

Winter 3-1-2023

Irvine Prairie Planned Work

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Recommended Citation

Irvine, C.; Pippert, B.; Jackson, Laura; Walter, Laura; Meissen, Justin; Olson, Andrew; and Phillips, Anne, "Irvine Prairie Planned Work" (2023). *Tallgrass Prairie Publications and Reports*. 15.

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IRVINE PRAIRIE

Winter Meeting | March 1, 2023

C. Irvine, B. Pippert, L. Jackson, L. Walter, J. Meissen, A. Olson, A. Phillips



Tallgrass Prairie
CENTER

University of Northern Iowa.

Planned Work 2023



2023 Irvine Prairie Outreach, Restoration, and Management Work Plan

Restoration and management work in 2023 will consist primarily of new planting and prescribed burning. Some plug transplanting will occur. Tasks to support 2023 operations follow:

SPRING (April 1 - June 30)

Prescribed Burning

Approximately 20 acres of Irvine Prairie planted in 2018-2020 will be burned as part of the long-term management of the site. Work is dependent on favorable weather.

Operator: JM, TPC staff and volunteers

Equipment: 2 pump engines, 4 backpack sprayers, 2 flappers

Location: Throughout South Tract Central Unit

Timing: March-May

Supplemental Plug Planting

Specific planting locations are currently unknown, but will likely focus on drier sites in the 2020 seeding area of Irvine Prairie, though two species suited for wetter soils are also being propagated. Species to be transplanted into suitable, strategic locations, preferably near trails, may include wood betony, prairie phlox, prairie rose, prairie blue-eyed grass, silky aster, rough false foxglove, field pussytoes, upland white goldenrod, groundplum milkvetch, cream wild indigo, few-flowered panic grass, purple lovegrass, marsh hedgenettle, and swamp lousewort. Three of these species (wood betony, rough false foxglove, and swamp lousewort) are hemiparasitic on grasses or sedges and will be propagated and transplanted with a host plant. Several of the target species are considered difficult to grow, and we may not be successful in producing transplantable plugs of all listed species. Stratified seeds of American hazel may be planted using the Droste can method to establish nut-bearing shrub thickets in selected areas. Bur oak acorns collected in fall 2022 from remnant populations in nearby pioneer cemeteries will be used to establish trees at designated locations in the welcome area.

Operator: LFW, TPC staff and volunteers

Equipment: Volunteer labor, hand tools

Location: TBD

Timing: late April-early June

Invasive Grass Mowing

Problem perennial grass areas found in old waterways should be mowed to promote uniform growth in preparation for a spring herbicide application.

Operator: JM

Equipment: Any mower set to 4 in. cutting height

Location: Past waterways

Timing: pre-green up (April)

Invasive Grass Herbicide Application

After invasive perennial grass areas have had time to regrow, they should be sprayed with appropriate herbicides at label recommended rates. Spot spraying will minimize off-target effects in established vegetation.

Operator: JM

Equipment: Backpack sprayer

Location: Past waterways/headlands

Timing: mid May

Establishment Mowing #1 (Fall 2022 Areas)

All early plantings benefit from mowing relatively early in the season to encourage light penetration to the soil surface. This mowing will cover ~25 acres. Depending on the equipment available, rotary disc mowers or other hay mowers are ideal for avoiding vegetation matting, which can impede light penetration to soil surface.

Operator: BP

Equipment: Hay mower ideal, brush hog OK, mower at ~6 in

Location: 2022 Fall Seeded Area, Additional ~0.25 acres in fall/spring 2022 area

Timing: late June

Local Ecotype Seed Collection

Local Ecotype Seed Collection

Potential target species for local ecotype seed collection include Illinois tick trefoil, false boneset, heavy sedge, smooth blue aster, Scribner's panic grass, porcupine grass, and partridge pea. We will continue collecting information about Benton County remnant populations using GIS apps to facilitate returning to the populations for seed harvest. We will communicate with the Benton County Roadside Manager regarding seed collecting plans from roadsides. Seed will be cleaned and stored at the TPC until sufficient quantities are on hand for inclusion in Irvine Prairie seeding mixes, or collections may be used for establishment of seed increase plots to produce enough seed for use in plantings. Local ecotype seed of species that establish poorly from seed (e.g., Scribner's panic grass, porcupine grass) may be used to produce greenhouse-grown plugs for direct transplantation at Irvine Prairie.

Operator: LFW

Equipment: GIS software, TPC seed lab and greenhouse equipment

Location: TBD

Timing: May - October

Summer (July 1-September 1)

Vegetation Outcomes Monitoring

In order to assess the success of the planting areas, formal monitoring needs to be undertaken. Information derived from monitoring will be used to identify areas for reseeding next year, and plan for future management prescriptions.

Operator: JM

Equipment: GPS, Sampling frame, datasheets

Location: All Irvine Prairie

Timing: July

Invasive Species Spot Herbicide Application

After invasive perennial grass areas have had time to regrow, they may be sprayed with appropriate herbicides at label recommended rates. Spot spraying will minimize off-target effects.

Operator: JM

Equipment: Backpack sprayer

Location: Past waterways

Timing: July-August

Establishment Mowing #2 (Fall 2022 Areas)

A second mowing should occur when weed or cover crop reaches approximately 2ft in height. Plan to mow at the end of July. This mowing will cover ~25 acres. Depending on the equipment available, disc or sickle mowers are ideal for encouraging light penetration to soil surface

Operator: BP

Equipment: Hay mower ideal, bush hog OK, mower at 4-6in

Location: 2022 Fall Seeded Area, Additional ~0.25 acres in fall/spring 2022 area

Timing: late July

Establishment Mowing #3 Fall 2022 Areas)

A third mowing may not be necessary, but should occur when weed or cover crop once again reaches approximately 2ft in height. Plan for a final mow mid-late August. This mowing will cover ~25 acres. planted fall 2022. Depending on the equipment available, disc or sickle mowers are ideal for encouraging light penetration to soil surface.

Operator: BP

Equipment: Hay mower ideal, bush hog OK, mower at 4-6in

Location: 2022 Fall Seeded Area, Additional ~0.25 acres in fall/spring 2022 area

Timing: late August

Fall (September 1 - December 1)

Seeding Establishment and Vegetation Outcomes Monitoring

In order to assess the success of the planting areas, formal monitoring needs to be undertaken. Information derived from monitoring will be used to identify areas for reseeding next year, and plan for future management prescriptions.

Operator: JM

Equipment: GPS, Sampling frame, datasheets

Location: All Irvine Prairie

Timing: September

Invasive Grass Spot Herbicide Application

Mow invasive grasses, and after invasive perennial grass areas have had time to regrow, they should be sprayed with appropriate herbicides at label recommended rates. Spot spraying will minimize off-target effects. Task may not be necessary depending on results of previous control efforts.

Operator: JM

Equipment: Backpack sprayer

Location: Past waterways

Timing: October

Fall Seeding

Approximately 28 acres of Irvine Prairie will be broadcast in the fall by TPC staff using a pendulum broadcast spreader. Three seed mixes will be planted in the southeast corner of Irvine Prairie (new addition). Establishment results from vertical tillage trials will determine whether vertical tillage prior to seeding will be required.

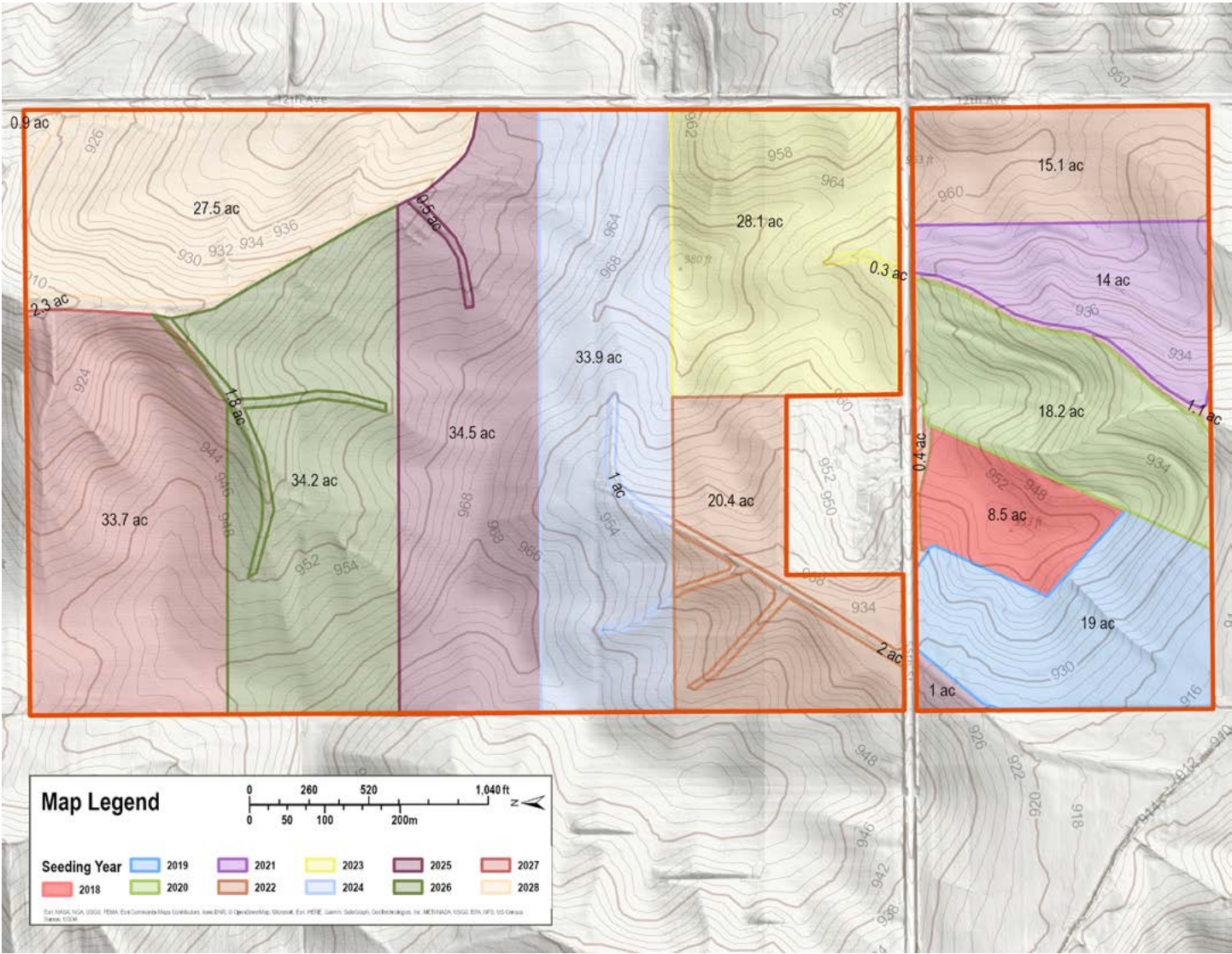
Operator: JM/AO

Equipment: Broadcast spreader

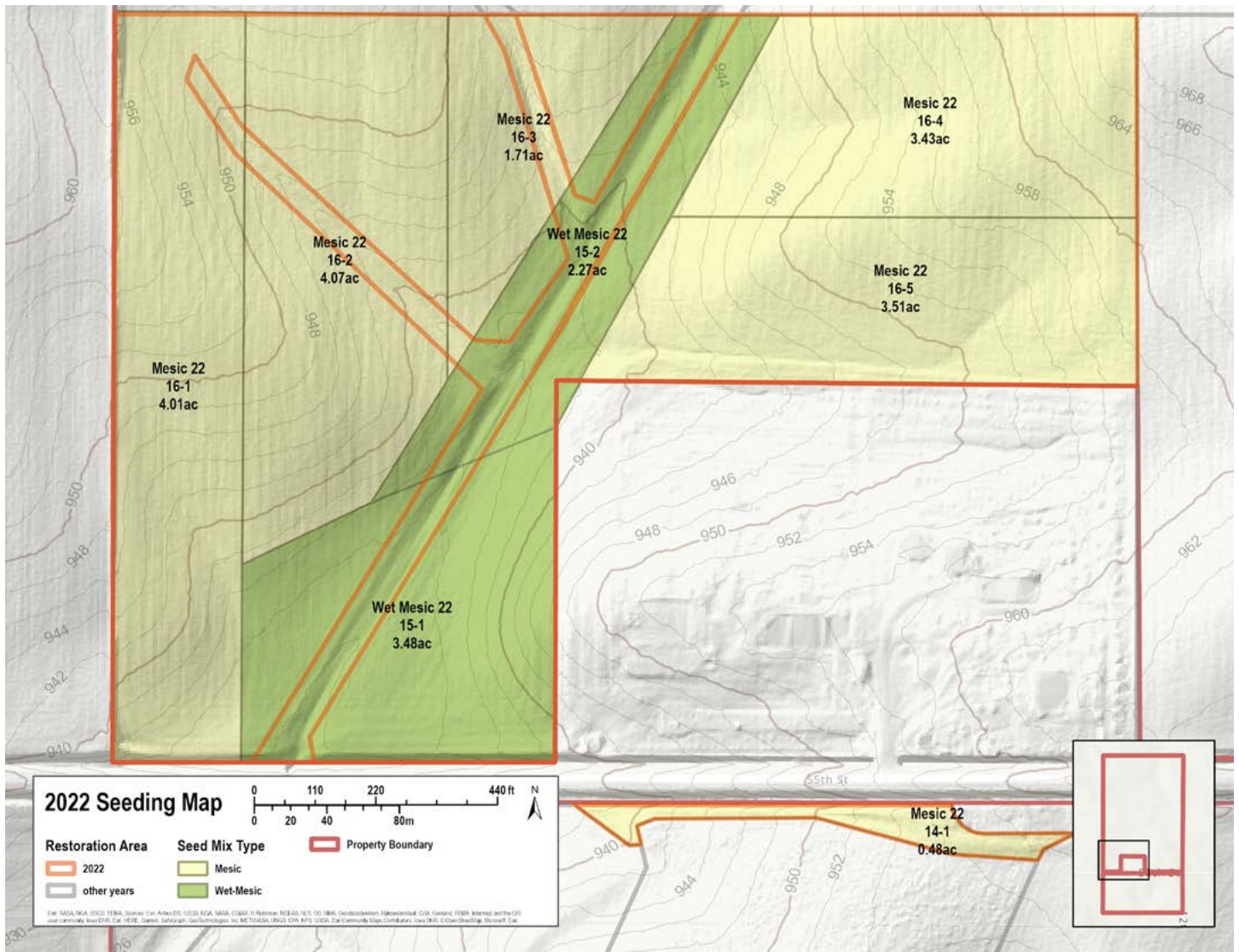
Location: Throughout 2023 Restoration Area

Timing: November

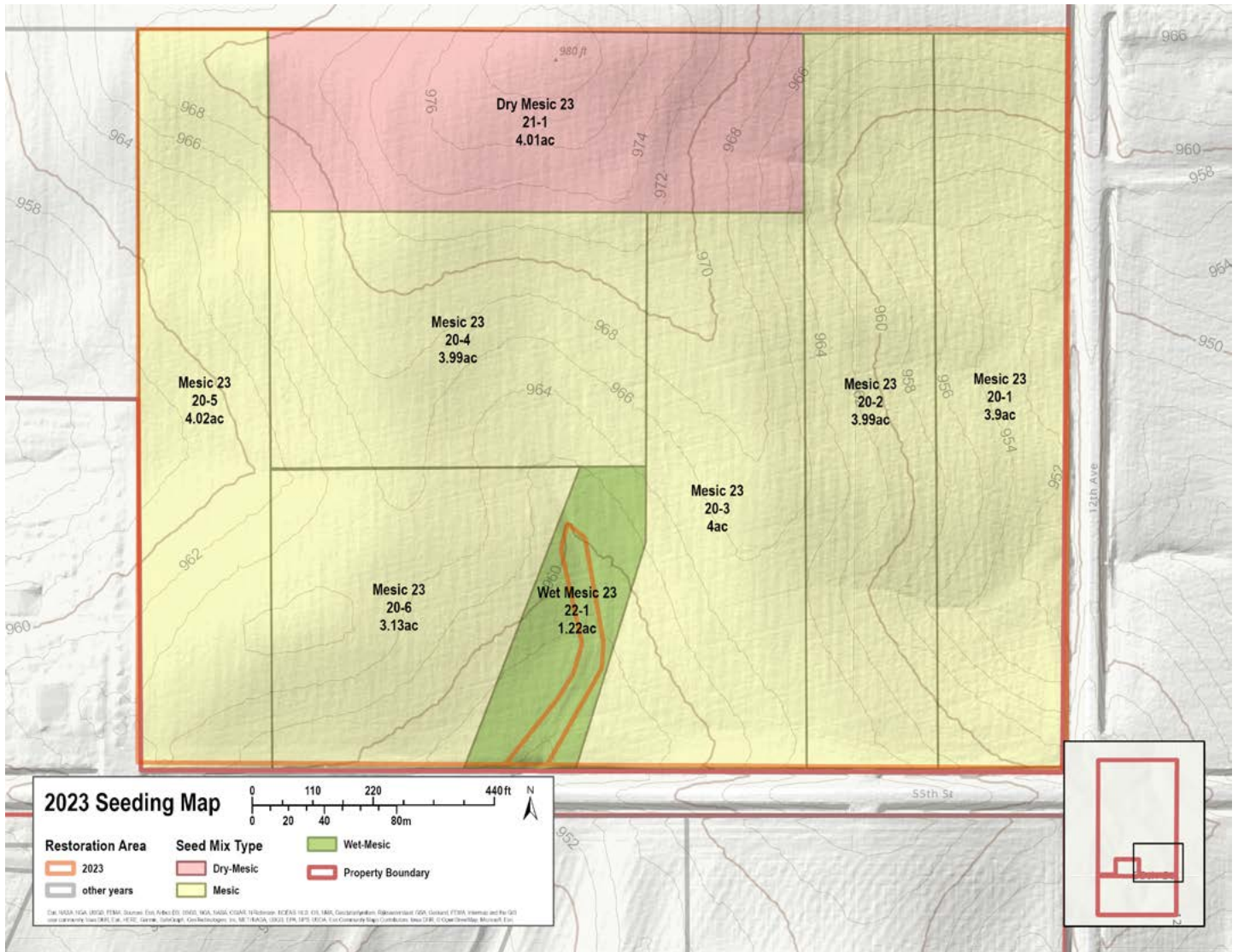
Maps and Supplemental Materials



Map 1 – Restoration timeline



Map 2 — 2022 Seed Mixes



Map 3 — 2023 Seed Mixes

Seed Mix	Site	Year	Total seeds/ft ²	Total PLS lbs./ac
Wet Mesic 22	Irvine Prairie	2022	73.47	5.270

Common Name	Scientific Name (ITIS)	Seeds/ft ²	PLS lbs./acre	Cost (USD) / acre	Seed Source(s)	Source ID?
big bluestem	<i>Andropogon gerardii</i>	1.39	0.38	\$5.77	Kossuth County, IA	Y
sideoats grama	<i>Bouteloua curtipendula</i>	1.29	0.586	\$8.90	Greene, Madison County, IA	Y
bluejoint	<i>Calamagrostis canadensis</i>	0.65	0.006	\$4.10	Rice County, MN	N
yellowfruit sedge	<i>Carex annectens</i>	0.93	0.028	\$7.05	Z, IA	Y
Bebb's sedge	<i>Carex bebbii</i>	0.47	0.037	\$6.70	Unspecified County, IA	N
shortbeak sedge	<i>Carex brevior</i>	0.47	0.044	\$4.37	Unspecified County, IA	N
crested sedge	<i>Carex cristatella</i>	0.09	0.004	\$0.70	Unspecified County, IA	N
heavy sedge	<i>Carex gravida</i>	0.05	0.011	\$3.19	Unspecified County, IA	N
troublesome sedge	<i>Carex molesta</i>	0.47	0.051	\$16.06	Z1, IA	Y
broom sedge	<i>Carex scoparia</i>	0.93	0.03	\$5.43	Unspecified County, IA	N
awlfuit sedge	<i>Carex stipata</i>	0.47	0.037	\$14.90	Dane County, WI	N
fox sedge	<i>Carex vulpinoidea</i>	1.87	0.051	\$2.11	Madison County, IA	N
Canada wildrye	<i>Elymus canadensis</i>	0.13	0.069	\$0.55	Kossuth County, IA	Y
Virginia wildrye	<i>Elymus virginicus</i>	0.23	0.151	\$0.90	Tama County, IA	Y
fowl mannagrass	<i>Glyceria striata</i>	3.72	0.063	\$11.40	Madison County, IA	N
Dudley's rush	<i>Juncus dudleyi</i>	5.3	0.005	\$2.17	Houston County, MN	N
poverty rush	<i>Juncus tenuis</i>	1.66	0.005	\$2.89	Vernon County, WI	N
marsh muhly	<i>Muhlenbergia racemosa</i>	0.97	0.033	\$5.93	Unspecified County, IA	N
switchgrass	<i>Panicum virgatum</i>	0.81	0.158	\$1.27	Kossuth County, IA	Y
little bluestem	<i>Schizachyrium scoparium</i>	2.14	0.388	\$4.27	Z1, IA	Y
green bulrush	<i>Scirpus atrovirens</i>	1.85	0.011	\$0.65	Z, IA	Y
Indiangrass	<i>Sorghastrum nutans</i>	0.97	0.22	\$2.64	Z2, IA	N
prairie cordgrass	<i>Spartina pectinata</i>	0.05	0.019	\$1.68	Grant County, MN	N
composite dropseed	<i>Sporobolus compositus</i>	1.86	0.169	\$2.57	Z1, IA	Y
Canadian anemone	<i>Anemone canadensis</i>	0.09	0.032	\$14.22	Fillmore County, MN	N
groovestem Indian plantain	<i>Arnoglossum plantagineum</i>	0.04	0.026	\$30.71	Will County, IL	N

white sagebrush	<i>Artemisia ludoviciana</i>	0.09	0.001	\$0.24	Z1, IA	Y
swamp milkweed	<i>Asclepias incarnata</i>	0.19	0.106	\$10.02	Madison County, IA	Y
prairie milkweed	<i>Asclepias sullivantii</i>	0.02	0.011	\$8.90	Kossuth County, IA	N
common milkweed	<i>Asclepias syriaca</i>	0.1	0.063	\$6.01	Madison County, IA	Y
Canadian milkvetch	<i>Astragalus canadensis</i>	0.65	0.104	\$1.98	Union County, IA	Y
largeleaf wild indigo	<i>Baptisia lactea</i>	0.02	0.03	\$7.54	Z1, IA	Y
white doll's daisy	<i>Boltonia asteroides</i>	1.86	0.032	\$5.69	Lee, Whiteside County, IL	N
partridge pea	<i>Chamaecrista fasciculata</i>	0.23	0.234	\$1.50	Madison County, IA	Y
white turtlehead	<i>Chelone glabra</i>	0.22	0.007	\$7.20	Allamakee County, IA	N
tall tickseed	<i>Coreopsis tripteris</i>	0.05	0.009	\$3.81	Allamakee County, IA	Y
white prairie clover	<i>Dalea candida</i>	0.21	0.031	\$0.58	Kossuth County, IA	Y
purple prairie clover	<i>Dalea purpurea</i>	0.3	0.045	\$0.69	Madison, Union, Greene, Kossuth County, IA	Y
showy ticktrefoil	<i>Desmodium canadense</i>	0.09	0.046	\$2.30	Houston County, MN	Y
parasol whitetop	<i>Doellingeria umbellata</i>	0.65	0.027	\$18.63	Houston County, MN	N
button eryngo	<i>Eryngium yuccifolium</i>	0.19	0.068	\$6.41	Z1, IA	Y
common boneset	<i>Eupatorium perfoliatum</i>	0.65	0.011	\$5.70	Rock County, WI	N
flat-top goldentop	<i>Euthamia graminifolia</i>	0.93	0.007	\$5.81	Iowa County, WI	N
spotted joe pye weed	<i>Eutrochium maculatum</i>	0.93	0.027	\$7.98	Allamakee County, IA	Y
plain gentian	<i>Gentiana alba</i>	1.86	0.036	\$12.19	Tama County, IA	Y
closed bottle gentian	<i>Gentiana andrewsii</i>	0.93	0.009	\$4.57	Madison County, IA	N
common sneezeweed	<i>Helenium autumnale</i>	0.93	0.02	\$1.46	Faribault County, MN	Y
sawtooth sunflower	<i>Helianthus grosseserratus</i>	0.05	0.009	\$3.99	Clayton County, IA	N
smooth oxeye	<i>Heliopsis helianthoides</i>	0.46	0.201	\$4.58	Z1, IA	Y
Virginia iris	<i>Iris virginica</i>	0.05	0.127	\$30.38	Green County, WI	N
Rocky Mountain blazing star	<i>Liatris ligulistylis</i>	0.05	0.013	\$3.77	Winneshiek County, IA	Y
prairie blazing star	<i>Liatris pycnostachya</i>	0.1	0.026	\$5.10	Kossuth County, IA	Y
cardinalflower	<i>Lobelia cardinalis</i>	0.92	0.006	\$5.03	Buffalo County, WI	N
great blue lobelia	<i>Lobelia siphilitica</i>	3.7	0.02	\$8.06	Madison County, IA	Y

American water horehound	<i>Lycopus americanus</i>	0.47	0.01	\$4.09	Porter, Laporte, Lake County, IN	N
winged lythrum	<i>Lythrum alatum</i>	5.51	0.005	\$2.11	Madison County, IA	Y
wild bergamot	<i>Monarda fistulosa</i>	0.93	0.036	\$3.61	Madison County, IA	N
swamp lousewort	<i>Pedicularis lanceolata</i>	0.46	0.029	\$11.48	Monroe County, WI	N
foxglove beardtongue	<i>Penstemon digitalis</i>	0.93	0.02	\$2.47	Madison County, IA	Y
ditch stonecrop	<i>Penthorum sedoides</i>	0.92	0.002	\$0.31	Houston County, MN	N
downy phlox	<i>Phlox pilosa</i>	0.01	0.001	\$2.06	Kossuth County, IA	N
Virginia groundcherry	<i>Physalis virginiana</i>	0.39	0.058	\$19.43	Allamakee County, IA	Y
narrowleaf mountainmint	<i>Pycnanthemum tenuifolium</i>	0.47	0.003	\$3.14	Z3, IA	Y
Virginia mountainmint	<i>Pycnanthemum virginianum</i>	0.93	0.011	\$5.79	Ringgold, Greene, Decatur County, IA	Y
pinnate prairie coneflower	<i>Ratibida pinnata</i>	0.65	0.059	\$1.87	Kossuth County, IA	Y
blackeyed Susan	<i>Rudbeckia hirta</i>	0.47	0.014	\$0.21	Madison County, IA	Y
sweet coneflower	<i>Rudbeckia subtomentosa</i>	0.47	0.029	\$2.80	Madison, Ringgold County, IA	N
browneyed Susan	<i>Rudbeckia triloba</i>	0.09	0.007	\$0.31	Appanoose, Allamakee County, IA	Y
Maryland senna	<i>Senna marilandica</i>	0.02	0.034	\$2.70	Madison County, IA	N
wholeleaf rosinweed	<i>Silphium integrifolium</i>	0.02	0.042	\$8.45	Ringgold County, IA	Y
hemlock waterparsnip	<i>Sium suave</i>	0.09	0.005	\$3.68	Will County, IL	N
stiff goldenrod	<i>Solidago rigida</i>	0.65	0.043	\$2.47	Kossuth, Ringgold County, IA	N
smooth blue aster	<i>Symphyotrichum laeve</i>	0.65	0.032	\$8.06	Z1, IA	Y
New England aster	<i>Symphyotrichum novae-angliae</i>	0.46	0.019	\$9.21	Z1, IA	Y
purplestem aster	<i>Symphyotrichum puniceum</i>	0.09	0.003	\$1.93	Fillmore County, MN	N
Canada germander	<i>Teucrium canadense</i>	0.19	0.025	\$6.08	Unspecified County, MO	N
purple meadow-rue	<i>Thalictrum dasycarpum</i>	0.19	0.046	\$9.19	Winneshiek County, IA	N
bluejacket	<i>Tradescantia ohiensis</i>	0.09	0.032	\$7.00	Lucas, Ringgold, Union, Madison County, IA	N
swamp verbena	<i>Verbena hastata</i>	1.86	0.054	\$6.54	Allamakee, Madison County, IA	Y
prairie ironweed	<i>Vernonia fasciculata</i>	0.51	0.058	\$8.71	Madison County, IA	Y

Culver's root	Veronicastrum virginicum	2.79	0.01	\$9.51	Greene, Jasper, Lucas County, IA	N
golden zizia	Zizia aurea	0.23	0.058	\$1.46	Kossuth County, IA	Y
common wheat	Triticum aestivum	2.7	10	\$4.10	Unspecified County, Not Applicable	N
rice hulls	NA	NA	15.323	\$3.83	Unspecified County, Not Applicable	N

Seed Mix	Site	Year	Total seeds/ft ²	Total PLS lbs/acre	Source ID?
Mesic 22	Irvine Prairie	2022	56.89	7.146	

Common Name	Scientific Name (ITIS)	Seeds/ft ²	PLS lbs./acre	Cost (USD) / acre	Seed Source(s)	Source ID?
big bluestem	<i>Andropogon gerardii</i>	1.00	0.273	\$4.14	Kossuth County, IA	Y
sideoats grama	<i>Bouteloua curtipendula</i>	3.47	1.573	\$23.90	Greene, Madison County, IA	Y
arctic brome	<i>Bromus kalmii</i>	0.50	0.170	\$10.22	Otter Tail County, MN	Y
yellowfruit sedge	<i>Carex annecteans</i>	1.00	0.030	\$7.56	Z, IA	Y
shortbeak sedge	<i>Carex brevior</i>	1.00	0.094	\$9.39	Unspecified County, IA	N
heavy sedge	<i>Carex gravida</i>	0.01	0.002	\$0.68	Unspecified County, IA	N
troublesome sedge	<i>Carex molesta</i>	0.50	0.054	\$17.21	Z1, IA	Y
Canada wildrye	<i>Elymus canadensis</i>	0.17	0.089	\$0.71	Kossuth County, IA	Y
Virginia wildrye	<i>Elymus virginicus</i>	0.10	0.066	\$0.40	Tama County, IA	Y
porcupinegrass	<i>Hesperostipa spartea</i>	0.00	0.014	\$2.73	Pierce County, WI	N
prairie Junegrass	<i>Koeleria macrantha</i>	2.00	0.027	\$5.45	Z1, IA	N
marsh muhly	<i>Muhlenbergia racemosa</i>	1.04	0.036	\$6.40	Unspecified County, IA	N
switchgrass	<i>Panicum virgatum</i>	0.61	0.118	\$0.95	Kossuth County, IA	Y
little bluestem	<i>Schizachyrium scoparium</i>	5.74	1.041	\$11.45	Z1, IA	Y
Indiangrass	<i>Sorghastrum nutans</i>	1.04	0.236	\$2.83	Z2, IA	N
composite dropseed	<i>Sporobolus compositus</i>	6.01	0.545	\$8.28	Z1, IA	Y
prairie dropseed	<i>Sporobolus heterolepis</i>	0.21	0.036	\$9.18	Madison, Union, Kossuth, Guthrie, Greene County, IA	Y
common yarrow	<i>Achillea millefolium</i>	0.13	0.002	\$0.29	Faribault County, MN	Y
leadplant	<i>Amorpha canescens</i>	0.09	0.015	\$2.56	Adair, Madison, Webster, Winnebago County, IA	Y

							Y
candle anemone	<i>Anemone cylindrica</i>	0.10	0.010	\$13.24	Hancock, Madison County, IA		
white sagebrush	<i>Artemisia ludoviciana</i>	1.00	0.011	\$2.75	Z1, IA		Y
swamp milkweed	<i>Asclepias incarnata</i>	0.05	0.028	\$2.69	Madison County, IA		Y
prairie milkweed	<i>Asclepias sullivantii</i>	0.01	0.006	\$4.84	Kossuth County, IA		N
common milkweed	<i>Asclepias syriaca</i>	0.11	0.068	\$6.46	Madison County, IA		Y
butterfly milkweed	<i>Asclepias tuberosa</i>	0.05	0.032	\$7.91	Unspecified County, IA		N
whorled milkweed	<i>Asclepias verticillata</i>	0.05	0.012	\$11.88	Ogle County, IL		N
Canadian milkvetch	<i>Astragalus canadensis</i>	1.00	0.160	\$3.04	Union County, IA		Y
largeleaf wild indigo	<i>Baptisia lactea</i>	0.02	0.032	\$8.09	Z1, IA		Y
false boneset	<i>Brickellia eupatorioides</i>	0.25	0.021	\$10.63	Allamakee County, IA		N
New Jersey tea	<i>Ceanothus americanus</i>	0.10	0.036	\$18.11	Union County, IA		Y
partridge pea	<i>Chamaecrista fasciculata</i>	0.30	0.302	\$1.94	Madison County, IA		Y
stiff tickseed	<i>Coreopsis palmata</i>	0.05	0.014	\$12.63	Kossuth, Madison County, IA		Y
white prairie clover	<i>Dalea candida</i>	1.00	0.143	\$2.71	Kossuth County, IA		Y
purple prairie clover	<i>Dalea purpurea</i>	1.80	0.272	\$4.14	Madison, Union, Greene, Kossuth County, IA		Y
showy ticktrefoil	<i>Desmodium canadense</i>	0.05	0.025	\$1.24	Houston County, MN		Y
Illinois ticktrefoil	<i>Desmodium illinoense</i>	0.05	0.032	\$5.70	Unspecified County, IA		N
tall cinquefoil	<i>Drymocallis arguta</i>	1.00	0.012	\$1.78	Webster County, IA		Y
pale purple coneflower	<i>Echinacea pallida</i>	0.20	0.103	\$3.26	Madison County, IA		Y
button eryngo	<i>Eryngium yuccifolium</i>	0.20	0.073	\$6.89	Z1, IA		Y
tall thoroughwort	<i>Eupatorium altissimum</i>	0.25	0.014	\$3.44	Allamakee County, IA		Y
flowering spurge	<i>Euphorbia corollata</i>	0.05	0.017	\$16.33	Whiteside County, IL		N
flat-top goldentop	<i>Euthamia graminifolia</i>	1.00	0.008	\$6.22	Iowa County, WI		N
plain gentian	<i>Gentiana alba</i>	2.00	0.039	\$13.12	Tama County, IA		Y
stiff sunflower	<i>Helianthus pauciflorus</i>	0.14	0.073	\$25.59	Kossuth County, IA		N, Y
smooth oxeye	<i>Heliopsis helianthoides</i>	0.50	0.216	\$4.92	Z1, IA		Y
Richardson's alumroot	<i>Heuchera richardsonii</i>	1.00	0.004	\$6.22	Madison County, IA		Y
roundhead lespedeza	<i>Lespedeza capitata</i>	0.10	0.034	\$2.55	Kossuth County, IA		Y
tall blazing star	<i>Liatris aspera</i>	0.10	0.017	\$12.76	Z1, IA		N
prairie blazing star	<i>Liatris pycnostachya</i>	0.20	0.049	\$9.89	Kossuth County, IA		Y

great blue lobelia	<i>Lobelia siphilitica</i>	2.00	0.011	\$4.35	Madison County, IA	Y
palespike lobelia	<i>Lobelia spicata</i>	1.00	0.003	\$8.46	Mason County, IL	N
wild bergamot	<i>Monarda fistulosa</i>	1.00	0.039	\$3.89	Madison County, IA	N
biennial beeblossom	<i>Oenothera gaura</i>	0.01	0.010	\$3.34	Rock County, WI	N
wild quinine	<i>Parthenium integrifolium</i>	0.10	0.039	\$4.91	Kossuth County, IA	Y
Canadian lousewort	<i>Pedicularis canadensis</i>	0.10	0.008	\$12.28	Fillmore County, MN	N
foxglove beardtongue	<i>Penstemon digitalis</i>	2.00	0.042	\$5.29	Madison County, IA	Y
downy phlox	<i>Phlox pilosa</i>	0.05	0.007	\$11.46	Kossuth County, IA	N
whorled mountainmint	<i>Pycnanthemum pilosum</i>	0.75	0.011	\$4.41	Z2, IA	N
narrowleaf mountainmint	<i>Pycnanthemum tenuifolium</i>	0.75	0.005	\$5.01	Z3, IA	Y
Virginia mountainmint	<i>Pycnanthemum virginianum</i>	1.00	0.012	\$6.26	Ringgold, Greene, Decatur County, IA	Y
pinnate prairie coneflower	<i>Ratibida pinnata</i>	0.80	0.073	\$2.30	Kossuth County, IA	Y
prairie rose	<i>Rosa arkansana</i>	0.02	0.022	\$4.36	Houston, Fillmore, Winona County, MN	N
blackeyed Susan	<i>Rudbeckia hirta</i>	0.75	0.022	\$0.33	Madison County, IA	Y
sweet coneflower	<i>Rudbeckia subtomentosa</i>	0.75	0.047	\$4.50	Madison, Ringgold County, IA	N
fringeleaf wild petunia	<i>Ruellia humilis</i>	0.05	0.026	\$11.05	Madison, Ringgold, Union, Polk County, IA	Y
wholeleaf rosinweed	<i>Silphium integrifolium</i>	0.02	0.045	\$9.07	Ringgold County, IA	Y
compassplant	<i>Silphium laciniatum</i>	0.01	0.041	\$10.43	Adair, Appanoose, Hancock County, IA	Y
prairie blue-eyed grass	<i>Sisyrinchium campestre</i>	0.11	0.006	\$8.81	Whiteside County, IL	N
gray goldenrod	<i>Solidago nemoralis</i>	1.00	0.009	\$2.29	Ringgold County, IA	Y
stiff goldenrod	<i>Solidago rigida</i>	0.75	0.050	\$2.84	Kossuth, Ringgold County, IA	N
showy goldenrod	<i>Solidago speciosa</i>	0.75	0.022	\$12.95	Black Hawk, Greene County, IA	N
smooth blue aster	<i>Symphotrichum laeve</i>	0.50	0.025	\$6.19	Z1, IA	Y
New England aster	<i>Symphotrichum novae-angliae</i>	0.50	0.021	\$9.89	Z1, IA	Y
skyblue aster	<i>Symphotrichum oolentangiense</i>	0.50	0.017	\$5.74	Ringgold, Union, Greene County, IA	Y
purple meadow-rue	<i>Thalictrum dasycarpum</i>	0.05	0.012	\$2.47	Winneshiek County, IA	N
bluejacket	<i>Tradescantia ohiensis</i>	0.15	0.051	\$11.30	Lucas, Ringgold, Union, Madison County, IA	N
hoary verbena	<i>Verbena stricta</i>	0.30	0.029	\$3.68	Ringgold, Madison, Union County, IA	Y
prairie ironweed	<i>Vernonia fasciculata</i>	0.25	0.028	\$4.25	Madison County, IA	Y

Culver's root	<i>Veronicastrum virginicum</i>	3.00	0.010	\$10.20	Greene, Jasper, Lucas County, IA	N
prairie violet	<i>Viola pedatifida</i>	0.10	0.010	\$13.94	Ringgold, Madison County, IA	N
meadow zizia	<i>Zizia aptera</i>	0.15	0.034	\$11.90	Blue Earth County, MN	Y
golden zizia	<i>Zizia aurea</i>	0.30	0.074	\$1.88	Kossuth County, IA	Y
common wheat	<i>Triticum aestivum</i>	2.45	9.091	\$3.73	Unspecified County, Not Applicable	N
Rice hulls			11.364	\$2.84	Unspecified County, Not Applicable	N

Seed Mix	Site	Year	Total seeds/ft ²	Total PLS lbs./ac
Wet Mesic 23 (planned)	Irvine Prairie	2023	95.84	6.556

Common Name	Scientific Name (ITIS)	Seeds/ft ²
Big Bluestem	<i>Andropogon gerardii</i>	1.000
Side Oats Grama	<i>Bouteloua curtipendula</i>	2.000
Upland Wild Timothy	<i>Muhlenbergia racemosa</i>	1.000
Switchgrass	<i>Panicum virgatum</i>	1.000
Little Bluestem	<i>Schizachyrium scoparium</i>	4.000
Indian Grass	<i>Sorghastrum nutans</i>	2.000
Prairie Cord Grass	<i>Spartina pectinata</i>	0.200
Rough Dropseed	<i>Sporobolus compositus</i>	2.000
Prairie Dropseed	<i>Sporobolus heterolepis</i>	0.100
Prairie Brome	<i>Bromus kalmii</i>	0.500
Blue Joint Grass	<i>Calamagrostis canadensis</i>	3.000
Small Yellow Fox Sedge	<i>Carex annectens</i>	2.000
Bebb's Sedge	<i>Carex bebbii</i>	1.000
Crested Oval Sedge	<i>Carex cristatella</i>	1.000
Heavy Sedge	<i>Carex grvida</i>	0.050
Field Oval Sedge	<i>Carex molesta</i>	0.500
Lance Fruited Oval Sedge	<i>Carex scoparia</i>	2.000

Awl fruited Sedge	<i>Carex stipata</i>	0.500
Fox Sedge	<i>Carex vulpinoidea</i>	3.000
Canada Wild Rye	<i>Elymus canadensis</i>	0.300
Virginia Wild Rye	<i>Elymus virginicus</i>	0.500
Fowl Manna Grass	<i>Glyceria striata</i>	4.000
Dudley's Rush	<i>Juncus dudleyi</i>	5.000
Rice Cut Grass	<i>Leersia oryzoides</i>	0.500
Dark Green Bulrush	<i>Scirpus atrovirens</i>	5.000
Partridge Pea	<i>Chamaecrista fasciculata</i>	0.200
Canada Milk Vetch	<i>Astragalus canadensis</i>	0.700
Showy Tick Trefoil	<i>Desmodium canadense</i>	0.100
Maryland Senna	<i>Senna marilandica</i>	0.050
American Vetch	<i>Vicia americana</i>	0.080
Foxglove Beardtongue	<i>Penstemon digitalis</i>	1.000
Ohio Spiderwort	<i>Tradescantia ohiensis</i>	0.150
Golden Alexanders	<i>Zizia aurea</i>	0.300
Common Yarrow	<i>Achillea millefolium</i>	0.200
Canada Anemone	<i>Anemone canadensis</i>	0.100
Prairie Indian Plantain	<i>Arnoglossum plantagineum</i>	0.020
Prairie Sage	<i>Artemisia ludoviciana</i>	0.500
Swamp Milkweed	<i>Asclepias incarnata</i>	0.200
Common Milkweed	<i>Asclepias syriaca</i>	0.200
Tall Coreopsis	<i>Coreopsis tripteris</i>	0.200
Flat Topped Aster	<i>Doellingeria umbellata</i>	0.500
Rattlesnake Master	<i>Eryngium yuccifolium</i>	0.300
Grass Leaved Goldenrod	<i>Euthamia graminifolia</i>	1.000
Spotted Joe Pye Weed	<i>Eutrochium maculatum</i>	1.000
Oxeye Sunflower	<i>Heliopsis helianthoides</i>	0.500
Great St. John's Wort	<i>Hypericum ascyron</i>	4.000
Meadow Blazing Star	<i>Liatris ligulistylis</i>	0.050
Prairie Blazing Star	<i>Liatris pycnostachya</i>	0.300

Great Blue Lobelia	<i>Lobelia siphilitica</i>	5.000
Water Horehound	<i>Lycopus americanus</i>	1.000
Prairie Loosestrife	<i>Lysimachia quadriflora</i>	0.100
Winged Loosestrife	<i>Lythrum alatum</i>	10.000
Wild Mint	<i>Mentha arvensis</i>	0.500
Wild Bergamot	<i>Monarda fistulosa</i>	1.000
Wild Quinine	<i>Parthenium integrifolium</i>	0.100
Ditch Stonecrop	<i>Penthorum sedoides</i>	5.000
Prairie Phlox	<i>Phlox pilosa</i>	0.020
Slender Mountain Mint	<i>Pycnanthemum tenuifolium</i>	1.000
Mountain Mint	<i>Pycnanthemum virginianum</i>	1.000
Yellow Coneflower	<i>Ratibida pinnata</i>	1.000
Black Eyed Susan	<i>Rudbeckia hirta</i>	0.700
Rosin Weed	<i>Silphium integrifolium</i>	0.020
Stiff Goldenrod	<i>Solidago rigida</i>	0.500
Purple Meadow Rue	<i>Thalictrum dasycarpum</i>	0.200
Blue Vervain	<i>Verbena hastata</i>	3.000
Ironweed	<i>Vernonia fasciculata</i>	0.300
Culver's Root	<i>Veronicastrum virginicum</i>	4.000
Boneset	<i>Eupatorium perfoliatum</i>	1.000
Bottle Gentian	<i>Gentiana andrewsii</i>	1.000
Sneezeweed	<i>Helenium autumnale</i>	2.000
Saw Tooth Sunflower	<i>Helianthus grosseserratus</i>	0.100
Obedient Plant	<i>Physostegia virginiana</i>	0.150
Sweet Black Eyed Susan	<i>Rudbeckia subtomentosa</i>	1.000
Riddell's Goldenrod	<i>Solidago riddellii</i>	0.500
Smooth Blue Aster	<i>Symphotrichum laeve</i>	0.500
New England Aster	<i>Symphotrichum novae-angliae</i>	0.700
Swamp Aster	<i>Symphotrichum puniceum</i>	0.500

False Indigo	<i>Amorpha fruticosa</i>	0.050
Meadowsweet	<i>Spiraea alba</i>	0.100

Seed Mix	Site	Year	Total seeds/ ft ²	Total PLS lbs./ac
Dry Mesic 23 (planned)	Irvine Prairie	2023	76.51	6.994

Common Name	Scientific Name (ITIS)	Seeds/ft ²
Big Bluestem	<i>Andropogon gerardii</i>	0.700
Side Oats Grama	<i>Bouteloua curtipendula</i>	4.000
Purple Lovegrass	<i>Eragrostis spectabilis</i>	1.000
Little Bluestem	<i>Schizachyrium scoparium</i>	6.000
Indian Grass	<i>Sorghastrum nutans</i>	0.700
Rough Dropseed	<i>Sporobolus compositus</i>	5.000
Prairie Dropseed	<i>Sporobolus heterolepis</i>	0.100
Prairie Brome	<i>Bromus kalmii</i>	0.500
Small Yellow Fox Sedge	<i>Carex annectens</i>	1.000
Bicknell's Sedge	<i>Carex bicknellii</i>	0.250
Plains Oval Sedge	<i>Carex brevior</i>	2.000
Heavy Sedge	<i>Carex grvida</i>	0.120
Field Oval Sedge	<i>Carex molesta</i>	0.500
Canada Wild Rye	<i>Elymus canadensis</i>	0.300
Porcupine Grass	<i>Hesperostipa spartea</i>	0.020
Inland Rush	<i>Juncus interior</i>	20.000
June Grass	<i>Koeleria macrantha</i>	4.000
Prairie Wedgegrass	<i>Sphenopholis obtusata</i>	2.000
Partridge Pea	<i>Chamaecrista fasciculata</i>	0.200
Biennial Gaura	<i>Oenothera gaura</i>	0.010

Leadplant	<i>Amorpha canescens</i>	0.200
Canada Milk Vetch	<i>Astragalus canadensis</i>	0.500
White Wild Indigo	<i>Baptisia lactea</i>	0.030
Cream Wild Indigo	<i>Baptisia leucophaea</i>	0.010
White Prairie Clover	<i>Dalea candida</i>	1.500
Purple Prairie Clover	<i>Dalea purpurea</i>	1.000
Illinois Tick Trefoil	<i>Desmodium illinoense</i>	0.100
Round Headed Bush Clover	<i>Lespedeza capitata</i>	0.150
Prairie Alumroot	<i>Heuchera richardsonii</i>	1.000
Prairie Ragwort	<i>Packera plattensis</i>	0.250
Foxglove Beardtongue	<i>Penstemon digitalis</i>	0.500
Large flowered Beardtongue	<i>Penstemon grandiflorus</i>	0.300
Prairie Blue eyed Grass	<i>Sisyrinchium campestre</i>	0.100
Prairie Spiderwort	<i>Tradescantia bracteata</i>	0.050
Ohio Spiderwort	<i>Tradescantia ohioensis</i>	0.050
Prairie Violet	<i>Viola pedatifida</i>	0.100
Heartleaf Alexanders	<i>Zizia aptera</i>	0.100
Common Yarrow	<i>Achillea millefolium</i>	0.200
Thimbleweed	<i>Anemone cylindrica</i>	0.100
Prairie Sage	<i>Artemisia ludoviciana</i>	1.000
Common Milkweed	<i>Asclepias syriaca</i>	0.200
Butterfly Weed	<i>Asclepias tuberosa</i>	0.100
Whorled Milkweed	<i>Asclepias verticillata</i>	0.050
New Jersey Tea	<i>Ceanothus americanus</i>	0.050
Prairie Coreopsis	<i>Coreopsis palmata</i>	0.100
Prairie Cinquefoil	<i>Drymocallis arguta</i>	3.000
Pale Purple Coneflower	<i>Echinacea pallida</i>	0.200
Rattlesnake Master	<i>Eryngium yuccifolium</i>	0.100
Flowering Spurge	<i>Euphorbia corollata</i>	0.080
Prairie Sunflower	<i>Helianthus pauciflorus</i>	0.030

Oxeye Sunflower	<i>Heliopsis helianthoides</i>	0.400
NA	<i>Hypericum sphaerocarpum</i>	0.200
Rough Blazing Star	<i>Liatris aspera</i>	0.200
Pale Spiked Lobelia	<i>Lobelia spicata</i>	1.000
Prairie Loosestrife	<i>Lysimachia quadriflora</i>	0.100
Wild Bergamot	<i>Monarda fistulosa</i>	1.000
Wild Quinine	<i>Parthenium integrifolium</i>	0.100
Prairie Phlox	<i>Phlox pilosa</i>	0.050
Hairy Mountain Mint	<i>Pycnanthemum pilosum</i>	1.000
Mountain Mint	<i>Pycnanthemum virginianum</i>	1.000
Yellow Coneflower	<i>Ratibida pinnata</i>	1.000
Prairie Wild Rose	<i>Rosa arkansana</i>	0.050
Black Eyed Susan	<i>Rudbeckia hirta</i>	0.700
Wild Petunia	<i>Ruellia humilis</i>	0.100
Compass Plant	<i>Silphium laciniatum</i>	0.010
Upland White Aster	<i>Solidago ptarmicoides</i>	0.500
Stiff Goldenrod	<i>Solidago rigida</i>	0.500
Showy Goldenrod	<i>Solidago speciosa</i>	0.750
Hoary Vervain	<i>Verbena stricta</i>	0.200
False Boneset	<i>Brickellia eupatorioides</i>	0.400
Cream Gentian	<i>Gentiana alba</i>	1.000
Old Field Goldenrod	<i>Solidago nemoralis</i>	4.000
Heath Aster	<i>Symphotrichum ericoides</i>	0.500
Smooth Blue Aster	<i>Symphotrichum laeve</i>	0.500
New England Aster	<i>Symphotrichum novae-angliae</i>	0.100
Aromatic Aster	<i>Symphotrichum oblongifolium</i>	0.300
Sky Blue Aster	<i>Symphotrichum oolentangiense</i>	1.000
Silky Aster	<i>Symphotrichum sericeum</i>	0.300

Seed Mix	Site	Year	Total seeds/ ft ²	Total PLS lbs./ac
Mesic 23 (planned)	Irvine Prairie	2023	76.17	7.338

Common Name	Scientific Name (ITIS)	Seeds/ft ²
Big Bluestem	<i>Andropogon gerardii</i>	1.000
Side Oats Grama	<i>Bouteloua curtipendula</i>	4.000
Upland Wild Timothy	<i>Muhlenbergia racemosa</i>	1.000
Switchgrass	<i>Panicum virgatum</i>	0.500
Little Bluestem	<i>Schizachyrium scoparium</i>	6.000
Indian Grass	<i>Sorghastrum nutans</i>	1.000
Rough Dropseed	<i>Sporobolus compositus</i>	5.000
Prairie Dropseed	<i>Sporobolus heterolepis</i>	0.100
Prairie Brome	<i>Bromus kalmii</i>	0.500
Small Yellow Fox Sedge	<i>Carex annectens</i>	2.000
Bicknell's Sedge	<i>Carex bicknellii</i>	0.250
Plains Oval Sedge	<i>Carex brevior</i>	1.000
Heavy Sedge	<i>Carex gravida</i>	0.120
Field Oval Sedge	<i>Carex molesta</i>	0.500
Canada Wild Rye	<i>Elymus canadensis</i>	0.500
Porcupine Grass	<i>Hesperostipa spartea</i>	0.010
Inland Rush	<i>Juncus interior</i>	20.000
June Grass	<i>Koeleria macrantha</i>	1.000
Prairie Wedgegrass	<i>Sphenopholis obtusata</i>	4.000
Partridge Pea	<i>Chamaecrista fasciculata</i>	0.200
Fringed Gentian	<i>Gentianopsis crinita</i>	0.020
Biennial Gaura	<i>Oenothera gaura</i>	0.010
Leadplant	<i>Amorpha canescens</i>	0.200
Canada Milk Vetch	<i>Astragalus canadensis</i>	0.700
White Wild Indigo	<i>Baptisia lactea</i>	0.050
Cream Wild Indigo	<i>Baptisia leucophaea</i>	0.010
White Prairie Clover	<i>Dalea candida</i>	1.000
Purple Prairie Clover	<i>Dalea purpurea</i>	1.000
Illinois Tick Trefoil	<i>Desmodium illinoense</i>	0.100

Round Headed Bush Clover	<i>Lespedeza capitata</i>	0.100
Prairie Alumroot	<i>Heuchera richardsonii</i>	1.000
Foxglove Beardtongue	<i>Penstemon digitalis</i>	2.000
Prairie Blue eyed Grass	<i>Sisyrinchium campestre</i>	0.100
Prairie Spiderwort	<i>Tradescantia bracteata</i>	0.050
Ohio Spiderwort	<i>Tradescantia ohiensis</i>	0.100
Prairie Violet	<i>Viola pedatifida</i>	0.050
Golden Alexanders	<i>Zizia aurea</i>	0.200
Common Yarrow	<i>Achillea millefolium</i>	0.200
Thimbleweed	<i>Anemone cylindrica</i>	0.100
Prairie Sage	<i>Artemisia ludoviciana</i>	1.000
Prairie Milkweed	<i>Asclepias sullivantii</i>	0.020
Common Milkweed	<i>Asclepias syriaca</i>	0.200
Butterfly Weed	<i>Asclepias tuberosa</i>	0.050
Whorled Milkweed	<i>Asclepias verticillata</i>	0.050
New Jersey Tea	<i>Ceanothus americanus</i>	0.050
Prairie Coreopsis	<i>Coreopsis palmata</i>	0.100
Prairie Cinquefoil	<i>Drymocallis arguta</i>	2.000
Pale Purple Coneflower	<i>Echinacea pallida</i>	0.200
Rattlesnake Master	<i>Eryngium yuccifolium</i>	0.200
Flowering Spurge	<i>Euphorbia corollata</i>	0.050
Grass Leaved Goldenrod	<i>Euthamia graminifolia</i>	0.500
Prairie Sunflower	<i>Helianthus pauciflorus</i>	0.050
Oxeye Sunflower	<i>Heliopsis helianthoides</i>	0.500
Rough Blazing Star	<i>Liatris aspera</i>	0.100
Prairie Blazing Star	<i>Liatris pycnostachya</i>	0.300
Great Blue Lobelia	<i>Lobelia siphilitica</i>	1.000
Pale Spiked Lobelia	<i>Lobelia spicata</i>	1.000
Prairie Loosestrife	<i>Lysimachia quadriflora</i>	0.100
Wild Bergamot	<i>Monarda fistulosa</i>	1.000
Wild Quinine	<i>Parthenium integrifolium</i>	0.100
Prairie Phlox	<i>Phlox pilosa</i>	0.050
Hairy Mountain Mint	<i>Pycnanthemum pilosum</i>	1.000
Slender Mountain Mint	<i>Pycnanthemum tenuifolium</i>	1.000
Mountain Mint	<i>Pycnanthemum virginianum</i>	1.000

Yellow Coneflower	<i>Ratibida pinnata</i>	1.000
Prairie Wild Rose	<i>Rosa arkansana</i>	0.050
Black Eyed Susan	<i>Rudbeckia hirta</i>	0.700
Wild Petunia	<i>Ruellia humilis</i>	0.050
Rosin Weed	<i>Silphium integrifolium</i>	0.020
Compass Plant	<i>Silphium laciniatum</i>	0.010
Stiff Goldenrod	<i>Solidago rigida</i>	0.500
Showy Goldenrod	<i>Solidago speciosa</i>	0.050
Hoary Vervain	<i>Verbena stricta</i>	0.200
Ironweed	<i>Vernonia fasciculata</i>	0.200
Culver's Root	<i>Veronicastrum virginicum</i>	2.000
False Boneset	<i>Brickellia eupatorioides</i>	0.200
Cream Gentian	<i>Gentiana alba</i>	1.000
Saw Tooth Sunflower	<i>Helianthus grosseserratus</i>	0.100
Sweet Black Eyed Susan	<i>Rudbeckia subtomentosa</i>	1.000
Heath Aster	<i>Symphyotrichum ericoides</i>	0.500
Smooth Blue Aster	<i>Symphyotrichum laeve</i>	0.700
New England Aster	<i>Symphyotrichum novae-angliae</i>	0.100
Sky Blue Aster	<i>Symphyotrichum oolentangiense</i>	0.500