Interviewer: Okay, great. Thank you so much. Just to get started, I was wondering, obviously I've read a bunch of your stuff online, but I was wondering if you would mind just sharing with me a little bit more about what you do in your area of expertise.

BD022: Okay, sure. So my current position is - I am NatureServe Director of the Biodiversity Indicators Program, and that kind of reflects that portfolio work. It reflects a lot of what I've been doing over the years. So that program works with partners around the world. So we have projects in parts of Africa, Southeast Asia, Latin America, Caribbean, Arctic, you name it. And basically what we do is work in partnership with national governments and even NGOs and regional bodies to design and implement biodiversity monitoring and reporting systems. The reason for that focus is partly based on NEET. So we tend to see a lot of different partners reach out to us needing more streamlined approaches and better data for reporting, especially to some of the big multilateral environmental agreements. But also, I guess it reflects my background. So if you, it's debatable if I have a skill, but probably my skill is herding scientists and talking. So, in my past, I've designed and implemented biodiversity observation systems. So I did, I built one for the whole Arctic for the Arctic Council. And then I was nominated and elected to co-chair this global organization called GEO-BON, which Emmett's a part of and many other folks at Smithsonian. So yeah, that's my background.

Interviewer: Very cool. Could you, so would you mind telling me, I mean, it sounds like you work all over the world, so this is a massive question, but just for my own curiosity, give an example of what a biodiversity monitoring program would look like that you would help implement in one of these places.

BD022: Yeah, sure. They're all a little bit different, so I could even provide some info on that. So we basically base our work along a structured workflow, but I can speak to that and send it to you later. So everything we do is sort of user driven. So we go through a process with our partners to really work with them to articulate, what are the things that are keeping them up at night? So these could be, if it's a government, it's a policy issue where biodiversity data is kind of not allowing them to make informed decisions. It depends on the partner. And then what we do is we start to unpack that to identify specific data and what we call data products to inform those issues. And then from that, we unpack the data and data products to design a monitoring and reporting system. So that's everything from the sort of primary observations to the analytics that, you know, maybe it's an automated pipeline through R and Python all the way to visualizing platforms. So a good example of that might be some work that we're about to do in Namibia, where they have a five-year project to strengthen their approaches at a national scale to address three different conventions, so Convention on Biological Diversity, Convention on Combating Desertification, and then the Climate Convention. And the intersect for them is they're facing issues around biodiversity conservation, land degradation, which kind of comes under the UNCCD. And they see opportunities around nature-based climate solutions, so carbon sequestration. So what we're doing or what we'll start to do with them is sort of define what we call a national monitoring reporting framework that identifies those key targets, so carbon sequestration, conservation, restoration, and then start to identify what are the commonalities in terms of indicators, so time series indicators and spatial data products that can inform the more optimal use of their land base and marine base. And then from that, we'll just work with them to design an actual monitoring program. So how do they sort of keep those indicators of spatial data products living? And we'll build a data visualization platform so they can track whether they're moving away or towards their targets. So I don't know if that helps sort of lay it out, but that's a pretty typical project for us. Others, we might just do one element. So for instance, we've got a project with the Arctic Council, where I've already worked with them to design a monitoring system. So all we're doing there is building a pan-Arctic biodiversity dashboard. So we're just taking the data that their monitoring program produces and creating a platform that sort of dynamically visualizes that data.

Interviewer: Got you. Very cool. OK, so to go back to the National Monitoring Reporting Program, just some understanding. So basically the key targets that they're working towards are certain ecosystem services. Is that correct? And then you're developing indicators to build towards those services or to provide for those services?

BD022: Sometimes, sometimes. It depends on the partner and how they speak to that. So you could argue that everything we do ultimately has an ecosystem service element. So we have a project in the Bahamas where ecosystem services are a big element to that. So we're working on building this platform to streamline management and enforcement planning for their protected area system. And a lot of that does, a lot of it's structured around ecosystem services, so sustainable fisheries, mangrove protection, you know, to mitigate flood risks, stuff like that. But it really depends on our partner. don't always, it's really driven by them, so we don't always, we don't come in there with a preset determined angle to what we might work on. Sometimes because, you know, you could argue everything we do is related to ecosystem services, but it's not always sort of put through that lens.

Interviewer: Okay, gotcha. Okay, that makes a lot of sense. So the indicators you said they usually are like spatial and temporal indicators for biodiversity that then inform monitoring. Could you give like, what are a few examples of what those indicators would look like?

BD022: Sure, so maybe I'll use some examples from our work in Africa. So we collaborated with the South African National Biodiversity Institute to do some work in Ghana and Uganda and Rwanda. And that was partly spatial. Well, actually almost everything we did was spatial. But in that case, we did what we call these spatial biodiversity assessments for the country And so they look at some core data layers. So we look at things like ecosystem extent, ecosystem condition, where the protected areas are, and sometimes some other data inputs, like when available species distribution, like locality of species. And from that, we do some core analysis where we look to figure out what are their most critically endangered ecosystems in the country and how well protected are those? And those actually become indicators where you can actually track progress over time to either restore or protect those systems. But then we do a lot of sort of what we call downstream indicators. So in particular with Ghana, we worked with them to assess things like the, at that point, the proposed targets for the new global biodiversity framework. But also they have national development plans. So there we created a suite of indicators based on their needs. So we did ones looking at trends in forest condition and fragmentation. We did some very basic indicators on fisheries 'cause of course fisheries are a big deal for Ghana. Things like that. So that's a pretty typical example, but a lot of our work is focused on the new global biodiversity framework. So with that framework, there's a bunch of goals and targets, four goals, 23 targets, and they have a monitoring framework with a suite of proposed headline indicators. So we are working with some of the national partners to help them use their data to build those indicators. And it's all over the map. I mean, we also do, sometimes we work on very non-biological indicators that we might do a finance indicator, all that sort of stuff.

Interviewer: So you said something about using existing data just now, I think that they have. So that was gonna be my next question of like, where does the data come from to inform these indicators and how does the monitoring program work after the fact once you guys are done collaborating with your partners, like where are the resources coming from to continue that monitoring process over time?

BD022: Yeah, no, great question. So our mantra is kind of national first, global second. So, and the reason for that, it's probably useful context is, if you look at things like the past 10 years, if you look at things like the Aichi biodiversity targets, They came with a set of recommended indicators. And we've done quite a bit of analysis on how nations tracked and reported progress towards the Aichi targets. So we went through their national reports and we sort of said, okay, how many times are they using indicators? What are those indicators? And how well do they correspond with the global risk? And what we found is that there's very little uptake of global indicators. The national partners tell us and all the other global organizations why. And a lot of that is trust and ownership reasons. And in many cases because it's been driven by global data sets not necessarily being used in the way they were originally designed. And so there's a tendency or a temptation perhaps to fill in gaps because we have massive massive gaps like everywhere even in the US, even though the US has the most biodiversity data in the world if- I should send you that paper on that analysis and see it. But um it there's so what we find or what our partners tell us is that when you take a global data set and disaggregate it to my scale it's either completely wrong or it really doesn't tell me what I need to know to make a decision, say around mangrove extent. So global mangrove cover is a great product. And it's not to say these global data sets aren't amazing 'cause they are, but they're sometimes not used with their original intent. So what we tend to do is, we'll work with the partner and say, okay, what data is available that you either own or someone else has collected at a local scale that we can use? And of course, it's never enough. So for instance, with Ghana, Ghana is a good example where we went through a process to define what are their priority policy needs based on the National Development Plan and Biodiversity Global Plan. And then what are some of those indicators and spatial data products that you need to feed progress towards those targets. And then we said, okay, well, what are the raw ingredients that you need to produce these.? And the focus there is on, can we find just a small set of raw ingredients? So we kind of use the kitchen as the corollary. It's like everybody's kitchen is flour, sugar, milk, butter, salt. And with that, you can make a pancake, you can make a cookie, you can make a cake. So we think that it's unrealistic to tell countries even arguably more advanced countries like mine, Canada, which isn't really all that advanced, what that you should be collecting like, you know, 50 variables and you know, at the national scale, it's just not gonna happen. So we try to boil it down to some core data sets. And then what we do is based on that, we'll start to do some analysis based on their data, which almost always tells you that there's not enough. Then we'll augment other data sets. So in Ghana, when they decided that forest cover metrics were really important to them, we first worked with their data sets. So they had done sort of a land cover extent analysis. But it wasn't complete for the country. So then we augmented that with Matt Hanson's data product at the University of Maryland. So we used the Global Forest Change dataset to validate their data as well as to fill in some gaps. And then what ended up happening was it sort of incentivized their land cover agency to finish their forest cover extent mapping and plots. And they did that within six months. So we actually ended up having a full dataset. And so by sort of creating outputs, it's better structured, we then use that to try and incentivize some very basic monitoring. And that's, but that, of course, is always a challenge because it's based on what the capacity is in the country. And often countries have very low capacity to monitor. But we're doing that right now in the Bahamas. So we've gone through a process to identify their priority policies around marine protected areas and now we're working with some of the core partners to develop a monitoring plan. And basically the basic question is like what are some feasible small handful of data ingredients you can invest in across your protected area network. And we will focus on those and we will build the monitoring plan around those core variables or core metrics.

Interviewer: Okay, so when you say policy priorities, I think you've mentioned MPAs a few times, is typically a policy priority protecting or conserving an area or are there other types of policy priorities that you talk about work with when you're building these indicator programs?

BD022: Yeah, well definitely conservation is a big one, but there's lots more. So restoration comes up pretty heavily. So in the Bahamas there's some parks where they're restoring mangrove cover, they're planting mangrove and stuff like that. But then there's also policy priorities that are ultimately about conservation, but they're focused on human activities and human threats and impacts. So it might be around developing more detailed zoning plans that are then enforced. So some of the policy priorities come out to enforcement and planning. Sometimes they're even just based on infrastructure policies. So we need more staff in Mariah Harbor Key National Park. We can't possibly manage this park with one person. That's real basic stuff like that. So it really depends. So it does go way beyond, I mean the ultimate goal, I guess you could argue, it's always about conservation protection. But we often are working on things like mitigating or reducing agricultural runoff into protected areas or managing forest cover in adjacent land holdings of that rim around a marine protected area. So then again, I'm thinking of Bahamas as an example or restoration targets. So it's, you name it, it's pretty broad.

Interviewer: Gotcha. Okay. Yeah. So I think probably I said in the email, the overarching very broad goal of this project is to understand the role of biodiversity in marine resource management. So it is marine resource focused, but just talking with you is really helpful even at a terrestrial and marine level, thinking about biodiversity in management. And I know that you work internationally, this is focused nationally in the US, but hearing your perspectives all over is still helpful. But I'm just wondering, like, have you seen or do you think that biodiversity is a priority or is considered in environmental management policy, I guess specifically nationally in the US, but all over, like, is that something that we are managing for? Is biodiversity specifically considered?

BD022: Yeah, that's a big question. I think so. I mean, it depends on whether, everyone would maybe have an opinion on whether it's enough. I mean, now I know enough to be dangerous about what goes on in the United States, but as a Canadian, I'm pretty familiar with it. And of course I work for NatureServe. So biodiversity is a pretty core element of any environmental policy and governance. And I would say it is slowly becoming more of a priority or taking more prominence, partly because of things like the six extinction crisis and global biodiversity. but also I think the new strategy that people have taken to connect biodiversity conservation with other goals, whether it's sustainable livelihoods, carbon sequestration, all that sort of stuff. So we've been trying to, knowing that biodiversity is sort of the poor cousin of the climate convention, we've always tried to find ways to attach it to that, right? Or even to land degradation and things like that. So I would say so. I think the needle is going up in terms of residents in most places. It certainly is. Internationally, it certainly is. Even in countries that we work with that are really by necessity focused on transforming their economies, they're doing so with biodiversity in mind. Uganda is transforming their agricultural production approach, but they don't want to do that without asking, you know, how do we do this in a way that maybe doesn't just mow over any last little bit of forest in our country? Because they've lost massive amounts of forest. That sort of thing. So yeah, there's an improvement. I don't think it's, at the end of the day, the people that make decisions are typically the environment agencies, so that's a big challenge, right? Sort of that mainstreaming into energy and forest and agriculture and fisheries, all that sort of stuff.

Interviewer: Right, okay. That makes sense. Yeah, so I think because you work at such a big picture scale, I think it's going to be hard for me to ask these questions, but I'm going to anyways. My next question was going to be, are there actions that you think are needed to better manage for biodiversity. And again, normally I ask this question in regards to US marine resource management, but just from your perspective in general, and obviously, you know, given the work that you do, building these indicators and building these monitoring programs, I think is probably gonna be part of your answer and it's important work that you're doing. But any other thoughts that you have on that?

BD022: Sure. Well, you know, I mean, biodiversity is a little bit different than say, alignment, or a lot different. And we often, like when I was co-chairing this global network, we always looked at things like the global climate observing system as a really good proxy and motivator for us. Can we develop a global biodiversity observing system? But of course, most, not all, but most things that are happening to biodiversity that are negative are happening at local scales around the world. So it's at death by 1,000 cuts. So I think we're starting to realize that you can't just take a top-down approach. So say you have like, NOAA has these National Marine Sanctuaries and they're probably already doing this, but this will reveal my ignorance. What's going on with National Marine Sanctuaries, but sort of involving the relevant local communities and productive sectors that may directly or indirectly impact marine resources or biodiversity in those sanctuaries is the way to go. That's where we tend to see solutions. And I will say, and I say this all the time to my colleagues in Canada, you know, Canada as a developed country sometimes with that comes an attitude that maybe we don't have something to learn from other countries and other parts of the world. That's a huge missed opportunity and the reason for that is that necessity breeds invention. And I've, all the most valuable things I've learned in my career have almost always come from developing countries because they're innovating through necessity. So if you look at what Colombia is doing, or Mexico, or South Africa, they are producing really powerful, streamlined approaches to conservation that I think the United States, Canada, other countries could totally benefit from if we were just willing to look at those things. I'll give an example. So Endangered Species Act in the US, and again, I'm speaking from a little bit of ignorance on the details and how that's sort of governed and enabled. But South Africa has a much more rapid and streamlined approach to how they assess species at risk, which leads to sort of more quick assessments and therefore more rapid action, I think probably the US, but definitely Canada can really benefit from starting to look at how they're doing that and whether we can implement something similar. The other thing I would say about the United States, and again it's the same as Canada, is there's a paradox where when you have a country with lots of resources like the US and Canada, what that tends to come with when it comes to conservation is too much complexity. So the United States has a lot of cooks in the kitchen that have some role in biodiversity management, USGS, BLM, Department of Defense, all that deal, US Forest Service, Fish and Wildlife Service, NOAA, so super complicated. So for instance, if you were to design an implemented biodiversity monitoring program, people would say, you know, and that a national one, some people might say, you know, the United States or Canada, that's the place where you're going to be able to pull that off. It's definitely the place where there's a lot more technical and data resources, but it's socially or politically probably the hardest place on earth to implement a biodiversity monitoring program. So there's a paradox there. Whereas, you take a country like Ghana, and And because there's not that many cooks in the kitchen, you probably have more opportunity to implement something.

Interviewer: Yeah, that makes a lot of sense. And that's what part of what I'm doing is a policy analysis and saying my work is US focused and looking at federal mandates. It's really complicated because there's so many different federal mandates. Then when you were doing some local case studies as well. So looking at things like federal management versus state management and how they each interpret biodiversity and manage for it is really different and really complicated and doesn't seem to be very holistic in the approach which is one of the challenges that we're discovering.

BD022: Yeah, yeah.

Interviewer: Yeah, so I see you said something about biodiversity being different from climate which made me think of something I want to ask you. So when we hear this term biodiversity one thing that we're hearing a lot or we're learning is that it means different things to different people and everyone thinks about a different thing when they hear that term. So I'm wondering what the term biodiversity means to you. Like when you hear that term, what do you think about? How do you conceptualize biodiversity?

BD022: Okay, that's like a skill testing question. Well, I kind of think about it in the same way as maybe the Convention on Biological Diversity defines it. So I see it as very broad based. So it's not only species or organisms as units, but the energy processes that govern those exchanges within an ecosystem. So I started to see it as pretty holistic. And there's even now a lot of focus, well, not a lot of focus, but there's emerging science of hollow plants and how almost, if you look at just about any species, you realize that they don't actually interact on their own, but they're sort of collectives, like the human body, for instance, or a tree or whatever. So we take a pretty broad perspective to that, which makes it more complicated, perhaps, than if he took a narrow review. I don't know if that fully answers your question. That was a pretty vague answer, but -

Interviewer: No, no, it does answer my question.

BD022: Oh, good.

Interviewer: And as a follow-up to that, another part of our previous research has, because of this issue of trying to define biodiversity effectively, some of the team's previous work has been biodiversity into four concepts as a way to conceptualize it. And I am wondering if you'll agree with those and if those are things you think about. So they are habitat forming species, species of conservation concern, harmful organisms and key food web supporting species. So do you agree that those are like the four bins of biodiversity that encompass what biodiversity means? Is that how you think about it or is it not?

BD022: Might not like my answer in this. I agree with that, but only because I believe there's, it depends on the issue they're trying to solve, how you lump and delineate bins for biodiversity. So that, what you just described, makes a lot of sense, especially from a marine resource management angle. But it's not the end all be all. So for instance, when we had to design this Pan-Arctic monitoring program, the first thing we had to figure out was like, how are we gonna do that? It's 38 million square kilometers as defined. And you know, and there's so what we ended up doing, and there's no perfect way, you always lose something when you bin things, but you absolutely have. We weren't going to go, oh, we're just going to have this monitoring program that doesn't delineate into bins. So the bins we chose there were terrestrial, freshwater, marine and coastal. And of course, by doing that, you lose, I think we have lost some of the focus on some of the exchange between freshwater and terrestrial systems with marine systems. But having said that, how you described it, I think, is useful when you think about a marine system, I think, and you're looking at sort of biodiversity and the functional roles, harmful versus habitat forming, all that. It makes a lot of sense. That was a rambling answer.

Interviewer: No, no, that was helpful. Yeah, it's interesting 'cause everyone thinks about biodiversity in a different way as it turns out. And so we've been trying to find a way that can help make it a little bit more concise and consistent. And so that's what we're trying to see if those points make sense.

BD022: I'll say this may be helpful because I've been through this many, many times where we're trying to define biodiversity for the purposes of structuring and monitoring programs. And for better or worse, I'm fairly pragmatic, partly because I would never accuse myself of being a really good scientist. But that, in my experience, when you get a group of scientists in the room, this is dangerous because you're recording this. But inevitably what happens is that because scientists often, not all scientists, but many are specialists, they have trouble seeing the big picture and they argue over small details, which are not small to them, but they get bogged down in the process and so they will argue about how to delineate, you know, a marine system, you know, what's the sort of environmental profile of that system, how do we break that apart, and often end up, if you allow them to, making it way too complex and and then it inevitably fails. And we've done a lot of work to look at why monitoring programs fail. And there's lots of reasons for that. But part of it is that they're usually made too complex.

Interviewer: Yep. No, that makes a lot of sense.

BD022: Lots of ways to skin a cat, so to speak.

Interviewer: Yeah, for this project, I'm interviewing scientists and experts such as yourself. And that's a theme for sure, is that, It's challenging. My plan for the fall is I'm doing three case studies to look at more localized issues in three areas in the US. And I'm planning one for this fall and I'll be bringing scientists and managers and stakeholders together. And I've done some work like that, but not at this scale. And I think it's gonna be really, really interesting and challenging for the reasons that you outline. So let's see how it goes.

BD022: I'll send you a couple things after this. So in my work in the Arctic and Columbia and elsewhere, we designed what we call a nine-step biodiversity observation network process. I'll send that to you because it may be helpful. It's purposely fairly general. But people are using it in different parts of the world to sort of just create their own process for that. So I'll send that to you.

Interviewer: OK, that would be great. Thank you. Can I take a step back for a second? There's something I wanted to circle back to that you said before about, when I was asking you about what management actions you think would be helpful to better manage for biodiversity, you were talking about involving local communities, and I was interested to talk a little bit more about that, of like, what have you seen that works in that space? Like, are there good examples that you could give of how involving local communities at a local level has been successful in better managing biodiversity?

BD022: Yeah, I think so. I mean, I think there's lots of great examples, many of which I've only sort of heard third hand. Like I think some of the artisanal, small-scale fisheries management on the eastern coast of India, apparently has been quite effective. But I say that without any firsthand knowledge on that. But where I have had firsthand knowledge, that's marine based, two examples come to mind. So again, going back to the Bahamas, the Bahamas National Trust and the Nature Conservancy have worked together to engage consistently in a long term process, local communities that are adjacent to their parks, and ultimately are users of those parks. And that has, just through that engagement, built a lot of trust, but a lot more ownership. The local community is starting to realize what the value of those parks is and why they need to maintain them because they're fishing them to whatever. And we've had places like Bonefish Pond National Park and New Providence, it used to be like a garbage dump. All the local people just dumped their garbage into that mangrove island. And they don't do that now. Now that's partly because it's enforced, but I think there's also a growing understanding of how they're benefiting from that. So if they feel like they're part of a process and they're engaged in it, they're more likely to be sustained support and stewardship. Another example would be from the Arctic where myself and others worked a lot with indigenous communities. They're living in coastal areas who already have deep knowledge because they've had to survive in those environments and interact with them in sustained ways. So there's no, you don't need to sell them and it would probably be pretty offensive trying to sell them on why that's important because they already understand that. But more in terms of doing what's called co-management and even co-research and monitoring has been very successful, which has led to better solutions. So for example, a lot of science, especially in northern or extreme latitudes, is seasonal by nature. So you have scientists go up in the summer and not in the winter. But they have all these people that are hunters and fishers that are out in those environments year round, and they are great human sensors. They’re out there seeing seasonal change or seeing things on the land and you can really do a lot of work just spatially depict what they're seeing and that has been used in the Arctic quite successfully to identify emerging issues such as loss of breeding habitat for migratory waterfowl or answers to why something's occurring. So there's been a lot of insights that have ended up directing research because the science just isn't there to figure that out. So that sort of local scale, local knowledge, indigenous knowledge can sometimes reveal potential hypotheses that we should be quite closely considering.

Interviewer: Gotcha. Okay. That makes a lot of sense. Okay. Well, I think that that was the majority of my questions. If there are things that you don't mind sending me, like you mentioned, that would be really, really great.

BD022: Yeah, I'm happy to do that. I just wrote down a few things, or a couple things anyways, that come to mind. So I'll definitely do that.

Interviewer: Yeah, that would be great. I really appreciate it. Yeah, I'm talking with people who work kind of bigger picture levels like you right now and then I'll be working with more localized managers and user groups later so kind of like getting this idea of how we conceptualize biodiversity down now to then inform the later parts of our project is what I'm trying to nail down now so any resources that are also really really helpful that you could send.

BD022: Yeah I will put together a list and send you something today while it's fresh in my mind or else I will forget.

Interviewer: That would be amazing. I really really appreciate it. Thank you so much.

BD022: Now it sounds like your project's really important so good luck with it.

Interviewer: Well yeah I just started my postdoc in February. It's a three-year project and after these interviews like I said I'll be doing these case studies. One's gonna be in it's gonna be based at Alabama in the Northern Gulf of Mexico and then one will be in the Salish Sea, which maybe you might have some interesting knowledge on. One thing, like the project, the funders are really focused on like U.S. marine resource management, but from some of my on-the-ground interviews in Washington, I'm just, you know, learning the importance of transboundary management approaches. And so I think we're realizing that we have to involve Canadian collaborators, which wasn't on the agenda initially so we're starting to tackle that issue. And then our third will be Chesapeake Bay. And so yeah, and it's hard because I mean, I'm sure you have a wealth of knowledge on this, but like the research questions are really high level right now. And so the point of the case studies is to narrow in on some themes that will likely be focused on managing for certain ecosystem services, like you described your indicator project a bit. And so we're trying to pick those services or themes now and then understand trade-offs of different management approaches in that localized area. And how biodiversity is being affected by them, how it impacts different services, and how that in turn impacts different stakeholder groups.

BD022: And it's a bit chicken and eggy in that one could argue that if you go through that process, you should cast a net really wide at the start. But the problem there is that as you narrow, you might start to dump stakeholders off the list and they don't like that as opposed to the other option is to go through that process, narrow in and then that will inform you who your collaborators should be, especially transboundary, which is more efficient but then they might not feel as much ownership. But for instance, if you're managing fisheries or southern resident orcas in the Salish Sea, you kind of need to talk to the Canadians. But it depends on who you talk to and how, but yeah, all those management issues around some fisheries, shipping impacts, just the sheer volume of shipping going to the Salish Sea, all that is pretty critical. But you want to keep it simple, so that's the challenge. I think there must be, or I'm from Vancouver see, you would think I know this, but there must be some exist, there has to be some existing trans-boundary management forms or something. There must, there has to be.

Interviewer: Yeah I think there are and even like just logistically in terms of workshops, someone was telling me recently who did some workshops in the Salish Sea about a some sort of like, I don't know who owns it, but some space like physical building space that's on the border that like you don't people don't have to cross the border technically and they use them for meeting spaces between the two countries. I’d never heard of that. But yeah, the political dynamics of the Salish Sea are really complex obviously with indigenous knowledge as well, like incorporating tribal managers and Canadian managers and US managers. So we were gonna do the Salish Sea first and I have now advocated for it to be our last case study because I feel like it might be the most obligatory. So I'm like let me get my feet on the ground here with the Gulf of Mexico first, which like most of my thesis work was in the Gulf of Mexico, our collaborators in Alabama. So I feel like I'm gonna tackle that one first, see how it goes, and then go back to the Saylor Sea.

BD022: Sounds wise. Yeah, so maybe, well I know what I'll send you. Yeah, because we've had to address this with our trans, or you know, our multinational monitoring programs, like the Circumpolar Biodiversity Monitoring program because that was eight countries digit, eight digitist groups as well. So yeah, it's super complicated. But it can be potentially rewarding. I was amazed at how much we were able to streamline just between things like how Canada and the US and Canada Greenland were investing resources in monitoring. and they weren't talking to each other. So we were basically tripping over each other with like plankton transacts and stuff like that. Yeah. Anyways, yeah, I'll send you a few things that I can think of.

Interviewer: That would be great, thank you. Yeah, yeah, and I was just, when I was just visiting Juneau back home, like it sounds like the Chinook fishery up in the Southeast Alaska is also now being impacted by the Orca management dynamics in the Salish Sea, which I didn't realize naively that like those two, I guess the way that the streams are set up, which makes sense, but the issues like extend far and wide, literally and spatially. So.

BD022: Absolutely. Yeah, it's super complicated. I mean, Southern resident orcas are, you know, arguably just sort of canary and that they're the most sensitive. So as the system is under stress, the first thing is to start to decline. And so they're revealing all of that issues to me on Chinook salmon, shipping, and then of course, plumes. It's a big one as well. So. Right. Yeah.

Interviewer: Yeah. Well, anyways, thank you so much for your time again. I really appreciate it. This is very, very informal.

BD022: Yeah. No, my pleasure. Yeah. Good luck. I'll send you, yeah. I'll send you a few things for sure.

Interviewer: Okay. Thank you so much.

BD022: I'm happy to answer any other questions.

Interviewer: Great. Thank you. I might take you up on that.

BD022: Okay. All right. Have a great day.

Interviewer: Yeah. You too. Bye