Final Report

Developing a Communications Plan for Red Tides in Florida

Lisa S. Krimsky
Elizabeth A. Staugler
Chris Simoniello
Nancy Montes
Paul Monaghan
Forest Hecker

August 2021

SGR-148

UF UNIVERSITY of FLORIDA

Sea Grant Florida

GCOOS GULF OF MEXICO COASTAL OCEAN OBSERVING SYSTEM

For More Information

Contact Lisa Krimsky at lkrimsky@ufl.edu

Suggested Citation

Krimsky, L. S., Staugler, E. A., Simoniello, C., Montes, N., Monaghan, P. & Hecker, F. (2021). Development of a red tide communications plan for Florida: Final report. Gainesville, Fla.: Florida Sea Grant College Program. SGR-148.

About the Authors

Lisa Krimsky, Ph.D. – Water Resources Regional Specialized Agent, University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) Extension and Florida Sea Grant

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

Nancy Montes, Ph.D. – Postdoctoral Associate, Florida Sea Grant

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

Forest Hecker – OPS Technician, Florida Sea Grant

Acknowledgements

This research report was developed through funding from the Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute.

Valuable input for the study was provided by Science Advisory Committee (SAC) members Dr. Larry Brand, Dr. Dail Laughinghouse, Dr. Eric Milbrandt, Dr. Mike Parson and Dr. Cilia Villac, and Communications Advisory Committee (CAC) members Dr. Hannah Brown, Becca Burton, Kristen Kusek, Dr. Jamie Loizzo, Dr. Matthew McCarthy and Dr. Tracy Sempier. The advisory committee Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis is available in Appendix I.

We would like to recognize the assistance provided by interns and volunteers. We especially thank the many individuals who donated their time to complete and return surveys and/or participate in a focus group. It is our intention that this work will provide information that benefits the public as they seek information and decision-making tools during future *Karenia brevis* red tide blooms in Florida.

Acronyms and Abbreviations

ABS – Address-based Sampling

BCRS – Beach Conditions Reporting System

BMAA – β-Methylamino-l-alanine, a neurotoxin produced by cyanobacteria

CDC – Center for Disease Control

COVID-19 – Acute respiratory illness caused by coronavirus, identified in 2019

DOH – Department of Health

DOI – Digital Object Identifier

ECOHAB – Ecology and Oceanography of Harmful Algal Blooms

ECS – Event Command Structure

ESRI – Environmental Systems Research Institute

FAQ – Frequently Asked Questions

FB – Facebook

FDACS – Florida Department of Agriculture and Consumer Services

FDEP – Florida Department of Environmental Protection

FDOH – Florida Department of Health

FSG – Florida Sea Grant

FSRC – Florida Research Survey Center

FWC – Florida Fish and Wildlife Conservation Commission

FWRI – Fish and Wildlife Research Institute

GCOOS – Gulf of Mexico Coastal Ocean Observing System

GED – General Education Diploma

GIS – Geographic Information System

GOMX HAB-OFS – Gulf of Mexico, Harmful Algal Bloom, Operational Forecast System

HAB – Harmful Algal Bloom

HABscope – A respiratory forecast

IRB – Institutional Review Board

Mote – Mote Marine Laboratory

MSG – Marketing Systems Group

NEP – National Estuary Program

NERR – National Estuarine Research Reserve

NGO – Non-Governmental Organization

NOAA – National Oceanographic and Atmospheric Administration

NSP – Neurologic Shellfish Poisoning

PIO – Public Information Officer

PR – Public Relations

PSA – Public Service Announcement

QR – Quick Response code (a type of barcode that links to a website)

SBA – Small Business Administration

SHA – Shellfish Harvesting Area

SMS – Short Message Service

Snowbird – Colloquialism for a Florida winter resident

START – Solutions to Avoid Red Tide

TDC – Tourist Development Council

URL – Uniform Resource Locator (the address of a webpage)

USPS – United States Postal Service

Table of Contents

List of Figures

Purpose

In Florida, red tide blooms of the dinoflagellate, *Karenia brevis,* have been identified as a primary concern for many lawmakers, commercial interests, and residents. Red tides in Florida occur on a near-annual basis along the southwest coast. While most prevalent in southwest Florida, red tide events can extend northwest to the Florida Panhandle and beyond, and less frequently, along the southeast Atlantic coast. Red tide blooms are naturally occurring events and have been reported in the Gulf of Mexico since the 1840s. However, there are assertions that red tide blooms in Florida are increasing in severity, frequency, and duration, a trend that is a concern for Florida's economic, social, and environmental health. *Karenia brevis* produces a suite of neurotoxic brevetoxins. In humans, these toxins can cause acute respiratory irritation and neurotoxic shellfish poisoning, the former is associated with the inhalation of aerosolized toxins and the latter with the consumption of contaminated shellfish. Red tide can also result in serious wildlife consequences including fish kills and other marine animal mortality events. Consequently, severe red tide events have been linked to adverse direct and indirect effects on local economies.

Following a 16-month bloom beginning in November 2017 and ending in February 2019, the state's Harmful Algal Bloom (HAB) Task Force was re-established through Executive Order 19-12. The HAB Task Force's initial recommendations prioritized the need for a long-term strategy to improve communication and education about red tide to ensure "public safety, transparency, and accountability".[1] This communication plan is a response to the HAB Task Force's priority recommendation.

The goal of this communication plan is to advance red tide communications by aligning practitioner needs with end-user wants. We achieve this by developing a better social science understanding of preferred red tide information, formats, and sources, as well as aligning the flow and timing of that information.

Process

The plan is based on findings from extensive research that was developed and implemented in consultation with the project's Science and Communication Advisory Committees. The research was driven by four primary objectives:

Objective 1: *Compile a review of current local, regional and statewide red tide communication and outreach products*.

This objective resulted in an annotated bibliography that compiled 38 primary and nine intermediate sources of red tide communications literature.

---

[1] Florida Harmful Algal Bloom Task Force. (2020). *Consensus Document #1: Initial recommendations regarding red tide (Karenia brevis) blooms*. https://myfwc.com/media/22769/habtf-consensus-1.pdf

Objective 2: *Evaluate the public's perception of value and usability of existing red tide communication resources*.

Three separate usability surveys were conducted to evaluate the Florida Fish and Wildlife Conservation Commission's Florida Wildlife Research Institute's (FWC-FWRI) red tide website, Mote Marine Laboratory's Beach Conditions Reporting System (BCRS), and the Florida Department of Environmental Protection's (FDEP) algal bloom status dashboard. Surveys were completed by 40, 45, and 56 individuals, respectively.

Objective 3: *Evaluate red tide information needs and wants, assess how demographics influence how red tide information is received and why certain delivery modes are preferred*.

Three major activities were undertaken to achieve this objective: 1) Seven focus groups (59 people total) were conducted with members of the natural resources, public health, tourism, traditional media, small business, and hospitality communities to assess their red tide communication needs and priorities; 2) A two-tiered survey was completed by a total of 919 Florida residents to assess their awareness and perceived understanding of Florida red tide; and 3) Four focus groups were conducted with a total of 26 Florida residents to identify their thoughts and feelings about current red tide communication and provide input on ways to improve red tide messaging and modes of communication.

Objective 4: *Develop a communication strategy for Florida red tides comprising short-term event responses and guidance towards a long-term educational campaign, with both approaches using multilingual and multimodal outreach materials*.

This report compiles the major findings from each of these previous objectives. This report, combined with the supporting documents detailing results from each component, (annotated bibliography, usability studies, focus groups and public survey instrument) constitute the communication plan.

Anticipated benefits of implementing this plan

This communication plan for red tides in Florida will promote:

- A strategic approach to communications that utilizes local resources and networks and is targeted at specific audiences.
- Adoption of best practices that have recently been developed for specific audiences.
- Clear, credible, coordinated, and consistent messaging regarding *Karenia brevis* blooms in Florida.
- Appropriate communication methods to ensure equitable access by diverse target audiences.
- Products and messages that are discoverable, usable, understandable, and meet the needs of practitioners and end-users.

This communication plan for red tides in Florida will advance:

- Communications networks among a variety of stakeholder groups in order to be efficient and responsive to the needs of many different audiences.
- Public awareness and understanding of *Karenia brevis* impacts.
- Informed behaviors and decisions to mitigate *Karenia brevis* public health risks while protecting our economic and environmental health.
- Trust and confidence in Florida's *Karenia brevis* monitoring and management.

Preamble

For millions of Florida's residents, workers, and visitors, red tide can be very personal. Severe events can disrupt stakeholders' lives, impacting work, home, health, community, and environment. An effective communication plan needs to acknowledge the human dimensions component to natural resources and public health management. Successful implementation of this plan, to the utmost extent possible, will need to:

- Balance accuracy with empathy – communicate science-based facts with compassion.
- Balance information with empowerment – provide the resources and tools to allow individuals and communities to make informed decisions, take protective measures for themselves and the environment, and be part of the solution.
- Be comprehensive and place-specific – acknowledge the statewide response while providing individuals the information to address what they can do, where, and when.

Framework

Rationale: The central goals of risk and disaster communication are to control and mitigate harm during an event.[2] Risk communication identifies public health risks and environmental hazards and promotes messages that encourage behavior change through self-efficacy actions.[3,4] For red tides in Florida, the primary concern is to protect public health without amplifying secondary (i.e., economic and social) risks.[5] Compared to other disasters such as hurricanes that have a narrow temporal component, the high uncertainty regarding duration of a red tide event poses unique communication challenges. However, regardless of duration differences from bloom to bloom, the stages of the communication process should remain consistent. The red tide communication cycle, presented in Figure 1, is adapted from the model presented by

[2] Reynolds, B., & Seeger, M.W. (2005). Crisis and emergency risk communication as an integrative model. *Journal of Health Communication Research*, 10(1), 43-55.

[3] Veil, S.R., Reynolds, B., Sellnow, T.L., & Seeger, M.W. (2008). Crisis & emergency risk communication as a theoretical framework for research and practice. *Health Promotion Practice*, 9(4), 26S-e34S.

[4] Coombs, T.W. (2015). What equivocality teaches us about crisis communication. *Journal of Contingencies and Crisis Management,* 23(3), 125-128.

[5] Kasperson, R.E., Renn, O. Slovic, P. Brown, H.S., Emel, J., Goble, R., Kasperson, J.X., & Ratick, S. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis*, 8(2), 177-187.

the NOAA Social Science Committee and the Crisis and Emergency Risk Communication model.[2,6]

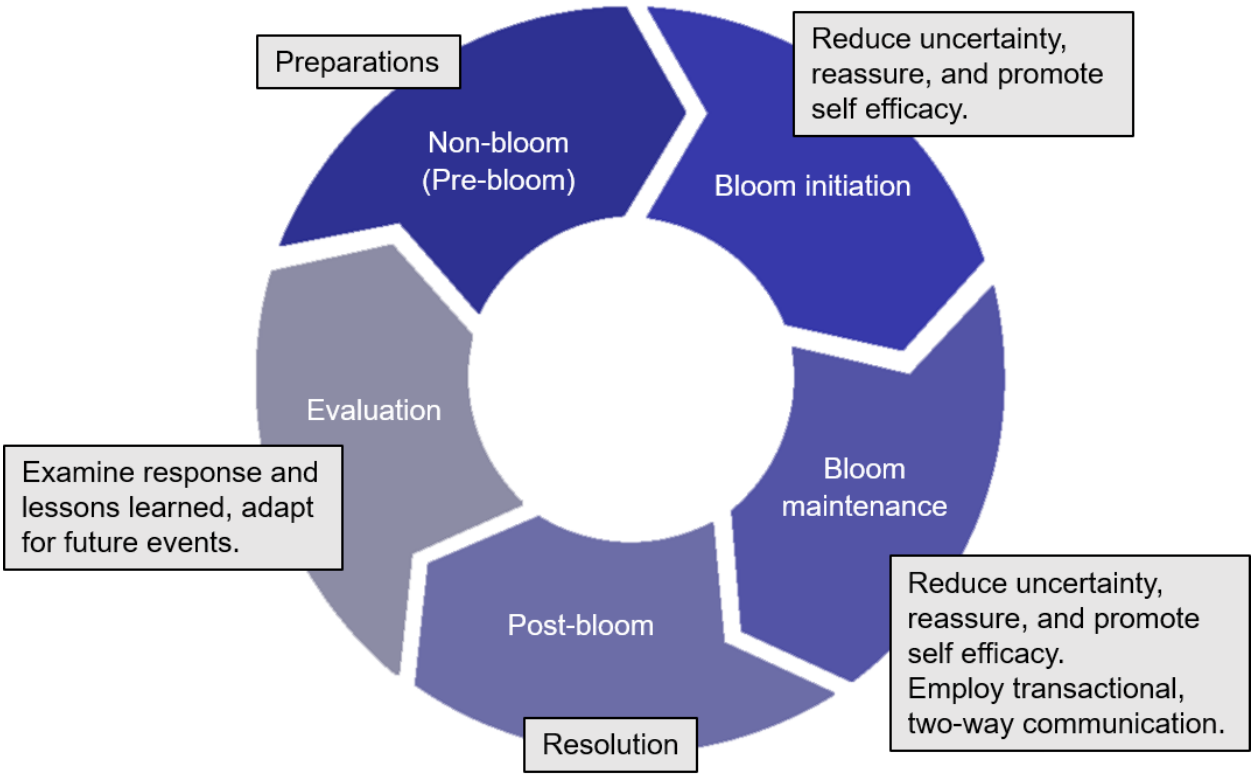

Figure 1. Red tide communication cycle adapted from the NOAA Social Science Committee and Crisis & Emergency Risk Communication models.

Non-bloom (Pre-bloom conditions)

Target audiences

- Scientists, managers and communicators from federal and state agencies and their red tide research partners (e.g., Mote Marine Laboratory and red tide research scientists)
- Local governments' programs and staff, state and community institutions and organizations (e.g., National Estuary Programs, local non-profit organizations, Florida Sea Grant, etc.)
- Tourism and visitor convention bureaus
- Traditional media

[6] Brown, V., Fauver, S., Geppi, D., Haynes, A., Kockow, K. & Nagele, D. (2016). Risk communication and behavior: Best practices and research findings. https://www.performance.noaa.gov/wp-content/uploads/Risk-Communication-and-Behavior-Best-Practices-and-Research-Findings-July-2016.pdf

Key theme

- The state of Florida is proactively addressing red tides through a robust research, management, and communication process.

Actions

- Institutionalize red tide event command structure (ECS) for sharing content across government agencies and partners to ensure structured, consistent and cooperative inter-agency coordination related to timing and content of messages (SGR-144).
    - Define points of contact (POC) by position to address employee turnover challenges.
    - Designate responsibilities.
    - Establish regularly scheduled meetings.
    - Develop a centralized database for red tide communication resources.
- Co-brand red tide education templates and resources (SGR-144, 147).
    - Use a variety of formats (e.g., textual, numerical, graphical, audio, and visual).
    - Products and procedures need to be vetted and approved by relevant organization(s). Materials should be readily available, reproduceable, and sharable, including an organized, accessible content archive (e.g., YouTube, Flickr, internal database).
    - Prioritize and develop new communication channels (e.g., web, app, social media, and signage.
- Develop a strategy to build stronger relationships with the traditional media (SGR-145, 147).
- Collaborate with agency and non-agency partners on resource development and professional training (SGR-144, 147).
    - Work with partners (e.g., tourism, small business, traditional media) to develop and distribute communication resources.
        - Develop and share engaging red tide research highlights ensuring consistency but recognizing unique organizational needs.
    - Co-develop and implement with red tide professionals (e.g., FWC, DOH, Sea Grant, GCOOS, Mote Marine Lab, academia) training workshops for practitioners (e.g., scientists, managers, public health officials) to build community capacity to better understand and communicate about red tide.
- Promote proactive environmental behavior targeting “What you can do” messages for nutrient mitigation. Aim for consistent messages that also consider region-specific needs (SGR-144).

Bloom initiation

Target audiences

- Scientists, managers and communicators from federal and state agencies and their red tide research partners

- Local governments' programs and staff, state and community institutions and organizations
- Tourism and visitor convention bureaus
- Traditional media
- Hospitality industries
- Resource-dependent small businesses
- Recreational shellfish harvesters
- Florida residents and visitors

Key theme

- The state of Florida, in collaboration with partners, provides efficient access to red tide information, supporting individuals' abilities to make informed personal decisions.

Actions

- Educate people about the science of red tide—including the organism responsible for Florida red tide and bloom dynamics. Communicate information about the unknown aspects of red tide and uncertainties associated with forecasting duration and impacts (SGR-144,147).
    - Utilize clear, concise messaging.
    - Disseminate through a variety of formats.
    - Share materials with partners for wider dissemination.
- Promote self-efficacy actions to reduce public health risks (SGR-144, 145, 146, 147).
    - Actions should be audience- and activity-specific.
- Broadly disseminate consumer-friendly, location-specific red tide-related environmental data.
    - Promote the use of existing red tide respiratory forecasting and beach conditions reporting tools by making them accessible from the FWC red tide website.
- Share with the public, official and grassroots mitigation actions being taken during a red tide event.
    - Communicate red tide response efforts using a variety of formats (e.g., textual, numerical, and graphical) and modes.

Bloom maintenance

Target audiences

- Scientists, managers and communicators from federal and state agencies and their red tide research partners
- Local governments' programs and staff, state and community institutions and organizations
- Tourism and visitor convention bureaus
- Traditional media
- Hospitality industries

- Resource-dependent small businesses
- Recreational shellfish harvesters
- Florida residents and visitors

Key theme

- The state of Florida, in collaboration with partners, prioritizes action-oriented messaging, communicating what is being done to mitigate red tides and what individuals can do to help.

Actions

- Promote self-efficacy actions to reduce public health risks (SGR-144, 145, 147).
    - Actions should be audience- and activity-specific.
    - Encourage engagement and use of the various public input platforms (e.g., volunteer water testing, FWC Fish Kill hotline).
- Broadly disseminate consumer-friendly, location-specific red tide-related environmental data (SGR-145, 146, 147).
    - Promote the use of existing red tide respiratory forecasting and beach conditions reporting tools by integrating them into the FWC red tide website.
- Share with the public, official and grassroots mitigation actions being taken during a red tide event (SGR-144, 145).
    - Communicate red tide response efforts using a variety of formats (e.g., textual, numerical, and graphical) and modes.
    - Personalize response efforts.
        - Showcase the laboratory and field work of local scientists.
        - Utilize local spokespersons to discuss mitigation efforts (e.g., commercial fishers participating in marine life cleanup, volunteers collecting water samples, Beach Conditions Reporting System and GCOOS HABscope sentinels, etc.).
        - Highlight stories that help small businesses.
    - Communicate information about the unknown aspects of red tide and uncertainties associated with forecasting duration and impacts is important.
- Coordinate weekly press briefings with the traditional media to ensure the exchange of accurate and timely information (SGR-144, 145, 147).
        - Press briefings should include multi-agency representatives including scientists, communicators, and managers.
        - Briefings should encourage two-way dialogue.
- Monitor social media and utilize a rumor control page to debunk persistent bloom-specific misinformation.

Post-bloom

Target audiences

- Scientists, managers and communicators from federal and state agencies and their red tide research partners
- Local governments' programs and staff, state and community institutions and organizations
- Tourism and visitor convention bureaus
- Traditional media
- Hospitality industries
- Resource-dependent small businesses
- Recreational shellfish harvesters
- Florida residents and visitors

Key theme

- Significant advancement in Florida's red tide response effort was made due to the strength of successful partnerships.

Actions

- Establish and/or participate in local community forums (SGR-144, 145).
    - Coordinate with local partners to discuss lessons learned and adapt ECS based on feedback.
    - Incorporate local experiences and knowledge into future communication trainings.
    - Encourage local government and community forums to discuss successes, lessons learned, and identify opportunities for future bloom events.
- Distribute to target audiences messaging focused on red tide research and mitigation, including uncertainties and actions being taken to resolve these uncertainties.

Evaluation

- Six months after implementation of this plan, Florida state agencies (FWC, DOH, and DEP) will:
    - Verify the creation of an agreed-upon ECS.
    - Reach consensus for content and have developed a centralized database for internal red tide-related communications.
- One year after implementation state agencies will:
    - Verify the creation and location/access point of co-developed and/or co-branded educational materials, resources, and messages.
    - Work with partners to develop a professional development training for best practices in red tide communication targeting scientists and other professionals engaged in red tide research and response, to be held in 2022 or 2023 and every two to three years thereafter.
    - Prioritize new communication channels for red tide information.

    - Conduct a survey of partners to determine use and perceived effectiveness of red tide communication materials.
- At one-year intervals, the state agencies will:
    - Re-evaluate the ECS and adapt as needed.
    - Reassess the process for two-way communication with the traditional media and adapt if necessary.
    - Report on the use of public input platforms and social media indicators.
- At three- to five-year intervals, the state will:
    - Review red tide educational materials, resources, and messages and update them to reflect the current state of the science concerning red tides.

Sources and flow of information

Rationale: The National Research Council describes risk communication as "an interactive process of exchange of information and opinion among individuals, groups, and institutions".[7] The collaborative development and dissemination of scientifically accurate, clear, and timely messages is critical to the communication process. Information must come from various trusted, relevant sources including experts and members of the local community.[8,9] Two-way communication with the traditional media and public is also essential for developing trust, relationships, and combating misinformation. The media remains the most effective source to increase awareness and knowledge to the widest possible audience,[9,10] whereas interpersonal communication remains the most effective means for changing attitudes and behavior.[11,12] Red tide self-efficacy and risk communication messages need to be audience specific to be effective. Figure 2 describes the flow of information for red tides in Florida as identified in project research. Due to research constraints, not all stakeholder groups were recognized during this project (e.g., commercial fishers and harvesters). While not all stakeholders are included in the flow of information it is important that they not be overlooked.

---

[7] National Research Council (1989). *Improving risk communications.* National Academy Press.

[8] Mileti, D., Nathe, S., Gori, P., Greene, M. & Lemersal, E. (2004). *Public hazards communication and education: The state of the art.* National Hazards Center.

[9] Veil, S.R., Buehner, T. & Palenchar, M.J. (2011). A work-in-process literature review: Incorporating social media in risk and crisis communication. *Journal of Contingencies and Crisis Management*, 19(2), 110-122.

[10] Ritchie, B. W., Dorrell, H., Miller, D. & Miller, G. A. (2004). Crisis communication and recovery for the tourism industry. *Journal of Travel & Tourism Marketing*, 15(3), 199-216.

[11] Freimuth, V., Linnan, H. W. & Potter, P. (2000). Communicating the threat of emerging infections to the public. *Emerging Infectious Diseases*, 6(4), 337-347.

[12] McComas, K. (2006). Defining moments in risk communication research: 1996-2005. *Journal of Health Communication*, 11, 75-91.

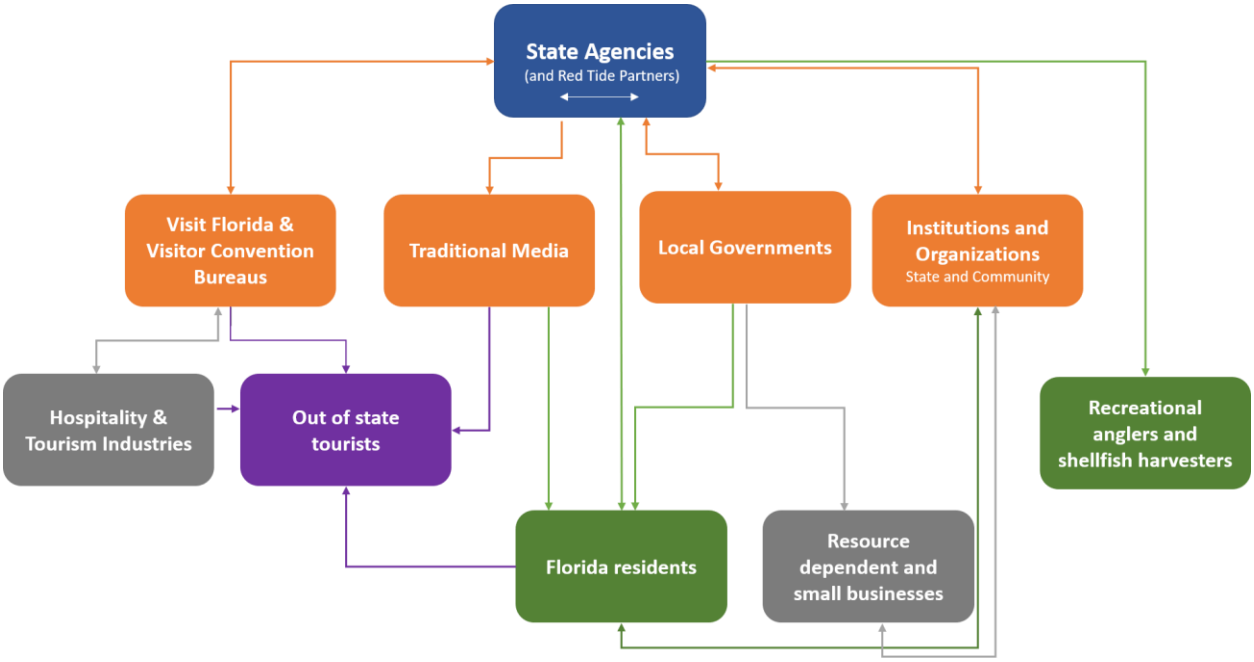

Figure 2. Sources and direction of information transmission for red tide in Florida.

Target audiences

- Scientists, managers and communicators from federal and state agencies and their red tide research partners
- Local governments' programs and staff, state and community institutions and organizations
- Tourism and visitor convention bureaus
- Traditional media
- Hospitality industries
- Resource-dependent small businesses
- Recreational shellfish harvesters
- Florida residents and visitors

Key themes

- The state of Florida collaborates with a variety of external partners to meet the needs of Florida's businesses, residents, and visitors.
- Community organizations, institutions, and trusted spokespersons can share agency-developed content, further extending risk-based messaging to audiences not typically reached.

Actions

- Build relationships that grow an informed, collaborative communication network (SGR-144, 145).
    - Identify new collaborators within federal, state and local governments, tourism and visitor convention bureaus, and community and non-profit organizations.

    - Identify relevant practitioners of red tide information, their roles, and connections to the public. Incorporate a two-way communication process into the red tide communications schema with these partners. This may include a POC listserv, establishing scheduled meetings during bloom events, and promoting new and existing communication resources.
    - Expand the communication network to include feedback loops with social services, schools, and other public service agencies to better reach underserved communities and vulnerable populations.
- Invite diverse disseminators of information from institutions and agencies not typically engaged to join public media calls to allow for greater transfer of information and expand reach to new audiences (SGR-144).
- Develop relationships and formalize a process for working with the traditional media (SGR-144, 145, 147).
- Identify trusted members of the community who can help share science-based messages (SGR-144, 145).
    - Include research scientists, recreational and commercial anglers, shellfish harvesters, public health officials, and other prominent local residents.
- Improve communication between recreational shellfish harvesters – especially non-English speaking harvesters (SGR-140, 146).
    - Develop FDOH signage to provide guidance on shellfish and finfish harvesting and cleaning for public boat ramps and fishing piers (See Figures 3 & 4).
- Continue to use and expand the use of public input platforms (e.g., Fish Kill hotline, BCRS, marine mammal stranding) as outreach mechanisms and to facilitate two-way communication (SGR-144).
    - Showcase community engagement successes in communication messages.
    - Utilize social media as a way to receive information from the community.

Evaluation

- Six months after implementation of this plan, the state agencies will:
    - Verify the integration of new and existing partners into red tide communication process.
- One year after implementation state agencies will:
    - Assess the number and contributions of new community partners and spokespersons.
    - Verify the implementation of new, multi-lingual communication channels for recreational shellfish harvesters.
- At one-year intervals, the state agencies will:
    - With partners, reassess the process for two-way communication and adapt if necessary.
    - Report on the use of public input platforms and social media indicators.

- Conduct a media analysis (e.g., TrendKite) to determine the effectiveness of agency red tide briefings and gauge agencies' coverage in print and broadcast media.

Content

Rationale: Effective risk communication is dependent on clear, honest, timely, and understandable instructions.[8] If any of these factors are missing, credibility may be undermined. During disasters, messages are often complicated by either scientific nuances or delayed due to existing communication structures. To be successful, messages should be crafted and delivered by communicators who "have a seat at the [management] table"[13] and messages should be customized for specific audiences, focusing on self-efficacy, personal impact, and potential risk. [4,14]

Target audiences

- Scientists, managers and communicators from federal and state agencies and their red tide research partners
- Local governments' programs and staff, state and community institutions and organizations
- Tourism and visitor convention bureaus
- Traditional media
- Hospitality industries
- Resource-dependent small businesses
- Recreational shellfish harvesters
- Florida residents and visitors

Key themes

- Individuals can participate in protective measures that will help reduce their personal public health risk.
- The location and intensity of red tide bloom impacts is influenced by the weather and tides. Bloom conditions can change rapidly and from location to location. Resources exist to help individuals plan their activities.
- Florida's coordinated and timely messaging will reduce unnecessary impacts on local economies.

Actions

- A communicator should be hired to coordinate all agency-related red tide communications.

---

[13] Fairbanks, J., Plowman, K. D. & Rawlins, B. L. (2007). Transparency in government communication. *Journal of Public Affairs*, (7), 23-37.

[14] Sellnow, D. D., Lane, D., Littlefield, R. S., Sellnow, T. L., Wilson, B., Beauchamp, K. & Venette, S. (2015). A receiver-based approach to effective instructional crisis communication. *Journal of Contingencies and Crisis Management,* 23(3), 149-158.

    - The communicator should be part of both the communications and research team to enable accurate conveyance of science-based information in ways that lay audiences will understand.
    - This position will balance the economies of scale for human and financial resources in state agencies through centralization of red tide communication efforts.
- The ECS should include mechanisms for streamlining lengthy internal communication reviews during the bloom maintenance communication stage (SGR-144).
    - Critical information that is needed regardless of individual bloom dynamics should be vetted and made readily available during non-bloom conditions to expedite timely dissemination.
- Communications need to balance public health messages with information that minimizes economic harm (SGR-145).
- Procedures should exist for facilitating the publics' removal of fish kills without the need for an emergency order declaration (SGR-144).
- Self-efficacy recommendations should be made based on specific activities.
    - Recommendations should be co-developed and/or co-branded across agencies for consistency of messages (SGR-146, 147).
- All images should be location-, date-, and time-stamped before dissemination (SGR-145).
    - Non-proprietary images should be included in a content archive for sharing (e.g., Flickr) and easily referenced.
- Red tide current condition and forecast products should be as localized as real-time or near real-time data allow (i.e., beach-specific information is ideal) (SGR-145, 146).
    - Date- and time-stamped videos and images showing current beach conditions should be disseminated to provide visuals of location-specific conditions.
- Local monitoring efforts should be ramped up during red tide events (SGR-145, 146).
    - Site-specific locations should be added to public input platforms and forecasts.
    - Partnerships with the hospitality industry could be developed to train employees to collect site-specific data.
- Products need to be developed that simplify the basics of tide bloom dynamics (SGR-145, 147).
    - Daily red tide messages should explain bloom patchiness and encourage individuals to check forecasting and beach conditions reports frequently.
- Develop multi-lingual messaging and talking points (SGR-144, 145).
    - Address frequently asked questions and common misconceptions related to bloom cause and effect.

    - Focus resiliency messages on areas that the public cares about like fish, wildlife, and seagrass habitats.
    - Communicate information about uncertainty in our understanding of red tide.
- Ensure red tide communication plan elements are part of a dynamic process to keep pace with questions people are asking in the moment, while still providing content about questions that are always going to be asked (SGR-145).

Evaluation

- Six months after implementation of this plan, the state agencies will:
    - Submit approval for a communicator position focused on coordinating red tide messages across agencies.
    - Verify creation of the red tide ECS and ensure it includes mechanisms for accelerated review of messages and fish kill clean-up procedures.
- One year after implementation state agencies will:
    - Verify the creation of co-developed and/or co-branded educational materials, resources, and messages.
    - Work with partners to develop a professional development training for best practices in red tide communication targeting scientists and other professionals engaged in red tide research and response, to be held in 2022 or 2023 and every two to three years thereafter.
- At one-year intervals, the state agencies will:
    - Report on the use of public input platforms and social media indicators.
- At three- to five-year intervals, the state will:
    - Review red tide educational materials, resources, and messages and update them to reflect the current state of the science concerning red tides.

Format

Rationale: As stated by Freimuth *et al.* (2000) “Even the best-crafted message is useless if it fails to reach the intended audience.”[11] The channels by which a message is delivered and disseminated is an essential component of the risk communication plan. As with messages, distribution formats should be tailored to the intended audience. Thus, there is no one-size fits all approach. Formats should be accessible to non-English speaking residents and visitors. Regardless of audience, the information should be easily accessible and the process should not discourage those looking for it.[8]

Target audiences

- Scientists, managers and communicators from federal and state agencies and their red tide research partners
- Local governments’ programs and staff, state and community institutions and organizations
- Tourism and visitor convention bureaus
- Traditional media

- Hospitality industries
- Resource-dependent small businesses
- Recreational shellfish harvesters
- Florida residents and visitors

Key themes

- The state of Florida is supportive in providing information about red tides to businesses, residents, and tourists.
- The state's collaborations and partnerships provide efficient access to red tide information, supporting individuals' abilities to make informed personal decisions.

Actions

- Make red tide information needed to inform personal decisions easily discoverable (SGR-141, 142, 143, 144, 145, 146).
    - Minimize the difficulty in finding information by centralizing content. The central location should be hosted by FWC as project survey results showed it to be the most important and trusted source for red tide information.
        - Information should be available in multiple languages.
- Reformat existing resources so that they meet the needs of the state's multiple audiences (SGR-141, 142, 143, 144, 145, 146).
    - Resources such as websites should start simple, prioritize information, and provide options for more in-depth information for those seeking it.
- Consolidate access to data products (SGR-141, 142, 143, 144, 146).
    - FWC should serve appropriate now-cast and forecast products on their website. Data should be available in near real-time and should not require navigating to an external source.
- Evaluate the use of new technologies to distribute red tide cell count and respiratory information (SGR-146, 147).
    - Information should be location specific.
    - Explore using SMS text messaging, mobile applications (apps), or push notifications.
    - Consider integrating information into existing, frequently used weather and tide apps (e.g., the air quality index).
- Develop new mechanisms to reach recreational anglers and shellfish harvesters (SGR-140, 146, 147).
    - Prioritize mechanisms to better communicate about risks and area closures.
    - Maps and closure information should be simplified and disseminated in an opt-out SMS text messaging or email notification system to individuals with a recreational fishing license.
    - Shellfish harvest and consumption signage should be posted at marinas and public access areas (See Figure 3).

- Beach signage should encourage self-efficacy actions and utilize images that are understandable by non-English speaking individuals (SGR-146) (See Figure 4).
- Create a multi-agency rumor control website to debunk bloom specific misinformation.
- Develop a strategy to build stronger relationships with the traditional media (SGR-144, 145, 147).
- Continue or expand the use of Facebook and Instagram to reach diverse audiences (SGR-147).

Evaluation

- Six months after implementation of this plan, the state agencies will:
  - Prioritize new channels for red tide communication including web, app, social media, and signage.
- One year after implementation state agencies will:
  - Conduct usability surveys or beta-testing with target audiences to pilot new channels for communication before launching.
  - Verify the implementation of new, multi-lingual communication channels for recreational shellfish harvesters.
- At three- to five-year intervals, the state will:
  - Review red tide communication channels and update to reflect the current state of technology.

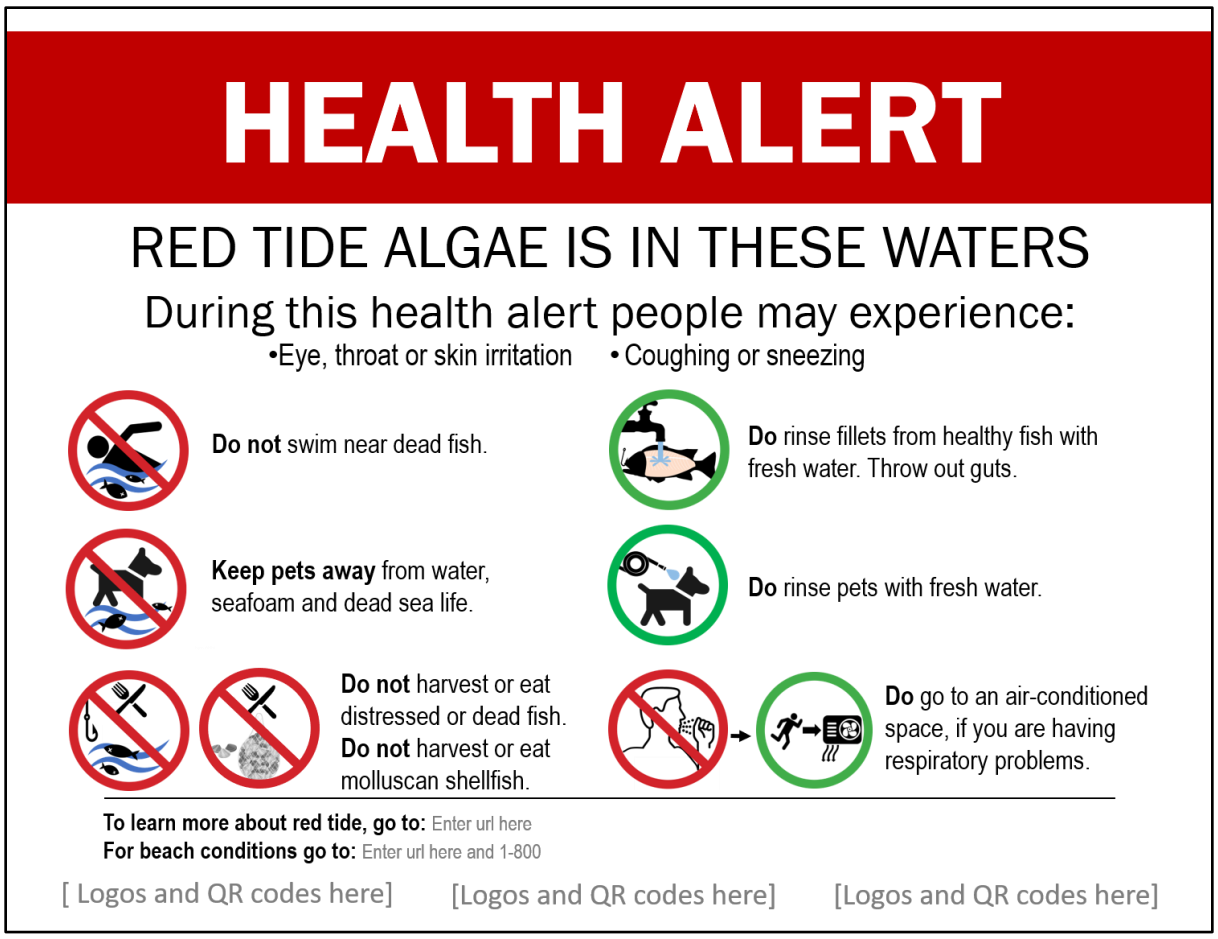

Figure 3. Exemplificative beach signage
Refer to Appendix II and III for more information.

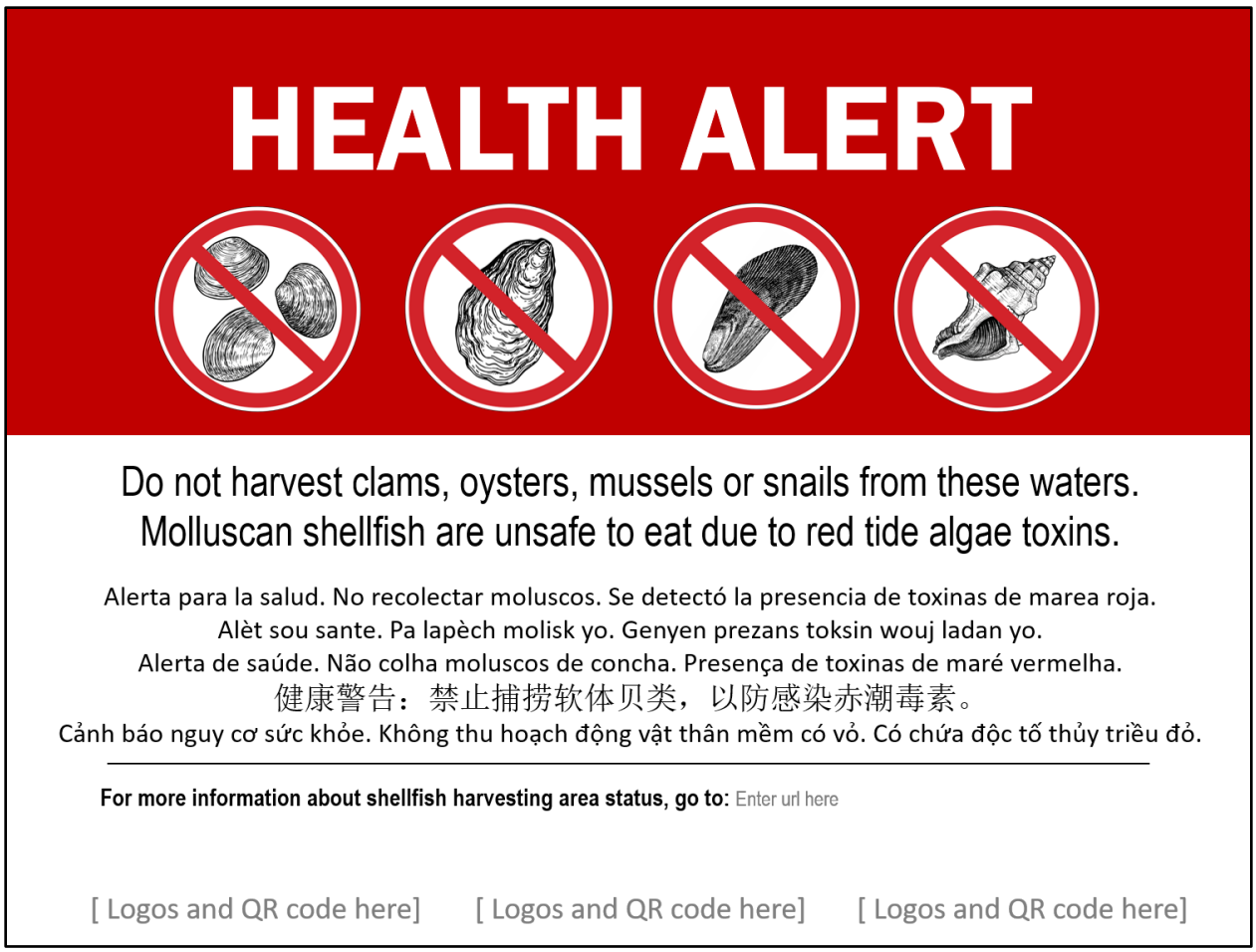

Figure 4. Exemplificative shellfish harvesting signage
Refer to Appendix II for more information.