**MONTANA DEPARTMENT OF TRANSPORTATION**

# STATEWIDE INTEGRATED ROADSIDE VEGETATION MANAGEMENT PLAN: 2025-2031

MONTANA DEPARTMENT OF TRANSPORTATION MAINTENANCE DIVISION

HELENA, MONTANA

MONTANA
Department of Transportation

Christopher Dorrington, Director

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March 4, 2025

To Whom It May Concern,

The Montana Department of Transportation (MDT) *Roadside Vegetation Management Plan* outlines MDT's current strategies, budget, and key personnel responsible for maintaining healthy and diverse roadsides. Additionally, the plan details recognized integrated weed and vegetation management practices to protect Montana's landscape. MDT's plan aligns closely with the Montana Department of Agriculture's Statewide 2017 *Montana Weed Management Plan.*

MDT acknowledges that highway traffic contributes to the spread of noxious weeds, which pose a threat to Montana's agriculture and recreational areas. This plan demonstrates MDT's commitment to managing and preserving diverse and sustainable vegetation along the state's roadways.

I am proud to reaffirm MDT's dedication to working alongside Montanans and neighboring communities as we strive to maintain a balanced and thriving environment for generations to come.

Sincerely,

3/4/25

Christopher Dorrington
Director

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# Montana Department of Transportation Statewide Integrated Roadside Vegetation Management Plan

## January 2025

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# CHAPTER 1

## PURPOSE & NEED FOR ACTION

# Chapter 1. Purpose & Need for Action

## INTRODUCTION

Highway rights-of-way are high-risk sites for introduction, establishment, and spread of noxious weeds. Weeds can be carried on vehicles, in the loads they carry, and on construction and maintenance equipment. They can be inadvertently introduced into rights-of-way during reclamation projects by use ofcontaminated mulch, soil or gravel, plant seed, and sod. Historically, some invasive plant species have been deliberately planted in erosion control, landscape, or wildflower projects. Weeds established on roadsides can spread into adjacent non-infested areas and can also be transported to surrounding counties and states. It is critical to develop a comprehensive integrated management plan to address noxious weed issues on approximately 181,000 acres of highway rights-of-way owned by Montana Department of Transportation (MDT).

For purposes of this document, a weed is defined as any plant that interferes with management objectives for a given area of land (or body of water) at a given point in time. Once a plant has been classified as a weed, it attains a “noxious” status by rule as described in the County Weed Control Act (7-22-2101 (8)(a)(i), MCA). The Montana County Weed Control Act defines a "noxious weed" as any exotic plant species established or that may be introduced into the state, which may render land unsuitable for agriculture, forestry, livestock, wildlife, or other beneficial uses and is further designated as either a state-wide or county-wide noxious weed.

MDT in cooperation with county weed districts (CWD) and Montana Department of Agriculture (MDA) developed criteria for managing weeds on roadsides. MDT recognizes that objectives, expected results, and needs of each county may vary. Overall purpose and objectives will remain consistent throughout Montana.

## PURPOSE

The purpose of MDT’s Statewide Integrated Roadside Vegetation Management Plan is to guide ecologically based integrated weed management strategies on roadsides that strengthen and support national, state, city and county roadside vegetation management objectives. This management plan provides a conceptual framework and recommendations for actions to reduce existing infestations, maintain low noxious weed soil-seed bank levels, reduce susceptibility of road rights-of-way to weed establishment, and manage spread of noxious weeds along state roads in Montana. This document was developed to meet state statute (7-22-2151, MCA), and provide guidance and direction to MDT while maintaining flexibility for local priorities and actions on a countywide level.

## OBJECTIVES

**Objectives of this plan are to provide overall direction to MDT and include:**

- Promote healthy, low maintenance, and self-sustaining roadside vegetation while maintaining right-of-way safety and function.
- Prioritize roadside noxious weed management strategies by species, abundance, and location statewide.

- Develop and implement action items that support integrated noxious weed management components on roadsides statewide.
- Assess and monitor weed infestations on roadsides.
- Promote stable long-term funding to support implementation of Integrated Weed Management (IWM[1]) on state road rights-of-way.

This plan is a dynamic document that integrates: 1) needs of local communities and highway users; 2) knowledge of plant ecology and natural processes; 3) design, construction and maintenance considerations; 4) government statutes and regulations; and 5) technology. Specific objectives, issues, and programs are discussed to improve weed management efforts on roadsides, foster coordination between county and state entities, and increase public awareness about noxious weed issues. Expected results of the weed management program are identified.

## NEED FOR ACTION

Rate of introduction and spread of noxious weeds has increased dramatically over the past 150 years as human activities, trade, and commerce have increased. Transportation corridors serve as a critical avenue for introduction, establishment, and spread of weeds throughout Montana (Chicoine 1984, Forcella and Harvey 1983, Losensky 1989). Vehicles are known to pick up and transport weed seed along highways and other paved and non-paved roads (Taylor et al. 2011, Trunkle and Fay 1991). The Montana legislature identified vehicles and associated transportation routes as major vectors of noxious weed introduction and spread to adjoining lands. In 1987 and 1989, they approved an annual fee on all motor vehicles registered in Montana to be used to fund weed management projects through the Noxious Weed Trust Fund Program.

Once established on roadsides, noxious weeds spread rapidly to adjoining cropland and wildland areas infesting thousands of acres (Losensky 1989, Tyser and Key 1988, Duncan et al. 2001). Currently there are 36 weeds and 5 regulated plants on Montana's noxious weed list that infest about 7.6 million acres in the state (Duncan 2008).

The impact of weeds on biological communities, ecosystem processes, and the agricultural economy is well documented in Montana. Studies have shown that replacement of native bunchgrasses with taproot weeds such as spotted knapweed can increase surface water runoff and soil erosion by 56% and 192% respectively (Lacey et al. 1989). This influences water quality in streams and rivers, and ultimately impacts productive potential of the land. Weeds have been shown to influence wildlife by reducing forage, modifying habitat structure—such as changing grassland to a forb-dominated community—or changing species interactions within the ecosystem (Belcher and Wilson 1989, Bedunah and Carpenter1989, Trammell and Butler 1995, Thompson 1996). Non-native plants also threaten biological diversity of native plant communities by displacing native species (Tyser and Key 1988) and can threaten the survival of rare and sensitive plants (Lesica 1991).

The cost of spotted knapweed and leafy spurge to Montana's economy is substantial. Bioeconomic models were used to evaluate annual economic impact of these weeds on grazing land and wildland values. Total impact from spotted knapweed infestations were estimated at $42 million per year, which could support 518 full time jobs in the state (Hirsch and Leitch 1996). If all vulnerable lands in the state were infested with spotted knapweed (34 million acres), the annual cost to Montana's livestock industry alone would be $155 million (Bucher 1984). The impact of leafy spurge to Montana's economy was estimated at $18.6 million per year (Leitch et al. 1994).

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[1] See Appendix D

The key to management of noxious weeds is early detection and rapid control of infestations to prevent spread into non-infested areas. Road rights-of-way are high-risk areas for introduction of new weeds to the state and can be a major site of spread of established noxious weeds. Therefore, management of noxious weeds along roadsides is critical to meet county, state, and national weed management objectives.

## PROPOSED ACTION

MDT proposes an ecological approach to weed management using integrated methods consistent with The Montana Weed Management Plan (Montana Department of Agriculture 2017), the National Invasive Species Management Plan (National Invasive Species Council 2008), and the Montana Invasive Species Framework (Montana Invasive Species Advisory Council 2016). This includes conducting assessments, prescribing management components to meet objectives, and identifying expected results. Weed management criteria for this plan were developed in part from detailed roadside weed management plans in Missoula and Phillips Counties. These counties represent high and low weed infestation levels respectively. Weed treatments are discussed in this document, and support and strengthen national, regional, and state directives as they apply to MDT lands.

Management of noxious weeds on state owned rights-of-way requires a comprehensive plan of action with six major components. Expected results from each component of the management plan are described below. Action items addressing each of these components are described in Chapter 3.

**1) Public Awareness and Education:** Increase public awareness of noxious weeds on roadsides and improve training for MDT employees on identification and management of state and county designated noxious weeds.

**2) Prevention and Early Detection:** Reduce establishment and seed production of newly invading weeds on roadsides, stockpiles, and other MDT lands.

**3) Rapid Response and Management:** Implement cost-effective integrated programs to reduce seed production and expansion of noxious weed infestations on roadsides (Appendix D).

**4) Reclamation and Rehabilitation:** Decrease susceptibility of roadside rights-of-way to noxious weed invasion and establishment through development of competitive desirable plant communities.

**5) Research and New Technology:** Identify**,** prioritize and facilitate coordination and implementation of research and new technology that will promote a stable roadside environment to support weed resistant plant communities on rights-of-way**.**

**6) Assessment (Monitoring and Evaluation):** Collect data that measures effectiveness of various programs over time (management, public education, etc.). Compile and analyze data to facilitate adapting future management decisions that improve program effectiveness

# CHAPTER 2

## EXISTING SITUATION AND CURRENT PROGRAM

# Chapter 2. Existing Situation & Current Program

## EXISTING SITUATION

### ISSUES AND LEGISLATION

Noxious weed management on state-owned roadsides in Montana must comply with existing laws and legislation. Appendix A provides an overview of national, state, and county laws, legislation, and directives that are incorporated into MDT's Statewide Integrated Roadside Vegetation Management Plan.

### AFFECTED AREA

Montana Department of Transportation (MDT) maintains more than 14,000 miles of centerline road through ten (10) MDT maintenance divisions. This includes 2,385 miles of Interstate, 5,647 miles of National andPrimary Highway, and 6,062 miles of Secondary Highway (including Urban and X-routes). The area encompassed by rights-of-way is estimated at about 181281 acres (Appendix C). Appendix F includes maps showing the location of MDT District Offices.

The U.S. Department of Transportation Federal Highway Administration (FHWA) classifies our nation's urban and rural roadways by road function. Each function class is based on the type of service the road provides to the motoring public, and the designation is used for data and planning purposes. The amount of mobility and land access offered by these road types differs greatly. For the purpose of this Plan, FHWA's road function classes are discussed as (1) Interstate, (2) Primary Highway, and (3) Secondary/Frontage Roads. Each road type is defined in terms of mileage, right-of-way characteristics, and typical management and maintenance activities. Appendix C includes a diagram and general description of each road type and associated right-of-way. Stockpiles, facilities, and structures have distinct characteristics and management activities, and are discussed as a 4$^{th}$ category in this plan.

1. **The Interstate System** is the highest classification of roadways in the United States. These arterial roads provide highest level of mobility and speeds over the longest uninterrupted distance. Interstates nationwide usually have posted speeds between 55 and 80 miles per hour. Typical distance from rights-of-way fence line to fence line on Interstate roadways is 260 feet, with 80 feet of road surface, and 180 feet of non-roadway (21.8 acres per centerline mile). Maintenance of Interstate rights-of-way may include mowing fence line to fence line (when appropriate), cutting trees and brush, cleaning ditches, and periodically blading shoulders where material build-up prevents drainage off of the road.

2. **Primary Highways** include major roads that connect local roads and streets with Interstate. These roads provide less mobility than Interstate at lower speeds and for shorter distances, and balance mobility with land access. The posted speed limit on collectors is usually between 35 and 70 miles per hour. Typical total width of a Primary Highway right-of-way is 160 feet, with 32 feet of road surface and 128 feet of non-roadway (15.52 acres per centerline mile). Maintenance activities on Primary Highway right-of-way are similar to those performed on Interstate ROW. However, Primary and Secondary Highways may require more tree and brush cutting, rock removal, and ditch cleaning than Interstates to maintain roadside safety and function.

3. **Secondary Highways and Frontage Roads** include minor roads that connect local roads and streets with Interstate and provide access between an Interstate and an airport, public transportation facility, or other inter-modal transportation facility. Total width of Secondary Highway and frontage road rights-of-way is 120 feet with 28 feet of road surface and 92 feet of non-roadway (11.15 acres per centerline mile). Maintenance of secondary and frontage rights-of-way is similar to that of Primary Highways.

4. **Stockpiles, facilities, and structures** associated with public safety, road construction, and maintenance are also owned and/or managed by MDT. Management of weeds on stockpiles is a concern throughout Montana. Stockpiles may be short lived or last for a number of years depending on use. For example, winter abrasives (sanding materials) are typically crushed to provide a three-year supply, however an all-purpose gradation for road shoulders or approaches can last much longer than three years. The content of the stockpile, configuration, and age will have an effect on how weeds populate the stockpiles. Facilities include rest areas and equipmentyards, which are susceptible to weed invasion. Structures include buildings, fences, guardrails, signposts and other permanent fixtures owned and/or managed by MDT.

## WEED SPECIES, LOCATION, AND ACREAGE

Plant species included on state and county weed lists are provided in Appendix B. State-designated weeds are divided into four priorities based on number of acres infested in the state and management criteria (Table 2-1). In most cases, state-listed noxious weeds will have priority over county-designated species for management on roadsides.

TABLE 2-1. MONTANA STATE WEED LIST CATEGORIES

| Priority | Abundance in Montana | Management Criteria | Number of species on list |
|---|---|---|---|
| 1A | Not present | Eradication if detected; education; and prevention | 4 |
| 1B | Limited presence | Eradication or containment and education | 5 |
| 2A | Common in isolated areas | Eradication or containment where less abundant; prioritized by local weed districts | 10 |
| 2B | Abundant statewide; widespread in many counties | Eradication or containment where less abundant; prioritized by local weed districts | 17 |
| 3 | Regulated plants have potential to have significant negative impacts. | The plant may not be intentionally spread or sold other than as a contaminant in agricultural products. The state recommends research, education and prevention to minimize the spread of these plants. | 5 |

Roadside acreage infested by noxious weeds varies throughout Montana and is influenced by infestation levels on adjacent lands and road type. Noxious weed infestations are more extensive in western Montana, than in the eastern half of the state. Priority 2B noxious weeds infest the greatest acreage on roadsides andother MDT lands.

## CURRENT PROGRAM

MDT uses an Integrated Weed Management (IWM)[2] approach for managing noxious weeds on state-owned rights-of-way. Current efforts for each of the six major components (identified in Chapter 1) of MDT's integrated roadside vegetation program are discussed below. Appendix D describes various IWM components and management tools in more detail.

MDT also recognizes that roadsides may support plant species of special concern, including rare or imperiled species and medicinal plants important to Tribal entities. MDT works with appropriate agencies and implements management methods consistent with protecting known species of special concern.

### PUBLIC AWARENESS AND EDUCATION

MDT Maintenance actively trains employees in Montana to recognize new invaders in Priority 1A and 1B classification. In addition, MDT financially supports statewide public education and awareness efforts and utilizes roadsides as demonstration areas for various weed management methods in cooperation with county weed districts.

### PREVENTION AND EARLY DETECTION

MDT assesses stockpiles annually, and roadsides prior to major construction or reconstruction for noxious and invasive species. MDT also supports the Montana Department of Agriculture Early Detection Rapid Response program and informs Montana Department of Agriculture of locations of newly invading weeds. Best management practices are implemented for road construction activities to prevent establishment and spread of invasive species, andconstruction sites disturbed during construction are monitored.

### RAPID RESPONSE AND MANAGEMENT

Weed management priorities on state roadsides are currently based on management objectives established by county weed districts and the Montana Weed Management Plan. MDT uses a combination of herbicides, manual and mechanical methods, and biological control as primary methods used to manage noxious weed populations along roadways. Appendix D describes general guidelines for components and management tools that are available as part of an IWM program for MDT rights-of-way. MDT provides training and equipment for vegetation maintenance to MDT employees including mowers, hand tools, and herbicide application equipment (backpack sprayers, and equipment-mounted sprayers). Weed management along roads, highways and other MDT facilities and lands are either conducted by MDT maintenance division, through Agreements with county weed districts, or through contracts with commercial applicators. Mowing and cutting are important components of MDT for road safety and vegetation maintenance and to a limited extent noxious weed control. In most counties, county weed districts manage noxious weeds in the Right of Ways for MDT. The Department may also maintain urban interchanges and some maintenance yards and associated facilities.

Guardrails, delineator [reflector] posts, signposts, and bridge ends are currently managed to maintain visibility of structures, facilitate drainage and/or lessen snow drifting. Management of these areas may involve application of non-selective herbicides, either yearly or at appropriate intervals by MDT maintenance crews in an attempt to maintain vegetation-free conditions.

[2] Integrated Weed Management (IWM) is an ecological approach to managing weeds by combining manual and mechanical tools, biological agents, cultural methods, and herbicides in a way that enhances weed control and minimizes economic, health, and environmental risks. Additional components of IWM include public education and prevention. Each component may be used separately or combined with other methods to implement a more effective management strategy depending on weed and site conditions.

MDT also manages facilities such as maintenance yards, stockpile areas, and rest areas. Total vegetation control is practiced in stockpile areas and maintenance yards. Rest areas are intensively managed for public use including maintenance of trees, shrubs, and mowed turf. Borrow locations, owned by MDT, arereferred to as "pit run" or aggregate source areas. Treatment of these areas for noxious weeds is currently on an as-needed basis.

### *Forage Permits*

Some districts in Montana issue forage permits that allow harvest of grass along road rights-of-way. These permits will not interfere or take preference over management of noxious weeds on state-maintained rights-of-way. Residual broadleaf herbicides (e.g. Aminopyralid, Picloram, dicamba, and others) may be present on roadside vegetation that was treated for noxious weeds. Herbicide residues may remain on hay and forage grass used for feed or bedding or may be present in manure and urine in livestock fed treated hay. See Appendix E for information on handling compost, manure, or hay/livestock bedding from herbicide-treated forage on roadsides.

### *Utility Easements*

MDT provides guidelines for weed management on sites where utilities are installed on state-maintained rights-of-way. MDT District Offices must approve herbicides used to control undesirable plants. The utility company may be required to reseed any disturbed ground with an approved seed mix recommended by either MDT or the county extension office. The utility may be required to control noxious weeds for two years from date of installation.

### *County Agreements and Contracted Noxious Weed Control*

Weeds along roads, highways and other MDT facilities and lands are usually managed through contracts with county weed districts. However, in some counties, the county weed coordinator may subcontract weed control on rights-of-way. In this case, the agreement remains between the county weed district and MDT and the county weed district must ensure that the subcontractor meets agreement specifications. In a few counties, the county weed districts are unable to maintain the noxious weeds in the rights-of-way. The MDT districts that oversee these rights-of-way may set up contracts with commercial applicators to take care of the noxious weeds.

### *Biological Control*

MDT and some county weed boards work cooperatively with other agencies (e.g. U.S. Agricultural Research Service-Animal Plant Health Protection Service, Montana Weed Control Association, or Montana State University) to establish biological control agents (insects and pathogens). These efforts will continue and expand as agents that fit roadside situations become available. MDT has and will continue to partner with county weed district personnel to release biological control agents in suitable locations along MDT rights-of-way. MDT partners with schools to develop insectaries for release on MDT properties. There are distinct educational benefits provided by this relationship, and MDT is encouraging counties to identify appropriate roadside areas for insect releases. Funding for this effort is out of the Maintenance Division Headquarters in Helena.

### *Expenditures for Weed Management Activities*

Distribution of funds from FY 2018 through 2024 for the ten (10) MDT Maintenance Divisions and Headquarters are shown in Table 3-1. This table relates only to the MDT vegetation management program budget and does not include funds expended on management outside the MDT Statewide Integrated Roadside Vegetation Management Program. The total funds expended by MDT are referred to and explained in Chapter 4, Table 4-1.

The Division distribution includes county agreements for items such as herbicide treatment, biological control, assessment (inventory/survey, monitoring and evaluation), as well as herbicide costs associated with work done by MDT.

The Headquarters distribution contains contingency funds available for items that are over and above Division expenditures. **Education Awareness/Biological Control** includes items such as high school education/biological control support, statewide education support, and conference attendance. **Assessment (inventory, monitoring, evaluation)** and **Contracted Costs/Revegetation** are both for formal specialty work that is over and above what is routinely done by counties, contractors, schools and MDT, and that is not paid out of the Division funds. **Supplies/Materials** includes safety items such as signs and personal protective equipment (PPE), minor equipment purchases/repair, and additional herbicide budget as necessary. **Equipment Purchases/Repair** are for major equipment items and had to be preapproved through the Equipment Division. MDT has the ability to shift funding from one category or Division to another to meet specific needs and to better utilize funds.

TABLE 3-1. DISTRIBUTION OF NOXIOUS WEED CONTROL FUNDS FROM FISCAL YEAR 2010 THROUGH 2012 FOR TEN MDT MAINTENANCE DIVISIONS AND HEADQUARTERS

| | FY 2024 Proposed Distribution | FY 2023 Proposed Distribution | FY 2022 Proposed Distribution |
|---|---|---|---|
| 21. Butte | $ 265,000.00 | $ 235,000.00 | $ 235,000.00 |
| 22. Bozeman | $ 169,000.00 | $ 139,000.00 | $ 139,000.00 |
| 31. Great Falls | $ 171,000.00 | $ 141,000.00 | $ 141,000.00 |
| 32. Havre | $ 130,000.00 | $ 100,000.00 | $ 99,000.00 |
| 42. Wolf Point | $ 81,000.00 | $ 51,000.00 | $ 51,000.00 |
| 43. Miles City | $ 111,000.00 | $ 86,000.00 | $ 86,000.00 |
| 51. Billings | $ 189,000.00 | $ 159,000.00 | $ 159,000.00 |
| 53. Lewistown | $ 122,000.00 | $ 92,000.00 | $ 86,000.00 |
| Sub total | $ 1,632,000.00 | $1,337,000.00 | $1,331,000.00 |
| | | | |
| Headquarters | | | |
| Education/Awareness/Biological control | $ 32,800.00 | $ 32,800.00 | $ 32,800.00 |
| Contracted Costs/Revegetation | $ 45,141.00 | $ 19,000.00 | $ 19,000.00 |
| Supplies/Materials | $ 1,043.00 | $ 3,100.00 | $ 3,100.00 |
| Equipment Purchases/Repair | $ 6,000.00 | $ 6,000.00 | $ 6,000.00 |
| | | | |
| Total allocated | $ 1,716,984.00 | $1,397,900.00 | $1,391,900.00 |

## RECLAMATION AND REHABILITATION

MDT restores desirable vegetation on disturbed roadsides and implements best management practices that facilitate establishment of desirable vegetation following construction, with the goal of decreasing susceptibility of roadside rights-of-way to noxious weed invasion and establishment.

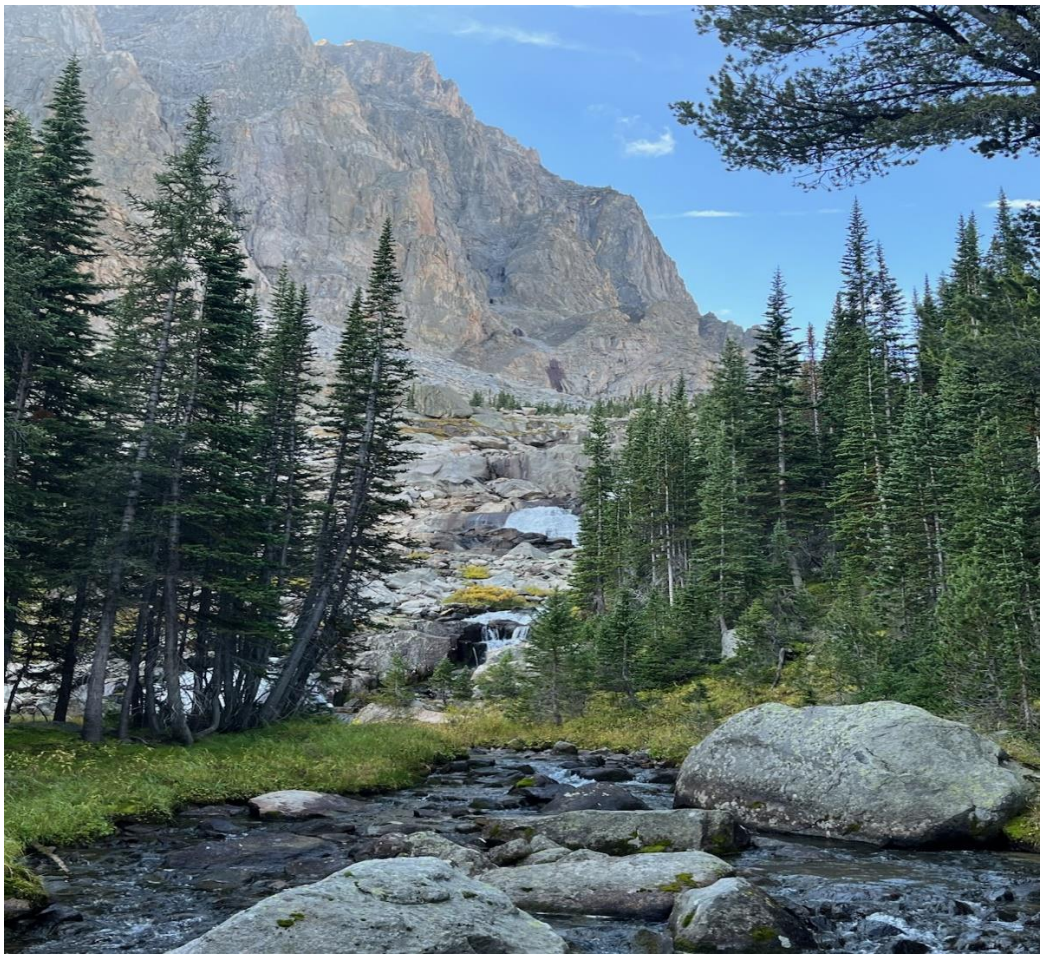
## RESEARCH AND NEW TECHNOLOGY

Research and new technology that promotes a stable roadside environment and supports weed resistant plant communities on rights-of-way is a component of MDT's current vegetation management program. MDT works cooperatively with representatives from MDT, county weed districts, Montana Weed Control Association, landowners, and the research community to coordinate new research and technology regarding roadside vegetation management. Examples of Research and new technologies may include drones, spectral imaging, and AI technologies.

## ASSESSMENT: INVENTORY/SURVEY, MONITORING, AND EVALUATION

MDT and County herbicide application records on road rights-of-way provide information onmanagement effectiveness and changes in weed populations over time. MDT uses a Maintenance Management System application to track / monitor weedcontrol costs and activities. MDT also uses informal visual assessments through experienced technicians to provide information on infestation levels and weed species present on roadsides.

Through annual evaluation of this Plan, MDT reviews the implementation of action items, evaluates effectiveness in achieving expected results, and determines if plan action items and expected results are realistic and desirable.



# CHAPTER 3

## PLAN OF ACTION:

## INTEGRATED ROADSIDEVEGETATION MANAGEMENT STRATEGIES

# Chapter 3. Plan of Action: Integrated Roadside Vegetation Management Strategies

The magnitude of noxious weed infestations on roadsides in Montana requires a comprehensive plan of action that includes six major components. These components are: 1) public awareness and education; 2) prevention and early detection; 3) rapid response to control new introductions, and implementation of integrated management methods for species that are widely established; 4) reclamation and rehabilitation; 5) research and new technology; and 6) assess weed populations and monitor and evaluate program effectiveness to measure progress towards expected results. The noxious weed management strategy will be compatible with Montana's overall weed management plan.

MDT is a cooperator/partner/board member with many invasive species boards statewide including; Montana Invasive Species Council (MISC), Montana Weed Control Association (MWCA), Aquatic Invasive Species Council (AIS), Noxious Weed Trust Fund (NWTF), MontanaNoxious Weed Education Campaign (MNWEC). Both NWTF and MNWEC are managed by the Montana Department of Agriculture.

MDT in cooperation with county, state, and federal entities will implement an integrated approach for managing weeds on roadsides in Montana (Appendix D). Management actions are based upon principles and practices consistent with current science, and will incorporate prevention, early detection and rapid response, control, and reclamation strategies to meet management objectives.

Action items for each component of the Integrated Roadside Vegetation Management Program are addressed in this chapter.

## LEADERSHIP

MDT is committed to observing state laws regarding management of noxious weeds on state owned rights-of-way (Appendix A). In addition, MDT will promote proper land stewardship and strive to be a good neighbor to adjoining landowners. MDT will continue to fund a noxious weed coordinator position with statewide responsibility to work with private and public landowners, county weed districts, and other state and federal agencies regarding noxious weed management on state owned rights-of-way.

### EXPECTED RESULT

**Provide statewide guidance and leadership in coordinating activities between private, state, and federal entities regarding noxious weed management on state-owned rights-of-way.**

| Action Items | | Responsible Entity |
|---|---|---|
| 1. | Ensure compliance with Montana County Weed Control Act. | MDT - weed coordinator |
| 2. | Facilitate coordination between MDT Districts and county weed coordinators regarding noxious weed management on roadsides. | MDT - weed coordinator; Maint. chief |
| 3. | Meet with county weed district's at least annually to discuss and formalize funding and management priorities. | MDT -Maint. Chief |
| 4. | Determine statewide management priorities and funding allocation based on the Montana Weed Management Plan and available revenue. | MDT - weed coordinator |
| 5. | Measure compliance with MDT Statewide Integrated Roadside Vegetation Management Plan. | MDT - weed coordinator |

| | | |
|---|---|---|
| 6. | Communicate/coordinate with MDT divisions to help ensure that construction and design features enhance desirable vegetation on roadsides thus minimizing weed establishment and spread. | MDT - weed coordinator and reclamation specialist |

| | | |
|---|---|---|
| 7. | Maintain council positions on applicable boards at the discretion of the Maintenance Administrator | MDT - weed coordinator |

## Public Awareness and Education

Public education is a critical component of the Montana State Weed Management Plan.

**EXPECTED RESULT**

**Increase public awareness of noxious weeds on roadsides and improve training for MDT employees on identification and management of state and county designated noxious weeds.**

| Action Items | | Responsible Entity |
|---|---|---|
| 1. | Support invasive plant awareness and education programs in Montana. | MDT - weed coordinator |
| 2. | Use roadsides for demonstration areas in cooperation with county weed districts (CWD) on various weed management methods. | MDT - Maintenance chief; CWD |
| 3. | Conduct or provide training programs for MDT employees on weed identification and management. | MDT -Maintenance chief; CWD; MDA; MSU extension |
| 4. | Distribute noxious weed information during local and regional events. | MDT |

## Prevention and Early Detection

A comprehensive approach for preventing establishment and spread of noxious weeds on roadsides in Montana is critical to the success of this plan.

**EXPECTED RESULT**

**Reduce establishment and stop seed production and spread of newly invading weeds on roadsides, stockpiles, and other MDT lands.**

| Action Items | | Responsible Entity |
|---|---|---|
| 1. | Monitor roadsides for noxious weeds continually. | MDT - weed coordinator; MDT staff |
| 2. | Monitor stockpiles annually for noxious weeds and treat as required. | MDT - weed coordinator; Maintenance chief |
| 3. | Support an early detection and rapid response program to stop establishment and spread of newly invading species anderadicate infestations when possible. | MDT and CWD; contractor: MDA |
| 4. | Inform Montana Department of Agriculture (MDA), MDT, and county weed district on the location of newly invading (Priority 1A and 1B) weeds. Sites with established new invaders will be monitored annually until seed is no longer viable and established plants are eradicated. | MDA, MDT, CWD |
| 5. | Work in cooperation with county, state, and federal entities to implement best management practices (BMPs) for road construction activities that prevent establishment of invasive plants. | FHWA; MDT |
| 6. | Focus monitoring for weed invasion in sites disturbed during construction. | CWD, MDT, FHWA |

## Early Detection and Rapid Response and Management

Management of roadside noxious weeds in Montana may vary based on weed species present, county objectives, road type including Interstate, Primary, and Secondary roads (Appendix C), and roadside "Zone" (described below). Management tools will be adapted to meet functional and safety requirements mandated by law, while promoting healthy, low-maintenance, weed resistant plantcommunities on roadsides. Backpack weed sprayers are available in every division throughout the state with the intent of eliminating new invaders as they become evident andto manage small infestations of noxious weeds in and around stockpiles, structures, and facilities.

Strategies and priorities for early detection and rapid response and management along roadsides are discussed below by
**priority** and roadside right-of-way **zone**.

#### EXPECTED RESULT

**Implement cost-effective integrated programs to limit seed production and expansion of noxious weed infestations on roadsides.**

#### ROADSIDE MANAGEMENT ZONES

1. **Zone 1 – The operational/active zone** includes the roadside area starting at the edge of the paved area extending typically to a minimum of fifteen feet (15'). This zone is highly vulnerable to invasion by weed species and will be managed to limit weed seed production. This zone is also typically mowed at least once a year to improve sight distance and aid in snow removal.
2. **Zone 2 – The transitional/passive zone** includes the roadside area starting fifteen feet (15') from the edge of the paved area to the right-of-way line. Highest priority areas for weed control within Zone 2 are; 1) roadsides that are within active Cooperative Weed Management Areas; 2) roadsides where adjacent lands are relatively free of noxious weeds. Satellite noxious weed infestations will be contained and controlled within this zone.
3. **Zone 3 - Stockpiles, Structures and Facilities:** Stockpiles include materials in stockpiles in addition to stockpile sites. Structures include areas in and around guardrails, delineator [reflector] posts, signposts, bridge ends, and stockpile areas. Facilities include maintenance yards and rest areas and other properties owned or managed by MDT. Controlling noxious weed seed production is a priority within this zone.

#### ROADSIDE WEED TREATMENT PRIORITIES

1. Early detection and rapid response to **new infestations** and **newly invading weed species**.
2. Complete control or eradication of **established high priority noxious weeds** occurring as satelliteinfestations on roadsides.
3. Restrict or minimize noxious weed seed production from pavement edge to 15 feet along the highway shoulder (Zone 1) to reduce seed movement by vehicular traffic
4. **Prioritize** noxious weed control from the edge of pavement to right-of-way boundary in areas where adjacent lands are weed-free, support relatively low weed populations, and/or are involved in active weed management programs.
5. Expand biological management efforts on Zone 2 roadsides where lands adjacent to right-of-way are heavily infested.

## NEWLY INVADING WEED SPECIES (PRIORITY 1A AND 1B NOXIOUS WEEDS)

### *Operational/Active (Zone 1}, Transitional/Passive (Zone 2}, and Stockpiles, Structures and Facilities (Zone 3}*

Early detection and rapid response to new invaders is the highest priority on roadsides and other MDTmanaged lands in Montana. These species are targeted for early detection and eradication regardless of road type or management zone. Species include those within Priority 1A and 1B of the Montana Statewide Noxious Weed List. Counties may also classify weeds in Priority 1A or 1B as "new invaders" if species are not currently present or present in only small infestations within their county.

| Action Items | Responsible Entity |
|---|---|
| 1. Ensure control of established new invaders by appropriate methods to achieve complete removal of the species. | Contractor; CWD, MDT Maintenance |

## ESTABLISHED PRIORITY NOXIOUS WEEDS (PRIORITY 2A AND 2B NOXIOUS WEEDS)

Priority 2B weeds are present in Montana in relatively large infestations. Management of these weeds will vary based on county objectives, status of weed infestations on adjoining lands, presence of Cooperative Weed Management Areas (CWMA), and roadside Zone. Control of seed production and containment of lateral spread on all satellite infestations of noxious weeds will occur within both Zone 1 and 2. Integrated management methods are described in Appendix D.

Management in Zone 1, from the edge of the paved area extending to a minimum of 15 feet, will be managed the same regardless of road type.

### *Zone 1: Operational/Active Zone*

| Action Items | Responsible Entity |
|---|---|
| 1. Control noxious weed seed production and spread of satellite weed infestations within Zone 1. | Contractor; MDT Maintenance |
| 2. Coordinate schedules between herbicide applicators and MDT mowing operations to obtain most effective control of noxious weed seed production on roadsides. | Contractor; MDT Maintenance |
| 3. Utilize mowing and herbicides to establish and maintain a 15-foot buffer along highway rights-of-way to reduce weed seed spread by vehicular traffic. Mowing will be prioritized based on roadside safety as well as vegetation management needs. | Contractor; MDT Maintenance |
| 4. Promote weed-resistant plant communities on roadsides by restoring and encouraging growth of desirable vegetation on disturbed sites or areas where vegetation is not well-established. | MDT Maintenance and environmental services |
| 5. Enhance or restore desirable vegetation that resists weed invasion on disturbed sites or areas where vegetation is not well established. | MDT Maintenance and environmental services |

### *Zone 2: Transitional/Passive Zone*

Priorities for management of weeds in this Zone 2 may differ slightly based on county objectives, road segments, size of individual infestations, accessibility, terrain, and abundance of weeds on adjacent land, or adjoining land management goals and objectives. Management methods are described in Appendix D. In general, highest priority areas for weed control within Zone 2 are roadsides:

1) within active Cooperative Weed Management Areas

2) where adjacent lands are relatively free of noxious weeds

3) where satellite noxious weed infestations can be contained and controlled

| Action Items | Responsible Entity |
|---|---|
| 1. Control seed production and contain spread on satellite infestations of noxious weeds and new invaders (Priority 1A and 1B) within Zone 2 roadsides. | Contractor; MDT Maintenance |
| 2. Expand biological control efforts on widespread weed infestations within Zone 2 in areas where adjoining lands are heavily infested. | MDT - weed coordinator |
| 3. Facilitate and support rearing and release of biological agents for MDT lands. | MDT - weed coordinator & maintenance |
| 4. Determine need for mowing vegetation in Zone 2. If mowing is necessary, when possible time mowing operations to limit and reduce seed production on roadside infestations where adjacent lands are infested. | MDT - Maintenance |
| 5. Enhance or restore desirable vegetation that resists weed invasion on disturbed sites or areas where vegetation is not well established. | MDT - Maintenance and environmental services |

### *Zone 3: Stockpiles, Structures and Facilities*

Management of stockpiles is critical to prevent weeds from establishing and producing seeds and/or other plant propagules. Once weeds have established on stockpiles and produced seed they can easily be distributed to roadsides during maintenance or construction activities. Maintaining weed-free stockpiles is an important component of the roadside vegetation management program. . MDT has supported the Montana Department of Agriculture's (MDA) shift toward construction materials being Certified Weed Free Materials by starting to have mined stockpile sites inspected by MDA to meet Certified Weed Free Material standards.

Presence of bare ground in and around structures and facilities has allowed invasion of noxious and nuisance weeds. Species such as sweet clover, kochia, and knapweeds are well established on most sites. Seeding desirable low-growing vegetation in and around structures will decrease susceptibility to invasion, decrease maintenance, and reduce damage caused by non-selective soil-residual herbicides. Vegetation barriers, such as mats, may also be considered around structures.

Noxious weeds will be controlled within facility and equipment yards, and rest areas to stop weed spread. Mechanical removal, physical barriers, or applications of non-residual herbicides will be encouraged in areas where total vegetation control is necessary.

| Action Items | Responsible Entity |
|---|---|
| 1. Control undesirable vegetation with physical barriers, mechanical techniques, seeding desirable competitive vegetation, and selective herbicides depending on function of structure or facility. | MDT - Maintenance chief |
| 2. Consider using foliar-applied, non-selective herbicides, such as glyphosate, for total vegetation control around structures. | MDT - Maintenance chief |

| | | |
|---|---|---|
| 3. | Establish demonstration areas to determine effect of seeding low-growing, desirable grasses in and around structures on weed establishment. | MDT - Maintenance chief; Environ. Div. |
| 4. | Reduce unused or unusable stockpiles to prevent weed establishment. | MDT - Maintenance chief |
| 5. | Control noxious and/or nuisance weeds on stockpiles before they produce seed. | MDT - Maintenance |
| 6. | Use mechanical methods, hand pulling or non-selective short-residual herbicides to control weed infestations on stockpiles. If a long-residual, non-selective herbicide is used to control noxious weeds on stockpiles, use the lowest rate possible to prevent injury to desirable plants that could occur when materials are placed on roadsides. | MDT - Maintenance |
| 7. | Encourage use of "Crushing Contracts" that give MDT control of ensuring weed-free aggregate source sites (pits) used by MDT maintenance. Encourage the use of certified noxious weed-free materials. | MDT - weed coordinator; Maintenance chief |
| 8. | Ensure training of applicators on non-selective herbicide application techniques for total vegetation control to minimize area treated and include training on selective herbicides for weed control. Treat only the area needed to meet road safety and function requirements. | MDT - Maintenance chief |

## Reclamation and Rehabilitation

Reclamation planning is an integral component of a roadside weed management program when loss ordisplacement of desirable species occurs. Without restoration, areas become re-infested with either the same or new weed species. Restoring disturbed roadsides is critical to slow establishment and spread of weed species.

**EXPECTED RESULT**

**Decrease susceptibility of roadside rights-of-way to noxious weed invasion and establishment.**

| Action Items | | Responsible Entity |
|---|---|---|
| 1. | Attempt to restore desirable vegetation on disturbed roadsides during the next appropriate growing season following disturbance activity. | MDT - Maintenance and Construction |
| 2. | Evaluate reclamation and rehabilitation projects following seeding to determine if seed establishment was successful. Restoration/rehabilitation of disturbed roadsides is not considered complete until 70% of vegetation is well established and/or final stabilization is reached, as determined by MDT guidelines. | MDT - Environmental Services |
| 3. | Work with highway design construction engineers to implement best management practices (BMPs) that facilitate the establishment of desirable vegetation following construction. This includes, but is not limited to, removal and stock-piling of topsoil for replacement following construction, avoiding steep cut slopes, and consideration of certification for all borrow sites. | MDT- Environmental Services; Engineering: FHWA |
| 4. | Identify roadside sites where additional resources or reseeding is needed to improve weed resistance of roadside plant communities. | MDT - Environmental Services |

## Research and New Technology

MDT recognizes the need for research and new technology for road right-of-way vegetation management that minimizes establishment of noxious weeds, facilitates safety and road function, and reduces maintenance costs. Although research and development of new technology is primarily the responsibility of the state maintenance division, counties or other stakeholders may identify and assist with research projects.

**EXPECTED RESULT**

**Identify, prioritize and facilitate coordination and implementation of research and new technology that will promote a stable roadside environment to support weed resistant plant communities on rights-of-way.**

| Action Items | Responsible Entity |
|---|---|

| | | |
|---|---|---|
| 1. | Coordinate new research and technology regarding roadside vegetation management with representatives from MDT, County Weed District, Montana Weed Control Association, landowners, and research community. | MDT - weed coordinator |
| 2. | Work cooperatively with other agencies and universities on suitable species for roadside revegetation. Competitive species that are low maintenance, low growing, and will not attract big game should be considered. | MDT - environmental services |
| 3. | Support research to optimize bio-control insect releases to maximize their effectiveness. | MDT - weed coordinator; environmental services |
| 4. | Evaluate effectiveness of drones and spectral imaging technologies for mapping and noxious weed treatments. | MDT - weed coordinator; UAS Manager |

## ASSESSMENT: INVENTORY, MONITORING, AND EVALUATION

### INVENTORY

#### EXPECTED RESULT

**Support inventory of noxious weeds on roadsides and other MDT lands.**

| Action Items | | Responsible Entity |
|---|---|---|
| 1. | Support Counties and MDT personnel in the use and training on applications such as Eddmaps and the State Libraries' Natural Heritage program. | MDT - weed coordinator |
| 2. | Encourage transparency and documentation of noxious weeds in the rights-of-way. | MDT - weed coordinator |

### MONITORING

The following components are considered a baseline for monitoring the status of weed management program.

#### EXPECTED RESULT

**Collect data that measure effectiveness of various programs over time (management, public education, etc).**

| Action Items | | Responsible Entity |
|---|---|---|
| 1. | Develop a monitoring program to measure effectiveness of weed management efforts on MDT owned/management roadsides | MDT - Maintenance; CWD |
| 2. | Track weed control costs and activities on specific roadside routes over time. | MDT - weed coordinator |
| 3. | Conduct informal review of mowing practices through maintenance review process. | MDT - weed coordinator |

## EVALUATION

Evaluations will help determine if the weed management program accomplishes plan objectives, and if the annual operation plan is still desirable and realistic. Evaluation requires analyzing data collected through monitoring, including cost/benefit of various management methods.

MDT and county weed districts will use information gained from monitoring weed infestations to improve future weed management efforts on highway rights-of-way. This evolving, or "adaptive" management allows MDT to learn from past experiences, improve effectiveness, and reduce impacts.

| Action Items | Responsible Entity |
|---|---|
| 1. Review implementation of Plan action items annually or as needed. | MDT - weed coordinator; MDA |
| 2. Evaluate effectiveness of action items in meeting Plan expected results. | MDT - weed coordinator |
| 3. Review expected results and action items of the Plan to determine if they are realistic and desirable. | MDT - weed coordinator |

# CHAPTER4

# BUDGETS, PLAN IMPLEMENTATION, AND EVALUATION

# Chapter 4. Budgets, Plan Implementation, and Evaluation

## BUDGETS FOR A COMPREHENSIVE WEED MANAGEMENT PROGRAM

A balanced comprehensive roadside weed management program that segments funding toward public education and awareness, prevention, early detection, management, research and new technology, and restoration/rehabilitation is vital to successfully manage weed infestations in Montana. Based on current weed acreage figures, approximately $1.7 million is available annually from MDT Maintenance Division to support components of noxious weed management, excluding restoration. Federal Highway Administration and MDT Construction Division have additional monies available for statewide erosion control, restoration, rehabilitation, and weed control for post construction on some highway projects. In addition to these funding sources, existing programs through Montana State University Cooperative Extension Service (for training and public education), MDT District Offices (employee time and travel), and county weed district (training) contribute in-kind funds to weed management on rights-of-way. The percent of total budgets allocated to each critical component of a weed management program was based on Montana's State Weed Plan and modified to meet roadside situations in Montana. Funding sources and budget allocations for management program components and administrative costs are summarized in Table 4-1.

Budget increases may be necessary to cover increased costs of management activities, potential weed spread, and addition of new road rights-of-way acres. Because of current and projected statewide budget constraints, this plan is based on current funding allocation of $1.7 million peryear for the next six years.

TABLE 4-1. PROPOSED BUDGET ALLOCATION FOR WEED MANAGEMENT ACTIVITIES ON MDT STATE OWNED OR MANAGED ROADSIDES AND FACILITIES IN MONTANA (BASED ON FY 2025 BUDGET AND FY 2022--2024 AVERAGES)

| | Approximate Budget Distribution | Statewide MDT Maintenance Division ($) | MDT Maintenance Divisions - employee expenses ($) | In kind-CWD & CES ($) | Federal funds & Construction Division ($) | Budget Total Including In-kind funds ($) |
|---|---|---|---|---|---|---|
| 1. Public Education/training | 4% | 32,800 | 50000 | 35000 | | 117,800 |
| 2. Prevention/ Early Detection | 4% | 105,000 | 25,000 | | | 130000 |
| 3. Rapid Response | 8% | 205,000 | 25,000 | | | 230000 |
| 4. Management | 82% | 1,320,569 | 1,107,945 | | | 2,428,514 |
| 5. Restoration* | | | | | variable | 600,000 |
| 6. Research & New Technology | 2% | 55,700 | 15,000 | | | 70,700 |
| | | | | | | |
| **TOTAL** | | **1,719,069** | **1,222,945** | **35000** | variable | **2,977014** |

*Post-construction federal funds for vegetation management

**(1) Public Education and Training:** $32,800 of the total budget is allocated towards public education and training (state weed education program, school support, training). In-kind services in the form of travel and salaries are provided by MDT Divisions ($50,000), and county weed districts (CWD) / Cooperative Extension Service (CES)/ and Montana Department of Agriculture (MDA) ($35,000).

**(2) Prevention and Early Detection**: $105,000 of the total budget is allocated to prevention activities described in action items. MDT employees will assist with early detection of newly invading species by reporting infestations and treating small infestations.

**(3) Rapid Response:** Estimated costs for rapid response program comprise $205,000 of the total budget. MDT also participates in rapid response on portions of MDT right of way. Rapid response activities are described in Chapter 3 under Prevention and Early Detection, and Management (Newly Invading Weed Species).

**(4) Management:** $1,320,569 of the total budget is allocated toward management of invasive plants on MDT lands through contracted services. MDT Divisions provide an average of $1,107,945 in assistance to county weed districts for traffic control, monitoring, and weed control. This figure includes labor and equipment only; herbicide costs are included in the program budget. $377,660 is estimated for mowing that is primarily for noxious weed control (10% of $3.8 million on average for FY 2022-2024).

**(5) Reclamation and Rehabilitation:** Funding is available in post-construction federal funds for vegetation and roadside management. Funding for these projects is from Federal Highway Administration and MDT Construction Division.

**(6) Research and New Technology:** $55,700 of the total budget is allocated towards research and new technology. Funding is generally for statewide research projects such as rearing and release of biological control agents, or recycled sand projects. Dollars are not provided to counties unless specifically involved in research or demonstration project.

Administrative costs are not allocated through the $1.7 million designated for noxious weed management.

## IMPLEMENTATION

The key to success of MDT's Statewide Integrated Roadside Vegetation Management Plan is dependent on the ability of responsible entities to implement action items identified in the Plan. Chapter 3 identifies key action items within the plan and responsible entity.

## EVALUATION & REVISION

Evaluation of progress on action items is critical to determine whether modifications or additions to the plan are necessary to improve facilitation and implementation. The work plan will be reviewed annually by April 1 to determine if action items are implemented and if objectives are being met.

MDT's Statewide Integrated Roadside Vegetation Management Plan will be reviewed biennially by Montana Department of Transportation, Montana Department of Agriculture and other interested parties. Status of action items will be reviewed, updated as needed, and suggestions identified for facilitation of the Plan. MDT will be responsible for scheduling an annual review process and implementing revisions in the Plan.

The Montana County Weed Control Act (7-22-2151) requires state agencies to complete six-year management plans. Revision of this document will be conducted every six years (2024).

# Chapter 5. References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# Chapter 6. Appendices

## APPENDIX A. ISSUES AND LEGISLATION

### FEDERAL DIRECTION: EXECUTIVE ORDER AND NATIONAL INVASIVE SPECIES MANAGEMENT PLAN

President Clinton issued **Invasive Species Executive Order** 13112 in 1999 calling on Executive Branch agencies to prevent and control introduction and spread of invasive species. The Order established the National Invasive Species Council, which is chaired by Secretaries of Agriculture, Commerce, and Interior and includes Departments of State, Treasury, Defense, Health and Human Services, Transportation, Environmental Protection Agency, and the U.S. Agency for International Development. The Order builds on the National Environmental Policy Act of 1969, the Federal Noxious Weed Act of 1974, and the Endangered Species Act of 1973 to prevent introduction of invasive species, provide for their control, and take measures to minimize economic, ecological, and human health impacts. The **National Invasive Species Management Plan** (2008) provides a blueprint for federal action for invasive species in coordination with international, state, local, and private programs. The Plan assigned the Federal Highway Administration's (FHWA) oversight in federally funded highway projects that include Interstate and State highways.

**Federal Highway Administration's Vegetation Management Program** guides State Departments of Transportation (DOT) on invasive species issues. Guidance on E.O. 13112 was issued to the states in September 1999, encouraging inventory and integrated management of roadside weeds before-and-after projects, assessment of invasive species during the NEPA process, and use of "environmentally and economically beneficial landscaping" practices[3]. The FHWA continues to provide technical support to all states on this vegetation issue.

Under the Executive Order, state DOTs have new opportunities to address roadside vegetation management issues on both construction activities and maintenance programs. Through new levels of cooperation and communication with other agencies and conservation organizations at all levels, the highway programs offer a coordinated response against the introduction and spread of invasive species.

The U.S. Department of Transportation policy is to fully participate in the Administration efforts to prevent introduction and spread of invasive species by 1) pursuing appropriate authorities and funding for implementation; 2) participating on interagency committees; 3) analyzing invasive species' effects in accordance with Section 2 of the Executive Order 13112; 4) increasing coordinated research; 5) implementing, at DOT facilities and DOT-funded facilities, the Presidential memorandum on beneficial landscaping; 6) coordinating with international organizations, such as the International Maritime Organization, the International Civil Aviation Organization, and the International Organization for Standardizations on cooperative efforts; 7) training agency personnel and informing the public; 8) coordinating with other federal agencies and with state, local and tribal governments; and 9) encouraging innovative designs for transportation equipment and systems.

The Department of Transportation's efforts to prevent introduction and spread of invasive species are consistent with: (1) strategic goals of protecting the natural environment, service, and teamwork; (2) statutory mandates to protect against aquatic invasive species; (3) active participation on interagency committees such as the Federal Interagency Committee for Management of Noxious and Exotic

3 Environmentally and Economically Beneficial Landscaping Guidelines include compliance with NEPA; use of regionally native plants for landscaping; design, use, or promote construction practices that minimize adverse impacts on the natural habitat; seek to prevent pollution; implement water and energy efficient landscape practices; and create outdoor demonstration projects.

Weeds (FICMNEW), the Native Plant Conservation Initiative (NPCI), the Interagency Ecosystem Management Task force, and the Interagency Working Group on Endangered Species; and (4) the 1994 Presidential Memorandum on Environmentally and Economically Beneficial Landscaping Practices.

Noxious weed management on state-owned roadsides in Montana must comply with existing laws and legislation. This section provides an overview of national, state, and county laws, legislation, and directives that will be incorporated into Integrated Roadside Weed Management Plans.

## STATE DIRECTION: MONTANA WEED LAWS AND MANAGEMENT PLAN

The first noxious weed legislation in Montana was passed in 1939. Since then additional laws and rules have been enacted to strengthen weed management efforts. Laws currently affecting weed management in Montana are summarized here and can be viewed in their entirety at www.mt.gov or http://data.opi.mt.gov/bills/mca_toc/index.htm.

**Montana County Weed Control Act (Title 7, Chapter 22 Part 21)** provides for weed management activities at the county level. Local county government has the responsibility for implementing and enforcing weed management in Montana. The Montana State Noxious Weed List (Appendix B) is determined by Rule of the Montana Department of Agriculture (MDA) under provisions of the Montana County Weed Control Act.

**Montana Weed Control Act (Title 80, Chapter 7 Part 7)** gives the Montana Department of Agriculture authority to provide technical assistance and coordination/services to local governments, agricultural producers, and the general public on management and control of noxious plants. This assistance and service may include local information on infested acreages and an assessment of the economic and environmental impacts on the state and its citizens as a result of these conditions. In addition, MDA may include information on proper use of herbicides and recommend where certain management tools should be utilized in order to avoid adverse economic or environmental impacts.

**Montana Noxious Weed Trust Fund Act** is a grant-funding program designed to encourage local cooperative weed management programs, creative research in weed control, including the development of biological control methods, and educational programs.

**Montana Noxious Weed Seed Free Forage Act** establishes a certification program that provides for production of weed-seed-free forage and mulch used by individuals, agencies, and private corporations on public and private lands.

**Montana Agricultural Seed Act** lists prohibited and restricted weed seed levels that must be maintained in state certified seed. All state-listed noxious weeds are included in this list.

**Montana Commercial Feed Act** prohibits noxious weeds in commercial feed.

**Montana Environmental Policy Act** must be addressed by major state actions that have the potential for significant environmental impacts 75-1-201 1(1)(b)(iv).

**Montana Nursery Law** allows for inspection, certification, and embargo of all nursery stock for listed pests, including weeds.

**Montana Pesticides Act.** The Montana Department of Agriculture administers the Montana Pesticides Act (80-8- 801 et seq., MCA), which requires the registration of all pesticides manufactured, formulated, distributed, sold, or transported in the state. Montana Pesticides Act is subdivided into three major areas of responsibility: (1) Registration of pesticides; (2) Licensing of pesticide

applicators, operators and dealers; and (3) Enforcement and administrative procedures. MDA is given the authority to sample, inspect and make analysis of pesticides distributed within Montana to ensure compliance with the Montana Pesticides Act. MDA may also register pesticides under Section 24C and 18 of Federal Insecticide Fungicide and Rodenticide Act (FIFRA). Section 24C (Special Local Needs) and Section 18 (Specific or Emergency Exemption) registrations generally require supplemental labeling.

#### MONTANA WEED MANAGEMENT PLAN

The **Montana Weed Management Plan** was updated in 2008 to provide the framework and recommendations for actions to prevent introduction and manage the spread of invasive plants in Montana. The plan incorporates management of noxious weeds to complement regional and national strategies.

The Montana Weed Management Plan identifies the following needs for roadside weed management programs:

- Continue to improve monitoring and evaluation of weed management efforts on rights-of-way.
- Periodically review reimbursement programs to county weed districts to increase efficiency and improve administration.
- MDT contracts will mandate contractors contact county weed districts for reclamation requirements on roadside projects and monitor reclamation projects on a regular basis.
- Evaluate budgets for weed control on right-of-way and increase as needed to meet right-of-way expansion.

## COUNTY DIRECTION: COUNTY WEED CONTROL ACT AND MANAGEMENT PLANS

County weed districts implement and enforce the Montana County Weed Control Act. In addition, they conduct weed education and awareness programs, develop cooperative agreements, coordinate weed management activities within and among counties, and monitor weed infestations on private and public lands. County weed management plans provide guidelines for compliance with the Montana County Weed Control Act, Title 7, Chapter 22, Sections 7-22-2101 through 7-22-2153, MCA, and provide a framework for effective noxious weed management[4].

In compliance with 7-22-2151, MCA the Montana Department of Transportation is required by state statute to develop a noxious weed management plan and to have the plan approved by County Weed Boards as well as providing a biennial report on weed management activities.

The county weed district may provide assistance to MDT in:

- Developing integrated noxious weed management plans
- Maintaining written agreements specifying the mutual responsibilities of the weed district and MDT for implementing an integrated noxious weed management plan.
- Coordinating noxious weed management programs with private Cooperative Weed Management Groups and other local, state, and federal agencies.
- Developing educational programs about noxious weeds for the agency's personnel and the general public.

[4] Online: http://data.opi.mt.gov/bills/mca_toc/7_22_21.htm

- Obtaining biological weed control agents and monitoring their establishment.

#### CONSTRUCTION SITES AND RECLAMATION OF DISTURBED RIGHTS-OF-WAY

Section 7-22-2152, of the Montana County Weed Control Act requires any person or agency disturbing vegetation by construction in the weed district to submit a revegetation plan to the Weed Board for board approval. The plan must provide for the establishment of beneficial vegetation in the disturbed area after construction is completed.

- MDT must allow county weed boards to review and comment on the reclamation specifications for all road construction projects that disturb ground off the driving surface. This is not intended for short-term minor disturbances by MDT maintenance crews providing for safe travel, which will be covered under long-term agreements with counties.
- Some counties now require approval of borrow sources prior to any material placement within right-of-ways, as well as power-washing of all equipment brought into construction project areas.
- The Standard Specifications for Road and Bridge Construction provides strong direction to construction contractors to abide by the County Weed Management Act. Standard Specification 107.11.5.

#### LANDOWNER AGREEMENTS

County weed districts in the state may develop an Herbicide Free Area Agreement for landowners who request herbicides not be applied to roadside rights-of-way adjoining their property (7-22-2153 MCA). Property owners will contact the respective county weed district to obtain an agreement approved by MDT. Persons signing this agreement must control noxious weeds on state-owned roadsides to meet management objectives (containment, total control, or eradication, etc). MDT may rescind the agreement for non-compliance with weed management criteria.

## APPENDIX B: STATE AND COUNTY NOXIOUS WEED LISTS

MDT will recognize management of both county and state-listed noxious weeds for management on roadsides. In most cases, state-listed noxious weeds will have priority over county-designated species. Management criteria for species will vary based on county objectives and levels of infestations in the county. State-listed noxious weeds are provided below in Table B-1, and county-listed noxious weeds are shown in Table B-2.

### MONTANA STATE NOXIOUS WEED LIST

The Montana State Noxious Weed List is updated as needed and is determined by Rule of the Montana Department of Agriculture (MDA) under provisions of the Montana County Weed Control Act. As of this writing, there are 35 designated noxious weeds and 5 regulated plants in Montana that are divided into four priorities based on number of acres infested in the state and management criteria.

Table B-1

| *Effective: February 2017* |
|---|

## ACRES INFESTED by NOXIOUS WEEDS

| **Acres in Montana Infested with Noxious Weeds 2016** | |
|---|---|
| Spotted Knapweed | 2,227,010 |
| Canada Thistle | 1,411,060 |
| Leafy Spurge | 781,916 |
| St. Johnswort | 698,355 |
| Houndstongue | 541,581 |
| Field Bindweed | 529,206 |
| Orange Hawkweed | 513,041 |
| Tansy Ragwort | 300,691 |
| Whitetop or hoary cress | 279,208 |
| Dalmatian Toadflax | 187,764 |
| Ox-eye Daisy | 173,277 |
| Sulfur (Erect) Cinquefoil | 152,262 |
| Hoary Alyssum | 121,531 |
| Yellow Toadflax | 68,681 |
| Russian Knapweed | 66,540 |
| Common Tansy | 65,880 |
| Saltcedar | 62,168 |
| Tall Buttercup | 34,321 |
| Curlyleaf Pondweed | 13,813 |
| Meadow Hawkweed Complex | 11,661 |
| Diffuse Knapweed | 10,402 |
| Blueweed | 8,864 |
| Perennial Pepperweed | 3,812 |
| Eurasian Watermilfoil | 3,397 |
| Rush Skeletonweed | 3,287 |
| Yellowflag Iris | 2,864 |
| Knotweed Complex | 750 |
| Flowering Rush | 750 |
| Purple Loosestrife | 384 |
| Scotch Broom | 152 |
| Dyer's Woad | 11 |
| Common Reed | 9 |
| Yellow Starthistle | <1 |
| **TOTAL ACRES INFESTED WITH NOXIOUS WEEDS IN 2016** | **8,274,648** |

## COUNTY DESIGNATED NOXIOUS WEEDS as of 2018

County weed districts have authority over management of noxious weeds through the County Noxious Weed Control Act (7-22-2101 et seq., MCA). Additional plant species may be prioritized for management in individual counties and are included on county weed lists. Table B-2 is updated with every new weed plan and summarizes county-designated noxious weeds. MDT will recognize management of both county and state-listed noxious weeds for management on roadsides. In most cases, state-listed noxious weeds will have priority over county-designated species.

Table B-2

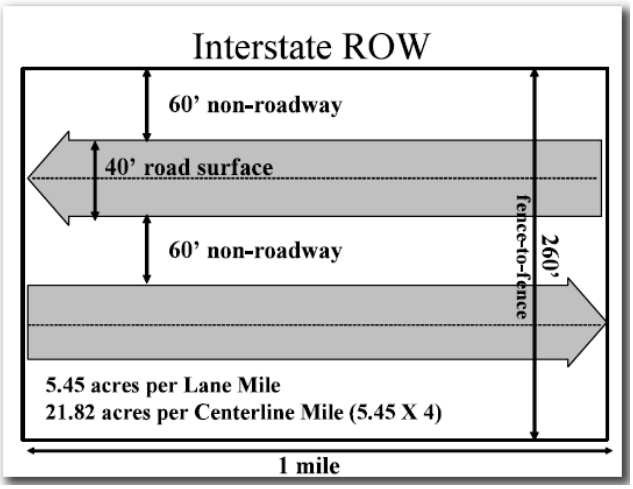
| COUNTY | |
|---|---|
| BEAVERHEAD | Musk thistle, Common teasel, Field scabious, Black henbane, Common mullein, Scentless camomile,Swainsonpea, halogeton,Cyprus spurge, Myrtle spurge, Absinth wormwood |
| BIG HORN | Common burdock, Black henbane, Poison hemlock |
| BLAINE | Common burdock, Baby's breath |
| BROADWATER | Black henbane, Musk thistle, Baby's breath, Scotch thistle, Perennial sowthistle, |
| CARBON | Musk thistle, Milk Thistle, Absinth wormwood, Scotch thistle, Common mullein |
| CARTER | Common burdock, Poison hemlock, Common mullein, Scotch thistle |
| CASCADE | State Listed Only |
| CHOUTEAU | , Poison Hemlock, Scentless Chamomlie, Baby's Breath |
| CUSTER | State Listed Only |
| DANIELS | Baby's breath |
| DAWSON | State Listed Only |
| DEER LODGE | Baby's breath, Black henbane, Common mullein, Curly dock, Kochia, Musk thistle, Perennial sowthistle |
| FALLON | Poison hemlock, Common burdock |
| FERGUS | State Listed Only |
| FLATHEAD | Baby's breath, Russian thistle, Tumble mustard, White campion, Creeping bellflower, Scentless chamomile, Absinth Wormwood, Noble yarrow, Kochia |
| GALLATIN | Poison hemlock, Musk thistle, Field scabious, Scotch thistle, |
| GARFIELD | State Listed Only |
| GLACIER | Musk thistle, Scentless chamomile, Black henbane, Bull thistle |
| GOLDEN VALLEY | Black henbane, Common mullein, Scotch thistle, Poison hemlock |
| GRANITE | State Listed Only |
| HILL | Common burdock |
| JEFFERSON | Baby's breath, Field scabious |

| | |
|---|---|
| JUDITH BASIN | Yellow mignonette |
| LAKE | Sheep sorrel, Musk thistle, Purple mustard, Hydrilla, Mosquito fern, Meadow Salsify |
| LEWIS & CLARK | Common burdock, Common mullein, Garlic mustard, Black henbane, Musk thistle |
| LIBERTY | Musk thistle, Perennial sowthistle |
| LINCOLN | Plumeless thistle, Common crupina, Dwarf snapdragon, Common bugloss, Common burdock, Absinth wormwood, Spotted cat's-ear, Kochia, Chicory, Scotch thistle, Meadow knapweed, Poison hemlock, Scentless chamomile, Germander speedwell, Common speedwell, Musk Thistle |
| MADISON | Musk thistle, Field scabious |
| McCONE | State Listed Only |
| MEAGHER | Absinth wormwood, Black henbane, Bladder campion, Bull thistle, Common burdock, Common mullein, Field scabious, Musk thistle, Perennial sowthistle, Poison hemlock, Scentless chamomile, Scotch thistle, Yellow mignonette |
| MINERAL | Common mullein, Scentless chamomile, Mayweed (Dogfennel) |
| MISSOULA | Fragrant waterlily |
| MUSSELSHELL | Black henbane, Scotch thistle, Common mullein, Poison hemlock |
| PARK | State Listed Only |
| PETROLEUM | Milk Thistle |
| PHILLIPS | State Listed Only |
| PONDERA | Common burdock, Musk thistle, Perennial sowthistle |
| POWDER RIVER | Black henbane, Poison hemlock, Puncturevine |
| POWELL | Black henbane, Wild caraway |
| PRAIRIE | State Listed Only |
| RAVALLI | Common bugloss, Field scabious, Black henbane, Common teasel, Kochia, Baby's breathe |
| RICHLAND | Baby's breath |
| ROOSEVELT | Baby's breath |
| ROSEBUD | Poison hemlock, Kochia, Puncturevine, Scotch thistle, Black henbane |
| SANDERS | Baby's breath, Common mullein, Ventenata |
| SHERIDAN | Baby's breath |
| SILVER BOW | Baby's breath, Matrimony vine |
| STILLWATER | Common burdock, Common mullein, Black henbane, Poison hemlock |
| SWEET GRASS | Poison hemlock, Urban spurge, Black henbane, Musk thistle, Woodland sage |
| TETON | Musk thistle |
| TOOLE | Musk thistle, Perennial sowthistle |

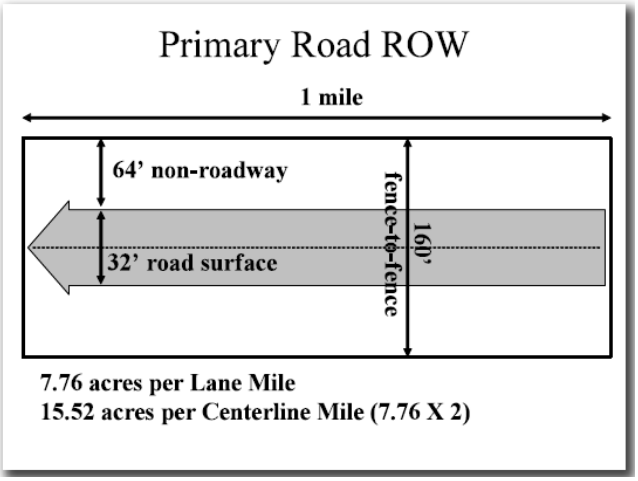
| | |
|---|---|
| TREASURE | Russian olive |
| VALLEY | Baby's breath |
| WHEATLAND | Yellow mignonette |
| WIBAUX | State Listed Only |
| YELLOWSTONE | Scotch thistle, Puncturevine, Common teasel, Common mullein, Poison hemlock, Purple mustard |

# APPENDIX C. RIGHT-OF-WAY ACREAGE BY ROAD TYPE

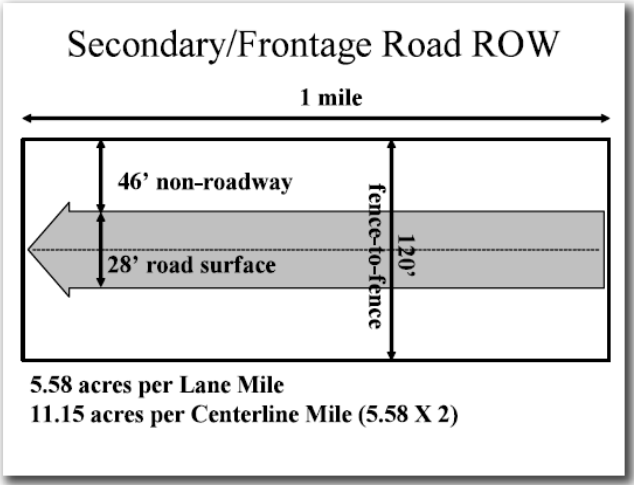
## DEFINITIONS AND STANDARDS FOR CALCULATING ROAD RIGHTS-OF-WAY ACREAGE FOR INTERSTATE, PRIMARY, AND SECONDARY /FRONTAGE ROADS




**The Interstate System** isthe highestclassification of roadwaysin the United States. These arterial roads provide highest level of mobility and speeds *over* the longest uninterrupted distance. Interstates nationwide usually have posted speeds between 55 and 80 miles per hour. Typical distance from rights-of-way fence line to fence line on Interstate roadways is 260 feet, with 80 feet of road surface, and 180 feet of non-roadway (21.8 acres per centerline mile). Maintenance of Interstate rights-of-way may include mowing fence line to fence line (when appropriate), cutting trees and brush, cleaning ditches, and periodically blading shoulders where material build-up prevents drainage off of the road.




**Primary Highways** include major roadsthatconnect local roads and streets with Interstate. These roads provide less mobility than Interstate at lower speeds and for shorter distances, and balance mobility with land access. The posted speed limit on collectors is usually between 35 and 70 mi/hr. Typical total width of a Primary Highway right-of-way is 160 feet, with 32 feet of road surface and 128 feet of non-roadway (15.52 acres per centerline mile). Maintenance activities on Primary Highway right-of-way are similar to those performed on Interstate ROW. However, Primary and Secondary Highways may require more tree and brush cutting, rock removal, and ditch cleaning than Interstates to maintain roadside safety and function.




**Secondary HighwaysandFrontage Roads** includeminorroads that connect local roads and streets with Interstate and provide access between an Interstate and an airport, public transportation facility, or other inter-modal transportation facility. Total width of Secondary Highway and frontage road rights-of-way is 120 feet with 28 feet of road surface and 92 feet of non-roadway (11.15 acres per centerline mile). Maintenance of secondary and frontage rights-of-way is similar to that of Primary Highways.

**U Routes (Urban Highways)** are highways and streets that are in and near incorporated cities and within urban boundaries and have been functionally classified as either urban arterials or collectors.

**X Routes (State Highways)** are highways throughout the state that are not located on a defined highway system but that are on the state maintenance system. Total width of Urban (U) and Frontage (X) roads is typically similar to Secondary Highways

## RIGHT-OF-WAY MILES AND ACREAGE BY COUNTY FOR FIVE ROAD TYPES

TABLE C-1. ROAD MILES AND RIGHT-OF-WAY ACREAGE BY COUNTY AND ROAD TYPE

| | Road Way Miles | | | | | Right of Way Acres | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| COUNTY | Interstate | Primary | Secondary | Urban | X-Routes | Interstate | Primary | Secondary | Urban | X-Routes |
| BEAVERHEAD | 171.500 | 74.066 | 136.535 | 0.000 | 83.090 | 1871.065 | 1149.50432 | 1522.3653 | 0 | 926.4535 |
| BIG HORN | 162.584 | 62.965 | 182.266 | 0.000 | 61.531 | 1773.79144 | 977.2168 | 2032.2659 | 0 | 686.07065 |
| BLAINE | 0 | 93.826 | 130.312 | 0.000 | 0.926 | 0 | 1456.17952 | 1452.9788 | 0 | 10.3249 |
| BROADWATER | 11.378 | 81.410 | 44.732 | 0.000 | 1.036 | 124.13398 | 1263.4832 | 498.7618 | 0 | 11.5514 |
| CARBON | 0 | 154.675 | 23.725 | 0.000 | 6.923 | 0 | 2400.556 | 264.53375 | 0 | 77.19145 |
| CARTER | 0 | 121.364 | 54.525 | 0.000 | 0.000 | 0 | 1883.56928 | 607.95375 | 0 | 0 |
| CASCADE | 123.590 | 153.460 | 109.772 | 47.330 | 73.077 | 1348.3669 | 2381.6992 | 1223.9578 | 527.7295 | 814.80855 |
| CHOUTEAU | 0 | 118.614 | 190.295 | 0.000 | 0.000 | 0 | 1840.88928 | 2121.7893 | 0 | 0 |
| CUSTER | 85.848 | 121.569 | 57.202 | 10.264 | 28.759 | 936.60168 | 1886.75088 | 637.8023 | 114.4436 | 320.66285 |
| DANIELS | 0 | 48.380 | 67.370 | 0.000 | 0.000 | 0 | 750.8576 | 751.1755 | 0 | 0 |
| DAWSON | 87.388 | 88.351 | 105.741 | 9.663 | 32.285 | 953.40308 | 1371.20752 | 1179.0122 | 107.7425 | 359.97775 |
| DEER LODGE | 28.602 | 51.127 | 39.117 | 5.359 | 12.675 | 312.04782 | 793.49104 | 436.15455 | 59.75285 | 141.32625 |
| FALLON | 0 | 86.305 | 76.898 | 0.000 | 0.493 | 0 | 1339.4536 | 857.4127 | 0 | 5.49695 |
| FERGUS | 0 | 229.295 | 109.716 | 10.598 | 0.690 | 0 | 3558.6584 | 1223.3334 | 118.1677 | 7.6935 |
| FLATHEAD | 0 | 240.264 | 83.457 | 52.136 | 10.356 | 0 | 3728.89728 | 930.54555 | 581.3164 | 115.4694 |
| GALLATIN | 87.632 | 185.872 | 91.009 | 46.486 | 19.855 | 956.06512 | 2884.73344 | 1014.7504 | 518.3189 | 221.38325 |
| GARFIELD | 0 | 135.671 | 120.148 | 0.000 | 0.000 | 0 | 2105.61392 | 1339.6502 | 0 | 0 |
| GLACIER | 0 | 136.972 | 130.873 | 0.000 | 11.732 | 0 | 2125.80544 | 1459.234 | 0 | 130.8118 |
| GOLDEN VALLEY | 0 | 41.832 | 51.369 | 0.000 | 0.000 | 0 | 649.23264 | 572.76435 | 0 | 0 |
| GRANITE | 57.292 | 37.089 | 32.837 | 0.000 | 56.946 | 625.05572 | 575.62128 | 366.13255 | 0 | 634.9479 |
| HILL | 0 | 80.271 | 189.259 | 11.874 | 1.094 | 0 | 1245.80592 | 2110.2379 | 132.3951 | 12.1981 |
| JEFFERSON | 189.390 | 71.013 | 35.019 | 0.000 | 78.328 | 2066.2449 | 1102.12176 | 390.46185 | 0 | 873.3572 |
| JUDITH BASIN | 0 | 76.913 | 76.858 | 0.000 | 0.953 | 0 | 1193.68976 | 856.9667 | 0 | 10.62595 |
| LAKE | 0 | 150.424 | 43.939 | 0.000 | 8.742 | 0 | 2334.58048 | 489.91985 | 0 | 97.4733 |
| LEWIS AND CLARK | 100.356 | 124.694 | 110.995 | 47.528 | 49.369 | 1094.88396 | 1935.25088 | 1237.5943 | 529.9372 | 550.46435 |
| LIBERTY | 0 | 25.514 | 116.105 | 0.000 | 0.000 | 0 | 395.97728 | 1294.5708 | 0 | 0 |
| LINCOLN | 0 | 196.005 | 76.010 | 0.000 | 0.000 | 0 | 3041.9976 | 847.5115 | 0 | 0 |
| MADISON | 15.208 | 173.031 | 66.935 | 0.000 | 9.555 | 165.91928 | 2685.44112 | 746.32525 | 0 | 106.53825 |
| MCCONE | 0 | 150.280 | 92.426 | 0.000 | 0.000 | 0 | 2332.3456 | 1030.5499 | 0 | 0 |
| MEAGHER | 0 | 101.809 | 57.452 | 0.000 | 0.000 | 0 | 1580.07568 | 640.5898 | 0 | 0 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **MINERAL** | **153.052** | **7.781** | **7.988** | **0.000** | **41.307** | **1669.79732** | **120.76112** | **89.0662** | **0** | **460.57305** |
| **MISSOULA** | **108.998** | **169.044** | **31.364** | **43.578** | **20.026** | **1189.16818** | **2623.56288** | **349.7086** | **485.8947** | **223.2899** |
| **MUSSELSHELL** | **0** | **99.148** | **43.307** | **0.000** | **0.000** | **0** | **1538.77696** | **482.87305** | **0** | **0** |
| **PARK** | **64.786** | **110.240** | **45.954** | **14.685** | **19.925** | **706.81526** | **1710.9248** | **512.3871** | **163.7378** | **222.16375** |
| **PETROLEUM** | **0** | **39.645** | **42.685** | **0.000** | **0.000** | **0** | **615.2904** | **475.93775** | **0** | **0** |
| **PHILLIPS** | **0** | **188.966** | **43.316** | **0.000** | **0.000** | **0** | **2932.75232** | **482.9734** | **0** | **0** |
| **PONDERA** | **61.254** | **54.223** | **116.660** | **0.000** | **34.365** | **668.28114** | **841.54096** | **1300.759** | **0** | **383.16975** |
| **POWDER RIVER** | **0** | **119.529** | **83.404** | **0.000** | **0.000** | **0** | **1855.09008** | **929.9546** | **0** | **0** |
| **POWELL** | **68.682** | **91.246** | **20.063** | **0.000** | **30.962** | **749.32062** | **1416.13792** | **223.70245** | **0** | **345.2263** |
| **PRAIRIE** | **55.758** | **0.000** | **68.386** | **0.000** | **28.502** | **608.31978** | **0** | **762.5039** | **0** | **317.7973** |
| **RAVALLI** | **0** | **76.571** | **57.818** | **2.656** | **46.442** | **0** | **1188.38192** | **644.6707** | **29.6144** | **517.8283** |
| **RICHLAND** | **0** | **132.792** | **90.176** | **8.345** | **0.000** | **0** | **2060.93184** | **1005.4624** | **93.04675** | **0** | |
| **ROOSEVELT** | **0** | **147.661** | **161.434** | **0.000** | **0.662** | **0** | **2291.69872** | **1799.9891** | **0** | **7.3813** |
| **ROSEBUD** | **83.938** | **159.969** | **105.803** | **0.000** | **51.945** | **915.76358** | **2482.71888** | **1179.7035** | **0** | **579.18675** |
| **SANDERS** | **0** | **176.219** | **101.087** | **0.000** | **1.900** | **0** | **2734.91888** | **1127.1201** | **0** | **21.185** |
| **SHERIDAN** | **0** | **93.732** | **64.968** | **0.000** | **0.000** | **0** | **1454.72064** | **724.3932** | **0** | **0** |
| **SILVER BOW** | **113.554** | **22.621** | **17.490** | **22.576** | **47.020** | **1238.87414** | **351.07792** | **195.0135** | **251.7224** | **524.273** |
| **STILLWATER** | **76.338** | **22.937** | **63.693** | **0.000** | **39.686** | **832.84758** | **355.98224** | **710.17695** | **0** | **442.4989** |
| **SWEET GRASS** | **74.196** | **31.812** | **47.638** | **0.000** | **46.025** | **809.47836** | **493.72224** | **531.1637** | **0** | **513.17875** |
| **TETON** | **42.698** | **68.844** | **115.131** | **0.000** | **35.180** | **465.83518** | **1068.45888** | **1283.7107** | **0** | **392.257** |
| **TOOLE** | **87.468** | **45.530** | **150.155** | **0.000** | **36.412** | **954.27588** | **706.6256** | **1674.2283** | **0** | **405.9938** |
| **TREASURE** | **52.470** | **0.000** | **46.705** | **0.000** | **19.011** | **572.4477** | **0** | **520.76075** | **0** | **211.97265** |
| **VALLEY** | **0** | **172.481** | **100.034** | **0.000** | **1.105** | **0** | **2676.90512** | **1115.3791** | **0** | **12.32075** |
| **WHEATLAND** | **0** | **79.693** | **37.776** | **0.000** | **0.000** | **0** | **1236.83536** | **421.2024** | **0** | **0** |
| **WIBAUX** | **30.458** | **26.208** | **37.715** | **0.000** | **2.334** | **332.29678** | **406.74816** | **420.52225** | **0** | **26.0241** |
| **YELLOWSTONE** | **191.100** | **97.948** | **90.921** | **91.763** | **92.125** | **2084.901** | **1520.15296** | **1013.7692** | **1023.157** | **1027.19375** |
| **Total** | **2385.518** | **5647.901** | **4494.568** | **424.841** | **1143.349** | **26026.001** | **87655.424** | **50114.433** | **4736.977** | **12748.341** |

# APPENDIX D: INTEGRATED WEED MANAGEMENT PROGRAM COMPONENTS

Montana Department of Transportation uses an Integrated Weed Management (IWM) approach for managing noxious weeds on state owned rights-of-way. **The following section describes various components and management tools that are available as part of an IWM program for MDT highway rights-of-way in Montana. MDT does not necessarily implement all management tools described here.** Time and resources dedicated to each component are determined based on state and county objectives.

> ***Integrated Weed Management (IWM)*** *is an ecological approach to managing weeds by combining manual and mechanical tools, biological agents, cultural methods, and herbicides in a way that enhances weed control and minimizes economic, health, and environmental risks. Additional components of integrated weed management include public education and prevention. Each component may be used separately or combined with other methods to implement a more effective management strategy depending on weed and site conditions.*

MDT recognizes that roadsides may support plant species of special concern, including rare or imperiled species and medicinal plants important to Tribal entities. The Department works with appropriate agencies and implements management methods consistent with protecting known species of special concern.

## MANAGEMENT TOOLS

General background and guidelines for implementing manual and mechanical tools, biological agents, cultural methods, and herbicides as part of an integrated management program are provided in this section. Tables D-1 and D-2 summarize general effectiveness of these tools applied to select plant species. MDT does not necessarily use all of the methods described.

### *Manual and Mechanical Methods*

Manual and mechanical techniques, such as pulling or cutting, may be used to control some noxious weeds on roadsides especially if populations are relatively small. These techniques can be extremely specific, minimizing impacts to desirable plants and animals, but they are generally labor intensive unless combined with other maintenance activities. Treatments must often be repeated annually, or several times per year to prevent invasive plants from producing seed or re-establishing. Repetitive treatments from laborers and machines may severely trample desirable vegetation and disturb soil, providing conditions for re-invasion by the same or other invasive species. When using manual and mechanical methods, it is especially important to thoroughly clean and inspect all equipment and clothing before moving it off-site. This will lessen the probability of spreading weeds to the next worksite.

#### HAND PULLING

Hand pulling may be a good alternative on sites where herbicides or other methods cannot be used. Pulling or uprooting plants can be effective on annuals and tap-rooted plants are particularly susceptible to control by hand-pulling. Pulling is generally not effective against many perennial weeds such as leafy spurge since deep underground stems and roots can re-sprout. In most cases, pulling will not be used as a management method on rights-of-way due to safety concerns. However, hand pulling may be used on stockpiles and maintenance yards for removal of individual species.

Many small infestations of newly invading weed species have effectively been managed by hand pulling or a combination of hand pulling and herbicide treatments. Advantages of hand pulling include a small ecological impact, minimal impacts to neighboring plants, and low cost for equipment or supplies. Pulling is extremely labor intensive, however, and is effective only for relatively small, newly established infestations, even when abundant volunteer labor is available. If volunteer labor is not available, pulling costs for dense infestations of tap-rooted weeds such as spotted knapweed are about $7000 per acre per year (Brown et al. 1999).

#### TILLING

Tilling, or other forms of turning soil, is often used for weed control in agricultural crops. Its use on roadsides is largely limited to restoration sites where soils are disturbed during construction or maintenance activities. Tilling is effective against annuals and tap-rooted perennials. Small fragments of some species, particularly perennials with rhizomes such as leafy spurge or Dalmatian toadflax, can resprout following tillage. Best control is achieved when soils are dry, so that remaining plant fragments do not have moisture necessary to survive and re-grow. Tillage should be combined with other restoration tools such as mulching, reseeding desirable species, and possibly herbicide treatments until desirable vegetation is established on the site.

#### MOWING AND CUTTING

Mowing and cutting are important components of Montana Department of Transportation roadside vegetation maintenance and can be modified to enhance invasive plant control. Mowing and cutting can reduce seed production and restrict weed growth, especially in annuals cut before they flower and set seed (Hanson 1996). Timing of mowing is critical to achieve maximum impact on invasive plants and minimize impacts to desirable vegetation. For example, spotted knapweed (*Centaurea maculosa*) seed production can be significantly reduced by a single mowing at late bud to early bloom growth stage (Watson and Renney 1974). If mowed earlier, beneficial plants are negatively impacted, and spotted knapweed is able to re-sprout and may produce more seed than non-mowed plants. Mowing spotted knapweed at late bud to early flower growth stage for three consecutive years may reduce adult knapweed density.

MDT's Maintenance Manual[5] describes mowing guidelines and standards to enhance desirable vegetation and impact desirable plants. The following information is adapted from the manual: **Section C. Chapter 5.6 Vegetation Management – Mechanical Mowing (MMS 2201) 11/02/2005.** Supplemental information added by the authors of this plan is shown in *italics.*

##### *Activity Description*

This activity is the mechanical mowing of vegetation along the roadside to ensure safe, functional, and healthy roadsides through proper planning and scheduling.

##### *Purpose statement*

The ultimate goal of roadside vegetation management is to produce a safe and healthy, low-maintenance, self-sustaining roadside by encouraging beneficial vegetation. Proper roadside vegetation management should not necessarily be based on a timetable, but on the current vegetation type, local concerns and condition of the roadside community.

The roadside is comprised of Three Zones.

[5] http://www.mdt.mt.gov/publications/manuals/maint_manual.shtml

- **An active/operational zone, Zone 1**, which is typically the area from the paved shoulder out 15 feet. *Mowing widths in the active zone may be limited to no more than 8 to 10 feet off the edge of pavement in identified wetlands, unless needed to maintain proper functioning of highway features (e.g. drainage or snow drift control).*
- **A passive/transitional zone, Zone 2,** which is the remainder of the right-of-way width. Zone 2 should not be mowed unless it is a component of a predetermined management issue, such as snow drifting areas, sight distance, aesthetic issues in urban areas, or a component of weed control plans.
- **And Zone 3**, which are the areas managed around guardrails, delineators, stockpiles and grounds associated with facilities.

Mowing may be used to:

- maintain safe sight distances
- control noxious and nuisance weeds
- reduce the potential for snow drifting
- improve aesthetic values and improve the visibility of signs
- comply with local urban concerns regarding vegetation management

*Timing of Maintenance*

Safety concerns take precedence over any of the other listed mowing purposes. If adequate sight distance for the traveler is limited by tall vegetation, mowing should take place regardless of other considerations. Prioritizing mowing should take into consideration road design and how it relatesto safety for the motorist. Highways, with wide paved shoulders, offer additional visibility warning and a safe place to park in an emergency and so should be mowed after roadways without these features.

**Mowing will be performed when necessary, and as part of a roadside management plan. Mowing after grasses reach dormancy (usually after July 15) will encourage the development of healthy, low maintenance, self-sustaining roadsides while addressing ground nesting concerns for song and game birds. Mowing is generally timed to support county noxious weed control plans, and forage removal/haying operations.** Some types of vegetation, such as sweet clover, can be more difficult to mow causing mowers to slow down, use more fuel and lose efficiency. Consider removing this type of vegetation with herbicides as mentioned in Chapter 5.7 (*of the MDT Maintenance Manual)*.

*There are urban and rural considerations for mowing.*

- Urban areas may have local concerns for fire, visibility and aesthetics that differ from rural considerations. Mowing height and frequency can and should be scheduled to compliment urban area goals.
- Rural rights-of-way, which is the vast majority of MDT's property, should only be mowed with the justifications listed in the Purpose Statement above. There are some rights-of-way that may not need mowing at all.

*Specialized Equipment*

- Mowers or brush cutters

- Truck mounted attenuator (TMA)
- Hand operated mowers and weed trimmers

*Safety and Training*

Supervisors should discuss safety hazards of mowing and use appropriate equipment and protective clothing. Consult MDT Employee Safety Manual and MUTCD mobile work zone requirements. Questions regarding vegetation should be addressed to the Roadside Management Specialist in the Helena Service Center.

*Best Management Practices*

Best management practices include:

- Mowing plans will identify areas and mowing timing to be supportive of the MDT 6-year noxious weed control plans and other considerations.
- Mowing widths in Zone 1 (15 feet from paved shoulder) may be limited in some places to no more than 8 to 10 feet off the edge of pavement. These areas may be defined by DEQ as state water quality impaired segments.
- Mowing height should never be less than 6 inches unless there is a specific urban consideration. This mowing height will reduce plant shock and root dieback. The following can occur if roadside vegetation is cut too short (scalping) during the growing season.
    - Soil temperatures and erosion increases
    - Desirable vegetation experiences reduced vigor, lowering tolerance to drought, and vulnerability to high-maintenance noxious and nuisance weed growth.
    - Mowing during the growing season opens the shade canopy and encourages weed growth
- Clean equipment used in mowing and brush cutting activities on MDT R/W on a regular basis. A mower will spread weed seeds when mowing through an infested area. Each mower should be cleaned by power washing prior to transferring the mower between Sections, when moving between counties, or when moving from one route segment to another if a route segment has known weed populations.

*Procedures*

Evaluate traffic control needs and appropriate work zone requirements.

Refer to the Area vegetation management plans for timing, location, weed control, and vegetation development.

Inspect areas to be mowed for debris and other hazards or obstructions. Remove debris to prevent items from becoming projectiles. Hazards and obstructions should be marked and may include culverts, concrete head-walls, flared ends, drop inlets, splash basins and washouts.

Mowing widths should be no greater than Zone 1 unless some limited or specific problem or goal exists. It is not MDT intent to mow all of our rights-of-way.

Check condition of equipment and complete required pre-operational inspections and daily operational servicing. Check to make sure equipment is set for appropriate mowing heights. Minimum mowing height is six inches (6”). Always mow in the same direction as traffic, unless special permission is given by the Maintenance Chief.

Shadow vehicles should be considered to warn traffic in areas where mowing operations interfere with the normal flow of traffic in the driving lane. Consult the MUTCD for proper traffic control techniques for mobile operations.

Particular attention should be given to visibility concerns at roadway intersections and approaches.

Since mowing operations often require operators to work in isolated areas, operators should take portable radios during mowing operations, if available.

When mowing around delineators, refrain from bringing the mower onto the paved roadway, if possible. Instead, consider eliminating the vegetation between the delineator and the paved surface using herbicides as described in Chapter 5.13 (*of the MDT Maintenance Manual)*. Extra caution should be given to steep shoulders to prevent rollovers when mowing behind delineators.

### *Cultural Methods*

Cultural weed management methods enhance growth of desired vegetation that should help slow weed invasion. The use of irrigation, fertilization, plant competition, smother crops, and weed life cycle disruption are methods that can be utilized on roadside rehabilitation projects. Maintaining native or desirable vegetation in a healthy condition and minimizing soil disturbance are beneficial for slowing spread of noxious weeds.

Irrigation can be used to manage some weeds; however, its application on most highway rights-of-way is limited. Irrigation can be used to help establish vigorous stands of desirable plants quickly and encourage root development thus providing increased competition for invasive plants.

Use of fertilizer as a weed management tool will cause most noxious weeds to become more vigorous. Fertilizer in combination with reseeding or other restoration techniques may increase vigor of desirable plants and make the site more resistant to weed invasion.

Fire is a natural process that can help maintain or improve health and productivity of native plant communities. However, fire may also open niches that enhance establishment of invasive non-native plants and is not a safe or practical roadside vegetation management tool that will be considered by MDT.

### *Biological Management*

Use of biological agents for managing noxious weeds is part of MDT’s integrated weed management program, and will be coordinated through county weed districts, universities, and other state and federal agencies. MDT is encouraging counties to identify appropriate areas for insect releases. Funding for this activity and for insectaries at selected high schools is being offered through a memo of understanding that insects raised and /or collected will be released on appropriate roadsides or facilities.

Biological control involves the use of living organisms, such as insects, pathogens, or grazing animals, to recreate a balance of plant species with predators. This tool is often viewed as a progressive and environmentally friendly way to control pest organisms. When successful, it can provide essentially permanent, widespread control with a very favorable cost-benefit ratio.

Biological control agents are introduced from the country where the host weed originated. These agents are extensively tested to ensure that they have a very narrow host range and will not pose a serious threat to non-target plants, especially endangered species. The testing process for a biological control agent is typically three to four years in duration and involves 50 to 75 test plant species with final approval by USDA, Animal Plant Health Inspection Service. Although extensive screening and testing reduces the potential for injury to native plants, biological control is not risk-free (Story pers. comm.). Once established, biological control agents may persist "forever" which is liability if the agent attacks desirable species (Pemberton 1985; Lockwood 1993, 2000; McEvoy and Coombs 2000). *Aphthona* sp. is an example of a well-established biological control agent that is impacting leafy spurge in Montana with no apparent damage to non-target plants.

Funding is made available to several high schools to develop insectaries to raise and release insects in appropriate locations of the rights-of-way. Memorandums of understanding have been drawn up between the schools and MDT. The long-term benefits of this relationship are awareness, education of students and the balance of biological control for rights of way and adjacent lands. Additional funding is available to purchase and release commercially available bio-control agents.

Use of grazing animals will not be a considered weed management tool on state-owned roadsides. High cost of fencing livestock, and liability issues associated with potential livestock incursions with automobiles, restrict use as a roadside vegetation management option.

TABLE D-1. MANUAL, MECHANICAL, AND BIOLOGICAL MANAGEMENT METHODS FOR NOXIOUS WEEDS (C. DUNCAN 2011) NOTE: DOES NOT INCLUDE SUBMERSED AQUATIC PLANTS.

| Weed Species | Hand-pulling/Digging | Tillage | Mowing | Biological Agents[3] |
|---|---|---|---|---|
| Blueweed[2] | Plants can be dug successfully; remove at least 3" of root crown | Controlled by tillage | Reduces seed production if mowed at late bud growth stage; no plant control | No biocontrol agents available. |
| Sulfur (erect) cinquefoil | Difficult to hand pull; digging is effective on individual plants | Controlled by tillage | Reduce seed production if mow at bud stage; no plant control | No biocontrol agents available |
| Common tansy | Stops seed production, will not control plant | Tillage will spread root fragments | Mow at late bud growth stage to reduce seed production; no plant control | No biocontrol agents available |
| Dyers woad[1] | Remove upper 3" of crown to control plant by digging | Annual tillage will control in crop. | Reduce seed production if mowed at late bud stage, no plant control | Rust fungus (*Puccinia thlaspeos*) can reduce plant vigor; not suitable as control in MT |
| Field bindweed | Stops seed production, will not control plant | Tillage will spread root fragments | Not effective | Mite - available in TX; moth - unavailable |
| Hawkweeds[2] | Not effective, digging spreads root fragments | Tillage will spread root fragments | Not effective; stimulates lateral growth | Under screening and evaluation; no agents currently available |
| Hoary alyssum[2] | Hand pulling effective on small, scattered infestations; remove at least 3" of root crown | Controlled by tillage | Reduce seed production if mow at bud stage; no control to very limited plant control | No biocontrol agents available |
| Houndstongue | Plants can be dug successfully; remove at least 3" of root crown | Controlled by tillage | Reduces seed production if mowed at late bud growth stage; no plant control | No biocontrol agents available for distribution in U.S.; *Mogulones cruciger* reported occurring near Missoula |

| Weed Species | Hand-pulling/Digging | Tillage | Mowing | Biological Agents[3] |
|---|---|---|---|---|
| Spotted and Diffuse knapweeds | Hand pulling effective on small, scattered infestations; remove at least 3" of root crown | Controlled by tillage | Reduce seed production if mow at bud stage; no control to very limited plant control | 13 insects introduced for biological management; insects established; reduction of infestations in some locations |
| Russian knapweed | Stops seed production, will not control plant | Tillage will spread root fragments | Reduce seed production if mow at bud stage; no plant control | A gall-forming nematode, *Subangina picridis*, has been released - limited impact |
| Knotweed complex | Large, extensive root system. Can dig newly established infestations. Must remove all root segments to control plant | Tillage will spread root fragments | Reduces seed production but my expand lateral growth | New invader; control infestations with other methods |
| Leafy spurge | Stops seed production, will not control plant | Tillage will spread root fragments | Must be mowed every 3 to 4 weeks to stop seed production; no plant control | 13 agents available for release; *Aphthona sp*. most suited to effective IWM |
| Oxeye daisy | Individual plants can be dug successfully | Controlled with multiple tillage operations | Reduce seed production if mow at bud stage; may stimulate lateral growth | No biocontrol agents available |
| Purple loosestrife[1] | Difficult to dig; must remove all root fragments | Tillage will spread root fragments | Reduce seed production if mow at bud stage; may stimulate lateral growth | 4 biocontrol agents available for release |
| Perennial pepperweed[2] | Stops seed production, will not control plant | Tillage will spread root fragments | Mowing 2 times per season stopped seed production (N. CA); no plant control | No biocontrol agents available |
| Russian olive-regulated plant | Can be dug or pulled with mechanical equipment - difficult to remove | Tillage not effective | Tree can re-sprout above cut area | No biological agents available |
| Rush skeletonweed[1] | Stops seed production, will not control plant unless done 2-3 times/yr for 6-10 yrs | Tillage spreads root fragments | Limits seed production in dry years; no plant control | 3 insects available; 1 fungus |
| St. Johnswort | Only effective on young, isolated plants | Repeated tillage effective | Reduce seed production if mow at bud stage; no plant control | 4 insects available; limited success in MT |
| Tall buttercup[2] | Individual plants can be removed by hand-pulling | Repeated tillage effective | Reduce seed production if mow at bud stage; no plant control | No biocontrol agents available |
| Tamarisk | Can be dug or pulled with mechanical equipment - difficult to remove | Tillage not effective | Re-sprouts when cut with mower | *Diorhabda elongate* - for availability contact Gary Adams APHIS 406-449-5210 |
| Tansy ragwort[2] | Individual plants can be removed by hand-digging; remove entire crown | Repeated tillage effective | Reduce seed production if mow at bud stage; no plant control | 3 biocontrol agents available; Cinnabar moth most effective |
| Canada thistle | Stops seed production, will not control plant | Tillage will spread root fragments | Must mow 2 X/year to obtain limited plant control; can reduce seed production if mowed at bud stage | 4 biocontrol agents available; minimal impact on Canada thistle in Montana |
| Dalmatian toadflax | Effective on small infestations; must be done for 5-6 consecutive years. | Dalmatian- Must be repeated every 7 to 10 days for 2 yrs to be effective; | Reduce seed production if mow at bud stage; no plant control | 5 biocontrol agents available; *Mecinus* stem mining weevil most effective |
| Yellow toadflax (yellow toadflax, | Must remove all root fragments; must be done for 5- | Not effective on yellow toadflax - will | Reduce seed production if mow at bud stage; no | 5 biocontrol agents available |

| Weed Species | Hand-pulling/Digging | Tillage | Mowing | Biological Agents[3] |
|---|---|---|---|---|
| cont.) | 6 consecutive yrs. | spread root fragments | plant control | |
| Whitetop (hoary cress) | Somewhat effective on newly established plants; must pull for 4 consecutive years | Tillage will spread root fragments | Reduce seed production if mow at bud stage; no plant control | No biocontrol agents available |
| Yellowflag iris[2] | Very difficult to remove, must dig and remove entire root | Tillage not effective | Reduce seed production if mow at bud stage; no plant control | No biocontrol agents available |
| Yellow starthistle[1] | Hand pulling effective on small, scattered infestations; remove 3" of root crown | Controlled by tillage | Reduce seed production if mow at bud stage | Biocontrol agents available; no ac currently in MT - biocontrol agents not suitable as control |

[1] Indicates weeds that are either in Priority 1A (not currently present in the state) or Priority 1B in Montana. Highest priori ty for eradication or containment where less abundant. Report new infestations to Montana Department of Agriculture or county weed district.
[2] Indicates Priority 2A weeds common in isolated areas of Montana. Management criteria require eradication or containment where less abundant. Report new infestations to county weed districts.
[3] Information on biological control agents can be found in *Biological Control of Invasive Plants in the United States*. 2004. Ed. E.M. Coombs, J.K. Clark, G.L. Piper, and A.F. Cofrancesco, Jr. Oregon State Univ. Press.

### *Organic Herbicides*

Organic herbicides include vinegar, teas made from straw, knapweed and other allelopathic plants. Researchers at the University of Montana have documented herbicidal actions of a chemical in knapweed. However, there has been little documented research on other organic herbicides. From observations, the effect of these products tends to be non-specific, suppressing plant growth and affecting native grasses and forbs. They may be more effective on annual plants.

### *Herbicide Management*

Herbicides are a valuable tool for managing invasive plants on transportation corridors and an important component of an integrated management program. As with other management tools, MDT recognizes the effects and limitations of herbicides proposed for use on roadsides.

Herbicides are categorized as *selective* or *non-selective* based on their ability to control certain kinds of plants. Selective herbicides will control either broadleaf or grass plants depending on the product selected. For example, 2,4-D and picloram () are selective herbicides that will control certain broadleaf plants such as knapweed and have only minimal to no impact on grasses at recommended application rates. An example of a non-selective herbicide is glyphosate affecting both grasses and broadleaf plants. Herbicides are also selective based on the rate used.
Spotted knapweed generally is controlled using a lower herbicide application rate (1 pint of picloramper acre) than for leafy spurge (2 quarts of picloram per acre). Application rate will affect potential impact on non-target broadleaf species. At 1 pint per acres picloram is selective for weeds such as spotted knapweed and sulfur cinquefoil while many native broadleaf plants are not injured.

Herbicides currently used for noxious weed control on roadsides include picloram, aminopyralid dicamba, 2,4-D, MCPA, fluroxypyr), clopyralid),triclopyr metsulfuron, imazapic chlorsulfuron, imazapyr, Indaziflam, and glyphosate. Other herbicides will be considered for use as they become available. In addition to these active ingredientsherbicide formulations also include inert materials, such as carriers and surfactants.

sulfmeturon (Oust), diuron, and bromacil may be used on a very limited basis for functional and safety aspects along roadsides where more long-term, total vegetation control is desired. Herbicide resistance has been known to occur in some weed species such as kochia. Proper selection of herbicides and varying the family of herbicide applied to a site will reduce the opportunity for resistance to occur. For example, if metsulfuron is applied for control of kochia along a roadside, the following year fluroxypyr, dicamba or 2,4-D should be used on that site. Table D-1 indicates herbicides, rates, and timing for controlling select plant species on roadsides.

Properly used, herbicides are effective against most invasive plants. Variation in effectiveness occurs due to weed biology, plant growth stage, application rates, condition of the application equipment, and environmental conditions such as temperature, soil moisture, and precipitation.

Herbicides proposed for use on roadsides have been registered for use by EPA. These herbicides are carefully tested by the manufacturer to determine human health, safety, and environmental effects prior to registration. Herbicide application made to road rights-of-way will be made within label directions by state certified herbicide applicators.

Residual broadleaf herbicides (e.g. amynopyralid, picloram, dicamba, and others) may be present onroadside vegetation that was treated for noxious weeds. Herbicide resides may remain on hay and forage grass used for feed or bedding or may be present in manure and urine in livestock fed treatedhay. See Appendix E for information on handling compost, manure, or hay/livestock bedding from herbicide-treated forage on roadsides.

MDT's Maintenance Manual[6] describes guidelines and standards for chemical vegetation control using herbicides. The following is adapted from the manual: **Section C. Chapter 5.7 Chemical Vegetation Control – Chemical Spraying (MMS 2204)**. Supplemental information added by the authors of this plan is shown in *italics.*

### *Activity Description*

This activity includes chemical treatments to control or prevent the growth of vegetation such as noxious weeds, brush or other vegetation. (See special instructions in Vegetation Management Plan.) **Chemical spraying should be done by or under the supervision of a licensed chemical applicator**. Chemical spraying may be a contracted service.[7]

This activity should be considered in developing the six-year weed control agreements.

### *Purpose*

The purpose of this activity includes the chemical control against the spread of noxious weeds, to inhibit the growth of vegetation around structures such as signs and guardrails, improve aesthetics, improve sight distance, reduce fire hazards, reduce snow drifting and to help with drainage problems in areas where mowing is not practical.

Nuisance vegetation, such as sweet clover and alfalfa, maybe controlled in Zone 1 through the use of herbicides. This vegetation causes visibility concerns as well as increased mowing efforts and can attract deer to the roadsides.

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[6] http://www.mdt.mt.gov/publications/manuals/maint_manual.shtml

[7] MDT Maintenance Division has licensed applicators that apply herbicides for noxious weed management on rights-of-way. Although most herbicide applications are currently contracted through county weed districts, MDT has assumed responsibility for weed control on some rights-of-way. Weed management activities, including herbicide applications, would be coordinated with respective county weed districts to help assure correct application method, timing, and noxious weed species and location.

### *Timing of Maintenance*

There are a number of chemical vegetation control options. Each situation will require planning for the specific application and specific product used.

Chemical mowing is harmful to beneficial grasses and should not be conducted.

Chemical sterilants are primarily used around guardrails, signs, stockpiles and facilities. Chemicals are typically applied in the fall or early spring based on manufacturer's recommendations.

County weed control boards typically perform noxious weed control for the Department. However, Department noxious weed control efforts must be done under the direction of a licensed applicator.

Appropriate chemicals are used to control brush and nuisance vegetation.

### *Specialized Equipment*

- Sprayer mounted on equipment
- Hand sprayer
- Protective clothing including gloves, eye protection, coveralls
- Truck Mounted Attenuator (TMA) may be required

### *Materials*

For a chemical vegetation control program to be successful, the proper product must be used. The product must be capable of obtaining the desired control and be economical when compared to other methods of control. All products must be handled, stored and applied according to the manufacturer'slabel.

### *Documentation*

A record of all chemical applications must be kept on the appropriate form acquired through the licensed applicator.

### *Storage*

Chemicals should be accessible only to authorized personnel and should be stored in accordance with safety data sheets and manufacturer's recommendations.

### *Safety and Training*

All employees who work with chemicals should attend training established and approved for chemical applicators and be licensed as a pesticide applicator or work under the direct supervision of a licensed pesticide applicators.

The following guidelines should be observed:

- Employees must be trained prior to using a chemical product.
- Ongoing and continued annual education is required for applicators

Employees may only use products for which they are certified to use.

Certification must be kept current for licensed applicators.

Employees will follow special instruction for each chemical he/she uses including the use of protective clothing, proper disposal, use and handling.

Employees must follow the manufacturer's directions for mixing, handling and use.

Employees should be familiar with the safety data sheets for specific chemicals they

are using.

Employees need to follow safety guidelines in the MDT Safety Manual.

### *Special Precautions*

Care must be exercised in filling and washing the equipment to ensure that chemicals are not deposited in locations that will become hazardous to vegetation, water, groundwater, human or animal life. Equipment should be checked before using and thoroughly cleaned after use.

Special precautions are required around water, crops, residences and areas designated as no spraying areas.

### *Environmental Best Management Practices*

Best management practices include:

- Eliminating spray activities on structures located over streams or adjacent to wetlands.
- Using chemicals approved for use near aquatic resources whenever spraying *near aquatic areas.*
- Using herbicides in accordance to EPA labels.
- Hand spray around structures over water or within riparian area that require chemical vegetation control.
- Within twenty-five (25) feet of riparian areas, boom spray no farther than eight (8) feet from the road edge.
- Within 25 feet of an active stream, stop all boom spraying unless specific herbicide permits.

### *Procedures*

Coordinate efforts with the county weed coordinator to develop an annual weed control plan.

Review project site to determine if any special application conditions exist.

Ensure that safety data sheets for the products being used are on the job site.

Check application equipment daily for safety and proper application.

Wear protective clothing and safety devices.

Mix chemical in accordance with manufacturer's recommendation.

Dye may be utilized with chemicals *when spot spraying* so applicators can determine where spraying has occurred.

Provide necessary traffic control.

Apply chemicals in accordance with manufacturers' recommendations.

Use caution to minimize drift to adjoining properties. Use hand-held wind gauges to determine wind speed. Applicators should use extreme caution spraying materials when winds exceed 10 mph.

Spray with truck sprayer when practical, hand-held sprayer on inaccessible areas or spray as identified in the weed control plan.

Remove traffic control.

Clean and service spray unit.

Dispose of chemical containers according to MT Department of Agriculture's rules.

## RECLAMATION AND REHABILITATION

Reclamation after construction and ground disturbing maintenance activities is a critical component of roadside invasive plant management programs. Healthy plant communities with adequate ground cover are more resistant to weed invasion. Restoration of roadside plant communities will ultimately reduce costs associated weed management.

MDT uses recent reference materials published by the Natural Resources Conservation Service (NRCS) and Montana State University Extension to inform reclamation strategies. Native and non-native grasses and forbs are considered with the ultimate goal of a stable, low maintenance plant community. *MDT Standard Specifications for Road and Bridge Construction*, and the Department's *Erosion and Sediment Control Best Management Practices Manual (Dec. 2016)* contain general guidance for contractors and MDT personnel for weed control and seeding requirements during construction projects. Project specific reclamation plans should also be developed.

For many projects, the roadside reclamation plan is divided into areas requiring different seeding and erosion control strategies. For multi-year projects, temporary seeding may also be used for weed management or erosion control. Permanent seeding plans can be divided up by slope and distance from the paved surface. For example, the seed mix design within 15 feet of the paved surface may include more short stature grasses, whereas the main consideration for a steep slope may be fast establishment and deep rooting. In all cases, seeding designs should consider invasive and noxious weeds. Seeding methods should be consistent with site conditions and seeding rates adequate to establish a diverse, weed resistant plant community of desirable species.

### *Considerations for Seeding*

Adapted from: Orloff N, M Pokorny, J Mangold, J Marks, B Christiaens S. Rogge. 2022. Revegetation Guidelines: Considering Invasive and Noxious Weeds. Montana State Univ. Est. Pub EB0242.

Establishing plants on disturbed roadside areas can be difficult. These areas often have highly altered soil, low in organic matter and higher in gravels and sands than the surrounding areas. It requires time and patience to establish a new seeding. Keeping in mind the economic and biological realities of the setting, is important to set goals for project success.

#### SITE ASSESMENT

Choosing plant species and planting methods for reclamation depends on many factors. Some of the most important factors are climate, soils and equipment accessibility. Much of this information can be found using online sources such as Ecological Site Descriptions or Soil Surveys published by the NRCS. It is also important to keep in mind that present conditions, impacted by construction activities, may be significantly different from historical data. Precipitation amounts and length of growing season can be used to choose plants that are well adapted to the site.

Soil texture, depth and organic matter can further refine the species chosen.

Roadside reclamation projects can encounter variable site conditions within a linear project, and some variability should be factored into the reclamation plan. Topsoil is salvaged and replaced wherever possible, but this usually results in some loss of depth or quality. Fertilizer use on poor soils may be necessary but should be applied carefully and the lowest possible rates. Studies have shown that high fertilizer rates in first year seeding are not necessary and benefits weeds. Weeds should be controlled using seedbed conditioning or other methods prior to seeding.

#### SEED MIX DESIGN

Seed used should be purchased locally from a dealer that has a Montana Department of Agriculture's seed dealer and labeler license. This ensures that the seed meets the legal requirements for sale in Montana, and that it is tested for weed seed content. Montana law requires that seed lots are tested and labeled with information about species, variety, purity and germination. With purity and germination rates in a given batch of seed the amount of Pure Live Seed (PLS) can be calculated. Seeding rates for a project should be ordered and applied using lbs. PLS. Seed containing noxious weeds or a significant amount of other weed seed should be rejected.

Many plant species have specific varieties that are commercially available. Varieties should be chosen that have characteristics beneficial to the project goals, and with an origin closer to the project site. Pre-made mixes from unknown or far away sources should be avoided.

Weed resistant plant communities fill many niches and provide strong competition for invading species. Therefore, a seed mix should contain species with various characteristics. Some considerations may be:

- Species with different seasons of growth
- Bunchgrasses and sod-forming grasses
- Fast establishing species
- Short and long-lived perennials
- Species with characteristics that meet the site goals and objectives.

#### METHODS AND TIMING OF SEEDING

In Montana, the suggested seeding times are either early spring, or late fall. Late fall, dormant season seeding is the preferred method of seeding for most native mixes. This is because many seeds require a cold period before they emerge, and the seed is already in place to take advantage of spring moisture. Fall seeding should be late enough that cold soil temperatures prevent seed germination. Seed planted too early in the fall could break dormancy and then freeze. Planted at the correct time, seed germination will occour when soil warms in the spring and there is adequate moisture in the soil.

Spring seeding can also be successful, but must be done early enough, usually by May 15$^{th}$, to have enough moisture prior to summer dry periods.. Spring seedings are often delayed because soils are too wet for seeding equipment. When soils dry enough for equipment to operate, there may not be enough moisture for seedlings to grow large enough to tolerate summer drought. Seeding in the late spring or early fall should only occur with supplemental water.

Drill seeding is the most reliable method of planting seed. For reclamation projects, a range drill or other heavy-duty drill should be used to plant the seed ¼ to ½ inch deep. This requires an adequately prepared, firm and weed free seed bed. Drill seeding is preferred because it ensures seed to soil contact, which is critical to plant survival. If drill seeding equipment cannot access the site because of its size or slope, dry broadcast seeding is commonly used. In order to ensure seed to soil contact when broadcast seeding, the soil should be left in a roughened condition and then raked, harrowed or scarified after seeding to cover the seed with soil. Because some seed will remain on the soil surface, and not have proper seed to soil contact, seeding rates should be doubled.

Hydroseeding can be used for very steep slopes or other sites that cannot be easily accessed on foot. Hydroseeding can result in lower seed establishment rates that drill or broadcast seeding because the

seed cannot be covered with soil. Seed can also be damaged by being in the mulch slurry, or by the hydroseeding equipment. Hydroseeding rates can be as high as four times the drill seeding rates.

#### EROSION CONTROL AND MULCHING

Roadsides often have steep slopes, ditch lines, cut-to-fill transitions and other areas highly susceptible to erosion. Erosion is especially common in the first years after seeding, because the high percentage of bare ground increases runoff. These areas need special attention to prevent the topsoil and seed from washing away. Biodegradable options like hydraulic mulch or erosion control blankets made of natural fibers are the most common form of temporary erosion control. Blankets and hydraulic mulches can also aid germination by retaining moisture and suppressing weeds.

Compost has been used extensively for reclamation projects, and in Montana it has been effective on steep slopes where placing topsoil is difficult. Compost can be used to improve soil quality, and because of its high-water holing capacity, is effective at preventing erosion. It is essential to use high quality, weed free compost. Poorly processed compost can leach excessive nutrients, contain weed seed or herbicides.

#### POST SEEDING MAINTENANCE

As a rule, newly seeded areas will be dominated by weedy type plants the year or two following seeding. This is expected and not necessarily bad because annual weeds can help stabilize soilsbefore the seeded species establish. Mowing these sites in mid-summer at a 6 to 8-inch mower height is the best management tool to control weedy growth and allow the seeded species to better compete for limited resources. Herbicides should not be used the firstgrowing season following seeding. Young perennial grass seedlings may be damaged even by “broadleaf” herbicides if the plants are under stress.

## ASSESSMENT: INVENTORY/SURVEY, MONITORING AND EVALUATION

Assessment includes inventory/survey, monitoring, and evaluation, which are critical components of a roadside vegetation management plan. Assessment is the process of gathering and evaluating information in a way that facilitates decision-making. Through methods such as inventory/survey, and monitoring, assessments can provide a more accurate picture of problems and solutions associated with plant invasions so that land managers are better equipped to identify feasible management strategies, develop measurable objectives, select safe and effective methods, and evaluate program outcomes.

Gathering information about the location and abundance of invasive plants (inventory/survey) is necessary to identify newly invading species, develop long-term management goals and objectives and implement action plans, and evaluate the status of weed management efforts. Monitoring is necessaryto establish baseline and trend data on changes in site condition and vegetation before and after implementing weed management practices. Evaluation relates information obtained from monitoringto the objectives of the annual plan of operation.

A statewide inventory was completed in 2006 that was specific to road rights-of-way. The survey was a cooperative effort with MDT, Montana Department of Agriculture, Montana State University, county weed districts, and the Noxious Weed Survey and Mapping System Program. There has been no formal inventory conducted on roadsides since 2006; however, individual counties maintain herbicide records on road rights-of-way and these data provide information on infestation levels and weed species present on roadsides.

**Monitoring and evaluation** efforts should be implemented to measure status of projects. Monitoring efforts should be both short and long-term depending on project objectives. The level of monitoring will vary based on resources and manpower available. Monitoring includes all aspects of the integrated program including public education and awareness, prevention, restoration projects, and

roadside weed management.

## PUBLIC AWARENESS AND EDUCATION

Early detection and treatment of weeds, and an overall effective preventive weed management program is dependent on education. County weed districts, federal agencies, Montana State University Cooperative Extension Service (CES), University of Montana, Montana Department of Agriculture (MDA), Montana Statewide Noxious Weed Awareness and Education Campaign, and the Montana Weed Control Association (MWCA), have been actively involved in educating the public about invasive plants.

## PREVENTION AND EARLY DETECTION

Transportation corridors serve as major sites for introduction and spread of noxious weeds. Thus, prevention, early detection of newly invading species, and implementing rapid control measures are critical to supporting county and state weed management objectives. **Preventing the introduction of invasive plant seeds and vegetative parts into non-infested sites is the most practical and cost-effective weed management method.**

Measures include:

- use of weed seed free seed, mulch, straw, and topsoil on construction projects
- cleaning construction, maintenance, and rehabilitation equipment before moving it to non-infested areas
- reseeding after disturbance
- maintaining healthy, weed resistant roadside plant communities
- not allowing newly established weeds to set seed
- eradication of newly established infestations

### *Construction Projects*

Assessment of weed presence or absence on existing roadsides should be conducted prior to major construction projects to ensure that invasive undesirable plants are not transported during construction/ reconstruction projects. Restoration following roadside construction or other major disturbance is critical for preventing weed invasion. Stockpiling the organic layer and topsoil for redistribution following construction will improve establishment of desirable vegetation. Desirable vegetation that resists weed invasion should be established as soon as practicable from the road edge to the ROW boundary. Construction sites should be monitored for a minimum of three (3) years, and newly invading weeds controlled prior to seed set. Federal funds are available for this effort through a bid process. The availability of these federal funds is tied to the recovery of beneficial vegetation as described in the Stream Water Pollution Prevention Permit (SWPPP) associated with the project.

### *Maintenance and Equipment Yards, Parking Areas, Road Turnouts, Gravel Pits*

Motorized vehicles have been identified as a major distributor of invasive plant seeds. Preventing establishment of weeds on roadsides where they can be moved by vehicles is critical. Weeds should be controlled in maintenance and equipment yards, parking areas, road turnouts, and other areas frequented by vehicles to prevent movement of seed to non-infested sites. Gravel pits and other sources of construction materials should have weed management programs in place to control noxious weeds or consider a quarantine of heavily infested sites to avoid seed transport.

### *Equipment Washing*

Equipment used in mowing, brush cutting, and other routine maintenance activities on MDT rights-of-way will be cleaned on a regular basis. A mower can be a virtual weed seeder when mowing through

an infested area. Each mower should be cleaned by power washing prior to transferring the mower between Sections, when moving between Counties, or when moving from one route segment to another if a route segment has known weed populations.

### *Weed Identification Training for Employees*

Prevention programs include training employees on invasive plant identification, impacts of invasive species, and management methods. Field employees including MDT engineers, biologists, maintenance and other staff involved in road construction and maintenance activities should receive training. Maintenance employees should also know locations of weed infestations to minimize spread during routine maintenance activities.

## APPENDIX E. STEWARDSHIP GUIDELINES FOR ROADSIDE FORAGE PERMITEES

Herbicides are applied along many roadsides in Montana to control noxious weeds. Some of the herbicides applied (aminopyralid, picloram®, aminocyclopyrachlor, dicamba, and others) have residual properties that remain in desirable grasses following application. Herbicide residues do not have adverse effects on livestock or wildlife consuming the forage. However, manure from livestock consuming treated forage and treated forage used for livestock bedding may contain herbicide residues that could damage desirable crops. Following are some facts and guidelines to follow when feeding hay harvested from roadsides.

### *Key Facts*

- Residues from most herbicides do not degrade in plants or plant biomass and take 3 to 7 days to pass through a grazing animal's digestive system once treated forage is ingested.
- Urine and manure from livestock fed treated forage may contain enough herbicide residue to cause injury to sensitive broadleaf plants (e.g. lentils, sunflowers, beans, etc) including ornamentals from 3 to 7 days following ingestion of treated forage.
- Herbicides such as aminopyralid, picloram, and dicamba are broken down by two mechanisms: soil microbes and ultraviolet light from the sun. These herbicides breakdown at different rates due to herbicide active ingredient; soil type; climate/ precipitation; and soil microbe population at site of treatment.
- Potential damage to desirable plants could result if herbicide-treated hay or manure from livestock fed herbicide-treated hay is used in compost or as a soil amendment.
- Hay harvested from Montana roadsides cannot be sold and must be fed or consumed on the farm or ranch that maintains the roadside forage permit.
- Forage permit holders need to assume that forage harvested from roadsides may contain herbicide residues and follow use precautions and restrictions described in the following guidelines.

### *Guidelines for forage permit holders*

1. Do not use roadside hay or manure from animals that have eaten hay harvested from roadsides in compost or mulch that will be applied to land where susceptible broadleaf plants may be grown.
2. Do not spread manure from animals that have grazed roadside forage or eaten hay harvested from roadsides on land used for growing susceptible broadleaf crops.
3. Manure from animals that have grazed forage or eaten hay harvested from roadsides should be used on rangeland, pasture grasses, or conservation reserve program lands (CRP).
4. Do not plant a broadleaf crop (e.g. soybeans, sunflower, lentils, vegetables, field beans, and potatoes) in fields treated with manure from animals that have grazed forage or eaten hay harvested from herbicide-treated roadsides until an adequately sensitive field bioassay is conducted to determine that the herbicide concentration in the soil is at level that is not injurious to the crop to be planted.

MDT attempts to provide accommodations for any known disability that may interfere with a person participating inany service, program or activity of the Dept. Alternative accessible formats of this information will be provided uponrequest.
For further information call (406) 444-6991 or TTY (800) 335-7592, or by calling Montana Relay at 711.

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