

NRCS Pollinator Conservation Activities

Stephen Brady
Wildlife Technology Development Team
Central National Technology Support
Center
Fort Worth, TX

steve.brady@ftw.usda.gov

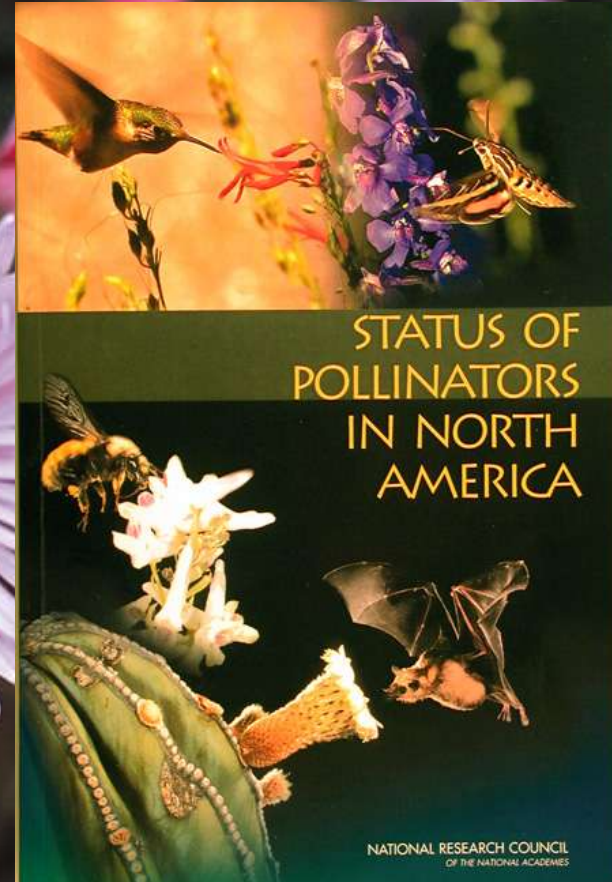


Thanks to Mace Vaughan (Xerces Society), Ramona Garner, & Doug Holy (NRCS) for some of the photos and information in this presentation.

Status of Pollinators in North America 2007, National Research Council <http://nap.edu/catalog/11761.html>



Stimulated by NAPPC





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“The development of management protocols for wild species in agricultural landscapes to sustain wild pollinator populations can create alternatives to honey bees as pollinator demand rises and shortages become likely.”



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“However, many simple and inexpensive practices for pollinator conservation are available. Public outreach is the key.”

“In some cases, farmers could find that promoting wild pollinators that can supplement or substitute for managed pollinators could provide greater yields than will complete dependence on rented honey bee colonies.”



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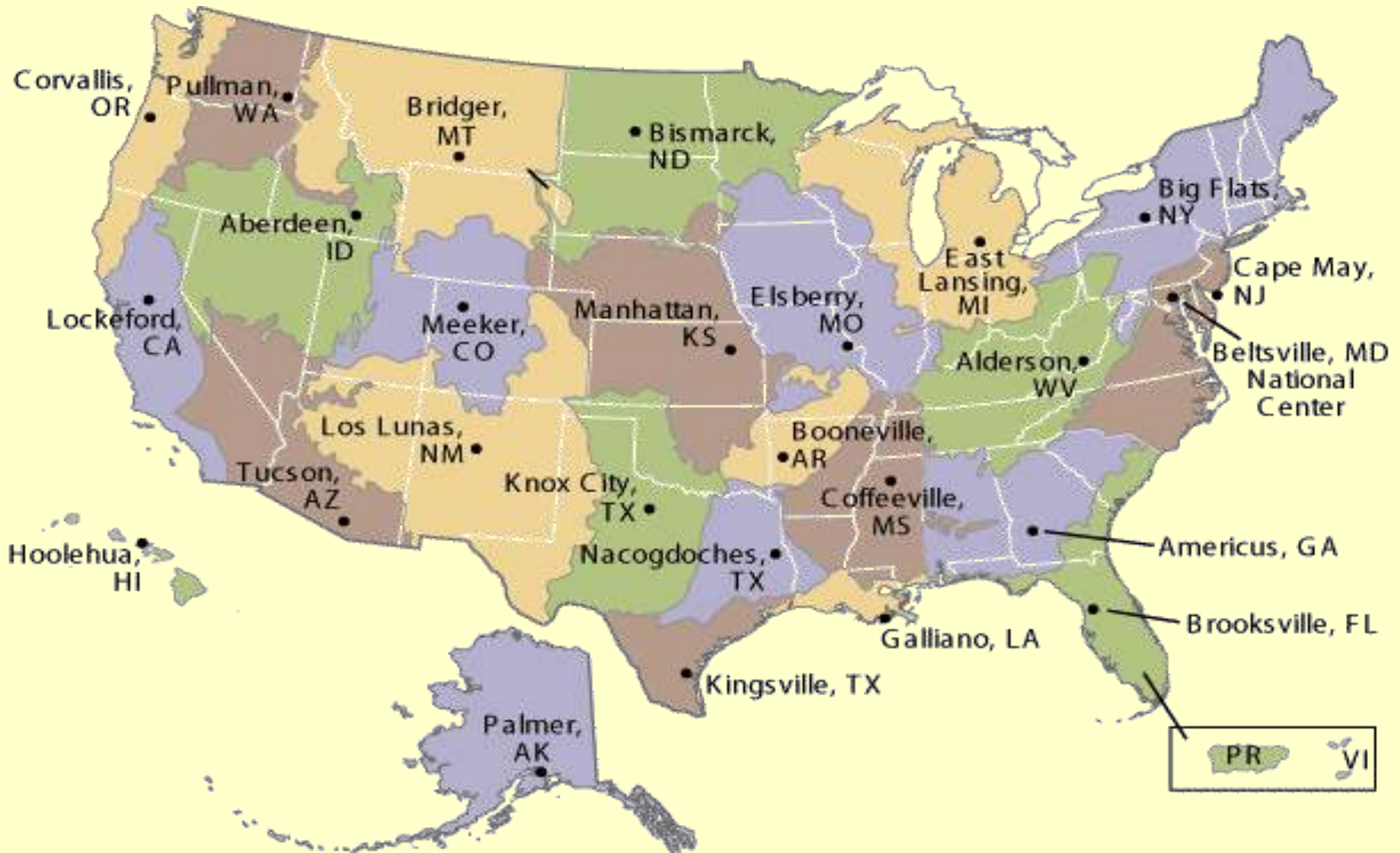
“NRCS offices should provide lists of scientifically tested and approved pollinator-friendly practices to farmers participating in programs.”

“Environmental Benefits Index (e.g., CRP) should explicitly include pollinator habitat considerations.”

“Conserve existing natural habitat in human-dominated landscapes.”

“Target new hires with expertise in biology - ecology”

NRCS Plant Materials Centers



Plant Symbol	Scientific Name	Common Name	Release Name	Collection Location	Host plant for larvae/catepillar
FORBS					
ACMIO	<i>Achillea millefolium var. occidentalis</i>	western yarrow	Great Northern Germplasm	MT, Flathead County	Yes
ARLU	<i>Artemisia ludoviciana</i>	white sagebrush	Summit	Bear Lake County, ID	No
ASTU	<i>Asclepias tuberosa</i>	butterfly milkweed	Glacial Lake Albany Germplasm	NY, Albany	Yes
COPA10	<i>Coreopsis palmata</i>	stiff tickseed	Northern Missouri Germplasm	MO, northern	Moths
COPA10	<i>Coreopsis palmata</i>	stiff tickseed	Western Missouri Germplasm	MO, western	Moths
DAPU5	<i>Dalea purpurea</i>	violet prairie clover	Northern Iowa Germplasm	IA, northern	Yes
ECAN2	<i>Echinacea</i>	blacksamso	Bismarck	ND	Unknown

Plant Symbol	Gen. Poll. Cat.*	Bloom Period	Flower Color	Plant Hght. (ft)	Light/ Soil Moist. Needs	Adaptation	Pollinator Notes
FOR BS							
ACMI O	Medium	late spring	white	3	Partial Sun, Sun/moderate	Intermountain West and Northern Great Plains	minute pirate bug (Orius), big-eyed bug (Geocoris), hoverflies (Syrphidae), and several tachnid flies
ARLU	Low	mid-summer	white	2	Sun/moderate	> 12" precip.	Primarily wind-pollinated
ASTU	Very High	mid-summer	orange	2	Sun/ low	Albany, NY & surrounding areas	Larval food for Queen and Monarch butterfly; bees, moths, other butterflies
COPA10	Medium	Late Spring - Mid	Yellow	2.5	Sun/ low	northern MO	bees in the family Halictidae and bee flies in the family

MOU with NAPPC/PP & Xerces Society

Net Training – NRCS Biologists SharePoint Site
<https://nrcs.sc.egov.usda.gov/st/bio/default.aspx>

**Pollinator Conservation Handbook (Xerces),
Technical Notes**

CStP Enhancement – Pollinators

Conservation Activity Plan – Pollinators FY2010



POLLINATOR BIOLOGY AND HABITAT

New England Biology Technical Note

April 2009

Prepared by the USDA NRCS Maine, New Hampshire, Vermont, Connecticut, Massachusetts, and Rhode Island State Offices, the Xerces Society for Invertebrate Conservation's Pollinator Conservation Program, and the University of Maine Cooperative Extension.

Introduction

This technical note provides information on how to plan for, protect, and create habitat for pollinators in agricultural settings. Pollinators are an integral part of our environment and our agricultural systems; they are important in 35% of global crop production. Animal pollinators include bees, butterflies, moths, wasps, flies, beetles, ants, bats and hummingbirds. This technical note focuses on native bees, the most important pollinators in temperate North America, but also addresses the habitat needs of butterflies and, to a lesser degree, other beneficial insects.

Worldwide, there are an estimated 20,000 species of bees, with approximately 4,000 species native to the United States. The non-native European honey bee (*Apis mellifera*) is the most important crop pollinator in the United States. However, the number of honey bee colonies is in decline because of disease and other factors, making native pollinators even more important to the future of agriculture. Native bees provide free pollination services, and are often specialized for foraging on particular flowers, such as squash, berries, or orchard crops. This specialization results in more efficient pollination and the production of larger and more abundant fruit from certain crops. Native bees contribute an estimated



Sweat bee (*Agapostemon* sp.). Photo: Toby Alexander, Vermont NRCS.

\$3 billion worth of crop pollination annually to the U.S. economy.

Undeveloped areas on and close to farms can serve as long-term refugia for native wild pollinators. Protecting, enhancing or providing habitat is the best way to conserve native pollinators and, at the same time, provide pollen and nectar resources that support local honey bees; on farms with sufficient natural habitat, native pollinators can provide all of the pollination for some crops.

Pollinators have two basic habitat needs: a diversity of flowering native or naturalized plants, and egg-laying or nesting sites. The Natural Resources Conservation Service (NRCS) can assist landowners with providing adequate pollinator habitat by, for example, suggesting locally appropriate plants and offering advice on how to provide



Natural
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August 2008

Technical Note No. _____

Using Farm Bill Programs for Pollinator Conservation



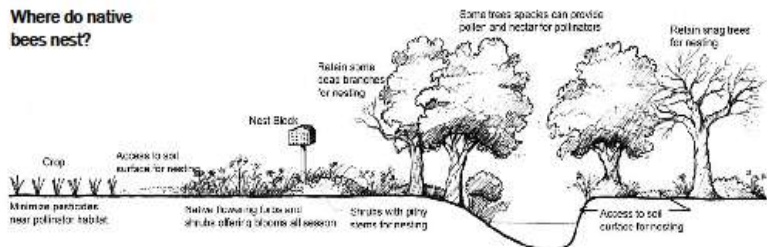


Enhancing Nest Sites For Native Bee Crop Pollinators

Introduction

The European honey bee receives most of the credit for crop pollination, but the number of managed honey bee hives is half of what it was in the 1950s; and this number continues to decline primarily because of honey bee pests and diseases. Native bees, however, contribute significantly to crop pollination and, on farms with sufficient natural habitat located nearby, may even provide all of the required pollination for some crops. In order to support the native bee community, it is essential to provide nesting sites in addition to floral resources. Unfortunately, intensively managed farm landscapes often lack the untilled ground, tree snags, plants, and small cavities that native bees require for nest construction. Agroforestry practices can provide essential nesting habitat for bees, our most important crop pollinators.

Where do native bees nest?



Most native bees nest underground in areas that are sunny, well-drained, and either bare or partly vegetated. Alternatively, they nest in narrow tunnels in wood, or small cavities such as abandoned rodent nests. USDA National Agroforestry Center illustration.

Native bees have very different nesting requirements from the more familiar European honey bee (introduced from Europe in the early 1600s). Unlike the large comb-filled hives of a honey bee colony, they are generally solitary species, with each female constructing and provisioning the nest by herself. Only when adults emerge from their hidden nests do we see them flying about pollinating crops and other plants. The rest of the year they are tucked away inside the cells of their underground or plant-tunnel nests. Most solitary bees are active as adults for only a few weeks each year and most have only a single annual generation. An exception are some social sweat bees that can have several overlapping generations through the summer. These sweat bees are the most abundant native bees in some studies of crop pollination and build large populations over the summer growing season.



Solitary wood nesting bees

About 30 percent of our 4,000 native bee species are solitary wood-nesters that build their nests inside hollow tunnels. These tunnels may occur in the soft pithy centers of some twigs (e.g. box elder, elderberry, or various cane berries); they may be left behind by wood-boring beetle larvae or, in the case of carpenter bees, may be excavated by the bees themselves. Another small but important set of bee species – at least one of which has been documented as an important pollinator of watermelon – tunnel into soft, above-ground rotting logs and stumps.

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Pesticide Considerations For Native Bees In Agroforestry

Introduction

Over 100 crop species in North America require insect pollinators in order to be most productive. In the past, native bees and feral honey bees could meet the pollination needs of smaller orchards, fields of sunflower and pumpkins, and berry patches. Those farms were typically smaller, more diverse, and adjacent to habitat that harbored important pollinators. Today, many farms are large, have less nearby habitat, and commonly rely on honey bees for crop pollination and pesticides to control weeds and pest insects. Native bees, however, can still be important crop pollinators when habitat is available (see *Agroforestry Notes* 33 and 34) and when they are protected from pesticides. The relative importance of native bees may increase if the number of honey bee colonies available for pollination continues to decline as it has over the past 50 years.

Pesticides are tools commonly used to control weeds and pest insects. However, pesticide use must be balanced against the importance of maintaining healthy populations of crop pollinators that can be damaged by pesticide applications. Agroforestry practices together with best management practices can help to reduce the unwanted side effects of pesticides and provide a refuge for native pollinators.

Overview

Herbicides. While herbicides don't directly target pollinators, they can destroy plants that provide flowers when crops are not in bloom. Herbicides are commonly applied around the edges of fields and elsewhere in the agricultural landscape for weed control or site preparation. Unless substitute flowers are available nearby, bees nesting on a farm are subsequently forced to forage more widely for nectar and pollen, which requires more energy and exposes them to more threats. As a result, they produce fewer offspring to emerge the following year.

Insecticides. Insecticides target insects and, depending upon the active ingredient and how it is formulated and applied, have a wide range of toxicities to bees. Foraging bees are poisoned by insecticides when they absorb the fast-acting toxins through their exoskeleton, drink toxin-tainted nectar, or gather polluted pollen or micro-encapsulated insecticides. Although an application of toxin can directly kill bees on contact, most poisonings occur when bees contact insecticide residue on plants in the hours or days after application.

Poison risk is not restricted to contact with insecticides in the field. Slow-acting toxins may be carried



This "no spray" sign, along the edge of an organic farm outside Salem, Oregon, is recognized by the Oregon State Department of Transportation. Well identified "no spray" areas provide a safe haven, free from pesticides, for wild bees to nest and forage. Photo by Brian Baker, Ph.D., Organic Materials Review Institute, Eugene, Oregon. Used with permission.

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Agroforestry: Sustaining Native Bee Habitat For Crop Pollination

Introduction

Over one hundred crop species in North America require a visit from an insect pollinator to be most productive. In the past, native bees and feral honey bees could meet the pollination needs of small orchards, tomato and pumpkin fields, and berry patches, because these farms were typically adjacent to areas of habitat that harbored important pollinators. Today, many farms are large and, at the same time, have less nearby habitat to support native pollinators. To ensure adequate pollination services, producers now rely on European honey bees. Research, however, shows that native bees can be important pollinators in agricultural fields as long as enough habitat is available.

Agroforestry connection

Whether growing a hedgerow or windbreak, managing a riparian buffer, or farming near forests, agroforestry practices can increase the overall diversity of plants and physical structure in a landscape and, as a result, provide habitat for native pollinators. This is especially true if consideration is given to the specific habitat needs of bees when designing an agroforestry project. For example, a wide variety of flowering trees and shrubs can be incorporated into a hedgerow, or a diverse understory of insect-pollinated plants can be used to augment a riparian buffer. Planting specific trees for timber can also provide habitat for pollinators; black locust and maple, for example, supply abundant flowers and are excellent hardwoods that



Windbreaks reduce wind speed and provide more favorable conditions for bee activity, which can increase crop pollination and yield. USDA National Agroforestry Center file photo.



Crops pollinated by native bees

- Alfalfa seeds
- Almonds
- Apples
- Avocados
- Blueberries
- Canola
- Cherries
- Chokecherries
- Cranberries
- Cucumbers
- Grapefruit
- Macadamia nuts
- Pears
- Plums
- Prunes
- Pumpkins
- Soybeans (hybrid seed production)
- Squash
- Sunflower seeds
- Tomatoes
- Vegetable seeds
- Watermelons

Improving Forage For Native Bee Crop Pollinators

Introduction

Agroforestry practices can provide essential habitat for bees, our most important crop pollinators. The European honey bee receives most of the credit for crop pollination, but the number of managed honey bee hives is half of what it was in the 1950s; and this number continues to decline because of disease and the immigration of aggressive races of honey bees. Native bees, however, significantly contribute to crop pollination – and, in some cases, provide all of the pollination.



An *Osmia aglaja* female pollinates a black raspberry flower. Photo courtesy Xerces Society For Invertebrate Conservation.

In order to support the native bee community, a wealth of flowers is necessary. Unfortunately, heavily managed farm landscapes often lack the diversity and abundance of flowers that native bees require. By providing abundant and diverse pollen and nectar sources, a diverse community of native bee species will increase, adjacent crops may yield more, growers could rely less on imported European honey bees, and farm biodiversity and other wildlife species will benefit.

This *Agroforestry Note* discusses how to maximize the ability of an agroforestry practice to support crop-pollinating bees, including a step-by-step method for planning forage enhancements. Other floral visitors, like butterflies, do not pollinate crops, but will also benefit from the techniques below.

Step 1: Identify and protect bee forage already in place

Existing pollen and nectar sources can often be found near fencerows or hedgerows, riparian buffers, other natural areas, or any place on or around the site where a variety of plants (weeds or otherwise) grow. To identify good forage plants, observe flowers early in the morning and in the middle of the day to note how intensively each species is visited by bees and other insects. Honeybees and bumblebees are both good, recognizable indicators of flowering plants that other native bees will use. Try to protect these sites and their flowering plants within the constraints of the landowner's goals.

Step 2: Ensure that flowers are present throughout the growing season

Bees are most active from February to November, longer in mild climates. The social bumble bee is often seen in any of these months, whereas the emergence and short (two to four weeks) active adult life of many solitary-nesting bees depends upon the species, and can occur from early spring to late summer. Therefore, a sequence of plants that provide a diversity of flowers throughout the growing season is necessary to support a diverse community of native bee species.

Bumble bees are some of our most efficient crop pollinators. When forage is available early in the growing season (like willow, red bud, maple, or manzanita), freshly emerged, overwintering bumble bee queens are more successful in establishing their colonies. Also, some solitary bees produce multiple generations each year, so reproductive success in the spring and early summer can lead to larger populations in the mid- to late-summer, when many fruits and vegetables are in bloom.

Conservation Innovation Grants

Insectaries for Pollinators and Farm Biodiversity (insectary hedgerows, buffer strips, riparian enhancements, etc.) Gold Ridge RC&D (CA)

Pollinator Partnership (CA) – ecological and economic benefits of insect floral resource strips within vegetable production systems.

Develop and test pollinator job sheets for 6 regions of US. Xerces Society

Promoting Agricultural Sustainability through Conserving Beneficial Insects: Restoring pollination and pest control services on farms in CA Central Valley. Xerces Society

SW Subterranean Program: Roost Conservation for Pollinating and Insect Eating Bats. Bat Conservation International (AZ, CA, CO, NV, NM, TX, UT).

“Improving Wildlife Habitat Through Effective Use of Plants” – The Wildlife Society (9-23-09)

Monarch Joint Venture

State Offices – EQIP & WHIP rankings

Plants for Pollinators – Plant Materials web site:

<http://www.plant-materials.nrcs.usda.gov/technical/pollinators.html>



Habitat management for native pollinators is very compatible with management for wildlife, water quality, erosion control, forestry, and most often agriculture.



Some Common Practices that can be made Pollinator Friendly:

Field Border - 386

Hedgerow Planting - 422

Conservation Cover - 327

Wildlife Habitat Management – 643, 644, 645, 647

Pasture and Hayland Planting - 512

Range Planting – 550

Riparian Herbaceous Cover - 390

Riparian Forest Buffer – 391

Tree and Shrub Establishment – 612

Windbreak/Shelterbelt – 380 & 650

More importantly – the goal of conservation treatment ought to be to conserve the capacity of the natural resource base to provide the full suite of ecosystem services. Adoption of an ecosystem process-based perspective is essential (Euliss et al. 2008).



**“When one tugs at a single thing in nature,
he finds it attached to the rest of the world.”
John Muir**

Planning conservation treatment:

- consistent with regional ecology
(i.e., native flora, fauna, & landscape)
- retain patches of native vegetation,
cover-structure-substrate-geology,



Planning conservation treatment (Cont.):

- connect patches together,
- retain various successional stages,
- avoid monocultures (i.e., increase forbs),
- native plant materials are often preferred
- plant forbs in clusters or “patches”
- Plans need to accommodate both spatial and temporal variability that emulate critical processes.



"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise". Aldo Leopold

