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

Welcome to another edition of Ocean Currents. I'm your host, Jennifer Stock. On this show, we talk with scientists, educators, fishermen, explorers, policymakers, ocean enthusiasts, kids, authors, and more, all uncovering and learning about the mysterious and vital part of our planet, the blue ocean. I bring this show to you monthly from NOAA's Cordell Bank National Marine Sanctuary, one of four national marine sanctuaries in California, all working to protect unique and biologically diverse ecosystems. Just offshore of the KWMMR listening area on the West Marin coast are the Greater Farallones and Cordell Bank National Marine Sanctuaries, which together protect 4,581 square miles of rocky shoreline, sandy sea floors, rocky banks, deep sea canyons, and maritime artifacts.

Happy December, everyone! I'm bringing you a recording from a lecture I attended at the San Francisco State Estuary and Ocean Science Center in Tiburon as part of the Rosenberg Institute seminar series in early November this year. The Honorable Dr. Jane Lubchenco gave a public forum talk called "Hope for People and the Ocean" highlighting some real reasons to hold on to hope during these trying times that we worry about ocean health. Dr. Lubchenco is a distinguished university professor and marine studies adviser to the president at Oregon State University and served as the undersecretary of commerce for Oceans and Atmosphere and the administrator for the National Oceanic and Atmospheric Administration between 2009 and 2013. This lecture was recorded on November 7, 2018 with support from the San Francisco State Estuary and Ocean Science Center. Hope you enjoy and stay tuned here to Ocean Currents!

Karina Nielsen: It's really wonderful to have all of you here tonight. My name is Karina Nielsen I'm the executive director of the Estuary and Ocean Science Center here at San Francisco State University.

(Crowd applause)

Now, I'm gonna turn meat red! Thank you. I appreciate it! It is really my extraordinary pleasure tonight to introduce our speaker, the honorable Dr. Jane Lubchenco, and I almost feel a little awkward saying it that way only because Jane and I go back a long way. We're in academia. We have kind of families in some ways that are academic families, and Jane and I are an academic family. She's my academic mom.

(Laughter)

Jane Lubchenco comes to us today. She's a University Distinguished Professor, and she's a marine studies advisor to the president of Oregon State University. She did her undergraduate degree at Colorado College. She did her master's degree at the University of Washington. She did her PhD at Harvard University. In 1977, she started at Oregon State University, and she's been there ever since. She did a short stint as an assistant professor at Harvard before moving there. One of the interesting things about Jane's trajectory professionally was that for the first few years of her professional life at Oregon State, she shared a tenure track position with her husband Bruce Menge, and they did that with purpose and intention. They would both have time to have family time and have work life balance. It was a very pioneering, bold move and there weren't very many universities that did that, so that's one of the cool things about Jane.

There's a lot of cool things about Jane, I'm going to tell you about a few of them because I'm so incredibly proud of her. She worked at the Smithsonian Institute for a while as a research associate. She was a visiting professor. She has worked internationally at the University of West Indies, the Smithsonian Tropical Research Institute in Panama, Universidad Cattolica in Chile, University of Oceanography in Qingdao in China, and the University of Canterbury in New Zealand. She's certainly a globetrotter or an ocean traveler. She served from 2009 to 2013 as the chair of the department of zoology in Oregon State. So, full academic life.

She also has many honors. She was on the National Science Board for two terms. She was nominated for each

term by President Bill Clinton and confirmed by the Senate twice for that. That's not always an easy task.

(Laughter)

She then served as Undersecretary for the Department of Commerce for Oceans and Atmosphere and the administrator for the National Oceanic and Atmospheric Administration from 2009 to 2013. She was nominated by former President Barack Obama and confirmed by the US Senate again. She took a break after that and served as a distinguished visiting scholar in public service at Stanford University and Mimi and Peter Haas named position. After that, as if this wasn't enough, she was the inaugural US Science Envoy for Oceans with the US State Department from 2014 to 2016 under Secretary John Kerry and President Obama. She's done a lot of public service.

In addition to this amazing public service you might ask, "Well, why all this public service?" Well, she's an extraordinary scholar. She has eight of her publications. This is an academic accolade. I don't expect all of you to maybe know what that is, but she has eight science Citation Classic papers. That means other scholars think her work is really quite important. They cite her work a lot. So that's huge.

She was elected. She is a member of the National Academy of Sciences and many other important societies. She was president of the American Association for the Advancement of Science or AAAS, the International Council for Science, and the Ecological Society of America. She was given the most prestigious award that is given by the National Academy of Sciences, the Public Welfare Medal, which is a really huge honor. For her public service, in addition, she received the highest honor the Coast Guard gives to a civilian, the US Coast Guard Public Service Award. I'm telling you all this because I think you should know what a rock star Jane is before she gives her talk. It is my incredible honor and pleasure to introduce her, and she's going to talk to us about hope for people and hope for the ocean. Without further ado welcome, Jane.

(Applause)

Jane Lubchenco: Evening, everybody. Thank you so much for coming. It's really a treat for me to be here. One of the most exciting things for a teacher is to see your students thrive and

succeed, and I could not be more proud of Karina as my academic daughter. I know my husband, Bruce Menge, who has her academic father, shares our excitement and pride in her. Thank you, Karina, for the invitation, and thank you for what you're doing.

It's really great to be here. I've enjoyed speaking with some of you this evening, and I really do appreciate all of your attendance tonight. Thank you for coming. Hello to everybody that's in the overflow room. I appreciate your being here as well.

I want to focus our attention tonight on hope and "Hope for the Ocean and People" obviously as my title. For anybody paying attention to the news, that title might seem a bit at odds with a lot of the doom and gloom that we hear about the ocean. If you're reading the newspaper, listening to the radio, watching TV, and watching your screens, you see news about climate change, ocean acidification, plastic pollution, coral reef bleaching, and dead zones. It sort of seems like one bad news story after another. All of that is out there. It is an immense challenge, but it's not an insurmountable challenge. Tonight, I hope to convince you that there actually are some amazing things that are underway, that if we can figure out how to replicate them, how to scale them up, we could turn this narrative around.

The bottom line for my remarks tonight are going to be simply how connected we are to the ocean. Those of you who have the privilege of living close to the ocean can feel that connection. Not everyone is aware of it, but people around the planet are connected to the ocean. Our future is connected to the future of the ocean. There are unprecedented problems, but solutions do exist. Yes, we can create new solutions, but we actually have a wealth of them at hand. We're just not using them to the extent that we need to. For that to happen, the pace of change needs to change. I think it's time for a new narrative about the ocean.

When I was growing up and for most of human history, the narrative around the ocean was, "It's so immense. It's so bountiful that nothing we can do can possibly affect the ocean. It is too big to fail." Now, the narrative has become, "It's such a mess. We have so many problems. It's too big to fix." I think it's time for a new narrative that says it is so important to our future. We can fix it. Let's get on with doing

it, and I hope you will agree with me by the end of the talk. In addition to that message of hope and a new narrative, you all, whether you are scientists or citizens, have a key role to play in framing this new narrative. Let's dive in.

I'm going to give you a sense of where I'm coming from on this, so that you can understand my thought process, pay a little attention to why you should care if you don't already, what are the problems, what are some solutions, and what can you do. That's sort of my overarching path tonight. I've been connected to the ocean for much of my career. I grew up in Colorado, but I've been working in and around the ocean for much of my professional life doing work around the planet and seeing problems and solutions globally for almost over 40 years as an academic researcher. Also as Karina mentioned, having an opportunity to be a public servant, to serve citizens of this country as the head of NOAA, working with members of the cabinet, working with the President and his team, working with members of Congress, and the immensely talented people at NOAA as a science agency, almost 13 billion people. I mean 13,000 people, sorry, \$5 billion or 13 billion people. That's more than on the planet!

(Laughter)

\$5 billion budget, doing just incredible work, whether it's on the ocean coast, climate or weather, and the intersection of all those. I also had an opportunity as Undersecretary of Commerce to work with not only members of congress but governors and a lot of citizens around the country as well as with other people around the world. NOAA and the US of course partner with a lot of other nations, so doing a lot of interaction with leaders, with citizens, with fishermen, and with people all over. Then, for two years as the first US Science Envoy for the Ocean, I did science diplomacy in China, in Indonesia, and in three countries in Africa, working on ocean issues with those leaders.

It is a wealth of experience. It really gave me some insight into not only the problems and solutions but how people are thinking about the ocean, how they're connected to it, and how they depend upon it. It's become increasingly obvious to me that there are some very obvious ways people understand that they are connected to the ocean. It provides for us. It feeds our souls and our imaginations as well as our

bellies. People's livelihoods depend on the ocean, and there are many ways that people know that they are connected to the ocean.

But that isn't all of the way in which we need the ocean or are dependent upon it. The ocean also provides over half of the oxygen for the planet. In addition to the things we know about, there are ways that we don't know about that we need from the ocean. The ocean absorbs over 90% of the excess heat that is trapped by greenhouse gases. That's a service that it provides to us. Climate change would be a lot worse than it is if the ocean weren't absorbing that excess heat. The ocean also absorbs around 30% of the carbon dioxide that we emit. All of those benefits that the ocean provides to us, we take for granted. We're cognizant of some of them, not others. We take them for granted. They've always been there. We think they always will be. But, in fact, that may be changing.

Those of us that live close to the ocean can see the bounty and the beauty. We can see some of what is happening. This helps us appreciate that for much of human history, the ocean has provided for people. It's been our grocery store, it's been our highways, our pharmacies, our playgrounds, our churches, our schools, and our libraries. It's been an insurance policy against mistakes that we make. In short, the ocean has been our life support system.

People like scientists that are paying attention to the ocean, or fishermen that work on the ocean, or those of you who live close to the ocean, can see changes that are underway. In fact, those changes are happening at sometimes a frightening pace.

Here's a very brief summary of what we know. Over a century ago, the ocean was for the most part, free of... Yes, we had some local pollution, but most of the ocean did not have the kind of pollution that we see today like either nutrient pollution, plastic pollution, and chemical pollution. It was just teeming with fish, especially great big huge top predators. For the ocean, just chalk block full of them playing a key important role that they play in maintaining the balance in ocean ecosystems. But today, the ocean is significantly depleted and disrupted. It's also polluted. It is warmer and is more acidic, and it's less resilient than it used to be. And all of that has happened in a relatively short period of time as a

result of a wide array of activities on land and in the ocean. The problems that are causing that are multiple like things we do on land and things we do on water. This is just a summary just to anchor our thinking about some of the challenges. Overfishing is very real. So too is illegal fishing, and loss of safe havens for wildlife. Most of the ocean used to be a de facto marine protected area, but it isn't any longer because we can go and fish, mine, and drill pretty much everywhere. We don't have the kind of safe havens that we use to protect oceans and ocean ecosystems. Climate change and ocean acidification are taking their toll on the ocean in many ways. Pollution is a serious problem. In addition to those, there is a very serious lack of awareness of even the existence of the solutions that I'm going to talk about. There's a lack of political will. I would lump all these together as some of our major challenges. This is causing a lot of people to ask the question, "Is it even possible to meet the needs of people, even today, much less tomorrow? Is it possible to use the ocean without using it up? Is it possible to do so in an equitable fashion? Is it hopeless?" I would suggest that, no, it's not hopeless. The challenges are immense, but it is possible. That's what we need to focus on. I see really encouraging progress bubbling up all over the world as a result of many things that are underway. Many citizens are becoming more concerned. Many scientists are focusing on solutions and not just identifying or raising the alarm about problems.

People are asking, "Okay. Yes, this is a problem. How can we fix it?" Many scientists that I know are doing things completely differently from what they used to. They're working with business people, they're working with politicians, they're working with community leaders to focus on solutions. That's different. That is making a difference.

Citizens are becoming engaged. Policymakers are beginning to take action. Business leaders have a key role to play here, and many of them are paying attention and saying, "I need to be part of the solution, not just part of the problem." They're collaborating, using new technologies, and there is just a wealth of amazing stuff that is underway.

Now, on to the ocean. There's a lot of good stuff that's happening. It's just not at the scale that we need or the pace that we need. I'm going to make that a little more concrete with two examples, one from fisheries reform and the other

from marine protected areas. Not that those other issues aren't unimportant or there isn't good stuff underway but just to give us something specific to focus on. So, I'm going to do this sort of problem solution construct here and start with overfishing and talk a little bit about fishery reforms.

Fisheries are incredibly important. Anybody who thinks about food security needs to be thinking about food from the ocean. The ocean provides over 3 billion people with a significant fraction of their daily protein. It's really important for food security for the future, especially in developing countries. However, the way we have gone about fishing has been with that old mindset that the ocean is immensely bountiful and infinitely resilient. We've seen the fraction of the stocks that are developing plummet. The fraction that are fully exploited go down quite significantly. This is from 1950 to about 2010. The number of collapsed overexploited stocks has increased significantly and collapsed has increased quite dramatically. Fifty years ago, there was very little that collapsed. Today, it's a significant fraction. This has been the global pattern of fishing. It's partly because we've been fishing harder and harder and exploiting newer and newer places. We've run out of new places to fish. Fishing harder and harder for fewer and fewer returns has been a major challenge, and it has caused a lot of people to say, "Okay, we can't get any more from the ocean. Where are we going to get it?"

People are turning to aquaculture, which is absolutely going to be part of the solution, but we've seen some very encouraging progress in reforming fisheries so that we're fishing smarter not harder, can build stocks back up to be super abundant, so that we can harvest fish from those wild stocks in ways that provide for more fisheries but also healthier oceans.

Science, in many ways, is driving a lot of the reforms that we've seen in fishery management. This is just one example of some researchers. Steve Gaines was one of Karina's academic brothers at Oregon State University, his colleague, Chris Costello, and their student, John Lyneham, published a paper in 2008 that analyzed fisheries around the world. They asked the simple question: Does the type of fishery management used in a fishery matter? They found the answer was it matters hugely. If fisheries are managed with the traditional approach, most of them are on this deep dive

to collapse. Those that are managed with a kind of whitespace management approach where fishermen are given a stake in the future and responsibility to be good stewards, that number of fisheries that are managed has increased. The fisheries that are managed with that tool that were on the decline are now stabilized, and their conclusion was if you design fishery management properly and switch to a different type of management, you can turn fisheries around.

The US has an amazing story that nobody has heard about turning fisheries around. Fisheries in the United States are more sustainable now than they've ever been after decades and decades of overfishing. This is a result of a couple of things. One was bipartisan legislation that was passed in 2006 that said enough of this talk about sustainability. NOAA, as the manager of federal fisheries, has to end overfishing and rebuild those stocks. NOAA has to do that. Use that mandate to end overfishing by using the science based limits, making fishermen accountable, doing management on an ecosystem basis, and where it's appropriate, you may switch to this new type of fishery management that's called rights-based approaches, which give fishermen a voice and a stake in the future. Making that change to implementing this law was really, really hard. It was hard for fishermen. It was hard for managers. It was hard for everybody, but it has been impressively successful. I cannot give enough credit to some of the fishermen who have been leaders in making the switch and in reforming fisheries, recovering fisheries, and now reaping the bounty.

These are three of the fishermen that we were able to celebrate at the White House as champions of change. Here are some numbers to make this a little more concrete. These are fisheries and federal waters all around the US. I'm going to compare the year 2000 and the year 2016. The number of overfished stocks that we had in the year 2000 was 92. That's bad. By the year, 2016, we had slashed that to 36 because of these reforms. There are still some overfished stocks that are there, but the number is just plummeting because of these reforms. Even more impressive, the number of rebuilt stocks has gone from zero in the year 2000 to 43 in the year 2016. We are ending overfishing and rebuilding those stocks that had been depleted, so they can again be fished sustainably. That is an amazing turnaround story that is due to a lot of hard work.

(Music)

Jennifer Stock: You've been listening to Ocean Currents here on KWMR. Jane Lubechenco is talking about the positive changes that are happening so that we can have hope for the future for our ocean. I hope you've been enjoying this lecture. This is a lecture with Dr. Jane Lubechenco that I recorded at San Francisco State Estuary and Ocean Science Center in November. This is a lecture she gave at a public forum. Thank you for tuning into Ocean Currents. Stay with us for the rest of the lecture, and we'll take a break after that with some announcements. Thanks for tuning in.

(Music)

Jane Lubechenco: We are ending overfishing and rebuilding those stocks that had been depleted so they can again be fished sustainably. That is an amazing turnaround story that is due to a lot of hard work. Since 2008, we've seen an increase in catches. We've seen an increase in the value. Fishermen are making more money, the fish are more valuable, and there's an increase in jobs because the stocks had been so depleted, there were fewer and fewer jobs and not much money to make. As the stocks had been rebuilt, there's more bounty there, so more fish in the ocean to be part of ocean food webs. More fish can be caught. There's more value, so everybody wins. Good triple bottom line. It was not easy to get there, but if you can, then in fact, it can be quite successful.

The West Coast Groundfish fishery is a poster child for this turnaround. It, over time, was a boom or bust fishery. It just was this bonanza all along the west coast-- Washington, Oregon, California. There were about 80 different species in this fishery. Then, in the year 2000, the fishery just collapsed. It was declared a federal fishery disaster. It was completely closed, fishermen were out of jobs, fishermen told their kids don't go into this business, there's no future, this is really awful, I can't pay back loans, can't pay for my boat, can't feed my family, and just really bad news.

In 2000, after that, there was strong motivation for some of those courageous fishermen to work together with scientists, managers, and politicians to design an improved type of fishery management. In 2011, this new rights-based

management program began for the West Coast Groundfish fishery. The results of that was a very rapid turnaround that surprised everybody. There was a reduction in the accidental catch of the species that were most vulnerable, which caused the fishery to be shut down. Now, 13 of those species are certified by the Marine Stewardship Council as sustainable, so an independent third party verifier sustainability is saying this is a good choice. There are 40 species in this groundfish fishery, so it's our best choice or a good alternative from the Monterey Bay Aquarium Seafood Watch. There's an amazing turnaround story because people were motivated to fix the problem. Because the ocean in this case was still resilient, we caught it before it was too late.

This is what I mean when I'm talking about fishing smarter and not harder. We have examples from other fisheries around the US of this and examples from a number of other countries around the world. This is something that is beginning to happen. At the global scale, we still have a lot of overfishing. Make no mistake about that. Now, we have the tools, and we know the secret ingredients for small scale fisheries and for large scale fisheries to turn those around. In addition to that, the motivation for business people, for investors, for countries, for companies, is that the calculations that Castello and Gaines and others have now published suggests that if we could reform all the fisheries around the world and bring them back to a healthy state, that would give us a huge triple bottom line win of over a 23% increase in harvest per year. That deals with the food security issue right there, increase in profits over 300%, and increase in fish biomass left in the water. Again, a huge triple bottom line potential that is actually getting the attention of major fishing countries like China, who says, "Oh, we should be paying more attention to fishery reform, not only pivoting to aquaculture and giving up on wild capture fishery but doing both." This has caused a lot of interest in new dialogue.

Companies are paying attention. This is a new partnership called Sea Boss that are the CEOs of the 10 largest seafood companies in the world, both aquaculture and wild capture fishery. These CEOs have learned about climate change, and they're worried. They've learned about illegal fishing. They know about illegal fishing, but they're now spotlights shining on it. They've learned about some of these fishery

reform potentials, and they have said, "We want to be part of the solution, not just part of the problem. We're going to work together and work with scientists, in this case facilitated by scientists at the Stockholm Resilience Center, to move ahead and be better stewards than we have been. This is pretty encouraging. That doesn't mean the job's done, but it's progress in the right direction.

I'm going to pivot now to focusing on marine protected areas and leave fishery reform for a moment. I mentioned earlier that we now have very few safe havens. Most of the ocean used to be a de facto protected area, and it isn't anymore. We fish, we mined, we drilled pretty much everywhere. There is new energy around creating fully protected marine areas to restore these safe havens and accomplish other things. Again, we have a wealth of scientific information to help us understand what the problems are, what the solutions might be, and what the benefits of making some of the changes might be. This is a series of studies from the PISCO team around the science of marine reserves that have been done at a number of places. They tell us that studies of fully protected areas with no fishing, no extractive activity, no drilling, no mining, can produce huge increases in biomass, in density, in size, and in diversity.

When you set up a marine protected area, that's where no extractive activity is allowed. Stuff gets big inside, it gets crowded, it gets abundant, and some of that bounty spills out to the adjacent areas. This figure shows different species of fish that were tagged inside a protected area, swam outside, and we're caught outside. There's a lot of spillover to the adjacent outside area.

Marine protected areas that are fully protected allow fish not only to live but to get big big big big. It's what the fishermen call BOFFF, Big Old Fat Female Fish. BOFFFs. Fishermen that I know have caps and T-shirts that say "Save the BOFFFs" because in fact, they know how important those BOFFFs are to the future of the fishery, the fish population, and the ecosystems.

Here's an example. This is vermillion rockfish that is about 15 inches. This individual produces 150,000 young. If you let this fish grow to be this big instead of catching it if it's in a reserve, then it can grow to, in this case, 24 inches. It produces 1.7 million young. A little bit larger size means lots

more babies, and for the future of the population, those babies are a good thing. Protecting the big mamas, whether they're fish or invertebrates, is really the secret to recovery as well as to the future.

Some of that bounty of the young that are produced are transported in ocean currents away from the protected area to adjacent outside areas. That's what this figure shows. Protected areas can both protect biodiversity and habitats inside but that bounty can help replenish depleted fisheries outside. We also know that if fully protected areas are large, then they can protect different types of habitats. Many species of fish and invertebrates occupy different habitats during different stages in their lifecycle. To help them recover requires protecting all of those different habitats.

The ecological balance and the relationships among species are restored inside a protected area. Having those big predators can help rebalance the system. In many cases, sometimes fishery management goes awry, and there was some miscalculation or some of the assumptions didn't work. Protected areas can provide some insurance against accidental mismanagement or against something uncertain that was unforeseen.

Finally, we're also learning that protected areas play a really critical role in making the ecosystem more less likely to change and better able to recover if it does change, if it bleaches, or if something else happens. It can recover faster if it's a fully protected area than if it's a fished area. This paper was a summary of a lot of different studies around the world showing that fully protected marine areas are more resilient in the face of climate change than areas that are outside. This is seen increasingly as a new tool in the toolbox, not only to help mitigate climate change but also to provide adaptation to climate change.

Knowing this evidence about all these benefits that protected areas do has gotten the attention of the countries of the world who have committed both through the Convention on Biological Diversity and to the Sustainable Development Goals to protect 10% of the ocean by 2020. Those commitments were made some time ago, 2020 is getting closer. People are saying, "Okay, how are we doing?" Well, this is the cumulative area of the ocean that is protected sort of in kilometers squared, and this is the percent of the ocean

area. You can see that the mount protected area has been teensy teensy teensy tiny until just the last decade, and it has gone up very dramatically, although we're only just shy of 4%. That's implemented on water protection. There's a long way to go before we get to 10%, but on the other hand, look at this trajectory. That's pretty impressive. We've gone from 0.3% a decade ago to about 3.6% today. So an order of magnitude increase or over that. The current fraction that is protected today is 3.6% that's implemented. We have another 1.6% that has been designated, so a law that says okay this area will be protected but that hasn't actually happened yet or proposed a head of state might say we're going to do this. If we add all that up, we're close to 7.3% for all MPAs, for all marine protected areas.

Those that are strongly to fully protected that have all those benefits that I just described, ee only have 2% implemented. We have another half percent designated and another half percent proposed. This still is getting us closer to 7%, but we are not quite there yet.

You might ask, instead of the global numbers, how is the US doing, or how's California doing? The US when President Obama took office, 5% of the US exclusive economic zone was highly protected. By the time he left office, that had more than four fold increase was up to 23%. The US is one of the countries that's in the lead on this in terms of the fraction of its exclusive economic zone that is highly protected. California has been a leader in this space as well. Californians have lots of polls as PPIC says 71% of Californians rate the condition of the ocean and beaches as very important to them personally. More than three quarters of Californians say it's very important that California has MPAs. That's from a 2018 poll. California has 16% of its state waters, so that's shore to three nautical miles, and then the federal waters start. So 16% of state waters are in MPAs and half of that amount is highly to fully protected. California is a leader in ocean protection in terms of its network of protected areas. You see here, the North Central Coast, these are areas that are fully to highly protected, both the reds and the blues here, and this network of protected areas was designed with scientific principles in mind to allow for connectivity from one to the other by the movement of juveniles or the movement of adults. About 7% of the state plus federal waters is protected so less well on the federal side off California. The results of this protection have been...

Information is now coming forth and being published about the results. Targeted fish species like kelp bass lobsters and sheephead are much larger, and they're more abundant inside those protected areas. The targeted species are increasing in abundance outside, so some of that bounty is spilling out to adjacent areas.

The conclusions from the marine protected area part is that we've seen some strong science. We've seen some good partnerships and changes in social norms. Awareness about the potential for this tool and increasing use to adopt it by countries have resulted in an increase in magnitude over the last decade. It's less than countries have agreed to, and a lot of countries are now saying, you know, 10% probably isn't enough. We need more on the order of 30%. That's what the IUCN or International Union for the Conservation of Nature has called for 30% in highly protected areas. We have a long way to go on that front. The fully protected marine areas may be especially important in providing resilience to climate change. Finally, the challenge continues to be somebody who has to give up something who's using a space and to give it up and not use it anymore. There's huge resistance to doing that, and there's a lot of conversation around how to change that dynamic for everyone to benefit indirectly, but also users that are giving it up to benefit directly from the increase in bounty that we see. There's some similarities across these two different areas and other areas that we've analyzed in terms of how do you make change happen. Some of those have to do with changing incentives. What are the incentives for the actors in particular activity? In terms of economics, changing the economic incentives, in the case of the rights based management for fishery. Fishermen benefited economically because the rights based approach enabled alignment of the short term incentives and long term incentives. Fishermen are rewarded for being good stewards, but also changes in social norms in what's the right thing to do, what do I personally believe but also what my friends believe, and both of those are changing behavior. Changing the incentives can convert a vicious cycle into a virtuous cycle. It's both economic incentives, which a lot of people tend to think about when you talk about incentives, but the social incentives, whether it's social norms or personal norms, are also really important.

We've talked about sort of where I came from, why you should care, what are the problems, what are a few of the

solutions, what's your role in this. I would suggest that one of the biggest problems is that most people aren't aware. Some aren't even aware that there are problems. Some are aware of the problems but because they just seem too big to fix, too complicated, and there's enough other stuff going on, they're not aware of the solutions. Therefore, there is a lack of hope and a lack of responsibility in terms of what I can do about this.

I think there actually is a lot of reason to be hopeful. There are good things that are happening. There's successful knowledge to action examples. There's science based policy reforms that are ending overfishing and rebuilding stocks. That's hopeful. There is resilience in those ocean ecosystems, and we can bring things back if we get on with doing it. We've seen increasing recognition of the importance of focusing on incentives and changing the incentives. We've seen a huge incentive in terms of the economic and environmental potential of rebuilding fisheries. We've seen increases in highly protected marine areas. Again, not enough, but enough to be encouraged that we could do more.

I think solutions exist. They're not at the scale that we need. We need greater awareness and greater action to actually make that leap. What can individuals do? Well, staying informed, coming to listen here, but also staying informed on a routine basis like reducing your own footprint through your carbon footprint, your water footprint, your plastic footprint is something everybody can do. What you choose to eat is really important, not only sustainable seafood sustainably caught or farmed, but eating lower on the food web is important and more plant based diets. Joining, supporting, and inventing action groups so you can work with friends and colleagues. Voting is really important. Communicating with your elected officials is really important. I'm constantly amazed at how many people don't do that. Running for office is also a very viable option. So, all of the above. Please, folks.

So the bottomline here, again, is that your future, your kids' futures, your grandkids' futures are highly dependent on the ocean. They're connected to the ocean. We need to care about what happens in the ocean, and we need to be better stewards. We need to understand some of these solutions. We need to make them happen. We need to accelerate the

pace of change. We've all seen situations where you can have a 180 degree flip in some attitudes towards something once enough people get motivated and make it happen. That's what we need here. It's time for a new narrative. It's no longer the case that is too big to fail. It's no longer the case that is too big to fix. The new narrative is it is our future, and if we work together, we can fix it and we must. It's the key to our future. I would suggest that all of you can help make that happen. I started off saying, "Can we use the ocean without using it up?" I would say it's tough. I'm not gonna sugarcoat this. The task is daunting. Ecological limits are very real. But, if we work together, if we pay attention to the science, we can make a change. We can make this happen. My hope is that we can recover the bounty, and we can use it wisely. I have three wonderful graduate students to thank for working with me on a lot of this work, and together we would say, "Enough folks have this doom and gloom. It's time to, pardon the pun, seize the day and to write a new narrative." One in which citizens and scientists are leading because they're taking a quantum leap for awareness and action because the ocean is our future. And my question to you is, will you help? Thank you.

(Applause)

Jennifer Stock:

Thank you, Jane Lubechenco. Will you help? That's what I ask every day. What are you doing to help? I help lots. I know by listening you're helping by learning more about ocean sciences. I love that she says pay attention to the science. We can make this happen, and we can recover the bounty. So lots of positive things to think about as we move forward and deal with ocean challenges with our changing climate. You're listening to Ocean Currents, and we're running really low on time. I want to make sure we get you to hear our Positively Ocean episode for the month by Liz Fox. Volunteer Liz Fox produces Positively Ocean for me to bring a positive story to you about ocean health, so stay tuned for Positively Ocean.

(Music)

Liz Fox: Hi, this is Positively Ocean where we celebrate the ocean and look at what's working well. I'm Liz Fox. 'Tis the season of competing for prime parking spots and not just at shopping malls anymore. Spaces can be limited at Drake's Beach Visitor Center at Point Reyes National

Seashore, where you might even lose out to a 1600 pound elephant seal. That's because northern elephant seal colonies are on the rebound after near extinction due to hunting over a century ago, and it's a change that humans will have to get used to. Sarah Codde is a marine ecologist for the Point Reyes National Seashore.

Sarah Codde: That is a good problem to have that we're dealing with a population that is rebounding. It's so successful that we don't know what to do about it, whereas other resource managers are dealing with "how do we save a species."

Lix Fox: Scientists don't know if elephant seals populated Point Reyes' shores before their population crisis, but they seem to be here to stay. The first breeding pair of elephant seals were cited in Point Reyes in 1981. Since then, the colony has grown to more than 2000 members. What's particularly complicated is that the goliath squid and fish eaters spend months at a time hunting thousands of miles from shore, and they need to haul out onto land, specifically to rest. So when a beach goer sees one, it may look like a bloated lazy log, and it would be hard to imagine the behemoth capabilities. Elephant seals can be fast and furious, outpacing a human, even on land.

Sarah Codde: When they're fighting, they don't care what is around them or what's in their way. They will trample over anything.

Liz Fox: And it's not just males in battle. Females with cubs can be fiercely protective, just like bears with cubs. Cody wants the public to enjoy observing elephant seals in a way that protects people and the animals.

Sarah Codde: It is an amazing experience. There are not many locations where you can see elephant seals. We do want people to enjoy that. We just want to make sure we're protecting humans and seals.

Liz Fox: Elephant seals need land for other life necessities too. Males' dramatic competitions for harem drive visitors by the droves to a lookout Chimney Rock. Outside of mating season, mature elephant seals return to land in the summer to molt. Females and pups need land to nurse and grow. Juveniles come to shore at different times

during the year to strengthen their bone development and develop habits that will help them mate in the future.

That's why Chimney Rock Beach is closed permanently to foot traffic. The restrictions in that location work well since there's only one narrow access path that can be easily chained and clearly marked as closed. Cody said the public generally understands and respects the parks limits, which are similar to other breeding areas in California State Parks.

Recently though, the colony has expanded down the coast and into areas of Drake's Beach that are accessible to curious or unaware beach goers. Several females have found refuge for themselves and their pups in beach areas that humans are accustomed to enjoying. Intense storms made some individuals leave the colony area in search of safety.

Sarah Codde: It went from like 20 females to 300 in like three years, and it went from a small little area to like a mile and a half of the beach.

Liz Fox: Coupled with the threat of beach loss due to rising sea levels in areas that are backed by towering cliffs, elephant seal territories are only more likely to overlap with human recreation areas in the future.

That's why Point Reyes National Seashore runs a winter wildlife docent program. Their goal is to educate visitors about these animals and how to safely view them. Last month, Cody even met with counterparts from an Año Nuevo State Park and Monterey Bay National Marine Sanctuary to share best practices about how to keep animals and humans safe, especially during this year's mating season, which is in its very beginning.

Sarah Codde: There's a lot of comparisons between elephant seals and soap operas because there's so much drama during the breeding season. You know, the male's fighting, the females fighting, the females trying to steal pups from other females. It's pretty fun.

Liz Fox: If you plan to come to the park, please make sure to check-in at the visitor center and find out the areas to avoid to protect yourself and the seals. Always respect posted signs.

And that's an example of how you can do right by the ocean. Until next time, I'll be searching for all things Positively Ocean. For Ocean Currents and KWMR radio, this is Liz Fox reporting from Point Reyes National Seashore.

(Music)

Jennifer Stock:

Thank you, Liz Fox for another awesome Positively Ocean episode. Those elephant seals are showing up here in Point Reyes. Don't forget to check in and find out where they are and how to be safe around them. We are out of time. Ocean Currents is the first Monday of every month. We are 11 to 12, and you can hear past episodes at our website cordellbank.noaa.gov or in iTunes. Please leave a review if you listen to the podcast and let me know you're listening and tell me what you think. I love hearing from listeners, so if you have ideas for topics, questions, comments, email me cordellbank.noaa.gov. Thanks so much for listening! Enjoy the ocean, bay, or whatever body of water you can get into safely. This has been Ocean Currents here on community radio for West Marin KWMR.

(Music)

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 on this program may or may not be that of the National Oceanic and Atmospheric Administration and are meant to be educational in nature. To contact the show's host, Jennifer Stock, email me at jennifer.stock@noaa.gov. To learn more about Cordell Bank National Marine Sanctuary, go to cordellbank.noaa.gov.

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