BIODIVERSITY CONSERVATION

An Organic Farmer's Guide









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Production Team

Jo Ann Baumgartner, Director, Wild Farm Alliance (WFA)
Laura Smith, Project Associate, WFA
Reggie Knox, Sustainable Agriculture Consultant
John Davis, Consulting Ecologist

Collaborators

WFA would like to acknowledge the contributions of our collaborators who helped shape and review this guide: Harriet Behar, organic inspector, farmer, and educator; Stacey Carlson, Marin County Agricultural Commissioner; Scott Exo, Director, Food Alliance; Sean Feder, Inspections Operations Director, California Certified Organic Farmers; Phil Foster, Foster Ranches; Tim Franklin, Applegate River Watershed Council and Yale Creek Ranch; Tom Gardali, Senior Biologist, Point Reyes Bird Observatory; Pete Gonzalves, Director of Oregon Tilth; Randy Gray, Wildlife Biologist, Natural Resources Conservation Service; Jessica Hamburger, Consultant; Dan Kent, Director, Salmon Safe; Jim Riddle, Endowed Chair, University of Minnesota and Chair of National Organic Standards Board; Margaret Scoles, Director, Independent Organic Inspectors Association; Sarah Vickerman, Director of West Coast Office of Defenders of Wildlife; Warren Weber, Star Route Farms; and Becky Weed, Thirteen Mile Lamb and Wool Company.

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WILD FARM ALLIANCE
PO Box 2570
Watsonville, CA 95077
831-761-8408
831-761-8103 Fax
info@wildfarmalliance.org
www.wildfarmalliance.org

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Introduction

Biodiversity Conservation & Organics

The USDA National Organic Program (NOP) Rule[1] requires the conservation of biodiversity and the maintenance or improvement of natural resources, including wetlands, woodlands, and wildlife. Until recently, the organic community has had no common understanding of what these requirements mean. With the help of the Wild Farm Alliance (WFA) and others, the National Organic Standards Board approved biodiversity conservation additions into their model Organic System Plan in August 2005.

Increasing Practices That Conserve Biodiversity and the Natural Resources of the Farm and the Larger Landscape

The goal of this guide is to increase the use of organic farming practices and other land management techniques that conserve biodiversity and the natural resources of organic farming systems, and to help farmers and ranchers comply with the NOP Rule. The guide draws on the knowledge and experience of organic farmers, certifiers, and conservationists, as well as current research and literature, to lay out a range of farming possibilities for a variety of situations that maintain and enhance biodiversity at the farm level and contribute to biodiversity conservation outside the farm's borders at the regional or watershed level.

The Biodiversity Crisis

Wendell Berry has written, "The question we must deal with is not whether the domestic and the wild are separate or can be separated; it is how, in the human economy, their indissoluble and necessary connection can be properly maintained."[2] Of the 200,000 plants and animals now known to exist in the U.S., fully one-third are at risk, with 400 species already lost to extinction and another 100 missing.[3] To put these statistics in perspective, one must understand that agricultural lands comprise roughly two-thirds of the continental U.S., and the destruction and degradation of native habitat during the conversion of these lands to present farm and ranch uses is the major cause for the listing of 42% and 26% of endangered species, respectively.[4–9]

Biological Diversity (Biodiversity)
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.

NOP Rule—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.

NOP Rule—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.

NOP Rule—Subpart C—Organic Production and Handling 205.200 General
Production practices implemented in accordance with this subpart must maintain or improve the natural resources of the operation, including soil and water quality.

NOP Rule—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.

Water development, much of which, again, has occurred in the name of agriculture, affects 30% of endangered species. Of course other impacts have contributed to the decline, such as commercial development, which is responsible for 35% of endangered species listings.[10]

Management decisions farmers make, such as providing habitats and wildlife linkages, can dramatically affect biodiversity levels. At the same time, these habitats can serve to support beneficial organisms and processes.

Farmers' Decisions Make a Difference

The International Federation of Organic Movements (IFOAM) reports that 37% of the earth's land is in agricultural production. Habitat loss is the main threat to biodiversity worldwide, with agricultural activities affecting 70% of all threatened bird species and 49% of all plant species.[11] Where large proportions of plants and animals of a given region depend on habitats within areas in agriculture, the management decisions farmers make can dramatically affect the overall level of biodiversity as well as the success of particular species.

At most, 5% of U.S. wildlands are protected. These "islands" in a sea of highly altered land do not provide satisfactory habitat or connectivity (movement and gene flow between populations) for many species. Networks of functional habitats must be created to link fragmented populations of key species and ecosystems. While the amount of wildness and existing habitat varies greatly from farm to farm, farmers and ranchers can work with adjoining landowners to help establish and maintain ecosystem connections through enhanced and restored waterways, woodlands, grasslands, wetlands, and other habitats across the landscape. Farms and ranches can help provide these habitats and wildlife linkages, thereby reaping nature's ecosystem services, including pollination, insect pest control, advantageous fire, predation, and natural erosion control.

Coming Full Circle

From beneficial microorganisms to predators, agriculture innately functions within and interacts with the larger ecosystem. Bacteria and fungi break down organic matter and help to maintain soil quality and recycle nutrients. Native pollinators, which contribute to an estimated $40 billion in orchard, row, and pasture business, can require native vegetation during non–crop flowering periods.[12] Predatory and parasitic insects colonize a farm's native plants from wilder areas. Their presence at the early stages of pest outbreaks can mean significant savings over more costly and toxic pest control measures.

Insectivorous birds and bats, which in the course of a single day during breeding season can capture more than their body weight in invertebrates, benefit from nesting and roosting habitat on or near farms, as do rodent-eating owls and raptors. Four-footed meso (midsize) predators, such as foxes, skunks, and raccoons, need territories that stretch through many family farms as they help keep gophers, mice, and ground squirrels in check. Coming full circle, the widest-ranging predators—cougars, bears, and wolves—regulate these meso predators from overly impacting the birds, snakes, fish, and other wild vertebrates. Supplying the necessary connected landscapes for these top food chain predators also provides the habitat linkages that pollinators require.

Working with Care

Not all conservation practices come without risks. The potential to bring unwanted pest birds, mammals, insects, 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 priority species, or in attracting native species into an area that makes priority species vulnerable to predation.

Benefits On and Beyond the Farm

Many organic practices can benefit wildlife and native ecosystems. However, there is great opportunity for agricultural lands to more effectively support and restore biodiversity and ecosystem health. More and more, public and private incentive programs support significant conservation efforts on the farm and beyond. See pages 22 and 23 for more information.

Native pollinators like this sweat bee contribute to an estimated $40 billion in orchard, row, and pasture business. Identifying and protecting nesting and foraging sites, letting crops go to flower, providing artificial habitat, and restoring native habitats can increase the number of native pollinators on the farm.

How to Use This Guide

Part A helps farmers understand the core biodiversity principles for agriculture, and highlights readily accessible Internet resources they can use to apply these principles. Part B outlines various practices that growers can use or adapt to local conditions to maintain and increase biodiversity on the whole farm, in uncultivated areas, in cropland, and for livestock management and wild harvest operations. Part B allows farmers to evaluate progress in biodiversity conservation and determine whether a practice is consistent with the NOP Rule. Part C, the biodiversity amendments to the National Organic Standards Board's Organic System Plan template, parallels part B. Part D provides strategies for planning, prioritizing, and monitoring; and part E covers the benefits and incentives for biodiversity conservation.

A. Primary Considerations

In order to address biodiversity conservation, organic farmers must have knowledge of native species and ecosystems on their farms and in the larger landscape.

Quality habitat is key for native plants and animals. The amount of food, cover, and water determines what kinds of wildlife live on the land, while soil and water conditions and disturbance regimes determine native plant populations. A farmer's actions can change native species' numbers by changing these parameters. If doing so compromises wildlife habitat, animals become vulnerable to prey or harsh weather conditions and will either move on or die. Native plants are resilient, but only under the right conditions. However, maintaining habitat can be enduring and cost effective; an organic farmer's standard of living is measured not only by yields, but also by the quality and biodiversity of life.

When balancing the changes that agriculture brings to the land, the gain of a pigeon or hayfield does not offset the loss of an eagle or wetland.

Understanding Core Biodiversity Principles

Ecosystem and biodiversity conservation generally takes place over landscapes much larger than an individual farm. 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 achieves habitat and ecosystem conditions able to support viable populations of native species, particularly those most adversely affected by human disturbance.

When determining what biodiversity should be conserved, all things are not equal and should not be given equal weight when balancing 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. Some species and communities, such as those that thrive in fragmented, simplified, human-dominated environments, are quite 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 well-being should receive more consideration in organic farming.

Take care not to foster unnaturally abundant species, such as the white-tailed deer, which damage ecosystems through much of the country. Instead uncommon, rare, or species that function as key components of healthy ecosystems should receive more consideration in the organic system plan.

In general, the conservation of native predators, such as raptors and large carnivores, should carry more weight than the conservation of their prey. Similarly, some species, such as reptiles and amphibians, are more likely to be adversely affected by farming activities than, say, rodents or blackbirds, and the organic system plan should include strategies to avoid or mitigate such losses.

In order to comply with the NOP Rule, sensitive habitat like the wetland in the foreground is preserved rather than converted to agriculture or development.

Determining What You Can Do

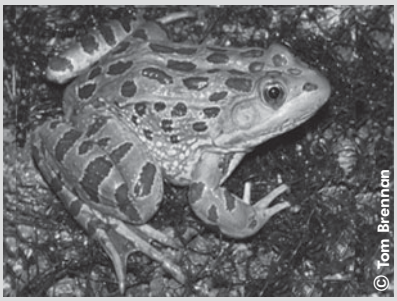
Assessing biodiversity resources on the farm is critical. As a steward of two-thirds of the nation's continental land area, you must have knowledge of native species and ecosystems in order to manage your land for the protection of highest-priority species and habitats. For example, such knowledge will help you to identify and protect sensitive habitats from gradual degradation or outright conversion to other uses, to safeguard lands and waters from incursion and spread of invasive species, and to enhance riparian areas as beneficial habitat links to lessen the impacts of fragmentation.

By working with your neighbors, non-governmental organizations, and public agencies, you can learn to identify highest-priority species and effectively protect and link blocks of essential habitat as part of a functional conservation network. As you focus more on biodiversity conservation and the benefits derived from natural ecosystem services, fresh approaches will replace previous practices that attempted to control nature. Managing a farm to derive benefit from natural ecosystem services can result in more profitability and sustainability.

Manage farmland within a watershed or ecosystem context.

Organic operations generally manage for diversity to increase the health, vigor, and resilience of their soil and crops. When managed within the framework of biodiversity at the watershed or ecosystem level, the farm

becomes more permeable for pollinators and other wildlife, and the surrounding ecosystem itself becomes more naturally complex, stable, and resilient, offering an array of services. You can do a lot yourself, but by collaborating with neighboring farmers, non-governmental organizations, and public agencies, you can achieve even broader ecosystem goals.



Endangered species, like this Chiricahua leopard frog, rely in a large part on farms for their water and habitat needs. Protecting them directly addresses the biodiversity crisis.

Take advantage of nature's ecosystem services: pollination, pest control, beneficial predation, advantageous fire, flood and erosion control, nutrient cycling, and improved water quality and quantity.

Ecosystem services come from every biological level on earth. Your thoughtful care of habitats contributes to the strength, stability, and function of these services, which have been roughly valued at $33 trillion for the entire biosphere.[13]

Avoid conversion of sensitive habitats to agricultural production or development.

Protecting sensitive habitats from degradation or conversion to other uses is critical in conserving biodiversity. You can help by identifying the high-priority existing habitats—including grasslands, desert scrub, forests, and wetlands—and ensuring their protection for native species conservation. In some cases, a permanent conservation easement may be appropriate to establish long-term protection of key areas.

Protect threatened and endangered species, species of special concern, and keystone species.

Maintaining these categories of species (described in detail in the glossary on page 24) is among the highest priorities for conservation of biological diversity.

Riparian areas support an inordinate number of native species compared to the rest of the landscape. Restoring degraded riverside habitats greatly benefits biodiversity and helps with water purification, flood protection and groundwater recharge.

Conserve and restore native plants and animals of the production operation, including in and around water bodies.

Biodiversity conservation depends on the protection of habitats for native plants and animals. In the U.S., the greatest losses of species and habitat by far occur in fresh water ecosystems. Roughly 30% of the protected species and the species proposed for protection made the list because of water resource development.[14] By managing riparian areas and wetlands for biodiversity, farms and ranches can also benefit from nature's services, including nutrient cycling, erosion control, water purification, and flood protection.

Conduct restoration based on native species and ecosystems present on the land before it was turned over to agriculture.

Successful restoration efforts are based on species and ecosystems that are adapted to, and that had historically occupied the farm. Nearby intact ecosystems that resemble the land prior to conversion can serve as libraries of ecological knowledge.

Maintain and restore linkages and connectivity, including large blocks of habitat and wildlife corridors, to strengthen regional networks of conservation areas.

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 smaller zero-extraction reserves, even within individual farms, are important. "Working landscapes" are not enough; true wildlands are critical. In regions used primarily for agriculture, enough 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.

When you realize that habitat loss is the greatest threat to native plants and wildlife, the importance of maintaining, enhancing, and even increasing native habitat becomes clear.

Prevent introduction and spread of invasive species. The spread of non-native, invasive plants, animals, and pathogens poses a major threat to the U.S. economy and environment. Leaders in agriculture and conservation call the devastation caused by such organisms one of the most serious and least-recognized tragedies of our time. With increasing global trade and travel, non-native species spread farther and faster than ever. It is critical to control populations of established invasives and aggressively prevent the introduction and spread of new pest species, especially those that threaten natural areas.

Assessing How the Farm Fits into the Context of the Larger Landscape

By carefully gathering information and planning, you can implement practices that provide highest returns in ecological services to your farming operation while restoring native species and ecosystems. The National Organic Program Rule requires each producer to develop an organic system plan. You can use this tool to plan for biodiversity conservation.

- Determine where your farm is situated in the watershed and the location of the nearest wildlands, open spaces, waterways, and protected areas. The TerraServer website (http://www.terraserver-usa.com/) provides topographical maps and aerial photographs of areas throughout the U.S.
- Create a farm map or download an aerial photo of your land from TerraServer. 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 priority species' requirements, such as how much territory they need, what kinds of food they eat, and where they find cover, can help streamline your approach. Marking different habitat cover on the map is a useful way to help identify actions for improving habitat management.
- 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. You can easily access much of this information from a few key websites:
  - Every state has or is working to complete a "comprehensive wildlife conservation plan" which addresses the "species of greatest conservation need" and the "full array of wildlife and wildlife issues." Links to each state's plan or its agency conducting the plan appear on the Biodiversity Partners website's Biodiversity Planning page (www.biodiversitypartners.org).
  - The NatureServe website (www.natureserve.org/explorer) provides information on rare and endangered species by particular watersheds and on threatened ecosystems by states.
  - The Invasive Species website (www.invasivespeciesinfo.gov) gives state-by-state information on problem species.
  - Find out about biodiversity conservation actions being taken by neighboring farmers and organizations in the area and how you might contribute to or become a leader in a biodiversity strategy for the landscape.

Invasive, non-native species like this salt cedar present the second greatest threat to biodiversity after habitat destruction. The cost of invasive species in the U.S. is estimated to be more than $138 billion per year. [15]

B. Practices & Actions That Support Biodiversity

Part B offers a variety of biodiversity conservation practices for the whole farm, for uncultivated and cropland areas, and for livestock management and wild harvest operations. The conditions and priorities for biodiversity conservation vary widely from region to region. Some of the practices and actions are broadly applicable across many regions, and other examples are more specific. You can adapt, modify, or add to the practices given here to create a biodiversity conservation plan that is appropriate to your local watershed and to regional conservation goals. The issues covered in this section correlate with the National Organic Standards Board's OSP biodiversity questions shown in part C.

Whole Farm Biodiversity

Taking Steps to Plan or Provide for Biodiversity

High Conservation Value

- Watershed map shows farm's connection to riparian areas/ drainages at higher and lower elevations and to nearby public natural resource lands and protected areas.
- Farm map includes hedgerows, woodlands, wetlands, waterways and riparian zones, wildlife corridors, special habitats, invasive species, and erodable areas.
- Biodiversity list includes wildlife and dominant native plants present on the farm, especially highlighting priority species.
- Farmer considers the following when making a biodiversity conservation farm plan:
  - Wildlife and dominant native plants that existed on the land prior to farming.
  - Regional conservation priorities established by conservation groups/ agencies.
  - Nearby natural areas that have intact ecosystems.
- Farmer collaborates with neighbors and others to enhance biodiversity for larger effect.

Moderate Conservation Value

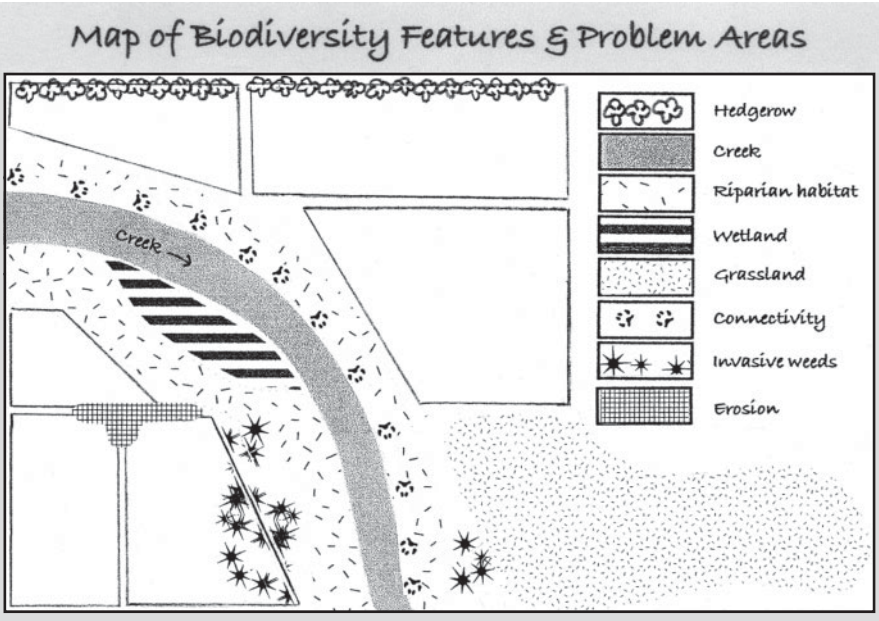
- Watershed map shows farm's connection to riparian areas/ drainages at higher and lower elevations and to nearby public natural resource lands and protected areas.
- Farm map includes hedgerows, woodlands, wetlands, waterways and riparian zones, wildlife corridors, special habitats, invasive species, and erodable areas.

Inconsistent with NOP Standards

- Farm map does not identify biodiversity features or problem areas.

NOP Rule

Subpart A – Definitions
Organic Production
Natural Resources
Subpart C – Organic Production
205.200 General



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

Whole Farm Biodiversity

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

High Conservation Value

- Water is used judiciously, and regionally appropriate crops are planted with the knowledge that large portions of conserved water will benefit native species and ecosystem functions.
- Water is managed to benefit priority species. For example, farm neighbors work together to time irrigations to ensure a creek never falls below safe levels for rare fish.
- Structurally diverse vegetation buffers of trees, shrubs, grasses, and forbs specific to the site are conserved or restored in shallow draws, along creeks and streams, and around pools, ponds, and wetlands, to support a multitude of wildlife, stabilize banks, and serve as a natural filter for pollutants.
- Wide riparian areas benefit priority species and may serve as a wildway or link to neighboring habitats and contribute to a broader conservation network.
- Efforts are made to protect or improve the natural function of a river and natural disturbance regimes important for aquatic species. For example, 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 to provide habitat.
- Riparian areas and adjacent floodplains are managed in coordination with a regional or watershed planning efforts to benefit native species and to allow the natural hydrology to function.

Moderate Conservation Value

- Water is used somewhat judiciously and some crops are planted that conserve water, thus leaving a portion for native species and ecosystem processes.
- Riparian zones and floodplains are managed to provide some benefits to native pollinators, natural enemy insects, and other native species.
- Narrow native vegetation buffer along water's edge reduces erosion.

Inconsistent with NOP Standards

- Farm operation uses water inefficiently.
- Farm operation reduces surface water availability, thereby negatively impacting priority and other fish and wildlife species.
- Farming practices abut riparian areas without a vegetative buffer, causing erosion, sedimentation, and degradation of aquatic habitat.
- Natural hydrological functions, such as flooding, are not allowed to occur, and terrestrial and aquatic species suffer.

NOP Rule

Subpart A – Definitions
  Organic Production
  Natural Resources
Subpart C – Organic Production
  205.200 General
  205.203 Soil Fertility and Crop Nutrient Management

Managing Water for Agriculture and Wild Nature

Riparian areas are the green zones beside rivers, streams, creeks, lakes, ponds, pools, and wetlands. Since they provide habitat for many species, wider is better for biodiversity.

Canal banks planted with native plants offer wildlife essential food, cover, and water, and serve as wildlife movement corridors as well.

Uncultivated Area Biodiversity

Providing Habitat for Pollinators, Insect Predators, Birds and Bats

High Conservation Value

- Native trees are planted or conserved (even as snags) for roosting and nesting habitat of birds, bats, native bees, and other wildlife.
- Sequentially flowering hedgerows and windbreaks including a layered complexity of native plants are well designed, installed, and maintained to benefit priority species and other wildlife, such as beetles, pollinators, insect predators and parasites, and birds.
- Hedgerows and windbreaks are installed in wide swaths and linked to natural areas on and off the farm where feasible.
- Unused areas like field corners and fencerows are planted to extend native habitat.
- Refuges of undisturbed soils are left for ground bees to create nesting burrows.

Moderate Conservation Value

- Bird and bat boxes support predatory birds and insectivorous birds and bats.
- Bird roosting sites that encourage predatory birds are conserved.
- Structures such as barns and sheds provide habitat for priority birds and bats.
- Invasive weeds are replaced with native grasses and forbs to help control erosion and to attract pollinator, predatory, and parasitic insects.
- Wooden blocks or bundles of stems or straws support native tunnel-nesting bees.

Inconsistent with NOP Standards

- Natural roosting sites for pollinators, insect predators and parasites, birds, and bats—such as hedges, live trees, and dead snags—are removed without first exhausting alternatives to eliminating habitat.
- Field margins, such as roadsides, fencerows, and areas around buildings, are eroding or are covered with invasive weeds.

NOP Rule

Subpart A – Definitions
Organic Production
Natural Resources
Subpart C – Organic Production
205.200 General
205.206 Crop Pest, Weed, and Disease Management Practice

Providing Habitat for Pollinators, Insect Predators, Birds and Bats

Provide the right kind of habitat and they will come. Nectar and pollen producing native plant hedgerows attract beneficial insect pollinators, predators, and parasites.

Native bees can save farmers money because they reduce the need for importing hives of honeybees. This native squash bee helps ensure good cucurbit fruit set.

Conserving native habitat on the farm and working with neighbors to do the same allows species like this barred owl to forage throughout the region.

Uncultivated Area Biodiversity

Restoring and Protecting Natural Areas

High Conservation Value

- Natural areas are retained, restored, and managed to accommodate the full range of native species specific to the farm and are connected or linked to other habitats in a regional conservation network.
- Linkages and corridors, which provide safe passage for wildlife, are preserved and restored.
- An agricultural conservation easement held by a qualifying agency or organization preserves the farm from development while protecting the natural resources of the land.
- Significant efforts are made to manage or protect habitats for the benefit of priority and other native species. For example:
  - Select areas are allowed to flood to create habitat for migratory birds.
  - Trees are maintained, standing deadwood and fallen and rotting trees are retained, and live denning foliage remains for priority species and other wildlife.
  - A pond managed for natives might have a log tethered in the middle to serve as a safe place for basking turtles, and might be allowed to dry up seasonally to favor desirable natives over their predators (e.g., frogs and fish).
  - The beaver, a keystone species, is allowed to build a dam.

Moderate Conservation Value

- Natural areas are left undisturbed, invasive species are controlled, and traffic is restricted during sensitive stages of native species' life cycles (reproductive and rearing) and migratory activity.
- Moderate efforts are made to manage or protect habitats in uncultivated areas for the benefit of priority and other native species.
- When cutting firewood, non–old growth trees are selectively harvested, leaving a thick cover of denning trees and other vegetation to protect the land.

Inconsistent with NOP Standards

- Sensitive habitats have been converted to agricultural production since the site was first certified.
- Natural and fallow areas are dominated by non-native species.

NOP Rule

Subpart A – Definitions
- Organic Production
- Natural Resources

Subpart C – Organic Production
- 205.200 General
- 205.206 Crop Pest, Weed, and Disease Management Practice

Restoring and Protecting Natural Areas

Restoring marginal farmlands to wetlands helps with floodplain protection, improves groundwater recharge, and supports a variety of terrestrial and aquatic species.

Beavers are keystone species, meaning they play a critical role in biodiversity. Many priority species rely on them to create the habitat associated with their ponds. Their handiwork also helps decrease the severity of floods and aids in recharging aquifers.

Uncultivated Area Biodiversity

Controlling Invasive Species

High Conservation Value	Moderate Conservation Value	Inconsistent with NOP Standards
• Farmer is knowledgeable about invasive species in the region, especially those that threaten natural areas, and has an effective plan and monitoring system. • New invasive species are aggressively controlled before they become established. • Invasives are excluded from the farm by using fully composted material, clean soil amendments and mulches, and uncontaminated tractor tools. • Organic methods, including biological control, are used and have no negative effects on desirable native species. • In previously degraded areas where invasives have been removed, restoration is occurring with native plants to benefit priority species and other wildlife.	• Invasive species are being controlled to a moderate but inconsistent degree.	• Invasive species widely occur and new ones are allowed to establish and spread. • Pests are controlled in ways that harm desirable native species, when alternative control methods exist.

NOP Rule

Subpart A – Definitions
Organic Production
Natural Resources
Subpart C – Organic Production
205.200 General
205.206 Crop Pest, Weed, and Disease Management Practice

Controlling Invasive Species

Yellow star thistle, the bane of many western ranch lands, is often referred to as invasive, non-native, an invasive weed, or an exotic plant pest. Aggressively controlling invasive species before they become established saves time and money.

Sudden Oak Death (SOD) affects not only oak trees, but other woody species as well. The dull black fungus shown here is in an advanced stage. Newly formed fruiting bodies are green or shiny black. Take care that mulch brought onto the farm does not contain SOD.

Wild boars, also known as feral hogs, 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 compete for food with native wildlife.

Cropland Area Biodiversity

Conserving and Providing Habitat

High Conservation Value	Moderate Conservation Value	Inconsistent with NOP Standards

• Safe passage of wildlife through part of the farm is planned by:
  • Fencing only individual fields, if necessary.
  • Using smooth wire instead of barbed or woven wire.
  • Designing fences to allow smaller wildlife to go under the barrier.
  • Adapting fences in places of known migration routes, making them shorter or less dangerous to cross.
• Fallow fields are flooded, if appropriate, to provide habitat for waterfowl and shore birds.
• Growing winter cover crops provides green browse, erosion control, and wildlife cover.
	• In-field pollinator and natural enemy insectary plants, cover crops, and companion plants are grown to increase organic matter and to provide cover and habitat for beneficial insects and other wildlife.
	• Intercropping is practiced to introduce diversity in perennial cropping systems.
	• Growing a variety of crops in annual systems brings diversity to the farm.
	• Fallow fields are planted with cover crops that displace invasive weeds and provide temporary wildlife habitat.
		• The whole farm is fenced in a way that presents migration barriers for wildlife.
		• Crop diversity is not present.
		• Alley cropping, intercropping, or companion planting are not practiced in perennial systems.

NOP Rule

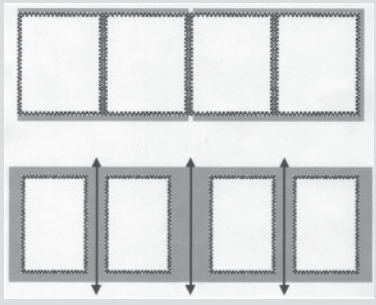
Subpart A – Definitions
- Organic Production
- Natural Resources
- Crop Rotation

Subpart C – Organic Production
- 205.200 General
- 205.205 Crop Rotation Practice

Conserving and Providing Habitat

Flowering strips of alyssum interspersed with vegetable crops help to draw pollinator, predator, and parasitic insects through the field as they forage for nectar.

Allowing rice fields to flood in the off-season attracts waterfowl and shorebirds, who feed on leftover grain and newly hatched aquatic invertebrates. The birds in turn trample the rice straw, and their excrement helps to break down the crop stubble, alleviating the need for burning and reducing future fertilizer inputs.



Fencing fragments the landscape and impedes wildlife movement. If fencing is required, fence individual fields, leaving wildlife paths in between them, rather than fencing the whole farm.

Cropland Area Biodiversity

Scheduling Farming Practices to Benefit Wildlife

High Conservation Value

- Farm management accommodates sensitive life stages, such as nesting and spawning, and migration needs of priority and other wildlife species. Practices may include:
  - Delayed hay and grain harvests allow ground-nesting birds to fledge and newborn four-legged animals to move on.
  - Clearing non-crop vegetation before bird breeding season, so birds do not become established.
  - Preventing disturbance in areas where mammals, including birds and bats, hibernate or rear young.
- Alternate mowing of field grasses, leaving 25–30 foot strips around hayfields when harvesting, provides wildlife refuges in undisturbed sites. Cleaning alternate sides of ditch banks allows for filtering processes important for water quality and satisfies the needs of aquatic species.
- Crop rotations are planned so that some fields always provide food (intentionally planted wildlife food crops or crop leftovers), water, and cover for priority and other wildlife.
- At harvest time, a minimum of one-quarter acre for each 20 acres of crop is left standing, ideally in patches or strips near native cover, to provide additional cover or food for native wildlife.

Moderate Conservation Value

- Farm management accommodates the spawning, nesting, and migration needs of native fish and other wildlife.
- At harvest time, a small portion of the crop, or its stubble, is left standing to provide cover or food for native wildlife.

Inconsistent with NOP Standards

- The spawning, nesting, and migration needs of native fish and other wildlife are disrupted, which results in harm, because no attempt was made to adjust the timing of farm practices to accommodate sensitive life stages.

NOP Rule

Subpart A – Definitions
Organic Production
Natural Resources
Subpart C – Organic Production
205.200 General

Scheduling Farming Practices to Benefit Wildlife

Insectivorous barn swallows need safe, undisturbed places to rear their young. It is most critical for farms to accommodate wildlife during the sensitive life stages, such as the nesting of birds, the spawning of fish, and the migration of wildlife.

Wildlife plantings of corn and small grains provided safe foraging and roosting cover for birds and created sheltered resting areas for mammals during a cold winter on this Wisconsin farm. Plantings like these help wildlife avoid hypothermia, exposure, and starvation at the coldest times of the year.

Cropland Area Biodiversity

Preventing Water Contamination

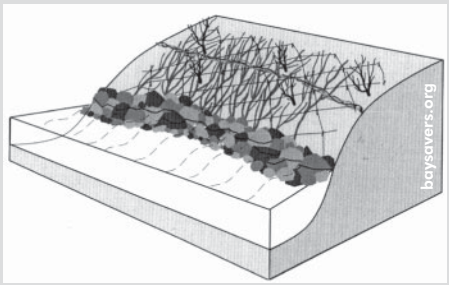
High Conservation Value	Moderate Conservation Value	Inconsistent with NOP Standards
• Contoured crop rows reduce erosion. • Roads, the ditches beside them, and the ends of crop furrows are planted in grasses to filter out sediments and contaminants. • Sediment basins are placed at the low end of fields to stop eroded sediment from leaving the farm. • Stream banks are protected from erosion with bioengineering by using appropriate native vegetation. • Nutrient needs of crops are calculated and only the amounts crops can take up are applied as fertilizer. • Fertilizers and composts are stored away from waterways or wells to avoid contamination.	• Fertilizers and composts are generally applied in correct amounts. • Reduced or minimum tillage lessens soil erosion.	• Soil is eroding. • Runoff from fertilizers and composts contaminate waterways. • Fertilizers are applied to fields in excess.

NOP Rule

Subpart A – Definitions
Soil and Water Quality
Subpart C – Organic Production
205.203 Soil Fertility and Crop Nutrient Management Practice

Preventing Water Contamination

Contouring crop rows reduces soil erosion and excess sedimentation of waterways while helping to retain moisture in the field where it does the most good.



Bioengineering techniques, such as this brush mattress, use vegetation, soil, and rocks instead of steel and concrete to stabilize eroding streambanks. Installing live stakes or live bundled stems and branches, which eventually sprout into numerous individual plants, is cost effective, self-repairing, aethetically pleasing, and good for wildlife and water quality.

Planting dense grasses on farm roads slows the erosive energy of water and cost-effectively reduces road maintenance and rebuilding.

Biodiversity When Livestock Are Involved

Protecting Riparian Areas and Sensitive Habitats

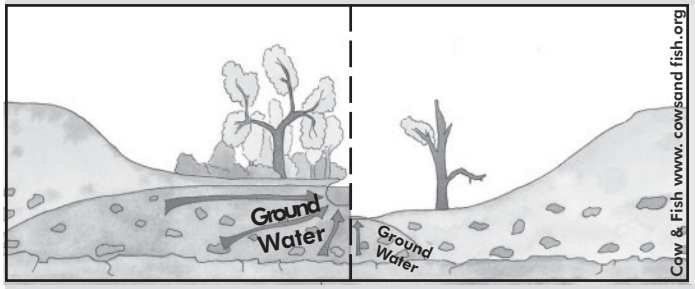
High Conservation Value	Moderate Conservation Value	Inconsistent with NOP Standards
• Fencing is used to keep livestock out of sensitive habitats including riparian zones and easily trampled or polluted rare plant and animal communities. If access to water is needed, use a fence chute across a stream to restrict livestock impact. • Animals are fed away from natural water sources and sensitive areas to minimize their impact. • Off-stream water sources and mineral blocks are supplied to disperse livestock and reduce impact on sensitive habitats. • Strong efforts are made to prevent bank erosion and to conserve native vegetation along waterways, so stored groundwater in this functioning ecosystem releases back into the stream and riparian areas during drier months of the year.	• If fencing is not used, extra attention to the frequency, intensity, and timing of livestock grazing is given to control access to sensitive habitats.	• Livestock degrade sensitive habitats, denude riparian vegetation that supports native species, and/or disturb aquatic habitats, including spawning gravels of fish. • Livestock contribute to waterway contamination.

NOP Rule

Subpart A – Definitions
- Pasture
- Organic Production
- Natural Resources

Subpart C – Organic Production
- 205.200 General
- 205.239 Livestock Living Conditions

Protecting Riparian Areas and Sensitive Habitats



In healthy, well-managed watersheds, stored groundwater releases back into the stream and riparian area.

Watersheds with poor groundwater storage capability may suffer low stream flows as limited storage is exhausted. Streams may become intermittent in flow during crucial times, and water may become unavailable for livestock, wildlife, and fish.

Fencing riparian zones to keep out livestock while providing an alternate water source can foster restoration of denuded habitat and ensure the high water quality important for healthy animals.

Biodiversity When Livestock Are Involved

Improving Pastures and Rangelands

High Conservation Value	Moderate Conservation Value	Inconsistent with NOP Standards
• Rangeland and pastures are well managed and overgrazing is prevented. • Restoration of trampled and eroded areas is done with native perennial grasses and forbs for the benefit of wildlife as well as livestock. • New invasive weeds are prevented from becoming established. • Invasive species are controlled with minimal negative impact. If appropriate, sheep and goats are allowed to graze, biological control methods are used, or prescribed burning is done with the assistance of experts to help control difficult invasive weeds. • Grazing takes into account habitat needs, including reproduction and migration, of priority species and other wildlife. • The frequency, intensity, and timing of livestock grazing are managed to minimize negative impacts to soil, vegetation, and ecosystem health. • Multiple grasses and forbs comprise the pastures and rangelands.	• Pastures are grazed to encourage a variety of healthy, vigorous, native and domestic forage plants. • Livestock do not impact priority and other wildlife species or special habitats.	• Overgrazing has led to an infestation of weedy invasives, a decrease in food value for livestock and wildlife species, soil erosion, and water contamination. • Livestock degrade vegetation or special habitat areas and diminish or exclude sensitive native species. • Wildlife and ecosystem health is compromised by unsanitary pasture conditions.

NOP Rule

Subpart A – Definition
- Pasture
- Organic Production
- Natural Resources

Subpart C – Organic Production
- 205.200 General
- 205.238 Livestock Health Care Practice

Improving Pastures and Rangelands

Overgrazing harms the land and livestock. During the early part of the last century, overgrazing caused this deep gully in the Wasatch Plateau of Utah.

Prescribed burning, when done safely with the help of experts, can help to alleviate invasive weeds and improve wildlife habitat. Once this California pasture was burned, it was successfully replanted in native grasses.

Biodiversity When Livestock Are Involved

Employing Wildlife Friendly Management Practices

High Conservation Value

- Operator does not shoot, trap, or poison native predators to protect livestock. Instead various benign practices are used, for example:
  - Guard animals, such as llamas, donkeys, or dogs, help protect livestock.
  - Frequent and unpredictable appearances are made by rancher to discourage predators.
  - Cattle are herded with sheep, goats, and calves to furnish protection for the smaller animals.
  - Fencing is located, designed, and managed to keep out predators, but corridors are left for wildlife when possible (some federal or state regulations may prohibit fence construction in certain areas).
  - Pasture use is scheduled for when predation pressure is low.
  - Circumstances of livestock death are documented and evaluated to determine predator role.
- Priority species including keystone species that provide habitat for wildlife, such as prairie dogs and beavers, are not harmed.
- Other non-predatory wildlife, such as native grazers, are allowed to co-exist with livestock.

Moderate Conservation Value

- Operator only kills a native predator after determining it has made multiple killings of livestock (see resources section), and all other strategies (see left) were tried, with results recorded.
- Operator allows native wildlife to co-exist with livestock.

Inconsistent with NOP Standards

- Operator kills native predator, whether or not it was determined to have caused previous livestock deaths, without trying other ways to discourage it.
- Operator kills non-predatory keystone and other priority species.

NOP Rule

Subpart A – Definitions
Organic Production
Natural Resources
Subpart C – Organic Production
205.200 General

Employing Wildlife Friendly Management Practices

Guard animals, such as these Great Pyrenees dogs, offer protection to vulnerable livestock. Llamas and donkeys can also supply excellent predator defense. Trapping and shooting should only be used as a last resort, after attempting all predator-friendly practices and after documenting the causes of livestock deaths.

Prairie dogs are keystone species. As many as 33 other wild birds, mammals, and reptiles rely on them as a food source and for the creation of habitat. Prairie dogs also help to conserve soil moisture and decrease soil compaction.

Biodiversity When Harvesting From the Wild

Maintaining and Improving the Sustainability of the Harvested Species

High Conservation Value

- Harvesting and gathering is only done from stable and sustainable populations and environments.
- Collections do not threaten the existence of priority and other native species or special habitat areas.
- Erosion and introduction of non-native invasives are prevented.
- 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 fostered.
- Agency or non-government organizations responsible for ecological management of the area have been notified of collections, and licenses have been obtained, if necessary.
- Wild crop sustainability is monitored using photographs, species counts, or other assessment techniques that can be referenced over time.

Moderate Conservation Value

- Sustainability of populations is strived for by the individual harvester but is not part of a coordinated effort.

Inconsistent with NOP Standards

- Harvesting or gathering threatens the existence of the collected native plant or animal species in the region.
- Harvesting or gathering exceeds the sustainable yield of the ecosystem and thereby negatively impacts the surrounding non-collected species.

NOP Rule

Subpart A – Definitions
- Wild Crop
- Organic Production
- Natural Resources

Subpart C – Organic Production
- 205.200 General
- 205.207 Wild-crop Harvesting Practice

Maintaining the Sustainability of the Harvested Species

Wild rice and other wild crops are harvested from stable and sustainable populations. At the same time, it is determined how these harvests maintain the area's biodiversity.

Wild crops, such as ginseng, are harvested only with the property owner's permission and care is taken to avoid causing erosion or introducing non-native, invasive species.

C. Biodiversity Conservation Amendment to the National Organic Standards Board's OSP

The National Organic Program (NOP) Rule requires each producer to develop an Organic System Plan (OSP). The National Organic Standards Board (NOSB) has approved the following biodiversity conservation amendment to their OSP template. Many certifiers have adopted the NOSB's model OSP forms and will continue to use their updates. These additions provide transparent and predictable guidance to farmers, inspectors, certifiers, and accreditation auditors.

Natural Resources: Biodiversity Management

NOP Rule 205.2 defines organic production as a production system managed in accordance with the Act and its 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. NOP Rule 205.200 and 205.203(a) require that production practices maintain or improve natural resources (soil, water quality, wetlands, woodlands, and wildlife) of the operation.

• *Whole Farm Biodiversity*

Does your field map include features such as hedgerows, woodlands, wetlands, riparian zones, and special habitats? ☐ yes ☐ no

List wildlife and dominant native plants present on the farm (note priority species):

_____

What steps do you take to plan/provide for biodiversity conservation?

☐ understand farm's location within watershed ☐ ascertain what wildlife and dominant native plants existed on the land prior to farming ☐ learn about regional natural areas and conservation priorities ☐ work with neighbors/others to enhance biodiversity (connectivity, restoration, etc.) ☐ other*

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

☐ plant regionally appropriate crops ☐ conserve water ☐ manage water for priority species ☐ retain/restore vegetated riparian buffers/wetlands ☐ protect/improve natural hydrology/ecological function of riparian areas ☐ other*

• *Uncultivated Area Biodiversity*

What actions do you take to provide habitat for pollinators, insect predators, birds, and bats?

☐ bird/bat/bee boxes ☐ hedgerows/windbreaks ☐ maintain/provide natural roosting/nesting/foraging sites ☐ other*

How are you restoring and/or protecting natural areas?

☐ manage for native plants/wildlife specific to the site ☐ preserve/restore wildlife corridors/large blocks of habitat ☐ establish legal conservation areas ☐ have not converted native habitats to farmland since certification ☐ other*

List problem invasives:_____

What actions do you take to control invasive plant/animal species, especially those that threaten natural areas?

☐ learn about invasives ☐ use weed- and pest-free seed/planting stock/soil amendments/mulches ☐ monitor for new introductions and control immediately ☐ suppress invasives using organic methods ☐ other*

• *Cropland Area Biodiversity*

How do you conserve and provide habitat for wildlife?

☐ use companion planting/intercropping ☐ ensure crop diversity ☐ erect wildlife-friendly fences ☐ manage fallow fields for wildlife ☐ other*

Do you schedule farm practices to benefit wildlife?

☐ avoid nests during breeding season ☐ stagger mowing/tilling practices ☐ plan fields to leave food/cover for wildlife ☐ other*

• *Biodiversity When Livestock Are Involved*

How do you protect riparian areas and sensitive habitats?

☐ fence to minimize impacting wildlife ☐ control sensitive area access ☐ prevent bank erosion ☐ feed animals away from water ☐ other*

How do you improve your pasture or rangeland?

☐ prevent overgrazing ☐ reseed/protect trampled or eroded areas ☐ plant native pasture ☐ employ ecologically sound grazing system ☐ use prescribed burning ☐ other*

What wildlife-friendly management practices do you use?

☐ use guard animals ☐ schedule grazing when predation pressure is low ☐ house livestock overnight in protected area ☐ document circumstances of livestock death ☐ other*

List problems with predators or other wildlife:

_____

Have you assessed the farm for biodiversity problems and greatest opportunities, then developed goals and a timeline for biodiversity conservation?

☐ yes ☐ no

Please describe or explain: _____

How do you monitor farm biodiversity?

☐ visually ☐ species counts ☐ other*

• *Biodiversity When Harvesting From the Wild*

How do you maintain or improve the sustainability of the harvested species?

☐ harvest from stable populations ☐ minimize disruption of priority species/sensitive habitats ☐ avoid erosion ☐ allow re-establishment ☐ monitor wild crop sustainability ☐ other*

***If you check other, please explain.**

_____

Natural Resources: Water Use

What practices do you use to protect water quality?

☐ sediment basin ☐ compost/fertilizer stored away from water

D. Crafting the OSP Conservation Component

Take Inventory, Set Priorities, and Create a Timeline

- Inventory your farm for wildlife and major native plants.
- Obtain a topographical map of the watershed that shows your farm and nearby public natural resource lands and protected areas.
- Create a farm map that includes 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.
- Research what species lived on the land prior to farming and locate the closest intact ecosystems that resemble the land's original state.
- Assess the farm for opportunities to support priority species and habitats in your watershed. These include threatened and endangered species, species of concern, and keystone species; migration and movement of native species; and ecosystem processes. Keep in mind that cover—grassed waterways, hedgerows and windbreaks, brushy draws, ponds, wetlands, and woodlands—should be scattered and ideally connected throughout the farm. List the farm's opportunities.
- Investigate incentive programs to assist with planning and implementation, such as habitat conservation programs through state or federal agencies or through non-governmental organizations.
- 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 practices and actions listed in part B and questions in part C to identify and select highest priorities for implementation based on maximum conservation value and value to the farming operation.
- Create a conservation component of the organic system plan with a clear definition of goals, 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.

Monitor and Revise the Plan

- Develop a plan to monitor or evaluate the success of the biodiversity practices you implement. 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 assess the biodiversity successes. The monitoring should help determine whether the natural resources of the farm or surrounding area have benefited from the conservation measures.
- Periodically review and revise the plan, priorities, and timeline based on conditions and management results.

E. Benefits & Incentives for Biodiversity

Many conservation and stewardship practices used by organic farmers—crop rotation, cover cropping, and use of native plants to control erosion and attract beneficial native insect pollinators, predators, and parasites—offer direct economic benefits to the farm and can also provide benefits to biodiversity. A multitude of government and non-governmental organization programs offer cost share, technical support, and other forms of assistance to farmers who wish to implement conservation practices.

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 "Salmon Safe," "Protected Harvest," and "Predator Friendly," certify environmentally beneficial management systems and can be complementary to organic certification. Food Alliance has a certification program with standards for pesticide reduction, soil and water conservation, labor standards, and wildlife habitat. In order to be certified and to market products under the International Federation of Organic Agriculture Movements (IFOAM), a farmer must adhere to biodiversity standards.

Some farmers market the habitat value of their land by offering recreational or agritourism services to anglers, bird watchers, wildlife enthusiasts, or urban dwellers. Small farms can diversify their income through consumer-focused activities, such as tours, mazes, and U-pick operations.

Federally Funded Incentive Programs

The 2002 Farm Bill authorized a dramatic increase in funding for the USDA's conservation incentive programs. The Environmental Quality Incentives Program (EQIP) provides up to 75% of the cost of practices on qualifying farms and ranches. USDA's Wildlife Habitat Incentives Program (WHIP) and the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program provide cost sharing for wildlife habitat restoration projects. The Conservation Security Program gives financial rewards to farmers and ranchers who keep their farms in excellent condition, while encouraging others through a tiered process. The Wetlands Reserve Program offers financial incentives for wetlands protection in exchange for retiring marginal land from agriculture. The U.S. Department of the Interior initiated a new partnership grant program to assist private landowners in working to conserve and restore the habitat of endangered species and other at-risk plants and animals. Conservation planning sits at the heart of most incentive programs.

Some marginal farmland is more valuable for conservation than production. The Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP) enable qualified farmers to receive payments for placing non-permanent vegetative cover on lands. In the 2002 Farm Bill the USDA authorized the enrollment of 2 million acres in a new rental program for ranchers. The Grasslands Reserve Program is a voluntary program to preserve and enhance the quality of native grasslands and rangeland. Watch for Farm Bill conservation programs updates on the NRCS website (http://www.nrcs.usda.gov/).

Conservation Easements

Conservation easements are legal real estate agreements between landowners and land trusts; other qualified conservation organizations; or local, state, or federal 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 houses on portions of their farmland while retaining the rights to grow crops, but can also provide natural resource protections. 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, Ducks Unlimited, or a local land trust. The USDA has three easement programs—the Farm and Ranch Lands Protection Program, the Wetlands Reserve Program, and the Grasslands Reserve Program.

Excellent Reasons to Support Biodiversity

Save Time and Money.
Planting natives that support pollinators and beneficial insects can help reduce costs for pollination and pest control. Perennial grasses or hedgerows can help eliminate mowing, discing, burning, and costs of fixing erosion.

Diversify Your Income Base.
Increased native plants and wildlife may bring income through agritourism or harvesting of saleable products.

Help Wildlife in Ways That Don't Interfere with Farming.
Many practices can be adapted for unused fields, road edges, and non-crop areas that will not affect production.

Add Value to Your Farm Products.
Educating your customers about the biodiversity you foster will help to keep wholesale and retail accounts.

Enjoy Watching Native Plants and Animals Thrive and Benefit from Your Efforts.
Passing to the next generation a farming heritage that supports native species can be very rewarding in and of itself, as can contributing to restoring your region's wildlife.

Take Advantage of Conservation Incentives.
Several agencies and conservation groups (see left and resource section) provide grants and cost-sharing programs for habitat enhancement.
(after Clark and Rollins, 1997)

Glossary

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.

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.

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 non-native (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.

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 area is defined as "a zone of transition from an aquatic ecosystem to a terrestrial ecosystem, dependent upon surface or subsurface water, that reveals through the zone's existing or potential soil-vegetation complex the influence of such surface or subsurface water. A riparian area may be located adjacent to a lake, reservoir, estuary, pothole, spring, bog, wet meadow, muskeg or ephemeral, intermittent or perennial stream." [16]

Sensitive habitats are areas in which plant or animal life or their habitats are either rare or especially valuable. These include habitats containing or supporting "priority" species; all perennial and intermittent streams and their tributaries; coastal tide lands and marshes; and lakes, ponds, and shore habitat.

Sensitive species are prone to becoming threatened or endangered.

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. Categorization as a species of concern generally carries no procedural protections.

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

Notes

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14. Stein et al., *op. cit.*

15. David Pimentel, L. Lach, R. Zuniga, D. Morrison, *Environmental and Economic Costs Associated with Non-Indigenous Species in the United States* (Ithica, NY: Cornell University, College of Agriculture and Life Sciences, 1999).

16. Oregon Revised Statutes, *Watershed Enhancement and Protection; Water Development Projects; Miscellaneous Provisions on Water Rights; Stewardship Agreements,* ORS 541.351 (10), 2003, http://www.leg.state.or.us/ors/541.html.

Selected Resources

General

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Whole Farm Biodiversity

Taking Steps to Plan or Provide for Biodiversity

Biodiversity Partnership/Defenders of Wildlife. *Biodiversity Planning* webpage links to each state's comprehensive wildlife conservation plan: http://www.biodiversitypartners.org/bioplanning/index.shtml. Find approaches and concepts for "conservation network design" at the regional level at http://www.biodiversitypartners.org.

InvasiveSpeciesInfo. State-by-state information on invasive species is available at www.invasivespeciesinfo.gov/.

Native Plant Society. Check on a listing for your state organization (e.g., California Native Plant Society: http://www.cnps.org).

NatureServe. *NatureServe Explorer: An Online Encyclopedia of Life.* This website provides information on rare and endangered species by particular watersheds, and threatened ecosystems by states: http://www.natureserve.org/explorer/.

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Uncultivated Area Biodiversity

Providing Habitat for Pollinators, Insect Predators, Birds, and Bats

Artificial Perches for Raptors. http://www.rain.org/~sals/perches.html.

The Barn Owl (*Tyto alba*). http://www.rain.org/~sals/barnowl.htmlRaptor.

Bat Conservation International. Bat House Project webpage gives information on research and design of bat houses: http://www.batcon.org.

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Environment Canada. *How Landowners Can Help to Conserve Raptors.* http://www.pnr-rpn.ec.gc.ca/nature/whp/raptors/dc17s02.en.html.

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Controlling Invasive Species

Center for Invasive Plant Management (CIPM) promotes the ecological management of invasive plants in the West: http://www.weedcenter.org/.

InvasiveSpeciesInfo. This invasive species website hosts a portal to state-by-state information: http://www.invasivespeciesinfo.gov.

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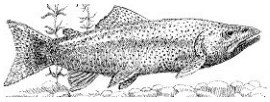

Cropland Area Biodiversity

Conserving and Providing Habitat

Alternative Farming Information Center. Access to information about alternative cropping systems, including organic agriculture: www.nal.usda.gov/afsic.

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Preventing Water Contamination

Alameda County Conservation Partnership. *Bioengineering* webpage offers graphic with explanations: http://www.baysavers.org/Programs/SLZ/bioeng.htm.

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USDA Natural Resources Conservation Service. *National Conservation Practice Standards.* This website offers downloadable papers on grassed waterways, nutrient management, and sediment basins: http://www.nrcs.usda.gov/technical/Standards/nhcp.html.

Biodiversity When Livestock Are Involved

Protecting Riparian Areas and Sensitive Habitats

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Biodiversity When Harvesting From the Wild

Maintaining and Improving the Sustainability of the Harvested Species

Center for Plant Conservation. Publications concerning America's vanishing flora. http://www.centerforplantconservation.org/Publications.html.

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Wisconsin Dept. of Natural Resources. *Wild Ginseng Regulations.* http://www.dnr.state.wi.us/org/land/er/laws/ginseng.htm.

Incentives

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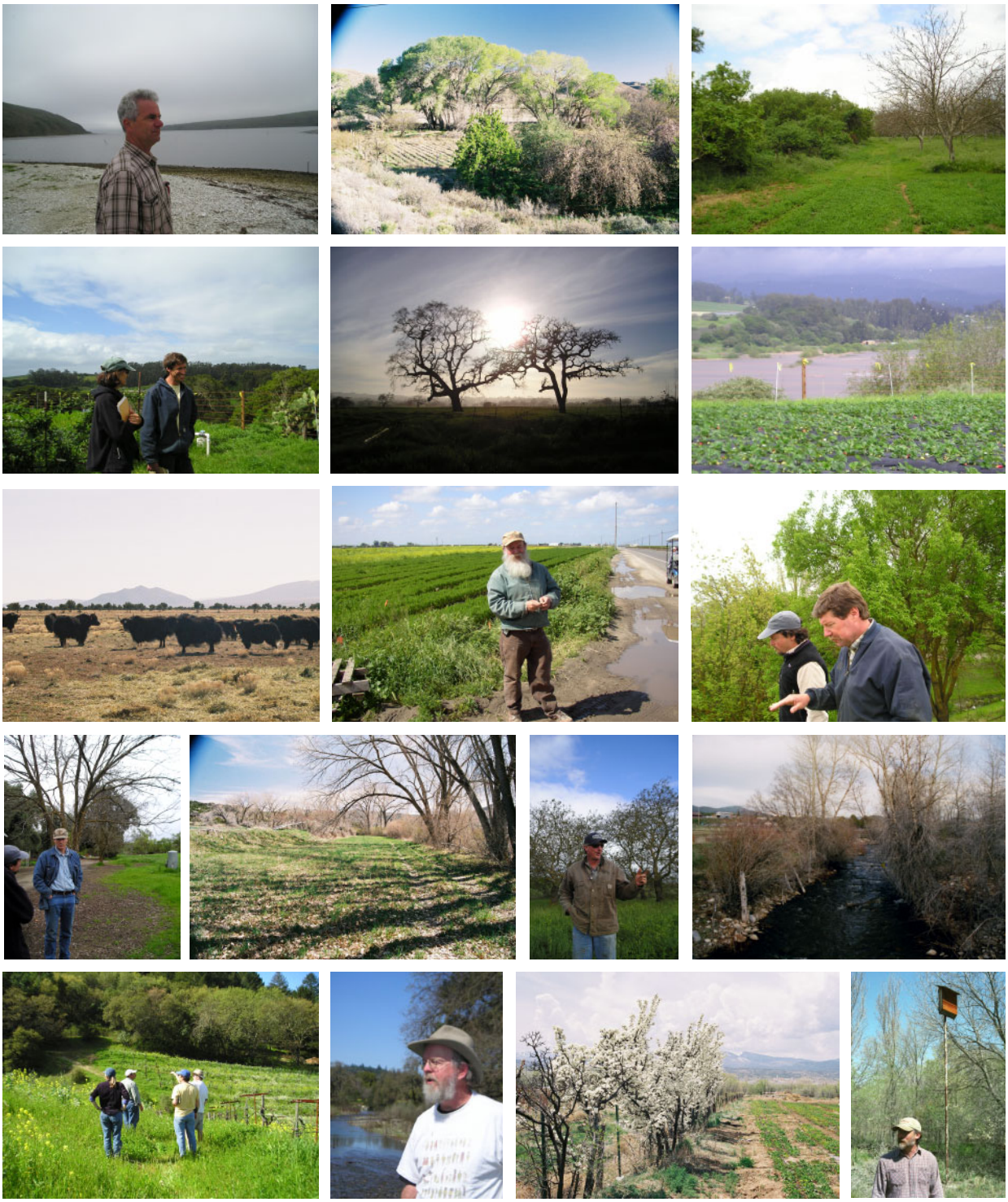
To view these resource pages electronically and access website links, go to http://www.wildfarmalliance.org/resources/index.htm.

Line art in resouce section: *Bob Savannah/USDA Forest Service.*
Inside back page photos: *Jo Ann Baumgartner/WFA; Robert Gerard.*

Organic Farms and Farmers Supporting Biodiversity



Photos left to right from top: *Kevin Lunny, Jardin del Alma, Riverdance Farm, Laura Smith with Stephen Pedersen, Quetzal Farm, High Ground Organics, Latir Mountain Ranch, Tom Willey, Sean Feder with Ed Sills, Charlie Rominger, Embudo Valley Organics, Phil Foster, One Straw Farm, Preston Vineyards, Lou Preston, Santa Cruz Farm, Michael Alexander.*

WILD
FARM
ALLIANCE

PO Box 2570
Watsonville, CA 95077
831-761-8408
831-761-8103 Fax
info@wildfarmalliance.org
www.wildfarmalliance.org