Comparative Evaluation Report

Findings and Insights for **GLANSIS** website
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Executive Summary

The GLANSIS website fills a niche gap within the invasive species database field, focusing exclusively on aquatic species and a highly specified geographic region, The Great Lakes. However, based on our research with local management agencies, we know that there are a variety of websites for data sharing and analysis used by current professionals. With this knowledge, we began to research and collect key points from a variety of databases, finding the following:

- Increased filter and search functionality on both a general search and map features
- Providing user feedback and signifiers
- Curriculum regarding species training
- Clear information hierarchy

These findings help to contribute to the following recommendations for GLANSIS site improvements:

- Including multiple filters and auto-complete on the Species list generator
- Enable filters, which can be user-generated from URL, for map feature
- Provide signifiers and positive feedback for users based on interactions
- Provide educational resources that focus on educating the general public on the invasive species identification and removal process
- Focus K-12 resources on high school students with solution-driven lesson resources
- Prioritize user access to desired features by adding "Contribution" to the navigation bar

Introduction

Engaging in this comparative analysis, we are focusing on professional invasive species biologists trying to find data for their local watersheds and also trying to contribute their data to the larger community. Following our findings from interviewing with local management agencies, we focus on what features ease the user journey for finding a specific invasive species page. What features are common among large data-based sites that have increased interactivity? These questions contribute to understanding the current standards regarding data sharing and analysis within invasive species and what features contribute to ease of use.

This will help us to provide recommendations for improving the overall user journey for professionals in the space and also reveal some of the current functionality that would help with invasive species management, such as the detailed view of individual watersheds. By evaluating competitors to answer these questions, we can help to make recommendations that would provide a heuristic that the current user base is already familiar with.

Methods

To study the comparators of the GLANSIS website, we collected all the websites mentioned and used by our interviewees: the local management agencies. We then established four criteria, including **audience, functionalities, platform, and competition with GLANSIS** to identify different types of comparators:

Type	Definition	Product	Product Description
Direct	Offers aquatic invasive species tracking resources, target local professionals, and compete directly with GLANSIS.	MISIN misin.msu.edu (Midwest Invasive Species Network)	A regional project led by Michigan State University that aims to provide resources for detecting and responding to invasive species in the Midwest.
Indirect	Offers similar functionalities through platforms other than a website.	GLEDN apps.bugwood.org/apps/gledn (Great Lakes Early Detection Network)	An online system funded by the National Park Service that collects and verifies invasive species reports from casual observers in the Great Lakes region.

Partial	Offers partial functionalities as GLANSIS.	iNaturalist inaturalist.org	A social platform where individuals can share and learn about nature by collaborating with others to collect and access observational data.
Parallel	Has similar functionalities and audience as GLANSIS but not directly competing.	EDDMapS eddmaps.org (Early Detection and Distribution Mapping System)	A web-based mapping system developed by the University of Georgia that enables users to document and track the distribution of invasive species and pests throughout the US and Canada.
Analog ous	Don't offer invasive species tracking resources but provide insights for GLANSIS.	Library of Congress loc.gov	The world's largest online library. It offers access to books, manuscripts, and photographs and provides digital collections, exhibitions, and educational materials for researchers, students, and the public.

We evaluated the selected products based on five key criteria, including **target audience, interactivity, information hierarchy, aids for user input, and education content**. Firstly, we considered the target audience of each product, deciding whether it was more geared toward professionals or enthusiasts. Secondly, we evaluated each website's interactivity to determine its user engagement level. Thirdly, we assessed the information hierarchy of each site to ensure clear navigation for users. Finally, we evaluate the websites' user input features and education content in an effort to discover ways to enhance GLANSIS. Based on these factors, we have chosen MISIN, iNaturalist, EddMapS, and the Library of Congress as the four products to prioritize for further analysis (Appendix 2).

Findings and Recommendations

Summary Results

Comparing the GLANSIS website with other websites with similar features, it stands out for its comprehensive data record, including biology, ecology, and history of introduction into the region for aquatic invasive species within the Great Lakes region. However, there are many aspects regarding **interaction design, information visualization, and website layout** that the GLANSIS website could learn from other comparators to improve usability for both nature enthusiasts and

professional biologists.

Finding 1: There is a lack of suggestions for user input

Comparing the GLANSIS website with its direct competitor MISIN and partial competitor EDDMapS, one significant difference is the lack of suggestions or hints for user input. Remembering the correct spelling of scientific names for species is difficult for most people, even those who work as a professional. To use the "Species List Generator" or "Contribute" function on the GLANSIS website, users must know the spelling of the specie's name to search for or upload information (Figure 1). The lack of a suggested option may make it difficult for students, educators, or citizens interested in aquatic invasive species to navigate the website efficiently. The MISIN website provides a filter to search for the letters that users typed in automatically; the EDDMapS website even provides reference pictures of the species to assist users in identifying their intended input (Figure 2). The Library of Congress, on the other hand, structured its search function differently than the other websites, as it categorized the sources based on their format (Figure 3). Users are able to apply different layers of filters before and after entering the keywords. All these different types of suggestions help improve the efficiency of the search process. The auto-complete function helps users to recognize what they want to search for, while the filter option allows users to narrow their search gradually when there is only a general direction.

Figure 1: GLANSIS Website Input UI

Figure 2: MISM and EDDMapS Input Automation

✓ Everything
Audio Recordings
Books/Printed Material
Films, Videos
Legislation
Manuscripts/Mixed Material
Maps
Notated Music
Newspapers
Periodicals
Personal Narratives
Photos, Prints, Drawings
Software, E-Resources
Web Archives
Web Pages
3D Objects

Online Format	
Image	42,378
PDF	29,616
Online Text	29,049
Web Page	737
Video	65
EPUB	5
Audio	2

Date	
2000 to 2099	1,148
1900 to 1999	17,731
1800 to 1899	20,899
1700 to 1799	182
1600 to 1699	1

Location	
United States	22,648
New York	7,721
Washington D.C.	7,193
Washington	7,125
District of Columbia	7,082
New York City	6,952
New York County	6,823
Kansas	2,260
South Carolina	1,729
Illinois	1,617
More Locations »	

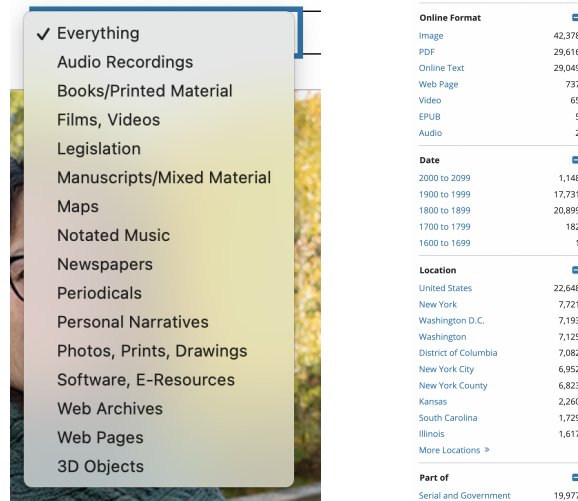| Part of	
Serial and Government	19,977

Figure 3: Filters of the Library of Congress

Recommendation:

The current system does not provide input suggestions, and the filter option is only available at the beginning of the search process. The GLANSIS website could benefit from incorporating an auto-complete function and advanced filter tools for species name input and species search. While users are typing, possible species names can be presented as a list for users to choose from. If the user is not sure what to search for, a list of species categories or locations can be served as filters both before and after the input to narrow the search result gradually.

Finding 2: Education Hub can use NGSS as guidelines

Educational resources are not uncommon on comparable websites to GLANSIS. Those that do, for example, MISIN, feature a self-led clear PowerPoint presentation followed by a quiz. This experience focuses on ensuring the learner can recognize an invasive species and how to safely remove the organism to further limit spread. When the state science standards were investigated for the Great Lakes region, most states adopted the Next Generation Science Standards (NGSS) or an amended version highlighting specifics for their states. These standards focus on integrating larger science phenomena into each standard. NGSS has highlighted instructions regarding invasive species for grades 9-12 in Life Science Courses. These standards can guide GLANSIS to develop its Education Hub content further.

Recommendations:

To help support local management agencies offering clear and concise presentations written in non-technical language will help educate local citizens on what invasive species in their area looks like and the proper protocol when one is identified. To support teachers in a 9-12 setting, educational plans should be suitable for a teenage audience, and given the NGSS guidelines (See Appendix A) focus on students developing possible solutions for invasive species management through engaging in engineering practices and refining solutions based on new information learned.

Finding 3: GLANSIS should improve its information hierarchy

To improve user navigation and information hierarchy on GLANSIS, the website should visually prioritize its core functionalities, specifically the Species List Generator, Contribute, and Education Hub, as indicated by the customer during stakeholder interviews. Currently, the Contribute tab is not included in the navigation bar, and the portals to these core functionalities are not effectively distinguished from the other portals on the homepage, making it difficult for users to access the website's most popular areas (See Figure 4). This lack of clear information hierarchy can undermine the website's branding, as new users may not immediately recognize GLANSIS' key features. Additionally, the website's heavy reliance on text can cause visual fatigue and should be addressed to improve user engagement.
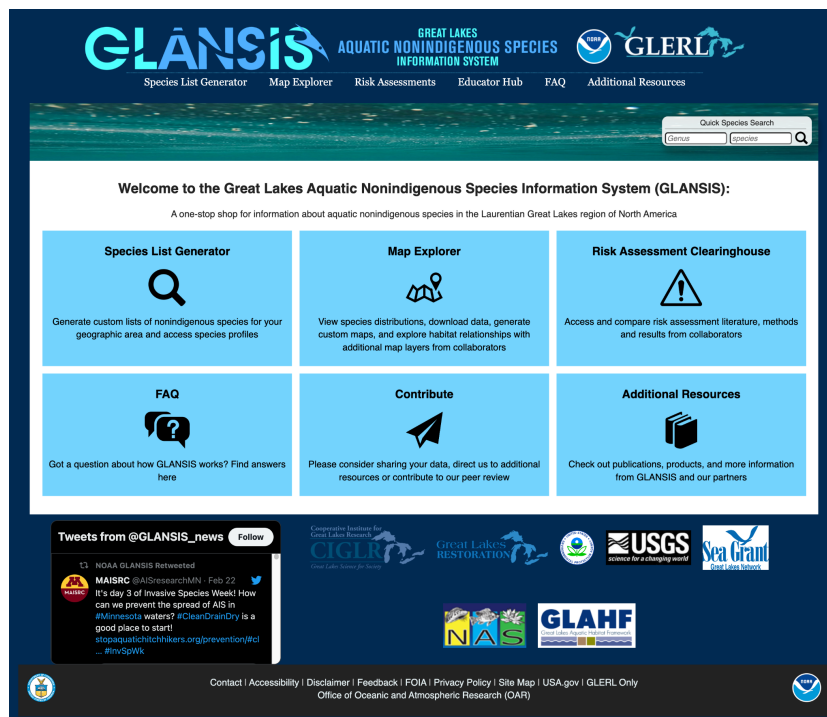

Figure 4. GLANSIS' home page.

Recommendations:

We recommend GLANSIS prioritize the Species List Generator, Contribute, and Education Hub by visually emphasizing them by placing them in the visual center, using contrasting colors, and applying distinctive typefaces (Kingston, 2020). Additionally, GLANSIS should add the "contribute" functionality to the navigation bar to ensure it is easily accessible for users. Furthermore, we suggest limiting the information presented on each page to avoid overwhelming users and enable them to complete their tasks efficiently.

Finding 4: UI lacks feedback from GLANSIS to users

The website lacks the ability to provide timely feedback to users after they submit

their reports. In contrast, another website with a similar feature, iNaturalist, allows users to record their observations in their personal accounts and receive updates after getting replies. In GLANSIS, users can contribute their observations either by filling out a form or by sending emails. However, in both cases, users do not have records of their reports. This means that if users want to check their observations in the future, they have no way of finding them. They do not know where their reports are sent or when they will be identified, and they have to wait for an email reply. What is worse is that if users report by filling out a form, they are not even required to leave a contact method, resulting in a complete loss of access to feedback after their submission.

Recommendations:
Our first recommendation is that GLANSIS create signup features so that users can have accounts on the website, which would allow them to track and receive updates on the status of their reports. This could also lead to more engagement with the website. If GLANSIS is not planning to have registered users, then at least provide users with a specific tracking number for future reference. Even the form of an email notification that confirms receipt of the report and provides an estimated timeline for when the report will be reviewed would help a lot.

Discussion

The products in this analysis are those mentioned in interviews with employees at local management agencies. The limited number and diversity of people interviewed resulted in a limited scope of products, suggesting that there might not be a comprehensive understanding of the potential competitors. Also, The analysis only comes from our group members, which may not reflect the full range of features and capabilities of the platforms being analyzed. Our next step would be to conduct a heuristic evaluation to get a more detailed identification of components for improvement on the website. In addition to this, we will also be conducting usability testing to identify issues we could not find.

Conclusion

Through comparative analysis, we determined to increase the usability of GLANSIS by increasing filtering options on both species search and mapping functionality and adding autocomplete to searches. Further recommendations include increasing user feedback and ensuring users know the system took their input. The website hierarchy should be clearly defined to improve the site's usability, such as including the "Contribute" function in the navigation bar. To help increase engagement in the Ed Hub, including presentation materials for general citizens to aid in identifying invasive species and management techniques. These recommendations are given to increase the similarity in heuristics between current tools used by professionals to increase site use.

References

Kingston, C. (2020, March 17). Visual hierarchy in design: Key principles & examples: Adobe XD ideas. Ideas. Retrieved February 27, 2023, from https://xd.adobe.com/ideas/process/information-architecture/visual-hierarchy -principles-examples/

Appendices

1. **NGSS Standards**

This breaks down a specific standard regarding ecosystem interactions and the detail in which invasive species should be covered. The standard also highlights the science competencies that should be enforced throughout lessons in this standard.

2. Comparative Matrix

	GLANSIS	MISIN	iNaturalist	EddMapS	Library of Congress
Target Audience	Professionals	Professionals	Enthusiasts	Professionals + Enthusiasts	The General Public
Interactivity	Low	Medium	High	High	Medium
Information Hierarchy	Unclear	Medium	Clear	Medium	Clear
Aids for User Input	Filters before Search	Categories + Search Suggestions	Filters + Search Suggestions	Categories + Search Suggestions	Categories + Filters + Search Suggestions
Education Content	External Links + Printables + Videos	External Links + PowerPoint presentation	"Seek by iNaturalist" App For Students	External Links + Printables + Videos	Blog Posts

3. **Presentation Slides**