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Participant: Wordly [W] English (US)

[>> W] So this is module six on pollinator identification and monitoring.

[W] On the agenda tonight we'll have Doctor Laura Moran kick things off with a bee fly or wasp quiz.

[W] And we'll go over some tricks on how to tell those three groups apart.

[W] Laura will also go into identifying the different bee groups you're likely to see visiting your habitat.

[W] After that, I'll talk about monitoring.

[W] And then with the remaining time at the end, we'll finish off with a question period.

[W] So here's our info slide for tonight.

[W] So this week's recording will be posted on the course info page by Friday of this week.

[W] Please put questions in the Q&A box and we'll try to answer some of them at the end of the session.

[W] And you can email us at.

[W] Pollinator org.

[W] If your question was not answered, and we'll try to respond to you as soon as we can.

[W] You can scan the QR code on the slide or use the link we sent to you in the chat or by email.

[W] If you would like this webinar translated in your preferred language.

[W] As always, please engage with respect and kindness in the chat.

[W] And as mentioned before, we suggest that you write down in point form or a few sentences the key takeaways from each training while you're attending live.

[W] And this will make it easier when filling out the step one form, which we will send to you next week.

[W] Okay, so I think you should know who we are at this point, but just in case you're tuning in for the first time and haven't met Laura yet, Doctor Laura Morandin is the associate director at Pollinator Partnership and has been doing research on bees and pollinators for 30 years.

[W] She received her PhD at Simon Fraser University in British Columbia, Canada, studying modern agriculture and pollinators, followed by postdoctoral research at the University of California, Berkeley.

[W] Laura has coauthored books and book chapters, created outreach and technical guides, has about 30 peer reviewed publications on pollinators and sustainable agriculture, and has consulted for government and industry.

[W] Welcome back, Laura, and I'll pass things over to you to start off our presentations.

[>> W] Great.

[W] Thanks so much, Anthony.

[W] Start the share here.

[W] Okay, great.

[W] Well, hello again everyone.

[W] We're nearing the end of PSC 2026, which is hard to believe, but I hope you had a good couple of weeks off and are pumped for, you know, this, this next couple of weeks where we end things off.

[W] So I'm really excited to be here tonight.

[W] This is one of my favorite modules.

[W] It's where we get to start talking about how you can see and celebrate some of the benefits of creating spaces for pollinators.

[W] And I'm going to show you how you can identify pollinators, which is going to give you the tools to check in on your habitat to see what's going on with pollinators, what plants are supporting, what insects, and hopefully also open up a world to you of these amazing animals.

[W] So this talk, maybe as far as you ever go on your journey to see the bees and other pollinators, or it might just be the initial spark that starts a much longer journey, which has happened with a lot of our stewards.

[W] So again, just a little overview here.

[W] I'll first go over some of the main pollinator groups, how you can tell them apart.

[W] Then I'll get into big groups.

[W] I'll show you some resources if you want to get more into bee and pollinator identification, because we can only really scratch the surface today.

[W] And then Anthony will talk more about monitoring and ways to monitor and resources for that.

[W] And really what we want you to to do here is we want to increase your awareness and understanding of the different pollinators and hopefully inspire in you a desire to go out and observe pollinators and plants more.

[W] That could be in the habitat you create, or it could just be every time that you're outside.

[W] So you really might be amazed by all the incredible bees and other pollinators around you every day that you might not have noticed before.

[W] Okay.

[W] And as I think you most definitely know, by this point in the course, there's many different types of animal pollinators.

[W] There's birds and butterflies, bats and other mammals, mammals.

[W] There's flies and wasps, even some lizards.

[W] Most of these groups are pretty easy to tell apart.

[W] Most people can tell a bird from a butterfly, an ant from a bat.

[W] But three of the most important pollinating groups that might have some tricks up their sleeves.

[W] Are these ones here?

[W] So you might think it's easy at first.

[W] You know, I know what a bee is.

[W] I know what a fly is.

[W] And I know what a wasp is.

[W] So what we're going to do here is we're going to start with just a fun challenge.

[W] You can participate or not.

[W] It's it's just for fun.

[W] And what I'm going to do here is I'm going to show you a picture.

[W] And then in your head or on paper, I want you to decide, not in the chat.

[W] Don't put this in the chat.

[W] I want you to decide if it's a B, a fly or a wasp, and there'll be ten pictures.

[W] I'll give you a few seconds to think about it and record your answer privately.

[W] Then before we move to the next picture, I'll give you the answer.

[W] And at the end, what we'll do is we'll have a poll where you can post and share your scores.

[W] It's just anonymous.

[W] Don't worry about it.

[W] Put in whatever score you got.

[W] This is just for fun, like I said.

[W] Okay, so let's get started here.

[W] Okay, so if you've got your paper and pencil ready or you're just going to think about it in your head, here's the first one.

[W] Is this a bee, a fly or a wasp?

[W] Okay.

[W] And this one is a fly.

[W] It is a type of sophied fly.

[W] And you can see it looks an awful lot like a bee.

[>> W] We'll be talking about why that might be in a.

[W] Bit.

[>> W] Okay, the next one.

[W] Number two.

[W] Is this a bee, a fly or a wasp?

[W] Okay.

[W] This one is a bee.

[W] It's a bumble bee.

[W] And actually a male bumblebee.

[W] It can't sting because only the female bees have a stinger.

[W] Next one.

[W] Bee fly or wasp?

[W] Okay.

[W] And this one is a bee.

[W] This is a tiny sweat bee.

[W] And they will actually land on you in the summer and lick your sweat.

[W] These are very cute little bees.

[W] Okay, the next one here.

[W] Bee or wasp?

[W] And these are both the same thing.

[W] Okay.

[W] These are bees.

[W] These are stingless bees.

[W] I took this picture down in Guatemala and.

[W] Yeah, these are bees, but they can't sting.

[W] Their stinger is so reduced that they can't use it for stinging.

[W] But they will bite.

[W] Okay.

[W] Next picture.

[W] Is this a bee or a wasp?

[W] Okay.

[W] And this one is a fly.

[W] It's another kind of surf and fly.

[W] The larvae of these flies are great for aphid control.

[W] They'll lay their eggs near aphids.

[W] And then when their eggs hatch and turn into larvae, the larvae are these little predatory monsters that go after the aphids.

[W] It's pretty neat to watch.

[W] And these syrphid flies are great pollinators, too.

[W] Okay, bee or wasp?

[W] These are bees.

[W] These are male bees.

[W] And their orchid bees.

[W] Next one.

[W] Bee fly or wasp?

[W] This one is a fly.

[W] And it looks an awful lot like a bee.

[W] It's a robber fly.

[W] And these ones will grab on to other insects when they come onto flowers.

[W] And they will put their proboscis into them and eat them and kill them.

[W] Okay.

[W] And this one wasp.

[W] And this one is a bee.

[W] It's a hylaeus or yellow faced bee.

[W] And there's a number of different species across North America.

[W] There's seven of them that are endangered in Hawaii.

[W] And a very cute little.

[>> W] Bee.

[>> W] Okay, the ninth one here.

[W] Is this a bee fly or wasp?

[W] Okay.

[W] This one is also a bee sometimes called the smiley face b c if you can see why, look at its middle section there on the top.

[W] It's got a cute little smiley face.

[W] This one is what we call a parasitic bee.

[W] We'll talk a little bit more about those later.

[W] And the last one is this a bee fly or wasp?

[W] And hopefully I haven't totally shaken your confidence.

[W] This one is a wasp.

[W] Okay, so that's the fun little quiz.

[W] Now we're going to pull up a poll so you can put in your results.

[W] Okay, so it's looking like the majority of people still some people putting in their answers here, about 25% got between 1 and 3, right.

[W] Most people got between about four and six. Right.

[W] That's pretty good because I picked hard ones on purpose here.

[W] Looks like we have a couple people, a few people that got perfect.

[W] So I think we've got some some bee experts in the audience here, maybe some entomologists in the audience, 21% got between 7 and 9, but the majority got between about four and 4 to 6.

[W] Right.

[W] So that that's that's pretty good.

[W] It looks like we have a group here that already knows a bit about this.

[W] Thanks, Anthony.

[W] Okay, so why is it so hard to tell some bees from flies from wasps?

[W] One of the reasons is because of a type of mimicry called Batesian mimicry.

[W] And with this type of mimicry, what's happening is harmless organisms imitate toxic stinging or in some other way, harmful animals.

[W] Harmful animals will often have really clear coloration and markings to let predators know to stay away.

[W] But this system can be co-opted by harmless organisms through evolution.

[W] So this mimicking of that look can fool predators into not wanting to pursue them, because the predator thinks that they're harmful.

[W] So this mimicry can be found not just in pollinators, but in many types of animals like fish and snakes, where harmless organisms piggyback on the look of a harmful organism.

[W] You can see here a non-venomous kingsnake that looks an awful lot like a venomous coral snake.

[W] And then you can see that juvenile form of the fish on the bottom, which is a bream, and that imitates a venomous fang.

[W] Blenny fish, which is poisonous.

[W] So because of mimicry and other factors, it's sometimes not easy to tell bees from flies, from wasps.

[W] But there are actually some fairly simple ways to tell them apart.

[W] I don't share this with you before the challenge because that's more fun.

[W] Okay, so now these fairly easy ways to tell them apart we're going to do is first start with the differences between flies and bees.

[W] Now, bees have these antennae that are sort of medium length antennae.

[W] The flies that you might get mixed up with bees are going to have short stubby antennae.

[W] So that's one of the first things to look for.

[W] Another thing to look for, to tell apart.

[W] A bee from a fly is the eyes.

[W] Flies have these big bulgy eyes, you know, kind of those what you think of as big bulgy fly eyes.

[W] And sometimes they even meet in the center, whereas bees have more of these kidney shaped eyes on the side of their head.

[W] And it's sometimes really obvious.

[W] You can see those short, stubby antennae and the really big fly eyes, no matter how much it looks like a bee, if you see those short stubby antennae and those big fly eyes, it's not a bee.

[W] It's a fly.

[W] Probably mimicking a bee.

[W] Some of the other things that are not always quite as easy to see, but might help you, is the four wings.

[W] So bees have those four wings, whereas flies only have two large wings.

[W] They have two more reduced wings, but they only have two of the large wings.

[W] There.

[W] For the most part.

[W] So if you can see only two wings then it might be a fly as well.

[W] But I encourage you first to look for those eyes and the antenna.

[W] Now, when something can be quite hairy and look like a bee and have those markings like a bee, but it won't have.

[W] If it's a fly, it's not going to have those medium length antennae, and it won't have those kidney shaped eyes on the side.

[W] So that's really the ways that you can tell apart the fly from the bee, no matter how hairy it is, how much it looks like a bee, it's not if it's got the stubby antennae and the fly eyes.

[W] Okay.

[W] And then next we'll once you know, okay, I it's not a fly.

[W] It's got those sort of kidney shaped eyes.

[W] It's got maybe medium length antennae.

[W] Then what you want to do is you want to know, okay, is it a bee or a wasp?

[W] Now, one of the best ways to tell apart the bees from the wasps.

[W] You can't do it with the wings.

[W] They both have those four sets of wings.

[W] And a lot of the wasps have those medium length antenna too, and sometimes a pretty similar body shape.

[W] So the reason for this is because wasps and bees are really closely related in evolutionary terms.

[W] So that they do have a lot of these characteristics.

[W] So they don't have the same tricks to tell them apart.

[W] But the wasps that you might get confused with bees, they're not hairy.

[W] So the these wasps are not hairy.

[W] So if you do see something that has the four wings, the sort of kidney shaped eyes, the medium length antennae, and it is quite hairy, then it's most likely a bee.

[W] If it's carrying pollen on it, then it's definitely a bee.

[W] And we'll talk more about where they carry their pollen and how they how bees carry their pollen.

[W] So the back legs can sometimes be something that helps you pull apart bees from wasps.

[W] But in general, it's going to be that lack of hair on the wasps that is going to help you really tell them apart from the bees.

[W] But then we've got some tricky bees too that don't have much hair.

[W] And I showed you those in the pictures and we'll talk about those in a bit.

[>> W] Okay, so.

[>> W] Now with those little clues that I gave you, I want you to take a second to see if you can tell what these pictures are.

[W] The one on the left and the one on the right.

[W] Okay.

[W] And most of you can probably now tell that these two pictures are both flies, not bees.

[W] But don't get discouraged if you did think they were bees or you thought they were wasps.

[W] This takes time.

[W] So this is really a skill that you develop over time, and we're going to give you the tools to be able to go out and start honing the skill and start telling these insects apart and really starting to categorize them.

[W] Okay, so we've gone over how to tell apart some of those main pollinator groups, the bees, flies and wasps that can be a little bit more difficult to tell apart than other groups.

[W] And, you know, use this information to just start going outside and practicing.

[W] Okay.

[W] But now what we'll do is we'll dive more into the bee groups and bee identification.

[W] Since they are the most important pollinators in most areas, in most ecosystems, and there are some fun ways we can start telling them apart and putting them into categories.

[W] So first, I'm going to start with showing you the evolutionary relationships.

[W] And there are seven families of bees, and this is based on their relatedness.

[W] You do not need to know this, but just to give you a visual, and each of these families is broken up into hundreds and sometimes thousands of different species, except for the stenothyridae, which is only found in Australia.

[W] We won't talk about them anymore.

[W] And there's only 21 species in that group.

[W] So again, I want you, I want to show this to you.

[W] Not so you memorize it, but so you have a sense of the amazing diversity of bees and how they relate to each other.

[W] Okay, so these are the five families that we're going to talk about today.

[W] And just go into a little bit more detail about.

[W] And you might notice, you might have already noticed on this that there are long tongued bees.

[W] So we've got the apidae and the megachilidae, and then we have short tongue bees, which are these other groups.

[W] And we'll talk about three of those groups that are common in our region.

[W] And I won't talk too much about the melittidae, the bees, because they are less common.

[W] And we just don't have a lot of time today.

[W] Okay.

[W] So the first group that I'm going to talk about here is the Apidae.

[W] And this family has two types of bees that are really familiar to most people, the honeybees and bumblebees.

[W] And although these two types of bees, those really familiar ones in the apidae, the honeybees and the, the bumblebees, they're social, meaning that they have a queen and a worker and they live in colonies.

[W] The vast majority of species in this group are actually solitary.

[W] And what that means is each female lays her own egg and lives on her own, mostly sometimes in groups.

[W] But she's going to have her own nest for the most part.

[W] This is the largest family of bees.

[W] It has the most species, and it also has some really wild and weird looking bees.

[W] It's got the longhorn bees, the large and small carpenter bees, the orchid bees that I showed you in that quiz, the stingless bees as well, and the nomad parasitic bees.

[W] And many of the bees in this family are known to be important for crop pollination.

[W] And of course, in addition to being really important to our natural ecosystems.

[W] The next group is the Megachilidae.

[W] And this family has some bees you might be familiar with as well the orchard mason bees and leafcutter bees.

[W] And this family is unique in that they carry their pollen on hairs on their bellies.

[W] And so that's different from other groups that mainly carry pollen on their legs.

[W] And some people put out artificial nest nests or bee homes or bee boxes, bee hotels for these bees.

[W] And we'll talk a little bit more about that in the last webinar.

[W] And the bees and megachilidae there are also different from most other bees, and that they collect materials to make their nests.

[W] Often the orchard mason bees collect mud and the leafcutter bees collect leaves, of course, and some others even collect things like plant hairs and pebbles to help form their nests.

[W] Okay.

[W] The next group, the andrenidae.

[W] These are short tongued bees, as are the next two groups that I'll cover as well.

[W] And they're sometimes collectively referred to as mining bees.

[W] And like most native bees in North America, they're solitary and they dig burrows in the ground where they lay their eggs.

[W] And unlike other families, most of the Andrena, they tend to look fairly similar to each other.

[W] But the group does contain the Perdita genus, which has the smallest bee in the world.

[W] Cinema.

[W] And so Andrena can emerge in large numbers from the soil in spring.

[W] They're often in these sort of nesting aggregations, and each species is out flying only for a few weeks at a time.

[W] I usually start seeing Andrena emerging.

[W] I just saw one today in the grassy areas around the streets and the boulevards.

[W] They nest between the black, the grass blades and they're quite active early in the season.

[W] Often many of the species and most species of Andrena, their stinger is so reduced that even if they wanted to, they couldn't sting.

[W] You.

[W] And of course, like other native bees, they're really docile and they're not aggressive to humans.

[W] The halictid A are collectively sometimes called the sweat bees, especially the smaller ones.

[W] This is the second largest family of bees with nearly 4500 different species.

[W] Most of these bees nest in the ground, and they range in size from tiny to medium sized bees.

[W] And in some species, they're shiny, some are striped, some are brilliant metallic green, and the little ones, like I said, they'll land on you in the summer and they'll lick your sweat.

[W] So that's my daughter's finger in the top picture.

[W] Most of these bees are generalists.

[W] They'll forage on a wide range of flower types.

[W] And also this family contains bees that are solitary, but some that are primitively social too.

[W] So they will live in these primitively social colonies a little bit more like bumblebees.

[W] And the honeybees.

[W] Okay.

[W] And the final family that we commonly see in North America is the colletidae.

[W] And they're collectively known as the plaster or polyester bees for the cellophane like substance that they line their egg chambers with.

[W] They're all thought to be solitary, but some do nest in aggregations, which means they nest around each other.

[W] And they have two main forms that you'll see in North America, the hylaeus, which are the wasp like ones that was in that quiz with the yellow markings on their face.

[W] And then the more hairy ones, the colitis.

[W] Okay, so that was a more scientific way that we can start looking at bees and categorizing them.

[W] But for community science, there's some great ways we can start getting out there and grouping them and seeing what's there and seeing what the diversity is.

[W] And this is just one way that is a common way that scientists work with communities to have them do monitoring and categorize bees.

[W] And so what, what you can do with this, you can see across the top.

[W] First you want to know is it a B?

[W] So you can go through that.

[W] Those steps that we talked about, is it a B?

[W] Is it a fly?

[W] Is it a wasp?

[W] If you're pretty sure it's a B, then the next thing we want to do mostly is is it a non-native, which are mostly going to be the honeybees?

[W] There are other non-native bees for sure, but the main non-native ones you'll see are the honeybees.

[W] Or is it a native B?

[W] And then after that, if we know it's a honeybee or if we don't know it's not a honeybee, it's one of these native bees.

[W] We can see if we can further categorize it into a bumblebee, what we call a hairy leg B doctor Elizabeth Ellie calls that a pollen pants B, which I think is pretty cute.

[W] A hairy belly B which are going to be those mega pile bees.

[W] Megachilidae family.

[W] Or is it another B?

[W] And these other bees are the ones that are just kind of the problem children.

[W] We can't get them in another category very easily by sight, so we just lump them all together in this.

[W] I think it's a B, but I'm not sure what it is.

[W] Okay, so I'm going to go through each one of these five categories and give you some tips and show you how you can, what they look like and how you can put them into that category.

[W] Okay, so first we want to be able to tell which ones are the honeybees.

[W] And with honeybees, there's some pretty easy ways that we can pull them apart from all the other bees.

[W] So if you look at this picture here, you can see that really hairy thorax.

[W] So that's one of the characteristics of a honeybee.

[W] And then also you can see that the abdomen that's this part.

[W] I'm not sure if you can see my cursor, but that red circle there, that is the that is a less hairy part on a honeybee.

[W] But one of the really big things that can help you ID something as a honeybee.

[W] Is this pollen basket on the back leg.

[W] So they have this really wide expanded area that is shiny and has these hairs around the outside.

[W] That's technically called a corbicula.

[W] And this shiny pollen basket.

[W] What they do is they pack this with wet pollen.

[W] So they actually will will make the pollen a little bit wet.

[W] This is unique to honeybees and one other group of bees in North America that I'll mention in a second.

[W] But that wet pollen lump that I'll show you is really characteristic of honeybees.

[W] Now, with honeybees, we don't want to go with color.

[W] Honeybees can be very golden like this one is, or they can be very dark in color even from the same colony.

[W] So color isn't a good way to ID honeybees.

[W] But looking for that back leg can be pretty obvious most of the time.

[W] Eventually you'll just get the whole overall look and what it looks like.

[W] But when you start out, start looking for those things.

[W] And here's that wet pollen basket that I mentioned to you.

[W] Hear that wet lump of pollen that's going to be unique mostly to the honeybees and the, the bumblebees, which I'll show you next.

[W] They also do this what pollen lump.

[W] So you can see the look of the honeybee here.

[W] This is a bit darker honeybee than the other one.

[W] And then I'm just going to give you a second to look at this picture and see if you can find the honeybee in.

[>> W] It.

[>> W] Okay.

[W] And so look right almost around the center of the picture, maybe a little bit lower than the center line.

[W] You'll see that honeybee there.

[W] And I find this is one of the best ways to ID a honeybee is those really big, heavy, droopy legs.

[W] So you can see how those legs are just kind of hanging down off the back of this bee.

[W] Okay, next, the bumblebees, the bumblebees are usually fairly easy to categorize and tell apart from other groups of bees.

[W] Bumblebees are robust and hairy bees, but do note that they vary in size from about the size of a honeybee up to the size of a small hummingbird.

[W] So if you remember back to the bumblebee lifecycle that I showed you in the first webinar.

[W] The mated queens are the only bees to survive the winter.

[W] They overwinter and then they emerge in the spring, and they're often really huge, these queen bumblebees.

[W] So around this time or even, you know, a few weeks back, depending on where you are in North America, you might have seen these really huge bumblebees.

[W] These are the queen bees emerging, and they're only out for a few weeks collecting pollen and nectar and starting the colonies after they have some daughter worker bees, they stay in the colony for the rest of the summer, and we see mainly the smaller worker bumblebees.

[W] So keep an eye out for those huge queen bumblebees around this time.

[W] And now bumblebees like those honeybees, they carry their pollen in these corbicula, these big.

[W] They have those big extended back legs that are shiny, not hairy, and they just have the hair on the outside of them.

[W] And they pack in those wet pollen lumps to bring the pollen back to their nests.

[W] Okay.

[W] When I first started working on bees, I thought identifying bumblebees to species was going to be pretty easy.

[W] So I had collected, I was up northern Canada and collected a ton of bees up there, a ton of bumblebees.

[W] And yeah, I thought, okay, they're they're big, they're fuzzy.

[W] They have distinct patterns.

[W] This is going to be easy.

[W] What I quickly found out is that even though there's only 46 different species of bumblebees in North America, they're not so easy to identify.

[W] And this is mainly due to the second type of mimicry.

[W] I'll talk about malarian mimicry.

[W] And this is a type of mimicry where both organisms are toxic or dangerous, and they've evolved to look similar.

[W] So bumblebees can sting the females anyways.

[W] So they're all dangerous to predators.

[W] And they've evolved in regions to look like each other so that they give out a common signal to predators that they're dangerous.

[W] Then they have the advantage of the predators, knowing that anything that has that pattern is dangerous.

[W] So it's a co-evolutionary relationship that benefits the different species of bumblebees.

[W] And a really interesting paper came out recently about this mimicry in bumblebees.

[W] And they called this mimicry rings, bumblebees of different species can look like each other in the same region, and bumble bee species, the same species can look quite different in a different region.

[W] So each bumblebee on this photo is a different species.

[W] But you can see how similar the ones in the groupings look, even though they're different species.

[W] So I quickly found out I needed an expert to help me with my bumblebees.

[W] I went to the great Robin Thorpe and he ID'd my bumblebee species.

[W] No problem.

[W] But yeah, I was in way over my head trying to ID these species species from a region where the bumblebees weren't known at that point.

[W] So that's a little bit of a trick I'm going to mention here.

[W] So if you do want to start id'ing bumblebees to species, it can really help to start knowing the bumblebees in your area.

[W] First, you can pick up some more in-depth guides if you want to get into it.

[W] You can take pictures, you can load them to einat.

[W] You can do Bumblebee watch, and Anthony is going to talk a little bit more about iNaturalist and how you can load things and learn what species you might have.

[W] But you know, really, if you can simply ID a bumblebee from other bees, you're doing great.

[W] So the next group we have the hairy leg or pollen pants bees.

[W] And so these are the ones that carry dry pollen all over their legs.

[W] And they have these really hairy legs all over them.

[W] So not like the honey bees and the bumblebees that have the, the shiny back legs, their back legs are quite hairy.

[W] So if you look at the bee's legs, you can group them into this group.

[W] If you see those really hairy back legs, which is sometimes more obvious, of course, if it's stuffed with pollen, and then you can really see that.

[W] Yeah, that's a hairy leg.

[W] B.

[W] And then the fine or the second to last group I should say, are the hairy belly bees.

[W] And these are the ones in the Megachilidae family.

[W] You can see those pollen carrying hairs on the belly.

[W] Sometimes it's very obvious.

[W] Sometimes it's a little bit less obvious, but usually you can see the hairs on the belly and sometimes with the leaf cutters, they're really cute.

[W] You can see them packing it right into the the hairs on their belly as they go around the flower.

[W] Okay.

[W] And the last one, the problematic bees, they often look like wasps.

[W] There's a couple reasons why they.

[W] Sometimes these bees look like wasps and might fool us.

[W] It's because in that first one that center B there, the bee.

[W] That one carries its pollen internally so it could look like a wasp to you if you didn't know, because it doesn't have those pollen carrying structures on it.

[W] It carries its pollen internally.

[W] And then it regurgitates it in its nest.

[W] Now the ones on the two outside, those ones look like wasps and are not hairy for a different reasons.

[W] These are the parasitic bees.

[W] And what these ones do is they go over and they lay their eggs in other bees nests, so they don't need to collect pollen for their bees, because what they're going to do is they're going to find another bee that has a nest, different parasitic bees specialize on different species of bees.

[W] They're going to go in there.

[W] They're going to lay their eggs and then they're just going to leave.

[W] So they're dropping their kids off for other people to feed them.

[W] Okay, so just a little review of those different categories, the way you might start doing some observations, whether formally or informally, or just a way to start thinking about the different bees you're seeing and try to categorize them into different groups.

[W] There's a lot of resources available.

[W] If this does inspire you and you want to get more into bid, I've organized these with the the less technical ones towards the top and then the more technical ones towards the bottom.

[W] So this will of course be available if you want to look more closely at some of these different resources.

[W] This is just an example.

[W] Okay.

[W] And again, a shout out to iNaturalist, which is a great resource.

[W] It's getting better all the time.

[W] A great way to record observations.

[W] You're not going to get many bees to species with iNaturalist, but definitely, you know, you should be able to get them to family or even genus with using taking good pictures of bees and uploading them to iNaturalist.

[W] Okay, so that's the end of my portion, and I'm going to turn it over to Anthony to talk more about pollinator monitoring.

[>> W] Great.

[W] Thanks, Laura.

[W] Okay, so for the next part of tonight's presentations, we'll be talking about monitoring.

[W] So now that we've given you all the tools on how to plant pollinator gardens and how to identify everything that's visiting the flowers that you've planted, now we want to know if what we're doing is actually working and helping the pollinators that we care so much about.

[W] So an example here you can see one of our colleague's old gardens, and you can tell just from this picture that this space is not really doing much for anything.

[W] It's being overrun by invasive species.

[W] We have Japanese knotweed and goutweed.

[W] You can see that there's not really any flowers blooming.

[W] And probably the only thing that this is helping are maybe some of the local rodents around town, but with some patience and persistence and a little bit of effort, they transform this space into this beautiful pollinator sanctuary.

[W] You can just tell from looking at this picture that this space now is really benefiting the local biodiversity, local wildlife, local pollinators.

[W] We have different types of native plants, different colors, different flower shapes.

[W] We have flowers that bloom throughout the seasons when pollinators are active in the spring, summer, and fall.

[W] And this was created into a truly incredible space for pollinators.

[W] You can see here too, they found 19 different pollinator species in this garden, and that's by going out there and actually looking and monitoring.

[W] So why monitor for pollinators?

[W] Because it's how we can tell if what we are doing is actually working.

[W] And it can also help help us measure change over time.

[W] It can help us assess differences between different landscapes, provide us with important metrics and reports.

[W] And it can also help us with external messaging and storytelling to share our work with others.

[W] Okay, so now let's get into the goals for monitoring.

[W] So once we've established the why and have decided to monitor, we can now start thinking about the goals in terms of our data.

[W] Our goals will dictate the type of monitoring that we do.

[W] Do we need and want data on habitat value to pollinators?

[W] You know, pollinator abundance, presence or absence of certain species, pollinator richness or diversity, community assembly and change over time or comparison of different features in our habitat, such as maybe our garden before versus after planting, you know, time of bloom of specific plants or what actually survives year after year.

[W] The other main thing we need to assess is who this monitoring and data will be for.

[W] Is it for our own personal knowledge, or is it for policy makers, funders, community groups, or a combination of audiences?

[W] Understanding the why, our goals and our audience will impact what and how we monitor.

[W] So there are a number of ways to monitor pollinators, but they can be categorized under a few broad categories.

[W] There is visual monitoring where we might use broad visual categories, such as the B groups, along with broad categories for non-b groups.

[W] For visual monitoring, we'd likely use data sheets and standardized methods and would require IDing to whatever level is feasible visually by looking.

[W] Or we might want to collect specimens.

[W] So standard ways to collect pollinators is by netting pan traps, vein traps or a combination of these collection methods.

[W] We might want to use photo or video monitoring and use apps such as iNaturalist, or it's possible to use a combination of these methods.

[W] All these methods have their pros and cons, and making a choice should include our goals, audience, and resources.

[W] In practice, it's beneficial to establish standardized methods such as identifying where we want to carry out our observations, and creating other standards that can be replicated, such as consistent monitoring times, distances, consistent weather when monitoring, and including as much complementary data as we can.

[W] You really can't have too much data when it comes to monitoring.

[W] And this is just an example of a monitoring sheet that will provide to you on the course info page.

[W] You can see here you can take this out with you when you're ready to monitor your habitat or your garden.

[W] And this has some of the main pollinator groups that you're likely to see, which you would just check off as it, as that type of pollinator visits your garden, and then you have information on which site you're monitoring on the date, the temperature, the wind.

[W] So like the weather conditions as well as the start time and end time.

[W] Weather conditions are really important for monitoring for pollinators because if you have a gloomy or rainy day, you're likely not to see much since they're usually hunkered down under the flowers protecting themselves.

[W] So usually when monitoring for pollinators, you want a warmer, sunny day.

[W] And we got some great resources on our website as well to help you identify the pollinators that are visiting your habitats.

[W] And so like Laura went over today, we have all the, the amazing bee groups that you're likely to see in North America.

[W] And you can download this guide and take it with you into, outside, into the fields.

[W] Okay, so now we'll switch gears and we'll talk about community monitoring for pollinators.

[W] Now this is my favorite part about being in this whole world of pollinators and bees.

[W] I really enjoy doing community monitoring since I think it's a really accessible way for all of us to contribute to really important data.

[W] But it also gets us outside and enjoying nature and just pausing in nature as well to see what's, what's out there locally.

[W] So how I participate in community science and community monitoring is I usually do it on all of my dog walks.

[W] So you can see here in this middle picture, that's my dog.

[W] And that's a local conservation area by my house.

[W] You can see that beautiful patch of fireweed that's blooming.

[W] And so every dog walk that I go on, I take my phone with me and I take as many bee and pollinator pictures as I can as my dog is running around enjoying the off leash time.

[W] And then I record those observations on time.

[W] So super easy really.

[W] With monitoring, it can be quite extensive if you're monitoring a large habitat and you're breaking things down into transects and quadrats, or it can be pretty low key with community science and just going out there, recording your observations, taking pictures and uploading them to community science projects.

[W] So again, very accessible and anyone can participate in this type of research.

[W] And with community science comes really interesting studies that contribute to long term data.

[W] And I think the most popular example of this is with the monarch butterfly and their overwintering counts.

[W] So as many of us know, the monarch butterfly takes this incredible migratory journey every year from Canada and the northern United States, all the way down to the fir forests of Mexico, which I believe is about a 5000 kilometer journey.

[W] So it's it's really, truly incredible.

[W] And what's been going on for the past 30 or so years is there's been a group of community scientists that have been tracking these overwintering populations year after year.

[W] And so I'll show you why this is important because if you look at this graph here, if you look at 2000 to 2001, so this 2.83 is their population.

[W] And then you look at the year after at 2001 and 2002, you can see the population really jumped.

[W] Now, if we only had monarch data for that one year, you would think that the monarchs were doing amazing.

[W] And maybe they don't need any more conservation action that goes towards them or any more funding.

[W] And so then we would end and then that's, you know, we think that the monarchs are saved.

[W] But if you look at this long term data that community scientists have been contributing to over this large amount of time, you can see that the trend is actually, you know, the populations are decreasing quite a bit.

[W] And so we wouldn't have this data and know just how important it is to conserve and protect the monarch without our important community scientists.

[W] And whenever we're talking about community science, I know this has come up quite a bit in this course at this point, but I naturalist truly is an incredible app and website to use.

[W] That I think makes it really easy.

[W] So just as a case study, I'll share with you some of the work that I've been doing up here in Yellowknife, Northwest Territories, in the subarctic region of Canada.

[W] So with iNaturalist, every time I go outside, I take pictures.

[W] Like I mentioned before, of the pollinators that I'm seeing.

[W] All these photos here are just taken on my phone.

[W] So the phone cameras nowadays are super high quality and make it really easy to get good quality photos of pollinators.

[W] And with those, those pictures, it also geo locates all those observations.

[W] So all those pictures coordinate with these points here on the map, which is really important when you're looking at population data.

[W] And from this information we're building pollinator guides with all the different bees and butterflies and other pollinators that folks are seeing around, around Yellowknife, which is really amazing.

[W] Since before we started this project, there was only a handful of observations on iNaturalist in Yellowknife.

[W] But with this increase in outreach and awareness and people wanting to get involved with community science, we've increased the amount of Bee observations.

[W] I think there's over a thousand now on it, so that makes it really cool for researchers to see the different species that are here and just learn a bit more about those plant pollinator interactions that are happening locally and helps us learn, okay, which plants do we need to protect now that we know which bees are going to those?

[W] And just a few examples here to hopefully inspire you to get outside more and to start looking at your local landscape.

[W] This here is an orange legged drone fly.

[W] It's a very popular fly here in Yellowknife.

[W] And when I first saw this flying around just with the naked eye, I definitely thought that this was a bee.

[W] But it wasn't until I took that picture and blew it up on my computer and looked at it a bit more closely that I realized that this was actually a fly.

[W] And so again, going off of Laura's identification tricks, if you look at the head of this fly, she has the big buggy eyes and the short stubby antenna.

[W] Immediately I'm thinking that's a fly now.

[W] And then she's got the two wings.

[W] So even though these types of flies are very furry and are excellent bee mimics, definitely a fly going off of those identification tips.

[W] So great pollinator and just yeah, even the way these flies maneuver in the landscape, they kind of drag their legs as if they're carrying pollen on their legs and they even fly similarly to bumblebees.

[W] So just a really cool bee mimic, but is actually a fly.

[W] The golden belted bumblebee.

[W] So I actually found I was, I almost didn't take this picture, but this is the golden belt.

[W] Golden belted bumblebee, and they're usually found in mountainous regions.

[W] And Yellowknife is not a mountainous region.

[W] So this one was way out of it's zone.

[W] And I found it next to the Jim of all places on this really scraggly patch of fireweed.

[W] And I took this picture and misidentified it on inat.

[W] But then we had some of the bee experts on I not come in and actually re-identify it and they determined it was a really rare find.

[W] And that to me just really motivated me to want to continue to get out there and see if we can find anything that maybe goes against what we would commonly see locally.

[W] And then finally, the Ashton's cuckoo bumblebee.

[W] So one of those parasitic bumblebees, I was teaching a grade nine class about pollinators doing a pollinator 101 course, and we went outside, and at the time it was there was only dandelions blooming.

[W] It was pretty early spring and this was one of our target species on our project that we're doing up here, because they're an at risk species.

[W] And so I was worried that we weren't going to find anything taking that class outside.

[W] But the first bee that one of the students found was this rare and at risk cuckoo bumblebee.

[W] And you can just see as soon as they saw it and realized what it was, that just like that moment of, of awe that, okay, this is something that I want to continue to do.

[W] And just seeing that was so inspiring.

[W] And the whole class then was outside on iNaturalist, wanting to also find cool bees.

[W] So I thought that was a really fun example about how great community science can be.

[W] And with community science as well, and in particular, it's really great to tell apart different species that might look similar.

[W] So these ones here that we have just by the naked eye would be really hard to tell apart.

[W] But when you blow up the pictures and you look at them a bit more closely, I can tell that these are actually two separate species.

[W] On the left we have the frigid bumblebee, and on the right we have the fuzzy horned bumblebee.

[W] The only real differences between these two species is that this orange band on the abdomen, on the fuzzy horn, kind of bleeds into this black band on their abdomen, whereas the frigid bumblebee has a solid black line on their abdomen.

[W] If you have a microscope, there's other differences that you can see as well.

[W] But again, just by using photography and blowing up these pictures, you can see, okay, those are two different species.

[W] And with this data now, so we've been going, we've been observing all the local native plants.

[W] And then adding in all the associated pollinators that we see on those native plants and creating almost like a top ten list for plants that people can plant here to protect and promote pollinators in their gardens.

[W] So there's lots of community science projects that you can take part in.

[W] That was just a local example and a case study.

[W] But we do have our pollinator week BioBlitz coming up in June that you all can take part in and sign up for, and you get to have your event posted on our map, which is really fun.

[W] And there's really community science projects for any type of animal or pollinator pollinator that you're interested in.

[W] So if you like bumblebees, there's specific ones called bumblebee watch birds.

[W] So ebird.org you can upload your observations to butterfly.org.

[W] There's National Moth Week that does, you know, everything to do with moths and oh, another one is butterflies and moths.org.

[W] So they're also really good website and community science projects.

[W] Okay, so that is the crash course in monitoring and pollinator identification.

[W] Just a few last slides here for housekeeping to wrap up.

[W] And then we'll get to our Q&A.

[W] So I saw someone posted in the chat about the course information page and where that is.

[W] And so you can use this URL to find the course info page.

[W] And it is in all the emails that we've sent out so far.

[W] And you can use that username and password to log in.

[W] And one last slide here before we get to questions.

[W] So recordings and resources will be shared for this session by Friday of this week on the course info page.

[W] And we'll have our final live session next week on April 7th.

[W] I can't believe how quickly this course has gone by, but that one will be expanding your impact.

[W] And it's a good one.

[W] It's a, it's a really fun one to, to close everything out on and more info on the step one and step two forms will be discussed next week.

[W] Okay, with that, I'll pass things over to Avery, who will lead our Q&A session.

[>> W] Awesome.

[W] Thank you so much.

[W] Anthony and Laura.

[W] And I just have to say, as someone who's obsessed with bees, this is my favorite session in PSC, so I hope everyone enjoyed it.

[W] We are going to start with a question that I think is applicable to everybody.

[W] And that question is, any tips for taking photos of pollinators?

[W] They move so quickly and they're so small.

[>> W] So any tips?

[W] Yeah, taking pictures of of bees in particular.

[W] It's it's tough.

[W] And I think I've mentioned this before, but my entire camera roll on my phone is filled with bee pictures, more than dog pictures and more than family pictures.

[W] It's all bee pictures.

[W] So my advice is take as many photos as you can of the ones kind of specimen, and try to get pictures of the head.

[W] Pictures clear of the side of the bee.

[W] And then also like over the top pictures.

[W] So you can get all three segments, the head, thorax, and abdomen.

[W] And that will make it easier for the experts to come in and help identify it.

[W] But yeah, sometimes some you'll, as you get out there, you'll learn that some bees are a bit more skittish than others.

[W] Some you can get right up to.

[W] And they're totally fine with you taking a close up picture.

[W] Whereas others will fly off pretty easily.

[W] And it's just kind of figuring out what works best in a lot of trial and error.

[W] But yeah, taking like basically spamming the photo button as soon as you see something is probably my, my best advice.

[>> W] We're also getting some really good tips in the chat about using the slo mo video feature on your phone, which can be really helpful.

[W] And then one of my favorite ways to photograph bees is actually just to sit in front of a flowering plant for 25 minutes, very still, very calm, and the bees will come to you.

[W] So that that can be a great way to get some nice off guard photos.

[W] Okay, now, a question from Lola.

[W] And she's wondering what is the best way to tell the difference between an introduced species and a native species of bee?

[W] And I think that this is more not really towards honeybees, but other introduced species.

[W] So is there a good way or a database that people can look.

[>> W] At?

[>> W] Yeah, yeah.

[W] So, you know, the most common one and most areas that you're going to see for sure is going to be a honeybee.

[W] That's a non-native bee.

[W] But one of the things you can do is is look at local websites to see what might be there.

[W] You know, I know in my region we've got a few, we've got the Willcarter bee.

[W] That is pretty cute.

[W] It's not native here, but it's very cute how the male protects its patch.

[W] And they're not overtaking the area.

[W] So I don't feel too bad about calling them cute and liking them.

[W] But yeah, to know for your area, I think you would probably just want to do some Google searches and figure out what in your area is a non-native bee.

[W] So there definitely is an increasing problem with it.

[W] I have seen more papers on it and how non-native bees are changing the natural or semi-natural ecosystem flora, because they're going to preferentially pollinate different plants than the native complement would.

[W] So we do want to be aware of them.

[W] It is probably going to be an increasing issue in the in the future.

[W] So far in my region, West coast, it's not a big problem.

[W] There are other ways that it is causing problems.

[W] Some of it is with moving around bumblebees that are not native to certain areas for actual crop pollination.

[W] So that has caused some problems.

[W] So there are some non-native bumblebees now in different regions because of this movement of the bumblebee colonies.

[W] So that is some place you could look to see if you do have that happening.

[W] These non-native bumblebees that have escaped bombus impatiens is one that is very established now in the Vancouver Lower Mainland region.

[W] And it didn't used to be there.

[W] So it's just from humans moving it for crop pollination.

[W] There's some others that have been moved for crop pollination.

[W] There's mega Rotundata, which is a leafcutting bee that gets used for crop pollination.

[W] So that has that has been introduced into North America too.

[W] So there are various species.

[W] Some are more general across North America, and some are going to be more specific to different regions.

[W] So I do just encourage you to look online for your region.

[>> W] Excellent.

[W] I think it's also worth mentioning university extension programs in your area can have really great regionally specific information for you.

[W] So that would be another place to, to consult.

[W] Okay.

[W] Moving on, a question from Linda about identifying wasps versus bees.

[W] So she's wondering if the pinched waist makes a difference.

[W] Is that a reliable way to tell bees from wasps?

[>> W] Sometimes.

[W] Sometimes not.

[>> W] So if you do see something with really like a thread waist, that's not going to be a bee.

[W] But they are closely related.

[W] So so so bees will also have a similar type waist to wasps.

[W] So it's, you know, a lot of the wasps that we kind of think of as pests and things.

[W] Those can be fairly easy to tell apart.

[W] You know, we see the yellow jackets, we see the the bald faced hornets, those those can be pretty easy to tell.

[W] Some of the tinier wasps, though, they look an awful lot like the tiny bees.

[W] And you really need to get them under a microscope or to be more of an expert in it.

[W] So it can be tough with some of the smaller ones.

[W] And yeah, it's not a reliable the waist pinching is not a reliable difference because bees are along the same evolutionary path when when that happened, although there are definitely wasps that have the extended pinched waist and that bees don't have that.

[>> W] Awesome.

[W] Now, a question from Mindy Norman.

[W] And she's wondering, given the growing, growing use of urban pollinator gardens, what specific plant combinations or habitat features have been shown to most effectively support native bumblebee populations throughout their entire life cycle, which is not just foraging, but also nesting and overwintering.

[>> W] Go for it, Laura.

[W] I was waiting for you there.

[W] Anthony.

[W] So yeah, so I think just to make sure I got the question right.

[W] So they're asking in terms of urban gardens, what should be done to support the entire life cycle of bumblebees in particular?

[>> W] Yeah, we've talked a lot about foraging, supporting, foraging.

[W] So I think maybe focusing your answer on overwintering specifically for bumblebees.

[>> W] Yeah, yeah, probably the nesting too, because that's something that we, you know, we tend to talk a little bit less about, which I think it's just our human bias somewhat.

[W] You know, we talk a lot about the flowers and the foraging, but these bees need somewhere to nest, of course.

[W] So a lot of bumblebees will tend to nest in old rodent burrows.

[W] So.

[W] I live on the coast.

[W] I've had chickens.

[W] Victoria is known for rats.

[W] It's not just my yard, but we're not going to necessarily try to get rid of everything.

[W] If there is an old rat burrow, we might get some bumblebees nesting in there.

[W] So yeah, it's it's one of those things about kind of keeping things natural as possible.

[W] If there are some dug holes in your ground from rodents, maybe don't plug those up.

[W] You might get some bumblebees in there.

[W] There are artificial nest boxes you can put out for bumblebees.

[W] They don't have really great success.

[W] I don't I don't recommend doing that.

[W] I, I do recommend much more trying to leave things as natural as possible.

[W] Now, there are a lot of bumblebees that will nest at the surface of the ground.

[W] So they'll nest in sort of compost piles or branch piles, even under vegetation.

[W] So I have seen some bumblebee nests under, you know, thick ferns because they'll get those dead leaves, fronds towards the bottom, and then that'll create like a natural ground nesting place.

[W] So and then there are some species that will also nest in cavities in old wood, but mostly they're going to be nesting at the ground or in the ground.

[W] So, so leaving those features for that nesting is really important.

[W] If you want to support bumblebees.

[W] I love having bumblebees in my yard.

[W] They're so fun to watch.

[W] So I do encourage you not to get too worried about it.

[W] Just tape it off.

[W] So so visitors don't step right on it.

[W] It'll only be there for the one year.

[W] And if you have those brush piles and you have a bit more nature wild scaping, you'll naturally have that that over or you'll have that nesting area for bumblebees overwintering, as Avery said, that's super important too.

[W] So we need somewhere for these queen bees to overwinter.

[W] They're going to find places.

[W] They're going to kind of, you know, burrow in little crevices.

[W] I see them in the fall, hovering over the ground and looking for places to make their nests.

[W] And so they'll burrow under some leaves they might go into under the ground just a little bit.

[W] So we want to do less of that clean up, a lot less of that sort of Victorian era gardening where everything looks like the inside of a house.

[W] We want to keep the leaves, we want to keep some vegetation and just try to leave those creatures alone that are going to be overwintering.

[>> W] Wonderful.

[W] Thank you so much.

[W] That was an excellent answer.

[W] Another somewhat specific question from Amy, and she has an aggregation of cellophane bees that recently woke up.

[W] They're emerging for the spring.

[W] It seems like the males wake up first and live maybe a week or two, and then the females wake mate and start to build nests.

[W] Does that seem typical for ground nesting bees?

[W] Considering males live such a short amount of time?

[>> W] Maybe.

[W] Maybe I'll start and then Laura, you.

[W] But yeah, I think from what I've seen is that the males usually are the ones that hatch first and then they'll, I guess, like fly around and wait for the female bees to mature and

then they'll mate and then yeah, they'll be like the male bee life cycle is pretty short after that.

[W] And they usually die off after they meet.

[W] But I know there are some cool biological like reasons why the males hatch first.

[W] And I know like for cavity nesting bees specifically.

[W] So the ones that you might see in your bee houses or hotels, the male bees are usually at the front of the cavity.

[W] And so they'll hatch first as well and leave.

[W] But they're at the front of the cavity because they're most likely to get predated.

[W] If there is something that comes and wants to eat the bee larvae.

[W] And so since the male bees are more disposable, they're usually at the front of those tubes.

[W] And the female bees, which do all the pollination and the egg laying, they're at the back, kind of protected by that front line of male bees that can get eaten.

[W] So those ones will hatch first and leave the nest.

[W] So yeah, I think generally the male bees are the ones that come out first.

[>> W] Yeah, yeah.

[>> W] It's not.

[W] Too much to add to that.

[W] Anthony.

[W] That's what I've seen and read.

[W] For most species, it's more linear with these tunnel nesting bees because the males are in the front, females are in the back, and these nests in the ground that are more sort of diffuse and complex than even in those ones, the males are often laid more towards the front of the nest, and they hover over the ground and just wait to pounce on those females as they come out.

[>> W] I'm so jealous that this person has a cellophane bee aggregation accessible to them, because I would just be sitting in there watching all day.

[>> W] And I'm so impressed that they said aggregation.

[W] I mean, that's that's pretty great.

[W] And yeah, you'll see a similar sort of thing with some other kinds of bees, the digger bees, the anthophora, they'll nest in these large aggregations and the males all come out at once, and then the females all start coming out at once.

[>> W] And it's just such an amazing sight.

[W] And I'm just seeing just a follow up on that.

[W] I'm seeing Amy in the chat, who says thought it was mostly the queens who emerged first.

[W] So that would be the Bumble Bees.

[W] So it's the queen bumblebee that survives the winter or the the princesses that become future queens.

[W] And so they'll be the ones that come out in the spring.

[W] And then they start a whole new colony over again, just on their own.

[>> W] Awesome.

[W] Thank you for catching that, Anthony.

[W] Now we'll move on to a question from Carol.

[W] And I really empathize with this, this question.

[W] So she's asking I'm really interested in working in the field of pollinator research, but I feel like it would be impossible to do seriously if I'm not comfortable with killing bees for data collection purposes, am I wrong?

[W] It feels like all research papers and books I read are based on this kind of process.

[W] So could you guys maybe talk about your experiences with lethal sampling and maybe some alternatives?

[>> W] Yeah.

[W] My alternatives.

[W] I haven't done any lethal sampling myself, but all my field work has been through inat.

[W] And so just getting pictures of bees and then going from there and trying to like observe the data from that, that point of view.

[W] But I think, Laura, you might have more experience with other types of sampling.

[>> W] Yeah.

[W] And there, there are definite ways that sampling can be done in a scientific way, more so now than, you know, 30 years ago when I started without doing lethal sampling.

[W] So there's Edna, there are ways to, you know, take parts of the bee.

[W] So Edna is where I'm not an expert in this, so apologies if I explain this wrong, but it's where the samples are picked up from areas in the environment.

[W] So the E means environmental DNA, and that's picked up from the environment from bees, visiting flowers or other areas.

[W] And the researchers can take samples of the the flowers or the other material where bees may have landed and get a good, pretty good now image of what bees have been there.

[W] So we're getting a lot better with these these techniques that are not lethal.

[W] There are also a lot of people working on different programs to be able to AI type programs to be able to ID bees to a further level than just genus, right to species with either photos or there's DNA barcoding, there's, which mostly does take take lethal, but there, there are ways that we can do it more with photos and get closer to the species and in some cases, species.

[W] So I wouldn't say there's no way to do it.

[W] There are definite ways to do it.

[W] And I know a lot of researchers are doing work more with Edna now.

[W] It seems to be such an exciting, growing area.

[W] So I think if you want to get into research and yeah, I mean, none of us want to kill things.

[W] So you want to get into research and you really do not want to do lethal sampling.

[W] There are I think there are ways that you can do.

[>> W] It.

[W] Just to follow up on that too, I think.

[W] Are there methods where you can like cool off the specimens that you catch and then you can really observe them as they're almost in like a frozen state, and then they warm up again and then they, they survive.

[>> W] Yeah.

[W] There, there are some researchers, I think it's Montana that are doing some work where they're, they're doing some ways where they're catching bees, they're cooling them and they're taking eight different set pictures of the bee and different set positions and then releasing it.

[W] And they've got pretty good survival from it.

[W] So there is a little bit of mortality just from that handling and cooling.

[W] But yeah, there are there are ways to do it and developing ways.

[>> W] I'm going to quickly add on just a little something from my own experience doing field work with bees, because I am not an insect killer.

[W] I never have been, but part of my degree.

[W] I had to, I had to kill a bunch of insects to study, and I think that some a way that a lot of researchers will kind of justify it is like, you do have to get data and to kill a few.

[W] You can save so many by creating good results and conducting good research.

[W] So there is that.

[W] But I've also done the freezer method and I prefer that greatly.

[W] You can kind of take photos of these lethargic, sleepy bees and watch them fly away and onto a flower like nothing happened.

[W] So there are alternatives and everyone should be interested in pollinator conservation science.

[W] And not wanting to kill insects does not have to be a hindrance to.

[>> W] That.

[>> W] Okay, now I have a question for Anthony.

[W] What is your username on iNaturalist?

[>> W] Good question.

[W] I actually need to go back.

[W] What is my username here?

[W] Let me see.

[W] It's my profile.

[W] I think it's like oh yeah, it's Colangelo.

[W] I'll post it in the chat.

[>> W] Yeah, post it in the chat.

[W] I think a lot of people want to want to see the photos that you've uploaded, and maybe help identify some of those bees from Yellowknife.

[>> W] Awesome.

[W] Thanks, everyone.

[>> W] So now a question for Laura.

[W] Why do sweat bees lick our sweat?

[>> W] I think likely for some minerals that they're wanting, it might be sort of like butterflies and they're puddling behavior where they go to puddles, moist moisture, mostly the male butterfly butterflies.

[W] But in this case, I think it might be the males and the female bees that are doing it with the sweat bees.

[W] So I would say for some trace minerals.

[>> W] Awesome.

[W] Now we've talked about this a few times throughout the course, but do you have a rough idea of actually how many species are known for stinging or have a particularly painful sting out of the wide range of bee diversity?

[>> W] There are people that sting themselves and rate the sting pain stuff.

[W] I'm sure people can post some some links to these crazy people that that do this and rate.

[W] So okay, coyote Peterson, is that the name of the person?

[W] I know my kids talk about this stuff sometimes I don't know.

[W] So yeah, we could probably find some of that out.

[W] My personal experience is that the odd time I have been stung by a tiny bee, I can.

[W] I barely notice it, you know?

[W] And that's only happened when I'm handling them, not just out in the world, out observing bumblebees can be pretty painful.

[W] Honeybees can be pretty painful.

[W] You know, I might be saying that, though, only because those are the ones that are protecting colonies.

[W] And when you're going and manipulating their colonies and doing stuff, you know, you're sort of asking for it.

[W] That's what they were.

[W] They evolved to protect their colonies.

[W] So but yeah, they can be pretty painful.

[W] I have been stung by a queen bumblebee before, and that was more painful than a worker.

[W] But sorry.

[W] Mostly.

[W] Yeah, just my sort of experience.

[W] Nothing too scientific there.

[>> W] Doing some fieldwork in Greece.

[W] I had a leafcutter bee in my net, and I was actually handling her to put a mark on her thorax.

[W] So it was really up in her personal space.

[W] And she did sting me.

[W] And the sting felt nothing like a honeybee sting.

[W] It was completely gone by the next day, almost just like a mosquito bite.

[W] So I think that like some of these nonsocial bees, you don't have to be so worried about their their stings.

[W] Now a few we got a few mentions of like other citizen science programs.

[W] There was Bumble bee watch that was mentioned, the Great Southeast pollinator count done by the University of Georgia every August.

[W] Also, the Great Sunflower Project.

[W] What do you all think about uploading observations to multiple projects?

[W] Or like which one is the best to participate in?

[>> W] Yeah, I think if you can upload to multiple projects that I mean, the more the better.

[W] Is kind of how I see it.

[W] And I mean, for me too, I'm usually focused specifically on bees.

[W] So my iNaturalist is mostly just bees.

[W] But if you're just a like a naturalist in general, and you have bird pictures and some bug pictures and other animal pictures, I mean, yeah, you can make use of all those, those observations and try to find a community science project for each one.

[W] If you're really keen.

[W] I think, I think sorry, I think two for the birding ones, if you have enough observations and maybe correct me if I'm wrong, you get like a hat out of it, like I think it was eBird.

[W] If you have a certain number of observations, they send you a hat.

[W] And I think one of my old professors had a cool eBird hat and was always really jealous of him, but he was like one of the top observers in Canada.

[W] So something to strive for.

[>> W] Awesome.

[W] The more the merrier.

[W] I think is a really great way to think about citizen science.

[W] So we're doing great.

[W] We have a lot of time for Q&A today, so I want to revisit a question about the difference between Scopa and Corbicula.

[W] We've gotten a little bit of confusion.

[W] So do bees have corbicula on both of their hind legs or just one?

[W] What actually is the difference?

[W] So maybe Laura can elaborate a little bit more on.

[>> W] That.

[>> W] Yeah.

[W] So when we're talking about Corbicula, we're talking about the mostly in North America anyways, talking about those areas where they're packing the wet pollen.

[W] So it's like a pollen basket they're putting it into.

[W] So we think of a basket with the outer hair, and then they're going to pack it into their.

[W] Whereas Scopa is where there's the really dense hairs to pack the dry pollen in, which are going to be most of those other bees other than the, the bumblebees, the honey bees, and the stingless bees.

[W] But yeah, mostly in North America, the bumblebees and honeybees are going to have that corbicula, which again, the basket, the hairs, the shiny spot, wet pollen.

[W] And then the the scopa is going to be that aggregation of those dense branched hairs where they're packing dry pollen.

[W] Does that help?

[>> W] Yeah.

[W] Maybe a way that could help people visualize it a little bit is like, if you wiped your finger on the corbicula, you'd get like a paste, like pollen residue.

[W] Whereas if you brushed your your finger against Scopa, it would be like a powdered pollen.

[W] So wet versus dry pollen.

[>> W] Yeah, that's great.

[W] Avery and so when people are collecting pollen.

[W] So I think there's a lot of honeybee keepers in the group here.

[W] They, they have these structures.

[W] Sometimes when they want to collect pollen from honeybees as they're going in and out, and it comes off in these balls.

[W] So it actually comes off in like these fairly formed balls, these wet pollen balls that are in the corbicula.

[W] And yeah, it's quite different from just that dry pollen.

[W] Like Avery said, with the with that difference.

[>> W] All right.

[W] Another question about bumblebees.

[W] Can you go talk a little bit more about the lifecycle of bumblebees?

[W] This person says every year or two they come flying around their house and they're very confident they're the same bumblebees or the same bumblebee colony that comes back to the same place every year.

[W] So some bees have that philopatry where they'll come back to the same nesting location.

[W] Is that true for bumblebees?

[W] Or, you know, how do bees fall on that spectrum of philopatry?

[>> W] Yeah.

[W] So what what I have found my observation with bumblebees is they're not necessarily going to use the exact same cavity each time, but in an area with cavities, they, they might return.

[W] And when I say they return, what that would be is the next generation.

[W] So they could be the descendants of the other one.

[W] So again, to go over that lifecycle, the Queen is going to come out in the early spring.

[W] She's going to build up a colony, lay females, those they do the work for the year.

[W] Then she's going to start laying new reproductives, the new queens and the males who will go out.

[W] They'll mate with different ones of the same species.

[W] Then the colony naturally dies off.

[W] The old queen dies off, and the mated, the new mated queens, those ones that were just born, they will overwinter and come back now.

[W] Yeah, I, I know that in nesting aggregation areas, like in the soil, when you have a lot of bees nesting in the ground, they will go back to those same locations.

[W] I don't think bumblebees tend to go back to the exact same hole.

[W] And the, I would guess the reason for that is because there can be buildup of parasites, diseases, things like that.

[W] If they continue to use the same hole year after year.

[W] So that that's been my observations, but I haven't I haven't looked into it deeply.

[>> W] I just want to say too, great job.

[W] If you have the same bumblebee like species coming back year after year, it means that you're doing something that's bringing them back.

[W] So that's good.

[>> W] Yeah, that's great.

[>> W] Cool.

[W] Well, we can get to our last few questions, but I did want to mention something that I think we've mentioned earlier in the course.

[W] But if if anyone ever wants to save the chat because like there's an interesting conversation that's happening or resources are being shared on Zoom, right?

[W] Where you type your message into the chat.

[W] There are three dots and there you can save the chat and it'll save it as a text file with all the conversations, we don't usually share the chat with within the course, but each of you is able to, to save it on your.

[W] Own.

[W] So now we'll do a question from Lola.

[W] She says, sorry if it's a little off topic, but why do I sometimes find 20 or or more dead bees of various species on the ground in different locations?

[W] Sometimes it's parking lots, parks or sidewalks.

[W] What what could be causing.

[>> W] That?

[W] Sometimes it's just that's just the end of the life cycle for the bee.

[W] Like I'll see sometimes bees on the sidewalk.

[W] And you can tell that they're just about to expire.

[W] I usually just try to move them into like a, into some vegetation so that they don't get stepped on.

[W] But yeah, bees don't live super long, so it is common to see them kind of expiring, like in open areas.

[W] If you're seeing a lot of them all in one place, then that to me says that there's something external that's happened to them.

[W] Also, if it's a really hot day, the heat, if they aren't able to fly back home and they get exhausted, they can kind of overheat if there's not a lot of vegetation around and there's only concrete or sidewalks.

[>> W] Yeah, yeah.

[W] And like Anthony said, unfortunately, if you do see an aggregation, it could just be natural or it could be pesticides that are in pollen and nectar, or there could have been an application of pesticides.

[W] Unfortunately, there was a pretty well publicized event in Portland a number of years ago where a lot of bumblebees died from, I believe it was neonicotinoid treatment of some trees.

[W] So yeah, it can happen.

[W] There are natural reasons, but it might not be.

[>> W] Yeah.

[W] If it's multiple different species, it does kind of sound like a pesticide issue.

[W] I also like think in greenhouses or in places where if you have like a screened in porch and you'll see a bunch of like dead bees on the perimeter of the porch, that could be like a mechanical thing that's killing them.

[W] Like they can't get out, but I'm sorry to hear that you're finding so many dead bees.

[>> W] That makes me sad.

[W] Probably one more question.

[W] Avery.

[>> W] One second.

[W] Will I pick?

[W] One more question.

[W] You mentioned bees being territorial, the males being territorial.

[W] Are all bees territorial?

[W] What can people do to decrease competition or territoriality in their gardens?

[>> W] I think it's just a part of their.

[W] That's just a part of their biology.

[W] And that just kind of the life cycle of the bee there.

[W] What was the bee that you mentioned, Laura?

[W] The the it's a non-native one, but.

[>> W] It's the.

[W] Yeah.

[W] The willcarter bee.

[>> W] The wool carder bee has some interesting territorial behaviors with the males, right?

[W] They have like the spikes that they use on other males that they like attack them. Yeah.

[W] So, I mean, it's just kind of the way of life for, for the bees.

[W] So I don't know if it's necessarily anything to try to prevent, but if you plant enough habitat, then maybe you can have multiple territories.

[>> W] That's the key.

[W] Yeah, that's definitely the key.

[W] And it is really funny to, to watch them guard their territory.

[W] It's an all day thing and they're really adamant about it.

[>> W] One of my favorite things with carpenter bee males, who can also be very territorial, is if you kind of fly into their zone, the male will zigzag like right up in your face, and it's not threatening.

[W] They can't even sting, but it's sort of like, get out of here.

[W] You're in my zone.

[W] So that's kind of a funny interaction that I always enjoy having.

[W] But with that, we'll end the Q&A session for this great session.

[W] And Anthony will wrap it.

[>> W] Up.

[>> W] Great. Thanks.

[W] Avery and I just pulled up this last slide again.

[W] So again, our final session will be next week on Tuesday, April 7th.

[W] It'll be expanding your impact.

[W] And yeah, thanks, Laura for your great presentation today.

[W] Thanks, Avery, for leading the Q&A.

[W] And thanks to all of you for joining us.

[W] And we'll see you again next week.

[W] Thanks, everyone.