

Jennifer Stock:

Good afternoon everyone. This is Jennifer Stock and you're listening to Ocean Currents, part of KWMR's West Marin Matters radio program series. Every Monday at 1 o'clock you can hear about a topic relating to the ocean, the environment, or our local economics in West Marin. On Ocean Currents we dive into the big blue and talk about ocean discoveries, natural history, research, science, management issues, and ways for you to get involved and for we all to get involved to help protect our ocean. Right off the coast here we have some of the most productive waters in the world and three contiguous national marine sanctuaries and the reasons these waters are so special and so productive is the result of the weather we've just been experiencing this past week and today and that is the wind.

These springtime winds generate an incredible phenomena of upwelling and fill the surface waters with nutrients for phytoplankton, zooplankton, and inviting larger animals to feed on the animals, such as humpback whales, the topic of our show. I was going to say the guest, but I don't actually have a whale today. Today we'll be talking about one of the most fascinating whales that grace our coast. Sometimes we can just see them from the shores of Point Reyes, but most of the time you need to get on a boat. This whale is so big, it deserves a show entirely of its own. So, today we'll be talking with David Mattila, the science and rescuer coordinator from the Hawaiian Islands Humpback Whale National Marine Sanctuary in Hawaii. David has been conducting research on whales since 1978. Prior to coming to the sanctuary, he directed humpback whale studies at the Center for Coastal Studies in New England. He focused on the Gulf of Maine feeding grounds of the humpback whale and the principal breeding grounds in the greater Antilles. He received the Ocean Hero Award from the Smithsonian Institution in 1994 for his work in promoting international conservation and scientific collaboration as well as the Environmental Hero Award by the US National Oceanic and Atmospheric Administration. David and his colleagues have developed equipment and techniques to attach to and restrain free-swimming whales in order to release them from lethal entanglements in fishing gear.

With all this experience, he is also coordinating an international humpback whale study in the north Pacific, which we'll be learning about a bit today called "Splash." So, I'd like to welcome David. Aloha!

-
- David Mattila:* Aloha!
- Jennifer Stock:* Welcome. You're live on the air!
- David Mattila:* Well, it's good to be alive.
- Jennifer Stock:* Well, I bet you it's quite beautiful in Hawaii. We've got some chilly wind here, but it's a good thing for the ocean. So, David, let's just start. You've had some experiences that most young folks just dream about as they think about careers in marine biology. How did you get interested in whales and starting to work with them?
- David Mattila:* Well, I have to say, I'm kind of an almost dinosaur because I got started back at a time when there wasn't a lot known about whales and really, a lot of my practical experience was very helpful. I'd been on the water all my life. I'd been...sailed my own little boat several thousands of miles and I was a fisherman and I used that experience, you know, at the time it was kind of like, "Where are they and can you find them and how many are there?" You know, very simple questions, and so I kind of backed into it without going through the traditional academic route and I started my own project down in the breeding ground in the West Indies and kind of learned from there and learned as I went along. It's a little harder to do that these days.
- Jennifer Stock:* Interesting. And so, you've recently migrated over to the Hawaiian Islands to work for the Hawaiian Island Humpback Whale National Marine Sanctuary. Why are the Hawaiian Islands such an important destination every winter for humpback whales?
- David Mattila:* Well, I wish we could tell you, actually. It's interesting. We've learned over the third something years that I've been studying whales, we've learned a lot about their populations, the numbers, how they move, their movements, a lot about their behavior. Here in Hawaii was really the epicenter of understanding humpback whale behavior throughout the world, but what we haven't learned a lot about is why they choose the places that they choose to come to and we...back when I started, people...I sort of asked people about it...I asked, "Why are they going down to the West Indies?" And they said, "Well, we think it's warm, clear, shallow water with a smooth bottom and maybe not too many predators." And that's about where we are today. We don't know much more than that.
- Jennifer Stock:* Do they breed in similar habitat areas like the Hawaiian Islands elsewhere in the Pacific?

David Mattila: Yes, they do. Actually, there's currently, that we know of, there's some breeding areas in southern Asia, the Philippines, the Okinawa Islands, and the Ogasawara Islands here in Hawaii also in some offshore...there's islands offshore of Mexico the Revillagigedo Islands and then down the coast of mainland all the way down into Central America, but they do...one of the boundaries seems to be 21 degrees centigrade. They always seem to get into water warmer than that and we don't know...a lot of people assume it's because of the warmth, but it could also be something about the lack of productivity from predators or the clarity of the water or other things associated with that warm water.

Jennifer Stock: Interesting. So, how many whales come into the Hawaiian Islands every winter?

David Mattila: Well, it basically...the good estimate we had was in 1993 and that was about 5 to 6,000, about 5,000 whales, actually, in Hawaii and the Hawaiian...the whales that come to Hawaii are believed to be about two thirds, approximately two thirds of the north Pacific...of all the humpback whales in the north Pacific and so, they...we have the majority here, it seems.

Jennifer Stock: Interesting. That's just funny. I wonder how they found it originally. Do we know how long, historically, humpback whales have been coming there? Is there historical records of that?

David Mattila: Actually that's one of the really fascinating mysterious. It's not...we don't know for sure that they've always been here. In fact, the evidence...the preponderance of evidence so far kind of suggests that maybe they're relatively new. They may have just discovered these islands 2 or 300 years ago...or about 200. There's not a lot of information in the Hawaiian lore or language about humpback whales, specifically. There is a Kohala, or whale, which was believed by most to be primarily the sperm whale and they did use the teeth from that when they stranded, but the whalers that came here were actually arctic whalers that would come here in the winter to reprovision and probably drink and carouse a lot and then they would go back up to the arctic to hunt in the summer...the spring, summer, fall, but they didn't mention in their log books that they saw any humpbacks or certainly not a lot of them.

So, it's kind of a mystery. It may be a relatively recent discovery by humpbacks of the Hawaiian Islands.

Jennifer Stock: Cool. So, The humpbacks that come to the Hawaiian Islands are coming...breeding in Hawaii and they are feeding in Alaska. What are some of the other feeding areas of humpbacks in the north Pacific? You were mentioning some of the breeding areas in the tropical latitudes, but how about some of the other foraging areas?

David Mattila: Well, they...we know that they've actually, on the eastern Pacific, that is the US West Coast, some of the feeding grounds start as far south as the southern California and the Channel Islands, in that area, extend their...actually, it turns out that the most of the west coast sanctuaries appear to be sort of the hot spots for productivity and therefore for humpback whales along the west coast and then there are quite...there seem to be quite a few in the British Columbia, southeast Alaska, Gulf of Alaska, Bering Sea, Aleutians, and all the way over to Russia and even probably into northern...well, southern Russian, maybe northern Japan a little bit, but primarily from Russia on down.

Jennifer Stock: So, this region here, with Gulf of the Farallones and Cordell Bank National Marine Sanctuaries as well as Monterey Bay and Channel Islands, these are destination foraging areas for humpbacks in the summer and fall months, but our whales that come here don't necessarily breed in the Hawaiian Islands. They breed down in the south like Costa Rica, Mexico, but do you think they ever cross over and sometimes decide to go to Hawaii instead?

David Mattila: Well, that's kind of an interesting question that we're...finding that out...we have just about finished the analysis of the data from this very large, comprehensive humpback whale research project that you mentioned, the Splash Project, and if I read it correctly, I don't think we've found any doing that. I wouldn't say that they would never do it, but because we do see some...we have seen already, some whales make some pretty interesting cross-ocean migrations like from the Russian Aleutians to Hawaii or even one year in the Philippines and the next year in Hawaii and there's also some movement from one year in Hawaii and the next year in Mexico, that kind of thing, but so far I don't believe we've found any whales from California. They all seem to go down the coast to, as you said, to mainland Mexico and Central America.

Jennifer Stock: I think some of our whales also go up to Olympic Coast, although I'm not sure. Some of those might be the ones who go to Hawaii. It's just interesting. Hawaii seems a little bit closer than Costa Rica, but maybe not. I'd have to look at the miles.

-
- David Mattila:* Yeah. Actually, no. You're right. The northern, the Washington-Oregon ones are also being...those are being found down in Central America.
- Jennifer Stock:* Oh, they do go south. Okay.
- David Mattila:* Yeah, and British Columbia is sort of the cut off. We do have a number of whales from British Columbia that come, and southeast Alaska, that come to Hawaii, but Hawaii seems to mostly whales from Alaska and British Columbia and also a smattering from the Aleutians and the Bering Sea.
- Jennifer Stock:* Interesting. For those just tuning in, I'm talking with David Mattila from the Hawaiian Islands Humpback Whale National Marine Sanctuary and we're talking about humpback whales in the Pacific Ocean, in the north Pacific specifically. One of the things that always intrigues me about these whales is they spend time in huge temperature changes and just thinking about humans as mammals, we have a hard time with adapting to temperature and how do the whales do it, from going to some of the coldest regions on the planet to some of the nicest, warmest, tropical waters? What are some of their physical adaptations for dealing with those temperature changes?
- David Mattila:* Well, actually, it is interesting because most of the large whales are better adapted to the cold water. Their large size means they have a lower mass to surface area ration, which means they lose less heat into the surrounding environment, but so, in effect, humpbacks are probably a little more in danger of overheating down in Hawaii in the breeding grounds than they are of freezing up in the north and that's been some of the speculation about why humpback whales have such long pectoral fins is that this may act, amongst other things, that may act as a bit of a radiator. They can increase the bloodflow, and they definitely do increase the bloodflow to the extremities like their pec fins and the flukes and the dorsal fin and cool themselves down that way, but they're pretty active, some of them, down here and I do worry about them overheating, but they do seem to have adapted pretty well.
- Jennifer Stock:* That might be a concern, actually, if we do have some extreme climate changes in the ocean temperatures. That might be something that the whales will be responding to.

David Mattila: It's possible. With whales like humpbacks that are, they actually hold the migration record for any mammal. They travel...they have been documented traveling farther than any other. They seem to be somewhat adaptable in terms of, you know, stopping at a certain temperature, but yeah, we don't know if there are ocean temperatures that are too hot. I know I work in American Samoa with the Fagatele Bay National Marine Sanctuary. We've been doing a marine mammal survey there and the water temperature there is a bit warmer than Hawaii and they do seem to manage it, but definitely they're having to travel much farther it seems, that may be one of the issues as the arctic and the Antarctic waters warm...there's already been a report, I think, of some humpbacks further up in the Bering Seas than anyone had seen them in recent memory.

Jennifer Stock: Wow. That's cool. Now, when they do these big temperature changes, I think I read somewhere and maybe it was gray whales, but they have barnacles that attach to them and different parasites in the colder waters and then when they get to the warmer waters do those survive as well or do those drop off?

David Mattila: I think it's believed that some of them do. I'm not an expert on parasites, but I knew that for humpback whales, they do have some barnacles that have to be by their size and by their position on the whale...you know, sort of season after season, they do survive that, but certainly the temperature change probably does impact them a good bit and actually, one thing I've noticed about unhealthy whales or in my case, I work with a lot of tangled whales, which are often unhealthy, they do get a parasite load much more rapidly here in the warm waters than they do up north.

Jennifer Stock: Interesting. Yeah, I've seen that before on pinnipeds. Sometimes they'll have gooseneck barnacles on their flippers that probably are not very healthy if they have those barnacles on them. Now, how about their communication. You sent me this great CD that I want to play some of for everybody to hear some of these songs, but how do they use their songs as part of their natural history? Do both the males and females produce these songs?

David Mattila: Actually, so far we've only found the males producing these songs. Now, all of them, the males and the females, do make sounds and a lot of the sounds that they make when they're not singing sound like, you know, portions of the song or notes of the song. So, the females do make some of those sounds, but the males are the only ones that seem to put it together in that very structured, repeated pattern that enhances...called a song. So, since it primarily

happens during the winter, during the mating season, there's strong evidence, coincidental evidence that it has something to do with that. The question is what exactly?

And the conventional wisdom was there are an awful lot of aspects of it that sound like an advertisement by the males and that the females may be choosing the males based on the quality of their song or something in the song, but the guy who has been doing the most work on this over the decades on this, Jim Darling, is kind of finding that here in Hawaii, anyway, most of the animals that come over to a singer and join it are other males and sometimes there's a bit of an altercation, very brief, but sometimes they swim off together as if they're forming some kind of a coalition, perhaps, but...

So, it's actually still kind of a mystery. It's not a slam dunk. We don't know exactly or what it is used for during the breeding season.

Jennifer Stock:

Wow, those are incredible things to try to figure out. It must be really hard. I'd love to play some songs. So, I'm going to put up one of these tracks that you gave us. Let's all take a listen and listen to some of these humpback whales.

(whale sounds)

Jennifer Stock:

Those are absolutely incredible to listen to and there's...you can hear some stuff in the distance too. How do you collect these sounds?

David Mattila:

Well, basically, we use a very simple underwater microphone called a hydrophone. It's basically a microphone that's coated in a sealant so it doesn't get wet and just...we're not doing a lot of work with sound, but we do make recordings for other folks when we find...so, it's mostly when we find a whale when it's singing if it's a good situation, it's calm, then we'll plunk the hydrophone over and make a recording. We've actually, there's a PhD student from Australia who's working with a song recording suite based in American Samoa and she's trying to figure out...there's a lot of heightened interest in the humpbacks down there because of the Japanese proposal to start hunting them and so, they're trying to figure out how many different populations are there and they're doing that through genetics and photo ID, but also looking at the song structure and it's interesting because the song can change sometimes by the introduction from an animal from a different...who is singing a different song from, I think, in the case

of Australia, they had mostly animals in eastern Australia were singing pretty standard eastern Australian songs and one winter some animals from western Australia were recorded going up the coast singing their western Australian song and the next year, all the whales were singing the western Australia song or something like that.

So, there's evidence of cultural transmission, which is fascinating, but makes it maybe difficult to use as a tool to determine, you know, the isolation of populations.

Jennifer Stock: Wow. That is so interesting. I'm fascinated by some of these sounds. So, let's actually go a little bit more into this big study that you're somewhat wrapping up with conclusions now, the Splash Study. You've been coordinating with scientists internationally in different agencies to study these humpback whales in this study called Splash. Can you tell us a little bit about what Splash stands for and some of the overall goals of the study?

David Mattila: Sure. First, I have to say, I'm one of the coordinators. It's really a team work and it's been a remarkably successful collaboration of over 300 researchers from 50 different organizations around the whole North Pacific. So, I've played my modest amount in helping to coordinate in Hawaii and helping to get the overall project going to some degree, but basically, the Splash stands for, it doesn't actually stand for something, which is, get out your pens...

Jennifer Stock: Another acronym.

David Mattila: ...Structure of Populations, Levels of Abundance, and Status of Humpbacks, but SPLASH is a lot easier to say and a lot splashier, I guess.

Jennifer Stock: Yeah. I always think of the whale breaching and splashing. So, you've got a good one there.

David Mattila: Yeah, but basically, the objectives were to for one, to first of all to coordinate all of the people that were working with humpback whales around the Pacific into a unified, sort of, standardized methodology of very simple techniques of photo identification and biopsy sampling of small pieces of skin tissue, and also to at the same time as coordinating the people that were currently doing things, to get into areas that nobody had been getting into and that meant, in large part, some of the offshore areas of the Gulf of Alaska and the Bering Sea and the Aleutians and far east Russia.

Those were spots that were just too difficult and nobody had been there really since whaling days, by and large, and the idea was to collect images...I think your listeners are probably aware that humpback whales have these unique black and white patterns on the underside of their tails and each pattern is unique to each individual. So, if you're behind the whale when it goes to dive and if it lifts its tail, you can take a picture of that and it's like fingerprinting the animal and we collected thousands of those photographs and those were all coordinated and analyzed and matched by the Cascadia Research Collective in Olympia, Washington and they've just finished this...really, Herculean task, of matching all of those by hand because we still don't have a way to do it by computer.

Jennifer Stock: That's like a big card game.

David Mattila: Well, yeah and, you know, it's all fine in the first year. What we decided we would do is to collect images in all the breeding grounds that we knew of and all the feeding grounds for basically...starting in the winter of 2004, the summer of 2004, the winter of 2005, the summer of 2005, and then the winter of 2006, and, you know, comparing the first year was not too bad, but as we went on season after season, now these poor folks up there at Cascadia were matching, you know, each new photograph to thousands of photographs and it was growing so it just took...I don't know how long it took to take one photograph through the whole catalog by the end, but several hours, I'm sure, but anyway, it was remarkable. We set our goals to collect certain numbers of photographs and biopsies and we were very successful and they're just finishing up the matching of those photographs.

Actually, I was hoping by the time of this interview that we would have some of those results, the final results for you, but it will be coming out, I think in about a week and a half.

Jennifer Stock: Oh, wow.

David Mattila: Yeah, we think that the primary results may be coming out in the scientific journal, Nature, but then it will be followed by a press release. So, for folks who are interested in learning about that aspect of the study, what we learned in terms of the movement of animals and how many there are any that kind of thing, it will be coming out in...well, probably stay tuned on your sanctuary websites.

Jennifer Stock: Excellent. Yeah, we'll give out the website towards the end of the show. Let's take a short break right now and we'll come back and talk a little bit more about some of these efforts and I think one thing that I should have mentioned at the very beginning is humpback whales are an endangered species, which really puts a lot of importance on why these studies are so important and we do have...seem to see them coming back, but let's talk a little bit more about that on the second half hour and so, David, please stay with us. I'm just going to put you on hold for a little bit here and we'll be back in just a little bit with some more information about humpbacks.

David Mattila: Sounds good.

(whale sounds)

Jennifer Stock: For those of you just tuning in, you're not listening to cows, you're listening to humpback whales, some sounds that were shared by David Mattila from the Hawaiian Islands Humpback Whale National Marine Sanctuary.

(whale sounds)

Jennifer Stock: You're listening to KWMR, 90.5FM in Point Reyes Station and 89.7 and you've just been listening to sounds of the humpback whale. They're not cows. They kind of sound like cows in those songs, but they're humpback whales singing and David Mattila from the Hawaiian Islands Humpback Whale National Marine Sanctuary is with us today. We're talking about humpback whales and a study that David is a part of in Hawaii, studying humpback whales throughout the North Pacific, so thanks for staying with us, David.

David Mattila: No problem.

Jennifer Stock: We're back on the air. So, we were just talking, you were giving us some of the overall goals and the objectives for this study and what are you hoping to get out of this project overall? How do you think this will advance our knowledge about humpback whales and protecting them?

David Mattila: Well, as you know, humpback whales are an endangered species, although, there's some of the list of endangered whales, there are some folks who feel that the humpbacks may be doing a little bit better than others, but we need to more fully understand the structure of their populations, you know? The most common

question I get is, "How many are there?" And I have to always say, "Well, in which population are you talking about?" Because you can have a situation where you've got a lot of whales recovering nicely, say, in the Hawaii, Alaska, but maybe the whales over on the western side of the Pacific in Asia, maybe they're not doing so well and so, we need to more fully understand the population structure in order to be able to then make the assessment of how many are there in each group and which ones are doing well and which ones aren't and then my particular interest has been since I got involved with this in New England 25 years ago or so, was the, is the problem of whales getting entangled in man-made ropes and nets and so, we've added to this Splash project, not just looking at how many and where they move and what the genetics are, but we're also taking thousands of images from the side of the animal to look at scarring and evidence of interaction with man-made ropes and nets and with boats and that kind of thing.

Jennifer Stock:

Interesting and I bet you, for every whale you see that have either scars or some type of evidence of entanglement that there's how many more do you think that you haven't seen?

David Mattila:

Well, that's the big question is, of the ones that we see with scars, those are the survivors and we don't know the relationship or the ration between how many whales survive versus how many die from an entanglement, but I have continued working and collaborating with folks back in New England where this has been identified as a major problem for humpbacks and right whales and there's a long-term study that I used to direct there with the Gulf of Maine humpbacks and I think they're getting very close to figuring out the relationship between the scarring and how many die and it's, I think, a little shocking. People are pretty shocked to learn how many animals have interactions.

Back in New England a conservative estimate is somewhere around 56 percent of the populations show evidence of entanglement and what was more shocking to me was when we started doing it year after year, we found that, actually, the person that I work with, Dr. Jude Robbins, she found that certain individuals, or when you looked at the same individuals, they could be getting entangled at a rate of ten to twenty percent new entanglements each year. So, it's kind of epidemic in some areas and we're curious to see what the situation was out here in the north Pacific.

Jennifer Stock: So, is the gear they're getting entangled in active fishing gear? Is it derelict fishing gear that's just drifting along? Do you have any idea of that?

David Mattila: It's all of the above. It... we were hoping back when we started taking gear off whales and figuring out what it was, we were hoping that we could identify a particular, you know, of source and try to prevent it because that's the name of the game ultimately is preventing it, but looking at it so far, it looks like these animals can sort of stumble into almost anything that's out there and, of course, the preponderance of what is out there is actively fished gear. Now, this is not the gear that is, say, being towed being a boat. It's usually what we call the passive fishing gear, which is traps and things that are set and have a rope and a buoy and they sit there for, you know, hours or maybe days and then the fisherman comes back, but also, there's a certain portion of the problem which is derelict gear because fishermen lose a lot of gear and debris, even.

We know now that from studying them and looking at it here in Hawaii and also work with collaborators in Australia that whales can become entangled in fishing gear and ropes and nets when they're not feeding and so, and in fact, some young animals do that we think may just be playing with it. So, they haven't learned yet the difference between a raft of seaweed and a raft of marine debris and they may become entangled in it by playing with it.

Jennifer Stock: Wow. So, what are the techniques you use for trying to remove it? You've pioneered some techniques and have been the go-to person in regards in removing gear, but how do you remove gear from a huge 45 ton mammal?

David Mattila: Well, obviously very carefully if you want to keep doing it, but I first would be remiss if I didn't give credit to John Leen in Canada who back in the late 70's had an epidemic of entanglements in in-shore fishing nets, cod traps, up in Newfoundland, but almost all of his whales were anchored. They got stuck and that, once they get stuck, they kind of give up and sit there and if you're careful and don't disturb them too much, you can get them out. What we came up with in New England and this was, actually, at the suggestion of the father of one of our scientists who was a fisherman and actually hunted or fished for tuna and he said, "Well, why don't you keg 'em like they used to back in the old whaling days?" And we thought about it and I don't know if people are all that familiar with the old whaling, but basically, when they threw a harpoon at a whale, that wasn't what killed the whale. That just attached a rope to a whale and then they would put on kegs and buoys and even get

towed around in their boats on a Nantucket sleigh ride until the whale tired and then when the whale tired it would then come to the surface and lay there and that's when they would actually come up alongside with lances and drive those into vital organs.

Sorry about all this gruesomeness, but that's what killed the whale, ultimately. Now, we don't throw any harpoons or anything like that, but what we do is if the entanglement is bad enough and the whale is swimming, then we will attach our own rope to the gear that's on the whale and we'll get towed around in a little inflatable raft and we'll add buoys and for humpbacks, most of the time if you add a couple of big floats, they tend to slow down and stay at the surface and oftentimes, if you add enough, they'll just stop and once they stop, then you can... we use a soft-bottom inflatable and have, you know, can bump up around them and they seem to be cooperative in that regard or in shock, we're not sure sometimes, but we have been able to stop them and get the gear off that way, but it is something that's very dangerous to both the people and to the whales and because they're an endangered species, we have to have not only the blessing, but the authorization of the Marine Mammal Health and Stranding Response Program and work under an endangered species permit to do it. So, it's not something... and it's obviously, I've given you the quick and brief and simplistic idea of how we do it.

Obviously, there's a lot of devil in the details and we have special tools that we use that attach and we have almost all of our knives are knives that are sort of hook or v-shaped and cut by..you hook them on to things and you pull away and we actually have breakaway gear that, for instance, a knife that comes off the end of a pole, but has a rope attached so that you can get away from the whale if it's thrashing until you get the knife where you want it and move away and just pull on the rope and add a safe distance. So, that's...

Jennifer Stock: That sounds really intense.

David Mattila: Well, it can be. Although, if it's done properly and by the safety protocols that we've established, it's hopefully not quite as exciting as it sounds and actually, I've worked heavily here in Hawaii with Ed Lieman who is going to be doing a series of seminars and trainings up and down the west coast in Australia...excuse me, not in Australia, Alaska, coming up here shortly, but that's for folks that have been identified as having experience with whales, experience with strandings with boats around whales and that have

been sort of hand-selected by NOAA fisheries in the permitting offices.

Jennifer Stock: Wow. So, do you feel that, I mean, you probably put a lot of effort towards these entanglements and rescues, but do you feel that part of your effort is also spent towards figuring out how to prevent this or..it seems like a very different scale of trying to solve that problem.

David Mattila: No, absolutely. We've...after, you know, after learning the extent of the problem for humpbacks and right whales and, I think one could make a case that for some extremely endangered populations like right whales and maybe western gray whales, western Pacific gray whales, which are down to about 125 individuals, I think saving one can make a difference to their chances of recovery, but it's...this happens at such a rate that really, and you can't get to them all. IT's just a big ocean out there. You cannot get to them all and so, we've become more and more convinced that the answer is prevention and that's...and it makes sense also for fishermen. They don't want whales getting in their gear. It's...

Jennifer Stock: It's expensive.

David Mattila: ...it's expensive, you know, all of that and so, what we've been doing for the past decade is really trying to gather as much information as we can every time we take anything off of a whale from, you know, the age and the sex of the whale, where it's from, to what type of gear and actually, out here in the Pacific will, if it's possible to, we will track where it came from and when it was set and when it was lost and what kinds of conditions and if it appears to be marine debris, then we give it to the marine debris team here in Hawaii and they'll track down, you know, and give us some idea where the whale may have encountered it, but ultimately, the idea is through reducing the amount of rope and net in the water column, that's...and maybe coming up with some better fishing and safer fishing practices, that we hope to prevent it.

Jennifer Stock: Yeah. I think the challenge is these areas that are so productive for fish are also the foraging areas for a large number of species. Do you see other types of whales being affected by gear? I hear most of it being humpbacks and also the right whales, of course, on the east coast, but are there other types of whales? I haven't really heard of a blue whale entanglement.

David Mattila: Yeah, no. They can. Some of the more streamlined whales may be a little bit less likely, but I would say some of the species are just

more cryptic. That is, we don't see them as much and they don't show as much of themselves at the surface. So, we don't have a really good way of estimating. I would say that this isn't just a U.S. issue by any means. There was a recent study done and an estimate that annually, around the world, over 300,000 whales, dolphins, and porpoises die each year in entanglement. Now, most of that is...or a lot of it's smaller cetaceans, that is dolphins and porpoises and most of that is determined by the...it's sort of extrapolated from the fisheries observer programs, but it's much harder to get a handle on how many large whales do, but we do pretty much every species that overlaps with gear that I'm aware of. We've seen entangled gray whales and entangled fin whales, entangled minke whales, even the few blue whales I've seen, I think one of them was entangled.

So, it's...

Jennifer Stock: It's not exclusive.

David Mattila: ...even entangled sperm whales, also.

Jennifer Stock: Wow. So, let's go into some of the other efforts that are being accomplished through Splash. We're studying this recovery effort and one thing we didn't really talk about too much is the recovery from whaling days and the huge amount of humpback whales that were taken during whaling days and have you seen...about how fast has this population recovered from whaling and are they still effected by it since this is an international species that is all over the Pacific?

David Mattila: Well, this is a pretty difficult topic because, quite honestly, I've never put a lot of trust in the estimates of how many whales there were prior to whaling and the reason is that it's a pretty...the way that the International Whaling Commission tries to do it and I have to say, there's some, you know, very good minds that are working very intensively with a lot of data trying to figure this out, but basically, you know, they look at how many whales there are today and then they look at the history of how many were taken and recorded in log books and they sort of trace backwards and figure out how many whales there had to be prior to whaling in order to end up where we are today given how many we know were taken over what period of time, but, now that sounds pretty simple, but then you get into issues like, well, how do you deal with the illegal whaling that wasn't recorded? And some of that bass become available, some of that information from the former Soviet Union.

I believe there were, I think there were over 1,000 humpback whales taken in the northern Pacific that weren't recorded and what about the animals that were what they called struck and lost and, that is, in the early whaling...well, they were harpooned, but got away. How many of those survived or didn't? And, actually, there are formulas and equations to try to figure all of that out, but I know that the only estimate...not the only, but one of the estimates that puts the population in the north Pacific prior to whaling at about 15 to 20,000, somewhere in there, and then after the whaling, right when it stopped, the population estimates were less than 10 percent of them remained, but, again, it's a very inaccurate science and there's been some recent work looking at genetics and trying to figure out how many there must have been prior to whaling in order to have the genetic diversity that we have now and those estimates come in an order of magnitude higher.

So, instead of 15 to 20, it would be 150 to 200,000. Now, those estimates are even cruder and based on a lot of other assumptions that have their issues. So, it's...you can understand where we are. It's really difficult to know exactly how many there were.

Jennifer Stock:

So, some of the genetic analysis that you're doing through the Splash study is also looking at the stocks and where they...do they ever overlap or trade breeding grounds and not so much about estimating the abundance. What are some of the other things that the genetics can tell you?

David Mattila:

Well, I'm not doing the genetic analysis. That's for sure. It's way over my head, but Dr. Scott Baker at Oregon State is doing that and there are a number of different things you can do. It depends on, well, first and foremost and most simple to me is you can determine the sex of the animal and, believe it or not, it's not like, say, killer whales, where there's sexual dimorphism and you can tell the males from the females. With humpbacks, it's a lot harder and basically until relatively recently, the only way, if it was a really big whale with a really little whale swimming with it, you were pretty sure that was a female, but then there are ways in Hawaii, if you're in the water, if you get a good look at the underside, you can tell, but even that's...you just can't do that for every whale. So, the little pieces of skin sample, which, by the way, is a dart that's sort of shot at the whale and it bounces off and it takes a piece of skin about the size of an eraser on a pencil.

Jennifer Stock:

And they don't even feel it, probably, huh?

David Mattila: No, and actually, I mean, a lot of the time there's no reaction whatsoever. If there is it's a little flinch like, "What was that?" And frankly, sometimes some of the stronger reactions I've seen has been to a miss when a dart went in the water right near them and so, it's really just a very momentary startle, but from that now, besides the genetics or along with the genetics, there are approximately 44 different analysis you can do, everything from looking at what they eat through a combination of stable isotopes and fatty acids and you can look at toxins, you can look at, we're hoping, beginning to develop hormones assays, for instance, to look at a pregnancy test for whales. That's being developed and a lot of other things about their health and diseases and all of that. So, it's a remarkable tool for understanding all sorts of things about whales.

Jennifer Stock: Well, it's really fascinating, the techniques and the technology we're getting these days to learn about animals we can barely see. They're below the water. What has been one of your most memorable experiences with humpback whales with all the work that you've done?

David Mattila: Well, I guess, you know, in some ways it's...I've always felt like being a whale biologist is a bit like being some kind of biological monk that's sworn to poverty and so, really the only traveling that I do is with the work, but it has taken me to some amazing places like Greenland and American Samoa and other spots and that, I have to say, up in Greenland just working up in the Fjords up above the Arctic Circle, looking for humpbacks and fin whales around icebergs just was...it was like being on another planet. So, that kind of thing...I remember one day, you know, where we were in the so-called sunset, it was still light, but with a giant iceberg and we had some killer whales and sperm whales and blue whales all swimming around and humpbacks where you could see them, their white pectoral fins down deep, you know, looking through the sort of slate color and it was really just a remarkable experience, but I guess also, obviously, some of the more heart-stopping were the rescues and probably the very first one was probably the most cathartic, I would have to say, because it was a whale that we had seen since it was born. We'd seen it as a calf and it had always been one of these really friendly whales that came over to boats and swam around and it got badly entangled in the summer in a gill net, monofilament, where it had it through the mouth and wrapped over the back and wrapped around the tail.

So, it was kind of hog-tied and we wracked our brains for how to try to get it out of it and that's when the older fishermen told us, "Hey, try legging." So, all of a sudden, she turned up outside of the

harbor on Thanksgiving day and we went out and actually got a hold of the net trailing behind and put on some floats and she actually stopped and we were, I remember being up at her head and we had cut the line across the back and I was trying to pull the net out of her mouth, but she was very gentle with us and eventually, I think just opened her mouth and it came out and then we were able to cut her free and off she went and she came back two years later with her first calf. So...

Jennifer Stock: Oh, that's wonderful.

David Mattila: Yeah. It was a, you know, pretty amazing experience. I don't know who was more shocked when we actually got a hold and stopped her, whether it was her or us, but it was...

Jennifer Stock: Wow.

David Mattila: Yeah.

Jennifer Stock: It must be hard...stories, few and far between, but so, wanting to keep you motivated and working hard to continue to solve the problem. We are just about out of time and I just wanted to ask you one more quick question. If there was just one thing you could tell people about their role in helping to protect whales from entanglement or toxins and helping to protect the ocean, what would it be?

David Mattila: Well, I think, actually, as a scientist I have to plead with people to try to understand scientists and try to understand that we're...that, you know, what people I think really don't like about us is we're never black and white. You know, it's always grey and I think that if people can just, you know, realize that this is...it's always going to be a little bit of grey and that and trying to understand and appreciate the difficulty of the sciences is helpful, but then, obviously, just taking care of your ocean, you know, and if you do go on whale watches, research the vessels and make sure they follow the regulations and guidelines and look for ethical behavior on the water.

Jennifer Stock: That's excellent. Excellent answer. Thank you so much, David for all your time today and for all the work you're doing with the whales and helping to protect the oceans. Thanks again for coming today.

David Mattila: No problem. I enjoyed it.

Jennifer Stock:

Alright. I just wanted to mention David's last comment about, as far as researching vessels. There are ways that you can see humpback whales right here off the coast of California, right outside of San Francisco and Bodega Bay and the Farallones Marine Sanctuary Association works with a good vessel and great naturalists. They'll be doing a couple whale watches this summer and fall to try to get out to see some of these whales that we've been talking about that are foraging out here. You can call 561-6625 or get online at farallones.org to find out about trips there and also, we're doing a Cordell Bank trip. If you want to brave the long day out to Cordell Bank out of Bodega Bay in October through the Point Reyes Field Seminars, we'll be doing trips out to Cordell Bank October 11th and 12th and 18th and if you want to learn more about that, you can give me a call at 663-1397 to hear more about the field seminar.

I want to thank David again for sharing all these stories about humpback whales. There's so many interesting things about them and listening to those songs and I do have a phone number. If you happen to ever be at a beach or on a boat and you see an entangled whale or dolphin on the water that's alive, a phone number to call to put the action plan into place here on the west coast is [562-980-4017](tel:562-980-4017) and that is a hotline to call to get the response effort out. For entangled seals and sea lions, you would call the Marine Mammal Center, which is 415-289-SEAL, S-E-A-L. Thank you so much for joining us today on Ocean Currents. You can catch archived shows and subscribe to the Ocean Currents Podcast online at cordellbank.noaa.gov or tune in the first Monday of every month at 1 o'clock.

(music)

Jennifer Stock:

So, until then that we all have a place in helping to protect the ocean and thanks for tuning in today.