The Xerces Society
for Invertebrate Conservation

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Native Bee Conservation

Pollinator Habitat

Assessment Form and Guide

NATURAL AREAS AND RANGELANDS

December 2014

The Xerces Society for
Invertebrate Conservation

www.xerces.org

Acknowledgements

Support for the Xerces Society's Pollinator Conservation Program is provided by the USDA Natural Resources Conservation Service, Audrey and J.J. Martindale Foundation, Cascadian Farm, Ceres Trust, Cinco, Clif Bar Family Foundation, Columbia Foundation, CS Fund, Disney Worldwide Conservation Fund, The Elizabeth Ordway Dunn Foundation, Endangered Species Chocolate, LLC, Gaia Fund, General Mills, Irwin Andrew Porter Foundation, McCune Charitable Foundation, The Metabolic Studio, Organic Farm Research Foundation, Organic Valley Farmers Advocating for Organics Fund, Panta Rhea Foundation, Swimmer Family Foundation, Sarah K. de Coizart Article TENTH Perpetual Charitable Trust, SeaWorld & Busch Gardens Conservation Fund, Turner Foundation, Inc., Whole Foods Market and their vendors, Whole Systems Foundation, and Xerces Society members.

Thanks to Megan Benage, Crystal Boyd, Carmen Converse, Greg Hoch, and Carmelita Nelson at the Minnesota Department of Natural Resources, and Jennifer Miller at the Northwest Center for Alternatives to Pesticides, for providing thoughtful feedback on this form, as well as the opportunity to test this tool with land managers.

Authors

Sarah Foltz Jordan, Mace Vaughan, Eric Lee-Mäder, Jennifer Hopwood, Jessa Kay Cruz, Brianna Borders, Jolie Goldenetz-Dollar, Kelly Gill, Nancy Adamson, and Anne Stine.

Editing and layout

Sara Morris and Emily Krafft. Template by Jessa Kay Cruz, Matthew Shepherd, Ashley Minnerath, and Hailey Walls.

Cover Photographs

Cover main: California rangeland planted with wildflowers to promote pollinators (photograph by Claudia Street, Glenn County RCD); left: *Megachile* leafcutter bee on native swamp thistle, *Cirsium muticum* (photograph by Sarah Foltz Jordan, The Xerces Society); right: eastern woodland with pollinator-friendly understory (photograph by Jennifer Hopwood, The Xerces Society).

Photographs

We are grateful to the photographers for allowing us to use their wonderful photographs. Jessa Kay Cruz, The Xerces Society: 2, 9d, 11. Sarah Foltz Jordan, The Xerces Society: 10b, 10c. Jennifer Hopwood, The Xerces Society: 10d. Eric Lee-Mäder, The Xerces Society: 7c, 7d, 9b. Scott Seigfreid: 12. Matthew Shepherd, The Xerces Society: 9a, 9c, 10a. Claudia Street, Glenn County RCD: 3. Mace Vaughan, The Xerces Society: 7a. Katharina Ullmann, The Xerces Society: 7b. The copyright for all photographs is retained by the photographers. None of the photographs may be reproduced without permission from the photographer. If you wish to contact a photographer, please contact the Xerces Society at the address below.

Copyright © 2014 The Xerces Society for Invertebrate Conservation

628 NE Broadway Ste. 200 , Portland, OR 97232
tel 503.232.6639 • fax 503.233.6794 • www.xerces.org

Regional offices in California, Minnesota, Nebraska, New Jersey, North Carolina, and Texas.

The Xerces Society for Invertebrate Conservation is a nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. Established in 1971, the Society is at the forefront of invertebrate protection, harnessing the knowledge of scientists and enthusiasm of citizens to implement conservation programs worldwide. The Society uses advocacy, education, and applied research to promote invertebrate conservation.

The Xerces Society is an equal opportunity employer and provider.

Native Bee Conservation

Habitat Assessment Form and Guide

Purpose

This tool is meant to help educate conservation planners and landowners, prioritize conservation actions, and quantify habitat or land management improvements on a single site. The goal of this tool is not to compare one site with another. Rather, it is intended to help incorporate pollinator conservation into a landscape management plan and then document improvements in pollinator habitat resulting from specific actions and management practices. As with any tool of this nature, the evaluation and scoring practice is a subjective process, and the usefulness of the tool is dependent upon the consistency of the evaluator. While the goal is to implement changes that will result in an increased final score, there may not always be a viable treatment for individual variables. The scoring goals outlined in the instructions are general guidelines, but the capacity to reach or exceed these goals varies widely in different landscapes and may be refined by state NRCS offices and other conservation agencies for a more regionally specific pollinator habitat assessment guide.

Instructions

- This pollinator habitat assessment guide is designed for natural areas and rangelands, on public and private lands. If you are working in a farm landscape, please use our *Pollinator Habitat Assessment Form and Guide: Farms and Agricultural Landscapes* (available at: http://www.xerces.org/wp-content/uploads/2009/11/PollinatorHabitatAssessment.pdf).
- The accompanying photos and notes will help you identify and assess some specific habitat features.
- An assessment should be done twice, once during the conservation planning process (before project implementation) and once after the plan has been implemented.
- Each item in the assessment should be given a score of 0 if not present or the appropriate value from the "Score" column.
- Prior to conducting an assessment, print out aerial photos to help with site and landscape questions.
- Add up the scores to calculate a subtotal for each subsection (e.g., 4a. Sites for ground-nesting bees).
- Next, add up subsection subtotals to get a total for each section. Transfer these figures into the summary table on page 3 to generate the overall score for each assessment.
- The post-implementation goal is hard to define for the country as a whole. Ideally, landowners/ managers should strive to achieve an overall score of at least 100, and an improvement of at least 40 points. If this is not possible for your region or land management plan, talk to your area biologist, regional ecologist, or planner for guidance.

California pollinator meadow featuring a mix of native wildflowers. Dominant flowers in bloom include California phacelia, California poppies, and golden lupine.

Site Summary

Owner/ Operator:		Planner:
Address:		County:
Dates	Assessment before implementation (existing habitat):	
	Assessment after implementation:	

Define and describe the project area (attach annotated maps; include Ecological Classification System information, if known):

Total Score for Habitat Assessment

The figures entered into this summary table will be calculated during completion of the assessment.

	BEFORE	AFTER
Section 1: Landscape Features *(max score 20)*		
Section 2: Site Features *(max score 35)*		
Section 3: Foraging Habitat *(max score 40)*		
Section 4: Native Bee Nesting Habitat *(max score 35)*		
Section 5: Management Practices *(max score 70)*		
OVERALL SCORE		

Section 1: Landscape Features

Characteristics of the broader landscape have a significant influence on wild bee populations and pollination services on adjacent sites. Natural areas in the landscape can also increase the likelihood that new habitat will be colonized by bees. Native plants, especially, are critical for supporting overall pollinator and wildlife diversity.

1a. Percent of natural or semi-natural vegetation within ½ mile of project area (whether on- or off-site). This land use cover includes prairie, shrub lands, woodlands, grasslands, riparian habitat, wetlands, and non-invasive weedy areas. It does NOT include lawn grass, cropland, or overgrazed pasture.

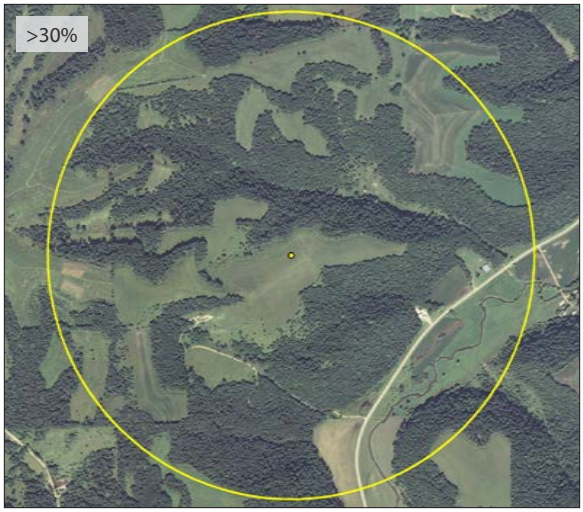
Max score of 10.

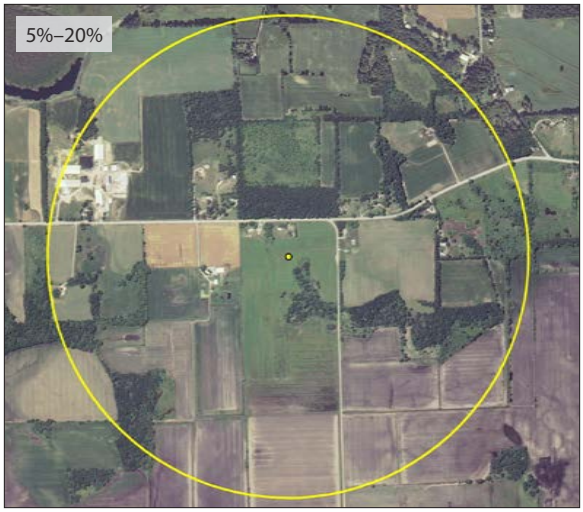
SELECT ONLY ONE	Score	Before	After	Treatment to increase score (no treatment if off-site)
>30%	10			
20%–30%	7			
5%–20%	3			
<5%	0			
Subtotal (1a)				

(1a)

The photos below illustrate the different percent covers.

½ mile





Go to top of page 6

Continue here

Section 1: Landscape Features *continued*

1b. Dominant vegetation in non-cropped area within ½ mile of project area (whether on- or off-site).

Max score of 10.

SELECT ONLY ONE	Score	Before	After	Treatment to increase score (no treatment if off-site)
Native plants	10			
Mix of native and naturalized (non-invasive) plants	7			
Naturalized flowering species (e.g., alfalfa)	5			
Mix of native, naturalized, and weedy/ invasive species	3			
Invasive flowering weeds and/ or sod-forming grasses	0			
Subtotal (1b)				
Landscape Features Total				

(1a)

(1b)

(1a + 1b)

Section 2: Site Features

On-site natural areas and other features have a significant influence on pollinator abundance and diversity.

2a. Percentage of target site that is in natural or semi-natural habitat (see 1a for examples).

Max score of 10.

SELECT ONLY ONE	Score	Before	After	Treatment to increase score
>75%	10			
50%–75%	7			
25%–49%	5			
10%–24%	3			
<10%	0			
Subtotal (2a)				

(2a)

2b. Additional site features that are present.

Max score of 10.

SCORE ALL OPTIONS THAT APPLY	Score	Before	After	Treatment to increase score
Permanent meadows with diverse native wildflowers allowed to bloom	10			
Pasture with >30% non-invasive, bee-friendly forage legumes (e.g., red clover, alfalfa, etc.) allowed to bloom	5			
Source of clean surface water protected from pesticides	5			
Buffers: 1 point for every 20% of area within 25' of water features (e.g., stream, irrigation ditch, pond) that is vegetated, ideally including bee-friendly plants	0–5			
Subtotal (2b)				
Site Features Total				

(2b)

(2a + 2b)

Section 2: Site Features

Section 3: Foraging Habitat

High flower abundance and season long bloom positively influence bee abundance and diversity.

3a. Percentage of vegetative cover that is forbs, flowering shrubs, or pollinator-friendly trees on site. *This does not include invasive or noxious species (e.g., knapweed, purple loosestrife, Canada thistle, yellow star thistle, etc.).*

Max score of 10.

SELECT ONLY ONE	Score	Before	After	Treatment to increase score
>50% cover	10			
30%–50% cover	7			
20%–30% cover	5			
10%–20% cover	3			
<10% cover	1			
Subtotal (3a)				

(3a)

The photos below illustrate some categories. See regional technical notes (listed on page 12) for lists of preferred pollinator plants and other information.

Go to top of page 8

Continue here

Section 3: Foraging Habitat *continued*

Section 3: Foraging Habitat

3b. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in **spring** and support bees. *In rangelands, this includes some forage legumes and cover crops, but does not include invasive or noxious species (see references section for examples).*

Max score of 10.

SELECT ONLY ONE	Score	Before	After	Treatment to increase score
5+ species (for rangelands) 10+ species (for natural areas)	10			
3–4 species (for rangelands) 5–9 species (for natural areas)	5			
1–2 species (for rangelands) 1–4 species (for natural areas)	3			
0 species	0			
Subtotal (3b)				

(3b)

(3a)

3c. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in **summer** and support bees. *In rangelands, this includes some forage legumes and cover crops, but does not include invasive or noxious species (see references section for examples).*

Max score of 10.

SELECT ONLY ONE	Score	Before	After	Treatment to increase score
5+ species (for rangelands) 10+ species (for natural areas)	10			
3–4 species (for rangelands) 5–9 species (for natural areas)	7			
1–2 species (for rangelands) 1–4 species (for natural areas)	3			
0 species	0			
Subtotal (3c)				

(3c)

3d. Number of species of forbs, flowering shrubs, or pollinator-friendly trees on site that bloom in **fall** and support bees. *In rangelands, this includes some forage legumes and cover crops, but does not include invasive or noxious species (see references section for examples).*

Max score of 10.

SELECT ONLY ONE	Score	Before	After	Treatment to increase score
5+ species (for rangelands) 8+ species (for natural areas)	10			
3–4 species (for rangelands) 4–7 species (for natural areas)	7			
1–2 species (for rangelands) 1–3 species (for natural areas)	5			
0 species	0			
Subtotal (3d)				

(3d)

Foraging Habitat Total (3a + 3b + 3c + 3d)

Section 4: Native Bee Nesting Habitat

Native bees have a variety of nesting requirements. About 70% of native bee species in North America nest in the ground, 30% nest in cavities in wood or stems.

4a. Sites for ground-nesting bees. *Ground nests are often marked by a small mound of excavated soil, but may also be nothing more than a small hole in the ground. Nests may be dug in bare soil, areas of patchy vegetation, or hidden among plants. They are usually in marginal areas such as ditch banks or track sides, and frequently can be found on slopes with well-drained soil and good sun exposure. Bumble bees frequently nest in abandoned rodent burrows or under clump-forming bunch grasses.*

Max score of 25.

SCORE ALL OPTIONS THAT APPLY A = abundant, M = moderate, S = scarce	Score	Before	After	Treatment to increase score
Areas of site with undisturbed, well-drained bare ground, or with sparse vegetation (A = >20%, M = 20%–5%, S = <5%)	A = 5 M = 3 S = 1			
Areas with well-drained sandy to sandy/ loam soil (A = >20%, M = 20%–5%, S = <5%)	A = 5 M = 3 S = 1			
1 point for every 10% of area untilled on site	0–10			
Areas of undisturbed (for example, ungrazed) native bunch grasses (clump-forming) (A = >20%, M = 20%–5%, S = <5%)	A = 5 M = 3 S = 1			
Subtotal (4a)				

(4a)

The photos below illustrate some ground nests and typical habitat.

Go to the top of page 10

Continue here

Section 4: Native Bee Nesting Habitat *continued*

4b. Sites for wood- and cavity-nesting bees. *The majority of wood- or cavity-nesting bees nest in pre-existing tunnels or cavities in snags, brush, or the centers of pithy-stemmed shrubs, and large-statured prairie plants.*

Max score of 10.

SCORE ALL OPTIONS THAT APPLY S = scarce, M = moderate, A = abundant	Score	Before	After	Treatment to increase score
Site has dead wood, snags, brush piles, shrubs with hollow or pithy stalks (e.g., elderberry, cane fruit, sumac) and/ or large, sturdy prairie plants with hollow or pithy centers (e.g., *Silphium*, *Solidago*, *Amorpha*). Note: all of these features may not be appropriate for each habitat type.	S = 1 M = 5 A = 10			
Subtotal (4b)				

(4b)

(4a)

The photos below illustrate some wood- and cavity-nest sites.

Native Bee Nesting Habitat Total

(4a + 4b)

Section 4: Native Bee Nesting Habitat

Section 5: Management Practices

Management practices in and around habitat areas have a significant influence on bee populations.

Section 5: Management Practices

5a. Pesticide use, including pollinator-toxic insecticides.

Max score of 40.

SCORE ALL OPTIONS THAT APPLY	Score	Before	After	Treatment to increase score
Buffer of at least 30' between any insecticide application and habitat areas, either on- or off-site	5			
Invasive weed control, if any, carried out with targeted herbicide applications, rather than broadcast	5			
No use of insecticides on site	30			
If insecticides are used (e.g., for mosquito control, grasshoppers, gypsy moth control), IPM program is in place	10			
If insecticides are used (e.g., for mosquito control, grasshoppers, gypsy moth control), IPM program is in place that specifically addresses pollinator protection	5			
If insecticides are used, spray drift is carefully controlled	5			
If insecticides are used, spray equipment calibrated annually, as per state regulations	5			
Sum all scores above for subtotal (5a)				(5a)

5b. Land management techniques used on the site or in project area. *These questions pertain to ongoing site management as opposed to site preparation. Note 'n/a' if option is not applicable to the site.*

Max score of 30.

SCORE ALL OPTIONS THAT APPLY	Score	Before	After	Treatment to increase score
If mowing or haying occurs, then entire disturbed area is limited to ⅓ of habitat per year. Haying or mowing is done patchily, at reduced speeds (<8 mph), with high mower height (12–16"), and in late summer (after peak bloom).	0–10			
If site is grazed, then conservation grazing plan is in place and includes prescribed grazing practices that encourage wildflower diversity/ abundance, such as low intensity grazing, or short duration grazing with long recovery periods.	0–10			
If burning occurs, then entire disturbed area is limited to ⅓ of habitat per year, and a patchy burn approach is used leaving numerous skips and unburned patches. A 3–10 year burn rotation period is used, and the time of year when burning occurs is varied. Rare invertebrate species and their specific needs are considered.	0–10			
Subtotal (5b)				(5b)
Management Practices Total				(5a + 5b)

Habitat Assessment Reference Materials

Crops and cover crops that provide pollen and/ or nectar for bees:

Alfalfa, almonds, alsike clover, apples, avocados, apricots, blueberries, buckwheat, canola, cherries, citrus, crimson clover, corn, cotton, cranberries, cucumber, dutch white clover, eggplant, fava beans, macadamia nuts, milkvetch, melons, mustard, peaches, pears, peas, peppers, phacelia, plums, pumpkins, raspberries, red clover, sainfoin, soybean, squash, strawberries, sunflower, tomatoes, vegetable seed, purple vetch, and watermelon. *(Note: this list is not exhaustive.)*

General Pollinator Conservation

Pollinator Conservation Resource Center
The Pollinator Conservation Resource Center includes regional information on plants for pollinator habitat enhancement, habitat conservation guides, nest management instructions, bee identification and monitoring resources, and directories of native pollinator plant nurseries.
www.xerces.org/pollinator-resource-center/

Attracting Native Pollinators
A complete guide to the fascinating lives of these vital creatures. The book includes detailed profiles of over 30 commonly encountered bee genera and more than 50 pages of fully-illustrated plant lists that enable you to choose the best plants for your region.
www.xerces.org/announcing-the-publication-of-attracting-native-pollinators/

Streamlined Bee Monitoring Protocol
Developed the University of California–Davis, Rutgers University, Michigan State University, and The Xerces Society, this guide provides instructions for assessing pollinator habitat quality and diversity by monitoring native bees. It was developed for conservationists, farmers, land managers, and restoration professionals to document how native bee communities change over time in pollinator habitats.
www.xerces.org/streamlined-bee-monitoring-protocol/

Pollinator Habitat Installation Guides
These regional guidelines provide in-depth practical guidance on how to install and maintain foraging and nesting habitat for pollinators in wildflower meadow plantings or linear rows of native flowering shrubs. Region-specific seed mixes and plant recommendations are included in the appendices of each guide.
www.xerces.org/pollinator-conservation/agriculture/pollinator-habitat-installation-guides/

Pollinators in Natural Areas: A Management Primer
A fact sheet discussing the importance of pollinators in natural areas, as well as their habitat needs. An extensive list of references is also provided.
www.xerces.org/wp-content/uploads/2008/11/pollinators_in_natural_areas_xerces_society.pdf

Inside Agroforestry–Windbreaks
An article about using windbreaks to provide pollinator habitat or to capture pesticide drift.
http://nac.unl.edu/documents/insideagroforestry/vol20issue1.pdf

Introduced, Invasive, and Noxious Plants
Federal and state noxious weed lists, invasive plant lists, and introduced plant lists, with links to more information.
https://plants.usda.gov/java/noxiousDriver

Bumble Bee Conservation

Conserving Bumble Bees: Guidelines for Creating and Managing Habitat for America's Declining Pollinators
A publication to help landowners and managers create, protect, and restore habitat for bumble bee populations.
www.xerces.org/wp-content/uploads/2012/06/conserving_bb.pdf

Bumble Bee Watch
A collaborative citizen science effort to track and conserve North America's bumble bees.
www.bumblebeewatch.org

Native Bee Nest Sites Guidelines

Tunnel Nest Construction and Management
Guidelines on the construction and maintenance of nests for tunnel-nesting native bees.
www.xerces.org/wp-content/uploads/2009/11/tunnel-nest-management-xerces-society.pdf

Enhancing Nest Sites for Native Bee Crop Pollinators
This article describes how to provide nesting habitat for native bees.
www.xerces.org/wp-content/uploads/2011/02/agroforestrynotes34-bee_nests1.pdf

Coming Soon from the Xerces Society

- *Prescribed Grazing to Increase Pollinator Habitat in the Central United States*
- *Natural Nesting Materials for Native Bees*

This mesic prairie provides both forage and nesting habitat with a mix of native wildflowers and bunch grasses.

Last updated: December 30, 2014