Survey Report

Usability Analysis of the Florida Department of Environmental Protection's Algal Bloom Sampling Status Dashboard

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For More Information

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Background

The Florida Department of Environmental Protection's Protecting Florida Together website was created to clearly communicate about water quality and priority environmental issues to the public. This effort includes the Algal Bloom Sampling Status Dashboard, hereafter referred to as the dashboard. The dashboard, https://floridadep.gov/AlgalBloom, is an interactive platform that provides real-time sampling data for harmful algal blooms in Florida.[1]

Users of websites are primarily concerned with finding desired information with ease and in a timely fashion. Usability testing measures the extent to which a website is easy to use, effective, efficient, and satisfactory.[2,3,4] Website usability testing relies on the execution of real tasks to uncover problems and improvements with the goal of making the website a more enjoyable experience for the user.[5]

This report is an assessment of the Florida Department of Environmental Protection's Algal Bloom Sampling Status Dashboard. The report presents the findings of a usability survey and offers recommendations based on the survey results.

Methods

An online survey instrument was developed and distributed using the Qualtrics survey software company. The survey instrument was developed to include the following sections:

- Screening questions and participant consent
- Demographics
- Homepage heat mapping
- Website tasks
- Attitudes about the website aesthetics, content, functionality, and user experience
- Prior website experience

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[1] Florida Department of Environmental Protection (2020, March 17) *Algal bloom sampling status Dashboard Overview*. https://fdep.maps.arcgis.com/apps/webappviewer/index.html?id=d62c3487e8de49f6b3a6559cdf059e14

[2] International Organization for Standardization, Technical Committee of Ergonomics. (1998). *Ergonomic requirements for office work with visual display terminals (VDTs): Part 11: Guidance on usability*. (ISO No. 9241-11)

[3] Joo, S., Lin, S., & Lu, K. (2011). A usability evaluation model for academic library websites: Efficiency, effectiveness and learnability. *Journal of Library and Information Studies*, 9(2), 11-26.

[4] Roy, S., Pattnaik, P. K., & Mall, R. (2014). A quantitative approach to evaluate usability of academic websites based on human perception. *Egyptian Informatics Journal* 15, 159-167.

[5] Dumas, S. C. & Redish, J. C. (1999). *A practical guide to usability testing*. Portland: Intellect Books.

Prior to dissemination, the survey was reviewed, piloted, and submitted for approval by the University of Florida Institutional Review Board (refer to Appendix V for the full survey instrument). The survey was open March 15 – April 15, 2021 and distributed to Florida residents age 18 and older. Participants were recruited through press releases, the project website, newsletters, and email lists from members of the Florida Harmful Algal Bloom Communication Working Group.

Data analyses consisted of descriptive statistics (e.g., frequencies, percentages, means, and standard deviations) and are presented in tables or figures by question.

Results

Demographics

A total of 56 individuals completed the survey. Complete demographic information for respondents is displayed in Table 1.

Table 1. Respondent demographics

Variable	Frequency	Percentage
Gender		
Male	7	30.4
Female	16	69.6
Prefer not to answer	--	--
Age		
18 to 24	3	5.4
25 to 34	9	16.1
35 to 44	3	5.4
45 to 54	14	25.0
55 to 64	15	26.8
65 to 74	10	17.9
75 to 84	2	3.6
85 and above	--	--
Race		
White	22	95.65
Other (Black or African American, White, Hispanic/Latino(a)	1	4.35
Prefer not to answer	--	--
Education		
High school graduate (includes GED)	1	4.35
Some college	1	4.35
Bachelor’s degree	8	34.8
Graduate or Professional degree	13	56.5
Prefer not to answer	--	--
County of residence		
Alachua	1	1.9
Bradford	1	1.9

Variable	Frequency	Percentage
Brevard	1	1.9
Charlotte	3	5.6
Citrus	2	3.7
Collier	11	20.4
Hardee	1	1.9
Hernando	1	1.9
Indian River	2	3.7
Lee	5	9.3
Leon	1	1.9
Manatee	3	5.6
Orange	1	1.9
Palm Beach	1	1.9
Pinellas	1	1.9
Sarasota	9	16.7
Seminole	1	1.9
St. Johns	2	3.7
St. Lucie	1	1.9
Volusia	1	1.9
Walton	1	1.9
Non-Florida Resident	4	7.4
Prefer not to answer	2	3.7

Respondents (n = 56) were asked to report the type of device they were using to complete the survey. The majority of respondents completed the survey on computers, either a laptop or desktop (51.8%). The other respondents completed the survey on mobile phones (37.5%) and tablets (10.7%).

Respondents' subjective, or self-perceived, knowledge of red tide algal blooms was assessed using a 3-point Likert-type scale of agreement (1 = *not at all knowledgeable;* 3 = *very knowledgeable*). A construct mean was computed to represent respondents' overall perceived level of knowledge. Overall, respondents considered themselves to be knowledgeable about red tides in Florida (*M* = 2.38; *SD* = 0.59) (Figure 1).

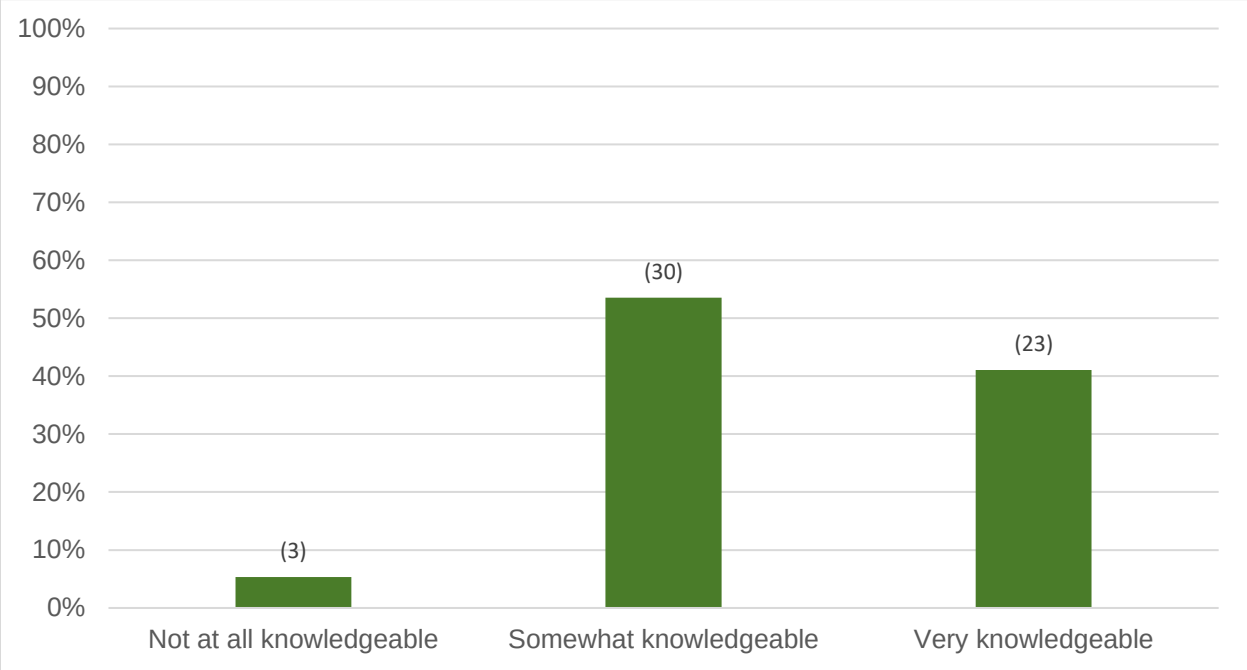

Figure 1. How knowledgeable are you about the coastal condition known as red tide?

Website Visibility

Visibility of the website homepage was assessed across five top U.S. search engines (Google, Bing, Yahoo!, DuckDuckGo, and AOL). The term “Florida red tide” was entered into the search bar and recorded if the algal dashboard appeared among the top ten results. The website did not appear in the top ten results of any of the search engines and received a visibility score of 0%. At the time of this survey, the dashboard was not optimized for red tide cell concentrations. To account for this, additional searches were conducted for the terms “Florida harmful algal blooms” and “Florida cyanobacteria blooms”. The website visibility scores were 80% appearing in four of the five and 40% appearing in two of the five search engines, respectively.

Mapping the Homepage

Participants were shown a screenshot of the desktop version of the dashboard homepage. Participants were asked to click on the area where their eye first went when they looked at the homepage image (Figure 2). Heat map results show that 93.8% of respondents clicked on the ESRI mapping interface. 6.2% of respondents clicked on the Areas of Interest region between the four image icons.

Participants were then asked to click on the area of the homepage image where they would go for more information (Figure 3). The majority of respondents clicked on the Algal Bloom Monitoring and Response Quick Links (53.1%) and the ESRI mapping interface (28.1%). These and other regions selected are presented in Table 2.

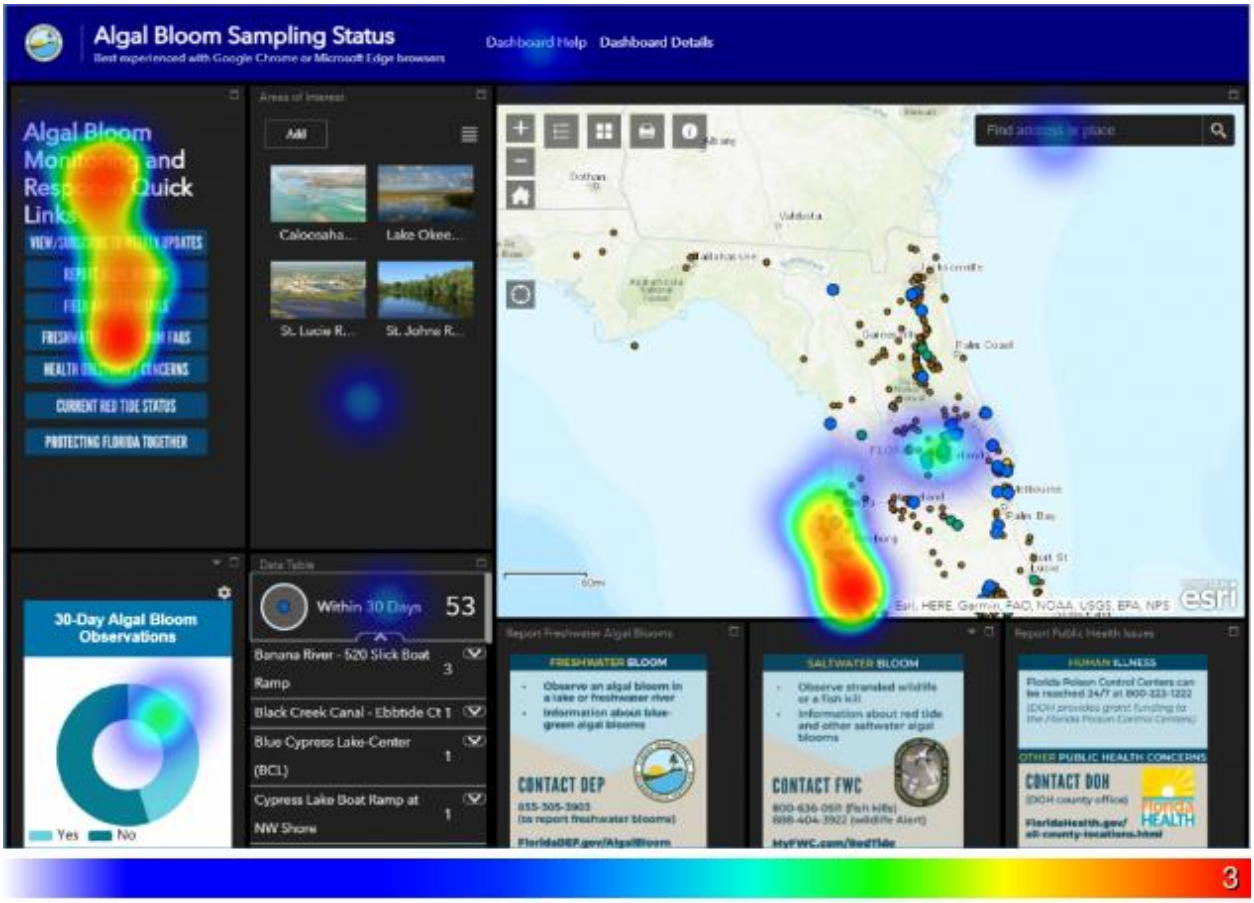

Figure 2. Homepage Screenshot Heat Map: Area where eyes first went (scale: 1 to 3 clicks)

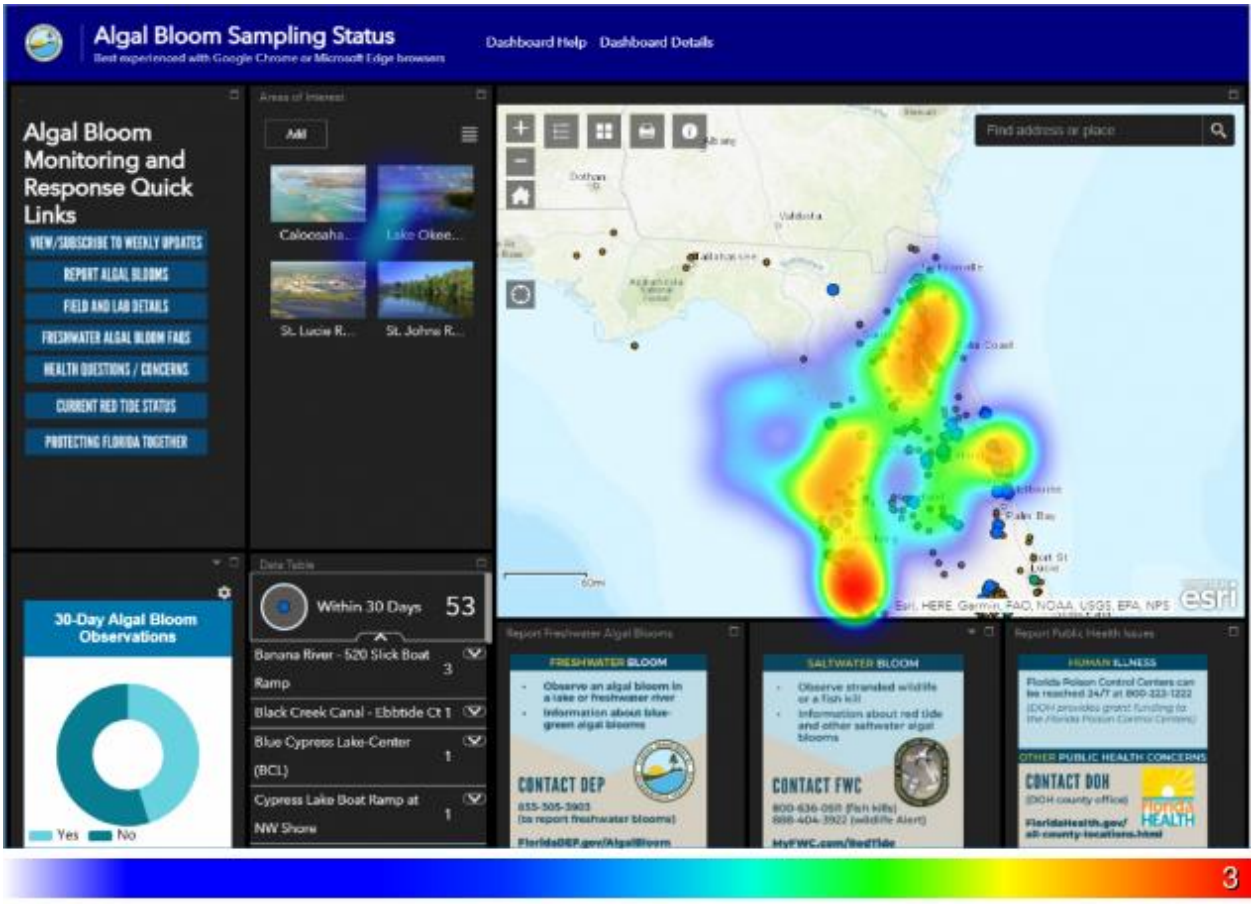

Figure 3. Homepage Screenshot Heat Map: More information (scale: 1 to 3 clicks)

Table 2. Homepage Heat Map: Area where individuals will go for more information

Homepage Region	Frequency	Percentage
Algal Bloom Monitoring and Response Quick	17	53.1
ESRI Mapping interface	9	28.1
30-Day Algal Bloom Observations	2	6.3
Data Table – Within 30 Days	1	3.1
Dashboard Help	1	3.1
Find address or place search bar	1	3.1
Areas of interest	1	3.1

Website Tasks

Participants were presented with three questions designed to assess different elements within the website. The questions varied in their level of difficulty. To complete the tasks, participants were advised to open and navigate the website in a new browser by clicking on the provided URL. For each task, the number of correct responses was assessed. The time it took a respondent to make their first click, second click, and the length of time it took a respondent to submit their response was recorded in seconds. The total

number of clicks each respondent made was also recorded. Respondents were asked questions about their experience after completing the task.

Task 1: Fish kill reporting agency

Correct Responses

Forty-eight individuals completed Task 1. The majority of respondents (70.8%) were able to correctly answer the question. Of those participants who answered the question incorrectly, 14.6% reported being unable to find this information on the website and 14.6% provided a wrong response (Table 3).

Table 3. Number of respondents who correctly answered Task 1

Question	Answer Choices	f	%
According to the website, what agency would you report fish kills to?	DEP (Florida Department of Environmental Protection)	7	14.6
	FWC (Florida Fish and Wildlife Conservation Commission)	**34**	**70.8**
	DOH (Florida Department of Health)	0	0
	I was unable to find this information	7	14.6

Note. Correct answer is bolded.

Time of Task

The amount of time it took the respondents to submit their answer (page submit) was recorded in seconds. The mean time to submit the page was 88.11 seconds. Participants clicked an average of 3.46 times within the website to try and find the information. Table 4 displays the full results.

Table 4. Task 1: Number and timing of clicks in seconds

(n = 48)	***Minimum***	***Maximum***	***M***	***SD***
Time of First Click	1.16	198.08	27.92	43.34
Time of Last Click	2.18	571.15	84.67	104.09
Time of Page Submit	10.76	572.41	88.11	102.99
Click Count	1	24	3.46	3.62

Respondent Perceptions

Respondents who provided an answer to Task 1 were asked to report a subjective account of their experience including ease of navigation and perception of time spent completing the task. Respondents' perception of ease in navigating the website to complete Task 1 was measured on a 5-point Likert scale (*strongly disagree* to *strongly*

agree). 41% of respondents had a positive attitude to the ease of navigation, 43.6% of respondents had a negative attitude, and 15.4% were neutral in their perceptions (Figure 4). The majority of these respondents (59.4%) believed that the amount of time to complete the task was a *moderate amount of time* and the remaining 40.6% believed it took *very little time* to complete (Figure 5).

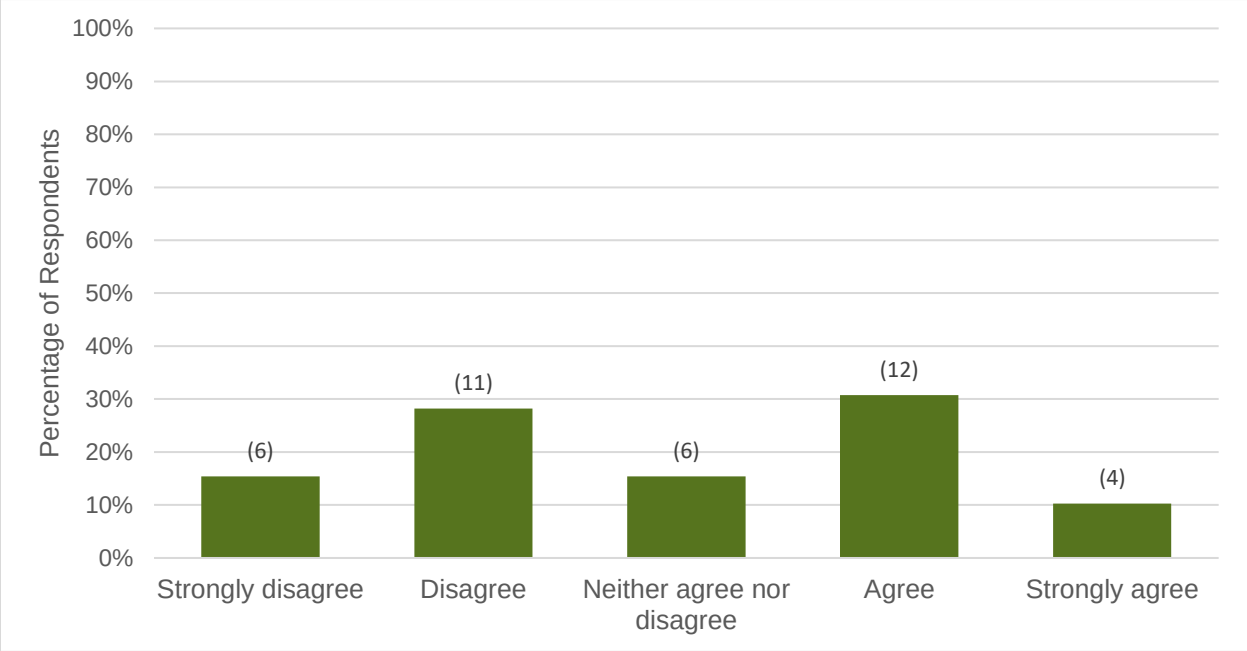

Figure 4. Percent agreement with the statement "I was able to easily find my way around the website to complete Task 1". Answer frequency shown in parenthesis.

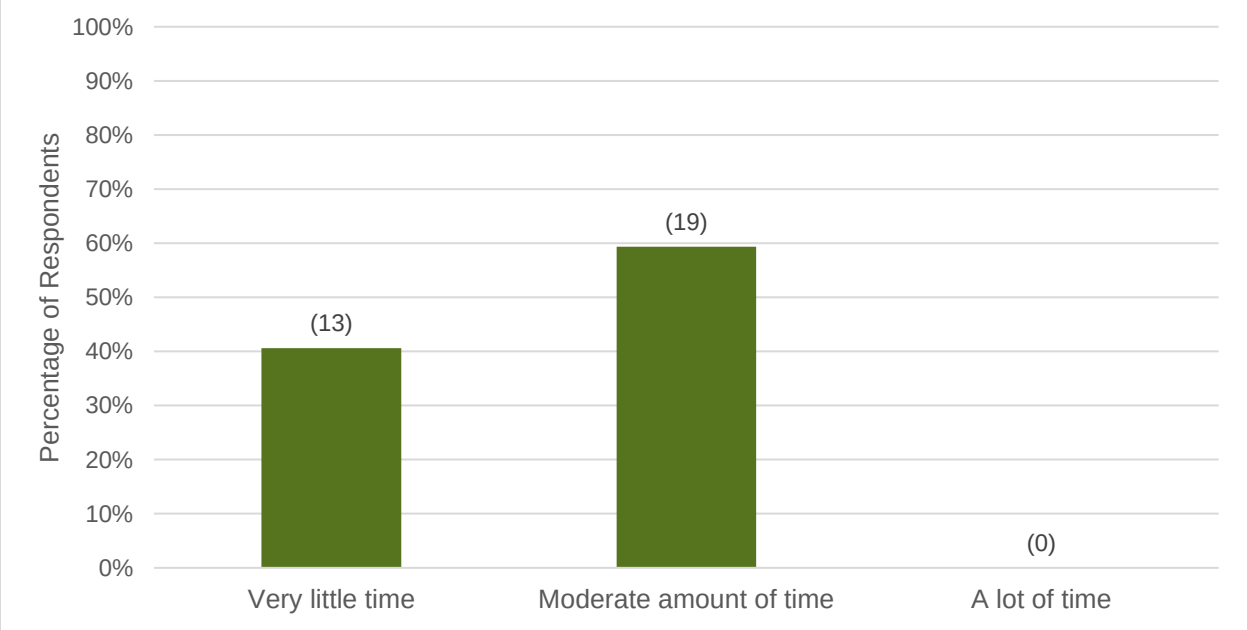

Figure 5. Perception of time spent completing Task 1. Answer frequency shown in parenthesis.

Open-ended Responses

Participants were provided the opportunity to write additional feelings, opinions, or recommendations about the website and their experience associated with completing Task 1. (*Note:* Quotes are provided verbatim). The following themes emerged from this question:

The respondents commented that there was too much information on the dashboard which made it difficult to find what they were looking for. Specific comments suggest that some respondents did not notice the agency tiles provided under the map interface.

- *I found it difficult to find the information and I almost gave up. I expected it to be a header, instead of being a bullet under saltwater bloom. That is not where I expected to find it.*
- *Lots of information on the page.*
- *Terrible page - cluttered with too much info. A standard rule on any slide, and this page equates to a slide, is easy to read info. Your page is equivalent to at least 7 slides.*
- *The question asked was about reporting dead fish. The only info I could find was how to report algae blooms...which may not have answered the question.*
- *There was no information on the website about reporting Fish Kills. I searched the website and found PDFs about Fish Kills to download, but I did not download these.*
- *Not sure if I had correct answer, searched the question and Seafan fact sheet-fish kill and disease came up.*
- *I tried all searches both basic and advanced and couldn't find the reporting site*
- *I found a link to report HABs but not specifically fish kills. It also only seemed to reference fresh water HABs in the link.*
- *Too much information happening on this page.*
- *I went to map as that is what is familiar to me. The rest is just background noise.*

Additional comments include:

- *It wasn't too hard to find...*

Task 2: Collier County samples

Correct Responses

Thirty-three individuals completed Task 2. Participants were asked to select the number of samples collected in Collier County over the last 30 days. Participant responses were compared to the FDEP metadata for the corresponding dates. 27.3% of respondents provided an incorrect answer and 21.2% responded correctly (Figure 6).

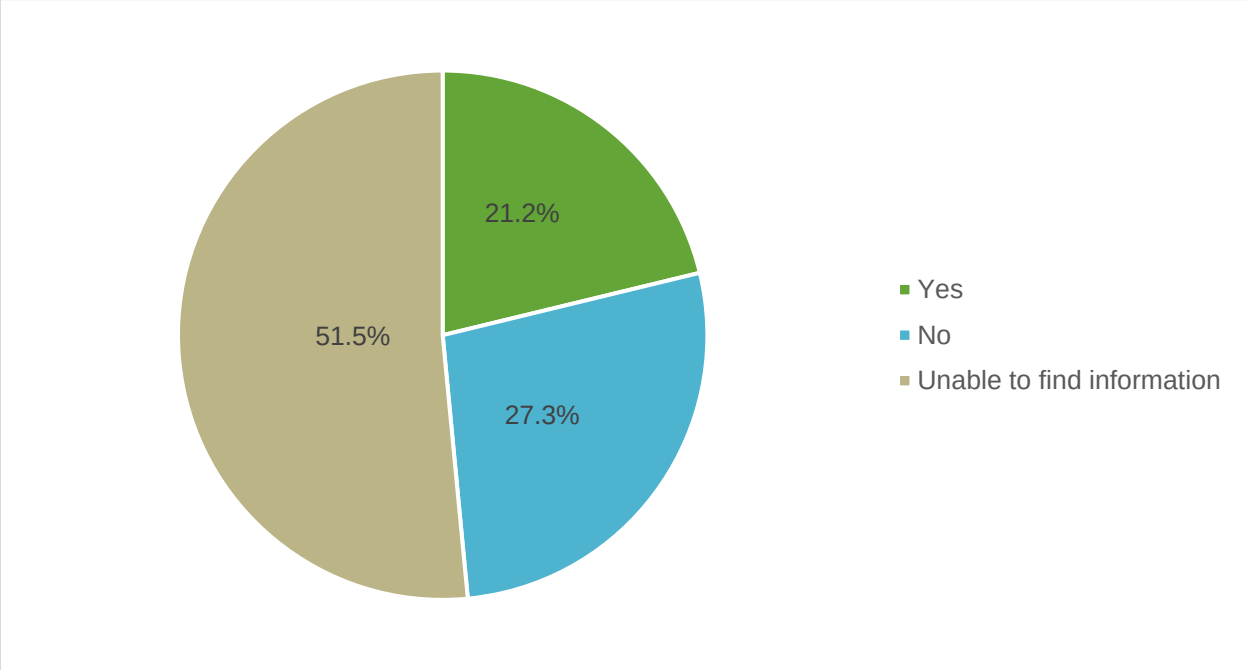

Figure 6. Percentage of respondents who correctly answered Task 2

Time of Task

The amount of time it took the respondents to submit their answer (page submit) was recorded in seconds. The mean time to submit the page was 143.6 seconds. Participants clicked an average of 1.41 times within the website to try and find the information. Table 5 displays the full results.

Table 5. Task 2: Number and timing of clicks in seconds

(n = 34)	***Minimum***	***Maximum***	***M***	***SD***
Time of First Click	2	862	85.00	154.38
Time of Last Click	4	862	107.48	173.30
Time of Page Submit	11	1182	143.60	251.82
Click Count	1	5	1.41	.957

Respondent Perceptions

Respondents who provided an answer to Task 2 were asked to report a subjective account of their experience including ease of navigation and perception of time spent completing the task. Respondents' perception of ease in navigating the website to complete Task 2 was measured on a 5-point Likert scale (*strongly disagree* to *strongly agree*). 18.2% had a positive attitude regarding the ease of navigation, 60.6% of respondents had a negative attitude, and 21.2% of respondents were neutral in their perceptions (Figure 7). 62.5% of respondents believed that the amount of time to

complete the task was a *moderate amount of time* and 37.5% believed the task took *very little time* to complete (Figure 8).

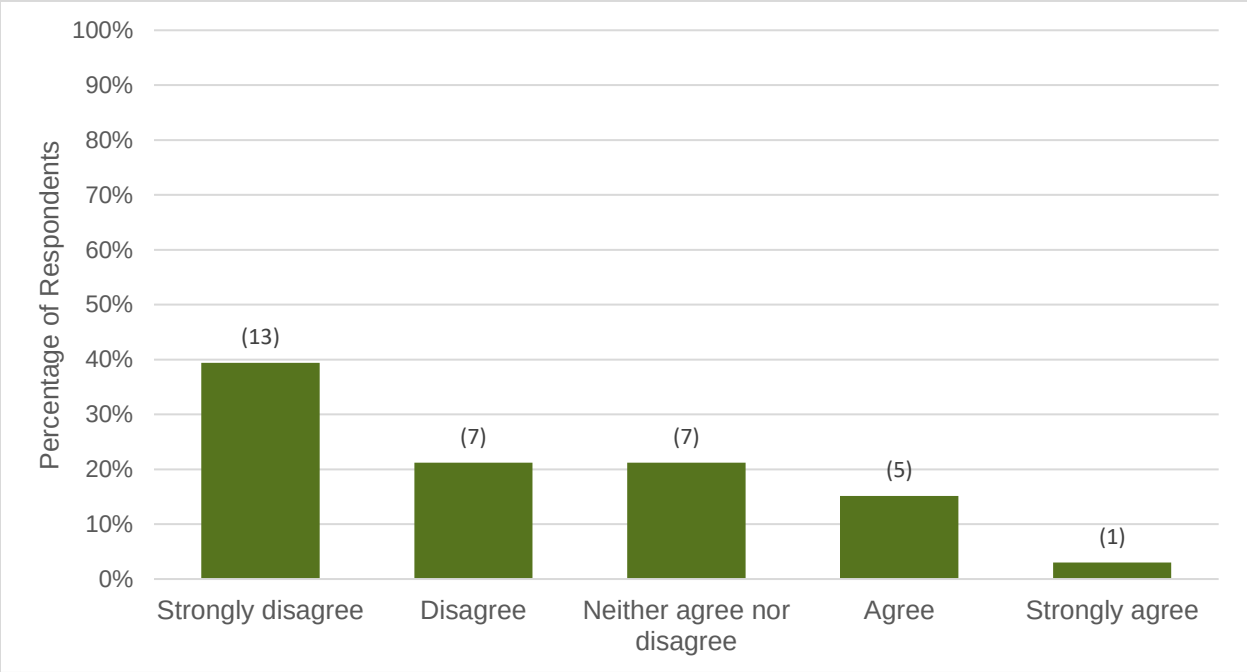

Figure 7. Percent agreement with the statement "I was able to easily find my way around the website to complete Task 2". Answer frequency shown in parenthesis.

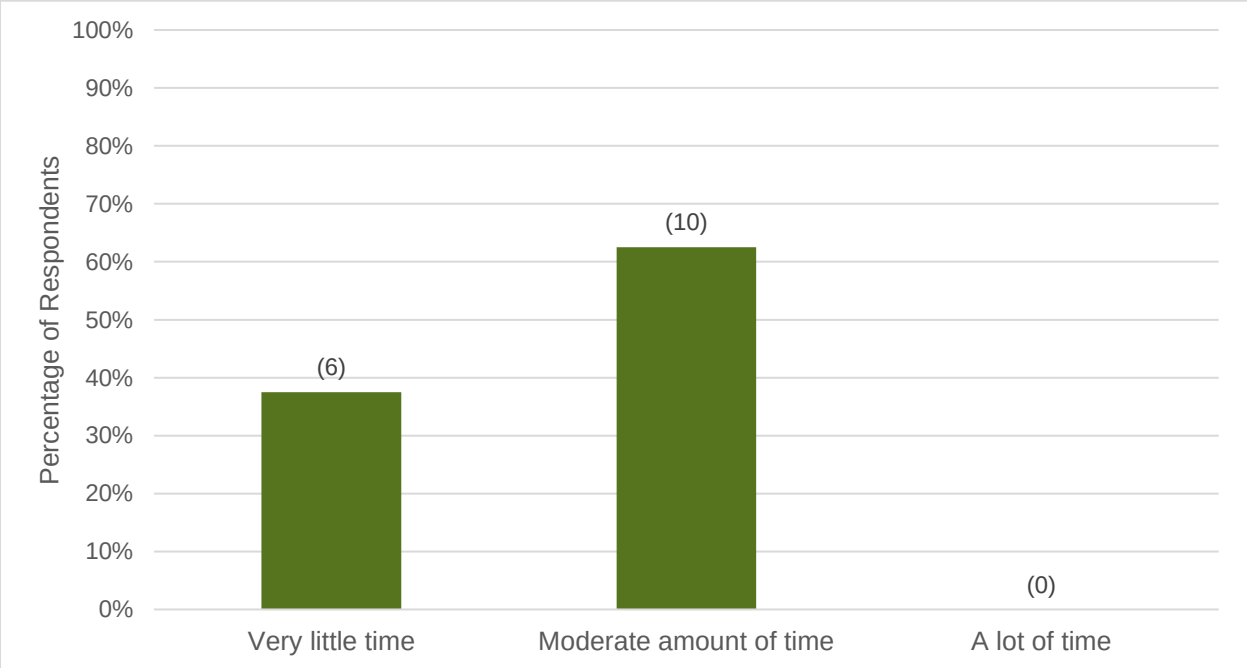

Figure 8. Perception of time spent completing Task 2. Answer frequency shown in parenthesis.

Open-ended Responses

Participants were provided the opportunity to write additional feelings, opinions, or recommendations about the website and their experience associated with completing Task 2. (*Note:* Quotes are provided verbatim). The following themes emerged from this question:

In general, respondents had difficulties with the various tools available on the dashboard that allow users to assess sample location and collection date. A comparison of the correct answers and the open-ended responses suggests that few, if any, users found or utilized the attribute table.

- *I'm not sure if I found the right answer. I searched Collier County on the map, but the bullet was blank. I assumed that meant zero, but I wasn't sure.*
- *Data table did not adjust with me zooming in/out on map and I was not going to sit there and click through each data point on the map to see the yes/no for whether a sample was collected. Also clicked on the "field and lab details" link at left and decided that also wasn't easily a resource for that data.*
- *I don't even know if I got the right answer....I saw where there was "within 30 days" but I was unable to ascertain if any of those spots were in Collier.....so I counted all of them.....assuming that if I had the map zoomed in...maybe it was only counting the county that was showing.*
- *the instructions of 'Hover over map to see algal bloom observations in the last 30 days' would be clearer.*
- *I clicked several tabs on the left and never found a listing by county.*
- *I could not find the information for this task. I see the box for data table (56 within 30 days) - is that where I was supposed to look? I do not see any reference to Collier County in that box.*
- *I watched the Help video tutorial to solve this one. It gave me some clues but I was uncertain about my answer.*
- *I couldn't answer the question so that might need work. There was a lot of other good information as I clicked around though. I noticed the data goes beyond Florida, maybe too much information?*

Respondents commented that the font on the dashboard could be larger and that the dashboard was difficult to use on a tablet.

- *It was a bit confusing, and I would prefer the instructions to be larger font*
- *Not easy to navigate on tablet*

Additional comments include:

- *The color for when the test was taken didn't match the legend. It's on a rotating message board on my phone so it wasn't easy to find.*

Task 3: Toxin detection

Correct Responses

Twenty-seven individuals completed Task 3. Using a multiple choice (select all that apply) question, participants were asked to determine what toxins were detected in the most recent samples collected at Sanibel Slough. Participant responses were compared to the FDEP metadata for the corresponding dates. 48.2% of participants answered the question correctly, 19.6% indicated that they were unable to find the information on the website, and 22.2% provided an incorrect response (Figure 9).

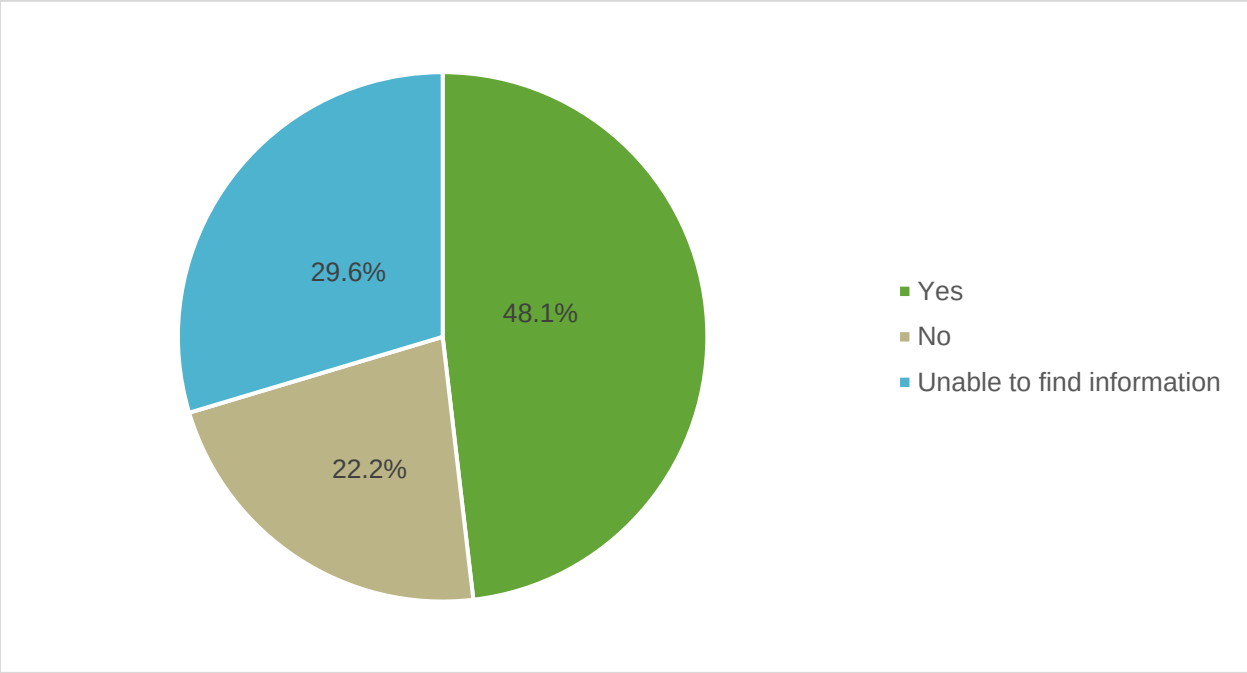

Figure 9. Percentage of respondents who were able to complete Task 3

Time of Task

The amount of time it took the respondents to submit their answer (page submit) was recorded in seconds. The mean time to submit the page was 72.58 seconds. Participants clicked an average of 1.67 times within the website to try and find the information. Table 6 displays the full results.

Table 6. Task 3: Number and timing of clicks in seconds

(n = 27)	***Minimum***	***Maximum***	***M***	***SD***
Time of First Click	4	387	63.81	86.89
Time of Last Click	4	387	67.67	88.56
Time of Page Submit	11	389	72.58	88.94
Click Count	1	6	1.67	1.30

Respondent Perceptions

Respondents who provided an answer to Task 3 were asked to report a subjective account of their experience including ease of navigation and perception of time spent completing the task. Respondents' perception of ease in navigating the website to complete Task 3 was measured on a 5-point Likert scale (*strongly disagree* to *strongly agree*). 44.0% of respondents had a positive attitude to the ease of navigation, 36.0% of respondents had a negative attitude, and 20.0% of respondents were neutral in their attitude (Figure 10). These respondents believed equally that the amount of time to complete the task was *very little time* (42.9%) and *moderate amount of time* (42.9%). 14.3% of respondents believed the task took *a lot of time* to complete (Figure 11).

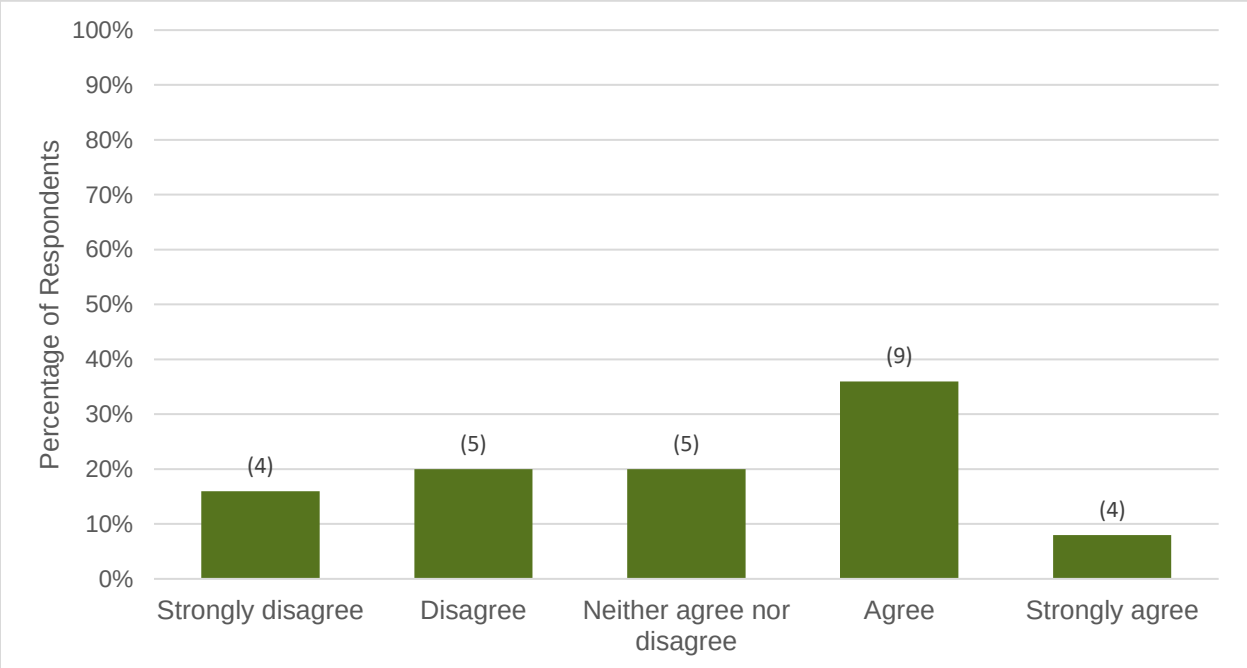

Figure 10. Percent agreement with the statement "I was able to easily find my way around the website to complete Task 3". Answer frequency shown in parentheses.

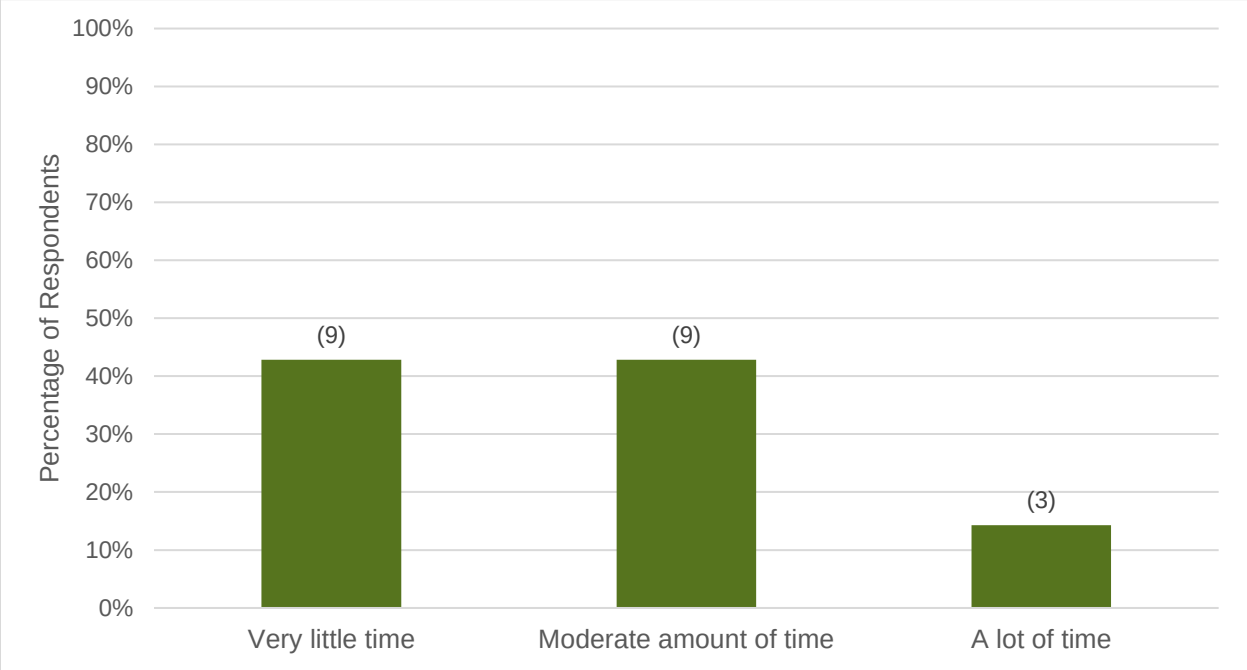

Figure 11. Perception of time spent completing Task 3. Answer frequency shown in parentheses.

Open-ended Responses

Participants were provided the opportunity to write additional feelings, opinions, or recommendations about the website and their experience associated with completing Task 3. (*Note:* Quotes are provided verbatim). The following themes emerged from this question:

Respondents provided mixed responses about the ease of navigation within the ESRI mapping interface.

- *I am familiar with the Sanibel area so it was easy for me to find the information using the map.*
- *I found this information much easier to find than the other two tasks.*
- *Aside from me assuming that "Sanibel Slough" was a Sanibel location and then being lucky that the first dot I clicked on Sanibel was called Sanibel Slough, finding site locations by name is not a great option for the general public.*
- *Question was direct....the pull down arrow made it understandable that I would get more info if clicking there.*
- *By accident I clicked on a tab that showed me cities and counties.*
- *If I had not watched the Tutorial video I would not have known where to find this information.*

Respondents provided recommendations to improve the utility of the site dropdown boxes for the user.

- *The data within the Sanibel Slough box is a little tough to read as it runs together instead of having a hard line break. The "Yes" almost appears to go with the Microcystin*

because it runs together like this on the second line... "Bloom observed: Yes - Microsystin" -- and then the next line says "Toxin: not detected".

- *I'm not sure if someone who was unfamiliar with ESRI would scroll down to look at more information on the information bubble that opens up once you click on a dot. I think prioritizing which data is seen at the top would be more beneficial to the public, i.e. I don't care about "sample depth description" and "sample depth (meters)" but I might care about toxin presence and image.*
- *Data tables are well thought out.*

Additional comments include:

- *The data said there was an algal bloom but no specific toxin that was listed. The question had 3 choices and only one said none. I'm not sure if an algal bloom is a toxin.*

Task 4: Email updates

Correct Responses

Twenty-two individuals completed Task 4. Participants were asked to sign up for email updates using the email address redtide@ifas.ufl.edu. Half (50%) of participants indicated that they were successfully able to sign up for email updates on the website and half (50%) reported an inability to sign up for email updates (Figure 12).

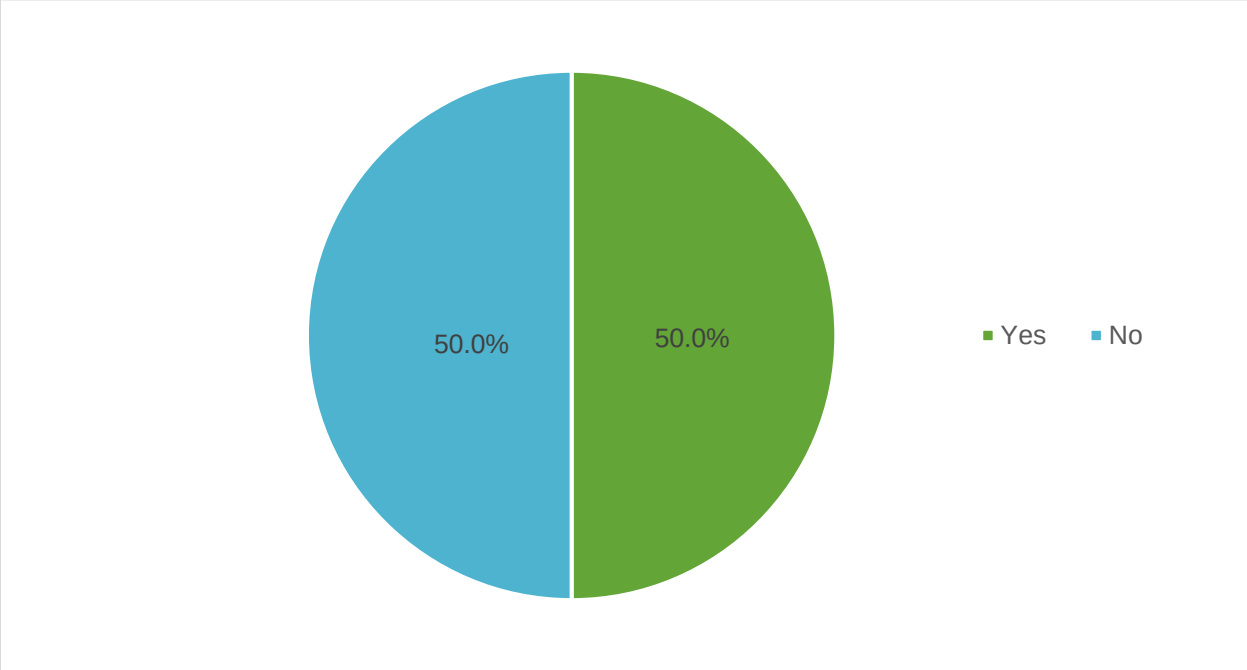

Figure 12. Percentage of respondents who were able to complete Task 4

Time of Task

The amount of time it took the respondents to submit their answer (page submit) was recorded in seconds. The mean time to submit the page was 83.06 seconds. Participants clicked an average of 2.75 times within the website to try and find the information. Table 7 displays the full results.

Table 7. Task 4: Number and timing of clicks in seconds

(n = 24)	***Minimum***	***Maximum***	***M***	***SD***
Time of First Click	2.00	362	45.09	80.99
Time of Last Click	8	556	79.59	116.83
Time of Page Submit	11	557	83.06	117.30
Click Count	1	11	2.75	2.51

Respondent Perceptions

Respondents who provided an answer to Task 4 were asked to report a subjective account of their experience including ease of navigation and perception of time spent completing the task. Respondents' perception of ease in navigating the website to complete Task 4 was measured on a 5-point Likert scale (*strongly disagree* to *strongly agree*). 56.5% of respondents had a positive attitude to the ease of navigation, 30.4% of respondents had a negative attitude, and 13.0% were neutral in their perceptions (Figure 13). 80.0% of the respondents believed that the amount of time to complete the task was *very little time* and 20.0% believed it took a *moderate amount of time* (Figure 14).

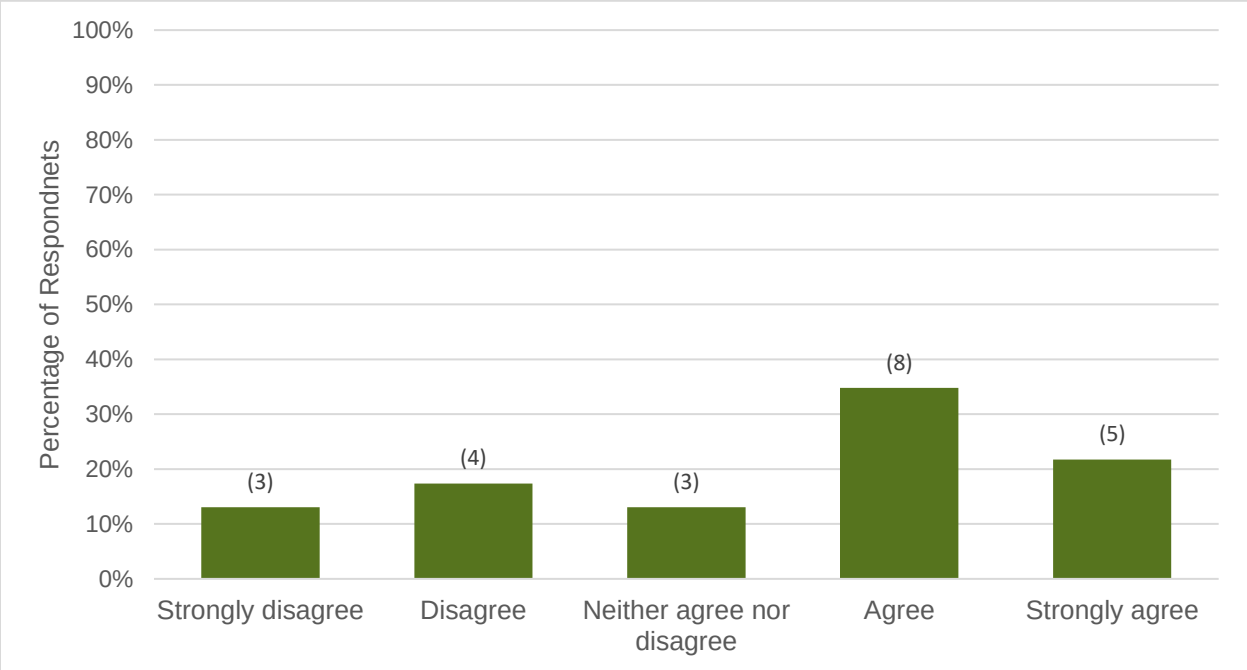

Figure 13. Percent agreement with the statement "I was able to easily find my way around the website to complete Task 4". Answer frequency shown in parentheses.

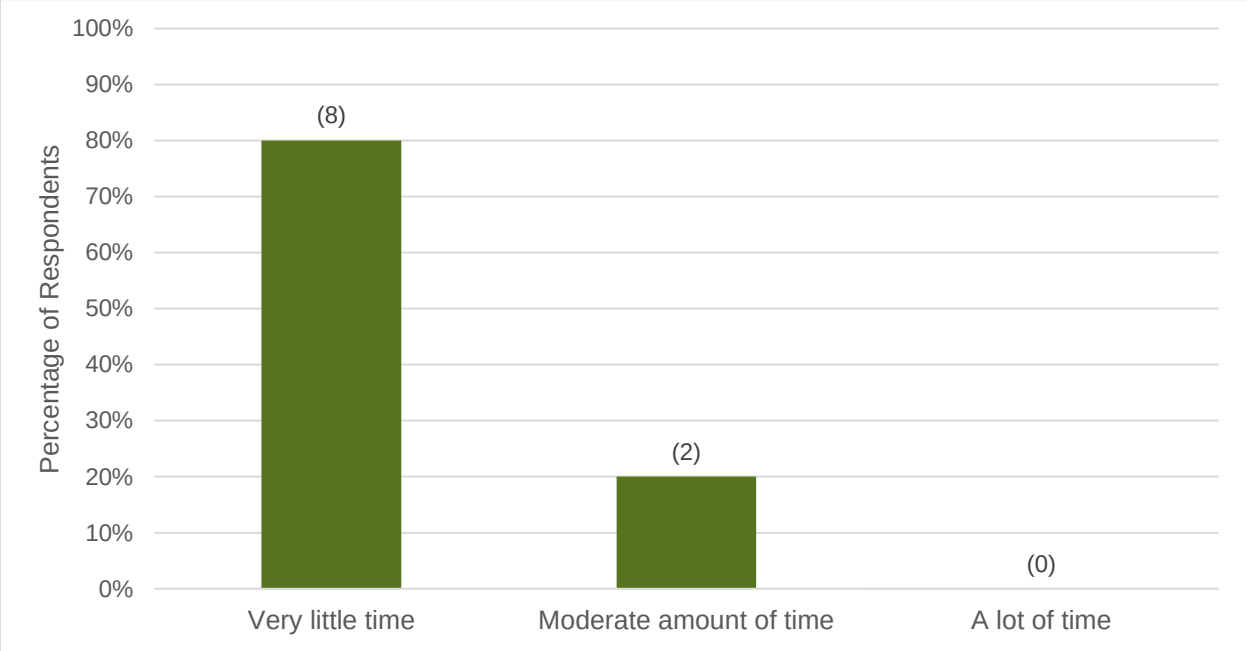

Figure 14. Perception of time spent completing Task 4. Answer frequency shown in parentheses.

Open-ended Responses

Participants were provided the opportunity to write additional feelings, opinions, or recommendations about the website and their experience associated with completing Task 4. (*Note:* Quotes are provided verbatim). The following responses were provided for this question:

- *unable to find domain*
- *Stopped looking too involved*

Respondent Variability

Standard deviation was high across the four tasks. Variability between respondents' task completion metrics is presented in Figures 15 and 16.

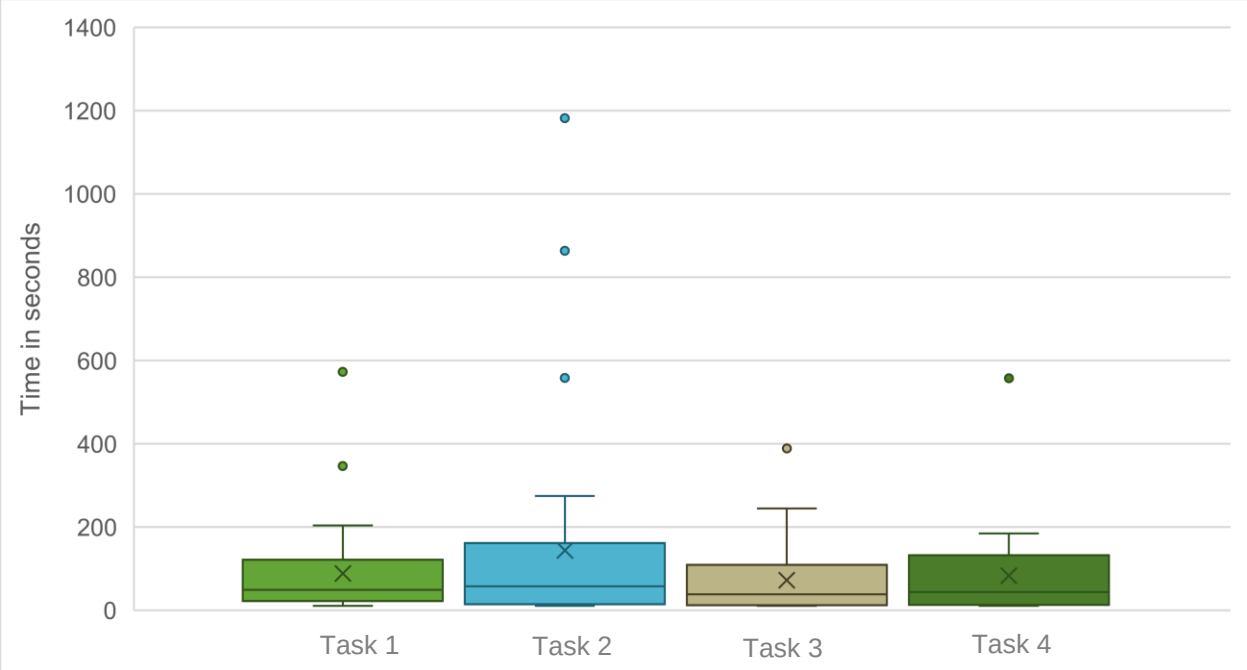

Figure 15. Respondents' time to click submit for all tasks

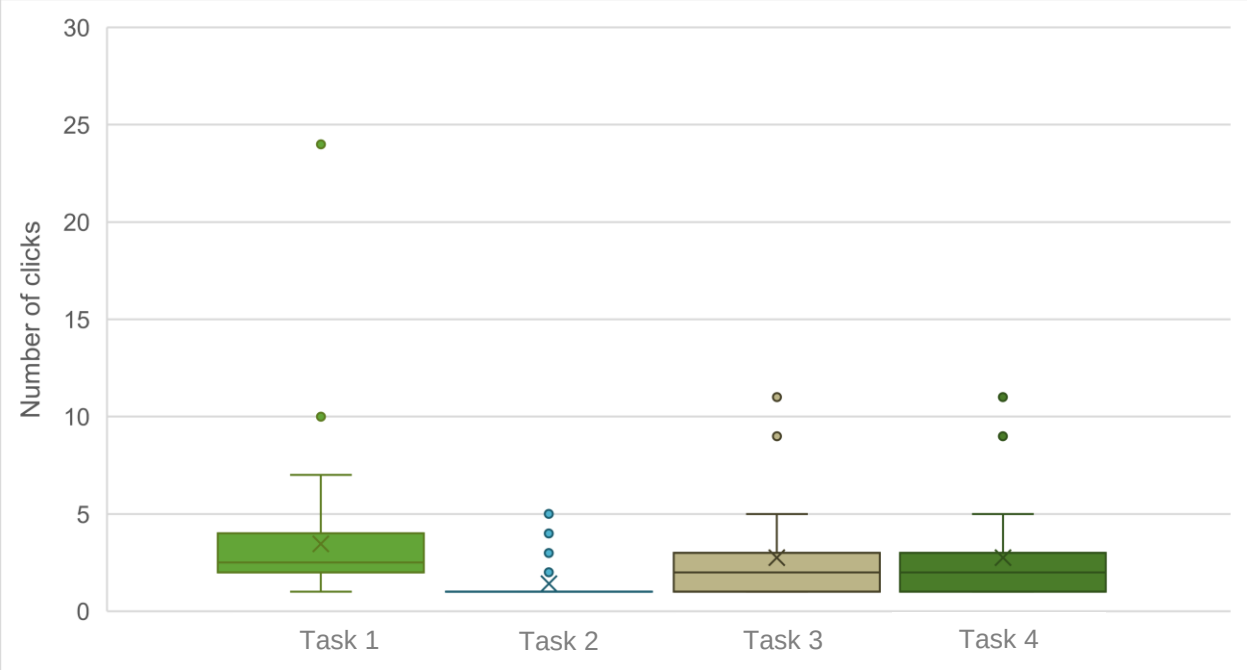

Figure 16. Respondents' number of clicks to complete all tasks

Attitudes Towards Website

Twenty-three participants provided their level of agreement or disagreement with statements about the website functionality and visual appeal. Attitudes about the website were measured using a 5-point Likert scale (1 = *strongly disagree;* 5 = *strongly agree*). A construct mean was computed to represent respondents' overall attitude toward the website. On average, respondents were neutral in their attitudes about the

website. Specifically, respondents had a slightly positive attitude about the usefulness of the content. Respondents had slightly negative attitudes regarding the website's ease of use. Respondents were neutral in their attitudes about the website attractiveness and logic (Table 8).

Table 8. Respondent's attitudes toward the website

Item	*M*	*SD*
This website has information that is of interest to me.	4.26	0.62
The pages on this website are attractive.	3.22	1.17
This website seems logical to me.	2.96	1.18
The layout of this website is confusing*.	2.17	2.30
Using this website for the first time was easy.	2.30	1.22
Everything on this website is easy to understand	2.35	1.19
Overall Attitude	**2.88**	**1.09**

Real limits: 1.00 to 1.49 = *strongly disagree;* 1.50 to 2.49 = *somewhat disagree*; 2.50 to 3.49 = *neither agree nor disagree;* 3.50 to 4.49 = *somewhat agree;* 4.50 to 5.00 = *strongly agree. *Note:* Reverse scale (1 = *strongly agree*; 5 = *strongly disagree*)

Website Experience

Respondents were asked if they had ever used the website prior to the survey evaluation. Twenty-three participants responded and 13% had used the website dashboard prior to completing the survey. Those who indicated "yes" were asked to provide information about content they usually search for on the website (Figure 17).

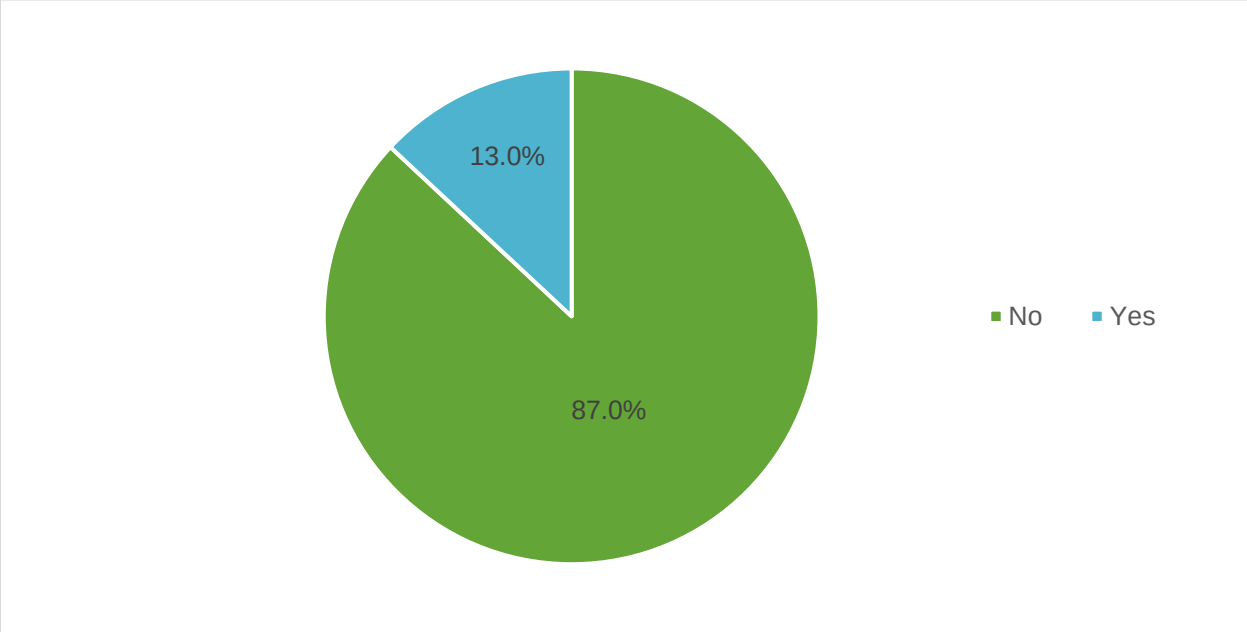

Figure 17. Percent of respondents who have used the algal bloom dashboard before.

The kinds of information that participants use the website for were reported verbatim as:

- *For fishing and boating*
- *Data and red tide results*

Conclusions & Recommendations

Results suggest that there is opportunity to improve the website's usability for the public. The website is most successful at meeting efficiency standards, but changes should be considered to improve ease, effectiveness, and user satisfaction.

Website Visibility

- There is a need to improve website visibility for the algal bloom dashboard when and if it is to become a resource for Florida red tides. However, the algal bloom dashboard had a high visibility rating across the five top U.S. search engines for the term "Florida harmful algal bloom".
- There is also an opportunity to increase use of the website through promotion of the dashboard. 87% of respondents had not used the website prior to taking the survey.

Mapping the Homepage

- The majority of the respondents indicated that the area of the homepage where their eyes first went was the ESRI mapping interface. Half of the respondents indicated that the area where they would most likely go for more information was the Algal Bloom Monitoring and Response Quick Links.
- This information suggests that the map and the sampling data are not the obvious place on the dashboard to go for more information and the other tiles may be taking away from the map's prominence.

Website Tasks

- Successful completion among the four tasks was only 47.5%. An average of 31.9% of respondents were unable to find the information on the website to complete the first three tasks.
- The average time to submit a response for all four tasks was 96.84 seconds (*S.E.* = 80.93, *n* =4) and participants had an average of 2.32 (*S.E.* = 1.21, *n* = 4) clicks across all four tasks.
- For those participants who were able to complete the tasks, the perception of how easy it was to navigate the website was mixed. On average, 39.9% of respondents had positive feelings overall, 42.7% of respondents had negative opinions, and 17.4% were neutral. Overall, half of respondents (50.2%) believed that the time it took to complete the tasks was *very little time*, 46.2% believed that it took *a moderate amount of time*, and 3.6% believed the tasks took *a lot of time*.
- These results and the open-ended responses suggest that while the information is of interest to users, the dashboard homepage has too much information for individuals to successfully navigate. The dashboard homepage could be simplified for the general public and additional information could be provided in dropdown/rollover tabs. Specific recommendations include:
    - The ESRI map interface should be the primary focus of the homepage.

- The map setting should default to those sites that were sampled within the last 30 days. The map should have the ability to show (turn on/off) older sites.
- Site dialogue boxes should be reordered to prioritize bloom information on the top and supplemental information below.
- The map search bar should be optimized to allow navigation to sites by sample location name.
- The attribute table should be easier to find.

Attitudes

- Overall, respondents had positive attitudes about the website content, but attitudes were negative regarding the dashboard's ease of use and functionality. Specific comments suggest that the website may be too complex and have too much information for the typical user.