

Transcript for Ocean Currents Radio Program October 7, 2019

*Lyons Filmer:* Welcome to Ocean Currents. Our host Jennifer Stock is on a special assignment. I'm Lyons Filmer, here in the studio. Today we have a true ocean broadcast bringing Ocean Currents to you from the Exploration Vessel *Nautilus*. Jennifer Stock is on board the *Nautilus* somewhere offshore in the Pacific Ocean, and we'll be joining her and the other scientists on this exploration expedition. Let's go live to the ship. Hello Jenny, you are on the air.

*Jennifer Stock:* Hello Lyons and hello listeners of KWMR. Thanks for tuning in. I am really excited to bring this special addition to you from the ocean. It's like a dream come true hosting Ocean Currents radio from the ocean itself. So 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 this show to 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 are the Greater Farallones and Cordell Bank National Marine Sanctuaries which together protect 4,581 square miles. These National Marine Sanctuaries are well situated in one of the most productive ocean ecosystems in the world here in California. The oceanographic system that generates tons of nutrients for a diverse food web support highly migratory mammals, seabirds and many local ones as well. I'm super excited to be with you today not only because I haven't been on the air for a while, but I'm actually in the National Marine Sanctuaries right now. Right now we are in the Greater Farallones National Marine Sanctuary about 70 nautical miles west of the Sea Ranch area. We are on the Exploration Vessel *Nautilus* on an exploration mission of the deep sea communities throughout both Sanctuaries. Ocean Currents comes to you today live from the ocean itself. I'm in the studio on the ship and I have our expedition leader Dr. Nicole Raineault who is the Vice President of Exploration

and Science Operations for the Ocean Exploration Trust, and Dani Lipski, Research Coordinator with Cordell Bank National Marine Sanctuary. Jan Roletto was going to join us who's with the Greater Farallones, but she's very busy with a dive right now and some exciting stuff happening so she couldn't join us, but Dani will cover for both the Sanctuaries. Our expedition time is a 24-hour round-the-clock operation, and we've been going full steam since Friday, but want to take a pause before this dive ends today. Our vehicle will be coming out of the water very shortly and catch up so you all can hear what we've been up to. Nicole, first if you could just tell us a little bit about the exploration the *Nautilus* and the Ocean Exploration Trust; tell us a little bit about this organization.

*Nicole Raineault:* Sure. *Nautilus* is owned and operated by the Ocean Exploration Trust. We're a non-profit organization, and our mission is to explore the world's oceans, areas that nobody has been before, with deep sea technology. We bring with us a mapping system wherever the *Nautilus* goes so we can map. Given that most of the world's oceans are unmapped, this is an important first step to help us decide where we're going to dive. When I say dive, I mean with remotely operated vehicles. We have two ROV's that have video cameras and lights because we go where it's very dark and one of them, Hercules, has sampling capabilities, so we're able to take samples of the sea floor, samples of biology, geology, water samples that scientists will use once we get them back on board the ship. A big part of our mission as well is outreach and education. We bring young people out to the ship, undergraduates, graduate students, to train them in science, engineering, communications. Then we also have the *Nautilus* live website. Nautiluslive.org is the best way for viewers to take a look at what we're doing in real time and also ask us questions. There's a little box on the *Nautilus* live website where you can write in to the watch standing science team, and we'll answer them as we can.

*Jennifer Stock:* One of the big things I'm seeing, this is my second *Nautilus* mission, which is so fun to be here again, but one of the big things I see is the mentoring that happens here. Can you talk a little bit about how young people can get into this field and how the Ocean Exploration Trust helps them by being part of these missions?

*Nicole Raineault:* Yeah. It's really critical that people are able to see themselves in a career at sea and actually experience it before they commit to it. I think our internship programs are an excellent opportunity to do that. There are open applications right now, so if you go to the [nautiluslive.org](http://nautiluslive.org) website, you'll see a link that you can click. We have interns in the science field, so undergraduates, graduate students, who come out in marine related fields. Also, ocean engineering or mechanical, electrical engineering, ROV pilots or learn how to be mechanics and drivers of these ROVs. Video interns as well. So people who are interested in telling stories from a video perspective or wildlife photographer types will come out as video interns. We bring out science communicators as well so these are professionals. One of our goals is just to make sure that in every watch team that we have on the ship there are young people, interns, who are learning about what it's like to do a job at sea.

*Jennifer Stock:* Where are some other areas the *Nautilus* has been this field season and, you're almost wrapping up the season 2, so where else are you headed after today or after this week?

*Nicole Raineault:* Yeah, *Nautilus* has traveled the furthest west we've been. We started in our home port of San Pedro, which is outside of L.A. in California, and headed out to Hawaii and did work in American Samoa with the Sanctuary there. We've done work around different US Territories including Howland and Baker, Johnston Atoll. We've done a lot of far ranging research on different seamounts in particular in the Pacific. After this we're actually going to work in another Sanctuary. We're going back to Monterey Bay National Marine Sanctuary, hopefully to visit the Octopus's Garden, that's the plan. So that will be next week.

*Jennifer Stock:* Literally the famous song could not have been more perfect; there is an octopus's garden in Monterey Bay. I want to turn a little bit more to the science and the objectives of this week, so Dani, I'm going to bring you on. I know you've been planning this cruise for a year. We call these cruises because we're out on a vessel; it's not like we're in cruise mode and the typical cruise most people think of. You and Jan Roletto from Greater Farallones have been planning this

for a year. How did you determine your research objectives for this week?

*Dani Lipski:*

Yeah. We have been planning this for a long time. I'll talk first about Cordell Bank National Marine Sanctuary and then I can speak to the Greater Farallones National Marine Sanctuary's goals as well. We were so fortunate to be able to come out on this vessel in 2017. At that time, the Sanctuary had been expanded in 2015, but we had very little information about the area that have been added to the Sanctuary, which was to the North and to the West of the original Sanctuary. At that time, we explored some of that deep habitat for the very first time down to 2,700 meters. Nobody had ever seen that habitat before. We weren't sure what we were going to find, and we were really thrilled to find these great biological communities with corals and sponges and fish that had never been documented in our Sanctuary before. We learned a lot on that survey, and we took a lot of samples that were then identified in the lab. We took all that video that we collected back to the lab and it was analyzed. Every single coral and sponge in that video was identified and enumerated. We learned a lot, but at that time we had only covered a small portion of our Sanctuary, and what we had found really just raised more questions for us, where else are these organisms, and we had questions about the identity of those organisms. The cruise in 2017 really helped kind of narrow in on what our goals would be if we could go back, so we were so excited to have this opportunity in 2019 to take a look at some areas where we hadn't been before, that we hadn't gotten to in 2017 to complete some of those surveys and through different depth habitats. The deep sea can be really structured by what depth you're in. You can see really different communities. So we had explored some depth zones but not others; we wanted to go back to different depth zones. Then we had seen some organisms we were interested in, and we wanted to go to places where we thought we would find them so we could collect them and learn more about them. So we're really building on our knowledge that we learned on our first 2017 *Nautilus* cruise and using that to inform and narrow in our goals for research in 2019.

For the Greater Farallones National Marine Sanctuary, the goal was to work up in the area that was added to the

Sanctuary in 2015. We're working in an area that is called The Point Arena Biogenic Area, and there are a few objectives on this mission for Greater Farallones. One is to look in some habitat that's never been explored before just to see what we could find, to find some substrate, hard substrate, that would be amenable to coral and sponge communities and fish communities, to look at that for the first time. It hasn't been explored before. In addition is a very specific and applied management goal to get some information that can help inform management. In this area there have been some proposed changes to the fisheries management zone. The National Marine Sanctuaries don't manage fisheries, but we do work closely with the rest of our partners within NOAA and the Pacific Fisheries Management Council to inform the changes that are being made and the management recommendations that are being made in those areas. So there have been some changes that have been proposed to fishing regulations, to open some areas and close some areas along the coast of California, and there was very little information about the area in Point Arena that has some proposed changes. We are specifically looking at those areas to survey those areas in a very prescribed way to look at transects where we can quantify the organisms and look at the density of those organisms so that we can provide that information to the organizations that make those recommendations for fisheries management.

*Jennifer Stock:* Can you talk a little bit about the significance of these deeper habitats to the overall ecology of this area in the ocean?

*Dani Lipski:* Yes. We still have a lot to learn about the ecology of the deep sea and so in one way we are still just trying to inventory the species that are there and learn about what is there. But it is thought that these communities play an important role in the ecology of sanctuaries. These deep sea communities that include corals and sponges and fish, they can provide habitat for a lot of other organisms. So often we will zoom in on these areas, and when you think it's just one large organism, that once you zoom in, you see that it's just covered with many other organisms. It plays an important function in the carbon cycling in the Sanctuary, and there is a connection to the surface areas of our Sanctuaries. That's what people can see from the shoreline, they see the ocean, they see the surface, and what happens on the surface of

the ocean is connected to the deep sea communities. When we're looking in the deep sea communities, those organisms there, they're feeding on detritus and organisms that fall from the surface of the ocean. So what happens on the surface of the ocean can affect those deep sea communities. It really is all connected.

*Jennifer Stock:* For folks just tuning in, this is Jennifer Stock, host of Ocean Currents calling in from the Exploration Vessel *Nautilus*, which is currently in the Greater Farallones National Marine Sanctuary. We're talking with scientists aboard the vessel, Dani Lipski from Cordell Bank National Marine Sanctuary, and earlier Nicole Raineault with the Ocean Exploration Trust. Dani, tell us what it's like to approach one of these deep sea communities. Suppose you're coming up on a transect and all of a sudden there's one of the habitats that we came upon. Just describe the species that you saw, how they are interrelated, and how they are intertwined with each other just so people can get an idea of the diversity of animals.

*Dani Lipski:* Sure. Well there really is the thrill of discovery because we don't know what we're going to find. We might find something new. We're coming up to a feature and it might start to be shadowy, the dark spots ahead, and then things start to become more clear. So you're really kind of straining your eyes to see 'what is that what is that' and then you might get there and things start to become more clear and you'll see these rocky structures. When you get to rock, you get excited 'cause you think 'we're going to see something cool here.' So we'll see these sponges which can be these white or yellow kind of globular kind of things; they can take lots of different shapes and forms, kind of bizarre looking. Then we see these corals. They have these fan-like structures. They can be white or yellow even red, pink. Some of them are really delicate, some of them are more kind of chunky looking. We see on the sea floor crawling around, we see the crab, we see fish tucked into little crevices. We see skates on the sea floor if there is some flat habitat. Then we get to these and we really zoom in, and you can see brittle stars climbing up to the tops of these coral so that they can extend into the water column and feed. We'll see little shrimp then isopods and amphipods on the structures of these corals. I hope that gives you a sense of

the communities that we see. It's one of those things where if you've ever stop to look in your garden or in a tidepool or something, and once you stop to look, everything just kind of comes out at you. There's so much more there than you originally thought. That's some of the kind of sensory experiences we have while we're studying the sea floor.

*Jennifer Stock:* I've kind of called it deep sea snorkeling because these cameras can get right in there and get magnified on this community and you see all these different animals looking up, crawling amongst each other at the edges. It's so stunning. I'm so honored to be part of this. Nicole, I want to ask you, you've been to so many expeditions and many places around the world's oceans. What are some of your observations of seeing the habitat here in the Greater Farallones and Cordell Banks Sanctuaries so far and how it might be similar or different from other areas that you've been to?

*Nicole Raineault:* Yeah I've really been enjoying watching these dives because I think it is amazing to see just the vibrancy of life here. There are so many of these rocky outcrops that have a diversity of life and it's very beautiful. As Dani nicely explained, the complexity of it is really rich and just beautiful to see. It's clear that this is an important area to protect. Compared to other areas I've seen, I think also when you look at other places, there's always some forms of life, so even when you're going over a mudflat you can find something living there, you can see signs of bioturbation. But certainly this is an area that is very vibrant. Areas up along the Cascadia Margin, where we have the methane seeps, we certainly get different types of communities along those cold sea features. We've been to areas with the hydrothermal vents and again you see differences in the communities. I think the important thing for people to realize is that the deep sea is full of life and we just have to spend some time looking for it.

*Jennifer Stock:* Dani, what are some potential threats to these areas and how does the information you're gathering through this research effort help support the Sanctuary management objectives?

*Dani Lipski:*

In Greater Farallones National Marine Sanctuary, the areas that we are studying right now, the vehicle's in the water, one of the threats to some of the areas that they might be opening here and other places along the coast is bottom contact fishing. If trawling is allowed in some of these areas, that is detrimental to these long lived and delicate, slow-growing organisms. Another concern is marine debris which is something that we've been seeing and viewers at home watching along can see this as well. We've seen some plastics. We've seen some trash. We've seen some fishing gear that's definitely harmful to the sea floor in these communities. Another big issue is climate change. A lot of the communities we're looking at in the really deep ocean, they have a fairly constant temperature and physical conditions, so they're not experiencing a lot of changes in that way, but they are still affected by climate change and those connections to the surface that I was talking about can definitely affect these deep sea communities. Those changes in ocean temperature, dissolved oxygen and acidification that are really affecting surface waters can affect the food supply for these organisms in the deep sea. If we start to see some of those conditions extending to the deeper sea, they will be affected by changes in temperature and dissolved oxygen and acidification as well.

*Jennifer Stock:*

Here's a question for both of you; what is the one thing you most want people to know about the ocean as a whole but also the deep sea environments, and how can they best help protect it?

*Nicole Raineault:*

I think it's really important that people know just how important it is to explore the deep sea because there is a lot more to discover. I think less than 1% of the sea floor has been actually seen by humans and just around 10 to maybe 13% of it has been mapped. We have a lot more work to do and that's important so that we can understand our planet and help protect it.

*Dani Lipski:*

I know that many of the local KWMR listeners probably have a strong connection to the coast and the ocean, but what I want people to know is that everybody on our planet needs to be concerned about the ocean. We are all so affected by the ocean. It provides so many services to us, not just a place to recreate and to relax and to fish, but it provides a

protein source for people around the world. It effects and drives our weather patterns, it absorbs the carbon dioxide and buffers those changes to our climate, and it provides 50% of the oxygen that we breathe. So if even people who don't live near the coast, who live in the middle of the country and maybe don't go to the beach and enjoy the ocean as much, everybody is really affected by changes to the ocean. By us studying the ocean, that allows us to share these facts and information with people to help them to understand how important ocean habitat is.

*Jennifer Stock:*

I'm glad you brought that last part up because that's one of the really cool things that's happening on this ship is that we are interacting with schools and museums throughout the week on these video chats, ship-to-shore interactions. Just before my radio show, I chatted with two schools in Oakland - one in Oakland, one in Alameda. The students got to see us here on the ship and hear about what we've been doing and what we're looking at, and it was really fun for them to talk with us directly. That education part is so important. The other part is the fact that the *Nautilus* is streaming live to [nautiluslive.org](http://nautiluslive.org) when the ROV's are diving, meaning when we have our ROV's in the water, people all around the world can watch. They can chat in too, they can write questions. We've had people from all around the world chime in and say hello, that they're watching. That is so exciting to me as a communicator and an educator, and I really appreciate that part of the *Nautilus*. I just want to say thank you, Nicole and Dani. We're working 24-hours around-the clock. Thanks for coming in to talk with our listeners today. Lyons, I wanted to give you a minute or two in case you have any last questions before we wrap up our time here on the *Nautilus* and KWMR.

*Lyons Filmer:*

Well thank you so much Jenny and Dani and Nicole. I have been watching [nautiluslive.org](http://nautiluslive.org) while listening to your conversation. It's absolutely fascinating. If you can hear the sound of my voice, and can get to your computer, go to [nautiluslive.org](http://nautiluslive.org). It's absolutely fascinating. Coral? We have coral here? My brain thinks 'oh Australia, the South Pacific'. We have coral just off our shore in the Pacific Ocean? In fact, there's a piece, I'm seeing a piece right now on [nautiluslive.org](http://nautiluslive.org) with lots and lots of fish swimming around it. There's some kind of, it looks red from a distance, but it

looks more brown up close, it's a worm or a slug kind of thing. I saw the skates. I've seen anemones. I think it's an anemone; a deep apricot color that was attached to some kind of small structure. It didn't look like coral, but I couldn't really see below the anemone itself. I thought we were too cold for coral, Jenny.

*Jennifer Stock:* Yeah, well that's one of the things that a lot of people don't realize is that we have deep water coral communities all around the world. It's just the technology to see them has just come on in the last century, even less than that, to be able to access them. It's an amazing thing that we're still discovering all these habitats around the ocean that we just don't know about yet because they're hard to see. Even when we go down for 24-hours+ diving, we're only seeing a small fraction of it because the lights of the ROV only go so far. We do go really slow so we can take it as much as possible. Even though we're going down and exploring the Sanctuary, there's still a lot of it we're not seeing. What's around the corner that's out of view that we're not seeing is always a wonder as well. These communities are very slow growing because it is so cold and dark and so very fragile, but at the same time really tough as well in the sense that they are thriving down there.

*Lyons Filmer:* I really took in the point, I forget which of you made it, about the food source for the deep sea environment animals is coming from the surface. So whatever is happening on the surface is affecting their food source which then of course affects them, not to mention the plastic and the other trash, human created trash. Another note that one of you said toward the end there was that the ocean provides 50% of the oxygen we breathe. I've never heard that before, and that is an astounding piece of information.

*Jennifer Stock:* Yeah, all that phytoplankton on the surface waters, those are tiny microscopic algae and they photosynthesis which means they use the sun to make energy. When they make energy for their bodies, they also make oxygen, and that oxygen is a big part of our atmosphere. If humans enjoy breathing, a great way is to appreciate the ocean because a lot of it does come from that phytoplankton.

*Lyons Filmer:* That's a great way to put it.

*Jennifer Stock:* Really quickly I wanted to mention that we're pulling up and we're going to be moving to another dive site soon. We're having some excellent weather right now, but we're kind of nervous there's some weather coming up that might put us on pause for a day, but we're hoping to dive later on in the week back in Bodega Canyon. This expedition is scheduled to end Friday which means diving would end Thursday. Every day is a little different. We react to the weather and what's happening. So the folks should definitely stay tuned. If there's folks that are local and would like to do a video chat, come down to Point Reyes National Seashore. On Thursday at the Red Barn Classroom at 12:00 o'clock, Ben Becker is doing a lunchtime Brown Bag Seminar and we'll be doing a video chat to talk a little bit more about what we've found and what we're seeing, and we'll have some photos to show. People can come down to the Red Barn Classroom at 12:00 o'clock for that on Thursday.

*Lyons Filmer:* That sounds wonderful. Again, I want to point people to [nautiluslive.org](http://nautiluslive.org). Through Thursday the camera will be down there looking. The Thursday noon event at the Red Barn at Point Reyes National Seashore Headquarters in Olema, sounds a great way to get a sense of, as you said, what's been seen and discovered. Are there other places people might go to see the results of what's been found and discovered on these explorations?

*Jennifer Stock:* Every single dive, after it's done, it gets archived to YouTube. If people want to see a dive that they've missed, they can go over to YouTube and Google 'Exploration Vessel *Nautilus* Cordell Bank' or 'Greater Farallones' and see the dive. I'm not sure how long it takes from being live to going over to YouTube. We have some *Nautilus* live lifers that live for this and then when the season ends, they are really sad. We have YouTube now where they can watch their videos nonstop and explore with us along the way. It's fun on the ship. We're on watch for four hours, a lot of us will be sitting in what's called the Lounge where there's screens up and we're watching even though we're not on watch because it's so exciting. I hope folks tune in and learn a little bit more about what we have right off our coastline of Point Reyes in this incredible area.

*Lyons Filmer:* Jennifer Stock is the host of Ocean Currents here on first Mondays at 11:00 am on KWMR, Point Reyes Station. Jennifer, thank you for your time and for your scientist guests, Dani and Nicole. My apologies, I didn't catch their last names. Thank them for their time as well. We really appreciate it.

*Jennifer Stock:* Thank you for helping to coordinate this. It's been really fun, and I appreciate you filling in for me while I'm out at sea.

*Lyons Filmer:* Fun for me too, Jenny. Thanks so much. We'll talk soon. Bye bye.

*Jennifer Stock:* Take care.

*Lyons Filmer:* Jennifer Stock, out on the Exploration Vessel *Nautilus* just off our coastline. I believe she said where they are at the moment is somewhere off Sea Ranch area, and this dive around the Sea Ranch area is coming to an end, and they're going to be going to the Bodega Bay area, Bodega Canyon Jenny Stock specifically mentioned. [Nautiluslive.org](http://Nautiluslive.org). Wonderful fun watching this. Absolutely fascinating. As Jenny said there is a way to submit questions.

(Music)

*Jennifer Stock:* 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](mailto:jennifer.stock@noaa.gov). To learn more about Cordell Bank National Marine Sanctuary, go to [cordellbank.noaa.gov](http://cordellbank.noaa.gov)