

GLANSIS User Experience Research Report: Survey

Jades Research Team

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Executive Summary

To assist the team at Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS), a database for aquatic invasive species in the Great Lakes area, we created and conducted a survey. The main aim of the survey was to gain more insights into trends of a focused user base of GLANSIS.

We focused on educators as our targeted user base and in particular educators in the biology field and mainly college level biology instructors. We drafted a survey based on three core questions and piloted it first to a small pool. After feedback from the pilot study, we restructured some questions and sent it out to the target audience through:

- Emails to given contacts.
- Emails to the biology and ecology departments from universities and colleges around the Great Lakes area.
- A survey link that was posted on the GLANSIS home page.
- A survey link that was published on GLANSIS official twitter.
- A survey link that was posted on several Reddit threads related to invasive species.

The survey was made through Qualtrics XM and was available online for around two weeks by the end of which we had obtained 35 responses. The data was then analyzed and visualized through Qualtrics and Excel.

These are the key findings analyzed from the results:

1. Academic journals can be the strongest competitors to GLANSIS.
2. The majority of educators prefer using a source because of convenience in the searching process.
3. Educators are more comfortable using the internet than using physical resources.
4. Educators find the species profile as the most important information when researching invasive species, followed by a brief invasion history and management.

The analysis of our results was able to point us to some improvements in the webpages. Therefore, we recommend the following:

- To develop a new section of the database that stores current academic journals.
- To make a more convenient search function.
- To include an effective quick search feature.
- To prioritize types of information by highlighting key aspects of the website, especially management of the invasive species.

Introduction

Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS) is a database that contains information relating to aquatic invasive species in the Great Lakes area. The website also has tools such as profiles, map explorer, risk clearinghouse and references.

To help the GLANSIS team achieve a higher level analysis and focus on targeted user bases, we conducted surveys focused on educators that use database systems for literary purposes. In this report, we will discuss the methods, analytical results, and improvement recommendations based on the survey completed by different biology instructors in different colleges.

The survey focused mainly on general practices used by educators in gaining information on invasive species. A set of questions nestled in the survey also focused particularly on how educators use GLANSIS as a database and on particular features. This helped us get insight on trends and general behaviors of educators that will help us make recommendations of improvement for the database.

The survey was based on three main questions:

- How long have you been working or educating about the biology/ecology field?
- What type of medium do you prefer to gather information?
- What factors do you think are most/least important when you gather information?

Methods

Target Population

Our target population consisted of educators in the biology field and mainly college level biology instructors. We targeted both potential users and existing users. The reason for targeting existing users was to get insights on features that are used most by educators and which features they prefer to use. Potential users would give us insight into what they do use in competitive databases and what features they like in other databases so that we may determine what may be lacking in GLANSIS. **Figures 1-1 and 1-2** below show breakdown the years of experience that survey participants have both in the field of biology/ecology and the years of experience they have as an educator in these fields.

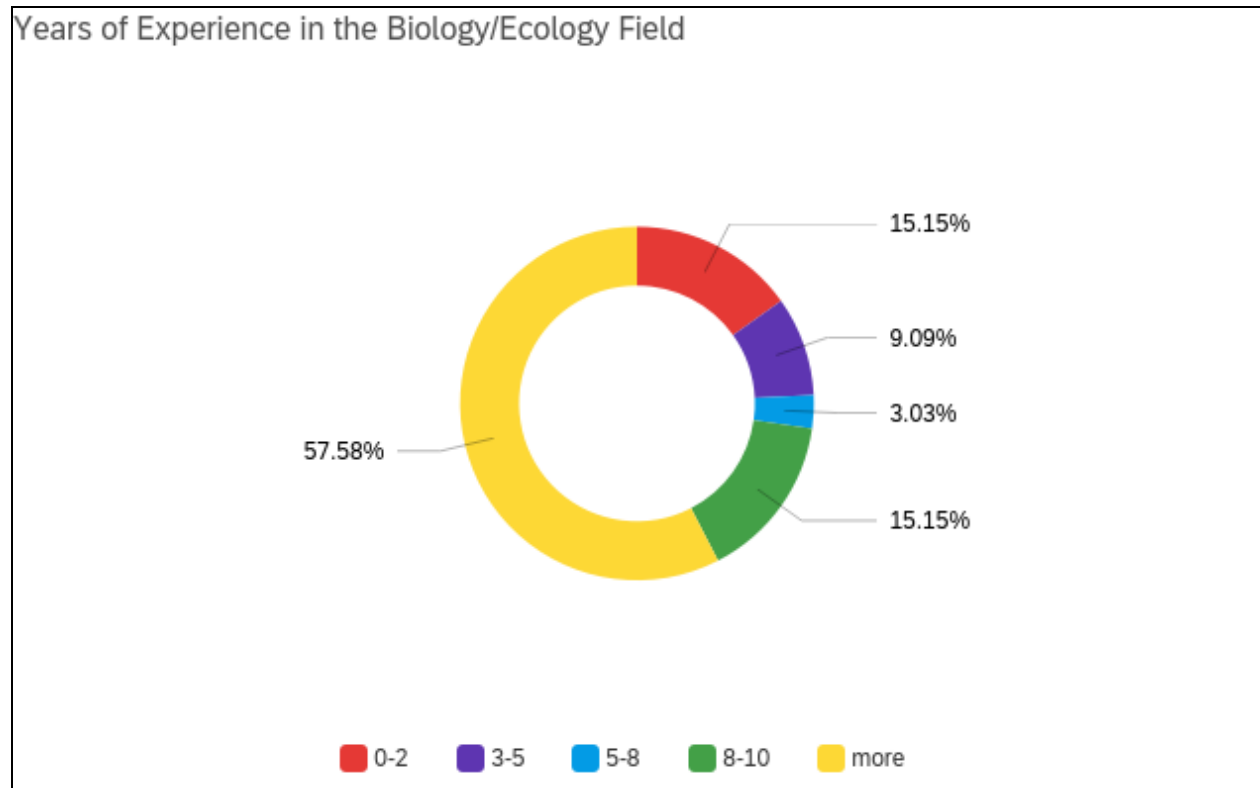


Figure 1-1. Survey results for years of experience in the biology/ecology field.

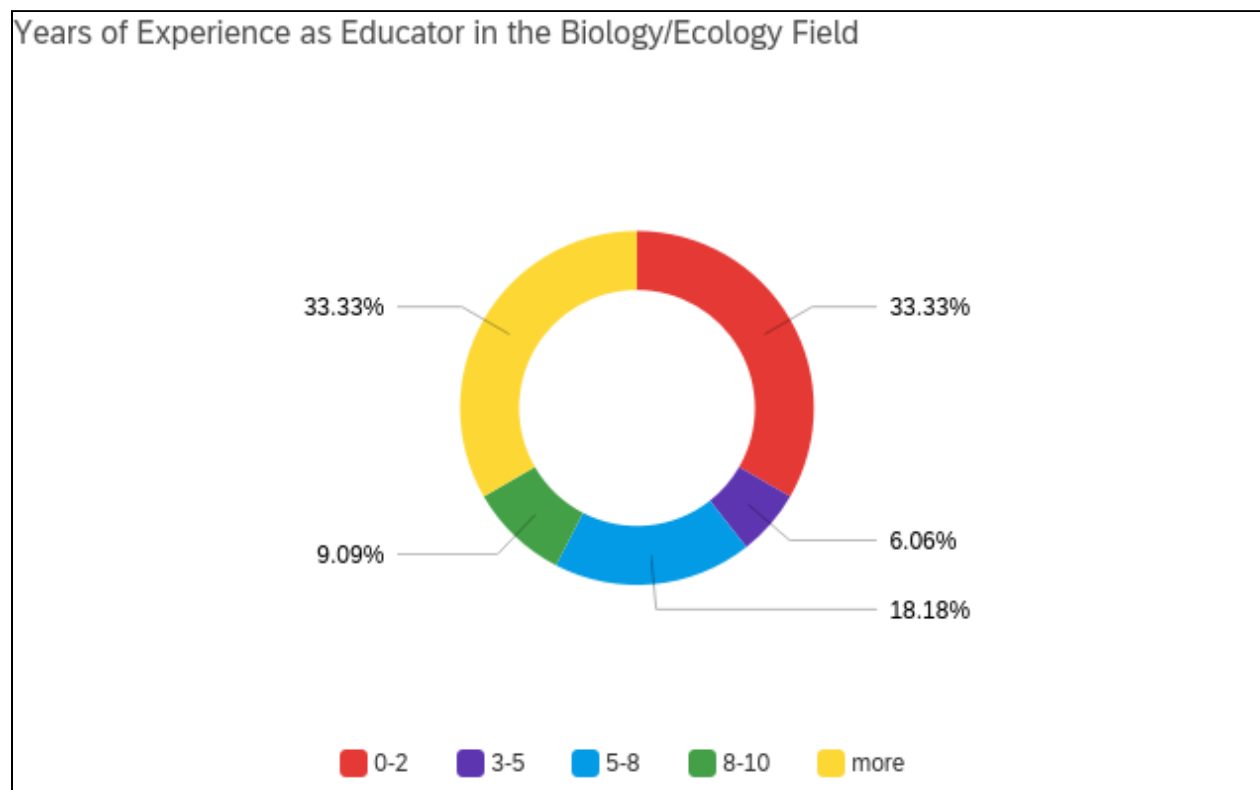


Figure 1-2. Survey results for years of experience as an educator in the biology/ecology field.

Recruiting Methods

In order to diversify our participant, we made use of several methods to recruit:

- The team at GLANSIS provided us with potential participants.
- We utilized email addresses from biology and ecology department websites from universities and colleges around the Great Lakes area.
- A survey link was posted on the GLANSIS home page, as seen in **Figure 2-1**.
- A survey link was published on GLANSIS official twitter, as seen in **Figure 2-2**.
- A survey link was posted on several Reddit threads related to invasive species.

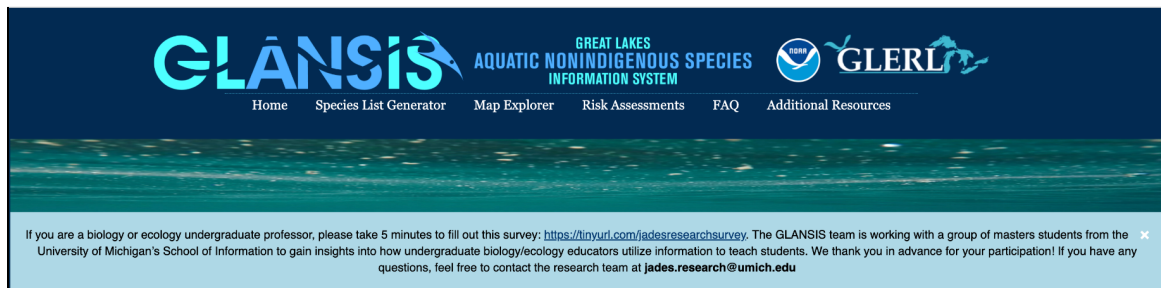


Figure 2-1. GLANSIS home page with banner containing survey information and link.

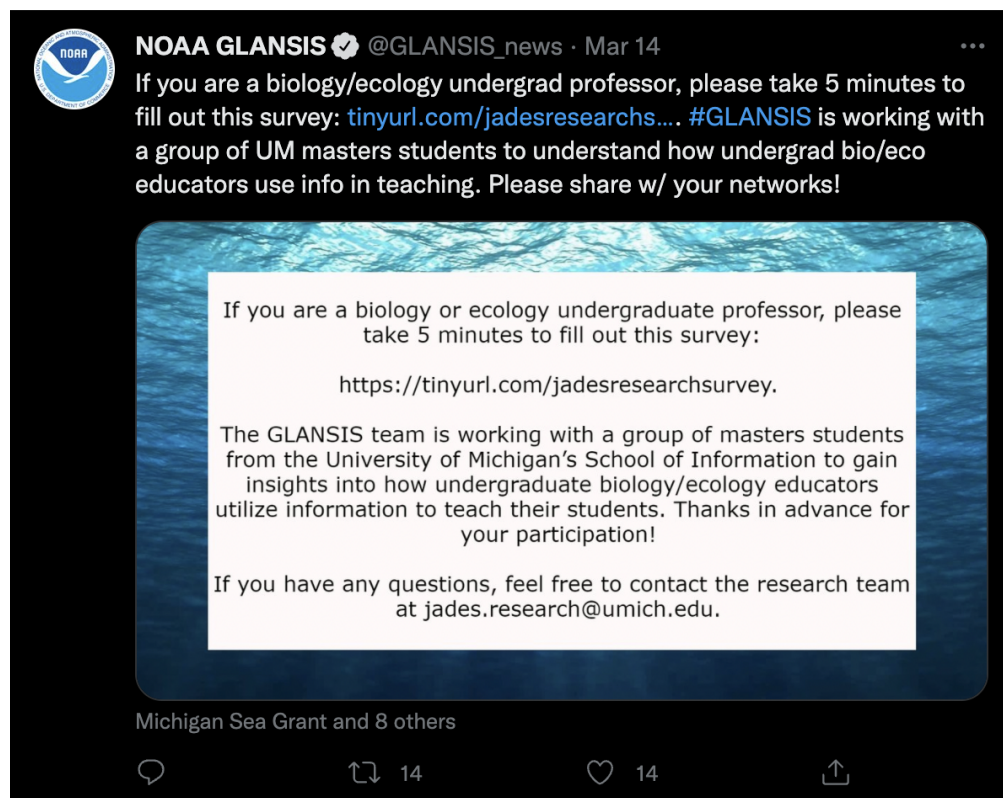


Figure 2-2. GLANSIS Twitter post with survey information and link.

Instrument

The survey was made through Qualtrics XM survey management system and was posted for around 2 weeks. A total of 35 responses were obtained.

Piloting Process

The survey was based on three overarching questions that we thought were most beneficial for the study. The survey was piloted first through five participants. This was done to test the reliability and validity of the survey and to test more pragmatic issues. There were no big issues found but we did rearrange some questions and changed the logic of select questions based on the feedback we received. We also made sure to separate the questions for current users of GLANSIS to a separate block.

Analysis Methods

To analyze the data obtained from the surveys, we first exported data to Google Sheets. The data was combed over extensively looking to remove non-qualifying results. We also removed responses that did not receive replies to. The data was then analyzed and visualized through Qualtrics and Excel.

Findings and Recommendations

Summary Results

Our survey focuses on undergraduate educators in the biology and ecology field and how they gather and utilize related data. Our survey results demonstrate that there were several preferred ways of gathering and utilizing information by undergraduate educators. After analyzing the numeric data and the open response questions, we were able to conclude key findings and recommendations. We received 35 total responses to the survey over a period of two weeks, the distribution of which is shown in **Figure 3-1**.

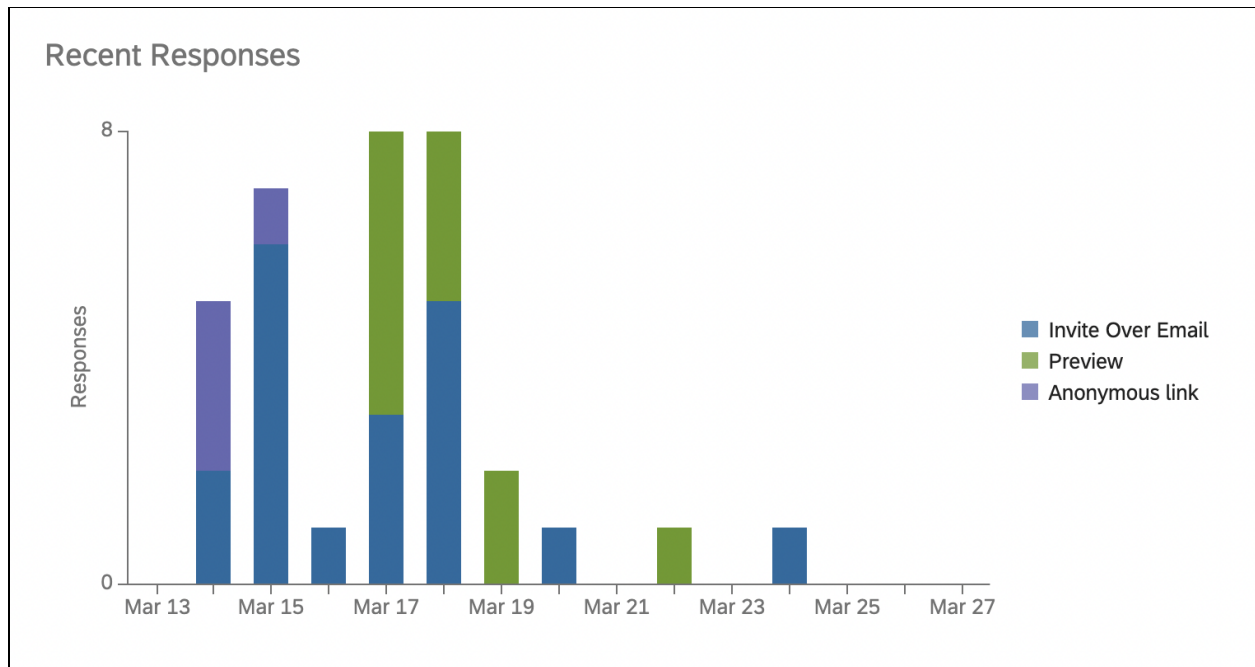


Figure 3-1. Distribution of responses over time and by type.

Key Findings & Recommendations

Key Finding #1: Academic Journals can be the strongest competitors to GLANSIS.

To identify the potential competitors, we set some questions to find out the users' preference of source finding out the information of any species. According to the survey result, most of the college biology/ecology educators like to use online databases to search for different species information, while the second popular option is through academic journey as shown in **Figure 4-1**. However, the cross table comparison with working experience shows a different result.

Preferred Sources to Gather Information About Any Species

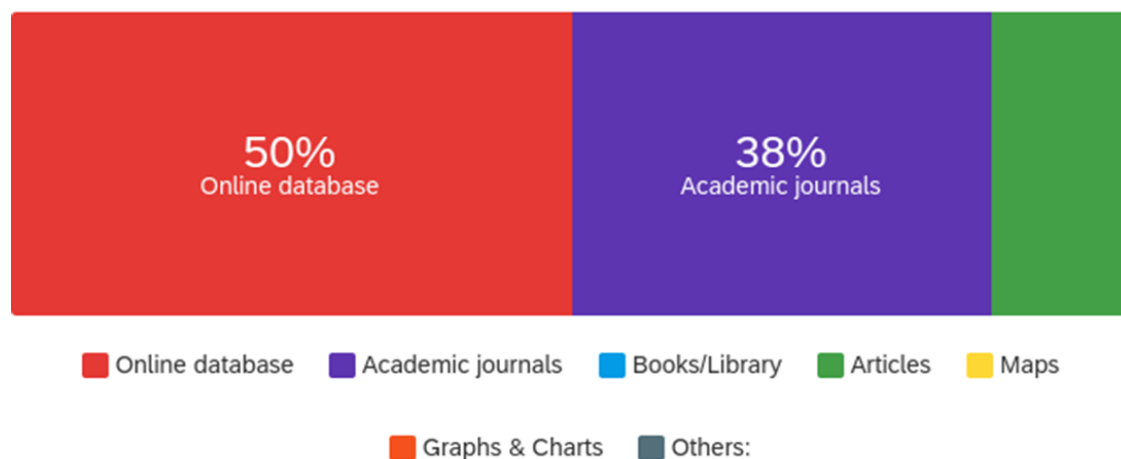


Figure 4-1. Summary of preferred sources to gather information about species.

In our survey, the previous questions diverse users into groups with different working experiences. After breaking out the data using the experience data, we can see that educators with different related experiences have different preferences of choice of information source.

Preferred Sources to Gather Information About Any Species, Given Years of Experience

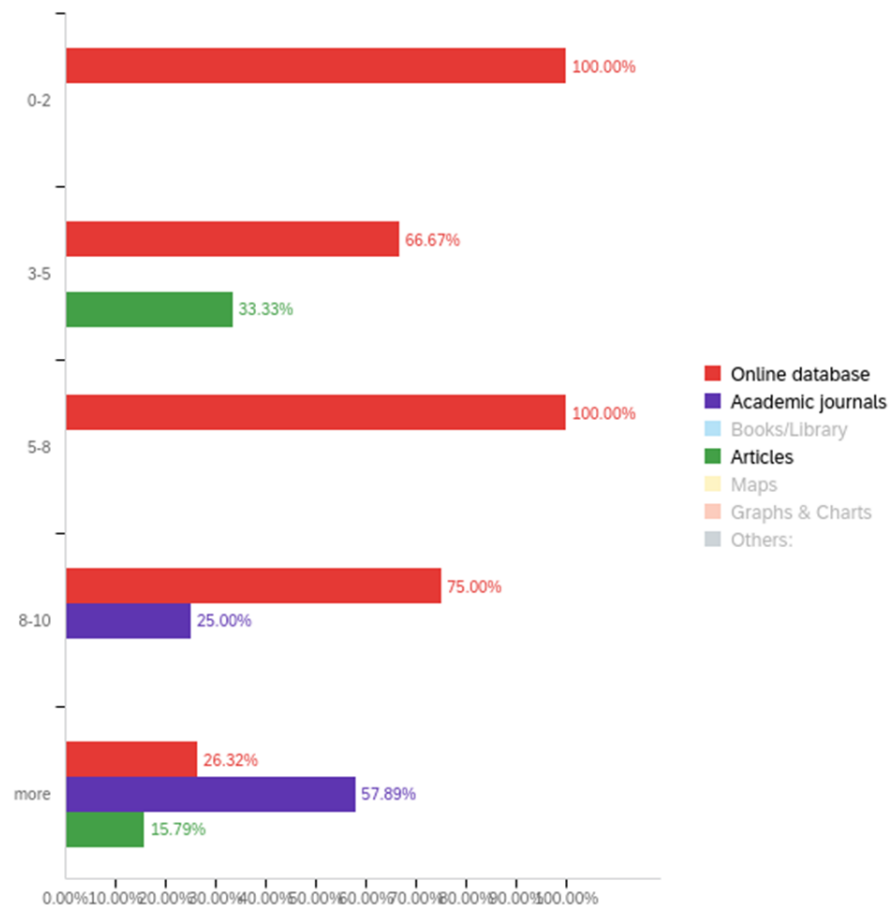


Figure 4-2. Preferred source of information breaking out by years of biology/ecology working experience.

As shown in **Figure 4-2**, we can see educators with more experience prefer academic journals more than other resources, while educators with less experience prefer online databases. If we see the work experience distribution shown in **Figure 4-3** at the same time, we can see that most of the educators have more than 10 years of experience related to the biology/ecology field, so the importance of academic journals might be the same as online databases. Thus, the academic journals might be the strongest competitors to online databases like GLANSIS.

Years of Experience in the Biology/Ecology Field

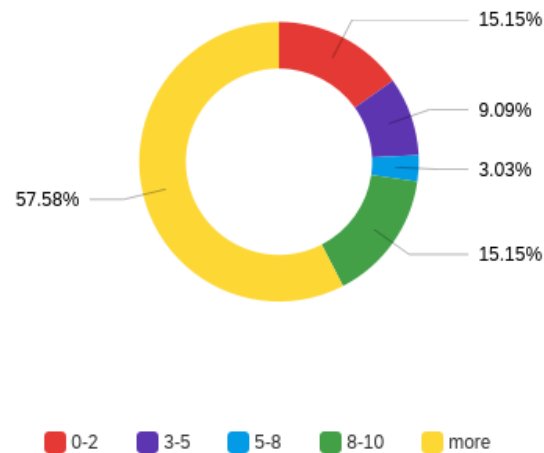


Figure 4-3. Experience related to biology/ecology field distribution

Recommendation #1: Develop a new section to store related and up to date academic journals.

For experienced educators, academic journals are still a very important source of information. Combining the results of questions below, the key reason here might be that academic journals are the most up to date information with reliable credibility. Educators with different experience have no problem accepting digital resources, and professional databases like GLANSIS rarely have problems with information credibility since all the pages have a lot of references. This can cost a large amount of time to publish one single reliable article. Thus, developing a new section of database storing related and up to date academic journals might attract new users and provide better services for existing users at the same time.

Key Finding #2: The majority of educators prefer using a source because of convenience in the searching process.

Choice of information source is based on different reasons for different people, but according to the survey, we found the three top reasons for college educators choosing a source of information.

Reasons Educators Prefer to Use a Given Source

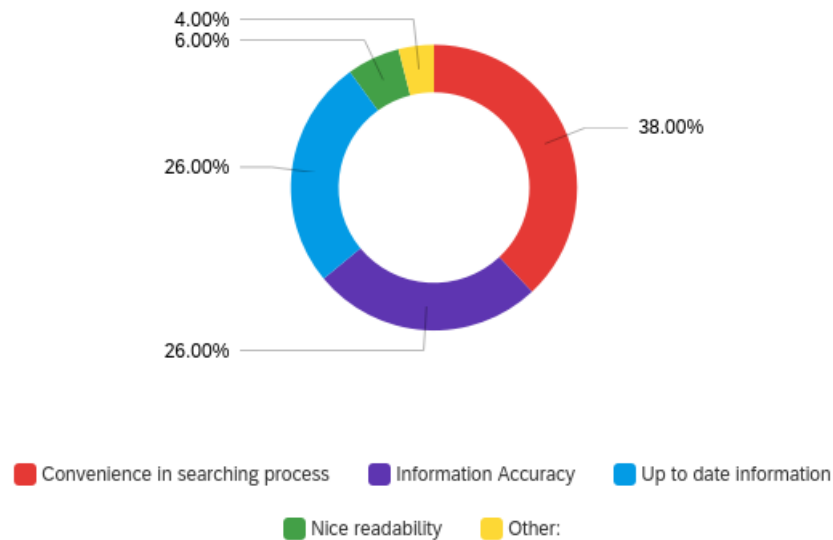


Figure 5-1. *Reasons for college educators choosing a source of information*

As shown in **Figure 5-1**, most users would like to choose a way with a more convenient searching process, and following the causes of information accuracy and up to date information. After breaking the data using work experience, as shown in **Figure 5-2**, we can see experienced users will be more likely to choose information sources with more up to date and accurate information. This confirms the inference in finding #1 that up to date information with reliable credibility is the main reason for experienced educators preferring academic journals.

Reasons Educators Prefer to Use a Given Source, Given Years of Experience

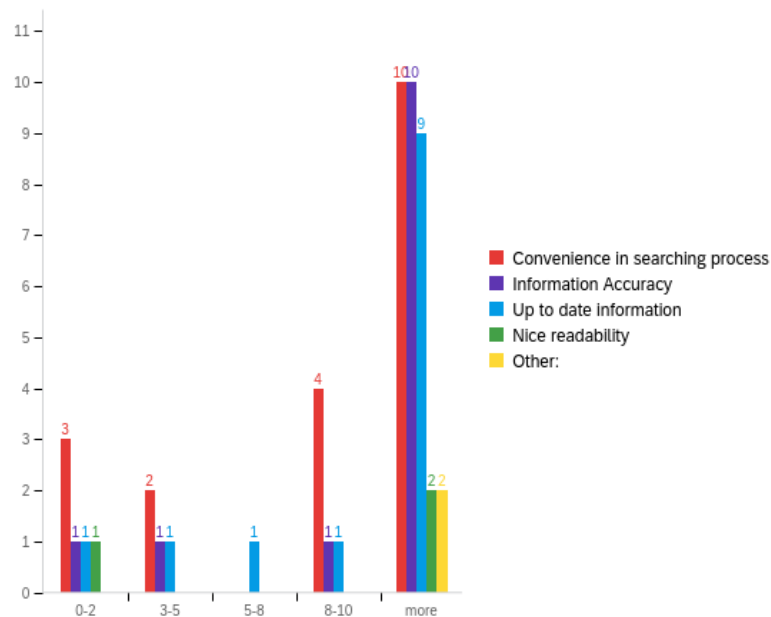


Figure 5-2. Reasons educators with different work experience prefer using a source of information.

Recommendation #2: Improve search functionality to make it more convenient.

Combining with the findings in previous studies, we highly recommend GLANSIS team to make a more convenient search function. The current Species List Generator is a mature high-end search engine for users looking for species information, but it needs new users to spend some to learn how to use it. Ideally, users should be able to perform a very simple search at the first time of using a new search engine, and then learn advanced functions as needed. A good example is Google search engine. New users have no problem performing a simple search on Google for the first time using it, and Google also provides advanced search options for users to perform a high-end search.

To be more specific, we recommend GLANSIS to add an one-line search page in the Species List Generator section. The one-line search page should show up first when users enter the Species List Generator section. In the one-line search page, users should be able to switch back to the current advanced search page easily.

Key Finding #3: Educators are more comfortable using the internet than using physical resources.

The results show that educators are more comfortable using the internet (online resources) than using physical resources (books and journals) to find information. The internet can include online versions of books and journals, but the majority of educators do not seem to utilize libraries and physical books to find information.

In the context of a Likert scale, the higher the number, the more the participant agrees with

that statement. The high means (4.69 and 4.27) and low standard deviations (0.63 and 0.93 respectively) indicate that the majority of participants feel comfortable with and prefer using the internet to gather information, as seen in **Figure 6-1**. The statement “I prefer using physical resources (books and journals) to gather information” also has a high mean of 4.18, but the statement “I am comfortable with using physical resources (books and journals) to gather information” has a low mean of 2.46. The high standard deviations for both (1.19 and 1.21 respectively) shows that educators have mixed responses on this topic.

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I am comfortable with using the internet (online resources) to gather information	3.00	5.00	4.69	0.63	0.40	32
2	I prefer using the internet (online resources) to gather information.	2.00	5.00	4.27	0.93	0.87	33
3	I am comfortable with using physical resources (books and journals) to gather information.	0.00	5.00	2.46	1.21	1.46	28
4	I prefer using physical resources (books and journals) to gather information.	1.00	5.00	4.18	1.19	1.42	33

Figure 6-1. Data table for Likert scale of comfort and preferences for online vs. physical resources.

Figure 6-2 shows that among the types of information sources, reading books in libraries is the least utilized method of gathering information about invasive species. With a mean of 1.85 and standard deviation of 1.15, it can be concluded that this source is the least utilized amongst most educators. Using this same logic, maps are the most utilized resource by most educators when gathering information about invasive species, as shown by the mean of 4.22 and standard deviation of 1.10.

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I utilize reading academic journals when looking up information on invasive species.	1.00	5.00	4.04	1.09	1.19	26
2	I utilize reading articles when gathering information on invasive species.	1.00	5.00	4.07	1.02	1.03	27
3	I utilize reading books in libraries when gathering information on invasive species.	0.00	5.00	1.85	1.15	1.33	20
4	I look through online databases when gathering invasive species information.	1.00	5.00	3.96	1.30	1.68	28
5	I utilize visual aids, such as graphs and charts, when conducting research on invasive species.	1.00	5.00	3.78	1.47	2.17	27
6	I utilize maps when conducting invasive species research.	1.00	5.00	4.22	1.10	1.21	27

Figure 6-2. Data table or Likert scale of sources of information.

Recommendation #3: Organize information in an effective way by highlighting key sources of information.

Since GLANSIS's database is online, it already connects best with educators in terms of the types of information it offers. GLANSIS can further emphasize this connection by organizing the information in an easy-to-find way. Since many educators are more comfortable with

searching for invasive species information online, GLANSIS can include what many search engines effectively accomplish: an effective quick search feature. This way, educators can use the GLANSIS database as a “one-stop shop” for all Great Lakes invasive species information. Finally, GLANSIS has an effective map tool that captures invasive species reports. This can be better highlighted by emphasizing this more on the home page, as well as on other pages, since this resource is a priority for many educators.

Key Finding #4: Educators find the species profile as the most important information when researching invasive species, followed by a brief invasion history and management.

Amongst the types of information that can be gathered about invasive species, educators value the species profile the most. In the context of ranking, the lower the number the more the participant values that type of information. As seen in **Figure 7**, the mean of the species profile is 2 with a standard deviation of 1.12. While the relatively high standard deviation indicates that educators may not all value the species profile in the same way, the low mean shows that educators that do value species profile ranked it as their highest priority.

Following the species profile, educators value a brief invasion history and management of the invasive species as well. Both the brief invasion history and management choices have a mean of 2.38. However, the brief invasion history has a low standard deviation of 0.86, indicating that educators typically rank this type of information as very important. Management has a higher standard deviation of 1.11, which indicates that educators may value this information but were varied in how they ranked this information compared to other types of information.

#	Field	Minimum	Maximum	Mean ▼	Std Deviation	Variance	Count
1	Species profile	1.00	4.00	2.00	1.12	1.25	8
3	Brief invasion history	1.00	3.00	2.38	0.86	0.73	8
4	Management	1.00	4.00	2.38	1.11	1.23	8
2	Invasion events record	2.00	5.00	3.63	0.99	0.98	8
5	Other:	2.00	5.00	4.63	0.99	0.98	8

Figure 7. Data table for ranking types of invasive species information.

Recommendation #4: Prioritize these types of information by highlighting key aspects of the website, especially management of the invasive species.

The species profile page can be organized to show these types of information first. On a given species profile page, GLANSIS prioritizes species information very well by putting this information first, as seen in **Figure 8-1**. GLANSIS also prioritizes the invasion history well by including various ways of communicating the data visually. As seen in **Figure 8-2**, the invasion history is shown in a table, written in paragraphs, and displayed in a map of the Great Lakes area. Because GLANSIS already has a map feature, the database can include this map feature on the species profile page to show that particular species' invasion history geographically.



Figure 8-1. Species profile page with species information shown first.

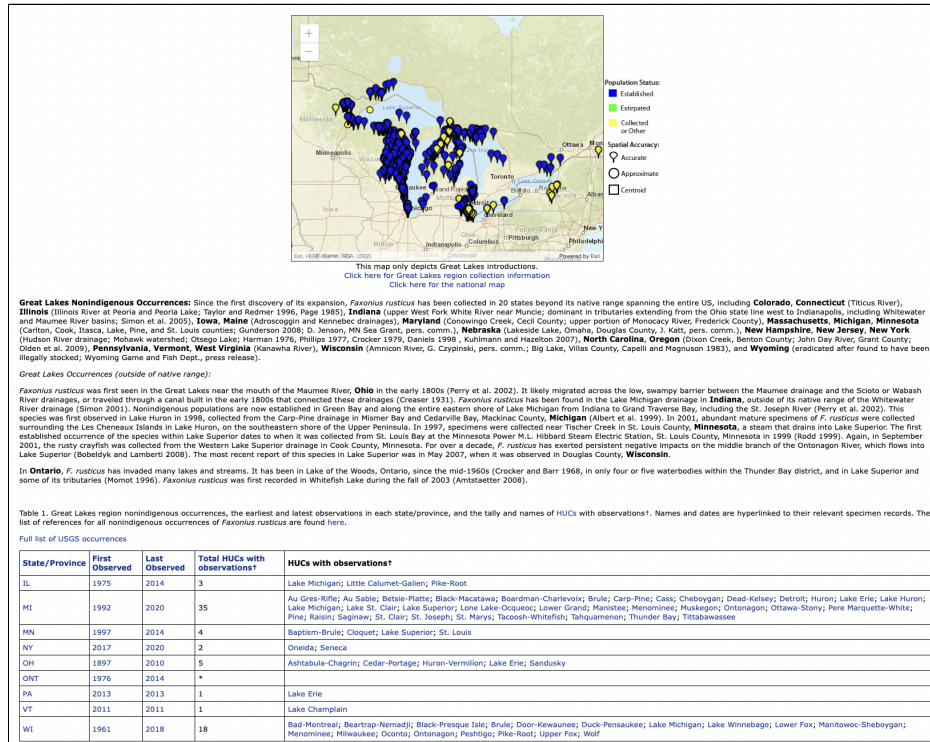


Figure 8-2. Species profile page with invasion history displayed with a map, a table, and paragraphs of information.

However, management can be highlighted better on the species profile page. Management of an invasive species is currently written as a paragraph, as seen in **Figure 8-3**. This information can be distilled into a table that distinguishes management and regulations by state in the Great Lakes area. A table can be utilized to display the various methods of controlling the species: biological, physical, chemical, and other.

Management: <i>Regulations (pertaining to the Great Lakes region):</i> It is illegal to possess, sell, purchase, offer for sale or barter, transport, import, or introduce this species to Pennsylvania (PAFBC 2006a, b, c), Michigan (Michigan 1994, MIDNR 2004), and Illinois (ILDNR 2005). In Minnesota, the rusty crayfish is listed as a regulated invasive species, making it illegal to introduce (i.e. release live) or sell live in that state (MORS 2008). A similar classification in Wisconsin prohibits release of any crayfish into the waters of that state, as well as simultaneous possession of both live crayfish and angling equipment on inland waters other than the Mississippi River (WIDNR 2004). In Ontario, live crayfish may only be used as bait in the waters from which they were caught; they may not be transported overland, including importation for use as bait, nor may they be sold or purchased if recreationally caught (OMNR 2011). Preemptive legislation has prevented rusty crayfish spread through anthropogenic transportation (Dresser and Swanson 2013). <i>Note: Check federal, state/provincial, and local regulations for the most up-to-date information.</i> <u>Control</u> <i>Biological</i> It is suggested that by restoring healthy populations of bass and sunfish, the effects of rusty crayfish may not be as severe (Momot 1984). In an experiment where regulations were put into effect to protect a smallmouth bass population, aquatic plants, benthic invertebrates, and sunfish all experienced population increases due to the increased predation pressure of the smallmouth bass on <i>F. rusticus</i> (Hein et al. 2006, Hein et al. 2007). It has also been suggested that total crayfish consumption, rather than proportion of a diet (Dorn and Mittelbach 1999), is more important when selecting a proper fish species as a control agent, and that different life stages of fish are more effective at different times in the control of <i>F. rusticus</i> (Peters 2010). <i>Physical</i> The establishment of electric fences to protect macrophyte populations from the rusty crayfish has significantly reduced crayfish densities in experimental plots (Peters et al. 2008). However, even at these reduced densities, <i>F. rusticus</i> was able to eliminate selected native plant species within three weeks, compared to within a matter of days in the control plots (Peters et al. 2008). Intensive harvest may reduce adult rusty crayfish populations, but will not lead to complete eradication. Therefore, manual removal, proper fishery management, and prevention of its introduction to new areas are the most valuable tools for minimizing the wide-ranging negative impacts of <i>F. rusticus</i>. <i>Chemical</i> While many chemicals are available to selectively kill crayfish, none is currently registered specifically for crayfish control (Ray and Stevens 1970, Bills and Marking 1988). <i>Other</i> The most important method of control remains education of anglers, crayfish trappers, bait dealers, and the public about the numerous threats this species presents to the Great Lakes and what they can do to prevent its expansion. Moreover, the Michigan Department of Natural Resources (2012) suggests harvest for culinary use as a potential control mechanism.
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Figure 8-3. Species profile page with management written in paragraphs.

Discussion

Our survey provided important information about how undergraduate educators select and gather the information of invasive species and how they prioritized the information. Unfortunately, even though our client helped us a lot to gather enough sample size in various ways, we could not get enough surveys to analyze as we expected. In addition, we realize that since there were users who skipped some questions for some reason. We should have designed some survey questions as required, so we could get all responses from every question. However, we still could find some key findings from the survey results. Our next step is to conduct a usability test with target users. Doing so will confirm that our findings and recommendations are meaningful or need to be edited.

Conclusion

We conducted Survey about the database system in general via Qualtrics based on our prior studies. The survey results show us how undergraduate educators gather the information from the database system and what factors they care the most and least about. By integrating the results, we are able to tell that users prefer a database system which has accurate information with a well organized format. GLANSIS has many potential parts that can be improved. It is obvious that GLANSIS provides accurate information about invasive species, but it falls on some shortcomings in the format and text hierarchy of information. GLANSIS can prioritize important information and highlight them with text hierarchy or different colors. Also, they can improve the search process in a more convenient and simple way on Species List Generator or Map Explorer. Doing so will provide more positive user experience for potential users of GLANSIS. In conclusion, this survey report shows us the importance of prioritizing and highlighting the key information and emphasizes on the simple formatting and search process in the database system, as we found in our prior studies. We can utilize these key findings in our final recommendation.

Appendix A: Survey Questionnaire

Available in PDF format: [Survey Report](#)

SI622 GLANSIS Survey

Start of Block: General Biology Question Block

Q1 How many years have you worked in the biology/ecology field?

- ☐ 0-2 (1)
- ☐ 3-5 (2)
- ☐ 5-8 (3)
- ☐ 8-10 (4)
- ☐ more (5)

Q2 How many years have you been an educator for the biology/ecology field?

- ☐ 0-2 (1)
- ☐ 3-5 (2)
- ☐ 5-8 (3)
- ☐ 8-10 (4)
- ☐ more (5)

Q3 From what kind of sources do you prefer to gather information about any species?

- ☐ Online database (1)
- ☐ Academic journals (2)
- ☐ Books/Library (3)
- ☐ Articles (4)
- ☐ Maps (5)
- ☐ Graphs & Charts (6)
- ☐ Others: (7) _____

Page Break

Q4 What are the reasons that you prefer to use that source?

- ☐ Convenience in searching process (1)
- ☐ Information Accuracy (2)
- ☐ Up to date information (3)
- ☐ Nice readability (4)
- ☐ Other: (5) _____

Page Break

Q5 Please indicate how you feel about the following statements: (0 for strongly disagree, 5 for strongly agree)

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree

0

5

I am comfortable with using the internet (online resources) to gather information. ()	
I prefer using the internet (online resources) to gather information. ()	
I am comfortable with using physical resources (books and journals) to gather information. ()	
I prefer using physical resources (books and journals) to gather information. ()	

Page Break

Q6 Please indicate how you feel about the following statements: (0 for strongly disagree, 5 for strongly agree)

Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree Don't Use N/A

0

5

I utilize reading academic journals when looking up information on invasive species. ()	
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I utilize reading articles when gathering information on invasive species. ()	
I utilize reading books in libraries when gathering information on invasive species. ()	
I look through online databases when gathering invasive species information. ()	
I utilize visual aids, such as graphs and charts, when conducting research on invasive species. ()	
I utilize maps when conducting invasive species research. ()	

Page Break

End of Block: General Biology Question Block

Start of Block: Researchers' Question Block

Q20 Do you conduct research as a researcher?

☐ Yes (1)

☐ No (2)

Skip To: End of Block If Do you conduct research as a researcher? = No

Q18 What geographical region do you conduct your research on?

Page Break

Q19 Have you ever uploaded your research to a database before?

☐ Yes (1)

☐ Not sure (2)

☐ No (3)

☐ Other: (9) _____

Appendix B: Survey Results Page

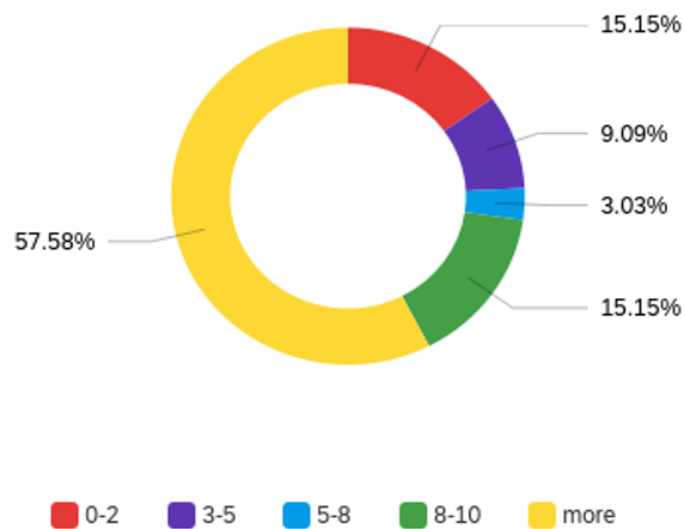
Available in PDF format: [GLANSIS Survey Result.pdf](#)

SI622 GLANSIS Survey

March 27th 2022, 6:12 pm MDT

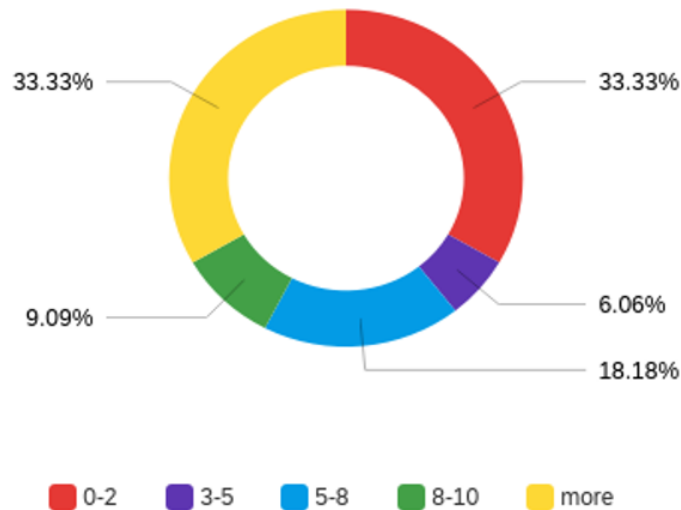
Q1 - How many years have you worked in the biology/ecology field?

Years of Experience in the Biology/Ecology Field



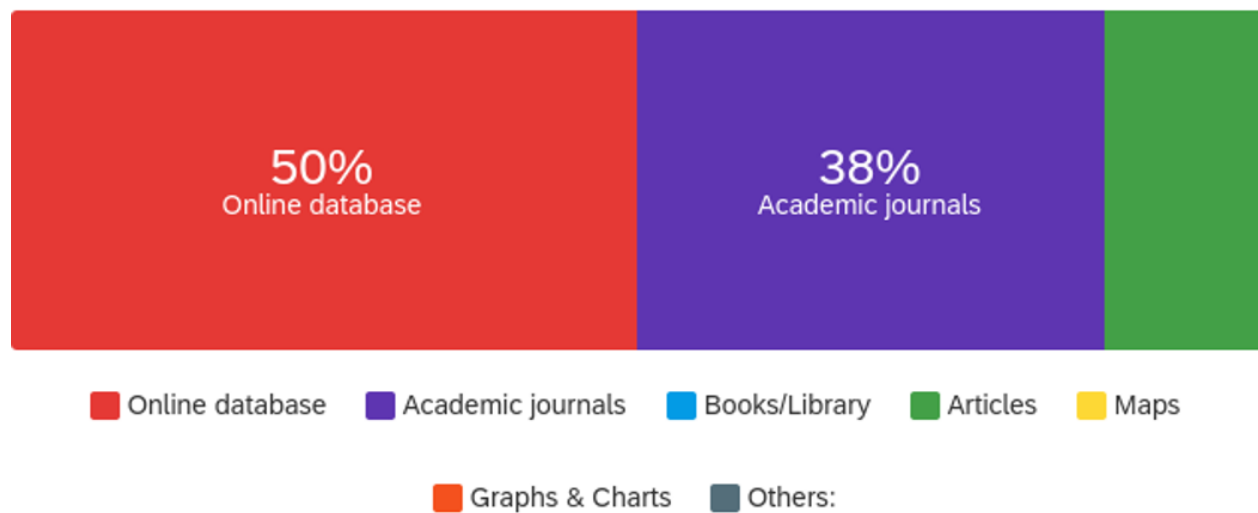
Q2 - How many years have you been an educator for the biology/ecology field?

Years of Experience as Educator in the Biology/Ecology Field

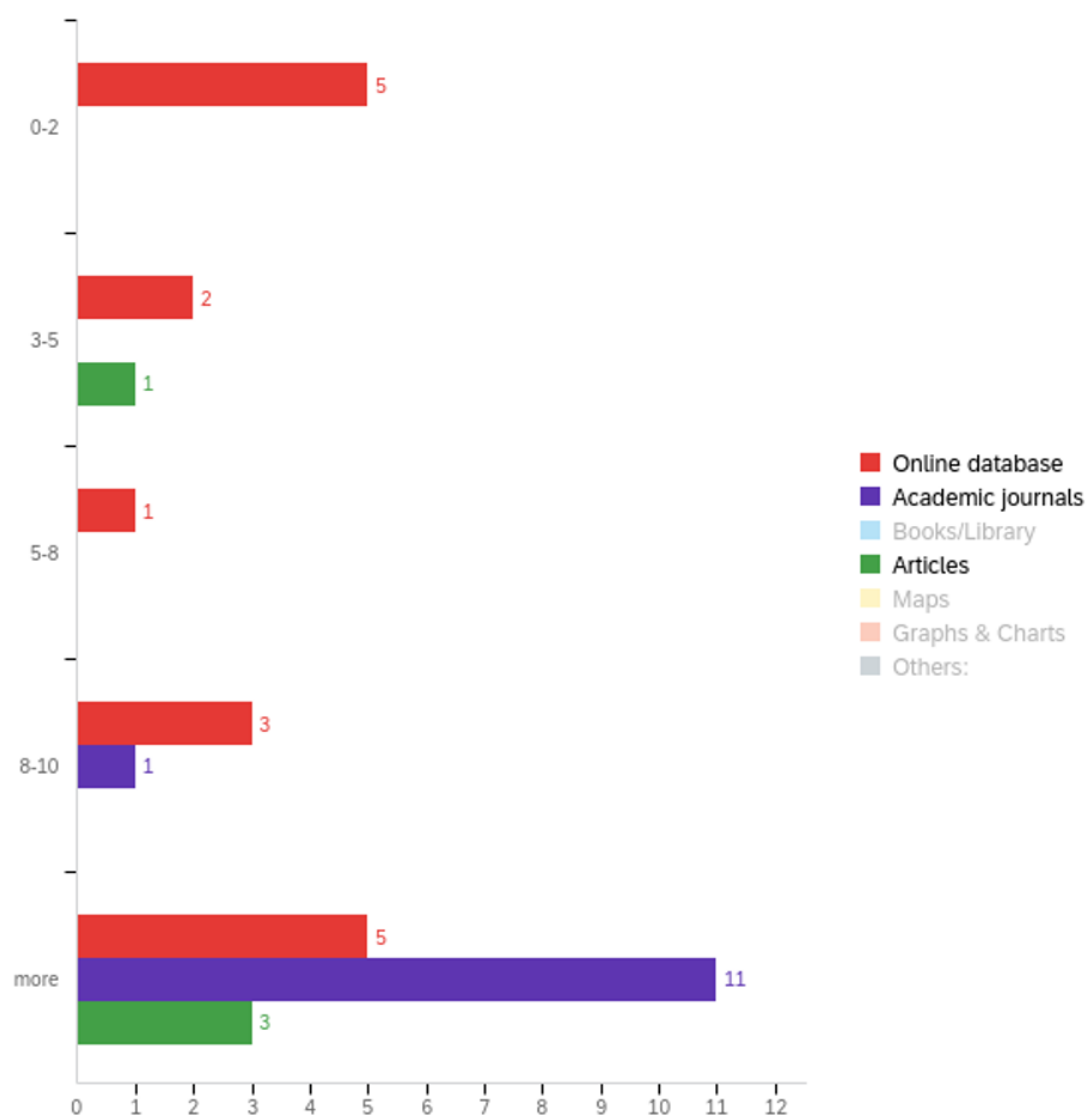


Q3 - From what kind of sources do you prefer to gather information about any species?

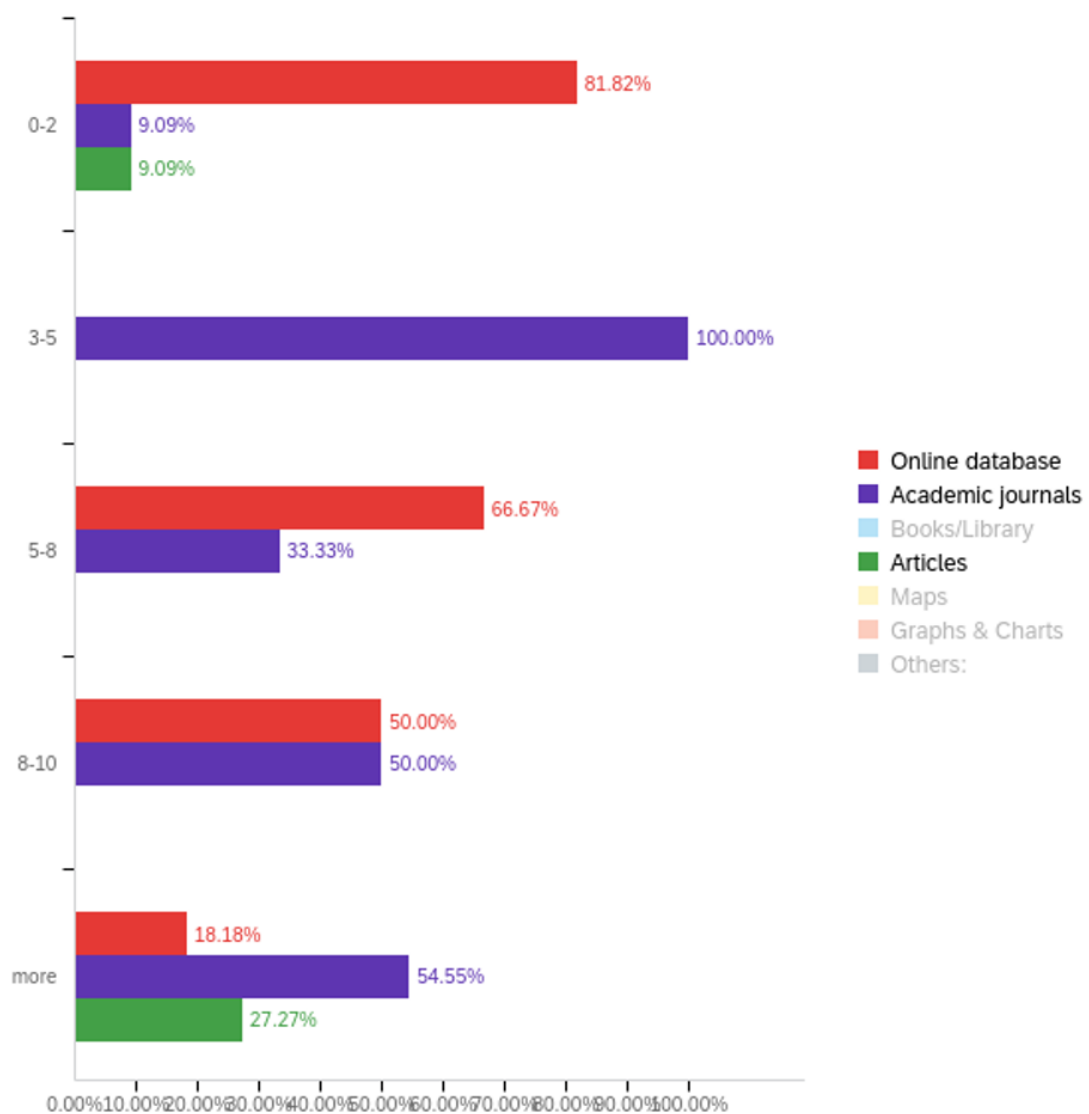
Preferred Sources to Gather Information About Any Species



Preferred Sources to Gather Information About Any Species, Given Years of Experience

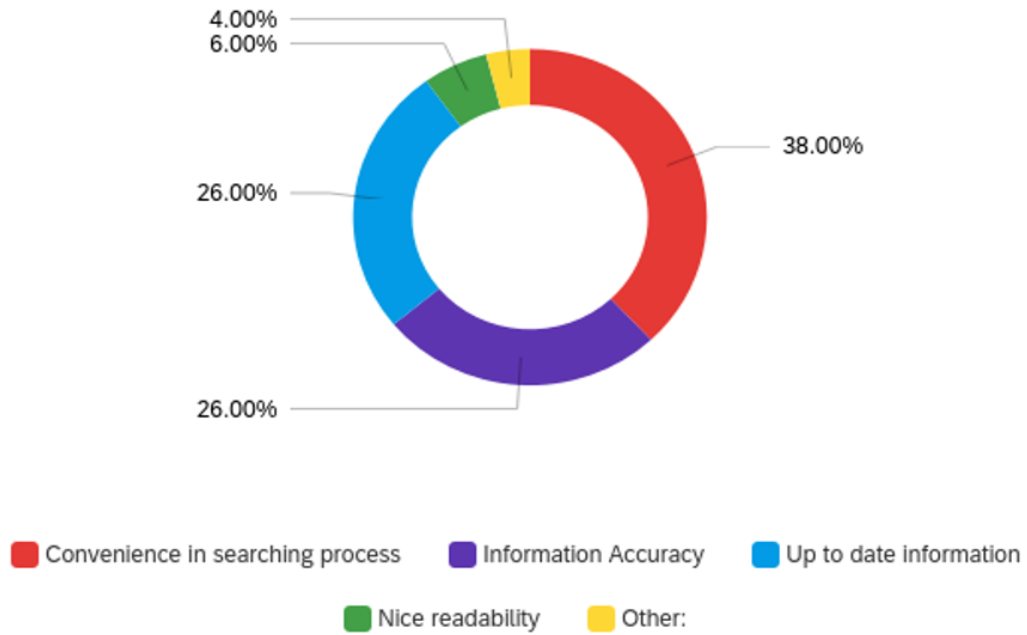


Preferred Sources to Gather Information About Any Species, Given Years as Educator

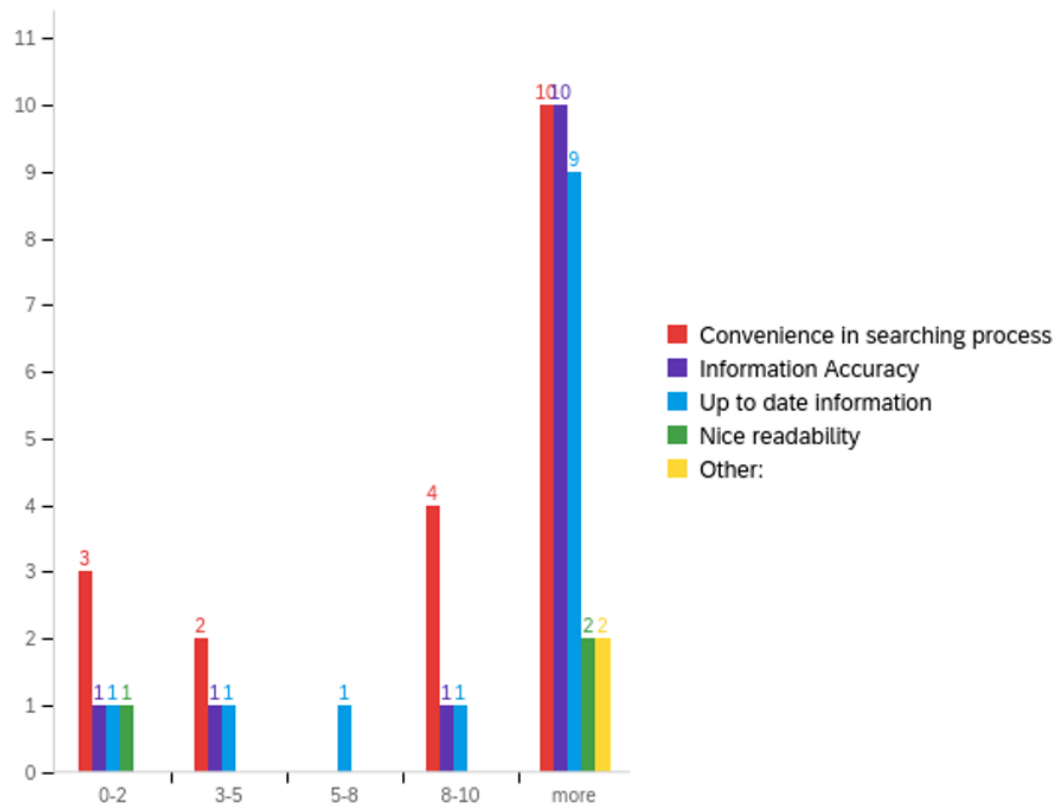


Q4 - What are the reasons that you prefer to use that source?

Reasons Educators Prefer to Use a Given Source



Reasons Educators Prefer to Use a Given Source, Given Years of Experience



Q5 - Please indicate how you feel about the following statements: (0 for strongly disagree, 5 for strongly agree)

#	I am comfortable with using the internet (online resources) to gather information	Mean
1	I am comfortable with using the internet (online resources) to gather information	4.69
2	I prefer using the internet (online resources) to gather information.	4.27
3	I am comfortable with using physical resources (books and journals) to gather information.	2.46
4	I prefer using physical resources (books and journals) to gather information.	4.18

Likert Scale of Comfort and Preferences for Online vs. Physical Resources

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I am comfortable with using the internet (online resources) to gather information	3.00	5.00	4.69	0.63	0.40	32
2	I prefer using the internet (online resources) to gather information.	2.00	5.00	4.27	0.93	0.87	33
3	I am comfortable with using physical resources (books and journals) to gather information.	0.00	5.00	2.46	1.21	1.46	28
4	I prefer using physical resources (books and journals) to gather information.	1.00	5.00	4.18	1.19	1.42	33

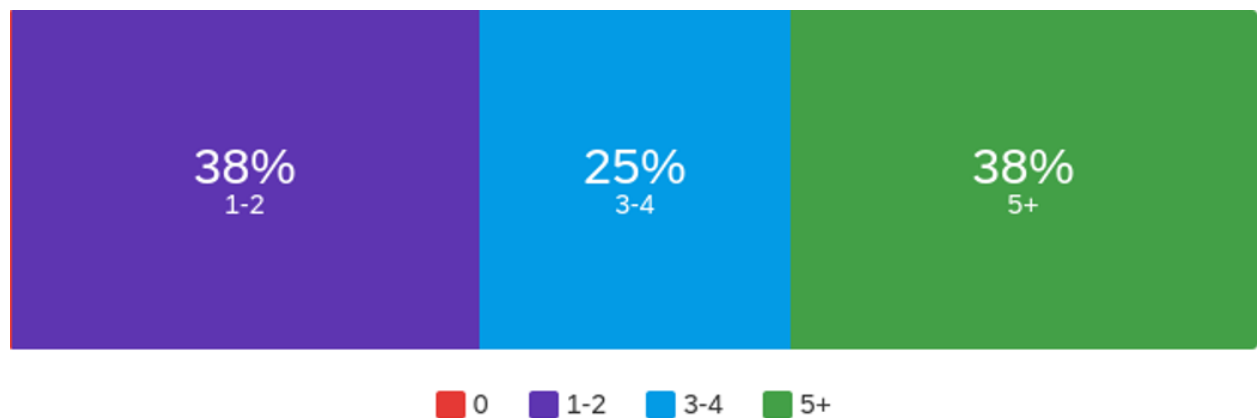
Q6 - Please indicate how you feel about the following statements: (0 for strongly disagree, 5 for strongly agree)

Likert Scale for Sources of Information

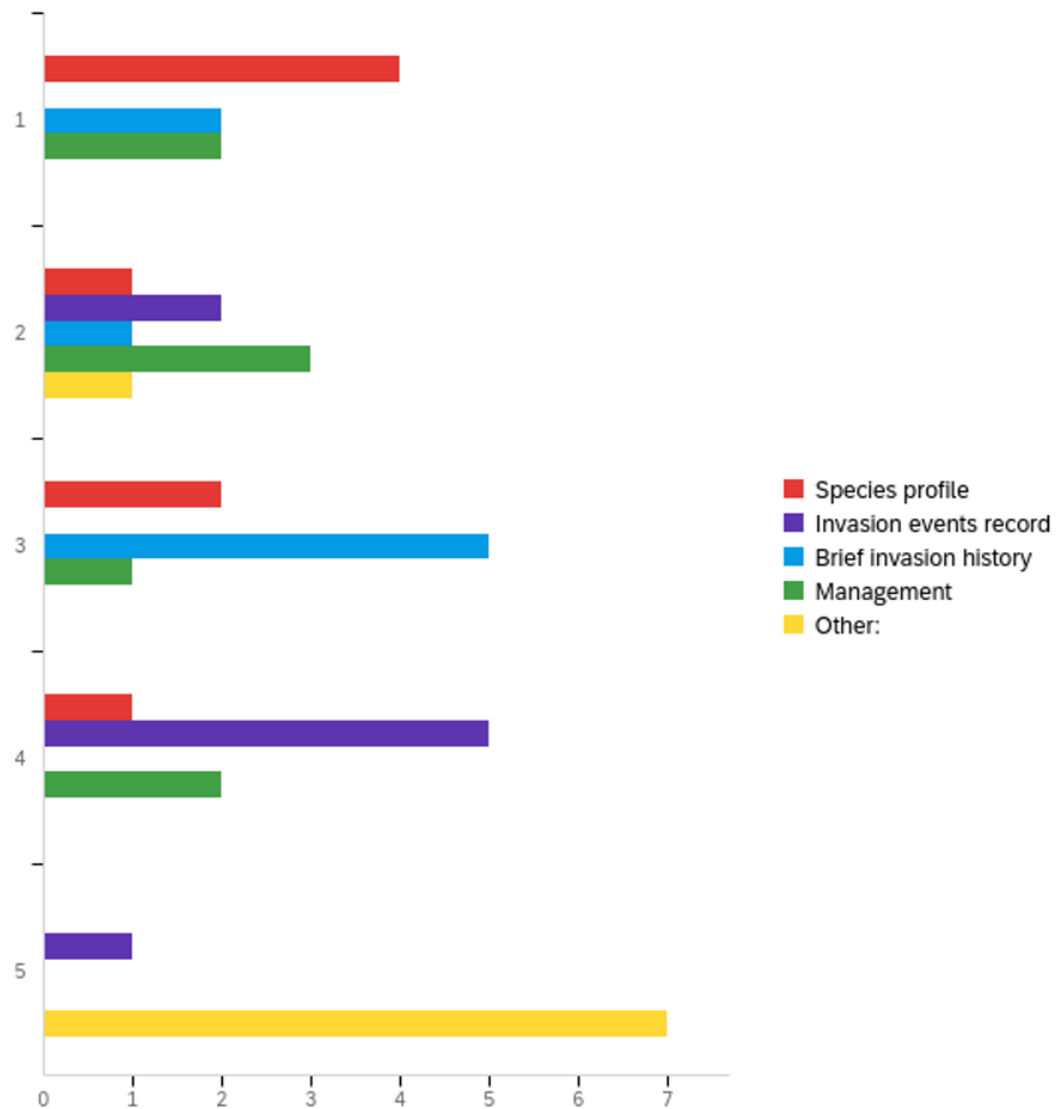
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I utilize reading academic journals when looking up information on invasive species.	1.00	5.00	4.04	1.09	1.19	26
2	I utilize reading articles when gathering information on invasive species.	1.00	5.00	4.07	1.02	1.03	27
3	I utilize reading books in libraries when gathering information on invasive species.	0.00	5.00	1.85	1.15	1.33	20
4	I look through online databases when gathering invasive species information.	1.00	5.00	3.96	1.30	1.68	28

5	I utilize visual aids, such as graphs and charts, when conducting research on invasive species.	1.00	5.00	3.78	1.47	2.17	27
6	I utilize maps when conducting invasive species research.	1.00	5.00	4.22	1.10	1.21	27

Q4 - In a given semester, how many times do you gather that information about invasive species?



Q7 - Rank the importance of the information about invasive species below:



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Species profile	1.00	4.00	2.00	1.12	1.25	8
3	Brief invasion history	1.00	3.00	2.38	0.86	0.73	8
4	Management	1.00	4.00	2.38	1.11	1.23	8

2	Invasion events record	2.00	5.00	3.63	0.99	0.98	8
5	Other:	2.00	5.00	4.63	0.99	0.98	8

Appendix C: Email with survey request that was sent out

Available in PDF format:  Survey Emails

Subject: UMSI: 5-Min Survey for Biology/Ecology Undergraduate Educators

We are Jades Research, a group of masters students from the University of Michigan's School of Information. Our team is working with GLANSIS to gain insights into how undergraduate biology/ecology educators utilize information to teach students. If you can, please take 5 minutes to fill out our survey!

We thank you in advance for your participation. If you have any questions, feel free to reach out to us at jades.research@umich.edu.