
Jennifer Stock: And welcome everybody to Ocean Currents. It's Monday and we have an exciting show for you today. This is part of the Monday West Marin Matters series. Every Monday at 1 o'clock you can tune in to hear about a local, environmental, or economic topic. On Ocean Currents, we dive into the big, blue ocean and talk about what covers three quarters of the Earth and produces the majority of the oxygen we breathe and controls the weather patterns we experience every day. On Ocean Currents, we talk with biologists, oceanographers, ocean policy experts, users, adventurers, and today, historians and anyone that can discuss salt water.

So, I'm really excited for today's topic. I've been learning quite a bit about some of the historical ecology research projects happening in the country and it's such an interesting topic. So, I wanted to share it with you all today. We know the ocean is in trouble, but we have a very short window of observations and hard data to learn from. So, the folks that I'm going to be talking with today probe into historical records to piece together the past. How can we tell what the marine environment looked like underwater before the advent of modern science, before scuba diving, submarines, or sonar? The fish kept no records. Can we somehow ask our forefathers if they knew about the variety and wealth of marine life underwater? Well, this is exactly what the National Oceanic and Atmospheric Administration also known as NOAA and University partners are attempting to do, to look at our changing marine environment through the eyes of people as early as the 17th century.

So, let's meet our guests. On the phone, I have Hugo Selbie, a California Sea Grant Fellow who is conducting an historical ecology study for the Monterey Bay National Marine Sanctuary collecting historical material that looks at biological indicators of the marine ecosystem and identifies and is describing long-term environmental changes within the Monterey Bay region prior to industrialized fishing. Hugo is from the UK and has a BS in marine geography from the University of Wales and an MS in marine biodiversity and conservation from Scripps Institution of Oceanography. Welcome, Hugo. You're live on the air

Hugo Selbie: Hi. Very nice to be here.

Jennifer Stock: We also have Catherine Marzin from the National Marine Sanctuary Program who's called in from Silver Spring, Maryland. Catherine is the historical ecology program manager for the sanctuary program. She created this program and oversees all the historic ecology projects and is seeking partners to develop new

historical ecologic projects in the sanctuaries and even internationally elsewhere. Catherine is also currently working on her PHD in addition to all of this. So, welcome, Catherine.

Catherine Marzin: Thank you very much for having me on your show.

Jennifer Stock: Great. So nice to have both of you here. Hugo is in Monterey, Catherine is in Silver Springs and I'm here in Point Reyes. We're all connected. So, first, I wanted to just ask both of you...this is such an interesting field of study that I just wanted to ask both of you, how did you get into this field of historic ecology? What drew you to this specific aspect of either history or ecology? How about, Catherine, we'll start with you.

Catherine Marzin: Thank you, Jennifer. I started being involved with a group of researchers from the University of New Hampshire who are involved in a program called the history of marine animal populations. There's a big scientific effort called the census of marine life to try to understand what was the past, present, and future of the world oceans. The life in the oceans, basically and this group was trying to understand how many fish there used to be in the sea and the group in New Hampshire in particular was very interested in the Gulf of Maine region on the Atlantic coast. What was very interesting for the sanctuaries is that they were able to show us the extent of our ignorance when it comes to the past, especially how little we know about the past life in the ocean and there was such a fascinating world that they opened up that we started talking about working together and bringing what they were doing into the sanctuaries.

So, we started this little pilot project in Stellwagen Bank, which is a sanctuary that we have off Cape Cod to try to see if history can actually enlighten us as to how rich, what was the biodiversity, what was the productivity, the number of fish, basically, that were in this particular piece of the ocean that we are supposed to manage? Has it changed? Is it the way it used to be like? Has it changed since the first pilgrims came to America?

So, all of these questions, we just started asking them and I was just so interested by the project, by the results that they showed us that I just...the more I learned, the more I wanted to know.

Jennifer Stock: Exciting. Thank you. How about you, Hugo?

Hugo Selbie: Well, I, first I was exposed to the subject was in the UK for a nonprofit called Blue Ventures and they work in Madagascar and

one of the avenues of research was to ask village elders about the history of their coral reef and so, to chart how the species had changed, how whether the sizes had gone down, and so, that was my first gutting, if you like, for historical ecology. Then, during my masters course, I met a man named Jeremy Jackson who works at the Scripps institution of Oceanography who...he's working very closely with worldwide partners with the history of marine animal populations project that Catherine was talking about. So, he really exposed me to the current research that was going on on a global scale. Then I started my California Sea Grant fellowship working with the Monterey Bay National Marine Sanctuary and there just seemed to be this huge disconnect of... Monterey is such a rich historical area, but no one really knew about it.

No one was really looking at the oceans and so, we thought that it would be a good opportunity to use my fellowship to begin a project to find out about these sorts of studies.

Jennifer Stock:

Wonderful. We'll go into a little bit more about the Monterey specific one a little bit later, but, Catherine, why don't you give us an overview. You kind of alluded to it in the beginning in your introduction there, but what exactly does the field of historic ecology encompass and you were alluding to putting together the past for the future, but what types of documents do you look at and pieces of information that you want to get to help look at historic ecological conditions?

Catherine Marzin:

Sure. Historical ecology is basically emerging of different academic fields and different academic skills. What it does, it uses history to inform scientists about what the ocean used to be like. So, usually when you have a scientist take research, you have an experiment that will tell you certain parameters about the ocean and you will use scientific data to analyze it to answer a particular question. What historical ecology is...it's a little bit of history and a little bit of science or a lot of history and a lot of science. What it does is, you have historians and archivists that are going to archives and libraries to look for documents that will describe what the environment used to be like.

These documents can be fishing logs or ship logs, explorer's narratives from early explorers that came to Monterey Bay or along the coast of California. They drew maps. They described what they were seeing. They described the environment they were looking at and all these documents have basically been at archives and have been of interest mostly to the historical community and now, we are...we as scientists, we've rediscovering them because

these first descriptions tell us what the environment used to be like and they are interesting in terms of the biology and the ecology of these locations, these areas, whether they are coastal or oceanographic.

One of the difficulties with the oceans is that you don't see them unless you go underneath it or unless you try to put a net and extract something from the ocean. So, what historical ecology basically does is it uses historical documents as proxies for scientific documents and once the historians are able to tell the scientists what these documents are saying, the scientists are able to analyze them and apply modern scientific tools. For instance, our population dynamics and statistics and information or the science of community ecology to derive certain descriptions. For instance, the biodiversity the area at a particular date or the biomass, basically, the number of fish that there used to be in the ocean.

So, it's an interdisciplinary area and in the marine side of things, it's been only very recently that we discovered that, yes, there was indeed a wealth of information archived that deserves to be looked at and we are just starting to even look at the tip of the iceberg.

Jennifer Stock:

So, it seems that you have to be starting with some question...it's such a broad amount of information that you probably could be looking for, but it seems like you're probably trying to compliment current information and current questions before you dive in to find a specific answer to a piece of time that you're looking for. Is that about right?

Catherine Marzin:

Well, it's...I would frame it a little bit differently. One of the difficulties is that the scientific questions you can ask will be limited by the kind of historical documents that are available in the archives. So, for instance, we would love to know the biodiversity. The biodiversity is basically a measure of the richness of species in an area. Well, in order to get at that we need to find documents that will tell us about these species that will be as extensive as possible and if we miss some of these documents, we may not get an accurate idea of what this biodiversity used to be like. So, the difficulty compared to a scientific approach, scientific approach is you ask a question, then you get your data. In historical ecology, the first step is to try to have...is to search the documents and all the archives and have a lay of the land of what all of the documents are available so then you can narrow the kind of question that you're able to do.

I mean, the basic idea is, at least for us in the sanctuaries, is we want to know what the sanctuaries used to be like. Now, in terms of what do we mean by "they used to be like?" Is it the number of species? Is it the number of the abundance of a particular species? Is it, you know, is it more focus along the coast or the relationship between different species working together? Is it the food web?

So, all these kind of questions will depend on the kind of data that are found.

Jennifer Stock:

Great. That's a great answer. How about..you're overseeing a few specific projects at the National Marine Sanctuary Program as a part of...can you give us a little overview of one of these main projects and where are they occurring and what are some of the questions you're trying to get to?

Catherine Marzin:

Sure. Well, we as I mentioned before, we really started in sanctuaries getting involved with historical ecology when we worked with the University of New Hampshire to tell us about the history of Stellwagen Bank National Marine Sanctuary. Stellwagen Bank is basically a sanctuary that's located at the entrance of Massachusetts Bay above Cape Cod. So, the ships that try to go to Boston Harbor from Europe will go through Stellwagen Bank. It's a...historically is was a fishing ground, mostly for cod, but it's also a sanctuary where we have a lot of whales that migrated. So, whale watching happens there too. So, the project in Stellwagen Bank is focused on analyzing this rich history of fishing in the sanctuary.

So, using log books from fishermen, using old scientific records of the fish commission. The fish commission was basically the predecessor to NOAA's National Marine Fisheries Service and so, the kind of questioning in Stellwagen Bank is heavily centered towards commercial fisheries, commercial fishing that was taking place in this area and what can we learn about the abundance of these fish that are still being fished at Stellwagen Bank today and what we're looking at is the extent to which, unfortunately, the abundance of fish has changed. It's a problem that's been happening in various places, but what we're doing is using these historical records to have a more accurate sense about what these good old days used to be like as opposed to each individual having an idea that there used to be a lot of fish. What we're looking at is, well, what are really the historical records telling us.

So, that's what the Stellwagen Bank Project is focusing on at this stage.

Jennifer Stock: Can I ask one question about that related to that? Within the research about the historical fishing, is there documentation of historical regulations like, what type of foresight was around at the time as far as preserving the abundance of fish or was there any foresight in regards to regulating fisheries? Is that type of information you're finding as well?

Catherine Marzin: Well, yes, as a matter of fact, this is, for me, as a fisheries scientist has been the most surprising of the discoveries from this research is that in my own ignorance, I used to think that the issues of managing fisheries was quite recent, but it turns out that among the records that were found by the historians were town records from...one of them, for instance, is from the township of Plymouth and the town council was discussing in, I believe it was 1700 or 1600, I would have to check my notes for the particular date, but it was basically discussing the fact that they should close mackerel fishing for part of the year because it was, they were afraid that there were not going to be enough for their own needs. They were relying on the mackerels for their own consumption. So, they didn't want to overfish.

So, what they were saying is, "We're going to close mackerel fishing that's intended for export." So, the mackerel fishing that was...the mackerel that was going to be salted and they were only going to catch fresh mackerel the rest of the year and so, here we have the township of Plymouth discussing a fishery management scheme, which I had no idea was happening as early as the early colonists in New England.

Jennifer Stock: So, what...managing the commons since it was a rather smaller population at the time.

Catherine Marzin: Yes, and their...it was survival of the community. They relied on it. So, they didn't have the choice. They had to fish sustainably. So, I mean, I thought that the notion or the concept of sustainability was quite recent, but it turns out that, no, we just forget. We are rediscovering it in a way.

Jennifer Stock: We went astray somewhere.

Catherine Marzin: Apparently.

Jennifer Stock: So that's the University of New Hampshire project. How about Hugo? What you're working on...something in Monterey Bay. Can you talk about that project a little bit?

Hugo Selbie: Sure. So, I've been trying to, as Catherine was saying, collect data initially for the Monterey Records and most of the data I'd been collecting at first was narratives, which they're essentially someone who used...visited the area and then described what they had seen. So, these narratives are pretty much...they go back until, well, the beginning of European exploration in the Pacific Coast. So, 1602, Sebastian Sebastián Vizcaíno came up the coast, saw Monterey, and then in the late 18th century more explorers came, Jean-françois de la Cruz, for example, and I'm going through the archives and the records and piecing out their descriptions and then finding out what these...what they're talking about in Monterey and seeing what's changed from those kinds of accounts and it', I mean, it's fascinating to see what's happening.

They all talk about a huge amount of whales, for example, which seem to feed an entire ecosystem. Whale carcasses washed up on the beach, were a food source for condors for the now extinct grizzly bears, all sorts and it's, yeah, it's the productivity of the system compared to what it is now is quite astounding.

Jennifer Stock: That's interesting. How about in regards to photos? Is this another part of your research is, for both of you, looking at photographs? How do you use photographs in your research? Hugo, why don't you start with that?

Hugo Selbie: Well, I've been collecting photographs...you can learn a lot from a photograph. The old adage, the picture says 1000 words, is very true and you can see if, for instance, a photograph is of the dock, you can see a lot of fishing boats in the bay and you can tell what kind of gear they were using, what kind of species they were trying to fish for. And so, you can make judgments, educated guesses about what the fishing effort is for these types of species. You can also find out about different methods to catch things to find out about, what else...well, I mean, different settlements that were there. You can use not just photos, but you can actually go back and look at oil paintings for a bit because photos only begin around 1890 and so, before that was still looking at pictures.

There's a famous one in, I think it's in Europe. There's old fish mongers with a lot of different species that were not available to be caught today, but were available back in the 1820's.

Jennifer Stock: Interesting. For those just tuning in, this is ocean currents and I'm talking with Catherine Marzin and Hugo Selbie, two folks that are working on some historical ecology projects within the national marine sanctuaries and we're talking about how we're looking at

historic documents and logs, photos to try to piece together some of the historic past of our marine environments. Catherine, you were also talking about, there were some other projects going on. We just heard about Monterey, University of New Hampshire...what are some of the other projects going on and some of the other questions you are looking at?

Catherine Marzin: Well, I was going to mention an example when you were talking about pictures. One of the exciting projects we have is in the Florida Keys with a young woman, Lauren McLenahan, working on her PHD and she's studying the historical ecology of that particular coral reef and it's a completely different environment. It's a coral reef. It was Spanish, then English before it became American. So, she had to go to the archives in Seville in Spain, and in the UK to try to mine the documents that pertained to the Florida Keys. The resources are very specific. You have the turtle industry, the sponge industry, shark resources.

You have endangered species or even species that have become extinct, for instance, the Caribbean monk seals. In the Florida Keys, you can't find it anymore and it's a very colorful history. Some of the resources she looked at were journals from pirates, for instance, but all of these documents told her something about what the environment used to be like and she's in the process of analyzing the data, but she showed me some pictures that she found in the local library that take sport fishermen from the 1950's onward and even earlier than 1950's and 1930's. The sport fishing industry in the Florida Keys started at the beginning of the 20th century and as...I don't know exactly when the camera started accompanying the sport fishermen, but she found over 600 pictures of basically people and their trophies that they caught while they were in the Florida Keys waters and what she started...putting it...is just putting them, over time, all these pictures one year after the other and what you see by analyzing all these pictures is the species that are being caught are different.

The sizes of the fish that are being caught are different from what they are today and it's a very dramatic difference. If you just look at one picture and the following year, you would not see a difference, but if you look at fifty or sixty years' worth of sports fishing pictures, you will see that the fishermen nowadays may not know what the environment was...the Florida Keys resources used to be like and what their maybe parents or grandparents used to catch in the Florida Keys.

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- Jennifer Stock:* That's amazing. So, you can have a family sharing photographs and just seeing species they've never seen before and see pictures of humongous rockfish that it's just, like, hard to believe that fish were that big that were here. We just don't see them that way anymore.
- Catherine Marzin:* Yes, and then the scientific question becomes what happened? Are the fish here nowadays or are they gone? Have they been overfished or if they're gone, why is that? Is it an environmental change or is it caused by overfishing? Or, are there other possible causes? So, the issue is both describing the changes in the environment and then, once we describe the fact that there's been a change, trying to understand why it happened.
- Jennifer Stock:* Do you find, I mean, one thing I could see is it seems that there's a lot of skepticism about current fisheries data in regards to making management decisions about fisheries. How do you feel the mixed historical data that you're looking at is taken by the scientific community, the fishing community for helping to make better management decisions for the future. It seems like there's always been a bit of skepticism about data and I'm just curious how the historic data that you're finding from all these different sources plays into that.
- Catherine Marzin:* Well, I think that the question is going to be coming later on once the results of our studies are going to be published and then used for management decisions, then we will see how they are being perceived because right now the management decisions on fisheries or resources are using current data. They're not using historical data per se. I mean, I believe in the fishery service, they're not using...the data they're using is, at the oldest, would be 1960's or 70's and I'm sorry if I show my ignorance to the listeners, but I don't believe they go as far back as the beginning of 1900 or even later. this is not the kind of data that they use for their management decisions, but what is interesting for use in the sanctuaries is that when we look at these records and we look at the change they describe or the relative change from what things are today, it's not from the management perspective, but it's from the historical perspective of a fisherman from the 1900's or 1850's saying, "This is what I did today. This is how much fish I caught. This is how big the fish, the individual fish was on average size." And this can be compared what a fisherman will find in the same location on an average day today.

The fish tend to be smaller nowadays and they tend to be less abundant. Now, the key question becomes, why is that? And that becomes the management decision.

Jennifer Stock: Yeah. It'll be interesting to see how that's taken in. Well, we're going to just take a quick, short break. It's already 1:30. So, I'll take a quick, short break and we'll come right back to this discussion about some of the historical ecology projects. Please stay on the line with us and we'll be right back with you.

(Music)

Jennifer Stock: Those of you just tuning in, you're listening to Ocean Currents on KWMR, this is 90.5 FM in Point Reyes Station and 89.7 in Bolinas. Also, you can tune in live on the web at KWMR.org.

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Jennifer Stock: You're listening to Ocean Currents on KWMR. On the phone, I have Hugo Selbie at the Monterey Bay National Marine Sanctuary and Catherine Marzin from the National Marine Sanctuary Program. Thanks for staying with us. Hugo, I just wanted to ask you, what is a typical search like for you as far as beginning a research project? When I met you a few months ago you mentioned how you'll start on one topic and then you'll find information that takes you another direction, then another direction. So, where do you start as far as finding some research...finding the records?

Hugo Selbie: That was very much one of the major challenges when I first started...was just...it's such a broad topic just even moving forward slightly, it's very easy to get overwhelmed in the barrage of information. So, what I did was I started to ask around on how other people had done it and essentially, tried to use what they were doing and incorporate it into my own research. So, what I did was, I came up with a few simple keywords that I monitor in natural history or, there's whales or whatever. I would then...I'd type these out into online catalogs like the online archive of California, the Melville, which is the catalog for the US...California system. Google is also fantastically useful and see what kind of results came up and then with those results, I started going into libraries and reading these accounts and seeing what was there that I thought looked interesting and relevant and then I would photograph the pages in the book and then I'd bring them home or bring them back to the office and take out certain sections of text and start archiving those and I constructed a database to put

them all into. So, they are always searchable and findable and we, later on, as the analysis component of the project kicks in, it will be much more evenly handled as well.

Jennifer Stock: What's been one of the most surprising things that both of you have discovered in some of your searches as far as interesting documentation or interesting stories that were just surprising to you?

Hugo Selbie: Well, I mean, some of the... what really surprises me, first of all, is the changing behaviors both of humans and of animals. For example, everyone thinks now of whales as wonderful cuddly creatures, but in 1914 I've got a little quote from the one trade, Daily Cyprus, that says, "It is estimated that these monsters of the deep destroy millions of the little fish," they're referring to sardines, "...and it's a wonder the government does not do something to have them killed." So, it's...the fishermen weren't always big fans of whales.

Jennifer Stock: That's interesting. You know, you also shared with me this article that I'm going to read real quickly because that also tells another interesting factoid about how fish may chase whales. This is the "Whale Lands High and Dry on Drive" from The Monterey American in 1913. "It is not only the hake that got themselves into to trouble by chasing their prey too closely to the shore and thus landing themselves high and dry. Even that monster of the deep, the whale, sometimes gets himself into such trouble. This is the case with a big forty foot whale that got himself on terra firm out at Bird Rock on the 17 mile drive. Unlike the hake, the whale does not die when it gets out of the water. Being a mammal and breathing air like warm-blooded animals. For this reason it is to be hoped that the huge beast will be able to make it's way back to the ocean when the tide rises again. For otherwise, it would practically have to die of starvation. It would be a great misfortune for the people who frequent the drive if it should die there for the huge carcass in decaying would make an awful, smelly mess. Whales have been on the beach at other points along Monterey Bay for several days at a time until the flood tide has taken them out again. It is not always in pursuit of prey, but rather, in seeking to avoid the awful attacks that at times whales are subjected to from the combined attacks of the swordfish and the thresher."

So, that was kind of an interesting article. We know whales wash up occasionally, usually from either a ship strike or they've died or they're malnourished, but here they're saying the whales may come ashore to avoid swordfish and threshers and how likely is that?

Hugo Selbie: Well, it's kind of a funny story. I read that article and I was like...I'd never heard of swordfish or threshers...I assume thresher to be a thresher shark, which is a pelagic shark, an open ocean shark which has an extremely long tail, which it uses to stun small fish and I read a couple of accounts from...one from the New York Times about how the swordfish and thresher sharks would combine their attacks upon whales to basically destroy them and so, what they said that the swordfish would force the whale up from below and then stab it in the belly and the thresher shark would jump up in the air and then slap the back of the whale with its tail and so, I was reading these and just thinking, "I don't know what this is. I haven't heard of anything like this." And then, I read a few more accounts and it seems to be that it's a bit of a miscommunication between historical facts and what we understand now.

We're reading it very literally to mean swordfish and threshers when, in fact, threshers can also mean thresher whales. Now, thresher whales are another name for killer whales whereas they're so-called because as they try and attack whales, I don't know if you've seen the Blue Planet, but there's a scene in there where they attack, a killer whale is attacking a grey whale calf and the way they kill it is they jump on top of it and try to drown it by submerging it so they can't breathe and so, by climbing up, they thrash about and get on top of this animal. So, the general consensus is that's where the name thrasher has come from.

Jennifer Stock: That is so interesting.

Hugo Selbie: And then, swordfish is also thought to mean a reference to a killer whale because often, it's not just here, there are accounts of swordfish and thrashers killing whales from all up and down the Pacific Coast, even down into Chile and they're thought to mean the killer whale's distinctive dorsal fin, which really is supposed to be representative of a sword and so, this makes much more sense, that killer whales attack and kill whales as opposed to swordfish which are known to eat small pelagic fish and sharks, which are known to eat the small fish.

Jennifer Stock: So, I can see how it can be easy to be stalled and trying to figure out some of the meanings of things, perhaps linguistically we called things different things at different times. So, then you have to go figure that out.

Hugo Selbie: That's all quite fun.

- Jennifer Stock:* That's cool. So, what are some other misconceptions that you may have discovered through some of your research about animals and the food web or biodiversity?
- Hugo Selbie:* I'm not sure if it's a real, kind of, scientific misconception, but one thing that's been interesting me recently is the change of the behavior of animals over time and so, otters, for example, nowadays we think of them as exclusively in the ocean and in the kelp forests and that's where they live and that's only where they live. They never come out of the water, they never go anywhere but the kelp forest and that's exclusively where they are, but some of the accounts you can read, they talk about the Native Americans catching otters on land with snares. One of the early Spanish explorations in 1738, I believe it was, they talk about being able to catch...the otters are so abundant they're on the shore and they can actually run up to them and club them with sticks. Now, and then...as the fur trade started to take off, then the otters became more and more wary and otters learn a lot from their mothers and so, as their mothers were staying in the kelp forests, the youngsters would stay in the kelp forest and this is just persistent over time until recently where with the reduction or with the abolition of hunting pressure and the otter numbers become sufficiently large again, they've actually started to revert to natural behavior and to haul out on land.
- So, I thought that was very interesting.
- Jennifer Stock:* That is interesting. What about as far as their range, otters range? What type of documentation have you seen about that? Now we have these very specific areas where otters are, but historically, we know they were in different areas. Have you just been focusing on the Monterey region or...?
- Hugo Selbie:* No, no. I've actually found some papers that refer to them as midland reports, then there is...like, trash heaps. So, it...Native Americans would use an animal and then they'd throw it into their trash heap. Now, we can find these and we can find out a huge amount of information from them--what kind of species they were eating. You can tell from a fish vertebrae what species of fish it is and then make a rough estimate of how big it is. So, you can learn a huge amount just from these tiny little bone fragments. So, what we've seen with otters is that they actually existed all the way up from Alaska down into Baja and so, there were regular occurrences on the coast, nothing new at all when you would see one, but now, we...a period from 1790 to 1850 of fur trade.

Most of the furs went to the Chinese, the Mandarin courts, which...their coats were very fashionable at the time and so, this is really extreme exploitation and the fact that otters, they don't give birth to many young, they take a long time to grow, they invest a few small young as opposed to a lot of just, kind of, making lots of eggs and letting...like schools of fish...letting them swim out and take their chances and so, they're very susceptible to over exploitation and so, now we've reached this time when in California, otters were thought to be extinct until 1938 when there was a small amount found just south of Carmel and I think the California populations is pretty much the only one there is until you start heading up into Canada.

Jennifer Stock:

Right, up the Olympic Coast I think there's a couple as well in that region. So, switching to more of a broader topic, Catherine, I wanted to ask you how you see the use of historical ecology in regards to studying climate issues. Climate is on everybody's minds and looking at the current science that we have now, but how can historical records tell us about historic climate issues or different levels and concerns?

Catherin Marzin:

Well, that's one of the aspects that surprised me about the study that I didn't expect would happen within our working with scientists and historians who have been mining archives, finding all kinds of documents. It turns out that some of these documents are also...can have dual purposes. I mean, we are extracting out of these documents, information on living resources--how many fish there used to be, what is the biodiversity? But these documents can also contain climate information. What was the weather the day the fisherman was catching this particular fish? What was the temperature when in the 1880's when the US Fish Commission started commissioning US fisheries research vessels and they navigating along the American coasts and they were gathering data on stopping in particular stations and taking oceanographic information of the symmetry, what was the depth of the ocean? What was the air pressure?

The Barometer...was it telling...and the winds? What was coming out of their dredges? So, suddenly we're starting to come across documents that are both...that have value in terms of climate as well as ecological data and we can now foresee the analysis of these documents that tell us more about how...what was the climate in addition to what was the ecology of a particular location and try to study them together so we can see if things have changed.

Was it because the climate changed or was it because of another reason?

Jennifer Stock: Hugo, have you seen that in the Monterey records in regards to oceanographic shifts in the Pacific Ocean in regards to fisheries?

Hugo Selbie: I haven't really gotten that far into that. I'm not sure I could answer that with any degree of accuracy.

Jennifer Stock: Yeah, I don't understand...all those John Steinbeck days...the booming sardine fishery then took a complete dive and really changed the economy of the region and there's different thoughts on why that happened and what not. It's be interesting to follow up on. Catherine, you were just at a conference in Switzerland talking about historic ecology. Can you tell us a little bit about that and where that might go?

Catherine Marzin: Sure. I was invited to talk to a conference, actually, a climate conference. So, I was the only person who talked about...fish. So, I was surrounded by climate scientists who are interested...well, not only interested, but whose job it is to put together the data sets that are used to study climate change. A lot of these data sets are basically like what we've been talking about. Mining historical documents to try to see what historical records contain in terms of climate information, the atmospheric conditions, and oceanographic conditions, so, physical variables. We, on the other hand, have been doing similar work, but looking at biological and ecological conditions.

So, I was presenting this surprising interface between ecology and climate research. In a way, we have so much in common in terms of the language we speak about the...we're reconstructing time series. We are reanalyzing historical data. We share similar approaches in how to study these documents. The difference is the...once these documents are mined is the science that is being used to analyze these data, but what was interesting is that, for instance, there's a group in the UK that is studying these old books, these ship logs from the East India Company. This was the...So, suddenly they were covering the entire ocean. They were also studying the ship logs from some of the old British Navy ships that used to come along the American coasts. So, they're looking at these data for wind, the weather information, but they also contain observations.

The captains were observing what was going on. They were saying if they saw something unusual. If they saw a school of fish, they

would have taken note of it. So, suddenly we have a lot in common. We want to be able to capture this information as well and as you know, we have sanctuaries in various parts of the American ocean, American coast. So, it would be really wonderful to be able to work with them in telling us, well, what was the climate? What were they observing in terms of the physical condition of the environment, but if they were seeing anything in terms of biology, you know, can we work together to extract off of that information?

Jennifer Stock: Is there a place where ship logs like, all...obviously there's a lot of ships around and they all keep logs...is there a place where a log is to be sent to when a ship is decommissioned? It seems like that is such a vital piece of information. What happens to all these logs when a ship is no longer in service?

Catherine Marzin: Well, that's a good question and the answer will depend on the kind of ship we're talking about. The National Archive, for instance, has a lot of ship logs. They're the ones with the Smithsonian Institution that have archived the ship logs, the log books of the fish commission research vessel, which is, for us, an incredible resource and these scientific logs have so much to offer in terms of climate and historical ecology research. Some of the other ship logs may be in personal collections for a particular commercial institution. They may be in local libraries or in state libraries or archived and that's why this kind of research is so geographically specific, it takes going to these places and coming across these documents and knowing the area is very useful in increasing the probability of coming across these treasure troves of information, in a way.

Jennifer Stock: I know, another question I was thinking about and this is probably for both of you if both with the research you've been doing is the historical attitude about the fishing for a living, fishing for a living and historically, what did people think of the fishing industry and when did it start to shift because once the industrialization and corporate fishing companies took on...have either of you seen any types of documents of what was it like for a fisherman way back and how they were regarded in the community?

Hugo Selbie: I've read a little bit about the...fishing community in Monterey and Santa Cruz and it seems that...and also there was a large Chinese and Japanese community here and they, as I understand it, the fishing community has kind of stuck to themselves and they didn't mingle so much with the rest of the community, but they always...one thing I've...they seem to have all taken a little bit

from where they were originally. So, Sicily or Italy or China or Japan and then brought these techniques or ways of dealing to Monterey or the Monterey Bay National Marine Sanctuary and so, for instance, there's some early uses of the driftnet, not the driftnet, the...

Jennifer Stock: Gillnet?

Hugo Selbie: No. The dredge. So, and that was brought across from Sicily. So, that started off in 1908, I think, or near the early 20th century and so, yeah. I think there's...I've read a few accounts about the fishermen and they...it seems like a really hard life. I mean, they didn't have the fish finders, didn't have what we normally associate with fishing vessels now. These guys would go out in 20 foot sailing vessels. They'd fish all night, then the trademark fog would come in. They'd be in the middle of the bay and they'd have to...they describe it as sniffing their way home and, you know, sometimes...I heard one account of a guy taking out his dad...every time he got lost or thought he got lost, he would put his finger in the water, taste it, and then say, "Right. we're going that way," and they'd always find their way home.

So, the local knowledge, as well, that these fishermen possess about the area is also another great avenue to research.

Jennifer Stock: Especially before all the technology like you're mentioning. Just knowing the sea and knowing the cycles. That is really interesting. Catherine, how about over in New Hampshire or with Stellwagen Bank...perceptions of fishermen in the pre-industrial age until now? Have you seen much information on that?

Catherine Marzin: Well, I haven't. Although, I've been working with historians that are so knowledgeable that they would be able to give you the exact, correct answer at this stage, but I haven't seen so much of a change in perception in New England in terms of how the fishing is being portrayed. The fact that there's less fish is known, but there's still a lot of respect for and respect for the..for fishing as a profession...the lore of the fishermen and the elements is still very much alive and the communities in New England are very much still centered around fishing, whether it's the lobster industry or cod or some of the other species.

I mean, that's my perception at least.

Jennifer Stock: Yeah, that's interesting. Maybe you'll have to support...maybe the local fishermen with a lot of this industrial and foreign going on.

So, I was just curious if there was any perceptions that have passed on. We're getting close to the top of the hour and I wanted to ask both of you, based on what you've seen and what you've learned and what you've seen through all the history and research that you've done, what recommendations can you pass on to listeners about their personal role in being a good ocean steward or helping to conserve the ocean environment?

Hugo Selbie:

Personally, I'd say...just to realize the ocean that you're looking at now is not...it's not what it was. It's not in a good place. It's been heavily changed from even 100 years ago. There's a lot less species. There's...sorry, that's incorrect. There are different numbers of species. The ecosystem isn't functioning quite as it naturally could have and so, one way I was thinking, for example, with the fisheries, is to really, really take a look at what you're buying in the markets and to try and only buy sustainably caught fisheries or fish. Don't ever buy shark, for instance. Just, really try and be educated with your consumer power because consumers can make a difference and they can try and change things.

Jennifer Stock:

Thank you. How about you, Catherine?

Catherine Marzin:

Well, if...I was thinking, in this subject, there's a great book that came out last fall called "The Unnatural History of the Sea," by Callum Roberts and it's a wonderful read and it has the more global world perspective of the extent to which the oceans have changed. I think the key message, in a way, what this study is is...these kinds of research are telling us the extent of our ignorance in terms of what the oceans used to be like, but it's not surprising because we're still discovering what the ocean, the way the oceans are today, but another aspect that is quite compelling is how we do not have a clear picture of what a healthy marine ecosystem is because we haven't seen it in our lifetime. It seems that the environment, by the time we started paying attention to conservation to conservation issues of the ocean, the ocean had already changed. So, we have to rediscover what a healthy environment is and that will tell us what we want the future to be. Especially if we want to manage or conserve or preserve the marine ecosystems, then knowing what they used to be like and knowing what they are today will help us define the future that we want and expect.

Jennifer Stock:

So, we really need to pay attention to shifting baselines in regards to our attitudes about what we see and realize that it's just a small piece of the window as far as historic time and this ecosystem and how it exists. Well, great. Catherine and Hugo, thanks so much for

your time today, sharing some of these stories and some of the methods you're using to look at some of this historic ecology. It's really, really interesting to me and I've always found fascinating how we use maps and charts and even menus and diaries to learn about historic ecosystems. So, thank you for sharing this information today.

Catherine Marzin: Thank you so much for having us.

Hugo Selbie: Yeah. Thank you very much.

Jennifer Stock: Alright. Take care.

Hugo Selbie: Cheers, bye bye.

Catherine Marzin: Bye.

Jennifer Stock: So, thanks for tuning in today to Ocean Currents. I think it was really interesting to hear of some of the misperceptions that could be passed on through the media of how we used to name animals differently and how a whole different concept could come about and to realize what we see right now in the ocean is actually quite different than what it used to be and some of these historic records applied with our current science can really help us make better management decisions for the future. So, take a look on the web. See what you can find out about historical ecology.

The National Marine Sanctuaries

Website, sanctuaries.NOAA.gov actually have quite a nice summary of some of the projects going on if you'd like to take a look at that. We'll include a link to that from the Cordell Bank website where this show will be archived in another week or so. You can always check, get past shows and achieves of Ocean Currents on the cordellbank.noaa.gov website. Up next, will be Rick Clark with Cruisin' the 50's. Next month when I'm back, I'll have a very special guest in the studio, the former manager of the Gulf of the Farallones and Cordell Bank Sanctuaries, Ed Euber, who has recently retired and will be here sharing some of his stories of his tenure at the helm managing this area and hearing about some of his very interesting adventures and stories.

So, we'll look forward to having Ed in the studio then. Until then, get out, stay cool, it's getting hot. So, get out into the water and take care. You're listening to KWMR.

(Music)