

# Focus Group Report

## Insights from Natural Resources and Public Health Professionals on Key Elements of Red Tide Messaging and Modes of Communication

Elizabeth A. Staugler  
Chris Simoniello  
Paul Monaghan

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## For More Information

Contact Elizabeth 'Betty' Staugler at [staugler@ufl.edu](mailto:staugler@ufl.edu)

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## About the Authors

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

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

**Paul Monaghan, Ph.D.** – Associate Professor, Department of Agricultural Education and Communication, UF/IFAS

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**Forest Hecker** – OPS Technician, Florida Sea Grant

**Lisa Krinsky** – Water Resources Regional Specialized Agent, UF/IFAS Extension, Florida Sea Grant

**Nancy Montes** – Postdoctoral Associate, Florida Sea Grant

**Rick O'Connor** – Florida Sea Grant Extension Agent, UF/IFAS Extension, Florida Sea Grant, Escambia County

**Elke Ursin** – Administrator of Public Health Toxicology, Florida Department of Health

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# Natural Resources & Public Health Professionals

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## Executive summary

*The goal of this project is to inform best communication practices to enable the use of science-based information in decision-making during Florida red tide events. Collaboration with stakeholders was an integral component of the project, particularly to better understand the human dimensions influencing decision-making. Conversations during the focus groups provided in-depth understanding of the emotions, values, thoughts and opinions driving personal behaviour.*

*In this report, we summarize in-depth insight about the key elements of red tide messaging and modes of communication provided by Natural Resources and Public Health professionals during three focus groups. We also identify the red tide-related communication challenges and successes of participants.*

*The instructive content provided by the focus group participants will help shape the Red Tide Communications Plan for Florida, which aims to align practitioner (i.e., agency) needs with end-user (i.e., resident and visitor) wants. The information will not only help determine preferred red tide content, formats and delivery modes but also inform development of innovative educational approaches and messaging aimed at public health and safety.*

*Focus group findings fall into six major themes: 1) strengthen communication networks, 2) provide behavioural recommendations, 3) message simple to complex, 4) access to information, 5) timeliness, and 6) communication for the practitioner. Recommendations under each theme is further described in the final discussion section of this report. Detailed information about each of these is presented in the following sections.*

## Methods

Three virtual focus groups were conducted with natural resources and public health professionals whose work includes communication of *Karenia brevis* red tide with stakeholders in Florida's southwest, central west and panhandle coasts. This study collected and analysed their input and insights under the guidance of the following major research questions:

1. What red tide information is most important to communicate to the public?
2. What questions are most frequently asked by the public during red tide events?
3. What red tide communication successes have been made in recent years?

4. What are the major challenges to red tide communication?
5. How does information flow between the scientific community and the public?
6. What opportunities exist for improving red tide communication?

Development of focus group questions and subsequent analysis were conducted in collaboration with a social scientist advisor. Focus group questions were reviewed for appropriateness and accuracy by the project's science and communication advisory committees, piloted, and approved by the University of Florida Institutional Review Board (IRB).

### **Recruitment**

Florida Sea Grant and Florida-based Gulf of Mexico Coastal Ocean Observing System (GCOOS) partners recruited through existing networks. In order to adhere to COVID-19 social distancing guidelines, virtual focus groups were employed. As such, each invited participant was able to select from one of three focus group date/time options.

### **Focus Group Implementation**

Focus groups were conducted in accordance with the University of Florida IRB to protect participant privacy and ensure they were aware of their rights as research participants. Because of the low risk to participants, the focus groups were designated as a study exempt (IRB-20202724) from full review. Nevertheless, it was important for participants to be aware that 1) their participation was voluntary; 2) they could choose to answer questions or not; and 3) they could terminate their participation at any time. We also informed them that we would be recording the focus group discussion for follow-up analysis but that steps would be taken to separate responses from all identifiers such as name and position.

Each of the three focus groups was facilitated by a moderator who asked the questions, probed with follow up questions, and ensured everyone had a chance to speak. A second moderator ensured all components of the questions were addressed by participants before moving to the next question. We began with a brief overview of the project and project team. Participants were asked to keep their video and microphone on to facilitate discussion. Participants then introduced themselves (first name), stated their professional position, and answered an ice breaker question. After everyone had a turn, we began with the focus group questions. Participants were free to speak without raising their hand and asked to keep the conversation verbal rather than writing in chat). In addition to recording the focus groups, project team members listened in the background and took notes to help with transcription.

## Data Management and Analysis

At the conclusion of each focus group, the recorded transcriptions, both text and video, were saved. Moderators and project team also debriefed to discuss session content, what was learned, what was surprising, and emotions evoked.

To begin analysis, text transcriptions were compared to what was said on the video and text transcription errors were corrected. Additionally, all participant identifiers, including names and affiliations, were removed from the transcripts to protect participant identities.

Data coding was accomplished in two stages and by two coders, working independently in Microsoft Word® and MaxQDA® (based on methods described in Charmaz, 2006; Krueger, 2000; Ritchie & Spencer, 1994). Initial coding involved the generation of numerous category codes without limiting the number of codes. At this stage, we listed emerging ideas and identified keywords frequently used by respondents as indicators of important themes. The second stage focused coding by eliminating, combining, or subdividing the coding categories identified in the first step. Attention was given to recurring ideas and wider themes connecting the codes.

## Sessions and participants

Three focus group sessions with 25 participants total were held (Table 1). Focus groups occurred on December 8, 15 and 16, 2020. Three additional public health professionals registered but were unable to attend due to COVID-19 responsibilities.

*Table 1: Focus group participants by job sector and jurisdiction*

Region	Participants	Public Health	Natural Resources	Other
<b>State-wide</b>	7	2	5	3
<b>Southwest</b>	8	3	5	0
<b>Central west</b>	6	1	5	0
<b>Panhandle</b>	4	0	4	0

## Focus Group Questions

Below is the bank of questions used during the focus groups (Probes indicated as bullets).

1. **Thinking back to the last significant red tide event, what was the best thing regarding communications that happened?**

2. **What kind of information or messaging were you most often disseminating to your audience?**
  - Can you describe that particular audience?
  - Why was this most often disseminated – Deemed important by you/your organization or was it a FAQ by public?
3. **Were you asked the same question(s) throughout the duration of the bloom or did the questions evolve with the bloom? If yes, how did the questions evolve?**
4. **Do you consider red tide to be a natural disaster?**
5. **What red tide topics do you feel are lacking from red tide communication with the public?**
  - Studies have indicated a lack of understanding by the public regarding seafood risks during red tide. How do we address this issue through messaging?
6. **What red tide information supported by science is the public most skeptical of?**
7. **What red tide misinformation has the public latched onto that you wish you could dispel?**
8. **How are you receiving/disseminating messaging/information?**
  - What is the mechanism?
  - Is there two-way communication (between state and local agencies, and between local agencies and public) or is it primarily one way?
  - How well are we communicating with non-English speakers?
9. **Is there anything else you would like to add/recommend about red tide communication with the public?**

## Participant Responses

In answering the focus group questions, participants provided a wealth of information. This section condenses the overarching themes gathered from the three focus groups.

### Key Findings for Major Research Questions

1. **What red tide information is most important to communicate to the public?**

Four categories of information will be discussed. These are: A) Risk, B) Forecasting, C) Basic science, and D) Causes.

**A) Risk** - Participants mentioned many red tide topics, from the basic science of the organism and origin of blooms (including anthropogenic linkages) to long-term effects on wildlife and ecosystems to a bloom's location and trajectory. However, the most important red tide information to communicate was the

health risk. The general public (e.g., tourists, weekend visitors, waterfront residents, anglers and local businesses) all want to know, “Is it dangerous?” Many focus group participants, representing state, county and municipal governments and/or agencies, are responsible for providing the public sector with information about how red tide can affect human health and the possible risks people face. The people they engage have a range of red tide concerns, including its effect on underlying health or geriatric issues and the safety of their children and pets. Participants shared their concern for underserved communities and vulnerable populations that may be at risk but find themselves left out of the discussion because of limited communication access due to language or the digital divide.

Communicating important information about health risks is complicated by the nature of red tide science (i.e., data collection methods, analysis and dissemination) and how information exchange with the public is mediated by the need to protect local economies. Communication is made more difficult by the way the public seeks out or is exposed to information, how they process it and how they make decisions. Professional communicators of red tide information must decide the best ways to disseminate information to specific target audiences while remaining responsive to additional questions the public may have (e.g., about the basic science, origins, and forecasts of red tide). Focusing on health risks and providing target audiences with tools to evaluate and mitigate personal risks is a balancing act shared by those who communicate red tide information.

*“I think helping people to understand the health impacts is probably first and foremost on their minds.”*

*“Where they can find information--that is the #1 thing I can tell them.”*

*“It is all about making the information available in terms of ...where they can expect to see it, where they can find out updates, where they can find out more information. Also, from a public health standpoint is to make sure that they understand the dangers that are associated with red tide. Not just in terms of seeing fish kills and things...”*

**B) Forecasting** - After health risks, participants shared that the second most important area of information is focused on helping the public determine what current and forecasted red tide conditions are and how these might affect their plans. The public wants to know, “What activities can I do?” “Where can I do these activities?” “Should I cancel my reservations?” These are difficult

questions and red tide communicators struggle to provide tools the public can effectively use to support their decision-making needs.

Both health- and recreation-related information were discussed in the focus groups in terms of nuance, complexities, localized versus broad geographic areas, and challenges associated with the temporal nature of red tides. One outcome of the discussions was the acknowledgement that the psychological strain on people and impacts to local economies, particularly during prolonged blooms, need to be recognized in scientific and outreach communications. Dismissing or overlooking the social impact of red tide, can offend those who are affected by it and bias the way they hear scientific messaging. For example, in one instance, statements about red tide being natural and commonplace was off-putting to those currently experiencing personal setbacks because of a bloom.

*“I would say that ... being insensitive to people's feelings and their worries and concerns is a poor communication option... It is not whether or not it is true. It is that it was terribly insensitive to what people were going through and it did not acknowledge their difficulty, ...”*

*“And so that was a big deal because the people who are out there, harvesting. They do not have a savings account to fall back on and that kind of thing. ... That is an audience that you do have to be sensitive to that economic need. Because yes entire families were having to go get food from the food pantry.”*

**C) Basic science** - A third category of information labelled the “basic science” of red tide was often discussed in the focus groups. Participating scientists, government employees and communication specialists agreed that the general public does not have a solid grasp of the science of red tide- what it is, where it comes from and how it can be affected by environmental factors. This can make use of existing communication tools difficult. One focus group participant said that every bloom requires the re-education of the public. Making the “basic science” of blooms easy to understand, accessible and useful for decision-making can improve science literacy of the public.

Inherent challenges to communicating about the basic science of red tide were also discussed. Among these difficulties are 1) Contradictions over interpretation of results from data collected using different methodologies; 2) Spatial and temporal gaps in data; and 3) Lag times between sample collection and reporting. Effective communication about the basic science of red tides needs to take these challenges into account by explaining not only successes but the challenges and limitations of the current state of red tide research and monitoring. Suggestions to address this challenge included highlighting the

scientists and agencies that serve the public during a bloom and offering the public ways to engage in their communities. Participating in beach watches, clean-ups, neighbourhood nutrient mitigation and animal rescue programs were mentioned as successful practices.

**D) Causes** - A fourth category of information shapes the public's perception of red tide- what causes it and what major anthropogenic nutrient sources make it worse. This is a contentious topic that occupies considerable time for communicators. People often want a "magic bullet" or one source to blame for their woes. Where a communicator stands on the issue of cause can sometimes weaken credibility. Some individuals and groups go so far as to actively disseminate misinformation about the cause of red tide outbreaks.

Understanding the target audience of red tide information is critical because people have different levels of knowledge and experience and are impacted in different ways. While communicators cannot realistically tailor information to every specific group, there were several categories mentioned that would benefit from targeted communication products. These groups differ in their knowledge, attitudes, and the specific ways red tide may affect them. Categories include waterfront residents; recreational and commercial fishing; shellfish aquaculture; foreign tourists; out of state visitors; recreational users (such as kayakers, scallopers), small businesses; science skeptics; environmental activists; and non-English-speaking people. While people in the various categories may access information through similar sources (e.g., red tide websites, traditional media, social media, social networks), some have a better working knowledge of the science and reporting tools. Regardless of the target audience category, prolonged blooms tend to also affect audiences further inland and result in widespread information fatigue.

## 2. What questions are most frequently asked by the public during red tide events?

Answers to this question overlapped with the previous discussion suggesting that information deemed important by practitioners is also important to the public. Emphasis was on public health and safety concerns regarding coastal recreation and seafood consumption, and concerns about wildlife impacted during a red tide bloom.

*"A lot of Northerners who come down here. Their biggest thing is whenever we post advisory or if they see a sign for red tide. They have no clue what red tide actually is. They ask what red tide is."*

*“These are some of the things that we are sharing all the time-- information about fish kills, general FAQs, that sort of thing.”*

*“...we do a lot of communicating about our sea turtle and dolphin deaths and things like that. ... People want to know what kind of numbers we are seeing, updates on the hospital patients we might have when we do recover any live ones, things like that.”*

*“Specifically, from anglers, are the fish healthy enough to eat. Are they safe to eat?”*

*“Most of the questions that we get correlate to long term health effects; most people are elderly living in high rise condominiums near the beach and they are trying to become more informed. Long-term health effects seem to be the focus of a lot of their questions.”*

*“We would get a lot of calls about should I cancel my trip? Should I still come? I had people asking if they should sell their house. I mean it was a lot of information and the ability to predict red tide in that way just does not exist. We have some tools for short term forecasting, but we do not have, should I cancel my trip in a month. Is it going to go away?”*

*“... I think that the bottom line when we hear from the public, is..., can you just tell me, is it safe or not.”*

*“The only time I really talk to them a lot is when I am speaking. I would say that, generally, people want to know what we are going to do about it. We are a government. We are responsible to do something, and they want to know what that is that we need to [do to] alleviate the issue.”*

### 3. What red tide communication successes have been made in recent years?

Participants were asked the following question, “What was the best communication-related thing that happened during the last significant bloom?” There were some surprising answers about what works and how best practices came to be developed. Primarily, the best outcomes were related to enhanced communication among stakeholders, scientists, agencies, county governments, and their offices and staff. Regular meetings were established and networking improved. Email lists were created for outreach. Consistency in posting of public signage was improved, people got engaged and active, public forums and workshops took place. Since the last significant bloom from 2017-19, agencies have expanded their partnerships, most notably with local governments, resulting in improved communication. Additionally, new tools such as FWC’s daily cell count map have been developed, and others such as the Beach Conditions Reporting System (BCRS) expanded. Many opportunities for the public to provide information to researchers was noted (e.g., fish kill hotline, BCRS), thus facilitating two-way information exchange between end-users and

the scientific community. All of these steps can be detailed and archived as a model for other regions and to make sure the established networks do not lapse between blooms, particularly important when there are personnel changes within organizations.

*“While they [red tides] were stressful and you were pulling your hair out at the time, it ended up fuelling how do we do public messaging and how do we deal with local governments. ... that was a good motivator for us to improve some of those communications and spend some time to look at how we can collaborate better.”*

*“I think the biggest thing that we saw in our region was enhanced collaboration and communication among the researchers and managers. Not so much the public communication in that respect, but just a better coordination of a response. An example is if you know about fish kills that might be showing up on beaches and better coordination of how to forecast those and respond to that.”*

*“...one of the things that came from the bloom, expanding to the east coast especially, was the development of our daily mapping tool. We get a number of questions about daily conditions. Also, having that [daily mapping tool] update daily instead of having two static reports that go out twice a week was a huge advance forward in our communications during that event.”*

*“... we have really been able to expand our beach conditions reporting system. We are bringing on a lot more beaches. During blooms, we see a huge uptick in the usage of that site, so [we are] bringing on more and more beaches. Beaches are contacting us, wanting to be on there and things like that. So, being able to expand that tool, adding some East Coast beaches, adding more and more on this coast. That has been one thing that we have been able to kind of really use a lot. It was a good positive just to see that tool was so utilized in 2018.”*

#### 4. What are the major challenges to red tide communication?

Some of the challenges to red tide communication have been mentioned previously: it is complicated and hard to understand, nuanced, geographically dispersed, and hard to predict. It is challenging for communicators to compile and interpret information and present to the diverse public in different ways that are understandable and useful. Perhaps the greatest challenge is mitigating the negative impacts from the fallout of a severe or prolonged bloom.

Communicators must be careful not to overreact because there is a lot at stake among local communities.

Another challenge to crafting and communicating red tide messages is the influence of the agency and the administrators who must approve or shape these messages. Participants spoke about their limitations as far as what they

could say, getting timely approval from their superiors and having to be careful about messaging and presentation depending on the agency. Some non-profits can dialogue more directly with the public, but this statement was more common: *“We can share the science with the public, but we are not allowed to pump out information- we send it to someone else (within the agency).”* Internal approval processes can significantly delay timely information from being released and focus group participants mentioned that delays in timely information can result in the expansion of misinformation.

*“To back that up, we run into a similar thing with messaging. The layers we have to go through. That is what I was talking about earlier, so many people have to see it. There are so many branding guidelines and so many messaging guidelines. To where you worry about losing the pertinent information .... Or trying to fit things in trying to meet a certain message are you then losing the importance of that message, are you losing the science side of it?”*

*“... So, it is not just direct communications to the public. It is also thinking about how we interface with organizations like media organizations that have a much bigger reach than a lot of us do. Our email list is only like 2500 people, but if you get something on the TV, there is going to be a lot more people hearing it. And something we heard from media organizations and [local tourism bureau] was that it could be difficult. Sometimes it is difficult to get in touch with the right people at an organization at the right period of time. So basically, making sure that you are able to respond more quickly to those inquiries, because if they do not get an answer from you, they are going to someone else. And that is one way that I think some of the misinformation spread during the last red tide bloom, was that other organizations were just quicker to pick up the phone.”*

Despite improvements in communication and collaboration amongst the scientific community, the public is still confused over who is responsible for what aspects of a red tide. This is complicated by the fact that information is distributed across many different places. It was noted by many local partners that they spend considerable time assisting their clientele in finding and interpreting information. Additionally, local partners outside of County government (Aquatic Preserves, NERRs, NEPs, and Extension agents) are generally not looped into any formal communication process. And it was generally agreed that *“We are not reaching non-English speakers and it is a problem, especially when it hits these counties.”*

*“...the existing sites are wonderful for scientists and technical audiences but not non-technical audiences .... They just get overwhelmed immediately and they are calling us and saying, what does this mean? You know, and we do not have the time to answer every call and look up each person's beach or waterway and give*

*them the rundown, especially because the information is in different places. I cannot just click on one site and find it all.”*

*“I really like what Participant #22 was saying about having a communication strategy. Having an ongoing relationship and ongoing communication so that there is a feedback loop. One between the scientists, practitioners, and those outlets; the right people. I think that is helpful. I am in community health. I work with a lot of underserved communities' and vulnerable populations. There needs to be that same feedback loop in terms of having folks from social services, schools, all the other public service agencies. Obviously, health departments and healthy start and others. Those providers that are more connected to populations. That may have questions about 'what does this mean?' or 'what is their own risk assessment?' I think having that information out to the media is one way, but another is through those community partners. These can help people make sense of or understand the information. Then make decisions about what to do about it. So that might be business owners too.”*

The communication challenge of trying to distil technical information into meaningful bite-sized messages the public can understand and act upon was suggested numerous times. Many respondents felt the current information available is too hard to find and interpret. It was noted that more pictorial communication products are needed, such as infographics, which could also help fill language barriers for non-English speakers.

*“... I think what we do as an [X] program is usually direct people to the experts and the different sources of information and really depending on the level of the audience, you know, some of these information sources are overwhelming and probably over their heads. So, there is a true need in terms of distilling the information down into practical, shareable snippets the general public would find more useful.”*

The public's confusion over the many different HAB species that occur in Florida and beyond complicates the task of effective red tide communication, especially when it comes to communicating risk. *“There is a big Facebook group that talked about the whole beach being completely toxic and do not go in the water because of algae. They are getting a lot of different algae mixed up and we would have to explain about how 'you know some folks can go swimming when there's red tide,' but they would argue and say no, it is toxic you cannot go near the water.”* The public also do not understand the difference between the health department sampling bacteria for Healthy Beaches and sampling conducted for red tide algal blooms. Complicating this is the public's variable history with Florida red tides, and the public's confusion over the patchiness of red tide blooms.

*“Especially because last year when we had that bad bloom there was blue green and red tide at the same time and that was the biggest confusion; not knowing the difference between the two.”*

*“... a lot of people ask us about the relationship between red tide and then cyanobacteria in the Caloosahatchee River. Whether or not those are the same, or related; they were asking if red tide ate the cyanobacteria, that was the term. So, there is a little bit of a conflation of those two things as well in the south when you get closer to that area.”*

*“I would say that one of the pieces of misinformation that I think we could improve on is understanding that when the Department of Health [is] working on the Healthy Beaches program ...they look at fecal bacteria and fecal coliforms and those types of things versus red tide. I think that that can get confusing.”*

*“People have variable experience with red tide. You will talk to an old fisherman who will be like oh yes, no the 1975 bloom was the worst, this is nothing. Then I would get phone calls after that say, oh my gosh, you got to do something. It is worse. It is horrible. Hideous. I would ask how long you have lived here. Well, two years. So, you are coming at it, and that that is what made it a struggle for me is to try and communicate to an audience that has a variable history with red tide.”*

*“And people think that because Florida has red tide, we must have red tide up here. It is that nuance, that understanding, that just because there might be some little amount of red tide found somewhere. They just think the entire state is like covered in red tide or something like that. So, it goes back to that nuance of not understanding of how widespread or narrow it can be spread and the amounts as well.”*

Participants discussed how misconceptions held by the public complicate red tide communication. Many misconceptions were notably based on geographically distinct local events that members of the public hold responsible for red tide events.

*“Does anybody want to talk about Piney Point.”*

*“I would say because we have had some wastewater overflows, we had really bad reclaimed water overflows for a long time, that the public here, those who are aware of it, think is the reason we had such a strong red tide. Whether or not that is true. I do not know, but that is a common misunderstanding.”*

*“There were a few groups that sought to fill that communication void with a lot of anti-phosphate mining information. And obviously, that is like you said, difficult to combat because there is an issue with nutrient pollution, but there is a lot of nuance to that...”*

*“I am going to sort of also say that one of the things they are most distrusting is when I tell them that red tide starts offshore and not with water releases from Lake Okeechobee and how the nutrients feed them. They just do not believe me; a red tide only comes when there's water releases. That is all we ever hear.”*

*“So here in Sarasota Bay there was a lot of people talking about nutrient runoff from agriculture and the truth is we do not really have any agriculture in our watershed. But they were hearing a lot about it from the Charlotte Harbor watershed where there are a lot more farms in the Caloosahatchee River watershed, for example.”*

Over the course of persistent blooms, questions and sentiment from the public tend to change. Most notably, as blooms progress, segments of the public become more knowledgeable and informed and the questions become more complex, often focusing on nutrient relationships. Also, as blooms progress, there is a heightened awareness of health risks and concern over various operational aspects, such as who is responsible for cleaning up dead fish.

Public sentiment may change from general awareness to anger and frustration, or a desire to do something helpful. Although it was noted that red tide basics and risk communication are always needed and most frequently communicated, it was not clear how these more complex questions are being addressed. However, participants felt that misinformation and conspiracy theories can expand when there is a lack of timely, science-based answers.

*“The most common questions that we get are. Where is it? How bad is it? What do I do with these dead fish? That is when it is happening. Then after it happens, it is more like anger. What can we do to keep this from happening again? I think that is the part that is hardest for a lot of us to answer. How to tell people what to do to help the problem. A lot of people want to help, but we do not know what to tell them to do.”*

*“I think my questions change from the sort of like where it is? Where can I find the most current information? And then fish kills that then followed, how do I report them? Who is going to clean up? Can I clean them up myself? Then there is the whole DOH sort of thing at the same time. Is this going to make me sick? Can my dogs be on the beach? Play in the Seafoam? To then like sort of all the Manatees and whale sharks and things like that would show up on the beach. And who is responding. Where do we put these carcasses? Can anybody touch these carcasses? These are the questions we kind of kept bubbling. Then as it's kind of went further along. It was a lot of economic questions like, is there are going to be relief for us? Are we going to get some kind of funding to keep our businesses afloat? Small business loans and things like that. And then it turned into well what are we doing to improve this?”*

*“Initially people want to know where it is and what is being affected as you get deeper into it the level of knowledge goes up. So, their questions get a little deeper and more complex. And sometimes a little more difficult to address. And there is always. Oh, well, why are not you are doing more how do you deal with those type of questions like, you should be researching this, and you are not, and you should be looking at this, and you are not. And that gets back to the preconceived notions and all the crazy conspiracy theories that in these bigger blooms later in the bloom you do start having to deal with that. Actually, I think the 2018 bloom the social media fed the complexity of dealing with that bloom. Right, I looked on a couple of Facebook pages and some of the stuff going around was absolutely unbelievable. But can you address, stuff like that, or even should you address the whole social media response to it. And that is, that's sort of what I am struggling to deal with now is, you know do scientists play a role, and having to deal with what is out there on social media or should I just back off and you know not put a target on my front. That definitely played a role in all the misinformation out there.”*

Several respondents felt that the public views uncertainty as scientists not trying to find answers. This is likely confounded by perceived government mistrust; a topic that came up throughout the focus groups. A general distrust in government or with science that does not align with a commonly held view, complicates effective red tide communication, and is a challenge that practitioners must regularly contend with.

*“...people are pretty skeptical that red tide and algae in general are naturally occurring and not always bad.”*

*“We often get questions that are; ‘what will blank and insert your favorite environmental phenomena or otherwise do to red tide.’ Some of those questions we can certainly answer, but some of the answers are we really do not know, it can go either way. So, I think having a better understanding that when we do not know it is not because we are not trying to figure that out or we have not researched it. It is that you know a number of different scenarios are possible.”*

*“We are a very rural area. Some of the fishers do not trust what the state is telling them or what the officials are telling them. They lump all agencies kind of together; federal, state and that kind of thing. There is also just kind of a lack of trust and in some cases a self-reliance. I am going to do what I am going to do; if the fish looks fine to me then truly it is fine to eat.”*

*“As a government, we have a challenge that some other people may not, some people in this group. But there is a kind of a heightened fervor of disliking government. It has been like that for several years. ... If you are using an authoritative government voice, it may be received well by some and not by others. To get to the others who do not receive it, you might want to have the person speaking like a charter boat captain or somebody they can relate to. Someone [they*

*are] a little less suspicious of because there's paranoia. People just do not trust anything. So, some kind of reputable person may be able to communicate in a way that a government spokesperson cannot to that segment of the population."*

## 5. How does information flow between the scientific community and the public?

Participants use many different modes to communicate with the public. In some cases, there are formal processes – weekly calls, working groups, etc. These typically involved state agencies (DOH, FWC) and local government offices. Other participants mentioned listservs and ongoing relationships with the public.

*"I work closely with my [X] experts. I also get feedback from the counties because they are literally front lines of what is going on. What are they experiencing other than, you know, beaches covered in dead fish? During that last major one, I hosted weekly calls with the counties. We have weekly phone calls with experts, just for red tide coordination all year anyway. I also get feedback from citizens who are commenting through Facebook sharing information, and phone calls or hotline, things like that."*

*"Email is a huge way for us to get the word out, you know, all of our list serves. We get the emails from the servers that we're on then we forward it. I do a lot of forwarding when there is a red tide going on. I have a standard email response that I send to just the general stakeholder questions that I might get independently. This has all the links and all the different places to find information."*

*"We also work a lot with our local tourism development councils (TDCs). Local counties that you know they have a large social media presence. A lot of tourists, a lot of restaurants work through those. A lot of real estate companies work through those. So just sort of echoing what everybody else has said, in terms of getting information out to the restaurants, to the public, to different avenues, to the counties, to the aquaculture industry, to the tourism industry. Just getting in touch with the right people that then have the connections to push the information further. Having those relationships. Knowing the right people to send the info to that then have the tools to push it further and to the additional correct people."*

## 6. What opportunities exist for improving red tide communication?

With the influx of new residents and visitors to Florida, education for basic information remains a priority. Because the public tends not to have the technical expertise or bandwidth to consume large amounts of technical information, there is a need for short, concise and picture-heavy communication products such as infographics.

*“... I think what we do as an [X] program is usually direct people to the experts and the different sources of information and really depending on the level of the audience, you know, some of these information sources are overwhelming and probably over their heads. So, there is a true need in terms of distilling the information down into practical shareable snippets the general public would find more useful.”*

*“I agree... 100% keep it simple. Find a way that it makes sense to multiple audiences. Different languages that are interpreted the same way. Make sure that if it is an infographic that different cultures interpret it the same way. You do not want to offend people. Make sure that you have gotten a direction of action as a result of that infographic, not just information.”*

Further, communication should be geared to personal experience rather than cell counts, which is less meaningful to the public. There is also an opportunity to infuse action-oriented recommendations into outreach messages related to nutrient reduction and coastal resiliency. Particularly during prolonged red tide events when there is greater public awareness and activism, having “what you can do” action-oriented messaging readily available may help fulfil the public’s desire to do something positive.

*“I would say that if there is a way to take the science and make it digestible with direct behavioural recommendations for people, then it is taking it that one step further. So, if it is a do nothing, then it is a do nothing. If it is, consider because you may be impacted by it, then those are the kinds of things that need to be directed to the end user so that they can make sense of what the data is.”*

*“So it is, what is it, how is it relevant to me personally. What are the conditions that would alter my experience? Is it going to in this case negatively impact how I proceed, whether it is sitting on the beach or fishing or you know, taking a stroll at night, boating, any of the things that may impact me in some capacity? And what I need to do to respond to that.”*

*“...beyond that is the solutions that would prevent these occurrences from impacting our, our short term economic and environmental conditions is something that as an Environmental Agency, I would love to see as part of the messaging. So, when we do have these events again, you know, sure here are things you could do immediately. You could recreate in in these alternative areas, but in the long term for these events happening again, here are other actions that you could do and be part of the solution and making our communities more sustainable in the future. So that sort of messaging. I would love to see as an outcome of it...”*

There is also a need to get ahead of the public’s more complex questions which tend to result in misinformation when left unanswered. Topics such as what is known about the role of nutrients, nutrient sources, multiple bloom

species/interactions, along with areas of uncertainty and how scientists are trying to answer should be collated into public friendly answers so that timely responses are made.

*“As a few people have already said there was a little bit of a vacuum of messaging. As we saw at the beginning of the last big event. So, having anything prepared at all is already going to be an improvement. It was a lot of scrambling to keep up. Or there was just a lot of silence from agencies. Because it has to go through all the approvals before they can put anything out there. That is damaging. People think that they are hiding something. They think that they do not believe them. .... It does not feel like they are validating these people's experiences. So, if sometimes the agencies are going to take longer, but if local governments or other groups has any piece, we can adapt a little bit more easily to fill that messaging void, sometimes better than the larger groups or local governments. If they almost make it part of their emergency management plans to have messaging and forms of communication, ready to go. Just like they do with anything else, with a hurricane or anything. That will be really helpful going forward. Treating it in that sense. So, I am sure people could get more into like what the messaging should be. But I think having it at all is going to be much more helpful for people because they are going to be looking for answers.”*

*“Our last red tide bloom was really intense. ...And I would say the phenomenon that occurred, that might be a value to you was Charlotte County put on a workshop. The public came. In fact, I went to it. There were lots of people, maybe 600-700 people there. And people were angry. There was a lot of angry people and a lot of different settings. That went on for a long time. ...And finally, we put together a workshop, a public workshop. And after that, I think the public was a little less upset with the whole situation. And I think, so what I would say is that communicating proactively helped a lot. Being quiet or reserved was a poor communication option. Because in a vacuum it was a lot of anger. A lot of really half-baked ideas. All kinds of people came out of the woodwork with all kinds of answers. And they had the stage. And so, I would say proactively telling the truth is a better strategy and it took us forever to do it, but it did get better after that.”*

From our participants, we heard they often find communicating and getting their message across difficult, particularly when speaking with the media or when speaking about areas of uncertainty.

*“...This is something I have tried to hone for many years, and I still have difficulties, is just effective communication of science. Especially the most recent science. The public, I do a lot of outreach talks, and as long as I can get a dialogue going, we are fine. But with the media it is always challenging, because it depends on the experience of the media person. What questions are asked. Is it as simple as, what is it, and how do we kill it? Versus. All right, we have a red tide bloom this year.*

*What is the Loop Current doing? What releases are they doing out the Caloosahatchee? There is a variable level of sophistication in terms of the questions. The other side is sometimes the environmental groups who are pushing you know their particular causes. Occasionally, it is another scientist who wants to argue. It is just there is a lot of different messaging going out there. Sometimes, especially with regards to the science, that can make it difficult..."*

Participants generally agreed that treating a red tide bloom as a natural disaster could help improve communication, although any determination needed to balance economic consequences with bloom risks. Many respondents indicated their organization did activate an emergency response during the 2017-19 bloom.

*"You know, we look at it like hurricane data. People were unfamiliar with the cone of uncertainty and now it is part of the vernacular. So, you know, giving people contextual cues, so that they can interpret the data and then they understand how that may be personally relevant that is going to be really important ..."*

*"I think part of a natural disaster is in how you respond to it. And another part of a natural disaster is in how you prepare for it. So that if we are looking at red tide, persistent long-lasting red tide blooms, as natural disasters, then maybe you do start to treat them more like flood events or hurricanes or something like that. And acknowledge that there are things that humans can do to change the trajectory..."*

*"And I think part of that is if somebody is in the driver's seat it is comforting to people. Kind of working off what I said before. Silence gets filled and if you are actively speaking and filling that silence with factual information... If you tell the truth and you are understanding of people's trials, it works much better. And it gets into a lot of things, like picking up the fish, which is a real concern. People do not like it. And it costs a lot. But if you do, it makes the situation better. So, there is value in using the already existing incident command system everybody has, to address it when it is persistent, not just a little bloom that comes goes."*

## Overarching Themes

Of the nearly five hours of conversations had in the three focus groups convened, six central themes arose. Table 2 shows the relationship between the central themes and major research questions.

*Table 2. Overarching themes across focus groups*

<b>Overarching Themes</b>	<b>Aligns with Major Research Question</b>
1) Strengthen communication networks	1, 3, 4, 5, 6
2) Provide behavioral recommendations	4, 6
3) Message simple to complex	1, 2, 4, 6
4) Access to information	4, 6
5) Timeliness	4, 6
6) Communication for the practitioner	4, 6

## Discussion

The study findings reported here highlight the complex and dynamic challenges associated with communication during red tide events. Six overarching themes summarizing a range of positive and negative communication experiences are discussed. While we recognize many communication successes were made during the last significant red tide bloom, there are opportunities to build on these successes. In all three focus groups, respondents offered a range of recommendations that cluster within the six themes.

- 1) Strengthen communications networks.
  - a. Those regions with more experience in long term red tide blooms had developed partnerships through regular meetings, communications plans, shared educational materials and personal connections with others in the same field. We can learn from their experience and create standardized trainings to prepare other communities for better HAB communication. Treating red tide blooms as natural disasters triggers emergency response networks and helps target resources, personnel and messages more effectively. It is also important to tell the public what steps are being taken to show active response.
  - b. Take steps to create, facilitate and strengthen collaborations among the partners.
  - c. Identify all relevant practitioners of red tide information, their roles, and connections to public.
  - d. Develop similar communications feedback loops (as with state agency and local government) with social services, schools, and other public service agencies to better reach underserved communities and vulnerable populations.

- e. Continue to use, and expand use of, public input platforms (fish kill hotline, BCRS, marine mammal stranding, etc.) as outreach mechanisms.
  - f. Identify trusted members of this community who can help by sharing science-based messages.
- 2) Provide behavioural recommendations
- a. Develop risk messages based on the types of activities people engage in (going outside, going to the beach, fishing, swimming, etc.).
  - b. Evaluate the benefits of treating red tide blooms as natural disasters.
  - c. Develop action-oriented recommendations to increase resiliency.
- 3) Message simple to complex
- a. Simplify basics. Consider picture-heavy infographics. Prioritize risk, highlight bloom patchiness.
  - b. Develop messaging/talking points that address frequently asked complex questions and common misconceptions related to bloom cause and effect.
  - c. Develop messaging/talking points that address the uncertainty surrounding long-term exposure effects.
  - d. Develop resiliency messaging based on things the public cares about (fish and wildlife, seagrass habitats, etc.).
  - e. Develop messaging/talking points related to uncertainty.
- 4) Streamline access to information
- a. Make it easier for the public to find the information they need (one stop shopping).
  - b. Repackage messages based on recommendations of public perception surveys and focus groups.
- 5) Timeliness
- a. Develop proactive strategies to deal with agency communication review delays.
  - b. Evaluate use of Apps and/or push notifications based on location.
  - c. Encourage continuation and expansion of local government organized summits.
- 6) Communication for the practitioner
- a. Provide training on effective communication for practitioners (How to get key points across).
  - b. Highlight/personalize the work of Red tide practitioners.

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