# Episode 64: Wildlife Habitat Connectivity - Written Transcripts

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## Episode Summary

In this episode of the In The Woods podcast by Oregon State University's Forestry and Natural Resources Extension Program, host Jacob Putney interviews Thomas Stokely, a forest ecologist with The Nature Conservancy in Central Oregon. They discuss the significance of wildlife habitat connectivity, the impacts of habitat fragmentation and loss, the role of roads and recreation, and the importance of integrating fire management to promote ecosystem health. Thomas explains concepts like landscape ecology, connectivity, and fragmentation, emphasizing the need for effective management strategies to balance human activities with conservation efforts. They explore specific projects like the Oregon Connectivity Assessment Mapping Project and strategies for mitigating human impact on wildlife through community involvement and science-based forest management practices.

## [00:00:00] Introduction to In the Woods Podcast

**Lauren Grand:** From the Oregon State University's Extension Service, you are listening to In the Woods with the Forestry and Natural Resources Program. This podcast brings the forest to listeners by sharing the stories and voices of forest scientists, land managers, and enthusiastic members of the public. Each episode, we will bring you research and science-based information that aims to offer some insight into what we know and are still learning about forest science and management.

Stick around to discover a new topic related to forests on each episode.

**Jacob Putney:** All right. Welcome back everyone to In The Woods Podcast, presented by the Forestry and Natural Resource Extension Program at Oregon State University. I'm Jacob Putney, extension agent in Baker and Grant Counties, and your host for today's episode.

## [00:00:45] Meet the Guest: Thomas Stokely

**Jacob Putney:** I'm excited to be joined today by my friend Thomas Stokely.

Thomas is a Forest ecologist with the Nature Conservancy in Central Oregon, and once upon a time, he was also an extension forester. He holds a PhD and master's degree in forestry from Oregon State University, where his research focused on the effects of forest management on wildlife habitat. His current work focuses on forest landscape ecology, including wildlife habitat fragmentation, and managing for landscape connectivity.

Thomas, it's great to have you with us today. Why don't you tell us a little bit more about your background and some of the things you've been working on with the Nature Conservancy.

**Thomas Stokely:** Yeah. Thanks for having me again, Jacob. So yeah, as a forest ecologist and. Central Oregon in the fire adapted landscape. I also do a lot of work that pertains to landscape resilience, to disturbance.

## [00:01:33] Forest Management and Wildlife Habitat

**Thomas Stokely:** So, a lot of the work that the Nature Conservancy focuses on in Oregon in terms of our dry forest systems is to try to help return fire back to the landscape as well as, work with a lot of stakeholder groups, partners to address, you know, increasing threats of wildfire to forest health and resilience. And so that looks like a lot of planning and implementation surrounding ecological thinning of forest as well as the use of prescribed fire and reintroduction of prescribed fire into the landscape.

And so based on my background being a little bit more of that tie between forestry and wildlife. My biggest interest is the ways that we manage the landscape to facilitate habitat suitability and connectivity across these landscapes. We're doing the work in, so not only is it focusing on, you know, wildfire, but also just the increasing the.

Presence of humans across the landscape, especially in these really popular destination areas like Central Oregon, where people flock to come to play and, and get outside and ride their bikes, ride their horses, ATVs, OHVs, ride around in the woods just to try to help. Find that balance between different resource values we have across the landscape, whether it's protecting communities from wildfire promoting forest health and promoting wildlife habitat and connectivity.

So that's kind of the main focus of my work currently. But our team generally is interested in helping to restore some of that resilience back to these systems. And in my case, that's the function of providing for biodiversity and wildlife habitat.

**Jacob Putney:** So today we're gonna kind of dive into somewhat complex topics, really and explore them a little bit further, specifically around the wildlife habitat connectivity and thinking about things like habitat loss and fragmentation and the impacts of roads and, and recreation. So, to kick us off why don't we define some terminology.

## [00:03:28] Understanding Habitat Connectivity

**Jacob Putney:** So, what do we mean when we talk about things like habitat con connectivity and fragmentation?

**Thomas Stokely:** Yeah, there's a lot of different buzzwords and technical words surrounding this, you know, landscape ecology, but connectivity is really, you know, the ability for a given species to move across landscape to fulfill all their life. History requirements so that they can survive and reproduce. So, you know, in terms of a highly connected landscape those are landscapes that, you know, will help facilitate the movement of a given individual within their home range.

Meaning, you know, where they're going to forage, where they're resting, where they're nesting. It could be migration. Connectivity from winter range up to summer range. And really importantly, it could also include dispersal ability for a species once they reproduce for the offspring to make it to new habitats, make it to new areas so they can occupy those areas, survive, reproduce, and contribute to population dynamics into the future.

So, in terms of connectivity, we talk about permeability of the landscape, and that's the overall sort of. Connection, not necessarily thinking about corridors which is, you know, a really big buzzword that folks use when it comes to like restoring that connectivity. But permeability is really the overall ability of a landscape to support the movement to facilitate you know, connection between different patches or in the case of like forested landscape.

Landscapes, how easy is it for them to move across this mosaic of different forest patches? So, landscape ecology is, is, it can be a pretty complex field of, of study and inquiry, and especially when it comes to. The study of habitat fragmentation and loss.

## [00:05:15] The Impact of Fragmentation

**Thomas Stokely:** And so, it's, it's really fascinating because, you know, some of this research started with Edward Wilson EO Wilson and Robert MacArthur and their theory of island biogeography.

They actually went in to different islands that had different distances to the mainland, different sizes of islands, and used insecticides to clear out those islands to see colonization rates that were associated with distance to the mainland as well as the size of these islands. And that led to this whole study of.

You know, basically conservation biology in terms of how do we design preserves, how do we design like landscape scale conservation to really facilitate biodiversity conservation to help facilitate the movement of species between these different habitat patches. Lo and behold, like it's really important to have really big patches, and it's really important to have patches that are well connected, so the further and more isolated a given patch, the more difficult it is for a given species to move to those areas. And so yeah, it has resulted in a lot of debate as well because people have been wanting to isolate or wanting, wanting to kind of decouple fragmentation from habitat loss. And hint it, hint, hint, it's very difficult to actually decouple them. And fragmentation is really the physical breakup of different habitat, patches, and a landscape.

And it's really difficult to actually think about fragmentation without acknowledging that some of that, those areas are actually lost. So, I mean, in terms of something that would be fragmentation without habitat loss, it could just be like a fence in your backyard. But even then, like. That fence is actually obstructing a certain area around it as well.

So technically there's some area that's lost in terms of what's available to that species. So, when we talk about fragmentation, it's really, you know, how, how disjunct are those habitat patches for a given species to move to and from. And generally, it's associated with some level of loss and habitat loss and fragmentation is seen as a, a major threat to wildlife across the globe.

And a lot of research is focused on how do we defragment these landscapes? In some cases, fragmentation is seen as potentially a good thing, especially for like edge species. Out in the east, you know, areas that are, they're fairly fragmented, especially like these agricultural and forest. Matrix matrices where you have like a mix of different habitat types and, and habitat patches and, and edges, like some species do really well in those areas.

Other species just cannot sustain themselves within a landscape that's highly fragmented because they might be an interior species, a species that really are utilizes these large patches and is susceptible to Edge effects, meaning they could, there could be more predation along those edges.

They could be more susceptible to differences in the microclimate might be warmer and drier in those areas. So, he just can't persist in those edges.

## [00:08:16] Species-Specific Habitat Needs

**Thomas Stokely:** So, it's, it's been an interesting field to study and, and I had the pleasure of working with Dr. Matthew Bets that there at OSU, he was my research advisor.

And I have to admit that I'm not technically a landscape ecologist in terms of training, although I did train with and learn from a lot of landscape ecologists. So, it is fascinating for me, especially as a conservation biologist and, and a forest ecologist to, to incorporate this into the work that I do.

So, it, it's one of those fields of study that that can get overly complex. But when you think about it, it's like. In terms of conservation, it's, it's really good to have connectivity. It's really good to give space for species to move around the landscape and to adapt through times. And I think that might lead to some other discussions.

But all in all, I guess, in terms of these in terms of the terminology, like it's really species dependent too, that we have to acknowledge the different, like species have different requirements and connectivity for one species is not gonna be the same for another.

**Jacob Putney:** Yeah, and I think you kind of alluded to it already, but you know, from that ecological perspective, you know, what is the importance of the habitat con connectivity?

**Thomas Stokely:** Yeah, for me, my perspective is, you know, isn't like it. It does boil to down to what this a given species needs within a landscape. Within their life cycle. But I think in terms of habitat connectivity and its importance, it's biodiversity conservation really.

## [00:09:46] The Role of Connectivity in Biodiversity

**Thomas Stokely:** Especially, you know, in terms of these systems that we work in are not static.

They're always changing. We have, you know, cycles of drought, we have cycles of insects, disease, wildfire different disturbances that alter, you know, the. The ability for a given forest patch or non-forest patch to provide the resources needed for a given species. And so, the more connected a landscape is, then theoretically the more the greater ability that a given organism can and move around the landscape and shift with shifting resources.

So really. Facilitating their ability to adapt to the changes through time and space. So, without, you know, highly connected landscapes. You can actually have more rapid species loss, especially given the rapid changes we're seeing more recently in terms of drought, in terms of heat waves shifting resources, the changes in plant phenology, you know, when wild wildfires or other pond resources pop up for a given species when insects come out of when, when they hatch or come out of hibernation.

In terms of that aligning with when the songbirds migrate up here, it's really important to have connected landscapes so that we can allow those species to shift with those shifting resources. So, it also has a lot to do with the overall flow of, of really matter and energy throughout the landscape. And that contributes to ecosystem productivity and function.

So, you know, you can think of it in terms of like the ability for salmon to move upstream. They hit a dam, and they can't get past that given dam. Then you no longer have the nutrient inputs that you would've had historically, and that would alter that ecosystem function in terms of productivity. So, I guess that's just an example I thought of off the top of my head because those salmon being able to get upstream actually provided a lot of nutrients to the forest that surrounded them.

And I think the same could be said for a lot of different species that move around the landscape and provide these different ecosystem functions and services to the forest. So, bio biodiversity is seen as really critical for ecosystem functioning. As you get. If fewer and fewer, fewer species and they aren't able to move around the landscape, you can have a loss of a given function like seed dispersal.

You can lose pollination potential. You know, the ability for pollinators to actually provide the ecosystem service to some of our crop trees, especially our native pollinators or, or some of our, not crop trees, but crop species including, you know, orchards and such. So, it isn't just about, you know.

Conserving for doing conservation for a given species, but overall ecosystem function and health, as well as the ecosystem services that the, a lot of these species provide to humankind. So, yeah, it's seen as, you know, it's seen as a really critical aspect of ecosystem management. And so, in terms of the work that we're doing, you know, it's, especially when you have more disturbances trying to keep s.

Different subpopulations from becoming too isolated because if they become too isolated, so an example is Isle Royale over in the Great Lakes where these wolves made it to an island, but it wasn't well connected and that population became really inbred. And the. That little subpopulation actually suffered quite a bit because of that inbreeding depression.

So, allowing not only at the population level for these species to adapt, but an ecosystem level for all the nutrients and energy and matter to flow across the landscape to help provide that ecosystem function and services to humans.

## [00:13:30] Threats to Wildlife Habitat

Jacob Putney: Thinking about your dam example you know, what are some of the biggest threats to, to wildlife habitat loss and some of the biggest drivers of fragmentation and loss of connectivity?

Thomas Stokely: Yeah. Again, it's really hard to decouple the habitat loss from fragmentation. I know that if Matt bets ever listens to this, he'd be really upset if I talked about them individually. But you know, it, it's an. In terms of Oregon, like we are seeing like an expansion of communities into the wildland urban interface that can lead to fragmentation of habitats because you have, you know, fencing, you have other things that could result in like an ecological trap.

So, in the case of like mule deer for instance, you might have mule deer that would historically have migrated from winter range up to summer range. That migration's really critical because they're obtaining most of their calories in their summer range. But if they're drawn into a community and no longer migrate to summer range, and they might be after someone's garden, and it just seems like a safe place because there's a lack of predators in that area.

Those individuals have actually a lot have, you know, lower survival rates than individuals that migrate up to some range. And the hypothesis: because they're not getting as much of the calories as they would. In town is, is and it's probably not as high a quality as they would if they're able to migrate up to summer range.

Those higher elevations that, you know, have a diverse amount of forage for them. So yeah, the human development's huge. One. We're also seeing, you know, increasing the high severity disturbances like fire. So, you know, species that are forest obligate. When you have very large, high severity wildfire events like the bootleg fire for instance, you have a major shift and the ability for a species to move across that landscape, some species really require a lot of canopy cover.

An example would be like Pacific Martin, for instance. And if you have this really high severity, wildfires with very little in the way of forest canopy it, you end up having an issue for those forest associated species that require some level of canopy to move across the landscape. They can't move across these wide-open areas because of the fact that they're way more susceptible to depredation from especially like, hawks and, and other raptors.

So, there's, you know, also historic management of our forest in Oregon has, has been a huge issue in terms of, we don't have as much course wood as we would've had historically. A lot of the logging practices of the 19 hundreds were, you know, going after the biggest healthiest. Trees and a lot of those trees were fire resistant trees like Ponderosa pine and, and Douglas Fir.

And so not only do you lose the function of that forest in terms of being more resistant and resilient to wildfire the whole system is more susceptible to high severity fire. Because we've kept fire from, from actually being able to do its thing in, in these landscapes that contributes to those high, very large patches of high severity fire.

But you have a lack of coarse wood and, and over 40% of the species, the terrestrial species in Oregon actually utilize Coe wood at some point in their life cycle. So, lack of course, wood in a lot of our forest systems is, you know, has a major impact on the habitat suitability of these different areas. Also got a lot of encroachment into other habitats like non forest habitats like meadows and even riparian areas would historically been a lot more hardwood dominated or becoming, have become more conifer dominated. And that can alter the connectivity of those stream systems, especially for species that really rely on the hardwood component.

Like a lot of songbirds and different mammals that might be foraging on them like beavers, for instance. That would be forging on the hardwoods. It's, you know, there's, and a lot of these things are, you can't just isolate like the one thing from another, just like habitat loss and fragmentation. It's hard to isolate the impacts of, of one, you know, of one issue for a given.

Wildlife species, so the whole wildland urban interface, you know, encroachment. Then you have more people kind of going into the woods. The more people you have going in the woods. The more wildlife, we're typically trying to avoid human beings, whether it's an anti-predator response to humans or poaching, or it could be increase in invasive species because we typically track, we bring a lot of those invasive species in our boots and in our, the fur of our, our dog hair.

So they, they bring in a lot of invasive species that can compromise wildlife habitat as well.

The fact that we haven't let natural disturbances play out historically would've had a lot more of a mosaic in terms of our forest structure, and now we have more of a homogenization of forests, whether it's from the historic management that's resulted in these really overly dense forest patches. To, you know, these high severity fires because of that densification of forest that then results in conversion to non-forest.

And we are very concerned about the increasing threats of of prolonged drought and heat waves and how that contributes to, you know, the overall stress of the forest and, and how much that would, you know, makes 'em more susceptible to a conversion away from forest habitats as well, and into something that might be more dominated by invasive species like cheat grass.

## [00:19:03] Species and Habitat Types in Central Oregon

**Jacob Putney:** So within this type of work, in general, maybe even some of the projects you've been working on are there certain species that you typically look at? I know you mentioned a few already, like beavers, mule, deer, songbirds and are there species that are important to look at or more indicators and, and thinking about that, is there specific habitat, habitat types that you look at as well?

**Thomas Stokely:** Yeah. Yeah, that's a great point. Again, I mean, going back to this, it's like when you're talking about wildlife biology 1 0 1, it's, you know, habitats. Very species specific. And some species are gonna be way more susceptible than others. Like I mentioned earlier, there are some species that are really just drawn to those edge habitats that would actually benefit from a, a more of a fragmented landscape.

That might be a bit more of a disjunct. Patches with a lot of edge area versus others. It might be more interior associated. So like spotted out for instance would require, you know, an old growth forest patch that has sufficient interior habitat to support their ability to breed and reproduce. And so it really depends on what you're interested in.

For the work that we're doing here in Central Oregon, we are actually relying upon a species list that the Oregon Connectivity Assessment Mapping Project, the acronym is O Camp that was developed by Oregon Department of Fish and Wildlife and others like there was a lot of other collaborators including academics, a Samara Group O Oregon Department of Transportation, and they are taking a look at connectivity across the entire state.

And they had a list of. All these different species that were not necessarily considered umbrella species or umbrella. We use umbrella species to suggest like, well, this one species represents a lot of different species. They call it more surrogate species. They were selected the species based on a variety of factors.

And one of the factors is, you know, what types of habitats they're generally associated with. So for instance, you have Lewis's Woodpecker that's gonna be associated with more open ponder roast of pine. Type conditions versus you have something like great gray, great gray owl that might be more associated with meadow lodgepole matrix.

So areas that are, you know, have your intact meadows. Surrounded by lodgepole pine. We've got species that are also not as mobile. Like Western Toad was in that list. Then you have species that are very mobile, like bee deer and elk, north American elk, and as well as puma, the mountain lion that can move really long distances, can move miles within a day, and are generally wide-ranging species.

So, they had a whole variety of different species to do this connectivity assessment, and they were able to, based on the habitat requirements of different species, model the habitat permeability across landscape, and they ran it through these models. They're called omni scape. It basically is like looking at the connectivity landscape for a given species based on simulated.

Electrical current in a landscape. So imagine you have like a surface, and you have all these different pixels that represent you know, different quality habitat areas that would facilitate movement versus areas that would actually break up the movement. Meaning it's more resistant. To the ability for species to move so they just can't move across a given pixel so easy.

And that it injects current in electrical current modeled LEC electrical current into this, into this matrix. And it determines how easy the electrical current can move around the landscape given these different habitat values, whether it's more resistant to movement or if it facilitates movement, whether that pixel would be considered an area source habitat or given species.

And so they modeled. This is across whole is a species and definitely recommend looking it up. They have a really great interactive map that you can look at these connectivity areas and they use that to develop these priority wildlife connectivity areas and. They're essentially, they look like corridors when you look at 'em.

And going back to terminology corridor is, is a bit more of a fixed area that we think of it as being more linear that might help facilitate species' ability to move across the landscape. So from one patch to another. And while it looks like corridors, the OC camp author's will actually. Specify that we shouldn't be looking just at those polygons we have in the map but looking at the areas surrounding them so that we can consider the entire landscape and not just these areas that are modeled as important connectivity across these species lists.

So for us we. Are doing this we're, we're actually utilizing that data to see, you know, how the potential effects of roads and recreation might be altering habitat connectivity for a variety of species. we've got north American elk, mule deer, well mule deer and blacktail deer. We have puma, great Grayle, la bunting, hermit thrush, Lewis’s woodpecker, Sierra Red Fox , Pacific Martin, gray squirrel, porcupine, and Western toad.

So we have quite the species list and it sort of represents different life history requirements. So species that don't. Move as well, or that might be more limited in terms of their ability to disperse to new habitats versus species that are wide ranging. That'll migrate from, you know, all the way from the sagebrush up to the high elevation, moist mix Conifer. And, and also that list represents sort of a sensitivity to human interactions, and I can talk a little bit more about the study that we're doing, but you know, mule, deer and elk are really sensitive to human interactions. They typically try to avoid us. I don't know if you've ever noticed this when you're out in the woods, that they're.

Typically running away from you when you, when you eventually see 'em versus something like, you know, a squirrel porcupine in Western toad might not be as sensitive to like that perceived. Predator effect, but would be really sensitive to say a road, trying to cross a road. They're more sensitive and to mortality.

I mean a lot of species are sensitive mortality from, from roadkill, but we also have birds that, you know, typically aren't as susceptible compared to, say western toad or, or deer.

**Jacob Putney:** No, that's fascinating. I'll have to check out that, that O camp study and that interactive map I thought about using electrical current. That's is really fascinating. But,

**Thomas Stokely:** it's, it's called Circuit Theory. Is, is is the theory that led to a lot of the modeling effort.

## [00:25:42] Impact of Roads and Recreation on Wildlife

**Jacob Putney:** Mm. Well, since you mentioned roads and recreation let's kind of dive into that a little bit further. You know, you mentioned some of them already, but what impacts do these have on on wildlife habitat?

**Thomas Stokely:** Yeah, that's a great question. And there's actually a wealth of literature out there. Looking at the potential effects of, you know, both roads themselves as well as recreationists on the forest. And it's in a, you know, the, the field of study is, is really varied, but the major take home from a lot of the literature is that yeah, a lot of species, even species we don't think of as being so sensitive to humans typically are really sensitive to the presence of humans on the landscape.

So we talk about. You know, disturbances within forest ecosystems in terms of like wildfires, a disturbance, wind as a disturbance. Drought is a disturbance, but just the human interaction with wildlife can be a disturbance to those, those individuals. And so when you have folks out there on the landscape, especially in areas that are like really, important habitat where maybe given.

Mule deer is selecting an area to have their fawns because it might be a really important area to, to forage so they can, you know, help promote lac lactation and, and feed their young. If you have people that are constantly mountain biking through that area or visiting it every so often, that can be enough of a disturbance to drive them off of that.

Area that's really in high quality habitat and in into areas that are more marginal habitats, and that can affect their ability to survive and reproduce. So if they're not able to get enough forage in a given area because of that human disturbance component, and they're forced onto areas that have less high-quality forage, then.

You know, in some cases that can lead to they're young, not surviving. Just the interactions with humans can lead to a lot of stress hormones as well. And, and as, as we all know, stress is really not great. It, it is important for short-term survival in terms of evading predators, but chronic disturbance to wildlife can lead to that chronic stress and and increase the amount of cortisol in these animals.

And that can also. Have detrimental effects on their survival and reproduction as well. So all these studies they, you know, looked at across many different species. They, Starkey experimental forest, actually collared elk and they put GPS units on different recreationists, whether or not they're hikers.

They were, they had horseback and then they had a TV, and they looked at how the elk would respond to these recreationists out there in the forest and. Actually, a lot of people think, well, mountain biking isn't as bad as OHV or, you know, horseback. I see a lot of elk on horseback, so they're not as bad. Hiking is, is pretty low impact, but for elk at least, it was just humans in general.

They typically were avoiding humans as much as possible. And so, you know, it's. I think we need to be careful about playing the, the blame game when it turn, when it comes to like who's having the biggest impact. 'cause it's generally the response to humans in general not necessarily a given user group.

The results is also this other study that. They had camera trapping, and they had audio playbacks of different recreationists, so they had audio playback of like a single hiker versus a group of mountain bikers. And they would broadcast this in the forest to see how wildlife would respond to those noises and.

For some of the species, especially the prey species like deer and elk. The major response was, yeah, noisy, big groups are, are not great. And they would typically, animals would typically try to avoid that noise and avoid those humans. So that, you know, that was a pretty cool study. That was, it was a study by Zeller Catherine Zeller that just came out actually in 2023 or sorry, 2024.

So pretty cool study. And for other species, you know, it's again, the roadbed themselves that can functionally fragment a landscape. So for, you know, different amphibian species or less mobile species, them trying to get across, four lane highway, it can be almost impossible. So in some cases, that can be an actual barrier to wildlife movement and totally fragment the landscape versus others, you know, they might be able to make it across the given highway or given roadbed.

But it, you know, there, there is this risk of mortality. And so a lot of work now with these major highway systems is focused on over crossings and trying to get over crossings or underpasses to allow wildlife to actually move across this barrier that is a highway. And so that's sort of the extreme version from like, you know, someone just hiking and disturbing an animal to, you know, these.

Big highways that are actually disconnecting habitat patches. So there are a lot of projects that are, there have been a lot of projects trying to look at more overpasses and underpasses across Oregon.

## [00:30:46] Wildlife Overpasses and Road Safety

**Thomas Stokely:** The more recent one that we, we have here in central Oregon is the, been to subtle lake initiative.

And that is looking at trying to create some overpasses on Highway 20 because there's just a, a ton of roadkill that's also a threat to humans in terms of human. Public health and safety, you know, collisions with deer and elk is, is, you know, a big risk to humans as well. So it's kind of like, all right, where's the win-win?

Where we, where can we put these overpasses and underpasses to, to not only help animals move across the landscape, but help reduce the risk of humans colliding with them in their vehicles and getting injured. Or, or, you know, or worse. So, you know, the main thing is, yeah, humans on the landscape tend to, you know.

We, we tend to push animals out of really important forging areas.

## [00:31:34] Recreation Impact on Wildlife

**Thomas Stokely:** So, you know, one thing that we're really looking at here in the Deschutes, which is super popular recreation area, is to better understand how roads and recreation might be affecting wildlife habitat connectivity, and their ability to move cross landscape.

**Jacob Putney:** Yeah, so thinking about some of those things you mentioned, you know, what can we do as a recreationist and then what can we do around roads, you know, like the the wildlife bridges and things like that to, to mitigate some of these impacts and to reduce, I guess not only the amount of stress that we put on some of these wildlife species, but just some of the impacts that, you know, we have just on our roadways, for example.

**Thomas Stokely:** Yeah, that's a great question. I think one of the main ones is as recreationists is, is to just kind of. To obey the closures, like whenever there is a closure, it's there for a reason. Oftentimes they'll put recreation closures or road closures in areas that are important, fawning areas for elk and mule deer calving and fawning calving for elk and fawning for mule deer.

Important areas for overwintering in the wintertime, these animals are really susceptible to this disturbance because they're not getting a ton of food in the winter. There's just not a ton available for them to eat. They're relying on their fat reserves that they built up throughout the summer from the plants.

They, they were the high-quality forage they obtained in the summertime. And so the more you stress 'em out, the more fat reserves they're building, and again, more cortisol that they have in their system and that, you know, can lead to, you know, lower fitness. So lower ability for them to survive and reproduce in the springtime.

## [00:33:14] Supporting Wildlife Initiatives

**Thomas Stokely:** So observing closures, I think is a really important one for Recreationists supporting these different initiatives. Looking at over. Passes and, and underpasses for wildlife connectivity across highways is a maiden one. You know, you can buy these license plates in state of Oregon that are watch wildlife.

And those are supposed to contribute to, you know, some of the, the work that is addressing where we should be putting these crossings. Obviously like, you know, when, when it comes to some of these roads road systems is, you know, watching for poachers, that's another one that. The Oregon State Police is, you know, has an O-D-F-W, Oregon Department of Fish and Wildlife have these campaigns about, you know, stop poaching.

So that's a main one too, because. In some cases, the animals might be habituated to humans, and that makes them way more susceptible to poaching because they're not necessarily trying to flee from humans in, in all cases. They might be used to that human presence. And then a poacher comes along and they're way more susceptible.

## [00:34:12] Forest Management and Wildlife Habitat

**Thomas Stokely:** So one thing that we're doing here in the Deschutes National Forest. Is working with the Deschutes Collaborative Forest Project, which is a multi-stakeholder group that is working with the Deschutes National Forest to address different issues and different values we have across the landscape.

A lot of the work has been focused on wildfire risk reduction and providing some recommendations and coming up with consensus about you know, how the forest should be managed to reduce. High severity, wildfire to the forest and forest, you know, to promote forest health as well as protect communities.

But a huge focus for the last few years has been wildlife habitat. And the major concern here, as I've already mentioned, and probably mentioned again, is you know, the, it's just a very popular destination area. So you have people moving here to be closer to the outdoors, and again, that can have big impact.

So we're trying to, trying to come up with these landscape scale strategies. Where we can a start to do more proactive restoration treatments that has wildlife habitat and connectivity as a primary objective. Identify those areas that are most critical for core wildlife habitat, these larger blocks of contiguous habitat where those areas important for connectivity across landscape and how do we manage that, especially in terms of w wildfire management.

We have, you know, different strategies and tactics for, you know, restoring fire back to the landscape as well as fighting fire. And some of those, all of those rely on road systems, right? We, we know that we can't just get rid of roads, and we don't want to reduce people's access to the forest because it is, you know, our public lands and, and people have an inherent right to those public lands and to enjoy them and to value them.

But we're trying to think about. Strategic sort of donation of the forest in terms of where are those areas that are most important, where we can reduce the density of roads, create larger blocks of habitat, maybe restore fire at a more meaningful scale. So have larger burn blocks, get more restoration work done within those areas prior to doing more prescribed fire operations.

So larger areas where we can do forest thinning that helps to return more of a mosaic back to the forest. So creating meadows. Leaving patches of dense forests for them to move for certain canopy associated species to move through. Really just build back a lot of messiness back in the forest so that those forests can function.

At a scale and function like they would've historically so that when wildfire does burn through, it isn't necessarily always going to be a detrimental impact to the Habitat resource.

## [00:36:53] Landscape Level Planning

**Thomas Stokely:** So landscape level planning is something that we're really working on. So, you know, having folks come to the table and in terms of, you know, helping provide input is a major one.

So we're, you know. Based on all this work, we've provided recommendations to the Forest Service on how to manage for connectivity and core habitat, or phase two of that was actually using the OC camp data sets to incorporate how roads and trails might be potentially affecting habitat connectivity across landscape.

Identify those areas that are really important currently for core habitat and areas that we could actually do more management to facilitate connectivity across the landscape. And we're hoping that that can then transition into some on the ground monitoring as well, where we would use some citizen science and use community science to help collect some of the data through camera trapping and this cool technology called bioacoustics monitoring.

But. The, one of the main challenges is gonna be, you know, working with the recreation community to make sure that we can sort of address what the trade-offs are at the landscape scale, and to help basically provide more input to that recreation community so we can dissuade people from creating their own trails in areas that might be really important habitat.

So that's another major one is don't use the user made trails or social trails, because a lot of times, we don't put trails in certain areas because those are important areas for wildlife habitat. So if people are building their own trails in these areas that can functionally make that habitat.

Way less suitable than it would if it was more or less intact. So, you know, one major step that we're gonna be doing is working with recreation stakeholders to address, you know, what are their values on the landscape? Where's the give and take? How can we build in more of this core habitat and connectivity without compromising people's ability to enjoy these landscapes and enjoy the public lands?

And, and in terms of what people can do on their own property fencing, making sure it's wildlife friendly. Fencing especially, you know, old barbed wire that's not very tight can really entrap a lot of different species especially mammals. I think, you know, many of us have seen, you know, carcasses and, and caught up in fencing.

So wildlife friendly fencing includes like smooth wire on the bottom, smooth wire on top. You can have some barbed wire but making sure that it's tight and making sure the spacing of the post is close so that the wire can't, can't become tangled as an animal tries to move through it. That's another main one.

Managing your forest include more of mosaic. You know, when you do thinning, don't just create like an open park-like setting, leave some patches, you know, some dense patches, create some openings. Create areas where you know, there's more forage and more pollen. Resources for pollinators and more insect diversity in those areas that are more of a mosaic.

So managing for a little bit more of a mosaic and messiness when you do forest management activities is, is pretty key. Then, you know, if there are road systems try to limit, you know, the overall amount of, of, you know, access to certain areas and, and making sure that if you have a road that you're not really utilizing you know, having it closed or having it to where, you know, it isn't just like a constant flow of traffic through an areas, it's, it's pretty important to minimize disturbance to wildlife.

**Jacob Putney:** Now it's exciting to hear that some of this work is, you know, prioritizing some of these objectives around wildlife habitat. And then really thinking about a meaningful scale too.

## [00:40:27] Future Goals and Monitoring

**Jacob Putney:** You know, we talked about at more of a landscape level you know, thinking about some of this work and you kind of mentioned some already around the monitoring and some of the bio acoustic stuff, but, you know, what are some of the, the future goals you know, for some of these, some of these projects and some of the work that you're involved with?

**Thomas Stokely:** Yeah. Again, like the main one is like working with the recreation community so we can all get on the same page. I think there's this perception that that recreation isn't necessarily a consumptive use of the forest, but. It is, it does have an impact on, on wildlife. So making sure that we can provide more science communication surrounding this, this subject.

And I think a lot of people get it when you really hone in on what, what they value. An example that I like to, to use is like, if you're, you know, hanging out in your living room, like, you know, eating a bowl of soup or whatever, and, and someone rides through, like on their mountain bike, you're gonna be like a little startled and then someone rides through on a horse.

You're definitely gonna be startled and then like, you know, comes in through the road, should be like, you're typically gonna be like, screw this place, I'm gonna move, you know? So, you know, connecting with people to make sure that they can understand why we should respect closed area, you know, closures for wildlife, why we shouldn't create user made trails is a big one.

So, there is, we can do all the science we want, but if we can't communicate that well to the public and we can't communicate that. To forest managers and practitioners out there in the forest, then the science, you know, has a lot less utility. So while we're doing all this modeling, we are working closely with recreation stakeholders, working closely with the National Forest.

To provide them with that information. And then hopefully what we're working on right now is, is thinking about, based on what we're finding from these models, actually getting out on the ground to try to help validate the utility of these models as well as inform future project planning. So if we have an area that is highlighting as being really important for wildlife connectivity.

We want to go in and put some camera traps as well as some of these acoustic they're called Accu. They, they have an acronym acoustic recording units or something like that, or audio recording units. Basically, they listen to the forest and so you can actually detect different bird species, for instance, and the camera traps would be more.

Of monitoring some of the mammals, some of the bigger mammals, specifically to get a sense for at least our species list and maybe some other species of interest that are sensitive to humans is an interaction between not only that s and recreation piece, but the amount of work we're doing in the forest in terms of, you know.

Thinning and prescribed fire operations. A lot of the prescribed fire and thinning is, is seen as like a reduction in habitat, but fire was always a natural part of this landscape. And Fire always played a role in promoting habitat resources for a, a vast variety of different wildlife species that are adapted to these fire adapted ecosystems.

So how can we do more of that restoration work? While creating larger blocks of intact habitat we definitely need more information to do that successfully. So we're hoping to test what are the interactive effects of opening the forest and roads and recreation. So when you open the forest back to more of, you know, of a condition that would be, you know, where you have.

Less dense forest conditions that can actually increase sight lines. So how far you can see into the forest that can increase noise propagation. And so, you know, my hypothesis would be that the, you know, opening the forest to a certain level, it isn't necessarily the reduction habitat resources, but the reduction in habitat suitability because that human component and so.

Trying to figure out what is the appropriate scale at which to create larger blocks of contiguous habitat, reducing road densities, making sure we prioritize recreation in areas that are having least impact on wildlife is one of the major objectives of, of this work, of especially doing on the ground monitoring work.

And we're hoping that can in inform future strategic planning and implementation at landscape scales to identify. Can we get larger blocks of, of habitat and do enough work in those areas to when wildfire does burn through it, it's not gonna be a whole type vegetation shift and conversion to out of non-forest habitat.

And given the amount of, you know, drought we've seen the last decade and luckily, we seem to be maybe getting outta that for now. So it is, it is an opportune time to start. Doing some of this work and making sure we get ahead of it. But the scale is immense. You know, the, the, in terms of the wildfire threat, in terms of the number of humans that are moving to these areas, it, it, it seems like a wicked problem in terms of just seems like over an overwhelming thing.

These interactions between humans out there in landscape and, and disturbances and drought and, and fire. But you know, more on the ground research and involving. Involving recreation stakeholders involving folks that, you know, just love to get outdoors and, and this, some of these science projects I think is gonna be pretty key.

'cause then they become messengers for biodiversity and conservation and, and wildlife habitat restoration.

**Jacob Putney:** Yeah, absolutely. And I think there's just a lot of complex things that go into a lot of this, this work and as you mentioned, you know, more data and, and getting out there and doing some of that monitoring. But I wanna make sure you have the opportunity too, to talk about an. Any other interesting projects that you've been working on or anything specifically that you want to part with related to, to wildlife habitat, connectivity, and kind of this landscape ecology in general.

**Thomas Stokely:** Yeah.

## [00:46:16] Prescribed Fire Training Exchange

**Thomas Stokely:** Well, gearing up for this two-week prescribed fire training exchange that's coming up. This will be my third year, helping them to organize and manage it. And it's a Huge undertaking in terms of getting, you know, around 40 participants from all over the US and sometimes internationally to come to an area and learn how to do more prescribed fire.

But a major focus of that prescribed fire training exchange is the use of fire to promote ecosystem health. So it's really the ecological use of prescribed fire. I think folks typically think of prescribed fire nowadays in terms of like protecting communities. But you know, one of the major things that I wanna, that I'm wanting to push for is the fact that fire can be used as a tool to remote habitat and to make it more resilient to the changes we're seeing on the landscape.

And so.

## [00:47:04] Fire as a Tool for Ecosystem Health

**Thomas Stokely:** Throughout the us like especially east of the Rockies fire, you know, is, is one of the primary tools for managing wildlife habitat out here. Fire is one of the primary tools for protecting communities and restoring, you know, these conditions to make forest a little bit more resilient. But again, people perceive that as negatively affecting wildlife habitat.

And so one of the major things that's somewhat of my passion project is, is to try to work with. Practitioners in terms of how do we tailor prescribed fire operations to really be used as a tool to enhance habitat, to recruit snags, to create openings, to make, you know, restore the forest ecosystem health rather than just be a fuels reduction.

Treatment. So again, with that, hopefully we'll be able to do some on the ground monitoring in conjunction with some of the treatments that we're implementing across the landscape to see what the wildlife responses are to, to these disturbances, to, you know, trying to restore that ecological process that is fire and, and the system.

And also, to understand the impacts of wildfire treatments across these forest systems as well. You know, wildfires were historically would've burned and east of the cascades, very large patches, but it would've been low severity fire. Now we're seeing a lot more high severity fire. So getting a better understanding of how that's affecting, you know, wildlife habitat connectivity as well as future fire regimes, I think is, is a pretty interesting field of inquiry and, and research.

But yeah, I mean, working for the Nature Conservancy, you get to get your hands on all sorts of different projects. So it's, it never gets totally mundane with one individual thing. There's typically a lot, and it is ecology. So when we're talking about ecology, it's just. Overly complex and us ecologist like to make things overly complex.

So I guess that probably should be a passion project of mine is, is try to make my life a bit simpler in terms of working with different stakeholder groups, researchers, and practitioners. But I do like to embrace that chaos and. Yeah I'm excited for this modeling effort to be concluding because I think it, it can actually it seems like it would be congruent with a lot of the other work that researchers have been doing in terms of landscape scale prioritization.

So where are those areas that are most important to do mechanical thinning and prescribed fire treatments? How do we align that with our understanding of habitat connectivity is gonna be a major thing that we're trying to use these models for, but just. I'm gonna be pretty stoked to get some sensors out there in the landscape, get camera traps and, and some of these audio, these acoustic recorders out there so I can get out in the field and you know, get to do a little bit of research, which is, you know, a, you know, major interest of mine is, is still being engaged in the research.

So there's always a balance between like, you know, doing the research and making sure it's applicable to land managers and, and making sure that that science is communicated to the public.

**Jacob Putney:** Well, Thomas, I I really appreciate you sharing your expertise with us today. I think it really demonstrates the interconnectedness of a lot of these ecological components that, and, you know, as you mentioned, are incredibly complex. And, you know, thinking about the, the, not only the scale, but the meaningful scale.

As well. So I know there's a lot of things we discussed today, but if there's any questions that came up while you're listening or if you'd like to learn more, please drop us a comment or send us a message on our website. I think we'll definitely link some of the, the research that you mentioned in that, that O camp analysis.

And I'll check that out as well. But before we wrap up here, we'd like to conclude each of our episodes with what we call our lightning round,

**Jacob Putney:** or a few questions that we ask each of our guests. So to kick that off, let's start with our first question. What is your favorite tree?

**Thomas Stokely:** Oh man. Well, I, that's, you know, when you ask a forest ecologist what their favorites are like we, we typically are like, well, it kind of depends. It's the ultimate answer is, it depends. I love fire adapted species. So here in the Pacific Northwest, I would have to say Western large would be my favorite.

It's fire adapted. It's long lived. It's a deciduous conifer, which is super cool. Gorgeous in the fall. It, it just seems to be like one of those species when you encounter, you're just in awe of, even, even in the wintertime when it doesn't have any of, any of its needles and it looks kind of dead.

You're like, yeah, that's a pretty cool tree right there. So I, you know, I do come from southern Missouri, so I really like flowering trees like. Find like the tulip trees really fascinating 'cause they're these giant flowering, you know, species. You know, the bald Cyprus, they breathe through knee their knees.

That's pretty cool. Like, they have these like roots that, you know, are sort of like go up above the, into the air. I just thought of that one off the top of my head because it's like, well what else besides western larch? There's a lot of different species I'm fascinated with. I mean, I love. Also, Oregon Oak, Oregon White Oak is, is pretty cool.

Another fire adapted species as well. Super critical for wildlife too, for all you folks that live on the west side or, or in the Columbia River Gorge. So promoting oak is, is always a good thing for wildlife.

**Jacob Putney:** Yeah, absolutely. Yeah, the Oregon White Up is a, that's a great one as well. And we did do an episode on that one. It's been a while now, but fascinating species as is the other ones as well. I don't think anybody's mentioned Bald Cyprus yet, so that's a good one. But yeah, Western Large, or Tamarack as it's often referred to,

**Thomas Stokely:** Mm-hmm. Great.

**Jacob Putney:** Is, is, is a great one as well.

I think I've mentioned that one in the past. So our next question what is the most interesting thing you bring with you to the field, either with you in your vest or field kit, et cetera?

**Thomas Stokely:** Ooh can I say my dog, Talon?

**Jacob Putney:** Absolutely.

**Thomas Stokely:** He, he's a pretty good field assistant. He, he sticks pretty close. He is always wanting to get me to go to the river, so take breaks and go to the water is always so he, he's, he's an encouraging field assistant. He encourages me to take some breaks. But he's also a good office assistant as well.

Just, you know, in terms of those long days at, at a computer, it's always great to have your little emotional support office assistant pup. Along, along your side. So I would've, to answer that one,

**Jacob Putney:** No, that's a great one.

## [00:53:32] Resources for Learning More

**Jacob Putney:** And then lastly are there any resources you would recommend to our listeners that they're interested in learning more about some of these aspects of landscape ecology wildlife habitat, habitat loss, fragmentation, things like that? Yep.

**Thomas Stokely:** Yeah. It's. Checking out the Oregon Connectivity Assessment Mapping project. I think you said that you would drop a link in there. I think just looking at it in terms of the area that, you know, you might be working, or you know where your community is you know, it's a great resource and again, like don't think about it.

You'll see these. Specific pathways, these polygons that they put on the map. But they encourage you to look at the areas surrounding them. So those are like, you know, in terms of all these different species they're modeling, those were like the optimal areas. But really think about it in terms of the areas surrounding them as well.

So just because you, your property or your community isn't like right on one of those. Wildlife connectivity areas, like think about the landscape surrounding, you know, where you work and where you live so that we can encourage, you know, land managers, we can encourage our neighbors to do things that'll help facilitate wildlife habitat connectivity and allow these species to move and shift with as the resources shift through time and space.

So that's a major one. If you want to go down a rabbit hole, definitely look up the habitat loss versus fragmentation debate. Some of it's Quite comical, like whenever scientists get into these debates, like they take things so personally sometimes. And so we got to read a lot of those when I was in grad school in the Matt Bets lab.

So, you know, you can look up some of Matt Bet's papers. Jonathan Valante had a really. Great one on reconciling the fragmentation versus habitat loss debate. And I can send you that one as well. It's a lot more technical, but it is an interesting one in terms of thinking about landscape level, about diversity conservation and, and getting over these debates and, and be more proactive about how we can manage landscapes.

But it is, it is pretty entertaining. To, to look into the debate and, and see what some of these comments are from different scientists, but there's a, yeah, there's also. The Nature Conservancy has another mapping effort called the Resilient and Connected Network. It's conserving Nature's stage is, is the main title, and it, it isn't getting to that fine detail of these specific like connectivity areas but looks at.

The overall landscape connectivity as well as potential resilience to, you know, changing fire regimes, changing climate. So it, it kinda looks at landscape resilience as well, and I would encourage that as a resource. It doesn't get into like species level or habitat requirements, but it kind of looks at the system overall.

So that's also a pretty interesting resource to think about connectivity.

**Jacob Putney:** Yeah, yeah, definitely. We can get those added to, to our, our website as well is when this episode comes out.

## [00:56:23] Conclusion and Lightning Round

**Jacob Putney:** Well, Thomas, again, thank you for being here today. I definitely learned a lot. This has definitely something I haven't spent a ton of time on, and so it's always fascinating to hear from an ecologist the different aspects and really demonstrates, you know, how these different pieces work together and the importance of each of them.

So this concludes another episode of In the Woods. I want to thank you all so much for listening. Don't forget to subscribe and we will see you all next time. Bye everyone.

**Thomas Stokely:** Thanks a lot. Bye.

**Lauren Grand:** The In The Woods Podcast is produced by Lauren Grand, Jacob Putney, and Scott Lood, who are all members of the Oregon State University Forestry and Natural Resources Extension team. Other members of the team who've been involved in the podcast include Carrie Berger. Jason O'Brien and Steven Fitzgerald episodes are edited and produced by Carrie Cantrell.

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Until then, what's in your woods?