Wetlands: The Original Wet 'N Wild with Dr. Alex Moore

Nerdin' About Podcast Transcript, Season 3 Episode 9

Michael
Hey, everyone, welcome to Nerdin' About! I'm Space Michael, and with me as always is someone who loves mornings, and that is Dr. Kaylee Byers.

Kaylee
Oh, hello. I actually do love mornings.

Michael
I do laugh sometimes, because I see early morning texts from you. I can see Kaylee's up, her brain is working, she's sent messages that she needs to send. I look at them, and sometimes it takes me a minute just to understand how the words connect. I'll stare at them, and be like what is happening right now?

Kaylee
I also don't usually send fully formed sentences. So that probably doesn't make it any easier. Well, and I appreciate you, Michael, because I know you're not fully a morning person. Here you are, 7am on a Tuesday, which is exceptional. I think that's because we're both really excited to be podcasting this morning. So, we're up bright and early today because we're chatting with Dr. Alex Moore, who's a postdoctoral fellow at the Princeton University High Meadows Environmental Institute. Alex's work explores how predatory prey interactions influence ecosystem health, as well as the role that culture plays in restoration and conservation. We are just very thrilled to be here chatting with you, Alex. Good morning. How are you?

Alex
I'm doing great. I'm so super happy to be here with the both of you,

Kaylee
Bright and early, we've all got our morning beverages. Mine is in a mug that says Crazy Rat Lady that my brother bought me. So, Alex, today we're going to be talking about ecology and a few different systems that you have worked in or are working in. I thought we could start off at the top, would you be able to tell us what drew you to ecological research?

Alex
Oh, great question. I think that the best answer to this is to say that I've always been really interested in nature and being outdoors growing up, was a big part of how I spent a lot of my time. As I was going through school, I was trying to think of how to translate my joy and the time that I spend in these spaces, and I get a lot of calm, and comfort and energy from - how do I translate that into learning and work? As I made my way through high school, I dabbled in chemistry and other scientific things, because I was good at them. Then as I got into college, I really tried to refine that by choosing work that spoke to me as a person. I decided to jump ship from chemistry and moved pretty quickly into ecology and biology and doing things that allowed me to ask questions about things that I'm really interested in and spend time in places that I feel good being in. So that's the short version of how I got into what I'm doing now.

Kaylee
Did you find that you were able to bring any of those chemistry skills with you?

Alex
Oh, absolutely not. (Laughs) Nothing that I learned in chemistry has been helpful, except for maybe learning how to hold a pipette, and doing a couple different things in lab, but that's mostly it.

Kaylee
Great. I'm going to play that particular clip for my father who's a chemist and as a child, I remember asking him a question about photosynthesis, and all of a sudden I was sitting down and looking at a diagram of a complex sugar. I was like, I am seven. I don't know what's happening. So, your research has looked at multiple aspects of ecosystems, but ecosystems can vary. So, what is an ecosystem?

Alex
Yeah, in broad terms, an ecosystem is basically just a collection of different ecological communities or different species interacting with each other, along with the physical environment that they occupy or live in at any given time. So, it's really about the combination of animals and plants, and then the physical spaces that they take up.

Kaylee
One of the things that I think is really interesting is we often don't think of cities as ecosystems, but they're very active ecosystems, and they're a growing area of research. I think it's an interesting thing to think of what we typically might think of as an ecosystem, wild overgrown forested areas, but actually, they're all around us everywhere.

Alex
Yeah, absolutely. I think that that is a product of the way that we usually take humans out of the conversation about nature and wild things. The reality is that we are very much embedded in it. Thinking about urban centers as being ecosystems is a really, really big place or area for research these days. So, I think that a lot of people are starting to accept that reality.

Michael
So, Alex, I'm curious to learn more about your research with wetlands. Now, I grew up in an area close to Vancouver here called North Delta, which has a bog. I know that that's maybe slightly different than a wetland. So, I'm curious if you could help me understand what a wetland is? What is a bog? How does this relate to your research on wetlands?

Alex
So, wetland is basically a really big term that encompasses all kinds of ecosystems. So, a bog is technically a type of wetland, there's more technical definition for the term, but essentially, a wetland is really just any ecosystem or place that undergoes any kind of inundation with water for either periodic periods of time or even for long term periods of time. The more detailed component of that is the reality that they have to consist of plants that are adapted to being in these high stress environments that have adaptations for being waterlogged for long periods of time, how they deal with salt, potentially. Basically, any sort of landmass that is periodically inundated with water, or any sort of ecosystem that is periodically inundated with water is technically a wetland.

Michael
Now would these be good places for teenagers to go drink? (Laughs)

Alex
I mean, I don't know how to answer that question. In terms of do I think it's a good idea, but it's certainly a place that it likely does happen.

Kaylee
Are there any projections about increases in wetlands? I'm thinking about the Intergovernmental Panel on Climate Change report and changing environments, we're going to have drying, and we're going to have flooding. It makes me wonder about whether or not we're going to see shifts in where our wetlands are or increases or decreases?

Alex
So, the answer to that is yes. We will certainly see shifts, I work mostly in coastal systems. So, I can speak to the coastal part of things, I can't quite speak to more permanent inland wetland systems. I do know, for coastal systems, we're seeing a lot of dynamic changing, a lot of losses of coastal systems, just because the way that sea level rise works means that those coastal systems are essentially drowning. So, they can't maintain themselves with the rate at which sea levels are rising. But then in other cases, with warming temperatures, we are seeing coastal systems be able to migrate northward into areas that used to be too cold but are now more hospitable for them. So, there's certainly some tradeoffs going on. I would say that overall, we're seeing losses more than we're seeing any kind of gains, at least across coastal systems.

Michael
So, your work, Alex is focused on community structure in wetlands. What do you mean by community structure? Is that things that are living in the wetlands? Or is that also humans again?

Alex
So at least in the context of the work that I do community structure is really specific to the species, the nonhuman species that are occupying a given environment. To be a bit clearer, community structure is one of those weird ecological terms that really refers to the unique assemblage of species that are present within that environment, and then their population sizes and how they interact with each other. So, you might have environment A, that has species one, two, and three, and then a separate environment B that has species, four, five, and six. So those are two different ecological communities. They're structured differently, because they have different species, the population sizes of those species are different, the way they interact with each other, either through competition, or predator-prey interactions, those are different kinds of ecological community structures. That's really what people are referring to when they use that term.

Michael
So, when are we going to get a Disney movie, because it seems like this is ripe for an animated movie of some city inside of one of these structures?

Alex
I mean, I think that we already do things in ways that we just don't pay attention to. So, The Jungle Book is a super great example of community structure, where you have all these different species, and they're interacting with each other. They happen to also talk and speak English, and so we're able to connect with them in those ways. I think it's present in a lot of things. We just don't call it that, as we're watching it and doing it.

Kaylee
Now The Bare Necessities will be in my head for the day.

Alex
I'm sorry.

Kaylee
No, that's fine. Yesterday, it was Encanto all day. I needed a bit of a Disney shift. So as part of that other work, I really want to ask you about crabs, essentially, this is where this question is going. In some of your work, you've talked about them as ecosystem engineers. So, we're thinking of that community structure and all these organisms are interacting, and some have different impacts on others. What is an ecosystem engineer? What do we mean when we say that?

Alex
Yeah, so any ecosystem engineer is effectively a species that happens to create or modify or maintain or even destroy habitat. So, they significantly alter the structure and function of the environment that they're found in. That then tends to lead to pretty significant shifts in species diversity or landscape level features of an area. One type of way of thinking about it is if an ecosystem engineer is present, you'll have an environment that looks like picture A, if that one species is gone, then that environment will shift and look like something totally different. So, then you'll have environment B, largely just because that one species has been removed. It performs and does a pretty significant thing to the ecosystem that's pretty important.

Kaylee
So, humans, probably pretty big ecosystem engineers, imagining species running around getting their little engineering degrees and tiny little rings to wear. One of the species that you mentioned in a paper was the purple marsh crab as an ecosystem, what's its deal? Is it doing good things or destroying the environment?

Alex
So again, the value judgment is always really tricky. It depends on who you are and what your priority is, I think for that system. For that paper and for the system, the area that I worked in along the East Coast of the United States, the purple marsh crab, which is a burrowing crab, it's an herbivore, it eats vegetation both above and below ground. It along with its pal that's it's usually found in ecosystem with the fiddler crab, both of them together are really important ecosystem engineers for salt marshes, or even other kinds of marsh systems that they might be found in. The reason for that is because they do a lot of burrowing in the ground. That sort of physical activity is super important. So, in the absence of these species, what you typically find within a salt marsh is just really, really thick matted peat as the ground. It's very firm, it's hard to puncture into, it's got no oxygenation, so there's no air making its way through it, it's not porous in any kind of way. Plants have a really hard time growing in those conditions, they can't get their roots quite deep within the system, and so it's just not a super hospitable place for many species to utilize. But in the presence of the purple marsh crab, and the fiddler crab, for example, they do all of this burrowing behavior. This loosens up the soil, it aerates it so oxygen can get in and allows for water to flow in and out of those different pores. That makes it much more hospitable for plants to come in and grow, and then those plants become habitat for other kinds of species. So, you see just a whole shift in what that ecological community looks like, what that ecosystem looks like, just in the presence or absence of those really important two species.

Michael
So, in thinking about this, that area, and thinking about people living around these areas, and perhaps more people living around these areas, how is that changing? What is your research revealing now that humans are moving into these areas and interacting with them more?

Alex
So, humans have always lived disproportionately on the coastline, which in itself is not really a new thing. Most coastal resources that human populations need tend to come from coastal regions. That part's not novel. Right? That has always been the case. I think that what's new now is really trying to recognize the relationships that people have with those coastal systems, the resources that we get from them, but then also thinking about how people interact with and tend to or recreate or restore or manage those coastal systems. I think we're learning a lot more about the nuances involved in that process. I think that with climate change, and with other kinds of changes that are happening at a global scale, we're also recognizing how important those coastal systems are for the protection and health of the communities of humans, not just the species, but the humans that live in those areas. I think that there is a pretty big shift happening in terms of recognizing the importance of the systems and also acting on recognizing that importance, figuring out things that we can do that is helpful, both for those ecosystems, but also for the communities who live in and around those areas. I think that's something that's happening more and more that maybe historically, we weren't seeing quite as much of.

Michael
Are there particular areas in North America that you're interested in where that confluence of humans and wetlands are in conflict with, or perhaps doing good at in that relationship?

Alex
Yeah, I think it's always tricky when we're talking about humans being net good or net bad for whatever we're looking at. Most of my work has historically focused on the north eastern coastline of the United States where we have lots of salt marshes. There's quite a bit of good historical research in those areas that I've learned a lot from and have built my current research off of, but I am shifting now. So, I'm moving that work southward. So, I work in southern United States right now on mangroves, because I'm really trying to broaden the kinds of ecosystems that I work in. Beyond that, I think that most of my work is starting to meander a bit more towards tropics and subtropics. So really getting into those areas where we're seeing pretty significant losses of these ecosystems. We're also recognizing that these are communities of people who really rely heavily on these resources, who themselves should be empowered to make decisions about how that land is used, and the resources that they're able to acquire from them. I see that as a pretty pressing need. So that's where my attention is starting to shift a bit these days.

Michael
So, tell us about mangroves. What are they and what is your research related to them?

Alex
Yeah, so this one's actually whether you realize it or not, a bit of a trick question. So, we talk about mangrove as if it's a homogenous thing. A mangrove is actually a term that's a catchall that describes a pretty big group of tree/shrub species that are mostly all woody I think. There's like at least 50 of them, and they're all called mangroves because they have the same kind of adaptations that allow them to exist along coastline that undergo periodic inundation and are

really salty. A mangrove is effectively any species found along those coastal regions that have such adaptations. There's a bunch of different kinds of species that fall within that category. They're typically found along the subtropics in the tropics, just like a number of other kinds of coastal systems. I am shifting my work into those ecosystems because they have been less studied with regard to some of the questions that I'm really interested in, and they're also incredibly important for both species and human populations. They're also in decline globally. There's a pressing need to figure out how they are important, and what are the ways that we can protect them in ways that are also equitable and inclusive for the communities who live near them and utilize those resources. So that's kind of the reason that I've shifted into those areas because I feel like we have done a lot of work on salt marshes. There's a lot of people who will continue to do work on salt marshes. I think that there's a really big gap in terms of addressing some really important pressing questions within mangroves. So, I'm hoping to try to help fill in that gap a little bit.

Michael
So, what are some of those pressing questions that you're delving into? Of course, I'm imagining climate change is going to come up at some point, probably a theme throughout a lot of your work. What are some of those specifics?

Alex
So, I'm certainly not a climate scientist by training, the work that I do is really more geared towards how we can best conserve and restore these ecosystems with a preference for restoration. It's kind of what my work focuses on. One of the things that's really important to recognize is that we do restoration across a myriad of different kinds of ecosystems, but we're not super great at it overall. When we think about the metrics of restoration success, you take a restored ecosystem, and you compare it to a theoretical healthy ecosystem. The restored system is not matching up with the healthy system. So, there's a big gap in terms of how well we restore ecosystems. What I'm trying to do in my work is figure out why we have that gap. Then think about ways to apply that knowledge to improve restoration practice and improve restoration outcomes. With regard to mangroves in particular, historically, restoration has really focused on fixing a lot of the physical characteristics of a mangrove, so making sure that the soil is in place, and has good quality and making sure that that the hydrology is intact, so that the water is flowing properly through the system. Then planting mangrove trees and effectively forest monocultures, and that has been largely unsuccessful. The work that I am doing now, the research that I do is trying to understand the importance of different kinds of species interactions. So different species you might find within a mangrove, what role do they play within that system? And might they be really important for including in restoration outcomes to improve how healthy and how well the system is functioning? My research with that ecological perspective is asking questions about the importance of species, of species interactions, and how might we use that information to better inform how we do restoration across those ecosystems.

Kaylee
So, Alex, you mentioned these different animals and things that live around them? What are the benefits of mangroves for non-human and human animals?

Alex
Yeah, the list is super long. So, I'll just like do a highlight reel. I think habitat is one of the biggest things that they provide for the different species that you find within them. They also are important for food resources. Examples like birds that might either be resident species or

migratory species that come into mangroves to find food resources or to nest and they tend to be a really unique and important ecosystem at different life stages for different kinds of species. Another example is that they're a super great nursery habitat. So, juvenile sharks will be found within mangrove areas that live and hide within their network of roots underwater, and then they eventually make their way out of mangroves when they get big enough to not be predated upon by other larger species. They perform a lot of really important functions in that way for critters, but then for people, they also do a ton of things. So, they're super important food and water resources also for people. Mangroves, in particular, have a lot of important timber that's used for building and other kinds of recreational needs and uses in the areas where they're found. They also protect coastal communities from storm surges and from hurricanes and other things that are expected to increase over time across the world. Then lastly, but certainly not least, is that they are really important cultural regions. So, there are lots of communities who utilize them for different cultural values, religious, or other kinds of education systems, different kinds of traditional ecological knowledge. There's a lot that is rooted in these coastal ecosystems for different local communities. So, they do a ton and that was again my highlight reel, but there's a lot more you could get into.

Kaylee
I also like that “rooted in” was in there. (Laughs) So mangroves are sort of these protectors that are protecting little shark nurseries. They're protecting us, they're providing us with lots of resources, they're culturally significant, and as you mentioned climate change poses a challenge to – everything really. What are some of the challenges that they might pose to mangrove ecosystems? You just mentioned storm surges, I'm imagining storm surges increasing and without those mangroves, we have less protection.

Alex
Yeah, it's not a great outlook. In terms of expected impacts moving forward, I think that one of the things that we can look for is, we know that sea level rise is happening and will continue to happen. Even though these are systems that have adapted for being inundated over long periods of time, they do have a balance between how much sea level rise they can tolerate, and how much they can adapt to over a period of time. So, at the current rate, sea level rise is happening way too fast for these systems to adapt, they're drowning along those coastlines, so we're losing these coastal systems as a result. We also have to be concerned with increases or alterations in precipitation patterns and storms. That I think can lead to both increased damage to these coastal systems, but also can bring in a lot more salinity. So, more salt into these systems, and they are very salt sensitive, even though they have adaptations for salt, there's only so much they can tolerate. That's likely to lead to an additional decrease in mangrove systems. You also have to deal with erosion and increased temperatures that in some ways might help with productivity or plant growth, but in other ways, influence other elements of the system that are more difficult for these species to adapt to. So overall, it's a net negative. (Laughs) Unless we consider the migration. We are seeing a northward migration of mangroves. That's an indication that they are shifting due to the experienced climate changes that we've seen so far. But even that is problematic, right? So, if they're moving northward, they're moving into systems that other species have historically occupied, and what does that mean for those different interactions? And what does it mean for those resident species? So, it's a mixed bag, but it's also like a mixed bag of mostly bad stuff.

Kaylee
It's always such a bummer to bring up climate change. I feel like I talk about it 95% of the time now, but at the same time, I think it's really important to think of the cascading impacts.

Alex
Yeah, absolutely.

Kaylee
So, you mentioned that mangroves have these adaptations for salt. It just got me thinking about seabirds with their salt excreting glands, and what is it that mangroves can do to deal with the salt?

Alex
Yeah, so they have two different ways of doing it. I will do a quick preface here by saying I'm not a botanist, I can't get into the nitty gritty, but I do know the large scale, big picture. The two ways that they do it. One is they have a system in place that could prevent salts from getting into their tissues to begin with, and so they filter in water and keeping salts out. So that's one way, but that's only like a small subset of mangrove species that do this. The bulk of mangrove species actually allow salt into their system and then excrete it out of their system. You'll see if you google this, at any point in time, that they're examples of mangrove trees, mangrove shrubs with leaves that have basically little salt crystals on the leaves, because they are like pores on the leaf surface that salt has been excreted out of. As you can see these crystals develop on the surface. So, they're picking the salt out so that it doesn't build up in their systems.

Kaylee
That's really cool. Can we harvest that salt? Do you know if anybody harvests it?

Alex
I can't think of a reason why not, off the top of my head. I would imagine the answer might be yes, but again, maybe – know we're quoting me on this, but I don't know if that's the exact answer.

Kaylee
Yeah, we'll quote, not quote, you on this. That is interesting thinking of going around picking up a leaf and having a lick. Never do that! Don't pick and lick.

Alex
Yeah. (Laughs)

Kaylee
So, you're talking about the myriad of benefits mangoes have for ecosystems, and the impacts on them. I imagine you also use a combination of tools, what are some of the tools you're hoping to use in this system that you're moving into?

Alex
My background is as an ecologist who does field experiments, and so that is a lot of what my work in these areas looks like. In going out into the field to do research, what I do for the most part, I set up a lot of exclusion areas. So, I'm really interested in that question of the role that different species might play within an ecosystem. Part of how I try to get at answering that

question is by setting up an area within an ecosystem, really setting up multiple areas, and then excluding some species from that area and then seeing what happens in terms of how the system performs, how it functions, and measure different, important metrics. I do that across different areas to also get a sense of how might these dynamics that we're seeing at this site be different at another location with similar or different species, to really try to get a broad sense for the role that these different species are playing across these systems. That will tell us how important are they, and then should we be including them in some of the ways that we manage these ecosystems, not only focusing on the plant, but also the other species and other critters that are present across those ecosystems. Another way that I'm doing more now is really trying to get a sense of the soil microbial community. Thinking about the bacteria and the fungi that are present across these systems, because I think that they are undervalued, or at least under explored I'll say, in coastal systems, and the micro biota are super important. They do so many things in terms of processing nutrients, and making them more available for plants and decomposition, all these things, we don't have a great sense of what they do in mangrove systems. That's another thing that I'm diving a bit more into these days.

Michael
Speaking of your research, you've argued for a holistic approach to studying ecosystems. So, what does that holistic approach look like, and why is it important?

Alex
For me, it really means not only going into a site and asking ecological science based questions, and then answering my questions, and then leaving and being happy about having done those things. I think that it's actually really important to make sure that local communities are both incorporated into the process of the work that you do, and also are given power to make decisions themselves about the work that I do. So, thinking about this, from a holistic perspective, for me means recognizing the importance of local human communities, and their values and their culture and how those things influence ecosystems, and how those ecosystems then feedback influence those communities. Recognizing all of that, along with a more Western scientific perspective on things, but not valuing that Western scientific perspective over anything else. It's really about incorporating these different value systems and these different knowledge systems for the benefit of both ecological or ecosystems, and also for the benefit of those communities who live in those areas. So, taking a more social science approach, in tandem with the natural sciences is what I mean when I say that.

Michael
Oh, Alex, this has been an amazing conversation. Thanks for bringing us into these weird, wonderful places that you study in wetlands. We've got some more questions from another species inside of these ecosystems. Do you know who these people are?

Kaylee
Is it the nerd herd Michael?

MUSIC

Michael
Alright, if you want to get in on the nerd herd questions, we post them on our social media @NerdNiteYVR. Our first one comes in from Brittney, who says "The teeth mangrove scene in Life of Pi has haunted them. Can that actually happen?" Have you seen Life of Pi Alex?

Alex
I have not seen Life of Pi the movie. I read the book in high school. I can't say that I know exactly what you're talking about, but I'm pretty sure the answer is no, just based on how the question was phrased.

Michael
Well, it looks like it's a carnivorous island. So that also sounds made up as well. Yann Martel, is that who wrote Life of Pi?

Alex
Yes!

Michael
So, what could they possibly be getting at here with a carnivorous Island?

Alex
I mean, all I can think of are things like carnivorous plants. So, like a Venus flytrap or other kinds of plants that get a lot of their nutrients from other living things. Those exist in the real world, but the carnivorous island sounds like fiction.

Kaylee
If it does exist, I do not want to go there.

Alex
It would not be on the top of my list.

Michael
It's a metaphor for a place that you haven't discovered yet. It's kind of scary. So, whatever it is, it's out there. You don't know what it is, and that's scary.

Alex
I think real ecosystems are scary enough. I don't know that I want to endeavor to explore a potentially fake one, that sounds even scarier than the real one.

Michael
Do you want to stick around and nerd out with us a little bit more Alex?

Alex
Oh, yeah, of course.

MUSIC

Michael
All right, if you want to get in on the nerd outs, we post for those on our social media @NerdNiteYVR. We did get one in from Ritika who was nerding out whether aliens would come to Earth for business or pleasure. What do you think Alex?

Alex
Oh, geez. Hmm, I kind of think that it would probably be like exploratory business because I imagine that they already have their sets of pleasure and other places that are already known. So that would be my guess.

Kaylee
They're probably looking at Earth like a carnivorous island.

Michael
Yeah, I just watched a series of movies actually, that were all on the same theme: Close Encounters of the Third Kind, Starman, and Explorers. It was interesting, because the good movies are the ones where the motivation is more ambiguous. It's more about humans, it's how are we learning from the aliens arriving. The worst of those was Explorers, which has a young Ethan Hawke and River Phoenix. That was not a great movie, but the motivation of the aliens makes most sense, because it was teenage aliens that discovered Earth and our TV, and they were like, “oh, they seem to have cool music and cool TV. Let's go and check it out and learn more about that.” Then the alien parents come and say, "what are you doing? Stop fooling around with those human kids." That made more sense. It was more adolescent curiosity than anything. Alex, what have you been nerding out about recently?

Alex
Great question. I think that I have been most nerding out these days about languages. It's not super sciencey. I'm currently in the process of learning Japanese. Through that I have been really, really, really impressed and intrigued by the history of language development across different regions, and where it all comes from and how in Japan, they have three different writing systems that everyone learns, and how that baffles me as an adult whose brain only uses certain capacity at any given time. So, I find it impressive that there are people who have to spend so much more of their time just learning their language, compared to what we do here. So, I've been really impressed and incessantly Googling, learning, and reading books about Japanese and historical languages and their evolution over time.

Michael
Are you using any of those apps that are really popular right now like Duolingo?

Alex
I'm currently using Duolingo. It works well for me because it shames me if I don't do my stuff time, and I find that I'm pretty shame motivated. So, the constant reminders of “Oh, no, you're going to lose your streak.” That really motivates me to get things done.

Michael
It's pretty brilliant how they've gamified learning, and how they're tricking people into learning stuff. It's pretty great.

Alex
It's working for me,

Kaylee
Michael, have you used any of those language learning apps?

Michael
I've been teetering on it. I haven't fully dove in. Speaking of things that I've been diving into, so we're recording this on March 15, which is one day after one of my favorite event days of the year Pi Day, March 14, but it's also two days after my least favorite day of the year. Alex, can you guess what my least favorite day of the year is that happened two days ago?

Alex
Now I'm terrible at guessing games. I have no idea.

Michael
It's the day that I love to hate. The start of Daylight Saving. So, my hatred of this day goes all the way back to when I was in school. We had physical alarm clocks that you had to change. I was always tripping up either in the spring or in the fall, arriving to school one hour early. Can you imagine? I'm just standing there waiting for them to open the school door, or then arriving one hour late. This happened many times. Then what I would also do is I would change the clock ahead of time, but then my parents would come in, they're like, "Oh, Michael is going to be late. Let's change it again. So, then it's like two hours out of sync, and then I wake up and I'm running around the house looking at every single clock. What time is it!? So, this fueled my agitation for humans trying to manipulate time, because I understand time is something that just happens. It's something that humans have discovered. It's our relationship with it. So, I get annoyed at this concept that that we need to manipulate time for whatever purposes. You know, in this day and age, we don't have this problem. We've got our smartphones, our time changes on its own, which sort of fuels this annoyance because now it's this thing that is automatic that we don't even need to think about. There's this automatic process that is affecting our lives. Nobody's thinking about it. It's just happening. It has zero benefit to anyone. Some of the pros of daylight saving is that's it's going to save more energy but we're using just as much electricity right now on our computers in the daytime, as we do in the evening time. There's been a lot of studies that show that there isn't really a whole lot of benefit to it. So, I would love to hear some counter arguments to this because it is widely unpopular. We had a referendum here in British Columbia, where it was like over 90% of the people said to get rid of it, which is astronomical. Can you get 90% of any population of people to agree on anything? But still, we're not changing it, because there's no motivation to actually change it. So, I did find one blog post, because I wanted to hear some counter arguments. So, I found this blog post Quick Tips for Surviving Spring Forward for Daylight Saving Time. There's more light to enjoy the evening. Okay. I guess if you work from nine to five, I guess there is more light in the evening. I'm going to say that's a loose one. Crime rate drops during daylight saving time,

Kaylee
Just that one day. Or like, following? (Laughs)

Michael
I don't know. That's seems kind of iffy, maybe everyone's just too tired to crime. The other one was it minimizes energy consumption, and it lowers cost, which I've already said, which I think is very dubious. This is when I realized this blog post is from an energy company! So I think this whole thing that we're just like letting happen is a big scam. What I found really funny is that they have some good things about time change, it says, "Stay positive." Stay positive? No! So that is my nerd out, my nerd rant, my annual nerd rant of the year. What about you, Kaylee, what are you ranting and nerding about these days?

Kaylee
I want to nerd out about a new paper that's winding its way through the peer review process right now as it should be. That's how it goes. I'm excited about it. It's led by Imara Beattie who's done an incredible job of this research so I want to hype it. For the study, Imara was interested in understanding what kills bats in British Columbia. Now that might sound like a pretty morbid topic, but it's actually incredibly important to understand why animals die, or what makes them sick, because if you know those things, you can actually inform things like management and conservation practices. So, to do this study, Imara used something called passive surveillance. So passive surveillance essentially involves members of the public submitting dead animals that they found to, in our case, the provincial veterinary lab. I'll say at the top, that passive surveillance has problems for these kinds of studies. It's important, but it has problems because you're relying on people to submit animals. So, you're more likely to find species that live near people, in your backyard, or have died by human associated causes. For those reasons, you can't really say anything about the true proportion of say, bats that have died by a thing. It's not actually a true proportion of the wild population. It can be used to signal towards areas that need some more research and consideration. So, Imara looked at dead bats that were submitted by the public from 2015 to 2020. I want to talk about the most interesting finding to me from that work, which was that the leading cause of death by bats was death by cats. Maybe that's not that surprising, necessarily, but bats that were killed by cats were in better body condition than bats killed by other causes, like direct trauma, say through vehicles or emaciation. So better body condition essentially means that they were fatter, which suggests that cats were killing bats that were less likely to die by other causes. So perhaps, healthier bats. That's important because many species of bats are already facing severe population declines throughout Canada throughout North America because of environmental pressures, because of a white nose syndrome, which we thankfully don't have here yet in BC, but it's coming. I think this is really important because cat predation is something we can actually manage. In fact, domestic cats as predators of wildlife are not new information at all. There's a recent paper that just came out in the Journal of Biological Conservation that I will link that cats were found to kill native species increasingly next to forest edges, too. So, their risk to wildlife is higher when they're nearer to forests. So, for wildlife conservation, it's really important to keep cats indoors or have supervised outdoor cat time. Also keeping cats away from those forested edges might be particularly important. So don't come for me. This is a contentious topic, and I'm getting ready for everyone to start yelling at me on Twitter. But keep your cats inside to protect your friendly neighborhood bats. So that's what I've been nerding out about.

Michael
Cats are for cuddling in your bed, and for getting on your laptop, not rolling around the backyard is that you're saying Kaylee?

Kaylee
Yes, they can depredate my laptop as much as they want. I prefer them to not depredate on adorable birds or bats.

Michael
Amazing. Well, Alex, thank you so much for joining us on this episode of Nerdin' About. You're heading over here to the left coast soon. Where can people learn more about you and your work?

Alex
I happen to be surprisingly all over the internet. So definitely on Twitter @Dr_AlexM I'm also all over the Princeton website because I'm doing my postdoc here. I worked at the American Museum of Natural History for a bit. So, I'm also still posting on their stuff. I have my own lab website. So, it's called inclusiveconservationlab.com. There's plenty of information there about the work that I do in the lab I'm hoping to set up and I think that you'll get plenty from just looking at those resources.

Kaylee
Well, thank you so much for sharing that. Glad to hear you're all over the internet, and we're both very excited for your arrival to UBC, and thank you to everyone for tuning in. If you want to hear more from us, you can follow us on our socials @NerdNiteYVR on Twitter, Instagram and Facebook. This episode is hosted by us edited by me and mixed by Elise Lane. We'll be back in a couple of weeks but until we meet again get your man-groove on in your local ecosystem.

Transcribed in part by Otter.ai