



GLDIATR

Great Lakes Detector of Invasive Aquatics in Trade

GLDIATR Phase III

Coordinating Information and Action to Prevent Online Sales of Aquatic Invasive Species

Final Report

Prepared by
Great Lakes Commission

September 30, 2026



Introduction

Trade in live organisms presents a complex management challenge because it is a widespread activity with a diversity of suppliers and consumers. Management efforts are complicated further by the ability to buy and sell organisms over the Internet. The Great Lakes Commission (GLC), recognizing the need to address this pathway, received Great Lakes Restoration Initiative funding from U.S. Fish and Wildlife Service in 2023 to continue its work on the Great Lakes Detector of Invasive Aquatics in Trade (GLDIATR) project. The goals of Phase III of GLDIATR were to:

1. Collect and analyze information on how many and what types of aquatic invasive species (AIS) are available for sale on the internet
2. Send targeted outreach messages explaining Great Lakes state and provincial regulations to AIS sellers, providing recommendations to improve their sales listings, and record behavior change associated with our outreach campaign
3. Share listing information with state, provincial, and/or federal representatives

This information is important to invasive species managers across the region to help inform and target a variety of activities, including outreach and education, risk assessment, monitoring and surveillance, and enforcement.

This report provides a high-level summary of the work the GLC and the GLDIATR project's advisory committee have completed regarding tracking and responding to online AIS sales pages. Additional work completed under the project's grant objectives (such as hosting informational summits, creating outreach material, the creation of AquaSale, etc.) are not included in this report. For more information about the project, visit the project website at <https://www.glc.org/work/gldiatr>

Searching for priority species

The list of priority AIS to search for was created by the GLDIATR advisory committee and reflected taxa of high concern to the Great Lakes states and provinces (see [Appendix A](#) for full list of species). "High concern" was determined via a set of criteria that included: 1. the species is found in trade in the U.S./Canada, 2. the species is on a regulated or "watch" list for at least one Great Lakes jurisdiction, 3. the species poses an ecological risk to the region, 4. management agencies are willing to take action to introduction of the species. Prior to beginning our search, GLC staff created a database of Great Lakes state and provincial regulations governing the acquisition of the priority AIS. Most taxa were regulated in at least one state or province or federally in the US or Canada, but some were emerging species of concern such as waterwheel (*Aldrovanda vesiculosa*) that are not currently regulated in the Great Lakes. This database was used to determine which sellers may have been violating state, provincial, or federal regulations and required targeted outreach. Several different methods detailed below were used to find sales listings featuring priority AIS.

Web scraping methods

Web scraping, or the automated process of extracting public information from websites and converting it into structured data, was used to search for GLDIATR priority species being sold on the internet. The GLC contracted with the web scraping company ScrapeHero to search for 67 taxa using 142 search terms

(including common and scientific names; see [Appendix A](#) for full list of search terms) across independent websites using the Bing search engine and across the marketplace websites eBay, Amazon, Etsy, and Kijiji (a Canadian website similar to Craigslist where only results from Ontario were collected). The data is returned from the contractor in the form of one row per potential sales listing, and includes fields such as the product title, product description, price, product category (as determined by a marketplace site). The project began with a proof-of-concept search in November 2023 using only ten search terms and a limited number of potential listings returned (Figure 1). Following this, preliminary searches using limited search terms (n = 39) took place monthly from January to March 2024, and searches using the full set of 142 search terms took place during May and July 2024.

Following an in-depth review of marketplace Terms of Use policies in 2024, web scraping efforts were discontinued after determining all targeted marketplaces restricted web scraping on their platforms. To ensure compliance with marketplace terms and conditions, the project pivoted to alternative data acquisition methods.

Utilizing eBay's Application Programming Interface

Through direct conversation with eBay, the GLC staff were introduced to eBay's Application Programming Interface (API) program, specifically their [Browse API](#). An API simply provides a structured method for different software systems or applications to communicate and exchange data. This new approach provided the team with a compliant alternative for accessing marketplace data while supporting the project's continued data-collection objectives.

The eBay Browse API allows users to search the platform for products using certain keywords, filter by category, price, etc. This allowed the team the ability to seamlessly maintain the same effort in tracking the sale of AIS on eBay as was done when web scraping. To accomplish this, GLC staff developed a Python-based script to automate the data retrieval process from the Browse API. The script was designed to execute monthly pulls and was used from October 2025 to January 2026. Over the course of those four months staff searched for 65 taxa using 133 search terms (including both common and scientific names) in the product categories "Pet Supplies > Fish & Aquariums" and "Home & Garden > Yard, Garden & Outdoor Living" (see full list of search terms and product categories in [Appendix A](#)).

This effort resulted in a standardized process to check the eBay platform for our target AIS. This script has been made available on our "GLDIATR_DIY" GitHub repository for those interested in duplicating the process, while also being fully customizable for your own searching needs. Please contact us (gldiatr@glc.org) for access to the repository.

Verification of sales listings

Both web scraping and the eBay API returned potential sales listings that needed to be manually inspected for accuracy. Both search processes return thousands of unrelated products that partially matched a search term (e.g., searching for certain live plants may return listings for products made from parts of dead plants such as baskets). Due to the sheer amount of data, including one instance of over 25,000 listings returned a month, an automated process was first used to prioritize listings for manual inspection. In short, the process includes the following steps: 1. Remove duplicate listings. Duplicate listings within the same month usually resulted from separate searches for both common name and scientific name for the same species. 2. Search for actual or fuzzy-matched scientific names in the

product titles and product descriptions using the [Global Names Finder](#) API, 3. Rank the remaining results using text analysis, weighted lexicons, and other ranking methods to assign a ranking score that was used to prioritize results for manual inspection.

The ranking process included upweighting or downweighting results with certain keywords (e.g., upweighting results with words related to live plants or animals such as “leaves”, “aquarium”, “bred”, and downweighting results related to other consumer goods such as “postcard”, “collectible”, or “plastic”), downweighting celebrity names and Fortune 500 company names, upweighting standard and alternate common or scientific name matches (actual or fuzzy), and upweighting marketplace product categories such as “live plants” or “pet supplies.” After the priority list was assembled, the results were randomly split and assigned to four to five GLC staff members for manual inspection. Results were checked from highest to lowest priority score, with as many listings as could be checked by each staff member in eight hours per month. Sales listings with confirmed live AIS were considered “positive hits” in Figure 1.

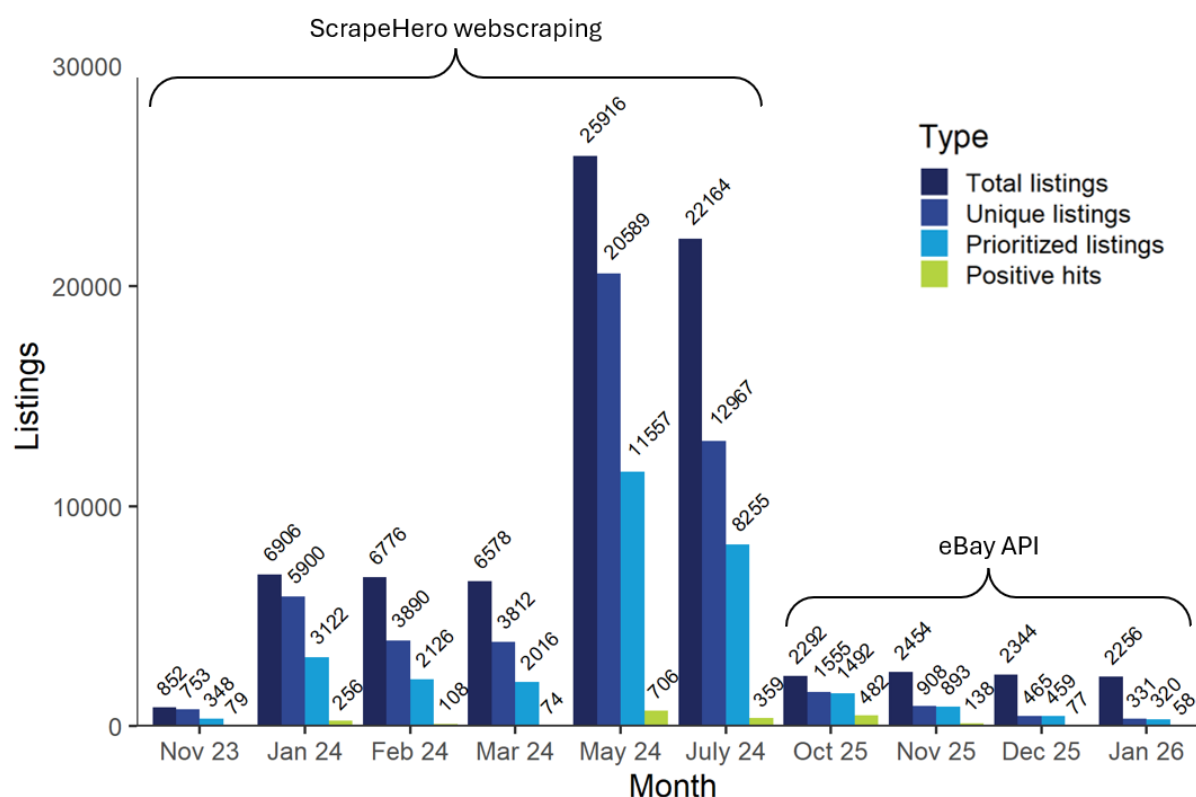


Figure 1. Total number of sales listings returned, that were unique, were prioritized, and were 'positive hits', or confirmed AIS sales listings for both web scraping performed by the contractor ScrapeHero and searches using the eBay API. "Month" is the abbreviated month and year the searches were conducted.

After AIS listings were confirmed, a “case” was added to a custom-built case management system for each seller that needed to be contacted. This allowed us to keep track of what was being sold and by whom, who we needed to contact, and keep track of behavior changes. To determine whether a seller needed to be contacted, we first checked to make sure they shipped their items to the U.S. or Canada, and if possible recorded for each species in each listing the following information to be used to check for behavior change after contacting them:

1. Do they list the species' scientific name?
2. Do they list accurate shipping restrictions for the Great Lakes region? (All shipping restrictions must be present for this to be true).
3. Do they have language that suggests proper disposal methods or tells sellers not to release?

If staff found additional GLDIATR priority species while looking at a seller's storefront, those listings were added manually to our cases separate from the standard search process. Listings for species restricted in the seller's jurisdiction were forwarded to the corresponding GLDIATR advisory committee representatives, while listings involving federally restricted species were referred to the appropriate federal authorities.

Results

In total, 78,538 potential sales listings were returned by our search methods, 51,170 of which were unique listings. Of these, 30,588 were prioritized for manual inspection, and 2,337 were found to be verified live AIS sales listings with shipping to the U.S. or Canada likely or confirmed. An additional 48 listings were found during manual inspection for a total of 2,383 AIS sales listings found in GLDIATR Phase III. Web scraping found that the majority of AIS sales listings were on eBay (Figure 2), which is why we focused on using the eBay API after the cessation of web scraping. Many fewer listings were found on Etsy (which only allows the sale of live plants, not animals), Amazon, independent websites found through Bing, Kijiji, and Mercari (which was not explicitly searched, but for which search results appeared in Bing).

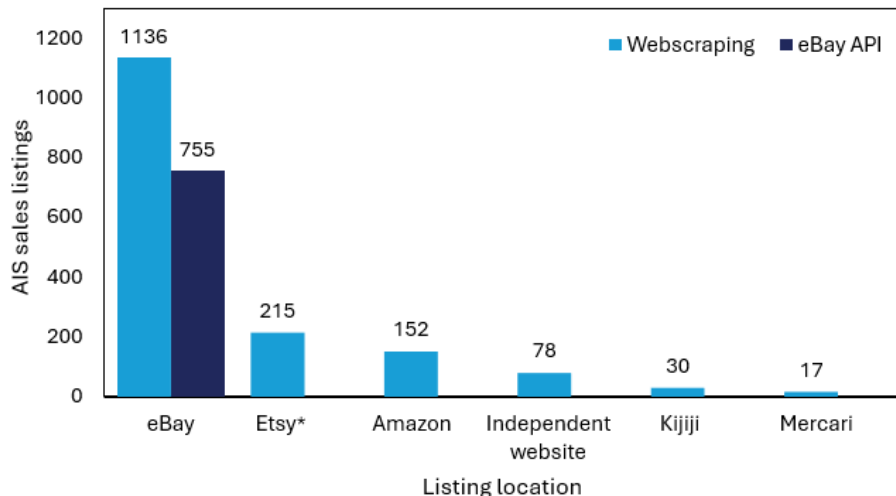


Figure 2. The number of sales listings per marketplace selling a GLDIATR priority species verified via web scraping and by the eBay API. *The marketplace Etsy only sells live plants and not live animals.

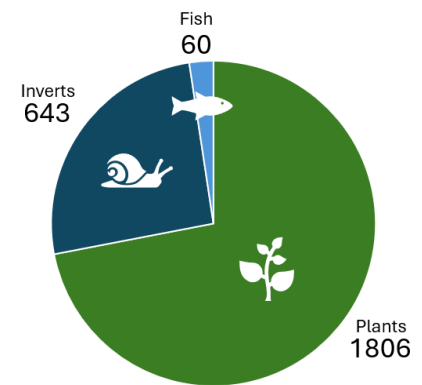


Figure 3. Numbers of confirmed AIS sales listings per taxonomic group. Note that totals add up to more than the total confirmed AIS listings because there can be multiple taxa per listing.

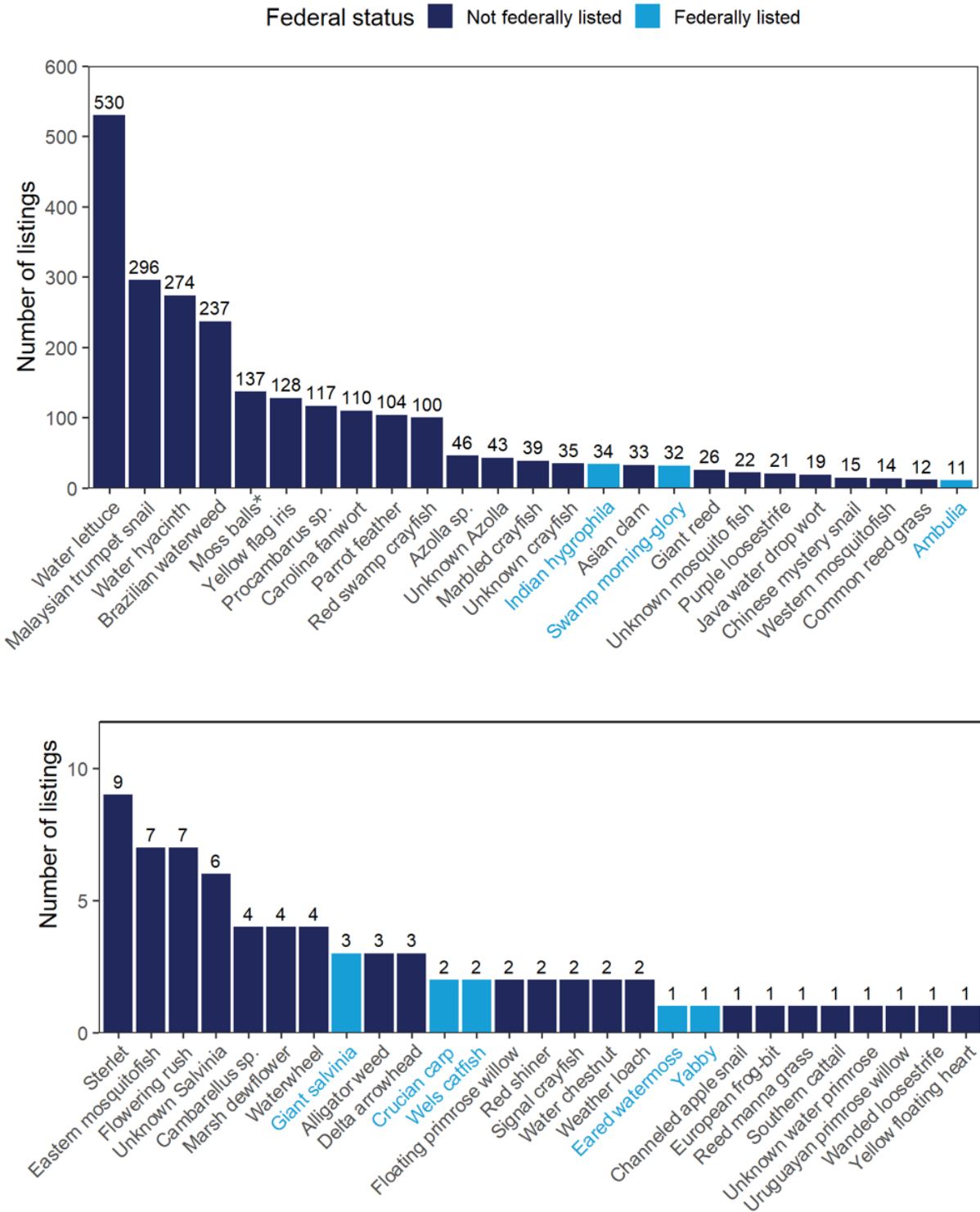


Figure 4. Number of verified sales listings found per taxa by common name. For scientific names, see Appendix A. Light blue = Federally restricted species in the U.S. or Canada. *Moss balls were only included in proof-of-concept and preliminary ScrapeHero searches.

The majority of listings (75.8%) advertised plants, 27% advertised invertebrates, and only 2.5% advertised fish (totals are more than 100% because a single listing could contain multiple taxa; Figure 3). A total of 52 taxa were found (Figure 4; [Appendix A](#)), 45 of which were on the original search list and 7 were added either because the species identifications were nebulous, and/or because they were restricted in some jurisdictions and worth contacting sellers about (*Procambarus* sp. crayfish, unknown *Azolla* sp., unknown crayfish, unknown *Gambusia* sp., unknown *Salvinia* sp., *Cambarellus* sp. crayfish, and unknown water primrose *Ludwigia* sp.). The most common species found for sale were water lettuce, Malaysian trumpet snails, water hyacinth, and Brazilian waterweed. Eight federally restricted species were found, primarily Indian hygrophylla in the aquarium trade and swamp morning-glory in the food market. Due to the sheer number of confirmed listings, moss balls were only included in proof-of-concept and preliminary ScrapeHero searches, and thus the number of moss ball listings is underrepresented (Figure 4). Since moss balls are of concern because of potential zebra mussel infestation and are not actually regulated, and because sellers of moss balls are highly disparate and transient (i.e., usually drop shippers who were difficult to track down), we abandoned searches of moss balls starting in May 2024. The majority of AIS listings found in web scraping were found under product categories representing the pets in the aquarium trade and trade of houseplants/water garden species (Amazon – Pet Supplies, Home & Kitchen; Etsy – Pet Supplies, Home & Living; eBay - Pet Supplies, Home & Garden).

We identified 849 sellers from 16 different countries. Sellers were located in the U.S. (n = 777); Canada (n = 22); Sri Lanka (n = 13); China, United Kingdom (each n = 7); Ukraine (n = 3); Italy, Poland, Portugal, Thailand (each n = 2); and Czech Republic, France, Hungary, Israel, Netherlands, Puerto Rico (each n = 1). Six sellers were from unknown locations. In the U.S., most sellers were in California, Florida, and Texas (Figure 5). Sellers had an average of three AIS listings each, with a maximum of 103.

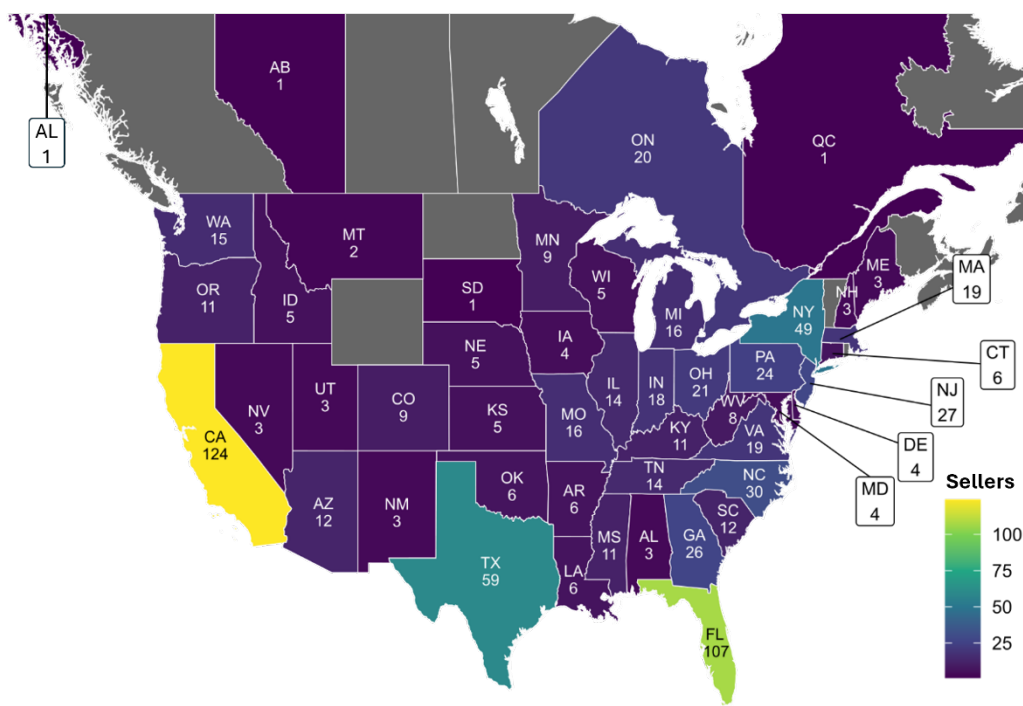


Figure 5. Map showing the number of sellers per state or province with confirmed AIS listings.

Sellers and sales listings were highly ephemeral, with many new listings or storefronts appearing or disappearing in each scrape / API pull (Figure 1, Figure 6). The highest numbers of new sellers, species, and listings were identified whenever a new search method was introduced (i.e., web scraping trials, full-scale web scraping, and eBay API). Discovery rates declined over time as fewer previously undetected records remained. Because the eBay API provided the most consistent long-term data collection method, we used it to evaluate ongoing detection rates. After the initial data pull, the eBay API identified an average of 5 new sellers per month for every 100 unique pages searched. In addition, targeted searches within the API's "Pet Supplies" and "Home & Garden" categories yielded substantially more confirmed AIS listings and sellers per 100 unique pages searched than web scraping methods.

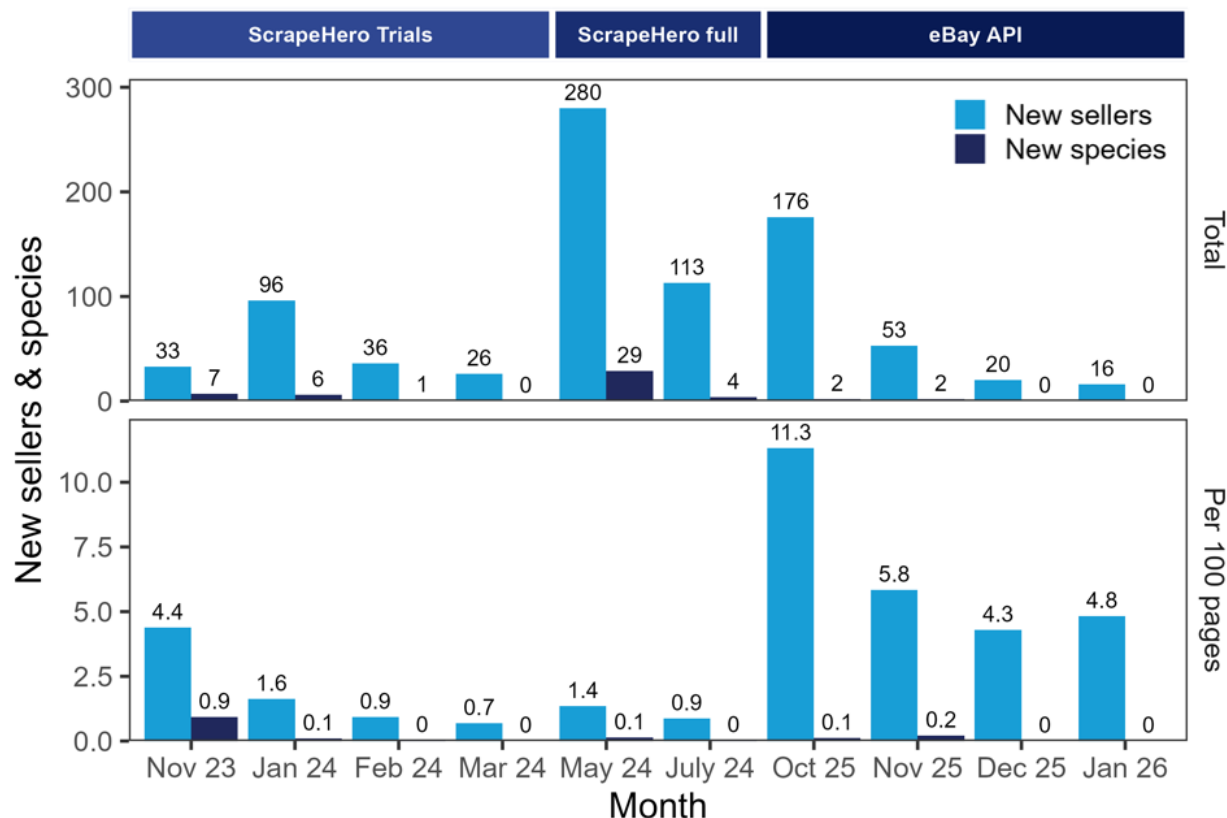


Figure 6. Total number (top panel) and number per 100 unique pages found (bottom panel) of new sellers and species found per month of data collection.

The largest barrier to confirming AIS for sale was species identification, hence the addition of results for a whole genus such as "*Procambarus* sp." Sellers often use obscure or vague trade names, outdated versions of scientific names (if scientific names are included at all), and/or use images that do not show identifying characteristics of species. Searches were also complicated by "plant packs" or listings with a variety of unnamed or ill-specified aquarium plants. Sellers of "plant packs" sometimes said they would add in free "mystery plants," the species of which were often unknown. There were also issues stemming from the uncertainty in naming, genetics, and visual identification of some species, namely Chinese mystery snails, which are disputed to be the same species as the Japanese mystery snail (*Cipangopaludina japonica*), have many scientific and common names, and share a common name

(“mystery snail”) and visual characteristics with another common snail in the pet trade, *Pomacea bridgesii*.

Outreach to sellers

Case summary

A total of 617 cases were added to our case management system for potential outreach. Because the outreach process began before we started the eBay API work, we did not add any cases for new sellers found through the eBay API data pulls, but we did add any new eBay API listings for sellers whose cases were already in the system. We decided after initial testing that we would not be contacting sellers whose cases were exclusively Amazon listings. Amazon’s messaging platform has the strictest contact limits of any of the online marketplaces we encountered: a user can only contact a maximum of five sellers, users cannot contact a new seller unless they have received a response from a past seller, or an unspecified amount of time has passed, as observed by GLC staff. In addition, Amazon’s website enacts shipping filters that prevent the sale of many AIS. Lastly, we did not contact any sellers about moss balls for reasons mentioned previously.

To determine whether outreach to sellers should or could occur, we first determined: whether the seller was still active and accessible for contact, if they were already following rules and regulations, and if they were selling target GLDIATR species (i.e., we finalized any nebulous species identification). This left 445 cases for which sellers needed to be contacted. Cases were often generated from a single marketplace ($n = 415$), but sometimes cases were composed of two ($n = 24$) or three ($n = 6$) marketplaces if we could determine that the same seller was responsible for multiple storefronts.

Outreach process

The outreach process consisted of three phases: first contact, second contact, and the behavior change follow-up assessment. To reach out to sellers, GLC created user accounts for Amazon, eBay, Etsy, Mercari, and Kijiji. All cases received an initial contact that identified which Great Lakes invasive species of concern were being sold, their corresponding Great Lakes state shipping restrictions, and recommendations on disposal methods and adding scientific names. Examples of contact letters can be found in [Appendix B](#).

At the time of first contact, not all sellers had listings that were still active or available. Any sellers that still had active listings received a second contact a minimum of two weeks after the initial contact. The second contact emphasized our recommendations that had not been followed after first contact. Any correspondence with sellers was tracked using our case management system, and all seller responses were documented by the type of response the seller made (e.g., basic acknowledgement, angry response, said they would make changes, etc.).

The behavior change follow-up assessment occurred at a minimum of twelve weeks from the first contact. This assessment reviewed seller pages and AIS listings to determine if any changes were made because of GLDIATR outreach. The follow-up assessment includes an overall evaluation category (e.g., now in compliance, partial behavior change, no behavior change) and assesses behavior change for each species being sold. The species evaluations indicate whether a species is still being sold, and whether a

seller always, sometimes, or never includes the scientific name, accurate shipping restrictions, or disposal methods.

Barriers

The process to contact sellers revealed several challenges, the first of which being various contact message limitations set by each marketplace platform (see [Appendix C](#)). Each platform has different character limits for their contact forms or messaging ranging from 1,000 to 4,000 characters, and most do not allow URLs or email addresses to be included in messages. These limits determined how much information could be conveyed to sellers to both inform them of our goals and provide information, resources, and recommendations. As the project progressed, GLC staff observed additional new message limitations, such as eBay restricting messages that included words like “website” or “Google,” which were being used in out contacts to direct people to the GLDIATR webpage for more information.

Each platform also has different limits on how many sellers a single profile can contact. As mentioned above, Amazon was the strictest, causing us to abandon this contact method. eBay was observed to have different daily limits depending on whether a seller was being contacted about a listing that was active, which limited GLC staff to sending between two to seven contacts a day. No daily limits were observed on the other platforms.

As a result of staff capacity, data validation, and daily contact limits, the final barrier is the delay in time from the original data pull to the time of first contact. Due to the impermanent and quick-changing nature of e-commerce and online marketplaces, many listings that were documented in the initial data pull were no longer available by the time staff were able to send a contact. Only 34% of sellers from the original 617 cases were still selling a given species at the time of our case follow-up process. Many sellers were hobbyists who occasionally sold a small number of plants or animals, possibly to reduce overcrowding in their aquariums, and frequently listed unrelated items alongside these sales. Listings from hobbyist sellers typically disappeared once the item was sold, whereas commercial aquaculture sellers often maintained recurring listings or dedicated webpages that repeatedly sold the same species. Due to our delay in contact, many sellers were contacted about species they had not been selling in months, resulting in responses confused about why they were receiving a message. In other instances, sellers had deleted their storefronts, some listings were no longer active, new invasive species were being sold that needed to be added manually, or individual store or usernames had been changed (Table 2).

Results

In total, GLDIATR staff contacted 445 cases and sent over 600 messages to sellers. Sixty-two percent of cases received one contact from GLDIATR staff, 34% received two contacts, and 4% received three or more contacts. Ultimately, 75% of cases did not reply in any form to GLDIATR contacts. Furthermore, of the responses received from sellers, the majority were unreceptive to our outreach and did not indicate that they would initiate any changes to their listings (Table 1).

Table 1. Responses from sellers.

Response type	# Responses	% Responses
Acknowledged / Non-corrective responses	61	45.9
Receptive / Proposed listing modifications	51	38.3
Information seeking	12	9.0
Hostile / Adversarial	7	5.3
Automated response	2	1.5

Although we received many messages from sellers that were receptive to our recommendations or interested in additional information, follow-up evaluations revealed the discrepancy between sellers saying they would update listings and how many did so (Table 2). Ultimately, only a small portion of sellers contacted meaningfully engaged with GLDIATR outreach.

Table 2. Follow-up evaluation categories per cases for which sellers had been contacted.

Follow-up evaluation	# Cases	% Cases
No longer selling	255	57.3
No observable behavior change	111	24.9
Partial behavior change	41	9.2
Now in compliance	22	4.9
Already in compliance	6	1.3
No behavior change and selling more AIS	5	1.1
Store closed	5	1.1

Engaging with online marketplaces

Throughout Phase III of this project, GLC staff committed to building relationships and working directly with the large online marketplaces as a way to encourage invasive species sale restrictions directly from the source.

Amazon's compliance team

Through 2025 and 2026, GLC staff met with representatives from Amazon's corporate compliance team. During these meetings, staff learned how Amazon restricts and manages the sale of plants and animals on their website and how their shipping filters prevent sales of certain species to certain states. GLC staff reviewed how accurate their internal shipping filters were for 19 different taxa and provided Amazon staff with feedback to improve accuracy. [See our summary here](#) for more details on our interactions and work with Amazon's compliance team.

eBay shipping pilot

In February 2025, GLC staff met with a representative from the eBay Regulatory Policy Team that specializes in working with non-governmental organizations and limiting restricted products. The discussion ultimately led to eBay offering to test the implementation of shipping restriction filters for

invasive species being sold on the eBay platform. The push for this effort came from the fact that eBay accounted for the majority of cases identified during the web scraping component of Phase III (Figure 2).

GLC staff consulted with the project's advisory committee to determine a list of the top ten priority GLDIATR species to trial with eBay shipping restrictions. The chosen species were a mix of the most commonly found GLDIATR Phase III species detected on eBay and species that are of priority concern to keep out of the Great Lakes region (i.e., marbled crayfish, wels catfish). GLC staff provided eBay with the list of the ten species, the relevant search terms (common name, scientific name, alternate trade names), and where the species cannot be shipped to in the Great Lakes region. When a buyer on eBay tries to check out with a flagged pilot species that is restricted via their shipping address, the shipping restriction works by blocking the checkout process with a warning message (Figure 7). The warning message explains that an item in their cart is restricted in the user's jurisdiction and links to the GLC GLDIATR webpage for more information. To learn more about the effectiveness of the pilot, [see our summary](#).

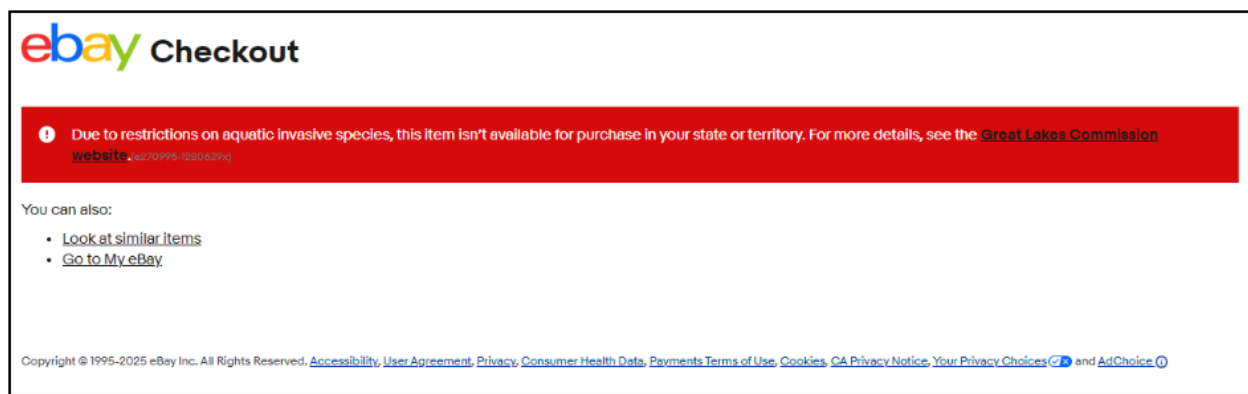


Figure 7. Upon selecting “Buy It Now” for a pilot species this warning appears to eBay buyers, blocking the checkout process.

Next steps and recommendations

Recommendations

At the conclusion of this project, the following recommendations have been made to guide others who may be undertaking similar work.

- **Outreach** to individual sellers is laborious and generally ineffective without the backing of law enforcement. Throughout the project GLC staff contacted 445 online sellers via email or contact form. This accounted for at least 75 hours of staff time. Future work and investment may be better spent engaging with online marketplaces directly and assisting them to better enforce their store policies. Additionally, when addressing repeat offenders (i.e., sellers who continually sell many notable AIS and are not just isolated hobbyist listings), it may be more effective to report their store as a violation against marketplace site policies versus attempting to conduct continuous outreach. If outreach to sellers is still a goal, the outreach should be closely coordinated with law enforcement officers to determine additional actions that might be taken for the sale of regulated species in their jurisdictions.

- **Web scraping** is an effective way to find invasive species for sale online, but legality and terms of service restrictions need to be confirmed prior.
 - Working with a website's API is a good alternative for those that may not have the approval or funds to pay for a third-party web scraping service. GLC staff have put together example code that replicates the API data pulls we successfully conducted on eBay. The code can be accessed via the GLC's Github repository upon request (email gldiatr@glc.org).

Recommendations to online websites and marketplaces

- Enhance or add checks in place for those selling live plants and animals. Improve site policies that help reduce the occurrence of invasive plants and animals being sold by creating explicit and detailed policies and resources for restricted animal and plant products. Some examples may be: providing links to federal laws (federal noxious weed list, Lacey Act), linking to [AquaSale](#) for the sale of aquatic plants and animals (so sellers can add proper shipping restrictions), and adding strong language/consequences for those that do not follow the site's policies regarding restricted species.
- Allow for reporting of sales pages that are selling restricted species (something that is missing from Facebook Marketplace)
- If possible, add automated shipping blocks to restricted jurisdictions

Next steps

At the conclusion of this project, the GLC looks forward to maintaining the aspects of GLDIATR that have been most successful while tackling newly added objectives. The objectives for the next phase of GLDIATR are as follows:

- Maintain searching priority online marketplaces (eBay and others) for GLDIATR species and share results with jurisdictional representatives via the private GLDIATR case management system
- Share project results through summary reports, a manuscript, and conferences
- Maintain relevant products that have been created in previous project funding phases

Due to the success in using the eBay API for tracking AIS sales, the team is looking into obtaining access to other marketplace APIs including Etsy and Amazon. Development on this work will begin in January 2027.

Appendix A: GLDIATR priority species list

Complete list of search terms used in GLDIATR Phase III web scraping and/or eBay API searches.

* Search term used both in web scraping and in the eBay API searching under the “Fish & Aquariums” product category

† Search term used both in web scraping and in the eBay API searching under the “Home & Gardens” product category

‡ Taxa found in at least one sales listing during GLDIATR Phase III

Priority species	Search terms
Fish	
Bighead carp (<i>Hypophthalmichthys nobilis</i>)	bighead carp*, hypophthalmichthys nobilis*
Black carp (<i>Mylopharyngodon piceus</i>)	black carp*, mylopharyngodon piceus*
Crucian carp (<i>Carassius carassius</i>)‡	carassius carassius*, crucian carp*
Eastern mosquitofish (<i>Gambusia holbrooki</i>)‡	eastern mosquitofish**†, gambusia holbrooki**†
Grass carp (<i>Ctenopharyngodon idella</i>)	ctenopharyngodon idella*, grass carp*
Ide (<i>Leuciscus idus</i>)	ide*, leuciscus idus*, orfe*
Northern snakehead (<i>Channa argus</i>)	northern snakehead*
Red shiner (<i>Cyprinella lutrensis</i>)‡	cyprinella lutrensis*, red shiner*
Silver carp (<i>Hypophthalmichthys molitrix</i>)	hypophthalmichthys molitrix*, silver carp*
Snakehead (<i>Channa</i> sp.)	channa*, ophicephalus*
Snakehead (<i>Channa</i> sp. / <i>Parachanna</i> sp.)	bostrychoides*, genera channa, ophiocephalus*
Snakehead (<i>Parachanna</i>)	parachanna*, parophiocephalus*
Sterlet (<i>Acipenser ruthenus</i>)‡	acipenser ruthenus*, sterlet*
Stone moroko (<i>Pseudorasbora parva</i>)	pseudorasbora parva*, stone moroko*
Tench (<i>Tinca tinca</i>)	tench*, tinca tinca*
Weather loach (<i>Misgurnus anguillicaudatus</i>)‡	misgurnus anguillicaudatus*, weather loach*
Wels catfish (<i>Silurus glanis</i>)‡	silurus glanis*, wels catfish*
Western mosquitofish (<i>Gambusia affinis</i>)‡	gambusia affinis**†, western mosquitofish**†
Zander (<i>Sander lucioperca</i>)	sander lucioperca*, zander*
Invertebrates	
Asian clam (<i>Corbicula fluminea</i>)‡	asian clam*, corbicula fluminea*
Channeled apple snail (<i>Pomacea canaliculata</i>)‡	channeled apple snail**†, pomacea canaliculata**†
Chinese mitten crab (<i>Eriocheir sinensis</i>)	chinese mitten crab*, eriocheir sinensis*
Chinese mystery snail (<i>Cipangopaludina chinensis</i>)‡	chinese mystery snail*, cipangopaludina chinensis*
Malaysian trumpet snail (<i>Melanoides tuberculata</i>)‡	malaysian trumpet snail*, melanoides tuberculata*
Marbled crayfish (<i>Procambarus virginalis</i>)‡	marbled crayfish*, marmorkrebs*, procambarus virginalis*
Marron (<i>Cherax tenuimanus</i>)	cherax tenuimanus*, marron*
Red swamp crayfish (<i>Procambarus clarkii</i>)‡	procambarus clarkii*, red swamp crayfish*
Signal crayfish (<i>Pacifastacus leniusculus</i>)‡	pacifastacus leniusculus*, signal crayfish*
Yabby (<i>Cherax destructor</i>)‡	cherax destructor*, yabby*

Priority species	Search terms
Plants	
Alligator weed (<i>Alternanthera philoxeroides</i>) [‡]	alligator weed ^{**} , alternanthera philoxeroides ^{**}
Ambulia (<i>Limnophila sessiliflora</i>) [‡]	ambulia [*] , limnophila sessiliflora ^{**}
Anchored water hyacinth (<i>Eichhornia azurea</i>)	eichhornia azurea [*]
Arrowhead (<i>Sagittaria sagittifolia</i>)	arrowhead, sagittaria sagittifolia
Azolla sp. (<i>Azolla</i> sp.) [‡]	azolla ^{**} , mosquito fern ^{**} , water fern ^{**} , water velvet ^{**}
Brazilian waterweed (<i>Egeria densa</i>) [‡]	brazilian elodea ^{**} , brazilian waterweed ^{**} , egeria densa
Carolina fanwort (<i>Cabomba caroliniana</i>) [‡]	cabomba caroliniana [*] , fanwort [*]
Common reed grass (<i>Phragmites australis</i>) [‡]	common reed grass [‡] , phragmites australis [‡]
Delta arrowhead (<i>Sagittaria platyphylla</i>) [‡]	sagittaria platyphylla [‡]
Eared watermoss; African payal; butterfly fern (<i>Salvinia auriculata</i>) [‡]	african payal [‡] , butterfly fern [‡] , salvinia auriculata [‡]
European frog-bit (<i>Hydrocharis morsus-ranae</i>) [‡]	european frog bit ^{**} , hydrocharis morsus-ranae ^{**} , hydrocharis morsus-renae
Floating primrose willow (<i>Ludwigia peploides</i>) [‡]	floating primrose willow ^{**} , ludwigia peploides [*]
Flowering rush (<i>Butomus umbellatus</i>) [‡]	butomus umbellatus [‡] , flowering rush [‡]
Giant reed (<i>Arundo donax</i>) [‡]	arundo donax [‡] , giant reed [‡]
Giant salvinia (<i>Salvinia molesta</i>) [‡]	kariba weed [‡] , salvinia molesta [‡] , watermoss [‡]
Hybrid watermilfoil (<i>Myriophyllum heterophyllum</i> x <i>M. laxum</i>)	hybrid watermilfoil ^{**}
Hydrilla (<i>Hydrilla verticillata</i>)	hydrilla, hydrilla verticillata ^{**} , water thyme ^{**}
Indian hygrophila (<i>Hygrophila polysperma</i>) [‡]	hygrophila polysperma [*] , indian waterweed [*]
Java water drop wort (<i>Oenanthë javanica</i>) [‡]	java water drop wort [‡] , oenanthë javanica [‡]
Marsh dewflower (<i>Murdannia keisak</i>) [‡]	marsh dewflower ^{**} , murdannia keisak ^{**}
Moss balls (<i>Aegagropila linnaei</i>) [‡]	aegagropila linnaei, moss balls
Oxygen weed (<i>Lagarosiphon major</i>)	lagarosiphon major ^{**} , oxygen weed ^{**}
Parrot feather (<i>Myriophyllum aquaticum</i>) [‡]	myriophyllum aquaticum ^{**} , parrot feather ^{**}
Purple loosestrife (<i>Lythrum salicaria</i>) [‡]	lythrum salicaria [‡] , purple loosestrife [‡]
Reed manna grass (<i>Glyceria maxima</i>) [‡]	glyceria maxima [‡] , reed manna grass [‡]
Southern cattail (<i>Typha domingensis</i>) [‡]	southern cattail [‡] , typha domingensis [‡]
Swamp morning-glory (<i>Ipomoea aquatica</i>) [‡]	ipomoea aquatica [‡] , swamp morning glory [‡]
Uruguayan primrose willow (<i>Ludwigia hexapetala</i> / <i>L. grandiflora</i>) [‡]	ludwigia grandiflora [‡] , ludwigia hexapetala [‡] , uruguayan primrose willow [‡]
Wanded loosestrife (<i>Lythrum virgatum</i>) [‡]	lythrum virgatum [‡] , wanded loosestrife [‡]
Water chestnut (<i>Trapa natans</i>) [‡]	trapa natans ^{**} , water chestnut ^{**}
Water hyacinth (<i>Eichhornia crassipes</i>) [‡]	eichhornia crassipes [‡] , water hyacinth [‡]
Water lettuce (<i>Pistia stratiotes</i>) [‡]	pistia stratiotes ^{**} , water lettuce ^{**}
Water soldier (<i>Stratiotes aloides</i>)	stratiotes aloides [‡] , water soldier [‡]
Waterwheel (<i>Aldrovanda vesiculosa</i>) [‡]	aldrovanda vesiculosa, aldrovanda vesiculosa [‡] , waterwheel [‡]
Yellow flag iris (<i>Iris pseudacorus</i>) [‡]	iris pseudacorus [‡] , yellow flag iris [‡]

Priority species	Search terms
Plants (continued)	
Yellow floating heart (<i>Nymphoides peltata</i>) [†]	nymphoides peltata [†] , yellow floating heart [†]
Reptiles	
Red-eared slider (<i>Trachemys scripta elegans</i>)	red eared slider*, trachemys scripta elegans*
Mammals	
Nutria (<i>Myocastor coypus</i>)	myocastor coypus [†] , nutria [†]

Appendix B: Example contact letters

Below are examples of the contact letters we generated for each seller and marketplace, including letters for the first time we contacted them and the second time we contacted them. These examples show Brazilian waterweed (*Egeria densa*) sold on July 15, 2024 but multiple species and dates could be included.

Full contact letters

These letters could be used when contacting someone via email as there are no restrictions on the number of characters that can be used.

Full contact letter – First contact

Hello,

Greetings from the Great Lakes Commission, a binational organization charged with promoting and protecting the environmental and economic health of the Great Lakes-St. Lawrence River region. We are contacting you today because you were offering for sale a plant that is illegal in at least one Great Lakes jurisdiction. We identified the following species being sold on [WEBSITE], which is of concern to the Great Lakes region. Sale pages were found during a web search on July 15, 2024.

This species carries the following restrictions per state, provincial, or federal law(s):

- Brazilian waterweed (*Egeria densa*)
 - Illinois (Injurious): Barter/exchange/gift/trade/transfer, import, lease/loan, offer for sale, possession, propagation, purchase, release, sell, transport
 - Indiana (Prohibited): Barter/exchange/gift/trade/transfer, distribute, offer for sale, release, sell, transport
 - Michigan (Prohibited): Import, offer for sale, possession, release, sell
 - New York (Prohibited): Import, offer for sale, possession, propagation, purchase, release, sell, transport
 - Ohio (Invasive): Distribute, import, offer for sale, propagation, release, sell
 - Ontario (Prohibited): Barter/exchange/gift/trade/transfer, import, lease/loan, offer for sale, possession, propagation, purchase, release, sell, transport
 - Pennsylvania (Class A Noxious Weed): Barter/exchange/gift/trade/transfer, import, lease/loan, offer for sale, propagation, purchase, sell, transport
 - Wisconsin (Prohibited): Barter/exchange/gift/trade/transfer, import, offer for sale, possession, purchase, release, sell, transport

Below are recommended actions for retailers offering illegal species for sale.

Recommended actions:

- Replace species in your inventory that are considered invasive to the Great Lakes with non-invasive alternatives.
- Learn about species regulations for Great Lakes states and provinces. **Legally, these jurisdictions do not place exclusive responsibility on buyers, and sellers/retailers are expected not to sell or offer for sale illegal, invasive species.**
- Provide information on species regulations and associated shipping restrictions, and proper disposal methods for unwanted organisms.

- List species' scientific name alongside common names, so purchasers know exactly what they are buying.
- Clean and inspect animals, plants, and packing materials prior to shipping to ensure that unwanted hitchhiking viruses, plants, or animals are removed.
- Join an invasive species awareness campaign, such as [Habitattitude](#), and help educate customers.

Visit <https://www.glc.org/work/gldiatr/resources> for more information on laws and regulations related to the species we are tracking as well as more information on these recommended activities.

A significant threat to our region is the invasion of harmful, non-native species that arrive here via multiple pathways. Some of these species are bought and sold for use in aquariums, gardens, classrooms, as bait or for other purposes and may be accidentally, or otherwise, released into the environment. As part of our work on this issue, we are reaching out to online retailers of aquatic plants and animals, such as yourself, to increase awareness of this issue and reduce the risk of harmful species being sold and shipped to the Great Lakes region. Please contact us at gldiatr@glc.org with any questions or for more information on how you can help protect the Great Lakes.

Thank you!

Full contact letter - Second contact

Greetings from the Great Lakes Commission. We are contacting you because you continue to offer for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species as being sold within the past year which carry some form of restrictions per state, provincial, or federal law:

This species carries the following restrictions per state, provincial, or federal law(s):

- Brazilian waterweed (*Egeria densa*)
 - Illinois (Injurious): Barter/exchange/gift/trade/transfer, import, lease/loan, offer for sale, possession, propagation, purchase, release, sell, transport
 - Indiana (Prohibited): Barter/exchange/gift/trade/transfer, distribute, offer for sale, release, sell, transport
 - Michigan (Prohibited): Import, offer for sale, possession, release, sell
 - New York (Prohibited): Import, offer for sale, possession, propagation, purchase, release, sell, transport
 - Ohio (Invasive): Distribute, import, offer for sale, propagation, release, sell
 - Ontario (Prohibited): Barter/exchange/gift/trade/transfer, import, lease/loan, offer for sale, possession, propagation, purchase, release, sell, transport
 - Pennsylvania (Class A Noxious Weed): Barter/exchange/gift/trade/transfer, import, lease/loan, offer for sale, propagation, purchase, sell, transport
 - Wisconsin (Prohibited): Barter/exchange/gift/trade/transfer, import, offer for sale, possession, purchase, release, sell, transport

Selling species in jurisdictions where they are restricted and invasive increases the threat to our region. Your commitment to providing accurate state restrictions in your listings and sharing information on proper disposal methods will help reduce the spread of invasive species and protect our waters. Please contact us with any questions or for more information on how you can help protect the Great Lakes.

Google the “GLDIATR” website for more information on laws and regulations related to the species we are tracking and recommended activities.

Thank you!

Amazon

Amazon - First contact

Greetings from the Great Lakes Commission, a binational organization charged with promoting and protecting the environmental and economic health of the Great Lakes-St. Lawrence River region. We are contacting you today because you have offered for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species being sold on Amazon within the past 18 months, which is of concern to the Great Lakes region. Sale pages were found during . This species carries the following restrictions per state, provincial, or federal law(s):

Brazilian waterweed (*Egeria densa*): restrictions in IL, IN, MI, NY, OH, PA, WI, Ontario.

Below are recommended actions for retailers offering illegal species for sale.

Recommended actions: A. Replace species in your inventory that are considered invasive to the Great Lakes with non-invasive alternatives. B. Learn about species regulations for Great Lakes states and provinces. Legally, these jurisdictions do not place exclusive responsibility on buyers, and sellers/retailers are expected not to sell or offer for sale illegal invasive species. C. Provide information on species regulations and associated shipping restrictions, and proper disposal methods for unwanted organisms. D. List species' scientific name alongside common names, so purchasers know exactly what they are buying. E. Clean and inspect animals, plants, and packing materials before shipping to remove unwanted hitchhiking viruses, plants, or animals. F. Join an invasive species awareness campaign, such as Habitattitude, and help educate customers.

Google the "GLDIATR" website for more information on laws and regulations related to the species we are tracking as well as more information on these recommended activities.

A significant threat to our region is the invasion of harmful, non-native species that arrive here via multiple pathways. Some of these species are bought and sold for use in aquariums, gardens, classrooms, as bait or for other purposes and may be accidentally, or otherwise, released into the environment. As part of our work on this issue, we are reaching out to online retailers of aquatic plants and animals, such as yourself, to increase awareness of this issue and reduce the risk of harmful species being sold and shipped to the Great Lakes region. Please contact us with any questions or for more information on how you can help protect the Great Lakes.

Thank you!

Amazon - Second contact

Greetings from the Great Lakes Commission. We are contacting you because you continue to offer for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species as being sold within the past year on Amazon which carry some form of restrictions per state, provincial, or federal law:

Brazilian waterweed (*Egeria densa*): restrictions in IL, IN, MI, NY, OH, PA, WI, Ontario.

Selling species in jurisdictions where they are restricted and invasive increases the threat to our region. Your commitment to providing accurate state restrictions in your listings and sharing information on

proper disposal methods will help reduce the spread of invasive species and protect our waters. Please contact us with any questions or for more information on how you can help protect the Great Lakes.

Google the “GLDIATR” website for more information on laws and regulations related to the species we are tracking and recommended activities.

Thank you!

eBay

eBay - First contact

Greetings from the Great Lakes Commission. We are contacting you today because you have offered for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species being sold on eBay within the past 18 months which carry some form of restrictions per state, provincial, or federal law(s):

Brazilian waterweed (*Egeria densa*): restrictions in IL, IN, MI, NY, OH, PA, WI, Ontario.

Recommended actions:

- A. Replace invasive species in your inventory with non-invasive alternatives.
- B. Learn about species regulations for Great Lakes states and provinces. Legally, these jurisdictions do not place exclusive responsibility on buyers; sellers/retailers are expected not to sell or offer for sale illegal invasive species.
- C. Provide information on species regulations, associated shipping restrictions, and proper disposal methods for unwanted organisms.
- D. List species’ scientific name alongside common names, so purchasers know exactly what they are buying.
- E. Clean and inspect animals, plants, and packing materials before shipping to remove unwanted hitchhiking viruses, plants, or animals.

Search for the “GLDIATR” web page for more information on laws and regulations related to the species we are tracking and recommended activities.

Invasive, non-native species pose a significant threat to our region. Please contact us with any questions or for more information on how you can help protect the Great Lakes.

Thank you!

eBay - Second contact

Greetings from the Great Lakes Commission. We are contacting you because you continue to offer for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species as being sold within the past year on eBay which carry some form of restrictions per state, provincial, or federal law:

Brazilian waterweed (*Egeria densa*): restrictions in IL, IN, MI, NY, OH, PA, WI, Ontario.

Selling species in jurisdictions where they are restricted and invasive increases the threat to our region. Your commitment to providing accurate state restrictions in your listings and sharing information on proper disposal methods will help reduce the spread of invasive species and protect our waters. Please contact us with any questions or for more information on how you can help protect the Great Lakes.

Search for the “GLDIATR” web page for more information on laws and regulations related to the species we are tracking and recommended activities.

Thank you!

Etsy

Etsy - First contact

Greetings from the Great Lakes Commission. We are contacting you because you have offered for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species being sold on Etsy within the past 18 months that carry restrictions per state, provincial, or federal laws:

Brazilian waterweed (*Egeria densa*): restrictions in IL, IN, MI, NY, OH, PA, WI, Ontario.

Recommended actions:

- A. Learn about species regulations for Great Lakes states and provinces. Legally, jurisdictions do not place exclusive responsibility on buyers; sellers/retailers are expected not to sell or offer for sale illegal invasive species.
- B. Provide information on species regulations, associated shipping restrictions, and proper disposal methods for unwanted organisms.
- C. List species’ scientific name alongside common names, so purchasers know exactly what they are buying.
- D. Replace invasive species in your inventory with non-invasive alternatives.
- E. Clean and inspect animals, plants, and packing materials before shipping to remove unwanted hitchhiking viruses, plants, or animals.

Google the “GLDIATR” website for more information on laws and regulations related to the species we are tracking and recommended actions you can take.

Invasive, non-native species pose a significant threat to our region. Please contact us with any questions or for more information on how you can help protect the Great Lakes.

Thank you!

Etsy - Second contact

Greetings from the Great Lakes Commission. We are contacting you because you continue to offer for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species as being sold within the past year on Etsy which carry some form of restrictions per state, provincial, or federal law:

Brazilian waterweed (*Egeria densa*): restrictions in IL, IN, MI, NY, OH, PA, WI, Ontario.

Selling species in jurisdictions where they are restricted and invasive increases the threat to our region. Your commitment to providing accurate state restrictions in your listings and sharing information on proper disposal methods will help reduce the spread of invasive species and protect our waters. Please contact us with any questions or for more information on how you can help protect the Great Lakes.

Google the “GLDIATR” website for more information on laws and regulations related to the species we are tracking and recommended activities.

Thank you!

Mercari

Mercari first/second contact

Greetings from the Great Lakes Commission. We are contacting you because you have offered for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species being sold on Mercari within the past 18 months that carry restrictions per state, provincial, or federal laws:

Brazilian waterweed (*Egeria densa*): restrictions in IL, IN, MI, NY, OH, PA, WI, Ontario.

Google the “GLDIATR” website for more information on laws and regulations related to the species we are tracking and recommended actions you can take. Invasive, non-native species pose a significant threat to our region. We are reaching out to online retailers of aquatic plants and animals to increase awareness of this issue and reduce the risk of harmful species being sold and shipped to the Great Lakes. Please contact us with any questions or for more information on how you can help protect the Great Lakes. Thank you!

Website / Kijiji letter

This letter is used if any of the listings were found on an individual website (e.g., www.myinvasivepets.com). It is in its shortest form in case they have a contact form with limited characters.

Website/Kijiji letter – First/second contact

Greetings from the Great Lakes Commission. We are contacting you because you have offered for sale a species that is illegal in at least one Great Lakes jurisdiction. We identified the following species being sold on your site within the past 18 months that carry restrictions per state, provincial, or federal laws:

Brazilian waterweed (*Egeria densa*).

Visit <https://www.glc.org/work/gldiatr/resources> for more information on laws and regulations related to the species we are tracking and recommended actions you can take.

Invasive, non-native species pose a significant threat to our region. We are reaching out to online retailers of aquatic plants and animals to increase awareness of this issue and reduce the risk of harmful species being sold and shipped to the Great Lakes. Please contact us with any questions or for more information on how you can help protect the Great Lakes. Thank you!

Appendix C. E-commerce marketplace contact restrictions

Online marketplaces have different restrictions on what can and cannot be sent through their messaging systems. For example, most have character limits limiting the length of the message, and messages containing email addresses or URLs may be flagged as spam. The sample letters generated by the GLC take these limitations into consideration. Marketplaces may also limit how many messages can be sent.

Marketplace	Character limit	Messaging rules
Amazon	≈ 4,000 (including spaces)	• No URLs or email addresses; • Can send a maximum of 5 seller messages total, until a response is received
eBay	2,000 (including spaces)	• No URLs or email addresses, cannot say “Google” or “website” • Contact limit of 5 messages per day as replies to active listings • Contact limit of 2 messages per day if a seller’s AIS listings are not active
Mercari	1,000	• No URLs
Etsy	≈ 1,500 (including spaces)	• No URLs (not a listed requirement, but observed by GLC staff)