

*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 that delves into the blue part of the planet and highlights ocean related topics. We talk with scientists, educators, explorers, policy folks, users, et cetera and learn about the mysterious ways this blue part of the planet functions and supports life. My name is Jennifer Stock and I bring this show to you from NOAA's Cordell Bank National Marine Sanctuary the first Monday of every month on KWMR. This show is part of the West Marin Matters series where every Monday at 1 o'clock, you can tune in to hear about a local environment or economic topic relevant to the West Marin area and beyond.

Today is a bit of a potpourri of topics. I'm going to keep you on your toes today. Last week, I attended the National Marine Educators Association conference in Monterey and had a chance to catch up with some of the presenters. So, I thought I'd share with you today, some of the highlights. The National Marine Educators Association is a national organization that works to make known the world of water through education and outreach efforts nationally and internationally and it's an exciting time to reconnect, learn from others that are working to help engage communities and students and people of all ages in the understanding of our ocean and fresh water world. So, here is the rundown for today's show: It's a bit of a mix. So, stay with us.

In just a few moments I'll play an interview with Carey Morishige, who is with the NOAA office of marine debris and gave a presentation at the conference about marine debris and a lot of the misinformation that's out there, but what are the facts and what is some of the research going on? So, you'll hear a little bit about that. Then, we actually are going to take a little break and have a live interview with folks from the Algalita Marine Research Foundation who have been on the road for the last few months, Marcus Eriksen and Anna Cummins have been bicycling from Vancouver to Mexico this summer, raising awareness about this issue and working in communities and we want to hear a little bit about that and where they've been stopping along the way and some of the work being done in California. So, we'll have a live interview with them. Then after the break, we'll hear the latest on

what's happening with ocean literacy in the K-12 education world and finally at the very end we'll hear an interview with Grant Washburn, who is a filmmaker, also local in San Francisco and a big wave surfer, one of the pioneering surfers who surfs Mavericks to this day and I had a chance to meet him and interview him a little bit too. So, that'll be towards the end of the show.

So, we have a bit of a mix here today. We've got the ocean literacy, we've got marine debris, and surfing all together in one show for Ocean Currents today. So, thank you so much for tuning in and please stay with us.

(Music)

*Jennifer Stock:* I'm talking with Carey Morishige from NOAA's marine debris program and we're going to talk a little bit about some of the information she presented today at the National Marine Educators Association conference and a session about the marine debris program. Carey, thanks for spending a moment with us today.

*Carey Morishige:* Sure, no problem.

*Jennifer Stock:* First, can you tell us how you got into the field of trash and marine debris?

*Carey Morishige:* It's a very exciting story, actually. Growing up and being born and raised in Hawaii, you see it all the time, but it's kind of out of sight, out of mind. When I was a graduate student at the University, a friend of mine who worked for the University of Hawaii Sea Grant College Program has a position open, actually, that would analyze and data crunch about 16 years of marine debris data collected by US Fish and Wildlife Service volunteers from Tern Island in the northwest Hawaiian Islands and I thought, "Well, you know, I could do that. That would be some extra cash for a poor graduate student trying to make it through college." And I took that project up.

It turned into a two-year position. I acquired more data from the US Fish and Wildlife Service and when I started working with the marine debris program back in 2005, I actually took that data, re-crunched it, added more data, and it's a publication now. It's a published paper in the marine pollution bulletin, 2007.

*Jennifer Stock:* Wonderful. When did the NOAA office of marine debris program get established and what are the major functions of the office?

*Carey Morishige:* Sure. The NOAA marine debris program, we were established in 2005. We were formalized in 2006 when former president George W. Bush signed the marine debris research prevention and reduction act, which essentially created our program and we work in those three areas, actually: The research, the prevention, and the reduction both on a national scale as well as an international scale. We're really set up to be sort of a centralized hub for marine debris information across NOAA and the federal government and so we serve in that capacity and everything that we do, or most of what we do and why we get so many projects done, so many things done when we're only nine people, we work through partnerships.

We have partners across the nation, both within NOAA, outside of NOAA with industry, academia, private businesses, NGOs and that's really how things get done.

*Jennifer Stock:* What are some of the research projects your office is working on or funding throughout our ocean?

*Carey Morishige:* We have several new and very cool research projects. One of the ones or two of them that I'm involved in, one of them is the At Sea Detection of Derelict Fishing Gear and it's looking at ways to find, really, derelict nets, derelict fishing gear in the north Pacific ocean, specifically, with helpful applications to other oceans of the world, but it's pulling in not only the folks that work in marine debris who are the people that typically we've worked with in this issue, but folks completely outside of our box, the oceanographers as well as sort of the techy engineers, the folks who deal with the different sensors and platforms and unmanned aerial systems and things like that. So, pulling in all these different sectors, pulling them together and having all of them work together to try and figure out a way to detect derelict fishing gear at sea with the intent to hopefully remove it before it gets close to shore and does the damage that it does.

Another area that we're involved in and I'm just sort of on the fringes of it mainly in the outreach realm, is the area of micro plastics and pollutants on plastics. Back in September of 2008, our program worked with the University of Washington-Tacoma and we hosted an international micro plastics workshop where we pulled in the top researchers in all of these areas from around the world, from the United Kingdom, the Netherlands, Australia, Japan, across the US. We pulled them together to finally figure out

what is it that we know about the micro plastics issues, about the ingestion of plastics, about this issue now emerging and really alarming the public of the pollutants: PCPs, DDTs, getting absorbed to these plastic particles and then ingested by these animals? You know, what do we know? Does it have food chain level effects?

And what we found from that is that there is actually a lot the we don't know. So, collaboratively, we've shared information, found out where the research gaps are, but hopefully from then on taking steps forward, working collaboratively with these international researchers and across the nation to really get at effectively addressing some of these big research gaps.

*Jennifer Stock:* What are micro plastics?

*Carey Morishige:* Micro plastics, you know, I don't think there's a formal definition for what constitutes a micro plastic, you know, 5 millimeters small or things like that. That's just a sort of a general term for small plastic bits, the type of things that are usually overlooked in beach cleanups because they're so tiny. These are pieces that usually come from larger pieces, broken up, fragmented, or degraded into smaller bits of plastic. As you know, plastics do not biodegrade. They really break down into smaller and smaller bits. So, those are these bits. They also come directly from sources like the roto-molding, which is plastic powder that is melted into things like kayaks to exfoliates used in a lot of our facial scrubs to...there was one other...the pre-production plastic pellets, otherwise known as neutrals to the general public, the form that plastic originates in before it gets molded into the things that you and I know of like the plastic bottle.

*Jennifer Stock:* So, you were talking how there's these gaps of information about these persistent pollutants. We know that these things...other things like DDT and PCPs can accumulate on these smaller plastics and they may be ingested by marine life, but are you saying we don't know much yet about the effect of bioaccumulation in the marine food web from that?

*Carey Morishige:* That's exactly correct. We know that these persistent, organic pollutants are in the ocean. We know that they absorb to these small plastic pieces of debris and we know that birds and fish, marine mammals, down to zooplankton ingest this plastic debris. What we don't know if whether or not these persistent organic pollutants, these contaminants, come off of the plastic pieces into the bodies of these organisms once they're ingested and we don't

know the food web effects, whether or not these pollutants bioaccumulate. Those are a lot of the things that are researchers are looking at.

*Jennifer Stock:* Interesting. So, do you know of any studied right now that are really looking at this, this transfer of pollutants through the food web, through different animals.

*Carey Morishige:* Personally, I don't know. Again, I'm on sort of the fringes of this research area. I'm sure there are people who do know, but no. Off the top of my head, I don't know.

*Jennifer Stock:* That's ok. That's cool. How about just the whole issue of watersheds and the transport of plastics through watersheds to the ocean. Is that another area the NOAA office of marine debris is trying to find ways to help with?

*Carey Morishige:* Absolutely. You know, marine debris doesn't just come from the coastal states or the coastal cities. It can come from landlocked states, downstream storm drains, rivers...it all connected to the ocean. So, those are definitely areas, watersheds, addressing the system from the ocean and coasts all the way up to the land, that we try to work in and a lot of what we do is through outreach and education, that prevention of the marine debris from getting into it even though you may dump it in Colorado or in a stream or on a street...somewhere that is so far from the ocean, so far from your mind, it has the potential to make it to the ocean and become marine debris.

*Jennifer Stock:* One of the things you talked about today during the talk was really trying to clear up a lot of confusion that the media has created with a lot of terminology of gyres and patches and state sizes and whatnot. What can you just tell us about what we do now about that area in the Pacific that has been talked about in regards to the accumulation of plastics there. What do we know about that region?

*Carey Morishige:* Well, the area in the north Pacific that NOAA focuses on and it's a known area to our researchers of concentration of marine debris. It definitely has not a sexy name like the garbage patch. It's called the North Pacific Subtropical Gyre is it's name, which is why I'm sure the media and others love to just call it the patch, but it's not just a convergent zone that concentrates marine debris. We now know that oceanic eddies lying near windrows, these other oceanographic features: currents, winds, also concentrate marine debris, but because we need to hone down the area because we

don't have the money or the resources to study the entire north Pacific ocean, you know, NOAA focuses on the subtropical convergent zone as a known area for marine debris accumulation.

*Jennifer Stock:* How about the use of it by animals that are traversing the Pacific? Is that another area they're trying to find more information on?

*Carey Morishige:* Yeah. The convergent zone, one of the things we use to sort of see the convergent zone with the satellite is the level of chlorophyll. So, we look at satellite photos that measure and look at and can see the chlorophyll content of ocean water because this convergent zone kind of travels along with something else called the transition zone chlorophyll fronts, another quite unsexy term, but yes, because there's a lot of chlorophyll there, there's a lot of zooplankton, there's a lot of fish, there are a lot of marine life in that area and, in fact, Hawaii's long line fishery, you know, a lot of our fishermen fish in that area just because it's fairly high in marine life.

*Jennifer Stock:* Interesting. You mentioned earlier about MARPOL, which is a fairly young act and what exactly is MARPOL, what does it stand for and what does it allow and disallow?

*Carey Morishige:* Sorry. I'm not sure of the details of all of MARPOL, but specifically in MARPOL which is an international marine pollution act, specifically annex 5 is the prevention of plastic pollution from ships and what it bans is the dumping of any type of plastic pollution from ships in our world's oceans and it is an international act.

*Jennifer Stock:* That's wonderful. Do you know when it was passed? I think it was '86, maybe?

*Carey Morishige:* I believe it was '87.

*Jennifer Stock:* We're close and we're going to look it up.

*Carey Morishige:* Yes.

*Jennifer Stock:* But that's a good act. I'm glad it passed. As far as this issue, it's such a huge, mind-boggling issue. What do you think we can tell people that they can do to help reduce this problem in the ocean?

*Carey Morishige:* Well, it's funny that you use the word reduce because one of the things we preach all the time are the three R's. It's really the simple things that people can do every day, the reduce, reuse, and recycle,

you know? Think of reusable vs. disposable. Recycle as much as possible. Try to reduce your waste stream. Also, get involved in beach cleanups, street cleanups, stream cleanups, river cleanups, you know, all of that has the potential of reaching the ocean.

So, it doesn't even necessarily have to be a beach or reef cleanup. You can clean up any area and that's, in a way, going to be preventing marine debris from occurring. Other ways that folks can get involved, really, just become knowledgeable about the issue. As you mentioned, there is a lot of confusing information out there in the media: the patch, what plastics do, whether or not they biodegrade, how big the area is in the north Pacific, can you walk on it, can you see it? There's a lot of confusing information. Go to a reliable source, learn about the issue and then tell others about it.

*Jennifer Stock:* Thank you so much, I really appreciate your time today in being a big advocate for working on this marine debris issue.

*Carey Morishige:* Not a problem. Thank you.

(Music)

*Jennifer Stock:* ...and we are back. You're listening to Ocean Currents. This is Jennifer Stock. In the first segment you just listened to earlier was an interview with Carey Morishige with the NOAA marine debris program and she talked a little bit about what the office of marine debris does within NOAA and the type of research that is needed to keep moving this issue forward, but we're going to take a little detour right now, actually, way down the coast of southern California where I have Marcus Ereksen and Anna Cummins from the Algalita Marine Research Foundation. Marcus and Anna, you're live on the air.

*Marcus Ereksen:* Hi, Marcus here. Thanks for having us.

*Jennifer Stock:* Excellent, Nice to have you here. So, just a quick recap: we've had Charles Moore on the show in the past talking a lot about the big issue in the Pacific Ocean and the research that the Algalita Marine Research Foundation has been doing, but I wanted to hear a little bit about some of the work you and Anna have been doing starting with last year when you set across in a non traditional sale craft across the Pacific Ocean. Can you tell us a little bit about the junk raft and the work you were doing while sailing across the Pacific?

*Marcus Ereksen:* Sure. So, Anne and I on our last research expedition, more than a year ago, we saw that in just ten years, the amount of plastic waste

floating in the middle of the north Pacific gyre had doubled by volume and we're finding plastic trapped inside fish. So, we decided then to do this stunt to build a Kon Tiki style raft out of 15,000 plastic bottles and float across the Pacific from Long Beach, California to Waikiki in Hawaii and we did just that. It was a raft made from 15,000 bottles, 30 sailboat masts, latched those and made a deck, and a century-ten aircraft, the fuselage of an airplane. All of it literally tied together and we sailed June 1st last and that began an 88-day odyssey floating across the Pacific. We outran three hurricanes and we made some interesting observations along the way.

*Jennifer Stock:* What are some of the observations you made?

*Marcus Ereksen:* Well, halfway across as we were running out of food we began fishing for sustenance and we caught one fish called a rainbow running. Now, this is one that you'll see in fish markets around the world. You'll see it on menus in Hawaii, for example, and we caught the fish, we opened its stomach out of curiosity and found 17 particles of plastic and nothing else. So, and these fish...we were surprised to see trash in fish that we were trying to eat in the middle of nowhere halfway to Hawaii, but what's interesting is that the fish have a big mouth and a very small sort of batch of small intestines. So, plastic particles go in their bodies and they just sit there and are in their stomachs for a long time until the fish grows bigger and can pass them. So, these plastic particles, we know from other Algalita research that plastics have this ability to absorb all kinds of pollutants like pesticides and oil drops from cars and PCBs. These are already in our oceans and in very high concentrations of the plastics.

So, you have this stuff inside fish that is potentially leeching these pollutants back into the fish's tissues and organs and that's where the research is right now, to figure out if those links are true.

*Jennifer Stock:* Interesting. I just...the earlier interview we did was with Carey Morishige from the NOAA Marine Debris program and she echoed that same thing, the research needs to be done to find out about this transfer up the food web. So, I'm hoping that we'll have some more information on that very soon. Now, coming back to this gear, I understand you and Anna Cummins, another educator with Algalitta Marine Research Foundation have set out for another adventure to have more of a presence with the public and talking about the issue of marine debris. Maybe Anna can give us an overview of the junk ride this year.



- Marcus Erekson:* Let me give you Anne to talk about Junk Ride. Here she is.
- Anna Cummins:* Hi, Jenny!
- Jennifer Stock:* Welcome, you're live on the air.
- Anna Cummins:* Thanks for having us.
- Jennifer Stock:* You bet. So, what are some of the goals of the ride this year. Maybe you can give us a little bit of a background on the bicycle ride. I'm assuming you're pretty much near done at this point.
- Anna Cummins:* Yeah, actually, we finished up last week. We crossed the border into Tijuana which is the last leg of our journey, but our idea was to ride 2000 miles from Vancouver, Canada down from Mexico to give forty presentations along the way to schools, universities or organizations and also, one of our primary goals was to give away samples that we collected out in the north Pacific gyre to educators and to legislators. So, that was a tremendous success. We were able to meet with five mayors including Gavin Newsom out in San Francisco, spend 15 minutes or so talking about the gyre with him and hand him a sample. One of the reasons why this has been such a huge issue is that it's the ultimate case of out of sight, out of mind.
- Very few people are able to see what's out there in the middle of the north Pacific Ocean. So, we were able to bring that directly to people and show them what's happening out in our oceans.
- Jennifer Stock:* How are some of these community leaders reacting to this information?
- Anna Cummins:* Well, what we're really seeing is that when people start to understand the human health impacts of this debris, seeing images that we've shown legislators of plastic particles in the fish that you and I eat, coupled with the information that these particles are absorbing pollutants, this really hits home when they can see that this trash is not just an aesthetic issues, it's not just unsightly, but it's actually entering the food chain. So, we've seen along the entire west coast, a ripple effect of cities trying to institute bans or fees on plastic bags, which is starting to catch on, but it's a very slow process. What we'd love to see is national, or at least, state-wide legislation banning some of these throw away plastics.
- Jennifer Stock:* One of the stops along the way....you participated in a medical study to find out about what toxins might be in your body and had

some blood tests done. Can you talk a little bit about that and when you might find out the results?

*Anna Cummins:* Sure, sure. Well, it's a product called synthetic me. We've been looking at the concept of synthetic seed, but we're now looking at how these plastics are entering the food chain. So, one of the things that's been shown with plastic particles is...will absorb...organic pollutants like PCBs...pesticides, drops from our cars. These will stick to plastic and now we know that fish are ingesting these plastic particles. So, what we're looking at is finding out if these particles are now acting as a transport vehicle for these organic pollutants in the ocean into our food chain. So, we're looking at this in two ways.

One: we're going to do tissue analysis on these fish, these lantern fish that we know are eating plastic particles to find out if these chemicals are getting into their tissues. So, we also took my blood up in Portland to do the same analysis on my body. So, we're looking at levels of PCBs, DDTs, flame retardants, and some other pesticides in my body. I actually am just starting to get the results back now. So, the next step will be to figure out where they fall in the national average, but flame retardants have been a big one. Here in California, we have some of the highest levels of flame retardants in our bodies in the world. So, what we hope with this is to show that there is a human health side of this plastic pollution out in the ocean.

*Jennifer Stock:* Excellent. We'll be very...paying close attention to find out the results of that this year. Can you talk a little bit...is there anything happening in California right now in terms of legislation? You were mentioning you're hoping for a national...a nation-wide effort here, but anything happening in California that listeners might be able to stay in touch with and keep their eyes on?

*Anna Cummins:* Yeah. Well there is a proposal to have a state-wide ban on plastic bags. There's a recent shift with that. I think it's been pushed to a two-year initiative, but since we've been on the road for a while, I haven't been able to track the progress. Listeners can go to...Heal the Bay is an organization that we work with locally that's done a lot of work on legislation, so [healththebay.org](http://healththebay.org), Surfrider Foundation also engages in some advocacy and legislative efforts. So, people can try that online. The best thing that people can do, though, is write to their legislators, write to their state senators, write to their local politicians and let it be known that they support this legislation.

- Jennifer Stock:* Fantastic. What's been the best part of the whole ride this year?
- Anna Cummins:* There were a couple of highlights. One was having our junk raft displayed on the front steps of the state capitol in Sacramento. That was pretty wonderful for us. We would have never dreamed when we were building this raft a year ago that we would see it displayed in front of the capitol and then on a personal note, we got married on the coast of Big Sur. That was great...wearing plastic bag outfits. I was wearing a dress by a Santa Barbara designer, Gianna Cohen and Marcus wore a plastic bag vest that she had also designed... a local artist who is doing some wonderful things with plastic materials.
- Jennifer Stock:* Fantastic.
- Anna Cummins:* That was a personal highlight for sure.
- Jennifer Stock:* Oh, that's wonderful. Thank you for sharing the news.
- Anna Cummins:* Thank you.
- Jennifer Stock:* How can folks stay tuned to your work with Algalita.
- Anna Cummins:* Absolutely. People can go to [Algalita.org](http://Algalita.org), that's A-L-G-A-L-I-T-A dot org to find out more about some of the current research. Our founder, captain Charles Moore, is at sea as we speak. He's on his longest voyage yet to the north Pacific gyre. So, people can follow that journey as it goes along. They can even ask questions directly and they can learn about our upcoming projects to the north and south Atlantic gyre through [algalita.org](http://algalita.org).
- Jennifer Stock:* Fantastic. Anna and Marcus, thank you so much for sharing your time today with us, really appreciate it.
- Anna Cummins:* Thank you and thanks for covering this issue.
- Jennifer Stock:* You bet. Take care.
- Anna Cummins:* Take care. Bye.
- (Music)
- Jennifer Stock:* I'm talking with Craig Strang who is with the Lawrence Hall of Science in Berkeley, California and Craig led a session today on ocean literacy and where we're going in the next few years on

getting it into classrooms across the United States. So, Craig, if you wouldn't mind...giving us an overview of today's session?

*Craig Strang:* Well, today's session had a couple of different purposes. One was to introduce the participants to the finely finally of the ocean literacy scope and sequence for grades K through 12. That is a document that is comprised of 28 conceptual flow diagrams. There are four conceptual flow diagrams for each of the seven ocean literacy principles, one for each grade band: K through 2, 3 through 5, 6 through 8, and 9 through 12. So, we've been working on that material for almost three years now and it was very exciting to be able to introduce that final version to people who have been waiting for it and, no doubt, will put it to good use. And the second purpose of the session was to move in to the next phase of the ocean literacy campaign and that is to start conducting widespread professional development for teachers and for information educators based on the ocean literacy framework that we've been working on for the last three years. So, we had participants focus for most of the day on designing professional development according to some research-based lessons learned best practices and well-regarded strategies that we know will work with teachers and other educators.

*Jennifer Stock:* How do you feel education and the types of work that you're doing with ocean literacy contribute to the greater goal of ocean conservation in the long run?

*Craig Strang:* Well, I think the ocean literacy campaign is largely focused on creating a better educated, ocean literate population that really understands the need to protect the ocean and use the ocean resources in a sustainable way. So, I think all of us that have been working in ocean literacy for all these years that in NMEA and COSI and National Geographic Society, and NOAA and the College of Exploration and dozens of other organizations, all of us are mostly dedicated to ocean conservation and really, wouldn't be doing this work unless the ultimate purpose was to convince people that the ocean resources need to be protected.

*Jennifer Stock:* With the current situation in California in regards to economics and the threats that the education system is facing in California, what are the biggest hurdles that we're going to be facing in the next few years to be able to bring in some of this content into the classrooms?

*Craig Strang:* Well, classrooms are a tough environment right now and our school systems in California, right here where the NMEA

conference is being held, but certainly across the country are beleaguered and underfunded and facing significant challenges as the result of the economic crisis, but also as the result of a couple of decades of neglect, even during good economic times. So, I think that the general difficult state that our school is in is really the biggest barrier, the biggest challenge, that we have to getting ocean literacy as part of the mainstream curriculum. Beyond that, I really think that the mainstream science community needs to be made aware of the ocean literacy framework and I think there is growing awareness, not just from those of us working on the ocean literacy campaign, but in the scientific community and in the education community that the ocean plays a very important role in climate change and in all of our earth systems.

So, at the same time that we are poised with some new resources, the ocean literacy scope and sequence and the ocean literacy framework, there's also a growing recognition that ocean sciences education is increasingly important. So, I think that there are many barriers and many challenges, but we're finding ourselves in the right place at the right time to make significant inroads in the next three to five years.

*Jennifer Stock:* That's great. Is there anything that families and community leaders and other education institutions beyond what we discussed today, help to support this effort and push for more ocean education in classrooms?

*Craig Strang:* Well, ocean literacy is really for all people, all citizens, not just for kids in schools, and so, I think that communities and parents and families play a huge role both in educating their own children and their own community members, but also in letting school officials know that this is an important element of what they feel a child's well-rounded education would include. So, I think that the public historically in the United States has a lot to say about what kids learn in schools and we have a very decentralized education system, state-to-state, county-to-county, school district to school district, individual parent groups, PTAs, and school boards really have a great deal of influence on the content that's presented to their children. So, I think reaching out to the public through the media, through public events, through community events, working especially in under-represented communities is probably one of the most important aspects of the ocean literacy campaign going forward into the future.

*Jennifer Stock:* Thanks so much for spending just a few moments with us today.

*Craig Strang:* Thank you very much. It's a pleasure.

*Jennifer Stock:* Craig Strang is the director at the Lawrence Hall of Science in Berkeley California. He's also a board member on the National Marine Educators Association and also a leader in the ocean literacy network.

(Ocean Sounds)

*Felicia Moore:* My name is Felicia Moore and I'm a professor of science education at Teachers College, Columbia University. It is very important for students to learn about the ocean and even within my own learning, I did not realize how much the ocean has impacted my life and how much I impact the ocean and I think at very young ages, from kindergarten through middle school through high school, just having an awareness of the world, the ocean, and its influence is something that everybody needs to know about. For me, as an educator, it's important for me to be able to know these connections so that I can teach future teachers and they can teach their students and for me, it seems more of a continuation of students just learning more about the world around them, being more interested in learning about science and its connections, and then being able to explain this and tell this to other people to also get them excited about science.

So, for me, the starting point for the ocean is just to know a little bit more of what we don't know and as we continue to learn about processes in the sea, in the world, and just, to me, make science that much more interesting and much more fascinating to know about and also for me, it piques my curiosity, because again, I don't know very much about the ocean. So, I just think this is just a really important thing for students to know about.

*Jennifer Stock:* And you just listened to a short segment about ocean literacy with Craig Strang from the Lawrence Hall of Science, and Felicia Moore, a professor at Columbia University who was expressing here interest in ocean sciences being included in curriculum for students so they become more literate and knowledgeable citizens. So, we've jumped around a lot today. We started off this show with marine debris and plastics, we've just had a little catch up on ocean literacy efforts. I thought I would just define that scope and sequence thing. Scope and sequence is basically how students learn certain concepts. So, before they can learn one thing and own that knowledge, they need to know the building blocks before that and so it's this matrix of facts and points and how they learn these things so that they can be appropriately designed into curriculum.

So, I thought I would just define that a little bit because it's education terminology, but we're going to take a quick little break here, listen to some music before our last segment of the day with Grant Washburn. If you're tuning in, you're listening to Ocean Currents and my name is Jennifer Stock. Today's show is a big potpourri of different interviews that I've done in the last week while attending the National Marine Educators Association Conference and we'll be back in just a little bit for the final segment. Thanks for tuning in.

(Music)

*Jennifer Stock:* I'm here with Grant Washburn, who is a surfer, legendary surfer, and also a filmmaker and Grant talked to the National Marine Educators Association this morning about his experience surfing at the legendary Mavericks off of Half Moon Bay. So, Grant, thanks so much for taking a few moments to talk with us today.

*Grant Washburn:* Thank you.

*Jennifer Stock:* So, you started surfing in New Jersey. How did you make your way to California to surf.

*Grant Washburn:* Very random college buddy who had a job out here and as I was getting ready to graduate and finishing my resume he said, "Oh, you should come with me." And I thought, "The waves have to be better than they are out here." So, without any research or knowledge and pretty much against the will of my parents, I left and moved to California and I never came back.

*Jennifer Stock:* How did you find Mavericks?

*Grant Washburn:* No one had heard of Mavericks when I first came out here and I for sure had no idea that there were big waves in San Francisco. I actually thought that southern California was the place for surfers and that I'd be getting leftovers up here and shortly after I moved here, which was 1990, Mavericks kind of came into the limelight and so, it was random and I wasn't really a big wave surfer, but I was always interested in big waves. So, I went to check it out and didn't immediately jump right into riding it. I caught a couple on the edge, but it took years of being around it before I was comfortable and I think I always planning on filming it because it was so amazing. I just wanted to show people. You come back from it, you're like, "I can't believe these waves!" And then, yeah,

slowly, but surely I became comfortable to start riding the big days and after five or ten years, I was like one of the main guys.

*Jennifer Stock:* I heard you talking earlier about planning for when Mavericks is going to be breaking and I have to say, I think surfers are probably some of the best oceanographers around. How are some of...how do you plan out when you think the waves are going to be breaking? I heard you talking about all of these different buoys and wave arrays and what not...can you talk about that a little bit?

*Grant Washburn:* Yeah, well, the buoys are nice because that's actually data. That means if you see it on the buoys, even the 600, 700 mile out buoy, that's real, but most of the forecasting is modeling and so we're looking at the potential for a swell generating storm, sometimes ten days before it even has formed, which is ridiculous, but to be honest with you, the maps are getting better, it's all satellite generated wind stuff and what you'll see is basically a set of conditions developing that makes it conducive to creating a storm that will make waves. So, you're wishing for the cold front off Siberia to brush up against a system over the Pacific and then turn into a swell-producing thing and when there's no waves, we are pretty radical in how far out we will reach to find something to get our attention and try to force it into making itself into a wave and so, it's kind of funny that way, but it is really neat when it starts to happen the way you are familiar with and so, we'll see patterns and they are not annual, even, like, ten years at a time where you'll have a stretch where you just have the most perfect scenario and these storms form all in a row, three in a row.

So, every third day for fifteen days is one of the best days of the decade and when that happens, everybody knows we're lucky and it's special, but then sometimes it's three or four years before anything even close to that happens again. So, it's having now...being kind of an old guy with a lot of...15, 18 years of watching it, it's really amazing that some years are so poor and then, next year, you could have three days in one week better than the previous five. It's just all of a sudden...it like, rains it pours.

*Jennifer Stock:* So, this year, 2009, was no contest, right?

*Grant Washburn:* Yeah, and we were just talking about that. It actually didn't have anything to do with the waves. We had some really great waves, the organizers didn't have sponsors at the time when the swells came and when they'd get their sponsors, they didn't have any swells. So, then their waiting period ended and we did have a few more swells. So, there's a bunch of extra logistical nightmares to



try to run an event and they seem to have a really hard time getting mother nature enough room to let it happen, but the surfers always score either way.

*Jennifer Stock:* That's what I was going to say. You guys are probably still out there anyway right?

*Grant Washburn:* Yeah. That's what's funny. People always ask the question, "How do you train for this event?" Well, you don't. You don't care because you're actually training for all the events, which is any swell event. Any time the waves are big, all these guys are prepared to go surf the waves anytime and it has nothing to do with event and so, you don't train for the event at all.

*Jennifer Stock:* So, back to the scene of where you're going out. You start in Half Moon Bay/ How do you get out to Mavericks. It's a pretty long paddle. How far offshore is it?

*Grant Washburn:* Yeah, it's about a quarter of a mile off the rocks, but about a half mile off the beach. So, you either go around the north side of the rocks or the south side of the rocks and then you have to paddle a long way from there out to where the waves are breaking. So, neither way is easy. It does sort of filter it out a bit. There's waves breaking over rocks so you're not likely to really get killed on the paddle out, but you could wreck your surfboard and you could certainly get hurt and a lot of guys get turned back before they even get near the main break because of that and on a big day, probably half the people, even the best guys get denied or break a board trying to get out. That's sort of par for the course.

*Jennifer Stock:* So, what's on your mind while you're paddling out, taking it all in, watching the waves, watching other people around you...what are you thinking about?

*Grant Washburn:* Sometimes it can be really serene. You can kind of sneak off that first bit where you jump off the beach and you have to clear some rocks and if you do, it's pretty much blue water and kind of an open paddle and it's a long paddle. So, you have some time to just, I don't know, your mind wanders for sure. Sometimes, especially when I was younger, I get thinking a lot about the surf. As you get older and you're more comfortable and you've been out there more, you think about other things and it's just sort of like being in traffic in something where your head just wanders and you think about something different, but it's nice. It's nice especially now with our never ending news cycle and all this connection and stuff to be able to disconnect and be out there and just paddle around.

*Jennifer Stock:* Nice. So, you're out there, you get your first wave and you look down and what's going on then?

*Grant Washburn:* Yeah, the excitement starts before the wave comes. We position ourselves next to the take off spot, but usually you don't sit right in it because you want to be able to get away from there if it's not the kind of wave that you want. So, the takeoff area is a shallow spot well offshore and it's very deep all around it, which is a safe spot. So, you kind of sit like, in the on deck circle and when you feel like it's your turn and you feel like the hot hand or whatever, you run out there and stand on home plate and when you're on home plate, you're going to get thrown through the air or you're going to ride the wave.

There's no getting off of it or turning back. So, there's some anticipation and getting your heart rate low and being prepared and when you make the choice, it's actually not as the wave arrives, it's before that. So, you choose to get on the field and it's like, maybe like a basketball court where you run out to the middle of the floor and when you're in the middle of the floor you can catch the wave and if you're not in the middle of the floor, you can't, but anywhere on the floor is danger.

So, you're sitting on the sidelines carefully waiting and then you run out there, the wave comes in and then basically just scoops you up. So, you're basically stationary and another thing people don't know is that as the wave approaches shore, it's pulling the water away from the coast. It's drawing off the reef and so, you basically go backwards even though you're paddling towards the beach. You're being drawn towards the wave. So, if you're wearing a GPS, your GPS would show that you're going backwards. Your speed over the water would be considerable because you're paddling fast. So, the water's going by your board and you're moving, but you're not actually getting away from the wave. Then the wave sucks you up and then gravity is what sets you free and you need to be going straight down to break out of that flow of water that's getting sucked up the wave and as you get to a plane, you become free of the friction and you start to skip along the surface and that's when you're surfing and we want to go straight down for about 10 or 15 feet to get enough speed to outrun it and once that happens, it's actually really, really fun.

So, you have this little anticipation. If you did it really well, it's so easy that you feel like you cheated and the thing just sweeps you up and you just control all that energy and it's just as smooth as

could be, but the slightest mistake and everything goes wrong all at once, just in a million ways, and it becomes a different ride.

*Jennifer Stock:* I was going to say, the skill set for this has gotta be intense. I mean, how many mistakes have you made to get to where you know what to do? And I'm sure mistakes still happen and wipeouts happen. So, how do you get to that skill set? It must be really hard for people to do this.

*Grant Washburn:* Well, for sure, you want to work up to it. I don't think anybody jumps in the big waves. You wouldn't be able to. So, you need to...it could be equated to golf or playing an instrument. If you just pick it up, you're going to be terrible. You need to practice. You need to do...swing small, play mini golf, you know? Play one string before you play the ten-string, twelve-string, whatever. You need to work up to it. Surfing in small waves is a good way to get used to the dynamics of the sport. All of us, when we were little kids, surfing little waves and getting familiar with that and then it's also a good time to wipe out because the stakes aren't as high.

If you make a lot of mistakes in waves like Mavericks, you will get hurt and you might get killed. So, we can't make a lot of mistakes and that's really the trick to it is being smart enough to do it in a way that doesn't make you vulnerable to those kind of things and make your mistakes when you're practicing on smaller waves and don't play those games on the big guy.

*Jennifer Stock:* Excellent. So, one thing you brought up during your talk was about the outlaw of jet skis within the Monterey Bay National Marine Sanctuary this year and I believe they allow for some permitted use for safety. How has the surfing community reacted to this whole issue? How are you guys feeling about that?

*Grant Washburn:* Well, there was a lot of discussion. I have friends that are...it really polarized the community for a large degree. There were people that hated it, didn't want to see any jet skis at all and then there was people that really embraced it and either put a lot of money into or a lot of time and effort and really wanted to see it pull out and I was kind of always in the middle in a way because, as a filmmaker, these are great tools and as someone who doesn't want to die, there's a chance you could be rescued if you get in trouble, but that doesn't excuse it. It's like, "Oh, let's all be reckless so we can save ourselves with jet skis." In a way, the jet skis did sort of up the ante on people taking chances because, especially some younger guys, would look at it and be like, there's a jet ski so now I can be completely foolish with my attempts, which...that's

not good for anybody and I also showed the part where the jet ski gets hit by the wave. I know and most people who are familiar with big wave surfing know that a jet ski can't save you. In a worst case scenario, there's nothing there to help you.

So, if you're putting a lot of investment in that, you're making a mistake. It's not going to be able to bail you out in the worst case scenario and secondary, a lot of people who would not be out on big waves are going to be out there on these jet skis because it's super fun and you don't need to be a surfer to ride around on the waves and actually what we saw when the jet skis became more part of it was people just using them as motorcycles and jumping waves and stuff and that's not fun for a surfer to be around and there's not really any way to say, "Oh, we're using it as a waterskiing tool. You can't drive your boats near us."

The boating law says if someone's swimming or paddling, they have right away, and that the boats need to stay away, but if you're driving around water skiing, the other guy can just drive around and that's what happened is people just drive on the waves with their jet skis and there's no shortage of people that want to do that and there's very few people that want to ride big waves by catching the waves with their hands. So, it controlled itself that way, but when the jet skis are coming at you, people that don't even surf at all having a great time doing donuts all over the waves and it just ruins it for a surfer and annoys the birdwatcher and makes a mess. The surfers basically said, this is no good either. So, even the guys that were really pro-jetski have no interest in seeing that be what's going on.

*Jennifer Stock:* Well, what a good answer. Good to hear. I just had no idea where they were on it. So, it's great. Something else that came up for me, I realized is the whole new issue of ocean energy and potential use of getting the power from the waves. How do you feel about that? Is that an emerging threat for surfing on the coast?

*Grant Washburn:* I don't really think it's much of a threat for surfing, no. There's so much energy in those waves and I think it's...really about storage, the energy...you know, the generating, there's so much power even just a couple waves, there's so much in it. It's just how do you capture it? How do you store it? How do you transport it and that's stuff that has less to do with the wave energy and more to do with batteries and as that gets perfect or whatever, improved, it's going to be more viable. I think right now there's a couple that they were going to do around here and I'm not sure if they're doing it anymore. Some of them are not going to effect surfing at all. Some

of them could be used instead of a jetty or something else like that. So, it could buffer an area that was going to get impact and, I think mostly they can do it with tide, they can do it with wave action, it can be done way offshore and it's just a matter of transporting the energy and making use of it, but any surfer will tell you, there's tons of power out there.

*Jennifer Stock:* I think there's some engineers, actually, that started out surfing and are now doing some of this engineering. So, you got into filmmaking and where are some of your films in the Bay Area that people might be able to see.

*Grant Washburn:* Well, we just had that film festival. So, it's going to be awhile. Next June, look for the Half Moon Bay Big Wave Festival. It's pretty cool. We had some old movies, Greg Knoll came. It was a really, really good whole week of films and we did get some money for the Marine Mammal Center and the Peninsula Open Base Land Trust, which is really a couple of cool things that we did and the school there too and it's fun because big wave surfing is such a neat thing. It attracts so much attention.

It's really awesome to give something back and capturing it to share is really what any filmmaker is doing, but when I first was surfing big waves, that...it's almost the first thing that occurs to you, "Man I wish I could take that home," because you want to see it over and over and surfers are huge with the images and I don't know if there's anything even remotely as related to that except for maybe porn. I'm just guessing, but surfers will sit there and look at surf pictures and surf videos forever and we just are so fascinated by that. We're so image-conscious and driven and whatever and for me, I love doing that. It's almost more fun for me to catch the picture of a good wave than it is to catch a wave and as I get older, it's going to be even easier. I'll always remember...I'll be 100 years old and I'll be out there with a camera and I'm happy and that makes it something I can always do, but being able to bring that magic best day of the decade into the lab and put it out on a DVD or show it on television is really pretty neat and so, we're lucky that we have that and so many people are inspired by it. So, you feel pretty good.

*Jennifer Stock:* I love watching big wave movies. It's so awesome. Where haven't you surfed that you'd like to?

*Grant Washburn:* Well, Chile is a place I'd like to go. They get a lot of big waves down there. I don't actually like tropical zones. I've some Viking blood and white, pale skin.

*Jennifer Stock:* A true Californian!

*Grant Washburn:* I don't tan well, but there tends to be bigger waves away from the equator and for the most part in the zone that's about where we are in San Francisco, Capetown, part of Chile, that's a nice climate, you know? Not too cold. Not too warm. The ocean is pretty moderately...it's not too cold, again. You have a wetsuit that will allow you to be able to be comfortable out there, but if you don't wear a wetsuit in Hawaii, you're going to get cold. The wind comes up and it's not 90 degree water, it's 72 and you get cold, but in a wetsuit, you can be really comfortable for a long time. So, Chile is my spot. Yeah, hopefully, I get to go there soon.

*Jennifer Stock:* Right on. So, you've been in the ocean for many, many years, ever since you were a little kid and you, like most of us, have this incredible passion for the ocean, what's your message to young people about protecting the ocean for the future?

*Grant Washburn:* Well, you know, it's funny because as you age you see the changes and that's something...there's not perspective when you're a kid. It just seems like everything will be the same forever and I think all people that's something that we are, as a species, waking up to. Wow, we're changing things or this is different. I mean, sea levels are going to rise and these surf spots are changing and the condition, the acidity of the ocean, and the ecosystems and all that stuff is changing. The Earth is going to scratch its itches and it's going to go on and it's just a matter of how long we get to play there and who's with us.

So, passing it on, I think any kind of excitement and interest and passion that people have, kids have, towards that, I think should be fostered because that's going to make it easier for the rest of us to enjoy it for longer. If we all sort of keep our secret spots secret, they're going to get destroyed more quickly and, you know, I'm pretty much an optimist. I think we can rebound, the ocean can rebound. We just need a little bit of foresight and some inspired people to help it happen.

*Jennifer Stock:* Excellent. Well, I'm sure your filmmaking is a big part of that, but we've been talking with Grant Washburn, a surfer. He spoke today to the National Marine Educators Association. Thank you so much for taking some time today to share and I hope to see your film next year.

*Grant Washburn:* Yeah, cool. Thank you very much too.

(Music)

*Jennifer Stock:* Thanks for tuning in today to Ocean Currents, a big mix of different topics and ocean related information. I will actually have to do a replay next month. I'm going to be out of town, but we will have another Ocean Currents show for you then. Thanks so much for tuning in today and stay cool.

(Music)

*Jennifer Stock:* Thank you for listening to Ocean Currents. This show is brought to you by NOAA's Cordell Bank National Marine Sanctuary, on West Marin Community Radio, KWMR. Views expressed by guests of this program may or may not be that of the National Oceanic and Atmospheric Administration, and are meant to be educational in nature. To learn more about Cordell Bank National Marine Sanctuary, go to [cordellbank.noaa.gov](http://cordellbank.noaa.gov).