Survey Report

Usability Analysis of the Mote Marine Laboratory Beach Conditions Reporting System Website

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August 2021

SGR-143

UF UNIVERSITY of FLORIDA

Sea Grant Florida

For More Information

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Suggested Citation

Krimsky, L.S. (2021). Usability analysis of the Mote Marine Laboratory Beach Conditions Reporting System website. Gainesville, Fla.: Florida Sea Grant College Program. SGR-143.

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Acknowledgements

Sarah Caywood – Staff Environmental Specialist, Mote Marine Laboratory

Kevin Claridge – Associate Vice President for Sponsored Research and Coastal Policy Programs, Mote Marine Laboratory

Aspen Cook – Staff Environmental Specialist, Mote Marine Laboratory

Forest Hecker – OPS Technician, Florida Sea Grant

Zarinah Salahuddin – Volunteer, University of Florida IFAS Extension

Chris Simoniello – Research Scientist and Outreach and Education Manager**,** Texas A&M University and Gulf of Mexico Coastal Ocean Observing System

Betty Staugler – NOAA Harmful Algal Bloom Liaison, Florida Sea Grant, University of Florida

This research was funded by the Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute.

Table of Contents

List of Figures

List of Tables

Background

The Mote Marine Laboratory Beach Conditions Reporting System (BCRS) is a citizen science outreach tool that provides real-time local beach conditions for Florida. The BCRS website, www.visitbeaches.org, is a Google Earth interface that allows users to look at sentinel reports to make informed, real-time decisions about local beach recreation. In addition to weather and surf conditions, the BCRS relies on volunteer sentinels to report subjective beach conditions including water color, drift algae, beach debris, respiratory irritation, dead fish, jellyfish, and crowds.[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 Mote Marine Laboratory Beach Conditions Reporting System website. 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] Nierenberg, K., Reich, A., Currier, R., Kirkpatrick, B., Backer, L. C., Stumpf, R., Fleming, L., & Kirkpatrick, G. (2009). Beaches and HABs: Successful expansion of the Florida red tide reporting system for protection of public health through community education and outreach. *Florida Journal of Environmental Health*, 203, 18–24.

[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 VI 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 45 individuals completed the survey. Complete demographic information for respondents is displayed in Table 1.

Table 1. Respondent demographics

Variable	Frequency	Percentage
Gender		
Male	14	45.2
Female	13	41.9
Prefer not to answer	4	12.9
Age		
18 to 24	--	--
25 to 34	3	6.7
35 to 44	9	20.0
45 to 54	4	8.9
55 to 64	8	17.8
65 to 74	15	33.3
75 to 84	5	11.1
85 and above	1	2.2
Race		
White	26	83.9
Other	1	3.2
Prefer not to answer	4	12.9
Education		
Some college	1	3.2
Associate’s or technical degree	1	3.2
Bachelor’s degree	13	41.9
Graduate or Professional degree	14	45.2
Prefer not to answer	2	6.5
County of residence		
Brevard	3	6.7
Charlotte	3	6.7
Citrus	1	2.2

Variable	Frequency	Percentage
Collier	9	20.0
Hernando	1	2.2
Hillsborough	1	2.2
Lee	6	13.3
Manatee	6	13.3
Martin	1	2.2
Monroe	1	2.2
Palm Beach	1	2.2
Polk	1	2.2
Sarasota	8	17.8
St. Lucie	1	2.2
Non-Florida Resident	2	4.4

Respondents (n = 45) were asked to report the type of device they were using to complete the survey. The majority of respondents completed the surveys on computers, either a laptop or desktop (53.3%). The other respondents completed the survey on mobile phones (26.7%) and tablets (20%).

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 very knowledgeable about red tides in Florida (*M* = 2.68; *SD* = 0.52) (Figure 1).

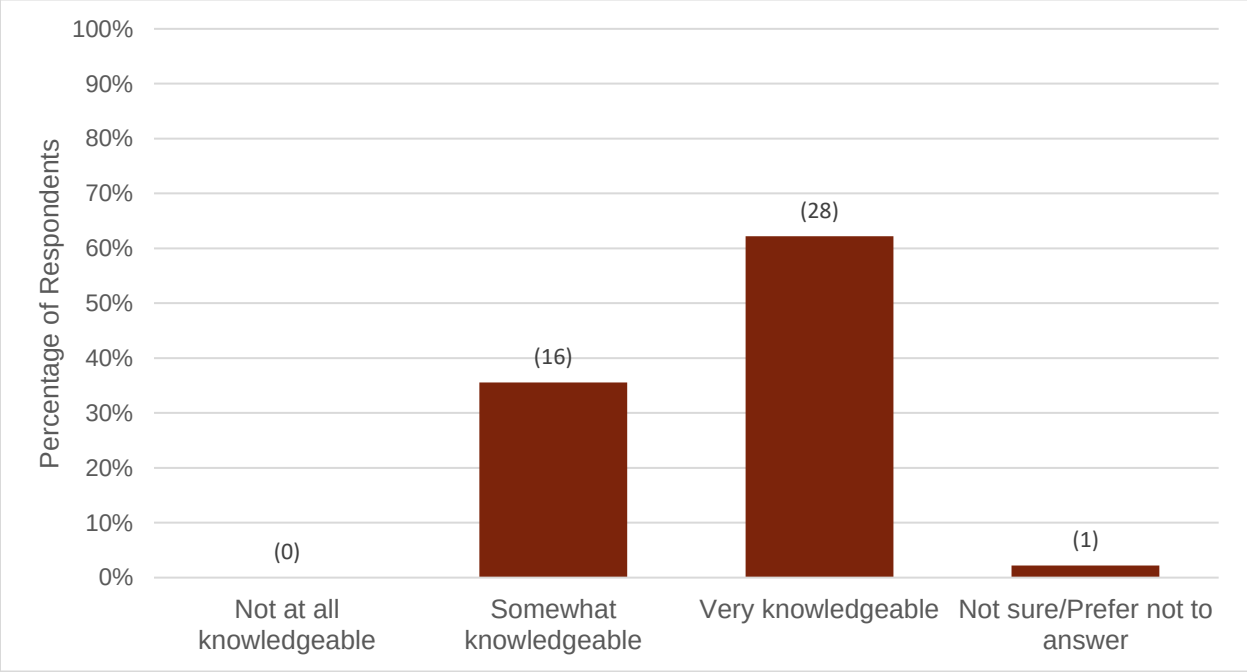

Figure 1. How knowledgeable are you about the coastal condition known as red tide? Answer frequency shown in parentheses.

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 BCRS website appeared among the top ten results. The website received a visibility score of 40% appearing in two of the five search engines.

Mapping the Homepage

Participants were shown a screenshot of the desktop version of the BCRS 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 the majority of respondents (93.3%) clicked on southwest Florida, the area dominated by beach report icons. The remainder of respondents clicked on the Panama City region (3.3%) and the Indian River Lagoon region (3.3%).

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 Southwest Florida report icons, primarily the area around Boca Grande (53.3%), the Resources icon (16.7%), and the Alerts icons (13.3%). These and other regions selected are presented in Table 2.

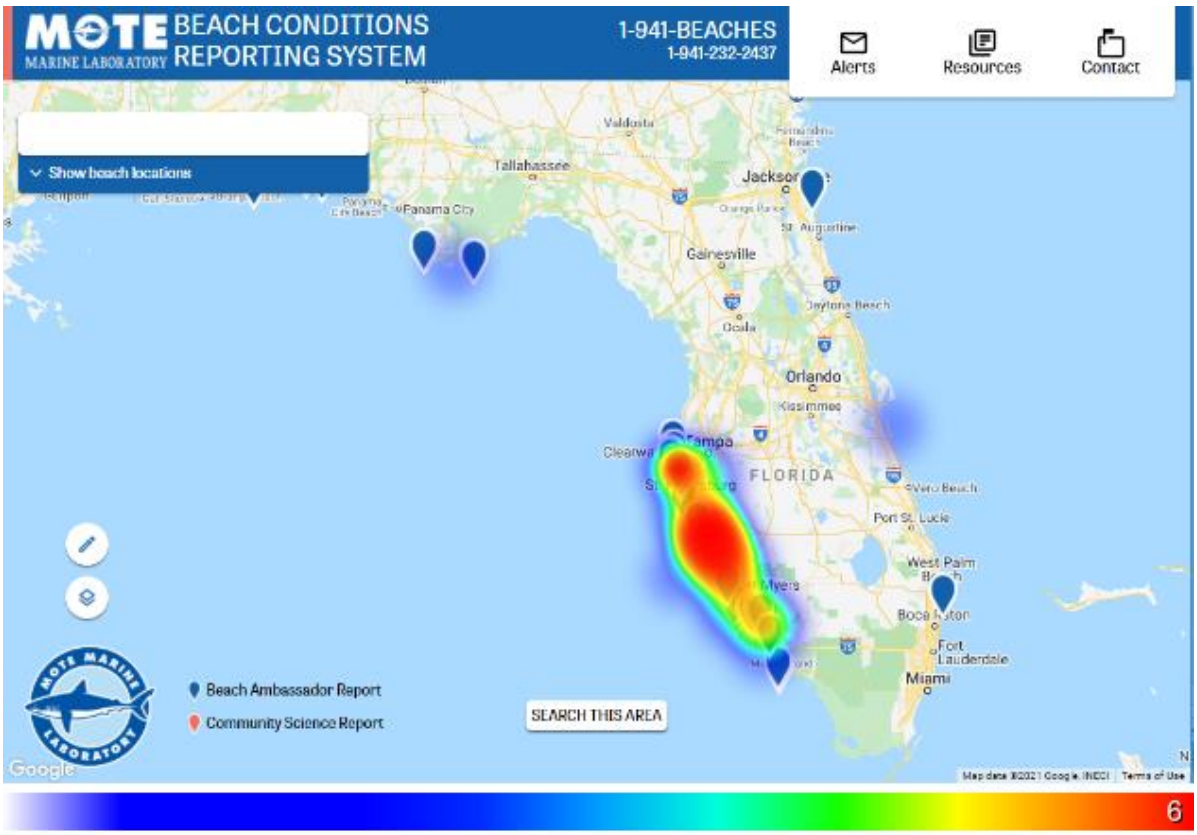

Figure 2. Homepage Screenshot Heat Map: Area where eyes first went (scale: 1 to 6 clicks)

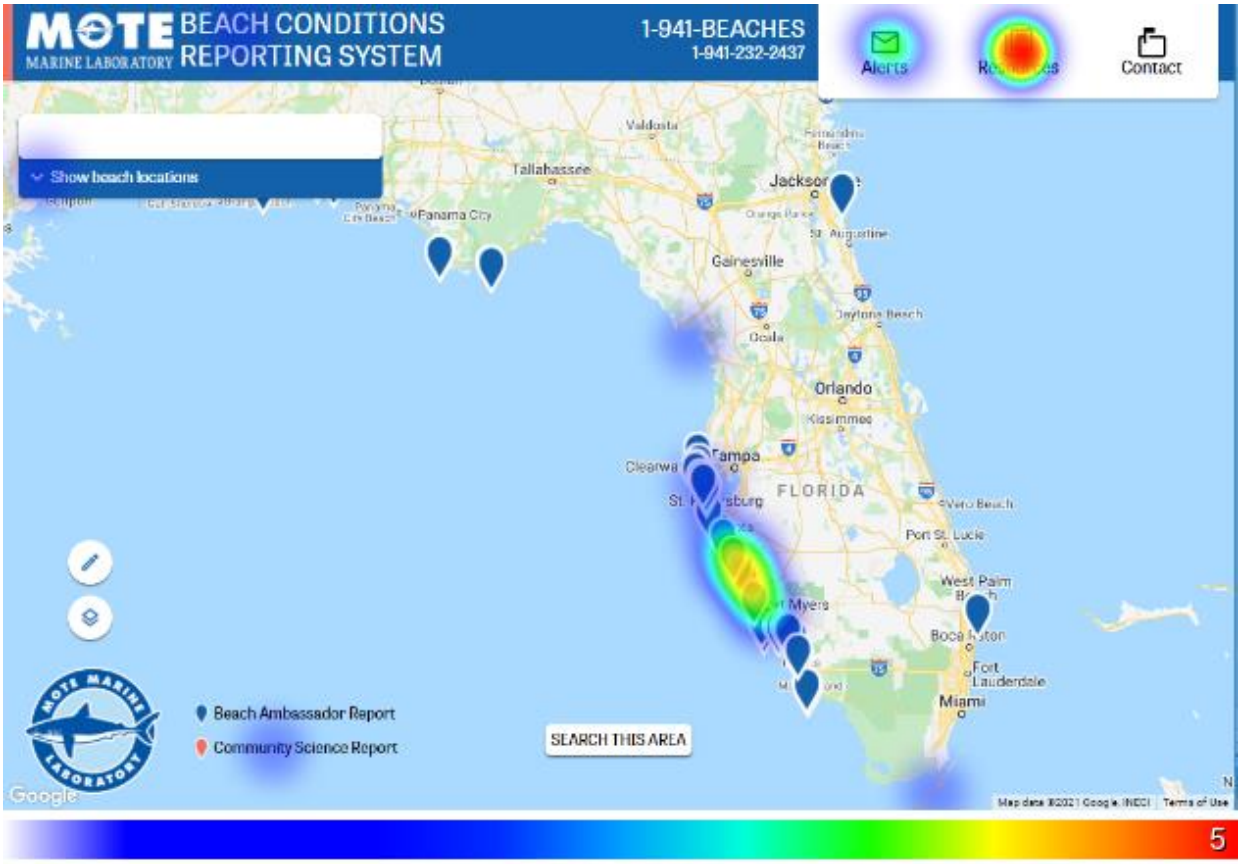

Figure 3. Homepage Screenshot Heat Map: More information (scale: 1 to 5 clicks)

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

Homepage Region	Frequency	Percentage
Southwest Florida report icons	16	53.3
Resources icon	5	16.7
Alerts icon	4	13.3
Community Science Report	1	3.3
Show Beach Locations drop down	1	3.3
BCRS heading	1	3.3
Key Largo region	1	3.3
Cedar Key region	1	3.3

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: Water Color Reported for Siesta Key

Correct Responses

Thirty-six individuals completed Task 1 which asked participants to select the water color reported for Siesta Key. Participant responses were compared against the Mote BCRS metadata for the corresponding dates and time. The majority of respondents (65.6%) were able to correctly answer the question. Of those participants who answered the question incorrectly, 28.1% reported being unable to find this information on the website and 6.3% provided a wrong response (Figure 4).

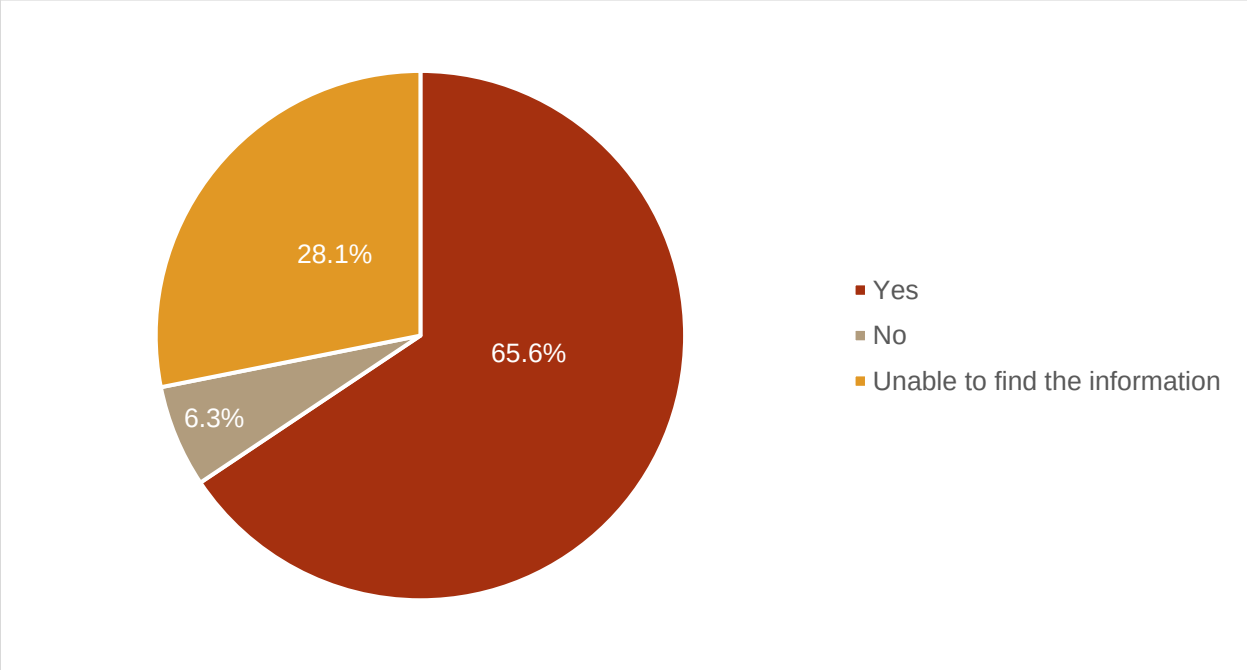

Figure 4. *Percent of respondents who correctly answered Task 1*

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 105.03 seconds. Participants clicked an average of 4.33 times within the website to try and find the information. Table 3 displays the full results.

Table 3. Task 1: Number and timing of clicks in seconds

(n = 36)	***Minimum***	***Maximum***	***M***	***SD***
Time of First Click	1.29	654.35	39.08	109.18
Time of Last Click	8.00	654.35	102.95	120.17
Time of Page Submit	11.33	656.00	105.03	119.97
Click Count	1	27	4.33	4.57

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*). 69.4% of respondents had a positive attitude to the ease of navigation, 25% of respondents had a negative attitude, and 5.6% were neutral in their perceptions (Figure 5). The majority of these respondents believed that the amount of time to complete the task was *very little time* (77.8%). 18.5% of respondents believed it took a *moderate amount of time* and only 3.7% of respondents believed the task took *a lot of time* to complete (Figure 6).

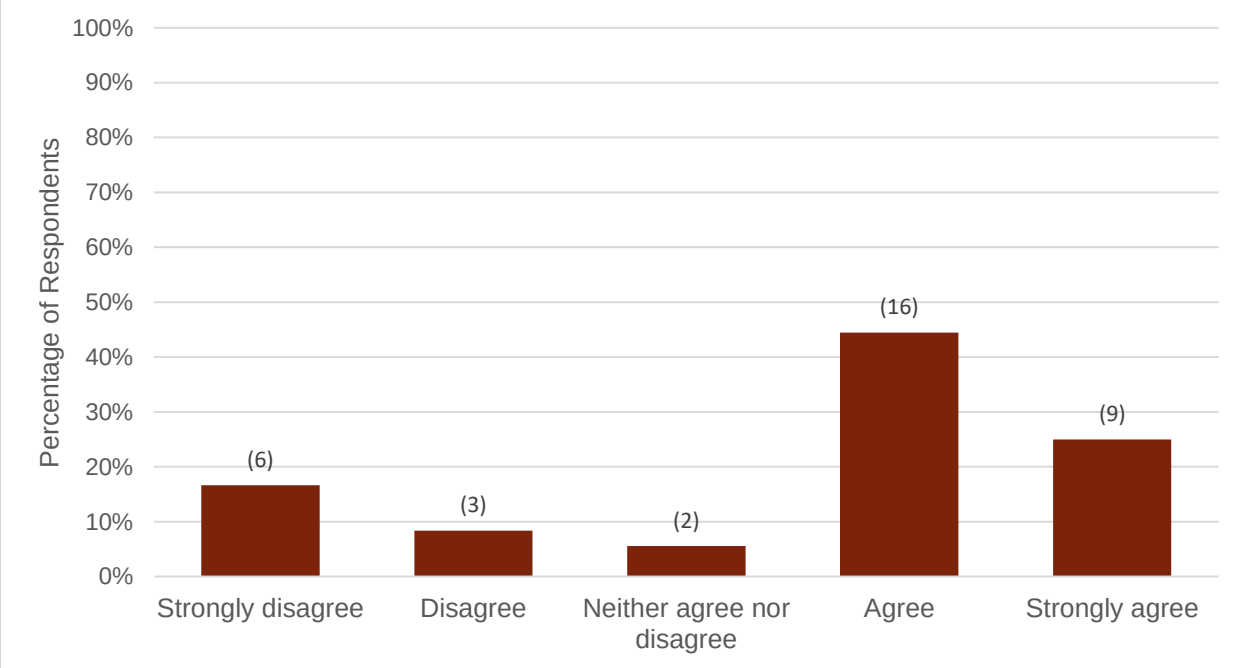

Figure 5. Percent agreement with the statement "I was able to easily find my way around the website to complete Task 1".
Answer frequency shown in parentheses.

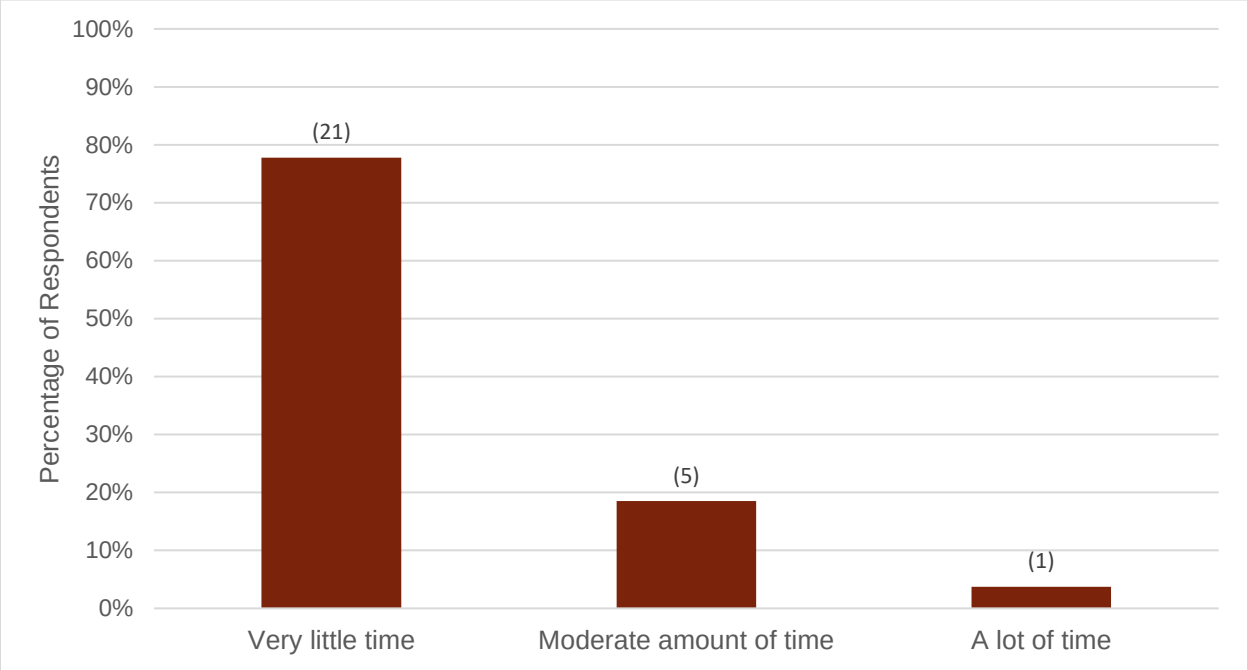

Figure 6. Perception of time spent completing Task 1. Answer frequency shown in parentheses.

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 1. (*Note:* Quotes are provided verbatim). The following themes emerged from this question:

The respondents commented that searching for specific information was not as easy or obvious as it should be. Respondents suggest that the map should zoom into an area once identified in the search bar.

- *A search area that asks what are you looking for would be helpful.*
- *Unsure where that data or map was because I did not find that option for Siesta and even finding Siesta Key was harder than it should have been.*
- *By hovering I never found Siesta Key on the map. I did find one water color report as clear.*
- *It's a cluttered mess lacking any specific search option. It would have been nice to find what you asked me to find.*
- *Locating Siesta Key was somewhat difficult, many sites clustered together. Also, I live nowhere near there so had to guess.*
- *I was able to find the information relatively quickly because I know where Siesta Key is located. I also tried using the search function; while the results did bring up siesta key fairly quickly, the map did not zoom to that location. It might be good for search results to highlight and/or zoom to search results.*

- *When you right click on https://visitbeaches.org to open a new tab it goes to the FWC red tide page. Had to manually type in the url to go to the beach site. I know where Siesta Key is, some people may not.*

Respondents found the platform easy to use and they provided recommendations for additional improvements.

- *It's a little awkward with the drop down of beaches on the far left and the reports on the far right, but it was pretty easily found.*
- *Needs bacteria sampling results such as ecoli and a HABs statement even if none is reported e.g., "no red tide organisms found".*
- *Great GIS Web Application!*
- *Easy, but I am motivated. I am highly allergic to Red Tide.*
- *The methods to zoom in on an map can vary, but this was logical and well-messaged*
- *Intuitive layout of the screen.*
- *Water clarity was not represented but rather the number of cells per liter.*
- *Easy to navigate.*

Additional comments include:

- *I had no idea there was a website dedicated to red tide reports.*

Task 2: Resources Navigation

Correct Responses

Thirty-five individuals completed Task 2. Participants were asked to navigate the website to access the FWRI Fish Kill Hotline. 85.7% of participants successfully found the Fish Kill Hotline and 14.3% responded that they were unable to find the information on the website (Figure 7).

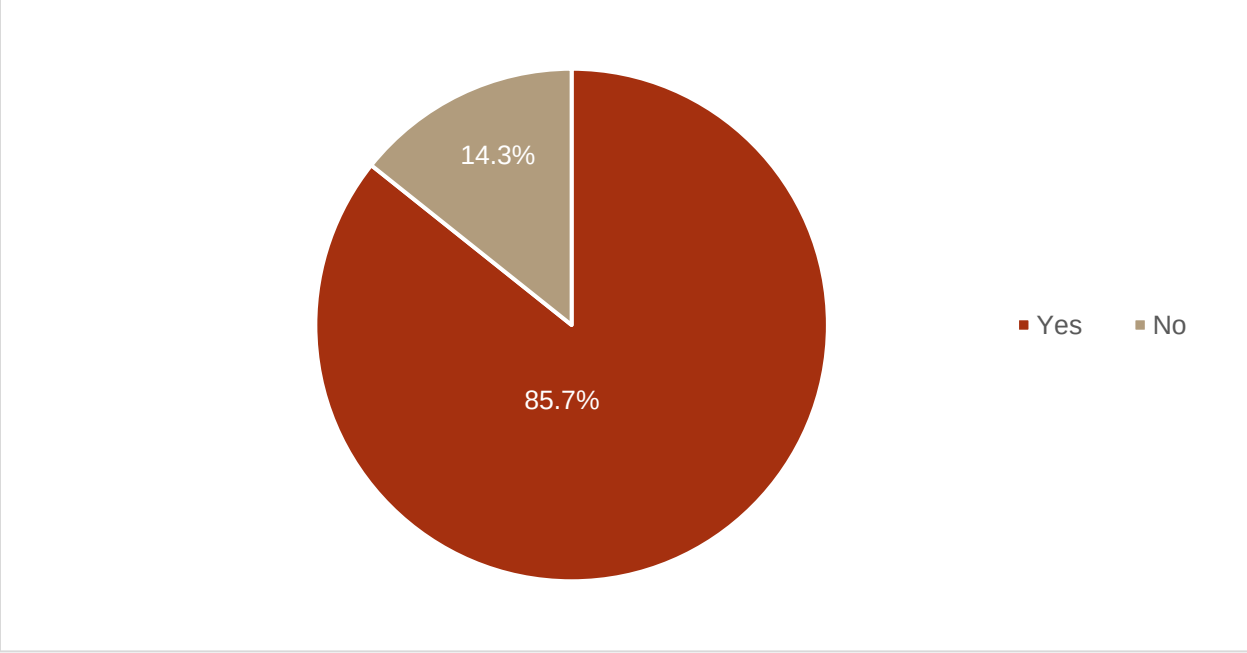

Figure 7. Percentage of respondents who correctly answered Task 2

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 53.47seconds. Participants clicked an average of 1.43 times within the website to try and find the information. Table 4 displays the full results.

Table 4. Task 2: Number and timing of clicks in seconds

(n = 35)	***Minimum***	***Maximum***	***M***	***SD***
Time of First Click	2.50	127.56	41.33	38.97
Time of Last Click	2.50	134.41	51.27	42.73
Time of Page Submit	10.89	135.36	53.47	41.94
Click Count	1	4	1.43	0.85

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*). 71.4% of respondents had a positive attitude regarding the ease of navigation, 14.3% of respondents had a negative attitude, and 14.3% were neutral in their perceptions (Figure 8). 66.7% of respondents believed that the amount of time to complete the task was *very little time* and 33.3% believed the task took a *moderate amount of time* to complete (Figure 9).

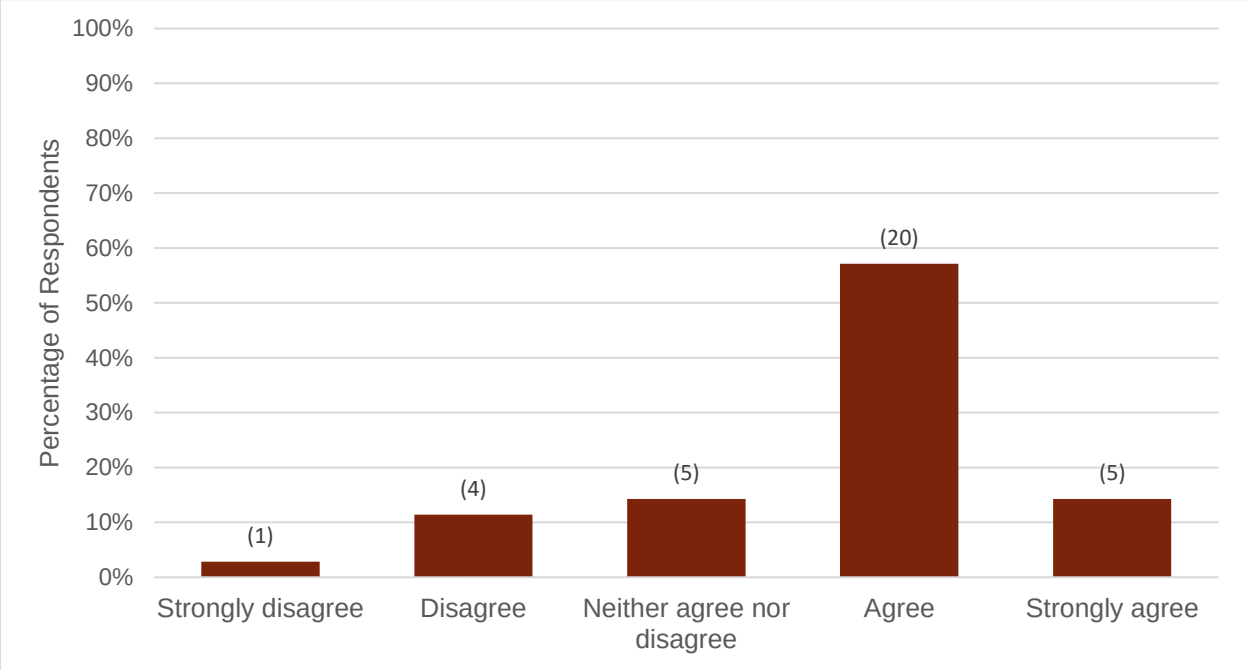

Figure 8. Percent agreement with the statement "I was able to easily find my way around the website to complete Task 2".
Answer frequency shown in parentheses.

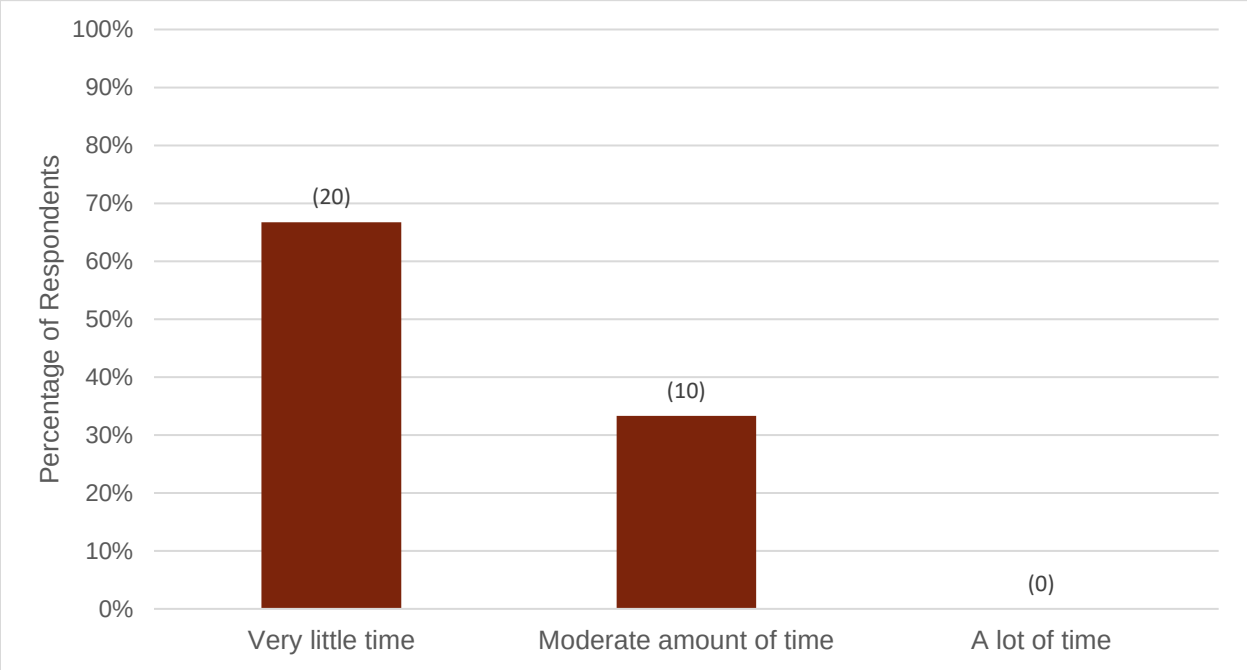

Figure 9. Perception of time spent completing Task 2.
Answer frequency shown in parentheses.

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 2. (*Note:* Quotes are provided verbatim). The following themes emerged from this question:

In general, respondents did not believe that the heading “Resources” was appropriate for the information presented.

- *It was a guess that the hotline would be found under resources. Again, a little awkward to navigate the website.*
- *Resources isn’t quite the right term that I would have used for...*
- *I think a typical user may be confused by the location. Users going to this website wanting to report something may be better served by a button or link that said "Click here to report" or something similar. The contact us link presumably just goes to a website admin and users may inadvertently send fish kill or algae concerns to this link not knowing how these systems work.*
- *For less proficient users this task would become difficult, providing additional tabs would be helpful for commonly searched items.*
- *A Hotline is a form of Contact so could be thought to be under that link. As there are only 3 options there's little chance of a User being overly confused.*
- *"Resources" needs to have other wording. There are important links in this list that should have better visibility.*

Respondents commented that the search bar was not useful for finding additional information on the website.

- *I did put the words "FWRI Fish Kill Hotline" in the search window, but it didn't go anywhere.*
- *A search on fish kill hotline returned nothing. So I looked under the resource tab and found it.*

Respondents suggested that navigation to other resources could be improved by adding direct links.

- *Why not list the number and online reporting on the main page rather than a hyperlink to another page where you must search through 3 phone numbers before you arrive at the fish kill hotline.*
- *There should be a direct link from the beach reports to the maps of red tide, https://myfwc.com/research/redtide/statewide/.*
- *If you want to make it easier put it on the same page. At least the resource bar.*

Additional comments include:

- *I did not know there was a fish kill website.*

Task 3: Email updates

Correct Responses

Thirty individuals completed Task 3. Participants were asked to sign up for email updates using the email address redtide@ifas.ufl.edu. 63% of participants indicated that they were successfully able to sign up for email updates on the website, 37% reported they were unable to sign up for email updates (Figure 10).

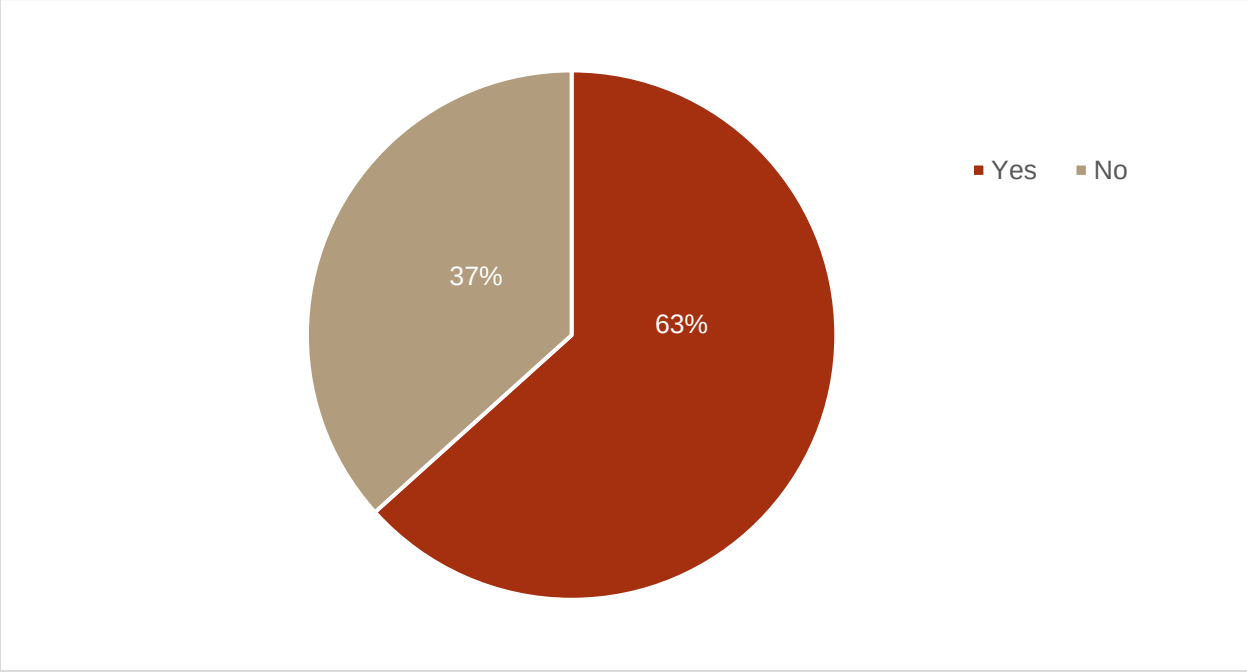

Figure 10. Percentage of respondents who were able to complete Task 3

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 103.12 seconds. Participants clicked an average of 2.45 times within the website to try and find the information. Table 5 displays the full results.

Table 5. Task 3: Number and timing of clicks in seconds

(n = 31)	***Minimum***	***Maximum***	***M***	***SD***
Time of First Click	1.76	306.54	40.85	63.34
Time of Last Click	8.50	376.40	99.22	100.15
Time of Page Submit	10.14	377.54	103.12	99.56
Click Count	1	6	2.45	1.36

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*). Respondents were evenly split with their opinions. 46.7% of respondents had a positive attitude to the ease of navigation, 46.7% of respondents had a negative attitude, and 6.7% were neutral in their perceptions (Figure 11). 15.8% of respondents believed that the amount of time to complete the task was *a lot of* time, 21.1% of the respondents believed it took a *moderate amount of time*, and a majority 63.2% believed that the amount of time to complete the task was *very little time* (Figure 12).

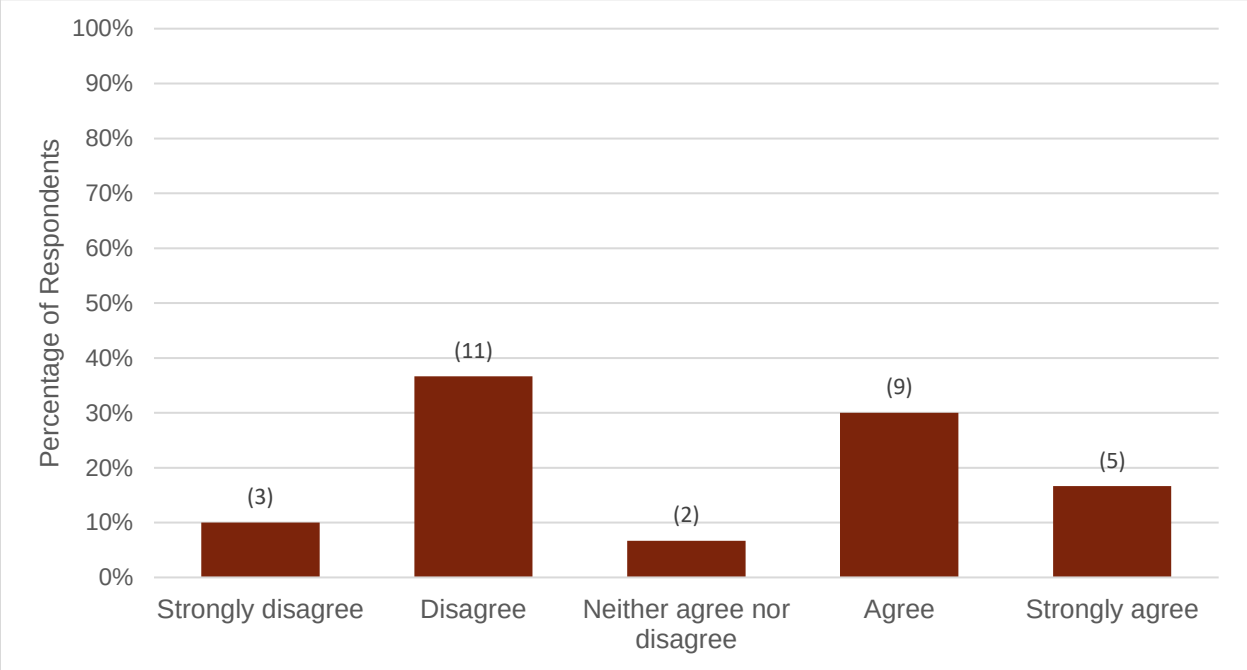

Figure 11. Percent agreement with the statement "I was able to easily find my way around the website to complete Task 3".
Answer frequency shown in parentheses.

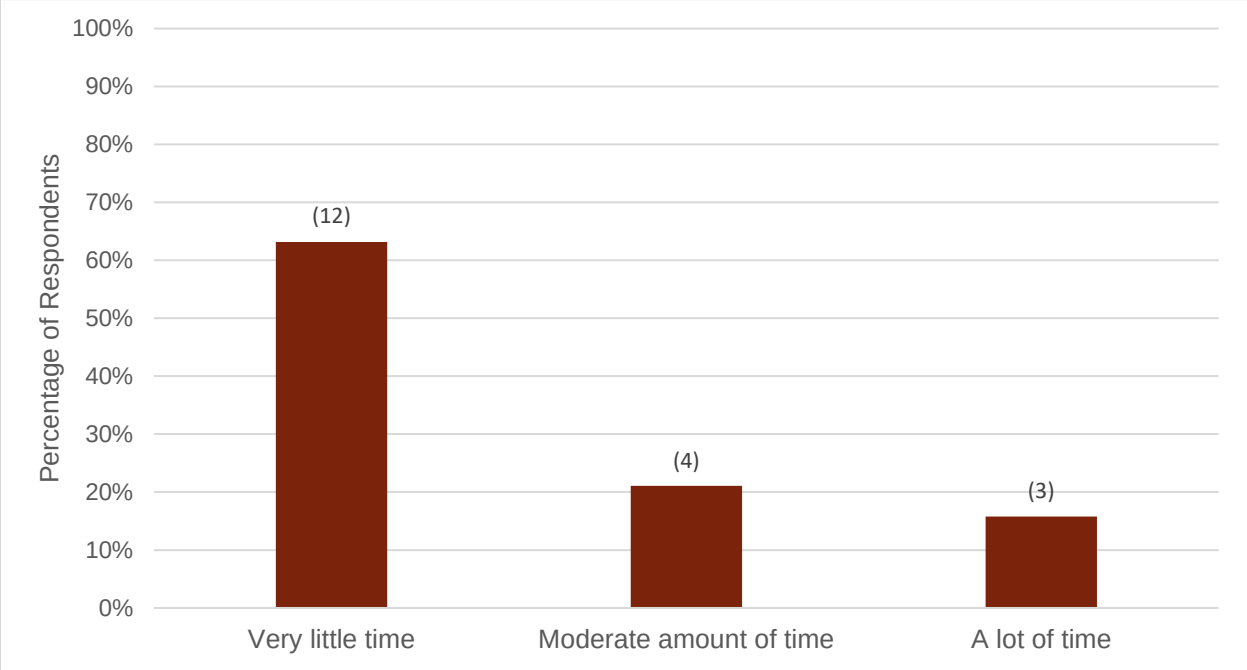

Figure 12. Perception of time spent completing Task 3. Answer frequency shown in parentheses.

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 were unable to find the location to sign up for email updates or thought that there were too many steps involved in the process.

- *At bottom of page?*
- *If possible, provide only a single link to sign up. You currently have two links to get to the subscription page.*
- *I put the red tide link address into Google and it brought up too many places. Then within the sample we were using for the survey, there was no "sign up here" or if you want to join our email, provide your email address" spot. I did see social medial and FB and others, but nothing specific that stood out for signing up via email.*
- *Never did find it.*

Respondent Variability

Standard deviation was high across the three tasks. Variability between respondents' task completion metrics is presented in Figures 13 and 14.

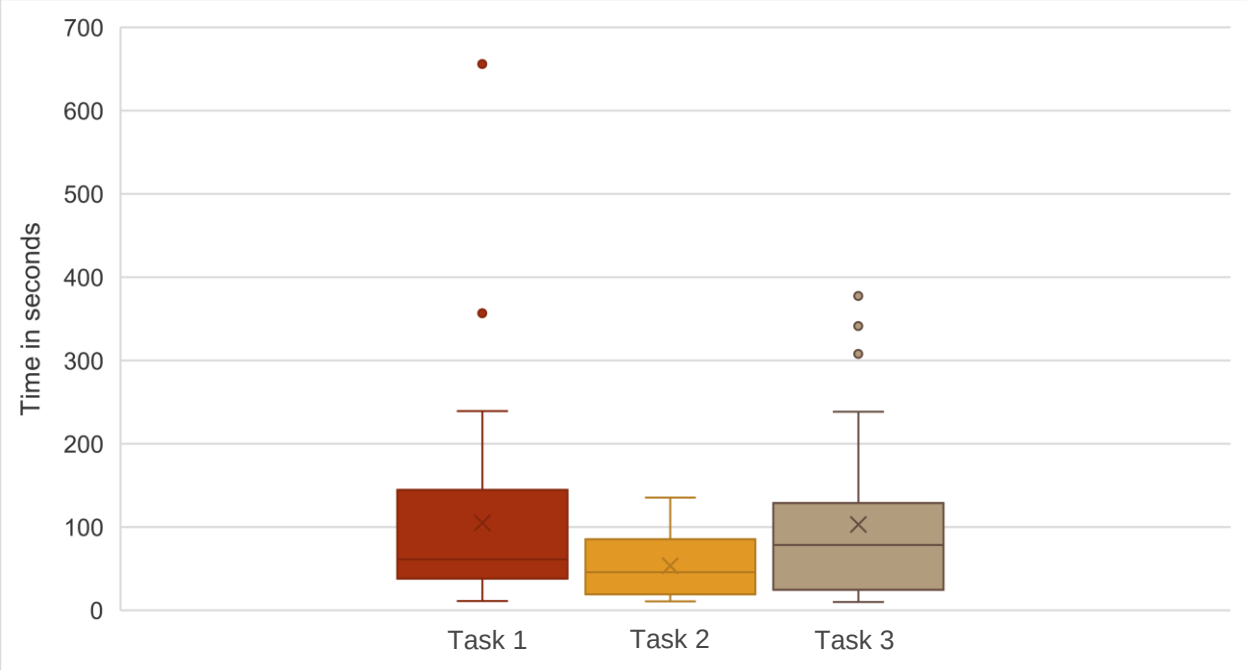

Figure 13. Respondents' time to click submit for all tasks

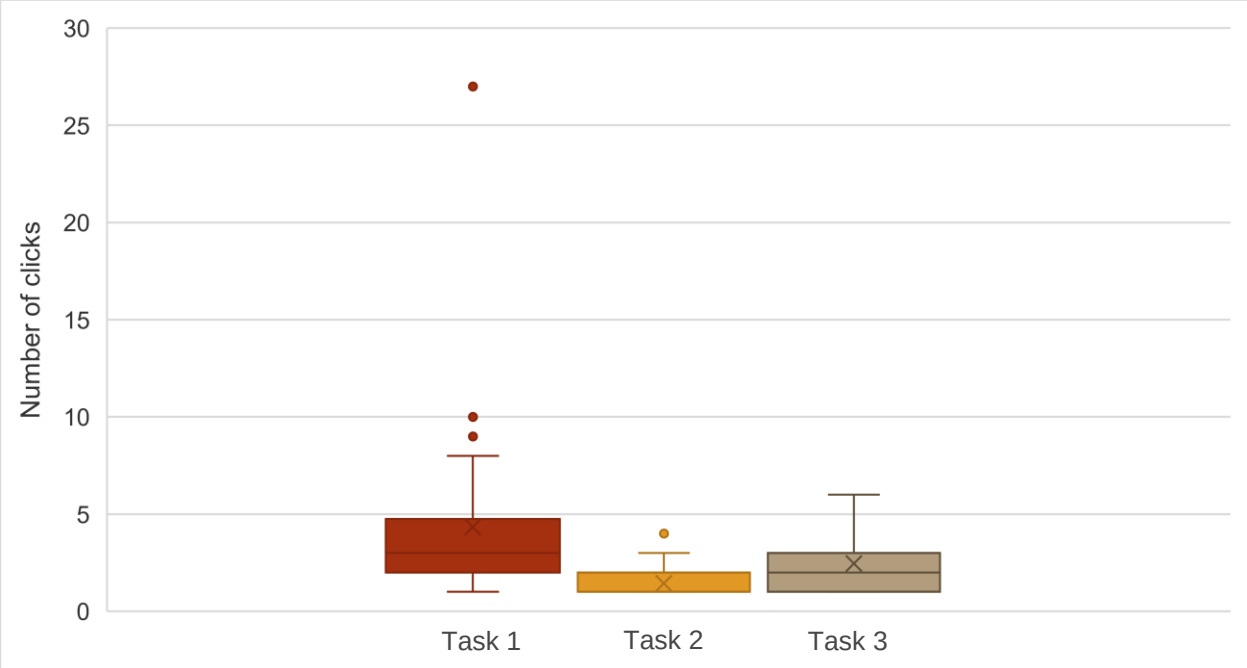

Figure 14. Respondents' number of clicks to complete all tasks

Attitudes Towards Website

Thirty 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. On average,

respondents had a slightly positive attitude about the website. Specifically, respondents were slightly positive about the usefulness of the content, the website attractiveness, and logic. Respondents were neutral in their attitudes about ease of use of the website. Table 6 displays the full results.

Table 6. Respondent's attitudes toward the website

Item	*M*	*SD*
This website has information that is of interest to me.	4.33	0.99
The pages on this website are attractive.	3.97	0.93
This website seems logical to me.	3.73	1.20
The layout of this website is confusing*.	3.30	1.29
Using this website for the first time was easy.	3.33	1.24
Everything on this website is easy to understand	3.6	1.16
Overall Attitude	**3.71**	**1.14**

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. Those who indicated "yes" were asked to provide information about content they usually search for on the website. 33% of respondents (n = 10) had previously accessed the BCRS website (Figure 15).

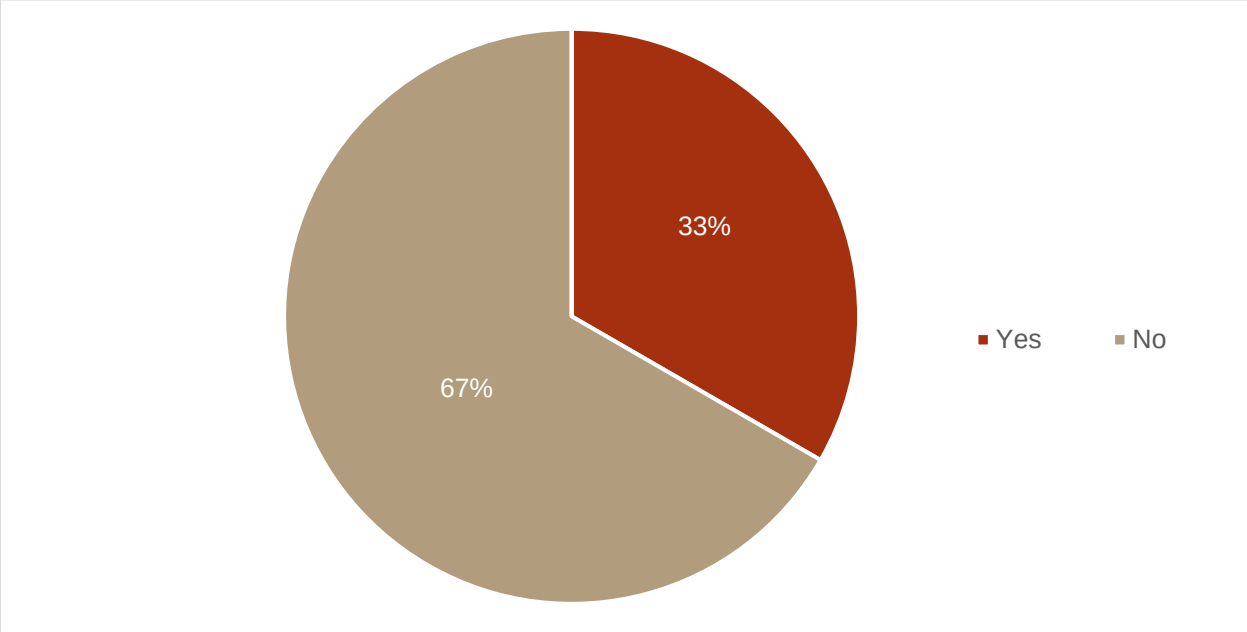

Figure 15. Percent of respondents who had previously used the BCRS website.

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

- *Red tide conditions, respiratory irritation, dead fish* (4 responses)
- *Weather, beach conditions, and surf conditions* (3 responses)

Conclusions & Recommendations

Results suggest that the website is currently meeting the needs of the public. The website is most successful at meeting user satisfaction, aesthetic, and effectiveness standards but improvements could be made to improve ease of use and efficiency.

Website Visibility

- There is opportunity to improve website visibility. The BCRS website visitbeaches.org had a visibility rating of 40%, appearing among the top ten search results in only two of five U.S. search engines using the search terms "Florida red tide".
- The website was used by one-third of all respondents prior to participating in the survey. These respondents were distributed across seven counties and also included one non-Florida resident. Half of these respondents resided within Manatee and Sarasota counties.

Mapping the Homepage

- Evaluation of the mapping interface revealed that the majority of respondents selected the area with the greatest concentration of reports as the location where their eyes first went and where they would most likely go for more information. Although the website was identified as being intuitive, there is an opportunity to make navigation easier for users by shifting visual focus to the Show Beach Locations search bar.

Website Tasks

- Successful completion of the three tasks was high at 71.4%.
- The average time to submit a response for all three tasks was 87.21 seconds (*S.E.* = 61.23, *n* = 3) and participants had an average of 2.74 (*S.E.* = 1.60, *n* = 3) clicks across all three tasks.
- For those participants who were able to complete the tasks, the perception of how easy it was to navigate the website was primarily positive. On average, 62.5% of respondents had positive feelings overall, 28.7% of respondents had negative opinions, and 8.8% were neutral. Overall, respondents believed that the time it took to complete the tasks was *very little time* (69.2%).
- These results and the open-ended responses suggest that the interface is logical. Respondents suggested that the icon names were not intuitive, and the search bar could be optimized to include resource information rather than just report locations.

Attitudes

- Overall, respondents had a positive attitude about the website's aesthetics, content, and functionality. Respondents were neutral in its efficiency and ease of use, especially first-time users. A brief description of the tool's capabilities could improve navigation for users.