

*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!

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*Jennifer Stock:* 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, kids, authors and more all uncovering and learning about the mysterious and vital part of our planet, the blue ocean.

I bring this 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, are the Greater Farallones and Cordell Bank National Marine Sanctuaries which together protect 4,581 square miles of rocky shorelines, sandy seafloors, rocky banks, deep sea canyons and maritime landscapes and artifacts.

I've been off the air for a while and I'm so excited to dive back into ocean interviews to share with you listeners. I'm always open for suggestions for shows and interviews, so just a little promo at the beginning of the show. Please let me know what you want to hear about. You can email me at [jennifer.stock@noaa.gov](mailto:jennifer.stock@noaa.gov). It's a fresh year and I'm just thinking about what we'll be discussing on Ocean Currents.

Today I'm delighted to welcome an old friend and colleague to the KWMR studio, Dr. Sarah Allen. Sarah recently retired from the National Park Service but continues to serve as a leading expert on marine ecology, marine mammals, Marine Protected Areas and her local specialty of pinnipeds. It's January and that means it's elephant seal season here in the Point Reyes National Seashore. We're going to talk elephant seals a little bit and a lot of other things too. Welcome Sarah to Ocean Currents.

*Sarah Allen:* Hello Jenny and Happy New Year to you.

*Jennifer Stock:* Happy New Year! It's great to see you in the studio. I haven't seen you in a while so I think we are going to have a nice chat talking

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about all things ocean. Last year, about a year ago, about this time, elephant seals expanded their range a little bit in the park. While the government was shut down and few government employees were around, they moved right on in to Drakes Beach. A couple have showed up again this year and I'm wondering if we could just talk a little bit about that. What led to this expansion?

*Sarah Allen:*

The elephant seal colony actually started in 1980 as an expansion from the Farallon Islands and from Año Nuevo. This is an amazing example of recovery of a species that was hunted intensively and they're expanding from their site at Point Reyes over the past 30 plus years from the Headlands, which is where they initially got established, and they spilled over onto Drakes Beach near Chimney Rock and now they've been expanding all along the beach. We've been fending them off from Drakes Beach parking lot for a number of years because we saw this expansion occurring. We have our methods for scaring them off with a tarp which they seem to be frightened of. Not car horns or pots and pans banging, but this blue tarp makes them scatter into the ocean. So we've been working hard to deter the males and females from getting established. But during the government shutdown we couldn't do that and they promptly moved in associated with big storm waves. That's what is kind of a pinch for them is when there's a big storm wave it pushes the animals around. Right now is when the females are pouring into the beaches from their long voyages offshore in the deep ocean. They're pouring in to give birth and this is when it starts taking off. This week there were 50 females, or something like 50 females right now, and two weeks ago there was one. They're starting to take off pretty quickly and as they pour in, they poured into Drakes Beach, and no one was chasing them off. They took over the parking lot, the islands, they went up the ramp to the visitor center. They had a good time.

*Jennifer Stock:*

Like "It's our time. It's our time to be here." Some people might wonder; why would you chase them off the beach if they're there? Why do we chase them off the beach?

*Sarah Allen:*

When I was working for the Park Service, and remember I'm retired now so I don't speak for the Park Service, but at the time we felt that it was a major safety issue. They have a big mouth and they bite. People are not always intelligent about how they approach a large, wild animal. You can get close to elephant seals which is really unusual for a large, wild animal. Think bison in Yellowstone. People can get amazingly close, but they put their lives at risk. That's what we're worried about is people getting bit

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and people perhaps harming elephant seals because they don't understand what their actions can do. So we wanted to keep them separate, and the Marine Mammal Commission said that we could scare them off of this public beach, "public beach", because we have a visitor parking lot and a concentration of the public. So we made that effort, but we failed. [laughing] Once you have a female with a pup, you're not going to move an animal around. It's not possible. It's dangerous, and you run the risk of having the pup abandoned by the females. Once a female comes in and gives birth, you can't do anything.

*Jennifer Stock:* Yeah, speaking from the human perspective, if I was pregnant and getting ready to deliver, I would not wanna be shushed off anywhere.

*Sarah Allen:* No, but you wouldn't want to be on a beach where there are a bunch of people either...

*Jennifer Stock:* That's right. Stressful.

*Sarah Allen:* ...There is a kind of an inherent intolerance to being around people. A pregnant female may come in and see a lot of people and say, "Well, I think I'll go down to the beach 100 yards south where there aren't any people and I can quietly give birth and nurse my pup."

*Jennifer Stock:* So that's the hope with this deterrence is to try to get them back to the places where it's quieter, safer for them, safer for everybody. How are they doing this year?

*Sarah Allen:* This year were being pretty successful [laughter], but not with the males. It's the females that we want to keep out. We try and keep the males out, but they're going to keep pouring in. With the females we are being, so far, effective. I think there have been a couple that have come in, but they've left and gone back to these other areas where there's a concentration. We had some big waves a couple of weeks ago and even last week, you probably read about that. Those waves carved out a huge amount of sand. Now the waves come right up to the bluff at high tides, so there are places that they used to use last year that they can't use this year. Last year there were 600 pups that were born between Chimney Rock and Drakes Beach. That's the highest we've ever counted in that section, but it also was a mild winter in January, February, if you remember.

*Jennifer Stock:* Right. The storms are a big part of that. One thing that's been on my mind is sea level rise is part of this in terms of where they might move to as the sea level comes up and storms continue to come. For the pinnipeds, we have harbor seals, California sea lions, occasionally Northern fur seals around or Guadalupe fur seals have even come ashore, but elephant seals seem to be extremely resilient to a lot of the changes that have happened in the ocean short term and long term. Whereas California sea lions, we really see them coming up on the beaches super skinny or super sick in response to algal blooms in the water. How are elephant seals so resilient to these changes in the ocean?

*Sarah Allen:* Well they feed in a completely different area than the California sea lions or even the harbor seals. They feed in the deepest ocean far from shore. Whereas the sea lions are feeding in the California Current which is driven by coastal upwelling and the California Current, itself, upwelling, and that's a distinct ecosystem that many marine mammals are dependent on, but elephant seals are disengaged from that. They don't rely on that ecosystem for their food. In fact, there was a study just done in the past few years, several studies, but one that identified that lanternfish, which are really deepsea fish and they have bioluminescence, are a big part of their diet. That's new information. Deepsea squid, ratfish, things that you would not want to put on your plate [laughter], are what they're forging on. That is a least affected area in the oceans right now. The California Current is affected because of those wind changes during El Niño events, but elephant seals, even in big El Niño years, elephant seals are affected. That showed up in '98 when many fewer female elephant seals came back pregnant during that. So they lost their fetus or they reabsorbed their fetus or didn't get pregnant that year. Even they are affected by El Niño years. I've queried a colleague of mine who's a scientist at Sonoma State, Dan Crocker. He's one of the leading researchers for elephant seals in the world. He's tagged probably more elephant seals than any researcher. I queried him how The Blob, which you are familiar with, but for listeners, The Blob is this big warm water mass in the Gulf of Alaska, how that might be affecting elephant seals because that's a new phenomenon and it may have long term effects for elephant seals since many of the males feed up in that area. I'm waiting to hear if he's done any analysis of that because that's a new phenomenon that's just being studied.

*Jennifer Stock:* From my understanding The Blob is setting up again this year in the North Pacific.

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*Sarah Allen:* It has set up several years since it was first identified, but then kind of dissipated. We'll see if it carries through. It sets up over the winter. What The Blob is actually is there are fewer storms in the southeast Alaska. Consequently, there's less turnover of the ocean, which would bring up that cold water from the depths. So instead of being turned over you get this warm mass of water sitting on top of the ocean water and that is brought South. That's how we get it. If you don't have a lot of storms in the Gulf of Alaska, you may develop this warm water mass called The Blob - a very important scientific term.

*Jennifer Stock:* I know, it's so funny. I'm surprised we haven't had another term for it yet.

For folks tuning in this is Ocean Currents and I have Dr. Sarah Allen here talking with me. We were talking about elephant seals and their resilience, so strong. When you talk about the different habitat that they utilize, it just made me think, in the last two years we've had this opportunity to actually look at that environment with the National Marine Sanctuaries with the Nautilus and the remotely operated vehicles. There was one dive we did where we went through, right on the edge of the continental shelf, where we went through a pretty deep layer of, I think, they were hake. It was just thick hake and then as you get deeper and deeper, less and less fish. That was a very significant zone that we went through. I'm pretty sure they were hake.

*Sarah Allen:* California sea lions feed heavily on the hake, by the way.

*Jennifer Stock:* So they feed down there too?

*Sarah Allen:* They feed along the shelf edge where hake are. They feed where there's a high abundance of food so they'll key in on migrating salmon, they'll key in on herring. It's whatever is super abundant at the time, sea lions will follow.

*Jennifer Stock:* Very opportunistic.

*Sarah Allen:* Yes, but what's different about elephant seals is they don't feed cooperatively. They're not herding fish; like sea lions and harbor seals are well known for herding fish together cooperatively. Elephant seals are not thought to do that. They may feed in the same area on the same type of fish and they may learn from each other. We don't know. We're just starting to scratch our understanding about that. They are likely feeding on individual fish

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and less so schooling fish. However, this new study was showing that they were following the deep scattering layer, which is a layer of all sorts of marine organisms, as it goes up and down. That's keying in on a mass of potential prey, a concentration. That's different.

*Jennifer Stock:* That's exciting.

*Sarah Allen:* Yes.

*Jennifer Stock:* While it was really cool down there, I was hoping that we'd see an elephant seal. [laughter]

*Sarah Allen:* No, but you know there has been a video at a thousand feet of an elephant seal that was taken off of British Columbia. It was at 1000 feet and it was a remote operating vehicle that was down there to measure hagfish. There was a yardstick next to this light that was down on the yardstick and the researchers were measuring the hagfish as they went by. They were using community science volunteers to look at these reams and reams of videos, and, all of a sudden, the snout appeared in the edge of the camera and sucked the hagfish...

*Jennifer Stock:* Oh my gosh.

*Sarah Allen:* ...and so one, it was an insight in that it was taking advantage of the light to grab the prey, but also that it sucked and it didn't chew. You'll see there are a lot of marine organisms that feed by sucking at depth.

*Jennifer Stock:* Wow.

*Sarah Allen:* Think beaked whale that have no teeth. They suck.

*Jennifer Stock:* Interesting.

*Sarah Allen:* Sperm whales likely suck their prey in and not chew even though they have teeth.

*Jennifer Stock:* So the teeth might be to grab something bigger since they can use multiple niches of sucking and biting. Wow. That is amazing.

*Sarah Allen:* One thing about the resilience, I wanted to get back to you about, is we've been watching the shoreline change at Point Reyes and how the elephant seals have shifted around because of that. There

might be big waves that carve out the sand and they'd have cobblestones and they may not want to use that, but there might be another slide in another area that creates a huge sandy beach and they'll immediately, the next year, take over that beach and start breeding there. So they're adapting to how the shoreline is changing. It's eroding, but new sand is being deposited, too. There's this kind of give and take that you're seeing along the shoreline; the ever-present carving out, but then redeposition. So it's an interesting play back and forth that they are adapting to in that way.

*Jennifer Stock:* That's interesting.

*Sarah Allen:* The pups can't swim at birth though so if you have these big storm events at a time when the pups are very small, say less than 10 days, they are less able to survive.

*Jennifer Stock:* OK, so elephant seals have quite a few different niches. They're responding to the changing shoreline here in Point Reyes and time will tell basically of what's going to happen in these more public beaches. We all just need to be more aware of what we're visiting. I was at Drakes Beach on Friday. There were a lot of people that were very close to elephant seals. It made me very nervous. I was totally off work; I was just with my family and very concerned. I hope people are really paying attention and keeping a smart distance of over 2 car lengths away has been the recommended distance.

*Sarah Allen:* Yes, if you see them reacting to you, you're too close. A good rule of thumb is about two car distances. Now a male sound asleep may not respond to you, but it's always safe to keep that distance. Females with pups are highly aggressive and will charge you.

*Jennifer Stock:* It's too early for pups at this point, right? Or no, there was one pup that was born already?

*Sarah Allen:* No, there are 49 pups right now.

*Jennifer Stock:* Oh my goodness.

*Sarah Allen:* Yeah it's taking off now. The first pup was just before Christmas and now there are 49.

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*Jennifer Stock:* Wow. We have some audio. Let's listen to some elephant seal sounds and talk a little bit about what we're hearing. These are females, right? Some bugling in the back.

(Start Elephant Seal Sounds)

*Sarah Allen:* Bugling would be males.

*Jennifer Stock:* Yes, bugling will be males. I'm going to keep these sounds on. I'm going to get you some headphones.

(Elephant Seal Sounds)

*Jennifer Stock:* All right so you can hear them now.

*Sarah Allen:* Now I can hear them. That's a whole colony sound. You hear the squealing of the pups; they sound like a little chimpanzee. The females that are growling kind of a little popping noise. Then the males which are trumpeting. They use that nose as a resonating chamber for their vocalizations. It sounds like a single-stroke engine. That bellowing is a female.

*Jennifer Stock:* The bellowing?

*Sarah Allen:* The bellowing would be a female, and then they warble. Females will warble at their pups and bellow at males. That little "arr arr" that's a female talking to her pup. There's a lot of physical contact between the females and the pups. They stay with each other. The female stays with the pup 30 days, on average 33 days. Unless they're separated because of storms or males or fighting, because females fight too, they stay closely together and the pup is nursing or sleeping.

(Stop Elephant Seal Sounds)

*Jennifer Stock:* We'll come back to some of these in a little bit. Oh my gosh. So exciting.

*Sarah Allen:* Well the males, there's been a lot of research on the males on their vocalizations because it's so different. That nose when they're onshore is very long and pendulous, but when they're at sea it becomes wedged-shaped. Otherwise it would hinder their ability to swim through the water. When they are onshore, they will trumpet with it.

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(Start Elephant Seal Sounds)

*Jennifer Stock:* I think this is some trumpeting.

*Sarah Allen:* See why people call it a single-stroke engine.

*Jennifer Stock:* Yeah

(Stop Elephant Seal Sounds)

*Sarah Allen:* The studies done by researcher Caroline Casey from UC Santa Cruz who's been looking at the vocalization; she's done some really exciting things. She's come up here to Point Reyes and recorded the vocalizations of males too. Those males that have deeper voices and can trumpet longer tend to be the alpha males and that's very similar to other large mammals. It's a measure of fitness that if you can hold your breath a long time that means you can dive deep and really get a lot of food.

*Jennifer Stock:* So you're very fit.

*Sarah Allen:* You're very fit. Males will often practice trumpeting against hard surfaces like rock faces or even under the docket at the lifeboat station. They'll go under there and it makes him sound really big. The other research that she showed is that males learn other male voices. They're actually responding not necessarily to the depth of the voice, but they're responding to knowing that male before and memorizing his voice. That's unique because she took vocalizations from alpha males down on Año Nuevo and brought them up to Point Reyes, and the alpha males at Point Reyes ignored them.

*Jennifer Stock:* Interesting.

*Sarah Allen:* It gives the impression that they've learned and there is a dialect. But then she was comparing vocalizations of animals recorded 40 years ago to today, and she found that the vocalizations are more complex and more individual. So there's a separation; dialect is less important. It's a whole new science where she's looking at this. It's very exciting.

*Jennifer Stock:* That is amazing. I know there's a lot of work trying to understand whale vocalizations and dolphin echolocation sounds that they put out, but I hadn't heard about elephant seal vocalization research. That's amazing.

*Sarah Allen:* What I think is to come is this vocalization underwater because many animals use vocalizations underwater that we're just learning about. Sea lions are well known for barking underwater. Elephant seals must be vocalizing. They blow bubbles a lot underwater so they may be vocalizing in other ways underwater to communicate.

*Jennifer Stock:* Amazing. That is so fascinating. In terms of the behavior that we see on the beach, so right now at Drakes Beach there a couple big males and there's been some fighting and some moving around. You can just sit there and watch. You can pretty much tell what's happening. It seems like most of the females so far are a bit further down the beach. Is this just sort of a setting up of a harem? Are elephant seals kind of dominating and communicating to each other about who's the best, who's going to be able to move in? And is that happen on the outskirts or does it happen in the middle of the colony too? I've heard of "Loser's Beach" where the offcasts have to end up and then they duke it out a little bit.

*Sarah Allen:* There are lots of strategies that have been teased out by watching how these colonies form. Even in the main colonies where there've been concentrations for decades, you'll find a larger male arriving maybe early and just defending his place on the beach. They're not defending a territory like you see for other mammals and birds. They're defending their place next to where the females are. So you may see an alpha-type male early on, but remember they're fasting the whole time that they're there, and it can be up to three months. There's a tipping point; do you come too early and you lose out at the end? Or do you come a little later and displace who might be there? That's one strategy. There is a strategy by some males that hang out in South Beach. All along South Beach you see these enormous males. Rightfully, you'd think they would be alpha males, but they're just resting on South Beach. I wouldn't call them "Losers". They're big males. But when the peak of estrus occurs, when most of the females are receptive to breeding, which is the first or second week of February, those males at South Beach come around and flood the beaches. An alpha male can't fend off all those males. That's a different strategy. We discovered that about 20 years ago at Point Reyes where there was, on South Beach, these enormous males and they just waited, bided their time; they're not waste wasting their energy with big fights. They're fighting a little amongst themselves but not much. Then a third strategy is these younger males that are about the size of a female. They sneak into the side of the larger harems and try to mate with females. Now usually a female is going to fend off

because she doesn't want to be bothered by this younger male, and the alpha male will intervene or a beta male will intervene, but sometimes they're successful.

*Jennifer Stock:* Amazing. Here at Point Reyes you were a huge part of all this monitoring, but you can't possibly do all this by yourself. Who else is involved with monitoring elephant seals out here in Point Reyes?

*Sarah Allen:* Volunteers are the backbone of all of this program. For many of the monitoring programs in National Parks, generally in Sanctuaries, that volunteers are the backbone. There are volunteers from the local communities and from the East Bay and the South Bay and San Francisco. We draw from a whole range of people who have an interest. Initially when we started monitoring in the '80s we had volunteers from Año Nuevo who already came trained. They already had studied down there and they were helping us up here. Right now, for example, we have a person from Bolinas, Marjorie Cox, who is incredible. She worked on the Farallones with Point Blue Conservation Science for a season, so she came experienced. We hired her last year as an intern to work for the season, and now she's invaluable. She's terrific. She's very competent. She's smart. She's fun. She surveys 3-4 days a week with us. Our surveys are counting the seals, but we also go back and we read what are called flipper tag. They're tags that we attached to the rear flippers, or other researchers attached to the rear flippers, and we collect that data and share it with all the other colonies. We have several layers of studying that's going on. Then there are a couple of other people from Bolinas. There are people locally. In Inverness John Longstreth is going to help me on Thursday survey. Sue Vanderwall is another one. Many people from the local community help because they have an interest and luckily they have some time.

*Jennifer Stock:* That's wonderful. That's fantastic.

*Sarah Allen:* I want to just re-emphasize. They are the backbone. Their experienced and we train them and they come back. So there's a high retention. I think Sue Vanderwall has been volunteering for 20 years. That's an incredible commitment. To her and to many of us, now I'm volunteering, to us it's a seasonal rite of passage in the winter that the elephant seals are back, we're out there, it's beautiful in between the storms, and it's a gift to be out here.

*Jennifer Stock:* It's a privilege to have this opportunity, honestly. The national seashore and the beauty and the cycles that we have here. I think about it every year like this is amazing. We have these amazing mammals on our beaches that we get to watch and enjoy and teach others about. Not all parts of the planet have such incredible biodiversity and I just remember every year how incredible it is. I really enjoyed sharing it with my son last week when we were out there.

*Sarah Allen:* I was telling a friend of mine over the weekend, "Go to Drakes Beach!" She has twin 7-year-olds. I said, "Go to Drakes Beach. You're like 20 feet away from these big males." What seven-year-old ever has that opportunity to see a wild animal and then to imagine where it's been, where it goes, how deep it dives, what it sees at that depth, and it takes you out of yourself to think of what they do. They're just an amazing, extreme example of mammal existence.

*Jennifer Stock:* Elephant seals have come back from this brink of extinction. You know, they were hunted to near extinction and have rebounded. What are some of the other threats that they face now as we have changing climate and marine debris and overfishing? What are some of the most direct threats to elephant seals? They seem to be doing great.

*Sarah Allen:* They are. Their population's increasing at about 3-5% per year in some colonies. I think down in San Simeon that population is increasing higher, like 8%. They're incredibly resilient, but we don't know how much. Genetically, there's some concern about the protein, their monoproduct alleles. Recent research has shown that there's actually a lot more genetic diversity than initially thought and that the northern colonies which include Año Nuevo, San Simeon and Point Reyes, those colonies are statistically different from San Miguel Island. Whether that's biologically different is not known. There is some difference between those two groups so there may be these subpopulations. There's that one concern because they went through not just one but two genetic bottlenecks. The first genetic bottleneck was from hunting because of their blubber yielded cooking and heating oil and the second bottleneck was because scientists from the Smithsonian killed the little colony that they found on Guadalupe Island. They hunted those ones that were there breeding. Luckily, most elephant seals are at sea and fewer concentrated on shore at any one time, so they didn't kill all of them. You can go to Cal Academy and you can

see the bones of elephant seals collected at Guadalupe Island in the late 1800s.

*Jennifer Stock:* Wow. That's cool.

*Sarah Allen:* Back to your thing about threats. There's that potential genetic one because of the bottlenecks. Sea level rise. It depends on the habitat and where they are. If it's an island, the Farallon Islands, for example, was an important colony. During storms the sand was washed away, carved out. They hardly use the Farallones anymore. There are about 100 pups born there every year. That is a potential. The food and where they feed. There is evidence that El Niño's warm water events can affect even their prey at the deep, deep water. So that is of concern. Plastics occur on their necks when they swim through the Garbage Patch, that's one of the areas where they feed in the Pacific Gyre. But we don't know to what extent animals are affected by that. It seems to be a small percentage that come on shore with plastic wrapping around their neck. We don't know about the plastic in their gut and that would require more intensive study. So how that might be affecting them.

*Jennifer Stock:* Just to let listeners know, this is KWMR, Point Reyes Station. You're listening to Ocean Currents here with Sarah Allen as my guest and this is Jennifer Stock. We're going to take a quick, short break. I'm going to give you some more elephant seal sounds to listen to while we just take a quick break and come back in just a moment.

(Elephant Seal Sounds)

*Jennifer Stock:* You've been listening to some elephant seals sounds that actually were recorded in Año Nuevo by acoustician Jay Salter. This is a CD he lent me that he took some very high resolution audio recordings to share. Thank you, Jay Salter, for sharing those sounds of all the elephant seals to really get you immersed in that colony.

You're tuned here to Ocean Currents. I have Dr. Sarah Allen in the studio with me and we're talking about elephant seals and also some of the other marine ecosystem wonders that we have around the waters at Point Reyes National Seashore. We were just talking about recovery and some of the other threats that they face. One of the questions I was wondering, since elephant seals have made this amazing recovery and we have so many other mammals and species that are down in numbers, are there lessons learned from

the elephant seal recovery that could be applied to others species in recovering those populations?

*Sarah Allen:* When the elephant seals were first discovered, it was on Guadalupe Island off of Baja California. There were several other pinniped species. In fact, the Mexican government stepped in right away and established it as a pinniped reserve. Because of that those other species also have rebounded. To me it's emblematic of: you protect an area, and they will come back. We have seen that time again in many examples. I just think of the Giacomini Wetland Restoration and all the species that have returned or benefited from that restoration effort to Tomales Bay. The elephant seals are yet again an example of that.

*Jennifer Stock:* Drakes Estero as well.

*Sarah Allen:* Drakes Estero, yes. The newest elephant seal colony is now in the Lost Coast in Northern California and that's fast growing. A little colony. It's about an hour hike along that trail on the Lost Coast on BLM (Bureau of Land Management-CA Coastal Monument) lands. There again, a protected area where the colony could get established. That example of Drakes Beach parking lot being taken over when it was shut down, that's a window on how little colonies get established. If you want a colony to get established, make sure that you have some protections there. Whatever they are. You protect their breeding sites because as a pinniped they have to come on land to breed. The same thing for Guadalupe fur seals. Their population's also recovering and they were discovered on Guadalupe Island by a researcher in the '50s. He thought they were extinct and he found them in caves. So here is a species that had a little niche in the caves in Guadalupe Island and that's how they survived from hunting and from temperature down there.

*Jennifer Stock:* Amazing.

*Sarah Allen:* Marine Protected Areas in particular now in California are hugely important. Especially with our better understanding of changes in climate. These little protected areas, and I say little because they only represent 18% of the State waters, they are refugia for species that can be protected with changes. That refugia might be because that's where there's kelp or there's freshwater flow in there or they're protected breeding colonies, but for whatever reason those Marine Protected Areas are exceptional and will help species transition to these different conditions. That's what climate change is; it's a different condition. Some animals have been highly

adaptive in the past to changing conditions and we may see that again. I'll give you one example that always shocked me. We know that gray whales were hunted in the Atlantic. There was a gray whale population in the Atlantic Ocean and they were extinct by the 12th century. Well in the past 20 years gray whales have been identified in the Atlantic Ocean. The only way they got there is through the Arctic waters. So with global warming, these waters are opening up; opening up different habitats for gray whales. They may benefit. They may not. They feed differently from say humpback whales or blue whales which were really tied to the California Current. Gray whales are mudsuckers. They eat the organisms that are in the mud. They'll eat krill. They'll eat things that are in the water column, but they really are mudsuckers. So are they better adapted? We don't know. Last year there was concern because there was a major die-off of gray whales. To put it in perspective though that last year was also the highest count ever made of gray whales, 25,000, since they were hunted. There is some thought that it may be higher than prehistoric levels.

*Jennifer Stock:* Wow.

*Sarah Allen:* If you have some die-off, proportionately, it wasn't very high into what that population was. Sue Moore who studies gray whales has said 'Let's just put this in context' and yes there was less food for them, but there are some gray whales that don't migrate up North; they stay year-round off of the Oregon Coast. They've found food in that zone that sustains them year-round.

*Jennifer Stock:* We have a few around here as well. Has it always been that way where we've always had some residents? Or a fairly recent phenomenon that they've stayed?

*Sarah Allen:* I'd say it's recent in that we've seen it and documented it in the past 20 years. They were feeding at the mouth of Tomales Bay 20 years ago. I think there were eleven seen at one time. I've seen them myself feeding and they've been feeding in Tomales Bay and around the Farallones there maybe once. They were thought to be juveniles but now they're actually adults that are doing it. So why go all the way to Alaska which is energetically kind of costly, unless you want to go on a trip to see some different locale, when you can find the food you need nearby.

*Jennifer Stock:* This might be a real jump off, but you know Drakes Beach has been such an interesting area with a lot of phenomena showing up at the beaches and getting people interested in what's happening in

the ocean. This year, about a month ago, we had fat innkeeper worms wash up in abundance. Is that a potential food source of gray whales because they live in the mud and the like subsurface...

*Sarah Allen:* They might.

*Jennifer Stock:* ....when they sift through?

*Sarah Allen:* Yes. I don't remember the specifics of the types of organisms, but a lot of polychaete worms, amphipods, have been identified. I don't know why it wouldn't be innkeeper worms. The gulls certainly went after them. They were a huge flock. I happened to be there during that time, not on the beach, but I was looking at them with a spotting scope. It was just hundreds of Western gulls. Not just Western gulls but hundreds of gulls. I didn't see any other birds feeding there which I found interesting. It was a concentration of gulls.

*Jennifer Stock:* I just thought of that because that phenomenon happened; it was so unique. They live in the soft sediment and I wondered if that was a potential, something that gray whales would suck up when they are skipping along the bottom.

*Sarah Allen:* I've seen them feeding in Drakes Bay intensively with mud pouring out of their mouths. Your colleague Dan Howard when he was diving in Drakes Bay said it's carpeted in mysid shrimp. I know that they like mysid shrimp and it may be that they are feeding on the shrimp both in the mud and when they swarm above the mud. One time I was watching off of Point Reyes headlands a gray whale feeding and diving continuously in one place. Obviously, it was feeding on something, but it was feeding with about 200 eared grebes. They were all feeding on the same thing as they kept diving together. I'm not sure whether the grebes were keen into the food or into the gray whale and disturbing the mud or sand.

*Jennifer Stock:* Interesting. Wow, cool. Now that you're retired you are going to have more time to be making all these amazing observations about what's happening in the ocean. I'm assuming you'll be maybe spending time on the coast and watching to add to your incredible knowledge of what's going on in the ocean.

*Sarah Allen:* Well things change, don't they, Jenny.

*Jennifer Stock:* [laughter]

*Sarah Allen:* I love being at sea and so I'm hoping for more opportunity to be on the water. I will forever be tied to this coastline. I grew up here and it's in my soul. I love to get that next generation up and going. Working with people like Marjorie and other young people, and students to get them interested in marine life because there's so much. We're just scratching the surface. There is so much and it seems magical sometimes what you see and hear and learn about. The potential for scientific discovery is extraordinary. We don't necessarily need to go to the moon to find incredible discoveries, as you well know, in the deep sea. These are the vehicles to that deep sea. Elephant seals are used by scientists to understand the deep sea because they come back to the same place on shore and they can retrieve these incredible gizmos that they attach to them.

*Jennifer Stock:* They're amazing. So we talked a little bit about gray whales which are also starting to move South. Their numbers are starting to show up a little bit. They saw about 9 this weekend moving South. But we're also talking about orcas, and orcas come through occasionally. There are a couple different pods of orcas, so which pod of orcas are we talking about that spend time off our coast right now?

*Sarah Allen:* Actually, there are three different types of orcas. They are called ecotypes and they may become different species. Genetically, they're actually different, but they feed on different things. The one that people are probably most familiar with are the ones in San Juan Islands that feed on salmon because there's a lot known about those pods. They're actually lettered pods: J, L, K, and I can't remember the other one. Those pods, that population is shrinking. The oldest they've documented, the oldest female, it's a matrilineal society, was over 100 years old. They feel she died recently. They go through menopause. It's documented, a female of another mammal, actually going through menopause. Anyway, that's one group. Their population is declining because they're dependent on salmon and fish. They actually come down to Monterey Bay and have been documented because individuals have been identified. They've seen the individuals down in Monterey Bay and they have been seen down in Drakes Bay. Drakes Bay is a concentration area for a lot of fish. Some salmon scientists think they're entrained in there meaning they're kind of pool in there before they may go into San Francisco Bay to spawn. It might be a concentration area for them. That's one group, one ecotype. They're called the southern Resident. Then there's the Transient ecotype. They are the ones that eat mammals. Those are the ones that are seen in Monterey

Bay but they're seen all the way up into Alaska. They're transient. That's why they're called Transients. They move up and down the coast. That population is actually increasing. The thought is that it's increasing because they're feeding on gray whales and the gray whale population is rebounding. They try and feed on other mammals but they're concentrating on gray whales. I am speculating that as the elephant seal colonies get larger, more or concentrated, that they will switch prey and also feed on elephant seals. They have been documented to feed on elephant seals in other parts. Even in the state of Washington they've been documented to feed on elephant seals. So those little plump weaners that are just floating along on the shoreline; easy pickin's for an orca. In fact, I talked to the researchers down in San Simeon and they said they've seen orcas around that colony. Perhaps in the next 5 to 10 years we might see more orcas.

*Jennifer Stock:* Interesting.

*Sarah Allen:* Yes. The third type of orca is called Offshore, and that's because it occurs mostly offshore. We know less about that group, but they do feed on sharks, primarily sharks, but not necessarily exclusively on sharks. One of the key indicators of their feeding on sharks is their teeth are all worn down because shark skin is like sandpaper, so they just wear down. I was lucky to help collect one for Cal Academy of Sciences that washed ashore at Tomales Point a few years ago. In fact, Joe Soule discovered it from Point Reyes when he was out hiking and he reported it. Cal Academy went down. The Park went down. We collected the whole skeleton because there was never a whole skeleton collected of this ecotype before. It's hanging in Cal Academy of Sciences right now.

*Jennifer Stock:* Oh that's the...

*Sarah Allen:* Yeah, that's the skeleton. It was assembled. There's a whole video on the assembly of it that Moe Flannery and others, Moe Flannery is the Director of the Mammals and Birds Section there. It was really fun to see that assembly. They found that this was a young male that had been documented in British Columbia even. But it had an injury to its rib cage that had been re-injured. There was some thought that it was being beaten up by another orca because it was a young male and they tend to be aggressive to each other. That's speculation.

*Jennifer Stock:* Wow, fascinating. There's so much social structure to mammals that we just don't know yet. We see some things that we can relate to as humans, but it's interesting how much we really don't know.

*Sarah Allen:* They have so much culture and it's different amongst those three different ecotypes. They have a different language. There's so much. We're just scratching the surface. And all this acoustic work, I think is fascinating because this is where we're drilling down to understand better. With large datasets you can analyze better. The Sanctuary and other organizations, like the Park Service, are putting these nodes in all over the United States where there are paired Sanctuaries and National Parks, National Seashores, etc., underwater nodes for collecting baseline sound data. You probably know about this.

*Jennifer Stock:* I know the one offshore. Do we have one near shore?

*Sarah Allen:* No. There is one in the National Park in American Samoa. There is going to be one up in Olympic National Park. I think there is one down in the Channel Islands.

*Jennifer Stock:* There is one in Glacier Bay.

*Sarah Allen:* In Glacier Bay, but that's been there for a long time. In fact, they can identify individual boats by the pitch of the prop spin.

*Jennifer Stock:* I know the one that we have out at Cordell is right on the border of the Cordell Bank and Greater Farallones National Marine Sanctuaries. I believe it's really focusing on low frequency noises. It's a hydrophone out there that they collected two years ago and put a new one out. I think they're going to be bringing it in and it's being analyzed now. Something I have yet to catch up on in terms of the findings of that, but it'll be interesting to see especially if we can get a one here closer to shore as well.

*Sarah Allen:* That's what we were arguing for, but they wanted to start with these distant locations first just to get some baseline and then compare to where you might have areas of heavy traffic. It's a whole field of study.

*Jennifer Stock:* Yeah, we will have to have an interview about this in the coming months. There are so many things to catch up on. Well we have just a couple minutes left. Is there anything else you'd like to talk about or share with us before we close out our show today?

*Sarah Allen:* For those who might be listening, I encourage you to go out there now, but go more than once because the season extends for three months and it has a different feel about it from the beginning to the end. In the beginning the males are coming in and they're just full of vim and vigor and they're big. They're massive. They're in their peak condition. The females are also newly arrived. They're pregnant and they're giving birth so you can see births, which is really exciting to see a birth of a marine mammal. It's not as simple as you would think, or perhaps you don't think it's simple, but it's very exciting to see a birth. It's not uncommon to see them especially in the couple first three weeks of January. You spend a couple hours out there, you could see a birth. Then the middle season, everything is chaotic and males are going in and out and there's a lot of action. If you like to watch animal behavior it's not a quiet little colony, it's full of action. During storms versus calm, warm days, it's very different. If it's a hot day, what we've discovered at Point Reyes is the females will actually take their pups to the edge of the water to cool them off. This has not been seen before where they take their pups swimming. Elephant seal pups are not known to swim, but they're actually swimming at that time when it gets really warm. In a storm, it's dramatic to see how the waves move the seals around, how they respond and protect their pups. Then finally at the end of the season, it's chaos with males everywhere and females leaving and pups squealing. It's an amazing transformation of the colony overtime.

*Jennifer Stock:* That's wonderful. Would Chimney Rock be the best place to likely see things in terms of births right now? I mean Drakes Beach obviously as well.

*Sarah Allen:* Chimney Rock is probably the best place to see, but there was a pup born at the lifeboat station and there are two more females there, so that might be another place to look.

*Jennifer Stock:* Walk down to the lifeboat station and, yeah, actually that's a great place 'cause you're really safe behind that fence there. You can be really close to them and observe them. I would just also recommend to folks to make sure to check the Point Reyes National Seashore website regarding shuttle information. There's a winter shuttle running Saturdays and Sundays because the traffic is quite large on the weekend.

Sarah, it's wonderful to spend an hour with you and hear all your knowledge. I know you'll be very effective at whatever next step

you take while you move on from your very... How many years did you work for the National Park Service?

*Sarah Allen:* 26 years.

*Jennifer Stock:* 26 years.

*Sarah Allen:* But I studied the elephant seals from when they first arrived here. It's been fun to watch this change overtime.

*Jennifer Stock:* Yeah, well we hope he stayed closely connected to the Park and this population so we could continue to learn from everything we have learned in the past and as we move forward with what's going to happen.

*Sarah Allen:* We are ready for that next generation to step up and be involved. If you have a passion about it, don't hesitate to reach out to Jenny or myself.

*Jennifer Stock:* That's right. Also, the docent program. The National Seashore also has an incredible docent program with wonderful training. They've already trained for this year, but come on out and meet those docents and maybe you'd want to do it next year. Great way to get a lot of great information about elephant seals and other marine life around the Peninsula.

I want to just say Happy New Year to everybody. I am really excited for coming back to Ocean Currents and KWMR this year and bringing more ocean interviews and topics to you all. I welcome your ideas. Please feel free to reach out to me at [jennifer.stock@noaa.gov](mailto:jennifer.stock@noaa.gov). Ocean Currents is always the first Monday of every month, 11 to 12. You can go to [cordellbank.noaa.gov](http://cordellbank.noaa.gov) for past episodes of Ocean Currents and that ocean podcast in iTunes as well.

Thank you for listening and enjoy the ocean, bay or whatever body of water you can get into safely this time of year and all year. This has been Ocean Currents here on community radio for West Marin. Have a great day.

(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 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).

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