
Jennifer Stock:

You're listening to Ocean Currents, a podcast brought to you by NOAA's Cordell Bank National Marine Sanctuary. This show was originally broadcast on KWMR in Point Reyes Station, California. Thanks for listening!

(Music)

Welcome to another edition of Ocean Currents. I'm your host, Jennifer Stock. On this show, we talk with scientists, educators, fishermen, explorers, policymakers, ocean enthusiasts, authors, and more, all uncovering and learning about the mysterious and vital part of our planet -- the blue ocean. I bring the show to you monthly from NOAA's Cordell Bank National Marine Sanctuary, one of four national marine sanctuaries in California, all working to protect unique and biologically diverse ecosystems. Just offshore of the KWMR listening area on the West Marin Coast of the Greater Farallones and Cordell Bank National Marine Sanctuaries, which together protect 4581 square miles of rocky shorelines, sandy sea floors, rocky banks, deep sea canyons, and maritime artifacts.

Today, our focus is right outside the KWMR doors and about one mile to the west. Located 45 miles northwest of San Francisco, Tomales Bay is a 12 and a half mile long coastal estuary that lies along the rift valley of the San Andreas Fault between the Point Reyes peninsula and the California mainland. In 2002, it was recognized as a wetland of international importance under the Ramsar Convention and is included in the Golden Gate biosphere, part of the UNESCO World Network of Biosphere Reserves. The bay is stewarded by agencies such as the National Park Service, NOAA, the Greater Farallones National Marine Sanctuary, state and county parks, the Marin Resource Conservation District, the Tomales Bay Watershed Council, and stakeholders, like my guest today, Terry Sawyer of Hog Island Oyster Company, who makes a living while supporting the local economy and culture directly depending on the health of the bay.

Tomales Bay has seagrass beds, intertidal sand, mud flats, and salt and freshwater marshes. Usually, about 20,000 wintering shorebirds, seabirds, and water birds visit and feed in the bay. Fish species including salmon, eel, sturgeon, halibut, endangered Coho salmon, and the commercially important civic herring, rely on its creeks and extensive eelgrass beds to spawn. The bay also supports a resident harbor seal breeding population. In summary within this

small stretch of water and in such close proximity to a major urban populace, this bay is stunning for humans and wildlife alike.

To maintain and improve the bay, especially with a more cultural invention of the bay, the Tomales Bay Watershed Council and the Marin Resource Conservation District, combined and have been eyeing and working on projects directly supporting the health of the bay. Today, I'd like to welcome Terry Sawyer to Ocean Currents, co-owner of the certified B Corporation Hog Island Oyster Company, foundation board member to the Tomales Bay Watershed Council, and elected director to the Marin Resource Conservation District and countless other duties of service. Terry, I'm thrilled to welcome you to Ocean Currents. Welcome!

Terry Sawyer: Good morning.

Jennifer Stock: Tomales Bay-- it's such a treasure! When I'm reading all these beautiful things about it, and I think about my relationship with the bay, everybody from afar or local has a story of how they found themselves here in this watershed. Can you share your story of how you made it to Tomales Bay?

Terry Sawyer: Well, the funny thing is I had a pretty amazing job working at the Monterey Bay Aquarium as an aquarist. At the same time, I was living in Santa Cruz and getting to know some adventurous marine biologists who were getting involved in starting an oyster farm in Tomales Bay. After helping them out, getting things started over a couple of years, I was lured by my friends to join them and leave a prestigious job with lots of job security. I joined the ranks of adventurous marine biologists that are taking the risks of farming in the water and farming in general. So, that brought me here in 1988. I officially moved here.

Jennifer Stock: Wonderful! Now, how can one oyster company be a certified B Corporation? This is relatively new. Can you talk a little bit about what is a certified B Corporation?

Terry Sawyer: Sure, it's a process. That's probably the best way to describe it. We underwent an evaluation. We were looking for third party certification to understand our impacts and understand ways that we could improve on our impacts. These are impacts that go from not only on the water, in the water, on the land, how we deal with our employees, etc. We settled on this particular form of certification because it's really a way to not only take the test. It's a very long, fairly honourous test to undergo, and you have to do this on a regular basis. Also, to actually go through and be certified as a

B Corp, a benefit corporation, you have to go through a legal process.

We actually were a California Corporation prior to this, and in California, it's possible to do a benefit corporation. We took the test, we went through our shareholder vote, and we are now officially a benefit corporation, a certified B Corp. We use this as a way of not only taking this test and trying to improve on our impacts, but it's like dropping that pebble in the water and seeing the ripples go out. Everybody that we deal with, everybody that we touch, everybody that is coming in contact with us... we examine our relationships with them. What we try to do is do business with those same types of people, and probably the key part that really was a good decision for me and my partner, John Finger, was to codify these principles and write it into our bylaws. We can go riding off into the sunset someday, and we'll have a company that's going to go on with the same standards that we've started. That's a hundred-year company. We're not here just to get in and get out. We're here for the next generations.

Jennifer Stock: It's a great way to do a little self-evaluation of how you're operating and how you want to interact with the community. It's great! I think a lot of people look to companies that are thinking about other people and thinking about the community. Congratulations, and it's a wonderful thing to have here in Point Reyes.

Terry Sawyer: Thank you.

Jennifer Stock: Turning to the bay a bit, historically, the Miwok were here 2000 to 4000 years ago and fit into the landscape. Over time, the human footprint has increased on the base health. How would you characterize the health of Tomaes Bay today?

Terry Sawyer: Well, you mentioned earlier on in your introduction that we are within an hour and a half of a major metropolitan area, and it's always remarkable to me to think that we're actually able to produce food out of that. Now, at the same time, we have periods of time where we are closed during the rainy seasons period, and we can be closed due to water quality issues. Water quality issues are directly related to land use practices, and those in some cases, can close us, depending on the amount of rain that we get, for 90 days or more each year. What's the condition of the bay? I would say that when it's open, it's pretty amazing. When it's closed, water quality standards do not meet, in some cases, recreational contact standards. So that's a concern, not only for myself growing food in

the water, but it should be a concern for everybody that uses and that enjoys this bay.

Jennifer Stock:

Tell us a little bit about the water quality. I know this is a big function of the Tomales Bay Watershed Council, but why don't we drop back a little bit and talk a little bit about the history of the Tomales Bay Watershed Council. When did that form and come to be and who are those board members that are directly involved?

Terry Sawyer:

Okay, it goes back in the 90's. Basically, it was a group of collaborators, and that's a word that I'm going to use a number of times in our talk today. It's stakeholders that involve ranchers, farmers, the community people that are involved in any producer production of food in the water. All stakeholders that would be considered in this, and we can bring in recreational users as well like boaters and fishermen. The board was basically started to understand what is going on in this bay because we're terrestrial, we're looking at something... that anything below the surface is not something we're comfortable with or familiar with necessarily. It's out of sight and out of mind.

If you look at this bay, 12 and a half miles long, it's got about a 200 square mile watershed. It's a pretty significant watershed for such a small body of water. There's a lot of impacts. They may be pretty far out in a way, but when we're looking at this ridgeline and this incredible vista that we have living here, we have to turn around and look at the water or vice versa look back. It all touches the water. There's a lot of potential as far as, you know, impacts that are out there. The Watershed Council, their goal really is to understand what's going on in the watershed and to enhance an understanding of that.

It's done in a variety of different ways, and I've taken the efforts that I've been able to put into it. Being able to understand what's going on, you have to monitor, you have to test the water, and you're testing, in this case, for fecal coliform. We've done nitrites in the past as well. We've got sample stations that are located in the bay and in streams. The sampling is an important part, the monitoring is an important part, and I believe in keeping that continuity. What we're talking about is something over time to really understand these trends. The trend of the bay really is stable. It's not continuing to go down, but there are areas that have not really improved on some of our leases. That's where we're trying to focus our energy right now.

Jennifer Stock: I imagine a lot of that is looking both upstream and downstream, and that's the thing with an estuary is that they both influence this body of water in between. You're mentioning about the 225 miles. I'm thinking every nook and cranny of every creek is included in that distance, and every single thing that happens up there influences that water. What are some of the projects or focuses you've had upstream as a council to work on helping improve water quality?

Terry Sawyer: Well, I can talk about the council, and I can talk about the Marin RCD...

Jennifer Stock: Now, they seem to be very intertwined with what they do in terms of stewarding water.

Terry Sawyer: One is more of handling public monies and sources of monies, and one is really dependent on donations and NGO participation. They're both extremely important. Just as examples, stream restoration is an important part and that reflects not only on the water quality but also on the salmonids. We're trying to restore some of the salmon populations and their spawning grounds.

The land use practices have not necessarily lent itself to improving what's going on in the water, for instance, like sedimentation. These projects will involve things like sediment control, keeping intensive culture in ranching and farming out of the streams and out of those direct steep slopes that feed right into the streams, which leads to not only fecal coliform loading but also sediments. Getting funding for fencing, getting funding for getting the water away from the stream into troughs that are away are important tasks.

The marine carbon project, which has been a very amazing success story, we can talk about that in more detail. I would say that as far as the successes like what's going on in Chicken Ranch Beach like trying to understand what's going on there with the contaminated stream where our children have all played. We have to look at those kinds of things and try to find ways to obtain the money, obtain the resources, the engineering that's involved, the permit process. All of those are very important components to understanding what's going on, but making it an effective, let's say remediation control that's going to actually enhance that water quality.

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- Jennifer Stock:* After there's some restoration, such as creek restoration, bank stabilization, or rerouting of water, do they do monitoring downstream to see if it's improved?
- Terry Sawyer:* That's a requirement. Yes. Part of that is making sure that monitoring is done correctly. It has to be the apples to apples. You have to know what's really going on within a certain proximity of a certain zone from an area that may be considered as a point source or a nonpoint source. That's the other thing. Understanding all of these potential impacts are what the Watershed Council and the Resource Conservation District have been very much effective, and still need to be having communication and education.
- Jennifer Stock:* And collaboration as you were saying. (laughs)
- Terry Sawyer:* Collaboration. There it is. There's the word.
- Jennifer Stock:* For folks tuning in, this is Ocean Currents here on KWMR. I'm Jennifer Stock, and I have Terry Sawyer of Hog Island Oyster Company here. We're talking upstream right now. What are some influences on the health of Tomales Bay? One of the things that came to mind was thinking about the watershed, and I've seen some wonderful examples of this bank stabilization and fencing to help stabilize where water is running. Last year, we had a crazy year of incredible amounts of water, and these atmospheric rivers seem to be on the rise with the precipitation trends we're going to get in the future, especially in the winter. I'm sure this is a new approach towards land management as well because there's such an influx of volume on the land. Were there big changes last year in the land that really proved that we'll have to keep working more towards stabilizing land?
- Terry Sawyer:* Well, that's really a great question. I would say that we've got practices and water systems that have been established on known patterns. What you have just mentioned is we have changes that are going on. Climate change is real. We're seeing it and part of that monitoring is what we're involved with, not only as a business but these organizations that we work with. What we're seeing is like especially if there's a fire event, you'll have increased erosion, or if you've got the stream banks where the stream has these old oxbows that are going on that we have built infrastructure around that we can't, we can't move. It is an engineering challenge. It's a permit challenge. We've had a lot of projects that have gone on, but we're trying to get out there and take care of road cuts, culverts that are getting clogged to make sure they stay clear, sediment loading reduction is the goal here. As far as where some of these

multiple channels are occurring, we're understanding what salmon need as far as pools to reside in, so they get shelter protection from predators. Since temperatures are rising, we make sure they're not overheated. There's a lot of considerations, and like this past winter, there were projects actually that showed that the work that was done was effective. There were projects that showed no, there's really not a lot you can do in some situations. What do you do then? Again, it takes engineering, it takes an understanding, it takes permitting, it takes money. Oh, did we mention political will? Anyway, it takes a lot.

Jennifer Stock: Luckily, locally in Marin, we seem to have a lot of support for the land management and the bay health. Back to the water quality monitoring, with the Tomales Bay Watershed Council, is that done year-round and at specific places? Is there a way for people like myself to keep up on the health of specific locations in the bay based on the testing?

Terry Sawyer: Great questions! Somebody did their homework. There's...

Jennifer Stock: I love this bay! I use it a lot! Thrilled to have you here!

Terry Sawyer: (laughs)

There are water quality stations that are established in some cases by the California Department of Public Health, the environmental management branch, and the shellfish growers each have their own monitoring stations. Some of them coincide with what the Watershed Council stations are. It extends further into the estuary and then up into the streams. Those are year-round. During the wintertime, they try to capitalize on those episodic events that occur. Hopefully, capturing when an actual storm has occurred, you get the increased flow and the increased loading whether it's the fecal coliform or sediments. There's sampling that goes on there, and they're done at the same location. There's certain funding that has to happen with the labs that support that. Then, on the shellfish side, we actually pay for our own monitoring. We have the requirements that we have to meet, and then, we take them to a certified approved saltwater lab. That has to be approved through an FDA process.

Jennifer Stock: There's lots of monitoring, lots of testing, and constant maintenance of that. Is there a website where people can check in?

Terry Sawyer: I'm sure, on those sample results and all that. Hopefully, we have the people involved, we have the money to update the websites,

and all that. The Watershed Council has on its website links to those sample results.

Jennifer Stock: That's great!

Terry Sawyer: One of the challenges is that you have multiple entities doing sampling and making sure that they're talking is always a challenge. That's been one of my pushes is to make sure that with understanding these trends, you got to take all of it into account.

Jennifer Stock: Some of the testing you've been doing has been focused also on chemistry and the water. Hog Island Oyster Company has been working a lot and has some of the influences that have been coming from the ocean into the bay. Can you talk a little bit about some of the climate work that Hog Island Oyster Company has been doing in partnership with the Bodega Marine Lab?

Terry Sawyer: How much time do we have?

Jennifer Stock: Well, we have about nine minutes until we take a short, short break.

Terry Sawyer: I'm poking fun at this because there's an awful lot going on. So, as we all know, there are changes that are going on out there, especially anybody along the coast. There's with the upwelling that's been going on, we're seeing signals of changes in the chemistry, not only in the pH but also in oxygen levels.

A word of caution, anything that we're talking about here is people have a tendency to one put everything in a nice tidy little box. What I've been learning over time, especially with the collaboration with Dr. Tessa Hill and the Bodega Bay Marine Laboratory's work on ocean acidification monitoring and research, is that it's a complicated system. Carbon chemistry is moving, and it's a dynamic process. What we're seeing is, yes, trends. We're seeing pH changes where the waters become more acidic. That's in the ocean and the upwelling that's going on. Once it comes into the estuary, it becomes even more complicated because then you have times when there's rainfall events where the rain itself may be of a different temperature and the pH. We have the nutrient loading that goes on. You have all these chemical processes that are going on, just like a science experiment, you move one variable, it changes the entire result.

The collaboration we're doing right now is part of a system on the eastern margin of the Pacific Ocean, and that's the entire North

American coast, basically all the way up to Alaska and includes Hawai'i. We're part of a network of one of 10 instruments that are on the west coast, that are the same. Again, you have to monitor the same parameters, apples to apples. It's available online. There's a site, and we can talk about that later. Anybody can go and look at it. We're soon to be two of 11 because with the hatchery that I've been building in Humboldt Bay, we're getting a second instrument of the same kind. We're learning what's going on, and part of what we're learning too is that collaboration has to involve the private sector to support the infrastructure. You need the knowledge from academia, the public funding to help make this happen because it's not cheap, and then you have to work out the bugs including having the interaction between oyster farmers and expensive equipment. We're not easy on equipment, and you're operating in a marine environment. None of that is simple.

Jennifer Stock: Are each of these instruments co-located in estuarine areas or each of them near aquaculture?

Terry Sawyer: Some are, yes! In some cases, they're linked to wharf mounted, buoy mounted, gliders – they actually use water gliders in the water – and all of those are interacting and linked.

Jennifer Stock: To date, how has this data helped inform you, as an oyster farmer, in terms of management day to day or storm to storm or season to season?

Terry Sawyer: Right, part of it is, we're sitting here talking right now because we love the water, and we love the ocean. We're concerned. As a business, it's helping me understand what's going on with the organisms that I am farming. They actually are building a shell. They need a certain parameter or set of parameters to build that shell. If it fluctuates too much, it becomes more difficult for them to build the shell and especially at the larval and the young stages. That's where we're seeing the impacts now, so let's say at a hatchery, I can make a decision to slow down the flow of the water coming in during that event while watching when the event is happening. I can buffer the water. I can use methods to manage what waters are coming in at the time, so I can manage that impact during the time that that upwelling event that we're talking about is going on. So, that helps me there.

Jennifer Stock: That's incredible, thinking about the field of aquaculture, and it's such an incredible place right now, especially in the United States. To put thoughts in terms of careers in science, the chemistry involved and the engineering of managing water and the buffering,

I'm just thinking of careers. You've been figuring this out day to day by managing it, but I'm thinking about the next up and coming potential farmers. Hopefully, they're practicing their chemistry.
(laughs)

Terry Sawyer:

The farming is an understanding of not only the shellfish that we're talking about, but also what species we're watching the changes in these trends, where the slope of change is actually very steep. It is something that we as a planet have not experienced before. The result of manmade practices are producing all the greenhouse gases and the carbon loading that's going on in the atmosphere. Then, that becomes absorbed by the waters in the ocean. We have organisms that we're used to growing.

Well now, I have to be looking into other organisms that I can grow. Then, I have to go through the whole marketing aspect of getting people to like what that is. Then also, as an example, macro algae – using seaweed for food and for fertilizer. We can be looking at that. At the same time, that is an organism that actually helps to buffer that water.

Jennifer Stock:

Seaweed is amazing. I had the seaweed harvester, Heidi Herman, come in and talk about all the amazing health aspects of ingesting seaweed as well as on land management and practice. She definitely got me thinking about seaweed in my garden, and Bren Smith, we've had on from Greenwave talking about this new 3D farming to think about the health properties and the new marketing of seaweed for food.

With the larval stages, I know the early research has shown early stages of calcifying organisms that are struggling with acidic conditions and excessive carbon dioxide in the water. Is there a threshold once they pass that they seem to be stable, and I'm wondering if this has changed what age of larvae and seed you put out in terms of into the watershed to start growing to an adult? Did they go out a little bit older than they used to go?

Terry Sawyer:

That's the theory that we've really protected the conditions where they're having to work hard to build a shell. A lot of these marine organisms are living off of an energy budget based on the yolk of the egg that they've developed from. In that time, they're not only developing shells, they're developing their organs that are actually helping them to be viable as adults. If you can get them past that stage, yes. You can talk about bringing them out into what we call the real world and real-world conditions. We try to enhance those conditions or the animals' size and level of development before it's

put out there. At the same time, we should be looking at other organisms that may not be as vulnerable, or organisms that are actually adapted to the types of swings in pH that have gone on, especially the eastern margin of the Pacific. We've seen historically these swings with upwelling.

Jennifer Stock: Right.

Terry Sawyer: Well, these are organisms that have survived and that have adapted that. Maybe, there are clues that we can use that we can actually go in and do breeding programs and develop species that will have that ability that they didn't have before.

Jennifer Stock: We're going to take a quick break here, and come back to Ocean Currents. For those tuning in, this is Jennifer Stock talking with Terry Sawyer of Hog Island Oyster Company. We're talking about Tomales Bay. We're talking about the aquaculture of raising oysters in a changing ocean and bay environment. Stay with us! We'll be back in a minute! You're listening to KWMR.

(Music)

Jennifer Stock: We are going to come back here to talk with Terry a little bit more about what's happening with aquaculture in the bay. Terry, you are in such an interesting position, and you have this on the ground knowledge of what's going on, working with the animals, working with the staff, and keeping these operations going and figuring them out. You're also working with all the stakeholders and landowners and who's in this watershed that influenced the water. Then, you even go beyond, and you're working a lot more with educating others, the decision makers in our county, state, and our country. You're educating them basically about what's going on. Can you talk a little bit about... it's almost like there's like two Terrys! There's Terry of Tamales and then Terry out and about. Keeping up with you is pretty tough! That is pretty impressive. Talk a little bit about the work you've done to educate the decision makers about what's happening on the ocean, in the bay, and what's happening with aquaculture.

Terry Sawyer: Well, it is trying to find the energy and the time for this, but we find it as a business absolutely essential to get involved, to lead the way, to be involved with not only local organizations like we're talking about, which involved the county. We go into Sacramento, walking the hill in Sacramento as we say, and meeting with our representatives and talking about the issues. We not only discuss the issues of climate change, but also talk about if I want to even

think about trying to get anybody else involved, much less maintain our involvement. I'm trying to farm in the water. It's incredibly difficult.

What used to be where we could fill out all our permits, and we can have it done for \$500. We're talking hundreds of thousands of dollars now and years in some cases to go through the permit process. That doesn't allow any sort of growth in an industry that is producing proteins in food in the water but also the challenges of trying to replace what we're having to import into this country. At the same time, understanding our impacts and acknowledging that there are impacts and trying to improve on those.

So, we go, and we talk with Sacramento. We talk about what we need to support on the laboratory side and what we need to support on the permitting side. The California Coastal Commission state lands regional boards – all of those are all involved in managing what's going on along the coast.

At the same time, we have to go to Washington D.C. at the same time talking to the state representatives that are representatives there, and other representatives from around the United States and talk about what these challenges are, where we need the cost, where we need the help, and what agencies to support on the federal level. As constituents, we represent an industry in which I have over 220 employees. Okay, that's a lot of people that I'm responsible for that believe in the same things that I do, then you have their families, and the communities that they're involved in. So, these are roles that we get to play as a small company that we can try to get this message out.

We take this message internationally as well. And I, for instance, two years ago, went with one other grower from the West Coast and two growers from the East Coast. We went to the UK. We had a carbon footprint to go do this and talk about what we're seeing on the West Coast, what we're seeing on the East Coast, what they are seeing. And this is not something that's unique just to hear. It's a worldwide challenge and trying, especially in this political environment that we're in right now and just doing what we know. We have data that we can actually show where there is change going on that we need to get people interested, we need to get people concerned, and get them involved because there's many people like me out there doing the same thing. We need to get it out there for more people.

Jennifer Stock: You just recently had an assemblyman member visit Hog Island. What was that like?

Terry Sawyer: Yes, assemblyman Mark Stone came out, and he brought a couple of staffers. We brought him out on the bay. We got them in boots, in the wet gear, life jackets, and walked around out there on one of our leases. They were stunned. It's a different world out there. It's just what you have the herons and the plovers and all the marine organisms. We had seals, river otters, and then we were talking about the osprey flying over us. There's somewhere around here is an eagle. I looked over probably 20 yards away sitting on the mudflat, looking at us was a bald eagle. And they were just absolutely stunned. To me, putting people in touch with the water, having them get wet, get the smell, get the feel the wind on their face, and to get that experience in that environment. They take that message back, and they talk to different people. They will be making decisions in whatever committees that they're involved with or other representatives that they're involved with. And yes, that's the kind of thing that needs to happen here on a much more increased level.

Jennifer Stock: I understand that last year, Jared Huffman had a symposium or a gathering at the Bodega Marine Lab talking about ocean acidification. What was that about, and what are some outcomes from that?

Terry Sawyer: Well, the Bodega Labs has a role here, and Jared Huffman did a great job of being able to sponsor this to come in, participate, and show that California as a state government is actually interested in what's going on. People were hearing things of grave concern about these changes that were going on and to take that and give it the messaging, with not only the academic component that was going on but also the audience participation, the questions that were coming through...trying to understand some of these changes just needed to happen. This goes back to this theme. It's education. It's about getting a message back, and Jared Huffman was great because he can go to Sacramento and to Washington D.C. Those are all key players in getting this message out there for us as an industry that we're out there.

I don't want to use that canary in the coal mine, but because we're out there every day, we can assume certain things. We get used to it. But then when you bring in these conversations and have these conversations with people that are like me, that are out there and have them interact with people that are in the general public, or people that are their representatives, that's absolutely essential that

that happens. We're going to need interest, energy, voices, money in science to come up with solutions on this because I have children. They're going to be having children someday. We're going to be talking about the next generations that all of us have in front of us. This is our responsibility.

With the Bodega Labs, one of the key things that's happening with Bodega Labs, for me, is that they are absolutely essential as a local laboratory. Just like Robert Tiburon. Both are in our area that are actually with their academic prowess. They're out there, functioning in a way that's going to connect the community. You know what it's like: you're getting your car to work and come home, you go out, you might go shopping or whatever, but connecting them back to the water is really what we're talking about. Keeping that alive is what I see is having our representatives out there because we have a message along the coast that we have to happen to the constituents that are in the interior, understand what's going on.

Jennifer Stock:

Yeah, I'm working with Bodega too with the scientists. It is applied science. It's science that's applied directly to people's lives, and the economy so I think that's really a wonderful partnership. We need to wrap it up, but I just wanted to ask: do you have a sense of hope for the future? All the work that you've put in to date, all these incredible partnerships that have helped keep things alive and moving forward to adapt. How do you see the next 10 to 15 years?

Terry Sawyer:

Well, it has to happen fast. It has to happen steadily. I have hope. That's why I'm here today. That's why I go to work and work on these very challenging obstacles that we've talked about today. I have children. I have a sense of responsibility. I've mentioned this, but at the same time, it's going to take a lot of people out there in your listening community to get involved and ask questions. Look at impacts, take care of the single use plastics issues, take care of how much you're driving, carpooling, other forms of transportation, etc. I have hope. I have to. I'm a hopeful person. At the same time, I'm sure, we can curl up in a fetal position and just go, "Oh my gosh, what are we going to do?" Look at what we're living in. This is paradise. We need to take care of it.

Jennifer Stock:

Thank you, Terry. I want to add, we are so lucky too in Marin. We have a bunch of innovators and people willing to experiment. It's really easy to dive in and participate as a citizen in these solutions. Part of those solutions are communicating, and even if you're not a teacher or a scientist, you can communicate about these concerns with your friends. I always tell people, that's one of the biggest

ways we can participate in these solutions is to keep talking about it. We have to all keep talking about it, and we're so lucky here. There are so many great solutions happening in the water and up the stream up the watershed in Marin. Thank you so much for all your participation in that and for being here today on Ocean Currents.

Terry Sawyer: It's my pleasure.

Jennifer Stock: I want to add too, folks, it's amazing to think about what goes into an oyster. I was reflecting on that today. Thinking about all the work that goes into one of those delicious oysters, and Hog Island Oyster Company, definitely part of its B Corporation, is giving back. Through the sales of Hog wine, 10% of their funding goes towards things to help the community. For three years, they've been putting funds towards water quality monitoring with watershed councils. I love that there are companies that are really getting back to helping steward and take care of things. Thank you so much!

And folks, we're going to take a quick break and come back with our Positively Ocean and a couple announcements. You're listening to Ocean Currents here on KWMR.

(Music)

We're back. Every month here on Ocean Currents, I bring short segments called Positively Ocean. I have a volunteer, Liz Fox, that curates the story, and we're going to have to play this episode that we tried last month but had some technical difficulties. Talking about sea turtles, we're going to go away from the West Coast and go to the East Coast and talk about some incredible people that are helping sea turtles. Stay here, listen to Positively Ocean!

(Music)

Liz Fox: Hi, this is Positively Ocean, where we celebrate the ocean and look at what's working well. I'm Liz Fox.

When government officials greet a private airplane packed with banana boxes at a Texas tarmac, you might imagine a dramatic showdown. But when Ben Higgins did that in 2014, it was a different story. Higgins is the Sea Turtle Program Manager at the National Oceanographic and Atmospheric Administration's Galveston Laboratory. In 2014, he received a shipment of cold stunned sea turtles from Cape Cod, Massachusetts.

Ben Higgins: I'm at the local airport here in Galveston. I drove out, flooded them into our van, and brought them over here and processed them. We weigh them and measure them. Our veterinarian takes a look at them, and they usually take an X-ray to develop a course of treatment. They stay here until they're ready to be released.

Liz Fox: Cold stunning happens when water temperatures dip below 50 degrees Fahrenheit and turtle metabolism halts, leaving them floating and at the mercy of currents and winds. Cold stunned sea turtles are alive, but they're incapable of moving or eating on their own.

As rescuers innovate to improve turtle survival rate, sea turtles may fly more frequently. That's because more turtles are getting stranded on the shores of Cape Cod than ever before. This winter, about 200 volunteers have retrieved more than 400 turtles from Cape Cod's frosty seafoam. For the past 10 years, volunteers have recovered an average of 300, cold stunned sea turtles per year, up from dozens in previous years.

Scientists aren't sure if the increase is the result of successful efforts to protect nesting sites on sandy beaches in the southeast and Mexico, or the turtles are now attracted to the nutrient rich Gulf of Maine, which is warming faster than almost any other body of water on Earth. It may be a combination of the two factors, said Bob Prescott, the director of the Massachusetts Audubon's Wellfleet Bay Wildlife Sanctuary. He's seen a dramatic increase in the number of sea turtles washing up over his career.

Bob Prescott: Yeah, I found my first sea turtle in 1974, in the fall. It was kind of a big shock and away because I had never really thought about sea turtles being here in Massachusetts.

Liz Fox: The 2014 stranding stands out in everyone's mind. A whopping 1241 sea turtles were trapped in the bay and cold stunned. That stranding event tested the entire East Coast Sea Turtle Recovery Network, including aquaria and wildlife refuges from Maine to Mississippi and Texas. Again, Prescott:

Bob Prescott: But one of the critical links with turtles is we have so many up here and we don't have the capacity and the tanks.

Liz Fox: With the facilities available but too far away, the U.S. Coast Guard and Air National Guard flew hundreds of sea

turtles to host sites before the turtles could recover enough to return to sea, but the enormous task of safely transporting hundreds of turtles remained as their recovery progressed at different rates. That's when sea turtles began to fly in private jets, and they have Leslie Weinstein to thank for their bird's eye view of the Atlantic. Weinstein is a lifetime turtle advocate who protected turtle eggs when he was a boy in his native Florida. During his career as a general aviation businessman, he continued to participate in sea turtle conservation. He was in contact with conservationists in Massachusetts and Georgia when the mass stranding happened. His contacts in the aviation world were just what everyone needed. It was Thanksgiving, and he remembers it well.

Leslie Weinstein: While you were eating turkey, I was on the phone shipping turtles.

Liz Fox: Weinstein mobilized a then budding network of volunteer pilots who donated their time, skills, and equipment. Higgins, who received about 50 Kemp's ridley sea turtles, had plenty of room in his tanks in Galveston, Texas. He's no stranger to sea turtle rescues. This year, he led the rescue effort for a record 3663 cold stunned green sea turtles from Texas's mudflats after January's freezing cold snap.

Ben Higgins: We have a really good network of people on the Texas coast in getting people out there looking for turtles.

Liz Fox: Cold snaps in the Gulf of Mexico that stun green sea turtles are different from the gradually cooling fall season that slow down sea turtles trapped in the Cape Cod Bay. Those turtles typically spend months with little access to food and face longer recovery. Green sea turtles in a cold snap usually need moderate warming, a checkup, a tag, and then they can return to nearby water when the weather conditions improve.

So, even during the biggest cold stunning event in Texas' history, the tanks at Higgins' NOAA lab and nearby aquaria did not reach full capacity. That means turtles stranded thousands of miles away can always catch a flight to a warm tank and professional care.

And that's an example of folks doing right by the ocean. Until next time, I'll be searching for all things Positively Ocean. For Ocean Currents and KWMR radio, this is Liz Fox reporting in Berkeley, California.

(Music)

Jennifer Stock:

Thank you, Liz Fox for that piece about sea turtles and folks helping out the sea turtles. It does take a village to keep things going. And I wanted to mention, just following up on the theme of our show today, the Greater Farallones National Marine Sanctuary, which is one of the stewards in Tomales Bay, they have a Sanctuary Advisory Council. They have a meeting coming up in Point Reyes. It'll be at the Red Barn Classroom at Point Reyes National Seashore on May 9, next month. These are public meetings. That means all of you are welcome to attend. There is a 15-minute public comment period but specifically of interest is that the afternoon agenda will be all about Tomales Bay. The Greater Farallones National Marine Sanctuary has been working with the stakeholders in the bay here on a monitoring program, as well as a vessel management plan to help steward the waters as much as possible. If you want to jump in and get involved and help, this is a great way to start getting informed. May 9th, Advisory Council meeting at the Red Barn Classroom at Point Reyes National Seashore. You can get more information about that at farallones.noaa.gov.

(Albatross sounds)

I hear those albatrosses! Who doesn't love that albatross? Well, the Greater Farallones National Marine Sanctuary is going to have an Albatross Soiree in San Francisco on April 28, 7 to 9:30 at the San Francisco Zoo. This soiree is a science and arts celebration. They'll have a special lecture by Breck Tyler, who is with the Institute Marine Sciences at UC Santa Cruz and has spent many years out on these remote islands where these wonderful albatrosses live and breed. Well, they live out on the big ocean, but they breed out on those islands. So, check that out April 28. It is all the way at the San Francisco Zoo. You can go to farallones.org for details and ways to purchase tickets. The Albatross Soiree, April 28th.

Well, I'm out of time here on Ocean Currents! Ocean Currents is always the first Monday of every month at 11am to 12pm. You can hear past episodes through the podcast, which is available in iTunes but also at cordellbank.noaa.gov. Ten years of shows to catch up on if you'd like. There is also a Twitter feed, and you can follow at Ocean KWMR to get information about this program and supporting links about the topics we covered here. I love hearing from listeners, so feel free to email me at cordellbank@noaa.gov. Tell me what you're interested in hearing more about or questions and comments. Thanks so much for tuning in and enjoy the bay,

ocean, or whatever body of water you can get into safely. This has been Ocean Currents here on KWMR in West Marin.

(Music)

Thank you for listening to Ocean Currents. This show is brought to you by NOAA's Cordell Bank National Marine Sanctuary on West Marin community radio KWMR. Views expressed by guests on this program may or may not be that of the National Oceanic and Atmospheric Administration and are meant to be educational in nature. To contact the show's host, Jennifer Stock, email me at jennifer.stock@noaa.gov. To learn more about Cordell Bank National Marine Sanctuary, go to cordellbank.noaa.gov.

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