Interviewer: So to start I was just hoping that you could tell me a little bit more about your area of expertise and your current work responsibilities in your current position.

BD024: Sure, so I trained as an ecologist and a biogeochemist in the natural science side. I mostly work at the interface between natural and social scientists trying to just bring evidence and information about the consequences of decisions on the environment and people. And so worked most of my career in conservation organizations or at the interface between universities and conservation organizations informing different decision makers. And my current role is at the White House Office of Science and Technology Policy and I'm the assistant director for biodiversity and conservation sciences in the climate and environment team. And I hold our nature portfolio, which is pretty broad, but interfaces with things like the America the Beautiful initiative, making sure that it has a science-based framework. We have a lot of emphasis on nature-based solutions and making sure that they are considered in that - in that America agenda, which is all the infrastructure funding. And then also our point on things like ecosystem service valuation and federal benefit cost analysis and our multilateral negotiations around nature-based forums, like G7, G20, and CBE and things like that.

Interviewer: Gotcha, okay, great. So really, really broad question to start, but I think like I said in the email, the overarching goal of this project is to understand the role of biodiversity in marine resource management. And so what we've been finding so far is that the term biodiversity means different things to different people and it can be measured in multiple different ways. And so as a starting point, I'm hoping to know what you think about when you think about biodiversity and what you see as the key aspects of biodiversity.

BD024: Okay, I should have said at the beginning too, so I will primarily answer these questions from my personal perspective. It's my opinion about biodiversity. So wait, you said, what does it mean and what was the second part of your question?

Interviewer: What are the key aspects of biodiversity as you see it?

BD024: Yeah, so I think about biodiversity in the very, very broad ecological sense of the term that I was trained in and including the biogeochemistry perspective. So I think about it as all of the interactions among all living and nonliving parts of the environment. So that's broader, I know than some people describe it. I think of it as all of the levels of diversity, so genetics, species, system, and their interactions, and I include people as a species, and an interactor in that system, so I also include ecosystem services in my thinking about biodiversity. We generally now in the USG perspective have used the term nature in a lot of our work because we think it elicits that broad consideration, which we think is most useful from a public perspective and a policy perspective, and have found how a lot of people think about biodiversity as a term is much more narrow. And sometimes only thinking about species diversity. So those are my two answers.

Interviewer: Perfect, great. Yeah, and so, okay, so as a follow up to that, then we're talking about species diversity. So part of our project is focused on thinking about functional diversity, again, within the marine resource spectrum. And so we've been conceptualizing biodiversity in the marine system into these four bins. And I'm wondering if you agree that these are the key components of marine biodiversity. And so they are habitat-forming species, species of conservation concern, harmful organisms, and key food web-supporting species. And I can put those in the chat. I'm a visual person personally, if you want me to put them in the chat.

BD024: So just from a species diversity perspective? What were you saying?

Interviewer: I guess from your entire perspective, I guess. I would appreciate it.

BD024: Yeah, so again, I would think of biodiversity as broader than species, so I would have that pre-emption. Can you just say them again?

Interviewer: Absolutely, yeah. Okay, habitat-forming species, species of conservation concern, key food web-supporting species, and harmful organisms.

BD024: And you are using these categories to what?

Interviewer: To conceptualize biodiversity more concretely.

BD024: I mean, I guess my initial reaction is like, it's not comprehensive. Right, like there's sure to be species that aren't any of those. So again, like are those useful categories for focusing management that's likely to provide efficient entry points for limited resources? Probably. Should that be put out there in the world as a representative and comprehensive set of categories for all of biodiversity? Probably not. I guess that would be my reaction.

Interviewer: Okay, great. So that feeds right into my next question 'cause the goal of this project is to better understand if and how biodiversity is being managed for. And so I'm wondering your perspective on that. Like is biodiversity a consideration currently in marine resource management? And if it is, how is it being managed?

BD024: Huge question.

Interviewer: It's the reaction I always get.

BD024: Yes and no. It depends on the management context. And remind me again, is this US focused or?

Interviewer: Yes, it's US focused, yeah.

BD024: So still depends on - some management approaches are very individual species oriented. And so those are really focused on individual species. And sometimes, the government - any response - considers interactions with other species of the ecosystem and planning for management of species and sometimes less so. And then there's other policies and regulations that are not individual species oriented but might be system oriented. And even in those you may like the intention, the policy intention may have been for a system approach but then the functional implementation is usually far from that. To some degree because of justifiable data limitations, to some degree because of lack of capacity or investment. I'm often kind of terrifyingly shocked at how little information is used even under an ecologically well-imagined management construct. So it can all sound good in the language and then what's actually brought to the planning process can have nothing to do with diversity. So I think there's, again, I would just say that it's a spectrum. In some cases there's really robust consideration of biodiversity information and interactions. And in other cases there's none, even when the policy precedent is there for it.

Interviewer: Gotcha. So could you give me some examples of some of the instances where there's robust considerations of biodiversity in management?

BD024: In marine systems? I'm only laughing, not because there aren't any, but because I've worked less in marine systems recently, so I know less about that. I guess the one I'm familiar with is thinking about coastal ecosystem restoration or management for flood risk reduction. So there's been a ton of science and analysis on how individual species or community structures reduce flood risk, you know, wind attenuation in coastal zones, either coral reefs, oyster reefs, marshes, dunes, etc., mangroves. What their specific and community functions are that affect that process. And that is increasingly used specifically in management and planning processes, whether they are government or private sector, like that kind of stuff is getting built into private sector risk models. And again, sometimes that's individual species associated information and sometimes it's like habitat associated but with a functional understanding of what diversity is doing in that habitat to that function.

Interviewer: Okay, great. So then on the other end of the spectrum, in thinking of instances where biodiversity isn't managed for, are there - I think you're gonna laugh at this question again and say this is a big question but - are there actions that you think are needed or tools that you think um should be utilized to better manage for biodiversity that we're not utilizing right now?

BD024: Oh there's so many. I'm gonna give you the list that to me are the most shocking that we do not have that are not used. So basic species diversity indicators with reasonable high resolution coverage for the entire US EEZ do not exist apparently. And like fishery landings data. It's like, it's not that exciting. It's a public repository, which is insane. Yeah. It's insane. Yeah. Yeah. I mean, I'll just stop there. There's like so, so, so, so many things. I mean, the other thing, I know it's getting work done I think- it's some service type stuff, as I mentioned. So I also think a lot about most of the biodiversity, like species data is completely disconnected from function - right there's even less functional data than the species representation data and there's even less that connects.

Interviewer: Oh I lost you. Oh sorry you just cut out I missed a bunch of that.

BD024: Okay, I think I was complaining about the lack of connection between species richness information because it's a function of information. And a good case is like carbon. People have been working on and trying to build up like coastal wetlands information and data about how different species compositions accrue carbon over time and cycle different nutrients, etc. But again, back to the sheer basics, there's not even representative biodiversity species richness data nationally, which is insane.

Interviewer: I think you were just starting to answer this, but I'm wondering how research, how academic research or NGO research, could better inform management to protect biodiversity better for the future and to sustain it in the future.

BD024: Yeah, I mean, for that, like basic species data is so critical, but then frankly, that is like the tip of the iceberg in terms of informing management because that's just like what's sitting there hanging out and everything in management is about what the fact of management practice is. And where the management is happening and what it is. And so I'm also amazed by how little information we have about presence or implementation of different conservation or other management practices, like what is actually happening where. And then what is the assumed outcome? What is an evidence-based interpretation of the likely outcome of those management practices under different contexts. And in an ideal world, from a science perspective, we would be observing impacts. We would just be regularly reporting on the outcomes of everything, which we are probably a millennia away from. And so in the meantime, all of the management decisions have to be made on a forward-looking assumption about effectiveness. And again, like the actual available information about effectiveness in terms of relating different conservation management or natural resource management options to each other is incredibly limited. So I want to say look at all of the marine management options I have for estuary D and know something about the current condition of that estuary and have a set of management objectives. But for my individual agency or for a set of agencies that are collaborating, it's a set of actions that we can take and they're likely outcomes. Looking at that from a fairly simple level, it's frankly impossible. Right? Like if I am a fishery manager that wants to manage a stock, I can do it. Right? And I can use a fancy model for it. If I am an estuary manager and I want to understand how farm bill programs are affecting water quality and what the - you know - state water board could be doing that would improve that water quality in combination with what NOAA is doing that can improve that water quality, I can't do it. Right. Unless I have a PhD researcher fully focused on that, synthesizing the research for that place, for that set of actions for the next two years. Right? And that is not functional. Like that's not an informed decision you think is not possible in that. So anyway, more consistent analysis, let me try and paraphrase, more consistent in like comprehensive analysis of the effectiveness of multiple conservation actions in marine outcomes is really really really needed. And having that in a consistent way so that you can compare actions and you can think about multiple outcomes is really important. Because again like most of the science is looking at like an individual management action and a small set of outcomes. We as students are going to be looking at the target outcomes. And more and more as we get a better sort of system-based management, nobody's thinking about an individual outcome. And if you want to look at multiple outcomes, you're looking at multiple different papers that use different parameters that didn't look at the same management interventions and you just can't compare them and you can't sort of say, "If I take this action, here's the set of outcomes that I can expect."

Interviewer: So are researchers, practitioners, managers across these different sectors collaborating or is that something that needs to be improved in the future?

BD024: Yeah, yeah. Of course, some of them are collaborating. Yeah. But there's still huge silos and very separate, you know, research communities, very separate research management communities. Still lots of stigma - I continue to be amazed by, like - against applied research informing research. So tons more of that is needed.

Interviewer: Gotcha. Okay, and are there resources that are needed to better facilitate that collaboration or to better facilitate managing for biodiversity better in general that we don't have right now?

BD024: Yeah. Here's my answer. So I'm just thinking now, well, so certainly from NGO management and NGO partnership management perspective, there's more potential there for problem-oriented engagement that helps a ton with that kind of collaboration. And as much as NGOs have funding and time to convene around those sort of decision points and issues, it can be very effective. But that doesn't always happen. Right? Often they just make a recommendation without convening. And I have seen some universities do an okay job of setting up those spaces for academics, but not many. So I think facilitation functions, boundary organizations, those kinds of mechanisms that curate a question and bring the right set of expertise together to collectively inform on an issue is needed. And those don't have to be like long processes. They can be sort of rapid insight mechanisms or they can be five-year grant programs. But kind of regardless of the motivation incentive to you know work on applied problems and then the like functional mechanism to engage with decision makers is still lacking.

Interviewer: Gotcha. Okay. I know we're almost out of time, but last question to follow up on that. Are there other barriers that exist currently for incorporating biodiversity better into marine resource management?

BD024: Yeah, I mean, sort of just on the science side, there's the policy side, right? So recognizing that whatever your meaning of biodiversity is, is relevant to resource management, it's still lacking. And functional policy language that makes space for those considerations and prioritizes or motivates those considerations. Again, in a lot of green management contexts, it isn't there.

Interviewer: Yeah, okay, great. Okay, well, I will stop there because we're about out of time, but thank you so much for fitting me in your schedule. I really appreciate it.

BD024: Yeah, thank you for doing this work. I hope it goes well.

Interviewer: Thank you, thank you. Have a great weekend. Thank you. Bye.