



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Final Report

July 2016

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Executive Summary

Aquatic invasive species (AIS) are introduced and spread in the Great Lakes-St. Lawrence River region through a number of pathways: commercial shipping, canals and waterways, trade of live organisms, and activities of recreational and resource users. One pathway, the trade in live organisms, presents a complex management challenge because it is a widespread activity with a diversity of actors. It includes intentional and unintentional releases of live organisms via the aquarium trade, nursery and water garden outlets, aquaculture, and the bait industry. Management efforts are complicated further by the ability to buy and sell organisms over the Internet. Although widely recognized as a threat, the scope of Internet trade in invasive aquatic organisms is not well understood.

The Great Lakes Commission (GLC), recognizing the need to address this pathway, received funding from the U.S. Environmental Protection Agency to carry out a project that included as its primary task the development of the web-based software tool Great Lakes Detector of Invasive Aquatics in Trade (GLDIATR). GLDIATR operates on an ongoing basis to collect and analyze, and allow users access to, information about how many and what types of AIS are available for sale on the Internet. GLDIATR searches are guided by a watch list of species of concern to Great Lakes stakeholders. 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.

During this project, the GLC engaged GLDIATR's target user community, including state and federal agencies, to ensure project activities were relevant and useful. Stakeholders provided input on the development of GLDIATR and associated project activities through a survey, webinars and two workshops. Their engagement in the project strengthened outreach efforts, validated GLDIATR as a valuable management tool, and highlighted areas for its continued improvement and application.

In its first month of operation, GLDIATR identified more than 200 unique websites and sellers offering 58 different species of concern for sale. The majority (69%) were plant species, including the 20 species most frequently found species. More than half of the suppliers identified are based in the U.S. Several of the species available are on the Great Lakes Governors and Premiers "least wanted" species list, including several highly invasive plants – Brazilian elodea (*Egeria densa*), parrot feather (*Myriophyllum aquaticum*), water soldier (*Stratiotes aloides*), water chestnut (*Trapa natans*) and hydrilla (*Hydrilla verticillata*).

The GLC also reached out to sellers identified through implementation of GLDIATR in efforts to demonstrate the system's usefulness in targeting behavior change among online retailers and other sellers of AIS. The GLC contacted 162 sellers with information about invasive species regulations and best practices and received 11 direct (non-automated) responses. Changes to seller inventory and shipping restrictions were documented in 27 cases.

Overall, this project demonstrates that AIS are being sold over the Internet and that managers need tools to prevent AIS introductions via this pathway. This project serves as a "proof of concept" for the application of web data mining technology to assist with AIS prevention and demonstrates that GLDIATR has the capacity to provide a valuable service to the Great Lakes region. It also shows that GLDIATR can help target outreach efforts to affect change in the marketplace. The GLC recommends additional activities and investments to ensure the tool is properly maintained, upgrades are developed and implemented, and progress is sustained. The Internet is an ever-changing, ever-growing environment. Systematic and continuous vigilance is needed to identify, monitor and respond to this pathway for introduction and spread of harmful AIS. The GLC plans to continue these efforts with continued funding from U.S. EPA (see www.glc.org for updated information).

I. Introduction

The Great Lakes region is united in its concern over invasive, non-native species that can cause significant impacts on ecosystems and economies. More than 180 non-native aquatic species are established in the Great Lakes and more are threatening to enter. There are a variety of pathways by which non-native species are introduced and spread in the region: commercial shipping, canals and waterways, trade of live organisms, and activities of recreational and resource users. The Great Lakes-St. Lawrence River region is investing considerable time, expertise and financial resources to address pathways associated with commercial shipping, specifically the ballast water of ships, and connecting waterways such as the Chicago Sanitary and Ship Canal. Other pathways for species introduction and spread are receiving comparatively less attention despite the significant risks they pose to the ecologic and economic health of the region. For example, intentional and unintentional releases of live organisms via the aquarium trade, nursery and water garden outlets, aquaculture, and the bait industry make up a complex vector—organisms in trade—that can adversely affect the Great Lakes.

The 2005 *Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes* reported “Importation, interstate commerce and trade are among the most dangerous pathways for introduction of invasive species in the Great Lakes ecosystem.”ⁱ A 2005 study of the invasion risks to the Great Lakes posed by the aquarium and live food trades found that a variety of non-native plants and animals not yet in the Great Lakes, but possessing “invasive” attributes, were available in the marketplace, including Brazilian elodea and the bighead and grass carp.ⁱⁱ The live organism trade has also been linked to the escape of some of the most problematic aquatic weeds in the U.S., such as hydrilla. Non-native aquatic weeds in the U.S. are estimated to cost \$10 million in losses and damages and \$100 million in control costs each year.ⁱⁱⁱ

“Importation, interstate commerce and trade are among the most dangerous pathways for introduction of invasive species in the Great Lakes ecosystem.”

The increasing availability of plants via mail-order and Internet sales is said to have helped drive horticulture and water garden industry growth.^{iv} Research shows that Internet retailers sell restricted plants and animals to customers. The Global Invasive Species Programme found that of 77 aquatic plant species restricted from sale in the U.S., 45 percent are available for sale on the Internet.^v A 1999 review found that 60 percent of the 25 invasive plants prohibited for sale by federal or Minnesota state laws were available for purchase by mail and the Internet. Also of concern is the availability of species that have been identified as an invasion risk to the Great Lakes, such as those on the *GLANSIS Watch List of Potential Great Lakes Aquatic Invasive Species*.

Past research, though limited and focused primarily on plants, demonstrates that Internet commerce facilitates the trade of live organisms, providing consumers, hobbyists and others on-demand access to worldwide distribution networks. Previous work by the Great Lakes Commission (GLC) investigating this trade also suggests that limited knowledge and resources, as well as the potential breadth of the Internet pathway, have contributed to a reluctance to comprehensively assess the extent to which Internet sales contributes to the movement of invasive plants and animals. The GLC determined that a systematic approach was needed to quantify and mitigate risks from this pathway. With funding from the U.S. Environmental Protection Agency and the Great Lakes Restoration Initiative, the GLC began a project in 2012 to develop software to assess the availability of AIS via Internet sales, identify and reach out to sellers, and target management activities. Ultimately, the intent of this effort is to help prevent AIS introduction and spread in the Great Lakes region.

II. Methods and Activities

A. Technical Support

The central task of this project was to develop software that would automate the process of searching the web to identify and report what AIS are for sale online and from which websites. To accomplish this, the GLC secured the help of Dr. Bing Liu of the University of Illinois-Chicago, a technical expert in the field of web data mining. With Dr. Liu's oversight and assistance, the GLC also developed and executed a competitive request for qualifications (RFQ) process to identify and hire a software engineering firm to carry out the software development. The RFQ was released in October 2012 and distributed to a number of web and software development firms as well as posted to GLIN-Announce and published on the GLC website. A conference call was held during the application process to provide an opportunity for potential applicants to ask questions and get more information. GLC received and reviewed, with the assistance of Dr. Liu, four applications for software development. The review team also held interviews with each of the applicants. The contract was awarded the contract to RightBrain Networks (RBN) and work plan was established and finalized with RBN in December 2012.

B. Species Watch List

To target the search and reporting activity of the software, the GLC identified a list of species of concern for the Great Lakes region, referred to as the Species Watch List (SWL). The GLC compiled the SWL using several sources:

- Non-native aquatic species prohibited or regulated for sale, transport or possession by Great Lakes states and provinces (Indiana, Illinois, Michigan, Minnesota, New York, Ontario, Ohio, Pennsylvania, Quebec, Wisconsin)
- GLANSIS Watch List of Potential Great Lakes Aquatic Invasive Species^{vi}
- Great Lakes and Mississippi River Interbasin Study Watch List^{vii}
- U.S. Fish and Wildlife Service Ecological Risk Screening Summaries^{viii}
- Stakeholder input provided through a survey

Compilation of information gathered from these sources yielded a list of 166 species, including common and scientific names for each. Readily available and known synonyms of common names for species were also included. It is important to note that the process of developing the SWL was designed to accommodate a broad range of potential invasive species threats to the Great Lakes and the GLC did not perform any independent prioritization, evaluation or risk assessment of the species. The GLC recognizes that it is possible that not all species on the watch list are a priority for managers or are species that are likely to be found in trade. Recommendations for refining the SWL are discussed in section IV.

C. Software Development and Operation

Software development was initiated shortly after the selection of RBN as the primary contractor. Biweekly calls of RBN, Dr. Liu and the GLC were held throughout the development process. In September 2013, a beta version of the system was completed. The beta system was demonstrated, tested and reviewed by the project team. The beta test successfully demonstrated that the system could conduct a scan of a website and identify a sale webpage. The team discussed modifications to the user interface and reporting, and next steps for continuing development and setting parameters for system operation. RBN concluded the principal development process in early 2014. RBN then worked with GLC to install the software on GLC equipment and hardware and prepare the software to be deployed at design scale.



GLDIATR

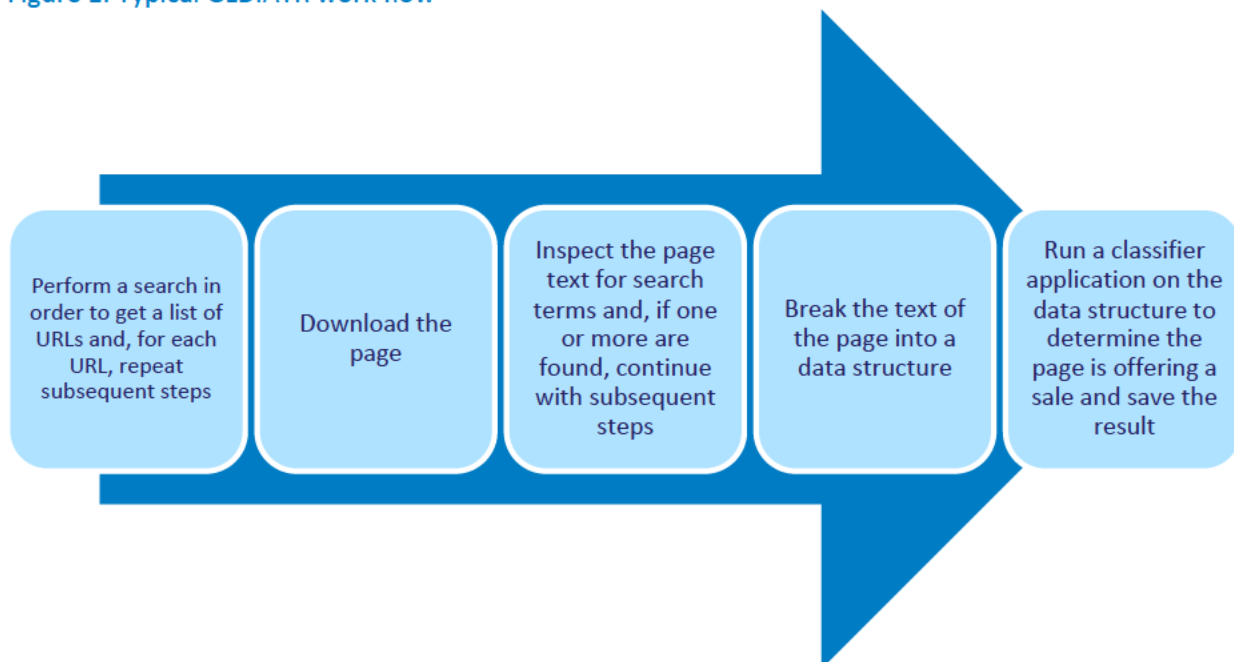
Great Lakes Detector of
Invasive Aquatics in Trade

RBN developed and operated the system in a small-scale, test environment, specifically on a single server. At full scale, the system is designed to operate in a distributed environment. That is, different components of the system run on separate virtual machines, or servers, to distribute the work load. The GLC purchased a dedicated server, associated equipment and back-up software to run the system at full design scale. In August 2014, the software was fully deployed. The name given to the software is the **Great Lakes Detector of Invasive Aquatics in Trade (GLDIATR)**.

The primary function of the GLDIATR system is to search the Internet and collect and report the URLs of webpages offering invasive species (as defined through the SWL) for sale. GLDIATR performs this function in an automatic and systematic manner that is faster and more efficient than a person is able to achieve through their own searches. While this primary function is straightforward, the GLDIATR system is complex. GLDIATR is comprised of a number of front and back end components or “applications.” Front end administrative sections provide the ability to control how searches happen and to view the information collected. Back end applications perform the system’s work, and each is responsible for specific tasks. Using these applications, the GLDIATR work flow typically proceeds as outlined in Figure 1.

The primary function of the GLDIATR system is to search the Internet and collect and report webpages offering invasive species for sale.

Figure 1. Typical GLDIATR work flow



GLDIATR performs its searches of the Internet based on parameters set by an administrative user and through the assistance of application programming interfaces (APIs) for the search engine Bing and the online retailers Amazon and eBay. These APIs provide easy access to their databases of webpages and sale items. All searches are executed based on a query (i.e., set of search terms) within the GLDIATR Dashboard application. GLDIATR queries are designed to simulate a person independently accessing Bing.com, Amazon.com or eBay.com and typing a query into the search box. For this project, GLDIATR queries were set to use species names as the primary search terms. In the future, queries could be set to include other terms such as “for sale” or “aquarium” to see if such a change would yield an improvement in search results. It should be noted that one difference in the automated GLDIATR search as compared to a search conducted by a person is that the Bing search engine learns and reorders search results according to their algorithms for what they think is most relevant to the user performing the search. The use of the Bing API to perform automated searches for GLDIATR removes these “relevance” judgments and thusly, the results and their order may be different than those presented to an individual using Bing.com.

Through GLDIATR, a schedule of Bing, Amazon and eBay searches is set using the Scheduler application. This schedule is set strategically so as to maximize use of the APIs. An account is required to use each of the three APIs. At the free account level used for this project, the Bing API limits the account holder’s ability to access data to 50 results per data call and 5,000 data calls per month. Under these restrictions, GLDIATR is set to scan the first 1,500 results for each of the 166 species on the SWL. Amazon takes a different approach to setting limits on the rate at which data can be retrieved, necessitating specifically timed delays between searches. (Timed delays are also set for Bing and eBay searches but are not specifically tied to API restrictions.) For this project, Amazon and eBay scheduled searches are set to scan the first 1,000 results for each species. Across the three searches, GLDIATR is able to scan 582,000 pages a month (or 19,400 per day), although not all searches will yield the maximum number of results (i.e., one species search may only yield 700 results). To match this capacity, an individual would have to scan over 200 web pages every 5 minutes, every hour, eight hours a day, for thirty days.

The efficiency of GLDIATR Bing searches is improved through the use of a “Domain Black List.” The Domain Black List (DBL) is a user created list of websites that GLDIATR ignores because they are not of interest (e.g., .gov websites, Wikipedia.org, YouTube.com, etc.).

GLDIATR is able to scan 582,000 web-pages a month.

GLDIATR also includes a component to search Craigslist. Unlike Amazon and eBay, Craigslist does not provide APIs and actively discourages activities such APIs would facilitate (e.g., automated searching). This makes the efforts of GLDIATR significantly more challenging and increases the likelihood that the system would be blocked from accessing any Craigslist pages. Further, the time in which it would take to complete a search of all Craigslist pages is significantly increased. The Craigslist search component built for GLDIATR allows the user to select specific states and cities to search. The project team estimates that a comprehensive search of all Craigslist pages in the Great Lakes region (i.e., 10 states and two provinces) for the 166 species would take several days up to a month to complete, depending on how conservatively timed delays are set. For these reasons, GLDIATR is not currently conducting ongoing scheduled searches of Craigslist (as it does for Bing, Amazon and eBay). Further, a search of Craigslist was not conducted under this project and is not included in the results presented in section III.

In addition to scheduled searches for Bing, Amazon and eBay, an administrative user has the ability to conduct independent searches of specific websites (or URLs) using the same work flow process described above. The difference is that instead of the searches being scheduled in advance and scanning any websites that are returned, a specific target website (e.g., www.Petco.com) is entered into a form and is subsequently scanned for species on the SWL. This search and scan occurs immediately and only once for all pages within the URL that is entered. These “one-off” searches can be conducted at any time.

Once GLDIATR retrieves and downloads pages based on a search query (e.g., species name), the Preprocessing application scans the content of the page for the terms in the SWL (i.e., species common and scientific names and synonyms) and records matches and assigns a score to those matches on a 0 to 1 scale, 1 being an exact match. The final step before GLDIATR reports its findings is to determine whether a page is a “sale page.” The Classifier application makes sale page determinations using a classifier model. The current classifier model was built using a training dataset compiled by the GLC. The GLC worked with RBN to classify 3,192 web pages collected by a run of the Retrieval application as “sale” or “not sale” pages. The resulting dataset provides the foundation for the current classifier model. The performance of the model can be scored across several metrics, including precision, recall and F1. Precision measures how well the classifier does when it makes the decision that a document is a sale. Recall measures how well the classifier does at retrieving sale pages. For example, if GLDIATR returns 30 pages classified as “sale,” only 20 of which are true sale pages, while failing to return 20 additional true sale pages, the precision is 20/30 and the recall is 20/40 (with 40 being the total number of true sale pages). F1 is a measurement that balances precision and recall. A high recall score is desired to ensure sale pages are not missed and a high precision score is desired to minimize the number of false positives. However, higher recall usually sacrifices precision, so a good model will balance the two.

GLDIATR performance can be improved over time with the addition of more records to the dataset. The Classifier application incorporates machine learning components so that data can be added and the model can be rebuilt. GLC attempts to generate improvements to the Classifier with additional data were unsuccessful. Thus, GLC and RBN reset the Classifier to the optimized settings based on the original dataset. All results discussed in section III were identified using the original Classifier. The project team suspects that problems with training the model were a result of using an unequal number of the four types of results. That is, significantly more false positive records were used to train the model than were false negatives, true positives and true negatives. Recommendations for continuing work on this component are discussed in section IV.

GLDIATR incorporates machine learning components so that system performance can be improved over time with the addition of more data.

GLDIATR is also built to report the source location of a species for sale in certain instances. As currently developed, location information, which can include city and state (and excludes shipping locations), is collected automatically by the system for sale pages identified through eBay searches. City and state location information is also collected for Craigslist searches.

The front end Dashboard application allows users to access data collected by GLDIATR and carry out administrative and end user functions. The GLDIATR Dashboard requires a user account to access and is accessible for log in online at gldiatr.glc.org. There are two primary types of user accounts: “Administrator” and “User.” A User’s access to GLDIATR is restricted to viewing the SWL and reports pages. Both the SWL and report sections of GLDIATR are dynamic and have sorting and filtering capability

that allows Users to view specific species or websites of interest. Users are not permitted to make changes to the SWL or the reports. These sections are described in more detail below:

- The [Species Watch List](#) page lists all species GLDIATR is targeting with its searches. Information provided includes the scientific and common names for each species, as well as any identified synonyms, and regulatory information. Species are organized and grouped into three taxonomically based categories: Fishes, Other Aquatic Animals, and Plants and Algae. Users may filter the list by regulatory status – regulated or not regulated and jurisdiction.
- The [Species Report](#) page lists all URLs classified as a sale page. It is organized by species and can be filtered by species name, regulatory status, date range found, and location (limited).
- The [Domain Report](#) page lists all URLs classified as a sale page organized by website domain name. This report can also be filtered by domain name, number of sale pages and date range.

Administrators have complete, unrestricted access to the GLDIATR Dashboard. Through the Dashboard application, Administrators have the ability to

- Manage User and Administrator accounts
- Make changes to the SWL, including the regulatory status of specific species
- Make changes to the DBL
- Make changes to document (i.e., webpage) classifications (i.e., “sale” or “not sale”)
- Export data to .csv format
- Add data to train the classifier model
- View real-time performance metrics
- View, in real-time, the status of and restart back end application “workers”
- Execute one-time searches of specific websites
- Set parameters for, schedule, start and stop Bing, Amazon, eBay and Craigslist searches
- Set parameters for, schedule, start and stop reports of sale pages for specific species to be emailed to specified users at specific intervals
- View all reports, including the Species Report and Domain Report, as well as additional reports

Select GLC and RBN staff members are the only Administrators. User accounts are granted and administered by the GLC and are intended for government agency representatives, resource managers, and other AIS practitioners. Users are required to agree to a Terms of Use (Appendix D) developed by GLC before they are granted access.

Full-scale operation of GLDIATR began in August 2014. GLC reviewed and conducted analysis on a dataset collected from August 6 – September 6, 2014. Data collected during that period represents a complete search run of all the species on the watch list according to the initial search schedule and query parameters set for GLDIATR. Specifically, these parameters include using the scientific name for each of the 166 species on the SWL as the search query to download and scan the first 1,500 Bing search results, the first 1,000 Amazon search results, and the first 1,000 eBay search results for each species query. Further, each page downloaded from these search queries was scanned for all species scientific, common and synonym name terms included in the original SWL.

Next, GLC staff conducted a manual review of each webpage classified as a sale page by GLDIATR (a positive result) in the dataset to verify that pages were classified correctly as a sale page (true positive). Pages that were found to be incorrectly classified as a sale page (a false positive), were reclassified in the GLDIATR database. Performance metrics conducted on the Classifier at the time indicate that the rate of false positives (precision) was approximately 14% and that the recall was approximately 75%. This means

that the system likely misclassified up to a quarter of the sale pages it retrieved from its searches as non-sale pages. In an attempt to identify and re-classify these missed pages (false negatives), staff initiated a review of the pages classified by the system as not being a sale page. The high volume of non-sale pages (over 300,000) and the relative proportion of false negatives to true negatives (estimated at 2%) resulted in a very high level of effort needed to identify them. Thus, this effort was abandoned in favor of focusing staff time on analysis of the positive results.

To further refine the data for subsequent analysis, GLC staff also removed any duplicate listings. That is, multiple sale pages within the same main website offering the same species for sale. For example, one website may have two slightly different URLs or two different pages listing the same species for sale, resulting in two different records in the GLDIATR database for the same species being sold by the same seller. The resulting dataset yielded 514 unique sale pages. GLC staff then completed manual collection of additional information from the sale pages, including contact and shipping information for the sellers. Shipping information was reviewed in an attempt to verify whether a seller would ship their product to the U.S. and/or if the seller restricted their shipment of specific species to any specific states or provinces. Contact information for the seller was collected in an effort to determine the seller's geographic location and to inform seller outreach efforts (described below). The entire dataset, including manually collected information, is provided in Appendix L.

GLDIATR scanned over 300,000 web-pages and identified 514 different listings of aquatic invasive species for sale in the first 30 days of operation.

D. User Community Engagement

GLDIATR was developed with a user community in mind and GLC made a number of efforts to ensure project activities were carried out and shared with this community. As the GLC is a representative of its eight member states and two member provinces, the GLC targeted state and provincial regulators and AIS coordinators as the primary user community for this project. In addition, the GLC reached out to federal agency representatives, nongovernment and nonprofit entities, private entities, and others throughout the project. GLC engaged in these efforts to share project findings and to ensure the software development and other project activities were designed and implemented with user community input.

Engagement with the user community began with a webinar in January 2013. The focus of the webinar was to inform participants of the project and gather input on the needs of the management community for the Internet trade pathway. Around the same time as the first webinar, the project team developed a survey for managers and others to provide input on the project. More than 50 people attended the webinar and 52 people responded to the survey. A summary of survey input is provided in Appendix E; the webinar presentation and a list of participants are provided in Appendix F.

A second webinar was held in July 2013 to gather initial input on existing available outreach materials and messages. The webinar was targeted toward outreach specialists and approximately 25 people participated. The webinar presentation and a list of participants are provided in Appendix G.

In November 2013, a workshop was held in Detroit, Michigan. The workshop objectives were to (1) provide an update on project status and next steps; (2) demonstrate a preliminary version of GLDIATR; and (3) provide an opportunity for input and feedback from participants. A webinar option was provided for those interested parties that were unable to travel. 26 people attended the workshop in person and 41 participated in the webinar. The workshop agenda, participant list and other materials are provided in

Appendix H. Response from the participants was overwhelmingly positive and indicated strong support and appreciation for the project. The following is a brief summary of specific feedback received at the workshop that was used to inform software development and project activities:

Stakeholders received the project positively, providing feedback and expressing significant support and encouragement for GLDIATR and the overall effort.

- Coordinate with law enforcement agencies if sellers are contacted alerting them to a regulated species they are selling
- Consider non-regulatory uses for the system, e.g., research tool for assessing the prevalence of online live trade of AIS in the Great Lakes region which can inform risk assessment efforts
- Develop a user management system and user agreements
- Differentiate clearly between regulated and non-regulated species, both within the system and in any outreach activities
- Do not post the URLs or links to specific sale pages publicly to avoid unintentionally facilitating purchase of invasive species
- Location information is highly desirable from an enforcement perspective and users would like to be able to filter results by location
- Consider temporal trend reporting regarding species in trade

The second of two workshops was held in March 2015 in Ann Arbor, Michigan. Key federal, state and provincial partners were contacted regarding preferred dates and locations for the workshop to facilitate their participation. A webinar broadcast of the workshop was also made available. 25 people attended in person and an additional 25 participated on the webinar. The workshop agenda, participant list and other materials are provided in Appendix I. Participants were given the opportunity to test the GLDIATR as a User and provide feedback. Again, the project was received positively and participants expressed a great deal of support and encouragement for GLDIATR and the overall effort. Specific feedback, summarized below, was used to inform next steps for the project, this report and its recommendations.

Input on GLDIATR Functionality

- Consider revisions to SWL, including other aquatic taxa (e.g., Mute swan, Nutria)
- Some simple bug fixes are needed
- Add option for users to export data to Excel
- Emailed species alerts are useful
- Give different levels of access
- Add ability to document outreach to sellers within program
- Include information about “approved” species
- Describe and clarify regulations and provide a list of species prohibited in each state
- Improve accuracy of the search results
- Add ability to filter reports by common name
- Geographic location information for sellers is still desirable; consider using IP address for this

Using GLDIATR to inform prevention and management

- Advertise productive enforcement actions (fines/tickets)
- Avoid unintentionally encouraging bad behavior based on perceived enforcement ability
- Integrity of search terms maybe compromised if SWL is publicized

- Announcements should be vetted/shared
- Potential use as an investigative tool for enforcement to help build a body of evidence for future restrictions

Ideas for future Internet trade pathway prevention efforts

- Use positive outreach promoting better practices, e.g., clean shipments
- Develop boilerplate language for contacting sellers
- Give credit to good actors, e.g., certification
- Purchase items to review orders for hitchhikers, mislabeling, etc,
- Develop framework for sharing information and maintaining records on prevention efforts (outreach, enforcement)
- Software would be more powerful with location data which is important to enforcement
- Create multi-stakeholder governance /advisory board to provide input on future development and ongoing prevention efforts
- Future administration of GLDIATR needs regional coordination with jurisdictional specificity, i.e., centralized software to ensure everyone has the same level of service, but provide specific subsections for individual jurisdictions
- Consider national interest, e.g., different issues in different regions

Additional outreach and engagement with other potential users of the system occurred through participation and presentations at key invasive species meetings and conferences, including meetings of the Great Lakes Panel on Aquatic Nuisance Species and the national Aquatic Nuisance Species Task Force. A complete listing of these presentations is provided in Appendix J. GLC was invited to give a majority of these presentations as both regional and national partners expressed strong interest in GLDIATR and related findings. Several groups indicated interest in deploying the system for their own purposes.

E. Seller Outreach

In efforts to help facilitate behavior change among online retailers and other sellers of AIS, the GLC also implemented outreach to sellers identified through implementation of GLDIATR. These efforts were designed to provide information about relevant regulations and potential risks/impacts associated with invasive species, and activities sellers can take to improve their practices.

In July 2015, the GLC contacted 162 sellers with information about invasive species regulations and best practices.

GLC staff reviewed available outreach information and solicited input from AIS outreach experts (via the July 2013 webinar) to develop materials for communication with sellers. Based on staff research and input received during the webinar and from follow-up conversations, a draft message to sellers was developed, along with a list of complimentary resources that sellers can be directed to for further information. These draft materials and a preliminary plan for communicating with sellers was shared for input at the November 2013 workshop. A key concern was taking additional steps to ensure the outreach did not interfere with law enforcement activities. A final draft outreach letter and a list of identified sellers was provided to primary points of contact within each of the Great Lakes jurisdictions for review prior to its distribution to targeted sellers. The letter is provided in Appendix K.

To target outreach efforts, the GLC used sale page URL data collected via GLDIATR. GLC staff accessed sale pages collected by the system between August 6 and September 6 to manually collect seller contact information. The GLC removed sellers from the outreach list that were identified to not include an option to ship to the U.S. or Canada. The final letter was distributed to a total of 162 sellers in July 2015. The GLC

contacted 118 sellers via email, 42 via an online site form, and two via U.S. mail. GLC was unable to contact all of the identified sellers because their websites were no longer active or were otherwise unable to be accessed in July 2015, or due to other limitations.

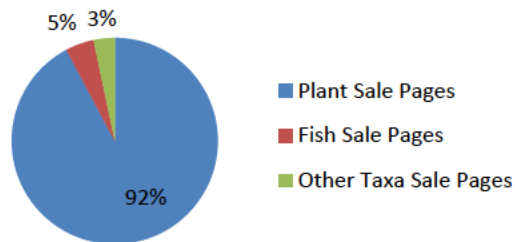
Over subsequent months, GLC staff recorded and reviewed responses to this outreach, as well as re-visiting targeted seller pages to determine whether any changes that occurred following the outreach, including determining if sellers removed target species from their inventory; restricted the shipment of target species to jurisdictions within the Great Lakes region; and/or provided invasive species awareness information for their consumers.

III. Findings

A. GLDIATR

The first run of GLDIATR (described above) successfully yielded a dataset of 514 unique web pages advertising species on the SWL for sale. These results demonstrate and confirm the availability of undesirable species on the Internet. Of the 166 species searched, 58 were identified, including 40 plant species, 11 fish species and seven other aquatic species (Table 1). Plants had the greatest distribution of sale pages among the three groups at a total of 474 sale pages or 92%.

Figure 3. Distribution of sale pages by taxa group



Nearly all of the species found for sale are regulated for some purpose by one or more federal or Great Lakes jurisdictions; only two are not regulated (*Poecilia reticulata* and *Pterygoplichthys pardalis*). Seven of the 15 species included on the Great Lakes Governors and Premiers “least wanted” invasive species list^{ix} were found: Brazilian elodea (*Egeria densa*), parrot feather (*Myriophyllum aquaticum*), water soldier (*Stratiotes aloides*), water chestnut (*Trapa natans*), Hydrilla (*Hydrilla verticillata*), yabby (*Cherax destructor*) and Grass carp (*Ctenopharyngodon idella*). The species with the most sale pages identified (37) was *Iris pseudacorus*, commonly known as yellow flag iris. This was followed closely by *Cabomba caroliniana*, or fanwort (36). The 20 species most frequently found were all plant species, with a total of 395 sale pages between them.

Figure 4. Species most frequently found for sale

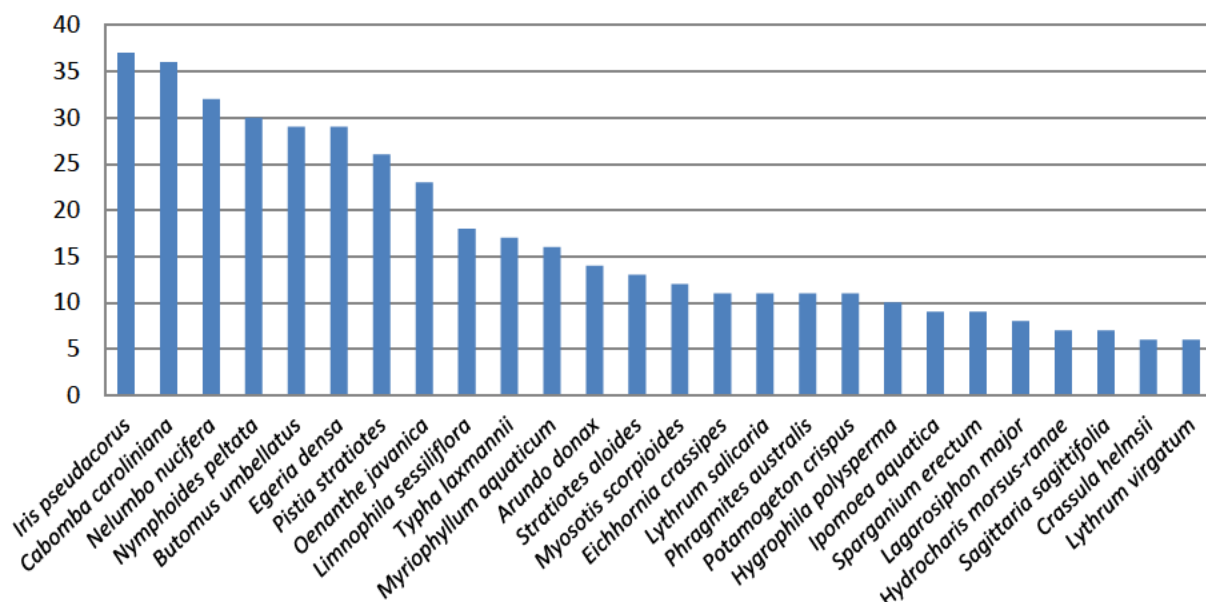


Table 1. Species found for sale online

| | | | Sale Pages | Jurisdictions with Regulations |
|-------------------|-------------------------|---|------------|------------------------------------|
| Amphibians | African clawed frog | <i>Xenopus laevis</i> | 2 | IL, NY |
| Crayfish | Yabby | <i>Cherax destructor</i> | 3 | IL, MI, MN, OH, PA |
| | Marron | <i>Cherax tenuimanus</i> | 1 | IL, OH, PA |
| | Marbled crayfish | <i>Marmorkreb</i> | 5 | MN, PA |
| | Red swamp crayfish | <i>Procambarus clarkia</i> | 1 | MI, MN, PA |
| Fish | Goldfish | <i>Carassius auratus</i> | 1 | MN, NY, WI |
| | Grass carp | <i>Ctenopharyngodon idella</i> | 1 | IL, MI, MN, NY, OH, PA, WI, ON, QC |
| | Red shiner | <i>Cyprinella lutrensis</i> | 2 | NY, WI |
| | Koi | <i>Cyprinus carpio</i> | 1 | MN, NY, WI |
| | Western mosquitofish | <i>Gambusia affinis</i> | 3 | MN, NY, WI |
| | Eastern mosquitofish | <i>Gambusia holbrooki</i> | 1 | IL, NY, WI |
| | Oriental weatherfish | <i>Misgurnus anguillicaudatus</i> | 6 | IL, MI, MN, NY, WI |
| | Blue tilapia | <i>Oreochromis aureus</i> | 1 | IL, NY |
| | Nile tilapia | <i>Oreochromis niloticus</i> | 2 | IL, NY |
| | Guppy | <i>Poecilia reticulata</i> | 4 | None |
| | Amazon Sailfin Catfish | <i>Pterygoplichthys pardalis</i> * | 1 | None |
| Molluscs | Asian clam | <i>Corbicula fluminea</i> | 2 | IL, IN, NY |
| | Malasian trumpet snail | <i>Melanooides tuberculata</i> | 3 | WI |
| Plants | Giant reed | <i>Arundo donax</i> | 14 | WI |
| | Mosquitofern | <i>Azolla pinnata</i> | 4 | IL, IN, MN, WI, US |
| | Flowering rush | <i>Butomus umbellatus</i> | 29 | IL, IN, MI, MN, WI |
| | Fanwort | <i>Cabomba aquatic, Cabomba caroliniana</i> | 36 | IL, MI, MN, NY, WI |
| | Australian stonecrop | <i>Crassula helmsii</i> | 6 | IL, MN, WI |
| | Brazilian elodea | <i>Egeria densa</i> | 29 | IL, IN, MI, MN, NY, WI |
| | Anchored water hyacinth | <i>Eichhornia azurea</i> | 3 | IL, IN, MN, WI, US |
| | Water hyacinth | <i>Eichhornia crassipes</i> | 11 | IL, MN, WI |
| | Giant hogweed | <i>Heracleum mantegazzianum</i> | 1 | IL, MI, NY, OH, ON, PA, WI, US |
| | Hydrilla | <i>Hydrilla verticillata</i> | 4 | IL, IN, MI, MN, NY, WI, US |
| | European Frogbit | <i>Hydrocharis morsus-ranae</i> | 7 | IL, IN, MI, MN, NY, WI |
| | Indian swampweed | <i>Hygrophila polysperma</i> | 10 | IL, IN, MN, WI, US |
| | Chinese waterspinach | <i>Ipomoea aquatica</i> | 9 | IL, IN, MN, WI, US |
| | Yellow flag iris | <i>Iris pseudacorus</i> | 37 | IL, IN, MN, NY, WI |
| | Oxygen weed | <i>Lagarosiphon major</i> | 8 | IL, IN, MI, MN, WI, US |
| | Ambulia | <i>Limnophila sessiliflora</i> | 18 | IL, IN, MN, WI, US |
| | Purple loosestrife | <i>Lythrum salicaria</i> | 11 | IL, MI, MN, NY, OH, PA, WI |
| | Wanded loosestrife | <i>Lythrum virgatum</i> | 6 | WI |
| | Melaleuca | <i>Melaleuca quinquenervia</i> | 1 | IL, MN, US |
| | Marsh dewflower | <i>Murdannia keisak</i> | 5 | NY |
| | Forget-me-not | <i>Myosotis scorpioides</i> | 12 | WI |
| | Parrot feather | <i>Myriophyllum aquaticum</i> | 16 | IL, IN, MI, MN, NY, WI |
| | Eurasian water milfoil | <i>Myriophyllum spicatum</i> | 5 | IL, IN, MI, MN, NY, WI |
| | Sacred lotus | <i>Nelumbo nucifera</i> | 32 | WI |
| | Water lily | <i>Nymphaea spp., Nymphoides geminata</i> | 2 | IL, MN |
| | Yellow floating heart | <i>Nymphoides peltata</i> | 30 | IL, IN, MI, NY, WI |
| | Japanese water celery | <i>Oenanthe javanica</i> | 23 | WI |
| | Duck lettuce | <i>Ottelia alismoides</i> | 1 | IL, IN, MN, WI, US |
| | Common reed | <i>Phragmites australis</i> | 11 | IL, MI, NY, WI |
| | Water lettuce | <i>Pistia stratiotes</i> | 26 | WI |
| | Japanese knotweed | <i>Polygonum cuspidatum</i> | 1 | IL, MI, NY |
| | Curlyleaf pondweed | <i>Potamogeton crispus</i> | 11 | IL, IN, MI, MN, NY, WI |
| | Arrowhead | <i>Sagittaria sagittifolia</i> | 7 | IL, IN, MN, WI, US |
| | Wetland nightshade | <i>Solanum tampicense</i> | 1 | IL, MN, US |
| | Bur reed | <i>Sparganium erectum</i> | 9 | IL, IN, MN, US |
| | Water soldier | <i>Stratiotes aloides</i> | 13 | IL, MN, WI |
| | Water chestnut | <i>Trapa natans</i> | 5 | IL, IN, MI, MN, NY, WI |
| | Southern cattail | <i>Typha domingensis</i> | 1 | WI |
| | Graceful cattail | <i>Typha laxmannii</i> | 17 | WI |
| | Sea lettuce | <i>Ulva spp.</i> | 2 | IL, WI |

*A single sale page from a 2008 blog by an individual selling their home aquariums: <http://sellingmytanks.blogspot.com/>. It is assumed that the fish is no longer available and no active sales were identified during this period

The 514 sale pages were found across 200 different websites. For purposes of this summary, all eBay websites (i.e., ebay.com, ebay.co.uk, ebay.ca and ebay.com.au) were counted as one website and all Amazon websites (amazon.com, amazon.co.uk and amazon.de) were counted as one website. GLC staff performed additional data collection to determine the geographic location of sellers as well as any geographic restrictions associated with shipping their stock. This effort included visiting each site to

- Locate contact information or other indication of a physical base of operations; and
- Locate any notices indicating an item could not be shipped to specific states, could not be shipped outside of a certain geographic range (e.g., a website based in the United Kingdom that will only ship within the United Kingdom), or was otherwise restricted.

For purposes of evaluating geographic location and shipping information, country specific marketplace sites of eBay and Amazon, as well as extraplant.com (as opposed to extraplant.us), were evaluated separately, increasing the total number of unique websites to 206. Further, individual sellers on these marketplace sites were sometimes in different geographic locations. For example, the geographic location of different sellers on sale pages identified on Amazon.com varied between the United States and other countries. Thus, the total number of sites for geographic location of sellers is greater than 206. In some cases, staff could not find any indication of location or shipping restrictions. The analysis showed that the majority of sellers (40%) are located in the United States, followed closely by Europe (39%).

Table 3. Geographic Location of Sellers

| | <i>No. of Sites</i> | |
|--------------------------|---------------------|---------------------|
| | <i>All</i> | <i>Ships to GLR</i> |
| United States | 86 | 79 |
| Europe | 84 | 25 |
| Asia | 11 | 8 |
| Unknown / No Information | 9 | 6 |
| Canada | 5 | 3 |
| Australia & New Zealand | 15 | 2 |
| Other | 3 | 2 |
| Total | 213 | 125 |

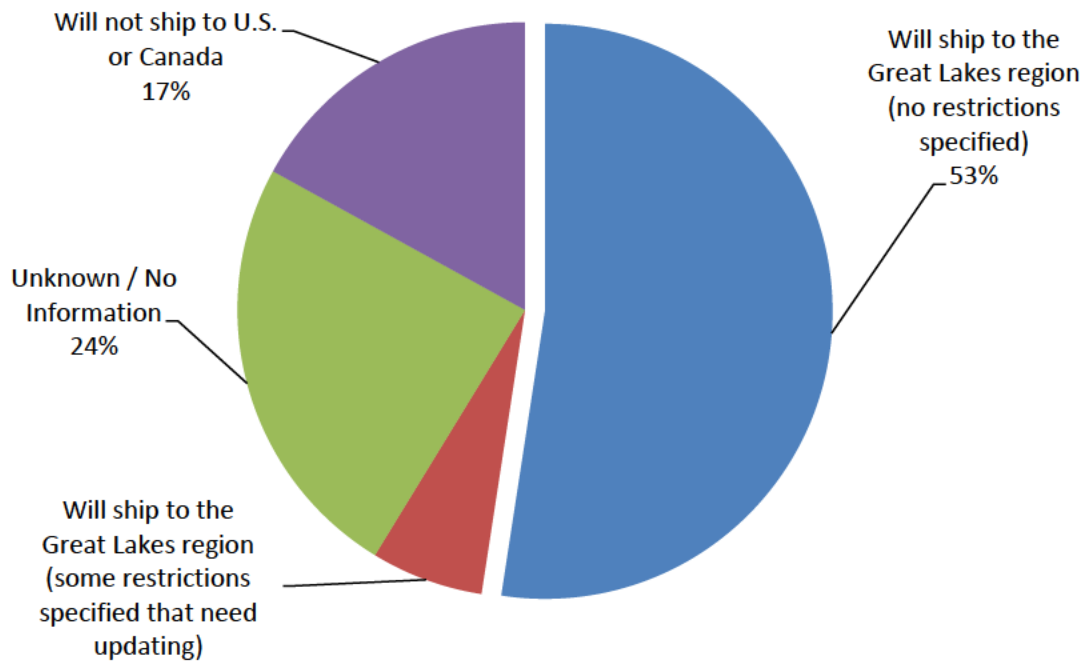
When considering shipping restrictions, all non-U.S. marketplace sites (i.e., ebay.co.uk, ebay.ca, ebay.com.au, amazon.co.uk, amazon.de, alibaba.com, www.bidorbuy.co.za,) were considered to be in the “unknown” shipping category, as shipping restrictions vary by individual seller. This additional analysis showed that 121 of the 206 websites (59%), representing over half (56%) of the total number of sale pages identified, would likely ship to areas within the Great Lakes region.¹

Table 4. Shipping Restrictions by Website

| | <i>No. of Sites</i> |
|---|---------------------|
| Will ship to the Great Lakes region (no restrictions specified) | 108 |
| Will ship to the Great Lakes region (some restrictions specified) | 13 |
| Unknown / No Information | 50 |
| Will not ship to U.S. or Canada | 35 |
| Total | 206 |

¹ Great Lakes region is defined as the states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio and Wisconsin, the commonwealth of Pennsylvania, and the provinces of Ontario and Quebec.

Figure 5. Shipping restrictions by website



Of sites that were identified as likely to ship to the Great Lakes region, over half (63%) are located in the United States and 20% are located in European countries.

Figure 6. Geographic distribution of sellers that will ship to the Great Lakes region

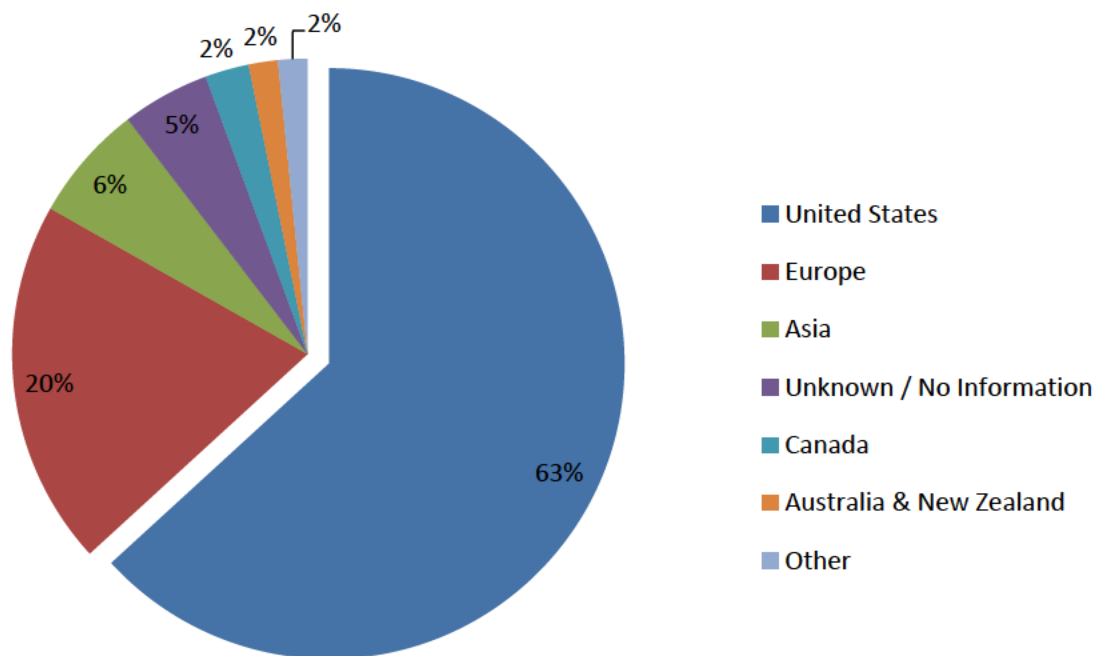
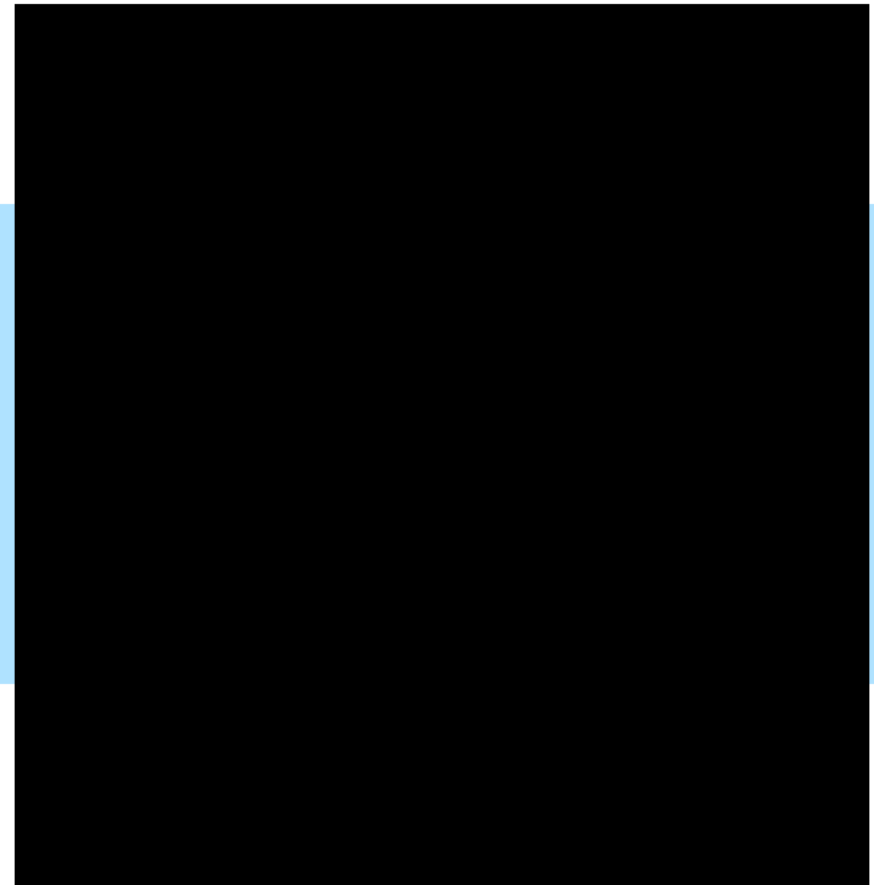
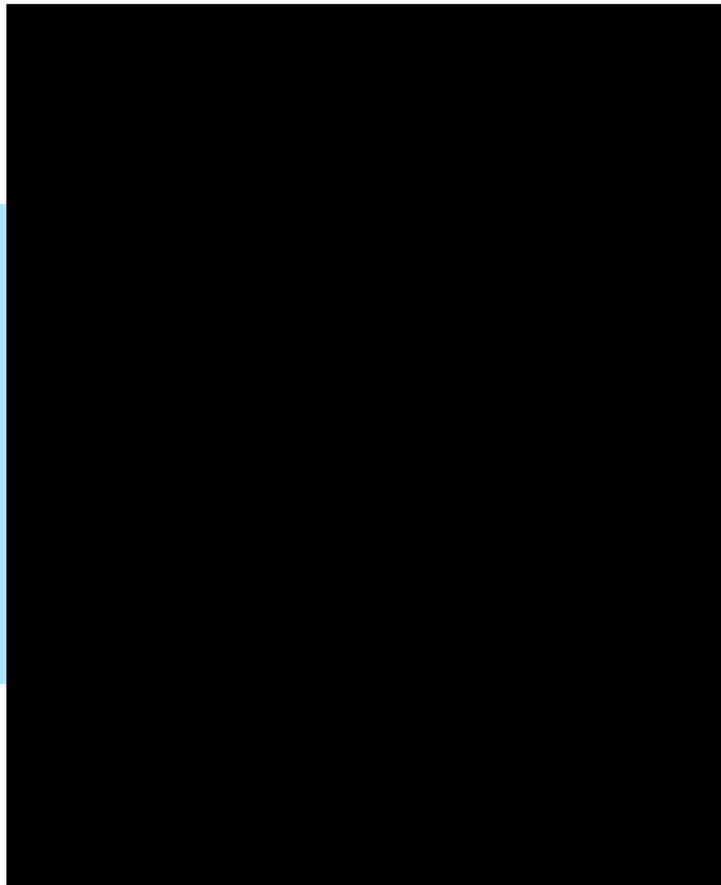


Figure 7. Websites showing examples of shipping restrictions

Unfortunately we do not deliver to Ireland, Channel Islands, Isle of Mann, Remote parts of Scotland, Europe or Internationally.



Anacharis Cannot be shipped to AL, CA, CO, CT, ID, IL, IN, LA, MA, ME, MI, MS, NC, NE, NH, NY, OR, PR, SC, VT, WA, WI - Know your state laws. Never release plants into public waterways.

If Anacharis is banned in your state we recommend [Hornwort](#) as a submerged plant.

B. Seller Outreach

When reaching out to sellers, all websites determined likely to ship to the Great Lakes region were included, as well as all sites for which shipping information was not available. This included sending 118 direct emails, completing 42 online contact forms, and sending two hard copy letters via U.S. mail. Contact information for several sellers, including many on marketplace sites (e.g., Amazon.com, eBay.com, alibaba.com) was not available. The GLC received 11 non-automated response emails; below is a summary of the responses. The GLC responded to each individual with more information.

- Four (4) sellers requested more information about which species were of concern
- Three (3) sellers said that they do not ship to the United States
- Two (2) sellers shared agreement with the sentiment of the letter and indicated they attempt to maintain up to date lists of restrictions and regulations
- One (1) seller said they no longer sell the specific species of concern (*Egeria densa*)²
- One (1) seller asked to not be sent SPAM

Other messages did not receive responses, received an auto-reply, or an error message. No additional attempts to contact these sellers were implemented during this project. Two months following the outreach, in September 2015, GLC staff revisited 145 seller websites in an attempt to determine if any changes were made to their stock or to their lists of shipping restrictions. Of the sites visited, it appeared that 14 sites updated their shipping restrictions for at least one species (9.6%) and 14 sites appeared to remove at least one species from their inventory (one site made both shipping and inventory changes). This included four sellers that responded directly to the outreach described above. Five sites were no longer available and no change was observed for 113 sites (78%). While no change was observed for a majority of sites, behavior change was not the primary objective of this project. This preliminary effort demonstrates the usefulness of GLDIATR in targeting outreach efforts and provides a foundation for future efforts.

Two months after contacting them, GLC found 27 sellers made changes to their stock and/or shipping restrictions.

² GLC visited the page and found the listing to still be active, in contradiction to the response.

IV. Discussion and Recommendations

Project findings support the original premise of this effort: Internet commerce is a significant potential pathway for AIS and that there is a need for ongoing monitoring and tools to inform management activities. GLDIATR serves as an efficient tool that scans the Internet for species of concern more quickly and systematically than an individual. Outreach activities demonstrated that some suppliers are interested in updating their website information and making changes to their available stock. Overall, this project allowed for the development and testing of innovative technology and serves as a “proof of concept” for the application of this technology to assist with invasive species prevention. As such, this project also highlighted a number of opportunities to enhance these efforts and continue to improve activities to effectively manage this pathway. The GLC offers the following recommendations that should be considered in the continuation of GLDIATR and associated efforts. These recommendations are reflective of discussions with the GLDIATR user community and stakeholders and other lessons learned through the conduct of this project.

A. Recommendations

Establish Regional Advisory Committee

Throughout the development of GLDIATR and associated activities, the GLC engaged a number of partners, including state and federal agencies, to ensure this work is relevant and useful. These efforts helped to validate GLDIATR as a valuable management tool and identify areas for its continued improvement and application. The GLC recommends that a more formal approach to user engagement be adopted in the future to provide input on GLDIATR implementation. Specifically, a GLDIATR advisory committee should be established to provide input and guidance on continued development and implementation of the tool. The GLC recommends that advisory committee membership be drawn directly from the primary GLDIATR user community and be representative of the diverse uses of the information it provides (e.g., research/risk assessment, outreach and enforcement).

Integrate GLDIATR into Management Agency Activities

There was general consensus expressed at the second workshop that the development and maintenance of GLDIATR remain centralized (e.g., within the GLC), but that its use should be decentralized to maximize its effectiveness as an AIS prevention tool. That is, the use of GLDIATR should be integrated into the day-to-day activities of AIS researchers, outreach coordinators, managers and law enforcement officials. Stakeholders stressed that without a central entity to maintain the system, its effectiveness will be limited by the lowest common denominator principle. That is, the jurisdiction that devotes the least to maintaining it will

define its success, since AIS don't respect state boundaries. Therefore, the GLC recommends both targeted and non-targeted approaches to facilitate this integration process. A targeted approach should be conducted through a series of user training workshops to ensure users can easily access and are familiar with the system. To facilitate participation and active engagement, the GLC recommends "on-site" training workshops for each of the target jurisdictions and user groups to help ensure that participation from users is not impeded by agency travel restrictions or other related obstacles. To complement this approach, the GLC also recommends continued, ongoing communication with the broader AIS community through facilitated conference calls, webinars, presentations and other forums to provide updates on GLDIATR operations and findings, and to share user activities on an ongoing basis.

Continue Outreach Activities

Effective and sustained outreach is key to any AIS program in order to change behaviors that lead to AIS introduction and spread. During this project, the GLC worked with partners to develop a regionally-based outreach message and deliver it to sellers identified by GLDIATR with the intent to reduce the availability of invasive species for sale. Seller response, though minimal, was mostly positive. In addition, nearly 10% of the sellers contacted made some change to their website. The GLC recommends the implementation of coordinated outreach activities based on GLDIATR results and building off of existing campaigns and messages targeted toward live organism trade industries. These efforts should be coordinated through an advisory committee, or similar body, to ensure regionally relevant and consistent messaging targeting the highest priorities.

Target High Priority Species

In its first month of operation, GLDIATR identified 200 different sellers offering 58 different species of concern for sale. The GLC recommends a coordinated outreach and enforcement effort targeted to a subset of high priority species – such as the Great Lakes Governors and Premiers "least wanted" species – with a goal of achieving a significant reduction in the availability of those species in the marketplace. Such an approach would provide an opportunity for continued meaningful and measurable progress on this pathway. An advisory committee, or similar body, should be engaged to determine which species should be targeted. The GLC suggests the "least wanted" list as an existing, regionally agreed upon priority list. This project confirmed at least seven of the 15 species on the list are readily available for purchase. This includes five highly invasive plants –

Brazilian elodea (*Egeria densa*), parrot feather (*Myriophyllum aquaticum*), water soldier (*Stratiotes aloides*), water chestnut (*Trapa natans*) and hydrilla (*Hydrilla verticillata*) – as well as the grass carp (*Ctenopharyngodon idella*) and the yabbie (*Cherax destructor*) – a crayfish. These are species for which the Great Lakes states are conducting active management, and, in some cases, costly eradication efforts. For example, the state of Indiana is working on an eight-year, \$2.3 million hydrilla eradication effort for a single inland lake.^x The province of Ontario is conducting a multi-year eradication effort on an infestation of water soldier in the Trent Severn waterway^{xi} and federal, state and provincial agencies are conducting active monitoring and response actions for grass carp.^{xii}

Modify Search Parameters

GLDIATR search functions are designed to be fully customizable. The GLC set initial search parameters (i.e., the SWL) to accommodate a broad range of potential invasive species threats and did not perform any independent prioritization or evaluation of the species on the list. The GLC recognizes that it is possible that not all species on the watch list are a priority for managers or are species that are likely to be found in trade. Further, each species is created equal in that GLDIATR retrieves the same number of Bing search results for each species (i.e., the first 1,500). In the future, the GLC recommends that the SWL be evaluated to both remove low priority species and add new high priority species. In addition, the number of search results that is retrieved for each species may be increased or decreased, depending on species priority or prevalence in trade. To assist with this, the GLDIATR “Offset Report” is available to provide information on which points within the search results the majority of sale pages are found (e.g., the majority of sale pages may be found within the first 100 search results or the first 500 results, etc., or a significant number of sale pages are continuing to be found after 1,000 search results such that it warrants searching a deeper number of results.). The SWL evaluation and any subsequent modifications should be done in coordination with a peer review team, ideally the previously recommended advisory committee.

Improve System Performance

As described previously, GLDIATR employs a model-based application to determine whether a webpage is of interest or not. This model is not completely accurate, and as a result, GLDIATR data includes a small percentage of false positives and false negatives. Thus, the GLC recommends periodic review of the data in order to identify and correct inaccuracies.

GLDIATR also does not capture all sale pages. To help address this, GLDIATR includes a machine-learning component to improve the model's performance over time. Specifically, administrative users may select records in the GLDIATR database to add to the dataset and use them to rebuild the Classifier model. In addition, the GLC recommends ongoing work to improve model performance. Through consultation with RBN, the GLC believes the attempts to improve the Classifier during the project were unsuccessful because of an imbalance in the types of records that were added to the dataset, i.e., a majority of records used were manually corrected false positives. Future efforts to improve the model should be done systematically and should apply different approaches. One approach is to add records to the dataset such that the ratio of sale pages to other pages is reflective of the real world, i.e., if 2% of all pages the system identifies are sale pages, then 2% of the pages in the dataset should be sale pages. A second approach is to add an equal number true positives, false positives, true negatives and false negative results to the dataset. Finally, the GLC also recommends further testing and implementation of the Craigslist search function.

Develop and implement GLDIATR updates

GLDIATR was developed to demonstrate the application of web-crawling and web data mining technology to the problem of invasive species trade over the Internet. The GLC is pleased with the results of the system thusfar, and sees opportunities to develop and apply this software beyond the "proof of concept" phase. In addition to continuing to improve the accuracy of the software as described previously, a number of other desirable upgrades and enhancements have been identified through the GLC's work to date and its engagement with targeted users. The GLC recommends that these enhancements be pursued, under guidance and oversight of a regional advisory committee and other users as needed.

Algorithm to identify the geographic location of sellers: During this project, the GLC manually collected information on the geographic location of online retailers, based on the results returned by GLDIATR. This information was identified as highly desirable at both stakeholder workshops because it allows managers to target activities within their jurisdiction. For example, regulations regarding the sale and possession of specific species still vary from state to state, which has implications for law enforcement activities. With additional development work, a new algorithm could be developed and tested that would automate this process and provide this additional information to users. The GLC anticipates that development of this algorithm would be straightforward for marketplace websites such as eBay and Amazon in which location information is placed on the page in a consistent manner that is relatively easy to predict and identify. It is likely that significantly more development and testing will be needed to automatically extract this information from various other online stores in which the placement of geographic indicators (e.g., contact information) varies from site to site.

Customized user interfaces and reporting: In order to facilitate and streamline user engagement with GLDIATR, test users recommended further customization of the software based on individual interests. Currently, GLDIATR reports the entirety of results from system searches in two reports: a species report including sale pages sorted by species, and a domain report including sale pages sorted by primary domain (e.g., www.ebay.com). Both of these reports allow the user to filter the results by a specific subset of species, species regulatory status, date the page was found, and other parameters. The user manually sets the filters based on their specific interests. The default view shows all the pages identified over the life of system operation. New, customized interfaces would establish default settings for each jurisdiction based on the species of interest for that jurisdiction (e.g., jurisdictionally regulated species). It could also incorporate the output of a geographic location algorithm to focus on specific locations of interest for that jurisdiction. These updates would enhance the user experience by allowing quick and direct access to the information most relevant to their needs. This will enable a more efficient response to potential AIS threats or violations. Again, such updates should be developed in close coordination with AIS managers from each of the jurisdictions. Further, individualized interfaces should be developed so that they can be modified in the future to accommodate evolving species regulations or interests, and the ability of a user to view all results should be retained.

Case management functionality: GLDIATR was conceived, developed and designed to help facilitate and target activities that will block the organisms in trade pathway from leading to AIS introductions in the Great Lakes region. Tracking the implementation of these activities is an important part of measuring progress and evaluating success. To facilitate this, the GLC recommends adding components to GLDIATR that will allow any user to record their activities. This is likely to include flagging sellers that have been contacted regarding species in their inventory identified by GLDIATR, either in an enforcement or general education-outreach capacity, including recording the date when the notification was sent, how the notification was sent (e.g., email, contact form, phone, U.S. mail, etc.), and whether a response was received. It is also important that users have the ability to share this information with each other to ensure management is coordinated and duplication of effort is reduced. The format and specific features should be developed and tested with an advisory committee or other members of the GLDIATR user community as appropriate.

In conclusion, the project demonstrates that GLDIATR has the capacity to provide a valuable service to the Great Lakes region. Moving forward, additional investments will be needed to act on the recommendations, ensure the tool is properly maintained, upgrades are developed and implemented, and progress is sustained on this critical issue for the health of the Great Lakes. The Internet is an ever-changing, ever-growing environment. Systematic and sustained vigilance is needed to identify, monitor and respond to this pathway for introduction and spread of harmful AIS. Toward this end, the U.S. EPA awarded a second grant to the GLC in May 2016 for continued funding of this effort and to implement the recommendations highlighted in this report. This and all project information is available on the GLC website (www.glc.org).

V. Appendices

- A. Terms of Use
- B. Stakeholder Survey Summary
- C. January 2013 Webinar Materials
- D. July 2013 Outreach Webinar Materials
- E. November 2013 Workshop I Materials
- F. March 2015 Workshop II Materials
- G. Seller Outreach Materials
- H. List of Presentations

VI. References

- ⁱ Great Lakes Regional Collaboration. 2005. *Great Lakes Regional Collaboration Strategy to Protect and Restore the Great Lakes*. p20.
- ⁱⁱ Rixon, C., I.C. Duggani, N. Bergeron, A. Ricciardi, and H.J. MacIsaac. 2005. *Invasion risks posed by the aquarium trade and live fish markets on the Laurentian Great Lakes*. *Biodiversity and Conservation*. 14: 1365–1381.
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- ^{ix} Conference of Great Lakes and St. Lawrence Governors and Premiers. 2013. *Council of Great Lakes Governors Aquatic Invasive Species Task Force “Least wanted” species list*. Retrieved from www.cglslgp.org/media/1156/least-wanted-press-release-and-listing-6-1-13.pdf
- ^x Fischer, E. 2015. Indiana Hydrilla Eradication & Starry Stonewort Battle [PowerPoint slides]. Retrieved from <http://glc.org/files/projects/ais/GLPMeeting-April2015-Fisher-SSW.pdf>
- ^{xi} MacDonald, F. 2015. Water Soldier Control and Eradication in Ontario [PowerPoint slides]. Retrieved from <http://glc.org/files/projects/ais/GLPMeeting-April2015-MacDonald-Watersoldier.pdf>
- ^{xii} Herbst, S. 2015. Grass Carp Efforts in Lake Erie [PowerPoint slides]. Retrieved from <http://glc.org/files/projects/ais/GLP-Meet-Oct-2015-A2-Herbst.pdf>

Appendix A. Terms of Use

**GREAT LAKES DETECTOR OF INVASIVE AQUATICS IN TRADE
TERMS OF USE AGREEMENT - USER**

EFFECTIVE DATE: MARCH 1, 2016

1. DESCRIPTION OF GREAT LAKES DETECTOR OF INVASIVE AQUATICS IN TRADE SERVICES

- a. Internet commerce facilitates the trade of live organisms, providing consumers, hobbyists and others on-demand access to worldwide distribution networks. Investigation into this trade has shown that federal, state and provincially restricted aquatic plants and animals are available for sale, knowingly or unknowingly, to consumers. The GREAT LAKES DETECTOR OF INVASIVE AQUATICS IN TRADE (hereinafter referred to as “GLDIATR”) is operated and maintained by the Great Lakes Commission (hereinafter referred to as “GLC”) and uses a “Semantic Full Text Algorithm” to systematically and continuously search the Internet for specific and potentially harmful, aquatic species for sale. It provides information on the online availability of invasive aquatic species to its users. Users must receive prior approval and authentication credentials from GLC in order to access GLDIATR and its information. Users may query GLDIATR databases based on specific search criteria and generate reports based on those searches.
- b. Use of GLDIATR services, including access to content provided at gldiatr.glc.org, is subject to compliance with these Terms. By visiting the GLDIATR site at <http://gldiatr.glc.org> you thereby agree to these terms.

2. INTENDED USES

- a. This software is intended to allow users to identify aquatic invasive species available for sale on the web, and aid state, provincial and federal agencies, resource managers, and other invasive species experts, in developing options for targeted management activities to reduce the risk of aquatic invasive species entering or establishing communities in the binational eight-state and two-province Great Lakes and St. Lawrence River region.

3. PARTIES

- a. System Administrator: System Administrator refers to GLC in their oversight, operation and maintenance capacity for GLDIATR.
- b. User: An interested party or similar user who has been granted access to and is using the system as provided by the GLC at <http://gldiatr.glc.org>.

4. ACCESS AND USE

- a. User: A user will be able to access information collected by GLDIATR. A user retains the right and ability to query information sourced from GLDIATR searches and reports produced by the System Administrator and displayed on the website. Users must obtain a username and password from GLC in order to access GLDIATR.
- b. System Administrator: GLC is the System Administrator for GLDIATR as it exists at gldiatr.glc.org. The System Administrator retains oversight authority over the system and user generated reports provided on gldiatr.glc.org.

5. CONTENT OWNERSHIP

- a. Users agree that GLC owns and retains all rights to GLDIATR services and information hosted on the web-based interface at gldiatr.glc.org. Users further agree that the content they view and search as a user is owned and controlled by GLC. Reports and content generated from the user interface and mined from GLDIATR databases shall continue to be owned by GLC.

6. USER GENERATED CONTENT

- a. Reports provided at gldiatr.glc.org are intended to be used as a tool for information sharing. Users are encouraged to use information generated by GLDIATR to inform related efforts.
- b. A user must obtain written approval from the GLC prior to using information contained in reports or otherwise derived from GLDIATR. Uses of information contained in reports or derived from the website include, but are not limited to, publically using the information derived from GLDIATR for other websites, products or publications.

- c. GLC is relieved of all liabilities associated with User developed content.
- d. The User is responsible for the professional quality and technical accuracy of all materials and products developed by the User containing information derived from GLDIATR services.
- e. The GLC's approval of all reports, products, and incidental work or materials generated by the User shall not in any way relieve the User of responsibility for the technical adequacy of the work. The GLC's review, approval, or acceptance of User generated content shall not be construed as a waiver of any rights under this agreement or of any cause of action arising out of this agreement.
- f. All work products associated with information gathered from GLDIATR and its databases shall carry attribution to the GLC. Final products created as part of this project may be used and distributed by the GLC or U.S. EPA at their discretion.

7. PROHIBITED USES

- a. Users agree to use GLDIATR for lawful, non-commercial, and appropriate purposes only.
- b. Users are specifically prohibited from:
 - Using this web based user interface or technology to conduct an illegal activity or to encourage conduct that would give rise to a criminal offense or civil liability
 - Use seller information in order to purchase legally restricted species
 - Introduce any malicious content including but not limited to viruses or any other computer code, files, programs that interrupt, destroy or limit the functionality of any computer software or hardware
 - Damage, disable, overburden, impair or gain unauthorized access to the GLDIATR system including GLC Servers, computer network or user accounts

8. REVOCATION OF USE

- a. If GLC determines in its sole discretion that a User is violating any of these Terms, GLC may (i) notify the User and (ii) implement measures to block or restrict User access to GLDIATR. The User agrees to immediately cease using GLDIATR and agrees not to circumvent, avoid, or bypass such restrictions or otherwise restore, or attempt to restore, such access.

9. SYSTEM MAINTENANCE

- a. GLC will continue operating and maintaining the capabilities of gldiatr.glc.org for as long as feasible, subject to personnel and monetary constraints.

10. TECHNOLOGY LIMITATIONS/ DISCONTINUATION

- a. GLC will make reasonable efforts to keep gldiatr.glc.org operational and accessible to Users, but technical difficulties or maintenance may, from time to time, interrupt connection. It may be necessary to change, suspend, or discontinue—temporarily or permanently—some or all of the GLDIATR services at any time without notice and liability. User acknowledges that GLC may do this at their sole discretion. User further agrees that GLC will not be liable for any modifications, suspension or discontinuance of GLDIATR services. All Users understand and agree that GLC has no obligation to maintain, support, upgrade or update the GLDIATR software and services.

11. INDEMNITY AND LIMITED LIABILITY

- a. GLDIATR and its web-based user interface at gldiatr.glc.org is a prototype that is continuously evolving and improving. This evolution may lead to errors in the information provided, including reports. GLC is not responsible for misclassifications of data which are the result of system error or other inaccuracy.
- b. Users agree to indemnify U.S. EPA, GLC and its Commissioners, directors, and employees from and against all liability, claims, suits, losses, damages and costs, including reasonable attorney fees (collectively, "damages"), arising out of use of GLDIATR, to the extent damages are caused by the negligence or willful misconduct of the User and its respective directors, officers and employees.
- c. GLC agrees to indemnify the User from and against all damages arising out of use of GLDIATR, to the extent damages are caused by the negligence or willful misconduct of GLC.
- d. In no event shall GLC, its Commissioners, directors, and employees be liable for any direct, indirect, punitive, incidental, special, consequential, or other damages including loss of profits arising out of or

in any way related to the use of GLDIATR and related products whether based in contract, tort, strict liability or other theory even if GLC affiliates have been advised of the possibility of damages.

- e. Certain State laws do not allow limitations of implied warranties of the exclusion of limitation of certain damages. If these laws apply to Users, some or all of the above disclaimers, exclusions or limitations may not apply.

12. WARRANTY

- a. Users agree that use of GLDIATR, GLDIATR services including the web-based interface, content, user material and any other materials contained on or provided through any access point are provided “as is” and, to the fullest extent permitted by law are provided without warranties of any kind, either express or implied. Without limiting any of the foregoing, GLC does not make any warranties of fitness for a particular purpose, title, merchantability, completeness, availability, security, compatibility or noninfringement; or that service provided by GLDIATR will be uninterrupted, free of viruses and other harmful components, accurate, error free or reliable.

13. SEVERABILITY

- a. Should any provision of these Terms be held invalid or unenforceable for any reason such invalidity or enforceability shall not affect the enforceability of the remaining provisions of these Terms and the application of those Terms should be enforced to the full extent permitted by law.

14. USER SUPPORT

- a. For technical or usage comments or concerns contact the System Administrator at gldiatr@glc.org.

15. ARBITRATION

- a. In an attempt to find the quickest and most efficient resolution of claims, users agree to discuss the issue informally for at least 30 days. Please contact the System Administrator at:

GLDIATR System Administrator
Great Lakes Commission
2805 S. Industrial Hwy., Suite 100
Ann Arbor, Michigan 48104
Phone: 734-971-9135
Email: gldiatr@glc.org

- b. If parties cannot reach an agreed upon solution by informal means then parties agree that any claim arising out of or related to these Terms or use of GLDIATR shall submit to binding arbitration. Parties agree to arbitrate in their individual capacity, agree not to arbitrate in a representative capacity or as part of a class, and expressly waive the right to seek relief on a class basis.
- c. Arbitration shall be administered by the American Arbitration Association in accordance with its rules and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.
- d. Claims shall be heard by a single arbitrator.
- e. Arbitration shall be conducted in Ann Arbor, Michigan, United States.
- f. Each party is responsible for their attorney fees related to arbitration and will equally share the common costs and fees associated with the alternative dispute resolution process such as filing fees and arbitrator’s costs.
- g. Users may pursue a claim in small claim court so long as the party proceeds on an individual basis. Parties may not bring a claim in any representative capacity or as part of a class and expressly waives the right to seek relief on a class basis.
- h. Unless otherwise required by a mandatory law of any jurisdiction, these Terms are subject to the laws of the state of Michigan, United States.

16. ENTIRE AGREEMENT

- a. Users agree that these Terms and any and all associated licenses constitute all the terms and conditions agreed upon and supersede any prior agreements made whether written or oral. Any subsequent or additional terms or conditions are void.

Appendix B. Stakeholder Survey Summary



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species: Initial User Survey Summary Report

This report was developed by the Great Lakes Commission as part of the project *Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species*.

February 2013

INTRODUCTION

To support the *Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species* project, the Great Lakes Commission (GLC) asked potential users to provide input, including their jurisdiction, questions and concerns about this pathway, and features they would like to see in the end product. This initial feedback will be used to shape the form and function of the web crawling software, the user interface, and the outputs of the system. Note that unless otherwise noted, respondents were allowed to select more than one answer, meaning that total percentages for one question may not equal 100%.

EXECUTIVE SUMMARY

Respondents: Fifty two people responded to the survey. The respondents were mainly professionals employed by state government (51.9%), federal government (15.4%), or non-governmental organizations (19.2%). Respondents represented agencies with AIS jurisdiction over a diverse set of water bodies. Agencies responsible for rivers and streams; inland lakes; and the Great Lakes (excepting Lake Ontario) were most prevalent. The majority of respondents indicated that they would like to continue to be involved (n=43) as the project moves forward.

Level of concern & ongoing projects: The majority of respondents (98%, n=52) were very concerned or concerned about the potential spread of aquatic invasive species via Internet sales. And, most respondents (74%, n=50) were unaware of previous or ongoing projects that address this pathway. The high level of concern and lack of on-going projects highlights the need for this project.

Species of greatest concern: The species of greatest concern were the various species of Asian carp, northern snakehead, hydrilla, and water hyacinth.

Desired features/capacity: Respondents were most interested in an easy to use program that provided a searchable database with information on the identity of vendors, the volume of sales broken down by species and vendor, a list of regulated species as well as native alternatives, and the ability to report to regulatory agencies. While some of these features may be outside of the scope of this project, the suggestions will be very useful during the design and implementation of this project.

Top questions and concerns: Respondents wondered how the project would identify species with multiple common names, how this project would relate to regulatory actions, identifying the scope of this problem by looking at the volume of sales by species and vendor, and on how this project can help with outreach to vendors and buyers.

DETAILED SURVEY RESPONSES

1. *In what capacity are you involved with aquatic invasive species?*

Respondents were mainly professionals employed by state government (51.9%), federal government (15.4%), or non-governmental organizations (19.2%).

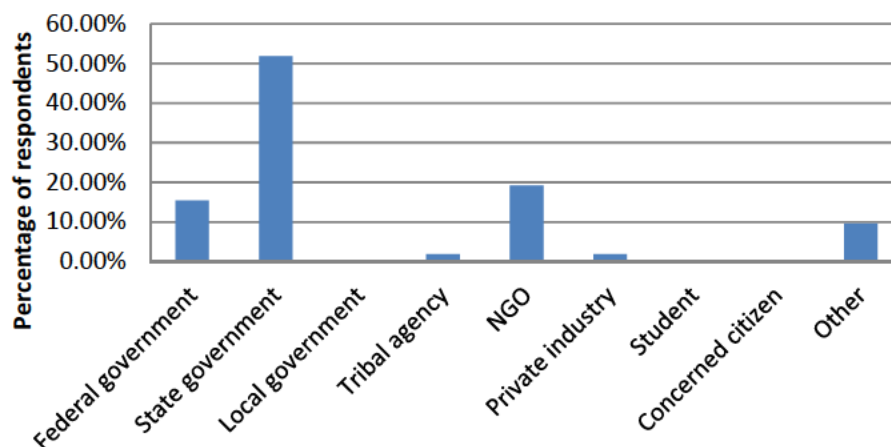


Figure 1: Sector breakdown of survey respondents. N=52

2. *Which water bodies does your agency have jurisdiction over in terms of managing aquatic invasive species (AIS)?*

Respondents represented agencies with AIS jurisdiction over a diverse set of water bodies. Agencies responsible for rivers and streams; inland lakes; and the Great Lakes (excepting Lake Ontario) were most prevalent.

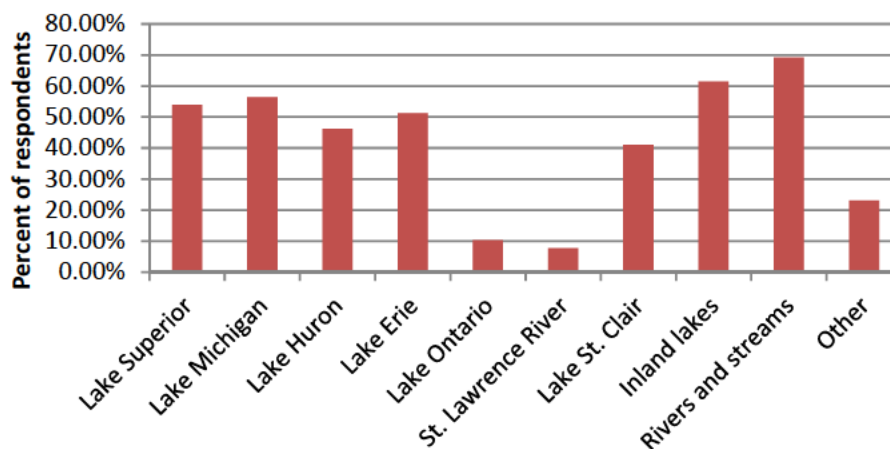


Figure 2: Percentage of respondents with jurisdiction for AIS in various regional water bodies. N=39

3. ***How concerned are you about the potential spread of aquatic invasive species via Internet sales?***

The majority of respondents (98%, n=52) were very concerned or concerned about the potential spread of aquatic invasive species via Internet sales.

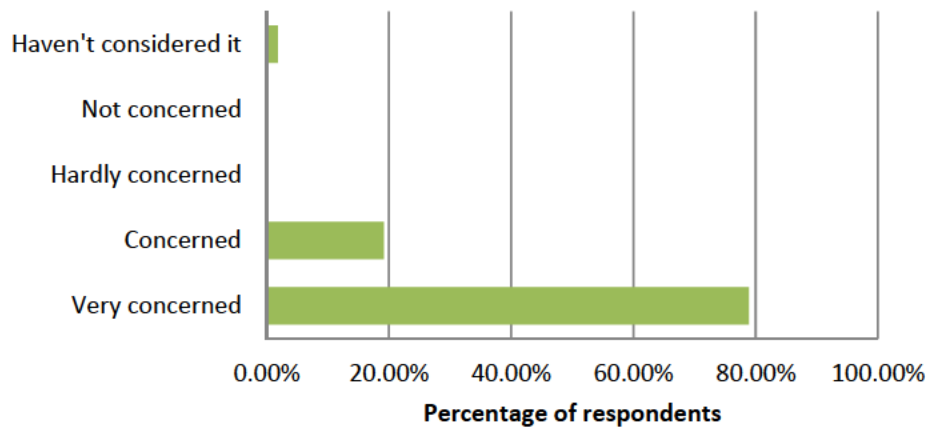


Figure 3: Assessment of the level of concern of respondents about the potential spread of AIS via Internet sales.

4. ***What specific questions or concerns do you have about this pathway that this project might be able to address?***

While there were many questions or concerns that were outside of the scope of this project, there were several questions or concerns that were raised multiple times that we have grouped into the top five responses that are listed below.

- 1) What are current regulations and enforcement options and how will those relate to this project? (n=10)
- 2) How will you identify species with multiple common names? (n=9)
- 3) What is the volume of Internet sales by species and by vendor? (n=8)
- 4) What type of outreach can be done for vendors and buyers? Where should education dollars be spent (e.g., on individuals, vendors, etc.?) (n= 5)
- 5) What is the identity of sellers and how can that information be used to determine which types of vendors are most problematic (e.g., Craigslist or EBay)?

5. Which species are you most interested in or concerned by in terms of availability through Internet sales? Respondents could list up to five species.

Respondents identified a host of species as well as many broad categories of species of concern. The species of greatest concern were the various species of Asian carp, northern snakehead, hydrilla, and water hyacinth. We have listed and tabulated the specific species that were identified in the survey in Appendix 1.

6. Please list any websites you are aware of that sell species of concern

There were several suggestions to investigate Craigslist and EBay as well as many specific sites. Refer to Appendix 2 for a complete list of responses.

7. What features would be most useful to you in a software package designed to assess the availability of invasive species via Internet sales and identify sellers?

Respondents were most interested in an easy to use program that provided a searchable database with information on the identity of vendors, the volume of sales broken down by species and vendor, a list of regulated species as well as native alternatives, and the ability to report to regulatory agencies. We have listed the top five requested features below.

- 1) Easy access to information on the name, contact info, type of business of the seller and what they were selling (n=10)
- 2) Report on the volume of sales by species and by vendor (n=8)
- 3) List of regulated species and a list of alternative options (n=4)
- 4) User-friendly, easy to use outputs (n=4)
- 5) Ability to report to regulatory/law enforcement agencies (preferably automatic) (n=3)

8 a. Are you aware of any previous or ongoing projects or resources that address the potential spread of aquatic invasive species via Internet sales?

The majority of respondents (74%, n=50) were unaware of previous or ongoing projects that address this pathway.

8 b. If yes, please provide a short description of the project or resource:

We received thirteen responses with several overlapping suggestions. Responses have been grouped and, in some cases, reworded for clarity. Responses were excluded if there was insufficient information provided to allow for the identification of the project.

Recommendations:

- 1) Minnesota Sea Grant projects
- 2) Illinois/Indian Sea Grant led a GLRI funded project focusing on OIT: Development of a needs assessment; distribution of existing OIT outreach tools; development of new OIT outreach tools; education and outreach on the "Don't Release" message ; trainings for master gardeners; working with state agencies to develop non-technical versions of state regulations on OIT; etc.
- 3) USFWS risk assessment project
- 4) The Mich. Dept. of Agriculture & Rural Development has a pending project where they will be developing a contact database of firms in Michigan that sell aquatic plants. As part of that they will try to capture those which have web site.
- 5) The Invasive Species Advisory Committee to National Invasive Species Council developed a general white paper on invasive species and e-commerce. The International Plant Protection Convention has also worked on e-commerce and plant species as well as aquatic plant pests. (n=3). (<http://www.invasivespecies.gov/ISAC/White%20Papers/E-Commerce%20White%20PaperFINAL.pdf>)
- 6) The Great Lakes Fishery Commission
- 7) Maki and Galatowitsh 2004 publication
- 8) Two GLRI funded projects by Great Lakes Sea Grant
- 9) The webcrawler developed by DNR in either N. or S. Carolina

9. Would you be interested in attending periodic (e.g., every other month) conference calls and/or webinars to receive updates and provide feedback as the project progresses? I

Out of the 48 respondents to this question, 43 said that they would be interested in continuing to provide feedback on the development of this project. For a list of contact information see Appendix 3.

10. Please tell us anything else you think we should know related to Internet sales of aquatic invasive species and/or your interest in this project:

Respondents provided a wide variety of comments and helpful suggestions. See Appendix 4 for a full list of comments.

Appendix 1: Species of greatest interest or concern in terms of availability through Internet sales

| Common name | Scientific name | response | Common name | Scientific name | response |
|-------------------------------|----------------------------------|----------|----------------------|------------------------------------|----------|
| Plants | | | Fish | | |
| Brazilian elodea | <i>Egeria densa</i> | 3 | loach | <i>Misgurnus anguillicaudatus</i> | 1 |
| crested floating heart | <i>Nymphoides cristata</i> | 1 | bass species | <i>Micropterus sp.</i> | 1 |
| curly-leaf pondweed | <i>Potamogeton crispus</i> | 1 | mosquito fish | <i>Gambusia affinis</i> | 1 |
| European frogbit | <i>Hydrocharis morsus-ranae</i> | 2 | northern snakehead | <i>Channa sp.</i> | 9 |
| fanwort | <i>Cabomba caroliniana</i> | 3 | brown trout | <i>Salmo trutta</i> | 1 |
| flowering rush | <i>Butomus umbellatus</i> | 2 | stone moroko | <i>Pseudorasbora parva</i> | 1 |
| Hydrilla | <i>Hydrilla verticillata</i> | 8 | wels catfish | <i>Silurus glanis</i> | 1 |
| parrot's feather | <i>Myriophyllum aquaticum</i> | 4 | Asian Carp | | 3 |
| purple loosestrife | <i>Lythrum salicaria</i> | 1 | bighead carp | <i>Hypophthalmichthys nobilis</i> | 6 |
| water aloe or water soldiers | <i>Stratiotes aloides</i> | 2 | black carp | <i>Mylopharyngodon piceus</i> | 3 |
| water chestnut | <i>Trapa natans</i> | 2 | silver carp | <i>Hypophthalmichthys molitrix</i> | 6 |
| water hyacinth | <i>Eichhornia crassipes</i> | 5 | grass carp | <i>Ctenopharyngodon idella</i> | 5 |
| water lettuce | <i>Pistia stratiotes</i> | 2 | Crucian Carp | <i>Carassius carassius</i> | 1 |
| yellow floating heart | <i>Nymphoides peltata</i> | 2 | diploid grass carp | <i>Ctenopharyngodon idella</i> | 1 |
| yellow iris | <i>Iris pseudacorus</i> | 1 | Prussian carp | <i>Carassius gibelio</i> | 1 |
| Crustaceans | | | Amphibians | | |
| rusty crayfish | <i>Orconectes rusticus</i> | 2 | African clawed frogs | <i>Xenopus laevis</i> | 1 |
| red swamp crayfish | <i>Procambarus clarkii</i> | 1 | | | |
| marbled crayfish (marmokrebs) | | 2 | Other | | |
| Mollusks | | | Pathogens/parasites | | |
| mystery snails | | 1 | | | |
| New Zealand mudsnail | <i>Potamopyrgus antipodarum</i> | 2 | | | |
| Chinese mystery snail | <i>Cipangopaludina chinensis</i> | 1 | | | |

Appendix 2: List of websites selling AIS

| Website |
|--|
| 1) http://www.pondexperts.ca/ |
| 2) http://bonniesplants.3dcartstores.com/Lily-Like-Aquatics_c_29.html |
| 3) Liveaquaria.com |
| 4) Aquabid.com |
| 5) http://www.crocus.co.uk/plants/_/carex-acutiformis-/classid.2000018217/?affiliate=bbcgwwwebmay |
| 6) http://www.kimskoi.ca/2010/07/welcome-to-the-new-kims-koi/ |
| 7) http://www.liveaquaria.com/product/prod_display.cfm?c=768+796&pcatid=796 |
| 8) http://www.bayoubloomstropicalplants.net/pond-and-bog-plants.php |
| 9) http://www.the-waters-edge.ca/index.html |

Appendix 3: Contact information for respondents interested in continued involvement with the project

| Name | Title | Organization | Email | Phone |
|---------------------------|---|---|-----------------------------------|------------------------|
| Allen Brandes | Fisheries Regional Programs Supervisor | MO Department of Conservation | Allen.Brandes@mdc.mo.gov | 417-895-6880 |
| Brenda Koenig | Aquatic Ecologist | Ontario Ministry of Natural Resources | brenda.koenig@ontario.ca | 705-755-1904 |
| Chris Weeks | Academic Specialist | Michigan State University | weeksch@msu.edu | 517-353-2298 |
| Cindy Borgwordt | Fish Health Specialist | Lincoln University | borgwordtc@lincolnu.edu | 573-681-5447 |
| Craig S. Milkowski | Commercial Fish Specialist | Michigan DNR LAW | milkowskic@michigan.gov | 989-733-0078 |
| Crysta Gantz | Lab Program Manager | University of Notre Dame | cgantz@nd.edu | 574-631-2849 |
| Danielle Hilbrich | Aquatic Invasive Species Outreach Assistant | IL-IN Sea Grant | hilbrich@illinois.edu | 847-242-6442 |
| David G Blahna | VMO, PA Aquaculture Liaison | USDA/APHIS/VS | david.g.blahna@aphis.usda.gov | 717.580.0374 |
| Dayna Laxton | Project Biologist | Ontario Streams | dayna.laxton@ontariostreams.on.ca | 416-886-5819 |
| Doug Jensen | AIS Program Coordinator | University of Minnesota Sea Grant Program | Djensen1@umn.edu | 218-726-8712 |
| Doug Sweet | Superintendent | London State Fish Hatchery, ODNR | douglas.sweet@dnr.state.oh.us | 740-852-1412 |
| Eric Fischer | AIS Coordinator | Indiana DNR Division of F&W | efischer@dnr.in.gov | 317-234-3883 |
| Eugene Braig | Program Director, Aquatic Ecosystems | OSU Extension | braig.1@osu.edu | 614-292-3823 |
| Greg Hitzroth | | Illinois-Indiana Sea Grant | hitzroth@illinois.edu | 217-300-0182 |
| Helene Godmaire | Director | AIS Quebec Council | cqees@gmail.com | 450-467-6921 |
| Jason Goldberg | Fish and Wildlife Biologist | U.S. Fish and Wildlife Service | Jason_Goldberg@fws.gov | 703-358-1866 |
| Jay Hemdal | Curator of Fishes and Invertebrates | The Toledo Zoo | jay.hemdall@toledozoo.org | 419-385-5721 ext. 2002 |
| Jim Grazio | Great Lakes Biologist | PADEP | jagrazio@pa.gov | 814-217-9636 |
| Kevin E. Ramsey | Law Enforcement Specialist | Great Lakes Fishery Commission | striperrams@msn.com | 319-483-7404 |
| Larry DeSloover | Conservation Officer | Michigan Department of Natural Resources | DeSloover@Michigan.gov | 989-370-0117 |
| Matt Preisser | Lake Coordinator | Michigan DEQ-Office of the Great Lakes | preisserm@michigan.gov | 517-335-0061 |
| Michael Hoff | AIS Program Coordinator | USFWS | michael_hoff@fws.gov | 612-713-5114 |

| Name | Title | Organization | Email | Phone |
|----------------------------|---|--|--------------------------------|------------------------|
| Mike Bryan | Plant Industry Specialist | Mich. Dept. of Agriculture & Rural Development | bryanm@michigan.gov | 517-241-2977 |
| Mike Freeze | President | National Aquaculture Association | kkeo@centurytel.net | 501-842-2872 |
| Mike Ripley | Environmental Coordinator | CORA | mripley@sault.com | (906) 632-0072 |
| Nancy Barr | DVM | Michigan Department of Agriculture and Rural Development | barrn@michigan.gov | 517-241-1475 |
| Nicolas Lapointe | Post-Doctoral Fellow | Carleton University | nlapointe@gmail.com | 613-858-8215 |
| Pat Charlebois | | IISG | charlebo@illinois.edu | 847-242-6441 |
| Robyn Draheim | AIS Coordinator - Pacific Region | USFWS | robyn_draheim@fws.gov | 503-736-4722 |
| Rochelle Sturtevant | Regional Sea Grant Specialist - Outreach | NOAA | rochelle.sturtevant@noaa.gov | 517-596-2598 |
| Roger Eberhardt | | Michigan Office of the Great lakes | eberhardttr@michigan.gov | 517-335-4227 |
| Ron Benjamin | MICRA Chair | MICRA | micrarivers.org | 618-997-6869 x-18 |
| Sara Grise | Senior Outreach Specialist | Pennsylvania Sea Grant | sng121@psu.edu | 814-217-9020 |
| Sarah LeSage | AIS Program Coordinator | MI DEQ | lesages@michigan.gov | 517-241-7931 |
| Stas Burgiel | Assistant Director, Prevention & Budgetary Coordination | National Invasive Species Council | stas_burgiel@ios.doi.gov | 202.354.1891 |
| Steve Huff | Commercial Fish Specialist | State of Michigan | huffs@michigan.gov | |
| Steve Wilden | Veterinary Medical Officer | USDA APHIS Veterinary Services | Steven.R.Wilden@aphis.usda.gov | 614-314-0614 |
| Sue Tangora | Invasive Species Coordinator | Michigan DNR | tangoras@michigan.gov | 517-241-1153 |
| Tim Banek | Invasive Species Coordinator | Missouri Department of Conservation | tim.banek@mdc.mo.gov | 573-522-4115 ext. 3371 |
| Tim Campbell | AIS Outreach Specialist | Wisconsin Sea Grant | tcampbe3@aqua.wisc.edu | 262-574-2153 |
| Todd Losee | AIS Specialist | Michigan DEQ | loseet@mi.gov | 517-335-3457 |
| Tom Alwin | | | tomgalwin@gmail.com | 517-285-8687 |
| Tom Goniea | Biologist | Michigan DNR | gonieat@michigan.gov | 517-373-7341 |

Appendix 4: Other information respondents wished to share about this topic as well as their interest in the project

| Other useful information and comments |
|--|
| The CQEEE is planning a project targeting 3 IS vectors. The main objective is to develop and implement an educational campaign targeting the following vectors: 1) aquarium trade, 2) school environment and 3) cultural communities. QC and Environment Canada funding requested. Decision should come later this year (May). Adding a tool to identify Internet sale would be great. |
| The GLFC law enforcement committee is highly involved with the preventing of spreading invasive species. Our work on internet sales is limited but we would use this information to assist in enforcement projects |
| We have an online database of regulations (federal and for all 50 states) and OIT website. (Unveiled soon.) Would be great to link the 2. Schools project - we have relationships with the major biological supply houses that we could feed into. |
| Is this low hanging fruit? The biggest problem is ballast water. More effort needs to be placed on that rather than this minor perceived problem. |
| Mich. Dept. of Agriculture & Rural Development has an initiative where we are now incorporating compliance with NREPA Part 413 in our inspections of plant growers and dealers, and to a limited extent with pet shops and other stores that sell aquarium & backyard pond plants. |
| I am the program manager for aquaculture with Michigan Department of Agriculture and Rural Development. My concern is primarily with the potential introduction of disease in these species and possible impacts on the aquaculture industry. |
| Asian market sales. Pet store trade. Minnow trade. |
| Make sure to take into account the sale of dry bulbs from the big box stores, e.g., Walmart sells dry pondweed bulbs that you drop into your aquarium and they germinate (back of package: Sea-Life, Inc., 1400 S. Van Eps, Sioux Falls, SD 57105) |
| I'm interested in both the mass market (Internet sales from large retailers) as well as private sales (Internet sale among collectors and individuals). |
| Our Conservation Agents have ordered prohibited species from E-bay, but we never able to obtain the contact information or the address of the seller. |
| I am aware that a Kibbutz from Israel was once selling pink (albino) diploid grass carp to pet stores in New York state. I am not sure if this is still occurring or not. |
| From a federal perspective, I hope that the project can develop products that can inform regulatory agencies (e.g., the Fish and Wildlife Service and the Animal and Plant Health Inspection Service) in terms of both particular species of concern as well as broader policy concerns. |
| I am the lead for bait policy in Ontario and we have initiated a review of bait use and management across Ontario. We suspect that internet sales of bait will be more common in the future and are concerned regarding ability to enforce provincial laws etc especially regarding spread of invasive species. |
| I have currently been working in partnership with the OFAH/MNR Invading Species Awareness Program and we've been inventorying pet stores and water garden/nursery centers since 2006, we have been made aware of the increase in online sales for these retail outlets, so this is definitely a growing pathway! |
| I know that it was discussed during the teleconference that this first version of the software will not have the capacity to mine data from sites in languages other than English, but this would be something worth investing in the future. I'm guessing that a lot of e-commerce is done through websites not in English, but would affect our backyards. |
| I have an extensive background in the aquarium hobby and have written books and magazine articles on various topics - and I'm always interested in staying abreast of changes in this regard. |
| I serve as APHIS PA Aquaculture Liaison and am interested in any aspect of control of aquatic species that may affect US Aquaculture industry |
| I would like to see compiled and disseminated information on state by state permit requirements for shipping live animals. |

Appendix C. January 2013 Webinar Materials



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Webinar

January 14, 2013





Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Webinar Objectives

- Describe the project and answer questions
- Request input to address information needs
- Improve understanding of stakeholder concerns and needs



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Project Overview

- Funding: FY12 Great Lakes Restoration Initiative grant from EPA
- Timeline: October 1, 2012 – September 30, 2014
- Project Objectives:
 - Develop software to assess the availability of invasive species via Internet sales and identify sellers
 - Provide management tools to decision-makers and regulators
 - Present information on the Internet marketplace, including risks and options for management



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Problem Statement

- Organisms in trade
 - Intentional and unintentional releases of live organisms that are bought and sold for use in aquariums, nurseries, water gardens, aquaculture, as live bait, etc.
- Internet commerce facilitates trade in live organisms
- Complex issue and scope is poorly understood → limited management efforts



Pathway Assessment

Develop web monitoring system to identify available species & suppliers

October 1, 2012 – December 30, 2013



Outreach

Inform suppliers of regulations, potential risks, consumer “best practices”

December 2013 – March 2014



Management

Share results; develop recommendations for future management; make system available

January – September 2014

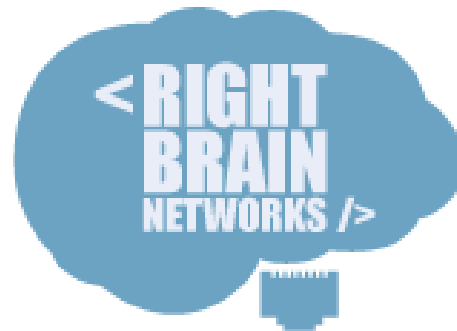
Stakeholder Engagement



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Current Status

- We have an idea of what we want our product to be
- We've contracted with
 - Technical advisor: Dr. Bing Liu (visit his [website](#))
 - Software engineering consultant: RightBrain Networks
- We have begun to engage stakeholders via
 - This webinar
 - [Survey](#)—please complete by Jan. 25, 2013!
 - ***Please stay involved!***





Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Next Steps

- **Develop software with help of contractors, stakeholders (through December 30, 2013)**
 - Further defining software specifications, e.g., search parameters, features, etc.
 - Developing detailed software design plan
- **Ongoing stakeholder engagement**
 - Utilization of survey feedback and other input to inform development of software
 - Scheduling future updates on progress... *Stay tuned!*



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Current Information Needs

Please take the survey!

- What specific questions or concerns do you have about this pathway?
- Which species should we be looking for?
- What software features would be most useful?
- What websites are currently selling species of concern?

Initial survey results: What specific questions or concerns do you have?

- **What species** are being trafficked?
- Species that are sold under the **incorrect name** or do not have the proper name attributed to them (i.e., species with ambiguous common names).
- Ability for species to be **shipped to states that prohibit them**.
- What **enforcement options** exist to address this pathway, and what funding mechanisms support it?



should we be looking for?





Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

QUESTIONS & COMMENTS

Project information is online at
www.glc.org/ans/internettrade.html

Attendee Report

General Information

Webinar Name

Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Actual Start Date/Time

Jan 14, 2013 02:08 PM EST

| First Name | Last Name | Organization |
|-------------|---------------|--|
| Stas | Burgiel | National Invasive Species Council |
| Michael | Hoff | U.S. Fish and Wildlife Service |
| Bart | Mosier | USEPA |
| Shannon | Van Patten | Michigan Dept. of Natural Resources |
| Kathleen | Burda | USDA APHIS VS |
| Dana | Filippini | National Park Service |
| Jamie | Begin | RightBrain Networks |
| Todd | Losee | Michigan DEQ |
| Bing | Liu | UIC |
| Doug | Jensen | Minnesota Sea Grant |
| Donald | MacLean | USFWS |
| Christopher | Winslow | Ohio Sea Grant |
| Mike | Bryan | Michigan Dept. of Agriculture & Rural Development |
| Sarah | LeSage | MDEQ |
| Joanne | Grady | USFWS |
| Susan | Pasko | NOAA |
| john | booser | PADEP/ Interstate Waters Office |
| Kevin | Ramsey | Great Lakes Fishery Commission |
| Erika | Weisz | Ontario Ministry of Natural Resources |
| Allen | Brandes | MO Department of Conservation |
| Michele L | Tremblay | naturesource communications |
| Anjanette | Bowen | US Fish & Wildlife Service |
| daniel | reed | us fish and wildlife service |
| Marshall | Meyers | PIJAC |
| Susan | Jewell | US Fish and Wildlife Service |
| Jill | Wingfield | GLFC |
| Kathryn | Buckner | Council of Great Lakes Industries |
| Greg | Hitzroth | Illinois-Indiana Sea Grant |
| Abigail | Fusaro | NOAA/GLERL |
| Luci | Cook-Hildreth | Texas Parks and Wildlife Dept |
| Jay | Hemdal | The Toledo Zoo |
| Craig | Milkowski | Michigan DNR Law |
| Jennifer | Nalbone | Great Lakes United |
| robyn | draheim | USFWS |
| Jeff | McAulay | GLC |
| Sara | Grise | Pennsylvania Sea Grant |
| Crysta | Gantz | University of Notre Dame |
| Chrystal | Schreck | Wisconsin Dept. of Natural Resources |
| Matt | Preisser | MDEQ-Office of the Great Lakes |
| Thomas | Goniaea | Michigan DNR |
| Steven | Huff | MDNR |
| Michael | Bommarito | Bommarito Consulting, LLC |
| David | Copplestone | Ontario Ministry of Natural Resources |
| Helene | Godmaire | CQEEE (AIS Quebec Council) |
| Danielle | Hilbrich | IL-IN Sea Grant |
| Craig | Martin | USFWS |
| Roger | Eberhardt | Michigan Office of the Great Lakes |
| Jason | Haines | MDNR--LED |
| Jim | Seidewand | PIJAC/ Pet World |
| Chris | Weeks | Michigan State University |
| Nancy | Barr | Michigan Department of Agriculture and Rural Development |
| Kim | Bogenschutz | Iowa DNR |
| Alisha | Dahlstrom | Wayne State University |
| Sue | Tangora | Michigan.DNR |
| Stanley | Cowton | US Army Corps of Engineers |
| Eric | Fischer | Indiana DNR |
| Paul | Gregory | Maine D.E.P. |
| Tim | Campbell | Wisconsin Sea Grant |
| Jim | Bredin | CEQ |
| Jason | Goldberg | U.S. Fish and Wildlife Service |
| Reid | Roeske | Mich DNR |
| Mindy | Wilkinson | DNR |
| james | schardt | epa-glno |
| Becca | Nash | University of Minnesota |
| Debrupa | Pathak | Biodiversity Policy Section, Ministry of Natural Resources |
| Dayna | Laxton | Ontario Streams |
| John | Goss | CEQ |
| Mike | Piskur | Council of Great Lakes Governors |
| Teresa | Dudis | USDA APHIS VS |
| Erin | Grey | University of Notre Dame |
| Nathaniel | Gillespie | USDA Forest Service |

Appendix D. July 2013 Outreach Webinar Materials



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Webinar
July 16, 2013





Webinar Objectives

- Review project and status update
- Brainstorming Session
 - Review existing communication resources
 - How do we reach out to vendors and consumers?
 - What is the message?
 - What are the mechanisms/products?



Project Review

- Funding: FY12 Great Lakes Restoration Initiative grant from EPA
- Timeline: October 1, 2012 – September 30, 2014
- Project Objectives:
 - Develop software to assess the availability of invasive species via Internet sales and identify sellers
 - Provide management tools to decision-makers and regulators
 - Present information on the Internet marketplace, including risks and options for management



Pathway Assessment

Develop web monitoring system to identify available species & suppliers

October 1, 2012 – December 30, 2013



Outreach

Inform suppliers of regulations, potential risks, consumer “best practices”

December 2013 – March 2014



Management

Share results; develop recommendations for future management; make system available

January – September 2014

Stakeholder Engagement



Expected results

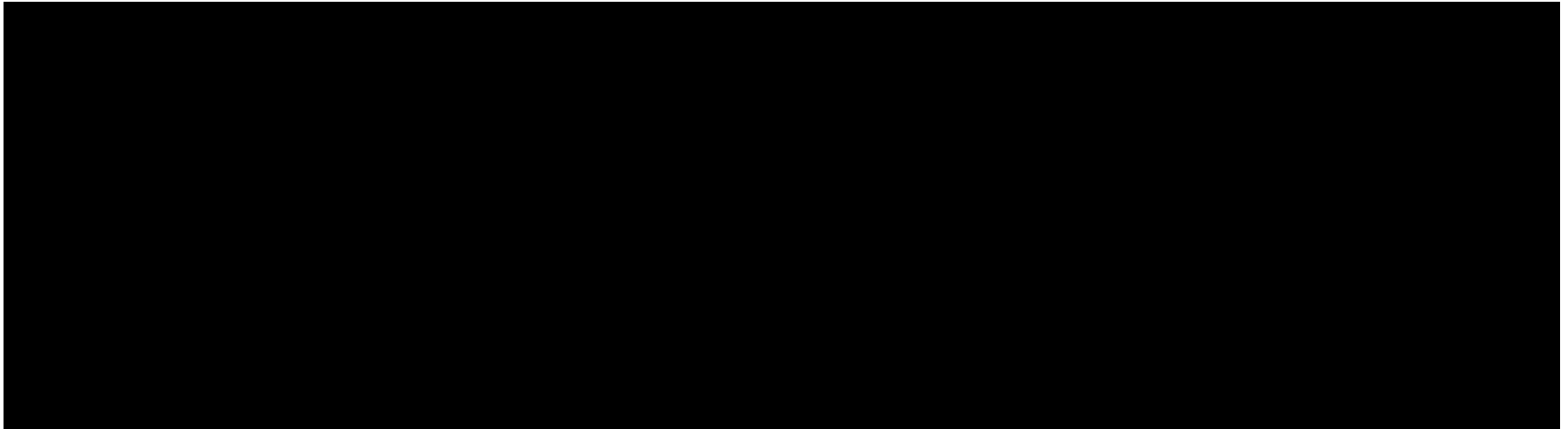
Information we plan to get using the software:

- Reports of species listings
 - By species & by vendor
- Location & contact information for vendors
- Shipping restrictions

Information will be distributed in reports via:

- Email list
- Public website

Hypothetical Result



Sells regulated species including: hyacinth, water lettuce, fairy moss, anacharis

Does limit the sale of plants to some states (no Great Lakes states are listed)

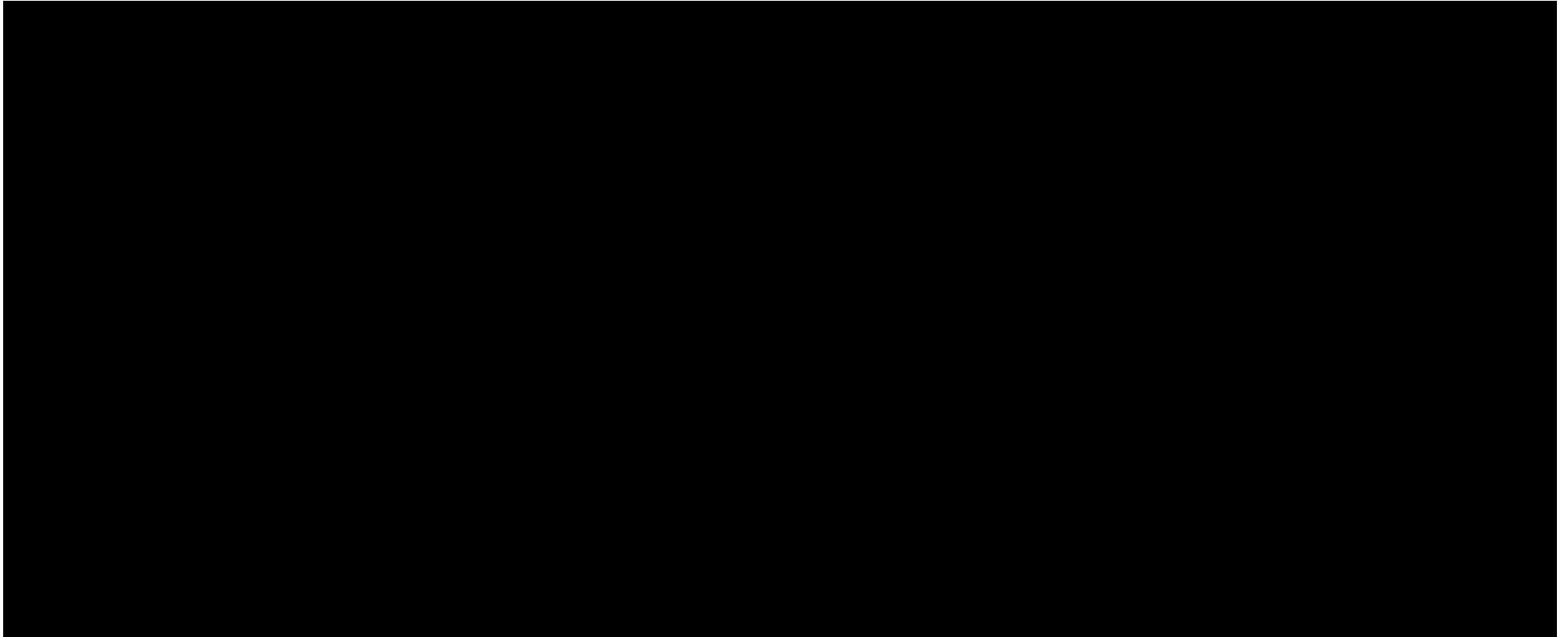
Shows willingness to alter behavior (switched variety of frogbit being sold due to regulations)

Limited regulatory authority (Located in North Carolina)

- Federally regulated species: USFWS or USDA-APHIS



Hypothetical Result



Individual retailer, located within the region (Buffalo, NY)

Limited regulation – non-native crayfish prohibited in WI and MN





Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

What is our outreach plan?

- How will we communicate with vendors selling species we don't want in the Great Lakes?
 - What is the message to vendors? To consumers?
 - What mechanisms for communicating those messages would be most effective?
 - What resources currently exist?
 - What new resources are needed?

We want your input and ideas!





Discussion



Are there existing resources we should be using/promoting?

Are there new resources/products that should be developed?



What is our message?

- **Considerations**

- Should message be different based on type of vendor (individual vs. corporation)?
- What about consumer behavior?
 - Project focuses on vendors but many existing campaigns focus on consumer behavior
 - Vendors have direct access to consumers
 - Opportunity to use our public website to promote consumer awareness



What is our message?

- Some ideas:
 - **Stop! What you're doing is harmful and possibly illegal!**
 - Potential for regulatory action
 - Creation of “bad actors” list on website?
 - **Learn regulated/unwanted species for the Great Lakes**
 - **Promote alternative species**
 - **Educate your consumers**
 - **Join an existing campaign** (Habitattitude, Grow Me Instead)



How should we communicate with vendors and consumers?

What are the products?

- **Some ideas:**
 - Database of regulations
 - Educational video/presentation hosted on website
 - List of alternative species
 - Vendor survey of where they obtain information about regulated species



How should we communicate with vendors and consumers?

What is the delivery vehicle?

- **Some ideas:**
 - webpage of information associated with the public interface of the search tool
 - Email with concise message with link to further resources



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Next steps

- Review existing information/campaigns (*now*)
- Use webinar input to develop
 - draft message
 - outreach plan (outlines delivery mechanisms and products)
- Distribute draft message for review and comment (*August*)
- Finalize message and develop products (*September-November*)
- Implement outreach plan (*starting in December/January and ongoing after project ends*)

Please continue to share ideas and resources for communication!

Visit our website for periodic updates <http://gic.org/ans/internettrade.html>



Attendee Report

Generated

Aug 28, 2013 11:26 AM PDT

General Information

Webinar Name

Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species -- Brainstorming about stakeholder communication

Actual Start Date/Time

Jul 16, 2013 01:54 PM EDT

| First Name | Last Name | Email |
|------------|-------------|-----------------------------------|
| Chrystal | Schreck | chrystal.schreck@wisconsin.gov |
| Stas | Burgiel | stas_burgiel@ios.doi.gov |
| Jill | Wingfield | jwingfield@glfc.org |
| Doug | Jensen | djensen1@umn.edu |
| Dayna | Laxton | dayna.laxton@ontariostreams.on.ca |
| Evelyn | Strader | straderco@aol.com |
| Kate | Howe | howek@purdue.edu |
| David | Blahna | david.g.blahna@aphis.usda.gov |
| Jay | Hemdal | jay.hemdal@toledozoo.org |
| Gary | Jagodzinski | gary_jagodzinski@fws.gov |
| Kevin | Ramsey | striperrams@msn.com |
| Jason | Goldberg | jason_goldberg@fws.gov |
| Marshall | Meyers | mmeyers@meyersalterman.com |
| Bart | Mosier | mosier.bart@epa.gov |
| Abigail | Fusaro | abigail.fusaro@noaa.gov |
| David | Copplestone | david.copplestone@ontario.ca |
| Eric | Fischer | efischer@dnr.in.gov |
| Nancy | Murray | nancy.murray@ct.gov |
| Danielle | Hilbrich | hilbrich@illinois.edu |
| Cory | Lindgren | cory.lindgren@inspection.gc.ca |
| Tom | Goniaea | gonieat@michigan.gov |
| Susan | Pasko | susan.pasko@noaa.gov |
| daniel | reed | daniel_reed@fws.gov |

Appendix E. November 2013 Workshop I Materials

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Wisconsin Department of
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Eric Marquis

Québec Government Representative
Chicago, Illinois

*Ensuring environmental and
economic prosperity for the Great
Lakes-St. Lawrence region through
communications, policy research and
development, and advocacy.*

October 2, 2013

Dear Colleague,

Please join us!

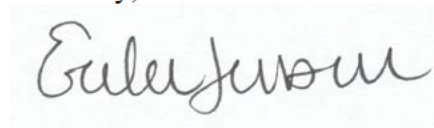
You are invited to participate in an upcoming workshop for the Great Lakes Commission project, *Protecting the Great Lakes from the Internet Trade on Aquatic Invasive Species*, to be held November 20, 2013 at the Marriott Detroit Metro Airport in Romulus, Michigan. As you know, the prevention and control of aquatic invasive species (AIS) is a priority issue in the Great Lakes region as ecological and economic impacts continue to mount. This project, funded through the Great Lakes Restoration Initiative, is supporting AIS prevention efforts by developing software to assess the availability of invasive species via Internet sales, identify sellers, and develop and implement targeted management activities.

Over the past several months, the Commission has been working with a software development firm, RightBrain Networks, to develop and design the web-crawling and analysis software. This workshop is being held as an opportunity to demonstrate a beta version of the software to interested parties and potential end users, as well as to get feedback on the software and other aspects of this project.

Overall, our efforts under this project are designed to provide management tools to decision-makers and regulators; collect and share information on the Internet marketplace; better assess the risks associated with this pathway; and present options for additional action to effectively prevent the movement of AIS via this pathway. **Key to our success is the participation of individuals like you** and other representatives from government, commercial, research, technology and non-government sectors.

To facilitate your participation, **travel funds are available** to help individuals who might otherwise be unable to attend. If you require travel assistance, please complete the attached form and return it no later than Friday, November 1. For more information about the workshop, please contact me by email (ejensen@glc.org) or phone (734-971-9135). We hope you will plan to attend.

Sincerely,



Erika Jensen
Project Manager



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Save the Date!

Join the Great Lakes Commission for a workshop to hear about and provide feedback on our efforts to assess the trade of aquatic invasive species over the Internet.

November 20, 2013 | 10:00 a.m. -3:00 p.m.

Detroit Metro Airport Marriott

30559 Flynn Drive · Romulus, Michigan 48174

Project Overview

This project, funded through the Great Lakes Restoration Initiative, will support aquatic invasive species prevention efforts by developing software to monitor the availability of invasive species via Internet sales, identify sellers, and develop and implement targeted management activities. This project will provide management tools for decision-makers and regulators, present information on the Internet marketplace, better assess the risks associated with this pathway, and present options for additional action to effectively prevent the movement of AIS via this pathway.

Who Should Participate

All interested stakeholders, including federal, state/provincial and tribal agencies, local governments, academics, nongovernment and private entities, among others.

Workshop Objectives

- Provide an update on project status and next steps
- Demonstrate a preliminary version of the web crawling system
- Provide an opportunity for input and feedback from participants

An agenda and registration information will be available soon.

For more information on the project visit: <http://glc.org/ans/internettrade.html>



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

November 20, 2013 | 10:00 a.m. - 3:00 p.m.

Dearborn Room

Detroit Metro Airport Marriott

30559 Flynn Drive · Romulus, Michigan 48174

Workshop Agenda

All times are Eastern

- | | |
|------------|---|
| 9:30 a.m. | Registration |
| 10:00 a.m. | Welcome, introductions, agenda review |
| 10:15 a.m. | Project overview and update |
| 10:45 a.m. | Presentation of Internet Sales of Invasive Species Detection System (IS2DS) Beta <ul style="list-style-type: none">• Features and functionality• Vision for ongoing operation and products• Questions for and from participants |
| 12:00 p.m. | Lunch <i>Provided in the hotel's Ha'Penny Restaurant</i> |
| 1:00 p.m. | Discussion session and feedback from participants <ul style="list-style-type: none">• How do you foresee using the IS2DS?• Do you foresee installing and using this system in your own agency?• What will you do with the information we provide?• What other management challenges do you face? |
| 2:00 p.m. | Outreach and communication with Internet sellers <ul style="list-style-type: none">• Draft message and available resources and materials• Tracking progress• Questions and discussion |
| 2:45 p.m. | Wrap-up / next steps |
| 3:00 p.m. | Adjourn |

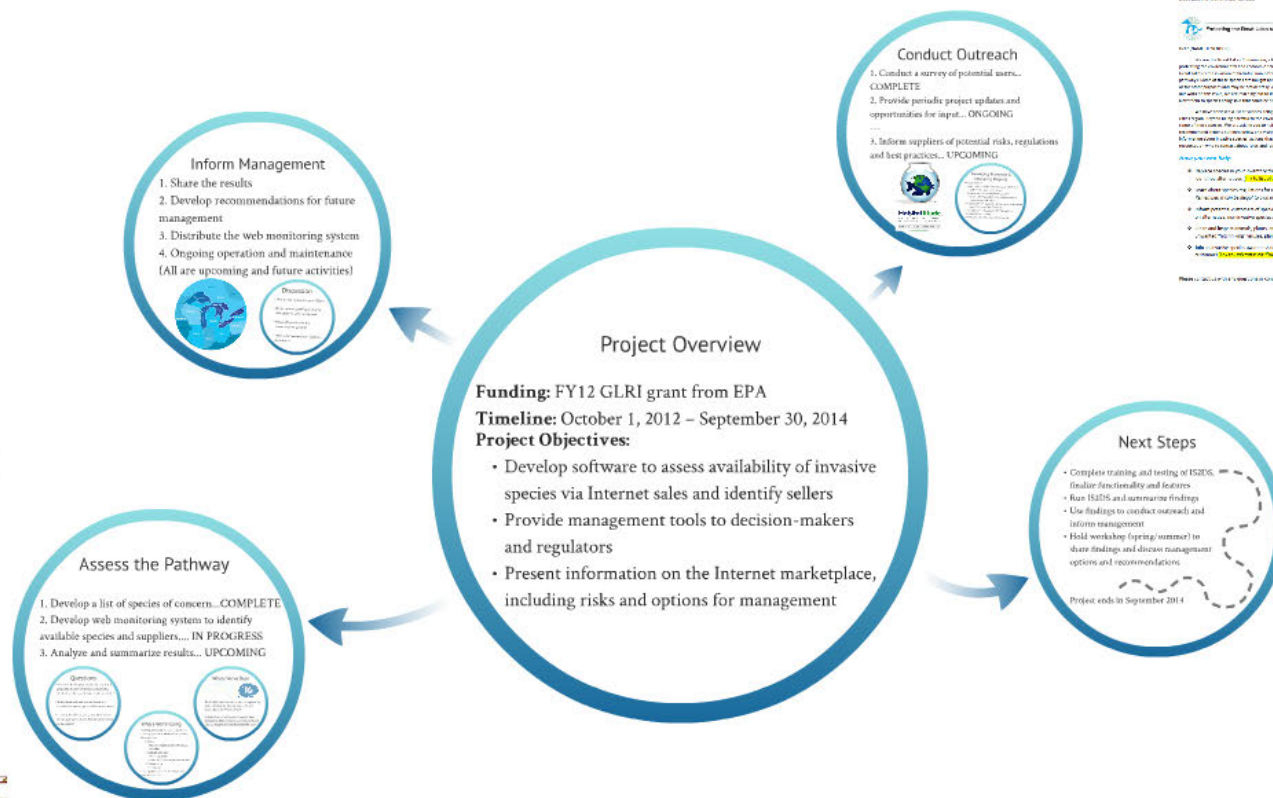


Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Workshop I November 20, 2013 | Detroit Metro Airport Marriott

Workshop Objectives

- Provide an update on project status and next steps
- Present proposed functions and features of the web crawling system
- Provide an opportunity for input and feedback from participants



Monitoring of Internet Sales of Aquatic Invasive Species

Presenting the Great Lakes Commission and the Great Lakes Restoration Initiative

Workshop Objectives

Provide an update on project status and next steps

Present proposed functions and features of the web crawling system

Provide an opportunity for input and feedback from participants

Project Overview

Funding: FY12 GLRI grant from EPA

Timeline: October 1, 2012 – September 30, 2014

Project Objectives:

Develop software to assess availability of invasive species via Internet sales and identify sellers

Provide management tools to decision-makers and regulators

Present information on the Internet marketplace, including risks and options for management

Inform Management

Conduct Outreach

Next Steps

Assess the Pathway

Workshop Objectives

Provide an update on project status and next steps

Present proposed functions and features of the web crawling system

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Presenting the Great Lakes Commission and the Great Lakes Restoration Initiative

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Next Steps

Assess the Pathway

Great Lakes
Commission
des Grands Lacs

Great Lakes
RESTORATION



Workshop Objectives

- Provide an update on project status and next steps
- Present proposed functions and features of the web crawling system
- Provide an opportunity for input and feedback from participants



Acknowledgments

U.S. Department of Justice
 DOJ Staff
 Tim Egan, Christine Manning, Carol Wang,
 Jeff McLaughlin, Margaret Kohn, Amanda
 Sweetman
 Dr. Bing Liu, Technical Advisory LLC
 Rightspin Networks
 James Jagan, Mike Sander, Josh Downey, Matt
 Surry, David Soderstrom
 U.S. Environmental Protection Agency



Workshop Objectives

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Assess the Pathway

1. Develop a list of species of concern...COMPLETE
2. Develop web monitoring system to identify available species and suppliers.... IN PROGRESS
3. Analyze and summarize results... UPCOMING

Questions

- Are there modifications to the functions and proposed features we should consider that would make the system more usable or useful?
- What thresholds and criteria should we consider for setting up the different user tiers?
- Looking ahead to ongoing operation beyond the project period, how often would you want to see reports?

Where We've Been

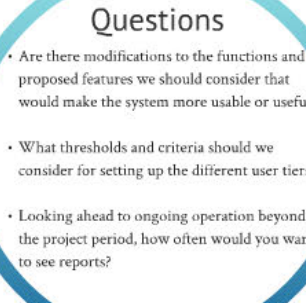
 

Hired RightBrain Networks, a software engineering firm, to develop the "Internet Sales of Invasive Species Detection System" (IS2DS)

Compiled a list of 167 species of concern using existing watch lists, restricted and regulated species lists, and suggestions from the stakeholder survey.

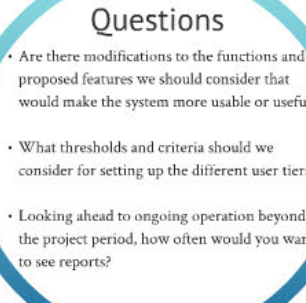
Where We're Going

- Training and testing the search algorithms
- Developing end user features and functions; three user tiers:
 1. Public
 - Reports of sightings listed by species and seller
 2. Authenticated user
 - Search capability
 - Other data/info management features
 3. Administrator
 - Full access
- Develop website to host IS2DS and info/outreach materials



Questions

- Are there modifications to the functions and proposed features we should consider that would make the system more usable or useful?
- What thresholds and criteria should we consider for setting up the different user tiers?
- Looking ahead to ongoing operation beyond the project period, how often would you want to see reports?

- 
- ## Questions
- Are there modifications to the functions and proposed features we should consider that would make the system more usable or useful?
 - What thresholds and criteria should we consider for setting up the different user tiers?
 - Looking ahead to ongoing operation beyond the project period, how often would you want to see reports?

Where We've Been

snakehead
Right Brain Networks
highly regulated
Internet Sales
Invasive Species Detection System
watch lists
stakeholder survey
hybrid
corporate
highly regulated
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Where We're Going

- Training and testing the search algorithms
- Developing end user features and functions;

three user tiers:

1. Public
 - Reports of sightings listed by species and seller
2. Authenticated user
 - Search capability
 - Other data/info management features
3. Administrator
 - Full access

- Develop website to host IS2DS and info/outreach materials

- ## Where We're Going
- Training and testing the search algorithms
 - Developing end user features and functions;
- three user tiers:
1. Public
 - Reports of sightings listed by species and seller
 2. Authenticated user
 - Search capability
 - Other data/info management features
 3. Administrator
 - Full access
- Develop website to host IS2DS and info/outreach materials

Inform Management

1. Share the results
 2. Develop recommendations for future management
 3. Distribute the web monitoring system
 4. Ongoing operation and maintenance
- (All are upcoming and future activities)



Discussion

- How do you foresee using the IS2DS?
- Do you foresee installing and using this system in your own agency?
- What will you do with the information we provide?
- What other management challenges do you face?



Conduct Outreach

1. Conduct a survey of potential users...

COMPLETE

2. Provide periodic project updates and opportunities for input... ONGOING

3. Inform suppliers of potential risks, regulations and best practices... UPCOMING



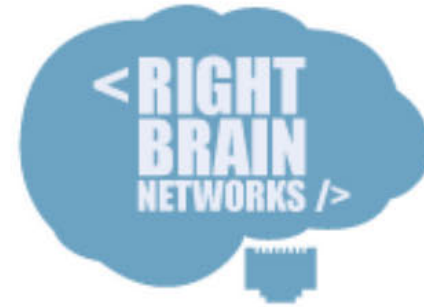
HabitatAttitude™
PROTECT OUR ENVIRONMENT
DO NOT RELEASE FISH AND AQUATIC PLANTS

PIAAC • U.S. FISH & WILDLIFE SERVICE • NOAA'S SEA GRANT
www.HabitatAttitude.net

Messaging, Resources & Measuring Progress

Key Considerations

- Target audience: sellers (businesses and individuals)
 - Sellers have access to consumers
- Be consistent and avoid duplication of effort
 - Utilize, build on and/or adapt existing messages, resources and campaigns
- Promote action/behavior change with positive messaging
 - what TO do vs. what NOT to do
- Provide access to information that will facilitate positive behavior changes
- How will we know if we've been successful?

[illegible]

Compiled a list of 167 species of concern using existing watch lists, restricted and regulated species lists, and suggestions from the stakeholder survey

Where We're Going

- Training and testing the search algorithms
- Developing end user features and functions;
three user tiers:
 1. Public
 - Reports of sightings listed by species and seller
 2. Authenticated user
 - Search capability
 - Other data/info management features
 3. Administrator
 - Full access
- Develop website to host IS2DS and info/
outreach materials

species

Compil
existing
lists, an

d
ant

Questions

- Are there modifications to the functions and proposed features we should consider that would make the system more usable or useful?
- What thresholds and criteria should we consider for setting up the different user tiers?
- Looking ahead to ongoing operation beyond the project period, how often would you want to see reports?

Discussion

- How do you foresee using the IS2DS?
- Do you foresee installing and using this system in your own agency?
- What will you do with the information we provide?
- What other management challenges do you face?

Messaging, Resources & Measuring Progress

Key Considerations

- Target audience: sellers (businesses and individuals)
 - Sellers have access to consumers
- Be consistent and avoid duplication of effort
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- Promote action/behavior change with positive messaging
 - what TO do vs. what NOT to do
- Provide access to information that will facilitate positive behavior changes
- How will we know if we've been successful?

TM



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Dear [NAME OF VENDOR],

We are the Great Lakes Commission, a binational organization charged with promoting and protecting the environmental and economic health of the Great Lakes region. A significant threat to the Great Lakes is the invasion of harmful, non-native species that are transported to the region 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 internet based sellers of aquatic plants and animals to alert them to species being sold that could be harmful to the Great Lakes.

We have enclosed a list of species being sold on your website which are of concern to the Great Lakes region. Beyond being harmful to the environment, it can be illegal, in some states, to own or sell some of these species. We are asking you to help us keep the Great Lakes great by following the recommended actions outlined below and visiting our website [\(address\)](#). The website provides more information about invasive species, actions that can be taken to stop the spread of invasive species, and resources on who to contact about rules and regulations on a state-by-state basis.

How you can help

- ❖ **Replace** species in your inventory that are considered invasive to the Great Lakes with identified alternatives [\(link to list of alternatives\)](#)
- ❖ **Learn** about species regulations for Great Lakes states and provinces [\(link to database\)](#).
Remember, it can be illegal to own or sell some of these species!
- ❖ **Inform** potential customers of species with invasive attributes and provide information on alternative, non-invasive species as well as information about proper disposal
- ❖ **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 [\(link to Habitattitude™ website\)](#)

Please contact us with any questions or concerns [\(include GLC contact information\)](#).



Website Resources

In addition to the email message we will send out to vendors, we are designing a website that will host or link to additional resources on invasive species and organisms in trade. Please review the list of resources and our proposed source for that resource. Let us know if there are other resources or sources that we should be aware of.

| Resource | Proposed source |
|--|--|
| List of species of concern for the Great Lakes | <ul style="list-style-type: none">Governor's "least wanted" list and list developed for the web crawling system (based on Great Lakes regulated species lists, watch lists, risk assessments)Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS) http://www.glerl.noaa.gov/res/Programs/glansis/glansis.html |
| Regulations by state and province | IL/IN Sea Grant database |
| Contact information for State ANS Experts | ANS Task Force Invasive Species Experts Database (http://www.anstaskforce.gov/experts/search.php) |
| Invasive species resources | We have developed a working list in Google Drive. Please add resources you know of. |
| Recommended actions (vendors) | See attached messages for recommended actions. |
| Recommended actions (consumers) | Promote existing campaigns (Habitattitude); ANS Task Force Water Garden Guidelines; Grow Me Instead |
| Alternative species list(s) | IL/IN Sea Grant lists(pending); Ontario Invasive Plants Council Grow Me Instead brochure |
| Safe methods for keeping and disposing of species | Habitattitude Canada What to Do with Unwanted Species |

Next Steps

- Complete training and testing of IS2DS, finalize functionality and features
- Run IS2DS and summarize findings
- Use findings to conduct outreach and inform management
- Hold workshop (spring/summer) to share findings and discuss management options and recommendations

Project ends in September 2014



Acknowledgments

GLC staff...

Tim Eder, Christine Manninen, Guan Wang,
Jeff McAulay, Margaux Valenti, Amanda
Sweetman

Dr. Bing Liu, Technical Advisory, UIC

RightBrain Networks...

Jamie Begin, Mike Gimbel, Josh Downey, Matt
Bussey, Michael Bommarito

U.S. Environmental Protection Agency



Workshop Objectives

- Provide an update on project status and next steps
- Present proposed functions and features of the web crawling system
- Provide an opportunity for input and feedback from participants



Acknowledgments

U.S. Environmental Protection Agency



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

November 20, 2013

Workshop Attendees

IN PERSON

| | | |
|-----------|-----------|--|
| Nancy | Barr | Michigan Dept. of Agriculture and Rural Development |
| John | Bedford | Michigan Department of Agriculture and Rural Development |
| Eugene | Braig | OSU Extension SENR |
| Matt | Bussey | Right Brain Networks |
| Abigail | Fusaro | Wayne State University |
| Tory | Gabriel | Ohio Sea Grant |
| Michael | Gimbel | Right Brain Networks |
| Thomas | Gonia | Michigan DNR |
| Jason | Haines | Michigan DNR |
| Steven | Halstead | MDARD |
| Seth | Herbst | Michigan Department of Natural Resources - Fisheries |
| Michael | Hoff | Fish and Wildlife Service |
| Steve | Huff | Michigan Department of Natural Resources Law Division |
| Erika | Jensen | Great Lakes Commission |
| Jennifer | Johnson | Michigan DEQ |
| Sarah | LeSage | Michigan DEQ |
| Bing | Liu | University of Illinois-Chicago |
| Christine | Manninen | Great Lakes Commission |
| Jeff | McCauley | Great Lakes Commission |
| Kevin | Ramsey | Great Lakes Fishery Commission |
| Bill | Rapai | |
| Sue | Tangora | DNR Wildlife Division |
| Margaux | Valenti | Great Lakes Commission |
| Guan | Wang | Great Lakes Commission |
| Chris | Weeks | MSU |
| Jill | Wingfield | Great Lakes Fishery Commission |

WEBINAR

| | | |
|-------------|----------------|--|
| David | Adams | NYS DEC |
| Paul | Angelone | US Fish & Wildlife Service |
| Martha | Barton | WDNR |
| Stas | Burgiel | NISC |
| Tim | Campbell | UW Sea Grant |
| Jacoby | Carter | US Geological Survey |
| Michael | Caston | USDA APHIS VS |
| Pat | Charlebois | IL-IN Sea Grant |
| Luci | Cook-Hildreth | Texas Parks and Wildlife Dept. |
| Alisha | Davidson | Wayne State University |
| Christopher | Deegan | WI Dept. of Agriculture |
| Robyn | Draheim | USFWS |
| Eric | Fischer | Indiana DNR |
| Carrie | Givens | USFWS |
| Jason | Goldberg | U.S. Fish and Wildlife Service |
| Joanne | Grady | U.S. Fish & Wildlife Service |
| Chris | Hamerla | Golden Sands Resource Conservation and Development |
| Dave | Hamilton | The Nature Conservancy |
| Greg | Hitzroth | Illinois Indiana Sea Grant |
| Bill | Horns | Wisconsin DNR |
| Kate | Howe | Midwest Invasive Plant Network, Purdue University |
| Doug | Jensen | University of Minnesota Sea Grant Program |
| SANDRA | KEPPNER | US FISH AND WILDLIFE SERVICE |
| Carl | Klein | Washington Department of Fish and Wildlife |
| Ben | Koski | Forest County Potawatomi Community |
| Dayna | Laxton | Ontario Ministry of Natural Resources |
| Cory | Lindgren | CFIA |
| Francine | Macdonald | Ontario Ministry of Natural Resources |
| Sophie | Monfette | Ontario Federation of Anglers and Hunters |
| Nancy | Murray | CT DEEP |
| Susan | Pasko | NOAA |
| daniel | reed | us fish and wildlife service |
| David | Reid | Self |
| April | Rosin | Colorado Parks and Wildlife |
| Chrystal | Seeley-Schreck | Wisconsin Department of Natural Resources |
| Jim | Seidewand | Pet World & PIJAC |
| Paul | Skawinski | Golden Sands RC&D Council |
| Kaycie | Stushek | Golden Sands RC&D |
| Margaux | Valenti | GLC |
| Bob | Wakeman | Wis. Dept. of Nat. Resources |
| Colby | Wells | Maine Inland Fisheries and Wildlife |

Appendix F. March 2015 Workshop II Materials

Erika Jensen

From: Erika Jensen [ejensen@glc.org]
Sent: Tuesday, February 10, 2015 5:31 PM
To: 'Undisclosed Recipients'
Subject: Internet Trade of Aquatic Invasive Species: Join us on March 10 in Ann Arbor
Attachments: AIS Internet sales workshop_March 2015_prelim draft agenda.pdf; AIS Internet sales workshop_March 2015_registration form.pdf; Travel Support Request Form.pdf

Apologies for duplicate postings. Please share this information with other interested parties.

Please Join Us!

Join the Great Lakes Commission for a workshop to hear about and provide feedback on our efforts to assess the trade of aquatic invasive species over the Internet.

March 10, 2015

9:00 a.m. - 4:00 p.m.

Sheraton Ann Arbor
3200 Boardwalk Street
Ann Arbor, Michigan, 48108
734-996-0600

Project Overview

This project, funded through the Great Lakes Restoration Initiative, is supporting aquatic invasive species prevention efforts by developing software to monitor the availability of invasive species via Internet sales, identify sellers, and develop and implement targeted management activities. This project will provide tools and information to decision-makers, regulators, and other stakeholders to better assess the risks associated with this pathway, and present options for additional action to effectively prevent the movement of AIS via this pathway. For more information on the project visit: <http://glc.org/projects/invasive/internet-trade-ais/>.

Workshop Objectives

- Provide an update on project status, findings and next steps
- Demonstrate the web crawling system and train participants in use of the system
- Provide an opportunity for input and feedback from participants

Agenda

A preliminary draft agenda is attached.

Sign Up Today!

Please register for the workshop online at: <http://bit.ly/AISwkshp> or by filling out the attached form and returning to Katherine Hollins at khollins@glc.org. Please sign up before **March 4, 2015**. There is no cost to attend the workshop.

Unable to attend in person? A webinar option is also available. Sign up for the webinar at:
<https://attendee.gotowebinar.com/register/9087943355081167874>

Hotel Accommodations

For those of you planning to arrive the night before the workshop, a block of overnight rooms is being reserved at the Sheraton for the night of March 9 at the federal per diem rate of \$105/night. *In order to make sure the block has been updated in their reservation system, please wait until after Feb. 11 to call and make your reservations.* To make a reservation, call the hotel at 734-996-0600 and request the "Great Lakes Commission" room block.

Travel Support

The Great Lakes Commission has some funds available to assist individuals in attending the workshop. If you are interested in applying for financial assistance to help defray the costs to participate in the workshop, please complete the attached "Travel Support Request Form" and return it to Erika Jensen (ejensen@glc.org). All requests for travel support must be made prior to February 27, 2015. We will do our best to accommodate all requests, however, travel funding is not guaranteed in the case that demand exceeds available funds.

Erika Jensen
Project Manager
Great Lakes Commission
2805 S. Industrial Hwy., Suite 100
Ann Arbor, Michigan 48104
ph: 734-971-9135 x139
e: ejensen@glc.org
<http://glc.org>



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Workshop

March 10, 2015 | 9:00 a.m. - 4:00 p.m.

*Sheraton Ann Arbor – Petit Ballroom
3200 Boardwalk Street · Ann Arbor, Mich. 48108
734-996-0600*

Workshop Objectives

- Provide an update on project status and next steps
- Demonstrate the web crawling system and train participants in use of the system
- Provide an opportunity for input and feedback from participants

Agenda

All times are Eastern

| | | |
|------------|--|---|
| 9:00 a.m. | Registration | |
| 9:30 a.m. | Welcome, introductions, agenda review | <i>Erika Jensen, Great Lakes Commission (GLC)</i> |
| 9:45 a.m. | Project overview, update and findings | <i>Erika Jensen and Bryan Comer, GLC</i> |
| 10:30 a.m. | Break | |
| 10:45 a.m. | Great Lakes Detector of Invasive Aquatics in Trade (GLDIATR) Demo | <i>Katherine Hollins, GLC</i> |
| 11:00 a.m. | Using GLDIATR: Interactive Training Session | <i>All participants</i> |
| 12:00 p.m. | Lunch | <i>Located in the Garden Room</i> |
| 1:00 p.m. | Group Discussion: Thinking about GLDIATR 2.0 <ul style="list-style-type: none">• Potential updates and enhancements• Species Watch List: What should be removed or added? | |
| 1:45 p.m. | Group Discussion: Integrating and using GLDIATR to inform prevention and management <ul style="list-style-type: none">• Management planning• Outreach• Regulatory decision-making and enforcement | |
| 2:30 p.m. | Break | |
| 2:45 p.m. | Group Discussion: Ideas for future Internet trade pathway prevention efforts <ul style="list-style-type: none">• Future management actions• Other tools (e.g., “Eco labeling,” inventory “screening” tools)• Working with industry | |
| 3:45 p.m. | Wrap-up and next steps | |
| 4:00 p.m. | Adjourn | |



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Welcome!

Internet Trade of Aquatic Invasive
Species Workshop

March 10, 2015 | Ann Arbor, Mich.





Overview, Progress and Findings

Project Workshop

March 10, 2015 | Ann Arbor, Mich.



Internet as an AIS Pathway

What We Know...

- Organisms in trade
 - Intentional and unintentional releases of live organisms that are bought and sold for use in aquariums, nurseries, water gardens, classrooms, aquaculture, as live bait, etc.
- Internet facilitates trade
- WWW is vast and changing
- Species of concern to Great Lakes region are being sold



Internet as an AIS Pathway

What We Don't (Didn't) Know...

- Who...
 - Is selling species we're concerned about?
- What...
 - Species are available for sale?
- Where...
 - Websites
 - Physical location
- How...
 - Many?
 - Are regulations/potential invasiveness communicated?



Project Objectives

- Develop and demonstrate software to assess the availability of invasive species via Internet sales
- Provide information and management tools
- Present information on the Internet marketplace, including risks and options for management

Funding: FY12 Great Lakes Restoration Initiative EPA grant



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

PROGRESS TO DATE



Pathway Assessment

- Develop a list of species of concern... COMPLETE
 - 166 species of concern
 - Regulations (U.S., Canada, state, province)
 - Watch lists for GL
 - Risk assessments
 - Stakeholder survey
- Develop web monitoring system to identify available species and suppliers.... COMPLETE*
 - Hired RightBrain Networks
- Analyze and summarize results... IN PROGRESS





Inform Management

- Share the results... IN PROGRESS
- Develop recommendations for future management... BEGINNING TODAY
- Distribute the web monitoring system... NEAR FUTURE
- Operation and maintenance... ONGOING*

*pending availability of funding



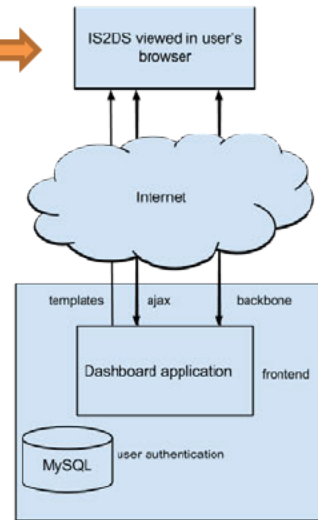
Conduct Outreach

- Conduct a survey of potential users...
COMPLETE
- Provide periodic project updates and opportunities for input... ONGOING
 - Webinars, presentations, workshops
- Inform suppliers of potential risks, regulations and best practices... NEAR FUTURE



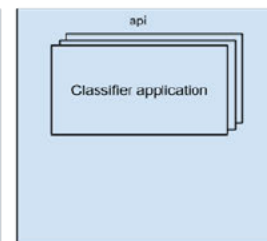
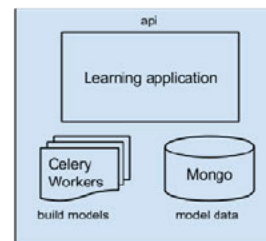
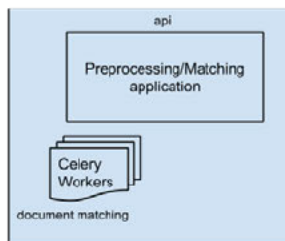
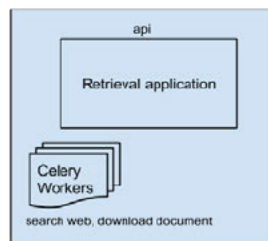
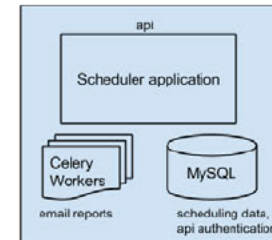
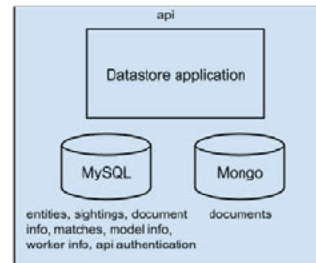
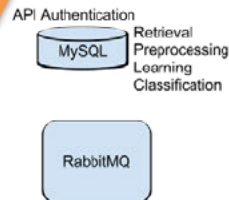
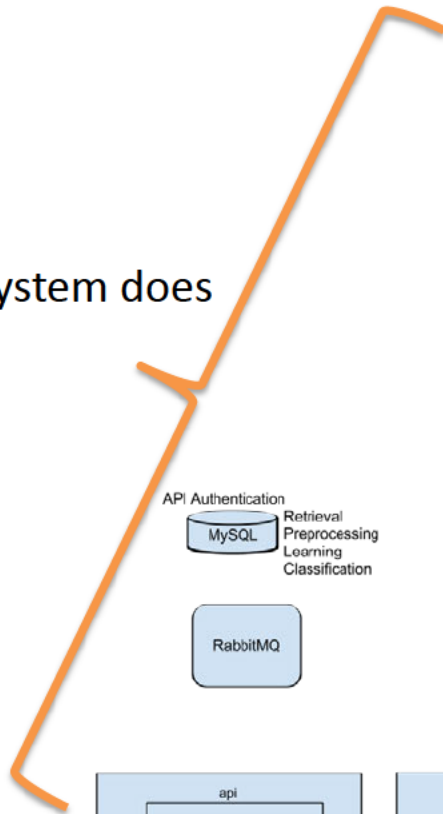
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What the user sees



Great Lakes Detector of Invasive Aquatics in Trade (GLDIATR)

What the system does





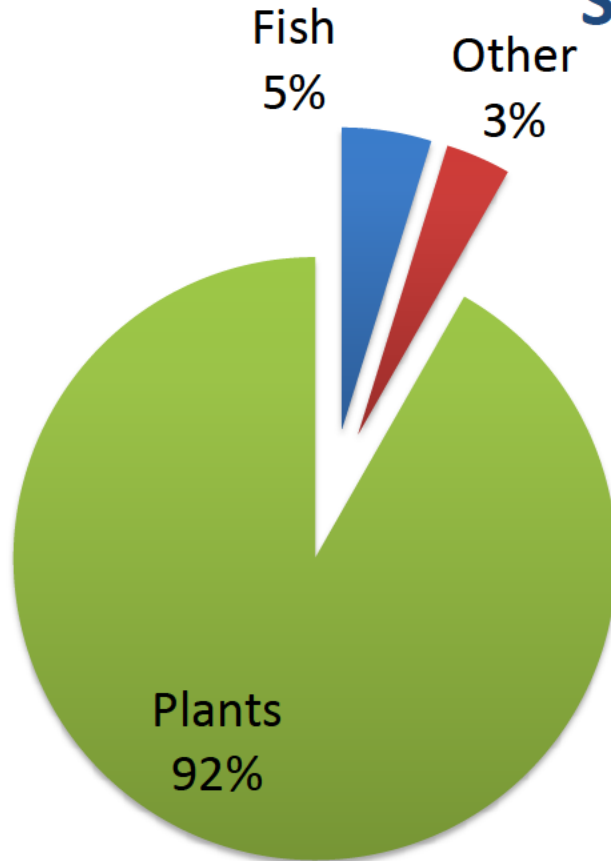
Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

PRELIMINARY FINDINGS



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Species Results



| No. of species found | 58 (of 166) |
|----------------------|-------------|
| Plants | 40 |
| Fishes | 11 |
| Other | 7 |
| | |
| Regulated | 49 |
| Non-regulated | 9 |

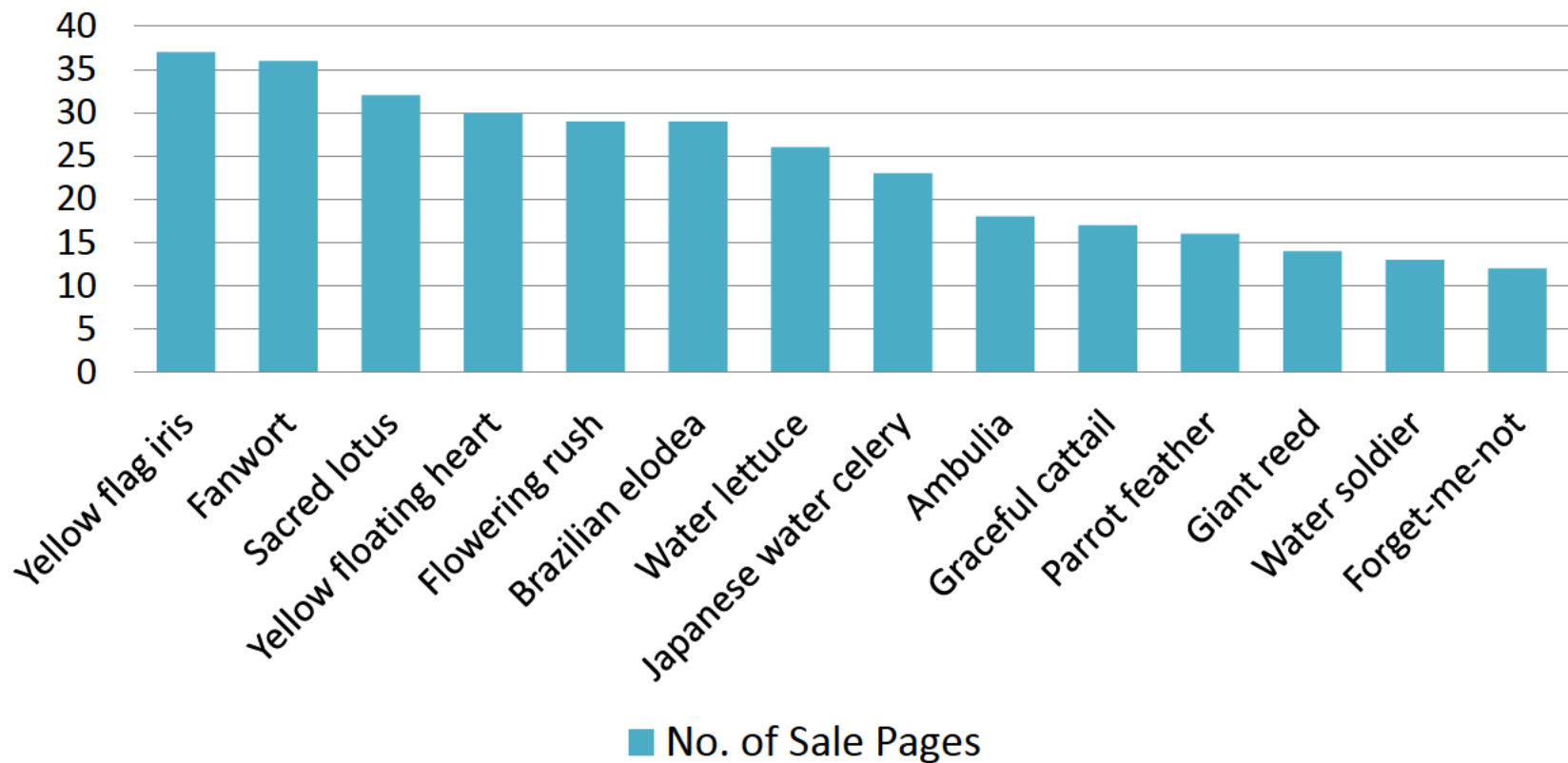
**Percentage sale pages by group
(Total number of sale pages = 514)**



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Species Results

Top 15 Species



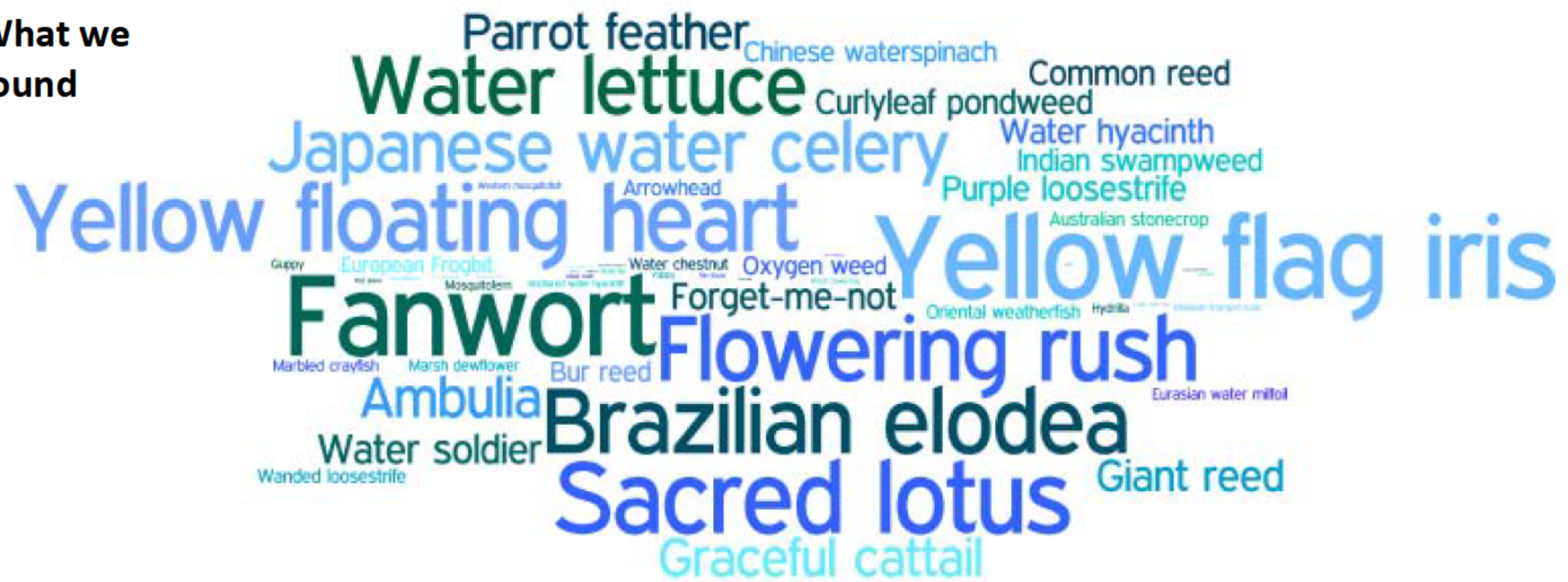


Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Species Results

| Great Lakes Governors/Premiers “Least Wanted” AIS | Number of sale pages |
|--|-------------------------|
| Brazilian elodea (<i>Egeria densa</i>) | 29 |
| Parrot feather (<i>Myriophyllum aquaticum</i>) | 16 |
| Water soldier (<i>Stratiotes aloides</i>) | 13 |
| Water chestnut (<i>Trapa natans</i>) | 5 |
| Hydrilla (<i>Hydrilla verticillata</i>) | 4 |
| Yabby (<i>Cherax destructor</i>) | 3 |
| Grass carp (<i>Ctenopharyngodon idella</i>) | 1 |

What we
found



What we
were asked
to find





Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Website Results

- 209 total (unique) websites
 - 133 will ship to the Great Lakes region*
 - 62% located in U.S.

Top websites selling to the Great Lakes (most sale pages)

| | |
|---|----|
| http://www.ebay.com/ | 24 |
| http://www.amazon.com/ | 11 |
| http://www.liveaquaria.com/ | 10 |
| http://www.pondmegastore.com/ | 9 |
| http://www.aquariumplants.com/ | 9 |
| http://www.primrose.co.uk/ | 8 |
| http://www.thegreenmachineonline.com/ | 7 |
| http://www.waterfordgardens.com/ | 7 |
| http://www.pondsplantsandmore.com/ | 6 |

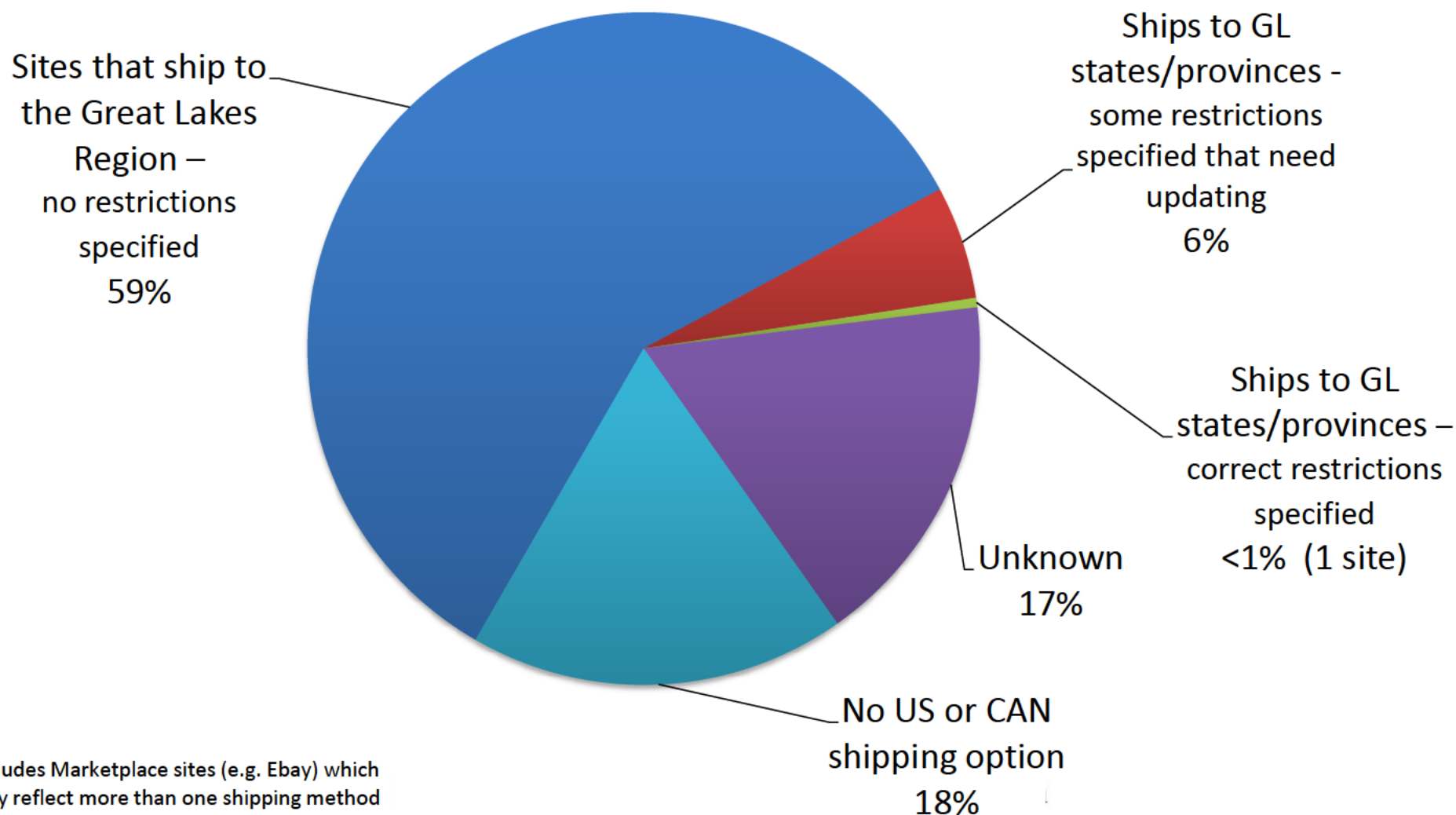
* Does not include sites for which shipping restrictions could not be determined





Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

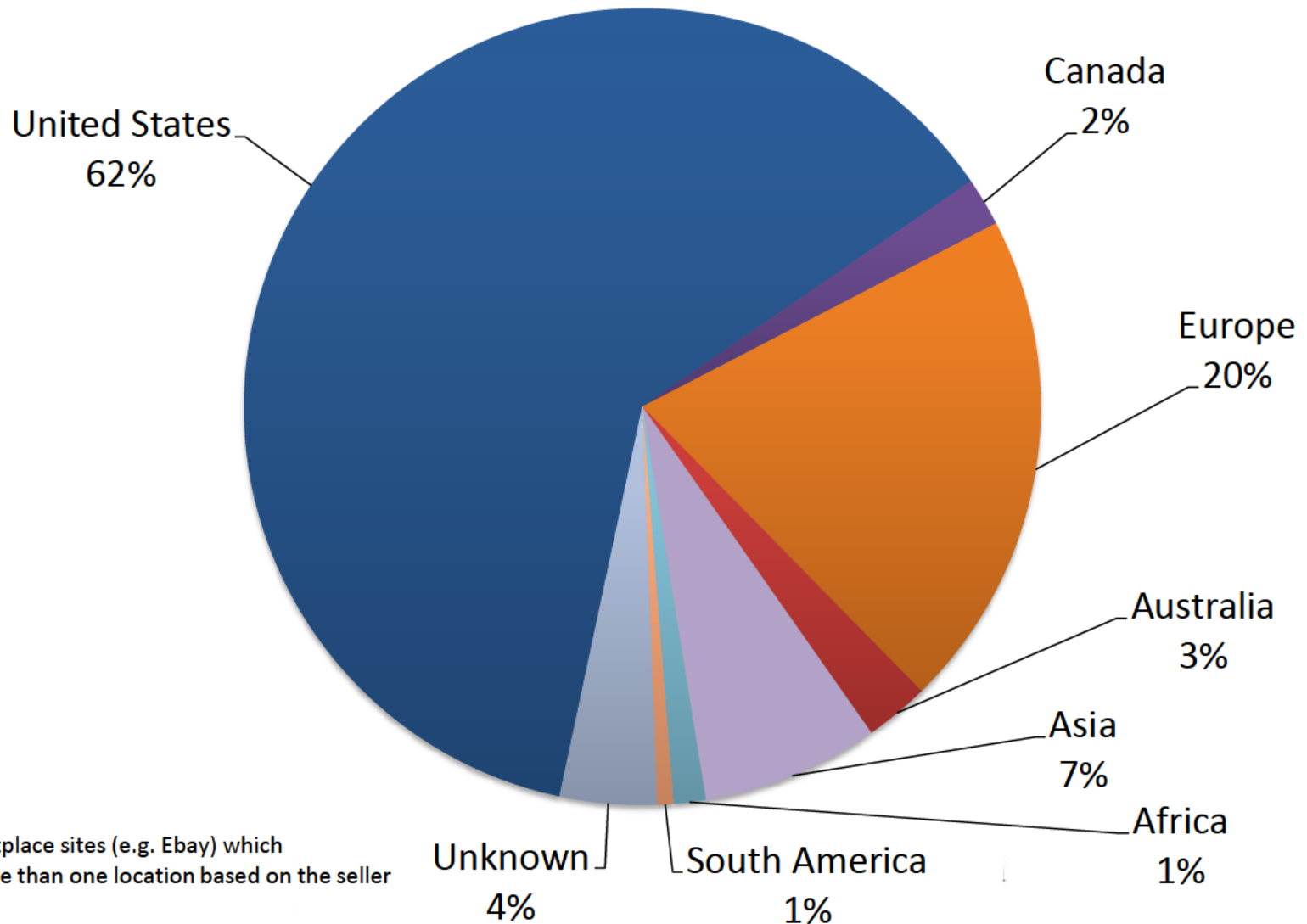
Shipping Specifications by Website





Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Website distribution around the world



Includes Marketplace sites (e.g. Ebay) which may reflect more than one location based on the seller



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Top 3 states overall:

- Ohio (14)
- Florida (13)
- California (10)



Sellers Located in the Great Lakes Region



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

SUMMARY AND NEXT STEPS



Preliminary Observations

- Internet trade is a problem pathway; getting hits on species that are a threat
 - Seems consistent w/ what is known about species common to trade pathway (e.g., popular water garden and aquarium plants)
 - Both domestic and international sources
- Good warning tool; useful as an indicator of what is in trade, inc. emerging species of concern
- GLDIATR is faster and more efficient than humans



Project Next Steps

- Continue to develop findings
- Conduct outreach
- Work with partners to take action on confirmed findings
- GLDIATR “roll-out”
- Develop final report, inc. recommendations for future work



Looking Ahead

- Ongoing O&M at GLC (as resources allow)
- “GLDIATR 2.0”: Potential updates and enhancements
- Using GLDIATR for prevention and management
- Ideas for future Internet trade pathway efforts



Acknowledgments

- GLC staff...
Tim Eder, Christine Manninen, Guan Wang, Jeff McAulay, Margaux Valenti, Amanda Sweetman, Katherine Hollins, Bryan Comer, Lisa Denys, Sarah Cook
- Dr. Bing Liu, Technical Advisor, UIC
- RightBrain Networks...
Jamie Begin, Mike Gimbel, Donna Campbell
- U.S. Environmental Protection Agency



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

GLDIATR Training

gldiatr.glc.org

Username: beta@glc.org

Password: beta



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

DISCUSSION SESSION



Thinking about GLDIATR 2.0

Potential updates and enhancements

- Using GLDIATR: How did it go?
- If we could make updates to the system, what would you change or add?

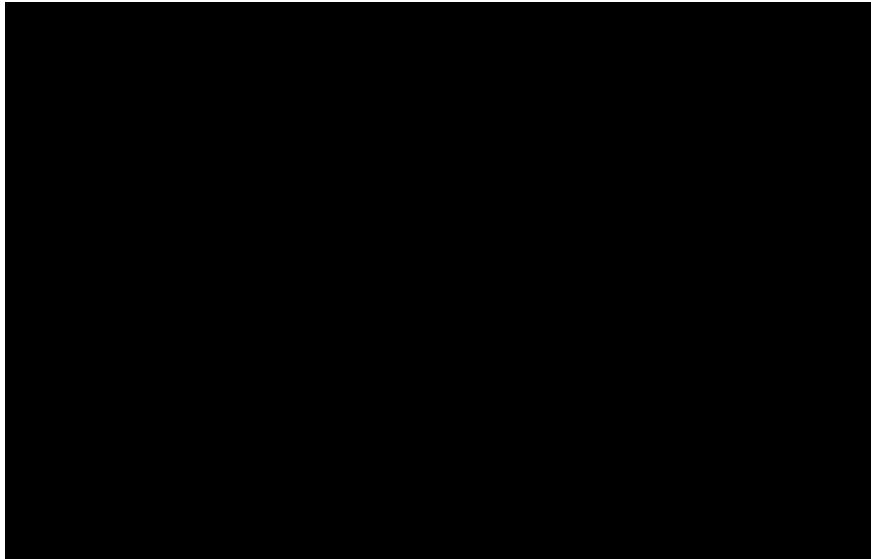
Species Watch List (See handout)

- Are there species that we should remove or add?

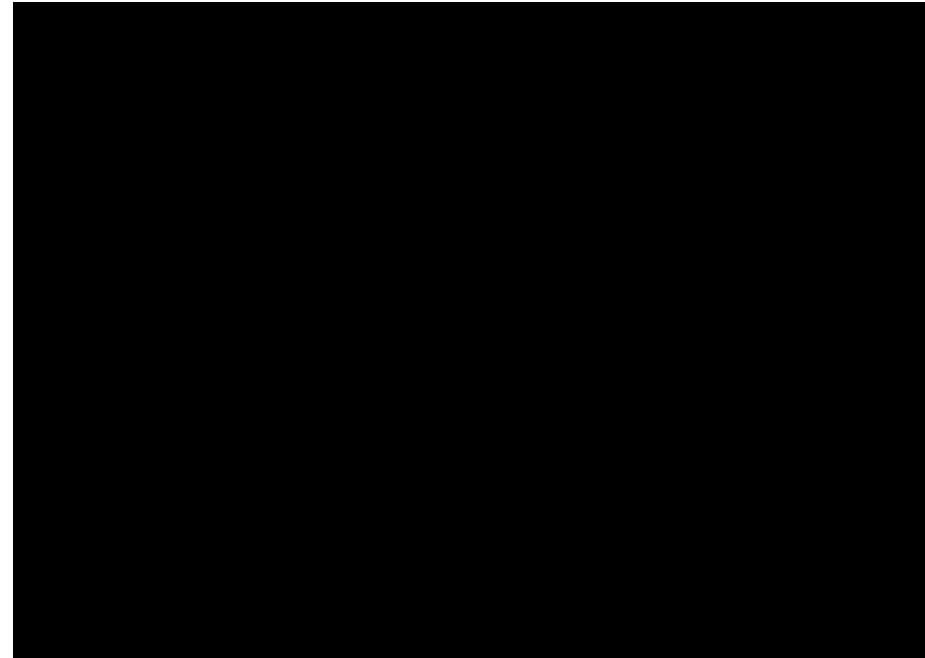


Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

Species Variants



Purple Cabomba - *Cabomba pulcherrima*



Narrowleaf Anacharis - *Egeria najas*



Integrating and using GLDIATR for prevention and management

- How will (or could) GLDIATR help you in your current position?
- What can we do to help integrate this tool into your work and/or other efforts?
- What more could we be doing with this tool to reduce risks posed by this pathway?



Ideas for future Internet trade pathway prevention efforts

- What other management actions could or should we be undertaking to reduce risk?
- Other there other tools that could be developed to help reduce risk?

Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

March 10, 2015

Workshop Attendees

IN PERSON

| First Name | Last Name | Organization |
|------------|--------------|--|
| Eugene | Braig | Ohio State University Extension |
| Christal | Campbell | UW Extension/Wis DNR |
| Donna | Campbell | RightBrain Networks |
| Steve | Cole | Great Lakes Commission |
| Bryan | Comer | Great Lakes Commission |
| Lisa | Denys | Great Lakes Commission |
| Tim | Eder | Great Lakes Commission |
| Brandon | Fehrenbacher | Illinois Department of Natural Resources |
| Tory | Gabriel | Ohio Sea Grant College Program |
| Michael | Gimbel | RightBrain Networks |
| Erika | Jensen | Great Lakes Commission |
| Kile | Kucher | Michigan DNR Wildlife Division |
| Philip | Kukulski | Greater Detroit Aquarium Society |
| Sarah | LeSage | Michigan DEQ |
| Christine | Manninen | Great Lakes Commission |
| Jeff | McAulay | Great Lakes Commission |
| Robert | Muller | Friend of the Rouge |
| Jennifer | Nalbone | New York State OAG |
| Kelly | Pennington | MN DNR |
| Kevin | Ramsey | Great Lakes Fishery Commission |
| Sue | Tangora | Michigan DNR |
| Heath | Tepovich | Illinois Department of Natural Resources |
| Jill | Wingfield | Great Lakes Fishery Commission |
| STEVEN | HUFF | MICHIGAN DNR LED |

WEBINAR

| | |
|----------|---------------|
| Allen | Brandes |
| Pat | Charlebois |
| Rich | Cook |
| Luci | Cook-Hildreth |
| Lisa | Corvington |
| Becky | Cudmore |
| Chris | Darnall |
| Lisa | Denys |
| Isabelle | Desjardins |
| Matt | Engel |
| Eric | Fischer |
| Joanne | Grady |
| Greg | Hitzroth |
| Doug | Jensen |
| Debra | Lawrence |
| Cory | Lindgren |
| Donald | MacLean |
| John | Navarro |
| Susan | Pasko |
| Bill | Rapai |
| Portia | Sapp |
| David | Scarfe |
| Lauren | Tonelli |
| Andrew | Tucker |
| Chris | Weeks |
| Scott | Williams |

Appendix G. Seller Outreach Materials

July 16, 2015

Dear Sir or Madam,

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. 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.

We identified species being sold on your website which are of concern to the Great Lakes region. Beyond being harmful to the environment, it is illegal, in some states, to own or sell some of these species. We are asking you to help us keep the Great Lakes great by following the recommended actions outlined below. The table on the next page and our website (<http://glc.org/projects/invasive/internet-trade-ais>) provides additional information about invasive species, actions that can be taken to stop the spread of invasive species, and contact information for rules and regulations on a jurisdictional basis. 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!



Protecting the Great Lakes from the Internet Trade of Aquatic Invasive Species

How you can help

- ❖ **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. *Remember, it is illegal to possess or sell some species!*
- ❖ **Inform** customers of species with invasive attributes and provide information on alternative and non-invasive species, species regulations and associated shipping restrictions, and proper disposal methods for unwanted organisms.
- ❖ **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.

See <http://bit.ly/1JRHOBC> for more information on these activities.

| Jurisdiction | Invasive Species Regulation Information | Contact Information |
|---------------|---|---|
| Illinois | <p>Illinois Injurious Species List and Regulations www.dnr.illinois.gov/adrules/documents/17-805.pdf</p> <p>Aquaculture Contacts & Regulations, Fish Importation Regulations & Approved Aquatic Species List www.ifishillinois.org/programs/aquaculture.html</p> | Kevin Irons, Illinois DNR, Manager, Aquaculture and Aquatic Nuisance Species Program, kevin.iron@illinois.gov |
| Indiana | <p>AIS Illegal Possession Rules www.in.gov/dnr/fishwild/files/fw-AIS_PossessionRules.pdf</p> <p>Indiana Aquatic Invasive Species Information www.in.gov/dnr/fishwild/3628.htm</p> | Eric Fischer, Indiana DNR, Aquatic Invasive Species Coordinator, efischer@dnr.in.gov |
| Michigan | <p>Michigan Invasive Species Laws www.michigan.gov/dnr/0,4570,7-153-10370_59996-270798--,00.html</p> | <p><i>Plants and insects:</i> Mike Bryan, Michigan DARD - Pesticide & Plant Pest Management Division, bryanm@michigan.gov</p> <p><i>All other species:</i> Seth Herbst, Michigan DNR - Fisheries Division, herbstS1@michigan.gov</p> |
| Minnesota | <p>Minnesota Invasive Species Laws www.dnr.state.mn.us/invasives/laws.html</p> | Kelly Pennington, Minnesota DNR, AIS Prevention Coordinator, Kelly.pennington@state.mn.us |
| New York | <p>New York Invasive Species Regulations www.dec.ny.gov/animals/99141.html</p> | 518-402-9405, isinfo@dec.ny.gov |
| Ohio | <p>Ohio Administrative Code: Chapter 1501:31-19 Wild Animal Regulations codes.ohio.gov/oac/1501%3A31-19</p> | Ohio Division of Wildlife, 1-800-WILDLIFE(945-3543), wildinfo@dnr.state.oh.us |
| Ontario | <p>How Ontario Combats Invasive Species www.ontario.ca/environment-and-energy/how-government-combats-invasive-species</p> <p>Ontario Fishery Regulations laws-lois.justice.gc.ca/eng/regulations/SOR-2007-237</p> | Natural Resources Information Centre, 1-800-667-1940, mnr.nric.mnr@ontario.ca |
| Pennsylvania | <p>Aquatic Invasive Species www.fishandboat.com/ais.htm</p> <p>Pennsylvania Noxious Weed List www.pacode.com/secure/data/007/chapter110/chap110toc.html</p> <p>Pennsylvania Code, Title 58 (See Chapters 63, 71, 73, 137) www.pacode.com/secure/data/058/058toc.html</p> | Jim Grazio, Pennsylvania DEP, jagrazio@state.pa.us |
| Quebec | <p>Regulation respecting aquaculture and the sale of fish www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=3&file=/C_61_1/C61_1R7_A.HTM</p> | <p><i>Aquatic invasive animal species:</i> Ministère des Forêts, de la Faune et des Parcs, 1-877-346-6763, services.clientele@mffp.gouv.qc.ca</p> <p><i>Aquatic invasive plant species:</i> Ministère du Développement durable, de l'Environnement et de la Lutte aux changements climatiques, 1-800-561-1616, info@mddelcc.gouv.qc.ca</p> |
| Wisconsin | <p>Wisconsin Invasive Species Rule (NR 40) dnr.wi.gov/topic/Invasives/classification.html</p> | Dreux Watermolen, Wisconsin DNR, Science Information Services Section Chief, Dreux.Watermolen@wisconsin.gov |
| United States | <p>Noxious Weed List: 7 U.S.C. 2801 et seq plants.usda.gov/java/noxious</p> <p>Lacey Act Injurious Wildlife: 50 C.F.R. §16.1 et seq www.fws.gov/injuriouswildlife</p> | |
| Canada | <p>Aquatic Invasive Species Regulations (SOR/2015-121) laws.justice.gc.ca/eng/regulations/SOR-2015-121/index.html</p> | |

Appendix H. List of Posters and Presentations

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|-----------------|---|
| Event: | 18 th International Conference on Aquatic Invasive Species |
| Date: | April 21-25, 2013 (<i>Poster</i>) |
| Website: | http://www.icaais.org/html/previous18.html |
| Event: | Great Lakes Fishery Commission Law Enforcement Committee Meeting |
| Date: | March 26, 2014 |
| Website: | NA |
| Event: | Great Lakes BIOTIC Symposium |
| Date: | June 3-4, 2014 |
| Website: | http://www.seagrant.wisc.edu/home/Default.aspx?tabid=621 |
| Event: | Upper Midwest Invasive Species Conference |
| Date: | October 20-22, 2014 |
| Website: | http://www.umisc2014.org/ |
| Event: | Aquatic Nuisance Species Task Force Meeting |
| Date: | November 5-6, 2014 |
| Website: | http://www.anstaskforce.gov/Meetings/2014_November/default.php |
| Event: | Great Lakes Panel on Aquatic Nuisance Species Meeting |
| Date: | November 19-20, 2014 |
| Website: | http://glc.org/projects/invasive/panel/glp-meetings/ |
| Event: | Briefing for U.S. Fish and Wildlife Service |
| Date: | January 30, 2015 (<i>Webinar</i>) |
| Website: | NA |
| Event: | Great Lakes & Mississippi River Basin Aquatic Nuisance Species Panel Meeting |
| Date: | April 14-15, 2015 |
| Website: | http://glc.org/projects/invasive/panel/glp-meetings/ |
| Event: | Aquatic Nuisance Species Task Force Meeting |
| Date: | May 6-8, 2015 |
| Website: | http://www.anstaskforce.gov/Meetings/2015_May/default.php |
| Event: | International Association of Great Lakes Research Conference 2015 |
| Date: | May 25-29, 2015 |
| Website: | http://iaglr.org/conference/past.php |
| Event: | New Hampshire Legislature Exotic Aquatic Weeds and Species Committee |
| Date: | June 29, 2015 (<i>Webinar</i>) |
| Website: | NA |
| Event: | Western Regional Aquatic Nuisance Species Panel Meeting |
| Date: | September 2-4, 2015 |
| Website: | https://www.fws.gov/answest/AnnualMeetingFall2015.html |