Invasive Plant Treatment Guidelines for Provincial Public Land Management: Marsh Thistle

Marsh (Plume) Thistle (*Cirsium palustre)*

Family: Asteraceae

Legal Status: Regional Noxious Weed, *Weed Control Act*

Description:

- Biennial to short-lived perennial;
- Grows 0.3 to 2.5 metres tall from a taproot with clusters of fibrous roots;
- Stems are slender and usually unbranched with a purplish hue. Stems have spiny wings arising from winged leaf-bases;
- Spiny basal and stem leaves are deeply segmented with prominent woody veins. Leaves are lightly to densely hairy on the undersides and have winged bases;
- Compact clusters of pink/purple flowers form at the tip of the stems. Bracts at the base of the flowers are sticky and tipped along the spine. If the main stem is broken, flowers will emerge from leaf nodes along the remaining stem;
- Seeds are straw-coloured, 2.5-3.5mm long with a 9-10mm long tawny pappus. A single plant may produce up to 2,000 seeds;
- Seeds are dispersed by the wind with most falling within 10 meters of the plant. However, vehicle movement of seed is significant;
- Seed viability is 3 years in soil;
- Life Cycle:
    - Seeds germinate throughout the growing season and form rosettes to overwinter
    - Rosettes begin to bolt in early July - earlier in southern regions
    - Flowering begins in early to mid July
    - Seeds usually start to form by late July and continue throughout the growing season
    - Plants typically cease to grow (senesce) after the first hard frost, but may overwinter as rosettes
- Prefers moist habitats, full sun and acidic soils. DOES NOT REQUIRE DISTURBANCE TO ESTABLISH.

Seedling

Rosette

Bolted plant

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Strategies for Marsh Thistle Management

Work collaboratively with adjacent land managers and other stakeholders to ensure strategic cross-jurisdictional approach to managing marsh thistle by region. The approach may include:

1. PREVENTION: If marsh thistle is not present in the region, crews will be asked to look for marsh thistle while completing invasive plant management activities;
    - If found in a new region, identification will be confirmed by working with a Provincial Invasive Plant Specialist;
    - Confirmed sites will be surveyed and treatments will be initiated to eliminate the site and keep the region free of marsh thistle. All survey and treatment data will be entered into the Provincial invasive plant database;
    - The Provincial database should be regularly reviewed to determine if marsh thistle is present in each region.

2. REGIONAL ERADICATION: If marsh thistle is present in the region but has a limited distribution with sites less than 300 square metres (<300m^2) each, efforts will be directed to contain and eventually eradicate ~~it~~. Note: If regional eradication is the goal, then all sites should receive treatment regardless of priority to prevent seed set.
    - All marsh thistle found will be surveyed and data entered into the Provincial database;

3. CONTAINMENT AND CONTROL: If marsh thistle has an extensive distribution and large population in a region, management will focus on containing established populations and preventing further spread. Note: A Provincial Containment polygon exists for marsh thistle and can be viewed in the Provincial database. All sites are treated outside of the containment polygon. Along the containment polygon, management to prevent seed spread of all known infestations will be necessary.
    - All marsh thistle found will be surveyed and data entered into the Provincial database;
    - Treatment priority will be given to: a) small, isolated sites; b) large sites and clusters of sites at greatest risk of spread (e.g., gravel pits, heavily travelled roads), and/or; c) sites threatening sensitive habitats.
    - Large sites (>300m^2) that are not associated with spread pathways or sensitive habitats will receive lower treatment priority.

Factors to Consider When Preparing Prescriptions

In addition to infestation size and distribution, the following should be considered in developing marsh thistle treatment prescriptions:

1. Soils – Marsh thistle can be found primarily in moist, heavy fine textured soils. Pulling plants in fine textured soils can often result in the tap root breaking which makes pulling less effective. Soil type also effects herbicide choice. In fine textured soils herbicides with residual qualities may have significant benefits in managing marsh thistle. Herbicide labels must be read thoroughly prior to product selection and adhered to at all times.
2. Water bodies – In BC there is a requirement to maintain set-backs from waterbodies when using herbicides. Applicators must follow the BC *Integrated Pest Management Act* and Regulation and the relevant Provincial Multi-Agency Pest Management Plan for Provincial Public land to ensure the appropriate Pesticide Free Zones (PFZs) and No Treat Zones (NTZs) are maintained.

3. Associated vegetation – Management of marsh thistle needs to include establishment and/or maintenance of a healthy plant community. Practices such as using selective herbicides and selective application methods, as well as grass seeding and/or planting larger treatment disturbances with appropriate vegetation need to be incorporated into prescriptions.
4. Goals - Prescriptions should consider the short, mid and longterm objectives for the site and the region. If eradication of a large site is the objective, then a possible prescriptive sequence of treatments may include:
    - Treatment with a selective herbicide with some residual activity OR treatment with a non-selective herbicide and seeding with a short-lived agronomic grass like annual or perennial rye;
    - Assessment and follow up treatments by pulling, digging and/or selective applications of herbicides;
    - If required, planting of native species to reclaim and restore the site to a sustainable healthy plant community, and;
    - Maintenance of the site by checking for and removing any marsh thistle that regrows or new seedlings.
5. Integrated Pest Management (IPM) – It is a requirement under the *Integrated Pest Management Act* and the relevant Provincial Multi-Agency Pest Management Plans (PMPs) for Crown land, that integrated pest management be practiced in BC. To develop a treatment prescription, each treatment method needs to be assessed for site suitability, efficacy in achieving site goals, and ability to integrate with other treatment methods.

Treatment Methods – When and Where They Should Be Applied

Cutting

NOTE: Cutting marsh thistle will not kill the plant even if repeated several times over many years. Repeated cutting will cause marsh thistle to produce new stems with multiple flowering stems and to take on a perennial habit with extensive tap and fibrous roots. Cutting will minimize seed spread only. Cutting must occur at the base of the main stem and no earlier than late flowering before seed dispersal.

Preferred Site Type(s): Sites larger than 25 square metres (>25m^2, e.g. 5m long x 5m wide) where herbicide application is not permitted.

- Cutting after seeds start to develop could increase spread and should be avoided;
- Cutting should not be used as a treatment method for smaller sites (<25m^2) where the goal is to eliminate the plants;
- Cutting can be an effective interim method of preventing seed spread from large sites (>25m^2). The site should be cut well after the plants bolt and before flowers open, typically early to mid-August in northern BC. After cutting, marsh thistle will usually flower again in a month;
- Cutting may have to be repeated in approximately 1 month intervals to prevent seed production;
- Drought conditions may alter the required frequency of cutting; and
- Sites should be monitored on a regular basis to determine appropriate treatment frequency based on the region and weather conditions.

Pulling and Digging

Preferred Site Type(s): Sites smaller than 25 square metres (<25m^2, e.g. 5m long x 5m wide) or containing only a few individual plants~~;~~ with moist, coarse textured soils are preferred.

- Previously cut sites are not ideal for pulling or digging, as plants may have developed extensive tap roots;

- Pulling and digging marsh thistle can be an effective way of removing small sites (<25m^2) or containing only a few individual plants;
- Pulling is easier in coarse textured soils when the soil is moist; and
- Pulling and digging can be an effective follow up treatment to herbicide application, once the site density has been reduced to a few individual plants.

Care must be taken to:

- Minimize disturbances from pulling and digging as this will promote germination of seeds banked in the soil. If areas larger than 5 square metres (<5m^2) are disturbed, then seeding a short-lived agronomic grass (e.g. annual or perennial rye) or planting appropriate native vegetation should be considered post treatment;
- Remove or contain pulled roots. Roots may be bagged and removed from the site; and
- Remove the entire tap root to prevent re-sprouting. This may be easier in coarse textured soils than fine textured soils.

Smothering and Other Treatment Methods

NOTE: Smothering will likely require follow up treatments and re-vegetation once the smothering materials are removed. Smothering is costly, compacts soils, impacts desirable vegetation, requires maintenance, and may delay site restoration.

Preferred Site Type(s): Sites larger than 25 square metres (>25m^2) or near a waterbody or licensed water intake (see relevant PMP), where herbicide application is not permitted.

- Smothering may be a viable option in limited circumstances, such as persistent, large sites where herbicide applications are not permitted. Such approaches need to be discussed and well documented when tried;
- Smothering materials usually consist of landscaping cloth and/or mulches, but may also include thicker materials such as carpet or recycled conveyor belt rubber. The smothering material will need to be in place for at least five years to deplete the viable seed bank;
- When the smothering material is removed the site may require re-vegetation using grass seeding and/or plantings; and
- Once the smothering material is removed (especially if removed pre-maturely), the site should be monitored for regrowth. Regrowth should be sparse and can be managed by hand-pulling or digging.

Other treatment methods, such as targeted grazing, are not recommended as the plant responds to top-growth cutting by producing more flowerheads.

Herbicides

NOTE: The applicator must always defer to the herbicide label use instructions, paying particular attention to the mixing instructions. Where herbicide treatment is suitable, the applicator is responsible for selecting an appropriate herbicide and for following the BC *Integrated Pest Management Act* and Regulation and the relevant Provincial Multi-Agency Pest Management Plan for Public land, including ensuring all active ingredients in a product are listed on the relevant PMP.

Preferred Site Type(s): Sites larger than 25 square metres (>25m^2), and not in close proximity to a waterbody or licensed water intake (see relevant PMP).

Recommended Selective Herbicides: When used properly, most grasses will be left undamaged, providing competition that will help control subsequent marsh thistle seedlings.

1. Active Ingredient(s): **Aminopyralid and metsulfuron-methyl** (e.g. Clearview).
    - Treatment Timing: Apply before bud stage or early flowering. This type of herbicide product has season long residual activity and will control new marsh thistle seedlings as they germinate.
    - Method: Best results are obtained when the spray volume is sufficient to provide uniform coverage of treated plants. Effective application rates for this product in non-crop areas is approximately 135 to 235 grams / ha.
    - Only one application per growing season is permitted.
2. Active Ingredient(s): **Aminopyralid** (e.g. Milestone).
    - Treatment Timing: Apply before bud stage or early flowering. Aminopyralid can provide up to 2 growing seasons of residual activity and will control new marsh thistle seedlings as they germinate.
    - Method: Best results are obtained when the spray volume is sufficient to provide uniform coverage of treated plants. An application rate of 0.5 L/ha of Milestone and a delivery rate of 200 to 400 L/ha will effectively control marsh thistle.
    - No more than 0.50 L/ha of Milestone can be applied per annual growing season.
3. Active Ingredients(s): **Dicamba, 2,4-D amine and Mecoprop-P** (e.g. Dyvel DSp).
    - Treatment Timing: Apply when marsh thistle is actively growing, prior to flowering. Residual activity is short and these products *will not* control new germinates.
    - Method: Best results are obtained when the spray volume is sufficient to provide uniform coverage of treated plants. The application rate found to be effective in non-crop areas is approximately 3.25 L / ha.
    - 2,4-D is not currently permitted on MOTI jurisdiction due to Ministry policy directive.

4. Active Ingredient: **Clopyralid** (Lontrel)
- Particularly useful where there are trees to protect (forestry plantation)
- Treatment Timing: applications should be made when the plants are in rosette to pre-bud stage of growth, actively growing and when there is adequate soil moisture.
- Method: The effective application rate for Lontrel herbicide is 0.83 L/ha with 100 to 200 L/ha of water.

5. Active Ingredient: Aminopyralid and 2,4-D tankmix
- Treatment Timing: Apply when marsh thistle is actively growing, before flowering.
- Method: Best results are obtained when the spray volume is sufficient to provide uniform coverage of treated plants. The application rate in non-crop areas is approximately 0.29 to 0.50 L/ha Milestone & 840 to 1440g ae/ha of 2,4D Amine.
- Do not apply more than 0.50 L/ha of Milestone per annual growing season.
- 2,4-D is not currently permitted on MOTI jurisdiction due to Ministry policy directive.

6. Active Ingredient: Picloram plus 2,4-D (Grazon and Grazon XC)
    - This product is selective and will kill or injure most broad-leafed plants. It is particularly useful where there is good grass growth around plants that can fill in after the thistle is removed.
    - Treatment Timing: Apply when marsh thistle is actively growing, prior to flowering.

- Method: Best results are obtained when the spray volume is sufficient to provide uniform coverage of treated plants. For treatment of marsh thistle, an application rate of 2.47 to 3.7 L/ha of Grazon XC and a delivery rate of 200 L/ha is effective.
- It is important to determine soil type and permeability before using these products. Grazon and Grazon XC are persistent in soil and are not recommended for permeable soils that will allow direct movement of water.
- 2,4D is not currently permitted on MOTI jurisdiction due to Ministry policy directive.

7. Active Ingredient: Picloram (Tordon 22K) at 2.25 to 4.5 L/ha
    - This product is selective and persistent and will kill or injure most broad-leafed plants. It is particularly useful where there is good grass growth around plants that can fill in after the thistle is removed.
    - Treatment Timing: Apply when marsh thistle actively growing, prior to flowering.
    - Method: Best results are obtained when the spray volume is sufficient to provide uniform coverage of treated plants. For treatment of marsh thistle, an application rate of 2.25 to 4.5 L/ha of Tordon and a delivery rate of 200 L/ha is effective.
    - It is important to determine soil type and permeability before choosing to use these products. Picloram products are persistent in soil and are not recommended for permeable soils that will allow direct movement of water.

Recommended Non-Selective Herbicides: These herbicides will kill most, if not all, vegetation where contact is made.

1. Active Ingredient(s): Imazapyr (e.g. Arsenal)

- Treatment Timing: Apply to young, actively growing plants. This type of herbicide product has some residual and will control new marsh thistle seedlings for a short period of time after treatment.
- Method: This type of herbicide product can only be used on non-crop areas and should not be considered if cropping or grazing of the site may occur. Foliar application rate should be approximately 3 L / ha and the spray volume should be sufficient to thoroughly wet plants; between 100 and 550 L / ha. If applying spray volumes greater than 500 L / ha a non-ionic surfactant must be added. This type of herbicide product is taken up by both the plant foliage and roots. When using selective application methods (e.g. foliar spot treatments), damage to non-target plants will be minimized, providing competition that will help control subsequent marsh thistle seedlings.

2. Active Ingredient(s): Glyphosate (e.g. Roundup, Vantage – a large group of commercial herbicides contain the active ingredient glyphosate).

NOTE: Glyphosate has no residual activity or soil uptake; it will only kill green, growing plants that it contacts. It is the only active ingredient that can be applied in BC within the 10-meter Pesticide Free Zone (PFZ) (up to 1m away from high water).

- Treatment Timing: Apply to young actively growing plants. Effectiveness will decrease once plants begin to bolt.
- Method: The application rate for controlling marsh thistle with glyphosate products is depends on the product. Consult the product label. The plants should be thoroughly wetted but not to the point of run off.