Pacific Northwest Garlic Mustard Working Group

Highlights from 2017-2018 Collaborations



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Abstract

Garlic mustard (Alliaria petiolata) (Washington-Class A, Oregon-Class B) is a noxious weed that threatens many types of ecosystems west of the Cascade Range, as well as riparian corridors east of the Cascades. Starting in 2014, a self-organized collaboration called the Pacific Northwest Garlic Mustard Working Group has brought together invasive plant managers from across Oregon, Washington, & British Columbia to share observations, best management practices, prevention techniques, survey methodologies and outreach strategies across the region. This has resulted in developing cross-jurisdictional IPM strategy, shared outreach & prevention products, regional maps, and a collaborative understanding of survey gaps and management practices.

Background

Garlic mustard has been widely characterized as one of the worst invaders of Northeast and Midwest forests. As an ecosystem modifier, garlic mustard is capable of successfully invading forest understories and becoming the dominant understory species. In the Pacific Northwest, its ecological effects are less well-studied; however, it has demonstrated the ability to invade nearly all PNW habitat types west of the Cascades, and riparian corridors east of the Cascades.

Habitats susceptible to garlic mustard (West of Cascades):

- Capable of invading both disturbed and healthy systems
- Open, well-drained sites to shady, moist sites
- Riparian floodplains and corridors, as well as upland areas
- Mixed conifer or oak woodlands, from sea level to >1500'

Habitats susceptible to garlic mustard (East of Cascades):

- Riparian corridors within a few feet of the water table
- Shady, moist copses at higher elevation (3,000-4,000' asl)


Garlic mustard invading a Western Oregon woodland

Control

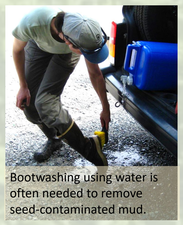
Integrated Pest Management (IPM) Guide for Garlic Mustard in the Pacific Northwest
Revised November 22, 2017

Mechanical	Manual	Chemical	Integrated Pest Mgmt	Notes/Tips
Mowing is not an effective control. Plants will still bolt, flower and seed, and additional seed heads may be created by mowing. Mowing after seeds are present (typically, May-September) will spread garlic mustard. This has been shown to turn small infestations into large infestations very quickly.	Handpulling can be very effective but must be done when soil is moist enough to allow complete root extraction. Pull carefully from root crown to avoid breaking off the stem. A hori hori can be useful to loosen soil around base of plants. May not be practical at larger sites, or in all situations. Roots left behind may resprout. Monitor site for regrowth. Second year plants will continue to bolt, flower and set seed even once pulled, unless disposed of properly. All pulled plants must be bagged, removed from the site, and disposed of in the landfill (NOT yard debris/compost). Soil disturbance may cause increased seed germination or seedling flush. Timing: Best time is during flowering when plants are most visible and when root stores have been used for flower production. However, rosettes can be handpulled any time of year, provided the soil is moist enough (generally *NOT* late summer). *1st priority: Bolting and flowering 2nd year plants; rosettes may be controlled on a time permitting basis.* Note, only a percentage of rosettes will make it to adult stage.	Spring (Apr - May): If only treating sites once a year, be sure to visit them in early spring (typically early April-late May but this can vary due to weather conditions). Apply the suggested foliar spray during bolting or flowering to prevent seeding. Be sure flowers and developing siliques (ie seedpods) have adequate herbicide coverage. Triclopyr amine at 2% rate (or Vastlan at 1.5% rate), plus 1% site-suitable non-ionic surfactant (e.g. Competitor or Agridex) will minimize damage to competitive grasses and work quickly on preventing seed maturation. Up until flowering (but no later), 2% glyphosate can be used instead of triclopyr amine. Fall (Sep - Oct): Rosettes can be sprayed in early fall after rain events end summer dormancy but before leaves begin to fall from trees and cover garlic mustard plants. Treatment trials to date suggest using 1% triclopyr amine OR 1% glyphosate, and 1% site-suitable non-ionic surfactant. 1% imazapyr has also been effective, but may not be appropriate if targeted plants are near mature trees or other desirable vegetation. Rosettes can also be sprayed in late winter, but this is only effective after winter dormancy ends. Garlic mustard often dies back in the winter so you must wait until the great majority of plants have re-sprouted. Rosette treatments at the height of summer may be least effective due to summer dormancy.	Combination of spring herbicide application followed by handpulling is very effective. Spray bolting and flowering plants in early spring (typically early April-late May). Revisit sprayed sites in early June (once seedpods have started to harden and spraying has become ineffective) to handpull any plants that were missed or bolted after spraying. Pulled plants must be bagged and removed from the site and disposed of in the trash. Revisit sites if possible after initial pull and be prepared to repeat pulling if smaller or later growing plants bolt. Fall rosette treatments can also be added to this IPM method as directed in 'Chemical' section of this document. This approach has the potential to reduce spring workloads and may be beneficial to desirable native plant recruitment. Reseed (e.g. blue wildrye etc) or replant trees/shrubs to provide competitive cover. Installing >5" layer of mulch, particularly hemlock mulch, may limit seed germination.	Multiple years are needed to exhaust seed bank, which can last at least 5-10 years. Early detected sites are much easier to manage! Control before the plant goes to seed! Once seedpods are no longer milky, even sprayed plants will continue to set seed. TIP: Be sure to spray seedpods during late treatment applications using the 2% triclopyr amine solution described OR handpull and properly dispose of plants before seed matures. Do not move plants, or enter site, once seedpods yellow and mature black seed is present. Prevention is Key! Consider impact of crews – clean boots, clothing, and machinery before moving from areas with garlic mustard plants/seed into uninfested areas!

Adapted from Western Invasives Network IPM Matrix

Key Points

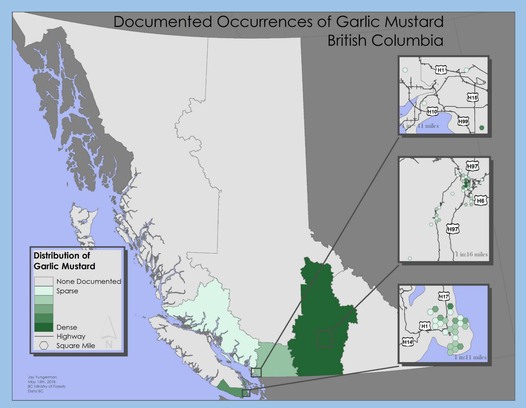
- **Identified Pathways:** Footwear, equipment, alluvial transport, wildlife movement and contaminated gravel & nursery stock have all been documented vectors. Logging, construction, utility work & even restoration practices can contribute to spread when contaminated soil is introduced.
- **Prevention:** Seeds spread easily through movement of affected soil. Cleaning practices are essential for minimizing spread of garlic mustard. Minimize access to infested areas and ensure all equipment and footwear are thoroughly cleaned of mud and soil prior to leaving site.
- **Survey Gaps:** Intensive local efforts appear to have largely identified extent; however, regionally, more attention needs to be paid to outlier sites. Working collectively, we identified possible areas across the Pacific Northwest that warrant additional, focused survey efforts.
- **Control Practices:** Second year plants need to be managed before they set seed, either with foliar herbicide or manual extraction. Strive to visit sites multiple times to ensure no plants are missed. While triclopyr may halt viable seed maturation up to seedpod formation, monitor sites sprayed late in the season and handpull if possible once seedpods start hardening off. Fall rosette treatments can be useful when high native cover is present and to reduce the extent of spring flowering. Consider reseeding. Long-term success depends greatly on finding new sites early before seedbank buildup.
- **Next Steps:** Overall, plant densities have declined at sites managed for multiple years. Investments at these sites still require annual survey and control. While most sites are being managed across the Northwest there are some areas that will benefit greatly from introduction of biocontrol agents.

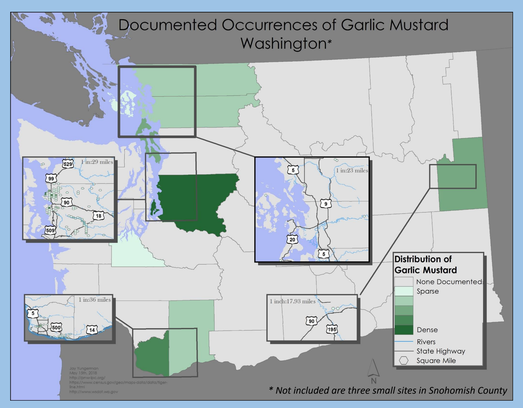

Bootwashing using water is often needed to remove seed-contaminated mud.

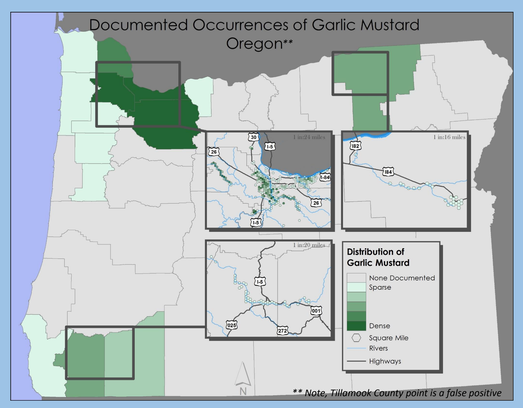

Multiple flowering events have been documented, even on sprayed plants.


Endurance of seedpods following treatment can be challenging. Ensure seedpods have adequate foliar coverage.

Regional Mapping







Contact

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- To join the Pacific Northwest Garlic Mustard Working Group listserv, please visit https://bit.ly/2yg2ySv.

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Compiled by Michelle Delepine, with photos by Chris Aldassy, Mitch Bixby, and King County Noxious Weed Control
Maps created by Jay Yungerman, in collaboration with Jeff Lesh (see *Contributors* for affiliations)

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