GLANSIS User Experience Research Report: Usability Testing

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Executive Summary

Great Lakes Aquatic Nonindigenous Species Information System, GLANSIS is a database with information on aquatic nonindigenous species for the Great Lakes. This report covers the usability testing conducted on the GLANSIS database. Our team focused on undergraduate and graduate students as participants for the usability tests.

Our team conducted usability tests on five total participants through a Zoom virtual environment. Our team asked pre-test and post-test questions to gauge the participant's preliminary knowledge and additional information they want to share after completing tasks. The five tasks focused on three main features: the advanced species search, the species profile page, and the map explorer.

Our team recorded the testing data on an Excel spreadsheet and synthesized the results. From these results, our team gathered the following findings:

- The home page can be confusing to find information.
- The advanced species search results page does not seem clickable.
- The Species Profile page is text-heavy and has low readability.
- The Map Explorer feature is not intuitive.
- The Map Explorer feature's feedback is not noticeable.

These are our team's recommendations, respectively:

- The three main features of the database can be located at the center of the home page, while the FAQ and Additional Resources buttons can be positioned in the footer.
- In the advanced species search results table, the species picture, scientific name, and common name should be prioritized and clickable.
- To increase readability, information on the Species profile page can be categorized by hierarchy of information and blocked in a pattern that can be followed by users.
- The map explorer page can utilize the principles of hierarchy grids to prioritize user interface elements connected to a particular function.
- The map explorer feature's feedback can be more apparent, and the map itself can indicate loading through the use of blur.

Introduction

Great Lakes Aquatic Nonindigenous Species Information System, GLANSIS is a database that aims to improve access to information on aquatic nonindigenous species for the Great Lakes. What started just as a database has now developed newer tools after conducting a series of interviews with educators and other users of the database. The website has tools such as profiles, map explorer, risk clearinghouse and references.

The team at GLANSIS plans to move beyond the higher level analysis and focus on college educators, and particular features. In this report, our focus is on the usability features of the website. We therefore conducted a heuristic evaluation to analyze the features of this website with a metric and to then identify issues that users might be facing.

Throughout the usability testing, we focused on these criteria:

1. **How the users use the Species List Generator to search their desired information of any invasive species, and where they get confused with the tool.**
2. **How the users use the Map Explorer to find out the distribution of any species during a certain time period, and where they get confused with the tool**

The main purpose of the study is to get a better understanding of our target user group as well as the main features of the database. Our target user base is biology and ecology undergraduate educators. Our team chose to focus on this group because the GLANSIS team plans to integrate an "Educator's Hub" in their next update of the database. By focusing on these aspects in our evaluation we would uncover the best possible user flows to get to the intended information while also focusing on the functionality and aesthetic of the features.

Methods

The team started by creating a one task test collaboratively to pilot for the entire study. This pilot task consisted of all the components of a usability test including an objective, a script, the task list, pre- and post test questions as well as the optimal results expected from the user. We tested this pilot on members of the team to finesse the process of our usability tests. We made changes based on how the moderator sounded (tried to make it more personable) as well as focused on making the tasks more easy to follow. Based on our pilot study, we followed suit on the improvements and put together a testing plan.

Our team decided to change the route for participants from what we had been previously doing for our studies. We decided to focus on students who are also covered under the 'educator' user base. The reason for doing so was to investigate

the website through the eyes of students, who may especially not be well equipped with professional information and who might also be naive to databases. The main criteria was to focus on students who use databases to accompany their educational studies. Our additional criteria, as suggested by the stakeholders as well, was to include undergraduate students. We also carefully selected students from biology backgrounds and to diversify the sample, we included students from other disciples as well.

Recruitment was mainly done through a personal network. We selected five participants, from which two were female and three were male. From the provided age brackets, three participants were between the ages of 24-30 and two participants were between the ages of 17-23. Most of the participants had a lot of experience with academic research however none of them were familiar with GLANSIS.

	Participants 1	Participants 2	Participants 3	Participants 4	Participants 5
Color					
Gender	Male	Male	Female	Male	Female
Age range	24-30	24-30	17-23	24-30	17-23
Role	Umich medical graduate student	Umich CSE graduate student	Purdue engineering undergrad student	Umich EECS graduate student	FAU Computer Science Undergrad
Characteristics	A lot of experience of academic researches; has some knowledge about invasive species, don't need our introduction	Familiar with different search engines and database system; has some knowledge about invasive species, don't need our introduction	Comfortable with academic research and reports; has basic knowledge of database systems	Familiar with academic researches especially for thesis searching; has some knowledge of database systems; almost no knowledge of invasive species	Familiar with computer systems + databases; has some knowledge about invasive species

Figure 1. Participants charts

Our testing plan included a technical plan, moderator script, pre-test questions, the tasks along with the success criteria and post-test questions. One full test requires the user to finish 5 tasks. The first two tasks focus on the general usage of the Species List Generator. The third task aims to test the different filters of Species List Generator. The last two tasks are aiming to test the Map Explorer tool. More detail of the tasks are included in Appendix A. Our tests were conducted online through zoom and were also recorded. Each team member conducted one test except one team member who conducted two. Participants were aware that they were being recorded and were asked for consent. Each test started with the moderator reading

out verbatim the script that carefully explained what the test was about and asked the pre-test questions. After which, the participants were provided with the task steps one at a time to execute the usability test. The moderator would simultaneously observe and take notes of the participants behavior and insights. After all the tasks were completed by the participant, they were asked any additional questions the moderator might have noted and ended with post-test questions. The results from the observations were analyzed through the Rainbow Spreadsheet method and findings were presented.

Findings and Recommendations

Summary Results

The usability test shows some UI problems on homepage, species list page, species profile page, and the Map Explorer page. The layout or the composition of the UI elements should be rearranged into a more hierarchical structure so users can interact with the system more intuitively. The interaction feedback also needs to be redesigned to provide users a better interaction and guidance of using the system. The functionality of GLANSIS is complete and complex, so the redesign of the interaction is essential for a better user experience.

Key Findings & Recommendations

Key Finding #1: Lack of Homepage hierarchy

All test participants start the test from the GLANSIS homepage, but some participants explore the homepage for several seconds before entering the correct page to start the task. We believe the main reason is that the homepage does not create a hierarchy of elements. One of our participants said: “The big blocks look nice, but I really get confused by the functionality inside the blocks. Why FAQ, Contribute, and Additional Resources are in the same kind of blocks as the previous three (Species List Generator, Map Explorer, and Risk Assessment)? I don’t think they are of the same level of importance.” In addition, the “Follow us on Twitter” link is too small, as almost every participant did not notice the link.

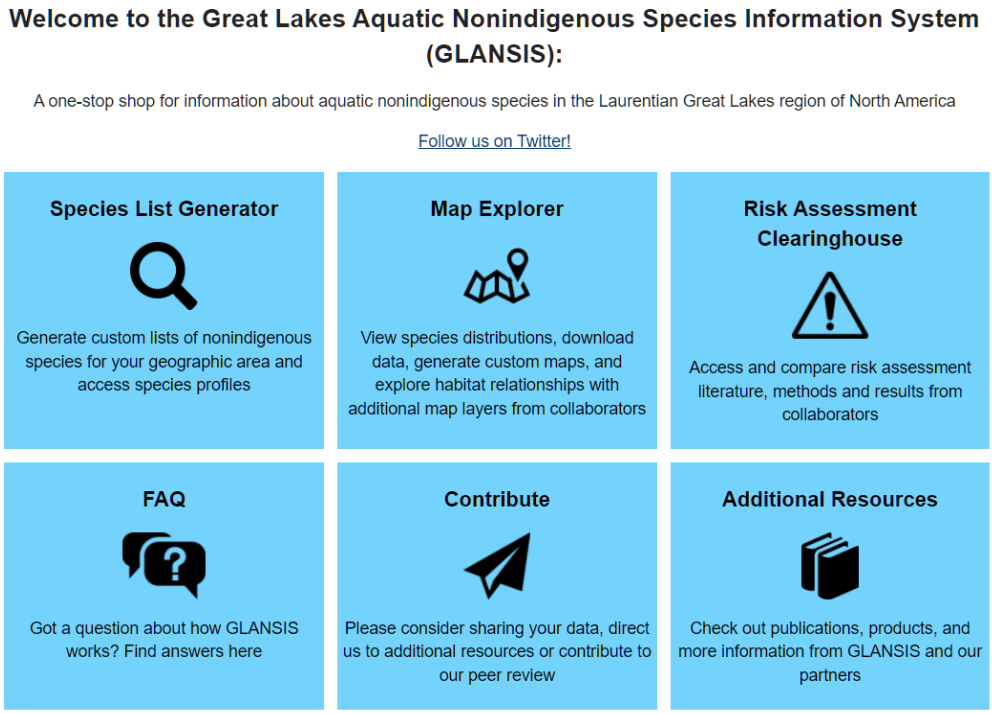


Figure 2. Blocks of main functionality of GLANSIS, but the bottom three actually does not share the same functional importance with the top three

Recommendation #1:

From the viewpoint of web design, the FAQ and Additional Resources blocks can be positioned in the footer part of the website since they are not as important as the other three blocks on the homepage. The navigation bar on the top of the website can be larger so it's more obvious to users. "Follow us on Twitter" link can be put in the footer part as an extra contact information. The hierarchy of the home page sessions can be redesigned to get a more intuitive user experience.

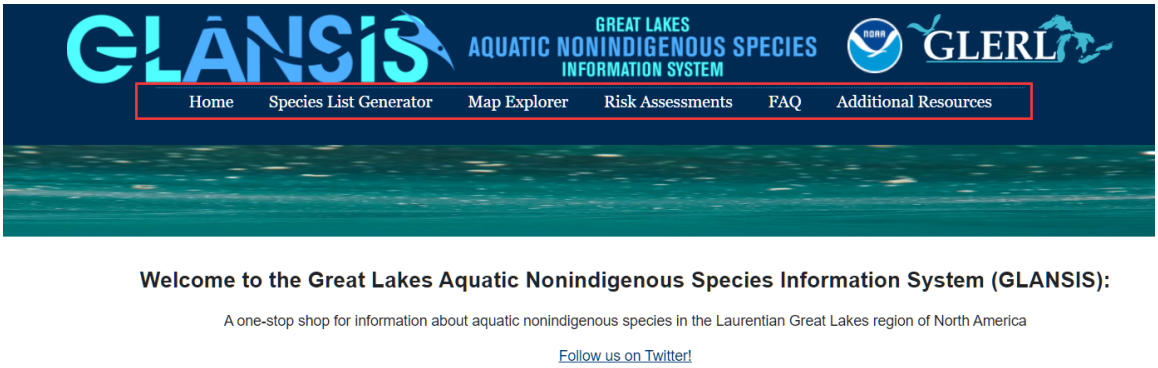


Figure 3. Header part of GLANSIS homepage. The navigation bar is marked in red rectangular, which is too small compared to the rest elements

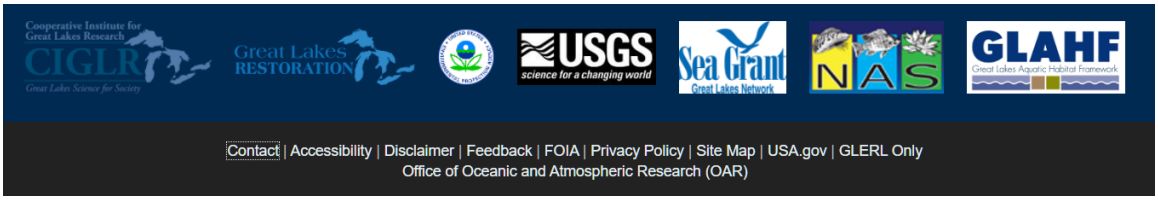


Figure 4. Footer part of GLANSIS homepage. Compared to many other modern websites, this footer contains too little information.

<u>Key Finding #2: The Counterintuitive Design of the List of Species</u>

During the first two tasks, 4 of the 5 participants get confused with the species list page. They either don't know how to enter the species profile page or think they are done with the task. The reason is that the species list page does not show a good navigation to users. 2 participants thought the species list was the end of the searching, and after we told them that it is not the target page, 3 participants in total clicked on the photo intuitively in order to go to the profile page, but the only way for users to go to the profile page is clicking the scientific name of the species. This is counterintuitive and also not obvious on the list page.

Results also available in CSV (click to export table to spreadsheet)
Click on a column header to sort by that column.

Total of 214 records

Photo	Taxonomic Group	Family	Scientific Name (click for species profile)	Common Name	Continent of Origin	Year First Collected	Category
	Algae	Hemidiscaceae	*Actinocyclus normanii f. subsalsa*	A centric diatom	Europe	1709	Nonindigenous
	Algae	Bangiaceae	*Bangia atropurpurea*	A red alga	Europe	1944	Nonindigenous
	Algae	Chaetocerotaceae	*Chaetoceros muelleri*	A centric diatom	Unknown	1978	Nonindigenous
	Algae	Stylonemataceae	*Chroodactylon ornatum*	A red alga	North America	1964	Nonindigenous
	Algae	Thalassiosiraceae	*Conticribra guillardii*	A centric diatom	Europe	1973	Nonindigenous
	Algae	Stephanodiscaceae	*Cyclotella atomus*	A centric diatom	Unknown	1964	Nonindigenous
	Algae	Stephanodiscaceae	*Cyclotella cryptica*	A centric diatom	Unknown	1964	Nonindigenous
	Algae	Nostocaceae	*Cylindrospermopsis raciborskii*	Cylindro	Indo-Pacific	1971	Nonindigenous
	Algae	Fragilariaceae	*Diatoma ehrenbergii*	A pennate diatom	Unknown	1938	Nonindigenous
	Algae	Gomphonemataceae	*Didymosphenia geminata*	Didymo	Unknown	1994	Range Expander

Figure 5. List of species generated by Species List Generator

Recommendation #2:

A recommended solution is to put the columns of scientific name and common name before the columns of taxonomic group and family, and make species photo, scientific name, and common name all clickable and guide users to the species profile page. The three elements should have an obvious change when it's hovered, focused, or activated, so users will know what they are doing with the elements.

This solution can also save the spaces for other information on one species. If other columns can be clickable and will guide users to pages other than species profile pages in the future, this will be compatible.

Key Finding #3: Species Profile Page Has a Poor Readability

4 of 5 participants had difficulty in finding out the first sighting after they arrived at the species profile page. 3 of them choose to use the "ctrl+f"("command+f" for Mac users) function provided by the browser to find out the observation information on the page. The main reason is that the page does not categorize different sessions well. The text amount is overwhelming for most users so they just give up reading at the first glimpse.

Ecology: *Faxonius rusticus* inhabits lakes, ponds, and streams, preferring areas with rocks, logs, or other debris for shelter. Clay, silt, sand, gravel, and rock all serve as suitable bottom types. However, *F. rusticus* prefers cobble habitat, which allows it to hide if necessary (Taylor and Redmer 1996). This species can thrive in areas of high flow or in standing water, but unlike other species of crayfish that can burrow in the sediment when water conditions decline, the rusty crayfish must have clear, well-oxygenated water year-round to survive (Capelli 1982 and Gunderson 2008). It is usually found at water depths < 1 meter, though it has been found as deep as 14.6 meters in Lake Michigan (Taylor and Redmer 1996). Adults typically occupy pool areas of >20 cm depth, while juveniles are usually found in shallower areas (<15 cm depth) bordering stream edges (Butler and Stein 1985).

Mature rusty crayfish mate in late summer, early fall, or early spring. The female stores sperm transferred from one or more males until its eggs are ready to be fertilized—usually by late spring when water temperatures begin to increase (Berrill and Arsenault 1984). Therefore, it is possible for a single mature female carrying viable sperm to begin a new population if she is released into a suitable habitat. Rusty crayfish females can lay between 80 and 575 eggs (Gunderson 2008). Eggs hatch in three to six weeks depending on water temperature. Juveniles stay with the female for several weeks after hatching (Berrill 1978) and reach full maturity the following year upon completion of about eight to ten molt cycles. After maturity is reached, growth slows greatly, with males typically molting twice per year and females molting once. In the spring, the male molts into a sexually inactive from (Form II) and returns to its sexually active form (Form I) in the summer (Gunderson 2008). The expected lifespan of *F. rusticus* is 3-4 years.

In its native range within the Ohio River valley, *F. rusticus* may seasonally be exposed to water temperatures ranging from close to 0°C up to 39°C; however, it prefers water temperatures between 20 and 25°C (Mundahl and Benton 1990). The maximum growth rate of juveniles is thought to occur at water temperatures between 26 and 28°C, while the maximum juvenile survival rate occurs at temperatures between 20 and 22°C. Therefore, adults will often displace juveniles into warmer habitats to favor maximum growth rate as a means of improving fecundity and competitive abilities (Mundahl and Benton 1990). At temperatures greater than 30°C, *F. rusticus* has been observed digging burrows in the sand beneath rocks near shore as a means of escaping the heat (Mundahl 1989).

Faxonius rusticus individuals feed as shredders, scrapers, collectors, and predators (Lorman and Magnuson 1978). This species is an opportunistic consumer of a variety of aquatic plants, benthic invertebrates, detritus (decaying plants and animals, including associated bacteria), periphyton (algae and microbes attached to objects submersed in water), fish eggs, and small fish (Lorman 1980). Juveniles tend to feed on benthic invertebrates, such as mayflies, stoneflies, midges, and side-swimmers, more often than do adults (Hanson et al. 1990, Momot 1992). Among the options of invertebrate prey for adults, snails are a primary target (Lodge and Lorman 1987).

Means of Introduction: Human activity best explains the presence of the rusty crayfish in areas outside of its native range. Angler bait bucket emptying is thought to be the primary cause of introduction and species spread (Berrill 1978, Crocker 1979, Butler and Stein 1985, Lodge et al. 1986, Hobbs et at. 1989, Lodge et al. 1994, Kerr et al. 2005; Kilian et al. 2012). The rusty crayfish is also commonly sold to schools and biological supply houses, leading to the potential for uninformed release into the wild (Gunderson 2008; Larson and Olden 2008; Kilian et al. 2012). Intentional release into water bodies by commercial crayfish harvesters is another suspected cause of its range expansion (Wilson et al. 2004). A further mechanism of human facilitated introduction is the intentional establishment of this species in lakes as a means of removing nuisance weeds (Magnuson et al. 1975). Once introduced to a new body of water, this species can move an average of 29 meters per day (Byron and Wilson 2001) and colonize the entire littoral zone up to 12 meters depth (Wilson et al. 2004).

Status: *Faxonius rusticus* is established in twenty states: Colorado (Illinois Natural History Survey 2011), Connecticut (Mills et al. 1997), Iowa (Leon et al. 2016); Illinois (Michigan State University 2015); Maryland (Maryland Department of Natural Resources 2012; Kilian 2013); Maine (Hobbs 1989; sighting reports); Michigan (Michigan State University 2015); Minnesota (Passe 2014); North Carolina (Fullerton and Watson 2001; North Carolina Wildlife Resources Commission 2017); eastern Nebraska (M. Wright pers. comm.); southern Nevada (sighting reports); northern New Jersey (Walker 2002); New York (Walker 2002; Dresser et al. 2016); Ohio (Peters 2010); Oregon (Sorenson et al. 2012); Pennsylvania (iMapInvasives 2016); South Dakota (South Dakota Game, Fish and Parks 2015); Vermont (Caduto 2011); Wisconsin (Wisconsin Department of Natural Resources 2015); and West Virginia (Jezerinac et al. 1994; Loughman 2012).

Its status is unknown in Massachusetts, New Hampshire, and Tennessee, as the only reported introductions are from Hobbs (1989).

Extirpated in Wyoming (Wyoming Game and Fish Department 2015).

Great Lakes Impacts: *Faxonius rusticus* has a moderate environmental impact in the Great Lakes outside of its native range.

Potential:
Current research suggests that the rusty crayfish could have a variety of negative environmental impacts if it continues to expand its range within the Great Lakes. Crayfish in general are considered to be ecosystem engineers, as they have a wide variety of indirect effects on ecosystems through disturbances, such as bioturbation (Jones et al. 1994, Statzner et al. 2000, Crooks 2002, Creed and Reed 2004, Usio and Townsend 2004, Zhang et al. 2004, Kuhlmann and Hazelton 2007). Native and/or existing species of crayfish are at risk of being displaced by this aggressive species (Magnuson et al. 1975). Replacement of low densities of native *F. propinquus* by higher densities of *F. rusticus* is expected to have many widespread negative effects on aquatic communities (Kuhlmann and Hazelton 2007). Displacement of *F. virilis* and *F. propinquus* has already occurred in many Northern Wisconsin lakes and in lakes throughout Ontario due to the introduction of *F. rusticus*. These kinds of species displacements have been observed wherever the rusty crayfish has been introduced (Capelli 1982, Butler and Stein 1985, Lodge et al. 1986, Olsen et al. 1991, Hill and Lodge 1994, Olden et al. 2006). Evidence of the rapid dominance of this species over previously established crayfish species was seen in a recent study on Lake Ottawa in Michigan's Upper Peninsula. Rusty crayfish were first noticed in the lake in 1987, where it made up about 20% of the crayfish community. By 1997, it had begun to dominate, making up 75% of the crayfish population, and since 2001 it has accounted for 100% of the crayfish species caught in traps (Rosenthal et al. 2006, Peters et al. 2008). There are three primary mechanisms through which the rusty crayfish is able to displace resident species.

One mechanism of species displacement is crayfish-to-crayfish competition, as this species is better able to compete for food resources and space than are many other species (Garvey et al. 1994, Hill and Lodge 1994, Bobeldyk and Lamberti 2008). Although both the rusty and native species of crayfish feed on aquatic plants, the rusty crayfish has a higher metabolic rate and spends less time hiding from predators, meaning it will eat more and spend a greater amount of time feeding (Stein 1977, Jones and Momot 1983). Due to its higher metabolic rate, *F. rusticus* is believed to consume twice as much daily as similarly-sized native crayfish (Olsen et al.

Figure 6. Screenshot of paragraphs on Rusty Crayfish species profile.

Recommendation #3:

The corresponding pages can also be streamlined in their instructions and other information that may not be vital to every user can be linked through those pages. This would help in reducing the amount of text information on the page and make the information easier to read. The information in all the pages could also be synchronized and follow a similar hierarchy so that it is easier for the user to follow. More images could be used to make the page less cluttered. For the species page, our recommendation is to categorize different information of a species and make information blocks. Different information should be well categorized, so users can go to the category where the information is located. Even if users want to read all the text in the species profile page, paragraph blocks can also increase the overall readability of the page, so users will not get lost during the reading.

Figure 6. The contents index of the Wikipedia page of rusty crayfish. As a good example of categorization, Wikipedia has good readability with large amounts of text.

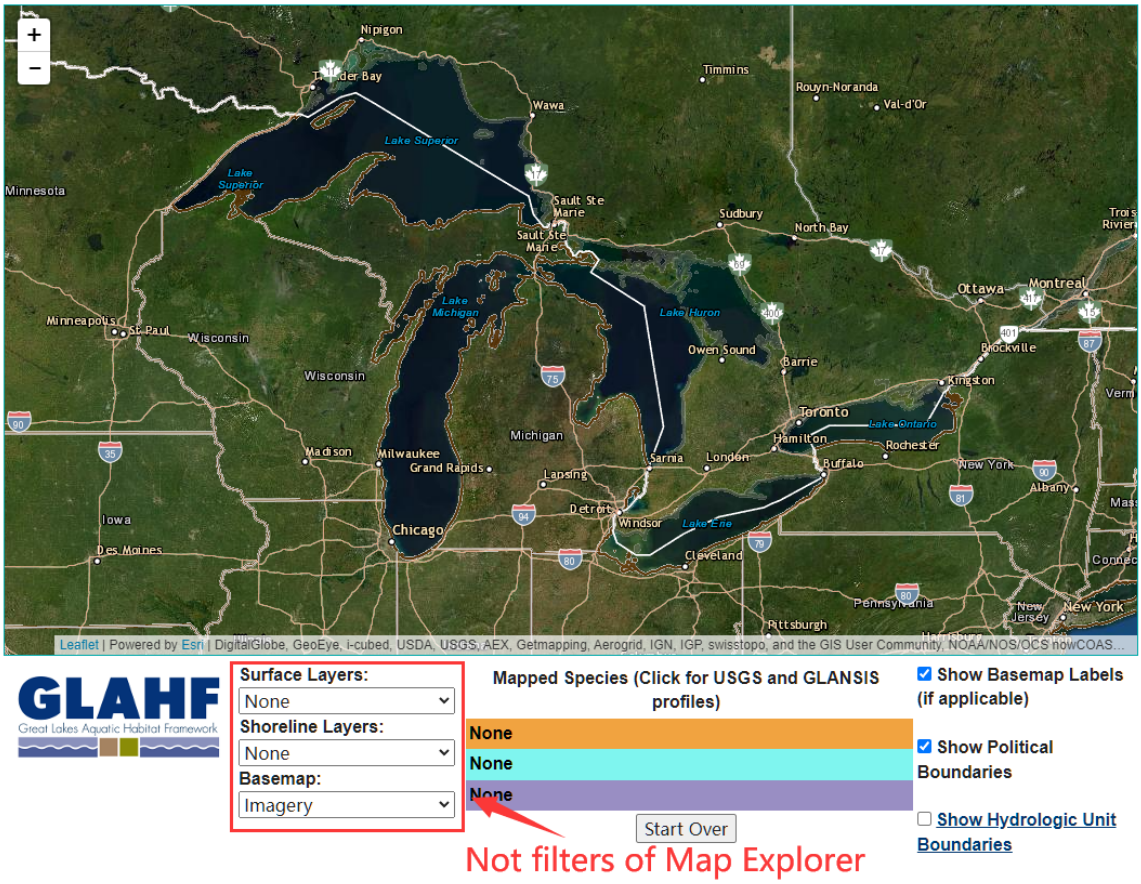
Key Finding #4: The UI of Map Explorer needs to be improved

Participants took the longest average time to finish the Map Explorer tasks, which indicates that there must be some problem here. The first problem of the Map Explorer is the overall UI layout. All 5 participants have problems finding different information on the Map Explorer page. The hierarchy of the page is not intuitively designed, so users have a difficult time finding the keys to start a search. The text information on the page is too much for a search tool, which increases the difficulty of using the tool.

GLANSIS Map Explorer

For a step-by-step Story Map on how to use the GLANSIS Map Explorer to create visualizations, display habitat layers, download data for use in a GIS program of your choice, and more, **click here**. A simplified text-only tutorial can be found **here**.

This search interface is designed to provide direct access to the USGS NAS species database and allow species' locations to be easily compared with habitat layers provided by the Great Lakes Aquatic Habitat Framework or downloaded to your own GIS. You may select GLAHF layers, and scroll down to select species (up to 3 species may be displayed at once, select them sequentially).



GLAHF
Great Lakes Aquatic Habitat Framework

Surface Layers: None
Shoreline Layers: None
Basemap: Imagery

Mapped Species (Click for USGS and GLANSIS profiles)

None
None
None

Start Over

Not filters of Map Explorer

Show Basemap Labels (if applicable)

Show Political Boundaries

Show Hydrologic Unit Boundaries

Figure 7. Map Explorer top UI elements

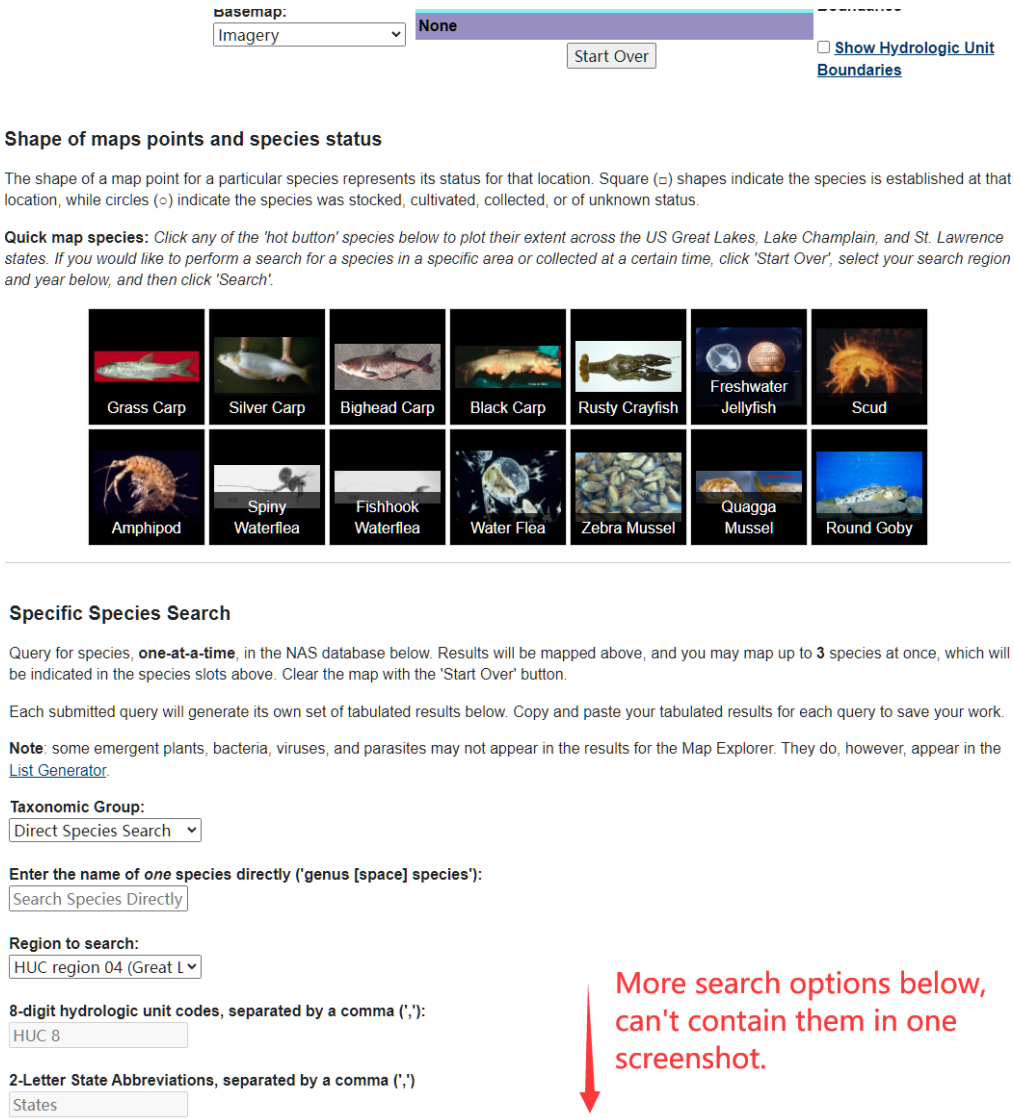


Figure 8. The Search function itself is far away from the map.

Recommendation #4:

The Map Explorer page should be redesigned following the rule of hierarchy grids. To be more specific, consider relationships between different UI elements and emphasize the most important element. For example, the search filters should be closer to the map itself, and the quick map species should be a hidden option standing away from the map and the search filters. The text description about the tutorial and the Map Explorer itself can be put in another individual page since they are not necessary when users conduct a search process. The map shape indicator may change from text description to legends on the map. The GLANSIS team should do more specific design on this since they know more about the importance of different UI elements.

Key Finding #5: Lack of Feedback on Map Explorer Interaction

Another problem about Map Explorer is the feedback when users interact with the tool. Participants tend to get confused when they are interacting with the Map Explorer since the feedback is too minimal for users to notice. The most obvious one is that users will repeatedly click on the search button while the map is loading. The "Mapping in progress" does show up when the map is loading, but no one noticed that before we pointed it out.

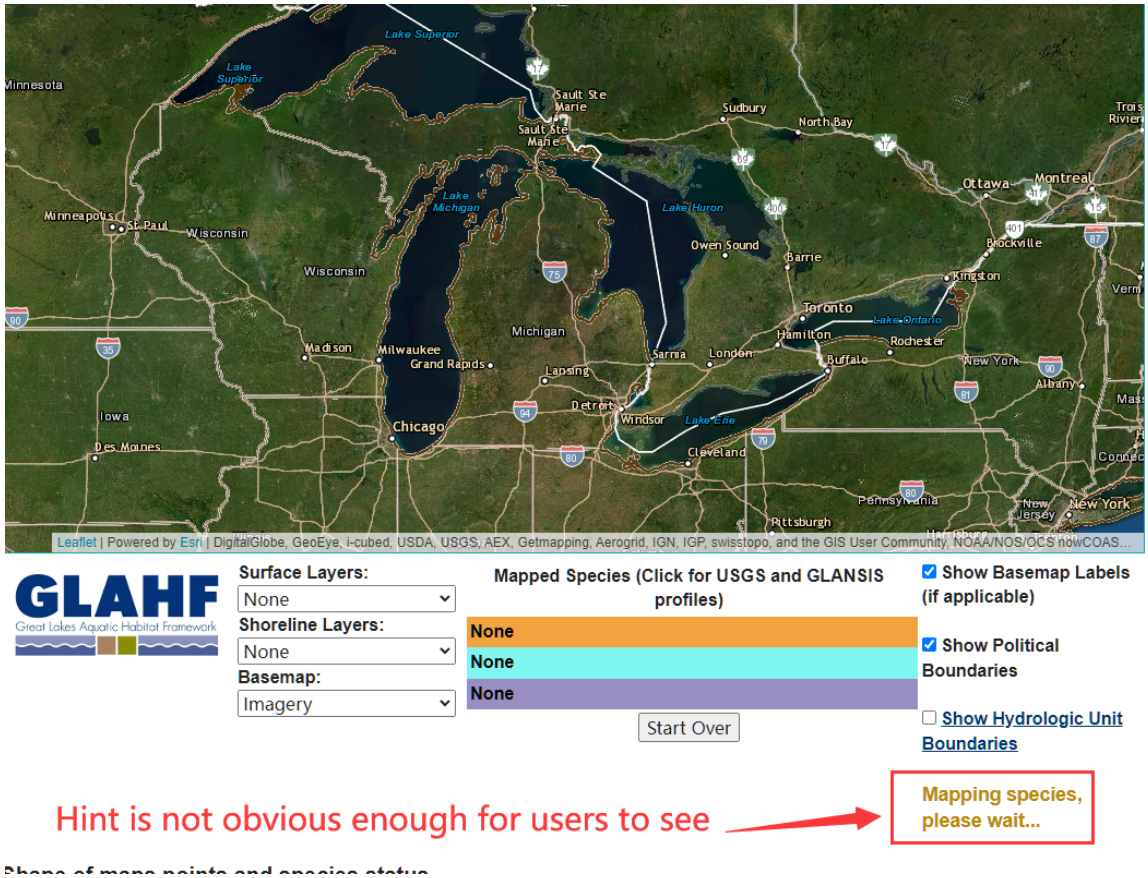


Figure 9. Loading hint is too hard to see.

Recommendation #5:

Giving the feedback for users is important for interacting with the website. During the loading process, it can show an interactive progress bar with the sentence "Mapping in progress" in the map area. For making the progress bar stand out, the map can be blurred a little bit during loading it.

Discussion

While we believe we successfully completed our usability testing on GLANSIS website, there were some limitations. Since we wanted to conduct the usability testing with professional undergraduate biology/ecology educators, we sent out a lot of emails targeting those people. However, unfortunately, we could not recruit those kinds of people. So, we decided to focus on students who are also covered

under the ‘educator’ user groups. It was still working because GLANSIS’s aim was building an educational hub in their system. We conducted the usability testing with five undergraduate and graduate students. As part of the future study, we would like to suggest to our stakeholders to consider doing more usability tests with biology/ecology undergraduate educators who are the primary user groups.

Conclusion

We conducted usability testing of the GLANSIS website based on our prior studies. Through usability testing, we were able to identify the weaknesses and strengths of the current website. We selected five students as our participants for the usability testing. From our observations and notes during the testing, we determined five key findings as well as corresponding recommendations: (1) The FAQ and Additional Resources blocks can be positioned in the footer part; (2) Putting the columns of scientific/common name before the columns of taxonomic group and family & Making species photo, scientific name, and common name all clickable; (3) The corresponding pages of Species Profile Page can be streamlined in their instructions & Other information can be linked through those pages; (4) The Map Explorer page should be redesigned following the rule of hierarchy grids rule; (5) Showing an interactive progress bar with the sentence “Mapping in progress” in the map area on Map Explorer page.

References[1]

Nielsen, J. (1994) Heuristic Evaluation. In J. Nielsen. & R. L. Mack (Eds.) *Usability Inspection Methods*. New York, NY: John Wiley & Sons.

Wagner, J., Lawrick, E., Angeli, E., Moore, K., Anderson, M., Soderlund, L. & Brizee A. (2010). APA Style. Retrieved from http://owl.english.purdue.edu/owl/section/2/10/.

[1] Others' work should be properly cited in the body of the report and the full references should appear here. Any reference in this section should have at least one corresponding citation within the text (and, or course, all citations should have a corresponding reference entry). All citations and references should comply with the APA guidelines (Wagner, et al. 2010). Please note that we are only following the APA guidelines for citations and references. You do not need to worry about all the other formatting guidelines.

Appendices

Appendix A. Moderator Script & Task Description

Hi my name is ____. Thank you so much for agreeing to participate in our usability test! We are working with GLANSIS to improve their database for use by biology/ecology educators like you.

We would just like to inform you that we will be recording this session. The reason for recording is so that we may be able to go back to the test and be able to analyze the results. Please let us know if you are not comfortable with the recording.

We will go ahead and explain a set of tasks that should take you 2-3 minutes to complete. Please try to intuitively navigate the website. Remember that we are testing the system and not your performance. If you have any questions on the task, feel free to ask us. If you feel that you want to quit a task at any time, don't hesitate to quit and move on to the next task.

During this session, we will be here with you and we may ask you some questions from time to time. Before we start, do you have any questions for me or the team?

Tasks

1. Navigate to the correct species search page and utilize the advanced search to find the rusty crayfish profile page.
2. Use the rusty crayfish profile page to find information on the first sighting in the Great Lakes area.
3. Do not use the common name, genus or species line in the search page to find any invasive species profile.
4. From the home page, navigate to the map explorer feature. Look up the distribution of the rusty crayfish species in the Great Lakes area. Find out which state has the most overall reports of rusty crayfish.
5. Add rusty crayfish sighting reports from 2018 and 2020 (not 2019) to the map. Identify the states that have clusters of rusty crayfish reports in these years.

Appendix B. Pre-test Questionnaire & Post-test Questionnaire

Pre-Test Questions

1. Are you more comfortable with using the internet (online resources) to gather information than using physical resources (books and journals)?
2. Can you tell us what website/system you usually use for searching information if there is any?
3. What tasks do you usually conduct with that website/system?
4. Have you ever used GLANSIS before?

Post-Test Questions

1. How difficult are these task assignments? (1=very easy, 5=very difficult)
2. How would you describe your overall experience with GLANSIS?
3. If you could change one feature in the GLANSIS website, what would it be and why?
4. What do you expect to see in GLANSIS in the future?

Appendix C. Questionnaire Responses

Questions	p1	p2	p3	p4	p5
Pre-test					
1. Are you more comfortable with using the internet (online resources) to gather information than using physical resources (books and journals)?	Internet	Internet	Online	Online	Online
2. Can you tell us what website/system you usually use for searching information if there is any?	Google, Pubmed	Bing	Google	Google	Google
3. What tasks do you usually conduct with that website/system?	Literature research	Everything almost	If they need info or answers. Everyday tasks (how big is 10 cm). Research-wise for classwork.	Almost everything.	Looking for information for almost everything
4. Have you ever used GLANSIS before?	No	No	No	No	No
Post-test					
1. How difficult are these task assignments?(1=very easy, 5=very difficult)	2	1 for T1-3, 5 for T4-5	2	2	4

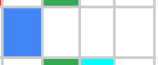
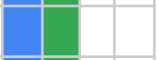
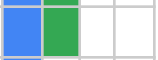
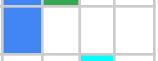
2. How would you describe your overall experience with GLANSIS?	Functionality is complete, but the overall result layout structure is confusing	Probably not for a general public	Overall rating of 4 for experience. Seems to be barebones for a website.	It is providing lots of valuable information for biology related people, but it is not for general people	It took a lot of time to do simple tasks that can very easily be made easier. Little things like make their logo a hyperlink to the homepage. Shoudl present the info on the homepage so it doesn't feel overwhelming.
3. If you could change one feature in the GLANSIS website, what would it be and why?	Map explorer, because it's better to make filteration or searching process while map is visible to users, like google map.	Map explorer, since is frustrating to use. It's even worse than any .gov	Species List Generator could have used a dropdown menu for genus & species like in the Map Explorer would be helpful (or listing all of them). Adding a way to go back to the home page would be helpful. On species profile page, the info can be grouped together better using dropdown menus to clear up	Species List Generator. it would be better to provide a tutorial before using it. It was confusing to use some filters.	I would change the layout of the homepage- to make it more accessible and clear to the user.

			space.		
4. What do you expect to see in GLANSIS in the future?	Nothing special since not related professionals	Nothing special since not related professionals	Update aesthetics of website	Better user interface and layout	I would hope to see that the website has been made to look more futuristic and user friendly.

Appendix D. Raw Observation Data

Codes	G: General Comment
	C: Confusion
	E: Error In Task Completion
	X: Usability Issue
	NH: Needed Help
	!: Critical Issue

Observations	**Code**	p 1	p 2	p 3	p 4	p 5
Task 1-2						
User uses ctrl+f function to find specific information on the profile page.	G					
User is confused about if they really found the first sighting info since the article structure is not clear	C					
Sessions in profile page are not clearly titled	X					
The navigation from species list to species profile is counter intuitive	X					
The homepage structuring is confusing since the importance of different functions are clearly not the same, but they are still in a same hierarchy structure.	C					
The common name should be the first since it might be the most commonly used.	C					
The map in the profile page looks nice	G					
Homepage decoration is not good, and font size is too small to read	G					
The user is confused where to start searching	C					
Filters are confusing	C					
The user is clicking photo to navigate to the profile	G					
User was able to find the species page but had time loading the website and expressed frustrations	X					
User did not intuitively click on the 'rusty crayfish' for more info	NH					
Once user clicked on the species they did not know where to go for more info	E					
User did not know how to go back to the home page	!					
Map feature on species profile page zooms in and out when I try to scroll just on the page	X					

Task 3		
The filter "Group" is too vague, which means some group in the drop list is too big and some are too small. No further filtering function provided in list page	X	
Some filters are confusing for non-biology professional users.	C	
The user is confused with various filters	C	
User was not able to complete the task	E	
User headed to species page	NH	
Task 4-5		
User is looking for a chart that shows the data of distribution, but he found only graphical map is provided	C	
The search filters are too far away from the map itself	X	
User is confused with which filter should be use on the map explorer page	C	
"Mapping in progress" is hard to see	X	
Lack of feedback when conducting search	!	
Lack of blurry search	G	
There are too much text which is overwhelming	G	
The user clicked the rusty crayfish on the quick map species	G	
The state names are confusing, the text is too blurry	C	
The user is using ctrl+f for searching 'year', and then entering the years	G	
User was confused between two options of 'map explorer'	C	
Too much information on the page	C	
Was confused about the task because of lack on information	C	
Did not know how to interpret the info and could not find the key	X	
Was able to fill in the years but did not know what meant what on the map	E	
Did not like the UI of the webpage	G	
User went back to species page to get scientific name because they didn't know it	G