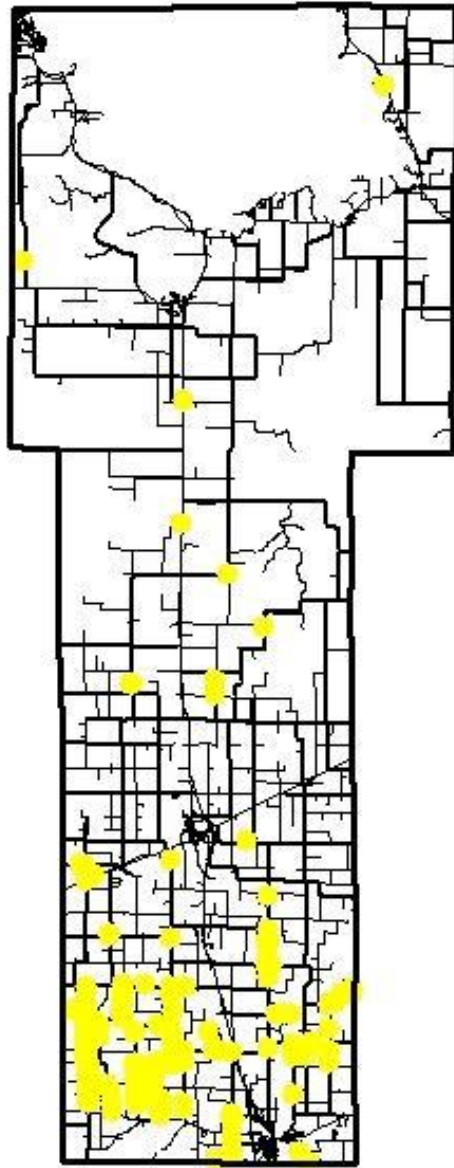


Mille Lacs County Integrated Roadside Vegetation Management Plan



Approximate Distribution of Leafy Spurge along Mille Lacs County ROWs.

Table of Contents

1. Executive Summary:	3
Introduction & Purpose	3
Background	3
Scoping of the issue	3
Goals	3
Summary	3
2. IRVM Program Implementation Parameters	4
2.1 Vegetation Management Regions	4
2.2 Vegetation Management in the standard mow area and front slope region	4
2.3 Vegetation Management in the ditch maintenance region	5
2.4 Vegetation Management in the back slope region	5
3. Non-Chemical IRVM Program Elements	5
3.2 Identification of Sensitive Areas	5
3.2.1	Organic Farming and Sensitive Crops 5
3.2.2	Protection of Native Species or Habitat 5
3.3 Prevention	6
3.3.1	Mowing 6
3.3.2	Soil Disturbance 6
3.3.3	Weed Free Mulch 7
3.4 Identification of Pests Targeted by the IRVM	7
3.4.1	Invasive Plants and Noxious Weeds 7
3.4.2	Woody Vegetation 8
3.5 Monitoring	8
3.6 Injury/Treatment Thresholds and Treatment Decisions	8
3.6.1	MN Dept. of Agriculture guidance for weed Eradication, Control, or Containment 8
3.7 Treatment Options and Management Practices	9
3.7.1	Techniques 9
3.8 Post Treatment Evaluations	9
3.9 Road Repair and Construction Considerations	10
4. Training, Information and Public Awareness	10
4.2 Training	10
4.3 Information	10
4.4 Public Notice	10
5. Steering Committee	10
5.2 Roles of the Steering Committee	10
5.3 Responsibility, Report-ability, Network of Technical Expertise	11
6. 2012 IRVM Non Chemical Weed Control, Conclusions	11
7. ADDENDUM: RECOMMENDED MANAGEMENT METHODS FOR 2013	12
7.2 Identification of Sensitive Areas	12
7.2 Identification of Pests Targeted by the IRVM	12
7.2.1	Leafy Spurge, <i>Euphorbia esula</i> (L.) 12
7.2.2	Canada Thistle, <i>Cirsium arvense</i> (L.) Scop. 14
7.2.3	Wild Parsnip, <i>Pastinaca sativa</i> L. 15
7.2.4	Additional Target Pests 16
7.3 Road Repair and Construction Considerations	16

Executive Summary:

Introduction & Purpose

Beginning 2012, the Mille Lacs Soil & Water Conservation District (SWCD), the County Public Works Department and the County Agricultural Inspector developed this management plan for controlling weeds primarily utilizing mechanical control (mowing) on roadside right-of-ways as a proactive way to address roadside management. Components of the plan may include all operations that are normally conducted to maintain roadside vegetation, erosion control and roadside safety issues.

Background

The staff of the Mille Lacs SWCD are delegated by the County to fulfill the duties of the County Agricultural Inspector. The SWCD provides management recommendations to the Public Works Department to fulfill the County requirement to control noxious weeds on its lands, primarily road right-of-ways. The SWCD also provides training, management recommendations, and enforcement assistance to Township and Local weed inspectors.

Scoping of the issue

Cost to implement weed control continues to increase: cost of fuel and petroleum based herbicides.

Pesticides are present Statewide in our groundwater and are an increasing public health concern.

The use of chemical herbicides on road right-of-way is non-compatible with organic farming practices.

The plan inventories noxious and invasive weeds that pose an economic or public health threat to Mille Lacs County citizens, it provides guidance to assess these risks and outlines tools and techniques that can be utilized in making weed management decisions. The plan will serve to support continuous improvement through an ongoing process of rethinking how roadsides are managed.

Goals

- Provide non-chemical roadside vegetation management recommendations
- Promote roadside safety for travel
- Promote Best Management Practices (BMPs) for control of vegetation and to prevent erosion
- Promote cooperation between agencies
- Provide opportunity for education and public awareness of management activities
- Utilize current research in the field of vegetation management

Summary

Leafy Spurge is considered to be the noxious weed of highest priority in Mille Lacs County due to its potential to create significant economic impacts to grazing and haying operations. The heaviest infestations of Leafy spurge are within the southern four Townships of Mille Lacs County. Preventing the spread of Leafy Spurge into un-infested areas is important. Leafy Spurge is visible early in the season, approximately mid May dependent upon weather conditions. Control must be done before viable seed develops, approximately early

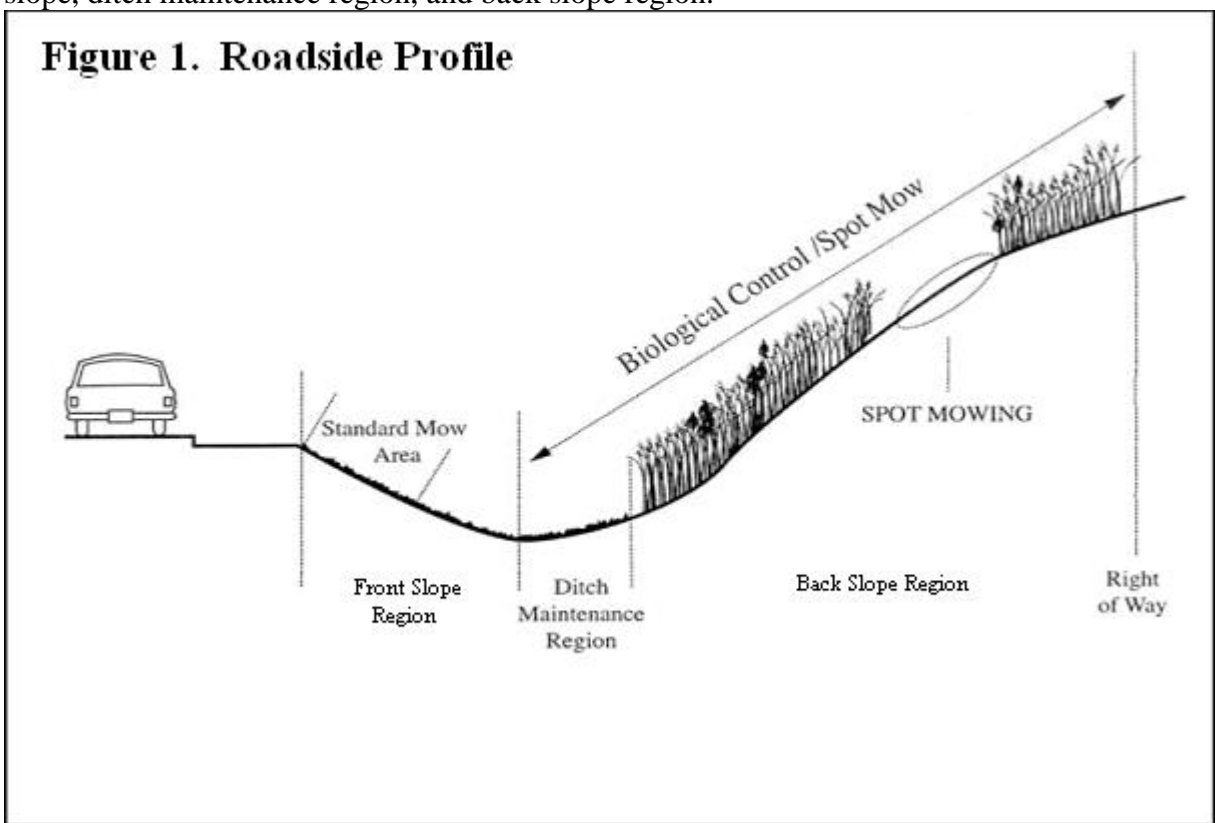
to mid June. With wet conditions in the spring access to road right-of-ways can be difficult. This presents a number of management complications that are described in greater detail within the plan.

Other noxious and invasive weeds of concern are identified within the plan and management of those weeds is discussed. The success of this non-chemical weed management plan hinges on timing and coordination of management techniques.

1. IRVM Program Implementation Parameters

2.1 Vegetation Management Regions

As shown in Figure 1, road right-of-ways have three primary management regions: the front slope, ditch maintenance region, and back slope region.



1.2 Vegetation Management in the standard mow area and front slope region

Management within the front slope includes a standard mow area which is reached with a single pass of the mowing equipment at a distance of approximately eight feet from the shoulder. To fully mow the front slope area requires additional passes by the mower and can be hindered by slope conditions such as soil moisture, slope grade and obstacles.

Weeds within this region are highly vulnerable to spread and movement as this region is the most frequently mowed for visibility and traffic safety. The timing of mowing shall be implemented before noxious or invasive weeds have formed viable seed or spreading plant parts.

This region is generally not practical for the use of biological control of noxious or invasive weeds because of the frequency of mowing. See section on Biological Control.

1.3 Vegetation Management in the ditch maintenance region

Management utilizing equipment in the ditch bottom or maintenance region can frequently be hindered by soil moisture or standing water.

1.4 Vegetation Management in the back slope region

Management utilizing equipment in the back slope region can be hindered by slope conditions such as soil moisture, slope grade and obstacles. The back slope region is often subject to encroachment of woody vegetation from adjacent land. Management of this region is also critical to prevent movement of any noxious or invasive vegetation from within the ROW on to adjacent lands. Many of these areas will border private lands. It will be of even greater importance for these areas to coordinate with landowners to effectively control the spreading of weeds.

2. Non-Chemical IRVM Program Elements

2.2 Identification of Sensitive Areas

Awareness of native and protected plants, as well as sensitive and/or organic crops will be important to making effective treatment and vegetation management decisions.

2.2.1 Organic Farming and Sensitive Crops

Organic farming is becoming increasingly more prevalent. Non-chemical vegetation management is generally compatible with both organic farming and sensitive crops. However, if a weed infestation is present in the ROW adjacent these cropping practices it shall be noted that close coordination and comprehensive management on the adjacent land will be essential to successful control. Typically weed response to non-chemical control techniques can be slow. It is important to understand the mechanisms for potential spread of the weed of concern with each adjacent land management technique. For example: leafy spurge, which is toxic to cattle, found within the ROW adjacent to an organic beef grazing operation would be of greater concern than if the adjacent land use was grazing sheep which can safely digest leafy spurge. Aggressive measures shall be taken to prevent the spread of weed infestations onto adjacent land.

2.2.2 Protection of Native Species or Habitat

There are a number of native plants that look similar to noxious or invasive weeds. For example: Flodman thistle or Golden Alexanders. Care shall be taken that control measures are not needlessly taken that would also result in the loss of beneficial plants. Additionally, areas of ROW may provide the secondary benefit of critical habitat to either plant or animal species. Care shall be exercised to recognize and manage for the protection of these secondary ROW benefits. For example: The native Flodman thistle can provide a food source for finches and other birds that is otherwise eliminated through the responsible control of the invasive thistle species.

Mowing beyond the standard mow area is restricted in Minnesota prior to August first to protect nesting habitat with the exception of mowing done for the control of noxious weeds.

2.3 Prevention

2.3.1 Mowing

Movement of viable propagating weed parts can occur during mowing. Mowing shall be implemented prior to the formation of viable seed. If mowing must occur with the presence of viable seed or propagating weed parts then equipment shall be cleaned onsite and before moving to a non-infested area. Mowing equipment is set to mow not closer than five to six inches off the ground. This necessitates mowing to occur after the flowering part of the plant is above six inches yet before viable seed has developed. The typical mowing season in Mille Lacs County begins after crack sealing of asphalt in April. The first cut of all County right-of-ways may not be completed until the end of June or second week in July. This plan assumes that three mowers and mower operators will be available.

Mowing beyond the standard mow area is restricted in Minnesota prior to August first to protect nesting habitat **with the exception of mowing done for the control of noxious weeds.**

Approximate schedule of mowing per weed species to prevent seed maturing:

Weed	May	June	July	Aug	Sept	Oct
Leafy spurge	x		x	x		
Wild parsnip		x	x			
Thistle			x	x		
Spotted knapweed			x	x		

2.3.2 Soil Disturbance

The introduction and movement of soil is responsible for the movement of weed infestations over great distances. Seeds, often dormant, are naturally stored within the soil of most ecosystems. This is referred to as the soil seed bank. Soil disturbance or movement of soil from within any of the ROW regions during construction, maintenance or utility work can spread the seed bank to previously un-infested areas. This spread can occur by intentionally moving soil or by inadvertently moving soil clinging to equipment.

It is necessary that road authorities and contractors working in the ROW take responsibility that soil being brought onsite is weed free and/or that onsite contaminated soil not be distributed to un-infested areas.

This can be accomplished by including known noxious or invasive weed locations into construction, maintenance or utility work plans, and by cleaning equipment before it is moved from infested to un-infested soil locations.

2.3.3 Weed Free Mulch

Mulch can have within it many viable weed seeds that are not easily distinguished. Certified weed free forages are available within MN. Weed free mulch shall be required whenever mulch is necessary for construction seeding or erosion control.

2.4 Identification of Pests Targeted by the IRVM

2.4.1 Invasive Plants and Noxious Weeds

In general, most weeds are invasive. However, for the purpose of this IRVM (Integrated Roadside Management) the term invasive plant is used to describe plant species that are not listed as statewide noxious weeds and have great potential to spread if not managed immediately.

The Minnesota Noxious Weed Law (MN Statutes 18.75-18.91) defines a noxious weed as an annual, biennial, or perennial plant that the Commissioner of Agriculture designates to be injurious to public health, the environment, public roads, crops, livestock, or other property. Additional information can be found through the MN Dept of Agriculture website at <http://www.mda.state.mn.us/plants/badplants/noxiouslist.aspx>.

Most of our state listed noxious weeds came from Europe or Asia accidentally, or were garden plants that escaped cultivation. A few species, such as poison ivy, are native to Minnesota and are listed as noxious weeds due to harmful effects that they pose directly to human health or agricultural systems. Noxious weeds are problematic because they are highly adaptable to disturbed areas, are able to spread at alarming rates, cause economic damage, and outcompete native vegetation that is important to our unique landscapes throughout Minnesota. For example, Leafy Spurge readily spreads into disturbed soils, such as unused fields and construction sites. Noxious weeds also create problems with soil erosion, diminished forage production on lands used by domestic and wild animals and impact the public in many negative ways, including health risks to horse and cattle, and economic losses with crops, gravel, and other resources. The main differences between a common weed and a noxious weed are that the latter have an enormous capacity for destruction and are very difficult to control.

2.4.1.1 Invasive and Noxious Weeds identified on Mille Lacs County ROWs

Common name, Botanical name

1. [Leafy Spurge, *Euphorbia esula* \(L.\)](#)
2. [Canada Thistle, *Cirsium arvense* \(L.\) Scop.](#) EXT
3. [Musk Thistle, *Carduus nutans* \(L.\)](#) EXT
4. [Plumeless Thistle, *Carduus acanthoides* \(L.\)](#) EXT
5. [Purple Loosestrife, *Lythrum salicaria, virgatum* \(L.\),](#) EXT
6. [Wild Parsnip, *Pastinaca sativa* L.](#) EXT
7. [Common Tansy, *Tanacetum vulgare* \(L.\)](#)
8. [Spotted Knapweed, *Centaurea stoebe* spp. *micranthos*](#)

2.4.2 Woody Vegetation

Unwanted woody vegetation can negatively impact the structural integrity of the ROW and roadbed. Woody vegetation within the ROW can create obstacles to maintenance equipment, traffic safety hazards and harm utilities.

2.5 Monitoring

A successful weed-management program depends on identifying the weed(s) and understanding their basic life cycles.

Ongoing roadside vegetation inspection and GPS data shall be collected identifying the presence of vegetation of concern, ROW characteristics, sensitive areas and adjacent land uses. Maps created from this data will aid in the targeted and managed control of vegetation.

2.6 Injury/Treatment Thresholds and Treatment Decisions

Management decisions will need to be made to balance the management needs, with the potential for injurious risk to public health, the environment, public roads, crops, livestock, or other property.

Private land use adjacent to right-of-way (ROW) with noxious weed infestation will affect the priority of control activity for that site. For example, leafy spurge in the ROW that has spread up the back slope may encroach on private land, potentially creating a much larger issue. If that private land is tilled annually the spurge would not take hold. If the land is grazed or hayed it would cause a problem for the landowner and require action by the landowner to prevent the spurge from leaving the ROW if mowing the back slope is not effective or practical. If however, the adjacent land is aggressively mowed prior to the development of viable seed on the plant by the landowner (lawn), heavily wooded or wetland, the spurge would not spread to that site.

In order to successfully implement mechanical noxious weed/leafy spurge control within ROW utilizing mowing as the primary method, communication with the public will be necessary to convey cooperative control efforts by the adjacent landowners.

2.6.1 MN Dept. of Agriculture guidance for weed Eradication, Control, or Containment

- Eradication - When populations of invasive weeds not normally found in Minnesota generally, or are only found in small areas are discovered, they need to quickly be eradicated. Eliminating these weeds when the population is small saves time, money, and resources. Eradication means destroying the above and below ground propagating parts of the weed.
- Control - If a noxious weed is found in sizeable numbers in limited areas of the state, a cooperative plan is developed where county agricultural inspectors, state staff and the landowner may work together to manage the weed. Control means that the plant is managed to prevent further reproduction so that the plant population is managed and reduced to a suitable level.
- Containment - Some noxious weeds are already well established in Minnesota and found in such large numbers that it is no longer realistic to eradicate the population.

Instead the MDA works at the county and municipal level to stop or slow their spread.

2.7 Treatment Options and Management Practices

Each species of weed grows and spreads differently requiring different methods of control. Not all techniques are suitable and not all will work in every circumstance.

2.7.1 Techniques

- Biological - control which uses other organisms to control noxious weeds. For example, in Minnesota, there are three existing biological control programs for leafy spurge, purple loosestrife, and spotted knapweed. These programs use host-specific natural enemies of the weed from its native range, i.e., Europe or Asia, to control its populations in Minnesota. All biological control agents undergo extensive host-specificity testing before being approved for release in the United States. Several other biological control programs are currently being evaluated in Minnesota for garlic mustard, common tansy, and European buckthorn.
 - ✓ Biological weed control site development
- Chemical - control which uses herbicides to control noxious weeds. All herbicides must be used in accordance with the registered label. For more information on recommended herbicides and rates, contact your local extension office.
 - ❖ Spot spraying as method to maintain a perimeter to prevent on weed patches from spreading outside the ROW. (With the objective of this IRVM to encourage non-chemical BMPs, this practice may be utilized only when all other management techniques are ineffective to prevent weed spread.)
 - ❖ It can't be emphasized enough to applicators that spray along public roads or utilities that sensitive crops, shrubs, trees or other desirable vegetation can be damaged unintentionally. Adjacent crops' susceptibility to damage must always be a consideration. Landowners must notify the road authority if they want to request specialized management activities.
- Cultural - control uses materials or techniques that reduce noxious weed populations. Examples include mulching, rotational grazing, and establishing good vegetation cover.
 - ✓ The feasibility of grazing livestock such as sheep or goats within the right-of-way for weed control may be explored.
- Mechanical - control uses process like cutting, mowing, and disking.
 - ✓ Mowing will be utilized frequently under this IRVM.
 - ✓ Tree and brush cutting

2.8 Post Treatment Evaluations

An evaluation of management actions that were successful as well as those that were unsuccessful shall be created after each season. Analysis shall be made as to the reason for the success or shortfall of management effectiveness that can be utilized to develop management changes for the following season.

2.9 Road Repair and Construction Considerations

Road repair and maintenance within ROWs is ongoing. Additionally, weather related emergency or unplanned repairs must be made. In any circumstance, construction site management to prevent the spread of weeds is necessary.

- Weed free mulch shall be utilized to prevent the introduction of weed seed.
- Soil disturbance or movement of soil from within any of the ROW regions shall be monitored as viable seed within the soil, referred to as the “seed bank,” can be spread with soil movement and result in the unintentional distribution and growth of weed infestations.

3. Training, Information and Public Awareness

3.2 Training

Training shall be provided to road authorities and workers within their area of responsibility that will allow them make effective vegetation management decisions. The SWCD office can provide training annually and as needed for noxious and invasive weed identification.

3.3 Information

Information on ROW management shall be made available for public review.

3.4 Public Notice

Public notice shall be provided of policies for regarding ROW vegetation management annually by May 15th.

- ❖ Though this is an IRVM recommending non-chemical control of vegetation, the use of chemical spot spraying may be determined to be prudent. Landowners requesting a buffer of no chemical spraying must notify the road authority. Management plans may be developed with landowners requesting a buffer of no chemical spraying to ensure weeds are controlled.

NOTICE: Townships may spray for the control of noxious weeds where they exist on township road right-of-ways pursuant to the Minnesota Noxious Weed Law, Minnesota Statutes, chapter 18. Citizens with questions or concerns may contact the Townships.

4. Steering Committee

A steering committee shall be formed to provide direction and guidance for the development of the IRVM plan. The steering committee provides for employee input and for input from other agencies. As a minimum, the steering committee shall be made up of members from Mille Lacs County Public Works Department, Soil & Water Conservation District, and the County Agriculture Inspector.

4.2 Roles of the Steering Committee

To conduct a successful program several ongoing roles shall be met. Therefore, the steering committee shall consider the following program needs.

- Budgeting
- Providing training to citizens and weed managers
- Encouraging input from citizens and weed managers
- Communication with local weed managers
- Interacting with technical experts

- Reviewing and determining equipment needs
- Determining type and amount of contract work
- Reviewing and evaluating the plan
- Review of laws and regulations

4.3 Responsibility, Report-ability, Network of Technical Expertise

The Steering Committee shall use the following technical expertise in managing the plan.

- Public Works Engineer – safety, design requirements, workloads, budgeting
- County Agriculture Inspector – weed control
- Soil and Water Conservation District – natural resources expertise
- Private contractors as needed

The Steering Committee includes the following:

Mille Lacs County Commissioner

Mille Lacs County Public Works Engineer

SWCD Board IRVM Committee members (two)

SWCD District Administrator/Mille Lacs County Ag Inspector Staff

A yearly work plan will be established by the steering committee by the beginning of each season (around May). This plan will be based on a review of previous year accomplishments and anticipated needs.

The steering committee will provide an annual report of accomplishments after each season to the Mille Lacs Soil & Water Conservation District board and the Mille Lacs County board.

The steering committee will make recommendations and facilitate the mission and goals of the plan. The action of the steering committee shall be by consensus.

5. 2012 IRVM Non Chemical Weed Control - Conclusions

Mowing Outcomes

- Unusually heavy amounts of rain during first half of season caused mowers to do first cut in May and a second cut soon after in mid-June. Mowers were able to mow spurge when requested all season.
- Public works made 2 or 3 passes as needed to mow all Spurge that was physically able to be mowed.
- CCMI Apprentice was able to GPS sites that could not be mowed and prioritize these sites for further control according to surrounding land use.
- CCMI Apprentice established bio-control on some sites that could not be mowed.
- CCMI Apprentice hand-pulled spurge in patches that were high priority and not appropriate for bio-control.
- CCMI Apprentice mapped additional sites for establishing bio-control and priority sites for hand-pulling.
- No known complaints from the public about lack of noxious weed control in County ROW.

Conclusion

- Control was achieved
- Issues to be addressed in the future:
 - Hand-pulling is very labor intensive and time consuming.
 - Control was evident this year but it will take several years to be satisfied that techniques are controlling spurge long term.

Steering Committee Recommendations

- Continue to implement mowing as the primary method of control of noxious weeds.
- Find an alternative to hand-pulling - possibly weed whipping
- SWCD will monitor known infestations for signs of failure to control.

6. ADDENDUM: RECOMMENDED MANAGEMENT METHODS FOR 2013

7.2 Identification of Sensitive Areas

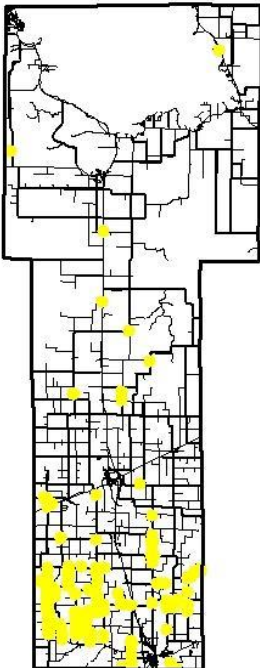
The SWCD will seek an intern through a grant from the Conservation Corps of MN and IA (CCMI) to assist with the initial land use survey to identify sensitive areas in reference to weeds of concern on ROWs. Information to be collected will include:

- Locations of organic farming
- Locations of sensitive crops
- Native plant or habitat areas of interest
- Noxious and invasive weeds
- Land use adjacent to noxious and invasive weed infestations
- ROW physical conditions (slopes or obstacles)

7.2 Identification of Pests Targeted by the IRVM

7.2.1 Leafy Spurge, *Euphorbia esula* (L.)

The key to controlling leafy spurge is early detection and treatment of the initial invading plant. This is a perennial plant with greenish-yellow flower bracts. Most leafy spurge plants flower in May and June, although mowed stems may flower later. Each plant can produce numerous stems from extensive rhizomes. Rhizomes are essentially masses of roots that store nutrients and allow for the growth of new plant growth. In addition to colonel reproduction by rhizomes, leafy spurge also produces seed that explodes from the seed pods and can travel up to 20 feet. The seed is durable and can remain viable up to 10 years.



Leafy spurge can disperse by wind, water, vehicles, contaminated soil and hay. Disturbances such as road construction create opportunities for leafy spurge which can spread along roadways to agricultural and natural areas.

Because the weed is difficult to eradicate, a persistent management program is needed to control top-growth and to gradually reduce the nutrient reserve in the root system. A 15-foot perimeter shall be treated around leafy spurge patches to control spreading of patches through seed dispersal and spreading roots. Patches shall be watched carefully and any re-growth or seedlings shall be aggressively retreated.

Monitoring and Locations

The southern four (4) townships of Mille Lacs County have the highest density of leafy spurge, located primarily on ROWs. The distribution of leafy spurge on ROWs compared to adjacent land in conjunction with a gravel pit historically infested with leafy spurge, indicates that leafy spurge seed was likely spread through gravel distribution. The highest concentration of leafy spurge is within Greenbush and Princeton Townships. However, intermittent patches occur throughout the County.

Injury/Treatment Thresholds and Treatment Decisions

Leafy spurge is an invasive plant that can dominate desirable vegetation and take over pastures, natural areas, and rights-of-way. Leafy spurge is toxic to cattle so they avoid eating it and consume the remaining forage. Thus, the more a pasture is infested with leafy spurge, the more its productivity is reduced. If leafy spurge is present in a hayfield, the hay cannot be cut and moved resulting in economic loss. In natural areas, leafy spurge can choke out native vegetation, including forage essential to wildlife.

Leafy spurge has a high potential to cause economic impacts to grazing and hay operations. Because pasture and hay represent a significant economic resource in the northern two thirds of the County, prevention of the spread of leafy spurge is a priority and aggressive control measures shall be implemented. Control means that the plant is managed to prevent further reproduction so that the plant population is managed and reduced to a suitable level. Additionally, no transportation, propagation, or sale of these plants is allowed.

If the infestation is outside of the reach of mowers and adjacent to land vulnerable to spread of the infestation, chemical spot treatment shall be considered to prevent spreading of the infestation outside the ROW.

Eradication shall be attempted on very small isolated or new patches. Eradication means destroying the above and below ground propagating parts of the weed. Consider hand pulling (use gloves) or spraying the plants with a herbicide and follow up over the next 3-4 years.

Treatment Options and Management Practices

- Biological control
Biological control, using the host-specific *Aphthona lacertosa* (Leafy Spurge flea beetle), is an accepted management tool for Leafy Spurge in Minnesota. Populations of the flea beetles can, over time, effectively control Leafy Spurge if managed successfully in partnership with other management tools. However, because the beetles

will not be able to prevent all Leafy Spurge plants from producing viable propagating seed, and because Leafy Spurge can be easily spread if mowed when the plant has produced viable propagating seed, it must be controlled using a method other than biological control in the Standard Mow Area of the right-of-way (see Figure 1).

- Mechanical control

Mowing must be carefully timed (prior to June 1st) to prevent viable propagating seed from being spread during mowing or cutting. Repeated mowing during the growing season is necessary to prevent re-growth and the formation of viable seed if mowing is the primary method of control.

- Chemical control

If chemical control is utilized, timing of the herbicide application is important. Herbicides shall be applied to leafy spurge at the proper growth stage so that optimum control can be achieved. Fall is an excellent time to control leafy spurge. However, management beginning in the spring and continued throughout the growing season must occur to prevent viable seed from maturing and being spread during cropping or right-of-way mowing activities. Fall re-growth will begin in leafy spurge in late August or September. During this time, carbohydrates are being transported to the roots for winter storage; herbicide translocation to the roots shall also increase resulting in improved control.

7.2.2 Canada Thistle, *Cirsium arvense* (L.) Scop.

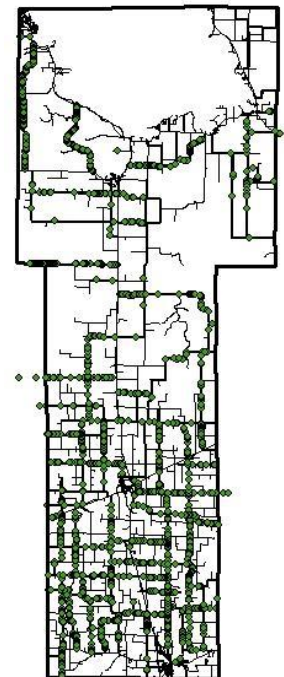
Numerous species of thistle occur in North America, and while some are invasive, many are native. Often the species are difficult to distinguish. Canada thistle is a perennial that reproduces from seed and by an extensive root system. The root system of Canada thistle allows the plant to spread rapidly once it has become established in an area. Nearly all parts of the roots can produce buds which gradually develop into shoots that grow and form new plants. Root segments as small as 1 inch can produce new shoots. Canada thistle seedlings that have four true leaves and are 20 to 30 days old can regenerate by their root system. Tillage equipment operated through Canada thistle can easily spread pieces of roots to non-infested areas and result in new infestations. Canada thistle can invade a variety of open habitats including prairies, savannas, fields, pastures, wet meadows and open forests. It forms dense stands which can shade out and displace native vegetation. Once established it spreads rapidly and is difficult to remove.

Monitoring and Locations

Canada thistle is distributed throughout the County both on ROWs and adjacent lands.

Injury/Treatment Thresholds and Treatment Decisions

Because of its widespread distribution the adjacent land use shall be carefully considered in determining the treatment method. For example, Canada thistle cannot spread to into wetland or woods. However, Canada thistle can be difficult to manage on rocky grazing land non-conducive to mowing, or within organic farming systems. Ag-



gressive control measures shall be implemented to prevent the spread of infestations by root growth or by seed.

Control means that the plant is managed to prevent further reproduction so that the plant population is managed and reduced to a suitable level.

If the infestation is outside of the reach of mowers and adjacent to land vulnerable to spread of the infestation, chemical spot treatment shall be considered to prevent spreading of the infestation outside the ROW.

Treatment Options and Management Practices

- Biological control – there is no biological control available currently.
- Mechanical control
Mowing shall occur before the thistle has developed the ball shaped seed head because it is possible for the seed head to open up even after mowing. However, it is better to mow thistle patches even after seed head development than to leave standing, as it will knock the seed heads to the ground than to leave them standing as it will diminish blowing and spreading of the seed.
Repeated mowing during the growing season is necessary to prevent re-growth and the formation of viable seed if mowing is the primary method of control.
- Chemical control
If Chemical control is utilized, the two most effective times for herbicide application to Canada thistle are at the bud stage and during re-growth in the fall. Results from experiments conducted in western Nebraska indicate that herbicides applied in September have generally provided 15 to 20% more Canada thistle control than herbicides applied in June.

7.2.3 Wild Parsnip, *Pastinaca sativa* L.

Wild parsnip is a biennial/perennial herb that can grow up to 4 ft. (1.2 m) in height. Flowering occurs from May to June, when hundreds of yellow flowers develop. Flowers are arranged in an umbel. Wild parsnip is native to Eurasia and occurs in sunny areas with varying degrees of soil moisture. Contact with this plant can cause skin to become photosensitive; exposure to sunlight can cause severe blistering.

Wild parsnip can look similar to Golden Alexanders, a native plant in Mille Lacs County, but is distinguished from other species in the parsley family by its yellow flowers and its pinnately compound leaves that are divided once into more than five leaflets. Wild parsnip shall be accurately identified before attempting any control measures.



Monitoring and Locations

Wild Parsnip is quickly increasing in distribution throughout the County. County wide mapping is yet to be done.

Injury/Treatment Thresholds and Treatment Decisions

Wild Parsnip poses a human health threat and eradication shall be attempted on infestations adjacent to land designated for public use. Eradication means destroying the above and below ground propagating parts of the weed. In areas not designated for public use, control measures that prevent further reproduction so that the plant population is managed to prevent spread and reduced to a suitable level may be sufficient.

Treatment Options and Management Practices

- Biological control – there is no biological control available currently.
- Mechanical control

Warning-- Care shall be taken to avoid skin contact with the toxic sap of the plant tissues by wearing gloves, sleeves, and long pants. Extreme caution shall be exercised when working around this plant. Contact with this plant can cause skin to become photosensitive; exposure to sunlight can cause severe blistering. Protective gear shall be worn when working around the plant or when cleaning equipment used around infestations.

Wild parsnip can become abundant along roadsides that are regularly mowed as mowing seems to encourage the production of flowering plants. If mowing occurs too early (in June or early July), the plants may re-sprout and still have time to flower and set seed; if too late in July, the primary umbel may have mature seeds that could be spread by the mower and germinate after cutting. Mowing shall be timed to just after peak flowering and before the seeds set. Plants may re-sprout and shall be cut again a few weeks later to prevent flowering

The best way to control wild parsnip is early detection and eradication. A very effective control method is to cut the entire root just below ground level with a sharp shovel or spade. Cutting below ground level prevents re-sprouting. In some soil types in wet conditions, the plants can be pulled out of the ground by hand. All seeds must be removed from the site and disposed of in a landfill or by burning.

- Chemical control
If mechanical methods have failed to control wild parsnip or are not feasible, chemical spot treatment shall be considered for eradication measures.

7.2.4 Additional Target Pests

[Musk Thistle, *Carduus nutans* \(L.\)](#)

[Plumeless Thistle, *Carduus acanthoides* \(L.\)](#)

[Purple Loosestrife, *Lythrum salicaria, virgatum* \(L.\)](#)

[Common Tansy, *Tanacetum vulgare* \(L.\)](#)

[Spotted Knapweed, *Centaurea stoebe* spp. *micranthos*](#)

7.3 Road Repair and Construction Considerations

Planned construction or repair projects should be reviewed annually to coordinate treatment decisions in project areas.