

DRAFT

AECOM

Sugar River Sedge Meadow Maintenance Plan

Within the Epic Property

July 17, 2024

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
 Shawn Tracy Scientist V	<i>Brian Bliesner</i> Brian Bliesner P.E.		

Revision History

Revision	Revision date	Details	Authorized	Name	Position

Distribution List

# Hard Copies	PDF Required	Association / Company Name
1	Yes	Epic

Prepared for:

Epic Systems Corporation
Eric Reith
Horticulture Manager
608-271-9000
erieth@epic.com

Prepared by:

Shawn Tracy
Scientist V
M: 763.248.0134
E: shawn.tracy@aecom.com

AECOM
800 LaSalle Avenue
Minneapolis, MN 55402
aecom.com

Table of Contents

Introduction	1
Monitoring	1
Monitoring Area	1
Monitoring Staff and Responsibilities	3
Data Collection	3
Invasive Plant Resources.....	3
Invasive Control Strategies	4
Overview	4
Strategies.....	4
Prescribed Fire	4
Chemical Control.....	7
Cutting/Mowing.....	9
Biological Control.....	10
Disposal.....	11
Adaptive Management Plan	12

Figures

Figure 1. Location of the Sedge Meadow habitat of interest within the portion of the Sugar River floodplain located on Epic property.	2
Figure 2. Suggested timing of control for select species in Southern Wisconsin (https://dnr.wisconsin.gov/topic/Invasives/control).	8
Figure 3. Mowing times for less common* invasive species in southern Wisconsin (https://dnr.wisconsin.gov/topic/Invasives/control).	9
Figure 4. Mowing times for common invasive species in southern Wisconsin (https://dnr.wisconsin.gov/topic/Invasives/control).	10
Figure 5. Regulated invasive species control as defined by available resources.....	13

Tables

Table 1. Treatment strategies by expected plant species in the Sedge Meadow Maintenance Area.....	14
---	----

Introduction

Both Epic and the Wisconsin Department of Natural Resources (DNR) have identified the need for a Sedge Meadow Management Plan for that portion of the Sugar River floodplain within Epic property located north of Highway 18, west of Country View Rd/Epic Lane, and east of Dairy Ridge Road. The primary concern is the potential invasion of woody plants (shrubs and trees) into the Sedge Meadow that would then ultimately cause the loss of the desired Sedge-dominated habitat. Epic has also expressed interest in the early detection and removal of other non-native and invasive species in the Sedge Meadow (i.e., non-native grasses and forbs) for the same reasons. The following content presents a plan identifying monitoring and maintenance guidance to achieve this goal.

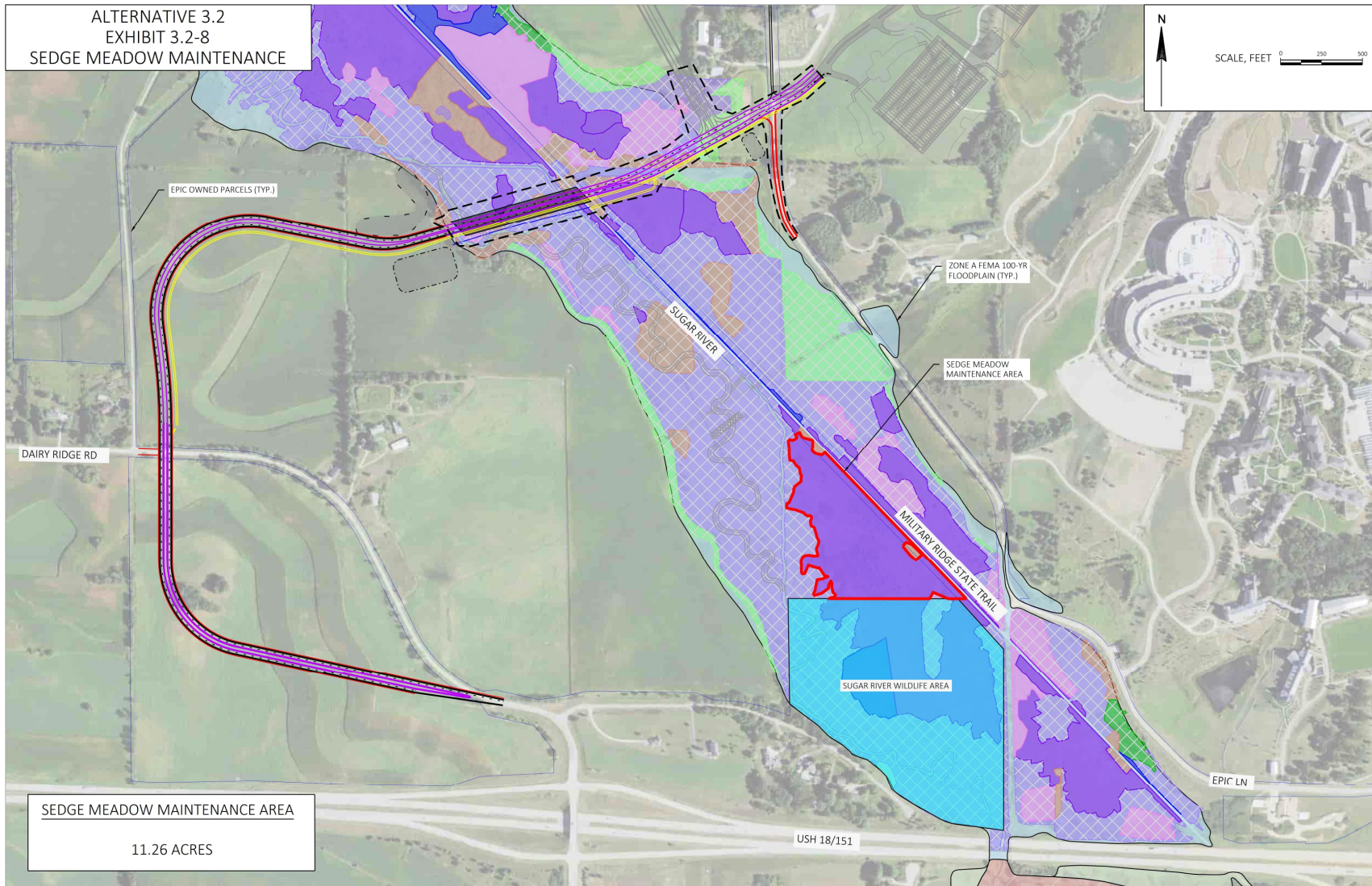
Epic's primary goal for the Sugar River and its floodplain is to restore and protect its natural resources. As higher quality Sedge Meadow Wetlands have been identified in the Sugar River floodplain, by recent evaluations and by the DNR, that are adjacent to Shrub Carr wetlands, concerns of woody species encroachment have been raised. If shrubs and trees colonize a Sedge Meadow, the vegetative community composition will slowly convert to a Shrub Carr wetland. As the DNR has requested the preservation of the Sedge Meadow it will be important for Epic to monitor and respond to woody species colonization. The following monitoring and maintenance plan will serve to guide Epic staff by outlining key staff and responsibilities, data collection protocols, and relative costs for monitoring, and best management practices for maintenance.

Monitoring

Monitoring Area

Sedge Meadow is located along the southern portion of its property lines west of the Military Ridge Trail (Figure 1). The Sedge Meadow extends westward nearly to the location of the old, channelized segment of the Sugar River where it changes to Wet Meadow habitat. Note that this wetland habitat extends southward into the DNR's Sugar River Wildlife Area.

Figure 1. Location of the Sedge Meadow habitat of interest within the portion of the Sugar River floodplain located on Epic property.



Monitoring Staff and Responsibilities

The Epic Horticultural Team, will select and lead monitoring staff to carry out data collection efforts for the Sedge Meadow maintenance area each year. All field-data collected by these staff will be submitted to Mr. Rieth for Quality Control and file storage. Results of the monitoring will inform the identification of an appropriate maintenance strategy and next steps.

Data Collection

Epic will perform routine monitoring of the Sedge Meadow Maintenance Area to document the presence/absence of woody species colonization. During the inspection, the following information will be recorded:

- a. Inspector name(s)
- b. Date
- c. Locations (points) or extent (polygon area) of woody shrubs (this will inform the management approach)
- d. Invasive plant species observed
- e. Notes

Monitoring will occur once per year during mid-summer and document invasive/non-native observations in the Sedge Meadow electronically using preventative maintenance software and electronic record-keeping. As each year passes, a common set of invasive plants will emerge, making the chosen management strategy(-ies) easier to develop. However, seeds can make their way into the valley either from river transport, wind transport, human transport via clothing, shoes and bikes, or via bird and animal droppings. It will therefore be important to be on the lookout for new invasive species.

Invasive Plant Resources

The Wisconsin DNR maintains a list of regulated species with links to information on each species including their ecological threat, identification tips, best management strategies for their control and additional resources to help staff maintain the Sedge Meadow Maintenance Area (<https://dnr.wisconsin.gov/topic/Invasives/RegulatedSpecies>). It should be noted, however, that this is simply a list of species regulated as illegal for sale by a nursery and does not represent a comprehensive list of all existing, non-native and/or invasive species. The Minnesota DNR maintains a list of invasive plants that should be consulted as a supplement to the Wisconsin DNR site and includes many of the more common non-native/invasive species (as well as their identification and management) likely to affect the Sedge Meadow habitats in the Epic property (<https://www.dnr.state.mn.us/invasives/terrestrialplants/index.html>). Annual reviews of these lists and their content will be important for monitoring staff to accurately identify invasive species.

One significant non-native/invasive species prevalent in the Sugar River floodplain is Reed Canary Grass. Reed Canary Grass has been planted throughout the U.S. since the 1800s for forage and erosion control. It is a perennial grass that grows in wetlands, ditch banks, moist fields, and along roadsides. It can outcompete most native species in natural wetlands and presents a major challenge for restoration in wetland mitigation efforts.

Reed Canary Grass likely occurs as both native stands and non-native stands in Wisconsin. According to the MN DNR, “there has recently been in-depth research on which populations of reed canary grass in Minnesota are native and which are non-native. Findings from the University of Minnesota indicate that reed canary grass populations along the rivers they sampled in Minnesota are likely predominantly native. The DNR is maintaining this webpage about reed canary grass as the page assists with identification of reed canary grass and provides management advice. Regardless of origins, reed canary grass can form dense, dominant cover and require control when there are management goals related to maintaining or restoring other plant species. For example, re-establishment of trees is very challenging in dense reed canary grass stands.”

As Reed Canary Grass seeds are regularly and very effectively transported by rivers and deposited along their banks, it is important to understand that off-site sources of seed from established stands means controlling this species is a significant challenge to resources. In many cases, natural resources managers have decided to forgo managing Reed Canary Grass for this reason, for the emerging understanding that native populations are a distinct possibility, and that this species rapidly forms a dense soft-armoring protection to stream banks. This being said, the Sedge Meadow Maintenance Area is disjunct from the old and proposed realignment of the Sugar River and any stands of Reed Canary Grass may occur in lower densities making its spread more controllable.

Invasive Control Strategies

Overview

The management of the Sedge Meadow will require a long-term commitment to achieve successful, sustainable plant community. The selection of appropriate invasive control strategies is an important task that needs to consider species, their life stages and the extent of the invasion against available resources to control them. Selecting the appropriate management strategy or strategies will depend on a number of factors including cost, surrounding land use, equipment availability, as well as the skill and ability of the responsible person or entity to implement the strategy (Minnesota Wetland Restoration Guide https://bwsr.state.mn.us/sites/default/files/2019-01/Sec6_02_25_2014_checked.pdf).

Strategies

The following set of strategies was assembled directly from the Wisconsin DNR website on Invasive Species identified earlier in this plan. **Unless otherwise referenced, each strategy’s content were pulled verbatim from the DNR website as appropriate to consider for the Sedge Meadow (<https://dnr.wisconsin.gov/topic/Invasives/control>).**

Prescribed Fire

If using fire as a control technique, know and follow local burning regulations and check local ordinances. Grass or prairie fires can spread rapidly. Consult with natural areas management experts at nature centers, your local DNR office or local land management consultants for training opportunities before attempting this method of control. Burn permits are required in many areas and more information on permits can be attained through local fire departments and the Wisconsin DNR.

Under DNR law, anyone found burning without a permit is subject to a \$175 fine. Those responsible for starting a wildfire are liable for all suppression costs. This could mean the cost of firefighters, fire trucks, airplanes and even the cost of damage.

Also, refer to the Best Management Practices for Invasive Species to reduce the spread of invasive species when preparing for prescribed burns (Chapter 8 of the Forestry BMPs <https://councilonforestry.wi.gov/Pages/InvasiveSpecies/Forestry.aspx>).

Read the Wisconsin DNR Forestry Management Guidelines (<https://dnr.wisconsin.gov/topic/forestmanagement/guidelines>) for a more complete guide of what is needed for a controlled burn to take place (planning, equipment, personal protection).

Controlled or "prescribed" burns are used to reduce invasive and woody plant density and competition, stimulate the growth of native plants, return nutrients to the soil, promote germination of dormant seeds and enhance wildlife habitat.

These burns are called "controlled" or "prescribed" because they are done only under specific weather-and fuel-related conditions that ensure an effective burn and the safety of the burn crew and the surrounding area. Purposely set in plant communities that have evolved with fire, such as oak woodlands, prairies, savannas and sedge meadows, controlled burns can kill or set back certain invasive species that do not tolerate fire. Burns are usually conducted in mid-spring or fall. If early blooming wildflowers are present, it is often best to burn in very early spring or late fall to avoid damaging them.

In natural areas that are badly infested with invasive plants, controlled burns may initially need to be done for several years in a row to reduce the weed seed bank and stimulate native species. Burning this frequently is not generally recommended in healthy native plant communities because important insect pupae and eggs may also be destroyed. Burning one-third to one-half of a natural area each year on a rotating basis is usually the preferred management strategy and will lead to increased plant and insect diversity.

Conducting controlled burns should not be taken lightly. Burning is a dangerous activity that requires planning, coordination, equipment and trained personnel. It also requires an understanding of how fuel conditions and weather conditions, such as humidity, temperature, wind direction and wind speed, affect a burn.

Another website that may be useful in deciding whether the prescribed fire is a viable management technique is the Nature Conservancy's Global Invasive Species Team website (<https://www.invasive.org/gist/control.html>). The website features Invasive Plant Species Summaries which give information regarding the management of various invasive species.

Sometimes large-scale burns are either inappropriate or cannot be done because of high fuel moisture or a lack of fuel to carry a fire. In such situations, spot-treating plants that are vulnerable to fire may be preferred. A propane torch with a long wand works well in these situations and can be used to treat individual plants or small groups of plants.

This technique works especially well on seedlings and young saplings and is generally less labor-intensive than hand-pulling and less expensive than herbicide treatments. Spot burning often only top-kills more mature plants.

To burn invasive plants with a propane torch, the operator passes the flame over the plant for less than one second, which is enough time to boil the water in the plant. Boiling the water within the plant will cause it to droop immediately and die within a couple of hours.

Some municipalities will not allow other types of prescribed burning but will approve burn permits for spot-treating plants with a propane torch. Be aware, however, that propane torches are dangerous to use, and there are several safety hazards that should be observed.

Wear fire safety gear (Nomex fire suit, hard hat with face shield and Nomex ear/neck protector, leather gloves and leather boots).

Make sure that the pressure relief valve on top is pointing *away* from the person carrying the pack. This valve is designed to release pressure by venting gas. If the tank overheats, the vented gas can ignite and will burn the applicator if the valve is pointing inward.

Always be cautious where you set the torch down because the tip of the torch gets very hot. Cool it down with water, if possible.

Do not use propane torches on dry vegetation or when windy conditions exist unless you have made adequate preparations to contain a runaway fire.

A Burn Plan must be developed for any prescribed burn (Minnesota Wetland Restoration Guide Prescribed Guidance Document #WRG 6A-2; <https://bwsr.state.mn.us/sites/default/files/2019-01/6A-2%20Prescribed%20Burning2.pdf>).

- Location of the burn
- Resource management objectives of the burn
- Necessary approvals, permits and variances
- Pre-burn vegetative description of the area
- Prescription for weather conditions required and observed conditions
- Description of the burning method to be used
- Description of pre-burn preparation
- Firing sequence of area to be burned
- Smoke management considerations
- Contingency plan for fire escapes
- Communication plan
- Job assignments and descriptions of responsibilities for all persons assisting with the burn
- Equipment and materials checklist (ex. Drip torches, tractors, discs, pump trailers, etc.)
- Job assignments and descriptions of responsibilities for all persons assisting with fire patrol, containment, mop-up and suppression of the burn.
- Post-burn evaluation and management
- Burn boss or landowner signature acknowledging acceptance of full liability resulting from implementation of the burn plan.

There are several smoke management considerations that need to be made for prescribed burns (Minnesota Wetland Restoration Guide Prescribed Guidance Document #WRG 6A-2; <https://bwsr.state.mn.us/sites/default/files/2019-01/6A-2%20Prescribed%20Burning2.pdf>).

- A 360 degree check for possible restrictive air space
- A 360 degree check for sensitive areas such as residences, roads, airports
- A check of sensitive areas downwind and 45 degrees on either side of initial wind direction
- An estimate of the length of time necessary to conduct the burn, plus a margin of error for wind shift or loss of speed, to predict smoke duration.
- Electrical or high power transmission lines should be documented and the burn plan designed and applied so that high dense smoke columns will not cross under or contact these lines.
- Electrical discharge can occur due to high concentrations of carbon in smoke columns.
- Moist fuels produce more smoke than dry fuels
- Head fires produce more smoke than slower burning backing fires
- Smoke problems at night are more hazardous than during daylight
- Stable air mass conditions can cause air inversions, which restrict smoke convection.
- Unstable atmospheric conditions are usually better for smoke management.

Consult the Minnesota Wetland Restoration Guide Prescribed Guidance Document #WRG 6A-2; (<https://bwsr.state.mn.us/sites/default/files/2019-01/6A-2%20Prescribed%20Burning2.pdf>) for additional prescribed burning guidance as well as the timing and effects for various plant species. Consult the DNR and the local fire warden for additional details, planning and permitting.

Chemical Control

When treating in a wetland, or other water resource setting, use herbicides labeled for aquatic use such as Rodeo or AquaNet (both are glyphosate products) and Garlon 3A or Element 3A (both are triclopyr products).

Chemical control refers to the use of pesticides, and for all practical purposes, some invasive organisms cannot be controlled without the use of pesticides. There are many kinds of herbicides, insecticides, and fungicides, and not all of them will be appropriate for every situation. The choice of a pesticide depends on the target population, stage of growth, the presence of desirable species that may be affected, the proximity of water resources and environmental conditions.

Additionally, there may be some areas where chemical control is inappropriate, for example, if rare species are present. Pesticides must always be applied in accordance with the label. Landowners should possess the proper equipment and the knowledge to safely apply chemicals or hire a licensed applicator. Proper personal protective gear should be used, and materials to contain spills should be kept close by.

Visit Wisconsin's Pesticide Applicator Training website (<https://fyi.extension.wisc.edu/pat/>) to find out more about pesticide applicator training, requirements and the certification process.

Basal bark: Apply herbicide (generally in an oil carrier) in a ring, at least 6" wide, to the base of a woody stem, typically the bottom 12-24 inches. For trees that root sucker, treat the exposed root collar as well. Spray to the point of run-off, but not beyond. The herbicide will penetrate the stem and move to the roots. The best timing is in the fall and early winter. Do not treat wet bark. Herbicide solutions may vary based on the diameter of the plant. Always apply in accordance with the herbicide label.

Bundle and cut: Bundle together all the stems of a plant (typically grass). Cut the stems above where they are bundled and apply herbicide to the cut stems.

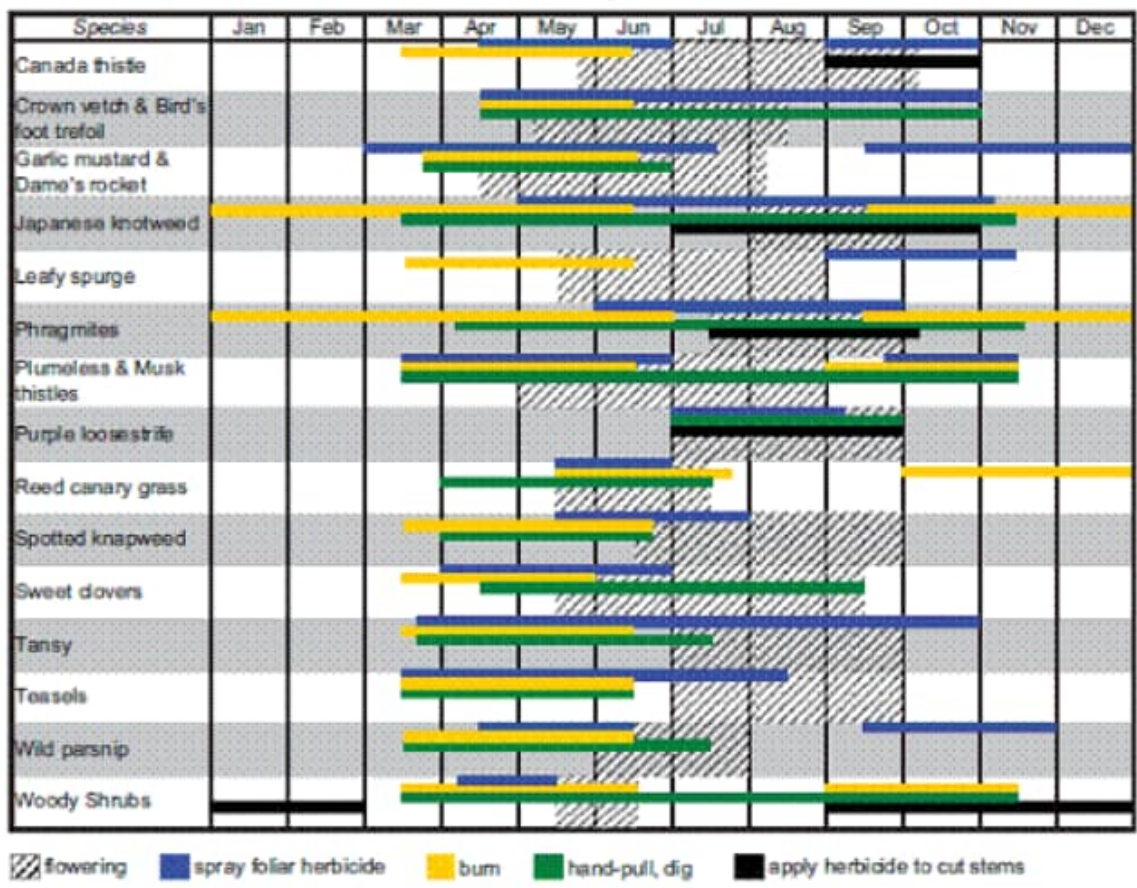
Cut-stump treatment: Cut all stems of a plant near its base and apply herbicide to the exposed cambium (outer) layer and down the sides of the root crown. Water-based herbicides should be applied immediately after the stem is cut. Oil-based herbicides can be applied later. The best timing is in the fall and early winter. Applications can be made using a sponge paintbrush, spray bottle or a backpack sprayer. Adding a dye to the solution helps keep track of what cut stumps have been treated.

Foliar spray: Apply herbicide directly to the leaf surfaces of the plant. Use care to avoid applying to any non-target plants. Use special formulations near open water. A variety of sprayers can be used, including handheld, backpack, and mounted sprayer units for off-road vehicles and trucks. A surfactant may be needed when applying herbicides to fuzzy or waxy leaves.

All herbicide label formulations are listed as percent active ingredient (a.i.); this is the chemical that kills the plant. When an herbicide is purchased it will contain a certain amount of active ingredient. You will need to know the percent a.i. in your herbicide of choice to determine the amount of carrier (i.e. water or oil depending on the herbicide’s formulation) you need to add.

For example, if the herbicide you purchased contains 41% glyphosate, but you need a solution of 1% a.i. you would need to add roughly 3.12 ounces of your original 41% herbicide to a gallon of the carrier. [e.g., 1 (% a.i. in solution) x 128 (oz in a gallon) / 41 (% a.i. in herbicide) = 3.12 (oz of herbicide)]

Figure 2. Suggested timing of control for select species in Southern Wisconsin (<https://dnr.wisconsin.gov/topic/Invasives/control>).



Cutting/Mowing

Repeated mowing or cutting of invasive plants can weaken the population by depleting root reserves and preventing flowering; however, mechanical control is typically most effective when used in conjunction with herbicide treatments. If infestations are small, the cost of mechanical control is usually relatively low and when combined with other treatments it can be very effective. However, cutting large populations of woody invasive plants can become labor and resource-intensive.

Cut or mow several times during the growing season. This is most effective if done just before plants flower. It is important to monitor the site for reflowering. Herbicide can be applied to the cut stems or resprouts. Avoid mowing if seeds have already developed as this will spread them.

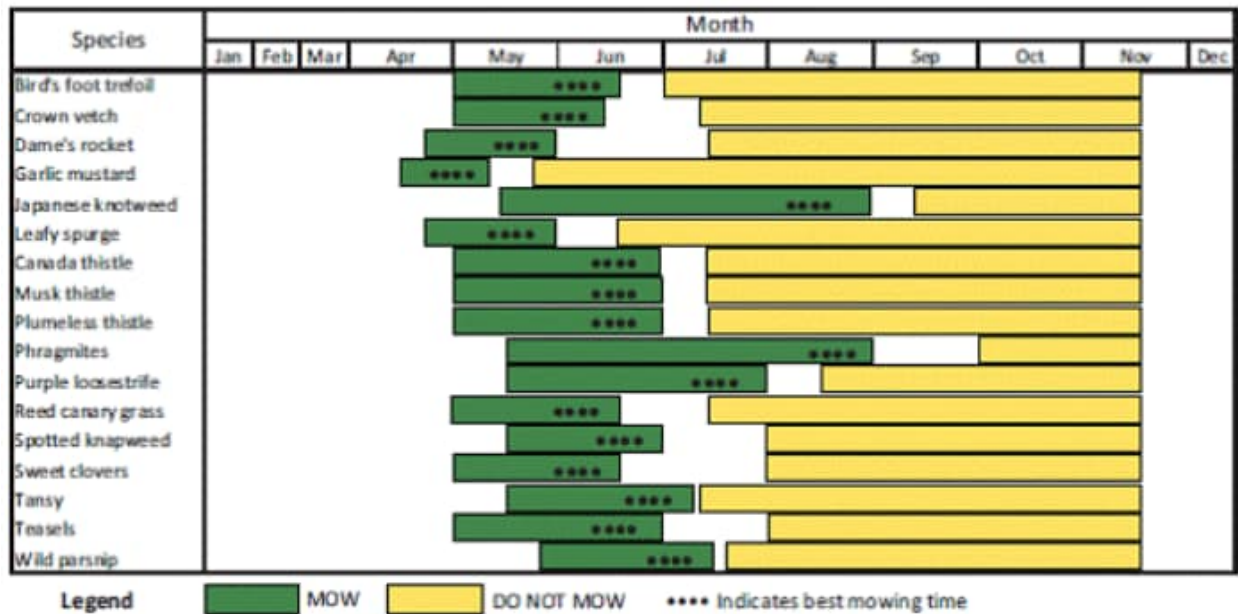
Mowing can be an effective control for some invasives species; however, it can spread those species if not timed correctly. Mowing can be done several times per growing season (into the “Do Not Mow” time) to prevent seed production and to deplete root reserves; however, the first mowing should not occur when the target invasive is just about to flower or in the early flowering stage. Avoid mowing if seeds have already developed as this will spread them. Emergence, flowering, and seeding times vary from year to year for most species (Figure 3; Figure 4).

Figure 3. Mowing times for less common* invasive species in southern Wisconsin
 (<https://dnr.wisconsin.gov/topic/Invasives/control>).



*These species are not yet common in most of Wisconsin and need to be contained if found where prohibited.

Figure 4. Mowing times for common invasive species in southern Wisconsin (<https://dnr.wisconsin.gov/topic/Invasives/control>).



Repeated mowing can diminish reserves of woody vegetation, though many species will continue to resprout after mowing, requiring the use of herbicide for effective control. Repeated mowing has been an effective technique for seedling buckthorn, Siberian elm, and cottonwood. It is most effective when plants are still seedlings, and have not developed more extensive root reserves (Minnesota Wetland Restoration Guide, https://bwsr.state.mn.us/sites/default/files/2019-01/Sec6_02_25_2014_checked.pdf).

Most woody invasive species re-sprout after cutting is conducted. A common method to remove species such as common and glossy buckthorn involves cutting the stem with a chainsaw or brush saw and then treating the stump with herbicide. **When treating in a wetland, or other water resource setting, use herbicides labeled for aquatic use such as Rodeo or AquaNet (both are glyphosate products) and Garlon 3A or Element 3A (both are triclopyr products).** These need to be applied when the temperature is above freezing (32 deg. F). Herbicide can be applied by backpack sprayers, wick applicators, brushes or rollers. Cut brush may require removal to allow for future management activities such as mowing (Minnesota Wetland Restoration Guide, https://bwsr.state.mn.us/sites/default/files/2019-01/Sec6_02_25_2014_checked.pdf).

Herbicides can also be applied directly to foliage to control shrubs and young trees. This technique is often conducted on dense stands of seedlings, or areas where species such as buckthorn or willow have been mowed and allowed to re-grow at a lower height. The same aquatic-use labeled herbicides mentioned above are used for this technique. A drawback of this technique is increased impact to surrounding vegetation (Minnesota Wetland Restoration Guide, https://bwsr.state.mn.us/sites/default/files/2019-01/Sec6_02_25_2014_checked.pdf).

Biological Control

A biological control refers to the use of animals, fungi or diseases to control invasive populations. Control organisms usually come from the native range of the target species and require a period of study to ensure that they will remain specific to the target population, and will not harm native species, crops, or other ornamental species. They require both federal and state permits for their use.

For more information contact the Wisconsin Department of Agriculture, Transportation, and Consumer Protection (<https://wiki.bugwood.org/Archive:BCIPEUS>) at 1-866-440-4523.

Biological control typically does not eliminate the invasive species, and usually takes several years to show results. However, biological control has been effective for some species. Examples include the *Galerucella* beetle which has been used with some success to control the European perennial purple loosestrife (*Lythrum salicaria*) and two species of parasitic wasp (*Agathis pumila* and *Chrysocharis laricinellae*) which were introduced to control larch casebearer (*Coleophora laricella*) infestations in tamarack.

Grazing animals can also be utilized as biological control agents. For effective control, grazing may need to be used for multiple, consecutive years, generally during the rosette (early growth) to early flowering stages, sometimes with multiple treatments per year. This practice is best used as part of an integrated pest management plan including manual, mechanical, or chemical controls. Care needs to be taken when using grazers since they can eat desirable plants as well as invasive plants and some plants are toxic depending on the grazer breed. The following is a list of invasive plant species and the grazers that will eat them:

Sheep, goats and cattle: kudzu, thistle (bull, Canada, and musk), wild parsnip

Sheep and goats: garlic mustard, spotted knapweed, cypress and leafy spurge, white and yellow sweet clover, tansy, yellow starthistle, reed canary grass

Goats and cattle: giant and Japanese knotweed

Goats: black locust, common buckthorn, honeysuckle (all species), Japanese barberry, multiflora rose, autumn and Russian olive, Oriental bittersweet, crown vetch

Disposal

Many weeds, like garlic mustard, continue to develop seeds once they have been pulled from the ground. For plants like this, effective control means that you must remove the flowering plants from the site to keep the seed from spreading. Allowing the plants to dry out and burning them is an option in some rural areas, but landowners should be aware that there are frequent restrictions or permit requirements for open-air burning.

Burying plants works, but is not feasible for most situations. Although backyard composting is normally the preferred method for dealing with most yard waste, backyard compost piles and bins do not reliably generate enough heat for a long enough period of time to destroy some weed seeds. The same problem may occur at many municipal or rural compost facilities, thereby spreading the weeds when the finished compost is utilized.

To ensure that the invasive weeds are destroyed and the seeds not redistributed, the DNR's Endangered Resources and Waste Management programs are asking property owners to separate and bag any invasive plants in clear bags and label the bags "Invasive plants – approved by DNR for landfilling." Groups removing invasive weeds from public properties like parks should make arrangements with their local public works office for collection and disposal.

For Assistance:

Natural resources manager (recycling and landfilling): 608-264-6286

Conservation biologist (invasive plants): 608-267-5066

The author of this Sugar River Sedge Meadow Maintenance Plan has successfully used the pile, dry and burn approach to invasive woody species disposal in State and County Regional Park Systems in Minnesota in the past. Invasive woody species were cut in summer and fall, then gathered into several, well-spaced piles for drying through winter. In later winter, when sufficient snow cover is achieved, a burning permit was acquired, and each pile was set on fire. The Sugar River valley is an appropriate location for this method over woody species removal that eliminates that accidental spread of invasive seeds and should be considered if/when Buckthorn, Tatarian Honeysuckle or other non-native invasive species are being controlled. If native invasive species are being controlled (as in from adjacent Shrub Carr wetland types), cutting shrubs prior to their seeding and leaving them lay where cut is likely sufficient.

Adaptive Management Plan

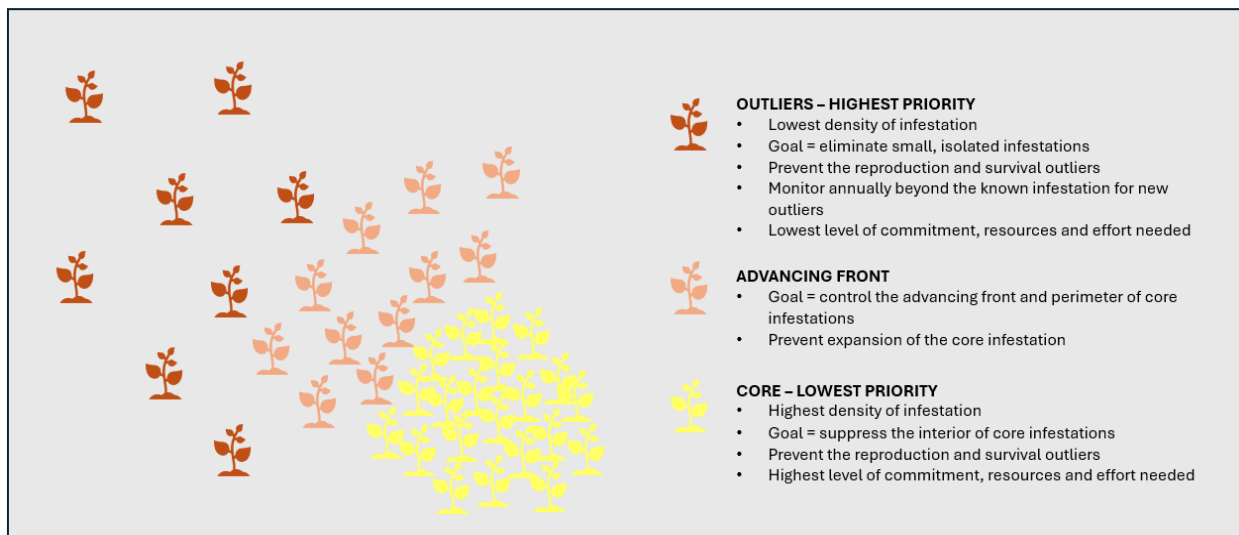
An invasive species management plan is only as good as the field data that informs it and the plan will likely need to change through time given several factors including, but not limited to, the initial set of species prevalent on-site, the life-stage of the plants, the required level of effort needed to address the invasion, and annual budgets.

Controlling invasive species (non-native or native species) within the Sedge Meadow Maintenance Site is attainable especially if acted on soon after detection. Completely removing invasive species can be very challenging if they are allowed to develop dense stands with abundant seed and root abundance. If Epic's resources are limited, or the degree of infestation limits the efficacy of control strategies, a recommended management goal is to reduce stand density, as opposed to all out eradication. The idea is to provide as much space and resources (soil, water, sunlight) for the native habitat to thrive.

There are several invasive species control strategies Epic can select from when developing an informed management plan for the next up-coming year. This plan may change from year to year as it adapts to the most current condition. Control strategies may include manual, mechanical, chemical, biological and cultural components. In order to select the most appropriate strategies to employ, Epic will need to identify (1) the species of invasive plants found, (2) their life stage(s) present, and (3) their abundance (density).

If invasive species are found to occur in larger, dense stands, a more regulated approach may be necessary, at least in initial stage of management, if resources are limited (Figure 5).

Figure 5. Regulated invasive species control as defined by available resources.



To-date, there appears to be no plant survey data for the Sedge Meadow Maintenance Area identified for this plan that would shed light on either an accurate native species assemblage or presence of native and/or non-native invasive species. However, some information is available from the *Assured Wetland Delineation and Wetland Assessment Report* (Heartland, December 1, 2023).

From the Heartland report:

*Sedge meadow was commonly observed within the interior of the wetland complex and was likely the dominant wetland plant community prior to historic ditching impacts and the invasion by reed canary grass. These communities were typically moderate to high quality and had a diversity of native species. Sedge meadow was frequently observed in mosaics that transitioned between shallow marsh, wet meadow, wet prairie, and shrub-carr. Sedge meadow areas were dominated by tussock sedge, blue-joint grass (*Calamagrostis canadensis*, OBL), hairy-fruit lake sedge (*Carex trichocarpa*, OBL), spotted Joe-Pye weed (*Eutrochium maculatum*, OBL), purple-stem aster, saw-tooth sunflower, and common great Angelica (*Angelica atropurpurea*, OBL).*

Wetland sampling point P33 recorded the following specific plant types:

- *Carex sticta* (Upright Sedge; native)
- *Symphyotrichum puniceum* (Purplestem Aster; native)
- *Typha latifolia* (Broadleaf Cattail; native)
- *Eupatorium perfoliatum* (Common Boneset; native)
- *Solidago gigantea* (Giant Goldenrod; native)
- *Epilobium coloratum* (Purpleleaf Willowherb; native)

Note that no non-native invasive species were detected. In fact, the only cattail present was the native Broadleaf Cattail, not the hybridized Narrowleaf Cattail.

Potential colonization of native and non-native species from adjacent Shrub Carr wetlands is a specifically-identified concern of the DNR. It is therefore of importance to be looking for the presence of the following woody species within the defined Sedge Meadow Maintenance Area:

- *Rhamnus cathartica* (Common Buckthorn; non-native)
- *Lonicera spp.* (Bush honeysuckle; non-native)
- *Acer negundo* (Box elder; native)
- *Spiraea alba* (White Meadowsweet; native)
- *Cornus racemosa* (Gray Dogwood; native)
- *Cornus alba* (Red-osier Dogwood; native)
- *Salix amygdaloides* (Peach-leaved Willow; native)
- *Salix bebbiana* (Bebb's willow; native)
- and native tree saplings (*Ulmus americana*, American Elm) and/or scattered mature trees

A review of Appendix G – Wetland Community Descriptions Table for notes on additional invasive species through the study's area of interest reveals the following invasive species.

- *Phalaris arundinacea* (Reed Canary Grass)
- *Typha x glauca* (Non-native Cattail)

Considering the above information, the following potential management strategies, by species, would apply if similar plant assemblages occur in the Sedge Meadow Maintenance Area.

Table 1. Treatment strategies by expected plant species in the Sedge Meadow Maintenance Area.

SPECIES	FIRE	CHEMICAL	CUTTING / MOWING (+Chemical)	BIOLOGICAL (GRAZING)
<i>Lonicera spp.</i> (Bush honeysuckle)	+	+	+	+
<i>Phalaris arundinacea</i> (Reed Canary Grass)	+/-	+	-	-
<i>Rhamnus cathartica</i> (Common Buckthorn)	+	+	+	+
<i>Typha x glauca</i> (Non-native Cattail)	-	+	-	-
<i>All native, invasive shrubs and trees</i>	+	+	+	+

+ = effective strategy; - = ineffective strategy; +/- = situationally dependent strategy, or partially effective

As invasive species will continually pose a threat to altering the community structure of the Sedge Meadow habitats within the Epic portion of the Sugar River valley, a long-term maintenance program will be required to maintain the area. The following represents an initial plan to meet the protection goals for the Sedge Meadows, though it will be important to revise this plan in the future in order to adapt to ongoing monitoring information.

YEAR	STRATEGY	TIMEFRAME
	<ul style="list-style-type: none"> Perform a visual survey of the Sedge Meadow Maintenance Area primarily for woody species presence/absence and abundance. Note any non-native invasive grasses, forbs, etc. presence/absence and abundance. 	July-August
	<p>INVASIVE WOODY SPECIES MANAGEMNET STRATEGY</p>	October
	<p>OPT 1: If occurrence of invasive woody species is limited to occasional shrubs in low density, use loppers, shoulder-harnessed brush cutter or chainsaw to cut flat and level 1-inch from ground. Treat the entire cut surface with Garlon 3A or Element 3A being careful to not overspray. If individual shrubs have berries, bag all branches with berries and remove from wetland for off-site disposal in a dump. Leave felled shrub in place.</p>	
	<p>OPT 2: If occurrence of invasive woody species is moderately abundant, but not a thick, large stand, use shoulder-harnessed brush cutter to cut flat and level 1-inch from ground. Treat the entire cut surface with Garlon 3A or Element 3A being careful to not overspray. If individual shrubs have berries, bag all branches with berries and remove from wetland for off-site disposal in a dump. Cut up felled shrubs into smaller pieces and leave in place.</p>	
	<p>OPT 3: If occurrence of invasive woody species is a thick, large stand remove as much of the stand as time and budget allows, via shoulder-harnessed brush cutter or chainsaw to cut flat and level 1-inch from ground. Treat the entire cut surface with Garlon 3A or Element 3A being careful to not overspray. If individual shrubs have berries, bag all branches with berries and remove from wetland for off-site disposal in a dump. Stack remaining felled shrubs into piles for drying and burning.</p>	
2024	<p>INVASIVE REED CANARY GRASS MANAGEMENT STRATEGY</p>	
	<p>OPT 1: If prevalence is not dense, but a few plants scattered in distribution, treat with Rodeo in October (labeled for sue near water) via either wick-wand or via saturated cotton glove over a rubber glove.</p>	
	<p>OPT 2: If prevalence is abundant, mow in October to reduce seed production and encourage native species.</p>	
	<p>OPT 3: If prevalence is abundant, perform a prescribed burn in October.</p>	
	<ul style="list-style-type: none"> If invasive woody species densities were high and burn piles were established from felled shrubs, obtain a burn permit and, when conditions are appropriate, burn slash piles. Develop an action plan for the management of specific invasive species using the content and resources provided here-in. Though there will be several strategies that may work for many invasive species, there may also be several invasive species that require very specific strategies that differ from others. 	February-March

YEAR	STRATEGY	TIMEFRAME
2025	<ul style="list-style-type: none"> • Perform a visual survey of the Sedge Meadow Maintenance Area primarily for woody species presence/absence and abundance. • Note any non-native invasive grasses, forbs, etc. presence/absence and abundance. • Update management strategy for Fall 2025 and entire growing season on 2026. <p>INVASIVE REED CANARY GRASS MANAGEMENT STRATEGY</p> <p>OPT 1: If prevalence is not dense, but a few plants scattered in distribution, treat with Rodeo in October (labeled for use near water) via either wick-wand or via saturated cotton glove over a rubber glove.</p> <p>OPT 2: If prevalence is abundant, mow in June and again in October to reduce seed production and encourage native species.</p> <p>OPT 3: If prevalence is abundant, perform a prescribed burn in June and October.</p>	June and October
2026	<ul style="list-style-type: none"> • Execute updated management plan and amend as needed. • One site visit per year for monitoring only. • If Reed Canary Grass persists into Spring, perform a controlled burn in Spring and Fall, then switch back to mowing in 2027. Following years, manage Reed Canary Grass as via 2025 until eliminated. 	

Note: Dates and calendar years and activities outlined in the Adaptive Management Plan are subject to change to accommodate project construction schedules (i.e., bridge and stream restoration), and any unforeseen factors/conditions (i.e., chemical availability, drought, flooding, hot/cold temperatures, or environmental conditions that otherwise prohibit or make unfeasible best practices to implement the Adaptive Management Plan as outlined).

