Garlic Mustard Working Group Fall 2014 – minutes

Cowlitz County Administration Building, Conference Room, October 24, 2014, 10am - 2:30pm

Introductions (10-10:10 am)

Aaron Yanez (Washington State Dept of Transportation)
Angelica Velazquez (Cowlitz County Noxious Weed Control Board)
Beth Myers-Shenai (Oregon Dept of Agriculture)*
Bill Wamsley (Lewis County Noxious Weed Control Board)
Brian Maupin (Southeast Alaska SWCD - Juneau)*
Charlie Nappi (Portland Parks & Recreation)
Chris Aldassy (East Multnomah SWCD)
Clark Sexton (Washington State Dept of Transportation)
Dan Sorensen (University of Washington)
Denielle Cowley (Clark County Environmental Services, Volunteer Coordinator)
Ed McFarlin (King County Noxious Weed Control Program)
Frances Lucero (King County Noxious Weed Control Program)
Jeff Lesh (Clackamas County SWCD)
Jon Wagner (East Multnomah SWCD)
Jordan Kim (Hood River SWCD)*
Karen Peterson (King County Noxious Weed Control Program)*
Kris Schaedel (Hood River SWCD)*
Kyle Strauss (Rogue Valley Garlic Mustard Contractor)*
Kyle McKune (Washington State Dept of Transportation)
Lindsey Karr (City of Portland Environmental Services, Intern)
Lucas Nipp (East Multnomah SWCD)
Maria Winkler (King County Noxious Weed Control Program, GM Program Coordinator)
Michelle Delepine (West Multnomah SWCD)
Mike Monfort (Clark County Environmental Services)
Mitch Bixby (City of Portland Environmental Services)
Sam Leininger (Clackamas County SWCD)*
Sarah Hamilton (4-County CWMA)
Sasha Shaw (King County Noxious Weed Control Program)*
Skyler Schrock (Cowlitz County Noxious Weed Control Board)
Vern Holm (Western Invasives Network)*
**Indicates attended remotely*

Extent & Current Management Approach (10:10 – 10:45 am)

Michelle Delepine (West Multnomah SWCD):

In the early 2000s community members first identified and began pulling garlic mustard in Portland's West Hills. The District developed its garlic mustard program in 2008 in collaboration with agency partners, and received an Oregon State Weed Board grant to help fund work. The District focuses on private properties. Program area includes SW Portland in addition to the West Hills. There is high landowner participation in the program with over 250 properties surveyed (150 with infestations), or 15

total gross acres. Some sites don't improve with treatment, while other have fantastic success.

Mike Monfort & Denielle Cowley (Clark County Environmental Services):

From 2002 to 2005 saw 4x increase in populations—largely due to flooding events spreading seed. Grants assisted with volunteer pulls each year along Salmon Creek. Post grant, the county has resorted to notifying landowners that they are obligated to control garlic mustard as it is a regulated weed, and they have done some enforcement on private properties. The county has seen a dramatic reduction; however, after finding good success at a particular site, another one pops up. Two population centers: Salmon Creek and East Washougal. Denielle reports seeing sprouting/flower/seeding events all within the same year—ie acting as an annual.

Charlie Nappi (Portland Parks & Recreation):

Forest Park includes 5200 acres and 80 miles of trails. Hikers and transients and dogs are biggest known vectors. Triclopyr is used at 2% to kill it quickly to prevent hikers from pulling it. Varied success.

Mitch Bixby (City of Portland BES):

First recorded in the eastern Gorge in the 1930s, first herbarium specimen in 1950s. Visiting hikers, etc has likely exacerbated its spread. Within the City of Portland, there are 70-80 road miles and 15 stream miles that the City manages for garlic mustard. Portland Parks had been working on garlic mustard for 2-3 years before BES got involved. 2008 BES joined forces with others and got a grant from ODA. Mitch feels containment is possible, but recognizes that some colleagues disagree. About 140 acres being treated, but densities are diminishing. Management includes starting with 2% glyphosate, then switching to 2% triclopyr when flowering nears completion. Older sites are harder to get under control.

Chris Aldassy (East Multnomah SWCD):

In 2008 it looked promising that a biocontrol agent for garlic mustard would be approved within a few years and the area of Corbett was deemed a containment zone—ie populations outside the containment zone would be controlled, as well as roadsides within the containment area. Treatment includes an early round of glyphosate or triclopyr, followed by a 2nd pass with 2% glyphosate + 1% triclopyr combo, or handpull. Discussion about survival post spray. There are 226 gross acres, and 10 net acres total. Elk and other wildlife trails appear to be the largest vector of new populations.

Jeff Lesh (Clackamas County SWCD):

Jeff reports (as of 2014) 15 gross acres, 114 sites, 220 treatments (avg 2 treatments a site). 920 acres (377+ properties) were surveyed for garlic mustard, for a total of 1200 acres surveyed over the course of the year. Focus is on the Clackamas River, where it is moving downstream. Big question mark over areas of the Clackamas, though many of these areas are planned to be surveyed in 2015. Good responses on control efforts because of early detection. Jeff suspects the positive results are because the patches are newer and the seed bank is exhausted quicker (Clackamas is on the leading edge of the infestation). He favors triclopyr as it allows grass to grow and compete. Their strategy is to control both rosettes and

bolted 2nd-year plants. He has found waiting to begin treatments until mid-April helps to catch everything, since rosettes seem to stratify their bolting times. Jeff reports being to sites with only rosettes – no second year plants (which presumes that all rosettes from the year before were controlled successfully). He also waits to mid-April to treat everything as if the plant is an annual. Triclopyr amine is used mid April to mid to late May. Jeff has found hitting the siliques with triclopyr has helped to prevent seed maturation during late season applications.

Bill Wamsley (Lewis County Noxious Weed Control Board):

Bill has not yet seen it, but expects it will be a matter of time, especially given the large draw of visitors to Mt. Rainier Recreation Area in his district.

Maria Winkler (King County Noxious Weed Control Program):

In 2002, King County began controlling garlic mustard, though detections began in the late 1990s. City mulch contaminated by garlic mustard was responsible for several occurrences. They currently manage 24 acres city wide with a staff of eight. City employee trainings (parks, utility personnel, etc) include garlic mustard ID and reporting. If ground moisture permits, flowering plants are handpulled and then rosettes are managed during a subsequent follow-up visit. Otherwise, flowering heads are cut-off and an application is made using 1-2% glyphosate + surfactant (usually competitor or agridex). Rosettes are controlled with 1% triclopyr, or 0.008% aminopyralid + 1% triclopyr (or 1% imazapyr if encountered during knotweed work). They aim for eradication. King has seen a reduction in density, but the footprint area stays the same.

Dan Sorensen (University of Washington Botanic Grounds, School of Environmental and Forest Sciences):

Comes from east coast where it is ubiquitous, where it has boom-bust seasons. Interested in who's removing garlic mustard biomass and does it affect success. Manages a couple small garlic mustard populations on campus.

Angelica Velazquez (Cowlitz County):

The only known garlic mustard site in Cowlitz County is at Lake Merwin. A few years ago, a new restroom was installed near a boat ramp and contaminated grading equip or materials may have led to the introduction. It was first treated in 2012 using 1% imazapyr (likely following only a single seeding event). In 2013 there were no rosettes or flowering plants, though the subsequent year's survey yielded six plants at the site. Maintenance operations may be stirring up the soil exposing whatever seed bank remains in the soil. Island County reports that contaminated nursery stock may be causing new introductions.

Brian Maupin (Southeast SWCD – Juneau):

Only known Alaskan location is in Juneau and covers approx. <1/4 acre on an eroded hillside. Identified in the late 1990s and work began in 2000. The project area includes 20 private properties, including the Governor's mansion. Ten years of really great eradication work, but one year it seeded due to lack of a

coordinator position. Plants hide in salmonberry. Youth crews are used to pull plants located in areas where chemical control isn't an option. 2% glyphosate is used in those areas. Brian is trying to get other weeds to take over the infested area to help with interspecific competition. The affected area is surrounded by a fence but black bears can still access the land and are vectors. After more than ten years of work, there has been minimal success. Soil disturbance by youth crews may help exacerbate seedling flourishes. There is a second site located in forest land, where staff is presumed to have been a vector. This patch was eradicated after two years of work.

Jordan Kim (Hood River SWCD):

There are two known sites in Hood River County. The largest was detected seven years ago and is scattered across a 60 acre organic orchard adjacent to the Mt Hood National Forest. The second site is a small garden where it was intentionally planted (1.5 acre, not organic). The organic orchard has presented numerous challenges, as the landowners are reluctant to provide much support, or change in management practices, etc. There are many vectors at this high traffic site including farm equipment, game trails, and visitors (site is also a wedding venue). Treatment trials have included using Burnout at the orchard with limited to mixed success. The garden site has been treated with 2% glyphosate, with a layer of hemlock mulch to suppress seedlings (hemlock is reportedly allelopathic to mustard species). The first year showed great success with little regrowth, but could be temporary given lifespan of chips. Maria reports that King has also used mulch to suppress seedlings and suggests laying them thick (6"). First year results in great suppression, but as soon as they break down (approx. 2 years) they need to be replaced.

Kyle Strauss (Southern Oregon contractor):

Recruiting landowners. Methodology includes hand pulling and herbicide. 2 front page spots in local paper for outreach.

Treatment Methods (10:45 – 11:50 am)

What are your challenges? What is most effective (timing, method, etc)? Suggestions for improvement?

CHALLENGES

Timing: If can only go to a site once in a season (for budget or capacity reasons), wait until flowering. Any earlier, and you will certainly miss later bolting individuals. Mitch gave the example of waist-tall plants being observed in mid-May that *were not* there in mid-April (others also observed seedling flushes within 10 day windows). Mitch suggests that waiting two weeks post full bolt to start will aid in getting the wave of early bolts (if spring is mild) as well as the main bolting wave (assuming that allows enough time to get to all sites within treatment window). Frances has seen flowering occur throughout the summer and recommends going back often. In areas with lots of weed pressure, visit site early before other weeds make it more difficult to find the garlic mustard.

Flowering: Are the teeny tiny flowering stems evidence of garlic mustard individuals acting as annuals? Maria and Brian believe they are actually very small 2nd year plants. Mitch has observed small flowering plants in carpets of first-year seedlings. Garlic mustard is very elastic. Others note compact growth.

Dormancy: Plants will overwinter by sending nutrients to roots. In Juneau, much of above parts die back, but it doesn't get too cold and spring is abrupt. Brian has seen that even with mild and warm summers, populations don't vary drastically due to weather.

Blackberry/Reed Canary: Jeff wondered if anyone else has also observed garlic mustard germinating within blackberry thickets and reed canary stands. Garlic mustard is able to compete with very aggressive plants. Jeff has attacked the blackberry and garlic mustard in stages with the goal of getting it all, and also assisting in future efforts by managing some of the blackberry cover too. To combat garlic mustard in reed canary fields, Frances instructs crews to walk a *very* tight grid—noting that surveying takes just as long as control. She also suggests making crews walk through blackberry. Angelica suggests knocking out the blackberry, which would promote seedbank to flourish and then knock it off heavy.

Surveying: Expense of surveying and locating garlic mustard increases as population decreases.

CONTROL METHODS

Prevention: Soil cakes on into boots—especially if lots of handpulling/soil disturbance. Bootwash station recommended, or bootbrushing in the least. Several partners report making sure contractors boot brush. Bootbrushing practices need to continue to be standardized and enforced—potentially with utilization or requirement of boot washing stations were feasible to remove excess caked on soil. Some contractors have trashed boots where seeds will stay. Boot brushing is second nature for some crews, but not others. There are products now on market that combine water action with boot brush (e.g. Greelyman Boot Cleaners). King County has posters with boot brush stations that ask park visitors to use the boot brushes after walking through the park.

Handpulling: Effective, but be sure to dispose of properly. Pulled plants (even pre-bolting rosettes) will bolt, flower and set seed unless bagged (do not leave on site to continue setting seed—do not compost). Michelle likes using handpulling as a backup during rainy days during the flowering window and has found it to be cost comparable when utilizing less experienced crews. Maria recommends using a hori hori to assist with root extraction. Another word of caution, handpulling will cause soil disturbance—potentially leading to a renewed flush of seedlings (as seedbank is exposed). Also, stems dry out and become brittle later in the season, making it harder to fully remove root. Some found that rosettes have large nutrient stores/bulkier tuber making it difficult to effectively remove them by hand. Others have been able to extract rosettes just fine.

Burning: Maria says burning doesn't work. Jordan has observed higher seedling presence around burn piles (though she isn't sure if it is from disturbance or it being added to burn piles). Sam suggests that if torching were done, adult populations should be controlled first (ie perhaps explore possibility of using it on seedling control). Dan heard of success torching at the cotyledon stage (on the East Coast).

Chemical: Jeff recommends diversifying chemical control strategy and emphasizes spraying the siliques. Charli has four test plots in two parks that are sprayed with triclopyr (2x/year) and reseeded with blue wildrye to see if the grass can outcompete garlic mustard, or at least help suppress seedling recruitment. Another plot has 40% California brome and 45% fescue. Michelle used imazapyr on a limited basis to try and knock out older managed knotweed sites with some success—could a similar strategy be enlisted for garlic mustard once the main population is under control? Frances says imazapyr offers more soil residual but that the effect only lasts through the first rains. Maria says glyphosate is their main go-to for spring control. Portland partners either use glyphosate early then switch to triclopyr, or use triclopyr throughout the bolting period. Mitch reports that Skamania had no success with aminopyralid, but Maria says that may be due to timing and phenology. She has used aminopyralid on rosettes and it seems effective. Jeff mentioned using milestone + garlon for rosettes (not 2nd year plants, which would just dieback and then resprout—ie topkill). Lucas has observed aminopyralid resulting in topkill and resrouts as well. Maria read somewhere that escort is not effective in garlic mustard control—though the label specifically lists use for garlic mustard control. Emily Stevenson (Skamania County) may have seen promising results with 0.02 escort with 1 percent glyphosate. Angelica said imazapyr use allowed them to come back at a longer return interval. Mike says the landscape really dictates herbicide choices. He hasn't had good luck with using imazapyr in the root zone of mature trees, but Frances and Angelica have used it in these settings without incident. Maria has had contractors kill plantings, but questions more the application technique than the chemical itself. Plateau (active ingredient imazapic) has been used in Clark County with good response.

Long-Term MANAGEMENT STRATEGY DISCUSSION

Sam: Garlic mustard managers look at management at a landscape level, not just a local scale. What if entities were to pool their resources and focus on the leading edge of the invasion, even it was outside their area?

Angelica: What are we trying to do? Hold the line or aggressively fight?

Maria: Eradication is possible in certain sites. A 40 acre park is sprinkled with garlic mustard and it may not be eradicated, but will work to contain it. In another area a flood zone means the patches move around within the area.

Mitch: Is there a possibility that garlic mustard will go in to remission after 20 years? Jeff saw a study where simply excluding deer eventually lead to garlic mustard declining. Dan read that management action was not needed over time; that native plants could compete more effectively eventually. Sam and Jeff read evidence that natives will bounce back once garlic mustard has been brought below a threshold.

Dan: Invasive earthworms alter forest soils—breakdown leaf litter faster and allow for more garlic mustard.

Angelica***:*** Are pre-emergents an option for limiting amount of garlic mustard germination? Challenge is that they prevent beneficials as well; Charlie recommends against their use. Angelica suggested another tactic could be promoting seedbank to flourish and then knocking it off heavy.

Survey/Mapping (including outreach) (12:25 – 1:30 pm)

How do you determine survey areas? Outreach strategies (How do you prioritize where to look? Increase program participation?) Mapping platforms + survey data management

SURVEYING & OUTREACH

Clackamas County: Jeff sends permit-of-entry requests to properties within 20-50 m around documented infestation sites >1000 sq feet. He uses python script to get resulting layer of sites targeted for surveying (though Arc tools can also be used, though requires a few more additional steps). He also surveys up and downstream of known infestation sites, as well as ad hoc throughout the season. The ArcMap buffer tool actually results in far fewer properties than simply pulling all adjacent properties adjacent to a taxlot with infestation (that way you aren't pulling in adjacent properties located far from the garlic mustard population). He doesn't resurvey sites were no garlic mustard is found. Jeff has found 20% of new properties surveyed have at least some garlic mustard. Jeff focuses on outreach and lets the contractors do most of the on-the-ground work by establishing set workflows/protocols. Contractors record landowner interactions for tracking. This frees up the agency staff person to focus on program development.

King County: Frances distributed thick handouts packed with useful information regarding surveying, collecting data, managing/organizing data, performing data analysis and synthesis, and producing maps. They have found trails a potential migration pathway for garlic mustard spread. They outreach to adjacent properties with known infestations, as well as those downstream. Postcards are distributed to target properties to "fish" for new populations, with especially suspicious properties receiving door-to-door follow-up (Clackamas also has a postcard they use for putting "feelers" out). In addition to municipal employee trainings, outreach includes tabling at farmers markets and other events with live specimens. Frances talked about their survey protocol. They fan out in a grid to survey through managed areas and large public areas like Golden Gardens Park. *They flag isolated patches to make relocating them easier on subsequent visits*. They have established protocol for determining suvey area, units, etc to keep data consistent between data collectors/records, etc. They continue to revisit annual for three years following after no new plants are found and then once more four years later before closing out the site. Maria emphazies use of non-biodegradable flagging for satellite populations and writing directions down on how to relocate them. Use flagging with "Noxious Weed" written on it. They also send out postcards at the beginning of the season to let folks know they'll be surveying soon and only call folks when there will be treatments made.

Washington Weed Laws & Compliance: Mike asks King what they do if landowners refuse entry. Frances says they pursue it in court and get a search warrant. The agency does the work themselves since when you let the landowner do it they do it badly. Angelica says they control all class-A species instead of allowing landowners to do it. King has had 100% compliance with garlic mustard control and no violations have had to been issued (threat of enforcement is enough). King funding for their robust program comes from tax assessments. Clark has had one citation/fine they had to issue and average 5-6 no compliance complaints per year.

Forest Park/Portland Parks & Rec: Charli Nappi uses youth crews and seasonal (non-herbicide licensed) staff to survey new areas and perform manual efforts (such as along stream corridors). Licensed contractors perform spray treatment work. Survey efforts are largely restrained to areas of known infestations due to time constraints.

Greater Portland Area: Oregon Invasive Species Hotline is one-stop place for reporting weeds across the state. Weed managers receive alerts when report is made in their area. For mailings, most Portland agencies (East and West Multhnomash SWCDs, City of Portland, Clean Water Services, etc) that work on private property send out permit of entry requests with their outreach letters—with follow-up door-to-door outreach at high profile sites. Door hangers are used by City of Portland (and King?). Michelle mentions increases success with handwritten notes on letters for properties with known infestations. Mitch uses website to track treatments throughout season so citizens know progress. Mitch mentioned a survey network within the city. It would take 1 year to survey the entire city (not including backyards and many natural areas)—how to do this effectively? Use of survey network?

King suggests sharing tracks data with other agencies and assigning particular areas of interest to weed watchers for getting more people looking in high-risk areas. Overlay tracks data with location of positive infestations to see where locations were missed. Forest Service lands are surveyed using weed watchers.

Angelica says it's interesting to listen to people talking about size and scale. With their large scale it is very important to coordinate with other agencies, such as Dept of Transportation. Apps help a lot to have hikers contribute to weed surveys. Discussion on scope and scale of surveys, making most of opportunistic surveying and gaps in what we know of unsurveyed areas.

MAPPING SURVEY DATA

Clackamas County: Jeff uses Fulcrum app to collect survey data, track treatments and communicate/implement/assign workflows with contractors—who only need iphones or android phone to use. Can improve signal accuracy in heavy canopy by using GPS. Data is synched to the cloud and accessed through web API. This technology has allowed him great capacity in implementing/managing the garlic mustard program.

West Multnomah: Michelle also uses Fulcrum app to collect all EDRR data. She points out that it allows ability to track infestations to the patch-size level, and aggregate these within separate site properties, etc. Useful for increasing amount of data that can be collected, while not taking more time than standard GPS. Great to have a centralized place for all data that is automatically kept current and can be accessed easily in both in field and office (freeing up her ability to spend treatment season in field).

King County: Ed uses Garmin GPS units (with cellular triangulation for increased accuracy), but uses defaults to facilitate a lot of data collecting without much need for time/manual data input. Each point represents 1 sq ft of infestation, unless otherwise noted by field notes (ie for larger infestations). This increases data precision and resolution. Tracks data is used to show were no infestations are and overall survey area. Requires post processing back in the office (see notes handed out by Frances), but end result is a lot of detailed spatial data. Workflow creates systematic year to year data. Crews can take data while also treating/spraying. Complications can occur with more than one species. Data is taken at nebulous sites, but Sites on small urban lots are mapped by simply a centroid data point once exported from Access database.

East Multnomah: Lucas (East Multnomah SWCD) takes rough estimates for each taxlot (references SALY—same as last year), rather than taking a 'high-tech' approach. He finds garmin units get great reception and cites <$300 cost. Jeff added that Trimble units take too long to collect data and have horrible reception (not to mention annual costs, etc).

REGIONAL MAPPING DISUCSSION

Discussion on defining " EDRR" -- recognizing that on a regional level a target invasive may be EDRR, but at the individual site level it may have complications. How does mapping help us with these decisions? Look at all weeds collectively—report all data and re-evaulate. Adjacent counties near known infestations need our data too.

Oregon Dept of Agriculture: For state mapping purposes, county level resolution is good enough for their purposes but scale down to watershed level or road system is useful too, but 3 meter resolution isn't necessary.

Alaska: "*The Alaska Exotic Plants Information Clearinghouse (AKEPIC) is a database and mapping application that provide geospatial information for non-native plant species in Alaska and neighboring Canadian Territories."* It is inexpensive and managed by USFS and University of Alaska. It ranks weeds from 1 to 100, and is a good tool for outreach. Site notes on infestations are included, Brian says every state should have one.

Michelle acknowledge that there are a lot of mapping initiatives but none that are region-wide (or that are utilized by all within the region).

Jeff suggests we prioritize data uploads to platforms that share with other platforms. He has researched EDDMapS, iNaturalist, iMap, Oregon Flora Project, WeedMapper (Oregon), etc—they are all very different. iNaturalist is the only all-taxa (including animals) that is also international. Project goals are needed to help guide what platform(s) are best utilized (ie is sharing between agencies main goal, or is it sharing with public, etc etc). Important goals recognized in the discussion include being able to make regional management decisions and having good maps to help neighboring jurisdictions monitor progress/updates/new infestations close to their borders.
In the great lakes region, seven different EDRR networks were combined into a single network.

Interagency Coordination & Strategy (1:30 - 2:25 pm)

Prevention (disposal, contractor requirements, etc), Long-term strategy, Next Steps

Coordinated Language: Frances and others would like standardized decontamination procedures to connect to contracts for restoration and construction. Group agreed that would be a good goal & action item.

There was discussion on having noxious weed approval for construction permits, etc. Angelica says consulting their county's weed control board is a requirement written into the early stages of the construction permit approval process. Using weed free hay is another requirement for Cowlitz permits.

Next Steps: Group agreed that meeting annually is a good idea; biannual format eventually. Suggestion to include eastern US contacts via webinar. Listserv would be good for check-ins, progress, sounding board, etc during field season. There was discussion on having a weekly poll to track phenology, etc across the NW (something simple that would simply require Y/N or checkbox, etc). Phenology tracking is helpful for everyone. Group expressed need to continue "bi-state" mapping (& beyond) discussion. Brian mentioned there is a large and established hawkweed focus group in AK and BC that could be tapped into for BC garlic mustard contacts.

Maria underscored need for studying garlic mustard impacts to PNW ecology, economics, etc. in order to better inform management decisions. Mitch wants to know if the allelopathic properties are being seen on the west coast the same as on the east coast. Studies haven't occurred in the NW. Dan asks what the implications of such a study would be. Mitch wonders what kind of effects are we really looking at. Assumption that it negatively affects mycorrhizae, but more research is needed on PNW soils. Maria still wants to know what the impacts of ignoring garlic mustard would be. It's hard to make informed management decisions when you don't know what you're managing for (ie what areas are most at risk, etc—focus efforts there). Scientific studies could help guide us and substantiate our work.