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Assessment of Pet Store and Seafood Market Availability of Invasive Species in Minnesota

By Carolyn Dindorf, Katie Farber, and Chelsea Delaney
Fortin Consulting, Inc.

Prepared for the Minnesota Department of Natural Resources (DNR)
Principal Investigator: Chelsey Blanke, Minnesota DNR Invasive Species in Trade Specialist

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Contact information

Carolyn Dindorf
Fortin Consulting Inc., Vice President/Limnologist (now with Bolton & Menk, Inc.)
carolyn.dindorf@bolton-menk.com
612-220-4999

Chelsey Blanke
Minnesota DNR Invasive Species in Trade Specialist
chelsey.blanke@state.mn.us
651-259-5350

Heidi Wolf
Minnesota DNR Invasive Species Program Supervisor
heidi.wolf@state.mn.us
651-259-5152

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Assessment of Pet Store and Seafood Market Availability of Invasive Species in Minnesota

Executive Summary

Fortin Consulting, Inc. (FCI) was hired by the Minnesota Department of Natural Resources (DNR) to assess retail availability of invasive species and provide education on invasive species regulations, identification, and proper disposal. The research focused on visiting pet stores and seafood markets that sell aquatic and other live species. The purpose of this project was to provide a baseline understanding of the availability of invasive species at these retailers in Minnesota, as well as educational outreach to retailers.

Invasive species are defined as non-native species that cause or may cause environmental harm or harm to human health or threaten or may threaten natural resources or their use in the state. Along with several other trade pathways, the pet and seafood trades are some of the known pathways for invasive species. The Minnesota Department of Natural Resources classifies invasive species as prohibited or regulated. Prohibited invasive species are generally illegal to possess, import, purchase, sell, propagate, transport, or introduce. Regulated invasive species are generally illegal to introduced into a free-living state (and this also applies for most other non-native species, classified as “unlisted” non-native species). FCI primarily searched for these species during the assessment, as well as invasive species classified under other state and federal regulations.

Seventy-four inventory examinations occurred in 66 pet stores and seafood markets (57 pet stores and 9 seafood markets). The prohibited invasive species, Louisiana crayfish (*Procambarus clarkii*), was found in two different independently owned pet stores. All of the pet stores and one third of the seafood markets inspected carried Minnesota regulated invasive species. Ten different regulated species were found in pet stores and one regulated species was found in seafood markets. Additional evidence that other prohibited and regulated invasive species not observed at the time of inventory examination may be sold in these stores was also found (such as video postings on a store Facebook page, labels on aquariums and a photo on a fish tank at a seafood market, and discussions with store staff). One species identified by the Minnesota Department of Natural Resources as an early detection target, water lettuce (*Pistia stratiotes*), was found at two pet stores. Several non-native crayfish were being sold at five pet stores and were likely being sold in seafood markets although none were observed in-person during the inventory examinations. Several hitchhiker organisms (i.e., plants, snails, fish, or invertebrates attached to plants or received in the shipping container) were observed. None of these were known to be invasive species but two

were likely non-native crayfish which require a permit to import. The crayfish were tentatively identified using photographs as *Procambarus acutus* or *P. zonangulus*.

Information on invasive species laws, identification and disposal was offered to all the stores to help them identify and avoid selling prohibited species and prevent release into Minnesota waters. Several pet stores had managers and owners with a background in biology, environmental science, botany, or conservation. Many stated they had some knowledge, and some had substantial knowledge of invasive species issues. Most stores were happy to receive the materials and updated information on invasive species. A few stores provided the names of their suppliers; nine different suppliers were mentioned. There was one incident where a pet store manager became very defensive and somewhat belligerent when told there was a possible prohibited crayfish in their tanks. There was a language barrier in a few seafood markets in asking questions and providing information to store staff.

Many of the species found have been introduced to Minnesota lakes, ponds, wetlands, or streams and some have become invasive. The stores carry species of plants, invertebrates, and fish from all over the world. All the pet stores inspected, except for those carrying the prohibited species or potentially importing non-native crayfish, are thought to be complying with Minnesota invasive species laws. However, the legal regulated species may become a problem if accidently or intentionally released to Minnesota waters. It is also important to note that this report includes a snapshot of what was present in the store at the time of inventory examination or labeled species confirmed as being sold. The composition of species being sold often varied between the first and second visits to a single store, and for the seafood markets, shipments were sometimes dependent on the weather where the fish, crayfish and other species are raised or harvested. It is the store owner’s responsibility to make sure they are not selling prohibited species.

Ongoing inventory examination, education and connection with these businesses will help prevent the introduction of invasive species in Minnesota. Pet store owners can help by knowing which species present risk of being invasive, requesting scientific names from suppliers, providing invasive species information to customers, supporting rehoming of unwanted organisms, and maintaining connections with the DNR. The DNR can assist pet stores and prevent invasive species by working with suppliers; providing information to sellers and customers; assisting with species identification; sharing the retail assessment findings with sellers, other invasive species professionals, and the public; and conducting future inventory examinations. The DNR can assist seafood markets and prevent invasive species by providing educational information and conducting further inventory examinations that include translation in various languages.

Introduction

Fortin Consulting, Inc. (FCI) was hired by the Minnesota Department of Natural Resources (DNR) to assess the availability of invasive species in retail pet stores and seafood markets. Invasive species are defined as non-native species that cause or may cause environmental harm or harm to human health or threaten or may threaten natural resources or their use in the state. Along with several other trade pathways, Minnesota residents can purchase invasive species through the pet and seafood trades. Hundreds of species of plants, invertebrates, and fish from all over the world are sold through these businesses, which have historically led to accidental or intentional invasive species introductions.

The Minnesota Department of Natural Resources (DNR) classifies invasive species as prohibited or regulated. Prohibited invasive species are generally illegal to possess, import, purchase, sell, propagate, transport, or introduce. Regulated invasive species are generally illegal to introduced into a free-living state (and this also applies for most other non-native species, classified as “unlisted” non-native species). FCI primarily searched for these species during the assessment, as well as invasive species classified under other state and federal regulations. Minnesota has additional regulations for crayfish: Live crayfish or crayfish eggs may not be imported without a permit issued by the DNR. Live crayfish can only be sold for aquarium use if the species cannot survive in Minnesota if released.

The purpose of this project was to provide a baseline understanding of the availability of invasive species at these retailers in Minnesota, as well as educational outreach to retailers. This is the first nearly statewide study of live organisms sold in pet stores and seafood markets in Minnesota. The results of the study will inform future work of the DNR as it evaluates program and funding needs for invasive species prevention and management.

Methods

Determination of study focus. While several other industries also involve trade in live organisms and have historically led to invasive species introductions, pet stores and seafood markets were chosen for assessment in this study because there were manageable numbers of these retailers to visit in Minnesota. These are also industries for which invasive species regulations and enforcement by the state are currently relatively limited. The study is one of several trade pathways prevention and research efforts by the DNR conducted from 2019-2021. More information can be found at the DNR’s trade pathways for invasive species website.

Store identification. The DNR provided a list of pet stores and live seafood markets, incorporating additional stores recommended by FCI. The list encompassed all known pet stores and seafood markets thought to carry live organisms in Minnesota. FCI was conducting a similar project for Hennepin County around the same time as the DNR

study, so twenty stores in Hennepin County were removed from the list[1]. This larger list was narrowed down to 57 pet stores and nine seafood markets after calling each to confirm if they were open and carried live organisms. Pet stores were asked if they sold fish, invertebrates or live plants and animals. Seafood stores were asked if they carried live crab, fish, or crayfish.

Target species selection and preparation for identification. The DNR specified which species to search for during the assessment. These included prohibited and regulated invasive species[2] and proposed prohibited invasive species, non-native crayfish, Minnesota noxious weeds[3], federal noxious weeds[4], federally listed injurious wildlife[5], and some plant species on a DNR "Early Detection Targets" list[6] (Appendix A). Minnesota prohibited, proposed prohibited, and regulated invasive species, early detection species, and non-native crayfish were prioritized because of the large number of invasive species to search for. DNR staff prepared an identification guide for these priority species to assist FCI staff with the assessment. FCI staff reviewed the DNR identification guide, plant and animal identification keys and information for any unfamiliar species. Many of the aquatic species were plants and fish, but also included snails, crayfish, and a turtle species. Some non-aquatic species were also on the list such as the European rabbit, some birds, and mammals, most of which were thought unlikely to be found in the pet stores or seafood markets.

Many target species have multiple common names, which can complicate inventory examination in stores. FCI did a search for common names and prepared a list of common names with their scientific names for the prohibited and proposed prohibited species (Appendix B). This helped in the search for prohibited species.

Organisms sometimes needed to be purchased for further identification. Because some of these species may have been prohibited to possess in Minnesota, a Minnesota DNR Prohibited Invasive Species Permit was obtained to allow FCI staff to possess prohibited invasive species purchased for further identification.

Inventory examination process. Initial inventory examinations were conducted anonymously, without FCI staff explaining what they were doing (as directed by DNR to avoid affecting assessment findings; though see related note on page 23). During the inventory examination, FCI staff walked throughout the stores and checked the tanks or other containers to identify any targeted species. In addition to species present, we recorded information on how plants and animals were stored, species labeling,

[1] Contact FCI (carolyn@fortinconsulting.com) or Hennepin County (tony.brough@hennepin.us) for a report on results from the Hennepin County project.
[2] Minnesota Invasive Species Laws (including lists of prohibited and regulated invasive species)
[3] Minnesota Noxious Weeds
[4] Federal Noxious Weeds
[5] Federally-listed Injurious Wildlife
[6] Minnesota Early Detection Target Species

hitchhiker and moss ball[7] presence, and if any invasive species information was posted. If a listed species label was found but no live specimen was present, the store staff were asked if they carried it. If they did, it was recorded and included on the lists of invasive species sold but noted that it was not present at the time of inventory examination.

All invasive species found were recorded on a field sheet. A sample of any prohibited species or possible prohibited species was purchased for further identification and confirmation. Photographs of the tanks (pet stores) or produce (seafood markets) were taken at each store. FCI attempted to take photos of all freshwater tanks.

Outreach and education to store staff. Following the examination, FCI staff introduced themselves to the store manager, owner, or other staff if no manager was present and briefly explained the DNR research study purpose and discussed the findings. Store staff were told that FCI was not providing the names of the stores with the inspection results so the DNR would not be able to identify individual stores; the DNR instructed that FCI disassociate the findings from individual stores because the project was designed as a study providing a snapshot of invasive species availability in retail stores that would not be used for enforcement purposes. Store email addresses were obtained from those willing to share them for future communications from the DNR. Managers were asked who their suppliers were and if they would provide a purchasing list. They were also asked if they carried marimo moss balls.

The staff were offered the following invasive species educational handouts:

- Minnesota Invasive Species list – DNR (Appendix C)
- Invasive Species and Your Business - DNR handouts (Appendix D)
- Guidelines for disposal of invasive animals and plants – Hennepin County, modified with permission by the DNR (Appendix E)
- The business card of the DNR Invasive Species in Trade Specialist

If a prohibited or possible prohibited species was found, FCI staff discussed the rules regarding prohibited species and the potential harm to the environment. Store staff were asked to follow the disposal guidance provided. FCI staff asked the intent of the stores to follow guidance and not order or sell the prohibited species in the future. A summary of the conversation was recorded on the field sheet.

Any prohibited species found were reported to the DNR as soon as possible. Data provided to the DNR was by site number rather than store name and did not include any location information.

[7] In March 2021, the U.S. Geological Survey received a report of invasive zebra mussels (*Dreissena polymorpha*) contaminating aquarium moss balls, prompting a nationwide response. Shortly after the finding, the DNR invasive species program and U.S. Fish and Wildlife Service enforcement staff directly contacted all Minnesota pet stores to inform them of the concern and provide guidance on proper disposal of the moss balls.

Secondary verification. Several specimens received verification of taxonomic identity by additional experts. A sample of *Salvinia* plants found at a pet store was delivered to Miyeko Kimitch at the U.S. Department of Agriculture-Animal and Plant Health Inspection Service (USDA-APHIS) Minnesota field office for secondary verification. Suspected prohibited invasive crayfish were initially examined and photographed live and later were frozen. Upon closer examination using a dissecting microscope, those believed to be the prohibited invasive species, Louisiana crayfish (*Procambarus clarkii*), were confirmed to match the characteristics in the identification keys (there is limited availability of keys and identification information for some non-native crayfish species; many are from northern Mexico and the southern and southeastern U.S.). Photos were sent to Gary Montz, DNR research scientist and invertebrate expert, for species verification. The specimens believed to be Louisiana crayfish were tentatively confirmed by the DNR. The crayfish were later preserved in alcohol and shipped to William Budnick, an expert crayfish taxonomist at Michigan State University, for further identification.

Results

Pet Stores

All 57 pet stores visited carried either regulated or prohibited species (mean respective regulated and prohibited invasive species per store: 3.5 and 0.04; range 2–7 species; Tables 1a, 1b; Figures 1 and 2). One prohibited species, 11 regulated species, and one early detection target species were being sold. The sole prohibited species, Louisiana crayfish, was found at two pet stores (3.5%) located in the Twin Cities Metropolitan Area. Commonly sold regulated species included goldfish (*Carassius auratus*) at 56 stores (98.2%) and koi (*Cyprinus carpio*) at 55 stores (96.5%). Commonly sold regulated plants included Brazilian waterweed (*Egeria densa*) at 33 stores (57.9%) and water lilies (*Nymphaea* spp.) at 25 stores (43.9%). Red-eared sliders (*Trachemys scripta elegans*), a regulated turtle species, was found in 24 stores (42.1%). All other regulated species, including Carolina fanwort (*Cabomba caroliniana*), parrot's feather

(*Myriophyllum aquaticum*), water hyacinth (*Eichhornia crassipes*), rusty crayfish (*Orconectes rusticus*) and *Tilapia* spp. were found in four or fewer stores. One early detection target species, water lettuce (*Pistia stratiotes*) was found at four stores (7.0%).

Number and type of plant, fish, and invertebrate species and other species varied substantially from store to store. FCI did not attempt to identify all species but focused on searching for the listed species of concern for this project. However, a list of fish species with over 500 species or varieties was created from labels on the tanks (Appendix F).

Of the 57 stores surveyed, 39 of the stores were chain stores (Petsmart and Petco), four were franchises (Pet Supplies Plus), and 14 were independent. Thirty-two of the stores (56.1%) were in the seven county Twin Cities Metropolitan Area and 25 (43.9%) were in larger cities in greater Minnesota.

The two chain stores Petco and PetSmart generally carried a similar list of species and quite a few different species of both plants and fish. The plants were sold in packaging and in aquariums and often there was a plastic label in the plant or on the tanks. The chain stores had detailed premade labels on the aquariums, including the common name and scientific name and often a photo.

Pet Supplies Plus franchise stores sold a more limited number of species and had similar labeling to the chain stores on some tanks, but only common names on others. Both the chain and franchise stores appeared to have all species labeled in some way.

Inventory in the independent stores varied from just a few plants, fish, snails, or crayfish to a wide variety of plants, fish, reptiles, and invertebrates. Many plants, fish and invertebrates were in aquariums with multiple species. Aquariums had either species labels or handwritten common names on the glass. Not all plants, fish, and other species were labeled.


Skunk Botia $6.99
Regal Peacock $19.99(M) $9.99 (F) #3065


amacharis bunch
2.99
assorted loose plants
4.99
assorted potted plants
6.99
6.99

Table 1a. Prohibited, Regulated and Early Detection Fish, Crayfish and Turtle Species Observed in Pet Stores

Store Ownership	Louisiana crayfish (*Procambarus clarkii*; prohibited)	Goldfish (*Carassius auratus*; regulated)	Koi (*Cyprinus carpio*; regulated)	Rusty crayfish (*Orconectus rusticus*; regulated)	Tilapia (*Tilapia* species; regulated)	Red-eared slider turtle (*Trachemys scripta elegans*; regulated)
Percentage of stores carrying	3.5	98.2	96.5	1.8	1.8	42.1
Total no. detected	2	56	55	1	1	24
No. detected at independent stores	2	13	13	1	1	1
No. detected at franchise stores	0	4	4	0	0	0
No. detected at chain stores	0	39	38	0	0	23
Average availability across stores	0.04	0.98	0.96	0.02	0.02	0.42

Table 1b. Prohibited, Regulated and Early Detection Plant Species Observed in Pet Stores

Species and regulatory classification	Carolina fanwort (*Cabomba caroliniana*; regulated)	Water hyacinth (*Eichhornia crassipes*; regulated)	Brazilian waterweed (*Egeria densa*; regulated)	Parrot's feather (*Myriophyllum aquaticum*; regulated)	Non-native waterlilies (*Nymphaea* spp.; regulated)	Water lettuce (*Pistia stratiotes*; early detection)
Percentage of stores carrying	7.0	1.8	57.9	1.8	43.9	7.0
Total no. detected	4	1	33	1	25	4
No. detected at independent stores	4	1	6	1	1	4
No. detected at franchise stores	0	0	1	0	0	0
No. detected at chain stores	0	0	26	0	24	0
Average availability across stores	0.07	0.02	0.58	0.02	0.44	0.07

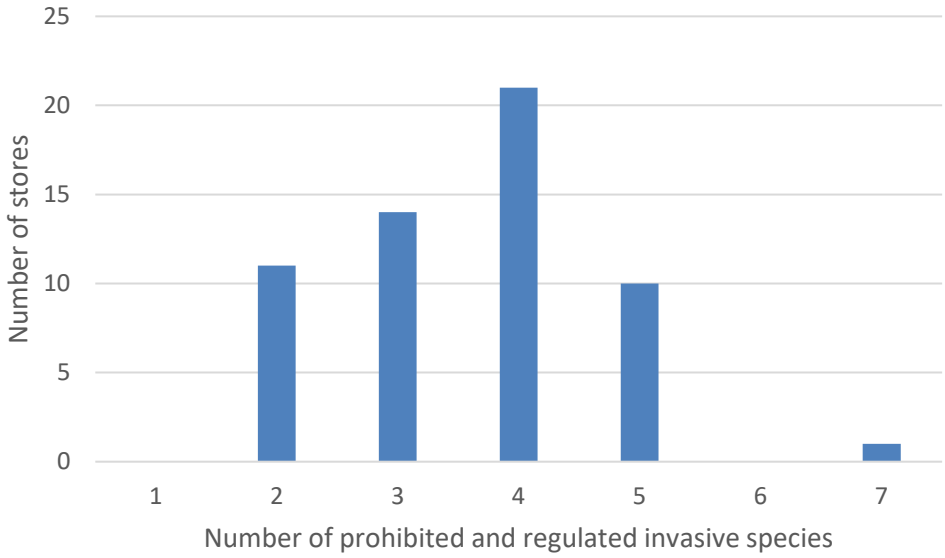

Figure 1. Prohibited and Regulated Invasive Species in Pet Stores - Number of stores with number of prohibited and regulated invasive species found in each store

More prohibited and regulated animals including crayfish, fish and turtles (mean: 2.4; range: 1–4 species per store) were carried in the stores than plants (mean: 1.1; range: 0–3 species per store).

Invasive species found in pet stores varied by store ownership with chain stores carrying the most (mean: 3.85; range: 2–5), followed by independently owned stores (mean 3.14; range 2–7), and franchise stores carrying the fewest regulated and prohibited invasive species (mean 2.25; range 2–3; Figure 2). The few prohibited species detected were carried only in the independently owned stores. If just regulated invasive species are included, the mean number of species for these stores drops to 3.0 and range to 2–6.

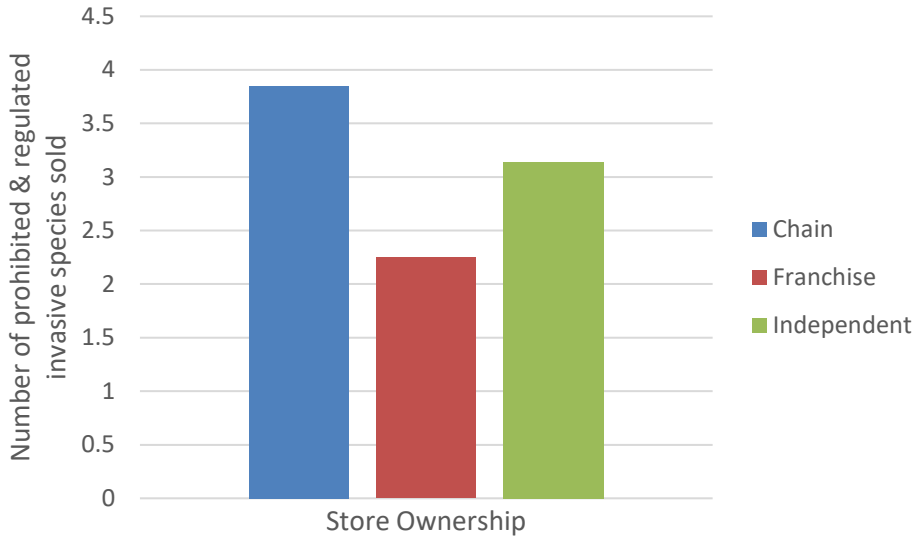

Figure 2. Mean Number of Prohibited and Regulated Invasive Species by Store Ownership

Prohibited Invasive Species

The prohibited species Louisiana crayfish (*Procambarus clarkii*) was found in two independently owned pet stores. One store had two color variations. It was also found in Hennepin County pet stores through a similar but separate 2021 study (not included in this report, see Methods). The DNR and many agencies list a common name of “red swamp crayfish” for this species. In the pet trade, this name is not used but many other common names are, including, tangerine crayfish, tangerine lobster, fireball crayfish, tricolor ghost crayfish, Louisiana crayfish, neon red crayfish, orange crayfish, snow white lobster, red lobster, scarlet crayfish, ghost crayfish, white specter crayfish, mudbug, red crayfish, black ghost, blue ghost, creamsicle crayfish, ivory crayfish, and vanilla crayfish. It is found in several varieties and colors in the pet trade that do not resemble the photographs commonly used for invasive species education (though the photographs used in educational materials do resemble the Louisiana crayfish used in cooking and dining).

Crayfish labeled "ivory crayfish", identified as *Procambarus clarkii*

Crayfish labeled "Red crayfish", likely *P. clarkii*

Crayfish labeled "Red crayfish", characteristics moderately consistent with *P. clarkii*

Non-native crayfish

Four stores carried other non-native but not prohibited crayfish. Three stores were selling electric blue crayfish (*Procambarus alleni*) and two were selling crayfish labeled either “red-brick yabby” or “red” but came up as “yabby” on receipt. The store selling the red-brick yabby had 13 of them in stock. Two additional stores stated they had been selling electric blue crayfish. One said the supplier stopped selling them and the other thought they were not allowed to sell them anymore. Two stores had non-native crayfish that were not being sold, rusty crayfish and two unknown crayfish, in their tanks that came in with a fish order. The two unknowns resembled but were confirmed not to be the proposed prohibited marbled crayfish (*P. virginalis or P. fallax forma virginalis*) by the DNR and Michigan State University experts (these were believed to be *P. acutus* or *P. zonangulus* but a specimen of the suspected marbled crayfish could not be obtained to confirm identity; *P. zonangulus* is not native to Minnesota, but it is unclear if *P. acutus* is native to Minnesota).

The two crayfish labeled as “yabby” were purchased for identification. They did not appear to be *Cherax destructor*, the prohibited invasive species. This was confirmed by DNR staff and Michigan State University. Michigan State University provided a report identifying the crayfish provided (Budnick, 2021; Table 2).

Table 2. Crayfish Identification - Michigan State University (MSU; Budnick, 2021)

Site #	Name listed at store	MSU Identification	MSU ID notes
30	Red Brick Yabby crayfish	*Cherax quadricarinatus*	characteristics majorly consistent
30	Red crayfish on tank, Yabby on receipt	*Cherax quadricarinatus*	characteristics majorly consistent
25	Red crayfish	*Procambarus clarkii*	characteristics moderately consistent
25	Ivory crayfish	*Procambarus clarkii*	characteristics consistent
13	Electric Blue crayfish	*Procambarus alleni*	characteristics consistent
13	Red crayfish	*Procambarus clarkii*	characteristics majorly consistent

It is also important to note the possibility that sellers communicated with each other about the study, influencing the results. As previously mentioned, FCI was conducting a similar project for Hennepin County around the same time as the DNR study. One retailer in Hennepin County was found to be selling the prohibited invasive Louisiana crayfish. Because this finding occurred as part of the Hennepin County project, rather than the DNR study that is the focus of this report, the DNR responded by verifying the species and interviewing and educating the retailer and supplier. DNR staff were transparent about the purpose and process of the DNR study. There is a possibility that the supplier notified their customers throughout Minnesota, either to protect them and/or prevent the spread of invasive species. In turn, this may have led retailers to compare their stocks with the list of prohibited invasive species and make adjustments prior to FCI’s visits.

Regulated Invasive Species

Regulated fish species found were documented on datasheets with their scientific name and the common name(s) on the label. Approximately 564 different fish species and varieties were found. There are duplicates in this count as some were only identified to the genus level, some to species level, and some to variety. Many of these had multiple common names (see Appendix F).

Red-eared slider turtle (*Trachemys scripta elegans*). Red-eared sliders are a popular pet turtle and were found in 24 stores (42.1%). All the turtles observed were stored in aquariums.

Red-eared slider (*Trachemys scripta elegans*)

Brazilian elodea or waterweed (*Egeria densa*). Brazilian waterweed is a very common submersed aquarium plant and is often sold under the common name “Anacharis” or sometimes “Elodea”. It was found in 33 stores (57.9%). It is stored in tanks weighted in bunches or sometimes floating in bunches.

Brazilian waterweed (*Egeria densa*)

Nymphaea species. *Nymphaea* species are water lilies, rooted floating-leaved plants. Twenty-five (43.9%) of the stores carried water lily bulbs, some packaged along with bulbs of additional aquatic species. They were found in plastic packaging or in boxes. Labels did not identify the lilies to the species level. It is not known how many different species or varieties of water lilies are being sold. While some *Nymphaea* species are native to Minnesota, non-native water lilies are classified as regulated invasive species.

Water lily (*Nymphaea* spp.) and other aquatic plant bulbs

Carolina fanwort (*Cabomba caroliniana*). Four stores (7.0%) carried green *Cabomba*. It is also found in a purple variety. Both the green and purple are varieties of *C. caroliniana*. Carolina fanwort was found only in independent pet stores. It is a rooted submersed plant with fan-like leaves arranged oppositely in whorls.

Carolina fanwort (*Cabomba caroliniana*)

Water hyacinth (*Eichhornia crassipes*). One store (1.8%) had a single water hyacinth plant mixed in with water lettuce. Water hyacinth is a non-rooted floating aquatic plant that has very long black roots and a beautiful purple flower. It has inflated petioles (stalks) which provide flotation.

Water hyacinth (*Eichhornia crassipes*)

Rusty crayfish (*Orconectes rusticus*). Rusty crayfish were observed in one store. Five crayfish were brought into the store from an individual that had caught them locally. Store staff reported that two crayfish had died and those remaining were not for sale. In a second visit to the store, no crayfish were observed, and it was reported that they had died.

Rusty crayfish (*Orconectes rusticus*)

Water lettuce (*Pistia stratiotes*). One early detection target species, water lettuce (*Pistia stratiotes*), was found. It was found in four of the pet stores inspected (7.0%). Water lettuce is a non-rooted floating-leaved plant. It has pubescent (hairy) thick leaves shaped in a rosette resembling lettuce leaves.

Water lettuce *(Pistia stratiotes)*

Other evidence of sale of prohibited and regulated invasive species

A few stores had signs on their tanks indicating they sold some prohibited invasive species, including weatherloach (*Misgurnus anguillicaudatus*) and Louisiana crayfish (*Procambarus clarkii*), but the species itself was not present. When this was mentioned to the store managers, most stated they were not selling them and removed the signs.

Several types of snails were found including snails labeled as “Mystery Snails” but were black or gold varieties and the shells were colored as indicated. These snails were labeled *Pomacea bridgesii.* The invasive mystery snails are different genera, *Viviparus* and *Cipangopaludina*. Other snails observed did not appear to be any on the invasive species list.

Two stores had fish tanks labeled with “*Perca*”, the genus name for perch species, but no species name was indicated. None of the fish in the tanks resembled the prohibited European perch (*Perca fluviatilis*). Rabbits were observed in one independent store, but they were not the prohibited invasive European rabbit species.

Aquarium moss balls

Many store managers were aware of the recent finding of zebra mussels contaminating aquarium moss balls and said they had been contacted by the DNR about the need to stop selling and destroy them. Many reported that the moss balls were removed, frozen

and disposed of. Several managers of one chain store reported that the stores were conducting system-wide cleaning to destroy any zebra mussels that could be present. They reported that this cleaning was to be completed in phases in stores across the state. Fish and aquatic plants were temporarily not for sale during this process. Signs about this cleaning process were found at two of stores of the same company.

Two stores had marimo moss balls in a display-only tank. At one store, FCI was told that one moss ball was locally grown and had been there for years. Staff said they were not selling aquarium moss balls and other moss balls that they had for sale were frozen and disposed of. The second store had one moss ball that had been in a home tank for a couple of years and was brought to the store for display about four months earlier but was not for sale. The moss ball was examined. No obvious zebra mussels were present.

During the store visits, no stores were observed to be selling marimo moss balls. However, a review of photographs taken during the examinations showed a moss ball in a tank with a price sign. FCI followed-up with a phone call to the store manager. The manager said it may have been left over from an order prior to the recall. They were not selling them at the time of the call, but it is possible the one observed was sold. Fourteen stores had tanks labeled with marimo moss balls, but none were in the tanks except for the two previously described, and one tank had the price tag removed. Java moss balls were observed at 5 stores.

Hitchhikers

Hitchhikers are unexpected species that come in unintentionally with shipments. Hitchhiker crayfish, snails, duckweeds, and common Salvinia (not the prohibited invasive *Salvinia* species) were observed in 18 stores. More stores reported that they receive hitchhikers, but the hitchhiking organisms may not have been present or observed at the time of FCI examination. Several stores reported that they occasionally to often receive crayfish as hitchhikers in orders. The crayfish come in with goldfish and feeder fish. One store manager said they once had a single order that had as many as 60 tiny crayfish in it. The stores manage these hitchhiker crayfish in different ways including removal, freezing, and disposal; giving them away to customers; giving them to employees; and/or selling them to a customer that feeds them to piranhas.

Photographs taken of two hitchhiker crayfish were sent to the DNR and experts in Michigan for identification (these were also described in the Non-native crayfish section). They were identified as *P. acutus* or the extremely similar *P. zonangulus*. Neither are classified as invasive species but there is concern that *P. zonangulus* may be invasive (Budnick, 2021). A live specimen was not collected because the crayfish was already given to a customer. However, FCI was able to contact this individual and get additional photos to help with identification.

Hitchhiker crayfish identified as *Procambarus acutus* or *P. zonangulus*

Snails are common hitchhikers in aquarium tanks, often coming in on live plants. Some stores reported that they try to remove hitchhiker snails once detected by treating water or by hand. One store indicated the snails were not a problem because they die from water changes. Several stores report that they feed hitchhiker snails to goldfish, cichlids, and assassin snails. Two stores said they may sell the hitchhiker snails. A few stores reported that they do not often get hitchhiker snails in their shipments. One manager reported that they don't receive many plants with snails on them but if they do, the whole bag is disposed of. Another said they mostly just leave them. A couple stores reported that the snails will not survive because they have some salt in the tanks.

One store reported they sometimes receive tadpoles in their feeder shipments.

Storage of Plants and Animals

All the fish and most plants were stored in aquarium tanks. Some plants were in pots within the tanks, some were floating at the top of the tanks, and some were unpotted but weighted down. Plants were also found on shelves either potted and in plastic containers, floating in water in a plastic container, or were sold as dry bulbs in plastic packaging or boxes. Turtles, crayfish, and snails were stored in aquarium tanks. All plants and animals seemed to be well contained with no risk of unintentional escape from stores.

Suppliers

A few stores provided the names of their suppliers (Table 3), but many did not want to provide the name, or the staff interviewed did not know who the suppliers were. Nine different suppliers were mentioned. One manager said they have over 25 suppliers but did not provide names. Apet was mentioned 25 times and is a supplier for the large chain stores.

Table 3. Pet Store Suppliers

Pet Supplier	Number of Stores
A & M Aquatics	1
Apet	25
Complete Aquatics	1
Gentry & Caterberry Fisheries, Inc.	2
Go Aquatics	5
North Star Aquatics	3
Private sellers	3
Segrest Farms	1
Viking Pet Center	1
5-D Tropical	5

Many stores stated they received shipments about once a week. One large store stated that they receive 25 shipments a week during the busy season (the seller did not explain when the busy season occurs).

Seafood Markets

An assessment of seafood stores was completed to determine if stores were selling live fish, crabs, crayfish, or other organisms for consumption that are classified as invasive species. All seafood markets were independently owned stores but three had more than one location. Seven of the stores (77.8%) were in the Twin Cities Metropolitan Area and two (22.2%) were in larger cities in greater Minnesota.

No prohibited species were observed during the store visits. Three of the stores carried live tilapia, a regulated invasive species (Table 4). Others carried tilapia in the coolers chopped up, or frozen. Based on postings on Facebook, signs at the stores, and phone calls to stores, three markets were thought to be carrying live crayfish, but samples could not be collected to determine what species they were selling.

- One market had a “crawfish” sign, but none were in stock and market staff did not know when they would be receiving them or what species they were.
- The second market posted videos of what appeared to be live Louisiana crayfish on their Facebook page several times in 2021. FCI called the store multiple times to determine when they would have them in stock. However, no samples were able to be collected to confirm identification of the crayfish despite two visits to the store.
- The DNR received information in mid-May that a third market may be importing live Louisiana crayfish and other crayfish. FCI staff called the store and were told that due to poor weather in the south, they would not receive the shipment of Louisiana crayfish until mid- to late-June. FCI called them several more times

and visited the store once, and no crayfish were observed. Confirmation of live crayfish was not received in any of the calls. In the last phone call, FCI was told that the market did not receive any shipments from Louisiana in 2021 but were expecting some from Minnesota. The species of crayfish was not provided. There is a possibility that some of these are rusty crayfish, which are legal to sell but are regulated invasive species.

Crayfish photos posted on Facebook page

One Asian market sold several species of fresh fish, crabs, eel, softshell turtle, and loaches. One tank labeled “loach” had a photo of what appears to be the prohibited invasive weatherloach (*Misgurnus anguillicaudatus*) posted on it. However, the tank was empty, so it was not possible to inspect a live specimen.

Photo of a weatherloach found on tank at seafood store

Table 4. Regulated Species Observed in Seafood Markets

Note: An x indicates a detection and a - indicates no detection.

Site #	Store Ownership	Store Type	Tilapia (*Tilapia* spp.; regulated)
8	Independent	Seafood	-
31	More than 1	Seafood	-
32	Independent	Seafood	x**
33	More than 1	Seafood	-
37	Independent	Seafood	-
50*	Independent	Seafood	-
56	Independent	Seafood	x
57	More than 1	Seafood	x
58	Independent	Seafood	-
Total Detected	Independent (some with more than 1 location)	Seafood	3

*Possible Louisiana crayfish observed in videos from store posted on Facebook

**Not in stock at time of inspection, but store sells

Store #8 sells live crayfish, but they were not in stock, and species was unknown

Store #31 was expecting to receive crayfish, but they were not in stock at the time of the visit or phone calls

There was a language barrier in a few stores in asking questions and providing information to store staff. It is not known which languages were being spoken by sellers. FCI tried to determine if live species were sold and to provide some educational information and materials. Several of the markets did not take the educational materials. None of the stores provided names of suppliers. The market staff FCI spoke with mostly did not know the suppliers or else they did not want to provide suppliers' names.

Storage of live fish and crayfish

Live fish were kept in tanks. The crayfish observed in the Facebook post were kept in open cardboard boxes that were quite full. They were not stored in water. There is the potential for escape of these crayfish, although it is not likely they would make it out the door and to a surface water.

Quality Control Checks

FCI staff reviewed the many photos taken at each store to make sure all species of concern were recorded. Some additional regulated or early detection species were found and recorded. It is important to note that this report includes a snapshot of what was present in the store at the time of inventory examination or labeled species confirmed as being sold. Ten percent (six pet stores and two seafood markets) were revisited to determine if different invasive species would be found. Only one store had the same number of invasive species on the second visit. Otherwise, each store had one to three more or fewer (±1–3) species found in the initial inventory examination (Table 5). This indicates either the stores had sold these species, new species came in,

or some were missed in the first or second examination. It is likely that species were sold, and new supplies were received. Shipments are received biweekly to up to 25 times per week at the stores, according to store staff.

Table 5. Quality Control Checks - Pet Stores - Invasive species detected at the first (V1) and second (V2) visits to pet stores (#) that received quality control checks

Note: An x indicates a detection and a - indicates no detection.

Common name	Scientific name	5 V1	5 V2	11 V1	11 V2	22 V1	22 V2	25 V1	25 V2	30 V1	30 V2	66 V1	66 V2
Goldfish	*Carassius auratus*	x	x	x	x	x	x	x	x	x	x	-	-
Koi	*Cyprinus carpio*	x	x	-	-	x	x	x	x	x	x	-	-
Non-native waterlilies	*Nymphaea spp.*	-	-	-	-	x	x	-	-	-	-	x	x
Brazilian waterweed	*Egeria densa*	-	x	-	-	-	x	-	x	x	-	x	x
Water lettuce	*Pistia stratiotes*	-	-	-	-	-	-	x	x	x	-	x	x
Carolina fanwort	*Cabomba caroliniana*	-	-	-	-	-	-	x	-	-	-	-	-
Red-eared slider	*Trachemys scripta elegans*	-	-	-	-	-	x	-	-	-	-	x	x
Rusty crayfish	*Orconectes rusticus*	-	-	-	-	-		x	-	-	-	x	-
Louisiana crayfish	*Procambarus clarkii*	-	-	-	-	-	-	x	-	-	-	-	-

For the seafood markets (Table 6), shipments were sometimes dependent on the weather where the fish, crayfish and other species are raised or harvested and staff did not always know when they would receive them. The markets indicated that the crayfish sell out quickly. It was difficult to time the inventory examination for when the live species were present.

Table 6. Quality Control Checks - Seafood Markets; Invasive species detected at the first (V1) and second (V2) visits to seafood markets (#) that received quality control checks

Note: An x indicates a detection and a - indicates no detection.

Common name	Scientific name	50 V1	50 V2	57 V1	57 V2
Tilapia	*Tilapia* spp.	-	-	x	-
Louisiana crayfish	*Procambarus clarkii**	-	-	-	-

*Possible *P. clarkii* sold at store 50 based on Facebook photos but not found at time of visits.

Presentation and Distribution of Educational Information & Materials

Invasive species education material was observed in several of the PetSmart stores. The materials observed were from the Habitatitude© program. A Habitatitude© brochure with the “Do not release” message was found in a rack with many brochures on fish and animal care. One store had Habitatitude© cards posted next to the tanks.

Two stores were identified as accepting rehomed pets. One had two aquariums with fish in them that were labeled “Adoption tanks”. The other noted on their website that they will rehome pets. Additional stores may also offer this, but the question was not asked.

A discussion on the inspection findings occurred and educational materials were offered to each store. Most stores were happy to receive the materials and updated information on invasive species. One store manager became defensive and difficult when it was pointed out that crayfish being sold were possibly invasive. Several stores had managers and owners with a background in biology, environmental science, botany, or conservation. Many had some knowledge, and some had substantial knowledge of invasive species issues. Some stated they would post the educational materials in the breakroom. Several store managers indicated they would change some behaviors when it was pointed out that some activities could cause potential introductions of invasive species. For example, two managers said they would quit selling crayfish after being made aware that some may be prohibited species. When it was pointed out that some labels on tanks were for the prohibited invasive species weatherloach (*Misgurnus anguillicaudatu*s), the labels were removed. FCI staff suggested that stores request scientific names along with common names so they can make comparisons to the invasive species lists and check for hitchhikers which could be invasive species and dispose of them.

Summaries of the conversations with store staff were noted on the field sheet. Below are some of the comments from store staff.

- Happy to receive the AIS information, “This is awesome. This will be really helpful”.
- “Happy to be up-to-date on invasive species”.
- Manager was "very happy that we were going out and educating people on AIS."
- One store owner commented that this was the first time someone has come into the store in 20 years (referring to someone checking on what was being sold).
- Manager knew about the Louisiana crayfish being a prohibited species. He had sold prohibited and proposed prohibited species before. He would be more aware of them and try not to sell them
- Surprised that some crayfish were on the prohibited species list
- “I had no idea these crayfish were prohibited”.
- “After talking, we will stop buying and selling crayfish”.
- In a follow-up phone call with a store manager, the manager stated he had decided not to support the sale of crayfish anymore after he learned some may be invasive.

- After being told crayfish hitchhikers could potentially be AIS, will stop selling them to customer and dispose of them.
- Hopes the DNR “can try to regulate turtles more” (manager was concerned about customers not planning for the size of adult turtles and presumably with how a customer might dispose of it if it becomes too large).
- Manager talks to customers about how fish and turtles grow. Doesn’t want them to be released into a pond.
- “We always make sure we look at the scientific names” when ordering fish and invertebrates.
- We will ask supplier to provide scientific names next time.
- Having pictures of the AIS when ordering fish would help a lot.
- A poster on AIS would be helpful so they could post it in the store.
- One said they are on the email list and get updates from the DNR.
- Tries to deter people from buying goldfish without the proper tank size.

Conclusions and Recommendations

Pet Stores

The assessment showed that pet stores are carrying prohibited, regulated, and early detection species. It is legal for them to carry the regulated and early detection species.

It was difficult to conduct the assessment due to the number of different species often found in a tank, with many of them moving. Aquariums may also have a lot of vegetation in them that the fish can hide in. Algae on the tank glass also limited visibility sometimes. A combination of looking at the species in the tanks as well as the labels was used to locate as many species as possible. FCI staff relied on photographs and identification information in keys and in the DNR-prepared information to identify the targeted invasive species. One problem that was found is that the prohibited or other invasive species may not always look like the commonly used photographs in educational materials or keys. Breeding has substantially changed the appearance of some species. This was very evident in the prohibited invasive species found, Louisiana crayfish. This species was more easily detected based on a list of common names assembled for this project, or in some cases, scientific names found on labels at the store. A closer look at distinguishing features was needed for positive identification.

Most of the inspections were conducted anonymously prior to speaking with a manager or other staff. In the smaller stores or when the store was not busy, it was harder to remain anonymous because FCI staff were often approached by store staff. It did not

seem to matter if the inspections were conducted anonymously or not, the data was gathered equally either way. It was not always possible to speak to a manager or owner, in which case the findings were discussed with store staff present. A few staff were as or more knowledgeable about species in the tanks than the manager. Many store employees were helpful in identifying species if asked.

Most of the store staff (managers, owners, and employees) were cooperative and interested in hearing about the project and invasive species education information. There was one incident where a manager became very defensive and somewhat belligerent when told there was a possible prohibited crayfish in their tanks. Some were leery of the project, did not believe it was just for research, and questioned if they would get into trouble. FCI staff explained that this was a research project to determine what was being sold and that the DNR was interested in helping them understand and comply with the laws as well as protect Minnesota waters and the environment.

Over 500 fish genera, species or varieties were observed. Many plants species were also observed. In a similar study completed for Hennepin County in 2015, one pet store clerk commented that they have access to about 800 species of plants that can be interchanged and sold as “assorted plants”.

One store carried six different species of turtles, including the regulated red-eared slider (Table 7). Some staff noted they spoke to customers about making sure they had tanks large enough for turtles, which can grow large, and telling them not to release them to the environment. There is concern from store managers that turtles could be released if they outgrow tanks. This concern also exists for goldfish and koi.

Table 7. Turtles Observed in Pet Stores

Common name	Scientific name
African side-neck turtle	*Pelusios spp.*
Chinese striped-neck turtle	*Mauremys sinensis*
Mississippi map turtle	*Graptemys pseudogeographica kohni*
Painted turtle	*Chrysemys picta spp.*
Red-eared slider	*Trachemys scripta elegans*
Reeves turtle	*Mauremys reevesii*

Some of the plants and animals found during the inventory examination have been reported in Minnesota lakes or rivers, including Louisiana crayfish, rusty crayfish, goldfish, Brazilian waterweed, water hyacinth and water lettuce. Other species may not survive Minnesota winters.

Discussions with store staff indicated that the DNR effort to contact pet stores about zebra mussels found in marimo moss balls was effective. Forty-seven of the stores stated they had been contacted and had removed and disposed of them, mostly by freezing first and then throwing them away. There were still a few stores that had them in tanks but stated they were not for sale or were locally grown (and presumably did not

contain zebra mussels). Several stores still had the moss ball labels on the tanks, but no moss balls were observed in the tanks.

Little to no information was posted in the stores about the danger of invasive species if released to the environment. The short invasive species education discussion had some positive results with some stores deciding not to sell crayfish. Many others were made aware of the issues and indicated they would be more careful in what they were ordering and selling. Managers often stated they would put the educational materials in the employee breakroom.

The prohibited species, weatherloach (*Misgurnus anguillicaudatus*), also known as gold dojo loach in pet stores, was found in pet stores during a 2017 study in Dakota and Hennepin counties (Fortin Consulting, 2017). It was reported to the DNR and the DNR contacted these pet stores about this finding and the need to remove them from stores and future sales. These efforts appear to have been successful. Weatherloach was not found during this study. However, a label on an aquarium listing the species was observed in two stores (not the same stores reported in 2017). Both stores confirmed they were not selling weatherloach and removed the label when it was discussed with store staff. One of the stores was part of the chain where weatherloach were previously found. It is concerning that the label was still present four years after the chain was notified by DNR enforcement to stop selling them.

FCI staff were able to see supplier lists from some suppliers. They generally include common names without scientific names. This makes it difficult for store owners and managers to know what they are ordering. FCI was told by some store managers that they rely on their suppliers to know what species are legal. One of the suppliers of the crayfish identified as Louisiana crayfish, a prohibited invasive species, told the store owner they were *Procambarus alleni* when he called to ask about them.

The assessment results were provided to the DNR without revealing retail store names and locations. Since there were findings of prohibited crayfish in several stores, it would be helpful to contact all stores, as well as known suppliers, regarding the finding and what to look for. Random future inspections may help to ensure that prohibited invasive crayfish are not being sold. A focus on periodically inspecting the suppliers may be the most efficient way of preventing prohibited species from getting into retail stores.

Store staff responses to the assessment

Most store managers, owners, and staff FCI spoke with were happy to receive the invasive species information and to hear more about the laws and concerns related to invasive species and some were glad to hear that this education of stores is occurring. The seafood market staff were less receptive to the information, in part due to a language barrier.

Recommendations for pet stores

Invasive species prevention practices for retail pet stores:

- Make sure the scientific name is included on all ordering lists from suppliers.

- Make sure the store has the most recent DNR list of prohibited invasive species and check supplier lists against the DNR list to avoid ordering prohibited species.
- Check orders for hitchhikers, small plants, snails, crayfish, or other species that are included with the orders. If the identity of these hitchhikers is unknown or they are invasive, they should be destroyed and properly disposed of. Consider providing feedback to suppliers about the concern of getting hitchhikers in orders and the potential that some could be invasive species.
- Stores could provide information to customers regarding invasive species and not releasing live organisms.
- If they are not already accepting returns of live plants and animals, consider offering this to customers to prevent them from being released or offer information about the Minnesota Aquarium Society's and others' unwanted fish and plant rehoming events.
- All stores should get on the DNR's mailing list so they can be contacted to receive future updates on invasive species.

Ideas for possible assistance from the DNR to pet stores and others to prevent selling of prohibited species and release of regulated species:

- Work with suppliers to identify and remove invasive species from sales, add scientific names to sales lists, and to remove hitchhikers as much as possible prior to shipping to retail stores.
- Provide periodic information to stores on invasive species, including updated regulations.
- Provide a list of common names of invasive species to watch out for when purchasing.
- Provide an invasive species photo guide to help pet stores avoid purchasing invasive species. This should include photos from the industry that show the different varieties. This could be an update of the Invasive Species and Your Business handout (Appendix D).
- Notify counties, watersheds and others about the retail assessment findings so they are aware of this potential invasive species pathway.
- Direct calls from DNR and USFWS staff to pet stores about the marimo moss ball recall was effective. This method could possibly be used for communicating future concerns or changes in laws. More work is needed to establish a list of email addresses for the stores.
- Conducting future inventory examinations would help ensure prohibited invasive species are not being sold and prevent future sales if some are being sold.

- Encourage county invasive species staff to conduct periodic inspections of pet stores and seafood markets. The photo guide mentioned above would be helpful for this along with the common names list.
- There is very little invasive species information provided to customers.
    - Provide an eye-catching but simple poster about invasive species for stores to post for customer education, possibly with the “do not release” message.
    - Provide educational materials free or at a low cost that businesses can hand out to customers to help educate customers on not releasing live species to the environment. These materials could also be used by county, watershed and other invasive species education programs.
    - Provide a list of talking points for store staff to tell customers when purchasing regulated or early detection species, or any species. Encourage store managers to train staff to talk to customers about invasive species.

Future research recommendations

- Researchers conducting the inventory assessments are likely not experts in all of the types of organisms that will be found. Many of these organisms are not from the United States and taxonomic keys may not be available. An invasive species photo guide with detailed descriptions and drawings of identifying features would be very helpful. This guide should include photos from the industry that show the different color variations, as well as common names used in the industries being assessed.
- Update lists of common names to include more invasive species.
- Have experts available that can help with identification of organisms.
- There are a lot of tiny snails that come in with orders, which are difficult to identify. Possibly collect some samples and have them identified by an expert in snail taxonomy.

Seafood Markets

No prohibited species were found at seafood markets during this study, however, the potential for prohibited species being carried was possible based on review of Facebook videos from one market, a photo posted on a tank, and reports provided to DNR staff. One regulated species, tilapia, was found. The live species are carried seasonally, dependent on weather in the area they are raised or harvested. It was difficult to time inspections to when the live specimens were at the stores. Additional inspections would be needed to determine if more species are being carried.

There was a language barrier with the Asian markets. FCI staff was not able to get contact information, find out what species they sell live, or discuss invasive species

concerns with all stores and many did not accept the educational materials. It is not known how aware the store staff are of invasive species concerns.

Recommendations for seafood markets

Ideas for possible assistance from the Minnesota DNR to seafood stores to prevent selling of prohibited species and release of regulated species:

- Provide a handout with photos on invasive species specific to this industry, translated to the language spoken by the market owners.
- Provide periodic information to stores on invasive species, including updated regulations. This information may need to be translated for some stores to be effective.

Future research recommendations

- Additional assessments would be helpful to more fully identify if the suspected invasive species identified in this study are being sold. Any future inspections should include a budget that accounts for the potential need for multiple visits and phone calls to make sure the organisms will be present at the time of the visit.
- Determine what language is used in the markets and have a staff person fluent in that language conduct the assessment or provide an interpreter if there is a need to speak to store staff.
- Have experts available that can help with identification of organisms.

Suggestions for assessing garden centers

Studies conducted in Hennepin County in 2015 and 2021 as well as a Dakota County study in 2017 showed that garden centers are also a potential source of aquatic invasive species. This Hennepin and Dakota county research included all garden centers that carried aquatic plants located in the two counties. A statewide study would be expensive due to the number of stores that exist. In order to assess the sale of aquatic invasive species it would need to be conducted when the plants are delivered to the stores, generally May to June. Many stores do not make a second order, so it is important to get there early before they sell out. It is possible that a project like this could be conducted by Minnesota Department of Agriculture nursery inspectors or Master Gardener or Minnesota Water Steward volunteers with oversight and training from a professional.

Conclusions

The Minnesota DNR is working to make connections with businesses in Minnesota to provide education on invasive species. Ongoing work is needed in this area. This research project was successful in identifying some invasive species sold in pet stores and seafood markets and making retail store staff more aware of invasive species, including highlighting that species retailers order from trusted suppliers may

unintentionally be invasive. It is the store owner's responsibility to make sure they are not selling prohibited species. Ongoing inventory examination, education and connection with these businesses will help prevent the introduction of invasive species in Minnesota.

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Appendix A. List of Invasive Species Primarily Searched for at Pet Stores and Seafood Markets

FCI staff primarily trained to search for the following prohibited invasive species, proposed prohibited species, regulated invasive species, early detection species, and non-native crayfishes. They also reviewed lists of and searched for state-listed noxious weeds, federally listed noxious weeds and injurious wildlife.

Scientific Name	Common Name	Regulatory Classification
Alopochen aegyptiacus	Egyptian goose	Regulated IS
Alosa pseudoharengus	alewife	Regulated IS
Amynthas and *Metaphire* spp.	jumping worms	Proposed prohibited IS
Azolla pinnata	mosquito fern, water velvet	Prohibited IS, federal noxious weed
Bithynia tentaculata	faucet snail	Prohibited IS
Butomus umbellatus	flowering rush	Prohibited IS
Bythotrephes longimanus	spiny waterflea	Regulated IS
Cabomba caroliniana	Carolina fanwort or fanwort	Regulated IS
Callitriche stagnalis	pond water-starwort	Early detection list
Carassius auratus	goldfish	Regulated IS
Carassius carassius	crucian carp	Prohibited IS, injurious wildlife
Carassius gibelio	Prussian carp	Prohibited IS, injurious wildlife
Caulerpa taxifolia	killer algae	Prohibited IS, federal noxious weed
Channa and *Parachanna* spp.	snakehead fishes	Proposed prohibited IS, injurious wildlife
Channa argus	northern snakehead fish	Prohibited IS, injurious wildlife
Cherax destructor	yabby	Prohibited IS, injurious wildlife
Cipangopaludina spp.	Chinese mystery snail, Japanese trap door snail	Regulated IS
Clariidae family	walking catfish	Proposed prohibited IS, injurious wildlife
Corbicula fluminea	golden freshwater clam	Proposed prohibited IS
Crassula helmsii	Australian stone crop	Prohibited IS
Ctenopharyngodon idella	grass carp	Prohibited IS
Cygnus olor	mute swan	Regulated IS
Cyprinus carpio	common carp, koi	Regulated IS
Dreissena bugensis	quagga mussel	Prohibited IS, injurious wildlife
Dreissena spp.	zebra mussel	Prohibited IS, injurious wildlife
Egeria densa	Brazilian waterweed	Regulated IS
Eichhornia azurea	anchored water hyacinth	Prohibited IS, federal noxious weed
Eichhornia crassipes	water hyacinth	Regulated IS
Eriocheir spp.	mitten crabs	Proposed prohibited IS, injurious wildlife
Gambusia affinis	western mosquitofish	Prohibited IS
Gambusia holbrooki	eastern mosquitofish	Proposed prohibited IS
Gymnocephalus cernuus	ruffe	Prohibited IS
Hydrilla verticillata	hydrilla	Prohibited IS, federal noxious weed
Hydrocharis morsus-ranae	European frog-bit	Prohibited IS

Scientific Name	Common Name	Regulatory Classification
Hygrophila polysperma	Indian swampweed, Miramar weed	Prohibited IS, federal noxious weed
Hypophthalmichthys harmandi	largescale silver carp	Prohibited IS, injurious wildlife
Hypophthalmichthys molitrix	silver carp	Prohibited IS, injurious wildlife
Hypophthalmichthys nobilis	bighead carp	Prohibited IS, injurious wildlife
Ipomoea aquatica	Chinese water spinach, swamp morning-glory	Regulated IS, federal noxious weed
Iris pseudacoris	yellow iris or yellow flag	Regulated IS
Lagarosiphon major	African oxygen weed	Prohibited IS, federal noxious weed
Lates niloticus	Nile perch	Proposed prohibited IS, injurious wildlife
Limnoperna fortunei	golden mussel	Proposed prohibited IS
Limnophila sessiliflora	ambulia	Prohibited IS, federal noxious weed
Lythrum salicaria, L. virgatum, or any variety, hybrid, or cultivar thereof	purple loosestrife	Prohibited IS, state prohibited noxious weed
Melaleuca quinquenervia	broad-leaved paperbark tree	Prohibited IS, federal noxious weed
Misgurnus anguillicaudatus	Oriental weatherfish	Prohibited IS
Monochoria hastata	ambulia, arrowleaf false pickerelweed	Prohibited IS, federal noxious weed
Monochoria vaginalis	heartshape false pickerelweed	Prohibited IS, federal noxious weed
Morone americana	white perch	Prohibited IS
Mycocastor coypu	nutria	Prohibited IS
Mylopharyngodon piceus	black carp	Prohibited IS, injurious wildlife
Myriophyllum aquaticum	parrot's feather	Regulated IS
Myriophyllum spicatum	Eurasian watermilfoil	Prohibited IS
Najas minor	brittle naiad	Prohibited IS
Neogobius melanostomus	round goby	Prohibited IS
Nitellopsis obtusa	starry stonewort	Prohibited IS
Non-native crayfishes (multiple species)	non-native crayfish	Require a permit to import
Nyctereutes procyonoides	Asian raccoon dog	Prohibited IS, injurious wildlife
Nymphaea spp.	non-native waterlilies	Regulated IS
Nymphoides peltata	yellow floating heart	Proposed prohibited IS
Orconectes rusticus	rusty crayfish	Regulated IS
Oreochromi, Sarotherodon, Tilapia spp.	tilapia	Regulated IS
Oryctolagus cuniculus	European rabbit	Prohibited IS, injurious wildlife
Osmerus mordax	rainbow smelt	Regulated IS
Ottelia alismoides	duck lettuce	Prohibited IS, federal noxious weed
Perca fluviatilis	European perch	Prohibited IS, injurious wildlife
Perccottus glenii	Amur sleeper	Prohibited IS, injurious wildlife
Petromyzon marinus	sea lamprey	Prohibited IS
Phasianus colchicus strachi	Sichuan pheasant	Regulated IS
Phoxinus phoxinus	Eurasian minnow	Prohibited IS
Phragmites australis subsp. *australis*	common reed, phragmites	Proposed prohibited IS, state prohibited noxious weed
Pistia stratiotes	water lettuce	Early detection list

Scientific Name	Common Name	Regulatory Classification
Potamogeton crispus	curly-leaf pondweed	Prohibited IS
Potamopyrgus antipodarum	New Zealand mud snail	Prohibited IS
Procambarus clarkii	red swamp crayfish	Prohibited IS
Procambarus virginalis or *P. fallax forma virginalis*	marmorkreb or marbled crayfish	Proposed prohibited IS
Proterorhinus marmoratus	tubenose goby	Prohibited IS
Proterorhinus spp.	tubenose gobies	Proposed prohibited IS
Pseudorasbora parva	stone moroko	Prohibited IS, injurious wildlife
Rutilus rutilus	roach	Prohibited IS, injurious wildlife
Sagittaria sagittifolia	arrowhead	Prohibited IS, federal noxious weed
Salvinia molesta, S. auriculata, S. biloba, S. herzogii	giant salvinia, aquarium watermoss	Prohibited IS, federal noxious weed
Scardinius erythrophthalmus	rudd	Prohibited IS
Siluris glanis	wels catfish	Prohibited IS, injurious wildlife
Solanum tampicense	wetland nightshade	Prohibited IS, federal noxious weed
Sparganium erectum	exotic bur-reed	Prohibited IS, federal noxious weed
Stizostedion lucioperca	zander	Prohibited IS, injurious wildlife
Stratiotes aloides	water aloe or water soldiers	Prohibited IS
Sus scrofa scrofa	European wild boar	Prohibited IS
Tinca tinca	tench	Proposed prohibited IS
Trachemys scripta elegans	red-eared slider	Regulated IS
Trapa natans	water chestnut	Prohibited IS
Viviparus georgianus	banded mystery snail	Regulated IS

Appendix B. Common Names of Prohibited Aquatic Invasive Species

Fish

Carassius carassius: crucian carp, English carp, gibele, golden carp, Prussian carp, Wild goldfish

Carassius gibelio: Prussian carp, Gibel carp, Golden carp

Channa argus: northern snakehead fish, Amur snakehead, eastern snakehead, ocellated snakehead, snakehead

Ctenopharyngodon Idella: grass carp, glass carp, white amur

Gambusia affinis: western mosquitofish, Gambusia, gambezi, topminnow

Gymnocephalus cernuus: ruffe, Eurasian ruffe, blacktail, pope, redfin darter, river ruffe, Acerina cernua

Hypophthalmichthys harmandi: largescale silver carp, largescale carp

Hypophthalmichthys molitrix: silver carp, Chinese carp

Hypophthalmichthys nobilis: bighead carp, big head

Misgurnus anguillicaudatus: Oriental weatherfish, amur mud loach, amur weatherfish, dojo, Japanese loach, Japanese weatherfish, Pond loach, weather loach, gold dojo loach

Morone americana: white perch, narrow-mouthed bass; sea perch; silver perch; wreckfish

Mylopharyngodon piceus: black carp, black amur, Black Chinese roach, Chinese roach, snail carp

Neogobius melanostomus: round goby, ginger goby, black spotted, goby, Caspian round goby,

Perca fluviatilis: European perch, Baars, perch, Reddie, Redfin perch, River perch

Perccottus glenii: Amur sleeper, Chinese sleeper, rotan

Petromyzon marinus: sea lamprey, lake lamprey

Phoxinus phoxinus: Eurasian minnow, common minnow, European minnow, Italian minnow, Zaisan minnow

Proterorhinus marmoratus: tubenose goby

Pseudorasbora parva: stone moroko, false rasbora, topmouth minnow, topmouth gudgeon

Rutilus rutilus: roach

Scardinius erythrophthalmus: rudd, pearl roach, redeye

Siluris glanis: Wels catfish, Sheatfish, Danube catfish, European catfish,

Stizostedion lucioperca: zander, pikeperch, European pike-perch, European walleye, perch-pike

Invertebrates

Bithynia tentaculate: faucet snail, mud Bithynia, common bithynia

Cherax destructor: yabby, common yabby, Blue Claw Fresh water, Blue Pearl

Dreissena bugensis: quagga mussel

Dreissena spp.: zebra mussel

Potamopyrgus antipodarum: New Zealand mud snail

Procambarus clarkii: red swamp crayfish, Tangerine crayfish, fireball crayfish, Tricolor ghost crayfish, Louisiana crayfish, neon red crayfish, orange crayfish, snow white lobster, red lobster, scarlet crayfish, ghost crayfish, white specter crayfish, mudbug, red crayfish, black ghost, blue ghost, creamsicle crayfish, vanilla crayfish

Non-native crayfish (permit required to import)

Cambarellus patzcuarensis: Mexican dwarf crayfish, Dwarf Mexican crayfish
Procambarus alleni: Electric Blue Crayfish, Electric blue Lobster, Blue Crayfish, Sapphire Crayfish, Florida Crayfish
Procambarus fallax f. virginalis or *P. virginalis*: marbled crayfish, marmorkreb, self-cloning crayfish

Proposed Prohibited Species

Amynthas & *Metaphire* spp: jumping worms, crazy worm, Japanese jumper
Clariidae family: walking catfish, clarias catfish, freshwater catfish
Corbicula fluminea: golden freshwater clam, Asiatic clam, golden clam, good luck clam
Eriocheir spp: mitten crabs, Chinese mitten crab, Shanghai hairy crab
Gambusia holbrooki: Eastern mosquitofish, gambies, plague minnow, top minnow, starling's perch
Lates niloticus: Nile perch, African snook, Victoria perch, Goliath perch, Giant lates
Limnoperna fortune: golden mussel
Tinca tinca: Tench, green trench, Doctor fish

Appendix C

Minnesota Invasive Species

The most current laws and list of species are posted at http://www.dnr.state.mn.us/invasives/laws.html. Note: This only includes species regulated by the Minnesota Department of Natural Resources. Visit the links on the other side of this page for more information.

PROHIBITED INVASIVE SPECIES

Certain invasive species that can threaten natural resources are prohibited in Minnesota. It is unlawful to possess, import, purchase, transport or introduce these species without a permit. Prohibited aquatic invasive species in Minnesota include the following, and any hybrids, cultivars, or varieties of the species listed below:

Aquatic Plants

- African elodea (*Lagarosiphon major*)^*
- aquarium watermoss or giant salvinia (*Salvinia molesta*)
- Australian stone crop (*Crassula helmsii*)
- brittle naiad (*Najas minor*)*
- curly-leaf pondweed (*Potamogeton crispus*)^
- Eurasian watermilfoil (*Myriophyllum spicatum*)^
- European frog-bit (*Hydrocharis morsus-ranae*)^
- flowering rush (*Butomus umbellatus*)^
- hydrilla (*Hydrilla verticillata*)^*
- Indian swampweed (*Hygrophila polysperma*)*
- purple loosestrife (*Lythrum salicaria*, *Lythrum virgatum*, or any variety, hybrid, or cultivar)^
- starry stonewort (*Nitellopsis obtusa*)
- water soldier (*Stratiotes aloides*)^*
- water chestnut (*Trapa natans*)^

Plus the aquatic plants listed in Code of Federal Regulations, title 7, section 360.200 (Noxious Weeds). Note: only the aquatic and wetland weeds are listed here. There are additional federal noxious weeds.

- arrowhead (*Sagittaria sagittifolia*)
- ambulia (*Limnophila sessiflora*)
- broadleaf paperbark tree (*Melaleuca quenquinervia*)
- burreed, exotic (*Sparganium erectum*)
- giant *Salvinia* (*Salvinia auriculata*, *S. biloba*, *S. herzogii* and *S. molesta*)^*
- killer algae *Caulerpa taxifolia* (Mediterranean strain)
- *Monochoria hastata* and *M. vaginalis*
- mosquito fern (*Azolla pinnata*)
- nightshade, wetland (*Solanum tampicense*)
- *Ottelia alismoides*
- water hyacinth, rooted (*Eichornia azurea*)

Fish

- Amur sleeper (*Perccottus glenii*)
- bighead carp (*Hypophthalmichthys nobilis*)†
- black carp (*Mylopharyngodon piceus*)
- crucian carp (Carassius carassius)†
- Eurasian minnow (*Phoxinus phoxinus*)^
- European perch (*Perca fluviatilis*)
- grass carp (*Ctenopharyngodon idella*)^†
- largescale silver carp (*Hypophthalmichthys harmandi*)
- northern snakehead fish (*Channa argus*)†
- Oriental weatherfish (*Misgurnus anguillicaudatus*)*
- Prussian carp (*Carassius gibelio*)
- roach (*Rutilus rutilus*)
- round goby (*Neogobius melanostomus*)
- rudd (*Scardinius erythrophthalmus*)
- ruffe (*Gymnocephalus cernuus*)
- sea lamprey (*Petromyzon marinus*)
- silver carp (*Hypophthalmichthys molitrix*)†
- stone moroko (*Pseudorasbora parva*)
- tubenose goby (*Proterorhinus marmoratus*)
- wels catfish (*Siluris glanis*)*†
- western mosquitofish (*Gambusia affinis*)^*
- white perch (*Morone americana*)†
- zander (*Stizostedion lucioperca*)†

Invertebrates

- faucet snail (*Bithynia tentaculata*)
- New Zealand mud snail (*Potamopyrgus antipodarum*)
- quagga mussel (*Dreissena bugensis*)
- red swamp crayfish (*Procambarus clarkii*)^*†
- yabby (*Cherax destructor*)*†
- zebra mussel (*Dreissena spp.*)*

REGULATED INVASIVE SPECIES

It is legal to possess, sell, buy, and transport regulated invasive species, but they and most other organisms may not be introduced into a free-living state, such as being released or planted in public waters.

Aquatic plants

- Brazilian waterweed (*Egeria densa*)
- Carolina fanwort or fanwort (*Cabomba caroliniana*)
- Chinese water spinach (*Ipomoea aquatica*)
- nonnative waterlilies (*Nymphaea spp.*)
- parrot's feather (*Myriophyllum aquaticum*)
- water hyacinth (*Eichhornia crassipes*)
- yellow iris or yellow flag (*Iris pseudacoris*)

Fish

- alewife (*Alosa pseudoharengus*)
- koi, common carp (*Cyprinus carpio*)
- goldfish (*Carassius auratus*)
- rainbow smelt (*Osmerus mordax*)
- tilapia (*Oneochromis, Sartheradon & Tilapia* spp.)

Invertebrates

- banded mystery snail (*Viviparus georgianus*)
- Chinese mystery snail, Japanese trap door snail (*Cipangopaludina spp.*)†
- rusty crayfish (*Orconectes rusticus*)
- spiny waterflea (*Bythotrephes longimanus*)

Reptiles

- red-eared slider turtle (*Trachemys scripta elegans*)

PROPOSED PROHIBITED SPECIES

These species are proposed for listing as Minnesota prohibited invasive species and some are federally regulated.

- common or giant reed grass, phragmites (*Phragmites australis subsp. Australis*)^
- yellow floating heart (*Nymphoides peltata*)
- Eastern mosquitofish (*Gambusia holbrooki*)^*
- golden freshwater clam (*Corbicula fluminea*)^*
- golden mussel (*Limnoperna fortunei*)
- jumping worms (*Amynthas* & *Metaphire* spp.)
- Nile perch (*Lates niloticus*)*†
- marmorkreb or marbled crayfish (*Procambarus virginalis* or *P. fallax forma virginalis*)*
- mitten crabs (*Eriocheir* spp.)†
- Tench (*Tinca tinca*)†
- tubenose goby (*Proterorhinus* spp.)
- snakehead fishes (*Channa* & *Parachanna* spp.)*†
- walking catfish (Clariidae family)*†

Early detection targets

These species are not regulated but have the potential to infest Minnesota surface waters if released.

- Asian clam (*Corbicula fluminea*)
- pond water starwort (*Callitriche stagnalis*)
- water lettuce (*Pistia stratiotes*)

Additional species are prohibited or regulated at the state and national levels including 1) non-native crayfish† 2) State-listed noxious weeds: www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list 3) Federally-listed noxious weeds: https://plants.usda.gov/java/noxious 4) Federally-listed injurious wildlife: https://www.fws.gov/injuriouswildlife/

* Species documented in the pet and aquarium trade
† Species documented in the seafood trade
^ Species documented in the horticulture trade

INVASIVE SPECIES AND YOUR BUSINESS

JOIN US IN PROTECTING MINNESOTA WATERS - SELL ONLY LOW-RISK SPECIES AND HELP TO PREVENT RELEASES AND ESCAPES

The invasive plants and animals pictured here have been documented in the seafood trade and are illegal to possess or sell in Minnesota without a permit. Invasive species are non-native species that present risks to Minnesota's fish, wildlife and plant communities, water quality and recreation or human health. Please note, this is not a complete list of species that are illegal to possess or sell.

Visit https://www.dnr.state.mn.us/invasives/restaurants-and-food-markets.html for a complete list.

DO NOT OFFER THESE SPECIES FOR SALE AT YOUR BUSINESS!

Silver carp
(*Hypophthalmichthys molitrix*)

Grass carp
(*Ctenopharyngodon idella*)

Non-native crayfish (*Procambarus clarkii*, *Cherax destructor*, etc.)

Bighead carp
(*Hypophthalmichthys nobilis*)

Mitten crab
(*Eriocheir sinensis*)*

DEPARTMENT OF NATURAL RESOURCES

*Mitten crabs are federally regulated species and are proposed state prohibited invasive species.

PHOTO CREDITS: Silver carp – U.S. Fish and Wildlife Service | Grass carp – U.S. Fish and Wildlife Survey | Non-native crayfish – Minnesota Aquatic Invasive Species Research Center
Bighead carp – U.S. Geological Survey | Mitten crab – "EriocheirSinensis1" by Christian Fischer, License: CC BY-SA 3.0, https://creativecommons.org/licenses/by-sa/3.0/

April 2021

DO NOT OFFER THESE SPECIES FOR SALE AT YOUR BUSINESS!

Visit https://www.dnr.state.mn.us/invasives/restaurants-and-food-markets.html for a complete list.

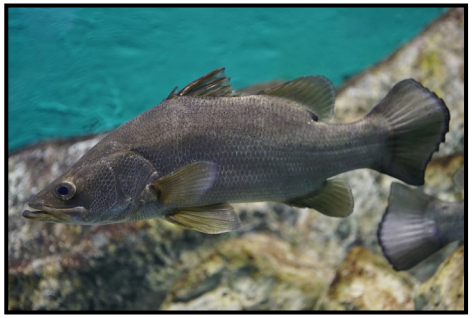
Snakehead fishes (*Channa* and *Parachanna* spp.)*

Crucian carp (*Carassius carassius*)

Wels catfish (*Silurus glanis*)

Walking catfish (*Clarias batrachus*)*

Nile perch (*Lates niloticus*)*



White perch (*Morone americana*)

Tench (*Tinca tinca*)*

*Snakehead fishes, Nile perch and tench are either federally regulated and/or proposed state prohibited invasive species. Northern snakehead (*Channa argus*) is already a state prohibited invasive species.

PHOTO CREDITS: Snakehead fishes – U.S. Fish and Wildlife Service | Crucian carp – "Карась звичайний, або карась золотий" by Володимир Дзюбак, License: CC BY-SA 4.0, https://creativecommons.org/licenses/by-sa/4.0/ | Wels catfish – "Wels / Catfish @ Fühlinger See" by Craebby Crabbson, License: CC BY-NC 2.0, https://creativecommons.org/licenses/by-nc/2.0/
Walking catfish – Zachary Randall, Florida Museum, UF 238365 | Nile perch – "Lates niloticus" by Daiju Azuma, License: CC BY-SA 4.0, https://creativecommons.org/licenses/by-sa/4.0/ |

April 2021

INVASIVE SPECIES AND YOUR BUSINESS

JOIN US IN PROTECTING MINNESOTA WATERS | SELL ONLY LOW-RISK SPECIES AND HELP TO PREVENT RELEASES AND ESCAPES

The invasive plants and animals pictured here have been documented in the pet and aquarium trades and are illegal to possess or sell in Minnesota. Invasive species are non-native species that present risks to Minnesota's fish, wildlife and plant communities, water quality and recreation or human health. Please note, this is not a complete list of species that are illegal to possess or sell.

DO NOT OFFER THESE SPECIES FOR SALE AT YOUR BUSINESS!

AQUATIC PLANTS ► Visit **dnr.state.mn.us/invasives/pet-and-aquarium-businesses.html** for a complete list.

Indian swampweed, dwarf hygrophila
(Hygrophila polysperma)

Giant salvinia
(Salvinia molesta)

Brittle naiad
(Najas minor)

Hydrilla
(Hydrilla verticillata)

Water soldier, water aloe
(Stratiotes aloides)

Please remind your customers not to release aquarium pets and plants into the wild!

Remember: It is illegal to release most non-native animals and plants into a free-living state in Minnesota.

DEPARTMENT OF NATURAL RESOURCES

Sea Grant Minnesota

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www.habitattitude.net

PHOTO CREDITS
Indian swampweed, dwarf hygrophila – U.S. Geological Survey
Giant salvinia – Vic Ramey, UF/IFAS Center for Aquatic and Invasive Plants
Brittle naiad – Mark Warman
Hydrilla – L. Gettys, UF/IFAS Center for Aquatic and Invasive Plants

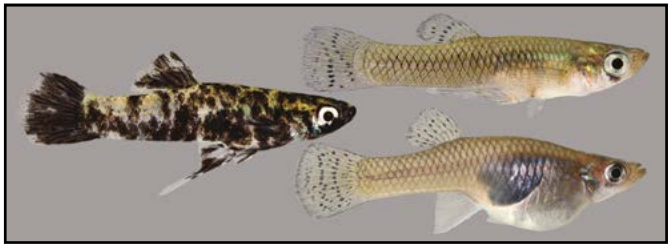
DO NOT OFFER THESE SPECIES FOR SALE AT YOUR BUSINESS!

FISH, CRAYFISH AND INVERTEBRATES ► Visit **dnr.state.mn.us/invasives/pet-and-aquarium-businesses.html** for a complete list.

Oriental weatherfish, pond loach, dojo loach
(Misgurnus anguillicaudataus)

Western mosquitofish
(Gambusia affinis)

*Eastern mosquitofish
(Gambusia holbrooki)



Stone moroko
(Pseudorasbora parva)

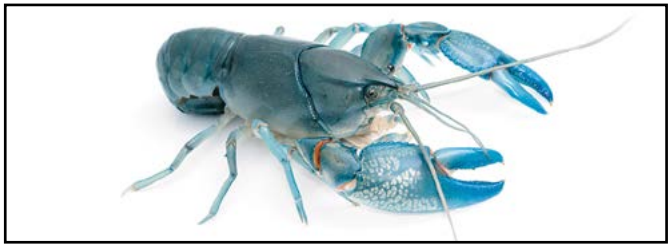
Northern snakehead
(Channa argus), **Channa* spp. and *Parachanna* spp.

*Nile perch, Victoria perch, African snook
(Lates niloticus)

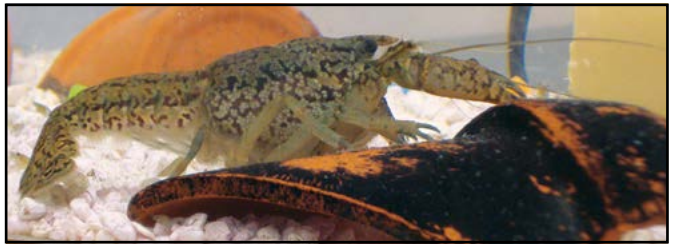
Wels catfish, sheatfish *(Silurus glanis)*

*Walking catfish *(Clarias batrachus)*

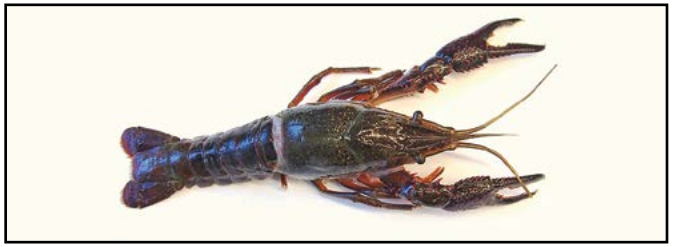
Yabby, yabbie *(Cherax destructor)*



*Marbled crayfish, marmokrebs *(Procambarus virginalis* or *Procambarus fallax* forma *virginalis)*



Red swamp crayfish, Louisiana crawfish
(Procambarus clarkii)



*Golden clam
(Corbicula fluminea)

*While eastern mosquitofish, snakehead fishes in addition to northern snakehead (*Channa* and *Parachanna* spp.), Nile perch/Victoria perch/African snook, walking catfish, marbled crayfish/marmokrebs and golden clam are not yet illegal to possess and sell, the Minnesota Department of Natural Resources is proposing to classify them as such.

PHOTO CREDITS
Oriental weatherfish, pond loach, dojo loach – Zachary Randall, Florida Museum, UF 236274 | **Western mosquitofish** – Brian Zimmerman
Eastern mosquitofish – Zachary Randall, Florida Museum, UF 238434, 235876, 238435 | **Northern snakehead** – U.S. Fish and Wildlife Service | **Nile perch, Victoria perch, African snook** – © Andrew Nightingale
Walking catfish – Zachary Randall, Florida Museum, UF 238365 | **Red swamp crayfish, Louisiana crawfish** – Minnesota Aquatic Invasive Species Research Center

Appendix E

Guidelines for disposal of invasive animals and plants

Photo Credit: Minnesota Aquatic Invasive Species Research Center

Aquatic Invasive Species (AIS) infestations can occur as a result of the release of invasive animals and plants. Introducing animals and plants into the environment in Minnesota can cause harm to our lakes, streams and wetlands.

DEPARTMENT OF NATURAL RESOURCES

Hennepin

Guidelines to help prevent the introduction and spread of AIS:

- **Filter** out plant fragments, snails, eggs or other small living species from tank water using a strainer or small mesh net before disposing of water down the drain.
- **Prevent** plants and plant parts, seeds, animals and tank or rinse water, from reaching storm drains.
- **Inspect and rinse** new aquatic plants over a sink with a strainer, to rid them of seeds, fragments, snails and fish.
- **Make sure** plants and animals cannot escape or are not released into the environment.
- **Provide information** to your customers on proper disposal of unwanted plants and **animals.**
- **Freeze** unwanted plants for 24 hours and then place in a sealed plastic bag in the trash. Composting of plants should be avoided, as seeds and fragments may still grow.
- **Follow guidelines** for humanely euthanizing prohibited invasive fish and other animals. Guidelines are available through the American Veterinary Medical Association. Disposal of live organisms should be considered as the last resort.

If you suspect you may have received a prohibited species in a shipment or a customer brings one in, please contact Chelsey Blanke (651-259-5350) or Heidi Wolf (651-259-5152) at the Minnesota Department of Natural Resources for additional instructions.

Find the current prohibited species list by searching: "MN DNR AIS laws" or directly at: www.dnr.state.mn.us/invasives/laws.html. Also be aware of state and federal noxious weeds, federally-listed injurious wildlife and permitting requirements for crayfish importation.

These guidelines were developed by Hennepin County and modified for statewide distribution by the Minnesota Department of Natural Resources.

Minnesota Department
of Natural Resources

info.dnr@state.mn.us
www.mndnr.gov/invasives

DEPARTMENT OF
NATURAL RESOURCES

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Hennepin

Appendix F. Fish Species and Aquarium Labels Observed in Pet Stores

Scientific Name	Common Name
Aborichthys elongatus	red tail squirrel loach
Acantopsis dialuzona	horseface loach
Acarichthys heckelii	Heckel's threadfin acara, Heckelii cichlid
Aequidens diadema "Rio Itaya"	royal acara
Agamyxis pectinifrons	spotted raphael catfish
Albino Dimidiochromis compressiceps	Albino Dimidiochromis compressiceps
Alestes	alestes tetras
Altolamprologus calvus	black calvus/ pearly lamprologus
Altolamprologus compressicep	gold head compressiceps, Red fin compressiceps
Amatitlania nigrofasciata	black convict, convict cichlid, convict, gold convict cichlid
Amatitlania siquia	Honduran red point
Amatitlania sp.	pearl Honduran red point
Ambastaia sidthimunki	dwarf "Sidthimunki" loach
Ambystoma mexicanum	axolotl
Ameiurus melas	black bullhead, bullhead
Amphilophus	blood red parrot cichlid
Amphilophus citrinellus	parrot jelly bean cichlid
Amphilophus citrinellus x Paraneetroplus synspilus	blood parrot, blood parrot cichlid, blue tiger blood parrot, parrot blood cichlid, platinum parrotfish, red parrot, snow white parrot, yuanbao cichlid
Amphilophus Festae	red terror
Amphilophus labiatus	red devil cichlid
Amphilophus lyonsi	Amphilophus lyonsi
Ancistrus brachyurus	butterfly pleco
Ancistrus cf. cirrhosus "Longfin"	longfin bushy
Ancistrus Cirrhosus	bristlenose pleco, bushynose pleco
Ancistrus dolichopterus	bristlenose plecostomus

Scientific Name	Common Name
Ancistrus sp	ancistrus rio Paraguay pleco, blue eye bristlenose pleco, bushynose pleco, brown bushynose, calico bushy pleco, chocolate bushynose pleco, lemon blue eye bushynose, longfin bristlenose pleco, lemon longfin bushynose, white spotted ancistrus pleco, yellow red eye pleco
Ancistrus sp. "Super Red"	super red ancistrus
Andinoacara pulcher	blue acara, electric blue acara
Andinoacara rivulatus	Aequidens rivulatus "Green Terror", green terror
Aphyocharax anisitsi	blood tetra, bloodfin glass tetra, bloodfin tetra
Apistogramma agassizii	Apistogramma agassizii fire red
Apistogramma borellii	apisto borelli
Apistogramma cacatuoides	Apistogramma cacatuoides, cacatuoides dwarf cichlid
Aplocheilus lineatus	gold wonder killifish, killie gold wonder
Aplocheilus panchax	panchax killie
Apteronotus albifrons	black ghost knife, ghost black knife, ghost knife
Apteronotus leptorhynchus	ghost brown knifefish
Archocentrus myrnae	Archocentrus myrnae
Archocentrus nigrofasciatus	pink convict
Ariopsis seemanni	columbian shark
Aristochromis christyi	Aristochromis christyi
Aspidoras spilotus	aspidorus "C125" spilotus cory
Aspredinidae	banjo catfish
Astatotilapia latifasciata	zebra obliquiden cichlid, Zebra Obliquidens
Asterophysus batrachus	gulper catfish
Astronotus ocellatus	long fish Oscar, Oscar, oscar tiger red cichlid
Auchenipterichthys thoracatus	driftwood cat
Auchenoglanis occidentalis	giraffe catfish, giraffe nose catfish
Aulonocara	aulonocara bi-color, aulonocara luanda
Aulonocara baenschi	regal peacock, sunshine peacock, yellow peacock cichlid
Aulonocara ethelwynnae	aulonocara ethelwynnae
Aulonocara jacobfreibergi	aulonocara eureka red fire fish peacock, lemon jacobfreibergi, otter point jake peacock, peacock cichlid, red jacobfreibergi, red peacock, red peacock cichlid
Aulonocara kandeense	aulonocara kandeense "blue orchid"

Scientific Name	Common Name
Aulonocara nyassae	peacock cichlid, peacock African cichlid
Aulonocara sp.	bicolor peacock, lemon jake peacock, Lwanda peacock, orangeblood peacock, red shoulder peacock
Aulonocara stuartgranti	aulorocara ngara, lethrinops "Red Cap", Ngara peacock, red sunburst peacock African cichlid
Aulonocara stuartgranti Maulana	Aulonocara stuartgranti "Maulana"
Aulonocara maisoni	aulonocara maison
Aulonocara sp. "Walteri".	aulorocara walteri
Aulonocara stuartgranti	aulonocara red shoulder
Aulonocara Stuartgranti Sp. Maleri	aulonocara maleri
Badis badis	badis badis
Balantiocheilos melanopterus	bala shark
Balitoridae	hillstream loach
Balitoropsis	lizard loach
Barbodes lateristriga	spanner barb
Barbodes semifasciolatus	gold barb, gold neon barb
Barbonymus altus	platinum tinfoil barb, red tail tinfoil barb, tinfoil redtail barb
Barbonymus schwanenfeldii	tin foil barb, tinfoil gold redtail barb
Barbus conchonius	rosy barb
Barbus fasciolatus	African banded barb
Barbus tetrazona	gold tiger barb, green tiger barb
Barilius bakeri	Barilius bakeri
Baryancistrus xanthellus	gold nugget pleco, gold nugget plecostomus,
Beaufortia kweichowensis	hillstream butterfly loach/pleco, Chinese butterfly loach
Bedotia geayi	Madagascar rainbow
Betta	betta
Betta persephone	persephone betta
Betta sp	binalatung betta sp
Betta splendens	betta, crowntail betta, glo betta, halfmoon betta
Betta anabantoides	giant betta
Biotodoma cupido	cupid cichlid

Scientific Name	Common Name
Boehlkea fredcochui	blue tetra
Boraras brigittae	Chili red rasbora
Boraras maculatus	Boraras maculatus, Boraras maculatus "Dwarf Rasbora"
Boraras urophthalmoides	exclamation point rasbora
Botia almorhae	botia yo yo loach, yo yo botia, yo yo loach, yoyo loach
Botia Histrionica	gold burmese loach
Botia splendida	Yasuhikotakia splendida botia
Botia striata	striata botia loach
Brachydanio rerio	long finned zebra danio
Brachydanio rerio 'frankei'	longfin leopard danio
Brachygobius	bumble bee goby
Brachygobius xanthozonus	bumblebee goby
Buccochromis heterotaenia	Buccochromis heterotaenia
Buccochromis rhoadesii	Buccochromis rhoadesii
Buccochromis spectabilis	Buccochromis spectabilis
Calophysus macropterus	vulture catfish
Carassius auratus	black moor, bubble eye, comet, Goldfish- fantail, oranda, telescope
Carinotetraodon travancoricus	dwarf pea puffer, pea puffer
Carnegiella strigata	marbled hatchetfish
Centrarchidae	sunfish
Centromochlus perugiae	honeycomb catfish
Centropyge vroliki	pearscale angel
Cephalopholis sonnerati	tomato victorian
Chaestoma milesi	rubber lip pleco
Chaetostoma milesi	rubberlip pleco
Chaetostoma sp. Aff	rubber nose pleco
Chalceus macrolepidotus	pink tail Chalceus
Champsochromis Caeruleus	Malawi Trout
Chitala blanci	royal clown knife
Chitala ornata	clown knifefish

Scientific Name	Common Name
Chlamydogobius	australian goby
Chromobotia macracanthus	clown loach, green tiger botia, tiger botia
Cichla kelberi	kelberi peacock bass
Cichla ocellaris	OB peacock, peacock bass, peacock fish, xiegu peacock bass
Cichla temensis	temensis peacock bass
Cichlasoma hybrid	Thailand flowerhorn
Cichlasoma salvini	salvini cichlid
Cichlasoma sp	cherry red flowerhorn
Cichlasoma trimaculatus x Cichlasoma festae	red dragon flowerhorn
Cichlidae	assorted cichlid
Cleithracara maronii	keyhole cichlid, key hole cichlid,
Colisa labiosa	sunset gourami, sunburst/thicklip gourami
Colisa lalia	Powder Blue Dwarf Gourami
Copadichromis boadzulu	Nyassachromis boadzulu
Copadichromis borleyi	kadango
Copadichromis quadrimaculatus	Copadichromis quadrimaculatus
Corydoras	albino catfish, albino cory, cory cats, cory green cafish, green cory, green cory cat, green laser cory, punctatus cory cat
Corydoras aeneus	aeneus corydora, albino corydora, green aeneus corydora, orange Venezuelan cory
Corydoras bilineatus	San Juan cory
Corydoras bondi	bondi cory
Corydoras delphax	delphax cory
Corydoras elegans	elegance cory, elegant cory
Corydoras imitator	corydoras imitator
Corydoras julii	juli cory, julii cory, juli corydora
Corydoras melanotaenia	green/gold cory cat
Corydoras metae	cory metae catfish
Corydoras nanus	corydora nanus
Corydoras paleatus	corydoras paleatus, paleatus corydora, pa oh corydorus
Corydoras panda	panda cory, panda corydoras
Corydoras punctatus	punctatus corydora

Scientific Name	Common Name
Corydoras pygmaeus	pygamy cory
Corydoras sp.	corydora kenci
Corydoras sterbai	sterbai cory
Corydoras venezuelanus	blue Venezuelan cory, Venezuelan cory
Crenicara	pike cichlid
Crenicichla cf. saxatilis	saxatilis pike cichlid
Crenicichla regani	dwarf remari pike
Crenicichla sp. 'Atabapo	red atabapo pike
Crinum natans	crinum natans
Crossocheilus oblongus	siamese algae eater
Crossocheilus reticulatus	silver flying fox
Ctenopoma acutirostre	leopard Ctenopoma
Cynotilapia sp. "Jalo"	Red Top Afra
Cyphotilapia frontosa	altoloamprologua compressiceps "Blue ikola", black widow frontosa, blue zaire frontosa, Burundi frontosa, frontosa, frountosa, Red frontosa, seven stripe frontosa
Cyprichromis leptosoma "Jumbo Speckleback Moba"	Cyprichromis speckleback
Cyprichromis leptosoma "Kerenge"	Cyprichromis leptosoma Kerenge
Cyprinus carpio	Common carp, koi
Cyrtocara moori	blue moorii hap, hap moorii
Danio albolineatus	pearl danio
Danio cf. "dangila"	Moustached danio
Danio choprai	glo danio
Danio erythromicron	erythromicron danio
Danio kerri	long fin danio
Danio kyathit	kyathit danio
Danio margaritatus	celestial pearl danio, galaxy rasbora
Danio rerio	cosmic blue glofish danio, electric green glofish danio, galactic purple glofish danio, glofish danio, gold zebra danio, green glofish danio, leopard danio, long-finned danio, orange glofish danio, red glofish danio, starfire red glofish danio, sunburst orange glofish danio, zebra danio, zebra gold lonfin danio, zebra tetras
Danio rerio `frankei	leopard long-fin danio, leopard long fin danio

Scientific Name	Common Name
Dasyatis margaritella	pearl stingray
Datnioides microlepis	Datnoid, Irian jaya tiger datnoid
Dawkinsia filamentosa	filamentosa barb, filamentosis barb
Desmopuntius pentazona johorensis	five banded pentazona barb
Devario aequipinnatus	giant danio, giant gold danio, giant gourami
Dianema longibarbis	porthole fish
Elacatinus	neon blue goby
Electrophorus electricus	electric eel
Enneacanthus gloriosus	bluespotted sunfish
Epalzeorhynchos bicolor	redtail black shark, redtail shark, red bala shark, red tail shark
Epalzeorhynchos frenatum	albino rainbow shark, galactic purple glofish shark, glo shark, green glofish shark, purple glofish shark, rainbow shark, white fin rainbow shark
Epalzeorhynchos kalopterus	flying fox
Epeizeorhynchis bicolor	red-tail black shark
Epipremnum aureum	gold aureum
Eretmodus cyanostictus	Eretmodus kipili orange
Erpetoichthys calabaricus	rope fish
Esox lucius	spot face pike
Etroplus maculatus	orange chromids
Exodon paradoxus	exodon "bucktoothed" tetra, paradoxus exodon
Farlowella	farlowella, farlowella catfish, fariowella pleco
Farlowella acus	whiptail, whiptail catfish, whiptail pleco
Fontitrygon margaritella	albino pearl stingray
Fossorochromis rostratus	Fossochromis rostratus
Garra	garra rufa alage eater
Garra flavatra	panda garra
Garra rufa	garden rufa algae eater, gara rufa, garra rufa algae eater
Gasteropelecidae	hatchetfish
Gasteropelecus sternicla	silver hatchet, silver hatchet fish
Gastromyzon punctulatus	Borneo sucker

Scientific Name	Common Name
Geophagus brasiliensis	pearl cichlid
Geophagus jurupari	Geophagus jurupari
Geophagus surinamensis	geophagus surinameros
Geophagus sveni	Geophagus sveni, glo sveni
Geophagus winemilleri	Geophagus winemilleri
Glossolepis dorityi	dorityi rainbow
Glossolepis incises	red iran rainbow
Glossolepis pseudoincisus	albino millenium rambosa, orange millinnium rainbow fish
Glossolepis wanamensis	emerald rainbow, emerald wanamensis rainbowfish
Glyptoperichthys gibbiceps	hi fin leopard gibbicep, marble sailfin pleco
Gnathonemus petersii	elephant nose
Gobioides broussonnetii	dragon goby
Gymnocorymbus socolofi	Gold Skirt Tetra
Gymnocorymbus ternetzi	black hifin/longfin tetra, black long-fin tetra, black skirt longfin tetra, black skirt tetra, black tetra, cosmic blue glofish tetra, electric green glofish tetra, galactic purple glofish tetra, glo tetra, starfire red glofish tetra, sunburst orange glofish tetra, tetra, white skirt hi-fin tetra, white skirt longfin tetra, white skirt tetra, white tetra
Gyrinocheilus aymonieri	algae eater, algae eater Chinese, Chinese algae eater, Chinese gold algae eater, gold algae eater, gold barb, gold Chinese algae eater, golden algae eater, ofocinelus algae eater
Haludaria fasciata	melon Indian barb
Hampala macrolepidota	hampala barb
Haplochromis	Kyoga flameback, Red fin borleyi
Haplochromis nyererei	Pundamilia nyererei red
Haplochromis phytophagus	Christmas fulu
Haplochromis sp.	flameback victorian
Haplochromis sp. "ruby green"	ruby green
Hasemania nana	silver-tip tetra, silver tip tetra, silver tipped tetra, silvertip tetra
Helostoma temminckii	kissing gourami, pink kissing gourami
Hemiancistrus guahiborum	orange seam pleco, Xingu orange seam pleco,
Hemiancistrus sp.	blue phantom pleco
Hemiancistrus subviridis	green phantom, green phantom pleco
Hemibagrus wyckioides	red tail Asian catfish

Scientific Name	Common Name
Hemichromis bimaculatus	jewel cichlid, jewel turquoise African cichlid, turquoise jewel
Hemidoras morrisi	hemidoras morrisi catfish
Hemigrammus	headlight taillight tetra
Hemigrammus bleheri,	golden rummynose tetra
Hemigrammus erythrozonus	glowlight tetra, glo lite tetra, glo tetra, glo-lite tetra
Hemigrammus Filamentosus	phoenix tetra
Hemigrammus ocellifer	head and taillight tetra, head & tail light tetra
Hemigrammus rhodostomus	rummynose tetra, rummy nose tetra
Hemigrammus rodwayi	gold tetra
Hemiodus gracilis	red tail hemiodus
Herichthys carpintis	electric blue Texas cichlid
Herichthys cyanoguttatus	green Texas cichlid, Texas cichlid
Heros cf. efasciatus	gold severum, severum gold cichlid
Heros rotkeil	orange shoulder severum
Heros severus	green heros severum, green severum, severum, severum green cichlid, severum gold cichlid
Heros sp.	red streak gold severum, red streak severum
Herotilapia multispinosa	rainbow cichlid
Heterandria formosa	heterandria formosa
Holacanthus bermudensis	blue angel
Hoplarchus psittacus	true parrot cichlid
Horabagrus Brachysoma	sun catfish
Hydrocynus goliath	goliath tiger fish
Hydrolycus scomberoides	Payara barracuda
Hypancistrus debilittera Armbruster	Colombian zebra pleco
Hypancistrus debilittera	Colombian zebra
Hypancistrus sp.	king tiger pleco
Hypancistrus zebra	zebra pleco
Hyphessobrycon amandae	ember tetra
Hyphessobrycon anisitsi	Buenos Aires tetra

Scientific Name	Common Name
Hyphessobrycon columbianus	Columbian red & blue tetra, Columbian tetra
Hyphessobrycon eques	neon serpae tetra, red minors, sepae tetra, serpae tetra
Hyphessobrycon erythrostigma	bleeding heart tetra
Hyphessobrycon flammeus	green fire tetra, orange von rio tetra, von rio tetra
Hyphessobrycon heliacus	kittly tetra
Hyphessobrycon herbertaxelrodi	black neon tetra, neon black tetra
Hyphessobrycon megalopterus	black phantom, black phantom tetra, phantom black tetra
Hyphessobrycon pulchripinnis	lemon tetra
Hyphessobrycon rosaceus	candy cane tetra, candycane tetra, rosy tetra, rosy white fin tetra
Hyphessobrycon rosaceus "HY511"	candy cane tetra
Hyphessobrycon sweglesi	phantom red tetra, red phantom tetra,
Hyphessobryon eques	serpae longfin/hi fin tetra, serpae neon tetra
Hypostomus laplatae	red fin hypostomus
Hypostomus plecostomus	common pelco, hypostomus pleco, load pleco, pleco, yellow pleco
Hypselecara temporalis	Hypselecara temporalis, temporalis cichlid
Ictiobus cyprinellus	buffalo fish
Inpaichthys kerri	blue emperor tetra
Iriatherina werneri	featherfin rainbow, treadfin rainbow, threadfin rainbow fish
Jordanella floridae	flag fish, flagfish, American flag fish, American flagfish
Julidochromis	julidochromis
Julidochromis marlieri	marlerii
Julidochromis ornatus	Julidochromis ornatus
Julidochromis regani	Julidochromis regani
Julidochromis transcriptus	julidrochromis transcriptus, Julidochromis transcriptus bemba, Julidochromis transcriptus "Gombi"
Kryptopterus vitreolus	ghost glass catfish, glass catfish, glass ghost catfish

Scientific Name	Common Name
Labidochromis caeruleus	electric yellow lab, lemon yelloe cichlid, lemon yellow African cichlid, yellow lab cichlid, yellow labidochromis
Labidochromis Chismulae	clown lab, Clown labidochromis, Poweder Blue Labidochromis
Labidochromis sp.	labidochromis sp "Hongi", lab hongi
Lamprologus meleagris	Lamprologus meleagris
Lamprologus ocellatus	gold ocellatus
Lamprologus ornatipinnis	Lamprologus ornatipinnis
Lasiancistrus sp. L178	red fin lasiancistrus pleco
Leiarius marmoratus	marble achara catfish
Leiocassis siamensis	Siamese Catfish
Lentipes ikeae	lentipes ikeae goby/blue belly goby
Lepidiolamprologus attenuatus	lepidiolamprologus attenvatus
Lepisosteidae	gar
Lepisosteus platyrhincus	florida gar
Lepomis machrochirus	bluegill
Lepomis marginatus	dollar sunfish
Lepomis megalotis	Longear sunfish
Leporacanthicus galaxias	vampire pleco
Leporinus friderici	friderici leporinus
Leporinus Granti	strawberry leporinus
Lichnochromis acuticeps	Lichnochromis acuticeps
Limia nigrofasciata	Humpback limia
Loricariidae	albino pleco
Luciocephalus aura	crocodile peppermint pike
Luciosoma spilopleura	apollo shark
Macrognathus aculeatus	lesser spiny eel
Macrognathus pancalus	yellow spiny eel
Macrognathus siamensis	peacock eel
Macrognathus zebrinus	zebra spiny eel
Macropodus opercularis	paradise gourami
Malapteruridae	electric catfish

Scientific Name	Common Name
Marosatherina ladigesi	Celebes rainbowfish
Mastacembelus armatus	tire track eel
Mastacembelus ellipsifer	ellipsifer eel
Maylandia callainos	zebra cobalt blue cichlid
Maylandia estherae	cherry red cichlid
Maylandia lombardoi	kennyi cichlid
Megalechis thoracata	albino hoplo catfish
Melanochromis	black cichlid
Melanochromis auratus	auratus, auratus cichlid, golden cichlid
Melanochromis cyaneorhabdos	maingano blue cichlid, maingano cichlid
Melanochromis johanni	Johanni
Melanochromis johannii	electric blue johanni, johanni electric blue cichlid, Mbuna
Melanochromis auratus	albino auratus
Melanotaenia boesemani	boesmanni rainbow, boesemani rainbow, boesemani rainbowfish, boesmani rainbow
Melanotaenia kamaka	kanaka rainbow
Melanotaenia lacustris	turquoise rainbow, turquoise rainbowfish
Melanotaenia maccullochi	malanotoenia moccullochi rainbow
Melanotaenia praecox	black neon rainbow, dwarf neon blue rainbowfish, dwarf neon rainbow
Melanotaenia splendida	deepwater creek rainbow
Melantaenia herbertaxelrodi	yellow rainbow fish
Mesonauta festivus	festivum cichlid
Mesonoemacheilus triangularis	zodiac loach
Metriaclima sp.	Metraclima sp. Daktari, metriaclima "zebra long pelvic"
Metriaclima sp. "mbweca"	Metriaclima Mbweca
Metynnis argenteus	silver dollar
Metynnis fasciatus	tiger silver dollar
Metynnis lippincottianus	spotted silver dollar
Microglanis iheringi	bumblee bee catfish, bumble bee catfish, bumblebee catfish

Scientific Name	Common Name
Microglanis iheringi Gomes	bumblee bee catfish
Micropterus salmoides	mouth bass
Mikrogeophagus altispinosus	Bolivian ram cichlid, ruby clown cichlid
Mikrogeophagus ramirezi	black ram, Blue ram, blue veil angel ram, electric blue ram, German blue, German ram, gold ram, golden balloon ram, ram cichlid
Mikrogeophagus ramirezi var	German gold ram cichlid, gold ram
Moenkhausia pittieri	diamond tetra
Moenkhausia sanctaefilomenae	red eye emperor tetra, red eyed tetra
Myleus schomburgkii	black bar silver dollar
Myliobatoidei	flower stingray
Myloplus rubripinnis	red hook metynnis
Mylossoma duriventre	spotted mylossoma
Myxocyprinus asiaticus	highfin banded loach
Nannacara adoketa	zebra acara
Nannostomus beckfordi	Golden pencilfish
Nannostomus beckfordi var. "Red"	red beckford pencilfish
Nannostomus eques	diptail pencilfish
Nannostomus mortenthaleri	Peruvian pencilfish, Peruvian red pencilfish, red arc pencil fish
Nanochromis transvestitus	Nanochromis transvestitus
Nematobrycon palmeri	emperor tetra
Neolamprologus brichardi	brichardi, neolamprolohus brichardi
Neolamprologus brichardi Albino	albino lamprologus brichardi
Neolamprologus buescheri	Neolamprologus buescheri
Neolamprologus cylindricus	Neolamprologus cylindricus
Neolamprologus helianthus	Neolamprologus helianthus "Mbita"
Neolamprologus leleupi	Neolamprologus leleupi
Neolamprologus multifasciatus	multifactus shell dweller, neolamprolohus multifasciatus

Scientific Name	Common Name
Neolamprologus pulcher	Daffodil cichlid
Neolamprologus sexfasciatus	Gold Sexfasciatus
Neolamprologus similis	Neolamprologus similis
Neolamprologus tretocephalus	Tretocephalus
Neomacheilus triangularis	batk loach
Nimbochromis livingstonii	livingstoni, nimbochronis livingstoni
Nimbochromis venustus	nimbochronis venustus, Venustus
Oliotius oligolepis	checkerboard barb
Oryzias	platinum medaka rice fish
Oryzias woworae	ricefish daisy blue killifish
Osteoglossidae	Arowanna, arowana
Osteoglossum bicirrhosum	silver arowana
Osteoglossum cf.	blue arowana
Osteoglossum Ferreirai	blue arowana
Otocinclus	Otocinclus, otocincus catfish, Otocinclus "dwarf sucker"
Otopharynx lithobates	yellow blaze lithobates
Panaqolus sp.	alenquer tiger pleco
Panaque bathyphilus	papa pleco
Panaque cochliodon	blue eye pleco
Panaque maccus	clown pleco
Panaque nigrolineatus	royal pleco, watermelon plecostomus
Panaque nigrolineatus laurafabianae	watermelon pleco
Panaque schaeferi	titanic pleco
Pangio kuhlii	khuli loach, kulii loach
Pantodon buchholzi	pantadon butterfly
Paracheirodon	albino tetras
Paracheirodon axelrodi	cardinal tetra
Paracheirodon innesi	green neon tetra, neon tetras

Scientific Name	Common Name
Paracheirodon simulans	green tetra, neon green tetra
Parachromis managuensis	jaguar cichlid
Parambassis ranga	glassfish tetra
Parancistrus auranbacus	chubby pleco
Parancistrus aurantiacus	chubby pleco
Paraneetroplus bulleri	Sarabia cichlid
Paraneetroplus synspilus	Gold Based Fader flowerhorn
Paratilapia polleni	Paratilapia polleni, paratilapia bleekeri
Parosphromenus linkei	Parosphromenus linkei/Moonspot Licorice Gourami
Peckoltia compta	leopard frog tetra
Peckoltia sabaji	para pleco, spotted tiger
Peckoltia vittata	candycane pleco
Pelvicachromis	kribonsis ocodated
Pelvicachromis pulcher	kribonsis, kribensis African cichlid
Perca	perch
Pethia conchonius	longfin rosy barb, rosy barb
Pethia nigrofasciata	black ruby barb
Pethia padamya	odessa barb
Petrotilapia tridentiger	Tridentiger
Petruichthys brevis	inle loach
Phenacogrammus interruptus	congo tetra
Phractocephalus hemioliopterus	red tailed catfish, red tail catfish
Pimelodus pictus	pictus catfish, pictus spot catfish, pimelodella catfish, pimelodella pietus cat
Pimephales promelas	rosy minnows, rosy red minnow
Placidochromis milomo	VC-10,Placidochromis milomo "VC"
Placidochromis phenochilus	phenochilus, placiaochromis "white lip" phenochilus
Placidochromis Phenochilus	placidochrom phenochilus "star sapphire"
Platydoras armatulus	raphael catfish, rafael spot/stripe catfish, raphael striped catfish, striped raphael catfish

Scientific Name	Common Name
plecostomus	Pleco
Plesiotrygon iwamae	plesiotrygon "antennna" stingray
Poecilia	molly
Poecilia sp.	dumbo purple mosaic
Poecilia latipinna	dalmation molly, sailfin molly
Poecilia latipinna var.	red leopard lyretail molly
Poecilia reticulata	Blue multicolor guppy, blue topaz guppy, dumbo ear tiger guppy, fancy guppy, guppy, halfback red rose guppy, metal galaxy, purple mosiac dumbo guppy, rose tail guppy, silverhead guppy, yellow lace king cobra guppy
Poecilia reticulata var. "Black Moscow"	black Moscow guppy
Poecilia reticulata var. "Blue Moscow"	Moscow blue guppy
Poecilia sphenops	balloon lyretial molly, balloon molly, black molly, creamsicle molly, gold dust molly, lyretail gold molly, lyretail molly, lyretail silver molly, molly, molly balloon, silver molly, sunset molly
Poecilia spp.	Sailfin molly- dalmation, Green Sailfin Molly
Poecilia wingei	black bar endler guppy, scarlet endlers, Tiger endler guppy
Polypteridae	bichir, palmos bichir
Polypterus	green bichir
Polypterus bichir	nile bichir
Polypterus bichir lapradei	Lapradei bichir
Polypterus delhezi	barred bichir, delhezi bichir
Polypterus ornatipinnis	Ornatipinnis bichir, ornate bichir
Polypterus Palmas Palmas	marbled bichir
Polypterus senegalus	albino senegal bichir, platinum sengenal bichir, senegal bichir, senegalus albino bichir, Senegalus bichir
Polypterus teugelsi	Teugelsi bichir
Pomacanthus maculosus	yellow head angelfish
Potamotrygon motoro	wild motoro stingray
Potamotrygon tigrina	tiger stingray
Prionobrama filigera	glass bloodfin tetra
Pristella maxillaris	gold pristella, gold pristella tetra, gold tetra, pristella gold tetra, pristella tetra, x-ray tetra

Scientific Name	Common Name
Protomelas similis	red empress
Protomelas sp. Steveni Taiwan	Taiwan reef
Protomelas taeniolatus	protomelas tangerine tiger
Protomelas sp	protomelas albono Taiwan reef
Protopterus annectens	African lungfish
Pseudacanthicus sp.	red fin sternella
Pseudochalceus kyburzi	kyburz tetra
Pseudocrenilabrus multicolor	pseudorenilabrus multicolor
Pseudoplatystoma fasciatum	tiger shovelnose catfish
Pseudosphromenus cupanus	paradise spiketail gourami
Pseudotropheus acei	white tail acei
Pseudotropheus elongatus	Pseudotropheus/Mbuna
Pseudotropheus livingstoni	Pseudotropheus Livingstoni
Pseudotropheus socolofi	powder blue socolofi, scoloffi, socolofi
Pseudotropheus sp.	acei, African cichlid
Pseudotropheus zebra	Albino zebra, Red zebra
Pterophyllum	angelfish, paraiba blue angel, pearlscale platinum angel
Pterophyllum altum	baby altum angel
Pterophyllum scalare	black angel, black angelfish, blue smokey pinoy angel, clown angelfish, platinum angel, platinum angelfish, red-black angelfish, veil angel
Pterophyllum sp	black marble angelfish, marble angelfish
Pterygoplichthys gibbiceps	albino pleco gibbiceps, albino sailfin plecostomus, gibbiceps leopard hifin pleco, leopard pleco, sailfin pleco
Pterygoplichthys joselimaianus	gold spot Plecostomus, yellow spotted para pleco
Pterygoplichthys scrophus	rhino pleco
Pundamilia nyererei	Nyererei crimson tide, crimson tide victorian
Puntigrus	black tiger barb
Puntigrus tetrazona	green tiger barb, tiger barb

Scientific Name	Common Name
Puntius amphibius	scarlet barb
Puntius conchonius	rosy barb/rosy neon barb, rosy red glass barb
Puntius rhomboocellatus	rhombo barb, snakeskin barb
Puntius tetrazona	cherry barb, galactic purple glofish barb, glo barbs, glo tiger barb, glofish orange longfin barb, long fin tiger barb, longfin tiger barb, starfire red glofish barb, tiger barb, tiger longfin barb
Puntius titteya	cherry barb, veiltail cherry barb
Pygocentrus nattereri	piranha, red bellied piranha
Rasbora	rasbora
Rasbora borapetensis	red tail rasbora
Rasbora einthovenii	brilliant rasbora
Rasbora trilineata	scissortail rasbora
Rhamphochromis esox	rhamphoschrimois tiger fish
Rineloricaria sp.	red lizard catfish
Rocio octofasciata	electric blue jack Dempsey, jack dempsey cichlid
Sahyadria denisonii	roseline shark
Sambucus racemosa	gold black lace
Sawbwa resplendens	asian rummy-nose tetra
Schilbe uranoscopus	glasscutter catfish
Sciaenochromis ahli	electric blue, electric blue cichlid, electric blue hap
Sciaenochromis fryeri	Electric blue alhi
Sciaenochromis fryeri "albino"	Albino hap ahli
Sciaenochromis ahli	iceberg ahli
Scleropages formosus	red dragon
Scleropages jardinii	jardini arowana
Scobiancistrus aureatus L014	sunshine pleco
Semaprochilodus insignis	flagtail prochilodus
Semaprochilodus taeniurus	flagtail prochilodus, red fin prochilodus
Serpenticobitis octozona	serpent loach
Serrasalmus	Manueli piranha
Sicyopus rubicundus	red lip goby

Scientific Name	Common Name
Sorubim lima	lima catfish
Sphaerichthys vaillanti	samurai gourami
Sternoptychinae	hatchet fish
Sturisoma panamense	royal whiptail
Symphysodon	discus
Symphysodon aequifasciatus	Blue face heckel discus, camera brown wild discus
Symphysodon discus Heckel	Heckel wild discus
Symphysodon sp	assorted discus, pigeon blood discus
Synodontis acanthomias	Synodontis acanthomias
Synodontis Angelicus	polka dot synodontis
Synodontis angelicus X eupterus	Synodontis angelicus X eupterus
Synodontis eupterus	eupterus synodontis cat, threadfin synodontis
Synodontis flavitaeniata	Synodontis Flavitaeniatus
Synodontis lucipinnis	lucipinnes synodontis
Synodontis multipunctatus	synodontis multipunctatus
Synodontis nigrita	gold nigrita synodontis, syno lace catfish
Synodontis nigriventris	upside down catfish
Synodontis ocellifer	Synodontis ocellifer
Synodontis Piedratus	Piedratus synodontis
synodontis sp.	synodontis sp.
Tambrapamei	arulius barb
Tanichthys albonubes	white cloud, white cloud longfin danio
Tateurndina ocellicauda	peacock goby, peacock gudgeon
Tetra Hyphessobrycon flammeus	von rio tetra
Tetradon palembangensi	dragon puffer
Tetraodon lineatus	Fahaka puffer
Tetraodon miurus	murus puffer, red murus puffer
Tetraodon schoutedeni	Schoutedeni puffer, spotted congo puffer
Thayeria boehlkei	penguin tetre
Thorichthys meeki	firemouth cichlid

Scientific Name	Common Name
Tilapia kottae	coptodon kottae
Tilapia spp	talapia
Tor sp	mahseer carp
Toxotes blythii	clouded archer
Trematocranus placodon	cape mcclear "Jacob"
Trichogaster	dwarf blood gourami, dwarf gourami, gourami
Trichogaster china	dwarf golden honey gourami, dwarf honey red gourami, red honey gourami
Trichogaster chuna	honey dwarf gourami
Trichogaster lalius	dwarf flame gourami, dwarf gourami, dwarf powder blue gourami, dwarf red fire gourami, dwarf red flame/blood gourami, dwarf turquoise gourami, poweder blue dwarf gourami
Trichogaster trichopterus	Platinum Gourami
Trichopodus leerii	pearl gourami
Trichopodus microlepis	moonlight gourami
Trichopodus pectoralis	snakeskin gourami
Trichopodus trichopterus	blue gourami, gold gourami, opaline gourami, upaline gourami
Trichopsis pumila	sparkling gourami
Trigonostigma espei	porkchop rasbora, pork chop rasbora
Trigonostigma hengeli	glowlight rasbora
Trigonostigma heteromorpha	harlequin rasbora, Rasbora heter
Tropheus duboisi	tropheus duboisi
Tropheus moorii	golden kiriza tropheus, naumbo red tropheus
Tropheus sp	Tropheus sp
Uaru amphiacanthoides	chocolate cichlid, urau cichlid
Vieja synspilus	flowerhorn, kamfa flowerhorn
Xenomystus nigri	African knife
Xenotoca doadrioi	Red tail goodeidae
Xenotoca eiseni	xenotoca eiseni
Xenotoca variata	Jeweled splitfin goodeidae
Xiphophorus	platty, platy, sword tail

Scientific Name	Common Name
Xiphophorus hellerii	black swordtail, green swordtail, marigold swordtail, neon swordtail, pineapple sword, red eye lyretail swordtail, red tuxedo swordtail, red wag swordtail, snake red/white swordtail, super red swordtail, tuxedo swordtail
Xiphophorus maculatus	blue coral platy, bumblebee platy, calico white platy, crystal platys, flag ship platy, green lantern platy, hifin platy, platy, plumetail, Red Mickey Mouse Platy, red platy, red wag platy, standard platy, sunburst neon mickey platy
Xiphophorus maculatus hybrid	plumetail platy, tiger comet platy
Xiphophorus variatus	redtail black variatus platy
Yasuhikotakia morleti	botia skunk loach, skunk botia
Zacco platypus	zacco platypus