

## **Beetle Banks**

Beetle banks are habitat enhancements intended to provide shelter for predatory ground beetles. Beetle banks consist of long, elevated earthen berms planted with perennial bunch grasses; occasionally the bunch grasses are planted with native wildflowers. Beetle banks provide undisturbed winter cover for ground-dwelling beneficial insects adjacent to cultivated fields and are intended to promote rapid movement by beneficial insects into crop fields during and throughout the growing season.<sup>∞</sup>

The beetle bank concept originated in Great Britain to provide habitat for beetles and other beneficial insects that had declined due to the loss of hedgerows and other habitat adjacent to cropland. British farmers have created beetle banks to successfully control crop pests; in some cases farmers have eliminated the need for pesticides altogether. Additional research suggests that various ground beetle species supported by beetle banks may feed extensively on weed seeds and can play an important role in suppressing crop weeds. Despite these promising results, beetle banks remain largely untested in the United States, especially outside the Northeast and Northwest.

## **Planning Beetle Banks**

Beetle banks are often positioned in the center of crop fields and may extend almost to the field edges, leaving enough room for equipment to pass. In this way, farmers can continue to cultivate fields around beetle banks. After establishment, beetle banks integrate into farmscapes as low-maintenance perennial rows. Current guidelines from Britain recommend at least one beetle bank for every 50 acres (~20 hectares). The Xerces Society currently recommends creating multiple beetle banks that are positioned at regular 200-foot (60 meter) intervals to account for the dispersal distance of ground beetles and other beneficial insects.

## **Creating Beetle Banks**

Beetle banks can be constructed by plowing two reverse furrows side by side to create an embankment roughly 2–6 feet (60 cm to 1.8 m) wide and at least 1 foot (30 cm) tall. Depending on soils, the plowing will leave rough clumps that will need to be smoothed with a lightweight harrow or rake before planting. A more simple approach to creating a beetle bank is to use a single-row bed shaper. Bed shapers produce a smooth, packed surface that eliminates the need for follow-up harrowing. Sow or plant the beetle bank immediately after plowing and harrowing to reduce weed pressure and stabilize the soil.

If cultivation is impractical or mechanical equipment is unavailable, then beetle banks can be created by sheet mulching. Sheet mulching is a low-maintenance and no-till organic site preparation method that smothers existing vegetation and seed banks. First, measure your field length and calculate the volume of mulching materials needed for a roughly 2–6 feet (60 cm to 1.8 m) wide and at least 1 foot (30 cm) tall bank. Mulching often requires 3–9 cubic yards (2–7 cubic m) per 1,000 square feet (93 square m) of weed-free material per layer. Mow or flatten existing vegetation, aerate compacted soils, and deeply water dry soils during winter or late spring. Next, lay select nitrogen-based “green” materials, meals, grass clippings, green prunings, grounds, pellets, or seaweeds, to a depth of 1 inch (2.5 cm). After watering the green layer, lay and overlap a weed-barrier of select carbon-based materials, corrugated cardboard, newspaper, recycled paper, or forestry slash (hügelkultur) to a depth of ¼–½ inch (0.6 cm to 1.2 cm). After thoroughly watering the weed-barrier, repeatedly lay and water 1 inch (2.5 cm) of green materials and 1 inch to 3 inches (2.5 cm to 7.6 cm) of carbon-based “brown” materials until the sheet mulch berm is 1 foot to 2 feet (30 to 60 cm) tall. Next, protect the topmost green layer with a 1-inch to 2-inch (2.5 cm to 5.0 cm) layer of wood bark, chips, sawdust, or shavings to retain moisture and prevent weeds. Keep sheet mulch moist throughout the growing season, but neither too dry nor too wet. Lastly, for sites established with transplants, plant transplants directly into the sheet mulch during the following spring. Otherwise, for sites established with seeds, remove the top brown layer and sow warm season grass and perennial wildflower mix into the upper green layer during spring.

## Planting Beetle Banks

Plant the bank with native grass plugs in a staggered pattern around 18 inches (46 cm) apart at a rate of 66 plugs for a 200 square foot (19 square m) beetle bank. Wider banks require multiple rows of transplants, staggered in a checkerboard pattern to ensure adequate coverage. Northeastern native grass seed can be broadcast at specific rates:

Species	H x W	Seed / Acre	Soils	Wetland Status
Big bluestem ( <i>Andropogon gerardii</i> )	6' x 3'	6 lbs.	Coarse-Medium-Fine	Facultative Upland
Purple lovegrass ( <i>Eragrostis spectabilis</i> )	2' x 2'	1 lbs.	Coarse-Medium	Upland
Switchgrass ( <i>Panicum virgatum</i> )	5' x 2'	3 lbs.	Coarse-Medium-Fine	Facultative
Little bluestem ( <i>Schizachyrium scoparium</i> )	3' x 2'	4 lbs.	Coarse-Medium-Fine	Facultative Upland
Indian grass ( <i>Sorghastrum nutans</i> )	7' x 3'	5 lbs.	Coarse-Medium-Fine	Facultative Upland

Supplement native perennial grass plantings with less than 25% of wildflowers from the Aster, Carrot, Mint, or Pea families to support flower foraging predators and pollinators. Appropriate wildflower selections include Common yarrow (*Achillea millefolium*), Partridge pea (*Chamaecrista fasciculata*), Virginia mountain mint (*Pycnanthemum virginianum*), and Common golden Alexanders (*Zizia aurea*). Spring is the best time to plant a new beetle bank; if one begins in the fall, then winter precipitation might cause erosion or loss of seed. Recommended grass seeds do not require cold stratification to germinate, therefore spring planting will establish good cover.

## Maintaining Beetle Banks

Beetle bank plantings should be irrigated as needed during the first three years for successful establishment. Protect established seeds or plugs with composted bark mulch at a rate of 6 cubic yards (4.5 cubic m) per 1,000 square feet (93 square m) to protect plants from weeds. Weeds may be problematic during the first two years of establishment. If weed pressure is moderate or heavy, then plant to hand-weed, mow, string-trim, or scythe the bank once or twice during the first three years. Occasional disturbances will not hurt perennial native grasses, but may actually help grasses compete with weeds by stimulating expansion and growth. Always protect beetle banks from pesticide drift.

After several years, beetle bank plantings will increase in size and crowd out most weeds. At maturity, beetle banks are typically thickly vegetated and resistant to weed encroachment. Reduce and stop disturbing beetle banks to provide a stable refuge for beetles and other ground-dwelling beneficial insects. In the long term, if shrubby weeds begin to take hold in the beetle bank, then manually remove woody growth.



Beetle banks shelter beneficial insects and protect areas for overwintering, egg laying, and pupation. The beetle bank pictured was created with sheet mulch and planted with farm-grown plugs. Photo: Jarrod Fowler, Xerces.

∞Adapted from: Xerces Society for Invertebrate Conservation, The (2014). *Farming with native beneficial insects: Ecological pest control solutions*. North Adams, MA: Storey Pub.

## Beetle Bank Timeline & Checklist

### STEP 1: Site Record

**Site Name:** \_\_\_\_\_ **Start Date:** \_\_\_\_\_

**Weed Pressure:** Low / Medium / High — **Weed Species:** \_\_\_\_\_

If Low–Medium pressure, then **Plowing & Bed-Shaping**; If Low–High pressure, then **Sheet Mulching**.

### STEP 2: Site Preparation Timelines

<b>Plowing &amp; Bed-Shaping</b>		
Timeline	Activity	Date Completed
Spring	Plow two reverse furrows side by side to create a 2–6’ wide x 1’ tall berm. <i>OR</i> Use single-row bed shaper to create a 2–6’ wide x 1’ tall berm.	
	Smooth berm with lightweight harrow or hard rake as needed.	
	Plant plugs 18 inches apart at a rate of 66 plugs per 200 square feet. <i>OR</i> Sow seed at species-specific rates.	
	Bark mulch plugs at a rate of 6 cubic yards per 1,000 square feet.	
	Summer–Fall	Irrigate and weed beetle bank plantings as needed.

<b>Sheet Mulching</b>		
Timeline	Activity	Date Completed
Late Winter – Spring	Mow or flatten existing vegetation.	
	Aerate compacted soils.	
	Deeply water arid or semi-arid sites.	
	Layer mulch: 3–9 cubic yards per 1,000 square feet of material per layer.	
	Water green layers and thoroughly water brown layers during layering.	
Spring–Fall	Irrigate sheet mulch as needed.	
Next Spring	Plant plugs 18 inches apart at a rate of 66 plugs per 200 square feet <i>OR</i> First, remove top brown layer of sheet mulch, then sow seed at species-specific rates.	

### STEP 3. Sheet Mulching Checklist

Layer #	Depth	Materials Used	Recommended Weed-Free Materials and Depths
Layer 6 - Top			1–2” Brown: Wood bark, chips, sawdust, shavings
Layer 5			1–3” Green: Composted animal and plant materials
Layer 4*			1–3” Brown: Crop residues, hay, hulls, leaves, peat, straw
Layer 3*			1” Green: Composts, meals, pellets, grounds, clippings, prunings
Layer 2			¼–½” Weed Barrier: Cardboard, newsprint, paper, slash
Layer 1 - Soil			1” Green: Meals, pellets, grounds, clippings, prunings

\*Layers 3 and 4 may be omitted at sites with low weed pressure.

**For additional information about site preparation, consult:**

[Foltz Jordan, S., Kay Cruz, J., Gill, K., Hopwood, J., Fowler, J., Lee-Mäder, E., and Vaughan, M. \(2017\). \*Organic site preparation for wildflower establishment.\*](#)