

Milk Thistle

Silybum marianum
Asteraceae

**Class A Noxious Weed
Eradication Required**

Legal Status in King County: Milk thistle is a Class A Noxious Weed (non-native species that is harmful to environmental and economic resources, limited in distribution in the state, and targeted for eradication statewide) according to Washington State Noxious Weed Law, RCW 17.10. In accordance with state law, the King County Noxious Weed Control Board requires private and public property owners to eradicate milk thistle from their property (eradicate means to eliminate a noxious weed within an area of infestation). In addition, state quarantine laws prohibit transporting, buying, selling, or distributing plants, plant parts or seeds of milk thistle.

BACKGROUND INFORMATION

Impacts and History

- Originates in the Mediterranean region. Seeds are used for medicinal purposes.
- Serious threat to some livestock, especially cattle. Milk thistle is a nitrate accumulator and ingestion of large amounts by grazing animals can cause nitrate poisoning, which can be lethal. Leaves become palatable in the early wilting stage after herbicide application, mowing or during drought.
- Spines can cause injury to livestock and other grazing animals.
- Large plant growth suppresses grass and other vegetation. Rosettes are up to three feet wide and flowering plants can be six to nine feet tall, remaining as dry skeletons in the winter and keeping other plants from growing.
- Forms dense stands that shade out forage species and exclude livestock.
- Date of entry into the United States is unknown. Currently reported from many western states including Washington, Oregon and California. Also reported in the southern and northeastern United States and in most provinces of Canada.



- First located by the King County Noxious Weed Control Program in 1999 in an urban medicinal garden and since found in other local gardens and scattered locations likely as escapes from intentional plantings.
- Several large infestations were found in 2001 in and around farms near Enumclaw in southeast King County. Follow up surveys resulted in milk thistle plants being found on over 40 properties in the area. These populations are thought to have been introduced through contaminated hay from Oregon or California and then spread between farms on mowing equipment.

Description



Flower head



Young rosette

- Large thistle, sparsely branched, usually around 6 feet tall
- Tap-rooted winter or summer annual (occasionally biennial).
- Flowers pink or purple on heads that can reach two inches in diameter and are surrounded by thick, spine-tipped bracts (spines can be up to 2 inches long).
- Leaves shiny green with white marbling. The marbling follows the veins and appears as if someone had poured milk on the leaves, hence the common name.
- Leaf edges are tipped with spines up to ½ inch long.
- Rosettes can reach 3 feet in diameter.
- Leaves on rosettes are large, up to 10 inches wide and 20 inches long.
- Grows in dense stands.
- Seeds are dark brown and about ½ inch long.
- Seeds are heavy (20 mg) and fall close to the parent plant unless carried by animals, vehicles, water or other vector.

Habitat

- Grows best in full sun or part-shade and fertile soil. Plant size is dependent on moisture.
- Often found in disturbed sites with high nitrogen soils such as dairies and pastures.
- Also found in fields, trail edges, orchards, gardens, roadsides, waste areas and ornamental and medicinal gardens.



Milk thistle by fence at a dairy in Enumclaw

Reproduction and Spread

- Reproduces only by seed. Plants that go to seed die at the end of the season. Large plants may produce more than 6,000 seeds.
- **Plants can flower from April to October in King County.**
- Unopened, fully formed flower buds will produce seeds if left attached to the plant.
- Seeds are heavy (20 mg) and have a deciduous pappus which means most seeds fall near the parent plant. Seeds can be dispersed longer distances by animals, on mowers and other equipment and vehicles, and in hay.
- Seeds can be viable for at least 9 years. Tilling, overgrazing or other soil disturbance will cause these dormant seeds to germinate.
- Most seeds germinate in the fall, but seeds continue to germinate throughout the year in western Washington, whenever temperature (32° to 86° F) and moisture conditions are favorable.



Germinating seedling



Large milk thistle rosette in a farm field

Local Distribution

The heaviest concentrations of milk thistle in King County are in livestock grazing areas near Enumclaw in the southeastern part of the county. Milk thistle is also found on several county roads near Enumclaw, a few sites in northern King County, and in medicinal and ornamental gardens in Seattle and other cities.

CONTROL INFORMATION

Integrated Pest Management

- The preferred approach for weed control is Integrated Pest Management (IPM). IPM involves selecting from a range of possible control methods to match the management requirements of each specific site. The goal is to maximize effective control and to minimize negative environmental, economic and social impacts.
- Use a multifaceted and adaptive approach. Select control methods that reflect the available time, funding, and labor of the participants, the land use goals, and the values of the community and landowners. Management will require dedication over a number of years, and should allow for flexibility in method as appropriate.

Planning Considerations

- Survey area for weeds, set priorities and select best control method(s) for the site conditions and regulatory compliance issues (**refer to the King County Noxious Weed Regulatory Guidelines**).
- Control practices in critical areas should be selected to minimize soil disturbance and efforts should be taken to mitigate or reduce impacts of disturbance. Any disturbed areas need to be stabilized to control erosion and sediment deposition. Refer to the King County Surface Design Manual for further information about sediment and erosion control practices (download the document at <http://www.kingcounty.gov/environment/waterandland/stormwater/documents/surface-water-design-manual> or call King County Water and Land Resources Division at 206-477-4800 to order a copy). Minimizing soil disturbance also avoids creating more opportunities for germination of weed seeds.
- Small infestations can be effectively dug up. Isolated plants should be carefully removed in order to stop them from infesting a larger area.
- For larger infestations, the strategy will depend on the land use of the site. In pastures, good grazing practices and management for grass and forage species will greatly improve control of milk thistle. Specific suggestions are given in the Best Management section below.
- Generally work first in least infested areas, moving towards more heavily infested areas, to allow surrounding vegetation to fill in bare areas. If vegetation doesn't re-establish on its own, seed or plant appropriate competitive cover to prevent re-infestation from the seed bank.
- Minimize soil disturbance to avoid creating more opportunities for seed germination.
- Properly dispose of all parts of the plant (see Disposal Methods section below).

- Whenever possible, control should be done before plants are flowering to prevent seed production.

Early Detection and Prevention

- Milk thistle is easier to find once it flowers. Monitor pastures, areas used by livestock, and roadsides for new populations of milk thistle in **May, June and July**. Continue to spot check around known infestations through October to catch late-flowering plants.
- Dig up isolated or small populations. If there are more rosettes than you can remove manually, it may be necessary to treat the area with an appropriate herbicide in the spring. Selective broadleaf herbicide applications in the fall will reduce the number of germinating seedlings the following spring.
- Prevent plants from spreading away from existing populations by washing vehicles, machinery, boots and animals that have been in infested areas.
- If animals are being moved from an infested pasture to an un-infested pasture, first hold them for at least five days if possible so that the seeds pass out of the animals' digestive system.
- Manage pastures for healthy grass cover and minimal soil disturbance.

Manual

- **Dig up the plants whenever you see them.** Attempt to remove plants before they flower.
- Plants in flower can form viable seeds even after they are dug up, so cut off flower heads, bag in heavy duty garbage bags, and dispose, especially later in the season when seeds are beginning to form. If the plants are in seed, it is very difficult to bag the seed heads without dispersing the seeds. In these cases, carefully cut off the seed head without knocking out any seeds and place in a bag to prevent dispersing the seeds. Applying hairspray to seed heads may help decrease seed escape while bagging.
- In areas where mature plants are removed, there are usually many small rosettes and seeds left in the soil. Carefully search the area for rosettes or germinating seedlings and dig them up. Completely removing plants is easiest when the soil is loose or wet.
- Return to the same location later in the spring and in the fall to remove plants coming up from seeds already in the soil and continue to monitor the area for several years.
- The use of hand mechanical tools is allowable in all critical areas in unincorporated King County. For other areas, check with the local jurisdiction about any restrictions.

Mechanical

- Mowing will **not** eradicate milk thistle effectively and can spread it further. Plants are able to re-sprout and flower again in the same season when mowed. Plants that are regularly mowed can persist as short-lived perennials or can flower below the level of the mower. Milk thistle plants that are pushed over by the tires of the tractor will often flower.
- Mowing may increase the amount of toxin ingested by grazing animals because milk thistle becomes more palatable as it wilts.
- Mowing may spread flower heads and seeds to new areas.
- Cultivation can control seedlings and tillage can be effective on younger plants.

Cultural

- In pastures, good grazing practices and management for grasses and forage species will reduce the opportunity for milk thistle to spread or become established.
- Minimize soil disturbance and re-vegetate disturbed areas to reduce seedling germination.
- Burning is not an option because fire can encourage seed germination and spread.

Biological

- Biological control is not recommended for milk thistle in Washington as eradication is required. Population density and the number of flowering plants can be reduced but there will always be some plants remaining when using biological control agents.
- The seed head weevil (*Rhinocyllus conicus*) is not recommended for redistribution because it attacks a number of native thistles and USDA does not allow interstate transport of this insect.

Chemical

- **Precautions:**
 - Herbicides should only be applied at the rates and for the site conditions and/or land usage specified on the label of the product being used. **Follow all label directions.**
 - For herbicide use in critical areas and their buffers, certain restrictions apply depending on the site and jurisdiction. In unincorporated King County, refer to the **King County Noxious Weed Regulatory Guidelines** for a summary of current restrictions and regulatory compliance issues. Elsewhere, check with the local jurisdiction.

- For your personal safety, at a minimum wear gloves, long sleeves, long pants, closed toe shoes, and appropriate eye protection. Follow label directions for any additional personal protection equipment needed.
- **Recommendations:**
 - For control of large infestations, herbicide use may be necessary to achieve eradication.
 - Use selective broadleaf herbicides in grassy areas in order to retain competitive vegetative cover and to reduce re-infestation from the seed bank.
 - The addition of a suitable non-ionic surfactant to the herbicide will help penetration of the thick leaf cuticle and improve results.
 - Apply a selective broadleaf herbicide and surfactant in the spring and again in the fall. Re-treatment in the summer may also be necessary to control late-germinating plants.
 - Infested areas should not be mowed until after the herbicide has had a chance to work; two weeks should be sufficient.
 - Between herbicide treatments, check for skips and remove any surviving plants before they go to seed.
 - Continue to monitor treated areas for new plants germinating from the seed bank for at least nine years after the last seed set and following any disturbance to the soil such as overgrazing or vehicle tire ruts.

Specific Herbicide Information

Selective Broadleaf Herbicides

Selective chemicals effective on milk thistle include: 2,4-D (e.g. Weedmaster, Crossbow, Weedar 64, Brash, Chaser, Unison), aminopyralid (e.g. Milestone), clopyralid (e.g. Stinger or Transline), dicamba (e.g. Vanquish or Banvel), metsulfuron (e.g. Escort), combinations of 2,4-D and aminopyralid, and combinations of 2,4-D and clopyralid. Add a non-ionic surfactant for better results.

Cautions

Aminopyralid, clopyralid, 2,4-D, dicamba and metsulfuron can harm certain grasses, alfalfa, clover and other legumes. If livestock are present, check the label for grazing restrictions and damage to forage plants. If hay is to be harvested from treated areas for mulch or compost, make sure to follow label restrictions. Plant material treated with aminopyralid or clopyralid should not be used for mulch or compost because these herbicides remain active in plant material after it has been cut. Plants mulched with treated materials may be affected. Certain additional restrictions apply for products containing Triclopyr BEE (e. g. Garlon 4, Crossbow). Refer to the **King County Noxious Weed Regulatory Guidelines** for more details.

Timing

All these products are effective in the early spring before any flower stems appear (pre-bolting). Aminopyralid, clopyralid or a combination 2,4-D+aminopyralid or 2,4-D+clopyralid formulation can be effective through bolting but prior to bud development. Fall applications of aminopyralid or clopyralid after rains have initiated seed germination are effective in reducing the number of seedlings and reducing the seed bank. Aminopyralid and clopyralid have some soil residual activity that provides extended control of germination, but must be used only on permanent pastures, rangeland or non-crop areas. Aminopyralid does not have any grazing restrictions. Apply herbicide on warm days when winds are low. Check label for specific information on wind and rain guidelines.

Non-Selective Herbicides

Glyphosate (e.g. Roundup) can effectively kill milk thistle and any other vegetation sprayed, including grass. Apply to plants in rosette stage in spring or in fall before the first freeze. Treatment with glyphosate needs to be combined with effective re-vegetation of the site to prevent milk thistle seedlings from re-infesting the area. Monitor the area for germinating seedlings or plants missed by the initial application.

The mention of a specific product brand name in this document is not, and should not be construed as an endorsement or as a recommendation for the use of that product.

Chemical control options may differ for private, commercial and government agency users. Additional information and control recommendations can be found in the references listed at the end of this document. **For questions about herbicide use, contact the King County Noxious Weed Control Program.**

SUMMARY OF BEST MANAGEMENT PRACTICES

Small Infestations in Native and/or Desirable Vegetation

- Dig up plants.
- Replace any divots created when removing the plants to lessen the amount of disturbed soil.
- If using herbicide, apply appropriate product and surfactant by spot spraying to minimize off target injury.
- Monitor site throughout growing season and remove any new plants.



Pull or dig individual plants

- If using an herbicide in a grassy area, use a selective broadleaf herbicide to avoid injury to the grass.
- If using herbicide where livestock are present, be aware of grazing restrictions and damage to forage plants.

Large Infestations/Monocultures in Grassy Areas

- Mowing is not effective for eradicating milk thistle. Mowing can be used for temporary suppression if the infestation is found later in the year in order to keep the plants from flowering, until an approved control method can be used. Do not mow milk thistle that has formed flowers or gone to seed.
- Large infestations can be controlled with selective broadleaf herbicides. (See the Chemical section of this document). Re-treatment later in the season and again in the fall is necessary to eradicate plants missed by the initial application and late-germinating plants. If livestock are present, be aware of grazing restrictions.
- If plants are about to flower, cut and bag the flower heads and dig up the plant. Chop the non-flowering parts of the plant into small pieces or bag the plant. Dispose of flower heads in household garbage. Do not compost.
- Suppression of large infestations of milk thistle with a selective broadleaf herbicide and surfactant will greatly increase grass production, which in turn increases the suppression of the milk thistle.
- Promote healthy grass cover by over-seeding with a mix of grass and clover species to provide a competitive ground cover to suppress milk thistle germination. Fertilize if soil tests indicate a deficiency.
- If grassy area is used for grazing, the area should be managed to promote grass and clover vigor. Graze uniformly and move animals from area to area in a planned sequence leaving at least 3 inches of grass in each area. Avoid grazing when soil is very wet because holes can be opened up to new weed infestations.
- Minimize soil disturbance and re-vegetate disturbed areas.
- Be sure to monitor for milk thistle on edges of pastures, manure lagoons and disturbed areas around fences and watering holes. Remove isolated plants before they flower.



Milk thistle rosettes in a pasture

Control in Riparian Areas

- Additional permits may be required for control of infestations in riparian areas. See the **King County Noxious Weed Regulatory Guidelines** for more information or contact your local jurisdiction.
- In some cases, the cleared area will need to be replanted with native or non-invasive vegetation and stabilized against erosion. See the King County Surface Water Design Manual for further information about sediment and erosion control practices (<http://www.kingcounty.gov/environment/waterandland/stormwater/documents/surface-water-design-manual> or call King County Water and Land Resources Division at 206-477-4800).
- Focus on manual removal for small infestations if possible.
- Mowing will not eradicate milk thistle.
- For larger areas where herbicide use is warranted, spray using low pressure and large droplet size to reduce drift. If herbicide could potentially drift into the water or a wetland area, use only approved aquatic herbicides and surfactants after obtaining necessary permits, applied by a licensed pesticide applicator with an aquatic endorsement.
- When large areas of weeds are removed, the cleared area needs to be replanted with native or non-invasive vegetation and stabilized against erosion.
- If a non-selective herbicide is used in grassy areas, the area should be re-seeded to prevent reinvasion by weeds.
- Infested areas will need to incorporate a management plan lasting for several years to eradicate plants germinating from the seed bank.

Control along Road Rights-of-Way

- Dig up small infestations.
- Spot spray with glyphosate if weeds are in areas with no desirable grasses.
- If plants are in grassy areas, use a selective broadleaf herbicide and surfactant; if sprayed with a non-selective herbicide, re-seed after control is completed.
- If plants are about to flower, cut and bag the flower heads and dig up the plant.
- Infested areas will need to incorporate a management plan lasting for several years to eradicate plants germinating from the seed bank.

Disposal Methods

- Bag all flower heads in sturdy trash bags (spines are very sharp). If the plants are in seed, carefully cut off the seed head and place in a bag without dispersing the seeds.
- Dispose of flower heads in household garbage or take to a transfer station for disposal. **Do not compost or put in yard waste.**

- If plants are not in bud, flower or seed, it is acceptable to chop up plants and leave on-site. However, do not leave the plants where grazing animals have access to them.
- Never dump plant material in un-infested areas as weeds can spread from yard waste piles.

References

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