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Justice Talking Radio Transcript

The Future of the Oceans—Air Date: 1/29/07

Oceans are losing fish populations at a dramatic rate and entire species of plant and marine life are disappearing, according to a new study in the journal Science. By 2050, oceans may be so endangered that they will no longer be able to provide fish for food or water quality adequate to sustain a diverse ecology. On this edition of Justice Talking we look at the laws and treaties that protect the oceans and ask whether we are doing enough to safeguard these habitats.

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MARGOT ADLER: This is Justice Talking. I'm Margot Adler. When you're standing on the beach and looking toward the horizon, the ocean can seem endless. In its vastness it can also seem kind of empty. But there's a whole world under the surface that most of us never see. Because 70 percent of the earth's surface is ocean, its health affects every person on the planet. On today's show we'll talk about the state of the seas, and we want to begin with someone who spends most of his time near the ocean and sometimes in it.

Rick Hinkson is a lieutenant lifeguard for the Sarasota County Beach Patrol in Florida. It's Rick's job to know the conditions of the ocean and if it's safe for swimmers. He's paid particular attention to "red tides." It's an algae bloom that can potentially darken the color of the water, produce coughing fits in beachgoers, and kill fish. I asked him to tell me about the first time he saw one.

RICK HINKSON: It was in--I had been here for almost three years but it was right before 9/11 happened in 2001. I had heard a buzz about this stuff that was coming up the coast that was killing everything. And it kind of rolled in on Labor Day weekend. And by, you know, we saw--you could actually see a divide in the water, you know, if you looked down the coastline. It was kind of speckled with white, which turned out to be dead fish. And by Monday morning, Tuesday morning there was 200 tons of dead fish on a three-mile stretch of public beach. And that was just one of our islands.

MARGOT ADLER: What does it look like?

RICK HINKSON: It's microscopic actually, so, I mean, you can't really see it unless it's in a large amount where it kind of tints the water to like a reddish hue, I guess. But that first time I saw it, it was, you know, almost like blood red for, I don't know, four or five months. We pretty much closed our beaches for the first two months that it was there because it was like, like when you got out of your car it was like a wall hit you in the face, like you are almost like asphyxiated.

MARGOT ADLER: What does it physically feel like when there is a red tide?

RICK HINKSON: The best way to describe it is if you had a cookie with confectioner's sugar on it, and you went to eat it and you inhaled, and that confectioner's sugar hit the back of your throat, and you just had that instant cough. That's how it feels when you take a deep breath.

MARGOT ADLER: What do you think causes red tides?

RICK HINKSON: I understand that it's a naturally-occurring phenomenon that happens all over the world, but I also understand that building blocks are phosphate, which is kind of a waste product of, you know, toxic waste. I guess you're not going to hear it from, you know, the masses, that it's going to be pollution because, I mean, that kind of says something about our culture that we're polluting our waters but we're not doing anything about it.

MARGOT ADLER: Rick Hinkson is a lifeguard in Florida. Thank you so much for talking with me.

RICK HINKSON: Thank you.

MARGOT ADLER: Florida has had significant problems with red tides, which are also known as "algal blooms." Barbara Kirkpatrick is a senior scientist at Mote Marine Laboratory in Sarasota, Florida. She joins me to talk some more about this phenomenon. Welcome to Justice Talking.

BARBARA KIRKPATRICK: Thanks for having me.

MARGOT ADLER: I just talked to a lifeguard in Florida who thinks red tides are caused by pollution. But the causes are not really clear, are they?

BARBARA KIRKPATRICK: No, they aren't and that's something that the research community is really working on, trying to resolve that question. We know that the blooms initiate offshore and then move onshore. The question is: With what we've done with our coastal community, have we given it really a nicer environment for the bloom to live in once it gets onshore?

MARGOT ADLER: So in other words, there would be more of the algal blooms because either it got warmer, or there was more stuff in the sea for these little creatures to eat?

BARBARA KIRKPATRICK: Yes. Or we've changed their environment and knocked out its competitors, which is another possibility.

MARGOT ADLER: Now what about frequency? Are they happening more often, algal blooms?

BARBARA KIRKPATRICK: Thought worldwide is that they are getting worse. And we also know that as our ability to detect them--we have tools now that we didn't have 10 years ago--so as we're better at detecting them we certainly find them more often.

MARGOT ADLER: Let's back up and talk about what a red tide really is.

BARBARA KIRKPATRICK: A red tide is a bloom of a microscopic, plant-like algae. So we're kind of talking at the bottom of the food web here in the environment. And these organisms go into a very dense concentration. We can find them anytime in the Gulf of Mexico at a very low concentration in the water. And there's a certain circumstance that causes them to go into a very dense thick bloom. And we don't understand what those causes are at this time.

MARGOT ADLER: In Florida, what are the health effects of algal blooms?

BARBARA KIRKPATRICK: The health effects of the Florida harmful algal bloom, *Karenia brevis*, are we can get ill through ingestion of toxic shellfish, and specifically, shellfish that are filter feeders, such as clams and oysters. It doesn't hurt the clam or oyster at all but then if we consume contaminated clams or oysters we get ill with what's called "neuro-toxic" shellfish poisoning. Now, the good news is the State of Florida and the United States have an extremely good monitoring program for Florida red tide with clams and oysters and filter feeders. So the good news is commercially purchased shellfish is safe to eat. The caveat is, and that's why we try so hard in the State of Florida to let people know where red tide is, is that people cannot go out during a red tide and recreationally shellfish. The toxin is extremely heat resistant, so if you cook it, it will kill any bacteria that's with that clam or oyster but the toxin is still effective.

MARGOT ADLER: Barbara Kirkpatrick is a senior scientist at the Mote Marine Laboratory in Sarasota, Florida. Thank you so much for coming on Justice Talking.

BARBARA KIRKPATRICK: Thank you, Margot.

MARGOT ADLER: Later on in the show we'll talk about other kinds of ocean pollution, including the serious problem of plastic and how carbon dioxide is not only leading to global warming but is also changing the chemistry of the sea.

Before we discuss those issues, oceanographer Sylvia Earle joins me to give us an overview of the state of our oceans. She has been studying the seas for decades. Formerly the chief scientist

of the National Oceanic and Atmospheric Administration, or NOAA, she is an explorer in residence at the National Geographic Society. Welcome to Justice Talking.

SYLVIA EARLE: Thank you. Glad to be onboard.

MARGOT ADLER: I gather you've logged more than 6,000 hours underwater. Tell us a little bit about this underwater world and why it's so important.

SYLVIA EARLE: Looking at the ocean from the shore, or from the ship, or high in the sky, you just see the surface, which in itself is beautiful. You understand that this is the blue planet. But it's the three-dimensional character of the ocean, the fact that it's water after all. Water is the key to life. Earth is blessed with a lot of it, but 97 percent of it is in the ocean. And of the 3 percent that remains, 97 percent of that is locked up as polar ice, at least for now.

MARGOT ADLER: In an article that you wrote that I just read you said you wished you could take everyone back to decades ago to look at the Florida Keys.

SYLVIA EARLE: Fifty years ago--think about how much change has taken place in that short period of time. We have managed to consume on the order of 90 percent of the big fish in the ocean: the tunas, the swordfish, the sharks. They're mostly gone. Until recently people have had the belief that there isn't much that we puny human beings could do to change the nature of the ocean. But in fact we have, not just because of what we've been taking out and the destructive means often applied to take fish and other creatures from the sea, but also what we're putting into the sea either directly or what we put into the atmosphere that falls back into the sea.

MARGOT ADLER: So if you were going to give a grade on the health of the oceans today, what would it be?

SYLVIA EARLE: Well, it depends on which aspect. Across the board, the oceans are in trouble. It's hard for me to assign a specific grade, maybe C-? Maybe it's better than that. In some places the ocean is in really good shape. But in other places, including places I knew as a child, such as Clearwater, Florida, when Clearwater had clear water, it is in very bad shape, like a D-, I would say. But other places have improved. Boston Harbor was once D-. It's creeping up on the scale somewhat.

MARGOT ADLER: What changes have you seen in the ecosystems of the ocean? And what are your greatest concerns?

SYLVIA EARLE: Well, in the last 50 years about half of the coral reefs have either gone or they're in serious trouble in just that short period of time. That's my lifetime. Kelp forests in California and other cold-water coastal areas, have also seen a sharp decline in once-healthy systems. And part of it relates to what we're taking out of the ocean. We seem to have a taste for the big predators: the grouper, the snapper, the tuna, the sharks. Taking them out of the ocean disrupts these systems in profound ways.

MARGOT ADLER: The oceans don't belong to any one nation. Are there any international efforts to protect the oceans that have been particularly successful?

SYLVIA EARLE: Nations of the world, generally speaking, are now claiming out 200 miles, the so-called "exclusive economic zones." The true United States is more than twice the size of what you look at when you look at a traditional map of the United States if you include the exclusive economic zone out into the sea. But beyond that 64 percent of the world's oceans are beyond any national jurisdiction. And it's kind of the Wild West out there.

MARGOT ADLER: Looking at the ocean as a whole, what responsibility does the United States bear for the current state of the oceans?

SYLVIA EARLE: United States has an opportunity to be a leader and in fact we have been a leader in many ways. In 1972, legislation came into play in this country that resulted in a system of national marine sanctuaries. And amazing, wonderful news: Last June, when President Bush declared as a national monument the largest protected area in the sea or on the land for this country--in fact larger than all of the national parks put together--the Northwest Hawaiian Islands National Monument, a 140,000 square miles of ocean that has full protection. Even the fish are safe there. That's the kind of leadership role that this country can take to demonstrate the importance of taking care of those systems that in the end take care of us.

MARGOT ADLER: Sylvia Earle is an explorer-in-residence at the National Geographic Society. Thank you so much for talking with me.

SYLVIA EARLE: Thank you for having me here.

MARGOT ADLER: To hear more of my conversation with Sylvia Earle, go to our website, justicetalking.org. Coming up on Justice Talking:

UNIDENTIFIED MALE: We believe firmly that we as humans need to stop treating the ocean as just a seafood factory and start managing it as an interconnected web of life.

MARGOT ADLER: A conversation about the seafood industry and how we can avoid overfishing our way to a future without fish. Don't go away.

MARGOT ADLER: This is Justice Talking. I'm Margot Adler. On today's show we're looking at the state of the oceans. Last fall a study in the journal Science made waves with dramatic claims about failing fish populations in the world's oceans. The article's authors say that biodiversity may become so compromised within the next 50 years that the seas will no longer have enough fish to provide food. In the United States, policymakers are relying on old and new laws to insure a future for our fishing industry and fish habitats. Molly Peterson reports.

MOLLY PETERSON: On a rainy morning in Destin, Florida, a snapper boat squeezes into a busy dock, its deck crowded with orange baskets of fish from the Gulf of Mexico. And that's when biologist June Weeks gets to work. Standing boatside, Weeks uses tweezers to carefully pull out pieces of the snappers' inner ear.

JUNE WEEKS: And I try to get at least 30 of each species, which is representative. It's totally random sampling.

MOLLY PETERSON: This research for the National Oceanic and Atmospheric Administration helps tell the age of fish. A few years back, scientists started noticing that Gulf red snapper were living shorter lives before finding a fisherman's hook, one indication that the fishery might be in trouble. So under a federal law called Magnuson-Stevens, the Gulf's regional fishery council has now set a quota for how much red snapper commercial boats can take.

UNIDENTIFIED MALE: B-liner, 51. Snapper, 59.

MOLLY PETERSON: At the other end of the dock, commercial fisherman David Krebs records the catch on a clipboard. Krebs says he likes the new quota system, and not just because the price is better.

DAVID KREBS: Our concern is to have a viable, sustainable fishery that we can move forward with.

MOLLY PETERSON: The boat's captain, Ross Bridwell, nods in agreement, but neither man likes another rule from the Gulf council: the size minimum. If the snapper's too short, fishermen have to toss it back into the ocean. Deepwater snapper pulled up quickly on a reel don't often survive when they're thrown back. Bridwell says this is a senseless kill.

ROSS BRIDWELL: Uh, this trip, probably a 1,000 pounds of red snapper, 700 pounds of vermilion snapper, and a hundred pounds of amberjack that is all edible. It's dead now.

MOLLY PETERSON: The landmark Magnuson-Stevens Act first passed in 1976 changed fishing in U.S. waters by putting much of the power for regulating species in regional councils, with mixed success. For decades the councils and federal agencies have struggled to balance economic interest with conservation. Last fall, Congress gave Magnuson new teeth: deadlines to end overfishing in the U.S. by 2011. Chief NOAA fishery scientist Steve Murawski says federal policy is moving towards managing ecosystems, not just species.

STEVE MURAWSKI: In terms of the strong suits we have, certainly our focus traditionally has been monitoring the high-profile, high-valued species. But I would say in many areas of the country our ability to understand broader environmental questions is increasing relatively rapidly.

MOLLY PETERSON: Steve Palumbi, a Stanford marine scientist, says the faster, the better. Working on California's Monterey Peninsula, Palumbi sees a thriving coast: pounding waves, bat stars on rocks, thick kelp forests where sea otters play. He says he also contemplates a time

60 years ago when Monterrey's famous Cannery Row churned out as much as a million pounds of sardines a day.

STEVE PALUMBI: The way we use the ocean is very complicated. It also sort of requires diversity. Managing for diversity is difficult, but as a general guiding principle it might allow fisheries management, and shoreline protection, and waste disposal--all those different kinds of management schemes--to have similar goals for once.

MOLLY PETERSON: The sardine fishery collapsed. Eventually it was closed. And in a provocative article in the journal *Science*, Palumbi and his co-author say the same thing could happen to most fisheries worldwide if the pressures on ecosystems, human and otherwise, don't let up in the next 40 years.

STEVE PALUMBI: And not all those fish went into the cans, let me tell you. A lot of them went into fishmeal and fish oil, which made the air just totally foul. The whole area was apparently covered by anemones on the shore just sort of sticking their pallid tentacles out into the ocean catching fish guts.

MOLLY PETERSON: Problems beyond overfishing, like climate change, coastal development, and pollution are all targeted by new laws creating protected regions in the sea. Last summer President Bush declared 139,000 miles of ocean near Hawaii to be the world's largest marine reserve. And this year California is establishing its first marine protected areas starting with the state's central coast. Stanford law professor Buzz Thompson says California's effort is innovative but he says the science helping to make rules about a piece of ocean and not just the fish in it still needs to develop.

BUZZ THOMPSON: So there's a real need today for even more scientific information on how we can manage fisheries better. And unfortunately we don't have a lot of time to develop that science, which means that it's going to be even more important to make decisions recognizing that we have a great deal of uncertainty but recognizing that unless we manage our fisheries we can lose them.

MOLLY PETERSON: While science looks for more answers, Thompson says policymakers must continue to balance conservation with consumption so that we'll still have more choices in the future. For Justice Talking, I'm Molly Peterson.

MARGOT ADLER: To talk more about our fishing policies and the tension between conservation and economic survival are John Connelly and Michael Hirshfield. John Connelly is the president of the National Fisheries Institute, the nation's largest trade association representing the fish and seafood business, and Michael Hirshfield is chief scientist at Oceana, a nonprofit advocacy organization looking at the health of the world's oceans. Welcome to both of you.

JOHN CONNELLY: Thank you.

MICHAEL HIRSHFIELD: Good to be here, Margot.

MARGOT ADLER: A report on the world's fish population was issued last year in the journal *Science*. It projected that 90 percent of commercial fish will be gone by 2048 if nothing is done to preserve them. Sounds staggering! Michael, what was your reaction?

MICHAEL HIRSHFIELD: I had a mixed reaction. One was as a scientist that's a level of precision that we're not used to seeing in scientific reports. On the other hand, every report that I've seen, whether it's from the United Nations or other scientists, have shown that the trends in fisheries are in the wrong direction and that fish populations in the world are declining, and that the middle of the century is not a bad estimate for when our oceans are going to be in real trouble unless we change the way we do things.

MARGOT ADLER: And John, what was your reaction?

JOHN CONNELLY: Much like Michael, we were stunned with the absolute accuracy of the scientists' report that it would happen in a particular time in 2048. Unlike Michael, though, we've looked to a more positive view of what the fishery scientists in the U.S. government and within the United Nations report, that about 81 percent of stocks are actually sustainably managed in the U.S., and about 75 percent of stocks globally are not overfished. And so while there are some challenges, we think most of our stocks are in healthy conditions.

MARGOT ADLER: At the end of last year Congress passed one of the most significant overhauls of the 30-year-old Magnuson-Stevens Act, which is the cornerstone of the nation's laws governing U.S. fisheries. Many environmental and industry groups hailed the changes. John, give us some examples of the changes that were made.

JOHN CONNELLY: Some of the examples that are important are it created a timeline for ending overfishing, and it created the opportunity for individual quotas for fish management. And it's going to strengthen the science that fishery management is based on. So each of the regional councils upon which--excuse me--that manage fisheries in our nation's waters will need to rely more heavily on the actual scientists to set the levels that fish can be caught at sustainably.

MARGOT ADLER: Michael, despite general praise for the changes, your organization issued a press release with this heading: "New Magnuson-Stevens Act Misses the Boat." So what weren't you happy with?

MICHAEL HIRSHFIELD: Um, it's not so much what was in the bill, or not in the bill, it's that a major overhaul of legislation like this one comes basically once in a decade. And we think that what really happened here was there was an opportunity missed. We believe firmly that we as humans need to stop treating the ocean as just a seafood factory and start managing it as an interconnected web of life. And those issues simply weren't addressed in this revision and we're afraid that if we wait another decade to do it then the oceans will be in that much worse shape.

MARGOT ADLER: If the two of you were going to think about each other's views, where do you think your main disagreements are? Let's start with you, Michael.

MICHAEL HIRSHFIELD: We do not think that the oceans should simply be viewed as a seafood factory, seafood production. When we talk about healthy populations of fish from the perspective of fisheries, we're talking about fish populations that have been reduced 60, even 70 percent from levels that they would have been if there were no fishing. And we just think it's really important to take into account the other aspects of the ocean ecosystem--whales, dolphins, turtles, corals, sea birds--all those other elements in the world's ocean, to a greater extent than we have to date. I don't want to minimize the efforts that the fishing industry has made, but we just think those questions always seem to be secondary. And we'd like to move them up the list a bit.

MARGOT ADLER: And John, how would you react to that question?

JOHN CONNELLY: As a group that provides healthy seafood to Americans we do see the ocean as the primary source of an opportunity to feed Americans a healthy diet. The American Heart Association, the American Dietetic Association, institutions like Harvard Medical School, are all encouraging Americans to eat seafood twice a week because it's so good for us. And so we need to make sure that the oceans can be seen, and are seen, as a place where we can sustainably harvest and fish, for now and for the future.

MARGOT ADLER: You're listening to Justice Talking. We're talking about the state of our fish and the state of the seas. That was John Connelly, president of the National Fisheries Institute. Also with me is Michael Hirshfield, chief scientist at Oceana. A recent United Nations report found that aquaculture--essentially breeding and growing fish--provides about 40 percent of the world's seafood. Could this be a solution to meet our growing needs? Should we have more fish farms off our coasts? Michael?

MICHAEL HIRSHFIELD: We should have more fish farms. Where we have them and what species we have I think is highly debatable. The biggest, successful--most successful fish farms to date are those such as catfish or tilapia that are on land. They're herbivorous fish. They're not contributing to overfishing in the oceans. They're not polluting the oceans. Similarly, shellfish aquaculture off of the coasts can generally be done in a sustainable way. The big concern of the conservation community is offshore aquaculture for carnivorous species where we have big potential for pollution, escapes, as well as the dilemma of having to catch fish to feed fish, which ultimately is a losing game.

MARGOT ADLER: By one estimate, more than two-thirds of the world's seafood is consumed in Asia. No matter what U.S. policy is regarding our fisheries, will it really make a difference if the rest of the world doesn't change its practices? Let's start with you Michael.

MICHAEL HIRSHFIELD: Asian consumption is a really big challenge. It's one of the reasons why the United Nations says that it's really important to develop, you know, more rigorous plans to prevent the decline of those that are exploited near their maximum potential, which is a way of saying we could be in real trouble if demand goes up. But the good thing about the oceans is that

even though they're connected a lot of the seafood, a lot of the fishing, is really local. So we can talk about Alaska fisheries. We can talk about the fisheries of the United States being in relatively good shape even if other parts of the world are not. That's a grim perspective to take. But it basically says that you can do a lot of good for the oceans by managing your fisheries in your local area sustainably.

MARGOT ADLER: And I would imagine you agree, John?

JOHN CONNELLY: The U.N. recently reported that about 75 percent of the globe's fishery stocks are not overfished. So we need to be careful about not damning the state of all fisheries when in fact most are doing pretty well. The concept of aquaculture is going to be very important in Asia though. That is the growing area of population around the world. And aquaculture is important there and it's going to become even more important in the future. So this mix of better management of fisheries around the world coupled with a strong sustainably-managed aquaculture program is going to go a long way to feeding an Asian population.

MARGOT ADLER: This is Justice Talking and we're talking about the state of our fish and the state of our seas. I've heard the argument that to protect our oceans we have to make a fundamental shift and treat the whole system, an ecosystem-based approach is what I've heard it called. Michael, how would this differ from what we do now and what would it look like?

MICHAEL HIRSHFIELD: In large part it would mean fishing less in some way, shape, or form. Really what we need to have is a change in perspective that leaves more of the life in the ocean. We believe if there is more life in the ocean we will be able to actually extract quite a lot rather than fishing it down to really, really low levels and then hoping that we don't face a collapse.

MARGOT ADLER: John, what's your own thought about this ecosystems approach? Do you have concerns about it?

JOHN CONNELLY: We think that understanding the impacts of fishing or other activities in the globe's oceans are important. However, we need to be careful about scientific hubris here. To understand all the implications of what happens when one takes fish out of the water is a daunting task. We're encouraged that Magnuson is requiring more research into the area, but before we change how we fish and the amount of fish that we provide to the American family, we need to be real careful that we understand what we know and what we don't know, and don't mix those two up.

MARGOT ADLER: And Michael, do you think there will be enough fish in the ocean to feed our planet in 50 years?

MICHAEL HIRSHFIELD: I'm a long-term optimist even though I see trends that are heading in the wrong direction. And I do believe that there's a growing awareness of the challenges that we face in managing our fisheries and that that's the first step towards getting concerted action.

MARGOT ADLER: And John, do you think there will be enough fish in the ocean to feed our planet in 50 years?

JOHN CONNELLY: Margot, I'm in the seafood business and you need to be an optimist in this business. So absolutely we will have fish now and in the future.

MARGOT ADLER: John Connelly is the president of the National Fisheries Institute, the nation's largest trade association representing the fish and seafood business. Michael Hirshfield is chief scientist at Oceana, a nonprofit advocacy organization looking at the health of the world's oceans. Thank you both for talking with me today.

MICHAEL HIRSHFIELD: Thank you very much, Margot.

JOHN CONNELLY: Thank you, Margot.

MARGOT ADLER: Coming up on Justice Talking we get some practical tips for buying environmentally sustainable seafood at the supermarket. For you salmon lovers there's both good news and bad news. Also: my conversation with a man whose passion is to research all the plastic that made its way into the ocean.

UNIDENTIFIED MALE: Well, I think you have to just think of it as Wal-Mart in the ocean. I mean, there are beaches throughout the Pacific now that are known as shopping beaches and the citizens and inhabitants of these islands go there to shop. They don't have a Wal-Mart but just about anything you can find in a Wal-Mart has washed up on their shopping beach.

MARGOT ADLER: Stay with us.

MARGOT ADLER: This is Justice Talking. I'm Margot Adler. On today's show we've been discussing concerns over the future of fish in our oceans. Some kinds of seafood have already been overfished, but not all. So how do you know the difference when you go to the supermarket or go out to a restaurant? Monterey Bay Aquarium has put out a guide to help advise consumers. George Leonard is the senior science manager for the Seafood Watch Program there. I asked him what I need to know when I buy fish. What should I avoid?

GEORGE LEONARD: We have three categories of fish. We have fish that are in our best choice, or in our green list. Fish that kind of fall somewhere in the middle, these are our good alternatives. And we have fish that are in our red list, which is our avoid list. The sort of textbook example would be Atlantic cod, which was really the foundation of the colonies years ago when the United States really got started and was a staple of diets for generations. And cod now are in extremely low abundance almost in all places in the North Atlantic where they're fished.

MARGOT ADLER: So give me a couple of other examples of fish that I should avoid.

GEORGE LEONARD: We make recommendations both on wild-caught fish and farmed fish. And farmed fish is making out a growing percentage of the U.S. diet. And farmed salmon is a species that is really plentiful now. You'll see it in almost in every restaurant, and in every grocery store.

MARGOT ADLER: And what are the real problems with farmed salmon? You know, the immediate thought is if it's farmed, you know, you would think it would be protecting the oceans and would be fine. So what's the problem?

GEORGE LEONARD: The real problem with farmed salmon--there's essentially two major problems: one is its reliance on wild-caught fish to grow the farmed fish, and the second is related to how it's grown, which is it's essentially grown in open-net pen systems in coastal marine waters.

MARGOT ADLER: And so it affects other fish because of that? Or--

GEORGE LEONARD: If you look at farmed salmon in particular, it takes about three pounds of wild-caught fish to grow a pound of farmed salmon, and so in terms of the overall impact on the ocean, farming salmon actually consumes more fish than it yields on the other side.

MARGOT ADLER: But you have some salmon on your best choices list, correct?

GEORGE LEONARD: That's right. And so the alternative really that we try to steer consumers to is wild-caught salmon. And this is mostly from Alaska, which is where the majority of salmon in the U.S. comes from.

MARGOT ADLER: I love swordfish. I know for years we were told to avoid it because it was being overfished. What's the situation now?

GEORGE LEONARD: In the 90s there was a big outcry from the public about the status of swordfish, and due to a number of chefs in New York and other areas in New England taking swordfish off the menu, as well as some concerted effort by fishery managers, swordfish, particularly North Atlantic swordfish, has rebounded quite dramatically.

MARGOT ADLER: Give me a few other best choices.

GEORGE LEONARD: There's a whole range of best choices. On the farm side, consumers really should look--particularly a great choice is U.S. farms catfish. Other species that are in our yellow and green list: farmed mussels, farmed shellfish, things like mussels, clams, oysters. These are all filter feeders that live very low on the food chain. These are all great choices. Things like in California here squid is generally a pretty good alternative. Fish like mahi-mahi, which is generally thought to be pretty abundant, are good choices.

MARGOT ADLER: Fishing is a huge business. How does much changing our individual choices in what we eat matter?

GEORGE LEONARD: There is very much a growing consumer group that is making better choices. And most importantly, businesses are really starting to take notice. Just a couple of examples: Wal-Mart--which is now the largest seafood and food retailer in the United States--about a little over a year ago they made a commitment to source all of their seafood from sustainable sources within the next three to five years. And when Wal-Mart steps up to the plate and does something it's likely to have really major ramifications worldwide.

MARGOT ADLER: Thank you so much for being on Justice Talking.

GEORGE LEONARD: Thank you, Margot. I appreciate it.

MARGOT ADLER: George Leonard is the senior science manager for the Seafood Watch Program at Monterey Bay Aquarium. On our website, justicetalking.org, you'll find a link to his organization's seafood guide.

MARGOT ADLER: Along with overfishing, pollution of our oceans is a serious issue. In an award-winning media campaign in 2003, California made the connection that the litter you toss on the ground can end up in our oceans. Here's one of the public service announcements that aired on the radio.

UNIDENTIFIED MALE: I'm Smith.

UNIDENTIFIED MALE: And I'm Jones.

UNIDENTIFIED MALE: And we're conducting an experiment to see if people like trash where they swim.

UNIDENTIFIED MALE: Smith opened the gate and dumped litter sample A into the pool. I'll observe.

UNIDENTIFIED MALE: Got it. [splash in water]

UNIDENTIFIED MALE: Hey dude, I'm swimming here.

UNIDENTIFIED MALE: Sir, we saw you leave this trash at the beach this morning.

UNIDENTIFIED MALE: Oh, no. Well, I was...

UNIDENTIFIED MALE: Sir, do you like trash where you swim?

UNIDENTIFIED MALE: No, of course not!

UNIDENTIFIED MALE: Then why would you trash California?

UNIDENTIFIED MALE: Don't trash California. A message from the Cal-Trans Stormwater Program.

MARGOT ADLER: Charles Moore lives in California and understands this issue all too well. He's seen more trash in the ocean than most. In fact, following and studying this garbage, which is mostly plastic, has become his life's work. Charles Moore is captain of the oceanographic research vessel *Alquita*, and the founder of the Algalita Marine Research Foundation in Long Beach, California. I asked him to tell me how he got interested in the trash floating in the ocean.

CHARLES MOORE: Yeah, I was involved in marine research and looking at water quality issues, and how I got into the trash was sort of by accident. On a return trip from Hawaii, we had extra fuel and diesel engines and decided to cross where most sailors avoid going, which is the Central Pacific Gyre. And that crossing happened to be in 1997, which was a large El Nino. The waters were extremely calm for over a week. In fact we really almost ran out of fuel completely. There was no wind, even less than usual. And that allowed whatever wanted to float to the surface to float up there. At the time I didn't know what was going on but I just was shocked because every time I came onto the deck and surveyed the horizon I didn't have to wait very long before I saw something made out of plastic floating by. And I had sailed to Hawaii as a teenager, at 14, and I didn't remember anything like that. So I've been alarmed at the increase in debris in the ocean. And seeing that really galvanized my interest.

MARGOT ADLER: Now, you've been to the North Central Pacific Gyre a number of times. First of all, what is a gyre?

CHARLES MOORE: Mountains of air are created by heat at the equator and as they descend at the poles they begin rotating in the northern hemisphere in a clockwise direction. And that peak of the mountain corresponds to the heaviest weight of atmosphere pushing down on the ocean. So you get this kind of a toilet bowl effect with a lower sea level at the center at the gyre, and then a circular current spiraling in. So it's a kind of gentle maelstrom, I call it. And it brings debris from all around the Pacific Rim into this central area.

MARGOT ADLER: Tell me the kinds of trash that you've found. What different types of items does this trash come from?

CHARLES MOORE: Well, I think you have to just think of it as Wal-Mart in the ocean. I mean there are beaches throughout the Pacific now that are known as shopping beaches. And the citizens and inhabitants of these islands go there to shop. They don't have a Wal-Mart but just about anything you can find in a Wal-Mart has washed up on their shopping beach. Pagan Island in the Northern Marianas has one, which is taller than a person stands full of debris. So they can go there and find footwear, they can find toys. You get virtually any kind of consumer good out there.

MARGOT ADLER: You talked about the plastic breaking down into little pieces. Is there evidence that plastic is ending up in the food chain?

CHARLES MOORE: Oh yes. We found salps with plastic firmly imbedded in their tissues. The vast majority of the creatures in the ocean are not intentional feeders, tasting, seeing what they're eating. They're mucous web feeders. They have sticky membranes that impact what their food source will eventually be and consume it without any discriminatory choice. They just bump into it basically. And that fact means that as plastics break down into the size class--around the millimeter size class--that starts to be the size that many of these creatures are perfectly comfortable taking into their bodies.

MARGOT ADLER: So is this plastic being dumped intentionally?

CHARLES MOORE: We think that there is some intentional dumping going on simply because the ocean has always been the repository for waste. It's downhill from everywhere. And all of our waste ends up in the ocean if it's not properly either recycled or somehow landfilled. But it's in general not intentional. It's in general just the surplus of our lifestyles that is ending up in the ocean. Everything now is packaged in plastic. It's what I call the lubricant of globalization. Without a take-back infrastructure, without the technology in place and the incentives to bring this material back into the industrial chain and make it an infinite cycle like we do with our compost and biological materials, it just ends up in the ocean.

MARGOT ADLER: Charles Moore is captain of the oceanographic research vessel *Alquita*. Captain Moore's next adventure is to spend a year following the trail of trash in the Pacific Ocean. You can go to our website, justicetalking.org, to hear more about his trip.

Just a final note on trash: It can get into the oceans in a number of ways. Some of it is just careless littering, some is intentional dumping, and some is accidental. Recently the cargo ship *Napoli* made headlines when it beached off the coast of Devon, England. More than a hundred large containers went overboard, plunging BMW motorbikes, bottles of perfume, and battery acid into the sea.

MARGOT ADLER: We're going to shift our attention to a different kind of pollution now, but unlike the refuse in the ocean, this one you can't see. To talk with me about global warming's effect on the chemistry of the sea is Christopher Sabine. He's an oceanographer with NOAA, the National Oceanic and Atmospheric Administration at the Pacific Marine Environmental Lab in Seattle, Washington. Welcome to Justice Talking.

CHRISTOPHER SABINE: Thank you.

MARGOT ADLER: We've been hearing a lot about global warming in the news and the effects of greenhouse gases on the environment. We hear a lot about rising sea levels in the media. But except for that, are the oceans being overlooked? Carbon dioxide also has a direct impact on our oceans, right?

CHRISTOPHER SABINE: Absolutely. The oceans actually have been performing a tremendous service for mankind for the past 200 years. The fact is that they actually absorb about half of the

CO2 that we produce from burning fossil fuels. But the consequence of that is that we're starting now to impact the chemistry of the oceans and change the chemistry of the oceans.

MARGOT ADLER: How much of this is because of human activity? Or is it a natural process?

CHRISTOPHER SABINE: Well, we know that for at least 11,000 years prior to the beginning of the Industrial Revolution so--say around 1800--that atmospheric CO2 was very steady in concentration. The oceans contain much, much more CO2 than the atmosphere. So if the oceans were not in a steady state, if they were losing CO2 or gaining CO2, there's no way that the atmosphere could remain as steady as it has.

MARGOT ADLER: I've even heard that the climate, that the temperature would have gone up another degree in a certain period of time if it wasn't for the oceans.

CHRISTOPHER SABINE: Absolutely. The oceans really control the overall system for CO2 on relatively short time scales, so on time scales of decades to centuries, which is kind of what we're dealing with here.

MARGOT ADLER: I've heard that our oceans are more acidic. Are we already seeing changes? And if so, what are they?

CHRISTOPHER SABINE: We are seeing changes. So the oceans as a general rule are slightly basic. If you are familiar with a pH scale--

MARGOT ADLER: Which I keep on forgetting all the time!

CHRISTOPHER SABINE: [laughs] Seven is neutral, right? And basics would be like sodium hydroxide, or baking soda is a basic compound. And acids are acidic.

MARGOT ADLER: Like vinegar.

CHRISTOPHER SABINE: Right, like vinegar. Right. So the oceans are actually slightly basic. The primary chemical compound in the ocean that involves carbon is actually called bicarbonate, which is baking soda. What's happening is as we add CO2, because CO2 reacts with the water molecules it forms carbonic acid--right?--which is an acid. So as we add CO2 we're converting that baking soda into an acid. It's just like when I was a kid I made a volcano where you put baking soda in the volcano and you dump in vinegar and it foams up. Well, that foaming, that bubbling is actually CO2 bubbles that are being created. We're doing the exact same experiment in reverse, right? So we've got our baking soda oceans. We're adding CO2 and as a consequence that's generating acid.

MARGOT ADLER: So are there any potential solutions to ocean acidification?

CHRISTOPHER SABINE: Well, the only solution is to decrease atmospheric CO2. And so there have been studies that have looked into trying to sequester carbon, to grab carbon CO2 out of the atmosphere, or prevent it from coming out of the smokestacks of the power plants in the

first place, and then store that carbon someplace. And the most promising ideas for that are to try and store it underground, back into reservoirs where we're getting that oil and natural gas out of originally. But there are also people that are looking into trying to store that carbon in the ocean. The problem is that that may help the atmosphere and global warming but it exacerbates the problems with the changing chemistry in the ocean.

MARGOT ADLER: Looking forward, what could potentially happen to our oceans in regard to fish and marine life, given this acidification?

CHRISTOPHER SABINE: Well, we know that the increasing CO2 affects the rate at which organisms that produce calcium carbonate can grow. So as we start to impact these organisms that are at the base of the food web that's going to have implications all the way up through the rest of the food chain, up into the fisheries that are important to our health and survivability.

MARGOT ADLER: So when you pick out something by itself you find, as I believe John Muir once said, that it's hitched to everything else in the universe.

CHRISTOPHER SABINE: Exactly. And there will always be some sort of life in the ocean, but it's a question of is that life something that we are willing to accept. Are we willing to accept oceans that are much more dominated by jellyfish rather than salmon and herring and cod and the fish that we normally like to eat?

MARGOT ADLER: Christopher Sabine is an oceanographer with NOAA, the National Oceanic and Atmospheric Administration at the Pacific Marine Environmental Lab in Seattle, Washington. Thanks for talking with me today.

CHRISTOPHER SABINE: Well, thank you very much for having me on.

MARGOT ADLER: Whether you live on the coast or inland, the health of the oceans impacts all of our lives. Tell us what you think is the best way to protect our oceans and marine life on our website, justicetalking.org. While there you can also sign up for our newsletter or subscribe to our free podcasting service. Thanks for joining me. I hope you'll tune in next week. I'm Margot Adler.
