



Wild Farm Alliance

# BIODIVERSITY CONSERVATION

## An Organic Farmer's and Certifier's Guide



2nd Edition

# Acknowledgements and Background

2nd Edition

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## Empowering Farmers, Connecting Consumers, Protecting Wild Nature

Since 2000, Wild Farm Alliance has educated farmers about on-farm biodiversity conservation, assisted them with its practical implementation, and initiated policies that support farm stewardship. Our mission is to promote a healthy, viable agriculture that protects and restores wild nature. Our work is centered on engaging and empowering those involved in the food and farming movement, including everyone from farmers to consumers.



Learn more and get involved:

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## How to Use This Guide

Organic operations must follow the NOP regulations. They can use the NOP Natural Resources and Biodiversity Guidance and this WFA Guide's interpretation of it to determine which conservation activities are appropriate. Not all activities presented here are required in order to obtain or maintain certification. Part A summarizes the NOP's Guidance. Part B helps farmers and certifiers understand the Core Biodiversity Principles for agriculture. Part C outlines various activities that operators can use or adapt to local conditions to maintain and increase biodiversity in all types of operations, and separately in crops, livestock, wild harvest and handling operations. Part D, the Organic System Plan template, parallels part C. Part E provides strategies for researching regional conservation goals. Part F, for operators, addresses planning, prioritizing, creating a conservation component of the organic system plan, and the follow-up monitoring required. Part G, for certifiers, covers conducting the operation's inspection and review. Part H discusses support and incentives.

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# Introduction

Organic operations that use the USDA National Organic Program (NOP) label are obligated to conserve biodiversity and maintain or improve the natural resources, including soil, water, wetlands, woodlands, and wildlife. The NOP published the Natural Resources and Biodiversity Conservation Guidance (hereafter referred to as “NOP Guidance”)<sup>1</sup> in 2016 in order to ensure uniform compliance with these regulations that have been in place since the NOP’s inception.<sup>2</sup> While conserving natural resources and biodiversity is a foundational principle of organic agriculture, many organic operations need to diversify more in order to comply with NOP regulations, and many organic certifiers need to update their Organic System Plans and their processes used for verification. This WFA Guide has been updated to reflect the NOP Guidance and the need for consistent implementation from operation to certification.

## Goals of this Guide

The goals of this guide are twofold. The first purpose is to clarify the NOP Guidance for organic operators and certification staff. Organic operators (farmers, ranchers, wild crop harvesters, and handlers) all must be able to select, implement, record, and monitor activities that conserve biodiversity in order to remain certified. Certifiers need to observe, verify, and report on the operators’ compliance in order to pass NOP accreditation. The NOP has committed to audit certifiers to gauge their familiarity with the NOP Guidance and how it is applied.<sup>3</sup>

The second goal of the WFA Guide is to increase organic operators’ and certifiers’ understanding of the benefits provided by biodiversity conservation. Outcomes ranging from enhanced pollination and improved pest control, to cleaner water sources can help an organic operation perform optimally. Decreased dependence on outside pest and fertility inputs and beehive rentals is an additional benefit.

## What’s at Stake

An organic regenerative farming future cannot be attained without conserving biodiversity and the associated ecosystem services. This is true not only for nature itself, but also for farmers and ranchers and all of us who depend on the natural world. We are in the midst of a Sixth Mass Extinction. Not since the age of dinosaurs has the world been on the verge of losing so many species in so little time. With growing resource needs and a warming world, losses are predicted to intensify.

Biologist E. O. Wilson reminds us that, “Like it or not, we remain a biological species in a biological world” created in the Holocene epoch before environmental degradation and human-caused climate change, now having to exist in the Anthropocene with changes we brought upon the world.<sup>4</sup>

In the last 40 years, the earth has lost half of its populations of mammals, birds, reptiles, amphibians, and fish.<sup>5</sup> Populations of land animals have been reduced by 39 percent and freshwater species by 76 percent. Many of those that are left are threatened or endangered.<sup>6</sup> Since nearly 60 percent of land



*Farms can provide habitats and wildlife linkages, thereby reaping nature’s benefits, including pollination, insect pest control, carbon storage and natural erosion control.*

### **NOP Regulation—Subpart C Organic Production and Handling §205.200 General Natural Resources and Biodiversity Conservation**

Production practices implemented in accordance with this subpart must maintain or improve the natural resources of the operation, including soil and water quality.

### **NOP Regulation—Subpart A Definition §205.2 Natural Resources of the Operation**

The physical, hydrological, and biological features of a production operation, including soil, water, wetlands, woodlands, and wildlife.

### **NOP Regulation—Subpart A Definition §205.2 Organic Production**

A production system that is managed in accordance with the Act and regulations to respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.

in the continental U.S. is in farming and ranching,<sup>7, 8, 9</sup> and 40 percent worldwide, agriculture is a large part of the problem. Other major culprits include invasive species, urban development and energy production. Nutrient pollution caused mainly by agriculture has created 200 dead zones in the U.S. and 400 worldwide, where oxygen concentration in fresh and ocean water is so low that animal life suffocates and dies.<sup>10</sup>

### Wild Nature's Inherent Value

More than three decades ago Michael Soulé, a leader in conservation biology, wrote that, "Species have value in themselves, a value neither conferred nor revocable, but springing from a species' long evolutionary heritage and potential or even from the mere fact of its existence."<sup>11</sup> This value should motivate respect and restraint on the farm and elsewhere in our world.

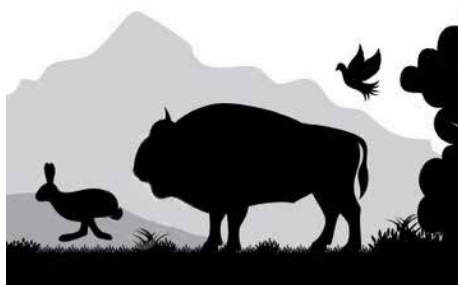
### Impacts to Nature

Plants and animals that have evolved to live within specific temperature ranges are threatened, either because they cannot adapt to the new temperatures caused by climate change, or because other species on which they depend are unable to persist. For example, if a pollinator is no longer present, a plant's existence may be threatened.<sup>12</sup> Approximately one-quarter or more of all land species are expected to be threatened with extinction by the year 2050 because of global warming.<sup>13</sup> Habitat degradation, overexploitation and invasive species are also major factors. Freshwater species are also threatened but the full extent of that risk has not yet been determined. While we don't know the exact casualties, we do know those disappearing species will

### What Biodiversity Looks Like



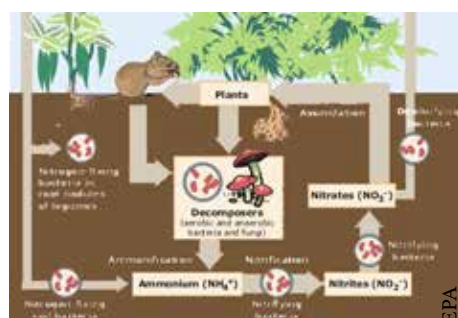
*Genetic Diversity — different genes and combinations of genes within populations*



*Species Diversity — different kinds of organisms*



*Community and Ecosystem Diversity — different habitats and species interactions*



*Ecological Processes — such as nitrogen cycling (shown here), or carbon storage*

### Biodiversity as Defined by the NOSB<sup>1</sup>

Biological diversity (biodiversity) includes variety in all forms of life, from bacteria and fungi to grasses, ferns, trees, insects and mammals. It encompasses the diversity found at all levels of organization, from genetic differences between individuals and populations (groups of related individuals) to the types of natural communities (groups of interacting species) found in a particular area. Biodiversity also includes the full range of natural processes upon which life depends, such as nutrient cycling, carbon and nitrogen fixation, predation, symbiosis and natural succession.

<sup>1</sup> The National Organic Standards Board (NOSB) is a federal advisory committee that advises the NOP.

### NOP Regulation—Preamble

We have amended the definition of organic production to require that a producer must conserve biodiversity on his or her operation. The use of 'conserve' establishes that the producer must initiate practices to support biodiversity and avoid, to the extent practicable, any activities that would diminish it. Compliance with the requirement to conserve biodiversity requires that a producer incorporate practices in his or her organic system plan that are beneficial to biodiversity on his or her operation.

haunt our food supply, especially the species that provide pollination, pest control, soil fertility, and clean water.

Even though ecosystem services—the benefits that nature provides—are estimated globally to be worth \$145 trillion/year,<sup>14</sup> we are losing trillions of dollars of these services because over half the land used for agriculture is moderately or severely degraded.<sup>15</sup> Bees and butterflies are under a high level of threat, with over 50 species of each on an endangered red list in North America.<sup>16</sup> These declines are due to degradation of habitat, pesticides (some of which are permitted for organic management),<sup>17</sup> and monocultures that concentrate bees, fostering the spread of pests and diseases.

In order to feed the world, there is great pressure to convert natural ecosystems to cropland and to intensify current farming practices. Rather than destroying untamed areas, organic farmers should first transition conventionally managed land. The most effective answer to the environmental challenges that threaten our future food security is to use the diversified organic agriculture methods shown in this WFA Guide, along with stabilizing human population and lowering carbon emissions.<sup>19, 20, 21</sup>

### Biodiversity Keeps Us Healthy

Biodiversity provides tangible benefits for human health. Preserving intact ecosystems and their native biodiversity can sometimes reduce disease transmission by changing the abundance, behavior, and condition of the host or vector.<sup>22</sup> Living close to nature helps to regulate



*“Biotic farming, in short, would include wild plants and animals with tame ones as expressions of fertility. To accomplish such a revolution in the landscape, there must of course be a corresponding revolution in the landholder. . . a good farm must be one where the wild fauna and flora have lost acreage without losing their existence.”—Aldo Leopold*

our immune systems by exposing and inoculating us with microbes, and by reducing chronic inflammatory responses. Living near natural environments is also associated with long-term health benefits including longer life spans, reduced cardiovascular disease, and reduced psychiatric problems.<sup>23</sup> The incidence of allergies in adolescents has also been found to decrease significantly with an increasing amount of forest and agricultural land around their homes.<sup>24</sup>

### Farmers’ Decisions Can Make a Difference

Biological diversity requires habitat to exist. Organic operations can provide that.

Where a large proportion of plants and animals in a given region depends on habitats within farm and ranch land, the management decisions of farmers can dramatically affect the overall level of biodiversity, as well as the success of particular species. While about 15% of the earth is in protected areas, only about one-fifth of the planet’s ecoregions are well represented in them.<sup>25</sup> These “islands” in a sea of highly altered land do not provide adequate habitat or connectivity (movement and gene flow between populations) for sensitive or wide-ranging species.

Networks of high-quality habitats must be created to reconnect fragmented populations of key species and restore ecosystem resilience. The amount of wildness and existing habitat varies greatly from farm to farm. Farmers and ranchers can start with what they have and work with adjoining landowners to help reestablish and maintain ecosystem connections through enhanced and restored waterways, woodlands, grasslands, wetlands, and other habitats across the landscape. Agroecosystems themselves can be part of these networks, such as diverse polycultures with trees, prairies with limited grazing, and winter-flooded rice fields that support native species.

✦ **Farms and ranches can help provide these habitats and wildlife linkages, thereby reaping nature’s ecosystem services, including pollination, insect pest control, predation, and natural erosion control.**

### Working with Care

Some conservation practices entail risks. The potential to bring unwanted pests and diseases onto the farm does exist. Unanticipated consequences to sensitive ecosystems may also occur, such as in manipulating a wetland that may then become less viable for high priority species, or in attracting native species to an area that makes priority species vulnerable to predation. Contacting local experts before taking action will reduce conflicts.



# A. About the National Organic Program's Natural Resources and Biodiversity Conservation Guidance

In January 2016, the NOP published the Natural Resources and Biodiversity Conservation Guidance. Wild Farm Alliance and partners wrote the initial draft of the NOP Guidance with input from many organic certifiers and others. The USDA Natural Resources Conservation Service (NRCS) collaborated with the NOP to make the NOP Guidance more relevant to their programs. After the organic community submitted almost 1,000 comments on the draft, the NOP made final changes and published the NOP Guidance (5020) along with a Response to Comments (5020-1) that explains their thinking.

The NOP Guidance covers the purpose and scope of the regulations, gives some background on the subject, and provides references. A section on policies and procedures spells out the roles of certifiers, inspectors, and certified operations. An appendix gives examples of activities to improve natural resources and biodiversity.

## Purpose

The purpose of the NOP Guidance is to bring uniform compliance of §205.200—the general natural resources and biodiversity conservation requirement—along with the associated §205.2 definitions of natural resources and organic production (see boxes on page 4). **Together these regulations require operations to conserve biodiversity and maintain or improve an operation's natural resources, including soil, water, wetlands, woodlands, and wildlife.** The preamble to the NOP regulations (see box on page 5) makes it clear that the intent of these regulations is to conserve biodiversity as much as is practical.

## Scope: Conservation Principles Are Fundamental to Organic Operations

The NOP Guidance states that, “Given the broad scope of these definitions [*natural resources, organic production, and what it means to conserve*], ‘maintaining or improving natural resources in organic production’ necessarily encompasses a range of conservation principles, including, but not limited to: protecting riparian areas; supporting native species and habitat; minimizing

invasive species; maintaining air quality; promoting crop diversity and plant condition; and improving soil condition.” Appendix A of the NOP Guidance provides examples of how these and many other principles may be implemented to meet compliance. The Core Biodiversity Principles in Part B of this WFA Guide explain and illustrate these activities.

## Background

Over the years many practitioners and advocates of organic agriculture have addressed the subject of conservation. The first edition of this WFA Guide was published in 2005 after the National Organic Standards Board (NOSB)—the guiding body for the NOP—took

an initial step towards encouraging conservation compliance by including biodiversity conservation questions in their model Organic System Plan (OSP). Later, one of the NOSB's most instrumental actions was to recommend that the NOP create many aspects of their NOP Guidance. These include 1) consistent discussion and review of biodiversity protection and enhancement in all certified operations' OSPs; 2) increased education for certified operations, inspectors, and certifiers; and

3) uniformity of inspection and certification procedures with regard to how certified operations should implement the biodiversity standards. The NOSB's recommendation also resulted in the NOP adding the general natural resources and biodiversity conservation requirement §205.200 to several of the accreditation checklists that hold certifiers accountable. The NOP will now consider biodiversity when evaluating materials for its National List of Allowed and Prohibited Substances.

### More Than Just Maintaining Soil and Water Quality

“Certified operations are required to implement measures that support natural resource conservation and biodiversity in addition to maintaining soil or water quality.” —from NOP Response to Comments 5020-1

## Appendix A

The appendix lists examples of activities that support conservation for All Types of Operations, Crop Operations, Livestock Operations, and Wild Harvest Operations. Examples cover soil composition and stability; water quality and quantity; support and coexistence with wildlife; native species and natural areas; invasive plants and animals; and crop and livestock diversity.

## NOP Guidance Policies and Procedures Chart<sup>1</sup>

| Policy Topic   | Role of Certified Organic Operations   | Role of Certifiers  | Role of Inspectors  |
|--|--|---|---|
| <b>OSP Required</b>                                  | Certified organic operations and applicants for certification must develop and submit an Organic System Plan (OSP) to a certifier. In many cases, the certifier provides an OSP with a section for a description of biodiversity activities and the monitoring approach (e.g., visual assessment of soil erosion, or species counts for biodiversity). <sup>2</sup>                                | Certifiers should consider an operation's monitoring plan that could include the frequency of monitoring, the types of observations or testing, and the method of documentation. <sup>2</sup>   | Inspectors must verify the accuracy, implementation and monitoring approach as described in the OSP. <sup>3</sup>   |
| <b>OSP Content</b>                                   | Operations must describe or list in their OSP activities (plans, practices and enhancements) that explain how they will <u>comprehensively</u> conserve biodiversity by maintaining or improving <u>all</u> natural resources, including soil, water, <u>wetlands</u> , <u>woodlands</u> , and <u>wildlife</u> , as required by §205.200 and §205.2 (underlining added for emphasis). <sup>2</sup> | "Certifiers must ensure that the OSP describes or lists practices that explain the operation's monitoring plan and practices to comprehensively support natural resources and biodiversity conservation, pursuant to §205.200." <sup>2</sup>  | During the onsite inspection, inspectors must verify the accuracy and implementation of the operation's production activities and monitoring approach that support the general natural resources conservation and biodiversity requirement, as described in the operation's OSP. <sup>2</sup> |
| <b>Appendix A</b>                                    | Operations can refer to Appendix A to learn about activities used to support natural resources and biodiversity conservation. <sup>2</sup>   | Certifiers can refer to Appendix A for activities that may support compliance with §205.200. <sup>2</sup>   | Inspectors can refer to Appendix A for activities that may support compliance with §205.200. <sup>3</sup>   |
| <b>Conservation Groups</b>                           | Operations worldwide can refer to conservation activities developed in conjunction with government or non-government organizations in order to fulfill part of their OSP. <sup>2</sup>   | Certifiers may consider activities developed in conjunction with conservation groups as part of the operation's OSP. <sup>3</sup>   | During the onsite inspection, inspectors must verify conservation activities implemented in association with conservation groups. <sup>3</sup>  |
| <b>NRCS Plans, CSP and EQIP</b>                      | If crop and livestock operations have participated in NRCS activities (e.g., conservation planning, Conservation Stewardship Program (CSP), or the Environmental Quality Incentives Program (EQIP), etc.), they may refer to those for part of their OSP. <sup>2</sup>   | Certifiers may consider NRCS activities as part of the operation's OSP. <sup>3</sup>  | During the inspection, inspectors must verify conservation activities implemented in association with NRCS. <sup>3</sup>  |
| <b>NRCS CAP 138</b>                                  | If crop and livestock operations transitioning to organic have participated in NRCS' Conservation Activity Plan (CAP) 138 that was created to serve as an OSP to address all organic requirements, then that can be submitted in place of a traditional OSP. <sup>2</sup>  | Certifiers may accept NRCS CAP 138 in place of a traditional OSP. <sup>3</sup>  | "Inspectors may also review implementation of the operation's production activities in relation to CAP 138 documentation submitted in place of a traditional OSP." <sup>3</sup>   |
| <b>Adjacent Land</b>                                 | Operations that have <i>adjacent</i> non-organic land they manage for biodiversity and their certified land <i>directly benefits</i> , then they can describe this in their OSP. <sup>2</sup>  | Certifiers may consider <i>adjacent</i> non-organic land managed by the operation as meeting the requirements to conserve biodiversity, if it <i>directly benefits</i> the certified land. <sup>2</sup>   | Inspectors may consider the operation's <i>adjacent</i> non-organic land as meeting §205.200 requirements if it <i>directly benefits</i> the certified land. <sup>3</sup>   |
| <b>Implement, Maintain, Monitor and Keep Records</b> | Operations have a responsibility to implement, maintain, monitor and keep records of practices that conserve biodiversity and natural resources. Records should support the certifier's ability to verify compliance (e.g., pest monitoring, limits on livestock access to waterways, reseeding areas, grazing rotations, or conservation maps). <sup>2</sup>                                      | "As part of the onsite inspection, certifiers should ensure that inspectors observe the conservation practices implemented, or review records that support implementation of conservation practices." <sup>2</sup>  | Inspectors may observe conservation practices implemented or review records that support conservation implementation for verification of compliance. <sup>3</sup>   |
| <b>Noting Exceptions</b>                             | Operations may explain in their OSP why they are not in compliance with §205.200, noting reasons such as extreme climatic conditions, or damage to the ecosystem beyond the control of the operation. <sup>3</sup>   | Certifier should consider inspector's report on exceptions to the conservation requirement, as part of its review and certification decision. <sup>3</sup>  | Inspectors should report on exceptions to the conservation requirement, such as extreme climatic conditions, or damage to the ecosystem beyond the control of the operation. <sup>2</sup>   |
| <b>Inspector Qualifications</b>                      | N/A  | Certifiers should ensure that inspectors are sufficiently qualified to effectively assess compliance with §205.200. Qualifications may include the inspector's knowledge, training, and experience observing and assessing conservation activities and monitoring in organic production. <sup>2</sup> | Inspectors must be qualified to assess compliance with §205.200, and be able to recognize and evaluate areas where: 1. natural resources and biodiversity are already conserved; 2. conservation projects are planned; and 3. improvement is needed. <sup>2</sup>                             |

<sup>1</sup> This chart was created from information in NOP Guidance.

<sup>2</sup> NOP text is paraphrased without changing its meaning.

<sup>3</sup> The text was included to cover what the NOP did not spell out.



## B. Core Biodiversity Principles

In order to address biodiversity conservation, organic operators must have knowledge of native species and ecosystems on their farms and in the larger landscape. They must understand how farm management activities affect the species on their land and the benefits those species provide. Core biodiversity principles help operators prioritize their actions.

### Support Field and Landscape Diversity

Organic agriculture in general has positive effects on biodiversity. Depending on where a farm fits into a continuum of management practices, biodiversity may either thrive or barely exist in an operation. On one end of the spectrum, less sustainable, more intensified agriculture occurs with outside fertility and pest control inputs, monocultures, conversion of perennial habitat to crop fields, large field sizes, and fragmented or absent habitat.<sup>26, 27, 28</sup> As the farm moves toward self-sufficiency and complexity, it supports soil biodiversity, protects soil and water quality, and provides flowering plants and native habitat patches with structural and compositional diversity that link together and connect to wilder areas on and off the farm.<sup>29</sup> On this end of the spectrum, the farm is highly diversified and integrated into the larger landscape.<sup>30, 31</sup>

#### Ways to Increase Diversity in and Around the Field

The highly diverse farm supports biodiversity in the field with practices such as using multiple crop varieties, composting, cover cropping, intercropping, crop rotations, fallowing, insectary strips, and integration of livestock.



*Natural areas on and off the farm serve as habitat for species like pollinators and natural enemies of insect pests. Conserving these areas is critical for the continued existence of the benefits they provide.*



*The more biodiverse a landscape is, the more benefits to the farm. Natural enemy organisms do not stop at a farm's borders but rather move to where food, cover and nesting resources exist to support them.*

Diversity is supported in field margins, edge zones, roadside plantings, woodlots, habitat islands, hedgerows, grass/prairie strips, natural pastures, wetlands, ditches, ponds, riparian areas, and other habitats that are important refuges for and sources of many organisms.

#### Benefits of Diversity

Increased farmscape complexity leads to more beneficial interactions among organisms that are part of food webs above and below the ground.<sup>32</sup> More benefits from biodiversity come from more complex food webs. Farms that support diversity of crop and non-crop species usually experience fewer serious pest problems, more pollination<sup>33</sup> and pest control,<sup>34</sup> more stable production, and more profit<sup>35</sup> than those without diversity.

#### Scale Is Important

Diversity on the farm is influenced by fields with small surrounding habitats as well as by landscape-scale diversity in the watershed and region. Farm habitat diversity can increase pollinator presence,<sup>36</sup> whereas

diversity in and surrounding the farm, and the number of nearby predators, tend to influence bird and bat occurrence.<sup>37, 38</sup> So the needs of these beneficial organisms may be fulfilled in a single field, or may require larger home ranges with multiple resources over the species' life cycles in order to support viable populations.<sup>39</sup>

Having biodiverse neighboring areas in the landscape will benefit the farm. A farm's borders are permeable to biodiversity. For example, if a less diverse conventional farm is situated near many organic farms, it may have similar biodiversity levels because the organic operations are supplying sources of natural enemies to their conventional neighbor.<sup>40</sup> Natural areas supply biodiversity

benefits to the farm. Therefore, working with neighbors to conserve and increase the landscape-level diversity—connections to habitat patches and large natural areas—is in the best interest of every farm within a community.

Conservation of species and ecosystems generally takes place over landscapes much larger than an individual farm.<sup>41, 42</sup> The measure of success is not simply the number of plant or animal species or natural communities in a given area, but whether the landscape as a whole provides habitat and ecosystem conditions that can support viable populations of native species, particularly those most affected by human disturbance.

## Promote Healthy Soil and Clean Water

### Organic Matter and Soil Life

Healthy soil is the key to healthy plants. By increasing soil organic matter through the use of cover crops, compost, manure, crop rotations, and recycling crop nutrients, the farmer fosters an environment within which diverse soil micro- and macro-organisms will thrive.

Soil biodiversity is necessary for optimal growth of crops. Each organism has its own specific influence, and together they create many additional benefits. For instance, several kinds of organisms work together in a multi-step process of decomposition, nutrient cycling and carbon storage.<sup>43</sup> A diverse set of microorganisms reduces plant and human pathogens through competition and predation.<sup>44</sup> Many other soil characteristics—structure, filtering, water-holding capacity, buffering, nutrient immobilization, and detoxification of environmental pollutants—are influenced by the association of many types of organisms and the minerals present in the soil.<sup>45, 46</sup>

✦ **Keeping the soil covered is a critical biological farming concept, not just for preventing erosion, but also because the practice supports a diversity of plants and animals—plants with abilities to accumulate minerals better than forage crops,<sup>47</sup> and butterflies<sup>48</sup> and birds<sup>49</sup> that are otherwise edging toward extinction.**

### Keeping the Soil Covered

Good farmers work hard to build and conserve healthy soils that sustain the land's productivity. Keeping the soil covered as much as possible prevents water and wind erosion both on and off the farm. Erosion removes topsoil, creates gullies, and leads to deposits of sediments

and pollutants in waterways, roads, and on neighboring properties. Dust clouds derived from bare soil or by cultivation of dry land will scatter valuable topsoil and cause air pollution. Planting windbreaks and hedgerows in appropriate areas throughout the farm reduces the impacts of wind on the soil. Other techniques to prevent wind erosion include mulching, tilling less frequently, keeping crops and cover crops in the field, using managed grazing instead of continuous grazing in pastures, and allowing non-invasive vegetation to grow along fence lines and ditches. Vegetated ditches can slow water down and help it infiltrate into the ground. Scraping ditches clean causes more erosion and degrades water quality.



*Cover cropping—simple but profound: “Feed the soil, not the plants” results in numerous vital functions that recycle dead material, filter and regulate water flows, and provide habitat for many plants and animals while supporting plant growth.*



### Protecting Water Quality

Planting and retaining soil cover will protect water quality from excessive nutrients and biocides that degrade irrigation water, and will safeguard sources of clean water for livestock and wildlife. Grasses and forbs on the edges of fields and in pastures will slow down and filter water. Animal burrows, plant roots, and soil with good structure will allow much of the potential runoff to infiltrate the soil. Riparian areas serve as the last stop along the water's path for filtering, detoxifying, and chemically and biologically binding contaminants before they reach ponds, lakes and waterways.<sup>50</sup>

When it comes to protecting water quality, an ounce of prevention is worth a pound of cure. Calculating specific crop fertility and pest control needs, making nutrient and pesticide applications well in advance of predicted storms, and timing irrigations so as not to cause runoff will all protect water quality. With livestock, collecting runoff from animals in temporary confined areas and raising livestock so that their manure does not become concentrated will also reduce water contamination. Groundwater, streams, lakes, and oceans are protected by verdant vegetation and sound nutrient and irrigation management practices.

## Maintaining or Improving Wildlife is Analogous to Maintaining or Improving Soil

### All Parcels Need to Be Treated the Same

Imagine a farm where three of its four parcels are maintaining the natural resources. The fourth has a severe erosion problem that needs to be corrected with soil conservation practices. Similarly, that fourth parcel has nothing in the field other than the crop and it is lacking activities that support wildlife. The farmer should correct the problem by supporting wildlife presence, such as with a pollinator habitat planting.

### Conservation Throughout the Production Season

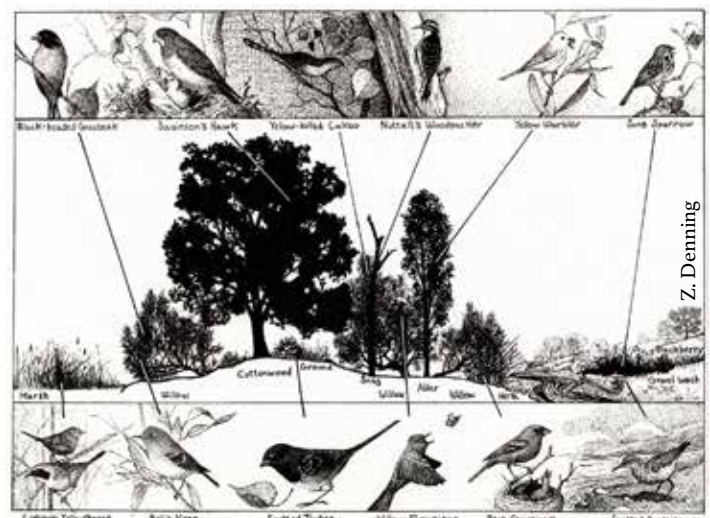
Imagine a different farm has dealt with erosion and supports biodiversity for most of the production season, but heavy spring rains cause gullies and there is no habitat present to support wildlife when the crop is planted. The farmer alleviates the problems with a fall planting of a native grass and wildflower filter strip on the upper edge of the field to spread out and dissipate channeled water, and to support pollinators and other beneficial organisms.

## Encourage Beneficial Wildlife

The benefits on the farm from pollination and pest control are exceedingly dependent on maintaining the insects, birds and other animals that provide these functions.<sup>51, 52</sup> All wildlife must have habitat that provides food, nesting and denning sites, and shelter from adverse conditions.

### Habitats Define Who Is Present in the Field

Beneficial organisms such as pollinators may require as little as a series of annual crop rotations or multi-cropping to increase farm and field diversity.<sup>53</sup> The necessary wildlife habitat could be small refuges among cultivated fields, such as wildflower strips that promote biological pest control and increased crop yields.<sup>54</sup> Or a more substantial sequence of native flowering perennial plants may be required such as hedgerows, or structurally and compositionally diverse natural riparian and woodland vegetation that provides areas for the beneficial organisms to prosper.<sup>55</sup> Habitat for pollinators and natural enemy insects and birds along crop edges can be added without reducing yields, and will in some cases increase yields.<sup>56</sup>



*Providing diverse structural and compositional habitat with live plants and snags will support feeding and nesting locations for a variety of birds and other wildlife.*





*When comparing insects in native plant hedgerows to weeds, the hedgerows support more natural enemy insects than pests.*

### When and How to Attract Pollinator and Natural Enemy Insects

Providing habitats for beneficial organisms throughout the production season is good, but being there year-round is even better. Grass strip “islands” can maintain predatory beetles all year,<sup>57</sup> and untilled, well-drained areas will ensure that ground-nesting bees are on the farm well before and after the crop is in flower.<sup>58</sup> Native perennial habitat ensures that predators and parasitoids are also available when needed.<sup>59</sup>

Native plant hedgerows promote the colonization and persistence of native bees more than do unrestored weedy field edges.<sup>60, 61</sup> While hedgerows also support many types of insects, natural enemy insects occur in much greater numbers than pests on native-plant hedgerows than in

weedy areas.<sup>62</sup> From the hedgerows, these pollinating and natural enemy insects disperse to provide pollination and pest control services to adjacent crops.<sup>63, 64</sup>

### Birds, Reptiles, Amphibians and Mammals Do Their Part

It is not only the natural enemy insects that help to keep pests in check on the farm. Larger organisms like birds and bats eat insects and play an important role in reducing pest numbers. In some cases they are central players at suppressing pests. Supporting beneficial songbirds<sup>65</sup> and bats<sup>66</sup> with nest boxes can be profitable. Hedgerows also can effectively support birds that consume insect pests.<sup>67</sup> Farms that experience pest bird activity near habitat can alter what they plant in adjacent crop rows during certain times of the year when birds are known to cause damage. Monocultures usually experience more bird damage than farms that have diversified crops. Even pest birds are often also beneficial because they consume pest insects before the crop is ready. In most cases, benefits of birds outweigh damages.<sup>68</sup>

Other types of pests can be controlled naturally on the farm. Placing barn-owl boxes<sup>69</sup> and perches,<sup>70</sup> and conserving large trees for raptors will reduce rodents. Falcons scare off and kill pest birds in vineyards.<sup>71</sup> Snakes, lizards, frogs, salamanders and predatory mammals also help keep pests in check.

✕ **Providing the required habitat for beneficial wildlife should be part of the farm’s pollination and pest control plans.**

## Plant Diverse Habitat—Go Native!

### Native Plants Are Integral to the Food Web

Using plants that are native to a region provides important benefits to the farm.<sup>72, 73</sup> When native plants are the foundation of non-crop vegetation on the farm, not only will natural enemy insects thrive, but so will birds, frogs, lizards, and carnivores such as foxes that rely on insects for a significant part of their diet.

✕ **In general, non-native introduced plants are less effective at supporting the food web that includes insects, birds and other vertebrates.**

Over half the species on the planet are insects,<sup>74</sup> and 99% of them do not cause harm to farms or other human enterprises.<sup>75</sup> Insects help with pollination, pest control,

and breaking down detritus in the soil. Insects also serve as food for many beneficial creatures including other insects and birds.

### Native Animals Co-Evolved with Native Plants

Most native insects share an evolutionary history with native plants. Many of these insects require native plants in order to survive. As plants evolved specific toxins to keep from being eaten, some insects also evolved the ability to digest these toxins, and became “specialized” for particular plant species. Most specialist insects can not adapt rapidly to live on non-native plants,<sup>76, 77</sup> which limits the food web associated with these non-natives. While some non-native plants can support generalist



J. L. Hyche, Auburn University, Bugwood.org

*Native plants like this willow support plant-eating insects as alternate food sources for natural enemy insects like this tachinid fly.*

plant-eating insects (crops are an obvious example), most of the non-native ornamental plants allowed to grow on the farm do not support these crucial native insects. There are several reasons for this: a) often the ornamentals were selected to be unattractive to insects, b) most native insects have not evolved to eat ornamentals, and c) many insects are specialists.

Perhaps about 90% of plant-eating insects have specialized in one to three plant families.<sup>78</sup> The rest of the plant-eating insects—the 10% that are generalists—are able to eat from many plant families. Even so, most native insect generalists prefer eating native plants.<sup>79</sup>

### Alternative Food Sources for Natural Enemy Insects

In seasons when primary crop pests are not available to natural enemy insects, some of them (especially parasitoids and predators) require alternate hosts or prey to complete their life cycles.<sup>80</sup> Native plants can provide insects as alternate food sources.<sup>81, 82</sup> For example, a tachinid fly, which attacks cabbage loopers, uses the California oak moth—a common species that feeds on native oak trees—as an alternate host.<sup>83</sup> Native flowering plants supply nectar and pollen, also important for natural enemy insects.<sup>84</sup> When natives are planted and conserved, they provide a source of insect food to keep many beneficial insect predators near the fields where they are needed.

### Beneficial Birds Thrive with Native Plants

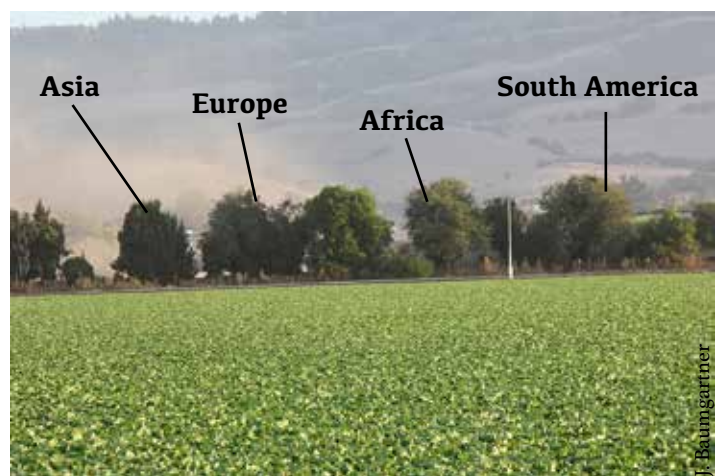
The same is true of birds, especially when they are raising their young. Around 96% of land bird species in North

America require high-protein diets of insects for their nestlings. These birds depend on native habitat that will support the insects they need for their families.<sup>85, 86, 87</sup> According to entomologist Doug Tallamy, “It is a matter of life and death for their offspring if they don’t catch enough insects.”<sup>88</sup> For example, chickadees must catch more than 5,000 insects to raise a successful brood. Many birds will eat crop-pest insects along with insects feeding on native plants.<sup>89</sup>

Native plants are less likely to become invasive, are adapted to local climates, require little maintenance, and are critical to restoration efforts for imperiled habitats and rare species.

Farms that have only crops and non-native plants in their landscapes offer little food for beneficial natural enemies and the insects they eat. Without native plant diversity, native insects and other species higher in the food chain will decline in numbers and possibly disappear. Nearby intact ecosystems can serve as libraries of ecological knowledge for guidance in choosing plants on the farm.

Invasive species displace native plants and animals, reducing biodiversity. Forty-two percent of threatened and endangered species are imperiled in part because of invasive species.<sup>90</sup> The invasive species do well because they have a competitive advantage, since the natural enemies they evolved with are not present to control them.



J. Baumgartner

*Non-native plants in farmscapes generally do not provide very much food for native plant-eating insects and the insect and bird predators that rely on them. The farm’s food web is too simplified and biodiversity benefits are limited.*

## Prevent the Spread of Invasive Species

### Invasives Threaten Farms and Natural Ecosystems

Invasive plants compete with native plants for sunlight and space. They offer less plant food and they support fewer plant-eating insects for wildlife.<sup>91, 92</sup> Invasive plants in pastures can cause harm to livestock (poison hemlock), reduce palatability (star thistle), or make animals reluctant to enter pastures (multiflora rose). Forage loss from invasive weeds on pastures adds up to nearly \$1 billion/year in the U.S. alone.<sup>93</sup> Invasive plants spread unwanted seeds onto cropland, increasing the need for weed control. Weedy areas are known to harbor more pest insects than are found in native plant hedgerows.<sup>94</sup> For all these reasons, invasive plants can decrease monetary and ecological land values.

Invasive animals may out-compete native species for resource niches and can become agricultural pests that consume crops, spreading plant diseases and human pathogens. About 40% of U.S. agricultural insect pests are invasive species.<sup>95</sup> The invasive Asian citrus psyllid spreads the bacterial disease known as “citrus greening.” The feral, invasive, non-native pig will eat other animals’ feces and hence carry *E. coli* O157:H7, *Salmonella*, *Campylobacter*, and *Cryptosporidium* at much higher levels than seen in other animals.<sup>96</sup> Feral pigs root up native plants and allow for the spread of invasive plants.

Negative changes to ecosystem processes can occur from invasive species.<sup>97</sup> Tamarisk trees in the Southwest cause rivers to narrow and channelize. Eucalyptus trees transpire massive amounts of groundwater and are extremely fire prone. Their allelopathic properties can change soil chemistry and decrease soil fungal mycelia that could otherwise reduce erosion.

### Managing Invasive Species

The most cost-effective approach to managing invasives is to recognize and deter them before they appear on the farm. Once there, early detection and rapid response can control them before they spread. Organic farmers may

use animals to graze such invasives as medusahead, purple loosestrife, and Spanish broom.<sup>98</sup> Other useful organic practices include insect biological control,<sup>99</sup> solarization, flame weeding, and mulching.<sup>100</sup> Because people move these invasives around the planet and encourage them with some of our management techniques, we can reduce their spread with education. But the problems are not all caused directly by humans. Climate change is also a factor. As the planet warms, new areas that were once inaccessible to invasives now offer them the right conditions.

Some people say we should embrace new ecosystems and forget about “natives” because the world is always changing. There is concern with the chemical warfare waged on invasive organisms. Indeed, the federal government already spends \$2 billion annually to fight invasives with glyphosate and other poisons.<sup>101</sup>



*Feral pigs, also known as wild boars, are native to Europe. They root up, wallow in, and destroy the integrity of the plant and soil community that local wildlife depends on. They also carry human pathogens more so than other wild animals because they consume other animal's feces.*

✧ The question is how to best control invasives organically, because managing them is all about protecting native biological diversity.

## Protect Habitats and Species, Especially Those That Are Sensitive

High-quality habitats support the existence of native plants and animals. The availability of food, cover, and water determines what kinds of wildlife will live on the land. Soil and water conditions and farming practices determine the persistence of native plant populations.

A farmer's actions can increase native species populations by using practices in this WFA Guide. If wildlife habitat is compromised, animals become vulnerable to prey or harsh weather and will either move on or die. Native plants are resilient, but only under the right conditions.



## Some Species Offer Greater Biodiversity Benefits than Others

✦ When determining which biodiversity should be conserved, all things should not be given equal weight to balance the changes that agriculture brings to the land. For example, the gain of a pigeon or a hayfield does not offset the loss of an eagle or a wetland, which provide more types of ecosystem services.

Some species and communities, such as those in fragmented, simplified environments, are common across the landscape, and their numbers may even increase through agricultural activities. Others may be uncommon, rare, or key components of healthy ecosystems, and their conservation should receive high priority.

In general, the conservation of native predators, such as raptors and large carnivores, should carry more weight than the conservation of their prey, for predators tend to reproduce relatively slowly and are generally in low numbers after decades of persecution. Similarly, some groups such as reptiles and amphibians are more likely to be adversely affected by farming activities than mammals or birds, and the organic system plan should include strategies to avoid or mitigate such losses.

Maintaining threatened and endangered species, species of special concern, and keystone species (see glossary) is among the highest priorities for conservation. Using the NatureServe website<sup>102</sup> to learn the national conservation status of rare and endangered plants and animals of North America, and the International Union for Conservation



*The presence of a threatened species such as this California red-legged frog indicates that the farm is supporting a healthy, diverse ecosystem.*

of Nature website<sup>103</sup> for the status of international species, operators can determine if their lands may support them.

## Riparian Areas Need Exceptional Care

In the U.S. by far the greatest losses of species and habitat occur in fresh water ecosystems. Roughly 30% of the protected species and the species proposed for protection are endangered because of poor water-resource development.<sup>104</sup> By managing riparian areas and wetlands for biodiversity, farms and ranches can benefit from nature's services, including nutrient cycling, erosion control, water purification, flood protection, and groundwater recharge. Riparian areas act as sponges, soaking up precipitation and then later releasing water slowly into streams for more continuous flows that benefit the operation and aquatic species.

## Issues Related to Protecting Sensitive Habitats

### Avoid Conversion of High Conservation Value (HCV) Areas

Protecting sensitive habitats from degradation or conversion to agricultural production is critical to conserving biodiversity. Between 2008 and 2012, 1.6 million acres of grasslands at least 20 years old were converted, primarily for crop production.<sup>105</sup> Farmers and certifiers can identify High Conservation Value habitats<sup>106</sup>—including forests, shrublands, grasslands, riparian habitat, wetlands and marine habitat—and ensure their protection for native species conservation (see glossary). Actions may vary from no conversion, to low impact grazing, or wild harvesting.

### Special Considerations for Land Coming Out of Conservation Reserve Program (CRP)

The CRP pays farmers to remove environmentally sensitive land from agricultural production and keep it in vegetative cover that provides habitat for biodiversity. When land comes out of CRP, it could go into organic production, if ecological damage is to be prevented. Without special considerations that protect sensitive HCV areas, it is possible for organic certification to be a mechanism that reduces, instead of improves, conservation activities. A comprehensive conservation plan can help determine the actions to take so that continual improvement in organic management is attained.

### Refuse to Let Produce Buyers Make the Case that Their Misguided Food Safety Requirements which Harm Biodiversity Are Supported by NOP's and FDA's Regulations

FSMA – the Food Safety Modernization Act<sup>107</sup> – makes it clear that FDA's food safety rules must not conflict with organic regulations. FDA's Produce Rule<sup>108</sup> confirms that organic produce buyers can not require harming protected species, or fencing or habitat destruction in FDA's name: "Nothing in this regulation authorizes the 'taking' of threatened or endangered species...This regulation does not require covered farms to take measures to exclude animals from outdoor growing areas, or to destroy animal habitat or otherwise clear farm borders around outdoor growing areas or drainages."

## Build Climate Resilience and Reduce Greenhouse Gas Emissions

Increased drought, flooding and drastic temperature shifts are becoming more common as climate change affects agriculture, native species, and ecosystems. By the end of the 21<sup>st</sup> century, global climate models predict current temperatures will increase by 2° to 6° C (3.6° to 10.8° F),<sup>109</sup> creating additional disruptions. Some regions will become drier and hotter, others will endure wetter and colder weather, and still others will have a mix of both, with more intense hot and cold periods and more concentrated, but altered, total precipitation.

Fundamental practices such as building soil organic matter, increasing biodiversity, reducing farm reliance on fossil fuels, and using pasture-based livestock farming methods<sup>110</sup> will continue to build resilience to these climatic disruptions and fluctuations. Agriculture is a major source of greenhouse gas emissions (GHG), but organic farming practices can both reduce carbon emissions and improve a farm's ability to withstand and mitigate the effects of GHG emissions.<sup>111</sup>

### Building Soil Organic Matter and Rotational Grazing

A key component of successful carbon storage and mitigation is building soil organic matter. More carbon is stored in the soil than in the atmosphere and in above-ground vegetation combined.<sup>112</sup> Therefore, building organic matter is a high priority, right in line with National Organic Program regulations that require the cycling of organic materials back into the soil to maintain and improve soil fertility. Organic farmers address this goal with methods like crop rotation, cover crops, composting, and reduced tillage.

Building soil organic matter also provides a solid platform for farm resilience—reducing runoff and erosion, improving infiltration, and enhancing water-holding

capacity.<sup>113</sup> Reduced tillage uses less fossil fuel and slows the breakdown and carbon release of plant material on the soil surface and in the root zone.

Rotational grazing allows for increased forage growth that facilitates soil carbon storage. The practice requires farmers to create a healthy nutrient cycle, building essential crop nutrients and soil quality.<sup>114</sup> A small amount of compost on pastures stimulates microbial activity and plant growth, increasing organic matter and enhancing the process of storing carbon in the soil.

### Farming with Perennials

Farmscaping is a practice that uses perennial plants along farm margins and throughout riparian corridors. These woody plants tie up carbon and nitrogen in their biomass, reducing carbon dioxide and nitrous oxide emissions without reducing nutrient availability to crops.<sup>115, 116</sup>



*Animals raised on pasture can produce less methane than animals fed on grains and fillers. Rotational grazed livestock management increases forage growth that facilitates soil carbon storage.*

✧ Often the species that occupy edge or riparian corridor habitats provide critical year-round pollination and pest control benefits that reduce off-farm inputs and improve the farm's ability to thrive in extreme circumstances.<sup>117</sup>

Farmscaping provides additional habitat for pollinators, natural enemies, and other wildlife as their habitat in natural areas is disappearing. More than 300 U.S. bird species are expected to lose much of their current range by 2080.<sup>118</sup> Shifting climate is resulting in plants being out of sync with animals' migratory and reproductive cycles. Pressure from invasive species is impacting habitat value. Some native plants are predicted to disappear from their locales and this means that the biodiversity provided by on-farm habitat patches and corridors is already critical.

Building soil organic matter and maintaining habitat can be enduring and cost effective. Organic farmers can measure their sustainability not only by yields, but also by the quality and biodiversity of life on their farms.



*Perennial trees and grasses are used as part of a riparian buffer to provide critical habitat for wildlife, to store carbon above and below ground, and to continually build soil organic matter. This type of farmscaping uses woody plants to hold carbon and nitrogen in the plant biomass, reducing emissions and helping the farm be more resilient in the face of climate change.*

## Maintain and Restore Linkages and Connectivity

Farm habitat patches that are knit together into corridors can support wildlife movement through the landscape, providing benefits to the farm and to wild nature. The most common corridors are riparian areas—natural areas along creeks and streams that support the flow of water and wildlife. Irregular areas that aren't cropped—too wet, steep or rocky to farm—are ideal habitat patches where connections can be made. Along with semi-natural habitats such as roadside plantings, vegetated ditches, field borders, prairie strips, hedgerows, windbreaks, and grazing areas, irregular patches can provide passage for many forms of wildlife. Which creatures use these linkages depends on corridor size, condition, and location, relative to places that animals are moving to and from.

“Working landscapes” are not enough; true wildlands are critical. In regions used primarily for agriculture, quality habitat (e.g., grasslands or woodlands) should be retained or restored to support the native plants and animals that inhabited the area prior to widespread conversion to crops, including sensitive and wide-

ranging animals like bears, wolves, pumas, jaguars, bobcats, eagles, hawks, songbirds, snakes, trout, salmon and butterflies. The amount of land in agriculture is so vast that it is the matrix in which most native species must now live.

✧ In any region, farmlands should help conserve enough native habitat, in the appropriate configuration, to maintain self-sustaining populations of native species in functioning ecosystems. Large core reserves (wilderness) interconnected by habitat linkages (wildways) to each other and to smaller zero-extraction reserves, even within individual farms, are important.

### Reducing Greenhouse Gas Emissions is All About Biodiversity

Biodiversity includes life and the full range of natural processes upon which it depends, such as nutrient cycling, carbon storage and nitrogen fixation.

### The Need for Connectivity

Fragmentation of our landscapes is causing populations of species to become isolated. As habitat patches become smaller, they are able to support smaller populations and fewer species with food and shelter, thus reducing local biological diversity.<sup>119</sup> Connectivity is vital, providing access to mates, genetic diversity and resources needed to survive.





*Organic farms are ideally suited to be situated near waterways because there is more need for the beneficial organisms that use these corridors, and less chemical runoff. These farmers removed invasive plants while widening the riparian corridor with native and harvestable shrubs and trees, and then fenced it off to keep their rotationally grazed cattle from overly impacting the area.*

Cropped fields may have little left of the original linking habitat. Narrow corridors that do exist may create problems, such as unintentionally encouraging nest predation by brown-headed cowbirds.<sup>120</sup> Songbirds need enough cover to hide their nests from cowbirds that leave their eggs in other birds' nests (brood parasites). Even areas covered with vegetation may have decreased wildlife value if they are composed mainly of invasive species.

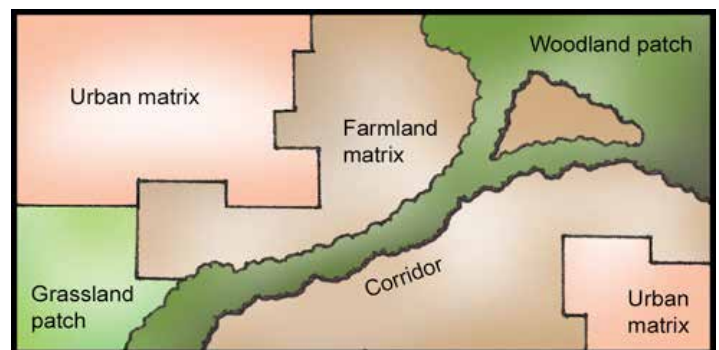
### Corridor Benefits

Habitat patches can link together to serve multiple functions. They can provide shade for livestock, be composed of harvestable species, and reduce wind damage. Corridors of habitat bring beneficial wildlife closer to production fields, making it easier for them to control pests or pollinate crops. Grass strips, also known as beetle banks, support predatory beetles that consume many pest insect eggs and larvae. Sequentially flowering native plants, interspersed as prairie strips and hedgerows throughout the crop and on the field edges, attract pollinators and natural enemies into the fields. Buffers used to intercept pesticide drift can serve double duty as conduits for species movement.

Linkages that provide for large carnivores can help prevent deer and other ungulates from overgrazing and over-browsing the natural vegetation, and also can reduce

rodent numbers.<sup>121</sup> Wildlife-friendly fences can allow access for wide-ranging mammals when crops or livestock are not present.<sup>122</sup>

Corridors not only provide passage for wildlife, but also serve as dispersal routes for plants, albeit at a slow pace, as their seeds and roots expand into new areas. Now with climate change, it is even more important to provide connectivity. Wildlife and plant species are on the move, readjusting to new conditions.<sup>123</sup> Many will need to move northward or upward in elevation to track their climate envelopes. Again, broad riparian buffers are among the most critical of wildlife corridors for terrestrial as well as aquatic wildlife, and especially as climate chaos upsets natural hydrological cycles.



*Woodland and grassland patches are connected by a corridor through farmland. Linking patches can benefit the plant and animal communities by providing access to other areas of habitat, increasing gene flow and population viability, enabling recolonization of patches, and providing habitat.*

### Bigger and Closer and More Complex

Some basic guidelines:<sup>124</sup> The closer the habitat patches are to each other on the farm, the better. The larger they are in size and the greater number of patches, the more diversity they support. The wider the corridors and the more continuous the connections, the more they provide safe passage. The more native plant species in the corridor and the more complex its structure and composition, the more resources will be provided.

Connecting habitat patches will make them more viable to more species. And when linked from one farm to the next, corridors can begin to make a significant difference.

## C. Activities that Support Biodiversity

Part C presents a variety of biodiversity conservation activities, some of which are covered in All Types of Operations, and others are specifically addressed in Cropland Area, Livestock Area, Wild Harvest Area and Handling Operations. NOP regulations are spelled out and examples of assessing NOP compliance in the field are given. Under each of the topics—compliance, minor issues and major issues—a rating system of white, white/black and black circles is used. This rating is intended to be a general indication of effects to natural resources and biodiversity. Examples of beneficial activities that address NOP regulations and stewardship goals are linked to NRCS conservation practices that can provide support

for them. Elements of biodiversity conservation are mandatory throughout the organic system plan (OSP).

The conditions and priorities for biodiversity conservation vary widely from region to region. Some of the activities are broadly applicable across many regions, and other examples are more particular to an area. Operators and certifiers can consider how the operation can best adapt, modify, or add to the practices given here to create a conservation plan that is appropriate to the farm, to the local watershed, and to regional conservation goals. The issues covered in this section correlate with the Organic System Plan questions shown in part D.

### Status of Compliance





(similar to NOP's definitions, but simplified)

**Compliance** – The operation is following NOP regulations.

**Minor Issue** – The operation can continue to be certified if it addresses the problem and records the change in the OSP (the certifier does not require a corrective action plan).

**Major Issue** – The operation must submit a corrective action plan that spells out how the problem will be fixed and the certifier must verify implementation of approved plan.

### Legend for Effects on Natural Resources and Biodiversity

-  **Beneficial**
-  **Partially Degraded or Harmed**
-  **Degraded or Harmed**
-  **Not Applicable**



*"In New England they once thought blackbirds useless, and mischievous to the corn. They made efforts to destroy them. The consequence was the blackbirds were diminished; but a kind of worm which devoured their grass, and which the blackbirds used to feed on, increased prodigiously . ... they wished again for their blackbirds."*—Benjamin Franklin, 1749

## All Types of Operations

### Taking Steps to Plan for Biodiversity

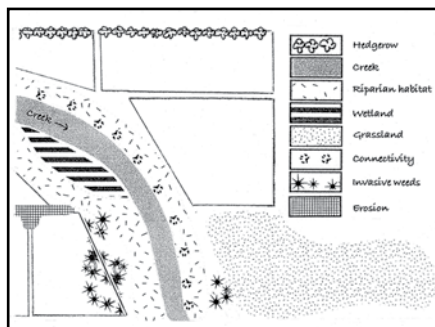
#### Related NOP Regulation (7 CFR Part 205):

#### **§205.201(a)(1)(3) – Organic production and handling system plan**

*Summary:* An organic production or handling system plan must include a description of practices and procedures to be performed, maintained and monitored, including the frequency with which they will be performed, and verification that the plan is implemented effectively.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*Mapping biodiversity features and problem areas will preserve an accurate record for reference in evaluating the progress of the farm's management plans.*

#### Minor Issue



*Without consistent monitoring and subsequent soil conservation actions as a key component of the farm plan, localized erosion like this can occur.*

#### Major Issue



*The organic system plan does not include practices that maintain or improve wildlife and its habitat throughout the production season.*

|                       |                       |                                  |                                  |
|-----------------------|-----------------------|----------------------------------|----------------------------------|
| Healthy soils         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Clean water           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Native plants         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Pollinators           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Natural enemy insects | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Reptiles/amphibians   | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Birds                 | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Bats                  | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Other mammals         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Area of operation; Natural resources; Organic production; Organic system plan  
 Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.240(c)(8) Pasture



## All Types of Operations

### Taking Steps to Plan for Biodiversity



### Stewardship Goal: Design and Map Conservation Practices

#### *Examples of Practices*

Farmer considers the following when planning conservation practices / activities:

- Wildlife and dominant native plants that existed on the land prior to conversion to agriculture will inform farm restoration decisions of the potential habitat conditions and what might be supported.
- Conversations with experts about local, state and national conservation priorities.
- Collaborations with neighbors and others to enhance biodiversity for larger effect.
- Establishing an agricultural and/or natural resources conservation easement.

Farm plan includes:

- A watershed map that shows farm's connections to riparian areas/drainages at higher and lower elevations, and to nearby public natural resource lands and protected areas.
- A farm map showing hedgerows, woodlands, wildlife corridors, priority species, sensitive habitats, wetlands, riparian zones, and areas affected by erosion or invasive species.
- A list of wildlife and dominant native plants that are present on the farm, highlighting priority species, their habitat needs, and a description of actions to protect them.
- Training employees to create habitat, restore natural areas, and monitor improvements.

#### *Agricultural Benefits*

- Mapping biodiversity features and problem areas will preserve an accurate record for reference in evaluating the progress of a farm's management plan.

#### *Ecological Benefits*

- A watershed map will help determine the ecological context in which the farm exists. For example, if the uplands in the watershed are composed of woodlands, then upland natural areas of the farm should support those same woodland species.

### USDA Natural Resources Conservation Service (NRCS) Technical Assistance

NRCS provides free conservation technical assistance to farmers and ranchers for planning and management that address opportunities, concerns, and problems related to the use of natural resources. This assistance can help protect and improve water quality and quantity, maintain and improve wildlife and fish habitat, explore opportunities to diversify, and apply sustainable agricultural practices.

## All Types of Operations

### Maintaining Wildlife on the Farm

#### Related NOP Regulations:

**§205.200 – General natural resources and biodiversity conservation**

**§205.2 – Definitions of organic production and natural resources**

*Summary:* Organic production practices must conserve biodiversity and maintain or improve the natural resources of the operation, including soil, water, wetlands, woodlands, and wildlife.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*Conservation buffers provide wildlife with food, nesting and denning sites, and corridors for safe passage.*

#### Minor Issue


















*Barbed wire causes birds like this burrowing owl to die from entanglement, and the operator does not replace it with high tensile wire when repairing.*

#### Major Issue



*Riparian trees that support wildlife on the farm are destroyed because of misguided buyer food safety requirements, not FDA's or NOP's regulations.*

|   |                       |  |                                  |
|---|-----------------------|--|----------------------------------|
|  Healthy soils         | <input type="radio"/> |  | <input checked="" type="radio"/> |
|  Clean water           | <input type="radio"/> |  | <input checked="" type="radio"/> |
|  Native plants         | <input type="radio"/> |  | <input checked="" type="radio"/> |
|  Pollinators           | <input type="radio"/> |  | <input checked="" type="radio"/> |
|  Natural enemy insects | <input type="radio"/> |  | <input checked="" type="radio"/> |
|  Reptiles/amphibians   | <input type="radio"/> |  | <input checked="" type="radio"/> |
|  Birds                 | <input type="radio"/> | <input checked="" type="radio"/>   | <input checked="" type="radio"/> |
|  Bats                  | <input type="radio"/> | <input checked="" type="radio"/>   | <input checked="" type="radio"/> |
|  Other mammals         | <input type="radio"/> | <input checked="" type="radio"/>   | <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definition: Area of operation

Subpart C – Organic Production and Handling Requirements: §205.203 Soil fertility and crop nutrient management

## All Types of Operations

### Maintaining Wildlife on the Farm



### Stewardship Goal: Sustain and Protect Wildlife and Their Habitat

#### *Examples of Practices*

- Safe passage of priority species and other wildlife through part of the farm is allowed by: a) fencing only individual fields, if necessary; b) using high tensile wire instead of barbed or woven wire; c) designing fences to allow smaller wildlife to go under the barrier; d) adapting fences in places of known migration routes, making them shorter or less dangerous to cross; and e) providing habitat cover in corridors.
- Farm management accommodates the needs of native insects, fish, birds, and other wildlife to spawn, nest, migrate and escape from predators and adverse weather. Practices may include:
  - Refuges of undisturbed soils are left for ground-dwelling bees to create nesting burrows; woody refuges are left for tunnel-nesting bees.
  - Fallow fields are flooded, if appropriate, to provide habitat for fish and waterbirds.
  - Disturbance is prevented where bats may hibernate or birds may rear their young.
  - Delayed hay and grain harvests allow ground-nesting birds to fledge and newborn four-legged animals to move on.
  - Leaving unharvested strips or stubble adjacent to other types of cover, such as grassy or brushy areas or woodlands, will provide high value for wildlife.
  - Retain areas for ground-foraging birds or mow/till before or after nesting season.
  - Provide structurally and compositionally diverse niches for various wildlife that use different layers of native trees, shrubs, wildflowers, grasses and leaf litter.

#### *Agricultural Benefits*

- More stable, diverse wildlife populations will provide more pest management on the farm.

#### *Ecological Benefits*

- Creating more wildlife habitat can support priority species that may be in decline.

#### Related NRCS Conservation Practice Standards (CPS)

- |                               |                                       |
|-------------------------------|---------------------------------------|
| • Brush Management (CPS 314)  | • Riparian Forest Buffer (CPS 391)    |
| • Fence (CPS 382)             | • Riparian Herbaceous Cover (CPS 390) |
| • Field Border (CPS 386)      | • Shallow Water Development (CPS 646) |
| • Hedgerow Planting (CPS 422) | • Structures for Wildlife (CPS 649)   |



## All Types of Operations

### Restoring and Protecting Natural Areas

#### Related NOP Regulations:

**§205.200 – General natural resources and biodiversity conservation**

**§205.2 – Definitions of organic production and natural resources**

*Summary:* Organic production practices must conserve biodiversity and maintain or improve the natural resources of the operation, including soil, water, wetlands, woodlands, and wildlife.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



One of the few remnants of a tall grass prairie is conserved on land with organic certification.

#### Minor Issue



A rare plant community is mowed before it has a chance to flower and set seed again.

#### Major Issue



A wetland is bulldozed.

|                       |                       |  |  |
|-----------------------|-----------------------|--|--|
| Healthy soils         | <input type="radio"/> |  |  |
| Clean water           | <input type="radio"/> |  |  |
| Native plants         | <input type="radio"/> |  |  |
| Pollinators           | <input type="radio"/> |  |  |
| Natural enemy insects | <input type="radio"/> |  |  |
| Reptiles/amphibians   | <input type="radio"/> |  |  |
| Birds                 | <input type="radio"/> |  |  |
| Bats                  | <input type="radio"/> |  |  |
| Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definition: Area of operation

Subpart C – Organic Production and Handling Requirements: §205.203 Soil fertility and crop nutrient management; §205.206 Crop pest, weed, and disease management

## All Types of Operations

### Restoring and Protecting Natural Areas



### Stewardship Goal: Support Biodiversity in Natural Areas

#### *Examples of Practices*

- Woodlands, prairies, riparian habitat, wetlands, and other natural areas are retained, restored, and managed to accommodate native species historically present on the farm.
- Degraded areas are allowed to re-colonize through natural processes such as flooding, beaver dams, germination of remnant seed banks and wildlife feces containing seeds.
- Natural areas are staked off and signage is installed so that they will not be accidentally destroyed by farm work.
- Vegetated corridors that provide safe passage for wildlife are preserved, restored and connected to natural areas on the farm and adjacent properties off the farm.
- Trees are maintained, standing deadwood and fallen and rotting trees are retained, and live denning foliage is left in place for priority species and other wildlife.
- An agricultural conservation easement preserves the farm from development while protecting the natural resources of the land.
- High conservation value areas are not converted to cropland.

#### *Agricultural Benefits*

- Diverse landscapes surrounding a farm can increase the farm's ecosystem services.
- Natural areas on the farm will support pollinators, and predators of pests.

#### *Ecological Benefits*

- Genetic diversity will increase when isolated plants and animals are reconnected with others of their kind by linkages to natural areas.
- Biodiversity conservation will lead to improved wildlife habitat and provide a greater buffer against natural disasters and climate change.

#### Related NRCS Conservation Practice Standards (CPS)

- |  |  |
|--|--|
| • Prescribed Burning (CPS 338)                     | • Shallow Water Development (CPS 646)  |
| • Restoration of Rare/Declining Habitats (CPS 643) | • Stream Habitat Improvement (CPS 395) |
| • Riparian Forest Buffer (CPS 391)                 | • Upland Wildlife Habitat (CPS 645)    |
| • Riparian Herbaceous Cover (CPS 390)              | • Wetland Wildlife Habitat (CPS 644)   |

## All Types of Operations

### Managing Water for Crops, Livestock, Native Species, and Riparian Ecosystems

#### Related NOP Regulations:

**§205.200 – General natural resources and biodiversity conservation**

**§205.2 – Definitions of organic production and natural resources**

*Summary:* Organic production practices must conserve biodiversity and maintain or improve the natural resources of the operation, including soil, water, wetlands, woodlands, and wildlife.

#### Assessing NOP Compliance in the Field - Examples of What to Look for...

##### Compliance



Sky Jones-Lewey, Nueces River Authority

*Riparian woodland vegetation is conserved and restored along river banks.*

##### Minor Issue





















*A narrow band of riparian habitat along the edge of the creek has limited conservation value.*

##### Major Issue



Sky Jones-Lewey, Nueces River Authority

*Riparian area was denuded, causing soil erosion, poor water quality, degraded wetland and woodland vegetation, and eliminating wildlife habitat.*

|   |                       |  |                       |
|---|-----------------------|--|-----------------------|
|  Healthy soils         | <input type="radio"/> |  | <input type="radio"/> |
|  Clean water           | <input type="radio"/> |  | <input type="radio"/> |
|  Native plants         | <input type="radio"/> |  | <input type="radio"/> |
|  Pollinators           | <input type="radio"/> |  | <input type="radio"/> |
|  Natural enemy insects | <input type="radio"/> |  | <input type="radio"/> |
|  Reptiles/amphibians   | <input type="radio"/> |  | <input type="radio"/> |
|  Birds                 | <input type="radio"/> |  | <input type="radio"/> |
|  Bats                  | <input type="radio"/> |  | <input type="radio"/> |
|  Other mammals         | <input type="radio"/> |  | <input type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Area of Operation; Soil and water quality

Subpart C – Organic Production and Handling Requirements: §205.203 Soil fertility and crop nutrient management



## All Types of Operations

### Managing Water for Crops, Livestock, Native Species, and Riparian Ecosystems



#### Stewardship Goal: Optimize Water Use and Riparian Functions

##### *Examples of Practices*

- Fields and pastures are managed to increase water infiltration and reduce runoff.
- If irrigation is used, it is with efficient irrigation systems that are monitored often.
- Fish screens are used when diverting water to avoid fish losses.
- Beaver flow control devices are used, trees are caged, or culverts are fenced to coexist with beavers and their dams which encourage riparian vegetation, buffer flooding intensity, and increase groundwater recharge.
- Regionally appropriate crops are planted, with the knowledge that large portions of conserved water will benefit domestic and native species.
- Structurally diverse buffers of trees, shrubs, grasses, and forbs are conserved or restored in shallow draws, along creeks and streams, and around pools, ponds, and wetlands.
- Setbacks to riparian areas are preserved and managed to prevent tractor damage.
- Ponds are located to avoid adverse impacts on water quality and stream temperature.
- Clean water sources are provided for animal drinking, bathing and nest building.
- Efforts are made to protect or improve the natural functions of a river and the natural disturbance regimes important for aquatic species. For instance, where appropriate, periodic flooding is allowed and drain tiles are removed from converted wetlands. Or a tree that has fallen into a stream, or appears ready to do so, is left in place to provide habitat.

##### *Agricultural Benefits*

- Water conservation can help ensure that groundwater resources are not overdrafted.
- Conserving riparian habitat will lead to stream-bank stabilization, slowing and dissipation of floodwaters, and improvement of water quality.

##### *Ecological Benefits*

- When water is conserved and water quality is protected, multitudes of aquatic and terrestrial wildlife are supported.

#### Related NRCS Conservation Practice Standards (CPS)

- Irrigation Water Management (CPS 449)
- Micro-irrigation (CPS 441)
- Riparian Forest Buffer (CPS 391)
- Stream Habitat Improvement (CPS 395)
- Wetland Wildlife Habitat (CPS 644)

## All Types of Operations

### Controlling Invasive Plants and Animals

#### Related NOP Regulation:

#### **§205.206 (a)(2) – Crop pest, weed, and disease management**

The producer must use management practices to prevent crop pests, weeds, and diseases including but not limited to sanitation measures to remove disease vectors, weed seeds, and habitat for pest organisms.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*The invasive multi-flora rose was present but is now under control. Monitoring occurs and any of this weed that is found is removed immediately.*

#### Minor Issue



*Pampas grass is growing in a small area of the farm and without immediate control it will spread.*

#### Major Issue



*The multi-flora rose is well established and has taken over natural areas that had been used by native species.*

|                       |   |   |   |
|-----------------------|---|---|---|
| Healthy soils         | ■ | ■ | ■ |
| Clean water           | ■ | ■ | ■ |
| Native plants         | ○ | ● | ● |
| Pollinators           | ○ | ◐ | ● |
| Natural enemy insects | ○ | ◐ | ● |
| Reptiles/amphibians   | ○ | ◐ | ● |
| Birds                 | ○ | ◐ | ● |
| Bats                  | ○ | ◐ | ● |
| Other mammals         | ○ | ◐ | ● |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Mulch; Natural resources; Organic production

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.206(c) Crop pest, weed, and disease management

## All Types of Operations

### Controlling Invasive Plants and Animals



### Stewardship Goal: Prevent Spread of Invasives to Natural Areas

#### *Examples of Practices*

- Farmer learns to identify invasive plants and animals and develops a monitoring system.
- Most importantly, invasive species are not allowed to spread to natural areas on and off the farm where they can outcompete native species.
- Care is taken to use only fully composted material, clean soil amendments and mulches, and uncontaminated tractor tools, in order to avoid introducing invasive weeds.
- When new invasive species are found, they are aggressively managed before they become established by setting seed or spreading underground.
- If invasive weeds are overtaking natural areas, several methods can be used, depending on the plant, including mowing, discing, mulching, solarization, hand weeding, fire when done safely with the help of experts, grazing or browsing by appropriate types of livestock, and biological control with insects or pathogens that attack the invasives. Herbicides that are not organically approved are not used.
- In previously degraded areas where invasives have been removed, restoration is occurring with a diversity of native plants that support wildlife.

#### *Agricultural Benefits*

- Removing invasive species before they spread makes them much easier and more cost-effective to manage.

#### *Ecological Benefits*

- Keeping an invasive species from spreading and monopolizing essential habitat resources will mean that light, nutrients, water, and space are available for native species.
- When native plants have room, they support a food web from microbes to top predators.

#### Related NRCS Conservation Practice Standards (CPS)

- |                                     |                                |
|-------------------------------------|--------------------------------|
| • Brush Management (CPS 314)        | • Mulching (CPS 484)           |
| • Critical Area Planting (CPS 342)  | • Prescribed Burning (CPS 338) |
| • Herbaceous Weed Control (CPS 315) | • Prescribed Grazing (CPS 528) |



## Cropland Area Biodiversity

### Promoting Soil Biodiversity

#### Related NOP Regulation:

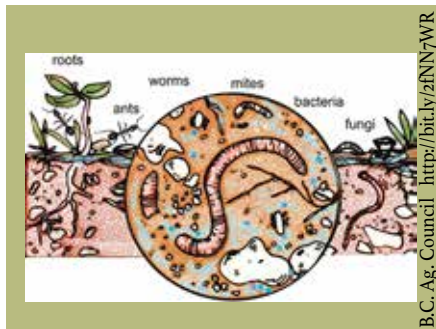
##### \$205.205(a)(b)(c)(d) – Crop rotation

The producer must implement a crop rotation including but not limited to sod, cover crops, green manure crops, and catch crops that provide the following functions that are applicable to the operation:

(a) maintain or improve soil organic matter content; (b) provide for pest management in annual and perennial crops; (c) manage deficient or excess plant nutrients; and (d) provide erosion control.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



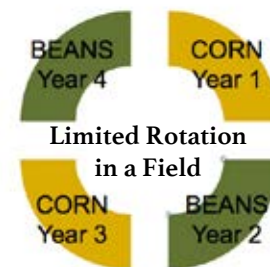
Diverse soil organisms are supported with additions of organic matter.

#### Minor Issue



Using only cover crops and crops from the same family (e.g., mustard cover crop and broccoli crop) can cause pest and disease problems.

#### Major Issue



Corn and beans are rotated with each other in a field, but not with a cover crop or other required rotation crops.

|                       |                       |                                  |                                  |
|-----------------------|-----------------------|----------------------------------|----------------------------------|
| Healthy soils         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Clean water           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Native plants         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Pollinators           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Natural enemy insects | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Reptiles/amphibians   | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Birds                 | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Bats                  | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| Other mammals         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Compost; Cover crop; Organic production; Natural resources

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.203 Soil fertility and crop nutrient management

## Cropland Area Biodiversity

### Promoting Soil Biodiversity



### Stewardship Goal: Increase Soil and Crop Health

#### *Examples of Practices*

- Planting cover crops, practicing rotations, applying manure (using a waiting period before harvest) as well as compost and mulches all increase soil organic matter.
- Adding organic matter fosters diverse soil micro- and macro-organisms, increases soil tilth, reduces erosion, stores carbon, retains nutrients, buffers pH, promotes plant growth, and improves water quality, water infiltration, and water-holding capacity.
- If weed pressure isn't high, cover crops can reduce weeds by dense seeding and/or using a light tine harrow for more delicate germinating weeds without harming hardier cover crop.
- Using strip intercropping and blends of cover crops will lessen compaction, scavenge nutrients from deep in the soil, and provide varying degrees of disease suppression.
- Using cover crops or rotating light-feeding crops (typically root crops and herbs) with heavier-feeding crops (corn, broccoli, and peppers) can help redistribute soil nutrients.
- Alternating shallow and deep-rooted crops can improve soil structure and fertility.
- Planting nitrogen-fixing crops such as beans, peas, and legumes in rotation with crops that don't fix nitrogen can improve fertility and yields.

#### *Agricultural Benefits*

- A healthy, biologically active soil with a full complement of microorganisms can lead to an increase in disease-free plants and a reduction of food-borne pathogens.
- Higher yields and decreased water costs can result from soils with high organic matter.

#### *Ecological Benefits*

- A diverse soil food web contains organisms from microbes and insects to amphibians.

#### Related NRCS Conservation Practice Standards (CPS)

- Compost Facility (CPS 317)
- Conservation Crop Rotation (CPS 328)
- Cover Crops (CPS 340)
- Mulching (CPS 484)
- Nutrient Management (CPS 590)

## Cropland Area Biodiversity

### Conserving the Soil Resource

#### Related NOP Regulation:

#### **§205.203(a) – Soil fertility and crop nutrient management**

The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of soil and minimize soil erosion.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



Washington State University

*Reduced tillage increases organic matter, promotes soil structure and uses less time, fuel and wear-and-tear on a tractor.*

#### Minor Issue



S. Earnshaw










*Even though the culverts are protecting the farm road from eroding, the ditch and fence line are devoid of vegetation and erosion is occurring.*

#### Major Issue



NRCS

*While three of the farm's four parcels are protected from erosion, a significant part of the crop in this parcel is lost to erosion.*

|   |                       |                                  |                                  |
|---|-----------------------|----------------------------------|----------------------------------|
|  Healthy soils         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Clean water           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Native plants         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Pollinators           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Natural enemy insects | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Reptiles/amphibians   | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Birds                 | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Bats                  | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Other mammals         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Organic production; Natural resources; Soil and water quality

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.205 Crop rotation



## Cropland Area Biodiversity

### Conserving the Soil Resource



### Stewardship Goal: Minimize Erosion and Compaction

#### *Examples of Practices*

- Plants cover the soil as much as possible, with very little time left bare without a crop or cover crop.
- Non-invasive plants are used along fencerows, in ditches, and in the understory of perennial crops.
- Annual and perennial cover crops keep soil from eroding, especially during rainy season.
- Native grass filter strips can reduce sheet and rill erosion.
- Grassed waterways and riparian vegetation can stabilize soil in ditches and rivers.
- Careful water applications can prevent irrigation-induced soil erosion.
- Arranging crop rows on contours and avoiding steep areas can reduce erosion.
- Planting perennials, instead of annuals, on the steepest hillsides can reduce soil disturbance in areas most vulnerable to erosion.
- Using reduced or minimum tillage or mulching can increase organic matter and lessen compaction and erosion.
- Tractor operations are conducted on soil that is not saturated.
- Rotating crops can foster soil structure and good tilth, minimizing erosion.
- Strips of cover crops are interspersed with strips of the crop to save soil and improve water quality.
- Windbreaks reduce the incidence of soil loss in windy situations.
- Highly Erodible Land as defined by a Farm Bill provision is put in conservation cover.

#### *Agricultural Benefits*

- The farm retains soil, improves soil tilth, and continues to be productive.
- Diverse soil microbial and invertebrate communities are stimulated and nurtured.

#### *Ecological Benefits*

- Off-site transport of sediments and nutrients to aquatic systems is reduced.

#### Related NRCS Conservation Practice Standards (CPS)

- |                                |                                   |
|--------------------------------|-----------------------------------|
| • Conservation Cover (CPS 327) | • Mulching (CPS 484)              |
| • Contour Farming (CPS 330)    | • Reduced Till (CPS 345)          |
| • Filter Strips (CPS 393)      | • Stripcropping (CPS 585)         |
| • Grassed Waterway (CPS 412)   | • Windbreak/Shelterbelt (CPS 380) |

## Cropland Area Biodiversity

### Protecting Water Quality

#### Related NOP Regulation:

#### \$205.203(c) – Soil Fertility and Crop Nutrient Management

A producer must manage plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination of crops, soil, or *water* [emphasis added], by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances...

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



S. Earnshaw

A filter strip next to a riparian area helps to protect water quality in the stream.

#### Minor Issue



NRCS










Irrigation water is applied too soon after an application of manure and causes contaminated runoff.

#### Major Issue



The Environment Agency

When manure is applied to frozen ground in the winter, runoff can cause water pollution during spring thaw.

|   |                       |                                  |                                  |
|---|-----------------------|----------------------------------|----------------------------------|
|  Healthy soils         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Clean water           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Native plants         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Pollinators           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Natural enemy insects | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Reptiles/amphibians   | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Birds                 | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Bats                  | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Other mammals         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Compost; Organic production; Natural resources; Soil and water quality  
 Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.203(c) Soil fertility and crop nutrient management

## Cropland Area Biodiversity

### Protecting Water Quality



### Stewardship Goal: Prevent Water Contamination

#### *Examples of Practices*

- Nutrient needs of crops are calculated, applying only the amounts that crops can take up as fertilizer, preventing nutrient loss and water contamination.
- Irrigation applications are managed to prevent nutrient leaching beyond the root zone.
- Ditches and the ends of crop furrows are planted with native grasses to filter out sediments.
- Sediment basins are placed at the low end of fields to intercept eroded sediments.
- Increasing soil biodiversity with organic matter helps to tie up nutrients and improve infiltration.
- Fertilizers, manures and composts are stored away from waterways or wells.
- Water resources are protected from contamination and erosion by installation of native riparian buffers that filter fertilizers, pesticides and pathogens in water. The width of the buffer is determined by the steepness of the slope.
- Wetlands are restored to help filter pollutants before they reach waterways.
- Stream banks are protected from erosion with the use of practices such as bundles of willow stakes, or slope enhancement.

#### *Agricultural Benefits*

- Excess amounts of sediment, fertilizers, and pesticides are reduced in surface runoff.
- Excess nutrients and other chemicals are reduced in groundwater flow.
- Reduction of inputs results in cost savings.

#### *Ecological Benefits*

- Less nitrogen fertilizer use can reduce N<sub>2</sub>O emissions that are harmful to climate stability.
- Nutrient reduction can prevent groundwater and surface water contamination that leads to polluted wells, lakes, rivers and low-oxygen dead zones where aquatic life cannot survive.

#### Related NRCS Conservation Practice Standards (CPS)

- |   |  |
|---|--|
| • Compost Facility (CPS 317)            | • Riparian Herbaceous Cover (CPS 390)  |
| • Grassed Waterway (CPS 412)            | • Sediment Basin (CPS 350)             |
| • Irrigation Water Management (CPS 449) | • Water and Sediment Control (CPS 638) |
| • Nutrient Management (CPS 590)         | • Wetland Restoration (CPS 657)        |



## Cropland Area Biodiversity

### Incorporating Biodiversity in Annual and Perennial Systems

#### Related NOP Regulations:

**\$205.200 – General natural resources and biodiversity conservation**

**\$205.205 – Crop rotation**

The producer must implement a crop rotation... (From Subpart A definitions: Perennial cropping systems employ means such as alley cropping, intercropping, and hedgerows to introduce biological diversity in lieu of crop rotation.)

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



Oak trees are conserved in an olive orchard.

#### Minor Issue






























Weeds stunt growth, provide little biological diversity and in lieu of rotation do not substitute for intentional planting of alley crops, intercrops or hedgerows.

#### Major Issue



While three of the farm's four parcels support biodiversity, nothing but the crop is allowed to grow on this one.

|   |                       |  |  |
|---|-----------------------|--|--|
|  Healthy soils         | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |
|  Clean water           | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |
|  Native plants         | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |
|  Pollinators           | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |
|  Natural enemy insects | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |
|  Reptiles/amphibians   | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |
|  Birds                 | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |
|  Bats                  | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |
|  Other mammals         | <input type="radio"/> |  <input type="radio"/> |  <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Natural resources; Organic production

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.203(b) Soil fertility and crop nutrient management; §205.206 Crop pest, weed, and disease management

## Cropland Area Biodiversity

### Incorporating Biodiversity in Annual and Perennial Systems



### Stewardship Goal: Provide Habitat for Pollinators and Other Wildlife

#### *Examples of Practices*

- In-field pollinator and natural enemy insectary plants, cover crops, and companion plants are grown to provide cover and habitat for natural enemy insects, birds and other wildlife in each physically separate, non adjacent parcel.
- Native plant field borders, hedgerows and windbreaks are installed in wide swaths and linked to natural areas, which are conserved on and off the farm where feasible.
- Invasive weeds are replaced with native grasses and forbs to attract pollinator, predatory, and parasitic insects and to help control erosion.
- Non-invasive plants are intentionally managed to support beneficial organisms when they do not harbor pests and invade crops. Weeds present by default, whose only known benefits are that they cover soil, are not enough to meet the requirement to support pollinators and/or other wildlife.
- Non-invasive plants are allowed in the understory, along fencerows and in ditches, roadsides, equipment yards, and around outbuildings and handling and processing facilities.
- Fallow fields are planted with diverse cover crops that displace invasive weeds and provide temporary wildlife habitat.
- Mixed crops and crop rotations ensure that some fields always provide food (intentionally planted wildlife food crops or crop leftovers), water, and cover for priority and other wildlife.

#### *Agricultural Benefits*

- Covering soil with habitat that supports beneficial organisms also protects water quality.
- The need for honeybee rentals is reduced because of nectar and pollen in native plants.

#### *Ecological Benefits*

- Since birds and other wildlife have evolved with native habitat, these plants provide more food resources than do non-native plantings.
- Helping to conserve pollinators through farm management aids in maintaining wild plant diversity and wider ecosystem stability.

#### Related NRCS Conservation Practice Standards (CPS)

- |                                |                                     |
|--------------------------------|-------------------------------------|
| • Alley Cropping (CPS 311)     | • Hedgerow Planting (CPS 422)       |
| • Conservation Cover (CPS 327) | • Strip Cropping (CPS 585)          |
| • Cover Crop (CPS 340)         | • Upland Wildlife Habitat (CPS 645) |
| • Field Border (CPS 386)       | • Windbreak Shelterbelt (CPS 380)   |

## Cropland Area Biodiversity

### Providing Habitat for Natural Enemies of Pests

#### Related NOP Regulation:

#### §205.206(a)(b)(2) – Crop pest, weed, and disease management

The producer must use management practices to prevent crop pests, weeds, and diseases. Pest problems may be controlled through mechanical or physical methods including, but not limited to, development of habitat for natural enemies of pests.

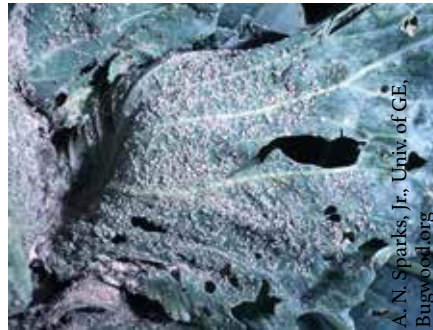
### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*A native plant hedgerow provides habitat for insects that are the natural enemies of crop pests.*

#### Minor Issue



*Natural enemy habitat was accidentally tilled in by new employee and farm now has no pest management strategy to keep cabbage aphids from proliferating.*

#### Major Issue



*The farm had a cover crop at the beginning of the year, but once the cabbage crop was planted, wildlife habitat, especially for natural enemies, was lacking.*

|                       |                       |  |                       |  |                       |
|-----------------------|-----------------------|--|-----------------------|--|-----------------------|
| Healthy soils         | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |
| Clean water           | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |
| Native plants         | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |
| Pollinators           | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |
| Natural enemy insects | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |
| Reptiles/amphibians   | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |
| Birds                 | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |
| Bats                  | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |
| Other mammals         | <input type="radio"/> |  | <input type="radio"/> |  | <input type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Organic production; Natural resources

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.205(b) Crop rotation; §205.206(a)(d) Crop pest, weed, and disease management



## Cropland Area Biodiversity

### Providing Habitat for Natural Enemies of Pests



J. Berger, Bugwood.org

### Stewardship Goal: Manage Pest Problems

#### *Examples of Practices*

- At all times during the production season, mixed flowering crops or cover crops provide a varied food sources for natural enemies and pollinators.
- Insectary strips, hedgerows, and windbreaks that flower sequentially before and after the crop are planted to benefit insect predators and parasitoids as well as insectivorous and predatory birds.
- A layered complexity of native plants ensures habitat and a food web for beneficial wildlife.
- Unused areas like field corners, ditch banks, irrigation canals, fencerows, and roadways are planted to extend native habitat.
- Flowering plants are interspersed in crops, or at the ends of crop rows.
- Native trees are planted or conserved (even as snags, unless infested with damaging disease) for roosting and nesting habitat of birds, bats, and other wildlife.
- Bird and bat boxes support predatory birds and insectivorous birds and bats.
- Trap crops can be used as part of a strategy to draw pests away from the cash crop.
- Alternate-row mowing and tillage of cover crops can provide refuge for beneficial organisms.

#### *Agricultural Benefits*

- Providing habitat for natural enemies can reduce the need for pest management inputs.
- Replacing annual weeds with perennial vegetation can reduce weed pressure and pests associated with weeds.

#### *Ecological Benefits*

- Building wildlife populations, including natural enemies, in the larger landscape will result in healthier natural areas.
- Habitat areas can benefit priority species and may serve as a wildway or link to neighboring habitats, contributing to a broader conservation network.

#### Related NRCS Conservation Practice Standards (CPS)

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| • Field Border (CPS 386)              | • Structures for Wildlife (CPS 649)  |
| • Hedgerow Planting (CPS 422)         | • Tree/Shrub Establishment (CPS 612) |
| • Riparian Forest Buffer (CPS 391)    | • Upland Wildlife Habitat (CPS 645)  |
| • Riparian Herbaceous Cover (CPS 390) | • Windbreak Shelterbelt (CPS 380)    |

## Cropland Area Biodiversity

### Preventing Air- and Water-Borne Crop Contamination

#### Related NOP Regulation:

#### §205.202(c) – Land Requirements

Any field or farm parcel must have distinct, defined buffer zones such as runoff diversions, to prevent the unintended application of a prohibited substance to the crop or contact with a prohibited substance applied to adjoining land that is not under organic management.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



A windbreak currently intercepts pesticide drift, and has conservation benefits of protecting the soil and the crop, and supporting beneficial organisms.

#### Minor Issue












A runoff diversion between a conventional and organic farm is not maintained and has the potential for a blow-out during a storm event like above.

#### Major Issue



Aerial applications with no buffers (windbreak, hedgerows, farm roads, ditches, etc) and with wind blowing towards organic field can result in drift.

|   |                       |                                  |                                  |
|---|-----------------------|----------------------------------|----------------------------------|
|  Healthy soils         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Clean water           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Native plants         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Pollinators           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Natural enemy insects | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Reptiles/amphibians   | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Birds                 | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Bats                  | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Other mammals         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Buffer zone; Drift; Organic production; Natural resources

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.202(b) Land requirements; §205.206 Crop pest, weed, and disease management

## Cropland Area Biodiversity

### Preventing Air- and Water-Borne Crop Contamination



### Stewardship Goal: Use Buffers and Diversions to Prevent Contamination

#### *Examples of Practices*

- Windbreaks and hedgerows composed of native shrubs and trees are located between the organic field and neighboring contamination sites to intercept pesticide drift, pathogens, genetic drift, chemical fertilizers, and dust that can cause pest infestations.
- Riparian trees are planted and conserved along banks to intercept contamination from across the river.
- The width of the plantings that intercept airborne contamination is based on the prevailing wind direction, strength and occurrence of wind, topography, and type of drift.
- The height, leaf area, and whether the plants are evergreen should be considered.
- Diversion ditches and grassed waterways are used to filter and to direct contaminated water away from organic fields.

#### *Agricultural Benefits*

- Farms can produce crops free from off-site contamination.
- Reducing winds can lessen soil erosion, decrease plant respiration, and help increase plant growth and yields.
- When diverse native shrubs and trees are used, they add multiple benefits of supporting pollinating and predatory organisms.

#### *Ecological Benefits*

- Woody plants will sequester carbon in biomass and in soils.

#### Related NRCS Conservation Practice Standards (CPS)

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| • Diversion (CPS 362)                 | • Hedgerow Planting (CPS 422)      |
| • Drainage Water Management (CPS 554) | • Hillside Ditch (CPS 423)         |
| • Field Border (CPS 386)              | • Riparian Forest Buffer (CPS 391) |
| • Filter Strip (CPS 393)              | • Windbreak/Shelterbelt (CPS 380)  |



## Cropland Area Biodiversity

### Co-Managing for Food Safety and Conservation

#### Related NOP Regulation:

#### **§205.203(c) – Soil fertility and crop nutrient management practice**

The producer must manage plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination of *crops*, soil, or *water* [emphasis added], by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*Composting manure reduces pathogens.*

#### Minor Issue












*On a windy day, dust-containing pathogens from a manure application may be blowing onto the crop and habitat.*

#### Major Issue



*No waiting period between applying manure-contaminated farm pond water and harvest (NOP issue); no water tests before use on covered produce (FDA issue).*

|   |                                  |                                  |                                  |
|---|----------------------------------|----------------------------------|----------------------------------|
|  Healthy soils         | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
|  Clean water           | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
|  Native plants         | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Pollinators           | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
|  Natural enemy insects | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
|  Reptiles/amphibians   | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
|  Birds                 | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
|  Bats                  | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
|  Other mammals         | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Compost; Disease vectors; Manure; Organic production; Natural resources

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.202 Land requirements; §205.203(b) Soil fertility and crop nutrient management; §205.205 Crop rotation; §205.239(e) Livestock living conditions

## Cropland Area Biodiversity

### Co-Managing for Food Safety and Conservation



### Stewardship Goal: Prevent Contamination of Crops

#### *Examples of Practices*

- Conservation practices are not compromised by buyer food safety requirements that conflict with NOP and FDA regulations and the Food Safety Modernization Act.
- The location of the crop is strategically placed away from sources of potential contamination, such as manure storage, and not in wildlife corridors or on recently flooded lands.
- High-risk areas are planted to grass or alfalfa for livestock, or for produce typically not eaten raw.
- Increasing soil organic matter with compost and cover crops nourishes beneficial microorganisms that prey on, antagonize, and compete with pathogens.
- A waiting period of at least 90 or 120 days—depending on whether the edible portion does or does not contact the soil—is instituted between applications of manure and the harvest.
- Irrigation water is tested if it is likely to contact produce typically eaten raw.
- While wildlife typically has low risk of carrying human pathogens, localized populations may have increased risk, so monitoring for significant animal contamination during the growing season and especially before harvest will help determine if any part of the crop should not be harvested or if wildlife is present in large numbers and needs to be deterred.
- Habitat is conserved for birds of prey and predatory mammals that keep rodents in check.
- Filter strips, windbreaks, and riparian areas and other conservation practices help to reduce pathogens in water and air.
- State and federal requirements for managing manure and protecting water sources from manure contamination are followed.

#### *Agricultural Benefits*

- Co-management of food safety and conservation helps to satisfy Good Agricultural Practices (GAPs) required by buyers and FDA's Produce Rule.

#### *Ecological Benefits*

- Wildlife, including priority species, is able to co-exist with agriculture on the landscape.

#### Related NRCS Conservation Practice Standards (CPS)

- |                              |  |
|------------------------------|--|
| • Compost Facility (CPS 317) | • IPM (CPS 595)                        |
| • Filter Strip (CPS 393)     | • Riparian Forest Buffer (CPS 391)     |
| • Grassed Waterway (CPS 412) | • Riparian Herbaceous Buffer (CPS 390) |
| • Hedgerow (CPS 422)         | • Windbreak/Shelterbelt (CPS 380)      |

## Cropland Area Biodiversity

### Building Climate Change Benefits in Crop Production

#### Related NOP Regulations:

**\$205.200 – General natural resources and biodiversity conservation**

**\$205.203 (e)(3)– Soil fertility and crop nutrient management**

The producer must not use: Burning as a means of disposal for crop residues produced on the operation: *Except*, That, burning may be used to suppress the spread of disease or to stimulate seed germination.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



Conserving woody vegetation on the farm will store carbon and support wildlife.

#### Minor Issue






























If there is no nutrient management plan, too much manure may be applied, causing excess nitrogen to pollute water and off-gas into the atmosphere.

#### Major Issue



Burning crop stubble to reduce residues also releases carbon into the atmosphere.

|   |                       |  |   |
|---|-----------------------|--|---|
|  Healthy soils         | <input type="radio"/> |  |  |
|  Clean water           | <input type="radio"/> |  |  |
|  Native plants         | <input type="radio"/> |  |  |
|  Pollinators           | <input type="radio"/> |  |  |
|  Natural enemy insects | <input type="radio"/> |  |  |
|  Reptiles/amphibians   | <input type="radio"/> |  |  |
|  Birds                 | <input type="radio"/> |  |  |
|  Bats                  | <input type="radio"/> |  |  |
|  Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Compost; Cover crop; Natural resources; Organic production

Subpart C – Organic Production and Handling Requirements: §205.203(a-d) Soil fertility and crop nutrient management; §205.205 Crop rotation; §205.206 Crop pest, weed, and disease management



## Cropland Area Biodiversity

### Building Climate Change Benefits in Crop Production



### Stewardship Goal: Diversify for Farm Resilience and Climate Stability

#### *Examples of Practices*

- Low or no-tillage can keep carbon in the soil rather than releasing it into the atmosphere as carbon dioxide and can reduce carbon emissions from excess fuel consumption.
- Monitoring crop irrigation and using systems that minimize evaporation, such as drip tape, can reduce pumping costs and energy use that contributes to greenhouse gas emissions.
- Increasing organic matter with cover crops, mulches and compost can improve soil water-holding capacity and resilience of crop plants during drought.
- Using catch crops, such as ryegrass, *Phacelia*, or mustard ties up nitrogen and stops it from off-gassing into air.
- Managing nitrogen, by timing applications to avoid typical seasons of rain or snow runoff, can minimize nutrient loss and reduce production of excess greenhouse gases.
- The need for nitrogen fertilizers (which use fossil fuels for synthesis) can be reduced when the soil organic matter builds up, and is rapidly cycled by an active soil microbial community.
- Conserving and re-establishing riparian areas can help stabilize streambanks during heavy flooding and can capture nitrogen in runoff before it off-gases or pollutes a stream.
- Diversifying crops and planting natural enemy insect habitat can minimize pest outbreaks, which are predicted to alter more rapidly as the result of changing climate.
- Carbon will be stored in woody biomass by planting non-crop vegetation such as hedgerows, windbreaks and farm woodlots.

#### *Agricultural Benefits*

- The farm can withstand and lessen effects of climate change through good stewardship.

#### *Ecological Benefits*

- Habitat planted to store carbon can also support natural enemy birds, insects and other wildlife impacted by climate change.

#### Related NRCS Conservation Practice Standards (CPS)

- |   |                                    |
|---|------------------------------------|
| • Compost Facility (CPS 317)            | • Nutrient Management (CPS 590)    |
| • Cover Crop (CPS 340)                  | • Reduced Till (CPS 345)           |
| • Hedgerow Planting (CPS 422)           | • Riparian Forest Buffer (CPS 391) |
| • Irrigation Water Management (CPS 449) | • Windbreak/Shelterbelt (CPS 380)  |

## Cropland Area Biodiversity

### Diversifying Crop Species and Varieties

#### Related NOP Regulation:

#### **§205.206 (a)(3) – Crop pest, weed, and disease prevention**

The producer must use cultural practices that enhance crop health, including selection of plant species and varieties with regard to suitability to site-specific conditions and resistance to prevalent pests, weeds, and diseases.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*The tomato variety was selected for climate appropriateness and resistance to prevalent diseases.*

#### Minor Issue





























*Tomato crop failed because even though extensive organic pesticides were used, available plants that are resistant to Fusarium wilt were not used.*

#### Major Issue



*The crop variety is susceptible to disease and requires the continual use of copper pesticides. Tests show copper accumulation in the soil.*

|   |                          |  |  |
|---|--------------------------|--|--|
|  Healthy soils         | <input type="radio"/>    |  <input type="radio"/>    |  <input type="radio"/>    |
|  Clean water           | <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |
|  Native plants         | <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |
|  Pollinators           | <input type="radio"/>    |  <input type="radio"/>    |  <input type="radio"/>    |
|  Natural enemy insects | <input type="radio"/>    |  <input type="radio"/>    |  <input type="radio"/>    |
|  Reptiles/amphibians   | <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |
|  Birds                 | <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |
|  Bats                  | <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |
|  Other mammals         | <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Crop; Crop rotation; Cultural methods; Disease vectors; Natural resources; Organic production; Planting stock

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation

## Cropland Area Biodiversity

### Diversifying Crop Species and Varieties



### Stewardship Goal: Broaden Crop Adaptability

#### *Examples of Practices*

- Avoid large scale monocropping by strip cropping with various crops to lessen pest and disease spread through a crop.
- Create smaller sized fields for more field “edges” which then provide beneficial insect habitat as well as lessening the spread of pests and diseases through similar crops.
- Growing several genetic strains of the same crop or heirloom varieties can help protect from pests and diseases.
- Planting locally adapted seed varieties or those suited to site-specific conditions that address soil type, climate, and topography can reduce pest and disease problems.
- Selecting varieties resistant to overwintering pests—which may be increasing in some places due to warmer winters brought about by climate change—can reduce pest infestations.
- Choosing varieties that require fewer chilling hours will utilize traits that break dormancy and begin flowering on time, resulting in better yields.
- Drought- and heat-tolerant varieties are chosen with water conservation in mind.
- When possible, using varieties that have been developed for organic production can reduce pest and disease issues.
- Using many types of cover crops will support various kinds of biological diversity above and below ground.
- The more diverse the crop selections, the more natural enemy and pollinator insects.

#### *Agricultural Benefits*

- Strengthening genetic diversity with multiple crop species and varieties can reduce pests and diseases.

#### *Ecological Benefits*

- More field “edges” allow for the planting of trees and shrubs for beneficial birds as well as windbreaks where wind is a production or erosion concern.

#### Related NRCS Conservation Practice Standards (CPS)

- Cover Crop (CPS 340)



## Livestock Area Biodiversity

### Improving Pastures and Rangelands

#### Related NOP Regulation:

#### **§205.239(e) – Livestock Living Conditions**

The producer of an organic livestock operation must manage manure in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, heavy metals, or pathogenic organisms and optimizes recycling of nutrients and must manage pastures and other outdoor access areas in a manner that does not put soil or water quality at risk.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*The livestock is managed so that the pasture does not receive too much manure.*

#### Minor Issue






























*If this pig-rooted pasture isn't soon rested and seeded with a pasture mix, erosion would result.*

#### Major Issue



*Livestock overgrazing is causing erosion because they are in the same area for extended periods of time, without allowing a sufficient recovery period.*

|   |                       |  |   |
|---|-----------------------|--|---|
|  Healthy soils         | <input type="radio"/> |  |  |
|  Clean water           | <input type="radio"/> |  |  |
|  Native plants         | <input type="radio"/> |  |  |
|  Pollinators           | <input type="radio"/> |  |  |
|  Natural enemy insects | <input type="radio"/> |  |  |
|  Reptiles/amphibians   | <input type="radio"/> |  |  |
|  Birds                 | <input type="radio"/> |  |  |
|  Bats                  | <input type="radio"/> |  |  |
|  Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Graze; Livestock; Manure; Natural resources; Organic production; Pasture; Soil and water quality

Subpart C – Organic Production and Handling Requirements: §205.200 General; §205.238 Livestock health care; §205.239(a)(5), (b)(4) Livestock living conditions; §205.240 Pasture

## Livestock Area Biodiversity

### Improving Pastures and Rangelands



Consider Bardwell Farm

### Stewardship Goal: Protect Soils, Water and Plants

#### *Examples of Practices*

- Pastures and rangelands are well managed, overgrazing is prevented, and excessive amounts of manure do not contaminate forage, soil, water, or wildlife.
- Chicken pastures include either movable coops lacking a floor, or rotation in multiple yards next to movable or stationary housing, so the chickens don't overgraze the area.
- Pastures are grazed to encourage a variety of healthy, vigorous native forage plants that help to filter manure runoff from pastures and to build soil microbial life.
- Trampled and eroded areas are restored with a diversity of native perennial grasses and forbs for the benefit of livestock as well as wildlife.
- Invasive species are managed using biological control methods, or by grazing sheep, goats or pigs, or with prescribed burning done with the assistance of experts.
- The frequency, intensity, and timing of livestock grazing are managed to minimize negative impacts to soil, vegetation and ecosystem health.
- Wetlands and other soggy areas are not grazed, or are minimally grazed, so manure left by livestock does not contaminate water resources.

#### *Agricultural Benefits*

- Livestock health improves with well-managed pastures.
- Chickens benefit when pastures are composed of diverse forage that supports chicken food—insects and seed-producing plants.

#### *Ecological Benefits*

- Clean water fosters healthy wildlife that is less likely to spread disease.

#### Related NRCS Conservation Practice Standards (CPS)

- |   |  |
|---|--|
| • Forage and Biomass Planting (CPS 512)       | • Range Planting (CPS 550)             |
| • Forage Harvest Management (CPS 511)         | • Silvopasture Establishment (CPS 381) |
| • Grazing Land Mechanical Treatment (CPS 548) | • Stream Crossing (CPS 578)            |
| • Prescribed Grazing (CPS 528)                |  |

## Livestock Area Biodiversity

### Employing Wildlife Friendly Management Practices

#### Related NOP Regulations:

**§205.200 – General natural resources and biodiversity conservation**

**§205.2 – Definitions of organic production and natural resources**

*Summary:* Organic production practices must conserve biodiversity and maintain or improve the natural resources of the operation, including soil, water, wetlands, woodlands, and wildlife.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



J. Baumgartner

*Operator does not shoot, trap, or poison native predators to protect livestock. Instead guard dogs are used for protection.*

#### Minor Issue



J. Sarvis





































*Operator kills a native fox after deciding it is killing chickens, and while some protection strategies were tried, there was no recorded proof it was the culprit.*

#### Major Issue



S. Creek Outdoors

*Operator kills multiple coyotes, not trying alternatives to discourage local populations, and continually kills new coyotes that fill the void.*

|   |   |  |   |
|---|---|--|---|
|  Healthy soils         |  |  |  |
|  Clean water           |  |  |  |
|  Native plants         |  |  |  |
|  Pollinators           |  |  |  |
|  Natural enemy insects |  |  |  |
|  Reptiles/amphibians   |  |  |  |
|  Birds                 |  |  |  |
|  Bats                  |  |  |  |
|  Other mammals         |  |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Livestock; Pasture

Subpart C – Organic Production and Handling Requirements: §205.238 Livestock health care; §205.239 Livestock living conditions; §205.240 Pasture



## Livestock Area Biodiversity

### Employing Wildlife Friendly Management Practices



### Stewardship Goal: Promote Coexistence of Wildlife and Livestock

#### *Examples of Practices*

- Operator does not shoot, trap, or poison native predators. Instead, various benign practices are used: a) guard animals such as llamas, donkeys or specific breeds of dogs can protect livestock, b) herding and/or frequent and unpredictable appearances are made by operator, c) small animals are grazed with large ones, d) vulnerable animals are housed overnight in protected areas, e) electric fencing is used; f) pasture is only used when predation pressure is low, g) livestock is bred for protective instincts, h) predator lights are used, i) diverse landscapes that support natural prey for predators are conserved and j) circumstances of livestock death are documented and evaluated as to predator role.
- Non-predatory wildlife, such as grazers, birds, and prairie dogs, is allowed to co-exist with livestock.
- High tensile wire instead of barbed or woven wire fencing is used to lessen injuries and death of wildlife and help reduce rodent populations.
- Movable enclosures are used instead of permanent fencing where wildlife corridors occur.

#### *Agricultural Benefits*

- Not killing predators has the benefit of not creating empty territory for new, often young, unskilled and dispersing predators that may be more apt to take livestock than wild prey.
- When coexistence is practiced, predators are already experienced with electric fencing and the threat of guard dogs and so are more apt to stay away from livestock.

#### *Ecological Benefits*

- Large predators such as mountain lions and coyotes help regulate the meso-predators like raccoons and foxes from overly impacting songbirds, amphibians, and other small prey.
- Large predators help to keep native ruminants like deer from denuding the landscape.

#### Related NRCS Conservation Practice Standards (CPS)

- Fence (CPS 382)

## Livestock Area Biodiversity

### Protecting Natural Wetlands, Riparian Areas and Other Sensitive Habitats

#### Related NOP Regulation:

#### §205.240(c)(8) – Pasture

The pasture plan shall include a description of the erosion control and protection of natural wetlands and riparian areas practices.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*Livestock near wetland is allowed to mob-graze the area quickly and then are moved elsewhere before they damage this sensitive resource.*

#### Minor Issue






























*Livestock is in the riparian area and the pasture plan does not describe how over-grazing of this site will be prevented.*

#### Major Issue



*Livestock has denuded the riparian area.*

|   |                       |  |   |
|---|-----------------------|--|---|
|  Healthy soils         | <input type="radio"/> |  |  |
|  Clean water           | <input type="radio"/> |  |  |
|  Native plants         | <input type="radio"/> |  |  |
|  Pollinators           | <input type="radio"/> |  |  |
|  Natural enemy insects | <input type="radio"/> |  |  |
|  Reptiles/amphibians   | <input type="radio"/> |  |  |
|  Birds                 | <input type="radio"/> |  |  |
|  Bats                  | <input type="radio"/> |  |  |
|  Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Graze; Livestock; Natural resources; Organic production; Pasture

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.238 Livestock health care; §205.239 Livestock living conditions; §205.240(c)(2-5) Pasture

## Livestock Area Biodiversity

### Protecting Natural Wetlands, Riparian Areas and Other Sensitive Habitats



### Stewardship Goal: Conserve Resources in the Pasture Plan

#### *Examples of Practices*

- If analysis of plant, water, and soil determines that sensitive habitats will not be harmed when grazed, then the grazing management plan should outline what time of year, for how long, and with what animals.
- Animals are fed away from natural water sources and sensitive areas to minimize impact.
- Off-stream livestock water troughs with wildlife escape ramps and mineral blocks are located in multiple places to disperse livestock and reduce impact on sensitive habitats.
- Native vegetation along waterways is conserved, so bank erosion is prevented and stored groundwater is slowly released into the stream during drier months of the year.
- Fencing and designated stream crossings keep livestock out of sensitive habitats including riparian zones and easily trampled or polluted rare plant and animal communities.
- The natural process of plant regeneration is allowed to occur in natural wetlands, riparian areas, and other sensitive habitats.

#### *Agricultural Benefits*

- Protecting habitats associated with water can increase water storage and dissipate stream energy, thereby enhancing stream-bank stability.

#### *Ecological Benefits*

- The grazing management plan ensures that native vegetation and wildlife habitat will be protected, and that sediments, nutrients, and pathogens will be kept out of water sources.
- Increased carbon storage in above-ground plant biomass and underground root mass.
- Provide habitat for wildlife and maintain habitat corridors.

#### Related NRCS Conservation Practice Standards (CPS)

- |                                    |                                       |
|------------------------------------|---------------------------------------|
| • Fence (CPS 382)                  | • Riparian Herbaceous Cover (CPS 390) |
| • Pipeline (CPS 516)               | • Stream Crossing (CPS 578)           |
| • Prescribed Grazing (CPS 528)     | • Water Facility (CPS 614)            |
| • Riparian Forest Buffer (CPS 391) | • Wetland Restoration (CPS 657)       |



## Livestock Area Biodiversity

### Using Native Trees and Shrubs For Livestock and Wildlife Benefits

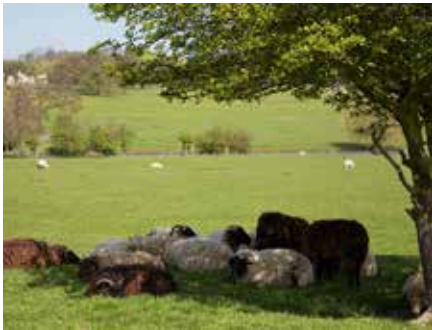
#### Related NOP Regulation:

#### **§205.239(a)(1) – Livestock Living Conditions**

The producer of an organic livestock operation must establish and maintain...year-round access for all animals to the outdoors, shade, shelter, exercise areas, fresh air, clean water for drinking, and direct sunlight, suitable to the species, its stage of life, the climate, and the environment...

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*Shade is available for livestock at all times.*

#### Minor Issue






























*Even though the livestock have sufficient forage, for days at a time in hot weather they do not have access to shade.*

#### Major Issue



*Livestock is left without shade or forage.*

|   |                       |  |   |
|---|-----------------------|--|---|
|  Healthy soils         | <input type="radio"/> |  |  |
|  Clean water           | <input type="radio"/> |  |  |
|  Native plants         | <input type="radio"/> |  |  |
|  Pollinators           | <input type="radio"/> |  |  |
|  Natural enemy insects | <input type="radio"/> |  |  |
|  Reptiles/amphibians   | <input type="radio"/> |  |  |
|  Birds                 | <input type="radio"/> |  |  |
|  Bats                  | <input type="radio"/> |  |  |
|  Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Livestock; Natural resources; Organic production; Pasture; Shelter

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.238 Livestock health care; §205.240(c)(6) Pasture

## Livestock Area Biodiversity

### Using Native Trees and Shrubs For Livestock and Wildlife Benefits



### Stewardship Goal: Provide Access to Shade and Increase Biodiversity

#### *Examples of Practices*

- Structurally diverse native trees and shrubs—which provide shade for livestock, flowers for pollinators and other insects, and seeds, berries and nuts for birds and other wildlife—are conserved and restored on the edges of pastures, such as in riparian areas and on woodland margins.
- Networks of tree lines are planted and protected until they are able to survive browsing pressure, in order to provide shade throughout the pastures on the ranch.
- To support biodiversity, native trees are conserved and restored in savannahs and other ecosystems where they were historically present.
- Grazing is managed so as to provide enough optimum forage to dissuade livestock from consuming all germinating native trees in savannahs and on pasture edges.

#### *Agricultural Benefits*

- Trees provide hunting perches for rodent-eating predators.
- Shade for livestock can result in less heat stress, more weight gain for some breeds, and an increase in milk yields of dairy cattle.

#### *Ecological Benefits*

- Shade trees add diversity to the landscape and can serve as stopping points for migratory birds and as nesting and roosting sites for other types of wildlife.

#### Related NRCS Conservation Practice Standards (CPS)

- Hedgerow Planting (CPS 422)
- Prescribed Grazing (CPS 528)
- Riparian Forest Buffer (CPS 391)
- Silvopasture Establishment (CPS 381)
- Tree and Shrub Establishment (CPS 612)

## Livestock Area Biodiversity

### Minimizing Occurrence and Spread of Disease in Housing, Pastures, and the Watershed

#### Related NOP Regulation:

#### **§205.238(a)(3) – Livestock Health Care**

The producer must establish and maintain preventive livestock health care practices, including appropriate housing, pasture conditions, and sanitation practices to minimize the occurrence and spread of diseases and parasites.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



Lambs are grazing on pasture containing a mix of grass, clover and other forbs.

#### Minor Issue
























Highly concentrated animals can become stressed, compromising their immune systems and possibly spreading pathogens into the landscape.

#### Major Issue



Cows are deep in mud and the runoff is likely spreading any disease and parasites that are present.

|   |                       |  |   |
|---|-----------------------|--|---|
|  Healthy soils         | <input type="radio"/> |  |  |
|  Clean water           | <input type="radio"/> |  |  |
|  Native plants         | <input type="radio"/> |  |  |
|  Pollinators           | <input type="radio"/> |  |  |
|  Natural enemy insects | <input type="radio"/> |  |  |
|  Reptiles/amphibians   | <input type="radio"/> |  |  |
|  Birds                 | <input type="radio"/> |  |  |
|  Bats                  | <input type="radio"/> |  |  |
|  Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Disease vectors; Livestock; Natural resources; Organic production; Pasture

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.238(a)(4-5) Livestock health care; §205.239 Livestock living conditions; §205.240 Pasture



## Livestock Area Biodiversity

### Minimizing Occurrence and Spread of Disease in Housing, Pastures, and the Watershed



### Stewardship Goal: Manage for Healthy Livestock and Wildlife

#### *Examples of Practices*

- Animals are out on pasture as much as possible, which reduces stress and boosts their immune system.
- Manure is periodically removed from livestock housing so it doesn't build up to amounts that can contaminate resources with pathogens.
- Harvested manure is composted to destroy pathogens, creating a nutrient-stable fertilizer.
- Manure ground into dust in confined areas is watered down so that any pathogens in the dust do not spread beyond the confined areas.
- Air filtration is used in livestock housing, and windbreaks are used outside housing, to reduce manure dust with pathogens from spreading into the landscape.
- In confined areas where contamination is a higher risk, potentially contaminated livestock feed is not left where birds and other wildlife can consume it and become infected with *E. coli* O157:H7, *Salmonella* and other pathogenic microbes.
- Wet areas are not grazed, so animals are less readily exposed to parasites.

#### *Agricultural Benefits*

- When the tilth of the soil is conserved, water- and nutrient-holding capacity is intact, as are sites for diverse microbial life that help to reduce plant and human pathogens.
- Animals are treated humanely.

#### *Ecological Benefits*

- Exposure of livestock pathogens to wildlife is reduced.

#### Related NRCS Conservation Practice Standards (CPS)

- |                                      |   |
|--------------------------------------|---|
| • Air Filtration (CPS 371)           | • Livestock Shelter Structure (CPS 576) |
| • Composting Facility (CPS 317)      | • Prescribed Grazing (CPS 528)          |
| • Dust Control for Animals (CPS 375) | • Windbreak Establishment (CPS 380)     |
| • Heavy Use Protection (CPS 561)     |   |

## Livestock Area Biodiversity

### Preventing Runoff of Wastes from Yards, Feeding Pads, Feedlots and Laneways

#### Related NOP Regulations:

##### **§ 205.239(a)(5) – Livestock Living Conditions**

*Summary:* The producer must use yards, feeding pads, feedlots and laneways that shall be well-drained, kept in good condition, and managed to prevent runoff to surface water and off-site.

##### **§205.239(b)(4) – Livestock Living Conditions**

The producer of an organic livestock operation may provide temporary confinement or shelter for an animal because of risk to soil or water quality.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*Laneways are well-drained and managed to prevent runoff.*

#### Minor Issue












*No plan is in place to fix erosion for this yard before it becomes a problem.*

#### Major Issue



*Runoff containing wastes is leaving the dairy facility and polluting a nearby waterway.*

|   |                       |                                  |                                  |
|---|-----------------------|----------------------------------|----------------------------------|
|  Healthy soils         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Clean water           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Native plants         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Pollinators           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Natural enemy insects | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Reptiles/amphibians   | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Birds                 | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Bats                  | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Other mammals         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Livestock; Natural resources; Organic production; Shelter; Soil and water quality; Temporary; Yards/Feeding pads

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation; §205.238 Livestock health care; §205.239(a)(1-4) Livestock living conditions

## Livestock Area Biodiversity

### Preventing Runoff of Wastes from Yards, Feeding Pads, Feedlots and Laneways



#### Stewardship Goal: Safeguard Water During Temporary Confinement

##### *Examples of Practices*

- The grazing plan includes appropriate locations where animals will be grazed during dry and wet periods, and relies on temporary shelter or confinement for only extreme weather conditions, so that the saturated soil of grazing areas is not damaged by compaction.
- A plan for confinement areas is in place to fix beginning erosion before it becomes severe.
- Confined sites are large enough to handle the type and number of animals present.
- Manure is periodically removed from yards, feeding areas, and laneways, and is composted.
- The site where animals are confined won't be washed away in a storm because it is made of concrete, has a well-draining rock base, or the livestock is rotated to multiple areas.
- Concentrated runoff coming from these sites is diverted into a temporary storage lagoon so that it does not pollute surface waters or contaminate livestock or wildlife.
- Sheet-flow runoff from these sites disperses through a continuous stand of grass that filters pathogens but is not allowed to grow too tall and lodge over—which could provide a moist, shady environment for pathogen growth.

##### *Agricultural Benefits*

- The spread of diseases is reduced—especially important for young livestock that is more vulnerable.

##### *Ecological Benefits*

- Cleaner water is available for aquatic and terrestrial species downstream of the facilities.
- Because water quality is protected, wildlife do not become infected with human and other pathogens that the livestock may carry.

#### Related NRCS Conservation Practice Standards (CPS)

- |  |                                       |
|--|---------------------------------------|
| • Animal Trails and Walkways (CPS 575) | • Filter Strip (CPS 393)              |
| • Composting Facility (CPS 317)        | • Heavy Use Protection Area (CPS 561) |
| • Diversion (CPS 362)                  | • Roof Runoff Structure (CPS 558)     |
| • Fence (CPS 382)                      | • Waste Storage Pond (CPS 313)        |



## Livestock Area Biodiversity

### Building Climate Change Benefits in Livestock Operations

#### Related NOP Regulations:

**\$205.200 – General natural resources and biodiversity conservation**

**\$205.2 – Definitions of organic production and natural resources**

*Summary:* Organic production practices must conserve biodiversity and maintain or improve the natural resources of the operation, including soil, water, wetlands, woodlands, and wildlife.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*Livestock is rotationally grazed to maintain soil health and plant vigor necessary for long-term carbon storage while also providing cover for wildlife.*

#### Minor Issue












*Overgrazing (on right) is leading to a decrease in food value for livestock and wildlife species.*

#### Major Issue



*Overgrazing causes soil erosion, water contamination, and inhibits forage regrowth that enhances carbon storage.*

|   |                       |                                  |                                  |
|---|-----------------------|----------------------------------|----------------------------------|
|  Healthy soils         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Clean water           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Native plants         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Pollinators           | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Natural enemy insects | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Reptiles/amphibians   | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Birds                 | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Bats                  | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
|  Other mammals         | <input type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Compost; Graze; Livestock; Pasture

Subpart C – Organic Production and Handling Requirements: §205.238 Livestock health care; §205.239 Livestock living conditions; §205.240 Pasture

## Livestock Area Biodiversity

### Building Climate Change Benefits in Livestock Operations



### Stewardship Goal: Diversify for Ranch Resilience and Climate Stability

#### *Examples of Practices*

- Grazing is managed so that in the process of plants balancing their root-to-shoot ratio, root masses turn over and gradually produce stored soil carbon.
- Grazing as much as possible while protecting natural resources can reduce demand for growing energy-intensive corn, soybeans and other feed associated with high nitrous-oxide gas emissions from nitrogen applications.
- Avoidance of overgrazing reduces erosion and the loss of stored soil carbon from the landscape.
- Livestock on rangelands rather than in confined animal operations can minimize production of methane and nitrous oxide from manure management.
- Trees and shrubs that store carbon are integrated into the landscape.
- Conserving and restoring unplowed prairies and grasslands can store carbon in soil.
- Conversion of cropland to perennial grazed grasslands can increase soil carbon storage.
- Diversified livestock breeds that are heritage, locally adapted, and/or well suited to site-specific conditions can be selected for tolerance of extreme weather.
- Pasture-raised livestock can produce less methane than animals fed on grains and fillers.
- Compost applied to pastures stimulates microbial activity and enhances carbon storage.

#### *Agricultural Benefits*

- Diversified livestock helps to reduce the risk of illness due to erratic weather.
- Grazing requires less energy to keep the livestock fed.

#### *Ecological Benefits*

- Pastures can maintain ground cover for grassland birds impacted by climate change.
- Unlike destructive practices, those that protect soil and plants have carbon storage benefits.

#### Related NRCS Conservation Practice Standards (CPS)

- |   |  |
|---|--|
| • Compost Facility (CPS 317)                  | • Range Planting (CPS 550)             |
| • Forage and Biomass Planting (CPS 512)       | • Riparian Forest Buffer (CPS 391)     |
| • Grazing Land Mechanical Treatment (CPS 548) | • Silvopasture Establishment (CPS 381) |
| • Prescribed Grazing (CPS 528)                | • Upland Wildlife Habitat (CPS 645)    |

## Livestock Area Biodiversity

### Diversifying Livestock Breeds

#### Related NOP Regulation:

##### § 205.238(a)(1) – Livestock health care

The producer must establish and maintain preventive livestock health care practices, including selection of species and types of livestock with regard to suitability for site-specific conditions and resistance to prevalent diseases and parasites.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*This breed is suited to an area with ticks and has the ability to remain relatively tick free without chemicals.*

#### Minor Issue






























*When management systems fail to control pink eye in a herd, consideration of cross breeding or changing the current breed could be warranted.*

#### Major Issue



*Cloned livestock such as Dolly above, are not allowed under the NOP regulations; nor will be new breeds developed with Crisper gene editing technology.*

|   |                       |  |   |
|---|-----------------------|--|---|
|  Healthy soils         | <input type="radio"/> |  |  |
|  Clean water           | <input type="radio"/> |  |  |
|  Native plants         | <input type="radio"/> |  |  |
|  Pollinators           | <input type="radio"/> |  |  |
|  Natural enemy insects | <input type="radio"/> |  |  |
|  Reptiles/amphibians   | <input type="radio"/> |  |  |
|  Birds                 | <input type="radio"/> |  |  |
|  Bats                  | <input type="radio"/> |  |  |
|  Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A -§205.2 Definitions: Livestock; Excluded methods; Organic production; Natural resources

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation

## Livestock Area Biodiversity

### Diversifying Livestock Breeds



### Stewardship Goal: Broaden Livestock Adaptability

#### *Examples of Practices*

- Choosing a variety of livestock breeds and/or cross-breeding for resistance to pests and diseases prevalent in the region helps to strengthen genetic diversity and reduces outbreaks.
- Selecting heritage breeds when appropriate to the production system will maintain variety within livestock populations and conserves valuable genetic traits such as disease resistance, survival, self-sufficiency, fertility, longevity, foraging ability, and maternal instincts.
- When adding livestock, choose breeds adapted to local conditions in order to optimize animal health and productivity.
- Mixed species grazing can improve forage diversity because of the efficiency of several types of livestock foraging with different grazing preferences on the same landscape.
- Chickens following cattle in the pasture can help to reduce pests by foraging in and spreading the manure.
- Management intensive grazing, including substantial rest periods for pastures, can help sustain diverse forage plants for livestock and wildlife, and the diverse livestock that depend on that forage mixture.

#### *Agricultural Benefits*

- Strengthening the integrity and future of agriculture through genetic diversity conservation.
- Slowing the loss and extinction of animal breeds ensures genetic diversity for the future.

#### *Ecological Benefits*

- Choosing livestock breeds that are more savvy in the presence of predators helps to reduce conflicts with wild predators.

#### Related NRCS Conservation Practice Standards (CPS)

- Prescribed Grazing (CPS 528)



## Wild Harvest Area Biodiversity

### Maintaining and Improving the Sustainability of the Harvested Species

#### Related NOP Regulation:

#### § 205.207(b) – Wild-Crop Harvesting

A wild crop must be harvested in a manner that ensures that such harvesting or gathering will not be destructive to the environment and will sustain the growth and production of the wild crop.

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



D. Pape

Maple sugar is harvested in a sustainable manner that doesn't overly stress the trees.

#### Minor Issue






























Not enough ginseng may be left to sustain harvestable growth in the coming years.

#### Major Issue



P. Bauer

Off-road ATV tire tracks into the forest are causing excess erosion.

|   |                       |  |   |
|---|-----------------------|--|---|
|  Healthy soils         | <input type="radio"/> |  |  |
|  Clean water           | <input type="radio"/> |  |  |
|  Native plants         | <input type="radio"/> |  |  |
|  Pollinators           | <input type="radio"/> |  |  |
|  Natural enemy insects | <input type="radio"/> |  |  |
|  Reptiles/amphibians   | <input type="radio"/> |  |  |
|  Birds                 | <input type="radio"/> |  |  |
|  Bats                  | <input type="radio"/> |  |  |
|  Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Pasture; Organic production; Natural resources; Wild crop

Subpart C – Organic Production and Handling Requirements: §205.200 General natural resources and biodiversity conservation

## Wild Harvest Area Biodiversity

### Maintaining and Improving the Sustainability of the Harvested Species



### Stewardship Goal: Sustain Growth of Wild Crop

#### *Examples of Practices*

- Harvesting and gathering is only from stable and sustainable populations on land and in aquatic environments.
- Collecting does not threaten the existence of priority and other native species or special habitat areas.
- Care is taken to prevent erosion and the introduction of non-native invasive plants.
- It is known whether other people harvest from the same area; if so, harvest is coordinated to prevent negative ecosystem impacts.
- Re-establishment of harvested species is allowed.
- Agencies or non-government organizations responsible for ecological management of the area are notified of plant collection, and licenses are obtained if necessary.
- Wild crop sustainability is monitored using photographs, species counts, or other assessment techniques that can be referenced over time.

#### *Agricultural Benefits*

- Future harvests are possible.

#### *Ecological Benefits*

- Part of the natural ecosystem is maintained.

#### Related NRCS Conservation Practice Standards (CPS)

- |  |  |
|--|--|
| • Conservation Cover (CPS 327)           | • Riparian Forest Buffer (CPS 391)     |
| • Critical Area Planting (CPS 342)       | • Shallow Water Management (CPS 646)   |
| • Filter Strips (CPS 393)                | • Upland Habitat Management (CPS 645)  |
| • Restoration of Rare Habitats (CPS 643) | • Wetland Habitat Management (CPS 644) |

## Handling Operations Biodiversity

### Promoting Biodiversity in Handling and Processing Operations

#### Related NOP Regulation:

**§205.200 – General natural resources and biodiversity conservation**

#### NOP Response to Comments on 5020-1 Guidance:

Handling operations and their certifiers should determine whether handling operations directly affect biodiversity and take action as appropriate (and as required).

### Assessing NOP Compliance in the Field - Examples of What to Look for...

#### Compliance



*A constructed wetland treats wastewater from a processing plant.*

#### Minor Issue



*Emissions from a handling operation may be causing excessive air pollution.*

#### Major Issue



*Processing waste is discharged directly into a stream.*

|                       |                       |  |  |
|-----------------------|-----------------------|--|--|
| Healthy soils         | <input type="radio"/> |  |  |
| Clean water           | <input type="radio"/> |  |  |
| Native plants         | <input type="radio"/> |  |  |
| Pollinators           | <input type="radio"/> |  |  |
| Natural enemy insects | <input type="radio"/> |  |  |
| Reptiles/amphibians   | <input type="radio"/> |  |  |
| Birds                 | <input type="radio"/> |  |  |
| Bats                  | <input type="radio"/> |  |  |
| Other mammals         | <input type="radio"/> |  |  |

#### Other Related NOP Regulations

Subpart A – §205.2 Definitions: Handling operation; Organic production; Natural resources

Subpart C – Organic Production and Handling Requirements: §205.201 Organic production and handling system plan; §205.206 Crop pest, weed, and disease management; §205.271 Facility pest management

## Handling Operations Biodiversity

### Promoting Biodiversity in Handling and Processing Operations



### Stewardship Goal: Sustain Biodiversity of Surrounding Natural Areas

#### *Examples of Practices*

- Water quality impacts of stormwater runoff from buildings and parking lots are reduced with dispersion (bioswales, rain gardens) and infiltration (vegetated filter strips).
- Native vegetative cover, mulch, or other methods are used to prevent erosion.
- Roads are constructed and maintained to minimize their effect on in-stream habitat and fish passage.
- Processing waste is disposed of before it harms wildlife.
- Constructed wetlands improve the quality of water that leaves processing facilities.
- When necessary, wastewater is pre-treated before it flows through a wetland.
- Dust emissions generated during processing are reduced by an air filtration system, and the operation has up-to-date permits.
- Perches for rodent-eating raptors are placed outside sheds and processing facilities.
- In order to lessen the need for an electronic insect killer, lighting fixtures are located away from vents, windows, or doors.
- Debris and food sources that attract pest insects, birds or mammals are eliminated near places where the pests could enter the facility, which reduces the need to destroy the pests.

#### *Agricultural Benefits*

- The facility will comply with other government regulations that protect air and water quality and fish and wildlife.

#### *Ecological Benefits*

- Biodiversity is conserved on the facility's lands.

#### Related NRCS Conservation Practice Standards (CPS)\*

- Air Filtration and Scrubbing (CPS 371)
- Constructed Wetland (CPS 656)
- Field Border (CPS 386)
- Structures for Wildlife (CPS 649)

\* In order to be eligible for NRCS cost-share CPS, a handler must also be engaged in agricultural production.



## D. Organic System Plan (OSP)

The NOP regulations requires each producer to develop an Organic System Plan (OSP). The chart below shows the summary of suggested OSP questions (which reflect the topics covered in “C. Activities that Support Biodiversity” section of this WFA Guide) and their related NOP regulations. Organic certifiers each have their own OSPs and can adopt all or part of these questions, depending on what they have covered to date. If certifiers do not need to comprehensively update all parts of their OSP, they may want to consider using two pages on natural resources and biodiversity conservation from the NOP’s Streamlined OSP for Crop Production.

| Summary of OSP Questions and Related NOP Regulations                                   | \$205.200 | \$205.201     | \$205.202 | \$205.203  | \$205.205        | \$205.206     | \$205.207 | \$205.238 | \$205.239         | \$205.240 |
|--|-----------|---------------|-----------|------------|------------------|---------------|-----------|-----------|-------------------|-----------|
| <b>• All Types of Operations Biodiversity</b>  |           |               |           |            |                  |               |           |           |                   |           |
| 1) Taking Steps to Plan for Biodiversity   |           | (a)(1)<br>(3) |           |            |                  |               |           |           |                   |           |
| 2. Maintaining Wildlife on the Farm  | x         |               |           |            |                  |               |           |           |                   |           |
| 3. Restoring and Protecting Natural Areas  | x         |               |           |            |                  |               |           |           |                   |           |
| 4. Managing Water for Crops, Livestock, Native Species, and Riparian Ecosystems        | x         |               |           |            |                  |               |           |           |                   |           |
| 5. Controlling Invasive Plants and Animals   |           |               |           |            |                  | (a)(2)        |           |           |                   |           |
| <b>• Cropland Area Biodiversity</b>  |           |               |           |            |                  |               |           |           |                   |           |
| 1. Promoting Soil Biodiversity   |           |               |           |            | (a)(b)<br>(c)(d) |               |           |           |                   |           |
| 2. Conserving the Soil Resource  |           |               |           | (a)        |                  |               |           |           |                   |           |
| 3. Protecting Water Quality  |           |               |           | (c)        |                  |               |           |           |                   |           |
| 4. Incorporating Biodiversity in Annual and Perennial Systems                          | x         |               |           |            | x                |               |           |           |                   |           |
| 5. Providing Habitat for Natural Enemies of Pests                                      |           |               |           |            |                  | (a)<br>(b)(2) |           |           |                   |           |
| 6. Preventing Air- and Water-Borne Crop Contamination                                  |           |               | (c)       |            |                  |               |           |           |                   |           |
| 7. Co-Managing for Food Safety and Conservation  |           |               |           | (c)        |                  |               |           |           |                   |           |
| 8. Building Climate Change Benefits in Crop Production                                 | x         |               |           | (e)<br>(3) |                  |               |           |           |                   |           |
| 9. Diversifying Crop Varieties   |           |               |           |            |                  | (a)(3)        |           |           |                   |           |
| <b>• Livestock Area Biodiversity</b>   |           |               |           |            |                  |               |           |           |                   |           |
| 1. Improving Pastures and Rangelands   |           |               |           |            |                  |               |           |           | (e)               |           |
| 2. Employing Wildlife Friendly Management Practices                                    | x         |               |           |            |                  |               |           |           |                   |           |
| 3. Protecting Natural Wetlands, Riparian Areas and Other Sensitive Habitats            |           |               |           |            |                  |               |           |           | (c)<br>(8)        |           |
| 4. Using Native Trees and Shrubs for Livestock and Wildlife Benefits                   |           |               |           |            |                  |               |           |           | (a)(1)            |           |
| 5. Minimizing Occurrence and Spread of Disease in Housing, Pastures, and the Watershed |           |               |           |            |                  |               |           | (a)(3)    |                   |           |
| 6. Preventing Runoff of Wastes from Yards, Feeding Pads, Feedlots and Laneways         |           |               |           |            |                  |               |           |           | (a)(5)/<br>(b)(4) |           |
| 7. Building Climate Change Benefits in Livestock Operations                            | x         |               |           |            |                  |               |           |           |                   |           |
| 8. Diversifying Livestock Breeds   |           |               |           |            |                  |               |           | (a)(1)    |                   |           |
| <b>• Wild Harvest Area Biodiversity</b>  |           |               |           |            |                  |               |           |           |                   |           |
| 1. Maintaining and Improving the Sustainability of the Harvested Species               |           |               |           |            |                  |               | (b)       |           |                   |           |
| <b>• Handling Operations Biodiversity</b>  |           |               |           |            |                  |               |           |           |                   |           |
| 1. Promoting Biodiversity in Handling and Processing Operations                        | x         |               |           |            |                  |               |           |           |                   |           |

The NOP clarifies the responsibility of certified operations to implement practices in compliance with §205.200, monitor them as appropriate, and maintain any records necessary for a certifier to verify compliance.<sup>1</sup> The OSP questions below on climate resilience and stability are recommended by WFA and not the NOP. We have done this because the definition of biodiversity explains that it includes life and the full range of natural processes upon which it depends, such as nutrient cycling, carbon storage and nitrogen fixation.

Organic certifiers may find it helpful to include the following explanatory text in their Natural Resources and Biodiversity Conservation section of their OSP:

“In the OSP, the operation must describe or list activities (plans, practices and enhancements) that explain how it will comprehensively conserve biodiversity by maintaining or improving all natural resources, including soil, water wetlands, woodlands and wildlife...”<sup>2</sup> Handling operations and this certifier should determine whether handling operations directly affect biodiversity and take action as appropriate (and as required).<sup>1</sup>

“Certified operations are required to implement measures that support natural resource conservation and biodiversity in addition to maintaining soil or water quality.”<sup>2</sup>

“Biodiversity, or biological diversity, is the diversity of life existing at three levels: genetic, species, and ecosystem. Therefore, biological diversity (biodiversity) includes variety in all forms of life, from bacteria and fungi to grasses, ferns, trees, insects, and mammals. It encompasses the diversity found at all levels of organization, from genetic differences between individuals and populations (groups of related individuals) to the types of natural communities (groups of interacting species) found in a particular area. Biodiversity also includes the full range of natural processes upon which life depends, such as nutrient cycling, carbon and nitrogen fixation, predation, symbiosis and natural succession.”<sup>3</sup>

## • All Types of Operations Biodiversity

### 1) Taking Steps to Plan for Biodiversity §205.200

#### 1a) Do you have a current conservation plan or contract with the USDA Natural Resources Conservation Service (NRCS), or other conservation agency?

Yes If yes, please list the conservation practices that you are implementing from your plan on your operation \_\_\_\_\_

No

#### 1b) Describe the natural resources of your operation (including those that may extend beyond your property boundaries, yet which impact/are impacted by your farming operation).<sup>4</sup>

1b.1) Soil (e.g., type or classification, slope, texture, structure, organic matter content, and/or other characteristics relevant to soil conservation and improvement): \_\_\_\_\_

1b.2) Water (e.g., groundwater, surface water, irrigation and wash water sources; comments or concerns regarding supply or water quality): \_\_\_\_\_

1b.3) Woodlands (e.g., forest, grassland, scrub or chaparral; species mixtures and proportion of area; production benefits such as windbreak, hedgerow, watershed, or habitat functions): \_\_\_\_\_

<sup>1</sup> NOP Response to Comments 5020-1

<sup>2</sup> NOP Guidance 5020

<sup>3</sup> Definition from the May 2009 NOSB recommendation

<sup>4</sup> Questions in 1b are after NOP's Streamlined OSP for Crop Production

1b.4) Wetlands (watershed, riparian areas, water bodies or storage features that double as habitat): \_\_\_\_\_

1b.5) Wildlife / Biodiversity (current common and priority wildlife and native plants; those species that existed on the land prior to farming): \_\_\_\_\_

**1c) What steps do you take to plan/provide for biodiversity conservation? §205.201(a)(1)(3)**

Draw on field map: areas of erosion woodlands wetlands wildlife/biodiversity habitats areas of invasives

Plan with understanding of: farm's location within watershed regional natural areas and conservation priorities

Work with others: collaborate with neighbors/others to enhance biodiversity (connectivity, restoration, etc.) train employees about restoration other \_\_\_\_\_

**2. Maintaining Wildlife on the Farm §205.200**

**How are you maintaining wildlife on the farm?**

Provide: corridors for safe passage of wildlife wildlife-friendly fences undisturbed, well-drained soil for ground-nesting bees / woody refuges for tunnel-nesting bees large blocks of habitat natural roosting, denning, nesting, foraging sites niches for wildlife that use short, medium and tall habitat

Support species: avoid nests during breeding season leave un-harvested strips for wildlife food/cover flood fallow fields for habitat value recognize priority species/habitat and create protection plans other \_\_\_\_\_

**3. Restoring and Protecting Natural Areas §205.200**

**How are you restoring and/or protecting natural areas?**

Conserve and/or restore: woodlands grasslands riparian habitat wetland areas standing deadwood/fallen/rotting trees native plants/wildlife historically present allow degraded areas to be recolonized have not converted High Conservation Value areas to cropland establish legal conservation areas other \_\_\_\_\_

**4. Managing Water for Crops, Livestock, Native Species, and Riparian Ecosystems §205.200**

**How do you manage water for the needs of crops, livestock, native species, and riparian ecosystems?**

Conserve water: plant regionally appropriate crops/varieties plant drought-tolerant natives use efficient irrigation schedule irrigations/avoid overdrafting groundwater/facilitate recharge monitor soil moisture encourage infiltration in fields and pastures locate ponds correctly (adhere to federal/state regulations)

Share resources: provide clean water sources for drinking/bathing/nest building manage water for priority species (rare fish/amphibians/birds/beavers) use fish screens retain/restore riparian buffers/wetlands/wildlife habitats protect/improve natural hydrology/ecological function of riparian areas other \_\_\_\_\_

**5. Controlling Invasive Plants and Animals §205.206(a)(2)**

**How do you control invasive plant/animal species, especially those that threaten natural areas?**

learn about invasives use weed- and pest-free seed, planting stock, soil amendments, and mulches monitor for new introductions and control immediately suppress invasives before they spread using organic methods other \_\_\_\_\_

**List problem invasives:** \_\_\_\_\_

**• Cropland Area Biodiversity**

**1. Promoting Soil Biodiversity §205.205(a)(b)(c)(d)**

**How do you increase soil organic matter and fertility and reduce pests?**

plant cover crops practice crop rotations add compost apply manure alternate shallow and deep-rooted crops alternate light- and heavy-feeding crops use nitrogen-fixing crops utilize intercropping other \_\_\_\_\_

**2. Conserving the Soil Resource §205.203(a)****How do you keep soils from eroding?**

Keep soil covered: allow non-invasive plants in fencerows/ditches/understory no more than 2 weeks uncovered during wet season allow covers in natural areas

Plant: crops on contour cover crops strip crops grassed waterways riparian vegetation windbreaks

Minimize compaction: reduce tillage avoid working saturated soils rotate crops

Avoid: steep slopes Highly Erodible Land (HEL) over-irrigation other \_\_\_\_\_

**3. Protecting Water Quality §205.203(c)****What practices do you use to protect water quality?**

Reduce pollution: establish grassed waterways/terraces/riparian buffers/wetlands to filter water calculate nutrient budgets prevent nutrient leaching from over-irrigation increase organic matter for better infiltration store compost/fertilizer away from water

Use: stream crossings/brush mattresses sediment basins other \_\_\_\_\_

**4. Incorporating Biodiversity in Annual and Perennial Systems §205.200 and §205.205****How do you support biodiversity in annual and perennial cropping systems?**

Provide/keep wildlife habitat in each physically separate, non-adjacent parcel: diverse mixtures of native trees/shrubs/grasses/forbs hedgerows windbreaks insectary plants blooming mixed crops cover crops crop rotations intercropping brush piles allow non-invasive plants in fencerows/ditches/understory replace weedy areas with native plants other \_\_\_\_\_

**5. Providing Habitat for Natural Enemies of Pests §205.206(a)(b)(2)****What actions do you take to provide food, habitat, or shelter for predatory insects, wasp parasitoids, spiders and other arthropods, bats, and birds?**

Provide/keep wildlife habitat during all the production season: blooming mixed crops cover crops hedgerows windbreaks flowers interspersed in crops, or at the ends of crop rows provide a balanced and extended food supply with mixed flowering plants before and after the crop stagger mowing/tilling practices manage fallow fields for wildlife install bird/bat boxes other \_\_\_\_\_

**6. Preventing Air-and Water-Borne Crop Contamination §205.202(c)****How do you protect crops from pesticides, pathogens, chemical fertilizers and gene flow?**

intercept air-borne contamination with windbreaks /hedgerows/ riparian trees design height, width, and leaf area of plantings based on wind dynamics, topography, and type of drift install diversion ditches and grassed waterways to filter and re-direct water-borne contamination other \_\_\_\_\_

**7. Co-Managing for Food Safety and Conservation §205.203(c)****How do you manage soil amendments, animals and habitat to prevent pathogen contamination?**

conservation practices are not compromised by buyer food safety requirements that conflict with NOP and FDA regulations locate crops away from sources of contamination plant high risk areas to crops not eaten raw increase soil biodiversity with organic matter to reduce pathogens use a waiting period between applications of manure and harvest compost is made correctly baseline water testing is conducted crop is monitored for animal contamination habitat for predators of rodents is conserved use conservation practices to reduce pathogens other \_\_\_\_\_

**8. Building Climate Change Benefits in Crop Production §205.200 and §205.203(e)(3)****8a. What actions do you take that promote climate stability?**

Manage nitrogen with: cover crops compost crop rotation nutrient budgeting

Decrease carbon off-gassing: reduce tillage water conservation lowers pumping costs and energy usage

Store carbon with: compost cover crops woody vegetation other \_\_\_\_\_



**8b. What actions do you employ that reduce climate change impacts to the farm?**

Use noncrop vegetation to: maintain continuous plant cover increase organic matter to improve soil water-holding capacity and infiltration protect streambanks for heavy flooding support beneficial organisms to manage increased pest pressure

Diversify crops for: pest resistance fewer chilling hours drought tolerance heat resistance  
other \_\_\_\_\_

**9. Diversifying Crop Varieties §205.206 (a)(3)**

**How do you increase crop diversity?**

grow a variety of crops/heirlooms/several genetic strains of the same crop grow locally adapted seed varieties/those suited to site-specific conditions use crops varieties developed for organic farms other \_\_\_\_\_

**• Livestock Area Biodiversity**

**1. Improving Pastures and Rangelands §205.239(e)**

**How do you improve your pasture or rangeland?**

Protect/restore pasture: manage the frequency/intensity/timing of grazing prevent overgrazing reseed/protect trampled or eroded areas plant native pasture prevent excessive amounts of manure from causing contamination

Control invasive species with: grazing biological control methods prescribed burning

Chicken pastures include: movable coops lacking a floor rotation in multiple yards other \_\_\_\_\_

**2. Employing Wildlife Friendly Management Practices §205.200**

**2a. What wildlife-friendly management do you use for non-predators?**

compose pasture plantings of diverse species allow non-predatory native grazers/grassland birds/prairie dogs to co-exist with livestock use smooth instead of barbed or woven wire fencing use movable enclosures instead of permanent fencing in known wildlife migration routes other \_\_\_\_\_

**2b. What non-lethal predator control practices do you use?**

use guard animals schedule grazing when predation pressure is low herd and/or make frequent and unpredictable appearances graze small animals with large ones breed livestock for protective instincts use predator lights house livestock overnight in protected area conserve diverse landscapes supporting natural prey for predators document circumstances of livestock death other \_\_\_\_\_

**3. Protecting Natural Wetlands, Riparian Areas and Other Sensitive Habitats §205.240(c)(8)**

**How do you protect wetlands, riparian areas and other sensitive habitat?**

control access to sensitive areas fence/designate stream crossings place feed/mineral blocks/water troughs away from sensitive habitats conserve native vegetation prevent bank erosion allow natural process of plant regeneration other \_\_\_\_\_

**4. Using Native Trees and Shrubs for Livestock and Wildlife Benefit §205.239(a)(1)**

**How do you provide shade for livestock?**

conserve/restore native trees and shrubs protect young trees from browsing pressure other \_\_\_\_\_

**5. Minimizing Occurrence and Spread of Disease in Housing, Pastures, and the Watershed §205.238(a)(3)**

**How do you manage manure in housing and pastures to keep livestock and wildlife healthy?**

animals are on pasture as much as possible remove manure periodically from livestock housing compost manure water down manure that is ground into dust use air filtration in livestock housing use windbreaks outside housing store livestock feed where wildlife cannot consume it do not graze wetlands and other soggy areas other \_\_\_\_\_

**6. Preventing Runoff of Wastes from Yards, Feeding Pads, Feedlots and Laneways****\$ 205.239(a)(5)  
\$205.239(b)(4)****How do you manage manure in yards, feeding pads, feedlots and laneways for clean water and healthy livestock?**Reduce potential contamination: remove manure periodically compost manure divert concentrated runoff into temporary storage lagoon disperse sheet-flow runoff through a grass filter stripConfine/shelter livestock: only when necessary on concrete on well-draining rock base on area large enough to handle type/number of animals rotate livestock to multiple sites other \_\_\_\_\_**7. Building Climate Change Benefits in Livestock Operations****\$205.200****7a. What actions do you take to store soil carbon and promote climate stability?**

grazing that promotes roots-to-shoots balancing process conserve/restore native prairie/grassland convert cropland to grasslands apply compost to pastures maintain/improve natural areas with woody plants other \_\_\_\_\_

**7b. What actions do you employ that reduce climate change impacts to the farm?**Promote resilience: maintain continuous plant cover on soils year round increase organic matter to improve soil water-holding capacity and infiltration protect stream banks during heavy floodingSelect livestock: heirlooms locally-adapted well-suited to site specific conditions other \_\_\_\_\_**8. Diversifying Livestock Breeds****\$ 205.238(a)(1)****How does livestock diversity relate to site specific conditions and resistance to diseases and parasites?**

choose a variety of livestock breeds to strengthen genetic diversity/reduce disease outbreak select heritage breeds to conserve genetic traits choose breeds adapted to local conditions mixed species grazing to improve forage diversity chickens follow cattle in the pasture to help to reduce pests use management intensive grazing to help sustain diverse forage plants and the livestock that depend on that forage mixture select livestock breeds to be savvy in the presence of predators other \_\_\_\_\_

**• Wild Harvest Area Biodiversity****1. Maintaining and Improving the Sustainability of the Harvested Species****\$205.207(b)****How do you maintain or improve the sustainability of the harvested species?**

harvest from stable populations minimize disruption of priority species/sensitive habitats allow re-establishment protect water quality prevent erosion avoid introduction of invasive plants notify responsible agencies/organizations of harvest coordinate with others who harvest in same area monitor sustainability of wild crop other \_\_\_\_\_

**• Handling Operations Biodiversity****1. Promoting Biodiversity in Handling and Processing Operations****\$205.200 and NOP Response to  
Comments on 5020-1 Guidance****How do you sustain biodiversity in the operation and its surrounding area?**Pest control: use raptor perches locate lighting fixtures away from vents, windows, or doors eliminate debris and food sources near buildingErosion control: native plants landscaping vegetative cover mulch

Buildings, parking lot, roads: vegetated swales rain gardens vegetated filter strips roads located to minimize effect on in-stream habitat and fish passage

Waste management: dust collection systems with up-to-date permits pre-treatment of wastewater before entering wetlands constructed wetlands dispose of processing waste before it harms wildlife other \_\_\_\_\_

## E. Researching Conservation Goals of the Region

Operators and certifiers must have knowledge of native species and ecosystems of the region in order to understand management practices that will support essential conservation values. For example, such knowledge will help:

- Identify and protect sensitive habitats from gradual degradation or outright conversion to other uses
- Safeguard lands and waters from the incursion and spread of invasive species
- Enhance riparian areas as beneficial habitat links to lessen the impacts of fragmentation.

By working with their neighbors, non-governmental organizations and public agencies, operators can learn to identify highest-priority species and effectively protect and link blocks of essential habitat as part of a functional conservation network. As farmers, inspectors and certification reviewers focus more on biodiversity conservation and the benefits derived from natural ecosystem services, fresh approaches will replace previous practices that attempted to control nature. Farmers who help conserve biodiversity will gain the benefits of a more profitable and sustainable farm, and certifiers will assist in evaluating farmscapes for the benefit of biodiversity.

While operators should develop biodiversity conservation plans as part of the organic system plan (OSP), it is essential for certifiers and inspectors to fully understand biodiversity conservation so they can assess farmers' implementation and monitoring of the OSP.

✕ **Therefore, operators, inspectors and certification reviewers must become familiar with priority species, habitats, conservation partnerships, biodiversity goals, and invasive species of the regions where their farm inspections occur.**

The following steps help to assess regional biodiversity conservation:

- Determine where the operation is situated in the watershed and the location of the nearest wildlands, open spaces, waterways, and protected areas. Use LandScope America to determine conservation priorities, protected areas, threats, plants, animals, and ecosystems in the

operation's watershed. An aerial photo from Google Earth can be downloaded to help assess how the operation fits into the context of the larger landscape.

- Assess the broader context for regional conservation priorities by learning about highest-priority species, natural communities, and ecological processes that require protection or enhancement, and regional invasive species that threaten natural areas. Talking with conservation experts in private organizations, universities, and government will help, but much of this information is available from a few key websites (see Web Tool Box).



*Native prairies adjacent to farms and prairie strips interspersed in farms will support a wide diversity of flowering species and pollinating insects.*



## Web Tool Box: Learning More About Biodiversity

COMETPlanner. USDA NRCS and Colorado State University. This is a carbon and greenhouse gas calculator for conservation practice planning and projects. <http://www.comet-planner.com/>

Google Earth provides aerial photos of regions throughout the world. Use their tools for measuring distances on the farm, and to see how the farmscape changes over time through historical imagery. <https://www.google.com/earth/>

Habitat Network. Cornell Lab of Ornithology. This web-based tool assists farmers and others to plan for and to map habitat on the land. <http://content.yardmap.org/>

Healthy Farm Index Online Calculator. University of Nebraska-Lincoln and The Organic Center. Use this web tool to assess, plan, record and monitor for biodiversity and ecosystem services on the farm. <http://bit.ly/1Tqu9DS>

International Union for Conservation of Nature (IUCN) Red List of Threatened Species and Key Biodiversity Areas, Biodiversity for Business. IUCN. This database provides information on the conservation status of rare and endangered plants and animals internationally. <https://portals.iucn.org/library/efiles/documents/2014-004.pdf>

Landscape America. This website, run by NatureServe and National Geographic, uses an interactive map viewer to bring together maps, data, photos, and stories, and provides tools and resources for strategic conservation planning and priority-setting. <http://www.landscape.org/introduction/>

National Invasive Species Information Center. USDA National Agricultural Library. This website provides state-by-state information. <https://www.invasivespeciesinfo.gov/index.shtml>

NatureServe Explorer: An Online Encyclopedia of Life. NatureServe. This database provides information on the conservation status of rare and endangered plants and animals by particular watersheds, and

threatened ecosystems in the U.S. and Canada. The database also provides information about ecosystems in general, but does not have a function to track locations of “at risk” ecosystems, such as High Conservation Value areas. The best available conservation tracking tools are for those for tracking species. <http://explorer.natureserve.org/index.htm>

Plants Database. USDA NRCS. Conservation information about plants. <http://plants.usda.gov/topics.html>

Threatened and Endangered Plants and Animals Database. U.S. Fish and Wildlife Service. <http://www.fws.gov/endangered/>

Web Soil Survey. USDA NRCS. This website provides soil maps for most of the U.S. (The same information can be obtained from a local Soil and Water Conservation District, Extension, or NRCS office.) <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

Wildlife Action Plans. Association of Fish and Wildlife Agencies. This website allows the user to select their state on a map to find state-specific Wildlife Action Plans. The plans assess the health of each state’s wildlife and habitats, identify the problems they face, and outline the actions needed to conserve them over the long term. <http://teaming.com/state-wildlife-action-plans-swaps>



*Nearby intact ecosystems can serve as natural libraries of ecological knowledge for learning about and selecting the plant species to use on the farm and ranch.*



## F. For Operators: Taking Inventory, Setting Priorities, Assessing Opportunities and Creating a Plan

The National Organic Program regulations require each operator to develop an organic system plan. Using this guide will result in taking optimum steps for biodiversity conservation, but all of them are not required.

### Identifying Sensitive Lands

- Decide if the land should be in agricultural production or if it is too environmentally sensitive. While some sensitive lands should never be farmed, others may be grazed or wild harvested. Land that is of High Conservation Value or Highly Erodible Land is sensitive and requires special consideration.
- A similar consideration should be made about land coming out of the Conservation Reserve Program, since it had to be environmentally sensitive in order to be enrolled.

### Setting Goals

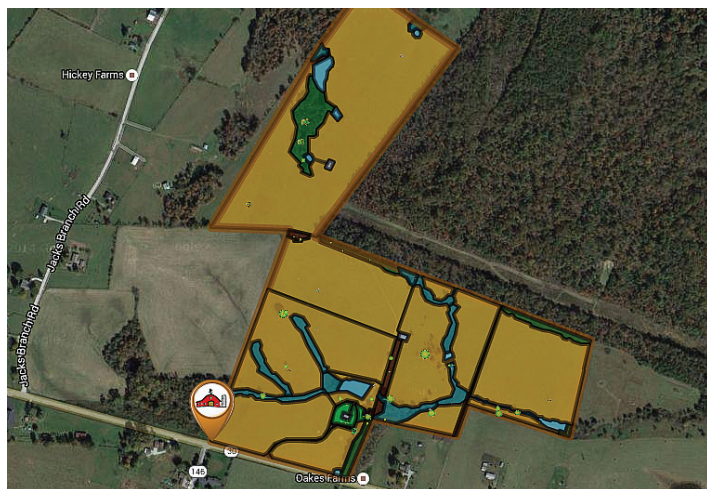
- Develop short and long-term goals that are good for profitability and biodiversity on and near the operation. A short-term goal may be to install a native grass filter strip that holds soil in place. A long-term goal may be to diversify the operation by adding more legume crops in rotations, increasing the variety of crops grown, adding more beneficial insect habitat throughout the operation, and restoring natural areas.
- Use the Healthy Farm Index Online Calculator (see Web Tools box) to set goals and measure progress towards optimizing multiple benefits that preserve and enhance on-farm biodiversity. The calculator looks at biodiversity, including species (wild and domestic plants and animals) and ecosystems (the amount, richness and rarity of non crop habitat) as well as ecosystem services: provisioning (production and markets), regulating (soil and water conservation), and cultural values (satisfaction and tenure).

### Mapping and Research

- Obtain a map of the watershed that shows the operation and nearby public natural resource lands and protected areas (as described above).
- Draw a map of the operation or download an aerial image from Google Earth. Alternatively, use the Habitat

Network to map the farm or ranch with many tools that identify production areas and wildlife habitat. Mapping can delineate how different types of cover, such as hedgerows, grassed waterways, brushy draws, wetlands, and woodlands, combine to form travel lanes for wildlife. Note isolated areas not connected to other habitats, hydrological and drainage conditions, invasive species, perennial cover, topography, soils, eroded areas, and special habitats like those used by priority species. Wildlife have different needs; providing a mix of habitat ensures wildlife diversity. Learning the requirements of priority species—such as how much territory they need, what kinds of food they eat, and where they find cover—can help streamline the approach taken. Marking different habitats on the map is a useful way to help identify actions for improving habitat management.

- Take inventory of the operation for wildlife and major native plants.
- Research what species lived on the land prior to farming and locate the closest intact ecosystems that resemble the land's original state. Make a list of native plants that may be used in the operation.
- Determine what other local, state and federal regulations may come into play when making changes to the land.



*Habitat Network can be used to map a farm or ranch, identifying production areas, wildlife habitat and travel lanes, and different types of cover—hedgerows, wetlands, woodlands.*



*By taking inventory of native plants, such as this elderberry that provides fruit, flowers, leaves (that support plant eating insects and their natural enemies) and cover, the farmer keeps track of the beneficial resources of the farm.*

### Assessing Opportunities

- Assess the operation for opportunities to support priority species and habitats in the watershed. These include threatened and endangered species, species of special concern, and keystone species; migration and movement of native species; and ecosystem processes. Keep in mind that cover—such as grassed waterways, hedgerows, windbreaks, brushy draws, ponds, wetlands, and woodlands—should be scattered and ideally connected throughout the operation.
- Refer to COMET-Planner to determine which conservation practices to use by calculating carbon and greenhouse gas emission reductions associated with these activities.
- List the operation's conservation activity opportunities.
- Investigate incentive programs that may assist with technical and cost-share planning and implementation. Habitat conservation programs may be available through state or federal agencies or through non-governmental organizations.

### Choosing Conservation Actions and Creating a Timeline

- Prioritize actions to conserve biodiversity based on regional conservation goals, priority species and sensitive habitats, invasive species and eroded areas, and the conservation activities of other land managers in the watershed. Use the activities listed in part C, questions in part D, and research in part E to identify and select the highest priorities to implement based on maximum conservation value and benefit to the operation.
- Create a conservation component of the organic system plan with clear goals and expectations, and a

timeline for implementation of conservation practices. Discuss how the operation will refrain from harming existing biodiversity resources and how the prioritized, economically feasible actions and practices that benefit biodiversity will be implemented over the short and long term.

### Monitoring and Recordkeeping

- Develop a plan to monitor or evaluate the success of the biodiversity practices that are implemented. Decide on a timeline and frequency for monitoring success. Use before- and after-photographs; water quality analysis; and plant, mammal, bird, reptile, amphibian, or insect surveys to determine the biodiversity successes. Alternatively, use the Healthy Farm Index Calculator to record and monitor progress related to biodiversity and ecosystem services. The monitoring should help determine whether the natural resources of the operation or surrounding area have benefited from the conservation measures.

### Revising the Plan

- Periodically review and revise the plan, priorities, and timeline based on conditions and management results.

### Connecting to Area-Wide Conservation

- Find out about biodiversity conservation actions being taken by neighboring farmers, ranchers and organizations in the area and how to make contributions to a region-wide biodiversity strategies for the landscape. The benefits that nature provides to the operation are more profound in diverse landscape settings.



*COMET-Planner helps farmers determine reductions in greenhouse gas emission associated with conservation practices, such as this restored riparian area.*



## G. For Certifiers: Conducting the Farm Inspection and Review

An operator's willingness to seek further knowledge, cooperate with others, and take part in a biodiversity strategy for the landscape are key indicators of their contribution to biodiversity conservation. The inspector should look for signs of commitment to understanding and conserving the full complement of biodiversity, and should be sure that the biodiversity resources on the farm have been sufficiently assessed. Review the biodiversity organic system plan (part D) in relation to compliance biodiversity measures and examples outlined in part C.

Be prepared to discuss key issues and practices with the operator, as well as how to prioritize actions. Ensure that expectations, measures, and timelines for implementation and monitoring are mutually understood. Begin the biodiversity conversation by assessing the producer's knowledge of:

- The farm's location in the watershed relative to the nearest wildlands, open spaces, waterways, and protected areas. How does the farm fit into the larger ecosystem?
- Regional priorities for conservation of native species, natural communities, and ecological processes.
- Biodiversity conservation actions undertaken by other farmers and organizations in the area. Is the operator contributing to a regional biodiversity strategy?
- Other biodiversity conservation resources. Has the operator engaged in any workshops or continuing education opportunities that address biodiversity or natural resource conservation? Is the operator familiar with nearby lands that have intact ecosystems?
- Incentives to assist with planning and implementation of natural resource and biodiversity conservation through non-governmental organizations or state and federal habitat conservation programs.

Continue the biodiversity discussion by reviewing the farm's natural resources, including:

- The list of wildlife and dominant native plants present on the farm. Has the farmer determined what priority species exist in the watershed and possibly on the farm?
- The map of natural resource features on the farm such as hedgerows, woodlands, wetlands, waterways and

riparian zones, hydrological and drainage conditions, wildlife corridors, invasive species, perennial cover, topography, soils, eroded areas, and special habitats like those used by priority species.

- Is the operator considering (or attempting to determine) farm restoration modeled after nearby intact ecosystems that resemble the land before agriculture?

### Reviewing the Farmer's Biodiversity Conservation Component of the OSP

#### Activities That Address Goals

Identify and prioritize practices and actions to conserve biodiversity based on the biodiversity problems and greatest opportunities for meeting conservation goals and adding value to the farming operation. They should:

- Contribute to regional biodiversity goals: support priority species (threatened and endangered species, species of special concern, and keystone species) and habitats, migration and movement of native species, and ecosystem processes.
- Maintain or increase biodiversity: enhance the diversity, presence, numbers, health, and vigor of native species and habitats. Refrain from harming existing biodiversity resources.
- Control or manage non-native invasive species and erosion: prevent establishment and spread of new invasives and proactively address possible erodible sites.

#### Monitoring

- Is there a plan to monitor or evaluate the success of the implemented biodiversity practices? What are the expectations, timeline, and frequency for monitoring success? Are the following procedures being conducted: photo monitoring; water quality analyses; plant, mammal, bird, reptile, amphibian, or insect surveys? Have natural resources of the farm or surrounding area benefited from conservation measures?

#### Plan Revision

- Does the farmer review and revise the plan, priorities, and timeline as needed based on evaluation of emerging conditions and management results?

## H. It Takes a Community: Support & Incentives

Addressing conservation has been a multi-pronged effort of many organizations in organic agriculture over the years. Wild Farm Alliance began working on organic biodiversity conservation education and policy back in 2003. We've partnered with many people to write the first edition of this guide, publish a compliance document, train operators and certifiers, and encourage the NOSB to make biodiversity-based recommendations to the NOP that have since been implemented. As a companion document to this WFA Guide, we recently published "How to Conserve Biodiversity on the Farm: Actions to Take in a Continuum from Simple to Complex."

### Support Organizations

Oregon Tilth's work in creating educational materials and collaborating with USDA Natural Resources Conservation Service (NRCS) has been crucial in bringing expert technical and financial assistance for organic producers. With Oregon Tilth's partnership, NRCS created an organic section on their website, offers organic webinars, published an organic handbook (with the assistance of WFA and others) and created a program for producers transitioning to organic agriculture.

NRCS' Organic Handbook is for conservation planners and other agricultural professionals who work with organic producers, but producers and certifiers can benefit from reviewing it as well. It gives an overview of organic agriculture and the NOP, explains integral conservation activities for organic production, and provides valuable resources in every chapter.

Transitioning producers can apply to NRCS' Conservation Activity Plan (CAP) 138 program for assistance with conservation efforts. An NRCS-certified Technical Service Provider (TSP) prepares the CAP which documents resource concerns such as erosion problems, water quality issues, or inadequate wildlife habitat. The TSP also addresses the producer's objectives and decisions for practice implementation during the transition period. The CAP is written so that the producer may use it in place of a traditional OSP.

NRCS' Environmental Quality Incentive Program (EQIP) Organic Initiative and its regular EQIP program offer almost 200 conservation practices for producers. Many of them are listed in the Activities section of this guide. NRCS also offers the Conservation Stewardship

Program (CSP). In order to receive assistance from NRCS, producers must control or own the land and be in compliance with Farm Bill provisions (currently Highly Erodible Land, Wetland, and Sodsaver).

USDA's Farm Services Agency (FSA) offers the Conservation Reserve Program (CRP) that provides yearly rental payments to farmers for 10-15 years who agree to remove environmentally sensitive land from production and plant species that will improve environmental health and quality.

National Center for Appropriate Technology (NCAT) assisted the NOP with the creation and updating of their model Organic System Plan, which has a two-page section on Natural Resources of the Operation and Biodiversity Conservation Management. NCAT has also written many publications for organic agriculture. National Organic Coalition and its member groups support conservation policies, especially those that make their way through the NOSB process. National Sustainable Agriculture Coalition (NSAC) works on organic conservation policy, including securing millions of dollars for organic related programs. NSAC and its member groups (of which WFA is one), are continually advocating for USDA programs to better support organic and sustainable agriculture goals. International Organic Inspector's Association plays an important role in filling the need for biodiversity conservation education in their inspector training programs.



*Healthy and sustainable landscape features are enhancing the world we occupy and experience. They can make the farm more pleasant to live and work in, and more valuable immediately and in the future.*



## Conservation Easements

Conservation easements are legal real estate agreements between landowners and land trusts, other qualified conservation organizations, or governmental entities that can permanently protect working farmland or habitat and natural lands surrounding farmland by establishing limits on how that land may be used. Agricultural easements typically provide cash payments to farmers who give up rights to subdivide or build on portions of their farmland while retaining the rights to grow crops. Some also are tied to organic certification. Easements often reduce a property's retail value, lower tax rates, and provide up-front cash and new financial options. Perpetual easement transactions are typically negotiated between a landowner and a non-governmental organization, such as American Farmland Trust, The Nature Conservancy, Land Trust Alliance, Ducks Unlimited, or a local land trust. NRCS offers the Agricultural Conservation Easement Program.

## Market-based Incentive Programs

Market-based certification programs and agritourism provide economic rewards for implementing practices that conserve biodiversity. While "certified organic" is the most widely recognized market-based certification program, other programs, such as "Bird Friendly," "Demeter Biodynamic," "Food Alliance," "Predator Friendly," "Rainforest Alliance Certified," "Salmon Safe" and "Whole Foods Responsibly Grown," certify conservation-based management systems. In order to market products under the International Federation of Organic Agriculture Movements (IFOAM), compliance with biodiversity standards is required. Some farmers market the habitat value of their land by offering recreational or agritourism services to anglers, bird watchers, wildlife enthusiasts, or urban dwellers. Others attract and keep Community Supported Agriculture members and farm stand customers by sharing their stewardship activities that protect biodiversity.



## Glossary

**Biodiversity**, or biological diversity, is the diversity of life existing at three levels: genetic, species, and ecosystem. Therefore, biological diversity (biodiversity) includes variety in all forms of life, from bacteria and fungi to grasses, ferns, trees, insects, and mammals. It encompasses the diversity found at all levels of organization, from genetic differences between individuals and populations (groups of related individuals) to the types of natural communities (groups of interacting species) found in a particular area. Biodiversity also includes the full range of natural processes upon which life depends, such as nutrient cycling, carbon and nitrogen fixation, predation, symbiosis and natural succession.<sup>1</sup>

**Connectivity** is the degree to which patches of habitat link to one another, allowing organisms and natural processes (e.g., fire and water flow) to travel between the patches.

**Conservation easement** is a legal agreement a property owner makes with a non-profit organization or public agency to restrict the type and amount of development that may take place on his or her property. The easement spells out the rights the landowner retains and the restrictions on use of the property. Each right and restriction is negotiated between the landowner and the conservation organization holding the easement.

**Conservation network** is a system of land and water managed for the primary purpose of conserving the representative ecological attributes of a region. It often includes lands used for such purposes as recreation and agriculture as long as ecological values receive special consideration. The network is configured to support native species and sustain the natural processes that clean our water and air and maintain thriving, diverse, natural ecosystems. Networks should include large core reserves—wilderness—linked by wildlife corridors and buffered by farmlands.

**Ecosystem** is a biotic community and its abiotic environment.

**Ecosystem functions** are a set of biophysical conditions and processes whereby an ecosystem maintains its integrity (e.g., primary productivity, food chain, biogeochemical cycles, etc.). Ecosystem functions include such processes as decomposition, production, nutrient cycling, gene flow, and disturbance.

**Ecosystem services** are the beneficial outcomes that result from ecosystem functions (e.g., cleaner water, pollination, reduced human health and ecosystem risks). These require some interaction with, or at least some appreciation by, humans, but can be measured in physical terms (e.g., water quality, crop set, and human health).

**Endangered species** are those in danger of becoming extinct within the foreseeable future throughout all or a significant portion of their range.

**Habitat** is the natural environment for the life cycle and growth of an organism.

<sup>1</sup> Definition from the May 2009 NOSB recommendation.

High Conservation Value Areas (HCVA) are natural habitats that have been identified as having outstanding importance due to their environmental, biodiversity, or landscape values. There are four types of High Conservation Value Areas listed below that address the NOP regulations regarding biodiversity and natural resources conservation.<sup>2</sup>

HCV1. Areas containing significant concentrations of biodiversity values, including protected areas, protected species, endemic species (native to or confined to a certain region), and critical temporal (temporary, transitory) use of refugia (an area that has escaped ecological changes) by species.

HCV2. Significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.

HCV3. Areas that contain rare, threatened or endangered ecosystems.

HCV4. Areas that provide basic ecosystem services in critical situations (e.g., watershed protection or erosion control, and areas providing barriers to destructive fires).

Highly erodible land is any land that can erode at excessive rates because of its soil properties. Highly erodible land is designated by field and based on the proportion of the total field acreage that contains highly erodible soils.<sup>3</sup>

Hydrology is the science of water, its properties, phenomena, and distribution uses and conservation over the earth's surface.

Invasive species are those that spread from human settings (gardens, agricultural areas, etc.) to wild or natural areas. Once in the wild, they continue to reproduce and displace native species, causing biodiversity to suffer. Invasive species are usually nonnative (i.e., humans introduce them into an area).

Keystone species is one whose impacts on its community or ecosystem are often greater than would be expected from its abundance or biomass. Because it makes a significant contribution to the maintenance and modification of its ecosystem, its decline would lead to the decline of many other species. For example, the beaver is not endangered, but it is essential to its ecosystem because it actively expands and maintains the riparian habitats and functions upon which many other species depend.

Migratory species reside in more than one location during the year, moving with the seasons (e.g., many birds and some mammals and butterflies).

Native plant or animal is indigenous (produced, growing, or living naturally in a locale, country, or climate; not exotic; not imported) to a given location.

Natural areas are dominated by native vegetation and exist as a natural process of ecological succession.

Niche is the specific area that an organism inhabits, and the role or function of that organism in an ecosystem.

Priority habitats are those in need of special conservation attention, usually determined by a statewide or regional biodiversity assessment. Priority habitats have declined significantly from their historic range. For example, white oak savannas were historically common in Oregon and now only cover 1–2% of their previous range. Priority habitats may also be vegetation types not well represented in existing conservation networks.

Priority species are “threatened” and “endangered” species, “species of special concern,” and “keystone species.”

Riparian areas are plant communities contiguous to and affected by surface and subsurface hydrologic features of perennial or intermittent lotic and lentic [moving and standing] water bodies (rivers, streams, lakes, or drainage ways). Riparian areas have one or both of the following characteristics: 1) distinctly different vegetative species than adjacent areas, and 2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms. Riparian areas are usually transitional between wetland and upland.<sup>4</sup>

Species of special concern is an informal term used by many public agencies to identify species that are potentially at risk, declining in numbers, or in need of concentrated conservation actions to prevent decline, commonly referring to a species or subspecies that has entered a long-term decline in abundance or has become vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. A species of concern generally carries no procedural protections.

Sodsaver is a provision that protects America's last remaining native prairies by limiting subsidies on land that is converted to cropland from previously unplowed and unplanted grasslands.<sup>5</sup>

Threatened species are those likely to become endangered in the foreseeable future.

Weeds are plants not valued where they are growing and are usually of vigorous growth, especially those that tend to overgrow or choke out more desirable plants.

Wetlands are areas that have a predominance of hydric soils (wet soils); are inundated or saturated by surface or groundwater (hydrology) at a frequency and duration sufficient to support a prevalence of hydrophytic (water tolerant) vegetation typically adapted for life in saturated soil conditions; and under normal circumstances will support a prevalence of such vegetation except that this term does not include lands in Alaska identified as having a high potential for agricultural development and a predominance of permafrost soils.<sup>6</sup>

<sup>2</sup> Two other sub definitions identified by HCV Resource Network (<https://www.hcvnetwork.org/>) that are not listed here include social and cultural issues.

<sup>3</sup> Definition from 2014 Farm Bill Conservation Compliance.

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## Selected Resources



### Tools for Farmers and Certifiers Being Naturalists

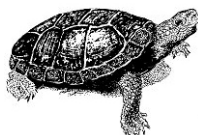
eBird.org. Find out what birds are in your area and report birds you've seen. Audubon and Cornell Lab of Ornithology. [eBird.org](http://eBird.org)

iNaturalist.org. Send a photo of a plant or animal so that it can be identified by fellow naturalists. [iNaturalist.org](http://iNaturalist.org)

InsectIdentification.org. Allows for a quick search of the database based on primary and secondary colors, number of legs, and territory or state. [InsectIdentification.org](http://InsectIdentification.org)

Leafsnap: Electronic Field Guide of Trees. <http://leafsnap.com/>  
Map of Life. Learn about the world's biodiversity and report species seen. <https://auth.mol.org/mobile>

Merlin Bird App. The Cornell Lab. Free app for bird identification. <http://merlin.allaboutbirds.org>



### Incentives

American Farmland Trust: Center for Agriculture in the Environment. <http://www.aftresearch.org/>

Land Trust Alliance. Questions on Conservation Easements. <http://www.landtrustalliance.org/what-you-can-do/conserv-your-land/questions>

USDA Natural Resources Conservation Service (NRCS). Organic Farming. This webpage has many resources for organic producers. <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/crops/organic/>

USDA NRCS. Organic Agriculture Webinars. <http://www.conservationwebinars.net/webinarSearch?Subject=Organic%20Agriculture&branding=Conservation%20Webinars>

USDA NRCS. Organic Operations and Transitioning to Organic. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/il/programs/?cid=nrcs141p2\\_030468USDA](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/il/programs/?cid=nrcs141p2_030468USDA)

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## Activities That Support Biodiversity

### All Types of Operations

#### Taking Steps to Plan or Provide for Biodiversity

American Horticultural Society. Native Plant Societies. Check on a listing for your state organization. <http://www.ahs.org/gardening-resources/societies-clubs-organizations/native-plant-societies>

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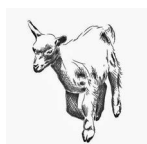
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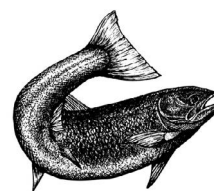
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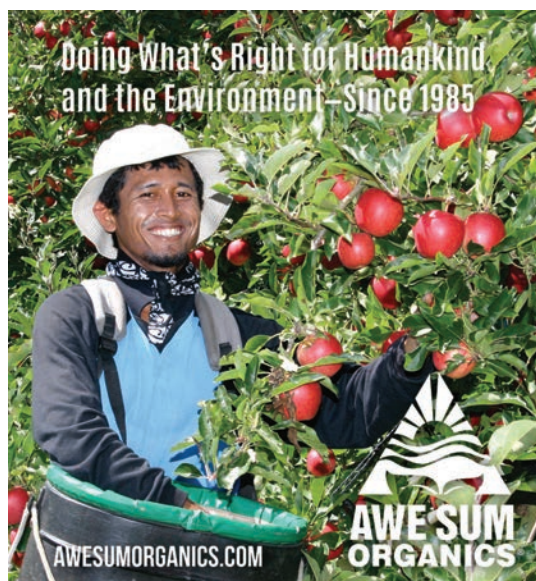
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