Introduction: Welcome everybody. Good afternoon ladies and gentlemen and welcome to the seventh annual Sustainability Conference here at Chico State University. I have the pleasure to introduce a scientist, activist, community organizer, author and father whose work is to inspire a deeper connection with nature by allowing all senses to absorb the feeling of being a part of something bigger than ourselves. J Nichols, originally from Manhattan New York was inspired at an early age to engage with natural habitat of the Chesapeake Bay which inspired his work with sea turtles. J is a research associate at the California Academic Academy of Sciences, founder and co-director of Ocean Revolution, an international network of young ocean advocates and catalysts for Live Blue. He earned his MEM in environmental policy and economics from Duke University's Nicolas School and his PHD in wildlife ecology from, from the University of Arizona. As he walked in today, we passed out a token of gratitude, a blue marble which represents the globe from a million miles away. Over a million of these marbles, marbles have been passed out including some that have, that are, that are owned by Harrison Ford and Jane Goodall. This is to remind people of our natural state of being, our intricate and amazing globe of life. Ladies and gentlemen, please give me a warm welcome to an innovator, J. Nichols.

[ Applause ]

Dr. J. Nichols: I love Chico

[ Cheering ]
Really, totally, I mean there are so many amazing people and amazing ideas born here. People all over the world know that. And you guys are so fortunate to live here and live that and then get to go and spread that message and that tradition all over the world. So, I just wanted to say that I'm really excited to be here, love being here. And, that's why I brought everybody a blue marble. If you don't have a blue marble, please let our friends passing them out know because you'll want one. You'll need it over the next hour or so while we that we spend together. I want to talk about, well, sustainability of course, but, hopefully some new ideas that you, you may not have considered or thought about. I want to connect our little blue marble, the planet we live on, with our brains a little bit more. I want to explore some new ideas. But, I'm going to do it through the ocean lens because I'm a marine biologist and kind of a sea turtle freak. So, I'm connecting the planet with neuroscience, and it's something we call nuero-conservation. It's a new, a new field that I hope you'll be hearing a lot more about.

This is sort of the outline, kind of an unusual outline. These are the questions we're going to touch on over the next hour we spend together, just a little preview.
And that’s how we get in touch. So, usually a speaker says turn off your cell phones. I want you to turn them on, put them on silent. And, if you feel like tweeting or communicating or photographing the person next to you or yourself for that matter, feel free to do so. Take pictures of your marbles. Take pictures of your, your prize that you just won in the raffle, whatever you want to do. But, we need to communicate our excitement about making things more sustainable on our planet. So, that’s how you get in touch if you want to tweet or email or check my blog.
So, the question, the ultimate question’s what do you, what do you really love? Just take a second and think about that. Does everybody have their blue marble in their hand? I want you to hold that in your hand. Don't drop it. Just hold it in your hand while we're, while we’re chatting and think about what is it that you really love? What gets you going? What keeps you up at night or gets you out of bed in the morning? What, what are you doing here? What really gets you going? Well, for me, at least part of that answer is my family, my daughter Grace, my daughter Julia, my partner Dana. I, I just love spending time with my family and I love spending time with my family near the ocean. There's really nothing better to me than that combination. It's, it's kind of what I live for, spending time with the people I love near a healthy ocean. So, take a look, hold that marble up in the air. That is what we look like right now from one million miles away, literally. I did, I did the math, I was on the math team in high school. I can calculate such things easily in my head. And, that is about what we look like from a million miles away. So, we're all sitting on this little tiny blue marble thinking about what we love about it. That's kind of a nice perspective to remind yourself of once in a while.
People around the world have also loved the ocean for all time. And, some people have demonstrated that love by creating art. This is some, some cave art or rock art in Baja California. And, the people who made that took some time. It's not easy to carve into that rock and it's not easy to carve an accurate depiction of a manta or a dolphin or a whale into rock like that. So, they must have felt some kind of affinity for those ocean animals in order to take that time and cut into that rock.
People around the world have made art for the ocean, depicting the ocean, out of respect for the ocean for a very, very long time.
Poets write about the ocean. One of my favorite poets Pablo Neruda writes about the ocean a lot. Sometimes you don't know if he's writing about the ocean or his lover, that sort of, you can't tell. But, he loves the ocean and he loves his girlfriend. [Silence] E.E. Cummings wrote about the ocean. I read this, probably, every week to my kids. For whatever we lose, like a you or a me, it's always ourselves we find in the sea. And, maybe that's part of why we love the ocean so much because we, we find something about ourselves when we go there. There's something about the blank slateness of the surface of the ocean or the vastness or the light off of the ocean. Jacque Cousteau talked about the ocean as casting a, a net of wonder over us. If you've been to the ocean, you know what I'm talking about. It's full of wonder it's full of mystery and it makes us fall in love not only with nature but with each other, popular place to take a honeymoon.
The Oregon Coast, even depicted in black and white on a flat screen, imparts a sense of movement and emotion. Just a simple black and white photograph of the ocean makes us feel something that we didn't feel two seconds ago. It's an amazing thing that the ocean can do to our brains.
I was fortunate, as a kid, to get to spend a lot of time in nature not just out in the ocean but in the mountains. This is the Rocky Mountains in Wyoming. That's Daisy, she was getting a really long drink of water after a long day of hiking. And, I remember that moment fondly, almost like it was yesterday. I can remember the way my feet felt in the mountains on the ground next to that pond, that lake. I can remember how Daisy smelled. I can remember how the air felt. I can remember everything about it. I remember from all of my senses like it was yesterday. That's what nature does for us.
As a kid, I loved to catch snapping turtles in the Chesapeake Bay. We used to catch them and then paint numbers on their shells and then throw them back and then sometimes recapture them and then take that data and plug it into some simple algebra and roughly predict how many turtles there were in that branch of the Chesapeake Bay. Little did I know that I'd be doing that for a living. Somebody spilled the beans and said hey you know you can study turtles legit as an adult. I was like hey sign me up.
My childhood heroes were Jacque Cousteau, no surprise, but Evel Knievel, man, that guy. Does everybody know who Evel Knievel was? Evel Knievel, well, he used to jump his motorcycle over a lot of busses and sometimes he didn't make it an sometimes he tried to jump his sky cycle over canyons and didn't always make it. But, he kept trying. And that was the thing that was so amazing about Evel Knievel, and then Dr. J, amazing athlete who basically invented the slam dunk and we share a name. So, it may be Dr. J's fault that I aspired to get a PHD so that I could call myself Dr. J.
But, this is Evel Knievel before he was Evel Knievel, he was Robert Craig Knievel. And, he hitchhiked from Butte Montana to Washington D.C. to meet with John Kennedy's chief of staff to protest the killing of elk in Yellowstone. In the dead of winter he hitchhiked with the elk rack on his back. He was a daredevil, and eco daredevil before he was a motorcycle daredevil. And, you are among a small group of people who even know about that. And, that's a photograph from the Washington Post so real documentation of an amazing moment. And, the only reason I know about that is my mom lives in Butte Montana and I'm friends with Evel Knievel's grandkids. And they told me this story and I was like man, I had no idea that my childhood hero was also an eco daredevil. It just makes it all just better.
So, I had this interest, passion I guess you could call it, in turtles that was not like a lot of other people I knew. And, I decide I would, I was going to spend my life studying and working on behalf of sea turtles.
And, I remember having a conversation with my dad. And, he said son what are you going to do with turtles? Good question, I thought, that's a little bit intimidating. He was expecting, you know, business, law, or medicine. And so, his son comes home and says, no turtles, option D or E or F or somewhere on the list. And, when he asked me that, I said everything.
It seemed like a good thing to say. And, then he said I, J I don't know what everything means with turtles. And I said, I don't know what that means either. I am just, but that's, that's what I'm going to do.
I should've said this, I should've said, Dad, real men love turtles because it's all about the love and you got Poseidon on your side. I mean, that's pretty badass. My Dad could not even argue with a statement like that. But, at the time I, I didn't say that.
But I have this obsession with sea turtles. And I see turtles where, well there really aren't turtles in fact. Some people would call that a leaf in drops of water. To me, it's a turtle.
There's another one. I know Tag is with me on this, people, you guys look a little turtlely right now actually, there's some turtles in the audience. You know who you are.
And so, I turned that obsession for sea turtles into a project that's a well running project right now called See Turtles. And, what we do is connect people who want to go see a real turtle with places to do it where it helps the community and helps the sea turtles. And the person who goes has a transformative life changing experience. See Turtles, pretty straightforward, seeturtles.org if you or anybody you know wants to go see a turtle, that's a good place to start.
So, things were jamming, somewhat some acceptance from my father for my turtle career, worked on a film with Leonardo Dicaprio called 11th Hour. Our research was published in National Geographic Magazine, that's the fame that got my father's attention the most. Our, our work was used by Apple Computers in some of their Ad campaigns. That all makes me feel, as a scientist, like you're, some, some kind of recognition of the work you're doing.
And then, this comes out in Popular Science Magazine ranking oceanographer, my chosen career, as second worst in science. You may ask me why, you know, the life of Jacque Cousteau how can that be second worst in science? Right between elephant vasectomist and hazardous materials diver, I mean come on, seriously. And, you know, the ones that are highlighted in blue are things that I've done one way or another throughout my, my career. So, we've explored dumps and, yeah, anyway, I won't go into all of that.
But, the reason is that our ocean is in trouble. There's a lot of bad news if you pay attention to environmental news, if you pay attention to the ocean science literature. You realize there is just relentless, almost weekly there's a new major peer review study that comes out that talks about what's wrong, what we're losing, what we've already lost, what the future looks like. And it's not good. So, oceanographers rank so poorly probably because of the stress that one will have to deal with when being, living, working as an oceanographer, seeing your field sites the ecosystems you're studying falling apart, seeing the animals you study disappearing, frankly seeing the things and places you love destroyed. That's what makes oceanographer rank so poorly.
And, we live on an ocean planet and we face a global ocean crisis. There's no way to candy coat it. And, my goal this afternoon is not to make you feel really super bummed out. I know, this group in particular knows, in detail, what's at stake here on our planet.
So, the approach I've taken is this very simple model that came out of my dissertation work and I call it the Conservation Mosaic because basically it's based on three, three parts, building a network, a robust diverse network, generating the knowledge we need to solve problems, using social science, natural science, indigenous knowledge, local knowledge, participatory research, and then sharing it, sharing the network, sharing the knowledge, as widely and as strategically, as smartly as possible, very simple. And, you can apply this model to really anything you do even for profit, nonprofit work. Another way of putting that is relationships, understanding, and sharing. It's all about building relationships, connections with each other with funders, with stakeholders, whichever words you want to use, generating the understanding and then sharing it.
This ocean crisis can be described as having three main components. The first one is that we’re putting too much into the ocean in the form of, well all kinds of chemicals, pollutants, oil. Everybody remembers the Gulf of Mexico disaster. To call it an oil spill is to really not give it credit for the scale and the destruction caused.
Seeing a sea turtle covered in oil is among the saddest things I've ever experienced in my life. I spent two weeks doing very little actually, doing what I could to try to help. And, a turtle covered with oil is shockingly sad. I wasn't, really was not prepared as a sea turtle biologist for the emotions connected to that experience. A turtle comes up to breathe and is always, often attracted to floating objects, floating algae. For them it's habitat. Sargassum floating in the Gulf of Mexico is habitat. Floating oil, to a turtle, looks like it's probably habitat. So, a turtle will come up face first, eyes first, nostrils, mouth, eyes first to breath into that mat of oil. And, the result is something like this. A sea turtle can't wipe its own eyes, it can't clear its own nostrils, it can't remove that oil from its body. It needs our help to, as a result, thousands of volunteers worked for days and months and even years to respond to help these animals, not just turtles, remove that oil from their bodies.
Another kind of pollution that we're putting into the ocean is plastic. And, I know this campus in particular is aware of the issues around plastic pollution. This is a river in Southern California, if you could call it a river, it used to be a river after a big storm event. All of that plastic was headed for the ocean. And, that's repeated all over the world. After big storm events, lots of plastic washes from the mountains down to the ocean.
And, in the ocean, animals like albatross eat the plastic, feed the plastic to their young. They can survive that, often they don't. But, regardless of their ability to survive eating plastic, it's just wrong. An albatross should not have a stomach full of plastic. One young albatross should not have that much plastic, shouldn't have any plastic inside its body.
I was recently in Brazil working with some colleagues who study and protect sea turtles. And I came across this sample. This is one bag of a stomach sample from one small green turtle, five kilogram green sea turtle which is small. That's a, that's a very young green turtle, 3,400 pieces of plastic, at least, inside that one little turtle. Again, there shouldn't, there shouldn't be one piece of plastic inside the turtle. But, that many pieces of plastic inside of one turtle is, is a sign that something is massively wrong.
Now, we know that we shouldn't dump our stuff into the ocean. We're reminded of that all, you know, everywhere I go there are these stenciled signs next to the drains. Don't, don't throw your stuff down the drain. It drains to the ocean, it drains to the river. We know this.
But, we continue to do it. The second part of the ocean crisis is we're taking too much out of the ocean. So, we're putting too much in but we're taking too much out as well. And, that's in the form of overfishing. We're just fishing down the food chain from the big animals right on down to the smaller animals.
Recently, this, this happened in Tokyo single fish sold for three quarters of a million dollars, one fish, three quarters of a million dollars. All right, so, to give you a little bit of an idea what's motivating the overfishing. So, if you are buying one ounce of that fish, that blue fin tuna, that may cost you 100 dollars, for one ounce of protein. Some people say well that's the market, that's economics, that's culture. I think it's something else. I think it's power addiction. And, I think that's worth exploring, the science of addiction and the science of power and not just giving people an outlet by saying it's culture, it's economics, it's the market.
Same thing's happening with sharks around the world. Shark fin soup is very popular. Sharks are caught, their fins are cut off, their carcasses are often thrown back. And, as a result, a lot of the big sharks all over the world are being decimated even the small sharks.
As the demand for shark fin continues, as the price goes up, we're losing sharks from our little blue planet.
And then, there's shrimp. At the other end of the spectrum there's the tiny little shrimp. But, that's our, our favorite thing to eat from the ocean, number one seafood is shrimp. People like them fried. They like them with garlic. They like them breaded. They like all you can eat shrimp. I challenge you to go, if you use Twitter, go on Twitter next time you are there and search for the word shrimp. People are really excited about shrimp on Twitter. I don't know, it's absolutely crazy, you'll be blown away at the shrimp excitement on Twitter. People tweet about their shrimp all the time. They want to get shrimp. They're getting shrimp. They just had shrimp and they, they just had shrimp and they want to go get some more shrimp. People are so excited about shrimp. But, it's the most destructive seafood, maybe the most destructive way of procuring protein because shrimp trawlers drag their nets on the seafloor, shrimp farms destroy mangroves. I saw a recent study that said that shrimp has a carbon footprint that may be at least four times the carbon footprint of beef, just to put it in perspective.
When shrimp are caught, mostly what we, what we catch are not shrimp. Most of what is caught is called by catch. And it's basically everything else in the ocean. Now, there are sustainable sources of shrimp. They are few and far between. They are kind of hard to find. They're somewhat limited in terms of the percentages of shrimp sold in our country. But, you should ask for them if you plan on eating shrimp. Just ask. And, if your server or your vender doesn't know the answer, then, skip to something else.
As a result of this overfishing and by catch, a lot of the big wild things in the ocean are gone. And, that's not good. We're losing biodiversity, we're losing biomass, we're losing jobs. The ocean ecosystem just is put at risk by this massive overfishing.
And, as a result, what we're finding are jellyfish are doing well. Jellyfish like when you remove the predators. And, in lots of places around the world, we're seeing jellyfish bonanzas.
In some places they are actually being hunted. This is a fellow I met in the Kei Islands in Indonesia. I was there to study leatherback sea turtles. And, the leatherbacks like to go there because of the jellyfish. And now, because the fisheries are going so poorly, fishermen have moved to collecting jellyfish. And this is a, these are stacks and stacks of jellyfish bells that have been salted and dried and they're stacked up like tortillas. And, I think I surprised them by saying what do they taste like. And they're like ooh we don't eat them, no, they, we just do this thing and ship them out. So, I grabbed one off the top, pealed it off and rolled it up, because that's what you do with a tortilla when you eat a plain tortilla, just roll it up and eat it. So, I rolled it up and took a bite. And, they thought I was crazy, it's not good. Just, I'm here to tell you, jellyfish, salted jellyfish is not so good. It tastes like rubber with salt. It tastes a little bit like seaweed, fishy salty rubber, not so good. But, there's a new market for them.
And then, the third part is we're putting a lot of pressure on the edge, the edgy places. And, by the edge I mean coral reefs, kelp forests, sea grass beds, mangroves, all of the productive bio diverse areas along the edge of the ocean. And, one reason why we're putting so much pressure on it is because we want to, we're moving there. A lot of people are settling along our coast. People want to be closer to the cost and we put a lot of pressure on, on that coast.
Here's an aerial shot from Imperial Beach California, rows and rows and rows of houses. So, the disconnect between the land terrestrial ecosystems and the ocean, aquatic ecosystems is huge. If you're an animal that wants to travel between the ocean and an intact terrestrial ecosystem, you got a lot of backyards and a lot of roads to cross. There's a huge disconnect between the ocean and the land because of our settlement along the coast.
We did a walk, a mega transect, you could call it, from Oregon to Mexico. We walked 1,800 kilometers down the coast. It took almost four months. And it was amazing, an amazing way to spend a summer. And, on our way through Southern California Delmar, I saw that little house for sale. And, was just curious, what, what does a house in Delmar in the summer of 2003 go for? 800 square feet, a carport, one story, one bedroom, any guesses?

800,000, 1.2, anybody, anybody, anybody, 5, 3 million, 6.3 in 2003 dollars, right. So, granted the real estate market was a little different in 2003, it did some things between 2003 and 2012 that are kind of will give you a neck ache, back ache, headache. But, that's impressive. 800 square foot, essentially what a realtor would call a teardown, right, 800 square foot house on the beach. And, the interesting thing about Delmar is it's one of the few places along the California Coast where you could walk out your door onto the beach. We have a lot of cliffs and a lot of houses are up on top of cliffs. If you walked out your door, you'd fall down a cliff on most, most of the California Coast. A lot of, a lot of places aren't just beach walkouts like, like on the East Coast. So, Delmar is special in that way. If you own that small bungalow, you can see the ocean, you can hear the ocean, and you can walk out your backdoor or front door which ever door that is to the ocean. And people were willing to pay a lot of money for that for some reason, a lot of money.
The ocean view premium around the world is huge. It can be anywhere from 15%, a 15% premium in Singapore, and that's a high rise condo, so maybe the 50th floor where you have an ocean view but it's urban and it's far away, you certainly can't hear the ocean but you can see a little bit of ocean. Bellingham Washington between 8% and 125, 127% premium for ocean view, and that 8%, that's where the realtor says if you stand over here and you lean over here and you open the window and look down there past your neighbor, that's the ocean. You pay for, pay for that, right on up to that 127% premium which is that hold side of the house you see this beautiful view of water. And then, South Carolina, almost 300% premium to look out on the ocean.
As a result, we’re putting this pressure on the coast for our seafood to have these ocean views and we’re destroying the habitat. We’re filling the quote unquote mud flaps which are in fact, important habitat, the mangroves, the sea grass beds, in order to build marinas, condos, and shrimp farms. All right, because we love it, we love shrimp, we love the ocean, we love to look at it, we love to sail on it, we love to hear it.
There are some places that are relatively intact. They’re mostly rock and ice. But, even those places feel our impact through climate change and the changing chemistry of the ocean. Even plastic pollution is being found at the poles.
As a result, we need to respond. Cities are starting to kind of freak out about this. There are conferences going on, seems like, every month around the world so people can adapt, teaching people how to deal with these changes. We're going to have to move back from the ocean over time. In some parts of the world, people are going to have to leave the islands behind and move completely. Everything they know, everything they've known through their entire history will be under water.
Coral reefs are changing, 70% of our coral reefs are in bad shape as a result of the way we're treating the ocean what we're putting into the ocean and what we're taking out of the ocean.
We need places that are truly protected where, as the cliché says, we leave only footprints and take only photos and even some places where we don't even leave footprints. So, simplicity said is the ultimate sophistication.
So, I tried to simplify, as much as possible, this ocean crisis without making it too simple because if you make things too simple, well then, you're just wrong.
So, we're putting too much in, we're taking too much out, and we're destroying the edge of the ocean. So, any of these ocean issues you may come across as you read and research and live in an aware way will fall into one of these categories. And, this is just a way to help you organize all of this bad news. And, that may help you deal with the sadness that you're probably feeling and will continue to feel.
So, take that blue marble and think about one of the emotions all this bad news brings up in you, if it makes you sad, if it makes you angry. Maybe it makes you excited and activated, frustrated. There's a lot of bad news and you do have an emotional response to it. And, that emotional response is important, it's an important part of how we go forward and deal with the crisis that's in front of us right now. The very reason for having a sustainability conference is because we're dealing with a crisis. Now, think about that emotion, pick one emotion. And, how much do you know about that emotion? Can you talk about that emotion in public as a serious student, as a serious professional? Usually, you can't. Usually we try to keep the emotional stuff to the side. But, there's a lot of knowledge about how those emotions work that's emerging from the field of neuroscience. And, I just want to propose that the more we begin to understand our emotional responses to bad news and to good news, the better off we may be. Red mind, that's what I call that response. Maybe anger, maybe sadness, maybe just down right pissed ofness, and that's good. That's important for survival. But, if we're like that all the time, if we're stressed in that way all the time, if the message is always bad relentlessly, we get worn down, we get sick, we can get depressed. Red mind all the time is no good, all right. And, as environmentalists, we deal with red mind a lot. There's a lot of things that put me into that red mind state. [Silence]
So, this ocean crisis is upon us and I'm going to steer things in another direction now.
This is the response that comes out of that three part set of points. We need to put less in we need to take less out and we need to protect the edge. That's the ocean called action. That's the appropriate response. And that's as simple as I can make it. If I made it any simpler, it wouldn't make any sense whatsoever.
And in that is an opportunity.
Because some wise people said that a crisis is an opportunity riding the dangerous wind. In every crisis there's an opportunity to respond, to take that red mind and turn it into action.
So, the question is what are we going to do? What are you going to do? You’re already doing it. The people in this room are among a group of people who are active, activated, responding, taking a piece of the problem and finding solutions. And looking at the problem with new eyes is part of finding the solution. Attacking the problem in the same old way or through the same old view will just keep us in the same paradigm. Technology offers solutions both high-tech and low-tech.
And, back in the day, our predecessors in the sea turtle world thought they were onto some pretty high-tech cool stuff. They tracked the turtles using weather balloons. In the 50s, they tied balloons to turtles and then followed the balloons. That was considered high-tech sea turtle tracking. We wouldn't think of doing that now. It sounds cruel and ridiculous.
A low-tech way of tracking animals, this is a flipper tag that’s put on turtles, but, you know, animals all over the world are tagged in different ways. And, that’s a low-tech way of studying turtles. You put a tag on it and then maybe somebody finds that turtle somewhere else and tells you about it. In this case, this tag was put on a loggerhead turtle in Japan. And, a fisherman in Baja Mexico ate the turtle, kept the tag, put it on his keychain, and when we were working together he said you might be interested in this tag. I actually turned it into a colleague of mine. And, here’s the weird thing. And I don’t, I don’t put too much weight on this. But, when that tag came to my colleague, I got an email saying hey J, I just got this tag, first tag ever recovered in Baja from Japan, the guy was carrying it around on his keychain for five years. And, here’s the tag number. When I received that email, I was sitting in a hotel room on the edge of my bed with my laptop next to [inaudible] who put the tag on the turtle eight years prior. He had his laptop. And, I said, and this was my first trip to Japan by the way. And I said [inaudible], I know this is going to sound strange. But, do you happen to know a turtle with a tag number 7767? And he said just a second and pulled it up in his Excel file and said yeah, I tagged that in Okinawa on this date. And, I emailed my colleague right back. That was a little spooky. That was one of those woo, moments, where you go, I think I’m on the right path here. So, we put a transmitter on a turtle in Baja, a turtle named [inaudible] named after the daughter of the fisherman. And, we tracked her as she made her way over 368 days back to the beaches where she was born.
And, those beaches just happen to be in Japan. So, prior to 1996 and 1997 because it took a full year to track her, we didn't know that turtles could cross an entire ocean. We didn't know that any animals could cross an entire ocean. That's not that long ago really when you think about it. Fifteen years ago we had no idea that these large ocean animals were making migrations across entire ocean basins. So, we took that data and we put it online. I had a friend, I was a grad student, I had a friend who said, hey you should take that data and build a website. And, in 1996, of course, my answer was what's a website. And, I mean, maybe that's a little exaggerating. But, websites weren't that popular. We built one. We put [inaudible] data online in real time. Millions of people who knew what websites were around the world started to find [inaudible] and track her online. And, my advisors and my colleagues said you can't share the data in real time. Somebody will steal it. I remember thinking, what the heck does somebody do with stolen turtle data? Is there a black market for stolen turtle data? If somebody stole the turtle data, maybe they would help save turtles, hmm, let's just put it out there. So, I was told that was career suicide. And, I've since then committed career suicide six times. And, we just started sharing and sharing and collaborating. And smarter people than us knew what some new things to do with the data. We published it based on the tools that we had and they published it collaboratively. And we share the data in lots of different, different analysis. People are now tracking all kinds of animals all over the world.
My friend Scott has tracked shearwaters all over the Pacific. These birds fly all over the Pacific like it's their backyard pond. It's absolutely amazing. Who knew that these little brown birds could just tear it up all over the Pacific, amazing.
We put cameras on the back of turtles. Now, this, the camera's large, I'm sorry. They're much smaller now because, you know, you know why, hard drives, no tapes, the cameras are tiny, they fit in your phone. Back then, we had tapes. And we put them on the turtle for a little while.
And, when we got the results, this is in collaboration with Jeff Siminoff, a good friend and colleague with National Fishery Service, we were so excited to see that green turtles eat sea pens. That was like the most amazing thing. They, we got that footage back. We had no idea that these green turtles in Baja ate sea pens. And we would just rewind it, hey, go back, go back, go back. Let's watch that part again. Oh yeah, look at that, oh go back, go back. Look at the way the turtle's looking at the sea pen. And we'd just watch it over and over. It's what turtle geeks do late at night. Get a six pack of beer and watch turtles eat sea pens. It's awesome.
Well, grandma and grandpa used to explore the ocean and their equipment was really clunky and really heavy really uncomfortable. But, they, it was beautiful, they held hands every time they went it, they always went over the side hand in hand. It just made the whole thing better.
Now we have different tools. We have high-tech ways of exploring the deepest parts of the ocean without having to go there.
And, what we're finding out is those deep parts of the ocean are not barren mud flaps devoid of life as the old story is in literature and publication supposed. They're actually quite bio diverse. An amazing number of species, un-described species, ecologies that we don't even understand yet, just going on in the deepest darkest parts of the ocean.

"The ocean bottom supports communities that may be diverse as those of any habitat on Earth."

Grassle (1991)
Gardens full of life 2,700 meters down under water in the dark, absolutely beautiful ecosystems that are just being discovered right now. This past decade has been a phenomenal decade.
And we're able study the surface of the ocean from far away, remotely, these drifting buoys.
Anchored larger, anchored arrays that send data in real time all day all night we're getting data from all over the world.
We've been getting data from space. So, space based technologies sending images and data about our planet day and night. And a lot of this data is available to everybody. It's being shared in real time. If you have the capacity to analyze it, it's there for you. You can download it, you can collaborate, you can look at summaries of it. It's there all the time. We're swamped with information about our planet.
We can see algal blooms at our field sites as they're happening from space, images, photographs of what's going on there from the comfort of our homes.
We can analyze what's going on in the Gulf of Mexico in the Delta region remotely from space, see the whole thing in one shot.
And, on the global scale, we're able to monitor the entire ocean, we can look at temperature and chlorophyll and currents. We can look at our whole planet remotely through technology. It's absolutely stunning, amazing.
And then, on the smaller scale, we’re studying the small planktonic animals learning about new species discovering and describing new species.
New species of algae, diatoms, amazingly beautiful and diverse.
These tiny, tiny little organisms that are in every single drop of sea water.
That's what sea foam looks like. Sea foam is made of diatoms. Just a cool image of the ocean that, in a perspective you've never considered before, macro photo of sea foam.
As Jacque Cousteau said, if it were just about logic, we'd been in trouble. We've got more logic and more data than you can even imagine. It's pouring in right now, right now from all over the planet. But, we're more than logical, we're human. We can do other things besides reason.
And, he also said people protect what they love and what they understand. Love and understanding, interesting.
Let's bring those things together, our planet, our love for our planet, and our big powerful brains.
Now, we used to understand our brains through phrenology. There was actually a journal called *Phrenology*. You could study the brain by reading the *Journal of Phrenology*. And the way that worked was, you felt somebody's skull, and you mapped the bumps and you looked at the map and you could tell something about who they were, how they behaved, the personality, and pretty wrong actually. But there was a journal.
We used to understand that it was emotion against, fighting against reason. Emotion and reason were fighting with each other, pulling at each other in this epic battle. You were either emotional and you kind of hung out with those artist, artist types, artists and the poets and the musicians or you were rational and you could hang out with the scientists and the engineers and the serious people. And those were the kind of the two choices, it was either or. And those were sort of the battle on campus.
But, we now know that it's emotion and reason. And neuroscientists, beginning with Antonio Damasio, in his 1994 book called Descartes Error, described how emotion and reason worked together. There is no reason without emotion. That's the summary of his whole book. It's impossible to reason without using your emotional capacity.
We used to understand our brains as a black box. We could study them by stimulating them and then recording the response. And, we didn't really know what was going on inside the box. But, we could stimulate and set the response and describe what was going on.
We used to also understand the brain as a computer. Well, the brain is neither a black box or a computer. Memory is distributed in our brains. Memories occur all over our brains not just in a linear fashion as in a computer.
There's a smart guy who said you can't manage what you can't measure. And this quote is repeated in particular through business publications over and over and over. And it turns out that he didn't actually say that. It was a misquote.
He said, the most important things cannot be measured, kind of different. But, that's an interesting quote even though that's not what he said.
We do want to try to measure things so we can manage them. And there is some truth to that even though it's not what he said.
And, there’s some truth to our inability to measure things that are really important like love. But, that’s starting to change. We can measure emotions these days.
He also said there's no substitute for knowledge. So, understanding how our brains work is incredibly important.
Back to that basic model, relationships, understanding and sharing.
So, I'd like to introduce you to your brain. This is what it looks like, about three pounds of beautiful flesh.
We’re increasingly able to look at our own brains, get into that black box and study our brains in increasing detail.
There's a great website that I highly recommend. If you find this website, you may lose an entire day just surfing it and learning about your brain. There's just a lot of information, a lot of images. And, most people haven't really looked, in detail at their brains.
We’re beginning to understand that love has something to do with chemistry, in particular, dopamine, oxytocin, [inaudible] and serotonin, different levels of different chemicals make us feel different things towards each other. And, to me, that's sexy, that's romantic. That doesn't take the steam out of the moment at all. My wife may disagree. I think she might have another opinion when I talk about oxytocin at amorous moments. But, I think it's sexy.
We're able to understand variation in our brains. Our brains aren't all the same. But, there are particular parts of our brains that are more different from each other and there are other parts that are more similar.
And, there are particular parts of our brains that are more connected to the rest of our brains than others. So, as modern neuroscience progresses, we're, we're finding lots of clues to who we are. And, we're just at the beginning and it's very exciting.
Even simple, well not so simple, but, beautiful images of our brains that are just inspiring, it almost makes me think of that sea pen. So turtle freaks see sea pens in brain images as well, apparently.
And, our level of detail just going further and further down to the level of the neuron to learn about how memory works, how consciousness forms.
Each brain, a billion, hundred billion neurons, quadrillion synapses, seven billion of us, that is serious complexity. And that is important to the future of our planet, the interaction between all of these neurons in us and between us.
Now, various fields are embracing neuroscience and forming new hybrid fields like neuro economics, a great set of books and conferences and research papers just exploding on the top of neuro economics.
Nuero marketing, marketers getting together, neuroscientists and learning how to sell you more things that you don't want or need, fantastic, isn't it.
Neuro politics, that's my buddy Jake Dunigan (assumed spelling) did his PHD in neuro politics one of the first doctorates in neuro politics is at the Institute for the Future in Palo Alto.
Politicians getting together with neuroscientists to figure out how to deliver their message, that is just a little bit creepy, isn't it.
There's an ongoing seven year conference on neuroscience and music that I've been attending at Stanford. Fascinating, music professionals meeting with neuroscientists to talk about how music makes us feel the way it does, one whole conference on rhythm and the brain, last year was on nostalgia, memory and the brain. And, the interesting thing about it was, this group of neuroscientists and musicians started getting into how nostalgia works.
When do we make nostalgia during our lives as our brains develop? When is the peak of nostalgia formation? It turns out, it's right about now for many of you college students. High school and college is when you create this particular kind of memory that we call nostalgia. And, the special thing about nostalgia, is, it goes way in and you can't get rid of it. So, when you're 80 years old, the music that was popular when you were that age will still make you feel really good. It'll make the hair on your neck stand up. All right, so, we would hope that you would come nostalgic for good music, maybe music you make yourself, beautiful places, not Angry Birds and not, definitely not Justin Beiber, one would hope. And so, this nostalgia thing is not to be messed around with. And, in the hands of marketers nostalgia gets, nostalgia is powerful. Keep that in mind when you watch Super Bowl commercials and you see ads and you listen to the music that they've licensed to try to sell you that car because they know what demographic they're after. So, nostalgia is an incredibly powerful thing. And, for me.

[ Music ]

[ Inaudible ]
Now, if we can become nostalgic with that sound and feel the need to protect [inaudible].

[ Inaudible ]

Maybe that's a tool for sustainability that we need to think about.
Now neuroscientists are working with the Michael Jordans of meditation to study the meditative, the contemplative mind and learning a lot of things.
Neuroscientists are working with dancers to understand what is it when you, why don’t you just do this with me? Rock back and forth, just rock back and forth. You don’t need to boogie. You don’t need to dance. Just rock back and forth. When you rock back and forth, your brain changes a little bit, you feel a little different. When you dance, you feel good. You like to dance. You like to listen to music. Understanding how that works, how dancing changes our brains is fascinating, dancers and neuroscientists working together.
We understand that a lot of the stress comes just from our mind. We make the stress. And so too, must be the ways we deal with the stress. Bob Sapolsky is a neuroscientist, a neurophysiologist at Stanford, he's written some incredibly entertaining books and some important papers on the neurophysiology of stress. He studied stress in animals, stress in people. And, what we know is stress makes you sick, period. Every medical doctor in the world knows that to be true. That was a far out kind of hippy Chico California idea, not that long ago. Now, it's a fact. Stress causes disease.
Our happiness and our health is related to the ability to manage stress.

(Nassir Ghaemi 2011)
So, that knowledge of how nature can make us feel, how nature can help us manage stress is an incredibly important piece of the puzzle for sustainability, for conservation, for the environmental movement.
Understanding what the amygdala is in the first place, that you even have an amygdala is an important thing to know. It's an important organ, an important part of the brain for our emotions.
And, understanding how dopamine works is important. The dopamine is an amazing chemical and it makes you feel good about snowboarding and it makes you get addicted to blue fin tuna. And it does all kinds of things. And, it's implicated in all things good, bad, and ugly. But, it's in your brain all the time. And, the more you understand it, the better you can manage it. And, you don't want to give that understanding up to people who don't have your best interest in mind necessarily.
Being in a wave, feeling the water, feeling the movement is all about dopamine. And, that doesn't make it any less exciting at all, in fact, to me, it makes it more exciting.
Being out on the water with my friends in Baja, they fish with a bugle, and, when they're happy they blow the bugle which is a lot, so. It's just one of the coolest things I ever experienced was my fishermen friends, playing, bugling, you know, out in the evening on the ocean in Baja.
When we see beauty, when we see the ocean, when we see nature, when we see that view in the mountains, that light goes through our eyes into our brains and elicits a response. That is happiness. That is the kind of nostalgia you want to make.
That is why the ocean view is so valuable because you're getting that, you're getting that experience. That's why the property values go up if they have windows like this.
That's why I can't get my kids out of the water. I didn't want to get out of the water either when I was a kid, is still don't. At the end of the day come on get out of the water, nope. Bring us dinner in the water.
This guy, this is my friend's son, they live in Bozeman Montana. And, they're planning a trip to Costa Rica several months away. He is already in Costa Rica. Every night he goes to Costa Rica in his head, in his imagination, in his bathtub. He just can't wait for Costa Rica to get into the water. And, right now, the bathtub in Bozeman has to suffice.
Today I spoke with a man who founded an organization called Heroes on the Water. And I invited him to participate in the second meeting of neuroscientists and ocean explorers. It'll be called Blue Mind. So, Blue Mind II is happening in North Carolina on the outer banks in June. And I invited him to join us and speak alongside a neuroscientist who studies post-traumatic stress disorder in the brain at NIH. And this guy, the founder of Heroes on the Water, he calls himself, he says I'm just a Texas bass fisherman and a veteran. But, Heroes on the Water has set up 21 chapters around the country. And, what they do is, they take injured VETs who are suffering from PTSD, may have lost a limb, they take them out in kayaks to go fishing as a way to manage their stress. And it works. And Jim says, you know what, I don't, I don't need you to tell me that this works. It works. But, I would love to have some science, some neuroscience to back it up so that I can go through the front door and get more funding so we can have 200 chapters of Heroes on the Water. Because, when you go out on the water and it calms you down, that's a good thing. So, everybody knows, you go out in a kayak fishing, and you're not spending most of your time catching fish, you're spending most of your time looking at the water. And, it works.
So, that's what this Blue Mind thing's all about, bringing in some neuroscience to back up really things we already know, things we already feel, things we've already experienced. But, when we talk about them in serious company with decision makers at our graduate committee meetings, people roll their eyes at us because they're soft and emotional, these words like love and happiness and fear and anger. And those words are kind of soft, fuzzy, emotional. If we bring the neuroscience to help back some of that stuff up, it could get kind of interesting. It is getting interesting.
So, you know, Coke, the biggest brand in the world, how did they, how did they get so big? Well, the product is mildly addictive, that’s probably part of it. But, they invest in a lot of marketing. And what is their message? The message is happiness, friendship, open happiness. Just twist that top and you’re happy. Right, sure, whatever, 100 million dollars of marketing later, marketing later maybe some people think that’s true. Coke uses happiness. McDonald uses love in their [inaudible], Subaru uses love, UPS uses love. And we, the people charged with sustainability, conservation, restoration, we shy away from words like love. We don’t want to get involved in nostalgia and happiness, friendship. That’s what it’s all about, for us, the reason why I’m a marine biologist, because I fell in love with the ocean.
Now, I don't drink Coca Cola, but I'm a little bit of a Mac geek. And Apple has done the same thing. They've Steve Jobs new as well as anybody in the world that creating emotional connections to his products is the key. Now they're the most cash rich company on the planet. Emotion and good design good products, emotion's the key.
The fact is, happiness does not come in an iPhone, sorry. It doesn't come in a bottle of Coca Cola. It doesn't come in a flat cheeseburger. Those things actually are, maybe some bad news, disguised as happiness.
So, here's this idea. We've got Blue Mind and Red Mind. And, we need to manage our blue mind and our red mind. Sometimes, it feels like it's blue mind against red mind.
But, it really is blue mind working together with red mind. You feel angry. But, you can't be angry all the time because then you're going to be stressed and you're going to get sick then you're out of the game.
Here's a curveball. Sitting in the hotel room the other day and flipping through the channels just to try and see what's going on because I don't get to do that very often and this guy shows up, Keanu Reeves and this movie Speed. It's all about red mind, right. So, their, their cruising along in this bus and, if the bus goes under 50 miles an hour it blows up. And they're going through LA and Sandra Bullock is driving. And, turns out, the bridge is gone, so they have to jump the bus over this big gap in the highway going 70 miles an hour. And that's one of the Baldwin guys. I don't know how he got in there. And so, they're all red mind, full on red mind. And, he toggles there for some reason, and they do a wheelie and somehow, they do a wheelie in the bus like Evel Knievel and they land oh barely on the other side of that thing. And everybody's yelling and screaming and cheering and high, well not yet, they're going to high five. And they didn't go under 50 miles an hour somehow. They made it safely across. The bus didn't blow up. And, the Baldwin guy's very happy which was really all that matters right. So, red mind focus, in the moment, survival, extremely important. And then, and so, I'm watching this like, I'm going to, I'm going to tell my friends at Chico about red mind and use this. And then, but check this out.
On the side of the bus, a wave, awesome, red mind, blue mind. If that wave was not on the side of the bus, who know what could've happened, really. You need that balance. You need both. It can't be all red mind. And, here's a cool thing.
Heal the Bay, a great organization in Santa Monica got a nice shout out, their little logo tucked in there on the side of the bus. So, not only we're promoting blue mind, but, we're giving a little shout out for our colleagues and friends there.
It's about connecting reason and emotion. Bring the emotion back it up with science. Don't let your red mind carry you away. Don't get too agro. Be kind, be patient, work hard.
Remember that we've got happiness on our side. This is what I think when I want to open happiness, a nest of baby turtles coming up out of the ground and running down the beach into the ocean. I get to see that and help them and bring my kids and then talk about it a lot, take photos of it.
This guy, another, another Hollywood guy, Michael J Fox, he loves turtles too.
I'm sitting, well, you know, you know Michael J Fox, right, he made that movie Back to the Future and a bunch of TV shows.
I'm sitting in a hotel room. The only time I really see TV is when I'm in a hotel room, if you haven't picked up on that. In Mexico City for a sea turtle meeting and, I flip on CNN. And, there's Michael J Fox shouting away with Larry King. And, the first thing he says is, I was snorkeling with a turtle and I got carried away. And then, he starts telling this story about how he was swimming in the U.S. Virgin Islands, met a sea turtle, and just lost track of time. Hours went by, hours later and he's still following the turtle. Finally he gets out of the ocean, walks up, says to his wife, I'm done.
And she says, that's good honey you've been in the ocean for a really long time. He said no, I am done, I quit. No more TV, I quit Spin City or whatever show he was working on. I made a decision while I was following a turtle and it changed my life 180 degrees. She said, okay. And, he writes about this in his autobiography and he says I have never looked back. I was in the ocean, got clear, made that decision, and I've never looked back. So that, all right, sample size of one. I'm not putting a lot of weight on the Michael J Fox story, but interesting.
Swimming in the ocean, seeing wild animals, swimming with a turtle, seeing a whale shark, having a fish that big swim by you safely is just awesome. If that doesn't make you feel happiness, I don't know what, what will.
We need to reconnect as Richard Louv says in his book The Last Child in the Woods, we're suffering from nature deficit disorder. We need to reconnect people with nature, with trees, with animals, with the coast, with the ocean, with mountains and rivers, and get our hands in the dirt. You can't do this through an app. You can't do it through an Imax film. We can't do it here in this auditorium. We can inspire each other and talk about it. But, you've got to get out there and form those nostalgic memories for real.
So, that brings us to what, you know, what are we doing here? We’re gathered in an air conditioned room on a beautiful day. Maybe we could've done this online. Maybe we could've Skyped. Maybe I could've emailed you my PowerPoint as a PDF. And, I could've recorded it for you. But, we wanted to be together. We wanted to be side by side.
Because we're social. Just as our brains are a collection of neurons, so are we a community when we get together. And, there are things we can do together in person that we can't do when we're spread apart.

"Just as brains can do things that no single neuron can do, so can social networks do things that no single person can do."

-Nicholas Christakis, Harvard University Medical School
Emotions are collective. Your emotions depend on the emotions of the other people in this room, of other people in your class, the people you live with, your professors, your friends, your family. Our emotions are collective. And, we try to be individuals. But, we're not.
There are studies that show that our drinking behavior, whether it's too much or too little depends on the behavior of our friends. Our eating behavior, whether it's too much or too little depends on the behavior of our friends, no new breakthrough there. But, what's interesting is your emotional state also depends on the emotional state of your friend's friends. And, you can see that two degrees of separation, drops down a little bit and depends on your friend's friend's friends.
And this is all measurable. So, think about that. If you just came back from an awesome hike and you're feeling good. You got your blue mind on, that's rubbing off on your friends. And then, they're taking it and it's rubbing off on their friends. And, check this out, they're taking that and it's rubbing off on their friends. So, that explains some things. When you're in a really chilled out community, whether it's Chico or Santa Cruz, check in on how much of that population is spending time in nature. And, I bet it's significant. And that stoke that you got from being in nature extends to your friends even if they're stuck with their head down in a book or in their laptop or in the lab. They get that contact high, I guess you could call it.
People can form group expectations and if those expectations are positive and uplifting that's a good thing. And that's what we need to be thinking about and understanding in order to make this sustainability movement stronger.
Gratitude and random acts of kindness are incredibly important tools. And, we’ve known that for a long time. Guess who just caught onto that. Coke, you’re going to be getting gifts, big ad trend last year in Ad Age Magazine was something called random acts of kindness. Ad Age Magazine listed random acts of kindness as a big new marketing tool. So, you’ll be getting feeling some kindness from somebody that wants you to buy some stuff, right. It works. We need to use kindness and gratitude as one of the many tools we have for sustainability. Agro, pissed off, grumpy, who wants to be part of that club?
The thank you economy, it's one of the reasons why I brought blue marbles, basically to say thank you to all of you for what you're doing.
Because I know each of you are doing your part. And, sometimes, that is a huge part and sometimes you're just getting started. And, it may be the little things you do in your household and on campus and it may be the organization you run or the students you advise or the projects you've started or this conference. But, it's important to say thank you often and mean it to each other, because we don't do that often enough. We don't thank those working hard towards sustainability. We don't thank them enough.
So, we know resilience requires biodiversity. We've known that for a long time.
We know resilience requires economic diversity.
And, we know resilience requires cultural diversity. But, there's one more piece. And we can back this up increasingly with good science.
It's that resilience requires emotional diversity. Emotional diversity, your family, your organization, your university, your community, your business, will be stronger and more resilient if it has emotional diversity. There are the outliers and there are the steady riders and there are the people who can hold down the fort and manage things and then there are the people with the wild ideas and everybody in between. And, it's all important.
Human salvation lies in the hands of the creatively maladjusted

-Martin Luther King Jr.

We need the wild cards and the face cards to make up the deck. Both are important.
So, we hear that the world, the planet is in our hands. And, when I hold this blue marble, I'm reminded of that. But so are our minds. And that's my message is yes it's about our planet. It's also about our minds. It's about our brains. And, who do you want to control your mind? I hope the answer's very clear and loud. You, you, you are in charge of your mind. Don't give that up. Don't give up your nostalgia. Guard your nostalgia. Be emotional. Align your emotions with your goals. Be passionate about the things you love and fight. Turn on your red mind once in a while. Turn on those after burners. I guess, you pull up on the steering wheel and you do a wheelie in the bus when you need to.
Connect your emotion and your reason to your dream.
My dream you know as I started the conversation, to spend time with my family, my girls, my partner Dana.
And to enjoy our beautiful planet together, to work to protect it so that it's a healthy place it's a bio diverse place that has turtles swimming in it in live coral reefs and friends.
I love turtles. I can't explain why. I'm not afraid to use the word in public. My science is peer reviewed whether I say I love turtles in public or not.
This guy Alejandro loves turtles. And, he grew up eating them and hunting them with his father. My daughter's growing up tagging and studying and protecting and thinking about turtles. Ali Andro grew up hunting and eating them. Now, he's fighting to protect them. And, this is a sea turtle he rescued from a poacher's net. He's making a living as an ecotourism guide as a field scientist and he loves these animals. I don't know, you tell me. There's not that many guys that are going to hug a turtle like that and look you in the eye and let you take a picture unless they believe it, particularly in Mexico. These are the macho guys. And he's not going to let me take a picture of him with that turtle unless he meant it, and he does.
We’re just at the beginning digging into the neuroscience intersection with the ocean. And, it's really exciting, barely scratched the surface, hope there's much more to share in the years ahead through various kinds of media and articles.
And, I want you to, in closing, take that blue marble out.
Explain a little more what it's all about.
See, when you hold it up like that.
That's what we look like from a million miles away. If you take it and put it really close to your eye and look at that bright light over there. Put it really close to your eye, almost, try to get inside it. [Silence] It's trippy in there. It's like you're under water. It's like you're swimming around with dinoflagellates and diatoms. And when you do this with kids, they swear they see turtles swimming in their marble. And if you see one, I'm going to have to check what's in your water bottle. It's about imagination. You can go into the ocean by holding up a piece of blue recycled glass.

Now, here's where we go all California. Take your blue marble and put it on your forehead. Just do it. Now, think of somebody that you owe some gratitude. Think of somebody who's working hard for our little blue marble, who's helping people, who's helping the planet, who's helping nature. Just imagine that person. I know you have a lot of choices. Just think of somebody and imagine them. Now, take your blue marble and hold it on your heart and imagine walking up to that person and taking their hand and putting your blue marble into their hand and saying thank you and giving them a small gift of gratitude. And, imagine how that simple thank you and this little token of gratitude will make them feel. You'll surprise them and you'll make them feel really good. And, here's the cool thing about gratitude, it'll make you feel really good too. That's the awesome thing about gratitude is that it feels good to get it and it feels just as good if not better to give it.
And so, carry your blue marble around for as long as you need to or want to and you'll know the right moment, you'll know the right person, it may be a stranger, it may be a close friend, it may be a colleague, it may be a professor, or student, maybe your childhood hero. And, just stop face to face, eye to eye, hand to hand and thank them for what they're doing and ask them to pass it on in the same way. And, I know this is not a solution to the serious crisis we face. But, it can't hurt. It might help. It might help build those relationships and promote the knowledge. It's all about sharing that. So, thank you very much for inviting me to spend this afternoon with you. And thank you from the bottom of my heart for the work that you're doing. There's nothing more important right now on planet earth than the task at hand among the people gathered in this room. So, thank you Chico, I love you.

[ Cheering ]

[ Applause ]

I don't see anybody rushing up here to kick me off the stage. So, if there are any questions we can do that. And, I'm happy to chat all night with the people who want to talk about turtles and the brain. And, I know there's a reception as well. So, if we want to have a few questions in this format and then we can hang out and keep chatting.
**Audience member:** [Inaudible].

**J. Nichols:** Yes, so I continue to do sea turtle research with a group of grad students that I advise who are studying sea turtles in various parts of the world, home range, long distance migration, and some social science need sea turtles as well. And, I'm working with a whole new group of scientists or neuroscientists on trying to plug in some of these ocean related questions. We're starting with some preliminary pilot work related to stress and cortisol and the ocean as well as some EEG work with a neuro marketing lab in Texas injecting some ocean imagery in their normal lineup to see what neurological responses, how it may different from what I call background noise, but they call 30 second commercials. Yep.

**Audience member:** [Inaudible]

**J. Nichols:** Yep.

**Audience member:** [Inaudible].

**J. Nichols:** Yeah. Well so, as I think most, most people who are interested in sustainability know we've got a plastic pollution crisis. It's not just albatross and turtles that are becoming more and more full of plastic. It's our entire ocean. And, there's been a lot of attention on what are called the jiar [assumed spelling]. A jiar is not, has nothing to do with plastic. A jiar is just ocean circulation. And within that circulation you get kind of an eddy, it's like large scale planetary scale eddy where you get accumulations of whatever is floating. And those areas are called garbage patches by the oceanographers because in the past hundred years, instead of it being kelp and glass buoys and coconuts, it's increasingly plastic and trash. So, in all the major ocean basins, you're finding these areas with a lot of junk floating around.
And, it's been, I would say mischaracterized by the media in some ways because people, people ask me. How, where's the, where's the trash island? And, can't we just go scoop it up and put it on a big barge and bring it home? No, it's not like that. It's, if you were sailing on a big ship through it, you might not even notice it because it's small and a lot of its subsurface. And it's horrible because there should be no plastic in the most distant corners of our ocean.

So, the first answer to what do we do about it is start, turn off the valve. We need to stop the flow of plastic out into our waterways both our rivers and our lakes and the middle of the ocean. Getting out there and cleaning it up is technically pretty challenging. It's micro plastic and there's a lot of other micro life out there. So, if you were filtering all the micro plastic, you'd be filtering everything. And that's not such a good, good idea. So, what I tell people is let's, let's work on land-based solutions to the problem while we try to figure out how to go out and clean it up. There's, you know, every year more research on the problem itself, characterizing the problem, looking at different bacteria that may be glommed onto or potentially be consuming the plastic and then looking at where this plastic is ending up and right across the board. Anything that's living out there has probably got plastic in it.

So, single use plastic should be something you avoid. When you have to use it, make sure it ends up in the right bin. And, that needs to spread globally. If you're a business person, take on one of these projects of finding a new Chico bags, you know, born here.
It's one possible solution to a very wasteful activity which is single use plastic bags. And, I think, the city of Chico is considering a plastic bag ban on March 6th. So, if you care about that issue, show up, let them hear your voice because the people who make the bags are pretty interested in selling more bags, not fewer. Chico Bags is interested in selling more Chico Bags obviously. But, bring your own bag, you know, that's a simple thing. But I, you know, my message on the jar and plastic in the ocean is yeah we've got a problem in the middle of the ocean, we've also got a problem in our own backyards. We got a problem in our refrigerators. We've got a problem on our beaches. And you don't have to go on a sexy Discovery Channel expedition to the middle of the ocean to encounter that problem. You can go, you know, to our rivers and lakes and beaches.

**Audience member:** [Inaudible]

**J. Nichols:** Other way around. It's more hope in the Atlantic and less hope in the Pacific. But, there are, with leatherback turtles in particular, the Pacific leatherback is in much worse shape than the Atlantic leatherback. The Atlantic leatherback in places like Trinidad is it's the best place to go to see a leatherback turtle in the world. And the populations are doing well. It's another story in the Pacific. So, the main nesting beaches in Indonesia where the leatherbacks migrate from Indonesia to California to feed on our jellyfish and then nesting beaches in Mexico and Cost Rica, and those animals migrate to South America and back and forth. Those populations are critically endangered. And, the thing with sea turtles it's required, to work with sea turtles requires, well all turtles, a lot of patience because they're a slow growing late maturing animal, seems like everything is lined up against them.
And, you know, in the course of a five year PHD project, you're unlikely to see a lot of results. If you stick around for 20 years, you may see the beginning of some progress. But, it really takes a lifetime, as we've seen, to see real responses.

So, in the case of the Pacific turtles, they're so complex in terms of their range. If you want to protect Pacific leatherbacks, you need to protect their beaches in Indonesia, their foraging areas in California, and then their migratory routes and developmental habitats spanning the Pacific Ocean where you find lung liners, gill netters, and this plastic pollution issue, so. Well, in the case of [inaudible] that was a black sea turtle. Where, the Pacific green turtle, they're doing well based on 30 years of community based conservation work from the beaches in [inaudible] to the foraging ground in Baja where we built really a social network of people who care about these animals and live day to day with them. Many of them are former turtle hunters. Carl describes Francisco Fisher in a chapter in his book. He's a convicted sea turtle hunter who went to jail. And, Carl and I met with him. I've known Francisco for a long time. And, Carl interviewed him and asked him all about what he, what he's doing now. So, that's a little bit of an insight to what's going on in Baja. Any other questions. All right. Thanks, stick around.

[ Applause ]