

Purple Loosestrife

Lythrum salicaria
Lythraceae

**Class B Noxious Weed
Control Required**

Legal Status in King County: Purple loosestrife is a Class B Noxious Weed (non-native species harmful to environmental and economic resources that landowners may be required to control based on distribution in the county and local priorities) according to Washington State Noxious Weed Law, RCW 17.10. In accordance with state law, the King County Noxious Weed Control Board requires property owners to control purple loosestrife on private and public lands throughout the county (control means to prevent all seed production and to prevent the dispersal of all propagative parts capable of forming new plants). In addition, state quarantine laws prohibit transporting, buying, selling, or distributing plants, plant parts or seeds of purple loosestrife.



BACKGROUND INFORMATION

Impacts and History

- Purple loosestrife is an invasive and competitive noxious weed that alters wetland ecosystems by replacing native and beneficial plants. Water-dependent mammals and waterfowl and other birds leave wetlands when their food source, nesting material and shelter are displaced by purple loosestrife.
- Dense infestations of purple loosestrife also alter the landscape by trapping sediments and thereby raising the water table.
- Although young shoots of purple loosestrife are palatable to cattle (and to white-tailed deer), larger plants are not, and so cattle graze preferentially on pasture grasses, giving purple loosestrife a distinct advantage in grazed areas. Over time, mature purple loosestrife plants will dominate, removing the use of the land as pasture. Similar processes can lead to destruction of hay meadows. Occasionally, deer browse the tops of mature plants in wetlands, but this doesn't appear to reduce the overall density of purple loosestrife.
- Purple loosestrife was introduced to the United States in the early 1800's at northeastern port cities, in ship ballast obtained from European tidal flats. Over the next 100 years it spread through canals and other waterways as far as the Midwest. It arrived in marine

estuaries in the Pacific Northwest in the early 1900s, suggesting that it was spread by maritime commerce.

- Purple loosestrife has also been commonly cultivated for the horticultural trade and became prized by bee-keepers in the mid 1900s. Deliberate planting and escapes from cultivation undoubtedly aided in the spread of infestations across the country.
- Purple loosestrife was first collected in Washington in 1929 from Lake Washington. The first eastern Washington collection was in the 1940s from the Spokane area, although there are reports that it escaped from a garden to the Spokane River ten years earlier.

Description

- Perennial emergent aquatic plant, reaching over 9 feet tall and 5 feet wide. As many as 30-50 herbaceous stems annually rise from a persistent perennial tap root and spreading rootstock.
- **Square stems** (usually 4-sided, sometimes 6-sided). Leaves are usually opposite. The leaves are linear in shape, 1.5 to 4 inches long, with smooth edges, and are sometimes covered with fine hairs.
- The showy **magenta or purple flowers appear from July to October** on flowering spikes. The flowers have 5 to 7 greenish sepals, 5 to 7 magenta petals and 12 stamens. Flowers will continue until frost.
- In winter months, dead, brown flower stalks remain with old seed capsules still visible.



Habitat

- Occurs in freshwater and brackish wetlands, lake and river shorelines, ponds, shallow streams and ditches, wet pastures and other wet places.
- Grows on moist or saturated soils or in shallow water. Can tolerate a range of soil pH and nutrients.
- Requires partial to full sunlight. Productivity is significantly reduced at 40% of full light.

Reproduction and Spread

- Spreads mainly by seed but also by stem and root fragmentation. A mature plant may have as many as thirty flowering stems capable of producing an estimated two to three million, pepper-sized seeds per year. Most seeds remain viable after two years in a natural water body, and stored in laboratory conditions they are viable for about three years.
- Dispersal is mainly by water, but seeds can also be transported on feathers and fur of waterfowl and other wetland animals as well as in mud on boots, tires, boats and pets. There is also some evidence of wind dispersal.
- Seedling densities sharply fall beyond 34 feet of the parent plant.
- Seed banks build for years, unnoticed until the right conditions of disturbance appear, resulting in a population explosion. Mature plants can live for 20 years.
- Vegetative spread is also possible. Buried stems harbor adventitious buds with the ability to produce shoots or roots. Breaking off stems or roots during incomplete plant removal initiates bud growth. Removed stems left on moist soil will also grow roots and sprout.

Local Distribution

- Found on lakes and waterways throughout King County, with 1,214 total sites reported in 2010.

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 or local jurisdictions**).
- Control practices in critical areas should be selected to minimize soil disturbance, or 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 (call 206-296-6519 or go to <http://kingcounty.gov/wlr/Dss/Manual.htm> for more information).

- Small infestations can be effectively hand-pulled or dug up if conditions allow (see section on Manual Control for more information). 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 site. Generally work first in least infested areas, moving towards more heavily infested areas. On rivers, begin at the infestation furthest upriver and work your way downstream.
- Minimize disturbance to avoid creating more opportunities for seed germination.
- Properly dispose of all parts of the plant (see Disposal Methods section below).

Early Detection and Prevention

- Look for new plants. Get a positive plant identification by contacting your local noxious weed control program or extension service.
- Look for plants along river and lake shorelines, in ponds, wetlands, ditches and wet pastures.
- The best time to survey is in July and August when the plants are flowering; however, seedlings may not flower in the first year.
- Look for seedlings starting in June.
- Dig up or pull small isolated patches.
- Prevent plants spreading from existing infestations by cleaning off equipment, boots, clothing and animals that have been in infested areas.
- Don't buy or plant purple loosestrife. According to state quarantine laws it is illegal to buy, sell or offer purple loosestrife or any of its cultivars for sale.

Manual

- Hand pulling and the use of hand mechanical tools is allowable in unincorporated King County critical areas. Check with the local jurisdiction for regulations in other areas.
- If the plants are in flower or seed, **cut off and bag all flower stalks and seed heads.** It is very difficult to pull the plants without dispersing the small, lightweight seeds. Brush off boots, clothes and animals before leaving the infested area.
- Hand pulling is recommended when plants are rooted in mucky, sandy or other loose, wet soil. Grasp the base of the plant and pull slowly with steady pressure to release the roots from the soil. Pulling purple loosestrife by hand is easiest when plants are young. Older plants have larger roots that can be eased out with a garden fork. Remove as much of the root system as possible, because broken roots may sprout new plants.



- Cutting plants at the base when in flower may prevent seeding, but cut plants may continue to produce flowers. Sites should be consistently and regularly monitored until frost to cut and remove any subsequent flowers. Cutting will not kill the plants, and they will need to be controlled every year. Do not leave cut plant parts on site, because root and stem fragments can take root and form new plants.
- All manual control sites should be monitored for several years for plants growing from root fragments and from the seed bank.
- **DISPOSAL:** All purple loosestrife plant parts, including flowers, seed heads, stems, leaves and roots must be securely bagged, and discarded in the trash or taken to a transfer station. **Do not compost or place in yard waste. Plants may regenerate in compost. If you have the ability to burn plants, following all local regulations and restrictions, burning vegetative material is an acceptable disposal method. Do not burn flowering stems or seed heads.**
- **NOTE:** Under the Washington State Lythrum quarantine (WAC 16.752.400-415), it is illegal to transport, buy, sell, offer to sell, or to distribute plants, plant parts or seeds of purple loosestrife into or within the state of Washington. However, by following the recommendations in this Best Management Practices document you are covered under the King County Noxious Weed Control Program's permit to transport purple loosestrife for the purpose of taking it to a transfer station or landfill.

Mechanical

- Removal of purple loosestrife with hand held mechanical tools is allowable in critical areas and their buffers within unincorporated King County. Check with the local jurisdiction for regulations in other areas.
- Mowing is not recommended. Since plant fragments can produce new shoots, mowing may facilitate spread rather than control.
- Cutting alone is not a control option for purple loosestrife. New plants will grow from the roots. Cutting late in the season but before seed set reduces shoot production more than mid-summer cutting.
- Sheet mulching or covering using black plastic, landscape fabric, or cardboard and six inches of mulch is an interim option for dense seedling infestations. It does not kill the roots of mature plants, but it does slow down growth and seed dispersal. The covering must extend several feet beyond the edges of the infestation and be weighted so the plants cannot push it up. The edges of the covered area must be monitored for plants coming up from rhizomes extending beyond the sheet. Covering materials should also be monitored for damage or gaps and repaired or re-installed as needed.

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.
 - A Washington State pesticide license with an aquatic endorsement is required for the purchase of aquatic herbicides. **NEVER apply non-aquatic herbicide formulations to water since many include ingredients toxic to aquatic organisms.**
 - For large infestations of purple loosestrife, herbicide use may be necessary for effective control.
 - Cutting after spraying is not necessary. If cutting is desired, infested areas should not be cut until after the herbicide has had a chance to work, which may take several weeks.
 - In sensitive areas or areas prone to erosion, careful spot-spraying will create less disturbance than manual or mechanical control.
 - For several years following treatment, monitor areas for new plants germinating from the seed bank. In some cases several years of treatment may be necessary.
 - When treating an area intermixed with native monocots (cattails, grasses, sedges, etc), using a selective broadleaf herbicide is recommended. The monocots will not be harmed by the herbicide and will be able to help suppress new plants emerging from the seed bank.

Specific Herbicide Information

Glyphosate (e.g. Rodeo®, AquaMaster® or Aqua Neat®): Apply to actively growing plants at early flowering stage. Application to pre-flowering plants or seedlings may also be effective, but unless the extent of the infestation is well known, plants can be difficult to locate when not in flower. Glyphosate works slowly, so plants may not appear to be affected for a couple of weeks. A second application a few weeks after the first may be helpful to control plants not in flower or otherwise skipped during the first application. Apply to foliage but avoid runoff. Caution: Glyphosate is non-selective and it will injure or kill other vegetation contacted by the spray including grasses, cattails and other monocots.

Imazapyr (Habitat®, Polaris®): Apply to foliage any time the plant is actively growing. Caution: Imazapyr is non-selective and highly effective even at low doses: it will injure or kill other vegetation contacted by the spray including trees, desirable vegetation, and grasses, cattails and other monocots. Also, imazapyr is soil-active and can harm trees and other plants rooted in the spray area or sometimes immediately downhill from the area being sprayed.

Triclopyr (Garlon 3A® and Renovate 3®). Apply when plants are in the mid to full-bloom stage. Application to pre-flowering plants or seedlings may also be effective, but unless the extent of the infestation is well known, plants can be difficult to locate when not in flower. Triclopyr is a selective herbicide and will kill only dicots (broadleaf plants and trees). It will not harm monocots such as grasses, sedges, cattails and many native aquatic plants.

All the above listed herbicides require the addition of an approved surfactant. Follow label directions for selecting the correct type of surfactant. Be sure that the selected surfactant is approved for aquatic use in Washington State.

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. **For questions about herbicide use, contact the King County Noxious Weed Control Program at 206-296-0290.**

Biological

- Biological control can take up to six years to have a significant impact on the infestation. Purple loosestrife population density and the number of flowering plants can be reduced, but there will always be some plants remaining when using biological control agents. Releases should be made only at sites where loosestrife infestations are large and immediate eradication of the weed is not the primary objective.
- All biological control agents approved for use on purple loosestrife in Washington State will not feed on any plant species other than purple loosestrife in our area.
- Where feasible, biological control plans should incorporate another non-chemical control method to be able to prevent all seed production as required by state law. If the infestation is inaccessible, remove flowers at the edges of the infestation to the greatest extent possible. If *Galerucella* or *Hylobius* species are present, flower heads should be cut, bagged and properly disposed of by the time of flower drop in mid to late August. If *Nanophyes marmoratus* weevils are present, flower/seedheads should be cut very carefully in early September after emerging adult weevils have left the flowerheads for the season. If there is any chance of mature seeds being present in the seed heads, extreme care should be taken to avoid spread.

- Biological control is not recommended or prescribed for small infestations.
- Two species of *Galerucella* beetles were first released in Washington in 1992 and subsequently have been released in King County several times in many locations. These small golden-brown leaf-feeders defoliate plants and attack the terminal bud area, halting or drastically reducing seed production. The larvae feed constantly on the leaf underside. Loosestrife seedling mortality is high. These beetles are highly mobile and are often found in King County in locations far from release sites. *Galerucella* beetles do not do well near salt water.
- *Hylobius transversovittatus* is a root-mining weevil that also eats leaves. The adult beetle is reddish brown and ½ inch long. It eats from the leaf margins, working



Galerucella beetles feeding on purple loosestrife



Hylobius transversovittatus

inward. Eggs are laid in the lower 2-3 inches of the stem, or sometimes in the soil near the root. The larvae then work their way to the root, where they eat the carbohydrate reserves. Evidence of larvae in the root is a zig-zag pattern. *Hylobius* tolerates coastal areas and is a better choice for infestations near salt water.

- *Nanophyes marmoratus* is a tiny seed weevil. Larvae and adults impact purple loosestrife by feeding on unopened flower buds. Flower buds with larval feeding damage usually abort and fail to produce seeds. Adults also feed on developing leaves, further weakening plants. *Nanophyes* can also be successful when used in conjunction with *Hylobius*.



Nanophyes weevil on purple loosestrife

SUMMARY OF BEST MANAGEMENT PRACTICES

Small Infestations in Native and/or Desirable Vegetation

- Hand pulling is recommended for young plants or older plants in loose, wet soil.
- Larger plants from isolated small populations can be dug out from moist upland areas. This may be impractical to impossible when trying to remove hardy, woody roots in compacted soils. Care should be taken to minimize erosion when digging in saturated soils on shorelines.
- If the plants are in flower or in seed, **cut off and bag all flower heads**. Pulling plants in seed will disperse the small, lightweight seeds. Cut plants may continue to produce flowers, so these sites will have to be consistently and regularly monitored until frost to cut and remove any subsequent flowers.
- When digging or pulling on shorelines, take appropriate erosion control measures.
- If manual control is not possible due to site conditions or available labor, apply appropriate herbicide with wick wiper or spot spray to minimize off target injury.
- If using an herbicide in an area that has desirable grasses and other monocots, use a selective broadleaf herbicide to avoid injury to grasses and other monocots.

Large Infestations in Areas with Monocots

- Cutting alone is not a control option for purple loosestrife. Shoots and adventitious roots will develop. Cutting late in the season but before seed set reduces shoot production more than mid-summer cutting. Cut plants may continue to produce flowers, so these sites will have to be consistently and regularly monitored until frost to cut and remove any subsequent flowers.
- Sheet mulching using black plastic, landscape fabric, or cardboard and six inches of mulch is an interim option for dense seedling infestations. It does not kill the roots of mature plants, but it does slow down growth and seed dispersal. This method is also non-selective.
- If an area has desirable monocots present, use a selective herbicide and encourage the growth of the monocots.

- If the infestation is in a pasture, encourage healthy grassy areas by seeding and fertilizing. Use a mix of grass and clover species to improve resistance to purple loosestrife. Fertilize according to the soil needs.
- If using biological control, areas need to be monitored and any flowers removed and properly disposed of where feasible. If the infestation is inaccessible, remove flowers around the edges of the infestation to the greatest extent possible. If *Galerucella* or *Hylobius* insects are present, flower heads should be cut, bagged and properly disposed of by the time of flower drop in mid to late August. If *Nanophyes marmoratus* weevils are present, flower/seedheads should be cut very carefully in early September after emerging adult weevils have left the flowerheads for the season. If there is any chance of mature seeds being present in the seed heads, extreme care should be taken to avoid spread.

Control on Shorelines

- When large areas of weeds are removed, the cleared area needs to be replanted with native or non-invasive vegetation and stabilized against erosion. Refer to the King County Surface Design Manual for further information about sediment and erosion control practices (call 206-296-6519 or go to <http://kingcounty.gov/wlr/Dss/Manual.htm> for more information).
- Survey area and document extent of infestation.
- Focus on manual removal for small infestations if possible.
- When removing vegetation on shorelines (by lakes, streams and wetlands) use barriers to prevent sediment and vegetative debris from entering the water system.
- Cutting will not control purple loosestrife but it can serve in the interim until more effective control measures can be accomplished.
- 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 the necessary permits.
- Infested areas will need to be monitored for several years to control plants growing from root fragments and germinating from the extensive seed bank.

Control along Road Rights-of-Way

- Pull small infestations if possible.
- Spot spray larger infestations. Use a selective broadleaf herbicide in areas with desirable monocots such as grasses, sedges or cattails; if controlled with a non-selective herbicide, re-seed after control is completed.
- If plants are about to flower, they can be cut until a more effective control strategy can be used. Be sure to dispose of cut plant parts properly.
- If plants are sprayed, wait until the herbicide has had a chance to work before conducting any regular right-of-way mowing.

Disposal Methods

- All purple loosestrife plant parts, including flowers, seed heads, stems, leaves and roots must be securely bagged, and discarded in the trash or taken to a transfer station. **Do not compost or place in yard waste. Plants may regenerate in compost. If you have the ability to burn plants, following all local regulations and restrictions, burning vegetative material is an acceptable disposal method. Do not burn flowering stems or seed heads.**
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