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

(Music)

Jennifer Stock: You're listening to Ocean Currents, a show where we talk about the blue part of our planet, the ocean. We talk about science, natural history, discoveries, conservation, policy, and ways for us land-based folks to get involved. My name is Jennifer Stock and I bring this show to you through NOAA's Cordell Bank National Marine Sanctuary, one of three special ocean places off the coast of Point Reyes. For those of you that enjoy beach combing and have been curious as to the origins of some types of debris, you are going to want to stick around for today's show.

We are talking with an oceanographer that has helped make oceanography much more accessible to thousands of people by connecting the things we find on the beach to human-related events. If Nike shoes or rubber bath toys washing up on the beach in mass abundance ring a bell to you, today you want to stay tuned. My guest today is Dr. Curt Ebbesmeyer. Stay with us. I'll be right back. Dr. Curt Ebbesmeyer is the author of "Flosametrics and the Floating World," and the founder of the Beachcomber's Network. So, we'll be talking a lot about marine debris today, trash, and some of the stories that come along with it. So, stick with us. We'll be right back.

(Ocean Sounds)

Jennifer Stock: Welcome back to Ocean Currents. This is Jennifer Stock and you're listening to KWMR, 90.5 Point Reyes Station and 89.9 Bolinas. Curt Ebbesmeyer has spent hours of time tracking floating things. He is a professional oceanographer studying things that float. In the 1990's he found himself using debris washed up on the beaches as useful data for studying ocean currents.

He founded a network of people that report the landfall of certain flotsam through his Beachcombers' Network. Curt founded the nonprofit Beachcombers and Oceanographers International Association in 1996 for which he write and publishes the magazine, Beachcombers Alert. He is the author of "Flotsametrics and the Floating World," a book co-authored with Eric Sigliano.

Curt, I'd love to welcome you to Ocean Currents. You're live on the air.

Curt Ebbesmeyer: Yes. Hi, Jennifer.

Jennifer Stock: There you are. Welcome to Ocean Currents.

Curt Ebbesmeyer: Thank you.

Jennifer Stock: So, you're joining us from the state of Washington, California. That's just a little bit further up the coast here in California. I think we have a lot in common on our shoreline. So, thanks so much for joining us. I want to let you know and our listeners know as well, I have an avid beachcomber here in our studio with us, Richard James, who the community of Point Reyes knows very well for cleaning up our beaches and has lots of questions about some of the debris. So, we'll bring him on to the air too in a little bit.

Curt Ebbesmeyer: Wonderful.

Jennifer Stock: So, I just want to start off just to get a little bit of your background. How did you first get interested in studying how water moves?

Curt Ebbesmeyer: Well, I was scuba diving off California, off southern California, back in the day in 1962 and my brother and I decided we ought to take scuba diving lessons and we happened to wind up in a swimming pool of Roy Rogers's son, Dusty and a bunch of other people and we just learned how to scuba dive off of Zuma Beach.

Jennifer Stock: So, you got interested in movement of water as at a young age?

Curt Ebbesmeyer: Yeah. It was that and some television programs like Sea Hunt and, no, you know, how when you're a young kid you have ideas and dreams and I was lucky enough to be able to follow them.

Jennifer Stock: That's great. So, I want to dive right into the interesting stuff about your flotsam studies. Your career as an oceanographer has taken you a couple places around the United States, but in 1990 it took quite a turn with the Nike shoe container spill and I imagine that there are several containers that go overboard monthly, but why did this specifically grab your attention and how did you hear about it?

Curt Ebbesmeyer: Well, I first heard about it from my mother. She asked me about all these Nike shoes washing up on the coast here and I said, "Well, first of all, it's hard to explain it as an oceanographer chasing

currents, what you do exactly." And she said, "Well, isn't chasing sneakers on the current something you should be doing," and I said, "Well, I don't know, but I'll look into it," and I did and it turned out that about, let's see, 80,000 sneakers fell overboard in five containers and each one had a unique number.

So, it was like having access to 80,000 messages in bottles, which is unheard of to be released at one time, in one place in the ocean. So, I saw it as a great scientific opportunity.

Jennifer Stock: So, how did you, I mean, it must have been a mystery, these shoes washing up on the shore. I don't imagine ships report their containers that are lost at sea.

Curt Ebbesmeyer: No, they don't. They like to keep that information secret.

Jennifer Stock: So, how did you track it back to this big container spill?

Curt Ebbesmeyer: Well, all the shoes were from Nike and it turned out Nike is a very green company. They really try very hard to make environmentally friendly shoes and so, they were the only company that I was able to contact that would actually open up their books and tell me where the shoes went overboard.

Jennifer Stock: And so, they told you where they went overboard and you had reports coming in of them washing up. What was the geographic area that they were washing up on and what were some of the questions people had about it?

Curt Ebbesmeyer: Well, Nike just gave me the latitude, longitude, and date of the spill. They didn't collect any information as to where they washed up or when. Nike just said to the beachcombers, "You can keep what you find. We have no interest in any lost merchandise that washed up on the beach."

So, beachcombers were free to keep them and many times, these were $100 shoes, but they didn't wash up tied together. So, the lefts and rights came ashore different places and so, you had people up and down the west coast from Alaska down to your neck of the woods who actually tried to match up lefts and rights so they could wear them, even after a year in the water, Nike made such good shoes that they were still wearable.

Jennifer Stock: So, how did everybody communicate to say, "I got a left shoe. It's blue and has a red stripe here." How did they communicate?

Curt Ebbesmeyer: Well, Steve McCloud, my friend Steve McCloud, started a kind of a flea market, if you will, and he would…people would collect reports of two or three thousand shoes and matched them up and for $30, people could buy them.

Jennifer Stock: Nice. How did he do? Did he make a profit?

Curt Ebbesmeyer: No, but he was a starving artist and $30, I think he sold something like 1300 pairs matched. So, you know, that's a nice piece of change over a three year period.

Jennifer Stock: Wow. If we could only turn that around with the amount of marine debris we have on the beaches now into turning in….we might solve our economic problems here in the US. So, this became a new study for you with tracking debris and tracking the potential deposits of debris. What are some of the other events that happened after this Nike shoe event that kept you going in tracking debris and where it might end up?

Curt Ebbesmeyer: Well, it turned out that after I did a little bit of research, it turned out that something like 100 million cargo containers are shipped overseas every year worldwide and something like 2 to 10 thousand go overboard. The container industry keeps those numbers secret, but I kind of gathered and made my own conclusion. We're both in about agreement and would say 2 thousand, I would say in the 1990's it was as high as 10 thousands. So, that's a lot of cargo containers with a lot of debris that could be tracked. So, I thought that was a great opportunity from an oceanographic, scientific point of view.

Jennifer Stock: Now, you teamed up with a couple of colleagues in terms of modeling, Jim Ingraham from NOAA. Can you tell us a little bit about the work that he does and how you two compliment each others science work?

Curt Ebbesmeyer: Well, we were in class together at the University of Washington and I knew that he had a program that used the US Navy weather data that's issued every day to blow, well, he was working on salmon migration. The question was, "How do currents effect salmon migration?" And I said to Jim, I said, "Well, what if we just consider a shoe like a salmon and turn off the swim speed. Wouldn't we have a piece of flotsam?" And he said, "Well, yeah. I can do that." So, he turned off the swim speed and used his program to reconstruct where the shoes went.

Jennifer Stock: Oh my goodness. So, this simulation is called OSCURS?

Curt Ebbesmeyer: Yes. Ocean Surface Current Simulator. So, when I first did this with Jim, I said, "You know, let's do a blind scientific test. I'll tell you where they started, but I won't tell you where they went."

Jennifer Stock: It's a little test.

Curt Ebbesmeyer: I said, "Why don't you run OSCURS and tell me where do they go?" So, he faxed back in about two hours a map showing where the Nikes went.

Jennifer Stock: And how was he?

Curt Ebbesmeyer: It was perfect.

Jennifer Stock: Oh my goodness.

Curt Ebbesmeyer: And we published the results in a scientific journal the next year. So, we had a really nice scientific result from the shoe spill and then more people let us know about more and more container spills or stuff that fell out of containers and we started just getting more and more scientific results and we've been using…the next big one was hockey gloves, no…tub toys. There was 29,000 tub toys that fell overboard in 1992. We've been tracking those ever since.

Jennifer Stock: Are they still washing up?

Curt Ebbesmeyer: Yep. Mostly in Alaska, but they've been washing up now since 1992, almost 20 years. So, we've learned how the ocean kind of retains lactic and how the ocean just pushes things around in great circles called gyres.

Jennifer Stock: Do these gyres ever interrelate in terms of…we're one big ocean on the planet. So, they're all connected somehow. Have you seen items that have been in the Pacific for a while wash up in places you never would have expected them to right away?

Curt Ebbesmeyer: Well, I guess my expectations are is to expect the unexpected. So, I'm never surprised anymore about where things go. I know things go everywhere. I'm just hopeful that somebody will report because the sad truth is that only about 3 percent of flotsam that goes overboard is ever reported.

So, I always urge beachcombers, if you see something and it looks like it might be traceable, drop me an email at my website so I kind of…So, if things…I guess the strangest…not the strangest, but the

longest piece of plastic that I know of fell in the water in 1944 when a PBY aircraft ditched off the Philippians in World War II and one of its pieces of plastic turned up in an albatross in the year 2004 out in the great Pacific garbage path and Jim Ingraham ran OSCURS and said, "Yeah, that was drifting all that time. 60 years." So, it turned out that an albatross was our best beachcomber.

Jennifer Stock: That was a question I was going to ask you about because you write about that in your book, "Flotsametrics" talking about….and I just thought the story was amazing. I'll relate this to listeners. There was a picture taken, is this the same story, a picture taken by Susan Middleton and David Lischwager?

Curt Ebbesmeyer: That's correct.

Jennifer Stock: So, this is a bird that had passed away, unfortunately, on the nest and it was dissected and they found over 500 pieces of plastic in this albatross gut. There was...

Curt Ebbesmeyer: Yeah, the bird's name was Shedbird...

Jennifer Stock: Shedbird.

Curt Ebbesmeyer: …and Shedbird was a chick and it was just unbelievable.

Jennifer Stock: That's a lot of plastic and we've talked about this on our show before too. We've talked with some albatross biologists and a lot about marine debris, but there was just a range of items in this including oyster spacers, Bic lighters, shotgun shells, toy wheels..just about everything, but there was one item in that picture that a reader who saw the picture published in National Geographic, saw and wrote in about and it connected back to you and I just thought, "Wow, this is amazing."

All of these people are connected over this one piece of plastic in a picture taken by some biologists of a dead bird," and it all came back to you in terms of identifying it and recognizing the amount of time that it had spent in the ocean, likely.

Curt Ebbesmeyer: Well, it was an amazing picture that Susan took. It had enough resolution and National Geographic ran a full page spread of just that picture that you could actually read the number on that piece of plastic and it said BP-101 and when that issue was published, the squadron men who flew the PBY's in World War II are still very active. I believe many of them are in their 80's and they saw

that and they said, "Well, that's our squadron call number, BP-101, is a squadron of PBYs."

And the internet lines just went red hot and they started talking and talking and talking and I said, "Yeah, that's most likely a piece of old Bakelite from their squadron, one of the planes they ditched," but what didn't happen until I started asking Jim Ingraham about OSCURS, I said, "Jim, is it possible that a piece of plastic could have been floating from that time, 1944, to the present?" And the only way we're going to know is if OSCURS can run that long and he says, "I happen to have the data." So, the data went back to 1944 and lo and behold, he ran the drift of that piece of plastic every day all the way up to the present and it never hit land.

Jennifer Stock: Wow. Incredible. It really kind of brought home to me how just about every piece of debris has a human story and some of them are more interesting than others, but this one was quite interactive in terms of bringing people together and I just thought that was incredible.

Curt Ebbesmeyer: Well, my view is every piece of flotsam has an incredible human story if it could only tell us.

Jennifer Stock: Right.

Curt Ebbesmeyer: Once in a while, we're lucky enough to pick it out. Like, for example, what comes to mind are surfboards sitting in front of beachcombers' houses. I was walking along and I happened to be up at Ledbetter Point and I saw a half of a surfboard with this 14 inch diameter shark bite taken right out of it.

Jennifer Stock: Wow.

Curt Ebbesmeyer: Yeah, and so, we'll never know what that's all about.

Jennifer Stock: Interesting.

Curt Ebbesmeyer: Yeah.

Jennifer Stock: So, for those tuning in, I'm talking with Curt Ebbesmeyer, an oceanographer and a flotsam specialist with monitoring things that are washing up on our beaches and tracking their sources. Now, Curt, a real big part of your work is really based on numerous people on land that are combing the beaches.

How did you get this network established in terms of how people can communicate? Was it just all by word of mouth in terms of, "I found this cool thing," and someone would say, "Call Curt Ebbesmeyer?" How did you get this network set up?

Curt Ebbesmeyer: Well, my dad was dying of Parkinson's and they had the toy story running pretty hot and they had already done the sneaker story and the drifting hockey gloves and information was coming in so fast and my dad said, "You need a newsletter." And dad's physical therapist, Jim White, happened to be there and he said, "Well, if you write it, Curt, I'll print it."

And mom said, "Well, ok. Yeah, I'll make the mailing list," and before you know it I was backed into a corner and I was doing a newsletter and we just finished our 61st issue, os it was 16 years ago and so, now we have a website, flotsmetrics.com and newsletter goes out four times a year and there's an incredible network around the untapped network of people who find things, but had no place to report.

Jennifer Stock: Interesting. So, is this only in the Pacific or do you have this as a worldwide network?

Curt Ebbesmeyer: It's worldwide.

Jennifer Stock: Wonderful.

Curt Ebbesmeyer: So, it's pretty cool because people find something and they just happen to report it and before you know it there's an incredible story that sort of will sometimes jump out.

Jennifer Stock: What is…are you on the beaches yourself combing on a daily basis?

Curt Ebbesmeyer: No, I'm unfortunately too far away and it takes me a lot of time. I'm a writer and an investigator and I spend one or two months a year on the beach, but I find I need a balance between being on the beach, operating the network, investigating what people tell me, and that kind of thing. So, it's, to me, if I had it my way I'd rather spend all of my time on the beach, but then I wouldn't be able to do the newsletter and I think part of the fun is finding out what flotsam is trying to tell us.

Jennifer Stock: What is one of the more memorable stories in your mind that you just were quite astounded by in terms of tracking down the source of some flotsam?

Curt Ebbesmeyer: I'm amazed by all the survival suits that wash up with human remains inside. I, you know, survival suits are supposed to tell you that, "Oh yeah, I got my survival suit on. I'm going to live." And sometimes people just aren't found and the survival suit washes up months or years later with remains still in them. And I'm also amazed by people who will walk by human remains on the beach and never report them because that may be the only part of a loved one that'll bring closure to a family. So, the human dimension of remains on the beach is always just…amazes me.

Jennifer Stock: Wow. That's amazing. You have, through your network, a way to bring people together to kind of share some of these events. These are called Beachcomber Fairs. How often do you do these and are these something that other people that are not beachcombers can come to and learn about?

Curt Ebbesmeyer: Oh, yeah. There's about, probably, a dozen around the country. I can't…limited retirement…I cut my salary 40 percent 30 years ago to do this kind of stuff. So, you wind up with a retirement that's pretty meager. So, I can only afford to go to four of them and I go to two hear in Washington and I go to one in Florida and one in Sitka and they're open to the public and we usually get a thousand, 2, 3, 4 thousand people come by and I'll be sitting at my table full of trash and people say, "Hey, I found this," and "I found that," and I take pictures and try to figure out what it is. It's a wonderful…they usually last 2 to 3 days and the events are in the back of my newsletter and I just hope that people will come by and tell me what they've got. It's sort of like an Antiques Roadshow, but it's…the Antiques Roadshow instead of being like sort of land-based, it's all ocean-based.

Jennifer Stock: It's so interesting. I would love to go to one of those…just find so many questions when you come along the beach and find certain items. What are good seasons for beach combing or for finding certain things? And I'm sure this varies geographically, but how about here in California, or I guess I should say in the north Bay near Point Reyes, what would you consider good seasons for finding good items?

Curt Ebbesmeyer: Well, every beach has it's own particular couple of months when it's best and those months are going to be different from beach to beach. Like out in Washington, it's March. March, April is the best time. Along eastern Florida, it's going to be September, October, November. Now, Point Reyes, I don't know the exact timing. So, I

don't know. There's…I don't know…the exact…I'm not familiar with the timing.

I haven't got enough reports to figure that out, but there are some beaches down there that stuff washes up. Part of your coast is known for its upwelling and that brings stuff up from the bottom. So, I've been learning from Point Reyes area that, you know, not all flotsam comes from the surface. Some of it is just upwelled from the bottom and so, it's a whole new dimension being opened up down there and I don't know the time. I would guess that the upwelling season is the time for a lot of the deeper stuff to come up and you can tell by the fog.

Jennifer Stock: Well, actually I have a question from Richard Lang, who is a local artist and an avid beachcomber out here on Kehoe beach with his wife, Judith, and I believe you've been in touch with Richard in the past. He sent in a question to you about a lump of coal, which I'm supposed to ask you about.

Curt Ebbesmeyer: Yeah, Richard and Judith, we've been corresponding for years. I've always wanted to get down to Point Reyes, but it's just tough.

Jennifer Stock: Yeah, yeah. Well, this is what Richard wrote and I thought this was an interesting question. It relates to this seasonality in terms of when do more things come up and he write, "Can you describe a seasonal ebb and flow of plastic, mostly between November and April?" You know, that's interesting, a transition between…before upwelling season that he's asking about. He said, "They had a clean beach in September 2010, but a mess by March.

The plastic arrived earlier than usual this year in 2010, 2011, but then it all but disappeared by February, but then it came in with a vengeance by March." And then in July 2010, they gathered over 80 pounds, I guess, in that one day, but in the 12 years they've been out on Kehoe, they said this past year was quite weird in terms of things coming and going and the timing of it all and now that you talk about the upwelling, maybe, maybe that's one of the main forces here, but just curious if you have any thoughts about that?

Curt Ebbesmeyer: Well, yeah, what comes to mind is the weather across the Pacific has gone through and has about a 30 year cycle to it and up here in Washington it'll be wet, you know, dry and it will by dry and warm for about 30 years and then it'll be wet and cold for thirty years on average and these fluctuations are maybe ten, twenty percent of the normals, but they're pretty noticeable and we had, about 5 years ago, we had a shift from the warm and dry to the wet and cold and

every year Jim Ingraham runs an index with his drift model OSCURS and this year being, ending in March, took a dramatic drop.

The really strange…we'd never seen a drift like this before to where we got…Seattle, our weather is more like southeast Alaska and southeast Alaska is more like Kodiak and the whole weather patterns have been…right now, it's feeling like fall. So, in my correspondence in France and other places, the weather is really different.

So, there's something that's happened this year and I don't…it's too early to tell what it is, but in 2010, it was the largest glass ball year since 2003 and there seems to be like a seven-year circle and 2003 was the largest since 1996. So, '96, '03, and '10 are about 7 years apart and that just happens to be the orbital period of the north Pacific subtropical gyre that goes around the great garbage patch. So, we're beginning to get some hints that these gyres kind of wobble and they may modulate the El Niño's and so forth. So, it's a new player in the climate drama.

Jennifer Stock: Very interesting. Thanks for sharing that. I have Richard James here in the studio and he was nodding his head that, "Yes," last year was a very good year for glass floats. I guess it's the treasure here in Point Reyes to find.

Curt Ebbesmeyer: Yeah. Every ocean has its jewels and the north Pacific, it's glass balls and the north Atlantic is sea beans, tropical seeds dropped by the jungles, which wash all around the north Atlantic and so, every ocean has its wonderful jewels.

Jennifer Stock: Well, we're going to take a short break right now. I'd like to ask you a little bit more about sea beans in just a little bit if you would just please hold on the line, we'll be back in just a couple of minutes. Stay with us. Those of you just tuning in, you're listening to Ocean Currents and this is Jennifer Stock. I've been talking with Curt Ebbesmeyer, an oceanographer who tracks flotsam and we will be back in just a minute to continue our interview.

(Music)

Jennifer Stock: You're listening to Ocean Currents for those of you just tuning in and I have Curt Ebbesmeyer on the line with us from Washington state and I also have a local beachcomber here, Richard James, in the studio and, Richard, I'm going to bring you up here on mic 2. Welcome to Ocean Currents, Richard.

Richard James: Hi, Jenn.

Jennifer Stock: Curt, I just wanted to come back to…you were talking about jewels. Every ocean and basin has its jewels and some people have asked me in the past about sea beans and I did not know what those were until I was going through your book and reading and I had no idea what a big deal sea beans were. Is this more of an Atlantic phenomenon and can you go over what these are from and what are sea beans?

Curt Ebbesmeyer: Well, they're a worldwide phenomena. Every tropical jungle has its giant vines that grow through the canopies of the jungle and they make…produce these seeds and there's about 100 species that are so hard they can float for 40 years.

Jennifer Stock: Wow. So, these things are evolved to, I take it, distribute by being on the ocean.

Curt Ebbesmeyer: Correct. Forty years gives a lot of time and they remain viable for perhaps, I would guess, up to maybe 5 years. Coconut will remain viable for maybe six months or so, but these other seeds are incredible. A friend of mine, John Dennis, started floating some in 1985 and Ed Curry kept up the experiment and we've been running this experiment all of these years trying to see how long these can float. We've still got eight species that are still floating after forty years or so. So, it's incredible. So, what the jungles do is they say, "A-ha! We'll just drop them in the Amazon," and the Amazon sends them out into the ocean and a lot of them go right over to Europe.

Jennifer Stock: Oh my goodness. Have you found them here in the Pacific? What do they look like?

Curt Ebbesmeyer: There's one that's called the sea heart. It's about the size of a fist, the palm of your hand about two inches across and they grow in southeast Asia and they'll come over here and there are not very many and our coasts are kind of rocky. So, it's hard to spot them. You really need to be down on your hands and knees and once you get your eyes tuned, though, you can find them, but the best beach combing I've had so far would be down in Costa Maya, we were down in the Sian Kaan National Biosphere in Mexico down towards Belize and there were, I think, five os us found 4,000 seeds in a matter of six days.

Jennifer Stock: Wow. So, I've yet to find a sea bean. Richard, have you seen any sea beans on your time here in Point Reyes?

Richard James: Not to my knowledge. I'm making notes to add to my radar.

Jennifer Stock: Very interesting. I love it. You've been to a couple different places. Is there a destination that you're just dying to get to in terms of investigating the flotsam and seeing what's there?

Curt Ebbesmeyer: Oh, about everywhere on the planet.

Jennifer Stock: Anywhere, huh?

Curt Ebbesmeyer: There's a million miles of shoreline on the planet and you can't cover it all, but flotsam accumulates in about 10 percent of it. So, if you're a beachcomber, the first thing you do is you say, "Well, I've got about 100 miles I can go to here," but you're going to know that, oh, maybe just a few miles of it is where about 90 percent of all the good stuff washes up.

So, it's like fishing holes. If you know…if you're a good fisherman, you'll know where to fish for best spending of your time. So, beachcombers kind of know all the little nooks and crannies just like surfers. Surfers know all the little places where the waves are just right.

Jennifer Stock: Interesting. Are there certain areas…I read about graveyards, flotsam graveyards. Are there certain areas that are just consistently inundated with debris from the ocean?

Curt Ebbesmeyer: Yeah, like the junk beach is one of the best near the south point of Hawaii, incredible amounts. Before it was cleaned up, plastic was 16 foot thick for a couple of miles. The great Bend of Texas is really cool, stuff from all over the Caribbean and north Atlantic kind of collects along that San Padre Island up to about Mata Gorda, Texas and I like to go down there and hang out and so, it's really cool. Sea beans…it's just incredible, the junk. Most of the junk from Hurricane Katrina that washed out of New Orleans went right on down there.

Jennifer Stock: Speaking of natural disasters, I think Richard has a question since he's concerned for his health in the next few years as things might be coming across the Pacific. Richard, did you want to talk with Curt?

Richard James: Sure, hi Curt...

Curt Ebbesmeyer: Hi, Richard.

Richard James: …it's a pleasure to talk with you. Given that I'm on the beach around here a lot, people are asking me often, one: do I see tsunami related trash that's washing ashore and I generally say, "No, I don't think so," and Richard Lang, I know Richard and Judith, and we joke and half don't-joke, are we going to need Geiger counters for the stuff that we find on the beach? So, my question to you is, can you explain the expected landfall of the tsunami stuff and can you address the radioactivity of any of that?

Curt Ebbesmeyer: Yeah, those are really good questions. On my website I've been trying to put up what Jim Ingraham shows as where the debris field is and it's about, the leading edge is coming towards Midway Island. It's about the size of California, the debris field. It's moving slowly at about maybe 6, 7 miles a day and I would guess that you might start seeing the leading edge of it maybe next year. So, go to my website.

I've been trying to put up every month where the debris field is and then as to Geiger counters…I've…my own view is that if I lived on the beach and it was next year, I'd like to have a Geiger counter for the following reason: liquids are going to dilute so much that I'd doubt that you'd ever see any radioactivity from just pure water or things dissolved in the water, but if your listeners can bring up the image that when the reactors at Fukushima, I forget the name of the reactors, but they exploded, do you remember the big, solid objects that went up in the air?

Those are particular objects and if they fall in the water and float, they may be hot and in terms of radioactivity, but they're not going to, how should I say, dissolve. So, it's possible that something washes up on the beach that's still hot and we're not going to know about it. So, and there's just not enough scientists to go out and measure every piece of flotsam. So, I think Geiger counters aren't all that expensive.

So, I'm urging beach combers, if you can afford to get one, carry one with you next year, year 13, and make some of your own…make your own measurements. It's like the citizen astronomers. They find remarkable things that scientists miss and I wouldn't be surprised if we had 1,000 beach combers out with Geiger counters next year, we might find some things.

Jennifer Stock: What are the levels that you would be concerned about if you were seeing some levels appear in your Geiger counter.

Curt Ebbesmeyer: I don't really know. If I got any hits at all, I'd be concerned.

Jennifer Stock: Yeah, that's true.

Curt Ebbesmeyer: I would actually keep a logbook. I always keep my little brown daybook in my pocket and anything interesting, I take a picture, I take my cell phone out, I take a picture and I send it back to my computer and I think about it, but the best you can do is if you get any hits, mark down the date and time, location, take a picture of what it was. If it's really hot and your Geiger counter starts going nuts, I would call the police.

Jennifer Stock: Oh boy.

Richard James: You know, about three months ago, I found a wave-guide. I don't know if you know what a wave-guide is, but it's a conduit for radio waves and it's about three foot long. It's made of bronze, very expensive looking item, and it was wrapped in bubble wrap and that was inside a sealed bubble-wrap bag and it's bronze and so, it's something like that, if that were to have originated from Fukushima, that...

Curt Ebbesmeyer: I was just out on the beach, Richard, up here near Forks, Washington and I had something just like that wash up. It was kind of bronze. It's a directional wave-guide for a…I'm trying to say…a cable operation and it was all in its box and everything.

Richard James: Maybe this is from the same ship, you know? I showed it, actually, to our resident transmitter ranger here, Richard Dillman, and one of his friends suspected that it was a 12-gighertz frequency, if that means anything.

Curt Ebbesmeyer: Send me a picture and the specs on it and I'll compare it with the specs that John Anderson at Forks…he found one. Sounds like it's about…it fits in the palm of your hands, it's about 4 inches across, highly machined, it has many, many, many specification parts and it looked like it was for a cable operations.

Richard James: Yeah, I'll send you a picture. This is grey and it's covered with part numbers and manufacturer numbers. I can get you that.

Curt Ebbesmeyer: Yeah. That would be…maybe we're dealing with a spill. We also had a bunch of refrigerator doors of small and refrigerators

themselves about two foot tall, small and Toshiba, magic chef, and I forget the other one, were the brand names on them, but just up at Forks we found three or four. I'm wondering if there was a container cargo spill of small refrigerators.

Richard James: I've only found one fridge and it was up on Tomales point a couple of years ago, but it was old and it was a ship-borne refrigerator and I found it two months later and it was just pulverized into pieces.

Curt Ebbesmeyer: These were pretty new, but we're finding mostly the doors in the last month or so. So, it's too many to be just haphazard. So, something is going on.

Jennifer Stock: Interesting.

Richard James: I'll keep my eyes peeled.

Jennifer Stock: Richard, what are some other items that you want to ask Curt about that you've found? You've been out here a lot. Richard collects tons of garbage off the beach. He's a viable cleaner-upper here, helping improve the habitat for sure on Point Reyes National Seashore, but he's always emailing me interesting stories and I'm always jealous that I'm in an office and he's on the beach.

Richard James: Well, you know, last year, Curtis, you were mentioning how last year was a big year for things and I've only really been doing this seriously for the past three years, I believe it is and this year is pretty much a desert. The ocean is not giving up what it's holding for the most part, but last year, the ocean was more than happy to give up.

I could clean the same beach three days in a row and get the same amount of plastic every day and there were times that it seems like almost like the deep…I called it, like, the deep gyre, the gyre got bumped really hard and I found a full-faced motorcycle helmet that had probably 20 bounds of gooseneck barnacles growing on it and when I picked it up, it was in the surf, oh about 40 live crabs fell out of it and so, things like that, that to my layperson's mind, that thing has been out in the ocean for a long time to develop that growth of barnacles. Is that a correct observation?

Curt Ebbesmeyer: Yeah. Particularly long gooseneck barnacles. Was it still floating, you think?

Richard James: Oh, absolutely because as you know, the heavy side goes down. So, as the barnacles grow, they just tend to keep that as the keel

and then whatever is facing up gets baked by the sun and nothing grows on it. So, I found a helmet. I found lots of those big bowling ball sized net-floats, those black net floats that would have nine, ten, twelve inch growth. The plastic ball was lifted off of the beach resting on a foot of barnacles.

Curt Ebbesmeyer: Well, that helmet strikes a chord because it may be traceable. They all have serial numbers.

Richard James: I still have it. It's sitting down on the beach. It…when you have barnacles on things, they small rather bad. So, I've learned to leave those on the beach for months to dry out.

Curt Ebbesmeyer: What I usually do is I'll try to knock off the big ones and then come home and get a big garbage bucket and put some Clorox in there. If it's really an interesting piece, I'll put in a bucket of pretty undiluted bleach and in about a month, I can start getting close to it and now, those helmets sometimes have decals that are really traceable and the serial numbers. You never know. I was just in Italy at a crime scene investigation conference and drifting human remains and you never know when something comes from a crime scene.

Jennifer Stock: Wow.

Richard James: Interesting. Well, you know, that helmet is still out there and it's still full of, they're now desiccated barnacles. I'll…maybe I can gather it up and not destroy my car with the odor of barnacles.

Curt Ebbesmeyer: Maybe you can have some, like, some surgical aspects to it and see if you can't get some serial numbers off of it.

Richard James: It's a unique; it's not just a white or black helmet. It's got a unique decal…it's red and grey and black. So, yeah...

Curt Ebbesmeyer: A lot of times noted artists do those things and sometimes those are really traceable.

Richard James: Interesting.

Jennifer Stock: Well, Richard, you've got some work to do here.

Richard James: So, when I find things like that, am I correct in my assumption that stuff that has the barnacles on it is from deep within…I mean, it's trapped in a place where it's not been released. Is that a correct assumption?

Curt Ebbesmeyer: Well, I would say rather than deep, I would say it came from far away, maybe. Something like that, it's not unusual to find something from Japan that comes over here and it's just loaded with gooseneck barnacles, like, I can think back to earlier times of, you know, of boats, skiffs just so covered and the boat overturned and the barnacles were two foot long and the boat was barely discernible, but it has come from Japan and in a couple of cases, the beachcombers traced the boats right back to Japan through the coast guard.

Jennifer Stock: I have a question that since both of you are talking about barnacles and what not, I know there pelagic barnacles, they're not going to survive at the shoreline, but I'm wondering, Curt, have you talked with any biologists in terms of is flotsam a viable way of invasive species being transported? I know that's a big deal with cargo ships offloading pallets, but now that we have all this extra flotsam in the last century or so in the ocean, is it possible for some non-native species to actually make it to a new habitat?

Curt Ebbesmeyer: Well, I know of cases…it's a really good question and I'm not aware of any biologists investigating that, but I do know that like across the Atlantic, some species of clams and bivalves have made it over from here over to Europe. I don't know about survivability, but they made it alive. So, I would guess that flotsam…there's no doubt in my mind that flotsam does transport species from Asia over here. It's just, is there enough there to establish a new population? I don't know, but flotsam, there's so much flotsam in the ocean that I would guess that it should be looked into.

Jennifer Stock: That's interesting. I was just…had these images of these living things crossing over and if Richard's picking them up and suppose this crab comes off that's like, "A new zone." I have this children's book spinning in my mind sitting here.

Richard James: Well, you know, I have found these five-gallon plastic jugs that I do think come from Asia with mussels on them that I've never seen around here. They're definitely not native mussels.

Curt Ebbesmeyer: Then what I would do is go to a biologist with lots of gray hair who really knows the species and see if you can't get it identified. You may…there have been cases of trans-oceanic species coming across on flotsam, but it took somebody who really knows their biology to identify to the species level.

Richard James: I'll see if I still have some of those mussels. They're beautiful and they're different. They're not the kind of mussels we have around here.

Curt Ebbesmeyer: Yeah, you probably need to get them preserved and I forget what kind of solutions, they used to use formaldehyde, but that's a no-no now. I forget how they're storing them, but in the 1800's they used pure alcohol to store specimens like monkeys out of Africa and so forth and I'm not sure…when I was doing the biology, we used to use formalin and formaldehyde and now we don't do that anymore, but I've forgotten where the science has gone, but the best thing you can do is preserve some specimens and then get them identified. It's a lot of work to find the right person, but it can be real scientific gold.

Jennifer Stock: We'll have to get you in touch with some people out here. There's quite a few marine institutions in the Bay area. So, we'll have to link up Richard with some.

Curt Ebbesmeyer: Yeah, I would go to the California Academy of Sciences first and maybe they have kind of an Antiques Roadshow and you get, like, here the museum opens up its doors once or twice a year and people can bring in anything for the experts to identify, but the California Academy of Sciences is so open and they have such a long tradition of citizen science that I guess that's where I would heard first.

Jennifer Stock: You'll have to give them a try. We just have a couple minutes left here, Curt. This has been so enjoyable. I really love hearing these stories. Is there one item that you're waiting to hear about somebody reporting to wash up somewhere?

Curt Ebbesmeyer: I just operate on the…I expect the unexpected. So, I keep my mind totally open. I try not to be like a racehorse with blinders. I just open to considering anything. I find that if I kind of limit myself that I overlook the gold. So, I really like to just consider myself pretty open to things. If, like, who would have guessed sneakers? Who would have guessed tub toys? All kinds of things. Who would've guessed a motorcycle helmet might be key to an important case? For all we know that motorcycle helmet that Richard has, has some invasive species in it.

Jennifer Stock: Yeah. We need to keep you under control there, Richard.

Richard James: They're dead now.

Curt Ebbesmeyer: Yeah, but they're maybe still identifiable.

Jennifer Stock: So, can you repeat again for listeners how people can get involved with your network and get in touch with you if they find something interesting on the beach that they'd like to get more information on?

Curt Ebbesmeyer: Well, if you go to flotsametrics.com, it's www dot F-L-O-T-S-A-M-E-T-R-I-C-S dot com, you'll see samples of my newsletter, you'll see where the tsunami debris field is supposed to be. You can..I have a lot of video links and stuff like that. So, anybody wants to contact me, there's a contact there. So, I would love to see…Richard can just go there and start sending me pictures. You just never know what really turns up, what the ocean really wants to tell us.

Richard James: Careful what you ask for, Curtis. I always have my camera on the coast.

Curt Ebbesmeyer: Please…that motorcycle helmet could be really cool. It may be even from Japan.

Richard James: I know right where it's sitting on the beach right now. So, I'll go check it out.

Jennifer Stock: You're going to have to report back to me so I can share it on the air with our listeners.

Curt Ebbesmeyer: Okay, well, thanks so much.

Jennifer Stock: Curt, thanks so much for you time.

Curt Ebbesmeyer: Thanks, Jennifer.

Jennifer Stock: And I'm sure you'll be in touch with people from Point Reyes real soon.

Curt Ebbesmeyer: That'd be cool.

Jennifer Stock: Take care.

Curt Ebbesmeyer: You too. Bye, bye.

Jennifer Stock: Bye, bye. We've just been talking with Curt Ebbesmeyer. He is the author of "Flotsametrics and the Floating World: How one Man's

Obsession with Runaway Sneakers and Rubber Ducks Revolutionized Ocean Science." The chapters reveal incredible details associated with studying the movement of water. There's chapters on messages in bottles, sneakers, castaways, the ocean conveyor belt, the synthetic sea.

Nearly every item we find on the beach has a human story connected to it. So, it's an incredibly interesting and informative book that if you're anywhere near interested in beach flotsam and things you might find, this would be a really great book for you to check out. I'm going to pull a quote that I pulled out of the book. I just thought it was great. It kind of reminds me of Richard.

"Going to the beach and ignoring the rack line is like going to Disney World and looking only at the parking lot." That's a quote from Ed Parry and Kathy Katz. They are presenters at the fourth annual Sea Bean Symposium in 1999 and I got that right out of the book. Pretty interesting stuff. We are coming up here on just the top of the hour and I wanted to leave you with just one little piece of information, something to stay tuned to with KWMR.

Here, locally, at Cordell Bank National Marine Sanctuary, we're going to be going out in a couple of weeks with an autonomous underwater vehicle to Bodega Canyon, an area that has not been explored. This is a submarine canyon just north of the Cordell Bank Sanctuary. The canyon is about 12 miles long and nearly one miles deep at 5,249 feet, or 1,600 meters and we will be posting pictures and updates on our Facebook page. You can just get on Cordell Bank National Marine Sanctuary and like our page to keep up on news related to that, but KWMR news will be following the story as well and hopefully producing a story about what we find from this exciting opportunity to explore an area that we haven't been yet and to learn about the sea floor habitats down there.

We know the surface waters are very productive, lots of whales and seabirds, typically over there, but we don't know what's down below. So, we're just about out of time here. It was so entertaining listening to Curt Ebbesmeyer and Richard, thanks so much for coming in and talking a little bit about some of the things that you've collected. It was great.

Richard James: Thank you, Jenn, for having me. It was a pleasure.

Jennifer Stock: I want to hear back about your helmet so I can report out to everybody.

Richard James: Will do.

Jennifer Stock: Alright, cool. And for those of you that want to hear past episodes of Ocean Currents, you can always tune in at cordellbank.noaa.gov for past episodes and our podcast and you can hear all the past episodes there including this one. This will be hosted in about a week or so, but I want to just say thanks again for tuning in to Ocean Currents, you've been listening to KWMR, 90.5 Point Reyes Station and 89.9 Bolinas. Thanks so much everybody. Enjoy the day.

(Ocean Sounds)

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