Zoom: PSC Virtual Training 2026: SJBL-7330 - info@pollinator.org

Participant: Wordly [W] English (US)

[>> W] Available for farmers and growers in supporting pollinators within agricultural landscapes, as well as bee friendly farming program.

[W] A bee friendly farming program.

[W] Overview.

[W] We will then have Isabelle talk about rain gardens and their importance in agriculture.

[W] Then we'll have Christine talk to us about her experience almond farming while keeping pollinators in mind, and some of the benefits and opportunities she's encountered using bee friendly practices.

[W] With the remaining time at the end.

[W] We'll do our Q&A session.

[W] And I just want to take a second here.

[W] While folks are still joining to show off this amazing poster.

[W] Every year, Pollinator Partnership works with an artist to create these beautiful posters.

[W] And a few years ago, the theme was pollinators and agriculture.

[W] So this can be downloaded from our website.

[W] And I'll put the link up on our course page after this webinar.

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

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

[W] So Friday of this week.

[W] And I believe the recordings from the two previous sessions from this week are already up on that course info page for you to check out.

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

[W] And you can email us at stewards at org 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 this slide, or use the link we sent to you in the chat or by email 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 as we've mentioned many times before, we suggest that you write down in point form or a couple 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 when it's sent to you by email.

[W] In April.

[W] Okay, so let's get to know our guest speakers a bit better.

[W] So joining us tonight, we have again three guest speakers.

[W] We have Cody Wilson who is the agricultural manager at Pollinator Partnership.

[W] Cody received his bachelor's of science in Ecology and evolutionary Biology from the University of California, Santa Cruz, where he focused on invasive and noxious species influence on arthropod community composition, and continued to receive his master's of science in environmental management with an ecology concentration from the University of San Francisco, where he studied agricultural crop, pest, pathogen and pathogen relations in response to the pressures of climate change.

[W] Having worked at local farms, a county level Department of Agriculture and a regional restoration and land management company.

[W] His background and passion for ecology and conservation and agriculture has propelled his career, and he's excited to encourage responsible land management practices through pollinator Partnership and the bee friendly farming program.

[W] Welcome, Cody.

[W] Isabelle Nazarian is the Midwest regional Partner biologist with Pollinator Partnership, bringing a lifelong passion for native plants and ecosystem restoration rooted in her rural Ohio upbringing.

[W] She earned a bachelor's of science in environmental science from the Ohio State University, specializing in ecosystem restoration, and conducted research at OSU's

Honeybee Lab focused on high mortality, pesticide impacts and the value of restored and agricultural landscapes as pollinator forage.

[W] Isabelle has experience in conservation, education, wetland restoration, implementation, and evaluating land for USDA conservation programs.

[W] In her current role, she provides pollinator focused technical assistance, education, and outreach to agricultural producers and NRCs staff across the Midwest.

[W] Through this work, she supports farm bill applications and conservation planning to help establish pollinator friendly habitat and farming practices across both urban and rural landscapes.

[W] Welcome, Isabelle and Christine Jim Firby farms 135 acres of almonds across two ranches in Central Valley, California, with her brother.

[W] She's a director for the Almond Board of California and serves on the Nutritional Research committee and is vice chair of the Biomass Workgroup.

[W] She's also a lover of pollinators, serving on the board for project APIs M, which funds and advocates for honeybee research and health.

[W] Christine grew up in farming and with a mind for science and environmental crusading.

[W] She set her sights on saving the environment.

[W] She earned a Bachelor of Science in biology from UC Santa Cruz and a master's of science in fisheries from Utah State University.

[W] Christine is a self-proclaimed advocate and pioneer, and one of her proudest accomplishments on the farm is the successful replanting of a 20 acre almond orchard.

[W] The rows are meticulously planted, pruned and interwoven with pollinator friendly cover crops such as wildflowers and sweet peas.

[W] Okay.

[W] And with that introduction, we'll pass things over to Cody to start off the presentations.

[>> W] Thank you Anthony.

[W] I'll share my screen.

[W] Hello, everyone.

[W] Thank you for having me today.

[W] Culture and why it plays an important role in our our farming systems.

[W] Before we dive in, I'd like to briefly, briefly introduce myself.

[W] My name is Cody Wilson.

[W] I'm an agricultural manager with Pollinator Partnership.

[W] I hold a master's in science in environmental management with an emphasis in ecology from the University of San Francisco and a bachelor's degree in ecology and evolutionary biology from the University of Santa Clara, University of California, Santa Cruz.

[W] My undergraduate research focused on how habitat features influence arthropod communities, particularly the impact of noninvasive or non-native invasive plant species on insect populations.

[W] During my master's program, I studied the effects of climate change on wine grapes, the glassy winged sharpshooter, and Pierce's disease, major pests and pathogens in California agriculture.

[W] I grew up in Sonoma County, California, surrounded by wine grape production.

[W] After completing my education, I returned home to serve as a biologist on the county's Department of Agriculture.

[W] There's.

[W] There.

[W] I led programs focusing on the glassy, sharpshooter, and other invasive pest detection and exclusion efforts while contributing to pesticide regulation programs.

[W] I later transitioned into hands on restoration work, leading crews and forestry and wetland projects with a private restoration company in the Pacific Northwest.

[W] In that role, we enhanced thousands of acres of habitat.

[W] For the past three years, I've been with Pollinator Partnership, where I've been able to bring together different threads in my career.

[W] I work primarily with agricultural producers, especially wine, grape and almond growers, to integrate pollinator habitat into working lands.

[W] Throughout this webinar, I I'll share practical strategies you can apply on your farm or private land to enhance pollinator habitat, while also supporting and strengthening production areas.

[W] So here's a quick roadmap of today's presentation.

[W] I'll begin with a brief overview of what pollinators need to thrive.

[W] From there, we'll connect those needs to what agricultural producers need and explore the benefits of that pollinator habitat can provide on working lands.

[W] Next, I'll introduce pollinator Partnerships, bee friendly farming program and how it supports growers.

[W] And finally, I'll wrap up by sharing a range of free, publicly available resources that can support you in developing your developing and enhancing pollinator habitat on your farm.

[W] So what do pollinators need?

[W] If you've participated in other PSC modules, this information may sound familiar, but it's worth reinforcing.

[W] Pollinators need diverse support, preferably native floral resources that provide abundant pollen and nectar.

[W] They need continuous bloom throughout the growing season, supported by a variety of host plants.

[W] They need a mix of types of plants, including woody, herbaceous and grassy species.

[W] They need designated nesting areas and strong habitat connectivity across the landscape.

[W] Our managed pollinators need.

[W] Speaking of the honeybees need clean water sources, especially, as I mentioned, for those managed pollinators, and they also need areas of reduced pesticide exposure.

[W] Together, these elements create the foundation for healthy, resilient pollinator populations.

[W] By incorporating these habitat features into agricultural landscapes, producers can experience a wide range of benefits.

[W] These include strengthening strengthened environmental stewardship, increased on site biodiversity, improved pollinator health, enhanced natural pest management services, increased pollination services and in turn, greater production and yield, improved soil health and improved water quality.

[W] I'll spend time reviewing many of these benefits in more detail and share research that supports these outcomes.

[W] Before actually, before we dive into that, though, it's important to recognize that every producer may have a different reason for installing and maintaining pollinator habitat.

[W] And that's a good thing.

[W] For some, the priority may be increased production.

[W] For others, it might be soil health, water quality, or long term sustainability.

[W] The key is identifying what matters most to your operation and optimizing these benefits.

[W] Whatever your reason, they're all valid, and pollinator habitat can be tailored to meet your specific goals.

[W] So now we'll take a look at the research that tells us about the effects of pollinator habitat on landscapes.

[W] When we examine how to achieve the greatest increase in pollinator abundance, study shows that the greatest increase occurs when just 3 to 5% of the farm's area is converted to uncropped habitat.

[W] Even relatively small additions can lead to meaningful results.

[W] In fact, farms that incorporate habitat can support approximately twice the invertebrate biomass per unit area compared to farms without designated habitat.

[W] Research also provides insight into how habitats should be arranged.

[W] Smaller.

[W] Multiple smaller habitat fragments often support more species than the same total area consolidated in just a few large blocks.

[W] Importantly for pollinators, subdivided habitat appears appears to increase population of beneficial.

[W] I'm sorry.

[W] Importantly to producers.

[W] Subdivided habitat appears to increase population of beneficial insects, particularly for parasitoids, while not increasing the herbivorous pests.

[W] When planning habitat placement.

[W] Scattering these areas across the landscape can improve geographic coverage.

[W] Increase diversity between the plots.

[W] If larger habitat areas are necessary, they should be positioned close enough together to reduce predation risk.

[W] As insects disperse from one area to another.

[W] Overall, thoughtful habitat design, even at relatively small scales, can significantly enhance ecological benefits on working lands.

[W] One effective way to increase floral resources within your agricultural system, while also creating a smaller habitat.

[W] Fragments, as we discussed, is through the use of flower strips.

[W] I'll go into more detail about flower strips later in the presentation.

[W] For now, we'll take a closer look at the data and the benefits they provide, particularly particularly particularly in relation to pest control.

[W] Research shows that flower strips have significant impacts on beneficial insect populations.

[W] In one study, the implementation of flower strips increased abundance and species richness of certain flies by 127% and lacewings by 48% as a result, pest aphid populations in adjacent potato fields were reduced by 75%.

[W] Another study found that flower strips increased.

[W] Increased natural enemy presence in nearby fields by 16%.

[W] In addition to strengthening biological pest control, these plantings also significantly improved pollination services.

[W] It's important to note, however, that pollination benefits declined as distance from from the flower strips increased.

[W] In other words, the closer to the habitat that the habitat is to the crop, the greater the pollination impact.

[W] The research also showed that perennial flower strips with higher plant diversity provided the strongest pollination benefits, highlighting the value of long term well-designed habitat plantings.

[W] Let's briefly look at the effects of hedgerows, another valuable habitat practice that I'll discuss more with more detail.

[W] Research shows that hedgerows support greater abundances of natural enemies compared to unmanaged or weedy field edges.

[W] These benefits extend beyond hedgerow itself and increase natural enemy populations have been documented up to 200m into adjacent crop fields.

[W] As with flower strips, however, these services declined as the distance from the planting increases.

[W] So reinforcing the importance of strategic placement within the agricultural landscape.

[W] When habitat enhancement is combined with integrated pest management or IPM, the results can be substantial.

[W] Substantial research shows that IPM programs, particularly those that support wild pollinator conservation, can reduce insecticide applications by up to 95% while maintaining or even improving crop yields.

[W] I'll explore what makes an effective IPM plan later, but for now, it's important to emphasize that diversification through both through habitat installation and IPM practices can create powerful outcomes for farms and on site biodiversity.

[W] By integrating habitat and IPM, producers can achieve enhanced natural enemy populations, reduce herbivore or pest abundances, and reduce crop damage through a combination of bottom up and top down ecological effects.

[W] Together, these strategies support a more resilient, productive and biologically balanced agricultural system.

[W] Now let's talk about production.

[W] Research shows that even in crops that are that are not pollinator dependent, the presence of pollinators can meaningfully increase yields.

[W] For example, in soybeans, yields increased by more than 6% in the presence of wild pollinators and by as much as 18% when APIs mellifera.

[W] The European honeybee, was present.

[W] Other studies have reported soybean yields increases up to 18% as well.

[W] In cotton, yields increased by approximately 15%, and canola increases range from 12.3 to 15.8%.

[W] It's important to emphasize that these crops do not require insect mediated pollination to produce a harvest.

[W] These yields.

[W] These yield gains reflect the added value pollinators can provide by enhancing pollination efficiency, demonstrating that even in crops not reliant on insects, pollinators can still contribute measurable production benefits.

[W] Another crop that is not pollinator dependent but has been central to much of my career is wine grapes like soybeans and cotton wine grapes do not require insect pollination to produce fruit.

[W] However, more recent research has identified other ways that pollinators can positively influence production.

[W] Grape flowers are covered by a protective protective cap called calyptra, which encloses the flower's reproductive structure.

[W] Until bloom, study have shown that honeybees will actively remove the cap while foraging.

[W] In doing so, several benefits have been observed, including increased pollen release, reduced risk of detritus infection, and decreased decreased incidence of shot or under underdeveloped small berries.

[W] In addition, research has been found that the presence of bee pollen and fermentation tanks actually enhances the fermentation process without negatively affecting the wine quality or taste.

[W] So while wine grapes are not pollinator dependent, pollinators still may still provide valuable and sometimes unexpected production benefits.

[W] Now, let's take a look at pollinator dependent crops and almonds.

[W] Research shows that wild bee species are more commonly observed visiting flowers and orchards that have adjacent semi-natural habitat or vegetation strips, and these systems wild bee species richness and flower visitation frequency, not honeybee visitation, were directly associated with increased fruit set.

[W] Additionally, fruit set increased as a as the percentage of surrounding natural habitat increased.

[W] This highlights the important role that diverse nearby habitat plays in supporting wild pollinators and strengthening production outcomes in almonds.

[W] Let's turn to blueberries as another example.

[W] Pollinator dependent crop research shows that when full pollination is achieved through a combination of managed bees or honey bees and increased wild bee presence, economic returns can be substantial.

[W] And in some cases, revenue can be documented to increase by $15,000 to $18,000 per hectare, or approximately 6000 to $7250 per acre.

[W] So why does this happen?

[W] Blueberries rely heavily on insect pollination to achieve optimal fruit set, berry size and uniform ripening, while managed honeybees provide important pollination services, while wild bees, including native solitary bees and bumblebees, often forage more efficiently on blueberry flowers.

[W] The unique behavior, called buzz pollination can improve pollen transfer, increase fertilization rates when habitat management practices increase, while bee abundance and diversity in near fields, growers often see higher fruit set, larger berry size, improved uniformity earlier, and more synchronized ripening and greater overall marketability.

[W] Marketable yields by supporting pollinator populations through habitat installation, producers can enhance the effectiveness of pollination and significantly increase both yield and revenue potential.

[W] Let's take a look at apples as another clear example of the value of insect mediated pollination in Apple's insect pollination directly influences both fruit quality and fruit quantity.

[W] When flowers received adequate pollination or adequate pollen, the results are noticeable.

[W] Noticeable in the orchard.

[W] Research.

[W] Research shows that insect mediated pollination leads to larger fruit sizes, more uniform.

[W] Symmetrical fruit shape.

[W] More consistent fruit set across the tree and greater number of fruits per tree.

[W] When pollination is incomplete, fruit may be misshapen, smaller, smaller or more likely to drop prematurely.

[W] Strawberries provide one of the clearest examples of how pollinators influence not just yield, but market value.

[W] Research has been shown that insect pollination can increase the average commercial value, marketable stock of marketable strawberries by as much as 92%.

[W] Strawberry fruit develops from multiple individual ovules on a flower surface, and each fertilized ovule contributes to the berries growth and shape.

[W] When pollination is incomplete, berries can become misshapen, uneven, small or lighter, reducing their marketability.

[W] With adequate insect pollination, growers can see larger berries, more uniform shape, greater firmness and higher proportion of marketable fruit.

[W] Strawberries highlight an important point pollination affects more than just total yield.

[W] It plays a major role in fruit quality, grading and overall economic value, making pollinator habitat a meaningful investment in the farm.

[W] Productivity and profitability.

[W] All right.

[W] Let's shift gears for a moment and move beyond production.

[W] In many conversations I have with producers, an important the impact of pollinator habitat on soil health often becomes the main focus and for good reason.

[W] Increased plant diversity on a farm doesn't just benefit pollinators above the ground, it transform what's happening below the ground as well.

[W] A greater diversity of plant species supports a wider range of soil microbes and improves nutrient cycling within the soil profile.

[W] As microbial diversity increases, so does the overall soil function, leading to improved soil fertility, better nutrient availability, and stronger long term soil resilience.

[W] In other words, diversifying vegetarian vegetation through pollinator habitat can be a powerful tool for building healthier and more productive soils.

[W] Habitat provides another important soil benefit, and that soil stabilization, particularly along riparian corridors.

[W] When native vegetation is established along waterways, root systems anchor soil in place.

[W] This reduces erosion, minimizes sediment runoff, and protects stream bank stream banks from degradation.

[W] Case studies case studies have also shown that this type of bank stabilization also improves soil retention on site, but also enhances downstream water quality, reduce sediment and nutrient runoff, lead to clearer water, healthier aquatic systems, and stronger macroinvertebrates invertebrate communities, which are key indicators of stream health.

[W] And when we talk about habitat and soil health, one of the strongest examples comes from the Prairie Strip research in Iowa.

[W] By integrating prairie strips into corn and soybean systems, researchers documented some remarkable outcomes, including a reduction in water runoff, reduction in soil loss, reduction in phosphorus runoff, large reduction in nitrate and nitrogen runoff, and all while recording no reduction in per acre corn and soybean yields.

[W] So there was also no increase in wheat abundance, and there was a reduction in emissions of heat trapping gases, particularly nitrous oxide.

[W] These are substantial environmental gains achieved without sacrificing productivity.

[W] And beyond soil and water benefits, later strips incorporate diverse flowering species directly into row crop systems, providing meaningful support for pollinator health and landscapes that are otherwise limited in floral resources.

[W] So if all this information we've covered so far feels like a lot, because it is, the research is clear pollinator habitat can influence production, pest management, soil health, water quality and even greenhouse gas emissions.

[W] So that brings us to the next question.

[W] What do we do with all this information?

[W] How do we translate these documented benefits into practical, on the ground decisions that can make that make sense for your specific operation?

[W] And with this in mind, Pollinator Partnership has developed a program specifically designed to help farmers, ranchers, and producers integrate pollinator habitat into working agricultural, agricultural landscapes.

[W] And that's bee friendly farming.

[W] Bee friendly farming is built on three core pillars sustainability, transparency and science.

[W] The program works directly with growers to develop practical, realistic solutions for incorporating pollinator habitat into their operations.

[W] It emphasizes transparency and its goals, standards and verification processes, ensuring producers clearly understand program expectations and outcomes.

[W] Most importantly, be friendly.

[W] Farming is grounded in science based standards.

[W] The program is designed to support both environmental stewardship and economic viability.

[W] Embedding pollinator conservation into agricultural systems in a way that strengthens long term sustainability.

[W] As a result, bee friendly farming has built a growing community of more than 800 producers across 25 US states and four Canadian provinces, all committed to integrating pollinator habitat into working lands.

[W] Together, these producers steward more than 365,000 acres of farmland, including over 156,000 acres of dedicated to pollinator habitat.

[W] And what does this look like on the ground?

[W] So what are these 800 producers actually doing on their farms to support pollinators?

[W] Let's explore that by walking through the bee friendly farming criteria.

[W] As we do, I'd like to note that many of the photos you'll see were submitted by friendly farmers themselves, showcasing real world examples of their operations.

[W] First, producers need to offer forage, providing good nutrition for bees on at least 3% of crop land.

[W] This forage can be temporary, including cover crops.

[W] In many cases, producers have large areas that have larger areas that might not be suitable for production, say it's rocky ground field margins, odd corners, low yield zones.

[W] While these areas might not be ideal for crops, they can be excellent opportunities for pollinator habitat establishments in these locations.

[W] Practices such as conservation cover annual annuals annually seeded set aside areas or preservation of natural habitat can be implemented and maintained.

[W] Conservation cover and annual set aside seedlings or plantings, which focus on establishing and maintaining vegetative cover, can reduce sheet, rill and wind erosion along with sediment, along with sedimentation, it can improve ground and surface water quality.

[W] It can reduce the emissions of particulate matter and greenhouse gases.

[W] It can also improve overall health and much, much more natural habitat or upland wildlife.

[W] Habitat management can also increase beta diversity across the landscape and can reduce erosion and soil loss.

[W] Together, these approaches allow producers to strategically use underperformed and marginal areas to generate meaningful ecological and operational benefits.

[W] Flower strips can be incorporated directly into row crop systems.

[W] They are particularly effective at enhancing pest control services in adjacent fields.

[W] As we discuss, and research shows that pollination benefits decrease with the distance from the planting, meaning placement matters.

[W] Now let's look at hedgerows.

[W] Hedgerows involved establishing dense linear vegetation often dominate plantings to achieve natural natural resource conservation goals, hedgerows can provide food cover and movement corridors for wildlife.

[W] They intercept airborne particulate matter, they reduce chemical drift and odor movement.

[W] They serve as barriers to noise and dust.

[W] They increase carbon storage in biomass and soils.

[W] They also increase overall community richness and much, much more.

[W] Hedgerows are a powerful way to provide both nesting and forage resources for pollinators.

[W] While taking little to no land out of production, they can be adapted and adapted into most crop types and farm layouts.

[W] And then finally, on this slide, we have field borders.

[W] Another flexible habitat option across a wide range of cropping systems.

[W] So field borders can help with your erosion control, improve water quality and increase plant and insect diversity.

[W] They can also be intentionally designed to increase beetle banks, plantings that support predatory beetles that help control pest populations together.

[W] Flower strips, hedgerows and field borders provide scalable, adaptable tools for integrating pollinator habitat into working lands.

[W] Now let's talk about cover crops.

[W] One of the most practical and widely used ways to reach that minimum 3% goal of forage.

[W] So cover cropping involves planting grasses and especially for pollinators, broadleaf or herbaceous species to provide provide seasonal cover and conservation benefits in orchards and vineyards.

[W] Cover crops are typically planted between rows, with proper mowing management, bloom time can be extended to maximize floral availability for pollinators.

[W] An annual annual row, crop crops and other systems cover crops are commonly integrated through crop rotation or terminate or terminated or crimped ahead of planting to avoid interference with production.

[W] When the right seed mix is selected to match your operations goals, cover crops can deliver substantial on farm benefits, including reduced erosion from wind and water, increased soil organic matter and improved soil health, reduce water quality degradation, improved nutrient capture and redistribution into soil profile.

[W] Nitrogen or nitrogen fixation.

[W] When legumes are included, suppressed suppression of weeds and disruption of pest cycles, improved soil moisture management through reduced evaporation and reduced soil compaction.

[W] Cover crops are highly adaptable and can be tailored to support pollinators while simultaneously simultaneously strengthened.

[W] Strengthening soil function and overall farm's resilience.

[W] And another often overlooked consideration is field access.

[W] Time is money, and in agriculture, that's especially true the less your operation is hindered from accessing fields with machinery and equipment, the more efficiently you can manage your crop.

[W] Maintaining clear, well-planned access routes supplemented with cover crops to reduce surface water holdings.

[W] As a as aided with plant root soil penetration allows you to apply treatments when timing is critical.

[W] Manage pests effectively, prune, harvest and perform routine maintenance, and respond quickly to weather and crop needs.

[W] When designing pollinator habitat, it's important to balance both the ecological benefits with operational efficiency through thoughtful placement ensures that the habitat enhancements support your farm.

[W] The second requirement for bee friendly farming is to provide forage from spring through fall.

[W] We strongly recommend planting at least three species per season whenever possible to provide consistent, diverse nutrition for pollinators.

[W] For example, in the Western states, native species such as the western blue flax, western yarrow, western goldenrod can be incorporated into seed mixes and often available by many seed vendors as well.

[W] While native species are preferred, they're not required for bee friendly farming standards.

[W] When developing habitat plans, I typically begin with native species and then incorporate non native non invasive species if needed, particularly when cost is a concern as native species can sometimes be a little bit more expensive.

[W] Although native plants can be included in cover crop mixes, this is much less common in practice.

[W] As a result, many producers rely on species such as brassicas, clovers and mustards to provide adequate spring bloom.

[W] The goal is continuous bloom flowering bloom throughout the growing season, whether through native plantings, cover crops or a combination of both to ensure pollinators have reliable forage from early spring through fall.

[W] The third bee friendly farming requirement is to incorporate permanent pollinator habitat containing pollinator forage features equivalent to at least 0.5% of total crop.

[W] Your total crop area.

[W] There's many ways to achieve this, but one of the most important principles is to start with what you have on site and then build from there.

[W] Depending on your region, your farm may already include wooded features like shown in the example.

[W] In the first photo.

[W] Wooded areas provide a variety of nesting opportunities.

[W] for ground for ground nesting bees, snags and dead wood for wood burning bees and pithy plant stems for cavity nesting bees, in many cases, these natural areas already support a diversity of pollinator species.

[W] For farms with more open landscapes or natural field edges, maintaining areas with buffer strips and field borders can help protect and support existing habitat.

[W] And then and when these types of natural features are limited, one of the best ways to incorporate habitat on farm is through the flowering hedgerows.

[W] As we previously discussed.

[W] The fourth requirement is to provide clean drinking water for pollinators on site when managed honeybees are present.

[W] Native pollinators are often able to utilize a variety of natural water sources.

[W] For example, many lepidopterans exhibit a behavior known as puddling, where they gather around mud puddles or moist soil to obtain the essential nutrients like sodium and amino acids, nutrients that aren't readily available in nectar.

[W] Managed honeybees, however, often benefit from additional support.

[W] They require reliable water sources not only for hydration but for high thermoregulation and humidity control, helping to maintain proper temperatures and humidity inside the colony needed for survival.

[W] Water can be provided through natural features already present on farms such as reservoirs, ponds, lakes, creeks or irrigation canals.

[W] When natural resources are not present and are limited, supplemental water can be offered using simple setups like water buckets fitted with burlap or similar materials that act as safe landing pad for the bees.

[W] And lastly, the final bee friendly farming requirement is to incorporate integrated pest management, or IPM, into your operations pest management strategy.

[W] This is accomplished by implementing seven key elements.

[W] First, is pest identification.

[W] Correctly identify the arthropod species present on the farm.

[W] This helps prevent the unintended reduction of beneficial insects, including pollinators and natural enemies that may already be helping control pest populations.

[W] Second is monitoring regularly monitor pest populations and crop damage to determine when thresholds are being approached, rather than relying solely on prophylactic pesticide applications.

[W] Third is risk risk assessment.

[W] Evaluate when management actions is truly necessary based on economic thresholds and potential impact.

[W] Then is your preventative techniques.

[W] Incorporate management strategies to reduce pest to reduce pest pressure, such as improving airflow through pruning and spacing.

[W] Eliminating eliminating alternate host plants, mating disruption, mechanical pest removal, selecting resistant crop varieties, as well as many, many more options that are out there.

[W] Next is a combination of management approaches.

[W] Use multiple complementary strategies such as mowing, prescribed burning, physical removal of disease material before pesticide application when necessary, all to create a diversified management system.

[W] Next is annually evaluate and adapt.

[W] Review your IPM program each year.

[W] Assess what worked, what didn't and where improvements can be made.

[W] Adjust strategies based on the changing conditions, including climate factors to improve long term efficiency.

[W] And lastly, you want to rotate your pesticide products and practices to prevent pest resistance and preserve the effectiveness of available chemistries.

[W] Together, these seven elements can create a thoughtful, science based approach to pest management one that protects pollinators, supports beneficial insects, and maintains effective crop protection over time.

[W] And that's it.

[W] That's what it takes to become a bee friendly farmer.

[W] With this, we verified these pollinator habitat components through straightforward review review process.

[W] That includes a series of questions and photo documentation.

[W] Once the review is complete, producers receive a report that helps them evaluate pollinator habitat efforts and benchmark their achievements.

[W] These scores can be used to guide incremental improvements on to habitat on their farm.

[W] In addition to the report, producers gain access to exclusive educational opportunities and additional program benefits.

[W] If you'd like to learn more about bee friendly farming, please scan the QR code on the screen.

[W] It'll take you directly to our website, where you can create a friendly farming account, which is free through our online portal, either to begin an application or to explore the program in more detail.

[W] In addition to the bee friendly farming membership program, Bee Friendly Farming also offers third party verification, verified certification.

[W] Currently, Bee Friendly Farming has 30 certified products on the market.

[W] These products represent farms and companies that have actively that are actively working to support pollinators through responsible land management and habitat practices.

[W] Across the program, we now have almost 1900 acres of dedicated pollinator habitat established on participating farms.

[W] When you look at the full footprint of the farms that are involved in bee friendly farming certified, that represents more than 7300 acres of agricultural land that are being managed with pollinators in mind.

[W] And we're continuing to grow.

[W] In the near future, we'll be certifying an additional 316 farms, bringing the program total to about 328 bee friendly farming certified farms.

[W] Finally, we're excited to share.

[W] We'll be launching a brand new bee friendly farming website.

[W] The site will be making it easier for farmers, partners and consumers to access resources, learn about the certification program, and connect with the work being done to support pollinators and agriculture.

[W] Overall, these milestones reflect the growing momentum behind pollinator friendly agriculture and the increase in interest from producers who want to be a part of the solution.

[W] If you're interested in becoming a bee friendly farming certified grower, or if you're simply like to learn more about the program, what the participation involves, please scan the QR code on the screen.

[W] Now.

[W] This will take you directly to additional information about the program, including certification requirements.

[W] Resources for program details, and ways to get in touch with our team.

[W] We're always happy to connect with producers and partners who are interested in supporting pollinators, as well as strengthening agricultural systems.

[W] Before I conclude, I'd like to leave you with information on a current pollinator partnership, funding opportunity and a number of helpful resources.

[W] These programs and tools can help you in planning, implementing and maintaining pollinator habitat in your operations.

[W] First, I'd like to highlight our NRC's Resource Conservation Partnership program opportunity.

[W] This program is designed to increase the capacity of California agricultural lands to provide habitat, forage, and other support for both wild and managed pollinators.

[W] A key focus of this effort is to create is the creation of pollinator quarters through collaboration with neighboring farms and ranches, strengthening habitat connectivity across working landscapes.

[W] Through this program, $1.2 million will go directly to farmers in the following counties Fresno, Madera, Merced.

[W] Monterey, Napa, San Luis Obispo, San Joaquin, Santa Barbara, Sonoma, and Stanislaus.

[W] We encourage all eligible producers to apply with the goal of planting habitat in fall 2026, and funds are available through 2027 for later projects.

[W] And finally, I'd like to leave you with a few additional resources.

[W] These tools and materials are available to help guide your pollinator habitat efforts and support implementation on your farm.

[W] First, we have the Bee Friendly Farming Handbook.

[W] This free guide outlines what it takes to become bee friendly farming member.

[W] While I've covered the main components in today's presentation, the handbook serves as a helpful reference, reinforcing that habitat features and the management practices pollinators need on agricultural lands.

[W] Also shown on the screen is the bee friendly Farming third Party certification manual.

[W] This manual follows the same foundation foundational principles, but is designed specifically for operations seeking third party certification with third party certification, producers and processors are eligible to the bee friendly farming logo on product packaging, allowing it to be proudly displayed on store shelves.

[W] Bee Friendly farming certification recognizes farms and brands committed to sustainable pollinator protection.

[W] Next, we offer two concise trifold guides one for for watermelon producers and one for potato producers.

[W] These guides are jam packed with commodity specific information and provide practical recommendations for implementing pollinator habitat into those particular cropping systems.

[W] They're designed to help Watermelon and potato growers efficiently plan and implement habitat practices that align with their production goals.

[W] Next, we have our technical guides for Farmers and Ranchers series.

[W] These guys are tailored to specific regions in the United States and cover topics such as integrated pest management, creating and maintaining pollinator habitat, enhancing existing habitat, and responsible pesticide use.

[W] While much of this information was introduced in today's webinar, these guys will provide regional specific detail and practical recommendations.

[W] Whether you're in California, Pacific Northwest, Midwest, Northeast or South, or southeast.

[W] These resources are designed to support pollinator conservation within your agricultural landscape.

[W] Additionally, if you're looking for additional regional resources, we also offer several free access guides tailored to your specific locations and needs.

[W] These include materials such as practices to reduce bee poisoning from agricultural pesticides in Canada.

[W] A technical guide for preserving and creating pollinator habitat on Ontario farms, and a guide for establishing monarch habitat on farms in Ohio.

[W] These regional specific guides provide practical, localized recommendations and are available at no cost to you.

[W] For those of you producing specialty crops, we offer the Protecting Pollinator from Pesticide series.

[W] The set of guides is tailored specifically to Apple's Highbush blueberry and squash production systems.

[W] Each guide outlines practical strategies for minimizing pesticide risk pollinators while maintaining effective crop production.

[W] These resources are designed to help specialty crop producers balance pollinator protection with the realities of pest and disease management, supporting both environmental stewardship and crop productivity.

[W] And for those of you in California, we're excited to share that.

[W] We're just about to release three new California specific pollinator guides for specialty crop production.

[W] These include best management practices for pollinators and apple wine, grape and blueberry production in California.

[W] These in-depth guides are designed to help growers establish and maintain effective pollinator habitat, while also supporting strong integrated pest management strategies.

[W] They provide practical, crop specific recommendations that help balance production needs with pollinator health, making it easier to incorporate pollinator friendly practices into day to day management.

[W] And of course, we have our Ecoregional Planting Guide series.

[W] These guides provide region specific native plant recommendations tailored to your local eco region.

[W] They're designed to help you select plants that will that are well adapted to your area, and highly beneficial pollinators.

[W] And with these, we created the Find Your Roots tool.

[W] This tool brings together all the Ecoregional planting guides into one convenient platform by entering your location site conditions such as sun exposure and soil moisture, and your plant planting goals.

[W] For example, perennial forbs, woody shrubs for hedgerows and even trees.

[W] The tool generates a customized list of native plants suited for your region.

[W] Another valuable tool offered by Pollinator Partnership Canada is Pollinator Enhancement Security Tool or pest.

[W] With pest, you can select your specific crop and identify pests of concern.

[W] The tool generates a list of alternate host plants associated with those pests.

[W] This information is especially useful for when designing pollinator habitat.

[W] For example, if you're concerned about pests such as the spotted wing, Drosophila or the brown marmorated stink bug tests can help you determine which plant species to include or which to avoid, which to avoid in your habitat plan.

[W] By using this tool, you can proactively design a habitat that supports pollinators while minimizing the risk of increased pest pressure in your operations.

[W] And for those highbush blueberry producers out there, I'm excited to share that we've expanded that platform into the Blueberry Pest tool.

[W] This enhanced version is designed specifically to support habitat planning around blueberry production areas.

[W] It includes detailed pest and alternate host profile cards to help you help guide plan plant selection decisions.

[W] With a database of nearly 2000 alternate host plants and a coverage of leading blueberry pests.

[W] Blueberry pest identified in the United States, this tool allows you to plan habitat with confidence.

[W] The goal is to support pollination and pollinators while avoiding the introduction of plant species that could serve as alternate hosts for pests.

[W] We'd like to invite producers and technical assistance providers to join our North American pollinator protection campaigns, Agriculture and Pollinators Task Force.

[W] This task force is focused on supporting agriculture while protecting pollinators.

[W] We work to identify gaps in resources and knowledge in hopes to ease efforts of farmers and land managers to implement pollinator friendly practices.

[W] By joining the task force, participants can help guide initiatives, share experiences from the field, and contribute to the solutions to make pollinator habitat and sustainable farming more accessible across North America.

[W] But it also is an opportunity to connect with other producers, technical experts and organizations that are actively working on strengthening the relationship between agriculture and pollinator health.

[W] Together, we can make a meaningful impact for both farms and pollinators.

[W] I'm excited to share that the opening, that the opening of the Farmer Ranch Award nomination period is right around the corner.

[W] With just about a month left, the.

[W] The award is an action item of the task force that I just mentioned, and it's.

[W] Recognizes agricultural producers in Canada, the United States and Mexico who have made significant contributions to pollinator protection and conservation.

[W] Whether you'd like to nominate yourself or recognize a producer who's doing excellent work, pollinators, I encourage you to submit a nomination form once it opens, is a great

opportunity to highlight and celebrate the important efforts happening across the working lands.

[W] Additionally, our consulting team offers pollinator habitat consulting services designed to help agriculture, agricultural operations, and other organizations successfully support pollinators.

[W] We work with farms, ranches, vineyards and orchards on habitat creation and enhancement, pollinator education, and for those looking for strengthening to strengthen their sustainability efforts, we can conduct audits of existing practices, reviewing current procedures, and helping integrate practical pollinators.

[W] Supporting approaches if you're interested in working with us, we'd be happy to connect and discuss how these services could support your goals.

[W] Pollinator partnership also works closely with USDA Natural Resource Conservation Service, or NRCs, through our Partner Biologist program.

[W] Through this program, Pollinator Partnership, partner, Pollinator Partnership biologists provide free technical assistance to farmers, ranchers, and other land managers who are interested in establishing and improving pollinator habitat on their land.

[W] Importantly, they can help help producers navigate USDA farm bill conservation programs, working directly with local NRCs offices to support applications and implementation of practices through programs such as Eqip, CSP and CRP.

[W] If you're interested in receiving technical assistance or learning how pollinator habitat can fit into your operation, we encourage you to connect with one of our regional partner biologists.

[W] And I, along with the rest of the bee friendly farming team, are here.

[W] We're here to avail and available to support your pollinator habitat or bee friendly farming related questions.

[W] We're here as pollinator specialists within the agricultural sector.

[W] Your role is to farm, produce and for those in the broader community to support those who do.

[W] Our role is to make that work easier by helping you design practical, effective habitat plans that strengthen your operation.

[W] At the same time, we work to connect communities and sustainable produce with sustainably produced crops, creating valuable creating value on both the farm and beyond.

[W] And as we wrap up, I want to sincerely thank you for your time and for the work you do every day in agriculture.

[W] Supporting pollinators isn't just about the conservation, it's about strengthening our farms, improving resilience, and investing in long term sustainability on working lands.

[W] I hope today's discussion provided practical tools, useful resources, useful research, and actionable items that you can apply to your own operation.

[W] Even small, thoughtful changes can create meaningful impacts.

[W] And for pollinators, for soil health, for water health, and for your bottom line.

[>> W] Great.

[W] Thanks, Cody.

[W] We'll now move on to Isabelle.

[>> W] Thank you guys.

[W] And thank you, Cody, for lining things up nicely for me.

[W] Let me share my screen one second.

[>> W] Let's see.

[>> W] Should be loading.

[W] How does that look?

[>> W] Looks good.

[W] Thanks, Isabelle.

[>> W] Cool.

[W] Just testing it out.

[W] All right.

[W] Hi everyone.

[W] I really appreciate you guys taking the time to tune in.

[W] And let me talk to you about rain gardens and their use on the farm.

[W] This is going to be a really short, high level presentation, mostly meant to get your gears turning about possible applications within your own projects.

[W] But as I'll mention in a moment, and as Cody mentioned recently, I work with a team of partner biologists and we are available to provide for their help and answers on this topic wherever you guys need it.

[W] So first, I'll start out with some background on myself.

[W] My name is Isabelle Nazarian.

[W] I am based in the Greater Cleveland area of Ohio, and I am the Midwestern partner biologist here at Pollinator Partnership.

[W] What that means is I provide farmers across the region with technical assistance for creating pollinator habitat on working lands and farms, and I help these farmers also get support and cost share funding through the USDA's farm Bill programs and through the Natural Resources Conservation Service.

[W] We have a handful of partner biologists across the US.

[W] As you saw in Cody's presentation.

[W] So if you're interested in getting some assistance with conservation planning assistance or you have questions about farm bill programs, make sure you reach out to me and I'll get you in touch with the right person for your region.

[W] And if you're interested in NRCs programs, that's great.

[W] Otherwise, we're still around to provide you answers to your questions and help planning any pollinator projects you might want.

[W] So what exactly is a rain garden?

[W] A rain garden is a type of green infrastructure where a shallow basin containing plants temporarily captures and processes water from impervious surfaces things like roofs, feedlots, farmlands and other high traffic areas that might be paved or heavily compacted.

[W] Rain gardens were originally designed to tackle urban stormwater issues, but they can be adapted outside of urban areas and have the same landscape benefits in farming contexts as well.

[W] Before we talk about those, let's go over what the parts of a rain garden are.

[W] So each part of a rain garden serves an essential purpose.

[W] I'm going to go through these kind of as if you were a little rain droplet, moving down through the system and entering into a rain garden.

[W] I'll also try to use the pointer here to make things a little bit easier.

[W] Or maybe I won't.

[W] So first up is the inflow.

[W] This is the entry point from where the entry point where rainwater from roofs, driveways, all of those impervious surfaces that we talked about is directed into the garden.

[W] And that's going to be kind of down by that downspout in this picture.

[W] After that, it's going to flow down into the basin or the kind of trough area that you see.

[W] This is a shallow, planted depression that temporarily holds and filters stormwater through soil, plants, and roots.

[W] It slows the water down as it moves across the landscape, and it's reincorporating it back into the ground rather than having it flow across the surface where it can pick up contaminants and cause erosion.

[W] At the edge of the rain garden is a berm.

[W] This is kind of a raised lip that goes all the way around the rain garden.

[W] It's usually made of soil, and it's usually on the downhill side of the garden, and it helps contain and slow the flow of water within the basin and keep it contained while it filters down.

[W] Lastly is the outflow.

[W] This is a planned and controlled outlet that allows excess water to safely exit the garden once it reaches capacity during a big rain event or an unexpected flooding.

[W] This helps prevent erosion and flooding.

[W] Another thing I want to mention.

[W] It's important to remember that rain gardens are not ponds.

[W] They are not meant to hold standing water for long periods of time, but rather to capture and process that water back down into the soil and into the ground.

[W] One of the biggest concerns that I hear when people bring up rain gardens is that they're going to attract mosquitoes or other pests.

[W] If they're designed correctly, they should not be holding water long enough to do that.

[W] Now let's talk about some of the specifications and what makes them work.

[W] Rain gardens are going to be most effective when you place them near an impervious surface.

[W] That's going to send water and direct water towards them.

[W] In an urban or small scale agricultural setting, a single rain garden is usually going to be about the size of a parking space, or smaller than that.

[W] To handle larger volumes of water and larger environments.

[W] A series of rain gardens can also be linked together, kind of like a chain, so you won't make necessarily one ginormous rain garden.

[W] If you're trying to capture a lot of stormwater, but rather a system that will process it over a length.

[W] The depth of your rain garden is primarily going to be determined by the slope of the ground and the soil type in the area, so steeper slopes are going to require deeper basin to effectively capture and slow that runoff that's moving across the landscape.

[W] While if you have a flatter area, you can usually get away with a shallower design, the soil's texture also plays a really big component, and that has to do with the natural drainage capacity and how quickly the water can infiltrate that soil and soak into the ground.

[W] So, for example, clay soils drain a lot more slowly.

[W] They might require a deeper basin or soil amendments, things mixed into the soil to allow enough time for that water to collect and drain without overflowing.

[W] Whereas something like sandy soils, water, you know, seeps through a sandy soil really fast.

[W] And can usually you can usually work with a smaller basin in that situation.

[W] So rain gardens serve multiple functions.

[W] First, the deep roots of native plants are increasing groundwater infiltration, and they're filtering contaminants from the water before it's released into local waterways.

[W] So it's picking stuff up as it moves across the landscape.

[W] And when it catches in this rain garden, it's moving through and getting some of that stuff filtered out rather than, you know, carrying chemicals and carrying debris straight into a stormwater drain.

[W] So this mitigates impacts of stormwater runoff, reduces erosion and water quality in general.

[W] The second main thing that we want to talk about is it the native blooming flowers that you use in this rain garden.

[W] If you're, you know, thinking about pollinators that is providing forage and habitat for pollinators and other wildlife so quickly.

[W] From a peer reviewed paper published in 2020, out of 233 monitored warm season rainfall events that they studied, nearly half of the total inflow inflow volume was detained, with 90% of all rainfall events producing no flow to the combined sewer.

[W] And for the events that did result in flow to the combined sewer, the rain garden delayed flows for an average of 5.5 hours.

[W] So this means that during most rainstorms, nine out of ten times on the sites with rain gardens that they studied, the water, the rainfall was absorbed into these gardens rather than being sent down into storm drains.

[W] And in the case where they did overflow, they were delaying that flow.

[W] So a ton of water wasn't hitting the storm drain all at once, but rather it was entering at a more at a slower pace over a longer period of time.

[W] Effective rain gardens also protect water quality on the farm.

[W] Benefit soil health by reducing erosion, increase water and nutrient infiltration, and support healthy soil microbiology.

[W] Because this practice is relatively easy to implement and tends to be smaller scale, it's often kind of considered a gateway to further conservation.

[W] So somebody might first put in a little rain garden and see how that does.

[W] And if it works out well for them, they might, you know, upgrade to adding things like riparian buffers and filter strips to their property.

[W] While most materials reference rain gardens as a residential or urban solution, usually shown in municipal areas or yards along roadsides and small towns and stuff, they also provide the same benefits on farms, but with even more relevant applications.

[W] I think they can be co-located with barns, confined feeding operations, access lanes, feeding and watering zones, basically anywhere with hard or compacted surfaces that prevent stormwater from being reabsorbed back into the ground.

[W] When designing a rain garden, it's really important to select native species that are adapted for the site.

[W] Conditions present in a rain garden.

[W] We know that native plants provide habitat for pollinators, so it's an important.

[W] It's important to plant a diverse mix of native plants.

[W] You want to include plants with different, you know, bloom shapes, sizes and colors, plant types and bloom periods.

[W] All of the things that you've learned so far in this course about what makes good pollinator habitat.

[W] That same information is going to apply in this case.

[W] You know, the only thing that's different is that it's important to select wetland obligate plants that can not only tolerate, but thrive in conditions present in a rain garden basin.

[W] So that's when you're planting in the deep part or the basin of the rain garden.

[W] You're going to want to look at things that are grown in and around wetlands, riparian areas and wet meadows.

[W] Whereas the plants that you're putting up on that berm or that raised lip, those are things that you can usually go for, stuff that tolerates more like medium or mesic soils.

[W] Luckily, there are several tools available to help you design and install your rain garden.

[W] A the first one is to find your roots tool.

[W] I'll kind of leave it at that because Cody went over that.

[W] The second and third thing that I mentioned are some references or yeah, some resources I just put together with other people on our team and have just been published.

[W] So we'll share the links to those.

[W] But I put together a quick reference guide that gives some more high level information on rain gardens, terminology, overview of practices, and then to go along with that, we put together a much more in-depth supplement.

[W] It includes the equations that you need to kind of figure out the size and depth of your rain garden, how to assess your soil and figure out what the infiltration rates and stuff like that are.

[W] And a lot more.

[W] So the goal with that is still, you know, for you guys to reach out to us if you have any questions or need to know, need help, you know, figuring out the details of your project.

[W] But I just want these kinds of resources to be available so that you guys can take a look and get a better understanding whether a practice like this might be a good fit for you.

[W] And that's it.

[W] So thank you guys.

[>> W] Great.

[W] Thanks, Isabel.

[W] And now we'll go to Christine.

[>> W] Okay.

[>> W] Sharing entire screen.

[W] Okay.

[W] Sure.

[>> W] Oh, here we.

[W] Go.

[>> W] All right.

[W] Is it up?

[>> W] It just needs to go into presenter view.

[>> W] I just yeah, I just hit that.

[>> W] Oh, there we go.

[W] Looks good.

[>> W] Great.

[W] Okay.

[>> W] My name is Christine Jim Firby, and my brother and I are almond farmers in California in the Central Valley.

[W] And I'm here today to tell you about our journey with habitat, where we started, where we've been, and where we're going to.

[W] So first of all, we've been integrating habitat into our landscape since 2015.

[W] We've done it inside the orchard and we've done it outside the orchard, inside the orchard, we're using multi-species cover crops and outside the orchard, we've done designated pollinator habitat.

[W] We put in wildflower perimeters, rows.

[W] We've actually three years ago done, we put in hedgerows and we just planted another 300ft of hedgerows this year.

[W] And then we've done some species specific habitat like milkweed for monarchs.

[W] And I'm going to go into detail about all of that.

[W] So where we started in 2014, I got a grant from Project Epsom to get free seed to put in or around my orchard.

[W] At the time, almond farmers didn't think we should have it in the orchard.

[W] We thought it would compete with the almond bloom for pollination for the bees.

[W] So I put it on the canal bank that ran right through the middle of my two orchard blocks.

[W] But that was a bit of a pain because I had to spread it and then rake it in.

[W] I was like, gosh, if I'm going to do this much area, I'd much rather use equipment than my back.

[W] So the following year I got seed once again and I decided I'm going to put it in the orchard.

[W] The orchard used to look like this.

[W] It was just native vegetation, which was a lot of grasses and some broadleaf weeds as well.

[W] I mean, still, it was great having vegetation in the ground, but it wasn't vegetation with a purpose.

[W] And the purpose for me was to actually provide forage for the bees that came on my property.

[W] Every bloom, if they could get pollen and forage before the almond bloom, it really got the hives going.

[W] So I have more active colonies during the almond bloom in February.

[W] So that was the goal.

[W] So it ended up looking like this.

[W] So I first started with planting mustard in the rows, and I was able to broadcast it until it do a light till into the soil.

[W] And I love the way it looked.

[W] And I had some of my best crops ever.

[W] It did not compete.

[W] There was also a research done by Neil Williams at UC Davis that had determined that it did not conflict with our pollination goals in the orchard.

[W] So I was game.

[W] But then I decided that I wanted to get more from my cover crop because I knew there were legume mixes out there, Clover mixes that could do nitrogen fixing and provide some plant nutrition.

[W] But I also didn't want to get lose that early bloom from the mustard.

[W] So I decided to start alternating clover and mustard.

[W] Rose rows so that I would find some sort of balance in my orchard.

[W] And every couple of years I would switch them.

[W] So.

[W] over time, I ended up with both clover and mustard in my rows, and over time, because I allowed my cover crop to go to seed, I have built my seed bank, so now I do do some overseeding.

[W] But the truth is, if I say I was not able to get seed, I would still have a very rich and diverse cover crop with mustards, clovers and other legumes.

[W] Grasses like triticale, some resident vegetation that was there beforehand, and native wildflowers that have made their way in from the edges.

[W] And what I've discovered over the years is that as the species diversity grows, there's not one particular plant that takes over.

[W] Like when I had just mustard, that mustard would get taller than me.

[W] And believe me, knocking down a cover crop that's six feet tall is a big job.

[W] But when you have a bigger diversity in your orchard, it actually acts to moderate growth of each of the species.

[W] And so you get a more controlled and manageable growth.

[W] So over the years, we, you know, of course, we always wanted the cover crop there for pollinators, bees and native pollinators.

[W] But we found so many other benefits from them.

[W] So the health of the soil increased so much.

[W] I mean, you're adding more organic matter to the soil, the water infiltration increased.

[W] I could go into my orchard after heavy rains with tractor and a tractor, and not worried about sinking into the soil.

[W] It increased my water holding capacity, and I have found that my water consumption has actually dropped over the years because not only is it covering that soil and protecting it from the sun and high temperatures, it's keeping, it's really preventing some of the evaporation that we actually will see during the summer months.

[W] And then in the case of the legumes, it's fixing nitrogen.

[W] As far as the other problematic weeds, like I said, the diversity actually helps outcompete weeds that were problematic in the orchard that were actually very hard to kill with herbicide.

[W] Now, those populations are remarkably lower, and I don't really have a problem with too many of them or them getting very big.

[W] And it also provides a lot of habitat for beneficial insects, birds, and of course, a greater diversity of the soil microbial community, which helps with nutrient cycling.

[W] And here you can see it's a young orchard.

[W] It's just been planted.

[W] And I have cover crop growing in between, which actually was great because it it prevented a lot of when you disturb soils as much as we do when we're developing a new

orchard, the species that like to come back first and the strongest are usually your most hardy weeds.

[W] But instead of that, we've planted the cover crop to outcompete them.

[W] So a few lessons that I've learned in terminating cover crop.

[W] Originally I was mowing, trying to mow a very dense cover crop in April when it was thick and still very lush.

[W] It was very slow work going through the orchard with our, you know, most powerful tractor using, you know, at real high RPMs, using a lot of diesel and sometimes accidentally burning the belts on those mowers if I wasn't careful.

[W] And those belts are expensive.

[W] And I thought, there's got to be another way.

[W] And so I started looking into crimping, as has been done in a lot of places and crops in the Midwest to terminate.

[W] And so what we did is we took an old roller, we welded angle iron onto it and started pulling that over the cover crop in the orchard.

[W] And the truth is, it worked beautifully.

[W] I'm able to move through the orchard very quickly.

[W] Don't use hardly any diesel.

[W] So I'm saving diesel.

[W] I'm saving saving time.

[W] And then this crimped cover crop that I'm now laying flat on the orchard floor dries over the next month.

[W] And then when I go in to finally mow it and chop it up as I prepare for harvest, it's very brittle.

[W] And so it breaks up very easily and is not as hard on the equipment.

[W] And that crimped vegetation in the spring actually acts like a fantastic mulch, as it protects the surface of the soil from the sun.

[>> W] But what it's also doing is sort of creating a mat that really suppresses the, what I call the summer weeds, the tough summer weeds that are hard to kill.

[W] And it.

[>> W] it just keeps them from coming up, growing very densely.

[W] And they, they end up being very easy to manage with the mower.

[W] Something you need to know though, with every great regenerative practice there can be trade offs.

[W] There is no perfect practice.

[W] So one of the things about cover crops is that gophers love cover crops because you're providing habitat.

[W] They also love hedgerows as much as you know, as much as the pollinators do.

[W] And they can make a mess of the orchard floor.

[W] We found some more natural solutions, as you can see there in the picture, we do groundwater recharge in the fall, in the winter, and at that time we worked the fields with the dogs to do a little a a little hunting.

[W] So, and like I said before, mowing the dense cover crops is slow work.

[W] But we've seen we have remedied that with the crimper in the past, harvesting off a cover crop orchard was seen as a barrier, but I have come up with a methodology with the way I plan my mowing and how I eventually mow down to the point where I am just burning it to the ground right in front of the shaker as we start harvest.

[W] And that allows us to still sweep our nuts into tidy rows.

[W] Yes, there is a lot of ground up organic matter in there from the cover crop, but we are able to blow that out by just slowing down our harvester.

[W] So it does require careful management of pesticides.

[W] So I have to be very wary of when I turn my sprayers on and off.

[W] But the truth is I am spraying only.

[W] I've reduced my insecticide sprays to one insecticide spray a year, about a month before harvest, as the nuts are drying and at their most vulnerable.

[W] Because now I have all these and it's a very targeted pesticide.

[W] I have all these beneficial insects in the orchard, and they've allowed me to stop spraying miticides.

[W] And I mean, they've brought in birds that are taking care of some of the pests.

[W] So I'm not about to start putting on a bunch of pesticides and wreck the balance that I've created.

[W] And sometimes you have to sacrifice a little bit of crop to protect your pollinators and your beneficial insects and, and sometimes vice versa.

[W] You know, you can have accidental take.

[W] Now we're going to talk about the designated pollinator habitat we put in.

[W] So when we redeveloped our orchard, there was like this little, I don't know, two thirds of an acre block that really was just a pain in the butt.

[W] It was so small.

[W] It was a pain in the butt to get our equipment around.

[W] And, you know, two thirds of an acre was not going to of almonds was not going to make a difference financially in our lives.

[W] So I was like, you know what?

[W] Let's just put it aside as pollinator habitat and we'll develop.

[W] Initially, I put wildflower seeds on all of it, but because the ground had been disturbed, there was a lot of competition from the bad weeds in there as well.

[W] So over time, that changed.

[W] And what I realized is the less you disturb the ground, the change becomes very interesting.

[W] As you see over time that you're not getting those real weedy species.

[W] And so now it looks like this.

[W] Actually, no, I take that back.

[W] This is what it looked like about three years ago.

[W] So I found more of a balance when I stopped actually tilling the ground.

[W] But then we took it to the next level and we have added hedgerows, which you can see around the edges on.

[W] I guess that would be the right.

[W] And then I have two rows designated for milkweed for monarchs.

[W] And then oddly, a row of bananas.

[W] And that's actually just a cultural thing we're doing because my sister in law is Hawaiian.

[W] And I'll go into a little more detail about our monarch butterfly habitat.

[W] We use a narrow leaved milkweed in the Central Valley.

[W] It seems to have the best survival rates, but getting milkweed established can be a little tough because initially it's not the greatest competitor, especially if you have a lot of grasses.

[W] And so I put up a levy, I put down weed cloth, put in irrigation, and.

[W] Planted and put the mulch on and planted the milkweed.

[W] So at least for the first two years, while the roots were and the plant was establishing, it wouldn't have too much competition.

[W] And so I did that a second time with a second row just this last year.

[W] And I tell you, if you plant it, they will come.

[W] So we have I had before I planted milkweed, I had never seen a monarch butterfly on our property.

[W] I mean, I knew they were in the Central Valley, but I had never seen one here.

[W] And so we started to see them gradually.

[W] We finally had a really, really good year.

[W] I guess.

[>> W] It was.

[>> W] Probably three years ago now where we actually had caterpillars.

[W] We saw monarchs mating.

[W] I mean, I'm not talking about thousands, but they were definitely if I was seeing them, they were definitely on the property.

[W] But it wasn't just monarchs that were coming to the habitat.

[W] I mean, we were also seeing great native species of bees like the California Longhorned bee, which are adorable.

[W] They like to cluster at night on flowers.

[W] And of course, your basic species that are great beneficial insects like ladybugs.

[W] But there's a ton of green, like all sorts of native pollinators that I don't even know the name of.

[W] Not to mention some pretty cool tarantula hawks.

[W] One year.

[W] And then we're doing wildflower orchard perimeters, and that's where I take the outer rows of the orchard, and I prepare the ground so that I can plant wildflower seed mixes, native wildflowers.

[W] And so you can see here when the a couple of different rows that we've had a couple different species mix too.

[W] You can tell by the different colors.

[W] One thing I did learn is that don't spread your seed and then kill them under.

[W] You're better off tilling the ground first if you need to sort of clean it up and loosen up the soil and not a deep till I'm talking about a really shallow till.

[W] And then you broadcast your seeds over and then you can just drag over some like old chain link fencing or anything that just sort of barely covers those seeds.

[W] Because if you think about it in the wild, nobody's going and tilling under seeds from wildflowers when they drop their seeds, they just sort of fall, right?

[W] So that was my big lesson in wildflower planting.

[W] And since then I've had great stands.

[W] I do overseed from time to time, but as I've noticed that on the side of the property with the the flower strip that has the prevailing winds, it actually blows the seed into the next row.

[W] And so those seeds have been migrating each year, one row in.

[W] And not only I think it's not just the prevailing winds, but the fact that when we harvest our nuts, the blower on the harvester faces into the orchard.

[W] So we're probably scooping up some of those seeds and then just blowing them over to the next row, which is a great way to disperse seeds, if you ask me.

[W] And finally, hedgerows.

[W] In 2023, we planted our first hedgerow through pollinator partnership.

[W] We got they got the grant through Toyota.

[W] And it's been actually a great success.

[W] We did water them, set up watering for two years.

[W] It was just drippers.

[W] They don't need much actually.

[W] They don't want much because they're native plants.

[W] They're used to California and they're used to dry conditions.

[W] We did another one planting.

[W] I think this is its third year now.

[W] And then I've just done one this last fall.

[W] So I have several different stages.

[W] And so these are what they look like at the very beginning.

[W] These two pictures here.

[W] And of course that yellow flower flower there is one of my favorite.

[W] It's Flannelbush love.

[>> W] It.

[>> W] But now one of those hedgerows, that's what it looks like.

[W] You can see on the side, where there's the bee boxes.

[W] That's a side without any hedgerow.

[W] That's what it would look like if I hadn't planted anything.

[W] And then on the other side, where the almonds also are, that whole row going down right through the middle of our property is a hedgerow, and you can't really tell how large those plants are.

[W] But within two years, all of those plants are 6 to 8ft tall.

[W] Some of them are giant.

[W] Some of them grew that, like the hooker's evening primrose, grew that tall in the first year.

[W] Again, they have had water the first two years, but now they're very well established.

[W] And I have to tell you, the hedgerow smells fantastic.

[W] A lot of sage species in there.

[W] Now I want to talk about what the hedgerow brings to my orchard.

[W] So we're going to talk about birds.

[W] I have since I put in hedgerows, I have noticed a out amazing increase in the bird population on this property.

[W] You can hear it, you can see it.

[W] I mean, there's bird poop everywhere, which I'm learning to accept and like.

[W] And that's a sign of success.

[W] But more importantly, it's what I'm seeing in the orchard that the birds bring to the orchard.

[W] So every year after we shake the trees, there's usually a few that get left in the orchard.

[W] Not a lot.

[W] We take most of them out, but what is left behind harbors a pest called navel orange worm.

[W] And it requires a lot of work during the winter, a lot of extra work in the winter to get them down and to get them destroyed.

[W] Well, what I have found over the last couple of years, as the bird population has grown, that the birds are actually taking care of a lot of those mummy nuts.

[W] So not only are they eating the nuts when they're still edible for bird off the ground and cleaning up.

[W] But sometimes, as you can see in the picture with my fingers, they actually just peck the the worm of the navel.

[W] Navel orange worm that's overwintering in the net.

[W] They just peck, peck out the worm and eat it.

[W] So they're actually these birds.

[W] I'd love to know which species they are, are, are providing a really valuable service.

[W] It's free labor.

[W] Can't complain about that.

[W] And you know, in exchange, I'm providing housing.

[W] So a few things to consider as we go forward.

[W] Habitat isn't always static.

[W] It evolves over time and certain things grow bigger than others.

[W] Certain things, plants outcompete others.

[W] And so you really have to look at it as an ecosystem that is subject to all the rules of nature.

[W] We need to rethink what we view as pests or weeds.

[W] Like sometimes what we see in our orchard, like, oh, we don't think that's supposed to be there, but maybe it's telling something about our orchard, like, oh, maybe you have that plant in your orchard because you have compacted soil.

[W] Maybe it's providing a service, breaking up compaction.

[W] So it's really about putting nature to work on your farm, just like the birds.

[W] I mean, I've also done the same thing with ants allowing ants to proliferate in the orchard at certain times of year because they also clean up old mummy nuts.

[W] Sometimes it's hard to nail down what the right practices.

[W] So when you're working on your designated pollinator habitat, like what, what is maintenance and what is disturbance like?

[W] Okay, I'm trying to plant more wildflower seeds, but I don't really want to rototill and disturb the soil because I've just created this great balance.

[W] So you kind of have to weigh those things.

[W] And the same goes for cover crop species, which is why I stopped tilling and I went to a low till seed drill.

[W] When I do decide to reseed, building and maintaining habitat takes time, labor and financial resources and all of these things.

[W] Farmers often have in short supply.

[W] So it's something to think about and why grants are so important.

[W] I will say that I think the people that are most open to putting in habitat are small family operations, and they often have the most limited resources.

[W] But the fact is, you know, they often live in the middle of their farm, in the middle of their habitat.

[W] So it has a lot of meaning to.

[>> W] Them.

[>> W] With farms, you know, one size doesn't fit all.

[W] That's why you guys have all those different guides out there.

[W] Soils, topography, water availability, all impact projects.

[W] And the last thing I'd like to say is, you know, when we do these habitat projects, we, we can't lose sight of the fact that a farmer's primary job is growing food and that these farms are working lands and that we should never lose sight of that.

[W] So in conclusion, what's next?

[W] I mean, I think I feel like I've done it all on this property, but you know what?

[W] We have another piece of property that.

[W] So I'm going to you know, I've been applying what I'm learning here to our second ranch so far there.

[W] We've done great with cover crops.

[W] The next step is, is to figure out how to put in a hedgerow without any water.

[W] So that's going to be a challenge.

[W] I'd like to actually, you know, our pollinator habitat here, we use it as a recharge basin.

[W] But I really want to promote this idea.

[W] If we get into groundwater recharge in California, because it's a great way to keep our aquifers full and clean, is to having them do double duty as pollinator habitat.

[W] It's completely possible.

[W] As far as you know, my pipe dream is to collaborate with the water authority because we have these great giant canal systems in California on federal or state land, and they're bordered on both sides by quite a bit of ground that is somewhat managed.

[W] And if we can manage it for pollinators, you're talking about a massive opportunity for a quarter for species.

[W] And finally just inspiring other people to take the same journey.

[W] And so with that, I conclude my presentation.

[>> W] Such a good presentation.

[W] Thank you Christine.

[W] You're welcome.

[W] Okay, everyone, I'm going to pull up one housekeeping slide here and we'll get to some questions.

[W] So again, the recording for tonight's session will be posted to the course info page by tomorrow.

[W] And the previous recordings are all there as well.

[W] We have a break.

[W] So the next live session will be module six on pollinator identification and monitoring.

[W] And that one will be on Tuesday, March 31st.

[W] So we have two weeks off to catch up on the recordings, digest all this information that we've provided to you, and we'll see you again at the end of March.

[W] And just a reminder that I'll be sending the step one form to you all when the session, the live sessions are complete in April.

[W] And with that, I'll pass things over to Avery to lead the Q&A session.

[>> W] Thank you so much, Anthony, and thank you to all of our wonderful presenters tonight.

[W] Cody, Isabel and Christine.

[W] So we are going to do one question per presenter.

[W] Since we're almost at the end of our time tonight.

[W] So we're going to start with Cody.

[W] We're wondering, some people in the group are wondering what some of your favorite cover crop plants are, or the best ones that you can recommend for growers?

[>> W] Great question.

[W] I think that very much depends on what your needs are on the farm.

[W] You know, each, like Christine mentioned, your legumes will be great for nitrogen fixation.

[W] If you're looking for more stabilization of your soil, those will be a little bit more on a different end of the spectrum you're looking for, like maybe a combination of oats, peas and vetch would be good for erosion control.

[W] Certain species work better in colder or warmer climates, so it depends where you're located.

[W] Typically, a lot of the ones that you'll see in practice will be your brassicas, mustard, clover, and vegetable are often implemented.

[W] So those would be the most common that I come across personally.

[W] But it very much depends on what your needs are on the farm.

[W] So there's, there's like, there's not a one cookie cutter example that works for everybody.

[>> W] Excellent.

[W] Thank you very much.

[W] Now moving on to Isabelle.

[W] Lucile is wondering how you select species for rain gardens in seasonally very dry places where native species might thrive throughout most of the year and hot conditions, dry conditions.

[W] But there are certain extreme weather events that cause flooding.

[W] How do you select plants when conditions aren't consistent?

[>> W] Yeah, of course, this kind of comes down to two things.

[W] First of all, there are plants that they might not be wetland obligate.

[W] They might not be in wetland environments that you know, all times of the year, but they still you can find plants basically that are adapted to this, these sort of like extremes.

[W] And another thing is the beauty of selecting native plants specific to your region is most of these plants have evolved alongside weather.

[W] Of course, weather events are changing, things are getting more extreme.

[W] But generally, if you are picking plants that are specific to your eco region, they're going to be able to handle a lot more of that back and forth than, you know, other things.

[W] But yeah, I would look for stuff.

[W] You can usually, if you do some research into the plants that you're picking and look for things that can tolerate dry spells and wet spells, those will probably be your best option.

[W] And of course, you can always reach out to us.

[W] We'll help you find those.

[>> W] Excellent.

[W] Thank you very much, Isabel.

[W] And now for Christine.

[W] We had a viewer curious about how you specifically made sure that native pollinators were not adversely affected when you applied insecticides to your trees.

[W] So what measures did you take to limit drift?

[>> W] Well, one of the things that I do is if I am ever applying a pesticide, I spray at nighttime so often and I do a couple of things.

[W] So the one time of year I do apply that pesticide, I make sure that I have mowed my orchard, so there's nothing attracting them to the inside of the orchard.

[W] First of all, then I actually and the trees don't have any flowers on them at that time, so I don't have to worry about them being attracted to the flowers.

[W] And then I actually do my pesticide application at night.

[W] So at least I know that a lot of pollinator species go down and nest in the ground or in cavities, so they're not out and about foraging.

[W] So I like to eliminate the crossing paths.

[W] And then if I'm close to, say, my designated pollinator habitat or a waterway or a hedgerow, I just turn my sprayers off.

[W] And that's what I talk about.

[W] When you have sacrificed some crop, I'm willing to turn them off like a couple trees in so that, you know, I create like a buffer zone.

[>> W] Awesome.

[W] And I think we're going to ask one more question for all of our presenters.

[W] And that is, how do you think that the public people on this call who may not be growers can encourage their local communities and farmers to take action for pollinators in their growing practices?

[W] And also, how can we get more conventional production shifted over towards pollinators supporting practices?

[W] It's a very broad question.

[W] So a few words from each of you would be appreciated.

[>> W] I'm just going to say my piece real quick.

[W] And I just had this conversation this morning with somebody.

[W] It's really the best way to get farmers to do it is to make them realize it benefits their operation and their yields and their production production, if it saves them money, which it does actually save you money on pesticides and, and fertilizers, that's a winner.

[>> W] Yeah.

[W] And I'll jump in on that similar note.

[>> W] I, at one.

[W] Point in my presentation, I was mentioning how no matter who you speak with, whatever commodity they're growing, whether it's blueberries, almonds, or if it's something like oats, you're going to find a different reason why someone might be interested in it, but not even recognize what that is.

[W] And it's identifying what that key aspect is.

[W] So whether it's soil health for the wine grape growers that I work with, or if it's for pollination purposes for almonds, or if we're talking about soil retention in corn and or soybeans, it's important to find what is important to that producer.

[W] And then you can talk about why.

[W] It's why pollinator habitat can help their service, what they're actually doing already.

[W] So it really just kind of honing in on what the interest is amongst farmers themselves.

[>> W] Yeah, I'll agree with what everybody else said.

[W] The other thing that I'll add is that I think one of the most beneficial things that you can do is set an example and, you know, show the producers that you are friends with or working with or neighbors of examples of these things working.

[W] I'm, you know, from the Midwest, I work in the Midwest.

[W] And some people would say we're, you know, behind on these regenerative practices compared to other regions, we have a lot more traditional agriculture.

[W] And when I talk to producers who aren't interested in implementing these practices, the number one thing I hear is just like, that's just not what we've done.

[W] And what we're doing is working for us.

[W] So just getting people comfortable with the idea of these practices, showing that they work and they do have a benefit and that it's not, you know, a massive unknown risk.

[W] It's always, you know, a little bit of a risk adapting something new.

[W] But people have done it before and it has paid off for them.

[W] I think that that brings a lot of comfort.

[>> W] Thank you all so, so much.

[W] You are all so wise and knowledgeable on this topic, and we're really lucky to have you as speakers tonight.

[W] And with that, I will pass it back to Anthony.

[>> W] Great.

[W] Thanks, Avery, and a big thank you again to our guest speakers, Christine, Isabel, Cody, amazing presentations tonight.

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

[W] I hope you had a really good week of our technical habitat sessions.

[W] And we'll see you again in a couple of weeks on Tuesday, March 31st.

[W] Thanks, everyone.

[W] Have a good rest of your night.

[>> W] Bye.