Creating Pollinator Habitat in Pastures, Grasslands, and Associated Lands

Organic Site Preparation and Maintenance—Buckwheat Edition

The goal of this fact sheet is to provide general guidance on the establishment and cost estimates of organically converting grasslands, pastures, or associated agricultural lands that are predominately comprised of well-established cool season grasses into pollinator habitat. Using buckwheat as a smother crop for CP42 Pollinator Habitat or Wildlife Habitat Planting (420) is recommended for sites that are sunny, well-drained, gently sloped, and have low to moderate weed pressure.

Setting Expectations—Establishment Takes Time and Patience!

- Organic site preparation (site prep) with buckwheat will require more time and effort than conventional methods, typically requiring one to three years, depending on the starting conditions and history of the site. It is strongly recommended to avoid selecting sites with a history of high invasive or weed pressure for organic site prep. Carefully evaluate if organic site prep is a suitable method for the site. Once planted, weed pressure during the first year of establishment can vary significantly, depending on the thoroughness of the site prep prior to seeding.
- The phrase, "Sleep, creep, and leap!" describes plant establishment during the first three years after sowing. During the first two years of establishment, perennials will invest most of their energy into growing a strong root system, leading to minimal aboveground growth. With proper site prep, much of the noticeable first year vegetation will be annuals and biennials from the native seed mix, with only small amounts of persistent grasses or weeds from the soil seedbank.
- In years two and three, the native perennials will begin to bloom, and with time and proper management, will dominate the site. By the end of the third year, successful pollinator habitat plantings will have approximately 85% cover of native species, with *a minimum* of three species per bloom period (early, mid, and late season).

Implementation

- When planning and implementing pollinator habitat, it is crucial that ample consideration and effort is given to site selection and prep *prior to planting*. The thoroughness of site prep will directly affect the project's success. When organic site prep is chosen, most sites will require more than one year of prep prior to planting. The goal of site prep is to eliminate the existing vegetation and reduce or remove dormant seeds in the soil. This ensures seeds will receive the necessary seed to soil contact and have adequate space to grow, which is necessary for successful establishment during the seedling phase.

During site selection, talk with your local USDA Service Center to ensure that your site(s) meet CP42 size requirements and includes necessary buffers from pesticide exposure. Avoid sites with a history of hard to control weed species or those located near such areas.

- A site is considered properly prepared and ready to be seeded when <5% of the existing vegetation or undesirable species remain. However, aggressive (i.e., species with fast spreading rhizomes) and invasive vegetation must be closely monitored and removed immediately, even at less than 5 %.

1. In early spring, mow vegetation and remove thatch once the field is dry enough to handle equipment. Lightly cultivate (1-2'' depth). Wait 2-3 weeks and lightly cultivate again to break up soil clumps while terminating weed seedlings. Assess and repeat if needed.

2. Once soil is at least 65ºF (~late May to mid-June), lightly harrow or rake the soil surface to remove thatch. Immediately sow buckwheat via seed drill or broadcast, but do not plant before heavy rainfall or in saturated soil, as buckwheat seeds are prone to rot. If rainfall is inadequate, lightly irrigate to encourage buckwheat germination, but avoid overwatering. After 1 week, check and reseed bare patches.
   a.) **If utilizing a seed drill**: sow at 0.5-1'' depth with 50-60 lb/ac in 6-8" rows.
   b.) **If broadcast seeding**: sow at 70-80 lb/ac and cultipack to ensure good seed to soil contact.

3. Mow 1st buckwheat crop 7-10 days after flowering (~6 weeks after seeding) and remove thatch. Assess weed pressure and lightly cultivate any areas with persistent weeds as needed. Sow the 2nd buckwheat crop, irrigate as needed, and quickly reseed any bare patches. Monitor and eliminate weeds before they go to seed (hand pull, string trim, etc.). Note: Buckwheat's quick and robust growth are what make it an effective smother crop. This characteristic also means that it *should not be allowed to set seed*. Timely mowing and management are important when using this species as part of a site prep plan.

4. Mow 2nd buckwheat crop 7-10 days after flowering and leave plant debris on the soil surface. Assess site.
   a.) **If at least 95% of the original vegetation has been eliminated and no other persistent weeds are observed below the buckwheat**: mow and rake off residue. For erosion control and weed suppression, consider sowing oats (*Avena sativa*) as a nurse crop between Aug. 15th and Sept. 15th at 30-50 lb/ac. Sow the native seed mix into the standing oats in late fall.

   b.) **If unacceptable weed competition is still present**: leave plant residue and repeat the entire process (steps 1-4) the following spring. If sowing oats as a winter cover crop, remove all residue and sow oats between Aug. 15th and Sept. 15th at 80-125 lb/ac. Use the higher rate if broadcasting the seed.

Seeding Considerations

- Best practices for seeding will depend on the size and moisture conditions of the site. Seeds are best planted in the fall after the first hard frost but may need to be planted in early spring if the site is prone to wet conditions in the fall. If oats were used as a nurse crop during site prep, the native seed mix should be sown directly into standing oats in late fall. Seeding success is also dependent on proper equipment use. Broadcast seeding and cultipacking are used for smaller scale plantings (<5 ac). Large scale plantings (>5 ac.) can be effectively installed using a specialized native seed drill that has been carefully calibrated, or a calibrated drop seeder followed by cultipacking.
- **Do not plant the seed too deep – wildflower seeds must not be sowed deeper than ¼''**. Very small wildflower seeds, such as wild bergamot (*Monarda* spp.) should be sown on the soil surface. To ensure even distribution and proper seeding rates, it is recommended to mix wildflower seeds with an inert carrier (e.g., sand, cracked-corn, vermiculite, clay-based kitty litter, saw dust, pelletized lime, etc.) at a ratio of 2:1 or 3:1 (carrier to seed, by volume). If you need assistance determining the carrier-to-seed ratio, please contact your local Ag Extension Agent or the seed supplier. If certified organic, confirm the chosen inert carrier is approved by your certifier prior to use.
- Seed mix designs for this conservation practice must be provided by or approved by NRCS before purchase and will require a custom quote from a native seed vendor. An approved seed mix will always contain a **minimum** of nine species of native pollinator-friendly wildflowers, with at least three species that bloom in each season (spring, summer, and fall). The overall seeding rate must be no less than 20 pure live seeds (PLS)/ft² for CP42. More than nine species of pollinator friendly plants are highly encouraged but not required. Native grasses (such as little bluestem) are not required, but if included, should not exceed 25% of the mix based on PLS/ft².

Table 1: Site Preparation Timeline and Activities for CRP Pollinator Habitat Establishment Using Buckwheat

Site Prep Year	Spring	Summer	Early – Late Fall
Year 1: ***Required***	Mowing, light cultivation, seeding buckwheat.	Monitor buckwheat. Mow and remove thatch from 1st buckwheat crop. Lightly cultivate weedy patches if needed. Seed and monitor 2nd buckwheat crop.	Mow buckwheat and assess site for readiness. If ready, remove residue, sow oats, and dormant seed wildflowers (or plan to seed in the spring as needed). If needed, repeat site prep in the following spring.
Year 2: ***Expected***	Remove plant residue (if needed), lightly cultivate, and seed buckwheat.	Monitor buckwheat. Mow and remove thatch from 1st buckwheat crop. Lightly cultivate weedy patches if needed. Seed and monitor 2nd buckwheat crop.	Mow buckwheat and assess site for readiness. If ready, remove residue, sow oats, and dormant seed wildflowers (or plan to seed in the spring as needed). If needed, repeat site prep in the following spring.
Year 3: ***Discretionary***	Repeat site prep as described above. If weed pressure persists, contact NRCS for additional guidance.		
Compliance Requirement: The buckwheat plantings cannot be harvested or grazed for the duration of the CRP contract.			

Management During Establishment and Beyond

Maintenance and monitoring are required throughout the contract to ensure that the installation will function as pollinator habitat and not revert to a degraded condition or become dominated by woody vegetation.

Mowing is Crucial for Successful Establishment

- After seeding the site, mow to a height of 6-8" when vegetation reaches 10-12" in year one and when vegetation reaches 12-18" in year two. *Do not mow lower than 6 inches*. Repeat mowing as many times as necessary (typically two to three times per growing season but will vary depending on the site and weather conditions). Mow when the weeds or other undesirable vegetation are flowering, do not let weeds set seed. Mowing will also trim some of the native plant growth, and that's okay! This action is critical for reducing competing vegetation and will allow the native plants to establish well. By the third year, plants from the seed mix should be established and management of undesirable species may only require spot mowing, string trimming, or hand-weeding.
- Long-term management (after year 3 and beyond): rotationally mow 1/3 of the site to a height of 6-8'' each year. This will help sustain a diverse habitat that is free of woody encroachment. Mowing between Oct. 1 - May 1 will limit disturbance of high monarch activity (migration and reproduction). To help reduce wildlife injury and mortality from mowing, install a flushing bar to the front of the tractor. This will create an early disturbance, giving wildlife time to safely relocate.
- During and after establishment, be sure to prevent the spread of invasives species or noxious weeds. Some species may require specific timing and frequency for effective control. Contact your local NRCS or Extension Service for additional guidance.

Table 2: Maintenance After Seeding Habitat Mix

After Seeding Habitat	Management Regime	# of Treatments
Year 1	Mow to height of 6-8'' when vegetation reaches 10-12''. Spot treat invasive/noxious species as needed.	Typically, 2-3 times per growing season.
Year 2	Mow to a height of 6-8'' when vegetation reaches 12-18''. Spot treat invasive/noxious species as needed.	Typically, 2-3 times per growing season.
Year 3	Spot mow, string trim, or hand-weed undesirable/weed species.	Typically, 1-2 times per growing season.
Year 4 and Beyond	Mow only 1/3 of the site to a height of 6-8''. Spot mow, string trim, hand-weed to treat invasive/noxious species as needed.	Only 1 time per year between Oct. 1 – May 1 to avoid high monarch activity.

Cost Considerations

- The table below outlines the potential cost range for implementing, establishing, and managing pollinator habitat with CP42 using Wildlife Habitat Planting (420). Please refer to the footnotes below the table for important details about how these variable costs were estimated.
- For CP42, cost-share of up to 50% of the reimbursable cost of installing approved practices is provided by the Farm Service Agency (FSA), as well as annual rental payments for land enrolled in 10-to-15-year contracts. Cost-share assistance is not available for any management activity (such as maintenance mowing) for CP42. If you have questions about cost share payments for CP42, please contact your local FSA office. For questions regarding habitat implementation and management, please contact your local Natural Resources Conservation Service (NRCS) office.

Table 3: Estimated Cost Considerations for Creating Pollinator Habitat

DIY and/or using local co-ops and partnerships					Contracted[9]		
	Recommended Methods[1]	Equipment [2] & Materials	Est. Cost Per Acre	Labor/Notes	Contracted Activity[8]	Est. Cost Per Acre[9]	Notes
Implementation (Site Preparation)	Mowing, Harrowing, Light Disking	Tractor, mower, or brush-hog	Fuel cost[3]	Mow 1-3 times, depending on regrowth	Mowing, Harrowing, Light Disking	$120-$250	Price will vary depending on density of veg, total acreage, operator and machinery fees.
	Seeding	Buckwheat	$160-$535 + fuel costs	Price will vary depending on seeding method, rate, and number of treatments	Seeding	$280-$895 for drilling or broadcasting	Price will vary depending on seeding method, rate, and number of treatments.
		Native seed mix[4] + seed carrier[5]	$250-$1,710	Seed mix varies by region and seed availability		$250-$1,710 for native seed mix[4]	Seed mix may be purchased separately by landowner from a native seed vendor.
		Native seed drill[6] or broadcaster[7]	$0-$20 + fuel cost	0.5-1 hour/ac (longer if calibrating native seed drill)		$125-$350 for drilling or broadcasting	Dependent on project size: broadcast seeding will be on the low-end estimate, native seed drilling on the high-end.
		Cover Crop (oats)	$15-$125 + fuel costs	Nurse Crop: 30-50 lb/ac; Winter Cover Crop: 80-125 lb/ac		$140-$480 for drilling or broadcasting	Price will vary depending on project size, seeding method, and rate.
Establishment (Years 1-4)	Maintenance mowing	Tractor, mower, or brush-hog	Fuel cost	Mow ~2-3 times in years 1-2	Maintenance mowing, spot mowing, hand-weeding	$330-$2,400; plan for 1-3 site visits per year	Site visits include monitoring and management of weeds, and a site evaluation will determine what activities are needed.
				Spot mow, string trim, or hand-weed in year 3			
				Mow only 1/3 of the site once in year 4 and beyond			
Estimated Cost per Acre[10]: $425-$2,390+ fuel costs					**Estimated Cost per Acre[10]: $1,245-$6,085 + fuel costs**		

[1] Recommended methods are representative of projects between 0.5 to 10 acres.
[2] Equipment is assumed to be in possession of the landowner prior to the project. Equipment may be rented from a local Conservation District (e.g., SWCD) at reasonable costs.
[3] Fuel cost will depend on the size of equipment, current fuel prices, and how many passes are required.
[4] Seed mix diversity (# of species in a mix) may affect cost, with a low diversity (9 species) at the low-end and a high diversity mix (>50 species) at the high-end of the cost range.
[5] Some seeding methods require that a carrier/bulking agent be added to the mix (e.g., sawdust, rice hulls, vermiculite, etc.).
[6] Native seed drills can be rented at many local SWCD for $5-25/ac, plus a delivery fee.
[7] Broadcast seeding methods will increase seeding rate up to 20%.
[8] Contracted third parties, such as restoration firms, LLCs, or any contracted hire. These cost estimates are highly variable and dependent on the size of the project, travel time to site, and complexity of the project (e.g., ease of access, topography, weed pressure, etc.). Cost ranges are approximate and individual project quotes should be sought if planning to use a third-party contractor. Costs per acre decrease as the size of the project increases.
[9] Some contractors charge a daily rate (e.g., $1916/day), for a fully loaded 2-person crew with equipment, instead of per activity, and/or may have a site visit minimum.
[10] Totals are calculated as follows: minimum range is sum of all activities at the minimum cost estimate; maximum range is the sum of all activities at the maximum cost estimate.

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