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BD060

**Interviewer:** So to get started I was hoping to learn a little bit more about your research and your area of expertise, and then I can tell you a bit more about the project we’re working on with Arianna and some other collaborators. And then if we have time, we’re building these conceptual models with folks to see how they think about biodiversity within the framework of their study system and their area of expertise.

**BD060:** Yeah, I can do that. My background is within wetland ecology and community ecology, and I primarily work with plants. Occasionally with invertebrates as well. And my research is about global change drivers and how that shifts plant communities in the coastal zone. And in the past few years, I’ve been really interested in and dialed into sea level rise as a driver for change in coastal ecosystems. And I’m talking about near-shore coastal ecosystems, like intertidal and very close to the high tide line.

**Interviewer:** Ok, gotcha.

**BD060:** And then my research, in the realm I’ve been looking at how forests are being killed by salt and transitioning to coastal wetlands. And I've been interested in forest tree mortality and ghost forest formation. And then I’m also interested in how salinity and flooding are killing crops in farmland, whether we can come up with what happens to farm land when it’s abandoned and invaded by salt. How do the new plant communities assemble in those fields. And also are there restoration and management activities that we can do to shape and guide the trajectory of those farmlands while they’re transitioning.

**Interviewer:** Ok, very cool. So, like I said probably pretty briefly in the email, our high level overarching goal in the project is to understand the role of biodiversity in marine resource management. And we’re talking about coastal and marine resource management. So, how we’re doing that is we’re interviewing folks such as yourself, other technical experts, broadly across all fields of coastal and marine resource management and marine biodiversity. And we’re hoping to understand first how folks think about biodiversity. One thing that we learned very early on in this project is that there isn’t a lot of consistency in how folks define and think about biodiversity, and of course there are a variety of ways that you can measure biodiversity. And then we want to understand how we manage for biodiversity in the US, either directly or indirectly. And so, we’re interviewing a variety of community members and stakeholders, including researchers, academics, technical experts, regional managers, and then local community members including fishermen, watermen, oyster farmers, waterfront homeowners, tourism operators, those sorts of folks. And what we hopefully want to understand with this project is what aspects of biodiversity are researchers and managers thinking about when they make decisions, and do those align with the same aspects of biodiversity that community members value or rely on for their livelihood or for other ecosystem services.

**BD060:** Sure. You’re going to distinguish researchers and managers, right? Because I don’t want to speak for managers.

**Interviewer:** Yes, yeah. We are. We’re talking to researchers across the country to get a broad perspective, but then in terms of managers and resource users, we have three case studies that we’re focusing on. So one is the Northern Gulf of Mexico, and we just concluded that case study last fall. And then, now we’re on our Chesapeake Bay case study and then we’ll go to the Salish Sea this fall. And so for each of those studies we’re talking with managers, regional managers who have regulatory power, along with local community members.

**BD060:** Ok, cool. That’s awesome. I’m really excited about this work, I think it’s a really clever idea and I like the way that you’re going about it so, it’s really great.

**Interviewer:** It’s daunting to be honest. But the Gulf case study went really well. The Chesapeake one has been a lot of similarities that have already emerged and synergies, but a lot of differences as well, as you can imagine. So it’s been really interesting.

**BD060:** Well, I know Ariana has great expertise there, so that’s awesome. And another thing I think I want to say about my background is that I do work closely with managers in a lot of different ways. So I work with monitoring, restoration projects, I work with economists thinking about behavior change and incentive structures, yeah so there’s a lot of different… I work with TNC on TNC land and kind of thinking about how they’re managing lands. I’m also on the Chesapeake Bay Seminole Site Cooperative steering committee and management team. And I’m a co-author of the state Saltwater Intrusion Report. So there’s a lot of different ways that I connect with management.

**Interviewer:** Yeah, very cool. Before I forget, do you know anyone by any chance at TNC locally who would be willing to participate in our study? Because I’ve had a really hard time getting in touch with anyone in TNC. I’ve emailed four people and I haven’t had -

**BD060:** No, I work with TNC in the Virginia Eastern Shore, but that is the Chesapeake Bay as well. So I could put you in touch with someone in that office. The person to talk to might be Jenny Miller, Jennifer Miller, who is the site manager. Because I have a lot of trouble getting a hold of the director of that chapter.

**Interviewer:** Yeah, gotcha. Ok. She’s probably just stretched really thin.

**BD060:** And then I also work with Alex Wilkeith. She does all the permitting and she’s a researcher herself in shorebirds, which is much more the coastal base than the Chesapeake Bay. A lot of that office, they do more coastal bay work than just Chesapeake Bay work.

**Interviewer:** Yeah, the Chesapeake Bay is so interesting. Even NOAA and EPA folks that I’ve talked to, they have a whole separate Chesapeake Bay sector. I think a lot of them say the Chesapeake Bay program, if I understand it correctly, and so I went to DC to the NOAA folks in science and technology and they’re like we don’t know anything about the Chesapeake Bay. And I was like wow, this is just such a different structure from a lot of other regions that I’ve seen, at least in NOAA.

**BD060:** Yeah. Yeah, they have a Chesapeake Bay office so you have to go there. It is, I mean Chesapeake Bay, it’s a sprawling environmental, nature community. I mean, it’s the biggest estuary in the country, so that’s warranted. And it’s a huge watershed. And they’ve put so much energy into water quality management and all that stuff so. Yeah. I guess, so you’re based in the midwest right?

**Interviewer:** No, I’m in Annapolis. I work out of SERC, the Smithsonian Environmental Research Center in Edgewater.

**BD060:** Cool. I was postdoc there.

**Interviewer:** Wow, I’ve met so many people, so many SERC postdocs in the region. And they all have amazing jobs. So hopefully this is a good outlook for me.

**BD060:** A good outlook, yeah. But I guess when I worked in New England, I used to work in the Chesapeake Bay scene and think it was a lot of, you know, overflow money from Congress and that they were totally overfunded. But then, now that I’m kind of in the scene, it really is very complex and sprawling and it’s nice to have all of these management groups interested in the Bay. So that’s good.

**Interviewer:** Yeah, it’s so funny you say that. I did all of my education at Northeastern in Boston, and it was the same thing. There’s a lot of Vims (?) folks who have migrated up to New England from the area and my perception of the Chesapeake is that there’s so much research going on there that I couldn’t imagine having a niche or a space for me to carve out, you know what I mean. There’s just so many institutions that are already set up and have been doing research for so long. But like you said, it’s such a massive study system. And really complex from a social ecological standpoint, I’m learning.

**BD060:** Um, so, yeah that sounds cool. I think - do you want to know how I think about biodiversity?

**Interviewer:** Yes, I do. And before we do that, I’m going to go ahead and share my screen with you. And I’ll just introduce this method a little bit while we talk.

**BD060:** I’ve used mental modeler.

**Interviewer:** Oh, fantastic ok. Love that. We used it at Sesync.

**BD060:** We used it at Sesync.

**Interviewer:** Oh, I know a couple people who have been in and out of Sesync. Do you know Steven Grey, who developed mental modeler? He used to be a post-doc at Sesync. But anyway, he’s our collaborator who developed this. He’s at Michigan State now. So yeah. We’re using mental modeler, and it sounds like you already know. It’s just a way that we can conceptualize how an individual thinks about their system, so we use it for knowledge capturing with experts such as yourself or we can use it with stakeholders, resource users, to understand what they value in their system and how they perceive their system. And so while we talk through our interview questions, we’ll build out a concept list for this system and then we can assess how they relate to one another. So really the reason why we’re using mental modeler for this project is because it helps us conceptualize and in a way quantify how management interventions are impacting components of biodiversity and ultimately our ultimate goal is to understand tradeoffs of management actions for biodiversity preservation, conservation, but also for access for different resource users who rely on different ecosystems for this system. So with that being said to get started, the first question being really broad to start off, I’m wondering what you think about when you think about biodiversity?

**BD060:** So I would say I think about species biodiversity and population genetics. And I sort of have those in two different parts of my brain, so I don’t do them together. But there are processes that affect both. And when I think about species biodiversity I would probably put a sub component of rare and endangered species.

**Interviewer:** Ok. That is great. That segways perfectly into my next question. So early on in this project, when we started to learn that there isn’t particularly consistency in the way that folks define and conceptualize biodiversity, we built a framework to hopefully help define biodiversity. Specifically marine and coastal biodiversity. And so we have four bins that we’re proposing - that we’re testing with this framework. I’m going to populate those into the model and I’m wondering that you agree with these components, and they’re specifically about species biodiversity. And if you don’t agree, what you would change or remove. So they are habitat forming species, key food-web supporting species… I’m going to stick this one here because I think it might be redundant, but species of conservation concern.

**BD060:** Yeah, exactly.

**Interviewer:** Ok. I’m going to take this one out.

**BD060:** Yeah, I would totally have those as the same.

**Interviewer:** Yeah, yeah. Ok. Here, I’ll do this. And then harmful organisms.

**BD060:** That is very aligned with my mental map.

**Interviewer:** Ok, awesome. Ok. Perfect.

**BD060:** I was even going to say that because I was going to say that in my system we have these really important ecosystem engineers of usually the primary producers. Usually the trees and the grasses and the marsh, and then, yeah. There’s all the other species that live within them and those are the associated organisms and they have the diversity and interaction webs.

**Interviewer:** Ok, cool. So then, next I’m wondering what management approaches within your study system currently manage for these components of biodiversity? Either directly or indirectly.

**BD060:** I guess one thing I want to say before we get to those is my mental map biodiversity is often about climate change stressors, so I always put in stressors or physiological stressors or environmental stressors, something like that. And then disturbance is another one, like storms - that is important for biodiversity.

**Interviewer:** Should physiological and environmental stressors be separate or on bin, do you think?

**BD060:** I would put them in the same bin, at least for now.

**Interviewer:** And then, sorry, what was the second one you said?

**BD060:** Disturbance. For example storms, fires.

**Interviewer:** Ok. Great.

**BD060:** And then in terms of management, certainly invasive species control is a common one I work with dealing with those harmful organisms. And another one I would put in this bin is really a little more upland, but when I’m talking about these farmlands that are affected by saltwater, which probably isn’t in your list of coastal ecosystems.

**Interviewer:** Yeah, not really. Although, agricultural land management has come up a lot, but I would say yeah, farmlands are probably too far inland in terms of the spatial parameters of our project.

**BD060:** Sure. Because that’s when I think about mowing, we’re actually talking about prescribed burning, but I think there are some people using prescribed burning for harmful organisms in the marsh. So you could put burning in there.

**Interviewer:** Ok, burning.

**BD060:** And then, yeah, we’re also thinking about - a major issue in my system is about tidal marsh loss, and especially interior ponding. So basically there are these microtidal marshes in the Chesapeake Bay. And when they drown due to sea level rise, it doesn’t always look like the waves coming into the marsh and eating the marsh. What it often looks like is changes in the hydrology within the marsh that results in ponding within the marsh interior, and then those ponds coalesce into bigger and bigger lakes, and then basically the whole marsh is water. It floods until the whole marsh becomes water altogether.

**Interviewer:** Interesting.

**BD060:** So that’s the kind of management that we’re thinking about how to prevent. And so drainage is really important. And so there’s runneling is one type of drainage. Those are really shallow ditches.

**Interviewer:** That can’t be how you spell that. Is that right?

**BD060:** Just one L.

**Interviewer:** Just one L, ok alright.

**BD060:** And there’s another type that has been tried in the Chesapeake Bay called tidal creek extension, and that’s more trying to replicate a sinuous creek channel that’s deeper. And then sometimes we’re also thinking about, and this is a second management type, the use of dredge oil to create marsh water and facilitate accretion in marshes. And the whole idea of these drainage and dredge oil approaches is to stem marsh habitat loss in ways that can support these habitat forming species that can support the food web.

**Interviewer:** Right. Ok. So, I’m going to start drawing some arrows based on what you just said. So it sounds like these dredge oil and marshes negate impacts of tidal marsh loss, and also for habitat forming species.

**BD060:** Yeah. Or you can just connect tidal marsh loss to -

**Interviewer:** Oh, like this. Ok.

**BD060:** And you can connect prescribed burning to harmful organisms and invasive species.

**Interviewer:** And so we use this to - so if we have more creation of marsh, if we increase creation of marsh, then you said we’re going to decrease marsh loss, right? So that’s negative. If you’re familiar with Mental Modeler, I always - people think like okay, this is negative in terms of our preferred state, but it’s actually decreasing so we think of it as increasing and decreasing. So if we increased our marsh creation, then it would decrease marsh loss, right?

**BD060:** Gotcha. It sounds like the drainage one is negative too.

**Interviewer:** Ok. And then, tidal marsh loss is a stressor for habitat forming species? Is that correct?

**BD060:** Yeah, it’s negative.

**Interviewer:** And then burning phragmites is positive or negative for harmful organisms?

**BD060:** Negative.

**Interviewer:** And invasive species control is…

**BD060:** Negative.

**Interviewer:** Ok, perfect. Yeah. Ok. Was there any other management components that we need to add?

**BD060:** Yeah. I’m trying to confine my management ideas just to, like, intertidal marshes. Because I think some of my work that’s up slope is a little bit outside of the bounds of what you guys were thinking, is that ok?

**Interviewer:** Yeah, I think that that is perfect.

**BD060:** Ok. Um, well I guess I would like to mention that there’s a lot of work around salt marsh birds. I’m sure you’ve talked to other people about salt marsh birds. It’s a big deal in terms of management, because we have a lot of rare and endangered salt marsh birds. We’re trying to avoid the listing of the salt marsh sparrow, and we think that the preferences and the needs of the salt marsh sparrow are somewhat representative of other marsh birds, and they all need these habitat forming species. So there’s a relationship especially between either of the \_\_\_ species, but apparently it needs a thatch later, it needs this high elevation, high ground, because when the tides come in it can flood the nest. And so, we’re doing all the management that I mentioned for the habitat forming species, we’re really thinking about salt marsh birds. I guess one other thing, this is an important one too, management for marsh migration corridors. And so this is kind of a land acquisition management. So we’re acquiring land that’s at slightly higher elevation in adjacent to present day hydrologic connectivity or present day marshes, where we think that marshes with sea level rise, and where we think that this will be good future habitat.

**Interviewer:** So it’s land acquisition of upland marshes. Is that correct?

**BD060:** You could say future marshes, or future habitat.

**Interviewer:** Future marshes, habitat. There we go.

**BD060:** And that’s to deal with these rare and endangered species, and also these salt marsh birds are an example of those.

**Interviewer:** Great.

**BD060:** And that land acquisition, that’s specifically called Marsh Migration Corridors. If you can just put that in there, yeah. And there’s also related to management, easements have been developed for that purpose.

**Interviewer:** Ok. And so this is for this. Sorry, could you explain what easements are? Because I’m uncertain.

**BD060:** Sure. So easements are where you make a deal with a private property owner. They transpose some of their property rights into perpetuity and they get some money from that. Essentially, an institution or the government can buy part of their property rights.

**Interviewer:** I see. Ok. So, that’s positive in that. Great. So I was going to ask what stressors impact the system, but I know you already brought in a few of those. Are there any other stressors that we should add to the system?

**BD060:** Um, I would add… yeah so I mentioned drowning and habitat loss, and then I mentioned phragmites as an invasive species.

**Interviewer:** So we have burning as a management control for phragmites and then we have our general bin of harmful organisms. Should we add in phragmites as a separate bin, or do we think it’s covered there?

**BD060:** No, we should because we should connect it with rare and endangered species and habitat forming species. Why don’t you just connect it to habitat forming species and just put a negative there. Because that’s basically, like, outcompeting a bunch of native habitat forming species.

**Interviewer:** I see.

**BD060:** And you can also, if you want to put habitat forming species, put an arrow into endangered species plus, and then down to key food web supporting species is a plus, and then I would give habitat forming species, maybe I would just call that native habitat forming species.

**Interviewer:** Ok, great. So I was just color coding, sometimes I think that that’s a little helpful. So I was putting our stressors as orange, so we could see which ones are which.

**BD060:** Cool. Um, I’m sorry, are there any other stressors… I mean that are kind of worth mentioning? There’s eutrophication, that can have a big effect in some places so I would probably add eutrophication in there as a stressor. And then there’s sort of like, there’s some legacy impacts of ditching that are really coming back to bite us in terms of marsh conservation.

**Interviewer:** I’ll just put ditching.

**BD060:** Yeah, I think it’s important to call it a legacy effect. It really had a big impact initially, and it was fine for a long time and it’s maybe still fine for some marshes, but now there’s this interior ponding unfortunately. Like, where there’s a lot of ditching there’s an extra interior factor. So the interior is a much bigger proportion of the area when you have these smaller areas due to ditching. And so they’re calling them waffle marshes, out in the coastal bays of Maryland, because they look like a grid with a little pocket of syrup in between every box.

**Interviewer:** Interesting. One of my good friends from grad school in my PhD cohort studies ditching, and the effects of ditching. And she had a really cool social ecological thesis where she looked at the species diversity of shorebirds, and then topped with waterfront homeowners and other coastal community members to see how ditching effected diversity and how that effected the ecosystem services that they derived from their nearby marshland, which is very cool.

**BD060:** Very cool, yeah.

**Interviewer:** So I’ve heard a bit about ditching from her. From preps for thesis defenses and oral exams.

**BD060:** Yeah, so I think that’s pretty good about my mental map. I think some other people may tell you about how crabs are - some people find there’s some issues with crabs eating marsh grasses, but I see it as kind of still in pretty good shape to the level of stressor. I think that one thing I’ve been interested in from a research perspective is whether I just want to come back to the population genetic diversity because I think the loss of habitat area and reduced population sizes has often reduced population genetic diversity in ways we sometimes don’t even know about, and that may be having sort of a latent effect on the ability of species to respond to stressors, they’re adaptive potential. So the connection between genetic diversity and adaptive potential and stress response or something.

**Interviewer:** Adaptive potential and stress response?

**BD060:** Yeah, exactly.

**Interviewer:** Ok. And so this goes here, right? That’s what you said?

**BD060:** Yes. And it has a positive relationship.

**Interviewer:** Ok.And then, was there a connection between species biodiversity and specifically habitat forming species? I thought you said population genetic diversity.

**BD060:** I think you captured in your four groups what I think of when I think of species biodiversity. Yeah, you can put a negative from the harmful organisms to like the food-web and the habitat forming and the rare and endangered. That’s part of my…

**Interviewer:** Yeah, ok great. So is species biodiversity, is that redundant or should we leave it there?

**BD060:** It’s redundant.

**Interviewer:** Ok. Great. So, with our remaining time, I’m hoping just to add in any other relationships that you see with these components. And then since you’re familiar with mental modeler, if we have time and as you go and if you’re able to do so, we can add weights to these relationships. And so, for this project we’re just doing low, medium, and high impact. So that’s 0, 0.6, and 1. So I’ve been setting them all to one and how I’ve been doing this is as we talk through relationships that you add, if there are components that you think have a lower weight, that are low, medium, or high and you can specify that, then I’ll lower it. But then my standard will be to put them as a one if that makes sense.

**BD060:** Mhm.

**Interviewer:** Ok.

**BD060:** Well, can I add in one more management thing?

**Interviewer:** Absolutely.

**BD060:** Yeah, so I guess I didn’t talk a lot about restoration. So I have dredge oil creation, which is also thin layer deposition if you’ve heard that term before, but that’s the same thing. But we didn’t really talk about planting, and that’s another thing they do with the dredge oil creation. And that’s planting the habitat forming species and that’s a pretty important approach.

**Interviewer:** So how is - so is planting ok for the concept?

**BD060:** Yeah.

**Interviewer:** Ok. And how can we connect that to -

**BD060:** Can we say restoration planting?

**Interviewer:** Ok, yeah. And it sounds like that’s connected to dredge oil creation?

**BD060:** Yeah. And I guess I’d give it a positive.

**Interviewer:** So is the arrow in this direction, is that right?

**BD060:** I don’t know.

**Interviewer:** Yeah, I’m trying to think of it.

**BD060:** Dredge oil creation… I guess it goes the other direction. It enables the planting. You can sometimes do it without dredge oil as well, you can imagine a place where you can maybe do that. But mostly it’s done with the marsh creation. In the uplands we’re using planting a little differently, we’re trying to develop some seed mixes and stuff but that’s not really in the marshes. And then that has a positive effect on the habitat forming species.

**Interviewer:** Yeah, ok. Ok, great.

**BD060:** I do know that one of my colleagues has another harmful organism that’s a stembor? It’s mostly - they find it mostly in the New Jersey cost, but I have found it being an issue in the Chesapeake Bay.

**Interviewer:** Ok. Before we draw any more arrows, are there any specific relationships that you would like to lower the weight?

**BD060:** Yeah, I’m not convinced of burning having a negative effect on phragmites. So I would just put the weight kind of closer to 0.

**Interviewer:** Oh sorry, I think you mean this here right? And make that low you said. And then should we get rid of this arrow to harmful organisms?

**BD060:** Yeah, sure. I mean, phragmites is like an example of a harmful organism, like I put invasive species in there.

**Interviewer:** Ok. We can merge phragmites and harmful organisms and put phragmites as an example in there, if you think it’s redundant.

**BD060:** Yeah.

**Interviewer:** Ok. Anything else?

**BD060:** Yeah, and then we use herbicide. So then maybe instead of invasive species control, just replace that with herbicide.

**Interviewer:** Ok. Is that how you spell that? Ok, great. Any other weights that we want to change?

**BD060:** Let’s see… I guess, like, maybe we could lower the dredge oil creation and the drainage. Just make them a negative 0.5 each one because overall I don’t think they’re not doing the job enough.

**Interviewer:** Ok. You’re talking these two arrows right here.

**BD060:** Yeah. But I don’t know. I guess maybe I’m interpreting that wrong. Because it’s not about effectiveness of management, it’s about what is the direct effect of these things on the stressor. The direct effect is strong. The overall efficacy at a landscape scale is low.

**Interviewer:** Ok, yeah, so we want the weights to be relative to one another to understand what relationships are driving system dynamics.

**BD060:** Yeah, ok.

**Interviewer:** Ok, so leave those as high?

**BD060:** Yeah leave them high. And… yeah, I think it’s a pretty good map and I think everything else is a strong relationship, at least in my mental map.

**Interviewer:** Ok, great. So are there, you know, are there any other core relationships that we want to go into? We could go through the colors and bins, or if you have thoughts immediately if you want to throw them out there I could draw them, whatever makes sense to you.

**BD060:** I guess, in terms of this being about tidal marshes, then the habitat forming species, there’s a high marsh and a low marsh species. And the high marsh species is one that I get very concerned about because it’s especially affected by, it’s mostly affected by phragmites and it’s more affected by barrier ponding.

**Interviewer:** Ok. So, do we need a separate habitat forming species, or is it ok to just leave it as one?

**BD060:** I mean, I’m happy with this. I guess we could if we wanted to get a bit more specific, but I think this holds pretty well.

**Interviewer:** Ok. Sorry, will you repeat what concepts were impacting it?

**BD060:** Just the interior ponding, habitat loss due to interior ponding, is especially affecting high marsh and so is phragmites.

**Interviewer:** I see. And we have those arrows drawn already, correct?

**BD060:** Yeah. And high marsh is also where a lot of the rare and endangered species are. I guess it’s not a coincidence, all these stressors creating habitat loss that’s negatively affecting those rare and endangered species.

**Interviewer:** Right, ok. And we have those arrows in, perfect.

**BD060:** We have those arrows representing that already. Do we have a connection between rare and endangered species and salt marsh birds? They are a rare and endangered species, do we want to put a connection there?

**Interviewer:** Yeah, that sounds good! And that would be… which way would that arrow go? So is increasing rare and endangered species impacting salt marsh birds, or vice versa? Or both, it could be bidirectional.

**BD060:** Like rare and endangered species, would they increase… it’s sort of like the phragmites example.

**Interviewer:** I was just going to say, we could group them together if that makes more sense.

**BD060:** Yeah, and then you could just delete, maybe, salt marsh birds, because I think we have the arrows reflecting that already.

**Interviewer:** Yeah. I’ll specify sparrows. And then this goes there… and yeah. It already has the same arrows. Perfect. Ok. Any other key relationships that we should draw in? We don’t really have any relationships from these stressors up here.

**BD060:** Yeah, eutrophication we could draw to the habitat forming species as a negative and a positive to the harmful organisms. And also a negative to rare and endangered, because sometimes that means outcompeting, like for example plants get outcompeted in eutrophic environments. And the physiological I would put a line to population genetic diversity, and that would be negative. Because it's a selective force. And the same for disturbance.

**Interviewer:** Ok. To population genetics.

**BD060:** Yeah. And you could also do a negative to the habitat forming species, because that’s actually the ecological definition of a disturbance. Um, and I guess maybe also put - no, that’s good.

**Interviewer:** Ok. Anything from legacy effects of ditching? That’s the only one I don’t have connected right now.

**BD060:** Oh, I actually don’t think I could see that. I have the zoom window through it. Legacy effects of ditching, I would put a positive to tidal marsh loss, so you might want to move it down there.

**Interviewer:** Ok, great. And then any other weights that we want to change. I’ve been again adding them just as 1 for now.

**BD060:** I guess the eutrophication I might just turn down, and then we… oh, we don’t have sea level rise. That’s sort of my - it’s driving all these things. So that’s important to have connected to tidal marsh loss there as a positive.

**Interviewer:** Ok. And sorry, just to go back, any weight changes that we need to make?

**BD060:** Yeah, I was going to turn down eutrophication just a little bit, so those weights can just be low.

**Interviewer:** Ok, I’ll do medium, in quotes. I’ve been doing 0.6. Ok, awesome. Anything else that we need to add or change?

**BD060:** Um, I mean, yeah. I wonder about dropping a stress. Sometimes, because we do see these kind of smaller scale disturbances in the marsh during droughts, that’s kind of true. And I’ve seen it happen in our region too. And let’s see restoration, let’s go back quickly.

**Interviewer:** I think we have restoration and the planting.

**BD060:** And dredging, yeah.

**Interviewer:** Ok. Great. Let me save that. Well that was all that I had, you were probably one of the most efficient mental modelers.