02/21/2024

BD046

**Interviewer 1:** Ok, so just to start, I was hoping that you could tell me a little bit about your area of expertise and your current work.

**BD046:** Me personally or my office’s area of expertise?

**Interviewer 1:** Um, both would be great actually.

**BD046:** Sure. So, I am currently the acting director for the NOAA Chesapeake Bay office. We are an office that is part of the whole hierarchy, but we’re under fisheries and habitat. The office of habitat in NOAA fisheries. And the reasons are pretty obvious, the Chesapeake Bay is habitat for many many different species, fish species, shellfish species, that are important to, you know, the Bay states. So Maryland and Virginia. And home to some endangered species as well. So what we do at our office, we’ve got a couple of specialty things that we do that I’ll really broadly get into. We have an observation branch that takes surface and really water column measurements. You know, things like temperature, salinity, dissolved oxygen. And we give that data to the public. So in some cases we have added that to the website so that the public can make safe boating decisions. Or we’re feeding it to, we’re giving it to the scientific community modelers so that can inform things like hypoxic value. You know, the Bay water column and the Bay are kind of a habitat in of itself. It’s a habitat structure. So that’s one of the things that our office does. Is this helpful information?

**Interviewer 1:** Yeah, no, this is great. I mean, just even personally I’ve worked at a few NOAA science centers. But the Chesapeake office seems kind of unique in this sense.

**BD046:** Very, very, very unique. I mean, just stepping back a little bit, we serve two entities. We serve NOAA and the reason we exist in the first place is the Chesapeake Bay Program. So I don’t know how familiar you are with the Chesapeake Bay Program. It’s a state federal partnership, right. Not the foundation. The state and federal partnership. We joined in the meetings to build NOAA’s capabilities there, in the bay. So, the observations program that I just mentioned to you, part of our surface level operations, started as a partnership with the Park Service. And our water column, we’re talking about the dissolved oxygen, we give that to ecosystem modelers. That was very much a Chesapeake Bay Program initiative. They funded the pilot and we have taken that over. That’s actually funded in partnership - almost everything we do, or at least part of everything we do, is to support the Chesapeake Bay Program in the areas that NOAA works. Sustainable fisheries, right, habitat restoration, and we also do a lot in environmental literacy. There’s a couple of other key things that I’ll say. We do a lot of oyster restoration. So, we are really the lead agency for the tributary restoration programs of the Bay. We have many many different partners. State, army corps, non-profits… we are the lead in the sense that we coordinate the work groups and say we’re going to do this, what the metrics are, we do a lot of the habitat mapping. Where we’re going to put these things, how we’re going to put them in, mapping them, what they look like. We fund restoration, we fund post-restoration monitoring, we do a lot of these things in different aspects. I mentioned environmental literacy - again, you’re getting a lot of strange things. A fishery office is working in environmental literacy. But again, this is all in the office of the Chesapeake Bay Program. So, like, 20+ years ago the Bay program said we need an education program that teaches our kids about bay waters. And that became a grant program to NOAA to administer, and 21 years later we’re still doing that. And there’s so much to unpack there. Because you can’t just give a two or three year grant to, say, our aquarium or nature center and make actual systemic change. So there’s a lot of things that have gone into a meaningful watershed educational experience. And providing funds to schools so that they can embed that into how they teach. So, that’s also - we have people on our staff who run those grant programs and work with the State Departments of Education all the time. Let me see.. I had foundations, I had oysters, I had environmental literacy… again, the other thing that I will say we do is with the bay program, there’s a couple work groups that share or coordinate. And the big one is the sustainable fisheries group. So that is a goal team that’s charged with Chesapeake Bay blue crab stock assessments, investigating habitat linkages between habitat and fish productivity, so we fund research around that. That group developed forage fish initiatives and forage species indicators so we track that, we have experts that talk about that. So that’s very much a policy space and a science space. I’ll stop there, but those are kind of the bins. There’s a few others, but…

**Interviewer 1:** Cool.

**BD046:** So the way I came to this… you know, my undergrad was in marine biology and resource management. But I came to - I was a fellow with the EPA. Now they’re called staffers. If you’ve ever heard of the staffer program.

**Interviewer 1:** I have, yeah.

**BD046:** Which is really like young professionals who staff the various work groups. So I just mentioned the fisheries goal team, I mentioned that. We have a really smart, talented guy, named Bailey Roberts. Who is a staffer for them. It’ll be much more than just taking minutes. They’re the person who is oftentimes identifying, or writing group reports for community experts and things like that. I was one of those people for a short period of time, a little over a year. I took environmental - I took a job at NOAA as a contractor. We needed an environmental education program because one of the things I did coming out of college was I did some teaching from an educational center, and then I was a program director at an environmental center. But I’ve always - my passion really is marine biology and things along those lines. I just worked my way up through NOAA doing many, many different things. It’s been a lot of policy and administrative side, less so on the science. So I have not - I do have a master’s degree in environmental policy and science, but I don’t have - I haven’t really done hard science. My master’s work was looking at conservation banking for environmental species, like the feasibility of doing that for one specific species. Conservation banking, I don’t know if you’re familiar with it, but it’s kind of like -

**Interviewer 1:** I think I’ve heard that term actually.

**BD046:** It’s kind of like wetland mitigation. So, if there’s a law that says no net loss of wetlands. So if you’re a developer, whether you’re a state, a private, or federal and you need to destroy wetlands, you have to protect an equal amount. Or restore an equal amount. And there’s banks out there that actually sell credits for that. So it created a market for wetlands. That same thing exists for endangered species. Legally you can’t destroy endangered species and habitat. If you do, you have to restore that at an equal amount or protect. So a developer might say I’m going to destroy 10 acres of endangered species habitat over here. Over here, there’s 50 acres of that habitat that’s unprotected. It could be destroyed. So the developer pays to protect that and also to manage it so that it doesn’t get overrun by invasive species. They manage it in perpetuity in order to destroy those 10 acres. Um, so I did some grad work on that. Of course, in my professional career I haven’t used that at all, but um. So, yeah. I’ve taken - I’ve had many jobs. I managed an environmental department of education grant program, working with K-12 schools and environmental education practitioners, I managed our fisheries research portfolio. So working with PIs like Matt Auburn. I worked with Matt a long time. I helped spin out a - it’s great talking about myself. An online database that shares ecosystem telemetry data. I really geek out on acoustic telemetry. Tagging fish and then tracking them with telemetry receivers. Matt does that a lot, and we’ve sponsored some of that research, but one thing, yeah. One of my babies was that. And this is being done everywhere. It was someone else’s brain child, and Matt and I brought it to the finish line.

**Interviewer 1:** Gotcha.

**BD046:** Um, and usually I tell people now, 60 different people are putting their data in there. It’s a really efficient manager of data. Kim Richi, right over there too, Kim works with Matt. Kim is the reason why I did the… So, part of my job has been able to get me to work with people, help researchers or restoration practitioners and help them get that. I did - so what I did is I was a deputy executive of this office in 2017, so half of that job was very much keeping the place operational. The budget. And the other half was I - it was kind of a unique position that I also had the observations portfolio under me. So the hardworking people who keep our buoys running, who put in our fish telemetry stuff, that kind of fell on me. So I know a lot about those things, but I haven’t, you know, I don’t have published papers on telemetry but I can talk about it.

**Interviewer 1:** Yeah, very cool.

**BD046:** Oyster restoration is probably the same way.

**Interviewer 1:** Ok, cool. Yeah, oyster restoration in particular, I’m intrigued to hear more about that as we continue talking. That’ll be great.

**BD046:** Yeah, please.

**Interviewer 1:** Ok. Cool. So I’m going to share my screen. Have you heard of a software or tool called mental modeler before?

**BD046:** You know, I have but I know nothing about it.

**Interviewer 1:** Ok, cool. So can you see my screen? Are you seeing just the blank mental modeler software?

**BD046:** Yes I am.

**Interviewer 1:** Cool, perfect. Alright. So, this is a tool that we’ve been using to - basically you can use this tool to draw a system according to how an individual sees their system based on either their perception or values or, in this case, we’re using it to capture knowledge from experts such as yourself. And so, what we’re going to do is I’ll ask a series of questions and we’ll use those questions to build out a list of system components. And then, really, the tool is used to understand how those components are connected to one another. So as we’re adding in concepts, we’ll ask you how certain components impact others and we can draw the linkages. But we’ll start with some pretty open-ended questions just to get our concept list going. If that sounds good to you.

**BD046:** Yeah.

**Interviewer 1:** Alright, cool. So, like I said in the email, the really high level goal of the project is to understand if and how we’re managing for biodiversity. But really early on in the project one thing that we learned is that people think about biodiversity in different ways. There are many different ways to think about it and to measure it. And so, just as a really high level starting point, I’m wondering what you see as the key aspects of biodiversity.

**BD046:** Um, I think key aspects are healthy functioning ecosystems that - I think biodiversity is one of the linchpins to that. So ecosystems that provide a suite of functions and services to people and to the ecology.

**Interviewer 1:** Yeah, ok. I’m going to ask about ecosystem services later, but I’m going to add that as a bin over here. Ok great. So it sounds like - we’ll do this. And biodiversity - we’ll talk more about the relationships, I’m just going to start drawing them as you’re talking. Just to get us going. Ok, great. So one thing that some previous research from our team has done is we’ve built these four key components of marine biodiversity and we’re asking folks if they agree with these components, or if there’s any way that they would alter these frameworks. So the four key components are habitat forming species, key food web supporting species, species of conservation concern, and harmful organisms. So I’m wondering if you agree with those, if there’s anything you would change or add or remove…

**BD046:** So, I don’t disagree with any of these. When I think about an ecosystem - so if I name some of these things, habitat forming species. So things that are actual habitat. Like submerged aquatic vegetation or coral. Yes? And then - which some of those could be key food web species or not. So then I think about oysters, key food web species that I mean, yes, forages are integral to biodiversity. Species of conservation concern, so with those, I mean to name that, are we talking about things that are endangered or threatened?

**Interviewer 1:** Yeah, we’re kind of leaving the definitions up to interpretation right now. We’re hoping to build definitions as we build out the framework further. So that’s kind of why we’re proposing the framework and wanting to get feedback from folk like you. In general yes, but if you have other thoughts of what would fit in that bin, that would be helpful to hear.

**BD046:** Well, I guess, where do… I don’t know how you would label it. Where do your everyday species come in? Again, if I look at the Chesapeake Bay, I can name you several habitat forming and food web species. So then I get, yes. Everything could be in the food web. But a striped bass or a summer flounder, I don’t automatically think of - well, surely their juveniles are food web species, but where does an adult fish fit into these biodiversity models?

**Interviewer 1:** That - I think that, probably how you just described it, a lot of folks have kind of thought of key food web as the all encompassing, but other folks have separated out what you’re describing into other bins. That’s something that we hear a lot. So we can do that if that’s what you think is more appropriate. I should also say that for some of these other interviews, we keep these really high level bins, but I’m really hoping to hear more from you about the Chesapeake Bay in particular. So if there are key Chesapeake concepts that you want to add in, we can do that, or if you want to tailor this to the Chesapeake that would be great as well.

**BD046:** I mean, again, maybe it’s just high trophic level species. Because that - I mean, when I see food web supporting, I think of things lower on the trophic level. So then I think of that, you know, higher on the trophic level species. It’s interesting because with 3 of the 4, or if it’s now 4 of the 5, I see kind of linkages and interactions. That’s - it’s just the food chain. It’s the web, you know. The species of conservation concern then, it strikes me as different. Not as something that shouldn’t be focused on, but it strikes me as, you know, we’re talking about things like their populations are being extracted… again, I’m not thinking it shouldn’t be in there, I just see it differently than the other three or four. Because harmful organisms are having those direct impacts on the web and on biodiversity. But you - I like the notion of having the species of conservation concern because you have to have that as part of… any study of biodiversity needs to consider what is going away.

**Interviewer 1:** Right, ok. Yeah, I’ve heard very similar things so that makes a lot of sense. Ok. So maybe we won’t add them to the model just for complexity’s sake, but I was wondering - because you were saying that you could talk about things in the Chesapeake for each of these. I was wondering if you could tell me a little more about the key species or priorities within these bins for the Chesapeake. For informing the rest of this case study. Which, I don’t know if I said this in the start, I should have prefaced this. But those kind of high level research goals that I’ve outlined, those are the overarching research goals, but then because they’re so broad, we’re doing three case studies for the project. I don’t think I mentioned this.

**BD046:** No, no.

**Interviewer 1:** So our first case study has been the northern Gulf of Mexico. So we just wrapped up a study there last fall. And then our second is the Chesapeake, and the third will be the Salish Sea this coming fall.

**BD046:** I don’t know where that is.

**Interviewer 1:** It’s off of Washington. Half of the southern Salish is off of Washington State, and the northern Salish is off of British Columbia.

**BD046:** Ok, ok.

**Interviewer 1:** Do you know the Puget Sound, like University of Washington? It’s very… puget is a subsection of the Salish.

**BD046:** Gotcha. Ok.

**Interviewer 1:** Yeah. Anyways, so yeah. We’ve been building all these high level conceptual models with these big broad bins, but now we’re starting to dive into the Chesapeake specific models. Which is in part what I’m hoping to get from our conversation today. So yeah. So are there any - you were starting to say before how there were things you could think of immediately for each of these bins for the Chesapeake. Do you mind talking about that a little more, what the key priorities are for these?

**BD046:** Yeah, absolutely. So, with habitat forming species I would say in the Chesapeake Bay it starts with oysters. Oysters - there are a lot of parallels with coral reefs, right. I mean this - going back, we are at maybe 2 or 3% of the historic amount of oysters we used to have. So the Chesapeake used to have an amazingly abundant oyster population. It’s well documented that they were navigation hazards, right. And so we have plunder from overfishing. Disease came in, disease really started to hit them in the 1950s and then poor water quality impacts. But they are hugely beneficial for a number of reasons. One, for water clarity, that’s a big ecosystem service that they deliver. They’re a habitat, I mean we know this. They’re a reef forming pollution traps, many small fish go to these, you’ll have anemones and sponges and squirts, and all kinds of things that, you know, all these marine invertebrates - it forms a basis of the food chain in the Chesapeake. That sends other larger fish higher up the trophic levels to forage.

**Interviewer 1:** Right.

**BD046:** We’re also seeing inter relationships between oyster reefs and SAV beds. So, submerged aquatic vegetation where we’ve done oyster restoration or have seen oyster reefs come back, and in proximity, whether it’s ringing them or in a semi-protected bay close by, because of the increased water quality you have SAV beds. And SAV, that’s an extremely important habitat in the Chesapeake Bay as well. We’ve got - again, at a fraction of what it used to be. But there’s a couple of really important places. Susquehanna flats up north, and then Pocomo or Puter sound rather, in the south. With these huge submerged aquatic vegetation. We call them SAV here, it’s not underwater grass. We don’t call it seagrass, because we’re not in the sea. Everywhere else in the world, you go to Florida, you go to Australia, they call it seagrass. We don’t call it seagrass here. Even though some of the species are the same.

**Interviewer 1:** Gotcha, ok.

**BD046:** So those I would say - and then there’s multiple… so we have one oyster species and multiple SAV species. But those I would say are the key habitat forming - and some of the research that I’ve seen on SAV beds is that SAV banks are better than oysters from a habitat perspective, but of course you don’t quite get the water filtration. The other issue with SAV is it can be very finicky in some areas. There’s some places where it’s been well established and those beds have been habitats for decades. There’s many places where we get a couple hundred acres one year, and the next year it’s gone.

**Interviewer 1:** Gotcha, ok.

**BD046:** So, more than oysters, they are susceptible to water quality. But, yeah. I think as a starting point, habitat forming species, you’ve got those. Then from a food web perspective - and I guess I’ll go macro. Of course there’s, you know, phytoplankton and so on, and you know, those are important for the aforementioned oyster reefs. Because those eat plankton for food. Um, but, we’ve really - the community has done a lot of research on our key forage species. So, lysids, I think those are maybe a crustacean, we’ve found those are really really important to high trophic level fish. Um, polychaete worms, and then we have a lot of small fish. Bay anchovies are very very important. And then some small fish, the juveniles of some larger fish, so like, juvenile spotted croaker are a really really important forage species for key web species. Which speaks to why, the fact that the Chesapeake Bay is a nursery. You do have a lot of fish that come in, lay their eggs, and leave. For portions of the year, anyway. And their young remain. So it is really a key nursery reef. And for those fish, why is it a nursery? Because it provides forage and then those species also become forage. Yeah, there’s more, and by the way so much information can be shared if you ask myself or… the other person who would be, you know, I think I’m giving you the right level of information, but if you want to dig deeper Bruce Vogt, who is in charge of our ecosystem science branch, he would be great.

**Interviewer 1:** I have, I chatted with him last fall. So I have - and I emailed him to follow up last week. So hopefully I’ll talk with him again.

**BD046:** Good. Yeah he’s great. Um, harmful organisms then, if I may go to that. So, that’s really interesting, especially when you talk about climate change and what’s going to happen. But if you talk with Bruce, surely he mentioned invasive species. That really is the top of the list in terms of what the science management community is concerned about. He’s worried about the fish that were brought in in the 1970s, with the goal of establishing a trophy fishery, and folks at that time thought that they would stay in the freshwater and be fine. And that they could handle a decent amount of salt. So these species are spreading, it’s mostly blue catfish but there’s also a flathead. And, you know it’s really interesting, it was a hot topic, like 10 years ago. Because they were exploding. And it died down for a while. There was some evidence that they were kind of reaching equilibrium. In fact, new studies in the James River say that the populations definitely reached equilibrium. Unfortunately, what’s really happening just since 2018 is that they've been exploding here. They’ve been here as Dr. Albert contributes, they’ve been here. We’e had them for 10-15 years. But really instantly, all the tributary places… I talked with a waterman actually about six months ago who fished way up in the Potomac River. And, just where they would catch a few hundred of these fish a day in 2018, now they’re catching 3,000 pounds of them. So a huge huge spreading of these, particularly in Maryland waters. And there’s a lot of concern that they are going to - the species that we care about, the endangered species, really anything. So, I think when we think of harmful organisms, that’s probably… I think of invasive species. That’s what I would go to first, for sure. There’s so much more with that issue.

**Interviewer 1:** Yeah, Bruce did mention that to me. Ok, great. What about species of conservation concern in the Bay? Or actually, sorry, before we go there. What about the higher trophic level species.

**BD046:** Yeah, so, that’s where I would put striped bass. Like, so, I would not put striped bass, certainly not in habitat forming, and I don’t really think of them as key food web supporting.

**Interviewer 1:** Right, ok.

**BD046:** Um, striped bass and bottlenose dolphins.

**Interviewer 1:** Ok.

**BD046:** So, striped bass, which is a hugely economically important fish. You know, it’s literally a billion dollar industry in Chesapeake Bay to catch striped bass. And before I forget, just let me go back to one thing. Key food web supporting species - you’ve got to mention menhaden. There are vast schools of menhaden, I’ll probably put them as species of conservation concern as well. But with striped bass and bottle-nose dolphins, there’s, we know that menhaden is one of the key things they eat. So striped bass eat a lot of predatory fish in 50+ pounds, 50 inches. They’re hugely economically - they’re an iconic species. But in terms of food key species and the food web, they’re a key species. They could also be displaced by the catfish and things like that. Dolphins were displacing a lot of them. Really, a lot of the studies that have come out are showing a lot more dolphins than anyone ever thought. You know, thousands of dolphins. They even - there’s even evidence that there’s a population that lives most of their lives out in the Potomac. You know, the mid part. And there’s been some citizen projects. There’s citizen science around reporting them on your cell phone. So studies of those continue to increase, and really you see that there’s a robust population of dolphins as well.

**Interviewer 1:** Ok, yeah.

**BD046:** So, yeah, in terms of high trophic levels… we don’t really get whales. We don’t have seals. In the southern part of the bay you do get harbor seals a little, but dolphins you do get them very commonly, even in the rivers.

**Interviewer 1:** Ok. Is there a tourism industry for dolphin watching here?

**BD046:** You know, if there is it’s just starting. I doubt it.

**Interviewer 1:** Ok.

**BD046:** But yeah, it’s - if you google Chesapeake Bay dolphins, there’s been Washington Post reports… It's really fascinating. When I first started working in the Bay in like 2006, it was like oh yeah, they’re around. But now, it’s just - people are really realizing that we have dolphins in the Chesapeake Bay. It’s just not a Florida thing or a coastal thing. They’re here.

**Interviewer 1:** Yeah, I didn’t know that. That’s interesting, ok.

**BD046:** Yeah, you see them - and I live in Annapolis too, if you know where the Chesapeake Bay Foundation is. It’s right out the bay. And our community pool’s out there. And many people, many people who go out around here, starting in May, will go like ‘oh yeah, I saw them’. And you’ll see pictures on instagram. They’re out there.

**Interviewer 1:** Cool, ok. Very cool. Um, so now back to species of conservation concern. That’s what I meant to talk about before.

**BD046:** Yeah. So, I mean in terms of if we’re going to make a formal designation, the - when you think about an endangered species that uses the bay, it’s Atlantic Sturgeon. So they spawn in many rivers, especially Virginia rivers. So, Chesapeake Bay tributaries are really good spawning habitat for sturgeons. You know they are, if you look at it in terms of the food web, I’m not sure that they’re integral. If they fall, I don’t know that - I don’t think that the ecosystem collapses. I hope that it doesn’t. But we’re concerned. They are one of these long-lived species, and certainly they cater to what the habitat is like. So for NOAA they are a designated species. There’s a lot of resources used for them. There are concerns about netting, mainly because there’s a massive industrial scale fishery for them. You know, billions of metric tons are harvested a year. So, many people, especially in the non-profit community, and the angler communities, but certainly some scientists who are concerned about that species from a fisheries standpoint. And then, I mean I can keep going. I will say that people are concerned about SAV. Especially eel-grass. We’re at the southern extent of eel-grass. And as the water warms, it looks like that might just be replaced with other species like widgeon grass. And widgeon grass is native, so… but there’s concern about that species and its climate change impacts. I would say as a whole, SAV seems fragile. So what do the heatwaves mean for SAV beds, increased storm events that can potentially threaten those. So when I hear of species of conservation concern, I think about what is sensitive. I wouldn’t say menhaden are sensitive, they’re not. They're a real… but we’re concerned there just because a lot of fishing surrounds them.

**Interviewer 1:** Ok, great. I think that was great, that was super helpful. And yeah, if we don’t get much in terms of the model building because I know that we are running out of time, that’s totally fine. This is really just helpful for me to get some local context. Because I’m just really now getting into some of the more local dynamics in the Chesapeake Bay. And I’m prepping for my Chesapeake workshops, so this is super helpful. Thank you. We could - like, if we had time, probably what I would do is I would add in those key species that you just described and we could draw some of those food web dynamics in mental modeler, and then we could add in some of the management components and ecosystem services. So that would be really cool, that would take a really long time. But that’s what I’ll be doing at a later date at a workshop. So that’s helpful to help inform that protocol. Um, which - ok, so then, in the last 10 minutes or so, what would be really helpful would be to hear about management dynamics around these species. So specifically we’re wondering are there management approaches in the Chesapeake that are directly managing for biodiversity.

**BD046:** Hm. So, I mean again, I’d be curious what you heard from Bruce. When I hear about managing for biodiversity, like if we’re talking about fishery management, because that’s our purview, right. We work with the fisheries managers, that’s - we bring together Maryland DNR, marine resource management, and all of the fisheries. Those are the three fisheries management entities in the bay. So, are they managing for biodiversity. It’s still - and I would say that there’s… when we say biodiversity, I think about an EBFM. Managing for the ecosystem as opposed to single species, right. As opposed to ‘we’re just going to manage for striped bass because all we can control is what’s harvested and then we can account for in a model what we think natural mortality would be and what we think natural population recruitment would be and that’s how we factor in what we manage’. That seems to be the way that things are still managed. On a species by species basis. There’s, you know, what we hope with the Chesapeake Program’s fisheries goal is, is that we provide a forum. Because again, fisheries have biodiversity within fisheries. In the Chesapeake, they’re impacted by things that happen on land. That’s everywhere, but here so more than any other place because we’ve got - well, you’ve probably seen. The land to water ratio of our watershed to the bay, it’s massive comparatively. You look at the Great Lakes, you look at the drainage of the Great Lakes, like the surface area of the Great Lakes is greater than the surrounding land. Not at all like in the bay. We’ve got this big old watershed draining into this bed. Impacting water quality, impacting SAV, causing algae blooms, causing fish die-outs. And those factors manage those things. Fisheries managers don’t manage those things. Fisheries managers aren’t coming and talking to the departments of agriculture or land planning commissions and saying alright, we know that if you do this it’s going to damage this fish habitat and impact our fishery. And impact species diversity and biodiversity. So, we should be talking about this. And that doesn’t happen. And I don’t think that that’s happened in many places in the world. We’re very much still a - from a fisheries management perspective, it’s still a kind of single-species approach. You know, what I would say though is that fisheries managers and not just fisheries managers, but like the Bay Program’s community, which is a science and policy and management entity, has supported habitat restoration. Oyster habitat restoration, for example. And wetland restoration, wetland protection. I feel like those kind of things are… you know, those are much more kind of ecosystem holistic things and they’ll contribute to biodiversity. You know, certainly if you think of oysters, right, oyster restoration is a goal. So is SAV. Those things are goals not because they, like, they’re directly going to be harvested or they benefit one species, it’s because they benefit the ecosystem. And they benefit, you know, they benefit biodiversity. So I would say, do we manage for biodiversity? No, not necessarily. But I do think that we actively do things to increase biodiversity.

**Interviewer 1:** Ok. Are there things that are needed in the future, you think, to better manage for biodiversity? I know you were just talking about, like, EBFM. But is there anything specifically in the Chesapeake Bay?

**BD046:** Um, I don’t know if I can answer that. I mean I think there are things that could be done to better manage for biodiversity?

**Interviewer 1:** Yeah.

**BD046:** You know I think that one of the things that’s being done is increasing the information about forage fish.

**Interviewer 1:** Mhm.

**BD046:** Um, these species that we have identified here as a key component, right, to fill the knowledge gaps around what’s the true value of those species and what’s the need so we could answer a management question. Like, how much forage do we need to support high trophic levels? We can’t - we can’t say that right now. So how much forage do we need for a healthy ecosystem? How much forage do we need to sustain the current population of dolphins? So I think that that’s one example of research to answer these management questions. And then, also the research to understand habitat management. So, what does it need to - how much productivity and biodiversity do we get from 100 acres of restored oysters.

**Interviewer 1:** Mhm, yeah.

**BD046:** You know, to inform, you know. Or could be restoring things differently that will help us increase biodiversity. But there’s still a lot of management questions.

**Interviewer 1:** Yeah, ok. Great. Um, well I know we’re just about out of time. I guess, just with the last little bit, I was going to ask if there are other folks that you think would be interested to talk to me about some of this stuff who you think would be helpful? Specifically watermen or other stakeholders. Because that’s been the hardest thing. It’s one thing to, like, you know, find some contacts for water folks. But connecting with watermen and community members has been more of a challenge. So I’m wondering if you have any suggestions.

**BD046:** Uh, have you talked with… now, would you ask the same kinds of questions? Like would you ask the same questions to a…

**Interviewer 1:** Yeah, yes and no. We have a slightly different approach. I would say with resource users and stakeholders where we are trying to build these models around key components of biodiversity areas they value or rely on, for their livelihoods or the ecosystem services that they have socio-economic benefits from local biodiversity, and then understanding how management impacts the benefits that they receive. We’re kind of shifting the framing a little bit when we speak with resource users. But it’s the same broad research question.

**BD046:** Yeah, I do think that it would be good to get someone from the recreational fish community for sure. I mean that could be - Dave Sakorski, he’s the executive director of the Chesapeake… the Maryland CCA. Coastal Conservation Association. He gets - he is very very active and they are a well respected and subscribed recreational fishing organization. So he may be a good person. The other thing if you’re interested is Bailey, who I mentioned earlier, he’s our staffer for the Fisheries Goal team. The goal team has broad representation. For example, we have different working groups in that goal team. One of them is invasive catfish. And we have several recreational anglers who are part of that invasive catfish group. So Bailey, if you sat down for just 10 minutes and talked with Bailey about what you’re doing, he could probably give you some really good names.

**Interviewer 1:** Yeah, ok. So they - so I gave a short presentation to the Fish GIT last September, Bruce invited me. So I met with him there briefly, but that was back in September when we were preparing for our Gulf case study. Um, and so now I’m like circling back. So I emailed Bruce, but that’s a really good idea. I should email Bailey too and see if he would. Because I’ve looked at the GIT websites and Bruce was telling me about all the other GITs as well for the Chesapeake Bay Program and it’s almost overwhelming. Because there’s so many names and I’m trying to figure out how to narrow in on who will be willing to participate and be a good study participant.

**BD046:** See that’s what - because Bailey is at the meetings. All of those meetings he’s on, and he deals with the correspondence beforehand, so he could tell you this person’s really active. They’ve emailed me about this, they talk… so he - I think that he would be the best person to tell you who’s engaged.

**Interviewer 1:** Ok, that’s a great idea. I’ll do that. Ok. Great, well I know we’re just about out of time but thank you so much for taking the time to chat with me. I really appreciate it, and this was a really great overview of the Chesapeake for me, so that was really helpful.

**BD046:** Good, I’m happy to do it. Thanks for inviting me.