

The purpose of this survey is to gather information needed to develop guidelines for ecological restoration project planning in Minnesota. We are asking you to provide cost and time estimates for site preparation, seeding, and vegetation management practices for different restoration scenarios. **Your responses will remain anonymous.**

The survey is divided into three sections:

- I. **GENERAL INFORMATION:** We ask about the restoration services your organization or company provides.
- II. **RESTORATION SCENARIOS:** Here, we've provided four example sites, each with the goal of restoring to either mesic prairie or wet prairie. The four sites are: 1) a recently harvested **soybean field**; 2) an abandoned crop field dominated by **exotic annuals**; 3) a pasture dominated by **invasive cool-season perennials**, and 4) a **degraded prairie remnant** with substantial tree and exotic weed invasion. For each of these scenarios, we've listed the likely steps of the restoration process and ask you to fill in the equipment you typically use and estimate the average cost and time required to perform each step on the entire parcel. As you complete the survey, we ask you to consider how your average cost estimates differ based on the specified site conditions, soil moisture, and restoration goals.
- III. **POST-SEEDING PRACTICE & PROJECT MANAGEMENT:** We ask about the activities and costs associated with management of prairie restorations, including controlled burns and monitoring. We also ask about other items that may influence restoration costs both at the project site and "behind the scenes".

Please answer as many of the following questions as you can and provide as much detail as possible.
Thank you for your participation!

SECTION ONE: GENERAL INFORMATION

1. Of the following items, please indicate which services & supplies are provided in-house, purchased/ hired out, or not offered or performed by your company or organization:

		Provided In-House	Purchased/ Hired out	Not Offered/ Not Performed
A.	Project Management (Planning & overseeing restoration activities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B.	Mowing (Before or after seeding)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C.	Herbicide Application (Broadcast or spot applications)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D.	Invasive Species Removal (Manual/mechanical - chainsaws, brushsaws, loppers, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E.	Seedbed Preparation (Disking, harrowing, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F.	Seeding (Broadcast or drill)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G.	Native Planting (Plugs, mats, potted material, bare root, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H.	Monitoring (Follow-up assessments)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I.	Controlled Burns (Before or after seeding)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
J.	Wild Seed Harvesting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K.	Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

***NOTE: If you only provide or perform items A or H-J please proceed to page 7.**

SECTION 2: RESTORATION SCENARIOS

For all scenarios, assume the restoration site is a protected **40-acre parcel** adjacent to a native prairie remnant. The restored prairie may be accessible to the public for light recreational use, but its primary purpose is to increase wildlife habitat and buffer the prairie remnant. Your goal is to effectively manage weed invasions and restore the 40-acre parcel to high-quality, species-rich prairie.

Each table in the survey assumes a different initial vegetation cover for the restoration site. We have listed the likely steps used to achieve the restoration goals described above and provided spaces in the tables to enter estimates for both a mesic prairie and a wet prairie. For **mesic prairie**, assume the site is upland, with dry to mesic soils. For **wet prairie**, assume the site has wet to wet-mesic poorly drained soils that remain saturated 6-8 weeks per year.

In each table, please indicate the total **COST** and **TIME** (in person-hours) required for each practice **that you would typically employ for the specified site conditions**. Please indicate a **single average estimate** rather than ranges for these values. Additionally, please indicate the equipment you would use each activity.

We have provided two **example seed mixes at the end of the survey**—one for mesic prairies and one for wet prairies. **Please do not include seed cost in your cost estimates** but assume that you are using these (or comparable) mixes when indicating your typical seeding methods and associated costs. **For all other items, include material, equipment, and labor costs.** Additionally, for wet prairie, assume that original hydrology is intact (i.e. exclude costs for filling ditches, breaking drain tile, etc.).

If you do not typically perform the restoration using the methods indicated, please enter “N.A.” for practices that are not applicable and/or fill in the **alternative (alt.)** action you perform and its cost. If the actions, equipment, and cost of the activity are the same for both the mesic prairie and wet prairie, please indicate “same” in the provided space. **SEE EXAMPLE.**

EXAMPLE Crop Field to:		Mesic Prairie		Wet Prairie	
Activity & Equipment		Cost	Person-Hours	Cost	Person-Hours
A		B	C	D	E
Seedbed Prep	1 Lightly harrow seedbed (or alt.) Equipment: Tractor Harrow	\$100.00/ACRE	6 HRS	SAME	SAME
Seeding	2 No-Till drill seed (or alt.) Equipment: broadcast seed Tractor Seed Broadcaster	\$125.00/ACRE	10 HRS	\$100.00/ACRE	14 HRS

SECTION 2: RESTORATION SCENARIOS

1. CROP FIELD

This site has been in a rotation of corn and soybeans, but most recently was cropped with soybeans. At the project onset, the site is primarily bare ground with light crop residue (soybean stalks). Weeds are minimal and no native species are present.

For the following practices or alternative (alt.), please list the equipment you typically use and the estimated price and time in person-hours for performing the activity **for the entire 40 acre site**. If estimates differ for mesic vs. wet prairies, please fill in the appropriate information for each (otherwise indicate "SAME"). If you do not typically perform that step or action, indicate NA (not applicable) or fill in the method & equipment you most typically use.

Crop Field to:		Mesic Prairie		Wet Prairie	
		Cost	Person-Hours	Cost	Person-Hours
A	B	C	D	E	
Seedbed Prep	1 Lightly harrow seedbed (or alt.) Equipment:				
	2 Broadcast seeding (or alt.) Equipment:				
	3 Cultipack (or alt.) Equipment:				

If you'd like to provide more information for this scenario, please comment below or use the space provided on pg. 8 for additional feedback.

SECTION 2: RESTORATION SCENARIOS

2. ANNUAL-DOMINATED FIELD

This site is an old, fallow crop field. Annual weeds dominate more than 75% of the site, and the rest of the site is primarily bare ground and a few exotic perennials. Native prairie species are generally absent.

For the following practices or alternative (alt.), please list the equipment you typically use and the estimated price and time in person-hours for performing the activity **for the entire 40 acre site**. If estimates differ for mesic vs. wet prairies, please fill in the appropriate information for each (otherwise indicate "SAME"). If you do not typically perform that step or action, indicate NA (not applicable) or fill in the method & equipment you most typically use.

Annual-Dominated Field to:		Mesic Prairie		Wet Prairie	
Activity & Equipment		Cost	Person-Hours	Cost	Person-Hours
A		B	C	D	E
Vegetation Removal	1 Control burn existing vegetation Equipment:				
	2 Herbicide- Broadcast spray (or alt.) Equipment:				
	3 Herbicide- Spot-spray remaining vegetation (or alt.) Equipment:				
Seedbed Prep	4 Lightly harrow seedbed (or alt.) Equipment:				
Seeding	5 Broadcast seeding (or alt.) Equipment:				
	6 Cultipack (or alt.) Equipment:				

If you'd like to provide more information for this scenario, please comment below or use the space provided on pg. 8 for additional feedback.

SECTION 2: RESTORATION SCENARIOS

3. INVASIVE PERENNIAL-DOMINATED PASTURE

This site is an old pasture (not currently grazed) dominated by herbaceous invasive perennial species (>75% total cover). Assume the existing vegetation is predominantly vigorous, dense stands of smooth brome (*Bromus inermis*) on mesic sites, and reed canary grass (*Phalaris arundinacea*) on wet sites. Native prairie species are generally absent. Non-selective vegetation control methods will be suitable for this site.

For the following practices or alternative (alt.), please list the equipment you typically use and the estimated price and time in person-hours for performing the activity **for the entire 40 acre site**. If estimates differ for mesic vs. wet prairies, please fill in the appropriate information for each (otherwise indicate "SAME"). If you do not typically perform that step or action, indicate NA (not applicable) or fill in the method & equipment you most typically use.

Invasive Perennial Field to:		Mesic Prairie		Wet Prairie	
		Cost	Person-Hours	Cost	Person-Hours
Activity & Equipment					
Vegetation Removal	1 Mow existing vegetation Equipment:				
	2 Control burn existing vegetation Equipment:				
	3 Herbicide- Broadcast spray (or alt.) Equipment:				
	4 Herbicide- Spot & foliar spray remaining vegetation (or alt.) Equipment:				
Seedbed Prep	5 Lightly harrow seedbed (or alt.) Equipment:				
Seeding	6 Broadcast seeding (or alt.) Equipment:				
	7 Cultipack (or alt.) Equipment:				

If you'd like to provide more information for this scenario, please comment below or use the space provided on pg. 8 for additional feedback.

SECTION 2: RESTORATION SCENARIOS

4. INVADED LOW-DIVERSITY PRAIRIE

This site is a low-diversity native remnant invaded by woody plants and herbaceous exotic perennials. Vegetation cover is approximately 10% trees and shrubs (3-inch average diameter), 50% herbaceous exotics and woody seedlings, and 40% native prairie species. For mesic prairie, assume woody cover is primarily eastern red cedar and sumac; exotic perennial cover is smooth brome. For wet prairie, assume woody cover is primarily aspen and sandbar willow; exotic perennial cover is reed canary grass. Restoration will require removal of woody species and selective vegetation control (e.g. spot-spraying) to minimize damage to existing native plants. The entire 40-acre site will be **interseeded** to increase diversity. Because this site is a remnant, assume that it is divided into **two management units**, and that restoration activities (e.g. burning, seeding) will be completed in two phases. Please include the total cost/time for both management units in your estimates.

For the following practices or alternative (alt.), please list the equipment you typically use and the estimated price and time in person-hours for performing the activity **for the entire 40 acre site (in 2 management units)**. If estimates differ for mesic vs. wet prairies, please fill in the appropriate information for each (otherwise indicate "SAME"). If you do not typically perform that step or action, indicate NA (not applicable) or fill in the method & equipment you most typically use.

Invaded Low-Diversity Prairie to:		Mesic Prairie		Wet Prairie	
Activity & Equipment		Cost	Person-Hours	Cost	Person-Hours
A		B	C	D	E
Vegetation Removal	1 Control burn existing vegetation Equipment:				
	2 Cut Invasive Trees & Shrubs (i.e. chainsaws, brush hogs, slash equipment) Equipment:				
	3 Herbicide- Spot & foliar spray select vegetation (or alt.) *include cut-stump treatment cost Equipment:				
Slash Removal	4 Haul & Chip cut material to remove from site (or alt.) Equipment:				
	5 Burn cut material on site Equipment:				
Seeding	6 Interseed with broadcast seeder (or alt.) Equipment:				
	7 Cultipack (or alt.) Equipment:				

If you'd like to provide more information for this scenario, please use the space provided on pg. 8 for additional feedback.

SECTION 3: POST-SEEDING PRACTICE & PROJECT MANAGEMENT

This section address activities that take place after seed installation, as well as other miscellaneous items that may influence restoration costs. For all questions, please assume that you are performing the specified activities on a **40-acre recently harvested soybean crop field**, as described in Section 1 (see pg. 3).

- Please provide the estimated cost and time (person-hours) for performing the following post-seeding activities **on the entire 40-acre site**. Additionally, indicate the **typical frequency** of post-seeding weed management activities, and typical equipment used for all other items. If estimates differ for mesic vs. wet prairies, please fill in the appropriate information for each (otherwise indicate "SAME"). If you do not typically perform a step or action, indicate NA (not applicable) or fill in the method & equipment you most typically use.

Management & Additional Activities on:		Mesic Prairie		Wet Prairie	
		Cost	Person-Hours	Cost	Person-Hours
Weed Management	1 Mowing Frequency:				
	2 Herbicide- Spot Application Frequency:				
	3 Controlled Burn Frequency:				
Reseeding	4 Re-Seeding (assuming poor establishment of original seeding) Equipment:				

- Please indicate the average amount of time (in hours) typically dedicated to the following project management services. Please indicate whether the cost of these services is already reflected in project bids in the activity costs or if they are included as a separate line item. If the latter, please provide the typical billable rate for providing this service. If you do not typically provide these services, indicate NA (not applicable).

		Person Hours	Price			Service Cost (if separate line item)
			Included in activity costs	OR	Separate Line Item	
A	Project Planning (Client consultation & site assessments)		<input type="checkbox"/>		<input type="checkbox"/>	
B	Project Management & Labor Coordination (During physical site restoration)		<input type="checkbox"/>		<input type="checkbox"/>	
C	Monitoring & Follow-up Site Assessments (After seeding)		<input type="checkbox"/>		<input type="checkbox"/>	

- For heavily-invaded sites (>75% cover invasive perennials; e.g. scenario 3) how many years (or growing seasons) of vegetation management do you typically undertake *prior to seeding*? AND what is the average added cost per year/season?
- What are the added mobilization costs of doing a restoration:
 - 50 miles away? _____
 - 100 miles away? _____

SECTION 3: POST-SEEDING PRACTICE & PROJECT MANAGEMENT

5. Additional Comments:

Please use this space to share any feedback or comments you may have on the survey. To provide further explanation or describe alternative restoration methods for any of the Restoration Scenarios in Section 2, please reference the appropriate steps using the cell coding in each table (e.g. "Scenario 1, A2" = Crop Field - No Till Drill Seeding).

THANK YOU FOR COMPLETING THE SURVEY!

In appreciation of your time for completing the survey, we're offering a **\$20 Holiday gift card to the first 50 people to return surveys**. If you'd like to participate in the opportunity to receive one of these gift cards, please provide your name and contact information here. Please note that your responses to the survey will still remain anonymous. Please complete and return your survey by **Wed, March 13th, 2013**.

NAME _____

MAILING ADDRESS:

EMAIL: _____

Please attach the completed .pdf file or a scanned copy to an email addressed to **wils0743@umn.edu**. If you prefer to mail the survey, please send it to:

Jodi Refsland
Department of Horticultural Science
University of Minnesota
305 Alderman Hall
1970 Folwell Avenue
St. Paul, MN 55108

If you have any questions, please contact Jodi at 608-475-0705 or **wils0743@umn.edu**

EXAMPLE SEED MIXES

Mesic Prairie			Wet Prairie*		
Scientific Name	Common Name	Weight (lbs)	Scientific Name	Common Name	Weight (lbs)
<i>Andropogon gerardii</i>	big bluestem	2.00	<i>Andropogon gerardii</i>	big bluestem	1.00
<i>Bouteloua curtipendula</i>	side-oats grama	1.60	<i>Bromus ciliatus</i>	fringed brome	1.50
<i>Bromus kalmii</i>	kalm's brome	0.50	<i>Calamagrostis canadensis</i>	bluejoint	0.04
<i>Elymus canadensis</i>	nodding wild rye	1.17	<i>Carex pellita</i>	wooly sedge	0.05
<i>Elymus trachycaulus</i>	slender wheatgrass	1.00	<i>Carex stricta</i>	tussock sedge	0.02
<i>Panicum virgatum</i>	switchgrass	0.06	<i>Carex vulpinoidea</i>	fox sedge	0.10
<i>Schizachyrium scoparium</i>	little bluestem	1.60	<i>Elymus virginicus</i>	Virginia wild rye	1.75
<i>Sorghastrum nutans</i>	Indian grass	2.00	<i>Glyceria grandis</i>	tall manna grass	0.15
<i>Sporobolus heterolepis</i>	prairie dropseed	0.07	<i>Glyceria striata</i>	fowl manna grass	0.11
			<i>Panicum virgatum</i>	switchgrass	0.75
			<i>Poa palustris</i>	fowl bluegrass	0.20
			<i>Scirpus atrovirens</i>	dark green bulrush	0.10
			<i>Scirpus cyperinus</i>	woolgrass	0.03
			<i>Sorghastrum nutans</i>	Indian grass	0.50
			<i>Spartina pectinata</i>	prairie cordgrass	0.50
Scientific Name	Common Name	Weight (oz)	Scientific Name	Common Name	Weight (oz)
<i>Agastache foeniculum</i>	blue giant hyssop	0.96	<i>Anemone canadensis</i>	Canada anemone	0.48
<i>Amorpha canescens</i>	lead plant	0.96	<i>Asclepias incarnata</i>	swamp milkweed	1.28
<i>Asclepias syriaca</i>	common milkweed	0.64	<i>Desmodium canadense</i>	Canada tick trefoil	8.00
<i>Asclepias tuberosa</i>	butterfly milkweed	0.64	<i>Doellingeria umbellata</i>	flat-topped aster	0.80
<i>Astragalus canadensis</i>	Canada milk vetch	0.96	<i>Eupatorium perfoliatum</i>	common boneset	0.48
<i>Dalea candida</i>	white prairie clover	0.96	<i>Euthamia graminifolia</i>	grass-leaved goldenrod	0.32
<i>Dalea purpurea</i>	purple prairie clover	3.04	<i>Eutrochium maculatum</i>	spotted Joe pye weed	0.64
<i>Desmodium canadense</i>	Canada tick trefoil	0.96	<i>Helenium autumnale</i>	autumn sneezeweed	0.80
<i>Helianthus pauciflorus</i>	stiff sunflower	0.96	<i>Helianthus grosseserratus</i>	sawtooth sunflower	0.80
<i>Heliopsis helianthoides</i>	ox-eye	2.08	<i>Liatris pycnostachya</i>	great blazing star	0.32
<i>Liatris aspera</i>	rough blazing star	0.48	<i>Lobelia siphilitica</i>	great lobelia	0.16
<i>Liatris pycnostachya</i>	great blazing star	0.48	<i>Mimulus ringens</i>	blue monkey flower	0.16
<i>Monarda fistulosa</i>	wild bergamot	0.96	<i>Pycnanthemum virginianum</i>	Virginia mountain mint	1.28
<i>Oligoneuron rigidum</i>	stiff goldenrod	0.96	<i>Symphotrichum puniceum</i>	red-stemmed aster	1.28
<i>Rudbeckia hirta</i>	black-eyed susan	4.96	<i>Verbena hastata</i>	blue vervain	2.40
<i>Symphotrichum ericoides</i>	heath aster	0.48	<i>Vernonia fasciculata</i>	bunched ironweed	0.48
<i>Symphotrichum laeve</i>	smooth aster	0.96	<i>Veronicastrum virginicum</i>	Culver's root	0.32
<i>Verbena hastata</i>	blue vervain	0.64	<i>Zizia aurea</i>	golden alexanders	4.00
<i>Verbena stricta</i>	hoary vervain	0.96			
<i>Zizia aurea</i>	golden alexander	0.96			
Mix:	State Seed Mix 35-241**		Mix:	State Seed Mix 34-262**	
Seeding Rate:	11.5 lbs/acre (59 seeds/sq foot)		Seeding Rate:	8.3 lbs/acre (119 seeds/sq foot)	
Cover Crop:	Oats/winter wheat (5 lbs/acre)		Cover Crop:	Oats/winter wheat (6.2 lbs/acre)	

* Wet prairie mix represents the drier end of the moisture range; assume the wet sites in survey scenarios grade from wet prairie to wet meadow (where State Seed Mix 34-271 will be more appropriate)

** Assume that you will apply these state seed mixes plus an additional ~20 species for a total of 50 species/mix.

**For interseeding (Scenario 4: Degraded Remnant) assume that you will apply a subset of these species-- those not already present on site (primarily cool-season graminoids and forbs).