
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!

(Ocean Sounds)

Jennifer Stock: Good afternoon and thanks for joining me on another edition of Ocean Currents, a show where we dive into the blue part of our planet, the ocean. I'm your host, Jennifer Stock. On this show we talk with scientists, educators, explorers, policy makers, ocean enthusiasts, adventurers, and more, all uncovering and learning about the mysterious and vital part of our planet.

I bring this show to you from NOAA's Cordell Bank National Marine Sanctuary, one of four National Marine Sanctuaries in California waters, all working to protect unique and biologically diverse ecosystems. Cordell Bank is just offshore of the KWMR listening radius, off the Marin Sonoma coast, and it is a hotspot for ocean life, above and below the surface.

I love this time of year because typically, I get out to the Cordell Bank Sanctuary with our annual field seminar trips in search of marine life. And just this last month we had two successful field trips where we had the opportunity to go out for a full day on the ocean and we got to see lots of Black-Footed albatrosses, Sooty and Pink-Footed shearwaters, Buller's Shearwaters, Storm Petrels galore, Pacific White-Sided Dolphins, Dall's Porpoise, and many, many more organisms. The whales seem to have left the area, though, not so many around, but ah, so it was a little quiet on the megafauna front. But nonetheless, it's always amazing to get out on the ocean and get reconnected.

I also just returned from a very long and intense week attending a conference in Monterey that focused on the ocean in a high CO2 world, and all week I heard talk after talk about the latest research regarding the impact of ocean acidification on the ocean globally. So, later in the show I'll give you more of an update on that.

But, I want to jump into today. I have a live guest in the studio. It's great pleasure to welcome Eben Schwartz from the California Coastal Commission to the KWMR Studio today. Eben is the Marine Debris Program Manager for the California Coastal Commission, based in San Francisco. He directs the largest clean up event in California, the California Coastal Clean Up Day, held

in September every year. And he serves on several leadership councils and panels that address this growing issue of trash in the ocean and on our beaches. So, Eben, welcome to KWMR...

Eben Schwartz: Thanks for having me.

Jennifer Stock: And Ocean Currents

Eben Schwartz: I appreciate it.

Jennifer Stock: It's been a long time that I've had this show and I'm kind of stunned this is the first time that I'm having you, so I'm so happy to have you here.

Eben Schwartz: I'm glad to be out here. It's so nice to be out here in this beautiful town

Jennifer Stock: I know, on a very hot day! So I imagine many people are at the beach, but they can catch the podcast later

So, you work on a hot topic, something I'm pretty passionate about myself, with marine debris and trash on the beaches. And since you work for the Coastal Commission, I'm hoping you can back up a little bit and just hear a little bit of background on what the California Coastal Commission is all about, when it was established and the main role that it serves in the State of California.

Eben Schwartz: Sure, I'd be happy to. The Coastal Commission has been around for quite a while now actually. The Coastal Act, which created the Coastal Commission, was passed in 1972, so we're celebrating our 40th anniversary this year of the Coastal Act. A groundbreaking piece of legislation, one of the first in the nation to specifically focus on coastal zone management and protection. So the Commission's job is to oversee the Coastal Act, make sure that it's being held to, and to make sure that our coastal zone, which is the entire length of the coast of California from the border with Oregon all the way to the border of Mexico, and varying widths, depending on where you are, and how urban or rural the area is. What we do is we work with local governments along that entire length of coastline, to regulate development, to ensure access to the coast, to improve access to the coast, and to make sure, and to protect viewscapes, and agriculture, and habitat, and to make sure that development that does occur along our coastline doesn't damage any of those sensitive resources, doesn't limit access to the

coast, and that our coast remains of the character that it was back in 1972 and will hopefully continue to be for the next 40 years.

Jennifer Stock: 1972 is a significant year for a lot of different legislation, and I've told people this before, I think my parents were having the foresight that I would be passionate about these issues. I was born in '72.

Eben Schwartz: Me too.

Jennifer Stock: Alright! So we were probably very, very little, I mean just being born when this was all established. What were certain activities that were happening 40 years ago that really stimulated the creation of the act?

Eben Schwartz: Well, there was a lot of development going on along the coastline. And some very large developments and there was this fear in the state of this sort of creeping urbanization of our coastline. Unlike many of the coastlines along the East coast, the California coastline has always belonged to the people of California, and as more and more sections of the coast were becoming, essentially walled off with development, private development, people's access to the coast was becoming limited. And because of that this groundswell movement happened and a citizen initiative Proposition 20, known as the Save the Coast initiative, was generated and passed that created the Coastal Commission, essentially to make sure that we didn't see further loss of access to our coast. And it's been incredibly effective, not just in very basic protection to the coast itself, but also in generating this ethic of coastal stewardship that we see now throughout the state of California. There is very, very strong support for coastal protection, for environmental issues in general in California. And because of that, the Coastal Commission has had an easier time that it might otherwise doing its job to make sure the coast remains protected and open to all, and for future generations.

Jennifer Stock: It's great, I really appreciate it because I love accessing the coast, and you know recently I was just up on the Mendicino/Fort Bragg coast, and you really have to find those little outlets to get down there, but there are signs that are produced by, I think the Coastal Commission, that say Beach Access or Coastal Access and you know you can get down there. And it's a very helpful tool to figure out how to get down and see some of these amazing places.

Eben Schwartz: Yeah, and those are a great success story actually, because we work in partnership with a lot of different organizations, primarily the Coastal Conservancy which is our sister agency that is able to purchase easements and land along the coast, and local organizations because each of those easements, each of these access ways has to be maintained by somebody, so local partners will take that on and it becomes a real community effort to make sure that that coastline is maintained and accessible for everybody.

Jennifer Stock: Excellent! Wonderful! Well thanks for that background. It was really helpful. But your focus, you really are the Marine Debris Program Coordinator for the state. And it's a huge issue, thinking about the length of the state and it's a fairly recent issue, actually. I, you know, I just started reading Captain Charlie Moore's book *Plastic Ocean*. I got to sail with Charlie Moore about five or six years ago, and became very familiar with his work with Algalita Marine Research Foundation. And he writes about his personal experience in growing up in Long Beach and never seeing debris as a kid, and it just made me think, wow this is a lifetime that we're seeing this incredible change, relatively new phenomena of this issue of marine debris. So, when about in California did we realize the power of this issue and started action on it?

Eben Schwartz: It's a really good point because if you look at, you know, Charlie Moore's life or Charlie Moore's book as one example, or just one benchmark for how we can measure this issue, when Charlie was growing up, the use of plastic specifically in our society was so much less that it is today. We focused on much more durable reusable goods. We were not, we didn't have the kind of packaging that we have today, we don't have the kind of single-serving society that we do today. And what happens when you create all that more packaging and use all that more plastic, is that you create many, many, many more opportunities for those items to get lost in the system and to become debris. So that's what we've seen: as single use disposable plastic packaging and plastic items become more prevalent, we've seen a marked increase in the amount of trash that's on our beaches and in our oceans.

There are countless studies about this, but plastic items just absolutely dominate the palate of beach debris that we clean up every year on Coastal Clean Up Day, dominates what we pull out of our storm water system, just across the board, what we're looking at is plastic debris for the most part, with some exceptions of course. But plastic has a lot of advantages over other materials, and it's those very same advantages - its durability, its ability to

keep food fresh, all these wonderful things that we love the material for, those translate into items that last a lot longer in the open ocean, that last a lot longer without biodegrading ever, on our city streets and in our storm water systems, so naturally we're going to find a lot more of it if it's never going to go away.

Jennifer Stock:

So, from my understanding the Coastal Commission, through the work done through the California Coastal Clean Up, they've identified that 60-80% or 85% of the ocean trash, ocean debris is plastic and land-based sources. So, what about the other stuff, I know, earlier on, when I started doing education about this effort, people would ask about at-sea dumping. And what about at-sea dumping, is that a significant source?

Eben Schwartz:

Well, it certainly is a source and it's a source that we remain very concerned about. Because a lot of the stuff that's lost at sea is very, very damaging. I mean you look at derelict fishing gear, for example. Fishermen don't want to lose their gear, but stuff does get lost off fishing boats - nets get lots, crab pots, lobster pots - all these things have a way of escaping the systems that are set up there. And those items don't stop working once they are lost from the boat, I mean derelict fishing nets for example will continue to ghost fish until they snag on something, or ball up into a net. I mean, these are killing machines out in the ocean for potentially years doing their job.

So, it's not an area of no concern, but when you look at the numbers: 60-80% and closer to 80% in California of the debris that's in our oceans is coming from land, it's certainly, there is some amount that comes from beachgoers, but the majority comes from storm water systems, and it could be coming from very, very far inland. Our rivers, our storm water systems are incredibly effective at pushing all the debris that either gets washed down by rain, or is just dumped or left or littered or whatever it might be, washing that straight out, mainly through San Francisco Bay and out the Golden Gate and then out into the ocean. In other areas it translates in different ways, but that's the pathway.

And that's where most of the stuff is coming from, which means that most of the debris that's on our beaches or in our waterways is stuff that you and I use. It's not some nameless, faceless person, it's the stuff that we use in our everyday in our everyday lives and that's the beauty of Coastal Clean Up Day, the clean up helps people make connections. They see what they're picking up, and they think about what they use in their daily lives.

It can affect their shopping decisions, it can affect how much they consume. It can affect whether or not they are going to choose that Snackables packages for their kids lunch, or...

Jennifer Stock: Oh geez, those are the worst.

Eben Schwartz: Those are really bad....Or buy bulk items and make a lunch. It really does impact people.

Jennifer Stock: It is a wonderful education event. So what, this is the, let's see I can't remember which anniversary it was, the 28th?

Eben Schwartz: The 28th, exactly.

Jennifer Stock: The 28th year of the Coastal Clean Up, and can you give us some highlights of the year, in terms of beaches cleaned, people, pounds...

Eben Schwartz: Yeah! We had a great year. It was spectacular. It's always spectacular. It's always one of my favorite days of the year cause you just stand out there, I'm out at Ocean Beach in San Francisco every year and you stand on the sea wall and you look at this mass of people out there just doing this incredible, incredible thing. And it really gives you a lot of encouragement to keep going throughout the rest of the year on what is otherwise... it can be kind of a depressing topic.

We had a great, we had one of our biggest clean ups ever. We had about 850 clean up locations around the state. We cleaned up in 55 of California's 58 counties, so we're really, really close to making this event what we've always wanted it to be, which is an opportunity for every single Californian, no matter where they might live, to participate in this act of coastal stewardship. We got three straggler counties out there that we're going to get for next year.

Jennifer Stock: Where are those counties?

Eben Schwartz: They are Northern California. They are, you know, Sutter, and I always forget the names of them... maybe one of the other ones. A couple of the other ones up there. I'll get back to you on that.

Jennifer Stock: Alright, we'll get on them!

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- Eben Schwartz:* We had about 61,000 people so far. We're still getting reports in, there are still a few events that are yet to happen. Some areas, we cleaned up close to a million pounds of trash so far.
- Jennifer Stock:* Wow! That blows me away. One day!
- Eben Schwartz:* It's one day, it's amazing what we get. I mean there are so many tires, for example, that we pick up at a lot of the waterways in the Sierras and that really jacks up the trash numbers quite a bit. Our numbers actually were down this year from previous years. We had this massive heat wave in Southern California on Coastal Clean Up Day with 105 in LA and 107 in Orange County. So I think a lot of people were sticking close to their air conditioners that day. But nevertheless, 60,000 people and growing is just an incredible statement about how much Californians really care about our coast and want to do something about it.
- Jennifer Stock:* Yeah. For those tuning in, I'm talking with Eben Schwartz, from the California Coastal Commission. He's the Marine Debris Program Manager. This is, my name is Jennifer Stock and you're listening to Ocean Currents.
- So, there's always a fun little event as part of the Coastal Clean Up cause people take data cards and the data is analyzed, but there's the most unusual item contest.
- Eben Schwartz:* Yes.
- Jennifer Stock:* What are the winners?
- Eben Schwartz:* We had a concrete statue of a rabbit that was found up in Shasta County, outside of Redding. And the other one was, it's going to come to me in a second...
- Jennifer Stock:* Was it something locally found here at Keyhole beach?
- Eben Schwartz:* Yes! It was! Thank you! That was it. It was found out at Keyhole Beach. It was an old love letter, a love poem I should say, that was really degraded, but it was this beautiful poem that someone found out at the beach and they brought it down to the volunteer barbeque at the **A model** Vistor's Center and read it aloud to the crowd, it got big cheers.
- Jennifer Stock:* Awwww...

Eben Schwartz: It was really wonderful. We actually have a picture of it that's on our Facebook page.

Jennifer Stock: Oh that's great! That's a fun little thing. The Coastal Clean Up, so fantastic event every year. I know that Point Reyes National Seashore hosts a clean up with Drakes Beach out here, and with several dedicated people that come out to the beaches and really are sleuthing and collecting art items for making art projects, but also just keeping a good eye and cleaning things up.

So, moving on. A big topic that people are really paying attention to right now is the tsunami debris. Unfortunately we had that tsunami last year that was really devastating and so many, so many big things got pushed out to sea and have been moving around the Pacific. And we talked about this a little bit a couple months ago and I'm curious if you can deliver any of the latest information in terms of items that might be something to look out for, and any reporting efforts that people should pay attention to.

Eben Schwartz: Yeah. We've been getting a lot of reports and there's been a lot of attention paid to this, and justifiably so. There's a real fear and awareness-raising that the tsunami brought on. You know, you go back to the origins and that earthquake and that tsunami in Japan left almost 16,000 people dead, so the scale of human tragedy was just enormous. You know the by-product now is this debris. There was about 1.5 million pounds, million tons, sorry, of debris that was washed out to sea and buoyant enough to enter the ocean currents. At least some portion of that is still floating out there and is starting to make landfall, actually has been making landfall since last November along the West Coast. We've seen derelict vessels. We've seen the giant pier that washed up in Newport, Oregon that was only recently dismantled. We've seen things like soccer balls and buoys, and water bottles with Japanese writing, and a lot of Styrofoam in Alaska. It's hitting in different areas and the modeling on the ocean currents continues to evolve. We've actually learned quite a bit about ocean modeling, ocean current modeling from this event. Alaska right now is sort of the front line of impact. They're seeing multiples of the amounts of Styrofoam and large Styrofoam blocks that they typically see at this time of year. And you know, as we've learned more about this, that started to make a lot more sense because these items are sitting higher up in the water. They're much more affected by wind than the currents themselves, and so it made sense that these things were hitting shores much more quickly.

Umm, we're continuing to see stuff that, NOAA is the lead agency on this, and they're collecting reports at their email address. They set up disasterdebris@noaa.gov. They received something on the order of 1300 reports from the West Coast so far. They've had eleven confirmed items from the debris. So there's a lot of reports. It's very hard to confirm a piece of tsunami debris. There has to be ownership markings or serial numbers or something they can trace back specifically to that event. We haven't had confirmed items that have washed up in California so far, but if you listen to my Beach Captains and County Coordinators along the coast, we're getting a lot of anecdotal reports that we're seeing increases in the types of debris we would expect to be washing up from the tsunami at this point. Things like buoys, water bottles with Japanese writing, Styrofoam blocks. These were largely fishing communities that were affected by the debris, by the tsunami, so items that could come from a fishing community are exactly what we're starting to see more of.

For the most part, we're not too concerned about the impact. We do see stuff from around the Pacific Rim every single year during our beach cleanups, but if we see dramatic increases in it, then we're going to be able to tell that, yes, the tsunami debris is starting to wash ashore in bulk; maybe we need to direct more resources to those areas to pick that stuff up. Our big concern of course is anything that might be hazardous. We're not worried about radioactivity from the debris. It was, the Fukushima Daiichi nuclear plant didn't melt down until the tsunami had washed all this out to sea already and what we have found has been tested and hasn't been found to have elevated radioactivity levels. We are concerned about things like kerosene tanks or other chemical containers that might be washing up from the area. There's a lot of household hazardous waste that gets washed out when an area of 220 square miles is devastated by a wave like that.

Jennifer Stock:

Yeah. It's pretty intense and hearing about that, I haven't heard too many reports recently. I think my biggest concern is invasive species, cause once you have all this new stuff floating around. I mean, of course it's been an issue all along with all this marine debris in the ocean, but species that don't typically live on the California coast easily travel here though these big items. I know that's a really big issue with the pier in Oregon.

Eben Schwartz:

Yeah

Jennifer Stock:

And that can devastate fisheries and habitats that really support a lot of vital habitat for native species.

Eben Schwartz: That's really true. That pier that washed up had 98 different species on it

Jennifer Stock: Oooh.

Eben Schwartz: And five of them were on Oregon's watch list for the most invasive species. It's a growing concern, but it's not one that is overwhelming the overall concern about the debris itself because what we've found is that most of the debris that's in the ocean is going to have washed out from land. The pier was living in the near shore estuarine environment and those items, and the species that are on them have a much higher likelihood of surviving in our near shore environment than the typical species that debris would pick up in the open ocean. Generally they wouldn't survive very long, if at all, once they enter our near shore environment.

Jennifer Stock: Um hum. Now, are you finding, and maybe through the Coastal Clean Up volunteers, that this has been an opportunity for people to become more aware of just the general ongoing day-to-day issue of marine debris? Are you seeing people be more aware of that now as this specific event kind of was a highlight?

Eben Schwartz: Well, we're working on it! I think it's, it's been eye-opening for a lot of folks, when they look at this. I mean you hear the numbers behind it: 1.5 million tons. It's an incredible amount of debris, and it's not something we're taking lightly. But when you compare it to what we do to the oceans every single year - we put more than five times that amount of debris into our oceans every single year. So really, this tsunami debris is a drop in the bucket. But it has done is that it's brought this whole new audience forward. It's brought a whole bunch of people who never thought about marine debris before to the table, where they're now starting to get engaged, starting to volunteer for cleanups. They want to act on what they see as a disaster, and there's a lot of those, you know, spontaneous disaster volunteers that are out there that are not typically beach clean up volunteers, So we want to capture those folks, we want to get that enthusiasm and keep them going and help them recognize that this is a persistent problem! This isn't a one-time event. We do this every single year, we do it throughout the year, and we need your help!

Jennifer Stock: Yeah! You don't even need to be part of an organized clean up to do it. You can do it on your own.

Eben Schwartz: Exactly! Yeah, no. We want everybody out there cleaning up all the time.

Jennifer Stock: Excellent! So, I recently read that about 10% of the plastic debris in the ocean is made up of pre-production pellets, or also known as nerdlies. That was through the Algalita Marine Research Foundation. What are the efforts going on to reduce this? These are the pellets that make our kayaks, and shampoo bottles, and toothbrushes, and anything that goes into mass production. It seems like we have some containment issues and I know that we find them a lot on our beaches here and they're very toxic.

Eben Schwartz: We sure do. We find them all the time, and actually, the studies that have been done on those issues find that, on a coastal clean up base, cigarette butts are always our number one item, but if you really start sifting the sand and doing the research that you need to do, we find that those pre-production plastic pellets are by far the most numerous item of beach debris, especially in Southern California, where there are so many plastic producers, there's something like 7,000 plastic producers down there. And they outnumber cigarette butts by a factor of a hundred. We're looking at a 100,000 or a 100 million for every million cigarette butts that we're picking up.

So there are a huge item and actually, one of the success stories that we've had is we've been working on this over the past five or ten years. The Ocean Protection Council here in California got involved in marine debris back in 2007, and passed a resolution on marine debris that was really wonderful. It was very far reaching and it was a great statement about all the different impacts that we need to look at, and all the different sources that we need to address. It was shying away from clean up, which is an after-the-fact effort...

Jennifer Stock: Right, not a solution.

Eben Schwartz: ...and dealing with the sources. One of those sources is storm water and at the top of that storm water chain are these plastics producers that were losing a lot of pellets. So out of that resolution spawned a piece of legislation, the one piece of legislation that has actually passed, it was generated by that resolution. And it regulated those facilities for loss of the pellets. It also mandated increased monitoring, by storm water agencies, and encouraged the use of best management practices, which have been shown to be really effective at containing these things. Charlie Moore had a great quote where he said if he'd do one thing to solve the marine debris problem in Southern California, it would be to give every plastics producer in the Southern California basin a Shop Vac,

cause that's really what it takes, is just cleaning up after themselves so they don't lose these things to the storm water system in such numbers.

You know they're very, very small, they lose them by the millions and don't even notice because they cost almost nothing, so it's almost more efficient for them not to clean them up.

Jennifer Stock: So, since that act passed, or the legislation passed, I think you were mentioning that there hasn't been a ton of money to actually enforce that. But have there been any changes seen by the producers and their behaviors?

Eben Schwartz: We haven't really studied the behaviors very much, but what we have seen is an overall reduction in the amount of storm water trash that's coming out of the Southern California basin. Especially, partly because of that act, but also largely because of new storm water regulations that have been put in place in that area. A lot of people have probably heard of the trash TMDL, the total maximum daily load limit that was set in that area back in 2001. It was the first of its kind, the TMDL statute is part of the Clean Water Act, that limits the amount of items that can, usually chemicals, that can come out of a water body. When it was set for trash in LA, it became this great new movement to stop trash from coming out, and along with all that trash, pellets were being captured, so we're seeing a lot less overall in Southern California than we did before that passed.

Jennifer Stock: That's really good news! Now you're talking a lot about Southern California. Is Southern California the largest producer of marine debris? There seems to be a lot of effort and monitoring in Southern California. But what about Northern California and the Bay area?

Eben Schwartz: Oh we definitely, we have our fair share and we contribute more than our fair share, I would say. But because Southern California is so highly urbanized and there are so many people in that area, far more than there are in Northern California, they're naturally going to generate a lot more trash, and because of that a lot of the management practices that we want to use to affect this problem are piloted there and then moved to the rest of the state once we've seen they're effective. Right now those storm water regulations have been replicated in San Francisco Bay and will be taking affect over the coming years and we're going to hopefully going to see the same success story here.

Jennifer Stock:

That's fantastic! So there's been a lot of progress on this issue in California, and hopefully we'll see more declines over time. I'd like to take a break real quick, and maybe when we come back we can talk a little bit more about some of the legislation going on in the state to help address this issue of plastics in the ocean. For those just tuning in, I am Jennifer Stock, and you're listening to Ocean Currents. And my guest today is Eben Schwartz from the California Coastal Commission.

(Ocean Sounds)

Alright, you're listening to Ocean Currents on KWMR 90.5 Point Reyes Station, 89.9 Bolinas, and I have Eben Schwartz here in the studio. We're talking about marine debris and California's efforts to help curb it and reduce it. So Eben, what are some key efforts that are happening in California that you can share with our listeners that are helping, are working to tackle this issue in California? It's such a huge, huge issue.

Eben Schwartz:

It's it is a huge issue, and one of the toughest parts about it is that you know, there's no silver bullet to this. There are so many different sources of marine debris there's so many different ways it gets out to the ocean that there is no single way to get at it. And because of that, there's no single agency in the state that's responsible for marine debris. No one has a mandate to deal with marine debris, people have small pieces of the pie, but the nice thing is because of all of the attention that's been brought to this issue, and because of efforts on from the Ocean Protection Council, among others, that have a great way of convening groups on this issue, everybody is starting to take a piece of that pie, and to do something about it.

The biggest is the one that I was talking about just before the break, it's the storm water regulations that are taking an impact in Southern California, and now the San Francisco Bay area. And there's, in fact, a statewide trash policy for storm water that is being developed at the State Water Resources Board and is under review, and hopefully going to be put into place in the next couple of years, that will have largely the same impact that we're seeing in these regions where they will limit dramatically the amount of trash that's allowed to enter water bodies through the storm water system. In San Francisco Bay region, the level that's acceptable is zero, In the LA region, the level that's acceptable is zero. So when you get that kind of an incentive for municipalities that have to follow those permits, all of a sudden you start to see things like

trash capture devices, and storm water basin inserts, much more frequent street cleaning, bigger education campaigns - San Francisco Bay region is starting a new education campaign as well - and all of those resources are brought to bear to tackle the problem and to stop this trash from getting out. There's also a whole lot of different efforts. So that's one way. And, you know, I always try to envision it as a pipe of the ways trash gets out to our ocean. It's a long pipe. It starts a specific point source and ends up at the ocean, and if you clean it up at the end of that pipe, it's incredibly expensive, and harder. Everything you do further up the pipe gets a lot more cheaper, a lot more effective, and you get better results.

Jennifer Stock: Hmm, that's interesting.

Eben Schwartz: So storm water regulations happen a little further up the pipe, but they don't hit the source. To address the sources, what a lot of cities are doing now is passing bans on items that are likely to become marine debris, so that they don't have to deal with it in their trash capture devices further down the pipe. That's why we're seeing so many plastic bag bans that are taking place in cities up and down the coast. We have smoke-free beaches that are taking place largely in Southern California, but also up here. There's polystyrene bans that are taking place, and all of those measures are reducing the amount of work that municipalities have to do on the clean up end of things.

We do have new education campaigns, we're always focused on different elements of it and trying to encourage people to take action on this every single day of their lives. But really the legislation that we're seeing, even at the state, that's going to have the biggest bang for the buck.

Jennifer Stock: Speaking of that, with the election coming up in November, are there any key initiatives that people should look for on the ballot this November regarding Marine debris?

Eben Schwartz: Not on the ballot, for marine debris. There were several pieces of legislation moving through this year, none of them got through. There was going to be a statewide ban on plastic bags, and a fee on paper bags. That didn't make it through. One of the really interesting movements that we're doing a lot more of in California and could have a really big impact on this issue is something called Extended Producer Responsibility. It's a way to force producers of items to essentially do a product stewardship role, where they're responsible for the entire life cycle of their product, rather than just

sticking it in a store to be sold and being done with it. So we now have - it's called EPR - we have EPR on carpets, we have EPR on batteries, we have EPR on appliances. There're different forms of it in all these different pieces of legislation, but what it makes, what it forces is responsibility on the producers, at least equal responsibility on the producers, for the end of life of their products. The big goal from my perspective would be EPR on packaging, cause that's the vast majority of what we see on our beaches and in our storm drains. If we could get EPR on packaging, we could go a long way towards bringing everybody who should be at the table to the table including producers, to keep take responsibility for the stuff that we all use.

- Jennifer Stock:* That would be awesome! That's the one thing, when I do talk to groups of students or adults that are interested in this issue is just the personal behavior response. And it's hard! I mean I'm, I've tired so hard to reduce plastic in our lives and it's just so difficult, but there are things we can do, trying to reduce, and using our water bottles.
- Eben Schwartz:* Exactly!
- Jennifer Stock:* Eben and I have here.
- Eben Schwartz:* Cheers!
- Jennifer Stock:* And I have seen a lot more people using those as well. I'm one of those moms at day care who has everything in a reusable container, and I think it's my little message to them as well.
- Eben Schwartz:* And it works! I mean, look at our state. We have 37 million people in our state. That's a lot of people, and every single one of those people brought a reusable bag to the grocery store just one time, during the year, that's 37 million single use disposable plastic bags that we've taken out of the system. And those become, they're used for seconds at times, and they are very likely to become marine debris. So there are actions like that - reusable water bottles, reusable bags, waste free lunches - that are simple to do once you look at it, and do make a marked difference.
- Jennifer Stock:* That's great! That's such an important behavior to continue to educate about, and getting kids on as a lifelong habit right now. I mean like, I find like, I feel like we're hearing these things over and over again as adults, but they really are key important actions that we can take. So I always encourage people, whatever you do, just using less and reusing materials is the way to go.

Eben, are there any websites that you recommend for people to track what's going on in terms of plastic and marine debris in the ocean?

Eben Schwartz: Sure, yeah, I mean they can always go to our website, which is coastal.ca.gov. It's the Coastal Commission website, and it's very informative about not just items like this, if you go to the public education page you'll get a lot of information about marine debris and what we're doing about it, and all of our different education programs, including our whale tail grants program, which helps support efforts around the state for coastal and watershed education, but you'll also get more information about the Coastal Commission itself, what's going on at the meetings, what issues we're dealing with, what the hot topic is these days. There's always a hot topic, no matter where you are in the state. It's one of the amazing things about this, is Californians love their coast, and it shows itself in a lot of different ways.

Jennifer Stock: And part of that right now is Coasts Weeks, right? Right after Coastal Clean Up for a few weeks they have a special way for people to get involved in coastal events and that's for a another week or so.

Eben Schwartz: Yes, about another week. Coast Weeks are the three weeks that take place, the three weeks after Coastal Clean Up Day where we maintain an online calendar of all the different ocean and coastal related events that are taking place around the state, and they can find that calendar online, and you've got another week of events to check out.

Jennifer Stock: Fantastic, and is there a link from the coastal.ca.gov website for that?

Eben Schwartz: Yes, and folks can also just go to coastalcleanupday.org if they want to get there even quicker. And one of the other great websites that's out there, is there's a group called the Clean Seas Coalition, which is a coalition of environmental organizations working on marine debris issues. They have a great bill tracker that keeps an eye on all of the statewide initiatives that are moving through the legislature that have anything to do with marine debris; which state they are, what committee they're in, and what actions people can take if they want to support it. And a few other groups that also focus on recycling or reuse - The California Product Stewardship Council is a great one, Californians Against Waste is another one.

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- Jennifer Stock:* So many groups!
- Eben Schwartz:* A lot of different resources that people can look into.
- Jennifer Stock:* Awesome. There's also, I just thought, just cause we're talking about websites: 5gyres.org. They have a fantastic blog that really talks about some of the issues involved with this in terms of the production and clean up and monitoring and I really enjoyed reading their blog.
- Eben Schwartz:* They have a great blog, and they actually, they also do ocean sampling in, off their catamaran to check out what's actually out there in the ocean. In fact my colleague Shannon Waters just came off one of their research trips from Japan to Hawaii where they were actually out there looking for tsunami debris. But they found an incredible amount of trash. I don't remember the exact number she told me, but they keep a lookout throughout the course of their month-long trip and if I got this number right, I'm sorry if I don't, but it's at least close to this, that when they figured it out at the end of the trip, after 30 days of monitoring all the time, they saw a piece of trash in the ocean every 2 1/2 minutes, for the entire length of their voyage.
- Jennifer Stock:* Wow, that's pretty hard to enjoy the wilderness if there's no wilderness.
- Eben Schwartz:* Absolutely
- Jennifer Stock:* Well, Eben, thanks so much for coming in today to Ocean Currents, and being a part of this community by sharing your information about the marine debris here issue in California and globally. And thanks again for coming in. Any last words?
- Eben Schwartz:* Thanks so much for having me. It's been a lot of fun!
- Jennifer Stock:* Keep up the great work and spreading the word about this!
- Eben Schwartz:* Thank you, will do.
- Jennifer Stock:* Folks, we're going to take a quick break here, listening to some ocean. I'll be back in just a minute.
- (Ocean sounds)

Jennifer Stock:

So, want to just give you some highlights from the conference that I was just at. And an issue we really got to keep our eyes on is ocean acidification. As I mentioned earlier, I was at the Ocean in a High CO₂ World Conference in Monterey last week. It was a big week for the ocean in Monterey. The Blue Ocean Film Festival was going on, which is an international ocean film event for industry filmmakers as well as the public, and a lot of passionate people there. Sylvia Earle was there, James Cameron, and all of these people that really are the movers and shakers for this ocean conservation movement.

But I didn't get to see any films, I was at a science conference, and trying to get my head around the ocean acidification and the science that's happening around that. This is the third symposium and it's an international conference, and it was incredible the amount of presentations that were going on. So, just to recap, we talked about it before on past shows, but ocean acidification is a process that's actually changing the pH of the ocean, it's lowering it. And it's caused by excess carbon dioxide in the atmosphere from carbon emissions. The ocean absorbs this carbon dioxide and it reacts with molecules in the oceans, actually changing the pH of the ocean. It's hugely important. If you think about your body and all the balances that you have to stay healthy with electrolytes, and hydration, your pH, all of that is so important, and if it becomes off by a little bit, you really feel the effects of it, and the same thing's happening in the ocean as well.

What really got me is the fact that it's the rate of change that is really the huge, huge concern here. 55 million years ago there was a similar event in our geologic record that we know of, where there was a shift of pH and a temperature increase, and there was mass extinction, and the scary part is what's happening now is happening ten times faster than when it did 55 million years ago, so there's huge, huge cause for concern amongst the scientific community for what this means for the food web.

So I heard lots of talks about studies that are going on, focusing a lot on the impact to larval and juvenile phases of key organisms like phytoplankton, and krill, oysters, crabs and fish. A lot of these species are being studied in the lab and in a controlled situation, and being exposed to very high CO₂, and they're really hoping to scale up a lot of these studies into more of an ecosystem model to really understand the effects in an ecosystem with predation and changing everything and temperatures. It's very different in a lab than it is in the real world. So very, very interesting stuff. We need

to keep our eyes on this issue, and continuing to work for lowering emissions globally.

After the science workshop, the sanctuary education team, which I'm a part of, we worked on a two-day intensive workshop with communicators from all around California, primarily a couple other key institutions as well, and we really are working hard to get our arms around how to communicate about this issue. I was really pleased a local, Terry Sawyer, from Hog Island Oyster Company, he came and participated and gave his perspective as a stakeholder, and several other folks from our area were there participating as well. So you're definitely going to hear more about this in the future, from us.

We are just out of time right now, just want to thank you for tuning in today to KWMR Ocean Currents, and next month we'll be talking with a scientist, Bill Cochlan from the Romberg Tiburon Center about phytoplankton. He is a fascinating scientist, and I have learned a lot about phytoplankton through him earlier this summer, and I'm really excited to bring him on. So come back then for Ocean Currents, the first Monday of every month, and thanks for staying tuned to KWMR!

(Music)

Jennifer Stock:

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