



Technology Advisory Council Public Meeting

November 12th, 2024 9:00am-11:00am EST

To Join Zoom:

<https://us06web.zoom.us/j/85812286859?pwd=zcxKdQ5GVTRoF0allg1lqnKWtdWmcP.1>

This meeting is open to the public.

1. Welcome
2. Technical Checks and Council Role Call
3. Agenda Overview
4. Review of previous Technology Advisory Council meetings
5. Initiative Reporting
6. Initiative Research Progress
7. Promising Tools and Technologies
 - a. Aspen Cook- "Beach Conditions Reporting System"
 - b. Dana Wetzel- "Natural Compound Control and Mitigation for Red Tide Blooms"
 - c. Steve McKenzie- "Innovative Use of Advance Oxidation, Nanobubble-Cavitation for Rapid Deployment"
 - d. David Spiers- "Non-toxic Biodegradable Formulation for Mitigation of Red Tide Cells and Toxins"
 - e. Jessica Frost- "Efficacy of Lake Guard Oxy Against *Karenia brevis* Development"
8. Looking Ahead
9. Public Comments

Florida Red Tide Mitigation and Technology Development Initiative
Technology Advisory Council Public Webinar – November 12th, 2024 9:00 am-11:00 am EST

In Attendance: Dr. Michael P. Crosby, Dr. James Powell, Dr. Katherine Hubbard, Dr. Kathleen Rein, David Whiting, Kevin Claridge, Lizabeth Longstreet, & see additional Attendee List included at the end of these meeting minutes.

Presenters: Kevin Claridge, Aspen Cook, Dr. Dana Wetzel, Steve McKenzie, David Spiers, Dr. Jessica Frost

Meeting Minutes:

Welcome, Webinar Meeting Logistics, & Agenda Overview

- Kevin Claridge reviewed the Agenda for this meeting
- Role Call- All members present
- Welcome remarks by Dr. Crosby

Red Tide Initiative Overview and TAC Requirements

- Initiative in Year 6 of funding
- Mote is looking at all the steps involved with producing a mitigation product, including lab research, regulatory steps, intellectual property, deployment, community engagement, etc
- TAC role and requirements in statute- to provide recommendations to Mote on the Initiative
- Florida Sunshine Law
- Florida Administrative Register notice
- Meeting Minutes
- Tiered testing- Tier 1 (literature review and lab research), tier 2 (mesocosm, raceways), tier 3 (nearshore pilot testing), tier 4 (commercialization)
- Red Tide Initiative Facility
- Regulatory Agencies and Permitting of mitigation products
- Accomplishments and Priorities Report
- Partners
- List of current projects ready for Tier 3 (field) testing
- Looking Ahead

US Harmful Algal Bloom Control Technologies Incubator

- Partnership between NOAA, Mote and University of Maryland that stemmed from the Red Tide Initiative to look at mitigation strategies for freshwater and marine HABs.
- Stimulating the HAB science community discussion
- Kickoff in 2023, two RFPs funded to date
- Potential leveraging for the Initiative to introduce more partners, new ideas, etc
- HABs including *Karenia*, *Microcystis*, *Alexandrium*, *Pyrodinium* and *Pseudo-nitzschia*
- List of 2024 funded projects
- 2025 Tentative Timeline for 3rd RFP focused on cyst beds
- “Clearinghouse” development to organize regulatory steps for mitigation

TAC Comments

- Kate- Thinking about EPA methods, is there consideration for single vs multi-lab validation for mitigation products in the lab and the field? To make sure multiple labs can use the same methods to see if they get the same results?
- Kevin- A few of the presenters will go into the research and testing they needed to do but maybe we can get into this more during the pre-workshop meeting.
- Kate- The challenge I see is with everyone using the same culture and facility, so having another lab duplicate these tests would be interesting to see.
- Dave W.- On the freshwater side, we used two different rounds of interlab variability studies for microcystin analysis, to see where differences arise, and these methods could be used in a similar way for the marine/brevetoxin samples
- Kevin- Asked Dave for SOP
- Dave- Posted in chat (Attached below)

Aspen Cook- Beach Conditions Reporting System

- The BCRS is a web-based reporting tool to protect public health and enhance beachgoer experience
- Has grown exponentially since 2006, now with 92 locations in 9 states
- BCRS extends to millions of users, with variability in users for events like tourist season and red tide blooms
- There are Android and IOS apps, but currently under development with updates
- Data sharing partners include state and local governments
- BCRS continually being improved for user friendliness and beach conditions

TAC Comments on BCRS

- Kathleen- What are the red tide indicators on the BCRS? I only see respiratory irritation. Also, where is the link to FWC/FWRI red tide status?
- Aspen- On the reports, the red tide indicators are dead fish, respiratory irritation, water discoloration and wind direction. When looking at all factors together, you can determine there might be a red tide present. And for the Red Tide Status link, at the top of the BCRS website under the resources tab, there is a link to the FWC Red Tide website
- Kathleen- This resource should be advertised more to the public, how do you get the word out? This would be great to have at the airport for tourists
- Aspen- We've talked about having billboards, but currently we use word of mouth and social media posts, as well as our partners advertise for us.
- Kathleen- A sign at the airport would be great.
- Kate- Do you have a targeted expansion plan for sites?
- Aspen- A little bit, we do have a list of locations that we target, but sometimes we have citizens contact us and say they want a certain beach on the BCRS and that will lead to new locations and volunteers
- Kate- As you expand, its helpful to highlight how the BCRS ties into red tide, so maybe think about packaging the red tide information a little differently on the website.
- Aspen- The new message updates can do this to tie in the FWC red tide status website
- Kate- Are you envisioning BCRS will look the same across all locations?
- Aspen- We are looking at making reporting customizable per region

Dana Wetzel- Natural Compound Control and Mitigation for Red Tide

- Assessed different natural compounds in phases/tiers
- Looked at 40 different candidates on red tide, narrowed down to 6 then 2
- Tested the algicidal activity, stability, toxin degradation, dissolution, dispersion, and depth dynamics to see how well it works in different situations
- Tested on mysid shrimp, killifish, grass shrimp with no mortality
- Researched and tested different deployment methods, including liquid, particles, and alginate beads
- Named the product Clear, and was registered with the State of Florida
- Conducted field trial in July 2024 using an ROV, next steps are to optimize application scenarios
- Also tested on *Microcystis aeruginosa* with promising results

TAC Comments on Clear

- Kathleen- Do you have a pure compound and do you know the structure? Can it be synthesized or do you isolate it from a plant?
- Dana- Yes I do, and it can be synthesized . We are purchasing the bulk ingredients and making it at Mote.
- Kathleen- Is the structure proprietary?
- Dana- Yes
- Kathleen- It looks like you are monitoring algaecide absorbance (215nm)? I would suggest since you know the structure to find a new method to detect, because there are so many things that monitor at that wavelength
- Kevin- We can set up a separate meeting to dig in to the technical report at another time
- Kate- There was no mortality during the studies you mention, did that include *Karenia brevis* and the treatment? Did *Karenia brevis* cause mortality?
- Dana- Yes, and no *Karenia* did not cause mortality
- Kate- Have you considered looking at wildlife impacts due to the alginate beads? It might be good to look into feeding styles.
- Dana- the particles would dissolve over an hour, the alginate beads would take a little longer, but they are already being used in the environment for other purposes
- Kate- Can you do additional analysis on the particles
- Dana- We have data on the particles that I took out of the talk that might answer some of the questions
- Kevin- Maybe we can dive into this deeper at the workshop or over email but we have to move on

Steve McKenzie- Innovative Use of Advance Oxidation, Nanobubble-Cavitation

- Technology has been used for 15 years in agricultural and energy sectors
- A mobile water treatment unit that can turn waste into drinking water
- Uses four different technologies, but have found that all four are not necessary for red tide mitigation which reduces cost of production and maintenance of equipment
- Initially tested on natural red tide bloom in Sarasota and proved successful
- Acquired equipment certification for the State of Florida and NPDES permit for field testing in South Florida, hoping to get State-wide permit.
- Need to address permitting requirements as a community
- Field trial planned in Sarasota for early December 2024
- Working on plans for deployment methods in nearshore vs offshore waters

TAC Comments for Ozonix

- Kate- Have you thought about how this might interact with marine mammals when applied in the field?
- Steve- No, it needs to be examined.
- Buddy- I have the same question in terms of acoustics- when you deploy this, is it loud?
- Steve- Its not louder than a boat motor. If we use the cavitation only, its very minimal noise.
- Buddy- Its worth looking at, manatees are very sensitive and Id like to talk about this more.

David Spiers- Non-toxic Biodegradable Formulation Xtreme

- Xtreme has been used in energy and agricultural sectors
- Non-toxic environmentally friendly product made of Quillaja
- Completed tiers 1 and 2, and field trial planned for November
- Exempt from EPA registration because ingredients are on the 25B list
- Registered with the State of Florida and exempt from State permits
- Reduced red tide cells by 100% in the lab by 4 hours
- Tested on clams and showed that Xtreme reduced toxin in clam tissue
- Xtreme is ready to be deployed with secure supply chain and licensed applicators
- Deployment options include crop dusters, barges, spray boats for small and large areas

TAC Comments for Xtreme

- Kathleen- Were the impacts to clams based on mortality or were there other physiological factors looked at?
- David- Xtreme was probably ingested by the clams, and its been known to reverse toxin with lots of data/testing to back it up, so happy to share that information
- Rich- Filter feeders eat the red tide, so its hard to tell if they accumulate the dispersed toxins, would need a shellfish expert to know whether Xtreme is preventing shellfish from taking up the toxin or if its working internally
- David- I want to thank the DEP for helping us get the permits needed for field trials
- Kate- Is there a targeted set of organisms that are tested in each of these projects or does it come down to the methods
- Kevin- There's some differences but mostly the same, comes down to how the product works or settles out on the bottom. We are happy to go back into the lab to test additional animals and potential impacts.
- David- We also tested Xtreme on EPA approved freshwater organisms and will do additional tests with saltwater organisms

- Kate- When you start to look at the different types of dispersal approaches that might help dictate what types of animals need to be tested.
- Rich- Right now we are following the EPA protocols

Jessica Frost- Efficacy of Lake Guard Oxy Against *Karenia brevis*

- Lake Guard Oxy is a hydrogen peroxide based product
- Primarily sodium percarbonate that when mixed with water produces hydrogen peroxide and considered environmentally friendly
- Lake guard Oxy is used around the world in freshwater environments
- Scalable, with application rate of 18 tons
- EPA approved and registered with the State of Florida
- Coated to release product over time
- Completed tiers 1 and 2, with successful reduction of cells and toxins
- Tested on clams and urchins with no mortalities, as well as toxicity tests on water flea, honeybees and quail

TAC Comments for Lake Guard Oxy

- Kate- Salt accelerates the degradation of hydrogen peroxide, have you tested your product against different salinities?
- Jessica- We have not but we will definitely look into that prior to testing in the field. But we have determined that water mixing/movement is the determining factor on how the product dissolves.
- Kate- Are you observing dissolved or particulate forms of toxins even after the cells appear to be gone? What are the toxins associated with?
- Rich- The extraction methods take whatever toxins are there, we cant distinguish whether they are internal or external
- Kate- are you using exponentially growing cells in these tests?
- Jessica- Yes, that was requested
- Rich- The control usually continues to grow once in the mesocosms, but it isn't always a perfect scenario as the culture has limits.
- Kevin- In terms of regulatory steps, it looks like FDACs has given you the thumbs up, and we just had a call with DEP to get the permit/exemption to apply in saltwater.
- Jessica- Yes, I sent all the information to DEP to determine what permits are necessary. I also wanted to give an update on product- we have 60 tons of product available for use.

Public Comments

- No public comment

Closing Comments

- Kevin- We have the workshop coming up in January 30-31 so hoe you can join for that
- Next TAC meeting will be Spring 2025
- Meeting Adjourned

Chat messages:

- Kate- Another question for Aspen - Bloom Zoom was mentioned in the attachment Liz shared but not during your presentation. Is that still under development and what stage is this project at please? What is the expectation for this potential tool by the end of the 6 year Initiative contract? Thank you!
- Aspen- BloomZoom is still under development. Please reach out to Dr. Lovko for details as he is the PI for the project.
- Dave W.- Microcystin Round Robin (interlaboratory variability studies) reports available at <https://floridadep.gov/dear/florida-dep-laboratory/content/dep-laboratory-library>

Attendee List:

Cassandra Berntsen
Kevin Claridge
Amber Bankes
Caroline.Gorga
Aspen Cook
Dave Whiting, FDEP
Celia Villac
Steve NH
Kelly Rein
Kate Hubbard
James Powell
David Spiers
Jessica Frost
Meghan Abbott
Kirby
Dana Wetzel
Rich Pierce
Steve Rowley