

CENTER FOR PUBLIC ISSUES EDUCATION

IN AGRICULTURE AND NATURAL RESOURCES

Final Report

Harmful Algal Bloom Public Focus Groups

Dr. Angie Lindsey & Sandra Anderson



For More Information

Contact the Center for Public Issues Education at piecenter@ifas.ufl.edu or 352-273-2598

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About the Authors

Angie Lindsey, Ph.D. – Assistant Professor, Dept. of Family, Youth & Community Sciences, UF/IFAS Center for Public Issues Education

Sandra Anderson – Research coordinator, UF/IFAS Center for Public Issues Education

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Background

Algal blooms occur when natural algae in lakes, rivers, and coastal zones are stimulated to grow out of control by elevated levels of nutrients in the water. Algal blooms that produce dangerous toxins that are detrimental to the plants, animals, people, and ecosystems in the affected areas are known as harmful algal blooms (HABs). Several types of naturally occurring HABs exist, including those caused by the marine dinoflagellate *Karenia brevis* (*K. brevis*) commonly known as “red tide” events. Red tide blooms most often occur in the ocean and nearshore coastal waters as *K. brevis* thrives in high-salinity waters. A red tide event affected portions of the coasts of Florida between 2017-2018. It persisted on the southwest coast beginning in October 2017 and spread to the Panhandle and the east coast of Florida.

This focus group study specifically explored:

- Participants’ knowledge of HABs
- Participants’ perceptions about community and personal effects of HABs
- Participants’ experiences with red tide events and HABs including the 2017-2018 event
- Participants’ concerns with future red tide events and HABs
- Participants’ Information seeking behavior in relation to red tide events and HABs.

Gaining an understanding of the participants’ knowledge, perceptions, experiences, concerns, and information seeking behavior regarding HABs can help to assess the socio-economic impact on areas of Florida that were and could potentially be impacted by HAB events in the future.

Methods

Data for this report was collected through 3 focus groups held in three Florida cities. The focus group locations were in Tampa, Ft Myers, and Panama City (Bay County) areas. One group was conducted virtually with residents in each of these cities from April through July of 2021. Participants had to be Florida residents, 18 and over who live in one of the three areas. The Tampa group was recruited through a third-party research firm while the Fort Myers and Panama City (Bay County) groups utilized a convenience sample with local Extension agents assisting in recruiting participants in targeted areas. All participants were offered a monetary incentive. We spoke with a total of 22 participants in this study. The moderator guide utilized in the focus groups was reviewed by a panel of experts consisting of faculty and specialists from the UF/IFAS Department of Agricultural Education and Communication (AEC), Department of Family, Youth, and Consumer Sciences, Department of Food, Resource, and Economics, and Florida Sea Grant. Member checking at the conclusion of each focus group was used to ensure credibility of the findings (Lincoln & Guba, 1985). The groups were analyzed using a constant comparison method to develop themes which have been identified in this report.



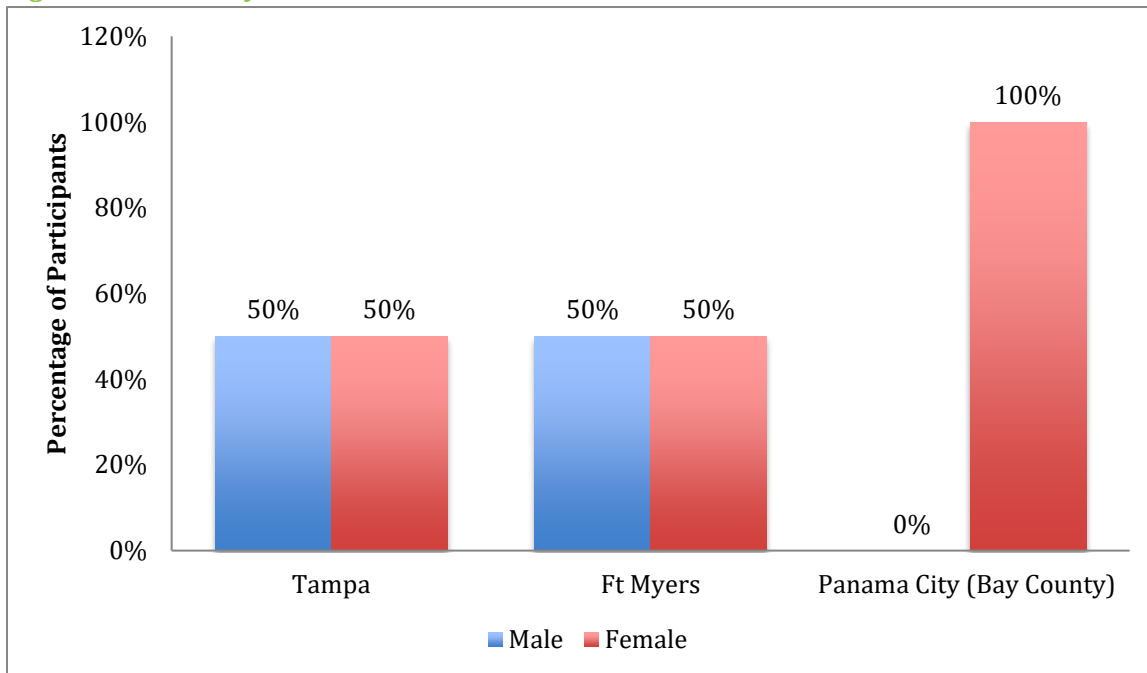
Description of Participants

There was an average of eight participants in each of the focus groups and 22 in total. Twelve participants virtually attended the Tampa focus group, 6 attended the Ft Myers group, 4 attended the Panama City and surrounding areas group. A description of the demographics follows.

Gender Representation

While overall, we had 41% male participants and 59% female, some locations had different gender splits. Figure 1 shows the percentage of males and females that are in each of the locations (Figure 1).

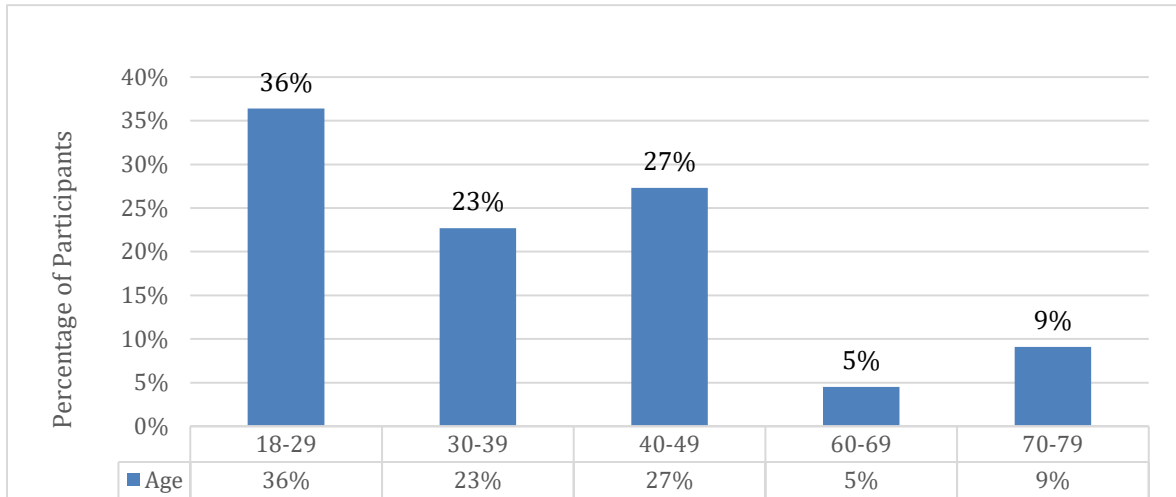
Figure 1. Gender by Location



Age of Participants Overall

Participants were asked to identify the age bracket they are included in. Fifty-nine percent of the participants fell between the ages of 18 and 39. Forty-one percent of participants were between the ages of 40 and 79. (Figure 2).

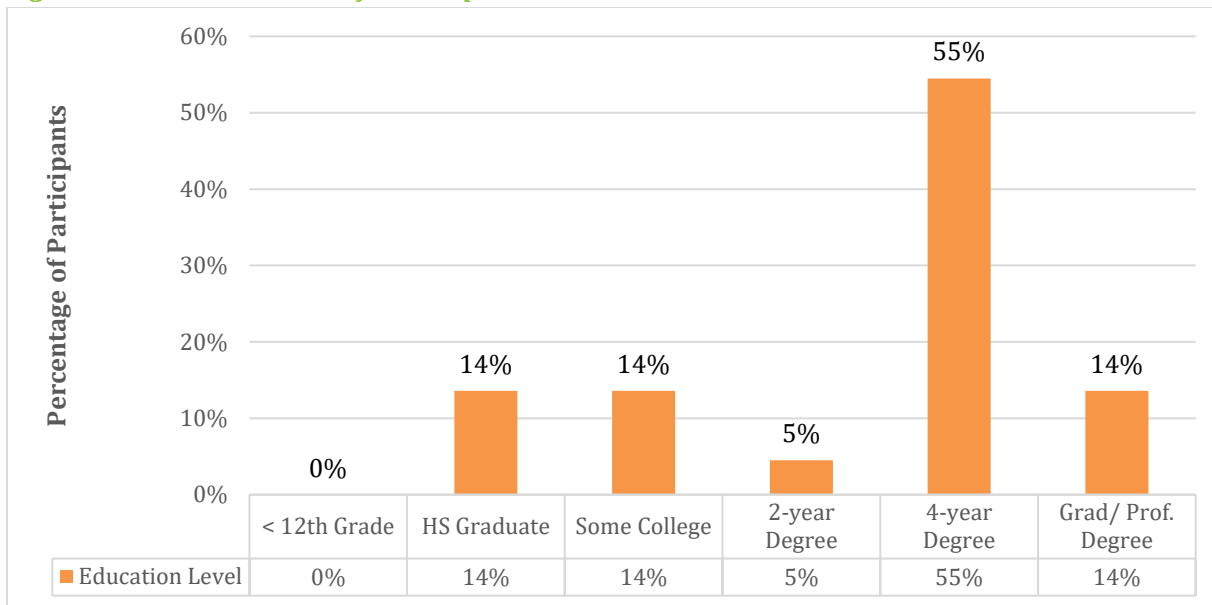
Figure 2. Age of Participants



Education Level of Participants

The participants were asked to identify the highest level of education they have completed. The majority of the participants surveyed had obtained at least a 2-year college degree (Figure 3).

Figure 3. Education Level of Participants



Race/Ethnicity Representation

Eighteen percent of the 22 participants identified themselves as Hispanic (Figure 4). Participants were also asked to select each of the races they identify with. Participants who selected more than one race were regrouped into the multi-racial category (Figure 5).



Figure 4. Hispanic/Latino Ethnicity

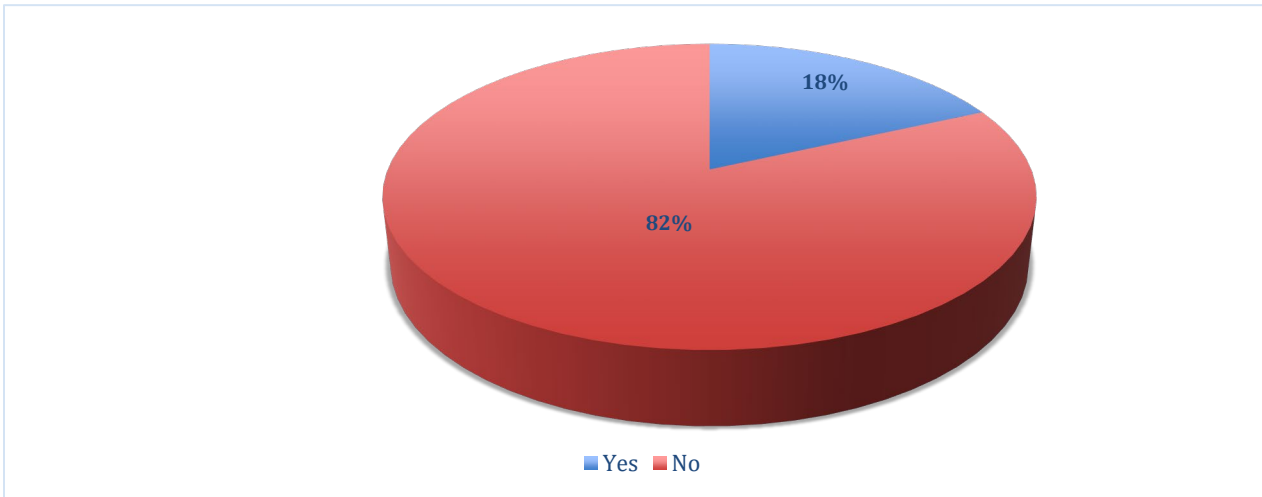
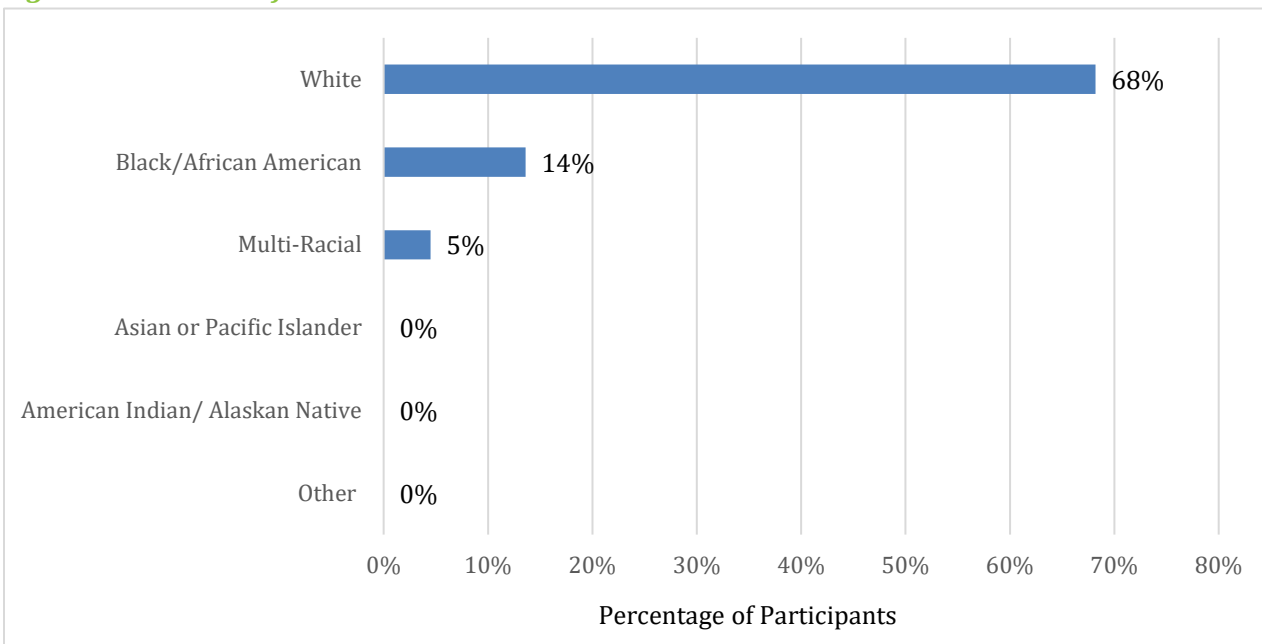


Figure 5. Race Identified

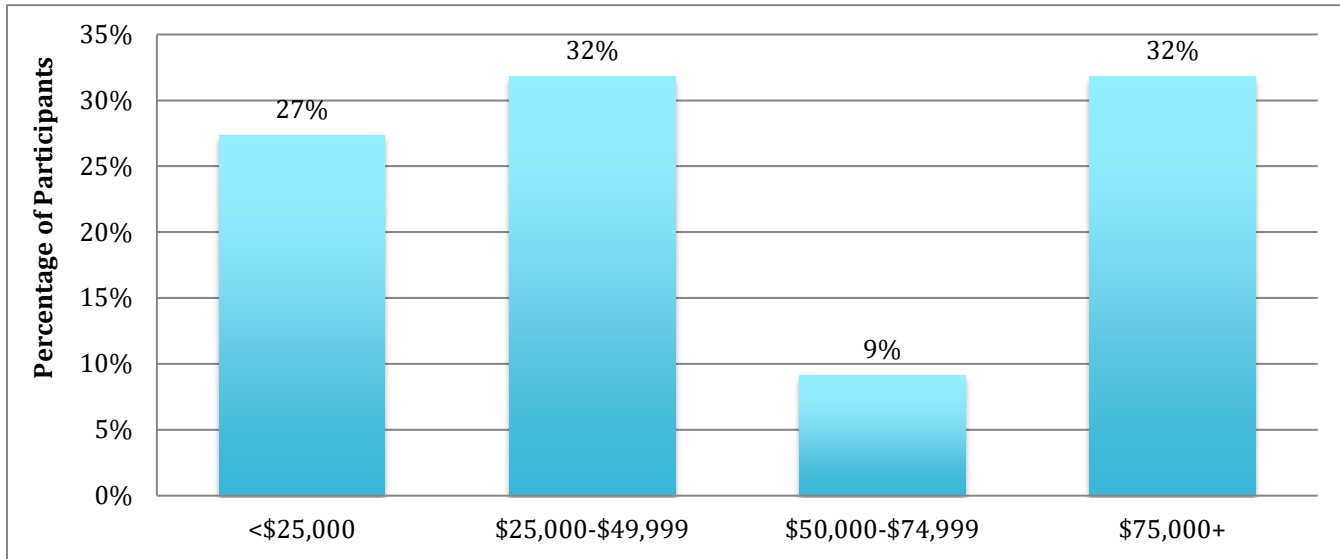


Total Family Income of Participants

Next, participants were asked to disclose their total family income for 2020. This income amount should include all sources of income and should be before taxes. Seventy-three percent of the participants made between \$25,000 and \$75,000+(Figure 6).



Figure 6. Total Family Income



Results

Harmful Algal Bloom Knowledge

Focus group participants expressed that they knew little to a moderate amount of information regarding HABs. However, upon asking follow-up questions, several of the groups knew more information than they had originally expressed. Knowledge expressed included information regarding types of HABs, where it is found, characteristics of HABs. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- One participant said, “I know it can be in fresh and saltwater.”
- Another participant explained, “It’s also harmful to people, some of the gases, or I guess the—it smells awful, but it could also cause severe allergic reactions or be harmful to people who are exposed to it in addition to the marine life and everything else that’s in the water with it.”
- A participant stated, “Usually, it’s kind of brilliant red stuff on the top of the water that you can see, and sometimes, it’s other colors too.”

Ft Myers group:

- A participant explained, “The frequency and the severity of them have been increasing as far as we know.”
- One participant stated, “I know blue-green algae is like more fresh water and red tide is out in salt water.”
- Another participant said, “Red tides can cause like a lot of short-term, like your eyes are watering, and you have an itchy throat, and it’s hard to breathe.”

Panhandle (Bay County):

- One participant said, “Well, I know that it affects humans, too, because when it’s going on, you can’t breathe, or you cough. Like when I would just go from one town to the next into work, I would have the horrible red eyes, running eyes, coughing, and it just affects everything. It’s also psychologically upsetting to see all the dead fish. There’s [nothing] really good about it. It’s very upsetting.”



- Another participant explained, "...but I do know hurricanes sure gets it out. It went away with the hurricane, when we had the hurricane, so kind of a bad way to get rid of it, though."
- A participant stated, "I would assume the higher temperatures set it off, so in the summers they would flourish."

Causes of HAB

Focus group participants described what they believed to be the underlying causes of HABs in their area. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- One participant said, "Seems like there's been a lot going on with the increase in pollution from runoff with nitrates and so forth."
- Another participant stated, "...an increase in the population of algae."
- A participant stated, "I thought that fertilizer runoff was a big thing."

Ft Myers group:

- A participant explained, "Harmful algae blooms are natural as in they've always been occurring."
- One participant stated, "You can't really blame agriculture or residents [be]cause it's a mixture of both of just runoff from farms and also lots of septic tanks, which is a big issue."
- Another participant said, "It just seems that there's obviously been a major increase in the population in the region in the past 40 years...and there are a number of different opportunities for nutrients to get into the water."

Panhandle (Bay County):

- One participant said, "I personally think that it's probably the runoff from all the agricultural and things that cause ecosystems to go a little askew. If you add a lot of chemicals in one direction or another that it would allow something to get out of balance, so that's what I think."
- Another participant explained, "All the nutrient buildup leads to eutrophication, which the algae will feed on, and they can flourish, but then [it] also is takin[g] away a ton of wetlands and takin[g] away what actually filters out the waters before they get into big bays and areas with hotter waters in it, so that's a big cause also."
- A participant stated, "I've just heard so many different stories about what causes it, and I don't really know. Everybody has a million theories about it, and I really haven't decided what I believe."

Harmful Algal Bloom Control Knowledge

Overall knowledge of HAB control was low to moderate. Most participants expressed they did not know a lot about control efforts in their community nor what they could do to aid in those efforts. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- One participant said, "I haven't really heard anything specific about mitigation or what the average person can do. I hear about controlling runoff and not using excessive amounts of fertilizer. I've heard generally some talk about, I guess, farming and how that impacts it and waste runoff from cattle farming and what



not, but it's all very general. It's not specific in terms of, as a property owner, you should do this or not do this.”

- Another participant stated, “I think it's in my grandparents' community where they live right near the water where they say that they shouldn't water their lawn right after fertilizing it because they don't want all that fertilizer to run right into the water.”
- A participant explained, “There's not really a lot that goes on, in my opinion, as far as any kind of preventative planning. It's basically like, something happens, and then they react to it.”

Ft Myers group:

- A participant explained, “I know they're trying to—several things to tackle it. I know with red tide. Specifically, they're like experimenting with like dropping clay onto them. That does something to disperse it or kill it off, but then also I know that on the local level, they're always trying to replace septic tanks with sewer systems. They're trying to incorporate it and get it all onto a sewer system, so there'll be less runoff of nutrients leaking out of septic tanks because that's a big source of nutrients along waterways”
- One participant stated, “...control efforts in our community. Not directly here, but I know they're talking about the reservoir...there's a reservoir to try and send the water south like to Lake Okeechobee. That is supposed to help with algal bloom impacts by just sending the water south.”
- Another participant said, “I know that they're doing lots of work on how to better—not to prevent it because I don't think it's going to be preventable, but just to get better communication to people and how to avoid red tide areas.”

Panhandle (Bay County):

- One participant said, “I know that they have started planting bulrush and stuff to help filter out stormwater runoff before it gets into certain bayous, which would help with filtering out those nutrients before they get into the bayous.”
- Another participant explained, “I know they have tried to pass a bill that has to do with having aerobic treatment unit septic tanks which will help reduce the nitrogen and—not really phosphorus, that gets filtered out by the soil more so than aeration, but at least help reduce the nitrogen that gets allowed back out into your drain field lines and stuff like that, and they tried to implement this bill for a lot of places around the springs. I'm not sure exactly what counties, and I don't think the bill has gotten very far yet.”
- A participant stated, “I don't know of any policies in Bay County. I do know that they did clean up the fish. They did groom all of the stuff off because we are such a tourist place. They didn't want people to not go to the beach.”

Costs of not controlling HAB

Overall participants agreed there were many costs of not controlling HABs. Costs to the economy, the tourism industry, the restaurant industry, the seafood/fishing industry, the real estate industry, the environment, human health, and the quality of life were among the costs mentioned by participants. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- A participant stated, “I think it's evident that the economy in the state will be and has been affected by these events, and heavily affected, not only the tourist industry, but also, as [another participant] was saying, the restaurant industry. Also, I believe that the people that live in the coastal areas are heavily



affected too because all the natural—unnatural causes of the death of all the sea population that occurred in those situations. The effects go in a wide, wide range of areas, the bad effects, the negative effects.”

- One participant said, “It’s going to cost tourism, people [are] not going to want to visit the beaches. It’s going to cost restaurants. Health issues associated with it.”
- A participant explained, “It could affect the visitors coming to the beaches to run away from the cold up north. It can increase prices on fish market sales for restaurants as well.”

Ft Myers group:

- A participant stated, “I think there’s a massive cost as in tons and tons of people lose their livelihoods. Some people completely like fishing charters and captains. Some people partially that are like a photographer or fitness instructor, they can’t use the beach. Then the entire region definitely felt a big economic pressure when it lost all the tourism because Florida is largely a tourism-based economy, so I think there’s huge costs.”

Panhandle (Bay County):

- One participant said, “Environmental effects, for sure. Species that are starting to diminish in their numbers.”
- Another participant explained, “I think anybody that has any property that would be affected by being close to the water would lose. You can’t resell something if you can’t breathe at the house, so that would completely take our house off the market. The fishermen and all that kind of stuff, they could completely lose their entire livelihood. Anybody that has set up for tourism or anybody that likes to come to the beach, even for your children or your grandchildren to be able to enjoy the beach like you got to, that is a cost.”
- A participant stated, “I think it’s also a cost to us because we’re not getting to go the beach and see our sunsets and do our other activities, and that kind of affects us and how we’re dealing with life also on top of the tourists and all of that. I think it affects us.”

2018 Red Tide Event

Prior to the red tide event, participants expressed they had little to moderate knowledge about red tides. Some described red tide events as a minor inconvenience. However, all the participants agreed the 2018 red tide event highlighted how devastating the impact of HABs could be to the environment, economy, and people. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- A participant said, “Mostly only related to when I would plan to go to the beach. I didn’t really think of it much as an overall issue. It’s more of a selfish scheduling thing. Then after 2018, it was like, you saw the not just a day at the beach was impacted. It was further environmental stuff.”
- One participant stated, “Yeah. I was just going to say, there was a huge environmental impact. Also, living on the beach in St. Pete, I witnessed an economic impact as well with the seafood restaurants. There were a lot of restaurants that didn’t survive. I believe it was a two-year period. Just seeing all those restaurants and businesses go out of business, it had a huge economic impact in the area as well.”
- Another participant explained, “Yes. For me, it was a very terrible episode that happened here because my family and I, we go to the beaches very, very frequently, and I remember that all that year, we could not go to the beach because every time that we saw the news, it was just shocking. We spent practically a year without visiting the beaches. It was really traumatic, especially for the kids.”



Ft Myers group:

- A participant stated, “I would say personally, that was when I was like less involved with environmental stuff, but I would say that personally as a resident, I always thought that they were really short. I know it was like a really abnormal bloom, but it was like over a year you couldn’t really go to the beach, and it was just never ending. I would say the biggest thing was I always thought that they were very short, very patchy, and you couldn’t really plan, or you just didn’t think about it. Like you would just go to the beach, and if you showed up and you saw dead fish everywhere, you pick up there’s a red tide.”
- Another participant explained, “Yeah. There’s been periodic red tides and algae blooms over the 40 years I’ve been here, but I think the one that you showed in the video was the worst that I’ve experienced in the 40 years I’ve been here.”
- One participant said, “I never imagined alga blooms could be disastrous. The experience of 2018 wrecked complete unprecedented havoc.”

Panhandle (Bay County):

- One participant explained, “I had experienced a red tide as a kid, so I knew what it was. I knew that it made me cough and not be able to breathe and all that, but as far as specifics, very little.”
- Another participant said, “Yeah. Well, I had previously known about it because there was one when I came here, but I found out really quick you suffered the effects even if you weren’t on the beach. I worked across the street. I’m really close to the water, and it would affect you even if you weren’t on the beach. It was really terrible, so people wouldn’t go out.”

Personal Impact of 2018 Red Tide Event

Many participants reported experiencing personal impacts from the 2018 red tide event. Economic as well as social impacts were reported along with impacts to participants’ physical health, mental health, and their pet’s health. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- A participant stated, “Yes. For me, it was a very terrible episode that happened here because my family and I, we go to the beaches very, very frequently, and I remember that all that year, we could not go to the beach because every time that we saw the news, it was just shocking. We spent practically a year without visiting the beaches. It was really traumatic, especially for the kids.”
- Another participant explained, “Personally, I had an experience where I brought my dog at a—an 80-pound husky, and he ate one of the red tide fish and then had to go to the emergency room. He was fine, but that was—I had some friends that had similar run ins with the red tide fish being eaten by their pets. I know that was a big issue for me personally anyways.”

Ft Myers group:

- A participant explained, “One thing I’d like to say about it affecting me economically is, I at the time during that big bloom, I was a part-time waitress...and I went from making like—I could make like \$200 a night in a couple hours to like getting told to go home after like 20 minutes or like after an hour and maybe taking home like \$20. They had to like start letting people go, and it was financially like a big struggle. Obviously, my part-time job to keep things going. Yeah, so economically...financially, that was a big struggle for me. I’d



also like to say—this is going to sound bad, but like my mental health from it...my mental health was like deteriorated from it, like it sounds bad, but it did. I just had moved here, and so I can't just pick up and move away, and so I like paid to get here. I love the water and to not be able to go do the things I love. My side job, I wasn't able to take home money from. My main job with photography, people didn't want to go to the beach. They were getting sick from it, so I couldn't do that job either. I know animals are dying and stuff, and to put any emphasis on a mental health aspect is sad, but there's a lot to it."

- One participant stated, "Yes, [my] first-hand experience was I would go to the beach to set up my classes, and I would have to cancel because of the smell and the rotting fish everywhere. It was a heartbreaking sight. I mean from an economic standpoint if your goal is to host classes on the beach where people can be out in nature, and nature is dying all around you, that kind of—it really puts a damper on everything."
- Another participant said, "The 2018 red tide event was the worst that I've experienced in the 40 years I've been here. When I take my sailboat out, I could kind of get the impact of the red tide with the itchy eyes in some of those...I couldn't really take my sailboat out without being impacted particularly by the red tide. I mean I didn't mind the discoloration of the water and that kind of thing, as much as the effects of the red tide on your breathing, your eyes, and that kind of thing."

Panhandle (Bay County):

- One participant said, "It was just a pain, like actually a pain. My eyes hurt, and I coughed. When I would travel to work, I was right across the street from work, and the first 30 minutes there, I couldn't even breathe, like coughing and coughing, and my eyes are burning, and I would finally get adjusted to it, but it was just really hard every day to go into work like that. Then to see all the fish was really terrible. Then it makes you wonder. That's not really sanitary anyway to have all that around because there were so many fish dead. They weren't exactly organized in cleaning it up."
- Another participant explained, "We did have company here at the time, my niece and nephew...so they weren't able to play in the water like I wanted them to be a—not financially, but psychologically, it was not much fun. We also had a bunch of dead fish in our lagoon behind our house that we had to keep cleaned up ...and we couldn't go outside in our yard because we live on the water. You had to stay inside, so physically, we don't have asthma or anything, we just couldn't [go outside] or your eyes would start watering when you stepped outside."

Community Impact of 2018 Red Tide Event

Most participants expressed awareness of the impacts to their community from the 2018 red tide event. Participants mentioned many different community impacts to the economy, impacts to industries/businesses, environmental impacts, health impacts, and social impacts. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- A participant stated, "Yeah. I was just going to say, there was a huge environmental impact. Also, living on the beach in St. Pete, I witnessed an economic impact as well with the seafood restaurants. There were a lot of restaurants that didn't survive. I believe it was a two-year period. Just seeing all those restaurants and businesses go out of business, it had a huge economic impact in the area as well."
- One participant said, "I recall vividly that the tourist industry was heavily impacted with the situation. I remember reading in the news constantly about—comments about the tourism industry being affected because our beaches, people come here to enjoy the beaches, and they wouldn't be able to do it at that time."



- Another participant explained, “I know that, because I heard the comments, some of the people that were living close to the beach areas, they say that the smell was completely horrendous, and they had to many times go away from their homes to avoid having this pestilent smell. That's an effect that personally affect them.”

Ft Myers group:

- A participant stated, “...but a lot of economic impact from the hospitality industry, the restaurants, the number of hotel rooms that weren't occupied. Real estate market suffered; people weren't buying homes on the water. There was significant economic impact during that year that this kind of across the board in the community.”
- Another participant explained, “I know a couple other people whose dogs died and passed away. Not like human health, but like our pet's health...Going to an affected beach, just like licking their paws afterwards, and it builds up in their system. That was sad. My dog's okay, but I know others that passed away.”
- One participant said, “Because agriculture caught a lot of flak from a lot of the environmental groups for being the cause of the bloom...on the image side, I think it definitely had a negative impact on the image of the agricultural community in the region.”

Panhandle (Bay County):

- One participant explained, “We live in a community where the outdoors is what we love the most, so it affects personal lives where people go on walks and hikes, et cetera, additionally, income as far as fishing and shrimping and anything that involves that. Then you have restaurants that are on the water or that primarily serve seafood, and they're having to get it from somewhere else. Then you have consumers who are questioning whether or not the seafood's good, so it just kind of trickles through the community.”
- Another participant said, “Yeah. We had just had hurricane come through in October, so we were already struggling with the tourists and that kind of thing, so anybody that was looking to—you could still run the fishing boats. People still had their boats, but then when the red tide came, then that closed that down as well. It was hard to tell. It was just a really bad couple of months anyway because of the hurricane, so it's hard to really separate the 2018 red tide event from that as far as community impacts because we were just—it seems like everything had just been changed.”
- A participant stated, “I think it also affected our medical community. We had some elderly people that had difficulties breathing, and we had to take them in to be checked, and it affected a lot of people in a lot of different ways. It definitely hit the tourists, but I'm sure that our hospitals saw an increase in respiratory distress, too.”
- Another participant expressed, “It seems like because we're such a tourist community, everything's affected just because people work at the dive shops. I think it affects an entire community therein because we're so directly related to that. We rely on that so much.”

Sources of Information about 2018 Red Tide Event

Most participants actively sought information about the 2018 red tide event. Local media (newspaper, television, radio) and social media (Facebook, Instagram, Snapchat) were the most common sources of information mentioned by participants. They also mentioned receiving information from a wide variety of other sources.



Information Now vs 2018

Most of the participants agreed there was more information available about HABs now than there had been during the 2018 red tide event. Participants also expressed they wanted more information about HABs, better communication surrounding HAB issue, more current research/education, and more information about prevention methods.

Preferred Sources for HAB Information

Participants discussed many preferred sources for receiving HAB information. Some of those sources included social media (Facebook, Instagram, NextDoor, Twitter, TikTok), local media (newspaper, television, radio), local state parks, text messages (school board, city), a county alert system, National Oceanic and Atmospheric Administration (NOAA), colleges/universities, local health department, local chamber of commerce, professional organizations, and word of mouth/long-term locals/local contacts.

Trusted Information Sources

Most of the participants indicated they trusted local governmental organizations, colleges/universities backed by research and scientists as sources of information about HABs. Other trusted sources of information about HABs mentioned by participants included, nonprofit organizations, and local groups that report red tide conditions in their local area.

Current Concerns about HABs

Participants expressed several concerns they currently have about HABs. Concerns mentioned included the impacts of another event like the 2018 red tide event occurring, concerns about short- and long-term impacts of HAB events on the economy, environment, and health of the surrounding communities, concerns about the impact of multiple disasters, and concerns about the effort being put into finding solutions and providing information to the public. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- A participant said, “I would say now especially, now dealing with COVID and how the air quality can be so bad, I just feel like human health wise, it would be a greater factor right now dealing with that. Also, economic side we already had to shut down or do minimal capacity. If something like another [2018 red tide event happens] ...make that even harder for those people. I definitely think it's [HAB events] are a greater risk now than it was back then, considering what we're going through right now.”
- One participant explained, “I think there's a—I think a little bit of everybody has touched on it, that it's environmental. It's economic. It's people who may use that space for recreation, which is, I think, incredibly important right now for people's well-being, to be able to get out in public spaces. It all mounts up, especially environmental stuff. Every time there's a red tide, it's not like, if it goes away, then everything is fine. The next one can be just as bad. It's another kind of knock on the system.”
- A participant stated, “I wish that they would have something, like some type of prevention or some type of a preparedness in order to combat what has happened before, like be more ready about it so people know what measures to go through to prevent something like this from happening again.”

Ft Myers group:

- A participant said, “...How can we best defend or protect ourselves from blooms, or how can we best at least be notified that they're happening? There's a lot of waterways everywhere, and a lot of places where I see swing ropes into the creeks and into the river. I know there's certain waterways that are designated for



like recreation, so I'm wondering like people that may not live here that may not know of HABs...A lot of waters are contaminated, and we should at least [know] how to be notified of the of these contaminated waters, and how to best protect ourselves?"

- One participant stated, "I would say that it's [HAB events] are inevitable as in—as I've said like it's something that's happened over and over again, and like they've always existed, and there's always been bad ones here and there...but I do think that humans are having a huge effect on the severity, and how long they last, and how large they are. I would say that it's pretty much inevitable that the bigger, longer blooms, in our life span as for the young people here is—like it might be once in a decade, once in 50 years, but they'll be bigger worse blooms until we figure something out."
- Another participant explained, "No, I am extremely concerned. These blooms, we may not have...like see a direct impact immediately, but the long-term impacts... so I took the Florida master naturalist class. The videos the information was from 20 years ago, and it's the same exact information about the algal blooms people been experiencing them...red tide, blue-green algae, and it's the same exact thing and narrative, and we need to do more research. I'm hearing the same exact thing, and so I'm extremely worried. I grew up my whole life trying to get into Florida, and I get here, and everything's dying around me."

Panhandle (Bay County):

- One participant stated, "Definitely concerned about HABs...I don't know a ton, but what I do know is that there aren't enough processes and procedures in place to protect [the environment]. I think there's a lot of red tape and a lot of politics around it, and I think that it's a gray area when it comes to a lot of it. I know that there's certain things that you can do and certain things that you can't do, but I want our area to be safe for other people to come...but seeing the deterioration just here in my community has been—it's really upsetting. This is a community where my family laid roots and seeing it change so much over the years is really sad."
- Another participant said, "It just seems to be like a disconnect about the fishermen, the people who live here, the tourists really are bothered by it, but then I don't hear anything political about it...to—like what we could do to prevent it or anything like that. It just seems like there's some kind of disconnect. There are just no policies, and it's frustrating because you can't, if you live here, get away from it. You're just stuck living in it and dealing with the consequences."
- A participant explained, "I'm worried. I work for the government. I know how slow things move. Things move really slow, and things like this, you can't have a very, very slow process to prevent it or else it's just not going to work... it worries me that it [another HAB event like the 2018 red tide event] could happen again because everybody's so slow moving."

Other things mentioned

Participants mentioned several general thoughts regarding HABs. The following quotes are examples of the discussion surrounding this theme:

Tampa group:

- A participant explained, "...but just in terms of like—there's not an ongoing kind of reporting. Like when it's allergy season, every day, the news will say like, the allergy conditions are at a two today, or they're at a 10 today. I don't see anything similar with red tide."
- Another participant said, "Environmentalism is not an issue in Florida, not in the way that it should be, and I think some of that is just political. Unfortunately, the political leadership in our state doesn't really like to put environmental issues on the forefront, and I think that hampers our ability to address those issues. It's



one thing to be aware, but it's another thing to have agencies doing something about it, to have more robust public service communications and things.”

- I don't think I've ever seen anything that—on any sort of cost benefit analysis on a projection of, if we're going to correct this problem, here's what the costs might be as opposed to, here are the costs that we already know have happened in the past because of the reduction in the tourism dollars, the loss of income, the businesses shutting down and all that. I don't even know if something like that is possible, but I suppose it would probably be at least a starting point to be able to make the point that, yes, of course, there's going to be a cost to preventatively try to keep this from happening as opposed to letting it happen, and then everything hits the fan, and all these businesses close, and the tourists don't come, and people have health issues that cause medical problems and all this sort of thing.

Ft Myers group:

- A participant explained, “I think that as more people learn about—like right now, I think a lot of people think red tide, “...but I think as more research is done, they are finding links between—it's a neurotoxin. Brevotoxin as a neurotoxin, so they're finding all these links between these mental things and red tide. I think that these longer blooms and the more science data that comes out, people might get more concerned, which might be a good thing as it might make more people want to fix the problem.”

Panhandle (Bay County):

- One participant stated, “I think that legislation is almost impossible without buy-in from the public. The education of the average joe would be far more effective than passing a bunch of laws that then you have to enforce because laws are only as good as the people that are going to enforce it.”
- Another participant said, “I think in layman’s terms for some people, yeah. Numbers and data, I don’t—but as far as how to look at it in layman’s’ terms, I would be interested in that, and just basically the history behind it, the currents behind it, and the future behind it, or whatever they have going on, updates on current research, things like that.”

Thematic Results by Location

A breakdown of the thematic results by location is provided below in Table 1.

Table 1. Thematic Results by Location

	Tampa	Ft Myers	Panhandle & surrounding areas
Themes:			
HAB Knowledge:			
Aware of HAB's	X	X	X
Two different types, red tide, and blue green	X	X	X
Found in freshwater and saltwater	X	X	
Recognition of brilliant red stuff on top of water (red tide)	X		
Present in hot weather	X		X
Have seen them all times of year			X



Harmful to all marine life & growth of sea grass	X	X	X
Harmful to people physically and psychologically	X	X	X
Smells bad/strong ammonia-like odor/smell of dead fish	X	X	X
Causes respiratory issues/ causes severe allergic reaction/sore throat/red eyes/coughing	X	X	X
Severity and frequency of HAB events are increasing		X	X
Should not go near water when present			X
Report HAB blooms if you see them			X
Hurricanes get rid of the red tide			X
Causes of HAB:			
They are naturally occurring		X	
Increase in the population of algae	X		
Increase in fertilizer/stormwater runoff with nitrates	X	X	X
Nutrient buildup leading to eutrophication which algae feed on and flourish			X
Caused by septic tank pollution		X	X
Caused by a mixture of both residents and agriculture by way of septic tanks and runoff		X	
Increase in population of people leads to increase in nutrient levels in the water		X	
Warm temperature of water increases growth of HABs			X
Loss of wetlands which filter water			X
Don't know what causes HABs/confused about cause			X
HAB Control Knowledge			
Aware of efforts to control runoff and fertilizer use	X	X	
References to farming/agriculture runoff and how it impacts the control issue	X		X
No watering of lawn after fertilizing	X		
Work being done on having better communication regarding how to avoid red tide areas		X	
Reservoir to send the water south		X	
Dropping clay onto the red tide to disperse/kill them off		X	



Replacement of septic tanks with sewer systems to decrease runoff of nutrients leaking out of septic tanks		X	X
Planting bulrush to help filter stormwater runoff			X
Clean up of dead fish/clean up beaches			X
Introduction of Legislative bill to treat septic tanks w/aerobic treatment to reduce nitrogen			X
Wants one entity to deal with prevention and control efforts	X		
Only hear about it when there is an event	X		
Feels there is not enough preparation	X		X
More reactive than preventative	X		X
Has not heard about what can and cannot be done as a property owner	X		
Heard minimal amounts of information about control efforts on news	X		
Unaware of current control methods/policies	X	X	X
2018 red tide event			
Had little to moderate knowledge of red tide prior to the event in 2018	X	X	X
Prior to 2018, red tide events were considered a minor inconvenience	X	X	
2018 event highlighted the devastating impact to environment, economy, & people	X	X	X
Length of 2018 red tide event was surprising	X	X	
Traumatic event for those directly and indirectly affected	X		X
Worst red tide event ever experienced		X	X
Did not have any knowledge of red tide before the 2018 event		X	
Sources of information about the 2018 red tide event			
Local and national news media (TV news/newspapers)	X	X	
Social media (Facebook, Instagram, Snap Chat)	X	X	X
NPR public radio	X		
Florida State Park			X
Department of Environmental Protection (DEP)			X
National Oceanic and Atmospheric Administration (NOAA)			X



Local health department			X
County alert system			X
Local/state park			X
Word of mouth		X	
Community Meetings		X	
IFAS/University of Florida		X	
Okaloosa Water Watch		X	
Legislative delegation/Legislative systems of information		X	
Chamber of Commerce		X	
Association of Water Resources (AWRA)		X	
First-hand experience		X	X
Actively sought information about the 2018 red tide event	X	X	X
Did not actively search out information about the 2018 red tide event	X		
Personal impact of 2018 red tide event			
Negative social impact of not being able to do water related activities or be outside near beach/water	X	X	X
Smells were bad	X	X	X
Affected personal health		X	X
Affected pets' health	X	X	
Seeing the dead fish was difficult	X		X
Affected economically		X	X
Affected mental health		X	X
Community impact of 2018 red tide event			
Tourism industry negatively impacted	X	X	X
Seafood/fishing/shrimping industry negatively impacted	X	X	X
Businesses/restaurants on the beach/near water negatively impacted	X	X	X
Overall economy negatively impacted	X	X	X
Environment negatively impacted	X	X	X
Could not do any water related activities or be outside in a community reliant on these types of activities	X	X	X
People who lived closer to the beach/water had to leave homes to avoid the terrible smells	X		
Those living or working closer to or at the beach/water were more directly affected	X		



Hurricane along with red tide event caused devastating damage to the culture of the community			X
Human/pet health negatively impacted	X	X	X
Hospitality/hotel industry negatively impacted	X	X	X
Real estate market negatively impacted		X	X
Impacted the medical community who saw an increase in respiratory distress cases			X
Motivated more community involvement/action regarding environmental issues/fixing them		X	
Current Concerns about HABs			
High level of concern about another similar red tide event happening again	X	X	X
Concern another similar event would devastate the economy and the environment	X	X	X
Concern about what the short and long-term impacts are for the health of people who live in areas affected by HABs	X	X	
Concern about compounded impacts of multiple disaster events happening at the same time (red tide event, COVID, hurricane, etc.)	X		X
Concern the HAB events are longer and worse than each prior event	X		X
Concern that there needs to be more effort regarding finding solutions		X	
Concern about how to best protect oneself from blooms/be notified if they are happening	X	X	X
Concern about long term impacts on health of neurotoxin (brevis toxin) aerosolized by blooms		X	X
Concern about consistent signage that signifies danger of blooms at all affected locations, especially for tourists		X	
Cost of not controlling causes of HABs			
Costs to the tourism industry	X	X	X
Costs to human health	X	X	X
Costs to the restaurant industry	X	X	X
Costs to the seafood/fishing industry	X	X	X



Costs to the quality of life	X		X
Costs to the environment	X	X	X
Loss of income/livelihood	X	X	X
Economic pressures	X	X	X
Costs to the real estate market (cannot resell property near to water/no one buying property)		X	X
Costs to any business located near beach/water			X
Information about HABs now vs. 2018			
More information is available now	X	X	X
More groups/organizations dedicated to this issue have popped up		X	
Wants more information about HABs now	X	X	X
Better communication needed about what is being done to deal with red tide	X	X	X
More research/education is needed that is current	X	X	X
More information about prevention methods needed	X	X	X
Preferred sources for HAB Information			
Social media (FB, Instagram, NextDoor, Twitter, TikTok)	X	X	X
Google		X	
Local media (Television, radio, newspapers)	X	X	X
Local and state parks	X		X
Local county-based websites			X
System networking		X	
ZooTampa	X		
Text messages (school board, city)	X		X
County alert system	X		X
The Aquarium	X		
Mote Marine		X	
Community outreach		X	
National Oceanic and Atmospheric Administration (NOAA)	X		X
Environmental Protection Agency (EPA)	X		
Florida Department of Consumer Services (FDACS)-Water Quality Division		X	
Fish and Wildlife Commission (FWC)		X	
The Conservancy of SW Florida		X	



The Waterkeepers		X	
Tampa Bay Riverkeepers	X		
Soil and water board	X		
Fish and Wildlife Association at USF	X		
Colleges/Universities	X	X	
Public events (festivals, county fairs)	X		
Community groups	X		
Neighborhood association	X		
Local health department		X	X
Local chamber of Commerce		X	X
Professional organizations		X	X
Scientists		X	
University of Florida/IFAS/Extension offices		X	
Florida Gulf Coast University Water School		X	
Word of mouth/long-term locals/local contacts	X	X	X
Restoration projects			X
Trusted information sources about HAB			
Trust information from community groups	X		
Trust information from nonprofit organizations	X		
Trust information from colleges/universities backed by research	X	X	
Trust information from governmental organizations	X		
Trust information from local governmental organizations	X	X	X
Trust information from scientists		X	X
Trust information from marinas			X
Trust information from local groups that report red tide conditions in local area		X	
Other ideas mentioned			
Wants an ongoing daily HAB report that tells us what to expect	X		
Aquarium should do an exhibit on HABs effect on marine life	X		
HAB information booths should be set up at tourist attractions	X		
Too many politics surrounding the HAB issue	X		X
Buy-in from public needed for legislation regarding HABs			X



Education about HABs would be more effective than legislation			X
A cost-benefit analysis should be conducted that shows costs of prevention vs. costs of reaction to a HAB event	X		
Release of scientific data/research on impacts of blooms will increase peoples' concern and motivate them to want to fix this		X	X

Recommendations

Participants have a wide variety of concerns about the socio-economic impacts HABs have had in the past and will have in the future on their personal lives and in their communities. This includes tourism, local restaurants, and recreation. The need for more information to better prepare for HAB events was expressed by participants. Participants also expressed a need for information on causes of HAB events and any preventive actions that can be taken. Participants also indicated the disruption these events brought to their daily lives and time spent outside doing things they enjoy. These results show that perceptions and knowledge of HAB are strongly tied to cultural rationality, including personal experience, social norms, and community concerns. Given this, it is important when communicating about environmental risks that communicators consider that audiences will assess risks culturally as well as impacts to economy. When developing environmental risk messages, it is important to acknowledge the concerns of individuals who are personally affected by environmental dangers. Social and local media were the ways participants indicated would be best to relay information and messages about HABs. When developing messages regarding HAB events, it is important to acknowledge the concerns of individuals who are directly and indirectly affected by the impacts of an HAB event.

References

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications.

