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Participant: Wordly [W] English (US)

[>> W] So this is the start of a new chapter in the program.

[W] Since the next three modules will all focus on habitat creation.

[W] So for tonight, we'll be covering the elements that make good and healthy habitat.

[W] We'll be covering ecoregions and why they're important.

[W] Some gardening resources as well as an introduction to where habitat can be implemented.

[W] And while we wait for folks to log in and join us tonight, I'll put up our housekeeping slide here.

[W] So as always, 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 will answer them at the end of the session.

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

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

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

[W] And we suggest that you write down in point form or 1 to 2 sentences the key takeaways from each training.

[W] While you're here live.

[W] And this will make it easier when filling out the step one form when we send it to you in April.

[W] If you need help with anything or have any questions about the program, feel free to email us at stewards at.

[W] Okay, so for those of you who haven't met Laura yet, Doctor Laura 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.

[W] Followed by a postdoctoral research at the University of California, Berkeley, where she worked on enhancement of native pollinators and natural enemy insects through small scale farm restoration.

[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 we also have Avery Rowe joining us tonight.

[W] Avery is the program associate at Pollinator Partnership.

[W] Avery graduated from the University of Florida with a bachelor's of science in entomology and a specialization in sustainable food production.

[W] Avery's research experience includes projects on ant speciation and insect susceptibility to climatic extremes, with a focus on native bees in Greece.

[W] Welcome, Avery.

[W] Okay, so now with that, I'll pass things over to Doctor Laura Miranda to get this session started.

[>> W] Okay, great.

[W] Well, thank you so much, Anthony.

[W] And hi, everyone.

[W] It's great to be here with you again today.

[W] Tonight I'm really looking forward to getting into more detail about how we can help pollinators and general biodiversity by creating habitat.

[W] I'm speaking to you from Esquimalt, British Columbia on Vancouver Island.

[W] And these lands that I work and live on are the traditional traditional territories of the Lekwungen speaking peoples, also known as the Songhees and Esquimalt First Nations.

[W] And today, as Anthony said, I'll be presenting with Avery and we're going to take about 60 minutes to do a general overview of habitat creation for pollinators.

[W] I'll do a really brief review of how bees live, since that helps inform us on what they need for habitat.

[W] I'll get into some options for habitat creation and more detail on how we can incorporate the elements that bees and other pollinators need into habitat, focusing mostly on nesting and floral resources.

[W] And Avery is going to take us through some eco regional guide eco regional considerations.

[W] Some of the resources we have.

[W] And then at the end, some habitat examples.

[W] So when we talk about habitat for pollinators, for biodiversity and for ecosystem service support, there's many different forms that habitat can take in many different types of landscapes.

[W] So in this module I'll be giving a general overview of what pollinators need.

[W] Focusing on bees and creating habitat that focuses on the needs of native bees in any type of environment is going to benefit other pollinators, other wildlife, and those essential ecosystem services that we as humans rely on.

[W] Okay, so when creating habitat for bees, we need to keep in mind that there are over 4000 species of bees in North America and over 20,000 species worldwide.

[W] And then hundreds of thousands of other types of pollinators.

[W] So they're diverse and how they look and how they live.

[W] And populations vary really immensely across regions.

[W] But there's a number of general commonalities amongst most of them and how they live and what they need so that we can provide overall information on creating habitat that is going to help most types of pollinators survive and thrive.

[W] So if you recall from the first module, I discussed how bees evolved during the time of dinosaurs.

[W] And along with the evolution of pollinators, flowers developed.

[W] And these flowers were essentially marketing campaigns to draw in insects that would spread the plant's pollen in a targeted way to aid plant reproduction.

[W] And after flowers developed, a type of wasp shifted to using pollen and nectar as its primary food source for itself and for its babies, and becoming the first bee.

[W] And recall that bees are unique in feeding their young on pollen and nectar, and having these grocery baskets, I like to call them to carry pollen back to their nests, and it results in them being very effective and important pollinators.

[W] And from the time they evolved, bees and flowers have radiated into the 20,000 different types of bees, and the 300,000 or so types of flowers that we have today.

[W] And importantly, bees and flowers evolved into the diversity that we have today through a process called coevolution.

[W] And this has resulted in the many connections between specific bees and flower types and into intricate webs of connection at the ecosystem level.

[W] So there are really regionally specific communities of native pollinators.

[W] And the best way to support them is by creating habitat with plants that evolved with those bees and other pollinators in that area.

[W] And we know that bees and other pollinators are facing a number of pressures that are leading to declines of some species and some populations.

[W] And one of the best ways to interrupt many of these pressures is by creating high quality habitat.

[W] So much of this course focuses on habitat creation, but we'll also discuss increasing your impact through outreach and knowledge sharing.

[W] Okay.

[W] Recall in the first module that I went over a typical native solitary bee life cycle.

[W] And I did that so you could better understand what native bees need.

[W] I discussed how the adults emerge in the spring.

[W] The males mate and then die after a few weeks.

[W] The females go on to collect nectar and pollen, make nests, provision the nests with nectar and pollen, and lay eggs in the provisioned nests.

[W] The adult females then die after a month or so, and the bees are in their nests as eggs and larvae and pupae over much of the growing season and the dormant winter months of the year.

[W] One of the takeaways from this is the importance not only of floral resources for bees, but also that they need safe nesting sites and places to develop and overwinter.

[W] Okay, so now that we've reviewed some of the information from the first module, we can start diving more into how we can create habitat for them.

[W] That's not only going to attract a diverse and abundant community of native bees and other pollinators, but we'll also help increase populations by providing that full complement of what they need to reproduce successfully.

[W] And what do we mean when we say enhance or create habitat for bees and pollinators?

[W] It can actually mean many different things and different ways all have their value in place.

[W] So I've put together some pictures to illustrate what I mean here.

[W] At the most basic, simple entry level, people might mow their lawn less and let weedy lawn plants flower, providing at least some resources to bees and other pollinators.

[W] It's better than concrete or a pristine lawn, but we consider this just an entry, and we encourage people, especially you wonderful people, taking this course, to think about ways that you and your private or work life can add more value to our ecosystems.

[W] So the next picture below is from my backyard at my old house, and it shows how I've added in some plantings of native plants, in pots and in patches in my back gardens.

[W] So it's quite an easy thing to do, and it can really transform a yard into a buzzing Paradise.

[W] So since I made those additions and I transformed that yard over about 10 to 15 years, my backyard really came alive with native bees and so many types of butterflies and dragonflies and damselflies, flower flies, birds and other just amazing biodiversity.

[W] So similar to that, the next picture in the bottom center shows my friend and colleague Amy Peltier from Parks Canada in her front boulevard, where she's transformed it by adding native plant pots and removing some of the sod grass.

[W] And then in downtown Victoria, we've smothered out all the grass in some boulevards.

[W] That's that top middle picture and added native pollinator plants.

[W] And then in the next picture on the top right, this shows a park where they've used various methods to control invasive plant species.

[W] And as a result, they have the most stunning camas and other wildflower meadows.

[W] And they've done very little actual reintroduction or planting.

[W] So they've more focused on suppressing the invasive, non-native species and letting the native species thrive.

[W] And then at the bottom right hand corner there, that's a full on what we sometimes call blank slate restoration, where all the existing vegetation is removed from large areas.

[W] And we attempt to create ecosystems that mimic some past historical or healthy ecosystems.

[W] And with this one, what we did, we converted approximately one acre of hydro land into a Garry oak meadow.

[W] So I'll talk about this project in a bit more detail at the end of the presentation, showing how the transformation impacted the native bee population.

[W] So again, I'm giving you the overview of what bees and other pollinators need for habitat in any type of habitat you might be interested in, in enhancing or creating next week's modules will provide more targeted detail on creating or enhancing habitat in different types of landscapes.

[W] So I showed this slide in the first module.

[W] These are the main three things that native bees and other pollinators need in habitat, whether it's large or small, habitat.

[W] So they need nesting and overwintering areas.

[W] They need flowers and other plant resources and areas without chemicals that are harmful to them.

[W] And as you saw from the bee life cycle, slide, nesting and overwintering habitat are really crucial for native bees and other pollinators.

[W] So I'm going to start with how you can help provide nesting for native bees.

[W] About 30% of the types of native bees in North America nest in tunnels above ground.

[W] Their natural nesting are places like hollow or pithy stems of plants and beetle tunnels, and old or living trees.

[W] Old, dead or living trees.

[W] So some common bee types that you might know that nest above ground are mason bees and leafcutter bees, and you can help boost nesting habitat for these types of bees by using plants with hollow or pithy stems.

[W] Like many rose and berry bushes and a lot of different types of asters have these hollow, pithy stems.

[W] If you want to sort of tidy up your garden and get rid of the the expended plant material, whether in your garden or larger habitat, and you cut down the dead plant vegetation.

[W] It might be providing bee nesting.

[W] And so these are stems from goldenrod and California aster in my old front yard.

[W] And I suggest you leave all or some of them in your habitat.

[W] I cut down old stems.

[W] I usually leave them behind the new vegetation.

[W] I just moved them to the front for this picture, and I've seen native bees emerging from these stems in the summer, so if possible, you can also have features in your garden or habitat like habitat trees, rock piles, down logs which can help provide areas for bees to nest.

[W] And for above ground nesting bees, there's a relatively new trend.

[W] It's been around for a while now, but it is.

[W] It has been picking up steam of putting out bee houses for them to use, and this can be fun and educational, but it actually can also be harmful to bees if it's not done properly.

[W] And we'll discuss bee houses in a bit more detail.

[W] In the last module of the training.

[W] We do also have a 20 minute video on Bee Houses on our YouTube page, and we'll link to that video on the course page if you want to check it out.

[W] Okay, about 70% of our native bees nest in the ground.

[W] And depending on what type of bee it is, they may prefer well compressed sandy or clay type soil.

[W] And some like very open soil and others nest right amongst the vegetation, even in long grass.

[W] The top picture on the right shows the ground at a really highly trafficked park near my house, where the bees don't seem to mind.

[W] Lots of people, lots of dogs, and they were nesting right beside where I was picnicking.

[W] And ground nesting bees are often also in lawns, especially if the lawns aren't super dense.

[W] And I have found a lot of minor bees nesting in the grassy areas in my front yard and in the sidewalk grass and things in my neighborhood.

[W] And you know, while most like more bare soil to nest in, they will nest in ground that has a bit of detritus under shrubs and ferns and bunchgrasses and some of the best ways to provide nesting for ground nesting bees is to observe areas that they're already using in your yard or other habitat that you're working on, and try to protect those areas by not tilling deeply, not converting them to other uses.

[W] If you can add structure to your plantings in the form of trees or shrubs and bunchgrasses that provide some bare ground under them, that can help to.

[W] So thick mulch isn't great for ground nesting bees having nesting areas, having areas without mulch, or with only thin leaf or other organic mulches can help increase nesting opportunities for these bees.

[W] And if you do use landscape paper that doesn't break down, that will definitely stop bees from being able to nest in the ground.

[W] And the last type of nesting I'll talk about is for the bumblebees, who nest in cavities.

[W] And these bees often use old rodent burrows below ground, or can sometimes be found in compost or scrub piles under low growing vegetation, or for some species, in hollows and trees or birdhouses.

[W] Bumblebees and stingless bees found in Mexico and a bit into the southern US, are a little closer to honeybees in their lifecycle than most other native bees in North America.

[W] For bumblebees, their colonies are much smaller than honeybee colonies, usually about 50 to a few hundred individuals, and the colonies die out naturally, die out completely each year.

[W] So by leaving areas that are scrubby in your yard and not clearing out all dead vegetation, and by leaving bumblebee colonies when you see them, you can really benefit their populations.

[W] So when I was living back in my house, I usually had at least one colony nesting somewhere in my yard each year, and we were just careful not to step on it.

[W] And sometimes we would put up a little flagging tape around it just to remind us and visitors not to step on it.

[W] As long as you don't put your finger right in the nest entrance, the bumblebees probably are not going to bother you.

[W] Okay, next, I'll spend some time talking about selecting plants to support pollinators and what you should consider in your plant composition.

[W] And generally, when we talk about floral resources for native bees and other pollinators, we're referring to the nectar and pollen that they get from flowers.

[W] So here's a diagram of a flower.

[W] Don't need to memorize this or anything.

[W] It just kind of helps give a bit of a visual.

[W] And the pollen is the male spores of a flower that are found in the stamen.

[W] Pollen is high in protein and fats and has other nutrients as well.

[W] The nectar is produced in nectaries, often at the base of the flower, and nectar is there to attract pollinators.

[W] It really doesn't do anything other than that for the plant.

[W] It provides the pollinators with an energy source because it's high in sugars and flowers that produce nectar.

[W] To provide that extra incentive on top of pollen for bees and other pollinators to visit, have tend to have a bit of a different set of pollinators that visit them than flowers that don't produce nectar.

[W] So the flowers want to attract pollinators.

[W] We've talked about that, and they want this to help spread the pollen to female parts of flowers and enable reproduction.

[W] So there's other plant parts and materials that are needed by pollinators.

[W] Some bees use leaves to line their nests, and as Steve and Amanda talked about last week, butterflies and moths need certain plants for their larvae to eat before they can transform into adult butterflies and moths.

[W] We have a brochure on our website that outlines selecting plants for pollinators, and it's a good entry point for information on why you should care about pollinators and how to prioritize plant selection.

[W] And again, we'll post this to the class page under this module.

[W] Okay.

[W] We're going to take a little bit of time with this slide.

[W] Here I show a way to consider and think about plants in terms of value to bees and other pollinators.

[W] So at the top there, native plants are plants that occur naturally in a region or ecosystem without human introduction.

[W] And these plants have evolved with local climate, soils, wildlife and pollinators.

[W] When we're wanting to support all of the really wonderful species of bees and other pollinators native to our area, it's best to look for locally native plants that have evolved with pollinators in the area.

[W] And what this will do is help create robust and resilient ecosystems more broadly.

[W] Regionally, native plants are great to.

[W] And I also want to mention what are sometimes called native hours.

[W] So these are cultivated varieties of native species that have been selected or bred for ornamental traits, like flower color or size, plant form or bloom time.

[W] And so although these plants are derived from plant species that may be native in your area, native hours differ in ecological value compared to wild types.

[W] Often, and research on these bred native plants are mixed in terms of their value to pollinators, with some of them showing that they're just as good.

[W] They attract just as many and just as much diversity of wild pollinators relative to their native cousins.

[W] And then others show that they're not quite as good.

[W] So it's quite variable for native hours, whether they're whether or not they're going to be valuable to pollinators.

[W] And then going down to that next set of plants.

[W] So we can also use non-native plants to support pollinators as long as they're not invasive in your area.

[W] I'll talk about that in a bit.

[W] So some plants like garden, garden herbs and cover crops.

[W] Well, not native to some areas where they're used.

[W] They also don't act weedy or displace native plants.

[W] They can provide resources for some types of pollinators, especially the pollinators like honeybees and native bumblebees that are more of those generalist type foragers, meaning that they're not too picky about which plants they forage from.

[W] And it's important to know that using these non-native plants won't support the diverse complement of bees and other pollinators that are native to an area, but they will benefit some pollinators.

[W] So you might see your non-native lavender plant just covered in bees.

[W] But when you look a bit closer, you'll likely see that all or most of the bees on the plant are honeybees and bumblebees.

[W] And we'll get more into identifying bees in a few weeks.

[W] Bread, ornamental plants so native hours could be considered bread ornament.

[W] Ornamental plants too.

[W] But specifically here I'm talking about ones that have been bred and domesticated for a long time.

[W] They could originate anywhere in the world.

[W] Their native counterpart, and they've been bred for our concept of beauty and showy traits often.

[W] So think of many petalled roses.

[W] So this breeding often reduces their ecological function, changing the amount of nutritional profile of the pollen and nectar, or making pollen and nectar inaccessible.

[W] Sometimes again, think of those roses that have tons of petals that pollinators can't get into.

[W] So all of these plants from the non-native bred ornamentals up on this slide can contribute pollinator health and ecosystem function to different degrees, with the top ones helping the most.

[W] So when creating habitat for pollinators, though, we don't need to necessarily rip out everything that's non-native and totally replace our plantings.

[W] We may want to grow vegetables and herbs and have other plants purely for their beauty, and that's okay.

[W] So incorporating some native plants where possible and making slow changes to having more native plants all will be beneficial.

[W] But what we should never plant are invasive plants and we should remove them when possible.

[W] So invasive plants by definition spread rapidly beyond cultivation and can cause ecological, economic and environmental harm.

[W] And they can take over natural and semi-natural areas, crowding out the diverse array of native plants that should actually be there.

[W] So this picture is an example from a park near my house showing the disruptive effects of English ivy on the forest understory.

[W] Invasive plants can do this because when they're out of their native range, they're often removed from their natural enemies and competitors, giving them a competitive advantage.

[W] They can also change the structure of the area and the soil properties, making areas inhospitable to the native plants, and this type of understory in wooded areas in my area, without invasive plants.

[W] Looks more like this.

[W] With a diversity of plant types and flowers, ferns and grasses, mosses and a few types of flowering plants in bloom.

[W] And you can search online to find out which plants are invasive in your region, and often local invasive species councils, government or other groups will have lists of invasive plants and alternatives that you can plant instead of invasive plants.

[W] So these are some of the common invasive plant species in my region.

[W] And a guide here that shows alternative plants.

[W] And in addition to the biodiversity support of using native plants, there are other reasons to seek them out.

[W] So using native plants can help promote respect for indigenous people that have been stewarding the land for millennia.

[W] It can help introduce young people to the concept of respecting ecosystems and biodiversity, and it can benefit future generations with more healthy and resilient ecosystems.

[W] And a really important thing to note is that native plants can help reduce upkeep and inputs in gardens, too.

[W] And in larger working lands, native plants, they're native.

[W] They're they're adapted to the conditions in your area and generally require less water and fertilizer than non-native plants do.

[W] Here's an example of that.

[W] This is a native patch in my old front yard, and you can see the grass starting to get all crunchy and dry, as it does in the summer.

[W] In my region.

[W] It goes totally brown by August.

[W] I don't water my yard at all, and you can see how well the native plants are doing and the amount of floral resources they're producing.

[W] Even under my total neglect.

[W] And as I mentioned, plants other than natives can be appropriate and beneficial, especially when we're talking about agriculture or other working landscapes.

[W] In these landscapes, we're not necessarily trying to recreate natural ecosystems, but rather to make them better than they would be without pollinator plantings.

[W] And Cody will talk more about this on the third landscape specific habitat module next week.

[W] Okay, so I'll go on with some more general principles about selecting plants that can be applied to most types of habitats and landscapes.

[W] And in addition to thinking about native, non native and ornamental plant selections, it's also important to think about plant diversity and structure.

[W] And when I say diversity, I'm referring to a few things.

[W] Choosing flowering plants with different forms, such as herbaceous plants.

[W] Shrubs, trees, vines and choosing plants that have different colors and differently shaped flowers.

[W] Bloom.

[W] Time is important and depending on the size of area you're working on, if you can have at least three types of plants that bloom in each of the flowering seasons in your region the spring, summer, fall that can help support a diverse group of pollinators.

[W] Many trees and shrubs that bloom early in the growing season and can be important for early emerging pollinators, like some of the mining bees that come out early and the queen bumblebees that come out early.

[W] And so right now we're having our June plum in bloom.

[W] We've got some mahonia, some Oregon grape that's blooming right now, and it's feeding those early spring pollinators and many asters like Goldenrods provide later season resources.

[W] And you also might want to think about your plant selection in terms of pollination syndromes by finding plants that have these different colors and scents and shapes and patterns, we can support a wide range of pollinator types.

[W] And Anthony or Avery, I think might touch on this, but we will post it to the class page to.

[W] So here's an example of how you might go about thinking about flowering plants and selecting a complement of species that will provide continuous bloom and therefore continuous resources and beauty over the growing season.

[W] So this is for my region on Vancouver Island.

[W] So for example, if I were planning a meadow in my yard or in a larger space, I might consider this complement a flowering species that combines shrubs and herbaceous flowers that have different colors and forms, and together bloom from early spring.

[W] Around this time of year and into the fall.

[W] And again, while your selection, your plant selection is going to be different across North America, I again want to mention goldenrod.

[W] I talked about it in the Q and A session in the first module, but there's about 100 different types of goldenrod that are native to different parts of North America.

[W] Some, like the Canada goldenrod, have a native range that spans much of the US and southern Canada, and like I mentioned, Goldenrods have received a bad rap I think because they bloom around the same time.

[W] They're often confused with ragweed, a plant that notoriously causes allergies.

[W] But goldenrod has heavy, sticky pollen, and it's not windborne, and it just supports a phenomenal abundance of pollinators.

[W] In the mid to late summer.

[W] So in addition to thinking about flowering plants and bloom, diversity and timing, also consider other plants like native grasses and ferns that can provide bare ground under and around them, and the native grasses, which are host plants to a number of moths and butterflies.

[W] Okay, so now I'm going to turn it over to Avery to talk about some geographic geographic considerations for plant selection and some of our resources.

[>> W] Thank you so much, Laura, and I'm so excited to be joining you all tonight as a presenter.

[W] I'm going to start by taking some time to cover ecoregions and some of pollinator partnerships.

[W] Really great planting resources that we have available for you all.

[W] So an interesting aspect about pollinators is that they travel through the landscape without worrying about crossing over provincial or state borders.

[W] So when it comes to planting for pollinators, we need to use other parameters to understand their environment that we share with them and how to best help them within those areas.

[W] This is where ecoregions can come into the picture.

[W] Ecoregions are a land classification system, and they define areas of land where ecosystems are generally similar.

[W] Ecoregions are separated into different tiers or levels, starting with broad ecological zones.

[W] Looking at macro climatic conditions all the way down to specific areas that encompass the local ecosystems.

[W] So for our use, it's this more specific level of ecoregion known as the level three ecoregion, that we want to look at.

[W] Using these ecoregions provides us with an accurate way to decide which plants we want to plant and like, based on the climatic and soil conditions when we're planting for pollinators.

[W] So to shape our our plantings based on the environments and the pollinators that we're hoping to attract and support.

[W] So that might sound a bit complicated, but pollinator partnership is here to make things as easy as possible for you.

[W] We've already talked about these briefly in previous modules, but our Ecoregional planting guides are an amazing resource that you can download for free on our website.

[W] We have 36 guides that cover most of the United States and 28 guides for Canada, with more currently in the works.

[W] Inside these guides, there are about 20 pages covering all the basics about pollinators.

[W] If you need a refresher, after this course ends, as well as a list of about 100 plants to support pollinators in your specific eco region.

[W] As you can see in the picture on the right, this planting list also comes with some great information on the sun and soil conditions each plant needs.

[W] The pollinator groups that flowers will attract, and info on host plants for butterfly and moth species, these are our most popular resources and if you haven't already, I highly recommend you check them.

[>> W] Out.

[>> W] We also have the Find Your Roots planting tool for both the United States and Canada, which can be found on our website.

[W] If you're looking for a streamlined list of plants for your garden, this database contains all the information from our planting guides and filters.

[W] The results that you're looking for based on different characteristics.

[W] So you can see here you can add your zip or postal code and simply select or simply select the ecoregion that you live in, using the interactive map to the right.

[W] Then you can apply filters that best meet your habitat goals, so you can select for plant type, soil moisture, sun exposure, and flower color, as well as bloom season.

[W] Once you've selected your filters, a plant list will be generated for you with a list of species that support pollinators in your ecoregion, which you can download as an Excel file and.

[>> W] Share.

[>> W] Next, we have our newest resource, the Host Plant Garden Cards.

[W] You can download a card for your area and turn your habitat into a haven for Lepidoptera, with plants that support the life stages of pollinator as they grow dependent on your ecoregion.

[W] Again, on these cards, you'll find common native plants that are associated with butterfly or moths that they support.

[W] Right now we have five cards, but more in the works, and they'll be uploaded to our website in the next few months.

[W] Moving on.

[W] We also have our garden recipe cards, which are a resource I get asked about all the time.

[W] We have 11 garden cards covering many regions of the US, and again there are more in the works and these cards provide you with a few suggested species of plants that will bloom during the spring, summer and fall, and a very visually appealing and easy to understand format.

[W] Using them, you can create a garden that's colorful, diverse, and provides pollinators with nectar, pollen and shelter that they need to thrive throughout the year.

[W] As you can see, the front of the card shows a suggested six by three garden plan for your specific region with pollinator friendly flowering plants.

[W] And on the back, there are four steps to follow to create your pollinator garden with some extra plant options and other information that you could find helpful.

[W] Now from the previous slide and our our garden cards, you can see the power of threes.

[W] This is based on the three by three rule when gardening for pollinators.

[W] This means that you should have three species of flowers blooming in each of the three seasons that pollinators are active the spring, the summer and the fall.

[W] To ensure that you're providing pollinators with pollen and nectar throughout their entire active foraging period, Laura mentioned pollination syndromes, and it's important to have flowers with different colors and shapes, which will increase the chances of different types of pollinators.

[W] Visiting your garden.

[W] All right, I will definitely be sure that these resources end up on our course information page.

[W] And I'm going to pass it back over to Laura to talk more about plant material and habitat.

[>> W] Great.

[W] Thanks so much, Avery.

[W] Okay, so I'm going to move on here and talk a little bit about some more decisions that you'll be making as you select plants.

[W] And the first one I'm going to talk about is between annual and perennial plants.

[W] So as you might know, annual plants are those that totally die except for the seeds in the cold or non-growing season.

[W] They need to reseed themselves or be reseeded every year.

[W] For native plants, annuals are usually purchased as seed, and in most areas it's best to sow the seed and fall before the cold, rainy period.

[W] But they can also be sown in some areas in the very early spring and still do okay, so annuals will reseed themselves if they have some bare soil for them to fall onto, and annuals establish and flower in their first year because it's their only year, so they can be great to use for helping to establish a habitat for quick color and to crowd out weeds before perennials become more established.

[W] And perennial plants, on the other hand, don't completely die from year to year, so they remain with some plant growth above or below ground.

[W] Well, always below ground, but sometimes above ground to.

[W] And this can be in terms of roots or corms or bulbs.

[W] And they tend to be slower growing because they take some time to establish root systems before putting energy into above ground growth and flowering.

[W] So depending on what type of habitat you're planting, you'll likely want to include both annual and perennial plants, or maybe just one or the other.

[W] And more details will be included in the modules next week for specific habitat types and what you might think about with annuals and perennials.

[W] And another decision you'll have when sourcing plants is whether to use seed or plugs and potted plants, sometimes called transplants, to create your habitat.

[W] There's pros and cons to both, and your decision is going to come down to a number of different factors, including the size of the area, how fast you want or need it to look good, your budget, your timing, and the supply of native seeds and plants in your area.

[W] So for many habitat types, a combination of seeds and plugs is ideal.

[W] And again, we'll talk more about making these decisions.

[W] And in the next modules.

[W] And there'll be some resources for that as well.

[W] Okay.

[W] What's the natural next question.

[W] Well how do I actually find native plants to put in my garden or larger habitat.

[W] There's a number of different ways.

[W] One of the best ways to find sources of local native plants is just by doing an online search for native plant nurseries in your area.

[W] You can also look in local garden stores for native plants.

[W] But at this point, my experience is that many don't carry native plants.

[W] But you can ask them to start sourcing locally native plants.

[W] And you know, with growing consumer pressure, mainstream garden stores are going to start stocking more locally native plants.

[W] There are some seed companies that supply seed mixes that are native to different regions.

[W] So for example, you can check out the regionally native pollinator seed mixes that we created with Stover seed.

[W] You can find that link under the Get Stuff tab on our website.

[W] But we'll also put a link in the class page.

[W] And I do caution you to be careful of generic pollinator seed mixes in local and chain stores.

[W] So many, unfortunately, of these seed mixes for pollinators have species in them that are invasive in the areas where they're sold.

[W] Some of the other options for sourcing native plant material include trading seeds and plants with neighbors and other community members that have native plant gardens.

[W] You might also want to look into collecting seeds from public or private lands in your area, but if you want to do this, you've got to look into the local rules and regulations on seed harvesting from native plants and make sure it's allowed and you have permission to do it on that land, and that you're taking a maximum of only about 10% of the seed from any one type of plant.

[W] So if you do have if you have permission or if it's your own land, that might be one in every ten plants you collect from, or just 10% from a plant.

[W] And native plants can often be salvaged from areas that are soon to be developed for human use.

[W] If you tap into your local conservation and naturalist groups, you can usually find groups that do native plant harvesting and plant salvaging and be kept informed of these different opportunities that come up.

[W] This this slide here.

[W] And what I've been talking about here is some what the next level for creating habitat.

[W] And I want to really stress that before engaging in these harvesting activities that you check out resources on our website for proper seed collection, tap into local conservation groups and make sure that you have the proper permissions and are using the proper procedures.

[W] The last of the three main habitat elements is that you provide an area for pollinators that's free from pesticides that are harmful to them.

[W] So I want to just go on a little bit of a tangent here.

[W] The word pesticide is an umbrella term for all things that kill pests.

[W] So under this umbrella there's herbicides, insecticides, fungicides, rodenticides and more acids.

[W] So it's based on what they're called is based on what they're formulated to kill.

[W] So the main ones we're concerned about in pollinator habitat are the insecticides, the products designed to kill insects in most cases and pollinator habitat.

[W] We want no insecticides used.

[W] We recommend using no insecticides sometimes for large scale habitat creation.

[W] Herbicides can be a tool used to clear out invasive, pernicious weeds.

[W] But for most garden and community type settings, we don't recommend the use of chemical herbicides.

[W] Other ways for prepping urban and smaller areas and controlling weeds will be discussed next week.

[W] By Sarah.

[W] And then, other than insecticides, there are some other asides like fungicides and some herbicides even that may cause problems for some pollinators.

[W] So we advise people to always try other methods before using chemicals.

[W] And if you have problems, look into integrated vegetation management and integrated pest management.

[W] And always follow label directions.

[W] If you are using chemicals, we have this card to help people that are using pesticides to read and follow labels.

[W] Finding any wording and mitigation required for bees and pollinators.

[W] For most situations, I think people should learn to tolerate biodiversity and maybe things you didn't necessarily plant or invite to your habitat.

[W] And with the exception of invasive plants and animals, you know, see what balances out in your habitat by letting nature do its thing, rather than using chemicals that tend to be pretty indiscriminate in what they kill.

[W] Okay, I'm going to end off here with a couple of examples of work I've been involved in where we measured the impact of creating pollinator habitat, and one is from a garden planting and one is from a larger meadow restoration, because I think it's informative and fun to see what these actions can actually do for bee populations and biodiversity.

[W] So I'll start with the project that we planted in late 2021 at the Nanaimo Airport on Vancouver Island in British Columbia.

[W] There was an ornamental garden right in front of the terminal entrance, and it was getting a bit old.

[W] One of the land managers at the airport took the PSC training.

[W] One of the very early PSC trainings, and decided that they wanted to transform this area into a pollinator garden that would benefit bees and pollinators and local ecosystems.

[W] So these are the before pictures of that space.

[W] And we worked with them and our local native plant nursery and flower nurseries to take out most of the ornamental plants and add in perennial forbs, shrubs and some small trees.

[W] And I did sampling of the pollinator populations in the new gardens in 2022, 2023 and 2024, and compared the native bees in the pollinator gardens to some of the nearby ornamental plantings.

[W] And I did equal time sampling and the pollinator garden and the ornamental beds.

[W] So here's an example of some of the ornamental plantings.

[W] But I was finding no pollinators on the ornamental flowers, not a single one in the first year.

[W] So I expanded my non pollinator garden sample to include some of the weedy grassy areas that had things like white clover, lawn daisy and dandelion.

[W] And in 2023, I found a grand total of six bees in these non pollinator garden areas, three honeybees and three bumblebees.

[W] So in contrast in pollinator garden in 2023 observing and collecting for the same amount of time.

[W] I found 481 bees.

[W] So in this graph you can see the number of bees on the vertical axis on each flower type across the bottom of the graph, there were over 20 different species of bees, and this huge

increase in the number and types of bees, I think, really demonstrates how a relatively small planting it was only about 12 by 12m or in feet.

[W] That's about 40 by 40ft.

[W] It shows how it can really make a big difference for pollinators and biodiversity.

[W] And we've taken these data and some of the specimens and created an interpretive display inside the airport.

[W] It was just installed about a year and a half ago.

[W] And apparently it is generating quite a bit of buzz.

[W] Okay.

[W] The second example is from a meadow restoration of about one acre that I did with Peninsula Streams and Satin Flower nurseries.

[W] There was a parcel of BC hydro land adjacent to a popular trail and this area beside the trail was dominated by invasive grasses and invasive forbs, and for hydro purposes needed to be maintained with low growing vegetation.

[W] It really provided a great opportunity to transform some of the underutilized working land into a more ecosystem supporting landscape.

[W] So this, of course, is the before picture.

[W] And you can see the land parcel here in the center of this map, and red in a really important part of this project was that the land is embedded in an urban matrix, but also close to a lot of urban agriculture.

[W] So it had the potential to increase pollination and ecosystem services to urban landscapes and gardens, but also to agriculture, commercial agriculture by supporting and exporting bees for cross-pollination.

[W] And we seeded and planted the meadow in the fall of 2018 with a crew of volunteers.

[W] And you can see in this picture our opening ceremony and welcome from Tiffany Joseph from the First Nation.

[W] And with the help of community volunteers, we seeded and planted the meadow with native plants with the goal of restoring something like a a historical Garry Oak ecosystem.

[W] And then here are some after pictures showing the meadow.

[W] After restoration.

[W] And we did continue to have community involvement and also a lot of school groups and youth leadership group involvement.

[W] So it was a really great community project.

[W] We did pollinator monitoring before and after the restoration.

[W] So here's just a little video to give us a nature pause.

[W] Okay.

[W] And here's some of the data.

[W] On the left is a graph showing the average number of native bees we collected at each sample time in 2018, before the area was restored to a natural type ecosystem.

[W] So I was collecting about five bees on each transect in the first year after the area was restored.

[W] The number of bees almost tripled in each sample to an average of about 19 bees.

[W] And in 2021, when the meadow was more mature, I found 45 bees per sample.

[W] So similarly, the bee richness, which means the number of different types of bees we were finding increased really greatly from before restoration, when there was about two types of bee per sample, to 2021, where I was finding about nine different types of bees.

[W] Each sample.

[W] Okay.

[W] And if you remember way back to the first webinar, I showed you this interaction between pollinators and flowers in a typical healthy natural ecosystem.

[W] You can see that there's a variety of bee types and other pollinators, and they interact in a complex, redundant and unique ways.

[W] And I did this type of interaction diagram for the native bee data before restoration and after.

[W] Okay.

[W] So here's what the interaction looked like when the area was dominated by invasive grasses and invasive flowers.

[W] There were really few types of flowering plants, few types of bees, and a relatively simple interaction structure.

[W] And then contrast that to the interaction diagram after restoration.

[W] And you can see that it's a huge increase in the number of plants and native bees and the interactions much more closely, looking like a healthy natural ecosystem.

[W] So these more complex interactions are more sustainable and more resilient to even pressures like climate change and other pressures.

[W] So I want to end my part here by highlighting the creating pollinator habitat doesn't need to be difficult or complex.

[W] So if we just keep a few principles in mind, provide flowers native where you can even just 1 or 2 in an ornamental garden or yard.

[W] Leave scrubby elements like old plants and bare ground.

[W] If you have the space and don't use chemicals, especially insecticides.

[W] And with those three things, you're going to be well on your way to supporting pollinators.

[W] Also, be inspired by natural areas when you create habitat and take your time and do what you can.

[W] So remember, even adding one native pollinator plant to your yard can make a difference, but it can be an addictive and slippery slope.

[W] So I'll warn you in the best possible way when you start seeing all the really beautiful bees and butterflies and other pollinators that start visiting your native plantings.

[W] So I do encourage you to start out with one native plant if you haven't started yet.

[W] If you're way past that and want to get into more complex habitat and pollinator support, we're here to help you and you'll have more of that in the upcoming presentations, where we'll get into a lot more detail for creating habitat in different ways on different land types.

[W] Okay, so thanks.

[>> W] And I'll pass it back to Avery for some pictures on habitat and what's going to happen next week.

[W] Thank you so much, Laura.

[W] Those examples of work that you have done in pollinator habitat restoration were amazing, and I just can't wait to see what this cohort does with their habitat outreach actions.

[W] So now quickly at the end here, I'd like to cover some places that we can implement pollinator habitat.

[W] As Laura mentioned, this will be a preview for what we're going to cover in depth next week during our three habitat sessions, which are home gardens, yards and balconies on Tuesday, March 10th, large land areas, rights of ways and municipalities.

[W] On Wednesday, March 11th and farmers, growers and agricultural landscapes on Thursday, March 12th.

[W] As we cover the following examples, just be thinking about which habitats are relevant to you and which session or sessions you'd like to attend next.

[>> W] Week.

[>> W] So up first, on Tuesday, March 10th, we have the home garden.

[W] We'll learn more about planting and planning your home garden from Sarah Wittenberg, who manages pollinator partnerships, bee friendly gardening program.

[W] We'll also talk about gardening in limited spaces with Sarah.

[W] I love bringing this example up because we often get asked if you can still help pollinators while living in an apartment or in a space without a backyard.

[W] And the answer is absolutely yes you can.

[W] This is a balcony garden created by one of our team members, Amber Barnes.

[W] She managed to grow ten different native species on her balcony.

[W] And you can see here that this small space is providing more habitat and resources than the entire maintained lawn outside of her building.

[W] It's just awesome to see, even if your balcony is on a higher floor.

[W] Bees, butterflies, and birds are all capable of flying high up and they'll be able to reach your balcony garden for pollen and nectar.

[W] Now I just want to mention that any habitat you create is good habitat.

[W] Pollinator habitat can thrive really anywhere if you know what to plant, even in places that are extremely dry or water limited.

[W] You can see here on the left we have a prickly pear cactus which grows in dry desert conditions but is visited by a whole variety of pollinators when they're flowering, including bees, wasps, beetles, birds and butterflies.

[W] On the right, we have the yucca plant, which grows in sunny and dry conditions.

[W] The reason I'm mentioning Yucca in particular is because they also have a very close relationship with the highly specialized yucca moth, which you can see here.

[W] This particular plant pollinator relationship is really interesting because they are completely dependent on one another.

[W] UKmoths only lay their eggs on these plants, and the yucca plants are only pollinated by these moths.

[W] It's a completely intertwined and codependent relationship.

[W] Moving on, we have sidewalk strips in towns and cities that can be converted to pollinator habitat.

[W] And I think this is great because when we come together to convert multiple sidewalk strips into habitat, we create an interconnected route that pollinators can reliably travel across between environments, kind of like a bee superhighway for pollinators to get around cities or urban environments.

[W] We'll learn more from Jordan Phelps on Wednesday on how cities and townships can support pollinators, and how community members can get involved in all of these initiatives.

[W] Then we have pollinator habitat along roadsides.

[W] This is a really great opportunity to provide a very large area of flowering resources for pollinators.

[W] Habitat along roadsides is great because it lowers maintenance costs from less mowing needs, but it also makes those long highway and freeway drives more picturesque and interesting for drivers and passengers.

[W] Hydro corridors, which are similar to roadsides, also provide a ton of space to implement habitat and support pollinators by allowing thousands of flowers to bloom.

[W] We'll also learn more about pollinator habitat in large landscapes on Wednesday with Andy Grinstead, our guest, and our guest presenter Hannah Franklin from the Sacramento Municipal Utility District, and their work at the Pine Hill Preserve.

[W] And finally, we have farms and agricultural landscapes through hedgerows and cover crops and buffer strips.

[W] There are tons of opportunities to implement pollinator habitat, not only to benefit the pollinators, but also to increase yield and the abundance of crops.

[W] We have three presenters on Thursday for our agricultural session Cody Wilson and Christine Gemperli, who will go into more detail on the importance of pollinator habitat and agricultural landscapes.

[W] We'll also have a great presentation during this session on rain gardens in Agricultural Landscapes by Isabel Nazarian.

[W] All right, so that was just a really quick intro into what we'll be covering in more detail during our next three sessions, which are back to back next week.

[W] You can find more information about what specifically will be covered in each session on the program outline, which is on the course webpage.

[W] Here's the info to log into the Course information page if you haven't already, where you can view all of the recordings.

[W] See all the resources we talked about today, and figure out what session or sessions you want to go to next.

[>> W] Week.

[>> W] And now I'll pass it back to Anthony for our wrap.

[>> W] Up.

[>> W] Great.

[W] Thanks, Avery.

[W] Thanks for the amazing presentations tonight.

[W] Laura and Avery again.

[W] So one last wrap up slide before we get to our Q&A period.

[W] So just to go over again, what Avery just mentioned, we'll have three sessions back to back next week.

[W] You only need to attend one.

[W] Whichever one is most relevant to your pollinator journey.

[W] But we do encourage you to attend all three because we have some incredible guest speakers that will be joining us next week, and they're all really interesting presentations.

[W] But again, you only need to attend one of these.

[W] Tuesday, March 10th will be we'll focus on habitat creation for yards and small to medium sized gardens.

[W] So if you're a home gardener, this is a really good one to go to.

[W] Wednesday, March 11th, we'll focus on habitat creation on a large scale for those who manage rights of way parks, roadsides and cities.

[W] So larger landscapes.

[W] This is definitely the session for you.

[W] And then on Thursday, March 12th, we'll complete our habitat sessions and focus on pollinators in an agricultural landscape.

[W] So I'll keep this slide just for your reference.

[W] And we'll also email you with more information.

[W] But let's now get to our questions.

[W] So the first question for tonight is what date can I clear out last year's debris without impacting bees.

[>> W] Okay.

[W] Yeah, I guess I can start with that.

[W] And so there are some rules of thumb.

[W] It's going to be different in every area.

[W] But in terms of, you know, you want it to be a time when they've had maybe 10 to 20 days of weather over about ten degrees Celsius, and somebody is going to need to help me with the conversion of that into Fahrenheit.

[W] So, yeah, you want a few degree days.

[W] Sometimes it said May, but that's going to change in different places.

[W] You know, really what you want to do is try not, like I said, try not to clear out too much of your debris.

[W] Bees are going to be emerging for a lot of the summer.

[W] Different bees come out in the early spring.

[W] Some bees come out a little bit later.

[W] Other pollinators are using those resources too, for overwintering and under them.

[W] Okay, somebody did translate for me.

[W] Thank you.

[W] Yeah.

[W] So so ideally you want to do as little removal as possible.

[W] What we what we want to do is try to keep it as, as wild as we can.

[W] But you know, we also want these.

[W] We do have that often that we want a little bit more manicured look.

[W] So, you know, I showed you how I put my old dead above ground plant material behind the other plant material.

[W] You can have a pile over in the corner, and then those bees can still emerge, even if they're coming out a little later in the season.

[W] Or what some people do, especially in larger habitat, is you might do a rotational thing.

[W] So this one year I'm going to mow and clear out this area.

[W] Another time I'm going to mow and clear out this area in the next year and keep things from year to year so that you're not clearing out everything each year.

[>> W] Thanks, Laura.

[W] What are the recommendations or what recommendations do you have for mulching in a way that doesn't interfere with the needs of ground nesting bees?

[W] Is sheet mulching with cardboard bad for ground nesting bees?

[>> W] Yeah, so there's a lot of different considerations here.

[W] I don't like weeds.

[W] I don't like weeding, so I will tend to use some kind of biodegradable mulch.

[W] I've definitely used cardboard and a lot of my different habitats that I that I've worked in, and it will degrade over time.

[W] So you are going to then eventually get that ground that's not covered up with something that's impenetrable to to the bees.

[W] So in terms of cardboard, yeah, I think that's fine.

[W] Go for it.

[W] Use it.

[W] It's going to degrade.

[W] Maybe.

[W] Don't put it everywhere.

[W] Maybe don't put it right under the pots that you're planting or the shrubs or the little ferns that you're planting.

[W] Leave leave a little space under there.

[W] You know the plant is going to cover that a bit.

[W] You might need to do a bit of weeding there more than where you have your, your cardboard, but that's going to provide some area for the bees to get into the ground during that time before the cardboard degrades.

[W] In terms of mulch, using biodegradable mulch, not using landscape papers that don't degrade those can often be really bad for the soil too.

[W] And the organisms in the soil.

[W] So there's a lot of reasons not to use those those landscape papers that don't degrade.

[W] So if you do use some kind of paper, use something that's biodegradable or you can use a mulch that is pretty broken down already.

[W] So you can use a broken down wood chip mulch or something like that.

[W] That is going to degrade as your habitat matures and you have less weed pressure.

[W] You know, one of the things that my friend at Satin Flower Nurseries often says is think of your your garden area or your habitat.

[W] It's like brushing your teeth.

[W] You do just need to keep it up.

[W] You need to get in there and weed.

[W] Sometimes you need to see what's happening.

[W] It's not a one and done type thing.

[W] There is going to be pressure from weeds.

[W] So you know, mulch, use of mulch, use some biodegradable mulch.

[W] But just be careful with it and try to have some bare ground too.

[W] If you can.

[>> W] Great.

[W] Thanks, Laura.

[W] I just saw a question about the sessions for next week and about the recordings, and all three of those recordings were planning to have available on the course info page by next Friday.

[W] So all three of those will be up on the website.

[W] Okay, I saw this really great question.

[W] And we've gotten this.

[W] I think each year that we've been running this about roadside habitats, and if that impacts pollinators, if it increases pollinator deaths, if it's not actually great for pollinators to be so close to the roadsides because of collisions with vehicles or extra pollutants.

[W] So what's the answer to that?

[W] One?

[>> W] So it depends as many things in science do and ecology do so in very so there is there has been some really good research that has come out recently.

[W] And then there is some older research that that came out.

[W] Generally what it shows is that the net, there's going to be a net positive benefit to putting in habitat on roadsides.

[W] So yes, you're probably going to increase kill because you're going to have more insects there.

[W] Our cars are very clear of insects these days, whereas, you know, if you're my age or, you know, you remember back there, you could you had to stop all the time at gas stations and things to scrub your car and your windshield and things because they were just covered in insects.

[W] So yes, there probably would be an increase in death, but there's also going to be a net benefit.

[W] So so that's in terms of like the cars hitting them and things.

[W] But you know there's also worries about salt and pollutants from cars and things like that.

[W] And one study that I read a year or two ago did talk about how on major highways that had a certain amount of traffic, you do get to a point where you're getting too many pollutants in that side habitat to to make it not beneficial to pollinators.

[W] And you probably shouldn't have habitat.

[W] And I think the recommendation from the hat was to have to put this habitat in areas that are four lanes or less, I think, and had, you know, a certain threshold of traffic for most urban type areas, not areas that are not large highways.

[W] What the research shows is there's going to be a net positive benefit of putting in the habitat.

[>> W] I'm seeing a question here.

[W] Does Pollinator Partnership have resources to help residents in an HOA that tend to have strong restrictions over lawns?

[W] And I'll say that we do have some resources on our website, and I'll definitely add those to the course info page so that you can download.

[W] I think we have like a letter template that you can use to email or send a letter to your HOA.

[W] And I'm also seeing a question here.

[W] Can you say a little bit more about pollinator syndromes?

[W] Do you want me to?

[W] I can answer that one if you'd like.

[W] Laura.

[W] Yeah, pollinator syndromes are really interesting.

[W] So it's not necessarily an exact science, but you're almost predicting how pollinators will react by the flowers that you're putting in your garden.

[W] So depending on the color of the flowers or the shape of the petals, you can kind of predict which pollinators you'll attract.

[W] So like, you know, white flowers that are open at night you might attract more moths.

[W] Whereas flowers that are blue, you might attract pollinators that see in the ultraviolet spectrum like bees.

[W] So we'll we'll definitely upload that resource on pollinator syndromes to the course info page.

[W] So you can take a look at that.

[W] But yeah, it's it's kind of a way to predict what you can attract to your garden.

[>> W] Can I add a little something to that.

[W] Of course.

[>> W] There are also all those volatile chemicals that we talked about last week with Lepidoptera that also play a part in different insects, identifying the plants that they'd like to go to.

[W] And then it also has something to do with flower morphology.

[W] So certain flowers have a resting place where a butterfly is able to rest and land while they're visiting the flower.

[W] Other flowers, like sunflowers, have that really big base that bees can walk in circles around as they gather pollen.

[W] So it also has to do with the ways that the insects are physically interacting with the flowers.

[W] But pollination syndromes are one of the coolest things.

[>> W] I think.

[W] Thanks, Avery.

[W] So I got this question's asking if native plants in one area, if they're planted in an area that they're not native, are they then considered invasive?

[>> W] No, not necessarily.

[W] So.

[W] Some plants outside of their native area are going to act invasive.

[W] And then we call them invasive.

[W] And again, those are the ones that you can find on your invasive species council or government websites.

[W] If you search for invasive species.

[W] But, you know, an awful lot of them don't do that.

[W] You know, they would need help to move around.

[W] They're not just going to start moving around on their own necessarily.

[W] So yeah, definitely not all species are going to do that and act invasive.

[W] But some will and it's pretty well recorded what the problem species are in different regions.

[>> W] Do any other animals have a corbiculae for carrying pollen or is it just bees?

[>> W] Just bees.

[W] One of the super cool things about them.

[W] Yeah.

[W] So they've got the that adaptation to bring the pollen and while in in corbicula it's that that wet pollen they pack.

[W] So it's some fluids and nectar and stuff too that they pack as opposed to the scopa, which is where they're going to pack different types of bees.

[W] Will will pack some dry pollen.

[W] So yeah, definitely other animals are eating pollen and nectar.

[W] Tons of other ones are.

[W] But having those reusable those, those, those physical features on them, those structures that corbicula to actually carry it back home to their babies is quite unique to bees.

[>> W] How can one collect pollinator population data in their gardens?

[>> W] Okay.

[W] Stay tuned.

[W] Do you want to talk about that, Anthony?

[>> W] Sure, yeah.

[W] And we'll definitely get into this more in session six on monitoring.

[W] But there's some really great community science ways to to monitor populations in your in your garden.

[W] One that we will talk about in more depth is iNaturalist.

[W] And just, you know, taking pictures of the pollinators, visiting your garden and those plants and uploading those to enact.

[W] And it's a really great way to learn about the different species that are visiting.

[W] But you can also get some cool population data that way as well.

[W] So stay tuned.

[W] As Laura said, I don't know, Avery, if you had something else to mention there too.

[>> W] I love iNaturalist and I think a lot of our participants are going to be really excited to use the tool.

[W] It also comes with an app version called Seeq, where you can identify things right, live on your camera and upload them to the database.

[W] So if you're walking around your garden, you can get real time information about what you're seeing.

[W] So yeah, get ready.

[W] It's going to be a great session.

[>> W] Yeah.

[W] And just just to add as a little bit of a preview, just get out and start looking too.

[W] If you record things in a little notebook or you just make note of it in your head, I think in most areas in North America, we're starting the spring season or getting pretty close to it anyways.

[W] Not where Anthony is, but in other areas.

[W] So yeah, just start going out and looking and we'll definitely talk about more more information on monitoring and different citizen science programs, community science programs that you can tap into.

[>> W] Yeah, I probably not going to see a pollinator until the end of June, so it's still quite a while.

[W] I really liked this question.

[W] I thought this was interesting.

[W] So after creating a garden of native plants a few years ago, I noticed that in the third summer bloom, a new species, a similar looking plant, emerged.

[W] Is it common for birds or other animals to spread seeds that match the ecosystem that has been created?

[>> W] Sorry, I just missed the very first part of.

[>> W] Could you?

[W] Yeah, I'll repeat it.

[W] So after creating a garden of native plants a few years ago, I noticed that in the third summer bloom, a new species, a new similar looking species of plant emerged, and it's suggested that maybe it was a bird that had dropped some seeds.

[W] Is it common for birds or other animals to spread seeds that to try to match the ecosystem that has been created, I guess, in your garden?

[>> W] Yeah, yeah, I wouldn't say purposefully so, but yes, birds and other things are going to spread seeds, birds and lots of other animals are going to spread seeds, whether it's on their pelt.

[W] It's something they've eaten.

[W] And then they're going to, you know, digest and poop out.

[W] But yes, there is a lot of spread of seeds by by animals.

[W] And then, yeah, in terms of what is going to grow there, the seeds are going to select somehow.

[W] If it is a good environment for them.

[W] So they might germinate and then not make it, or they might not germinate at all if it's not the right environment for them.

[W] So a lot of seeds get spread around and a lot of seeds also don't take hold.

[W] The vast majority of seeds don't take hold.

[W] So it's one of those sort of probability chance things.

[W] A ton of seeds go out of a ton of different species, and the ones that find the right environment happen to be in the right environment are going to thrive.

[W] There.

[>> W] How important is prepping the soil prior to planting?

[W] When designing and creating a pollinator habitat?

[>> W] Can I just go with it?

[W] Depends.

[W] Yeah, it definitely depends.

[W] So you know, if you if I'm doing a pollinator garden in my front yard and you know, there hasn't been any heavy chemical use or anything like that there, I'm probably not going to augment my soil there.

[W] So augmenting your soil with fertilizers or like that can sometimes increase the weed pressure.

[W] The native plants often do just fine in whatever soil that you happen to have there.

[W] Now, there's definitely going to be different things where you are going to need to augment your soil, and there's definitely methods you can use where you use ways to increase the organic matter in your soil.

[W] If you do have really poor soil, you can use compost in your soil to beef it up a bit.

[W] But again, that might increase the weeds.

[W] The viability of the weeds more than your native plants.

[W] But it is going to be different in different habitats, but usually for native gardens, unless there is some big issue happening in the area.

[W] Like I said, like a big contamination or the soil is really poor, clay soil.

[W] And a lot of cases less is more and you can get away with not doing too much soil or any soil augmentation.

[>> W] Thanks, Laura.

[>> W] I've had some experiences for soil prep where in converting somewhere that has been an invasive patch recently, like the seed bank can kind of resurge after a few seasons and all those invasive plants can come back and outcompete the natives that I've planted.

[W] So I think that a strategy in that case is to maybe like block off the area with cardboard or something to prevent sun and prevent those seeds from germinating so that they don't come back in the future.

[W] So that would kind of be a case like pesticide contamination, where you might want to take extra precautions.

[W] Do you agree, Laura?

[>> W] Oh totally agree.

[W] Yeah, that's a great addition.

[W] And yeah.

[W] So we'll be talking in the next webinars about how to prep your site quite a bit, because prep is the most important step in terms of weed control and invasive control.

[W] It's very disappointing to put a lot of money and time into planting and not having done the the prep and having those invasives, like you say, Avery just coming back and really, yeah, whacking down your native plants.

[>> W] So yeah, we'll get into a lot more detail next week on that. Yes.

[W] Lots of prep details in the presentations next week.

[W] I'm seeing a question here.

[W] What about native night blooming plants for pollinators like moths.

[W] And would they improve things for bats.

[W] So I can take this one.

[W] And this is something that Doctor Kristen Lear had touched upon last week.

[W] But in a lot of places in North America, we don't have pollinating bats.

[W] So the night blooming plants that we're planting are usually visited by moths.

[W] However, by increasing the amount of moths that go to your garden, you are improving the populations of bats that eat insects.

[W] So you're really helping that.

[W] I guess trophic level ecological system.

[W] So yeah, by planting more plants that bloom at night, you are really helping your local, your local ecosystem.

[W] Okay.

[W] Moving on.

[W] So water sources for your pollinator habitat, is it super critical to include a water source.

[>> W] Sorry, I lost my cursor there for a second.

[W] Yeah.

[W] It depends.

[W] I'm just going to start every sentence that way now.

[W] So if you're starting with seed and you've you've prepped your area in terms of doing some kind of invasive control, non-native plant control, and you're seeding at the right time, which is going to be different in every area.

[W] In our area here, it's often in the early fall.

[W] It's good to put down seeds.

[W] You don't need to you you don't need to add water to it.

[W] You actually don't want to because some of the plants want that dry season.

[W] They want to go with the natural seasons.

[W] Now, with a changing climate, there's some caveats to that.

[W] So sometimes in that first year you've planted your you have sown a bunch of native seed in the fall or in the winter.

[W] You can do it over the snow.

[W] To which Andy will talk about in his presentation.

[W] But once they they start putting their roots down and they do fairly well in the spring, but then you get a really unusual hot or dry spell.

[W] You might lose a lot of plants if you don't water, and it has a lot to do with our changing climate that we're having to deal with.

[W] So for the most part, with seeds you can put them in.

[W] Not worry too much about irrigation, but you might want to just watch it in the first couple of years, especially so when you're planting potted plants, plugs, larger potted plants, those will need water, because what you're doing is when you're planting them, it might be in the fall, might be in the spring, might even be in the summer.

[W] Those need to establish those already have a lot of top material to them.

[W] A lot of above ground plant material.

[W] And the roots haven't really gotten into the soil properly and can't support that above ground until they have established their roots a little bit more.

[W] So with potted plants, you do need irrigation in most cases.

[W] Sometimes you can get away with not plant them.

[W] In the fall they get the winter rains.

[W] The roots get pretty good for that dry period.

[W] But yeah, you you often will want to watch those plantings more.

[W] And usually when you do potted plants, you're going to want to irrigate them right away.

[W] And if you're planting them in the summer, they're going to need to be watered.

[W] That entire first summer.

[W] When we do native plant hedgerows in farm systems, usually for about the first three years we use irrigation and then after that they don't need irrigation anymore and they're beautiful hedgerows with native plants, with deep root systems that can tap into the soil very deeply into the water.

[W] And they don't need further irrigation.

[W] So I think that that answer it.

[>> W] Yeah.

[W] Thanks, Laura.

[>> W] And I did get quite a few questions about natives and resources for them.

[W] So Avery and I will do some research, and we'll try to post some great resources for you on the course info page.

[>> W] Yeah, I've got some good papers for that that have come out recently.

[>> W] Perfect.

[W] Thanks, Laura.

[>> W] Do you mind also touching on the water needs of pollinators in general?

[>> W] Oh, sure.

[W] Yeah.

[W] Yeah, it's it's a common thing that people think that native bees need extra water.

[W] You got to thank you from Paige there.

[W] Yeah.

[W] So we don't.

[W] Since I've been with Pollinator Partnership, we have somewhat removed the water part.

[W] From what pollinators need in an environment.

[W] Native bees are going to get their water needs from from nectar from.

[W] I've seen them running up grass and licking the exudates.

[W] The guttation fluid from from grass.

[W] They're not.

[W] I have never seen a native pollinator except for maybe one bumblebee going to one of those water dishes that that is put out.

[W] So the native bees, we don't need to add water to our environment if we're putting in plantings, then they're going to be okay.

[W] They're going to get the water that they need.

[W] So, you know, things like mason bees, they're going to want like damp soil.

[W] So maybe you want to water your soil a little bit.

[W] But in terms of, in terms of like putting out the dishes of water, we don't think that's going to that's going to benefit the native bees.

[W] Now honeybees are going to go to this water.

[W] So we do recommend and we have it as something in our bee friendly farming program that if you do have honeybees, then you need to have clean water sources for them.

[W] So if you are trying to support honeybees, they need that water in the hot, dry times to to cool down their hives that get quite hot.

[W] The other thing is that that they're sometimes wasps and things will be a little bit thirsty.

[W] They might go to plain water.

[W] I see that once in a while.

[W] Again, it's probably for cooling their colonies.

[W] They will go to bird to hummingbird feeders too, because they do like the the sugars there.

[W] Now the moths and butterflies will what's called puddle.

[W] So they will go to moist areas of soil.

[W] And it is such an amazing sight.

[W] I've seen this in the tropics a number of times too, with just huge piles of butterflies puddling, but you know, they're not really going so much for the water, but the moist soil has these nutrients in it that they need.

[W] And I think specifically for the sperm production of the male butterflies and things.

[W] But there are needs that they get from that.

[W] But it's less that they're using just plain water.

[W] So if you put out plain water you might get some wasps, you might get some honeybees.

[W] If you've got some in the region, but you you're probably not going to be benefiting the native bees.

[>> W] They probably don't need.

[W] It.

[W] Thanks, Laura.

[>> W] And thanks, Avery, for for adding that on about pollinators.

[W] I think that's that's all the questions that we have time for for tonight.

[W] So thank you again, Laura and Avery for your presentations tonight.

[W] And thank you, all of you, for joining us live.

[W] So again, we'll have our three sessions next week.

[W] Our more technical habitat sessions.

[W] Choose the one that fits best for you or, you know, join all three if if that interests you.

[W] But we'll be sure to send you an email this week with more information.

[W] We'll have the recording for this session up on the website by Friday.

[W] And yeah, we'll be look forward to seeing you again next week.

[W] Thanks everyone and enjoy the rest of your night.

[W] See ya.