

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

(Music)

*Jennifer Stock:* Hello, everyone! This is Ocean Currents. My name is Jennifer Stock and I'm the host for this program and we bring this program to you once a month and focus on lots of ocean topics. On this show, we bring ocean experts in the field to talk about ocean conservation issues, exploration, research, and how we can all get involved in learning about and helping to protect the ocean.

We focus locally here on the California Coast as we have three contiguous national marine sanctuaries here, but go beyond and global as well. Today we are focusing locally here on the waters off our coast in the Bay area of California. It's no mistake as to why these waters were protected as national marine sanctuaries by congressional designations. This region has an incredibly rich food web, and important breeding and feeding areas and is dynamic to no end. PRBO Conservation Science had been monitoring the marine ecosystem in these waters to help guide protection, conservation, and management.

Cordell Bank and Gulf of the Farallones National Marine Sanctuaries are working together with PRBO Conservation Science to understand how ocean conditions are changing and to better understand how the ecosystem is used by different levels of the food web from microscopic phytoplankton all the way up to seabirds and whales. So, today I have two local marine ecologists with me. I have Lisa Etherington, who is a colleague of mine with the sanctuary and she is the research coordinator at the Cordell Bank National Marine Sanctuary and coordinates all of the science-related projects relating to understanding and conserving Cordell Bank's incredible ecosystem and Jaime Jahncke, am I saying that right?

...is the marine ecology division director at PRBO conservation science, a non-profit that works to advance conservation through bird and ecosystem research. He is also an alternate member for the Cordell Bank Sanctuary Advisory council and represents the research community. So, thank you both, Lisa and Jaime for

joining me today to talk about the work you're doing and sharing it with our listeners today.

*Lisa Etherington:*      It's good to be here. Thanks, Jenny.

*Jennifer Stock:*      I haven't had people live in the studio for a while, so this is really exciting for me to see two faces here. Most of the people I have usually are by telephone. So, would you say it's pretty exciting out there right now with all this wind on the ocean?

*Lisa Etherington:*      Yeah, just recently in the last couple of weeks, if anybody has been out at the beach they've noticed that the winds have definitely picked up. So, we've got those winds coming from the north-northwest and they're really making it a pretty interesting environment out there and we hope to get out on the water here in a couple of weeks to be able to see what kind of implications those kind of winds have on the ecosystem out there.

*Jaime Jahncke:*      I guess on the islands, some of the new habitat... Cassin's auklet, a small bird was in the island has laid eggs already this year and it's the earliest breed and they have had since 2002. So, I think they're coming around.

*Jennifer Stock:*      Oh, wow. So, that is exciting. We'll talk a little bit about that as we talk about some more of this stuff. So, we've talked a lot on this show about how rich this ecosystem is, but both of you originate from different parts of the globe and have worked in different places. How would you compare the conditions of the ocean off our coast here in terms of biological productivity as compared to other areas where you have studied and worked? And Jaime, why don't we start with you?

*Jaime Jahncke:*      So, I come from Peru, but I have had the opportunity to work also in the Bering Sea, Galapagos... I could say that most of these places are all very productive systems, but the best point of comparison between Peru and California is that both are eastern boundary currents, both are areas where wind... the interaction between winds and the coast result in a very strong upwelling which brings nutrients and enhance the amount of phytoplankton that you can have in the water and that's very good for all the wildlife that depends on that.

*Jennifer Stock:*      So, very similar ecosystem to the California coast? Interesting and Lisa, how about you?

*Lisa Etherington:* I've been lucky enough to work in a variety of different marine systems, primarily in the Caribbean and North Carolina and Alaska before coming to California a few years ago. So, I'm relatively new to the California system, but compared to the Caribbean, it's a very low-nutrient system. So, we have less production, but overall higher biodiversity. In North Carolina, it's warm water current. So, very different than if you tried to go in the ocean in North Carolina as opposed to in California. So, in the estuaries of North Carolina, we primarily have nutrients coming from the land.

So, the productivity is really driven by that nutrient delivery from the land. So, a difference between estuaries and offshore systems and in Alaska, I worked in Glacier Bay. So, it's another estuary, but it's glacially influenced. So, you have a lot of fresh water runoff and you have extreme tidal currents and it's kind of the intersection of those two different physical processes that leads to the high productivity there. So, we see some of the same species in Alaska that we see here, but I would say, off the coast of California here, there's a higher diversity of marine mammals and seabirds than what I was experiencing in Glacier Bay.

*Jennifer Stock:* That is so interesting, the whole idea about the estuary-driven nutrients coming from the land versus here, our nutrients are really coming up from the sea floor. So, that's a good contrast. So, the reason I wanted to bring you both on as this summer the sanctuaries and PRBO are doing some research together on the water off the coast of Point Reyes and I thought it'd be nice to share the type of work you're doing and what you're working towards identifying with your research.

This year, PRBO and the sanctuaries are doing some oceanographic monitoring work on the sanctuary's research vessel, Fulmar, which is a shared research vessel between Monterey Bay, Gulf of the Farallones, and Cordell Bank. Jaime, you've been doing this for a couple of years, can you give us some background on the history of this monitoring program that the PRBO has been leading here?

*Jaime Jahncke:* Okay. So, this work started in 2004, in fact, we started collaborating with the sanctuaries in 2005 and this collaboration has come a long way into what is now a joint monitoring program. The objectives of our work are to understand the food web in the California current to try to know more about krill and krill-dependent marine wildlife. We want to use this information to propose design considerations to improve zoning within the

sanctuaries and we try to communicate our findings to a wide group of stakeholders, which includes the managers, policy makers and the public.

*Jennifer Stock:* So, what is the exact monitoring exactly entail? So, you're getting out on a boat and what do you do?

*Jaime Jahncke:* We do multiple activities. We try to...our work is pretty comprehensive in that we look at the water, the oceanography, we look at the prey, the zooplankton, we look at the birds. So, in a particular day at sea, we will use instruments, we'll deploy instruments in the water to measure physical properties of the water like temperature and salinity.

We will use nets, deep nets, in the water to take a sample of what are the type of organisms that are living there and as we're moving along our transects, we'll be counting the birds and mammals that we see towards one side of the boat and the boat is equipped with two systems. One is an eco-sounder, which is an instrument that allows us to measure, indirectly, the amount of biomass of krill that is in the water and has another system that...where it takes waters from the oceans, it runs it through a system in the ship.

So, it continuously measures temperature and salinity of the water. So, then, once we're back in the lab, we're able to relay all of these different layers of information to understand better where birds and mammals proliferate and why.

*Jennifer Stock:* So, do you see a lot of variability from station to station and that's basically the goal of the study?

*Jaime Jahncke:* Yes, we do see a lot of variability. For example, there are areas that are highly influenced by the Bay plume, which is runoff of the freshwater coming from San Francisco Bay. We have areas like over Cordell Bank, which tend to be the first one to respond to the winds where you can clearly see the seasonal upwelling. We have areas where we tend to see a the relations of whales. In this case, again, Cordell Bank seems to be a good place to see blue whales.

*Jennifer Stock:* This is why I like talking to people like you because you know this ecosystem on this micro finite level whereas most of us just think of blue water and whales, but to be able to explain, like, where these freshwater plumes come out and they meet and they make a difference. It's really, really interesting.

*Lisa Etherington:*      There's really a lot of structure to the ocean. I think a lot of people don't think about that. They think about it being this continuous, homogeneous place where these animals are, but really, the physical properties of the ocean drive where we find the animals.

*Jennifer Stock:*      Lisa, you bring up a good point and I know we've talked about this before, but let's talk about it. In the spring, this is the upwelling season. So, we're getting into this new season and there's a different stratification happening. Can you just talk a little bit about the spring and what the layers of the water are like versus the winter months? Let's just do a little compare there.

*Lisa Etherington:*      Sure. In the winter months, it's really our storm season and that's when the water column or the whole mass of water from the surface down to the sea floor, is pretty similar. So, it's being mixed up. It's being churned so that it's similar from the surface to the bottom whereas when we start to get the really warm water or the sun's heating in the summertime, we'll get what we call stratification. So, we just have different layers of the ocean.

So, you've got the warm layers on top, the cool layers on the bottom. So, it separates out by density of the water and the phytoplankton really need those warm waters so that they can stay in the surface layers where they can photosynthesize. So, what happens during upwelling is that we get this churning of water from these strong winds that brings up these high nutrient waters from the bottom, but we also need to have the winds kind of die down for a little bit so that then the phytoplankton can remain in those surface waters and can photosynthesize.

If the winds are just really strong and that continues for weeks and weeks, phytoplankton are going to be pushed offshore and aren't going to have a chance to really have a large growth in the population or have a bloom.

*Jennifer Stock:*      So, that was an issue a couple of years ago. We had just wind, wind, wind, wind, when is the wind going to stop? And then, a lot of nutrients got pushed off and we had a tough year that year for the auklets, I remember. Going back to some of the research with the net sampling and the seabird and mammal observations, Jaime, how does this pair with the monitoring going on with the Farallon Islands? You mentioned earlier that the auklets are already breeding and how do you pair that information because they're so interconnected with breeding and the food?

- Jaime Jahncke:*      So, PRBO has been studying seabirds on the Farallon Islands for over 42 years now, since 1967 and this is a cooperation with the US Fish and Wildlife Service. Our long-term datasets enable us to answer questions about what is causing seabird colonies to fail or succeed and in this case, we were able to document, for example, in 2005 and 2006, we saw a complete nesting failure of Cassin's Auklets.
- They were not able to raise a single chick in any of these two years and this was never observed in our long-term 42 year data set and in our case, what we found at sea from our monitoring was that waters were warmer than normal, that winds were also weaker than normal. We found that there was less krill in the water than we saw in the previous years and the few krill that were available was not in the adult class sizes that the birds feed on, but there was a few krill, but they were in very small juvenile stages and that wasn't good. 2007 and 2008, as you mentioned, winds were much stronger, but they were a little bit too strong and so, there was...we didn't see the levels of production that we would expect for...that is typical for the California Current.
- Jennifer Stock:*      Right. So, those Cassin's Auklets are really an important bird as far as an indicator of the ocean's health as far as their success goes, right?
- Jaime Jahncke:*      Yes, in this case, we consider the Cassin's a good stand in species for this region.
- Jennifer Stock:*      And they're also endangered? Aren't Cassin's endangered?
- Lisa Etherington:*      I'm not sure.
- Jennifer Stock:*      I'm not sure, either.
- Jaime Jahncke:*      I'm not sure either.
- Jennifer Stock:*      Where else do they breed? We know way out on the Farallon Islands, do they breed anywhere else in the California Coast or...I think they breed up in Oregon too, right?
- Jaime Jahncke:*      Yes. I think the southernmost colonies are probably on the San Bonitos where the islands, I think there's some. They're trying to encourage some monitoring of Santa Barbara Island and the Farallones where we have about, I think it's about 20,000 birds or so, but they are most common in the Gulf of Alaska and on the

Aleutian Islands and I think that the center of their distribution is somewhere around Vancouver Island.

*Jennifer Stock:* For those of you who haven't seen a Cassin's Auklet, they're basically a big tennis ball, not much bigger than a tennis ball, that sit on the water, these round little fluff balls and when they take off there are these cute little feet that paddle off and they run away or dive down below the water. They're really, really beautiful little birds.

So, as far as the Cassin's auklets being such an indicator and we're talking about different timing of the winds. Do you think that all of these conditions and how they're so variable have contributed the disappearance of salmon this past year? You know, there's a lot of different theories on the table of what happened to the salmon, but how much does oceanography play a role in that? Theoretical here, just a couple ideas.

*Jaime Jahncke:* Yes, so, most that enter the ocean a particular year, remain at sea to feed and grow for about three years before they come back on to land to spawn. So, for example, last year was...we experienced a low of salmon returns and these correlated with what happened in 2005 when we experienced the first complete failure of the auklets.

We see this three-year lag. Again, I think for this year now, 2009, we are expecting to have very low salmon returns and this again correlates well with nesting failure of the birds in 2006. I guess if we can just...in 2007, birds did slightly better. So, hopefully things are going to start improving over the next few years. Last year, Cassin's auklets had an average productivity and offspring success. So, I guess that hopefully means that salmon conditions may be a bit better.

*Jennifer Stock:* Yeah, it takes a while. It doesn't just switch like that. That's what's pretty amazing about this big ecosystem. It doesn't just come back in one year. So, we'll see what happens. So, as far as this effort, it's been going on since, 19..what did you say, 1994?

*Jaime Jahncke:* The work on the island? 1967.

*Jennifer Stock:* And the oceanographic profiling?

*Jaime Jahncke:* Since 2004.

*Jennifer Stock:*      2004. So, this is taking place across Gulf of the Farallones and Cordell Bank Sanctuaries. Lisa, as a coordinator of research and science information for the sanctuary, how does this information help in your research goals for the sanctuary?

*Lisa Etherington:*      Well, first we need to characterize what the marine ecosystem looks like in our sanctuary. So, we first need to know who is there, when are they there, how do things vary spatially and temporally? So, the information that PRBO Conservation Science is gathering is really providing us a lot of baseline information about some of these spatial and temporal patterns and so, also, trying to monitor these populations over time, it really gives us an understanding of what's causing the changes that we see in seabirds such as the Cassin's auklet or why do we see changes in the abundance of blue whales that we see within our sanctuary.

Is it a human activity that's causing that or is it some kind of natural fluctuation. So, understanding the physical components and monitoring that is really a crucial part of this in trying to understand how the physical habitats of the ocean environment are changing and what that means in terms of the animals that are out there. So, that work is definitely very important for us and we've also been doing a monitoring program that was started in 2004 as well, but it really concentrates on just the feature of Cordell Bank itself. It's been known that this area is a hot spot for marine mammals and sea birds and so, on the program that we initiated was to really understand some of those smaller scale features that may be leading to the aggregation of animals around this sea floor feature.

So, the work that PRBO is doing is really helping us to put that in context to figure out the contribution of the area right around Cordell Bank to this overall ecosystem and how it compares with a larger, more regional sampling approach.

*Jennifer Stock:*      I can imagine this information is extremely important, especially right now while we're facing some potential large-scale global threats on the ocean. What threats do you consider to be the most pressing for the Cordell Bank region. A lot of folks think, "Oh, it's offshore," but it's a really important area for marine life. What do you think are the most pressing threats in that area?

*Lisa Etherington:*      Well, we've identified a couple main threats that are withers present or there's the potential for those threats. One of these is vessel traffic and that includes the potential for oil spills, for



discharge, it also includes the potential to either disturb or harm marine mammals and that could be just changing their behavior or it could be physically actually striking those animals.

So, that's one of the things we're interested in is where are these animals congregating and looking at the patterns of vessel traffic in the area and trying to see if there might be some potential areas where those two are overlapping and it might be a concern. So, that's definitely something we'd like to do with some of the data from PRBO as well as some of the data that we're collecting within the sanctuary is to understand how vessel traffic might be a potential problem.

We definitely have identified climate change as a potential threat and pressure on the sanctuary resources and so, that's something we're trying to think about what we need to do to monitor different ocean conditions to be able to understand the impacts of climate change on the ecosystem and I'd say, maybe one of our other top ones would be harvesting. We definitely recognize that there are different types of fishing practices and some are better than others and we have noted some habitat disturbance due to bottom-tending gear and that is definitely something that we look at in terms of habitat protection...is something we're concerned about and also, just the fishing that has higher amounts of by catch is a concern for us as well.

*Jennifer Stock:* Excellent. I know there's a big report coming out pretty soon that you've been working hard on and that'll be a great summary of some of the current conditions and some of the threats that are coming online. As far as the use of the data for PRBO, Jaime, can you talk a little bit about how you're all planning to use the data? I understand that some of the data may be used to help designate federal marine protected areas. How is that...how are you going about doing that? Or is it still a little too far off or...?

*Jaime Jahncke:* Well, we have been talking more now in the terms of improving ocean zoning and working with the sanctuaries in the current legal frameworks to come up with solutions that help protect some of the main habitats for the birds or main areas of concentration for whales and other marine mammals and at the same time try to figure out which areas should be used or are being currently used for fishing or shipping lanes to try to minimize the overlap of activities that can negatively effect marine wildlife.

*Jennifer Stock:* So, is this mainly associated with the California Marine Life Protection Act, or is this going into the federal waters?

*Jaime Jahncke:* We contribute information for the marine life protection act regarding birds and their foraging activity around the Farallon Islands, but the Marine Life Protection Act only has jurisdiction over the three nautical miles adjacent to shore. So, hopefully, over the next few years it will be some sort of federal towards this and they will be more than interested in working together with the sanctuaries to come up with some proposals or signed consideration for these potential protected areas.

*Jennifer Stock:* Yeah. So, I know we're still in the process of getting the state ones designated. So, it'll be interesting to see where this progresses to. Excellent. Well, for those just tuning in, we've been talking with Jaime Jahncke from PRBO Conservation Science and Lisa Etherington from the Cordell Bank National Marine Sanctuary and we're just talking a little bit about some of the monitoring efforts that are going on in the waters offshore here and how the data is used to help protect this ecosystem. We're going to take a short break in just a minute or so here and I hope you'll stay with us. Thanks for tuning in to Ocean Currents.

(Music)

*Jennifer Stock:* This is Jennifer Stock. We're on Ocean Currents and in the studio with me today, I have Lisa Etherington from the Cordell Bank National Marine Sanctuary and Jaime Jahncke from PRBO Conservation Science and PRBO and the sanctuaries are collaborating this summer with doing some monitoring efforts off the coast, monitoring that's been taking place for a few years now, but working together with the sanctuary, with the shared research vessel and we were talking earlier a little bit about how this monitoring is helping identify areas where prey concentrates and the role of the dynamics in the ocean with predators like Cassin's auklets, but we'd be remiss to not mention this global climate change happening and how do your monitoring efforts contribute to preparing for climate change?

We know it's on its way in some form or shape or any other. So, how do you shape your monitoring efforts and use this information to help prepare for that as far as helping to manage this place and keep it healthy?

*Jaime Jahncke:* So, as I mentioned before, fish have commercial value, like the salmon, even the rockfish. Both have declined or failed to recover despite all of our management efforts. In this case, salmon and rockfish depend on the same types of food consumed by seabirds, the seabirds that we monitor in the Farallon Islands. Some of these seabirds, their reproduction follows similar trends like the abundance of the salmon and the abundance of the rockfish. So, we can really use these seabirds and our monitoring to understand, to learn more about what's going on at sea and what may be happening with the biomass of these fish.

So, what we aim to do with our monitoring is to try to understand better how climate has or will effect the marine environment and the seabirds and all the different datasets that we collect allow us to do that. We don't just count birds. We try to look at the ecosystem as a whole and we have all these multiple layers that allow us to see the interactions and how things work. We want to be able to determine what are these ecological relationships that effect the birds now.

So, we can then extrapolate and see what may happen in the future and again, because birds are... seem to be a good indicator of the fish, we may use our bird data to predict what we should expect will happen with the fish over the next few years and we are really aiming to produce some sort of decision tools that could help guide fisheries managers on what they do to manage their specific fisheries they are responsible for. So, we want to really support the sustainable fisheries practices in California by developing these tools that could facilitate their work and your work.

*Jennifer Stock:* With the sanctuary? How about for you, Lisa, as far as the efforts towards your goals and preparing for climate change and keeping Cordell Bank a healthy place?

*Lisa Etherington:* Well, I mean, the route of climate change really highlights the importance of these monitoring programs so that we can really understand how we've already seen some changes as well as to be able to predict what the future changes are going to look like. So, we've been trying to find some funding to purchase some additional oceanographic equipment to collect some additional data than what we're collecting now that will help us to understand the properties of these ocean habitats that can influence animal abundance in the area.

So, yeah, I feel like these monitoring programs are really important for us in trying to track these changes and trying to separate out anthropogenic inputs as opposed to just natural fluctuations.

*Jennifer Stock:* Right, and the natural fluctuations go beyond just seasonal change. There's El Nino events and the Pacific Decadal Oscillation, a ten-year even that kind of changes. So, it's kind of hard to isolate, I bet, which...what's really going on here? Now, you mentioned, Lisa, there have been some changes I have seen.

We've seen a couple changes so far. Can you just go through some of those? I mean, I think thinking about the arrival of Humboldt Squid is maybe a potential...that's a new thing. They've just come in the last few years and what else would you say has been potentially related to these changes?

*Lisa Etherington:* Right. I know there have been predictions in terms of the changes in the intensity and the timing of upwelling. So, that in 2005 and '6 where the Cassin's auklets didn't do well, that was a year where upwelling was much later. It was very strong later in the summer, but it's that crucial time period in the springtime when a lot of these organisms are trying to feed their young where it's a critical reproductive time period that they're really counting on that food resources out there.

So, if upwelling timing and intensity is altered, then that's really going to have a major implication on the ecosystem. So, any kind of disruption like that could be a trend or something that we're seeing with climate change.

*Jennifer Stock:* It'll be interesting to see what's going to happen this year. It's...I mean, just like you were saying early with timing of it all, the Cassin's were ready to breed, but the food wasn't there a couple years ago and it sounds like this year we may have a nice early start. So, it'll be interesting to see how it carries out. As far as...we know this climate change is going to happen and what are the ideas behind...how can we best prepare for it to come? And it sounds like, duh-duhhhh...this huge doom is coming, but there's change happening and so, what is the best thing that we can do for marine ecosystems that are really productive like this region here between Gulf and Cordell as far as preparing for the worst?

*Lisa Etherington:* I think one of the things we want to do is try to reduce as many of the other threats that we possibly can. If we can't control much of climate change, at least on our local scale here, we can try to

eliminate all those other things that might be causing harm to the ecosystem. So, instead of having climate change adding on top of four or five other things that are causing stress to the system, if we can reduce some of those other stressors, then hopefully we can have a more healthy ecosystem with all of its, sort of, functioning parts. So, if we're able to kind of increase the overall biodiversity in the ecosystem functioning, then hopefully it increases the ability of these systems to be able to adapt to climate change.

*Jennifer Stock:*

Excellent. I was listening to CNN a couple of...it was last year and there were a couple people testifying to a climate change committee about the marine environment and they were really talking about making these buffers, these areas...reducing the impacts to help and also creating more marine protected areas which is part of reducing impacts. So, it was kind of interesting to see. So, we've got a couple minutes left here and as marine scientists, you both see these micro-levels, like we were talking about earlier, the currents and these, oh, what is the word?

Anyways, these micro-level patterns where you can really tell the outflow of the Bay and how it effects the ecosystem and what not, but most of us here in the Bay area, I mean, we realize we have the Bay and the ocean, but what do you think is the most important thing for people to keep in mind when they're thinking about voting or...what do you think the most important thing they need to know about the ocean in regards to being a good marine ocean steward?

*Jaime Jahncke:*

I guess you were talking about meso-scale features. Those miniature, small types of processes in the ocean. I guess the point is that the ocean is not just a bathtub filled with water. You have a very variable and very dynamic ecosystem and we really live from all these layers and all these specific features, which allow for production, phytoplankton, and to aggregate in specific areas where birds and mammals and other fish can make use of them.

*Lisa Etherington:*

Yeah, I mean, a lot of us may not get out to, particularly, Cordell Bank Sanctuary. I know it's pretty far out there. Some hardy fishermen might get out there and some to do some whale watching and observations of sea birds, but for the rest of us that maybe don't get out there very often, just the understanding that the ocean really provides so many ecosystem services to humans.

Atmospheric and climate regulation is something that we don't think about that the oceans play a really important role in.

Phytoplankton are producing about half of the oxygen that we consume. So, we don't see those little microscopic plants out there, but they're doing a good job producing oxygen for us and, of course, a lot of our food comes from the ocean. So, we need to appreciate it, even if we're not able to get out on the water ourselves.

*Jennifer Stock:* Excellent. That's great. Are there any resources or websites that either of you would like to share to allow people to learn a little bit more about the work that your organizations are doing?

*Lisa Etherington:* We do have one website with the Central California sanctuaries that is really kind of a compilation of the natural history of Cordell Bank, Gulf of the Farallones and Monterey Bay National Marine Sanctuary and it's called The SIMN Website, or it's Sanctuary Integrated Monitoring Network and I believe it's [www.sanctuariesimn.org](http://www.sanctuariesimn.org).

So, that's one place where you can find out a lot of information on the different animals and the habitats in the sanctuaries and then it also lists all the research projects, not all, but at least some research projects that are going on in the sanctuaries and you can find out more about PRBO Conservation's work in the sanctuaries there.

*Jennifer Stock:* And there's some graphs and what not I've seen on that website that kind of show the trends to date. So, a nice place to get some visuals for all of this. How about you, Jaime? Any things you want to add?

*Jaime Jahncke:* You can also visit, I guess, PRBO website, [www.prbo.org](http://www.prbo.org), but most of all our information and the data that we have collected jointly on the cruises is posted at the SIMN website and you can see, like, there's multiple figures there and you can really see what's going on out there on the krill and the ocean and the birds.

*Jennifer Stock:* Yeah, and one other website I wanted to add to that, actually, it's off the PRBO website, but I check in on it every once in a while, is the Farallones blog, [LosFarallones.blogspot.com](http://LosFarallones.blogspot.com) and I just think this is so cool that you guys are doing this because it's such a place that people are not allowed to visit.

It's a refuge and the biologists out there that work for PRBO are creating updates that people can see with photos some videos and seasonal things that are happening on the island. So, it's a great

place. [LosFarallones.blogspot.com](http://LosFarallones.blogspot.com) and I believe there's a link off PRBO's website too.

*Jaime Jahncke:* Yes, you're right.

*Jennifer Stock:* It's really cool. That's what I was learning about when the elephant seals were coming back and checking in on when things are going on. It's fun. Since I can't get there I like to watch it remotely. Anyway, I just want to say thank you so much for sharing your time with us today. I know you both are incredibly busy, writing grants, trying to get money to help do this work and your passion and your energy for this is so important. So, thank you for taking the time to come today.

*Lisa Etherington:* Thanks for having us.

*Jaime Jahncke:* Thank you for inviting us.

*Jennifer Stock:* Ocean Currents is part of the West Marin Matters series each Monday at one o'clock. You can tune in to learn about environmental and economic issues that pertain to us locally and globally. To hear past episodes of Ocean Currents, you can go to [cordellbank.noaa.gov](http://cordellbank.noaa.gov) and click on the radio show link and you can sign up for our podcast there too if you want to hear the shows from the past.

Next month on the show, I have an author coming on, Dan Bartolotti, and he's the author of Big Blue and it's a book that was recently published on blue whales and so far, this is one of the only books I've read that really has a comprehensive look at their natural history of what we know about blue whales, which you can imagine being a pretty hard thing to understand and our human history of whaling, which was a really difficult part of the book to read, but really interesting as well.

So, Dan will be talking about his book and the scientists that he worked with to talk about the current research and efforts as well. So, that should be interesting next month. But, until then, thank you for tuning in again and remember, these coastal winds are actually a very good thing for the food web out here. So, hold on to your hats and enjoy the upwelling and we will be back next month. Thanks so much for tuning in.

(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 of this program may or may not be that of the National Oceanic and Atmospheric Administration, and are meant to be educational in nature. To learn more about Cordell Bank National Marine Sanctuary, go to [cordellbank.noaa.gov](http://cordellbank.noaa.gov).