

MEMORANDUM

TO: Cedar Lake Restoration Review Team

FROM: Mark Christenson CERPIT, PE (Lic. MN)

DATE: February 17, 2026

RE: Cedar Lake Restoration Plan
SEH No. SEHDB 186202 14.00

SITE DESCRIPTION

Figure 1 shows the restoration areas which are located at 2979 Cedar Lake RD Cloquet, MN 55720. The site is located within the North Shore Highlands (212Lb) ecological subsection of the Northern Superior Uplands (212L) ecological section within the Laurentian Mixed Forest (212) ecological province. The areas to be replanted are the area adjacent to the proposed boat launch and the shoreline of Cedar Lake (see figure 1). The areas in question are currently dominated by Speckled Alder (*Alnus incana*).

PROJECT DESCRIPTION, GOALS AND OBJECTIVES

The project will install a new boat ramp with controlled access through a gate that is to be used by the Fond du Lac Band (FDL) natural resources department to provide regular maintenance to Cedar Lake through vegetation management and beaver population management. As part of the project the area around the proposed boat launch will be revegetated, clearing the existing alder thicket and replanted with wet forest tree species. Additionally, the encroaching alders along the shoreline will be cleared and replanted with wet meadow/emergent marsh species. This memo describes the revegetation installation and maintenance plan.

SELECTION OF PLANT MATERIALS

Native plant communities for the respective areas were chosen using guidance from the MnDNR's 2003 *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* field guide, *Ganawenindiwag: Working with plant relatives to heal and protect Gichigami shorelines* guide, and the Minnesota Wildflowers website¹.

The Northern Rich Tamarack Swamp (Western Basin) [FPn82] was used to choose tree species appropriate for the forested area adjacent to the boat launch. The species chosen are summarized in Table 1.

¹ [Minnesota Wildflowers](#)

Table 1: Planting List

Species (Botanical Name)	Species (Common Name)	Containerized Tree height [ft]	Caliper Size [in]	Quantity	Planting Density/Spacing	Cultural Relationships
<i>Larix laricina</i>	Tamarack	6	1.5	120	300 stems/acre	Medicine, Technology
<i>Picea mariana</i>	Black Spruce	6	1.5	50		Medicine, Technology
<i>Thuja occidentalis</i>	White Cedar	6	1.5	70		Food, Medicine, Technology, Ceremony

Both the area by the boat ramp and the shoreline will be seeded to enhance regeneration of herbaceous native plant communities. It is assumed that management of Speckled Alder and Reed Canary Grass will yield a 50% release of the native seed bank. Both areas will be reseeded at 50% coverage with the seed mixes in Table 2.

Table 2: Seed Mix List

Title	Label	Category	Purpose	Region	Application rate [lb/ac]
Woodland Edge Northeast Mix	36-312	Current State Seed Mix	Woodland	Northeast	32.15
Wet Meadow NE	34-372	Current State Seed Mix	Wetland	Northeast	29.9

RESTORATION PLAN

Boat Ramp Area

Site Preparation

The area around the boat ramp is currently dominated by Speckled Alder and it is assumed that reed canary grass is also in the area. The following sequence is proposed to prepare the area for restoration:

- Brush mow and/or hand cut out the Speckled Alder. The method will depend on the amount of native sedges in the area, if there is an abundance of sedges it is preferred to hand cut the alder to minimize impact to the sedges.
- Treat the cut stumps with a mixture of Herbicide Garlon 4 and surfactant Bark Oil Blue.
- Any reed canary grass in the area should be mowed and spot treated with a non-selective herbicide with a wick applicator.

Installation of Plant Materials

This area is proposed to be replanted with FPN82 tree species (see table 1). The overall planting density is proposed at 300 stems per acre with a plant height of 6 ft. Containerized trees to be planted by hand with holes dug with an augur. Trees should be thoroughly irrigated immediately after installation. When trees are planted an back filled install mulch 6 inches deep around the base of each tree at a 6 ft diameter. Re-seed 50% of boat launch area with Woodland Edge (36-312) seed mix. It is assumed that

the remaining 50% of the area will be regenerated through existing seed bank released with the removal of Reed Canary Grass.

Site Maintenance

The area should be monitored and maintained for 2 years following installation of native plant materials. If alders return mow if on flat ground, otherwise remove by hand. If reed canary grass returns spot treat as necessary with mowing and wick application of a non-selective herbicide. Trees should be re-mulched annually for 2 years.

Shoreline Area

Site Preparation

The shoreline area has areas with Reed Canary Grass and encroaching Speckled Alder. The following sequence is proposed to prepare the shoreline area for restoration:

- Brush mow and/or hand cut out the Speckled Alder. The method will depend on the amount of native sedges in the area, if there is an abundance of sedges it is preferred to hand cut the alder to minimize impact to the sedges.
- Treat the cut stumps with a mixture of Herbicide Garlon 4 and surfactant Bark Oil Blue.
- Any reed canary grass in the area should be mowed and spot treated with a non-selective herbicide with a wick applicator.

Installation of plant materials

It is assumed that managing the Reed Canary Grass will release the native seed bank and natural regeneration will occur to a certain extent. However it is proposed that 50% of the area be reseeded with Wet Meadow (34-372) seed mix to enhance the restoration.

Site Maintenance

The area should be monitored and maintained for 2 years following installation of native plant materials. If alders return mow if on flat ground, otherwise remove by hand. If reed canary grass returns spot treat as necessary with mowing and wick application of a non-selective herbicide.

SUCCESS CRITERIA AND PROJECT CONCLUSION

Restoration success will be measured by the following criteria after 2 years of maintenance and monitoring:

- 80% survivorship of planted tree species
- Reduction of Speckled alder along shoreline and reduced presence in Boat Launch area.
- Reduction of Reed Canary Grass.

Attachement: Figure 1, 36-312 Seed Mix Data Sheet, 34-372 Seed Mix Data Sheet, Bark Oil Blue MSDS, Garlon 4 MSDS, glyphosate MSDS

x:\ko\m\mnlan\186096\5-final-dsgn\50-final-dsgn\50-hydro\restoration_plan\restorationplan_memo_draft_20260311.docxvegetation establishment.

Legend

 BWSR RIM Easement

Restoration Areas

 Wet Forest

 Wet meadow/Emergent marsh

Boatramp

 Dock

 Road

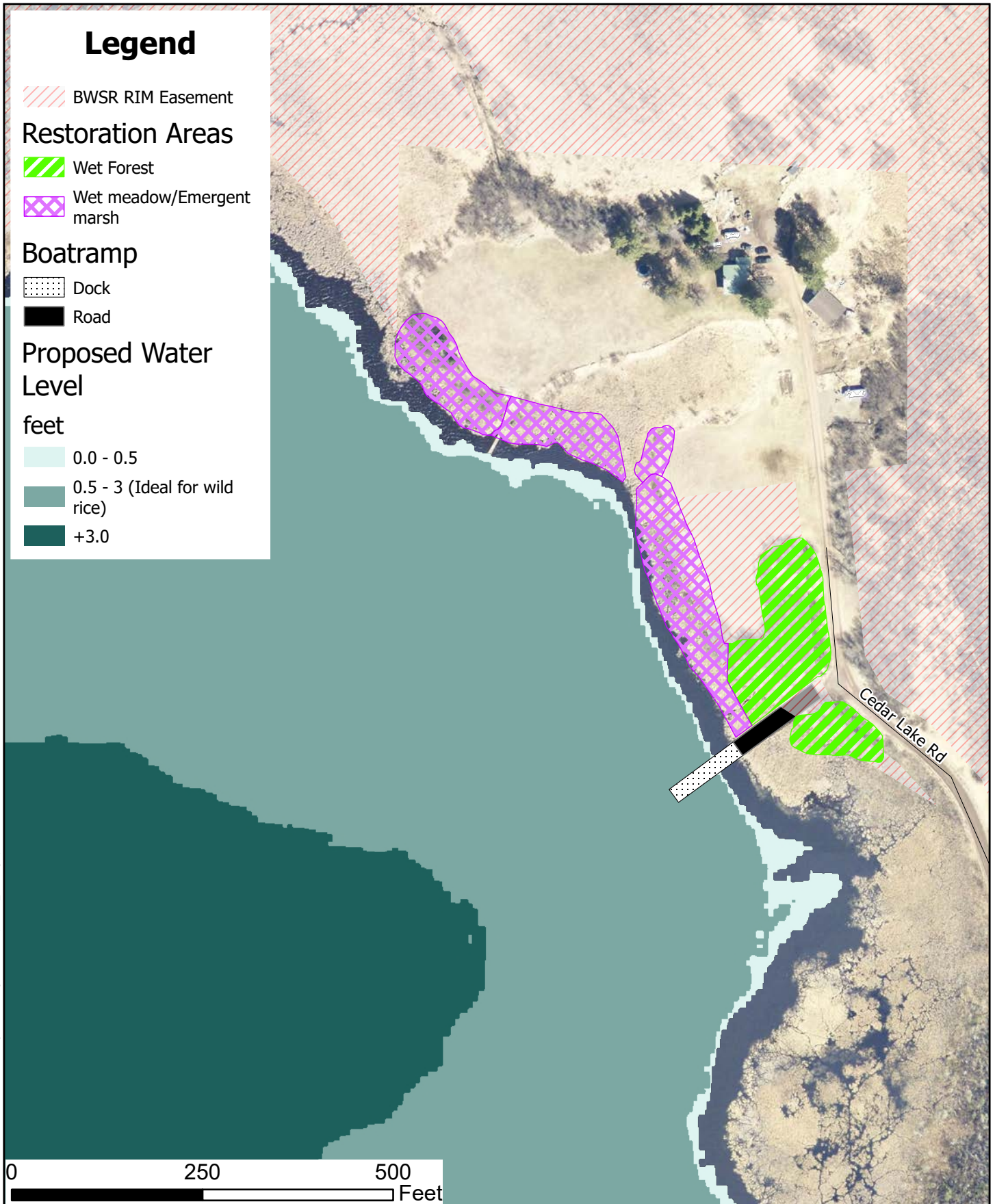
Proposed Water Level

feet

 0.0 - 0.5

 0.5 - 3 (Ideal for wild rice)

 +3.0



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Project: MNLAN 186096
Print Date: 3/12/2026

Map by: amack
Projection: NAD 83, UTM 15N
Source: SEH, ESRI, CARLTON CO

Restoration Areas

Cedar Lake Hydrology Restoration Carlton County, Minnesota

Figure
1

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Woodland Edge Northeast 36-312

Updated: 2023

This woodland edge mix has been designed for Northeast Minnesota in areas with dry to mesic soils and part sun for at least 50% of the day where land is being converted from other uses such as lawn, or agricultural fields like row crops or pasture.



Partners also include collaboration among Non-profits, Seed vendors, SWCD, Tribal Governments, Consultants, County and Cities. (See partners list on [website](#))

36-312

Woodland Edge Northeast Mix

Code	Common Name	Scientific Name	PLS lb/ac	% by PLS lb/ac	Seeds/f t2	% by Seeds/ft2
brocil	Fringed Brome	<i>Bromus ciliatus</i>	1.49	4.63%	6.02	5.97%
calcan	Bluejoint Grass	<i>Calamagrostis canadensis</i>	0.10	0.31%	10.28	10.20%
danspi	Poverty Oats	<i>Danthonia spicata</i>	0.10	0.31%	0.92	0.91%
elycan	Canada Wild Rye	<i>Elymus canadensis</i>	1.25	3.89%	2.39	2.37%
elyhys	Bottlebrush Grass	<i>Elymus hystrix</i>	0.98	3.05%	2.74	2.71%
elytra	Slender Wheatgrass	<i>Elymus trachycaulus</i>	1.55	4.82%	3.93	3.90%
poapal	Fowl Bluegrass	<i>Poa palustris</i>	0.63	1.96%	30.08	29.85%
schpur	False Melic Grass	<i>Schizachne purpurascens</i>	0.05	0.16%	0.58	0.57%
		Grasses Subtotal	6.15	19.13%	56.94	56.49%
achmil	Common Yarrow	<i>Achillea millefolium</i>	0.03	0.09%	1.96	1.95%
aqucan	Wild Columbine	<i>Aquilegia canadensis</i>	0.05	0.16%	0.70	0.69%
dalpur	Purple Prairie Clover	<i>Dalea purpurea</i>	0.12	0.37%	0.66	0.66%
doeumb	Flat-topped Aster	<i>Doellingeria umbellata</i>	0.04	0.12%	0.98	0.98%
dryarg	Prairie Cinquefoil	<i>Drymocallis arguta</i>	0.06	0.19%	5.07	5.03%
eurmac	Large-leaved Aster	<i>Eurybia macrophylla</i>	0.03	0.09%	0.85	0.85%
rosbla	Smooth Wild Rose	<i>Rosa blanda</i>	0.08	0.25%	0.08	0.08%
rudhir	Black-eyed Susan	<i>Rudbeckia hirta</i>	0.26	0.81%	8.79	8.72%
solnem	Gray Goldenrod	<i>Solidago nemoralis</i>	0.06	0.19%	6.61	6.56%
solpta	Upland White Goldenrod	<i>Solidago ptarmicoides</i>	0.04	0.12%	0.94	0.93%
solrig	Stiff Goldenrod	<i>Solidago rigida</i>	0.14	0.44%	2.11	2.09%
symlat	Calico Aster	<i>Symphyotrichum lateriflorum</i>	0.03	0.09%	2.75	2.73%
symlae	Smooth Blue Aster	<i>Symphyotrichum laeve</i>	0.06	0.19%	1.21	1.20%
		Forbs Subtotal	1.00	3.11%	32.72	32.46%
cover	Oats/Winter Wheat	<i>Avena sativa/Triticum aestivum</i>	25.00	77.76%	11.14	11.05%
		Cover Crop Subtotal	25.00	77.76%	11.14	11.05%
		Total	32.15	100.00%	100.79	100.00%

36-312 Woodland Edge Northeast Seed Mix Guidance

(MIX IMAGE)

Seed mix name: 36-311 Woodland Edge Northeast (previously 36-311)

Geographic area: Laurentian Mixed Forest Province excluding Chippewa Plains, Pine Moraines & Outwash Plains, and Mille Lacs Uplands subsections. Mn/DOT Districts 1 & 2(east).

Year of development: 2009

Year/s of update: 2021

Status (*Standard or Pilot mix*): Standard

Primary and Secondary Functions:

Primary – Partly shaded grassland planting for native roadsides, reclamation, etc. in north-central and northeast MN

Secondary – Carbon sequestration, wildlife habitat, emission reductions, water quality

Similar State Mixes: 36-212, 36-412, 36-712

Compatible NRCS Practice Standards: None

Compatible Minnesota CRP Practices: None

Suitable Site Conditions

Areas with dry to mesic soils and part sun for at least 50% of the day where land is being converted from other uses such as lawn, or agricultural fields like row crops or pasture.

How to Modify for Site Conditions and Goals

Use species substitution and diversity list to adjust as needed for site conditions. Use the [BWSR Seed Mix Substitution Table](#) when species are not available from vendors, or the landowner has alternative goals for the site.

Site Preparation

The primary goal of site preparation is to control weed species and provide ideal growing conditions for native seeds or plants to be installed. Preparation methods vary depending on the current site conditions. For example, sites with introduced perennial grasses require different suppression techniques than sites that have been farmed with row crops. Specific conditions should be considered when selecting site preparation techniques: unique biology of current (unwanted) vegetation, potential desirable and undesirable species in the seed bank, previous pesticide use on site, and potential for soil erosion. Annual cover crops or row crops can be used in preparation for a native planting, as long as they are not grown with persistent pesticides such as neonicotinoids or other long-lasting chemicals that may negatively impact pollinators or desirable vegetation establishment. For example, following soybean harvest, an un-tilled soybean field provides a good seedbed with potentially little plant residue for planting native prairie mixes. For fields where persistent chemicals have been used (including neonicotinoids or long-lived herbicides) it is recommended to plant a temporary cover crop for one or two seasons to allow the chemicals to break down in the soil. For more details on organic or pesticide-free site preparation techniques, see the Xerces Society guide, [Organic Site Preparation for Wildflower Establishment](#).

Seeding Dates

Forb-dominated pollinator seed mixes can be installed in the spring or fall but fall dormant plantings allow seeds to naturally stratify and settle into the soil through periods of freezing and thawing over the

winter. Spring seedings should be done on or around May 1-July 1 when soil temperatures are at least 60 degrees Fahrenheit or higher. Fall seeding should occur when soil temperatures fall below 50 degrees Fahrenheit for a consistent period of time (usually around October 15 in the northern half of the state and November 1 in the southern half of the state). Fall dormant seedings can help reduce weed pressure during the first year of growth because native cool-season grasses and forbs germinate earlier and start competing with weed species right away. Frost seedings are also an option if the snow cover is shallow, ice-free, and winds are calm. For a frost seeding, seeding rates may need to be increased by 25 -50 percent due to lower germination rates and loss of seed that is consumed by wildlife over the winter months.

Seedbed Preparation

Methods that are used to prepare a seedbed can vary depending on the type of seeding equipment to be used. If a traditional native seed drill will be used, a smooth, firm seedbed is required. Soybean fields usually are sufficiently prepared for a native seed drill. Corn fields should be raked and bailed if possible or light tillage should be used to remove leftover corn residue that would prevent sufficient seed to soil contact. Sites that were recently tilled will require additional soil treatment such as field cultivation, harrowing and rolling to prepare a firm seedbed and prevent seed from being buried too deep. Native seeds will have difficulty germinating if they are buried more than ¼" deep. Broadcast seeding can be conducted on soybean or corn fields; fields that have been disked, should be cultipacked or allowed to settle before seeding. Some practitioners have found that broadcast seeding on a smooth surface (not tilled or disked) leads to the establishment of higher diversity. It is important that the soil surface is not too hard packed, so cultipacking or light harrowing of crop fields before broadcast seeding may be needed. Seed can be lost on smooth surfaces, so it is recommended to seed into temporary cover crops or to roll sites after broadcast seeding. BWSR has seedbed preparation guidance based on current site conditions on our website: <https://bwsr.state.mn.us/habitat-establishment-management-resources>

Temporary Cover Crops and Mulch

Short-lived temporary cover crops can help stabilize project sites in preparation for planting native seed mixes. Cover crops such as oats (the most commonly used species) should be mowed to 10-12 inches before seeds mature (or harvested upon maturity) to prevent re-seeding. Other cover crops typically used in agricultural fields, such as buckwheat, winter wheat, sorghum sudangrass, and radishes, can help stabilize soil, build soil health, or provide weed competition as part of restoration projects. Residues from temporary covers should be minimized prior to seeding to increase seed to soil contact.

Seeding Methods

A variety of seeding equipment is used for upland pollinator plantings including broadcast seeders, no-till native seed drills, Brillion seeders and Trillion seeders. Specialized native seed drills can handle a wide variety of seed (fluffy, smooth, large and small) and low seeding rates. Conventional grain drills are not capable of handling diverse seed sizes and will not provide satisfactory results. Broadcast seeding is common for planting pollinator mixes. Broadcast seeding equipment should be used that is designed to spread mixes with different sized seeds (e.g., Vicon Seeders). NRCS recommends broadcast seeding at a rate of 1.5 times the normal seeding rate and cultipacking after seeding (based on Agronomy Tech Note 31).

Management Methods

Integrated Pest Management – Land managers and seed mix practitioners should utilize [Integrated Pest Management](#) in their efforts to establish and manage plantings. Integrated Pest Management, or IPM, is an environmentally sensitive approach to pest management that relies on the use of a

combination of practices (conservation grazing, haying, prescribed burning, etc.) to successfully establish and manage native vegetation while minimizing the use of chemicals and accomplishing goals such as the protection and restoration of pollinators and other beneficial insects. Ultimately, using a variety of practices is the most effective, sustainable, and culturally appropriate way to achieve project goals.

Establishment Mowing – Mowing can be an important step in the establishment of upland prairie restoration sites that have high pressure from annual weeds. Mowing at least twice the first season and once the second season with a flail mower or stalk chopper (to prevent smothering plants) may be needed to decrease competition and to provide sufficient sunlight for seedlings. Haying is another method to remove mowed vegetation that prevents smothering of the new seeding. Mowing should be conducted before weeds mature and seed out and it is important that mowed vegetation does not smother the planting. Problematic weeds should be mowed to between five and eight inches before seed is allowed to set (usually as weeds reach 12-14 inches). Mowing height should be raised as native plants establish. Mowing too short can be detrimental to the outcomes of a successful planting. The timing and frequency of mowing should be planned to allow sufficient light to reach native plant seedlings and to prevent weed seed production. Some grassland managers see success without mowing but the need will vary depending on site conditions (such as soil productivity) and weed pressure.

Prescribed Burning – Prescribed burning is beneficial to remove thatch, control invading woody and invasive plants in prairies, fertilize the soil with ashes, stimulate seed germination and new plant growth, and increase diversity in plantings. Burning is typically initiated after the third or fourth years of establishment, after native vegetation is reaching maturity. Uplands benefit from burning every three to five years. The timing of a burn can help with management goals. Late spring burns are used to combat cool-season non-native species such as brome and reed canary grass. Burning a portion of the property each spring instead of an “all at once” burn will leave undisturbed nesting cover for ground nesting birds. Fall and spring burns should be alternated periodically to simulate natural variation. Burn plans are needed to define the details of how the burn will be conducted, who will be involved and for contingency planning. In many cases, permits are also required. It is recommended to only burn one-half or less of a project site at a time if they are large (over 50 acres), or don’t have any adjacent refuge such as other conservation lands adjacent to the site for wildlife species. Partial burns and burns that are patchy may also benefit pollinator populations if timed correctly (when pollinators are not actively foraging, or pollinators have pupated and are mobile).

Spot Mowing – After vegetation has established it may be beneficial to spot mow areas with invasive or noxious plants. Spot-mowing can slow some of the aggressive and fast-growing invasive plants while allowing the native species to become established. Spot-mowing should be done at a raised height between 4-6 inches in order to target the invasive plants and to not damage the native species. Spot-mowing for control of invasive or noxious weeds can be done every year to ensure planting health, even during 10 establishment years. Care should be taken to avoid mowing the planting too frequently or too aggressively, such as weekly or shorter than the recommended height as this can damage the native vegetation and cause the planting to fail. A list of noxious/invasive weed species that should be eradicated can be viewed at the Minnesota Department of Agriculture’s website.

Spot Management of Weeds – Problematic perennial weeds that cannot be managed effectively with other methods may require digging, pulling, smothering or spot treatment with herbicide for sufficient control. Examples include reed canary grass, smooth brome, quack grass, purple loosestrife, Canada thistle, Kentucky bluegrass, crown vetch, and birds-foot trefoil. These methods often are not conducted during the first year of establishment due to potential impact to native plant seedlings, but it may be important to control some weeds before they have a chance to spread. If herbicides will be used it is important that monitoring indicates that they are needed, and treatments are made with the goal of removing only the target plant or plants. Herbicides should be selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment. For

example, they should only be used when pollinators and other insects are not active (A common approach is to mow or grazing invasive weeds in the summer followed by herbicide application in the fall). Minimize herbicide first year/spot spray year 2. Unless significant problem weeds show up.

What to Expect in Year 1

During the first year of establishment, many native grasses, sedges and flowers will remain about one to three inches tall. Mowing will help to keep agricultural weeds (foxtail, barnyard grass, ragweed etc.) managed so the native plant seedlings receive sufficient water and sunlight. The planting may have a somewhat weedy appearance in the first year (see establishment mowing paragraph above).

(IMAGE)

What to Expect in Year 2

During year two, some of the native grasses, sedges and flowers may reach their mature height and some of them may even flower. Depending on when the seeding was conducted (spring or dormant), there might also be many first-year native seedlings germinating alongside native plants that established the year prior. Mowing may still play a key role in managing weeds and allowing seedlings to grow.

(IMAGE)

What to Expect in Year 3 and Beyond

By the end of year three many of the native plants will be mature and should start flowering. There may be some species that are slow to establish and may not show up for several years.

Problem Solving

Poor Establishment After Year 1 – It is often difficult to determine if a seeding is successful during the first year as establishment may vary depending on weather conditions and some species may be slow to establish. It is typically best to wait until the second year to conduct any corrective actions. Look for species such as Black-Eyed Susan flowering in year 1 for confirmation the seeding was a success.

Poor Establishment After Year 2 – If native plant seedlings are not establishing about every one to two feet it may be necessary to inter-seed some species into the planting. If this is a concern it is recommended to inspect the site during the growing season to recommend what species could be supplemented.

High Annual and Biennial Weed Competition – Typically, annual and biennial weed competition is not a big problem in prairie plantings as they are short lived and as long as mowing is conducted before seed is set, they should not add additional seed into the planting.

High Perennial Weed Competition – Dense establishment of perennial species can be a problem as it can prevent the establishment of forbs. Prescribed burning, prescribed grazing, and/or herbicide application may be needed to manage perennial weeds.

Low Forb Diversity After Year 3 – If grasses and sedges are establishing successfully but there is a lack of forbs it is recommended to conduct inter-seeding of additional forbs in late fall or after a prescribed fire in spring or fall. See the [Xerces Society guide](#) for additional information about inter-seeding wildflowers.

Wet Meadow NE 34-372

Updated: 2023

This mix has been designed for areas with soil saturation within a foot of the surface during a majority of the growing season and full to partial sun where land is being converted from other uses such as agriculture or non-native grasses to a wetland restoration.



Partners also include collaboration among Non-profits, Seed vendors, SWCD, Tribal Governments, Consultants, County and Cities. (See partner list on [website](#))

34-372		Wet Meadow Northeast Mix				
Code	Common Name	Scientific Name	PLS lb/ac	% by PLS lb/ac	Seeds/ft2	% by Seeds/ft2
brocil	Fringed Brome	<i>Bromus ciliatus</i>	0.74	2.47%	2.99	1.76%
calcan	Bluejoint Grass	<i>Calamagrostis canadensis</i>	0.07	0.23%	7.20	4.23%
elyvir	Virginia Wild Rye	<i>Elymus virginicus</i>	1.49	4.98%	2.30	1.35%
glygra	American Manna Grass	<i>Glyceria grandis</i>	0.16	0.54%	4.11	2.42%
glystr	Fowl Manna Grass	<i>Glyceria striata</i>	0.10	0.33%	3.31	1.94%
leeory	Rice Cut Grass	<i>Leersia oryzoides</i>	0.20	0.67%	2.50	1.47%
poopal	Fowl Bluegrass	<i>Poa palustris</i>	0.34	1.14%	16.24	9.54%
		Grasses Subtotal	3.10	10.37%	38.64	22.70%
carcom	Bottlebrush Sedge	<i>Carex comosa</i>	0.11	0.37%	1.21	0.71%
carsco	Pointed-broom Sedge	<i>Carex scoparia</i>	0.10	0.33%	3.09	1.81%
carstr	Tussock Sedge	<i>Carex stricta</i>	0.03	0.10%	0.58	0.34%
carutr	Northwest Territory Sedge	<i>Carex utriculata</i>	0.05	0.17%	0.20	0.12%
carvul	Brown Fox Sedge	<i>Carex vulpinoidea</i>	0.14	0.47%	5.14	3.02%
elepall	Common Spikerush	<i>Eleocharis palustris</i>	0.03	0.10%	0.56	0.33%
sciatr	Dark Green Bulrush	<i>Scirpus atrovirens</i>	0.18	0.60%	30.41	17.87%
scicyp	Woolgrass	<i>Scirpus cyperinus</i>	0.06	0.20%	37.47	22.01%
		Sedges & Rushes Subtotal	0.70	2.34%	78.66	46.22%
anecan	Canada Anemone	<i>Anemone canadensis</i>	0.03	0.10%	0.09	0.05%
ascinc	Swamp Milkweed	<i>Asclepias incarnata</i>	0.25	0.84%	0.44	0.26%
bidcer	Nodding Bur Marigold	<i>Bidens cernua</i>	0.06	0.20%	0.46	0.27%
calpal	Marsh Marigold	<i>Caltha palustris</i>	0.01	0.03%	0.10	0.06%
chegla	Turtlehead	<i>Chelone glabra</i>	0.01	0.03%	0.34	0.20%
doeumb	Flat-topped Aster	<i>Doellingeria umbellata</i>	0.04	0.13%	0.98	0.58%
eupper	Boneset	<i>Eupatorium perfoliatum</i>	0.07	0.23%	4.11	2.42%

eutgra	Grass-leaved Goldenrod	<i>Euthamia graminifolia</i>	0.02	0.07%	2.57	1.51%
eutmac	Joe Pye Weed	<i>Eutrochium maculatum</i>	0.06	0.20%	2.09	1.23%
helaut	Sneezeweed	<i>Helenium autumnale</i>	0.08	0.27%	3.82	2.24%
helgig	Giant Sunflower	<i>Helianthus giganteus</i>	0.03	0.10%	0.11	0.06%
lycame	Water Horehound	<i>Lycopus americanus</i>	0.03	0.10%	2.08	1.22%
lytala	Winged Loosestrife	<i>Lythrum alatum</i>	0.01	0.03%	1.10	0.65%
mimrin	Monkey Flower	<i>Mimulus ringens</i>	0.02	0.07%	16.90	9.93%
spitom	Steeplebush	<i>Spiraea tomentosa</i>	0.01	0.03%	0.90	0.53%
symlan	Panicled Aster	<i>Symphyotrichum lanceolatum</i>	0.03	0.10%	1.72	1.01%
sympun	Swamp Aster	<i>Symphyotrichum puniceum</i>	0.03	0.10%	0.88	0.52%
verhas	Blue Vervain	<i>Verbena hastata</i>	0.06	0.20%	2.05	1.20%
zizaur	Golden Alexanders	<i>Zizia aurea</i>	0.25	0.84%	1.01	0.59%
		Forbs Subtotal	1.10	3.68%	41.76	24.54%
cover	Oats/Winter Wheat	<i>Avena sativa/Triticum aestivum</i>	25.00	83.61%	11.14	6.54%
		Cover Crop Subtotal	25.00	83.61%	11.14	6.54%
		Total	29.90	100.00%	170.20	100.00%

Seed Mix Enhancements or Substitutions

List of Additional Species to Add Diversity or for Substitutions

The numbers (1-9) are species ranges that relate to the MN Ecological Subsections.

Wet Meadow Northeast

Updated 10-01-2022

Grasses:

Scientific Name	Common Name	Recommended Seeds per Square Foot
<i>Bromus pubescens</i>	Hairy Wood Chess	3
<i>Calamagrostis stricta</i> (2,5,8,9)	Narrow Reedgrass	33
<i>Elymus riparius</i>	Riverbank Wild Rye	3
<i>Elymus villosus</i>	Downy Wild Rye	
<i>Leersia oryzoides</i>	Rice Cutgrass	4
<i>Muhlenbergia racemosa</i>	Marsh Muhly Grass	2
<i>Muhlenbergia glomerata</i>	Clustered Muhly Grass	2
<i>Panicum virgatum</i> (3,4,7-9)	Switchgrass	4

Forbs:

Scientific Name	Common Name	Recommended Seeds per Square Foot
<i>Anemone cylindrica</i>	Long-headed Thimbleweed	2
<i>Cicuta maculata</i>	Spotted Water Hemlock	1

<i>Galium boreale</i>	Northern Bedstraw	2
<i>Gentiana andrewsii</i> (3-9)	Bottle Gentian	3
<i>Helianthus giganteus</i> (1-8)	Giant Sunflower	.5
<i>Lobelia spicata</i>	Rough-spiked Lobelia	3
<i>Lysimachia ciliata</i>	Fringed Loosestrife	2
<i>Symphyotrichum puniceum</i>	Red-stemmed Aster	.5
<i>Salix bebbiana</i> (1-9)	Bebb's Willow	1
<i>Salix discolor</i> (1-9)	Pussy Willow	1
<i>Salix petiolaris</i> (1-9)	Meadow Willow	1

Sedges:

Scientific Name	Common Name	Recommended Seeds per Square Foot
<i>Carex brevoir</i>	Short Sedge	.5
<i>Carex emoryi</i>	Emory's Sedge	.5
<i>Carex haydenii</i>	Hayden's Sedge	.5
<i>Carex pellita</i>	Wooly Sedge	.5
<i>Carex bebbii</i>	Bebb's Sedge	.5
<i>Juncus dudleyi</i>	Dudley's Rush	10

Wet Meadow Northeast 34-372 Seed Mix Guidance

Seed mix name: Wet

Meadow Northeast 34-372

(Previously 34-371)

Geographic area: Northeast Minnesota

Year of development:2009

Year/s of update:2022

Status (Standard or Pilot mix): Standard

Primary and Secondary Functions:

Primary – Wildlife habitat, restoration of wetland functions, and water management

Secondary – Carbon

Sequestration, emission reductions, pollinator habitat, songbird habitat

Similar State Mixes: Wet Meadow South and West 34-272

Compatible NRCS Practice Standards:



Compatible Minnesota CRP Practices:

Suitable Site Conditions: Areas with soil saturation within a foot of the surface during a majority of the growing season and full to partial sun where land is being converted from other uses such as agriculture or non-native grasses to a wetland restoration.

How to Modify for Site Conditions and Goals: This mix includes a list of additional species that can be considered to add species diversity. Site conditions such as sunlight, soils, hydrology and existing vegetation along with functional goals for the project such as carbon sequestration, pollinator habitat, and benefit to bird species can all have an influence on species selection and the modification of seed mixes. Additional plant species can also be added from containerized plants. It is also common that seed substitutions ([see list](#)) are used for wetland seed mixes when other species are not available.

Site Preparation: Primary goals for site preparation tend to focus on controlling weed species and providing ideal growing conditions for seed or plants to be installed. Site preparation methods vary depending on past uses of the site and the weed species that are present. The protection of microorganism populations and native seedbanks, preventing soil erosion, and managing weed establishment are all considerations during the site preparation process. In most cases, non-herbicide methods are preferred over herbicide intensive methods to protect aquatic organisms and soil microfauna, but herbicides may be the most efficient method of controlling some invasive perennial species. It is common for many conservation plantings to transition from corn or soybean production. Fields that are in agriculture often have control of most weeds. Another consideration is that several chemicals being used for weed control, along with herbicides (for herbicide-resistant crops) act as pre-emergents or post-emergents (designed to inhibit germination) and can be a problem for native vegetation establishment from seed. Investigate prior chemical use and labels to help define probability of having chemical carryover that could/should be addressed by using temporary cover crops to allow time for chemicals to break down. If a site is in perennial weeds such as smooth brome, quack grass or bluegrass and cannot be put into agricultural production for one or two seasons intensive site preparation may be needed. Herbicide application is often recommended, as tilling alone may re-suspend the rhizomes, allowing them to continue growing. For species such as reed canary grass and giant reed grass, cropping with chemicals that break down quickly, or combinations of mowing, herbicide application, prescribed burning, and tilling (or possibly additional herbicide application) may be needed. The [Minnesota Wetland Restoration Guide](#) provides detailed management recommendations for a wide range of species.

Seeding Dates:

Wetland seed mixes are most often installed in the fall after October 15th as a dormant seeding as most sedges, rushes and forbs need a winter to break their seed dormancy and start growing. It is also common to wait until shortly before snowfall to prevent the loss of seed from wind, birds and rodents. Snow seeding is conducted during early or late winter when there is less than four inches of snow, and on sunny days when seed can move to the soil surface. This technique has been successful for a wide variety of species types. Refer to the Minnesota Wetland Restoration Guide for more information about snow seeding. Wet meadow seed can also be installed in the spring once soil temperatures reach 50 degrees Fahrenheit until June 30th but only a portion of the seed mix will germinate that first year. If a wetland project will be constructed in the spring/early summer or will have flowing or fluctuating water levels it may be better to seed later in the spring after water levels stabilize.

Seedbed preparation

Methods that are used to prepare a seedbed can vary depending on the type of seeding equipment to be used. If a traditional native seed drill will be used, a smooth, firm seedbed is required. Soybean fields generally are sufficiently prepared for a native seed drill, but sites that were recently tilled will require

additional soil treatment such as harrowing and rolling to prepare an adequate seedbed and prevent seed from being buried too deep. Broadcast seeding can be conducted on soybean or corn fields, or fields that have been disked, as long as the soil is allowed to settle before seeding. Some practitioners have found that broadcast seeding on a smooth surface (not tilled or disked) leads to the establishment of higher diversity. It is important that the soil surface is not too hard packed, so cultipacking or light harrowing of crop fields before broadcast seeding may be needed. Seed can be lost on smooth surfaces, so it is recommended to seed into temporary cover crops or to roll sites after seeding.

Temporary Cover Crops and Mulch

The use of short-lived temporary cover crops help stabilize project sites and minimize the need for additional mulch in preparation of planting native seed mixes. They can also provide time to observe weed problems, and to allow for proper weed control before fall seeding. Temporary cover crops such as oats or winter wheat (the two species most commonly used) should be mowed to 10-12 inches before seeds mature (or harvested upon maturity) to prevent re-seeding. Slough grass (*Beckmannia syzigachne*) is a common cover crop for wet areas. Annual rye grass was commonly used but is generally avoided now due to its ability to inhibit germination of native species. Other cover crops typically used in agricultural fields, such as buckwheat, pennycress, and radishes, can help stabilize soil, build soil quality, or provide weed competition as part of restoration projects. Also see [NRCS Agronomy Technical Note 31](#).

Seeding Methods

A variety of seeding equipment is used for wetland seeding including broadcast seeders, traditional native seed drills, no-till drills, Brillion seeders and Trillion seeders. Broadcast seeders are most often used for wetland seeding as most of the seed is very small and needs to be near the soil surface to germinate. Specialized native seed drills can handle a wide variety of seed (fluffy, smooth, large and small) and low seeding rates so they are also an option for wetland seeding if they are calibrated correctly.

Management Methods –

Establishment Mowing

Establishment mowing may be beneficial for wet meadow plantings if the site conditions are not too wet for the equipment. Pressure from annual and biennial weeds is generally less with increased soil saturation and water depth. For smaller projects, brush cutters, string trimmers, or hand equipment can be used to target weeds and work around native plants. See the Minnesota Wetland Restoration Guide appendix: <http://bwsr.state.mn.us/restoration/resources/documents/appendix-6a-3mowing.pdf>

Mowing at least twice the first season and once the second season with a flail mower or stalk chopper (to prevent smothering plants) is often helpful to decrease competition and to provide sufficient sunlight for seedlings. Weeds should be mowed to between five and eight inches before seed is allowed to set (usually as weeds reach 12-14 inches). Mowing height should be raised as native plants establish. The timing and frequency of mowing should be planned to allow sufficient light to reach native plant seedlings and preventing weed seed production. Sites with low weed competition due to sandy soils or other factors may not need mowing.

Prescribed Burning

Prescribed burning can be beneficial for some wet meadow plantings, particularly if burning was part of the historic plant community for the project. Burning can remove thatch, control invading woody and invasive plants, stimulate seed germination and new plant growth, and increase diversity in plantings. In some cases, the disturbance and increased nutrients from a burn can stimulate reed canary grass germination, so this should be considered when the species is a risk for a project. Burning is typically initiated after the third or fourth years of establishment, after native vegetation is reaching maturity. Burning is commonly conducted every three to five years. Fall and spring burns should be alternated periodically to simulate natural variation. Burn plans are needed to define the details of how

the burn will be conducted, who will be involved and for contingency planning. In many cases, permits are also required. It is recommended to only burn one-half or less of a project site at a time if they are large (over 50 acres), or don't have any adjacent refuge such as other conservation lands adjacent to the site for wildlife species. Partial burns and burns that are patchy may also benefit pollinator populations if timed correctly (when pollinators are not actively foraging or pollinators have pupated and are mobile).

Spot Treatment of Weeds

Problematic perennial weeds that cannot be managed effectively with other methods may require spot treatment with herbicide for sufficient control. Examples include reed canary grass, quack grass, purple loosestrife, Canada thistle, and Kentucky bluegrass. In some cases, herbicide treatment is not conducted during the first or second year of establishment to avoid impact to seedlings, but it may be important to control some weeds before they have a chance to spread. A common practice for Canada thistle control involves clipping seedheads while they are in the bud stage (usually early June) and conducting herbicide application with a broad-leaf specific herbicide in the fall (mid to late October). This timing limits the application of herbicide while pollinators are active. Grass-specific herbicides are used to control reed canary grass in wet meadow restorations, particularly on sites dominated by forbs and sedges that will not be affected. Grass-specific herbicides are most effective on young reed canary plants (6-12 inches tall) than on mature plants. There is some evidence that using surfactants along with herbicides and disking prior to application may improve effectiveness. It should be noted that grass specific herbicides are not aquatically certified and should not be used near open water. When using a broad-spectrum herbicide, it is important that an aquatic safe form of glyphosate and surfactant be used near open water. When using herbicides, labels must be followed, certified applicators must conduct the treatment and Personal Protective Equipment (PPE) must be used according to label instructions. Minimize herbicide first year/spot spray year 2. Unless significant problem weeds show up.

What to Expect in Year 1: During year one of growth many native grasses, sedges, rushes and flowers will remain about one to three inches tall. Agricultural weeds such as ragweed, barnyard grass and foxtail barley may be common but not necessarily a cause for alarm. The mowing will play an important role to keep weeds managed so the native plant seedlings receive sufficient water and sunlight. The planting may have a somewhat weedy appearance this first year.

(IMAGE)

What to Expect in Year 2: During year two the native grasses and flowers may reach their mature height and some of them may flower. Mowing will still play a key role in managing weeds and allowing seedlings to grow.

(IMAGE)

What to Expect in Year 3 and Beyond: By the end of year three most of the native plants will be nearing maturity and should flower. There may be some species that are slow to establish and may not show up for several years.

Problem Solving

Poor Establishment After Year 1 – It is often difficult to determine if a seeding is successful during the first year as establishment may vary depending on weather conditions and some species may be slow to establish. It is typically best to wait until the second year to conduct any corrective actions.

Poor Establishment After Year 2 – If native plant seedlings are not establishing about every one to two feet it may be necessary to inter-seed some species into the planting.

High Annual and Biennial Weed Competition – Typically, annual and biennial weed competition is not a big problem in wet meadow plantings as they are short lived and as long as mowing is conducted before seed is set, they should not add additional seed into the planting.

High Perennial Weed Competition – Dense establishment of perennial species can be a problem as it can prevent the establishment of forbs. Herbicide application may be needed to manage perennial weeds.

Low Forb Diversity After Year 3 – If grasses and sedges are establishing successfully but there is a lack of forbs it is recommended to conduct inter-seeding of additional forbs in late fall. See the [Xerces Society guide](#) for additional information about inter-seeding wildflowers.