

Summit CWMA High Elevation Garlic Mustard Control Program

January 2023

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PROJECT DESCRIPTION

The High Elevation Garlic Mustard ISM Weed Control Program in Summit County is grant, partner match and in-kind contribution funded. The project focuses on the Class 1B state-listed noxious weed, garlic mustard (*Alliaria petiolate*). The goal of the High Elevation Garlic Mustard Control Program is the removal of garlic mustard and restoration of natural ecosystems for the protection of forest, open space, and tributaries to the rivers of the Weber River and Salt Lake County Watersheds.

The High Elevation Garlic Mustard Control Project Area encompasses private and public lands within Summit County and just over the Salt Lake County line. Many residential and ski resort properties border locally and federally owned public open space. Proximity to vast wildlands makes EDRR of noxious weeds critical; detection and treatment of noxious weeds is integral to the protection of watershed and wildlife habitat quality. Wildland-Urban Interface (WUI) areas can be challenging environments for noxious weed control due, in part, to the thousands of small (.2-1 ac) privately owned lots lining the forest edge. To effectively control garlic mustard,

identifying and mapping noxious weeds, and facilitating control treatments, substantial outreach, and partnerships are essential. The Summit CWMA and its partners include both private and public owners and managers of large and small parcels of land, as well as Summit County non-profits, businesses and residents.

TREATMENT AND DATA COLLECTION

Integrated weed management that incorporates outreach, hand weeding, mulching, herbicide, vegetation thinning (used to gain better access to weed populations), and revegetation is used. Multiple contractors are utilized to ensure control efforts are as timely as possible.

ArcGIS Field Maps is used to capture new garlic mustard populations (and other priority noxious weeds), and record treatment actions and herbicide rates. The app collects the following attributes for each site: percent cover (or absence) and dominant growth stage of the primary weed species, control method used (with herbicide rates), contractor or partner that applied treatment, bags of noxious weeds pulled from a site, and notes. The app is also used to record areas monitored,



*Garlic Mustard Games Volunteer
Weed Pull Station*

resources were provided in both English and Spanish. Volunteers use station materials to pull/cut weeds and bag them. Before leaving the site, volunteers scan a QR code on the station to enter themselves into a biweekly prize drawing. This program differs from the Garlic

Mustard Games in that there are no planned events, and all noxious weeds are targeted. The CWMA and its partners pick up filled bags and track the total pounds of weeds pulled.

Hounds Against Houndstongue was a partnership with Snyderville Basin Special Recreation District (the District). The District holds dog poop clean-up events multiple times a year at the popular Run-A-Muck off-leash dog area. The CWMA tabled at this event and provided information about houndstongue, emphasizing how easily it spreads via clothing and pets. The CWMA incentivized participants to collect houndstongue seeds by hand and/or pull them off of their dogs post-hike by offering them five cents per seed. Additionally, participants tried to guess how many houndstongue seeds were in a jar; the closest guesser earned a basket of dog-related prizes, including toys, treats, gift cards, and a comb to remove seeds from their dogs at home.

Also new in 2023 was the implementation of thinning in overgrown riparian areas. Riparian areas were thinned of dead or laterally growing, unhealthy vegetation to increase accessibility for weed control crews.

TREATMENT RESULTS

In 2023, we were able to inventory twice as many acres as we had aimed to. One hundred and thirty acres were prioritized for inventory in 2023 and a total of 286.81 acres were inventoried. Priorities included portions of

the Ontario Trail System, Treasure Hill, Iron Man Trail, portions of the Canyons Resort stream corridor, Sun Peak HOA Open Space, Utah Olympic Park trails, Pinebrook Creek Trail, Ecker Hill trails, Toll Canyon, and upper Summit Park Open Space.

Eighty-five acres associated with the Ontario trail system were inventoried and no additional garlic mustard was found; however, several new populations of yellow toadflax were found. Due to the species discovered, that effort was charged to the Summit CWMA's yellow toadflax and spurge control program. While not all of the prioritized areas at Treasure Hill were inventoried, 12.5 acres were visited and only two new, small populations of garlic mustard were identified and mapped. Sixty-three acres associated with trails in lower Toll Canyon and the adjacent Discovery Open Space were inventoried, and no new garlic mustard populations were found. Other sections of Toll Canyon were not inventoried in 2023.



Hounds Against Houndstongue Table

We were not able to inventory the new Seldom Seen downhill mountain bike trail before snow-making operations began; however, we did reassess and inventory portions of Spiro Trail—the popular, downhill-primary route Seldom Seen is slated to replace. Spiro Trail received maintenance this season; as such, it should be re-monitored within the next few years to ensure garlic mustard does not spread along the disturbed soils.

The majority of the areas above and within Sun Peak HOA and the Utah Olympic Park priority areas were inventoried, and an additional acre of garlic mustard, in the form of small patches, was identified and

mapped. New sections of the Pinebrook Creek Trail were inventoried and monitored as well. No new garlic mustard populations were found.

Due to delays in gaining access to the property, we were unable to inventory the stream corridor below the Canyons Resort maintenance building. Iron Man Trail, upper Summit Park Open Space, and the Ecker Hill Trail System were not inventoried this season, as other areas demanded our attention.

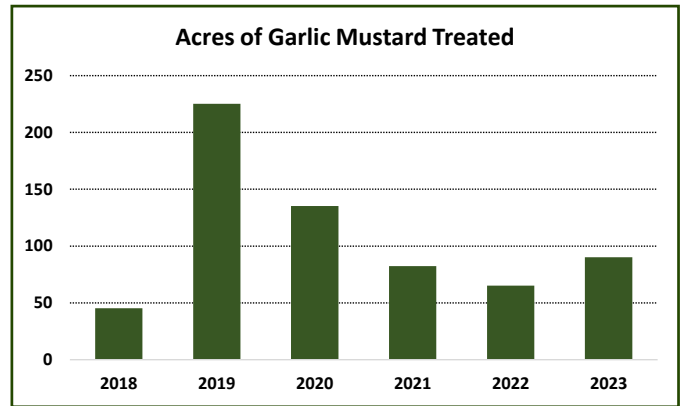
Due to the perfect growth conditions of fall 2021 to fall 2023, percent cover of garlic mustard increased at many sites throughout the project area. Additionally, populations we had considered almost eradicated in the past 3-4 years returned. Still, at consistently treated sites, garlic mustard percent cover remained lower than they were when the project began. While weather has resulted in a loss of progress in some areas, that loss is minimal and can be regained.

The single garlic mustard population known on Bonanza Flat was treated in 2023. The boundary was assessed for spread, but no spread was observed.

The Iron Mountain community and Crescent Ridge Condominiums continue to have dense populations of garlic mustard. These residential populations are adjacent and down slope from the large Armstrong garlic mustard population. While the Crescent Ridge garlic mustard population has pockets of reduced percent cover, the majority remains dense. The HOA has become very active in controlling this population. The Thayne's Canyon and Iron Mountain communities continue to have low participation rates in our programs and control



Garlic mustard rosettes of the Armstrong population after flowering second year plants were removed.



More of the garlic mustard populations treated in the last three years requires access via trails and/or must be treated using backpack sprayers. This more difficult access is more labor intensive and costly which reduces the number of acres we are able to control each season.

efforts; the high number of second homes within these HOAs is likely a contributing factor.

The Armstrong population is the largest continuous garlic mustard population mapped in Summit County. Four years ago, the Armstrong population was known to be approximately 30 acres. This population is now mapped at 48 acres. This increase is more likely the result of additional inventory efforts in the area than it is a reflection of rapid spread. The Armstrong population has patches of declining percent cover, particularly in the areas Garlic Mustard Games volunteers have worked within the last three years. Otherwise, due to the size of the Armstrong population, 2023 treatment efforts focused on the Armstrong trail corridor that runs along the edge of the main population. This strategy helps to reduce trail-associated seed spread.

Rotary Park has been included in the High Elevation Garlic Mustard Control Program in previous years. In an effort to more evenly distribute the workload between the two Summit CWMA garlic mustard programs, this area was moved into the Low Elevation Garlic Mustard Control Program this season. The area did receive treatment and monitoring; for more detail, please see the Summit CWMA Low Elevation Garlic Mustard Control Program 2023 Report.

Percent cover and number of garlic mustard populations continues to remain stable throughout Park City Municipal Corporation and Snyderville Basin Special Recreation District properties where control has been

consistent. However, some areas with long histories of invasion that had been nearly eradicated in the past few seasons, showed reinvasion. The ideal growing conditions of fall 2021 through fall 2023 likely caused old seed banks to germinate.

This is the fifth year the CWMA worked with Park City Garden and Nursery to control garlic mustard growing along its section of creek. The portion of the population we originally had consent to treat remains nearly absent of garlic mustard. Expansion of the Nursery grounds upstream in 2022 allowed us to access and treat additional portions of the garlic mustard population. These newly accessible areas are densely populated and will likely require another 2-3 years of treatment to show reductions. Additionally, large patches of overgrown vegetation in the stream corridor prevent treatment of the garlic mustard present in the understory. These garlic mustard plants continue to act as a seed source and hinder the successful treatment of the property. Thinning this woody vegetation would allow for treatment and make site-wide control achievable long-term.

The nearby Sun Peak HOA had significant reinvasion levels in areas previously showing decline. Much of the Sun Peak garlic mustard is located within the forest and along a stream corridor. Resident participation remains lower in Sun Peak than in other HOAs; however, the HOA is currently developing an updated weed control plan. An additional challenge in this HOA open space is an ongoing fire mitigation project; fire mitigation activities have led to increases in the size and percent cover of known populations, expansion of population boundaries, and establishment of new populations. The CWMA is working



Spring flooding of Sun Peak HOA trails open space delayed inventory and treatment to later in the fall.

to support Sun Peak HOA weed control efforts, and Sun Peak, in turn, is working to bring the neighboring HOA, Enclave, to the table. Enclave HOA has also conducted fire mitigation within its open space, and the CWMA is aware of sizeable garlic mustard populations spreading within those areas.

The garlic mustard populations of PRI and the Utah Olympic Park do not appear to have expanded, and no new populations were found. The PRI garlic mustard population did, however, show slightly increased percent cover in 2023. Still, percent cover at that site remains far lower than it did when it was originally discovered.

Several garlic mustard populations in the Pinebrook HOA showed reduced density. Access to private properties in Pinebrook remains more limited than in Summit Park; consequently, the extent of invasion within residential parcels of the Pinebrook HOA is less understood. Within HOA open space, however, percent cover is declining. This is particularly true in an area known as the “mailbox trailhead” where 100% cover of garlic mustard has declined to only 10-20% cover, and revegetation has increased native grass and forb cover by over 50%. This site has been a Garlic Mustard Games weed pull station location for two years, and residents have dedicated themselves to weeding this area and maintaining the progress made.

Garlic mustard populations on public and private



Volunteers from the Park City Trail Club pulling garlic mustard on Pinebrook HOA Open Space.



Left: Pre-thinning riparian vegetation at the Canyons Village site. Right: Post-thinning, area is accessible for treatment in 2024.

property in Summit Park and Toll Canyon have been reduced where consistently treated. Additionally, garlic mustard spread from residential areas to open space remains limited. The majority of garlic mustard in Summit Park continues to be on residential properties. Where an invasion line between the open space/Salt Lake Watershed and residential parcels has been established, maintaining this line is a high priority of this project as is the control of the remaining garlic mustard population.

Due to extensive overgrowth of woody vegetation along the creek that runs through a drainage in the Canyons Village, garlic mustard control has long been hindered. Thinning of dead wood opened the canopy and exposed dense garlic mustard populations that can now be treated in 2024. A total of 2,300 lbs. of dead vegetation was removed from 0.12 acres.

Revegetation

Areas previously seeded in fall of 2020—including Toll Canyon, Summit Park Open Space, Pinebrook Creek Trail, Poison Creek, and Prospector Trail—continue to support the establishment of seeded grasses. In 2023, these areas, along with new restoration sites, received additional seeding with native grasses. In total, 40.82 acres were seeded within the High Elevation Garlic Mustard Control Project area. Soil amendments were not used for these seedings as seeding trials conducted over the last 4 years indicate that seed availability, rather than soil quality, is likely the most significant factor in native plant community recovery. We will

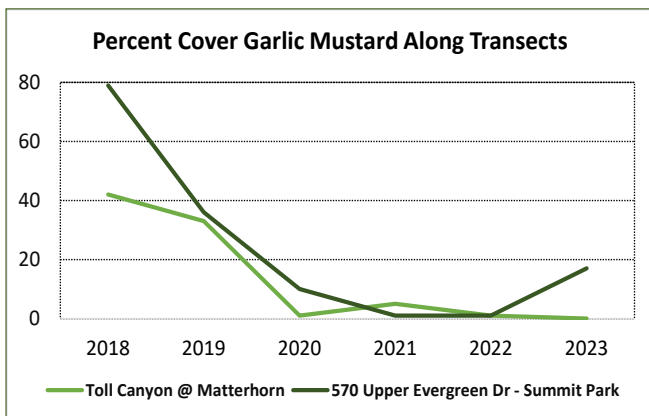


Dense patches of garlic mustard uncovered by removing dead, woody vegetation.

monitor these sites, and if any show poor native plant establishment, we may apply soil amendments and reseed.

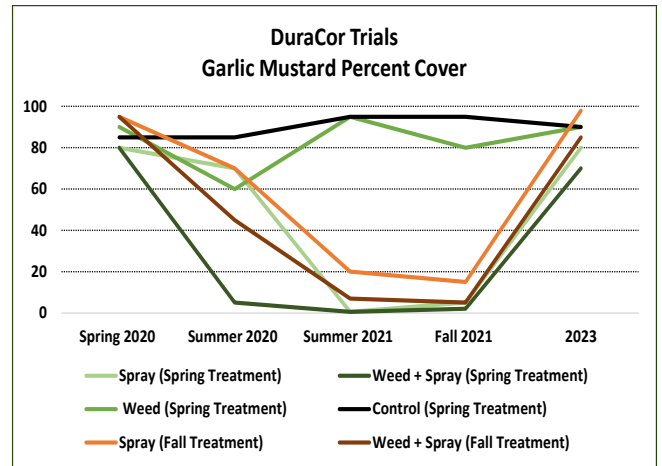
Transects

By 2020, the 570 Upper Evergreen site (Summit Park) had reached less than 10 percent cover of garlic mustard; in 2021, that coverage dropped to near zero. However, in 2023 percent cover increased to 17%. Flowering plants accounted for the majority of the increase. Treatment did not occur in 2022 as the seedlings germinated in late fall and the snow came before treatment could occur. In 2023, the site was weeded and treated with herbicide. In 2023, the Toll Canyon transect remained nearly free of garlic mustard and appeared to be filling in with native plant species.



Garlic Mustard - DuraCor Trials

Herbicide trial plots were established in 2020 to test how long control would last and whether we could reduce overall herbicide use from 2-3 treatments a year for three years with 2,4D and Dicamba to one treatment every 3 years with DuraCor. The DuraCor nearly wiped out the garlic mustard for one year. By 2022, garlic mustard was just beginning to reestablish and percent cover remained visibly lower in treated plots. By 2023, the spring weeding + herbicide spraying plots continued to have low garlic mustard cover. The spring spray and the fall weeding + herbicide spray treatments had just slightly more garlic mustard cover than the spring weeding + herbicide spray treatment. It is likely these differences will no longer exist by summer of 2024.



These results suggest DuraCor can be applied to treat garlic mustard once every 2-3 years and can reduce overall herbicide use in areas of 100% garlic mustard cover. Because it is a preemergent, and therefore prevents germination of all species, it is not recommended for use in areas with a mix of species. There was a small reduction in shrub cover the first year after treatment; however, by year two all plots, including the control (no treatment) plots, showed the same level of reduction. This finding suggests that the reduction in shrubs cover may not be associated with the DuraCor. Regardless, this herbicide has been shown to impact shrubs and applicators should take care when using DuraCor near shrubs and trees.

CONTRIBUTORS TO SUCCESS

Multiple factors increase our ability to respond to weather, use time and money efficiently, collect high quality data, and share information across jurisdictions. The following is a list of the project components we found most effective.

Multiple Contractors: The ability to hire multiple contractors allows for more efficient treatment and response to limiting weather conditions.

Use of ESRI Software: Web-based treatment consent facilitated by Survey 123 increases participation of residents and auto-populates our contractor maps, ensuring crews know where they can and can not treat.

A shared Summit CWMA map on the ArcGIS Field Maps allows for real-time mapping of new weed populations

TOLL CANYON SEEDING TRIALS

In 2020, the Summit CWMA was awarded funding from the Utah Weed Supervision Association for revegetation seed mix, soil amendments and biochar trials for shady garlic mustard treatment sites. The trials aim to identify an effective seed mix and/or methods to address soil legacy impacts at these difficult sites.

Trials continue to have high grass establishment. Wild rye, slender wheat grass and fescue remain the only species flowering within the mix, but there is significant percent cover of non flowering grasses that cannot be identified.

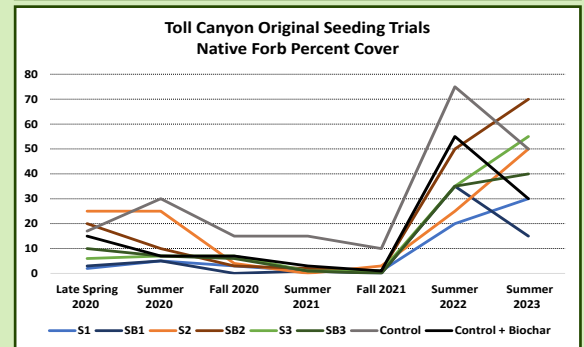
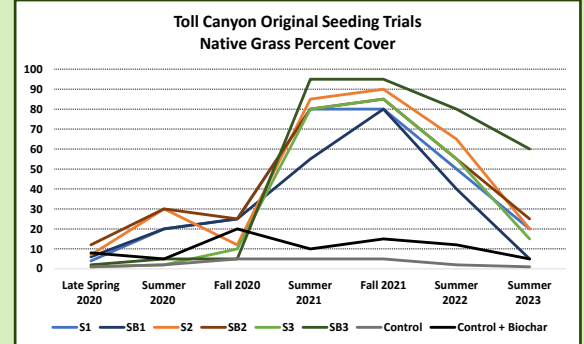
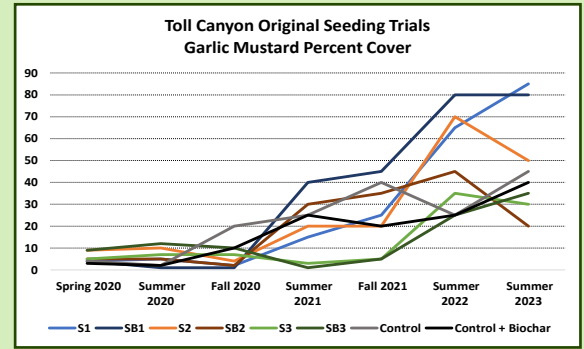
In the original plots, garlic mustard recovered most rapidly when seed mix 1 was used and had more limited recovery where seed mix 3 was used. The opposite is true of the expanded plots; garlic mustard recovered most with seed mix 3. All grass mixes resulted in high levels of grass establishment. In the original plots, the use of biochar and compost had mixed results that appeared seed mix related, whereas, in the expanded plots, both seed mix 1 and 2 had greater grass cover when used with biochar and compost together and the use of compost alone was more effective than no soil amendment.

The 2022 peak in forbs is due to seeding in 2021, however, the only seeded species that increased was common yarrow. Original plots that had higher grass establishment had slightly lower native forb establishment. Expanded plots had the lowest native forb establishment when seed mix 1 was used, and the highest cover when mix 3 with no amendment or mix 4 with just compost was used. Surprisingly, weedy forbs had the greatest establishment in the same plots that had the greatest grass establishment (seed mix 1) in the expanded plots. It is not surprising that weedy forbs and native forbs generally did not establish well under the same treatments.

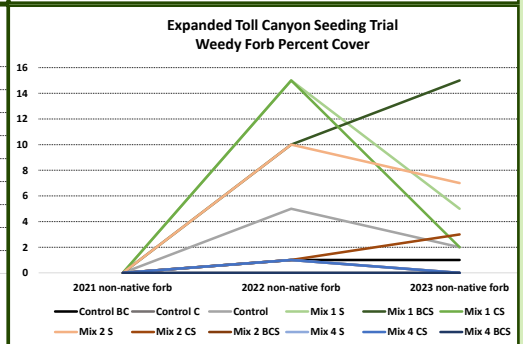
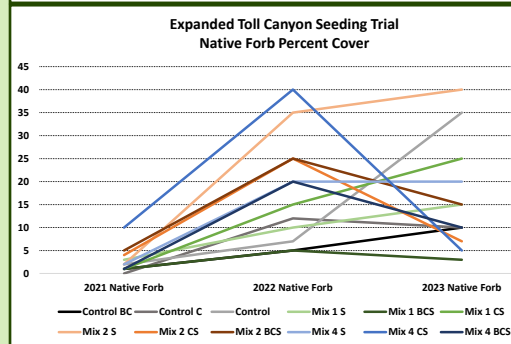
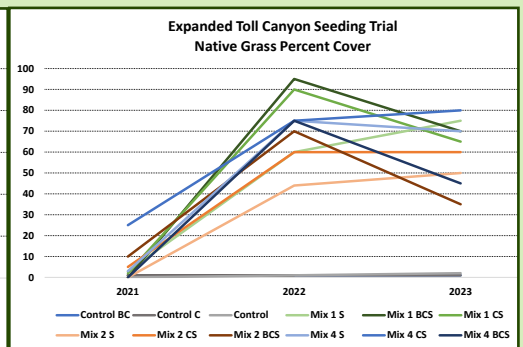
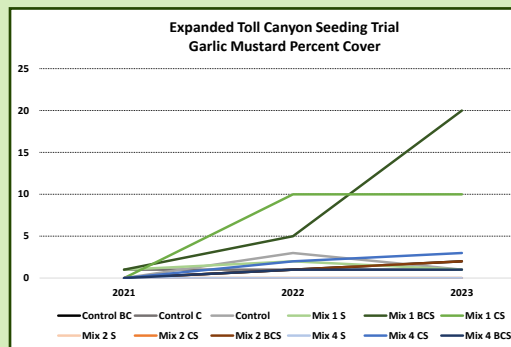
It appears that the response of seeded species is dependent on the soil amendment used and the establishment year (water availability is likely important). Interactions between seed mix and soil amendment occur but vary by year.

The results that remained constant across sites are that seeding increased native grasses and that, where seeding of native forbs occurred, there was also an increase in native forbs. This result indicates that these sites are seed-limited, likely due to a long history of fire suppression that allowed forest canopies to shade out forest floor species and a long history of garlic mustard invasion.

Monitoring of plots will continue for one more year to see if expanded plots and the original plots begin to look more similar.



Original Plots started 2020
S = seed mix, B = biochar, C = compost



Expanded plots started 2020.

and treatment, and aids communication with all partners and contractors.

Monitoring/Survey: Pretreatment monitoring allows for assessment of weed status before sending full control crews to the site; this strategy increases herbicide crew efficiency. Post-treatment monitoring allows for assessment of treatment completeness and new plant growth.

Local Government and Weed Department Support: Partnering with our county and municipal weed departments allows us to obtain grant funding, acquire herbicide for partners at affordable rates, incorporate noxious weed trainings, and treat priority weed populations on private lands when CWMA or county staff discovers them.

Consistent Partners and Treatment: Communicating with and directing treatment is increasingly more efficient with consistent partners. As an understanding of treatment needs as well as policy requirements is already in place, treatment goes forward without interruption.

Outreach Communication: Adding all events to the website calendar helped residents sign up for and follow our events and a call to action button allows residents to sign up for control assistance online.

FUTURE TREATMENT PLANS

As we continue to find new garlic mustard populations, strategic use of resources and annual funds is increasingly important. Using ArcGIS, we have identified all private parcels within 50 meters (first priority) and 100 meters (second priority) of open space and created a map showing these as priority areas. This will guide control decisions as residents sign up for the program. In 2024, we will continue to work with HOAs to aid in data collection to inform their weed management plan development, particularly these implementing fire mitigation in areas of known garlic mustard invasions.

Delayed spring weather and wet autumns created challenges for getting contractors out to treat at optimal times. To address staffing issues, we have added a new contractor from American Fork to our contractor list. This

PROJECT PARTNERS

We would like to thank all of our partners and sponsors for their contribution to this program. Thanks to the Utah Department of Agriculture and Food for funding this project. Recognition is also due to the following partners for their participation:

Primary CWMA Member Partners

Ecology Bridge: Sara Jo Dickens, Betsy Hochman, Stephanie Saladyga

Summit County: Dave Bingham and Dan Pena

Snyderville Basin Special Recreation District: Matt Bengé

Park City Municipal Corporation: Logan Jones, Hannah Halsted, David Jenkins

Deer Valley Resort: Laura Sexton and Paul Hedman

Pinebrook HOA: David Geffen, Stephan Herrera

Summit Park HOA: Mike Quinones

Sun Peak HOA: Teresa Wharton

Utah Olympic Park: Jamey Kimball

Utah State University Extension: Elizabeth Cohen

Woodward Park: Tom Butz

Additional Partners

Utah Weed Supervisors Association: Jerry Caldwell

Vail Resorts: John Sale, Brett Johnson

Mountain Trails Foundation: Rick Fournier

Recycle Utah: Carolyn Wawra

Park City Rotary Club: Insa Riepen

Contractors

Ecology Bridge: Sara Jo Dickens, Betsy Hochman, Stephanie Saladyga

EcoLawn: Rob AhPing

EcoSolutions: Kelly Creamer

Greenleaf: Buck Bailey

Ground Solutions: Sterling Graham

Providia Management Group: Scott Pratt

Additional Sponsors

Arcade Belts

Dakine

Kate's Real Food

Oleus

Fjallraven

Swaner Preserve and EcoCenter

Park City Film

Alpine Distillery

Savoury Kitchen



11 Years
of funding
Garlic Mustard
Mapping and
Control

Fiscal Agent
Summit County



**Project
Manager**
Ecology Bridge



\$80,000 - ISM Grant
\$6,000 - UWSA Noxious
Weed Grant



8 Years
Using spring
and fall
treatments



6 Years
Thinning with
weeding
pre-herbicide



**286.81 ACRES
INVENTORIED**



**25.62 ACRES
HAND WEEDING**
20% Treated Acres



**64.18 ACRES
HERBICIDE**
51% Treated Acres



**40.82 Acres
Reseeded**

1 Transect
3 Research Projects



**3rd ANNUAL
GARLIC MUSTARD GAMES**



GARLIC MUSTARD GAMES STATS



121 VOLUNTEERS



955 HOURS



4,600 POUNDS

** Includes High and Low elevation Program areas



10 PARTNER HOAS

5 Years
Partnering with HOAs

135 Participating
Residential Parcels

OUTREACH

Summit CWMA outreach is achieved through regular social media posts, appearances on the local radio station (KPCW), articles in local papers (Park Record), partnerships with local government and HOAs, and community volunteer programs.

HOA Outreach Program

Many of our partner HOA open spaces are adjacent to or contain waterways and trails that lead to public open space. Consequently, treatment of these areas is extremely

important for reducing garlic mustard invasion of public open space. Our HOA partnership program aids in the success of the CWMA in many ways:

- ◆ Increased reach of resident outreach
- ◆ Higher volunteer recruitment
- ◆ Increased participation in the Summit County weed program for assistance and herbicide consultation

Garlic Mustard Games



Team Garlic Mustard Be Gone - 2023 GMG Champs

Garlic Mustard Games events were held throughout Park City and the Snyderville Basin. Despite record spring flooding and difficult weather conditions, the Garlic Mustard Games program succeeded in removing over 4,600 pounds of garlic mustard (this total includes pounds pulled in both garlic mustard management areas). In all, 121 volunteers on 28 different teams participated.

Advertising on local radio, in local papers, on HOA websites, on Summit CWMA and partner social media, and through direct outreach to local interest groups generated large numbers of volunteers and many opportunities to educate residents about garlic mustard and other noxious weeds.

HOA Partners	Event Locations
Bear Hollow	Pinebrook Creek
Summit Park	Woodward
Pinebrook Master	Summit Park
Sun Peak	Sun Peak
Thayne's Canyon	Armstrong Trail
The Colony	

Hounds Against Houndstongue

The goal of Hounds Against Houndstongue is to teach hikers how easily houndstongue seeds attach to dog fur and spread to new locations. 40 seeds were collected and 22 individuals were reached. The Run-A-Muk trail system was chosen for this event because the property, historically, hosted large houndstongue populations. Additionally, Basin Recreation's well-attended dog poop clean-up days presented a great opportunity for partnership. Surprisingly, participants had a difficult time finding houndstongue—a result indicative of crews' success nearly eradicating houndstongue at Run-A-Muk. In 2024, we will hold the event again and identify locations that currently have high levels of houndstongue.



Noxious Weed Ambassador Program

Volunteers of the county-wide Ambassador Program pulled a total of 475 pounds of weeds in just under two months—75 pounds of which occurred in the High Elevation Garlic Mustard Control Program area. Musk thistle and common burdock were the most commonly pulled noxious weeds through this program. In 2024, this program will run from May/June - October and additional volunteer stations will be placed throughout recreation areas and trail systems.

new contractor has larger crews than most of our current contractors and has performed high quality control on other programs we work on.

To further facilitate control efforts, we will continue thinning work in riparian corridors where overgrown vegetation and debris prevent crews from accessing and controlling garlic mustard.

CONCLUSIONS

Containment of garlic mustard populations and reduced population densities have been achieved where treatment has been applied consistently over the last seven years. Several new populations in open space and in residential areas were found in 2023; most were treated. With continued, consecutive treatment, garlic mustard can be controlled and, in some areas, may even be eradicated; however, ensuring private property owners control and monitor their properties for long enough to make progress is a challenge.

Record snowpack, higher than average rainfall, and a delayed spring led to increased garlic mustard in some areas where control had previously achieved near eradication. It will be critical to maintain control in these

areas to prevent long-term reestablishment of garlic mustard. Seeding efforts are resulting in the establishment of native plants; however, progress is slow. Continued maintenance and support of revegetation sites that are progressing more slowly will be key to converting these sites back to resilient, native plant communities.

The Garlic Mustard Games continues to grow in popularity and participation. In 2023, volunteer participation remained high; participation was especially important this year given that the late spring, flooding of creeks, and rapid summer warm-up reduced the control season by 1-2 months (depending on site location). While the total pounds of garlic mustard removed was down, volunteers pulled over 4,000 pounds in a much shorter timeframe than in previous years. The Noxious Weed Ambassador Program allowed us to extend our volunteer programs beyond the growing season of garlic mustard and harness already committed volunteers to address additional noxious weed species—particularly musk thistle and common burdock.

FINANCIALS

In 2023, the Summit CWMA was awarded \$80,000 for the

2023 ISM Grant Expenses

High Elevation Garlic Mustard Control Program - 2023 Budget		
Line Item	Descriptions	Expensed
Expensed January 1 - June 30, 2023		
Restoration	Seed and soil amendments	\$1,650.00
Supplies	Herbicide for partner use	\$610.00
Contractors	Mechanical Weed Removal	\$7,316.70
	Inventory and Mapping	\$9,483.00
	Herbicide Treatment	\$16,683.10
	Arc GIS Data Management/Mapping	\$2,720.00
Administration (Fiscal)	Administration (Fiscal)	\$ 4,600.00
Administration (Project Management)	Administration (Project Management)	\$3,446.90
ISM Sub-total		\$46,509.70
Expensed July 1 - December 31, 2023		
Restoration	Seed and soil amendments	\$2,102.00
Outreach	Outreach Labor and Supplies	\$2,692.43
Contractors	Mechanical Weed Removal	\$11,705.04
	Mechanical Thinning and Mulching	\$3,430.77
	Inventory and Mapping	\$3,555.00
	Monitoring	\$3,000.00
	Herbicide Treatment	\$16,526.95
	Revegetation	\$1,478.10
	Arc GIS Data Management/Mapping	\$959.20
Equipment	Dump Trailer Rental Fees	\$ 689.08
Administration (Fiscal)	Administration (Fiscal)	\$ 4,000.00
Administration (Project Management)	Administration (Project Management)	\$883.95
ISM Sub-total		\$51,022.52
ISM Grant total expenses in 2023		\$97,532.22

2023 state fiscal year (July1, 2023-June 30, 2024). Additionally, \$46,509.70 was carried over from the 2022 state fiscal year grant. This totaled \$126,509.70 going into the 2023 season. \$97,532.22 was spent in 2023, leaving \$28,977.48 to be applied to work conducted

spring of 2024. This grant was matched through partner in-kind donations, the Utah Weed Supervisors Noxious Weed grant, a BIL grant and the UServeUT grant. The total match was \$36,036.97 giving the project a 27% match.

2023 Partner and Additional Grant Matches

2023 Match		
Line Item	Descriptions	Expensed
Summit County	Weed Identification training - Labor, conference space, county weed identification books	\$ 262.00
	Chemical control of Garlic Mustard	\$ 705.00
	Equipment: trucks, spray rigs, GIS	\$ 400.00
Park City Municipal Corporation	Contractors: Mechanical control of garlic mustard	\$ 1,300.00
Basin Recreation	Contractors: Mechanical and chemical control of garlic mustard	\$ 2,550.00
	Incentive items for volunteers - day passes to local recreation center	\$ 100.00
USERVE UT Grant	Prizes for outreach program competitions	\$ 142.73
	Food for end of season volunteer event	\$ 528.24
UWSA - Noxious Weed Grant	Inventory and Mapping	\$ 1,425.00
	Herbicide Contractor	\$ 4,575.00
BIL Grant	Hand removal of garlic mustard	\$ 3,000.00
	Inventory and Mapping	\$ 4,255.00
	Project management and reporting, Fiscal Agent Fees	\$ 800.00
	Herbicide Contractor	\$ 6,183.50
	Outreach - banners for the dump trailer, flag signs	\$ 454.39
	Restoration Supplies - Native grass seed and soil amendments	\$ 1,000.00
Deer Valley	Stickers for the Summit CWMA and Garlic Mustard Games, Venue for end of season volunteer party	\$ 700.00
Ecology Bridge	Mechanical control and GIS Specialist	\$ 1,415.60
	Administration, Inventory/Mapping, Monitoring, GIS Specialist, Mechanical Control, Outreach	\$ 6,240.51
Match Total		\$ 36,036.97

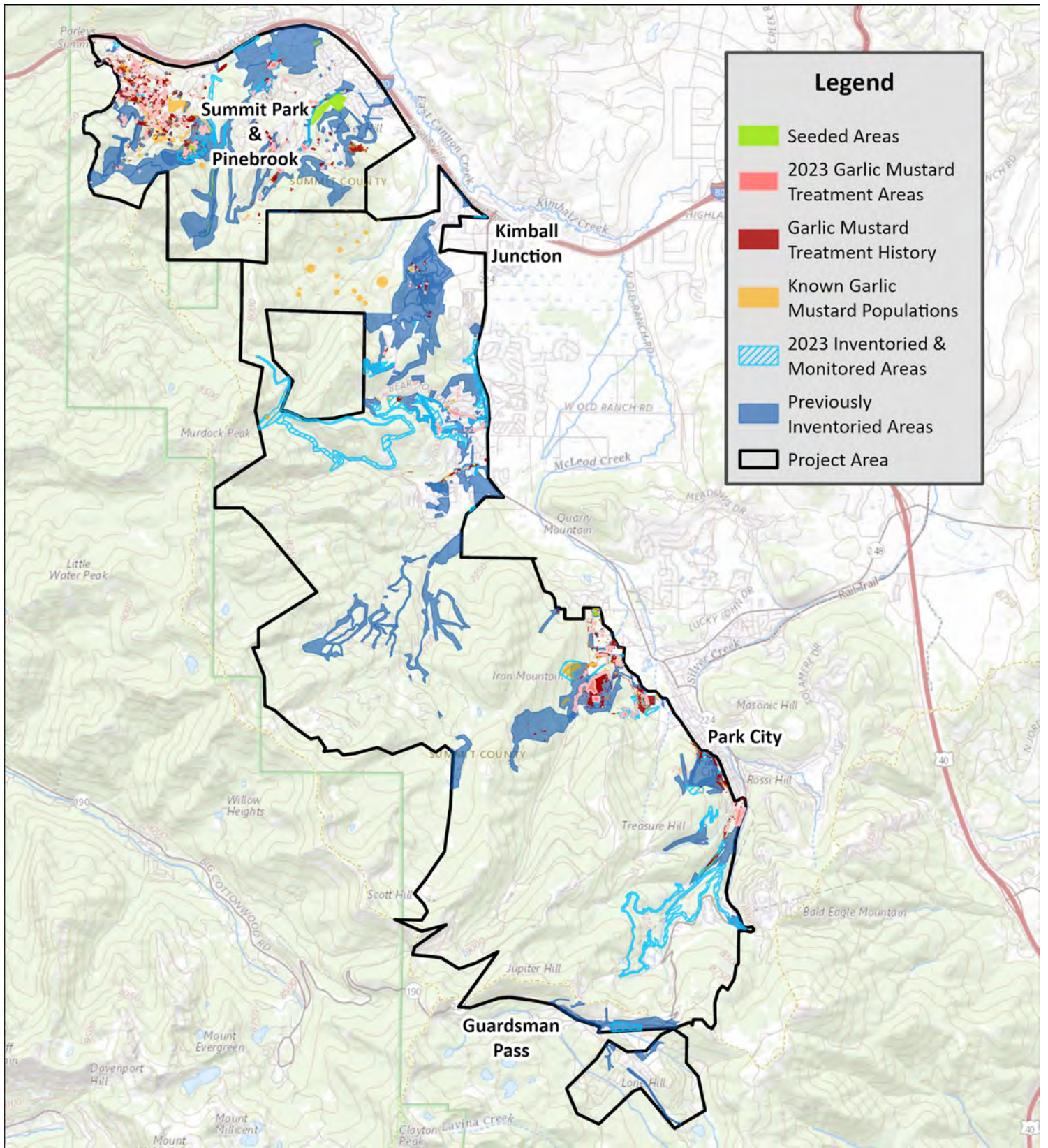


Left: Garlic Mustard Games training Right: Volunteers having fun during a Garlic Mustard Games pull event

HIGH ELEVATION GARLIC MUSTARD CONTROL PROGRAM: 4 YEAR PLAN

Garlic mustard control began in 2010 as a partnership between the Summit CWMA, Salt Lake County and the Salt Lake Watershed. Garlic mustard has been treated using hand weeding, mulching, herbicide and restoration. Since the program began, thousands of acres of garlic mustard have been treated. The Summit CWMA partners with the Summit County Weed Department to hold two, free noxious weed trainings annually, and, as of 2023, the CWMA runs three volunteer programs to incentivize community participation in weed control: the Garlic Mustard Games, the Noxious Weed Ambassador Program, and Hounds Against Houndstongue.

2023	INVENTORED 287 Acres	MONITORED 4 sites	<ul style="list-style-type: none"> • DuraCor Trials • Toll Canyon Seed Trials • Toll Canyon and Upper Evergreen Dr Transects
	CONTROLLED 90 Acres	RESTORED 41 acres	<ul style="list-style-type: none"> • Summit Park Open Space - No Worries Trail, Parkview dr trailhead
	Thinned .12 Acres	New - thinning of overgrown riparian vegetation in the Canyons Village to increase access to garlic mustard populations that have previously gone untreated because crews could not physically reach them.	
	OUTREACH	<ul style="list-style-type: none"> • 1 KPCW appearance, 1 Park Record article • New - Noxious Weed Ambassador Program including a Spanish translation • New - Hounds Against Houndstongue Event 	
2024	INVENTORY GOAL 250 Acres	MONITORING GOAL 4 sites	<ul style="list-style-type: none"> • New: Organic herbicide trials - Armstrong and Park City Nursery • DuraCor Trials • Toll Canyon Seed Trials • Toll Canyon and Upper Evergreen Dr Transects
	CONTROL GOAL 150 Acres	RESTORATION GOAL	<ul style="list-style-type: none"> • 4 maintained acres
	THINNING GOAL .2 Acres	Canyons Village and Park City Garden and Nursery	
	OUTREACH	<ul style="list-style-type: none"> • 1 KPCW appearance, 1 Park Record article • All 3 volunteer programs • Add a Spanish translation of weed training to the website • Create the noxious weed identification sports hanky 	
2025	INVENTORY GOAL - 300 Acres	MONITORING GOAL	<ul style="list-style-type: none"> • New: Organic herbicide trials - Armstrong and Park City Nursery • 3 sites: Toll Canyon, Upper Evergreen Dr, thinning site Transects
	CONTROL GOAL - 150 Acres	RESTORATION GOAL	<ul style="list-style-type: none"> • 4 maintained acres
	THINNING GOAL - .2 Acres	Canyons Village and Park City Garden and Nursery	
2026	INVENTORY GOAL - 250 Acres	MONITORING GOAL	<ul style="list-style-type: none"> • 3 sites: Toll Canyon, Upper Evergreen Dr, thinning site Transects
	CONTROL GOAL - 100 Acres	RESTORATION GOAL	<ul style="list-style-type: none"> • 1 new acres, 4 maintained acres
	THINNING GOAL - .3 Acres	Canyons Village	
2027	INVENTORY GOAL - 250 Acres	MONITORING GOAL	<ul style="list-style-type: none"> • 2 sites: Toll Canyon and Upper Evergreen Dr Transects
	CONTROL GOAL - 150 Acres	RESTORATION GOAL	<ul style="list-style-type: none"> • 2 new acres, 5 maintained acres
	THINNING GOAL - .1 Acres	Canyons Village	

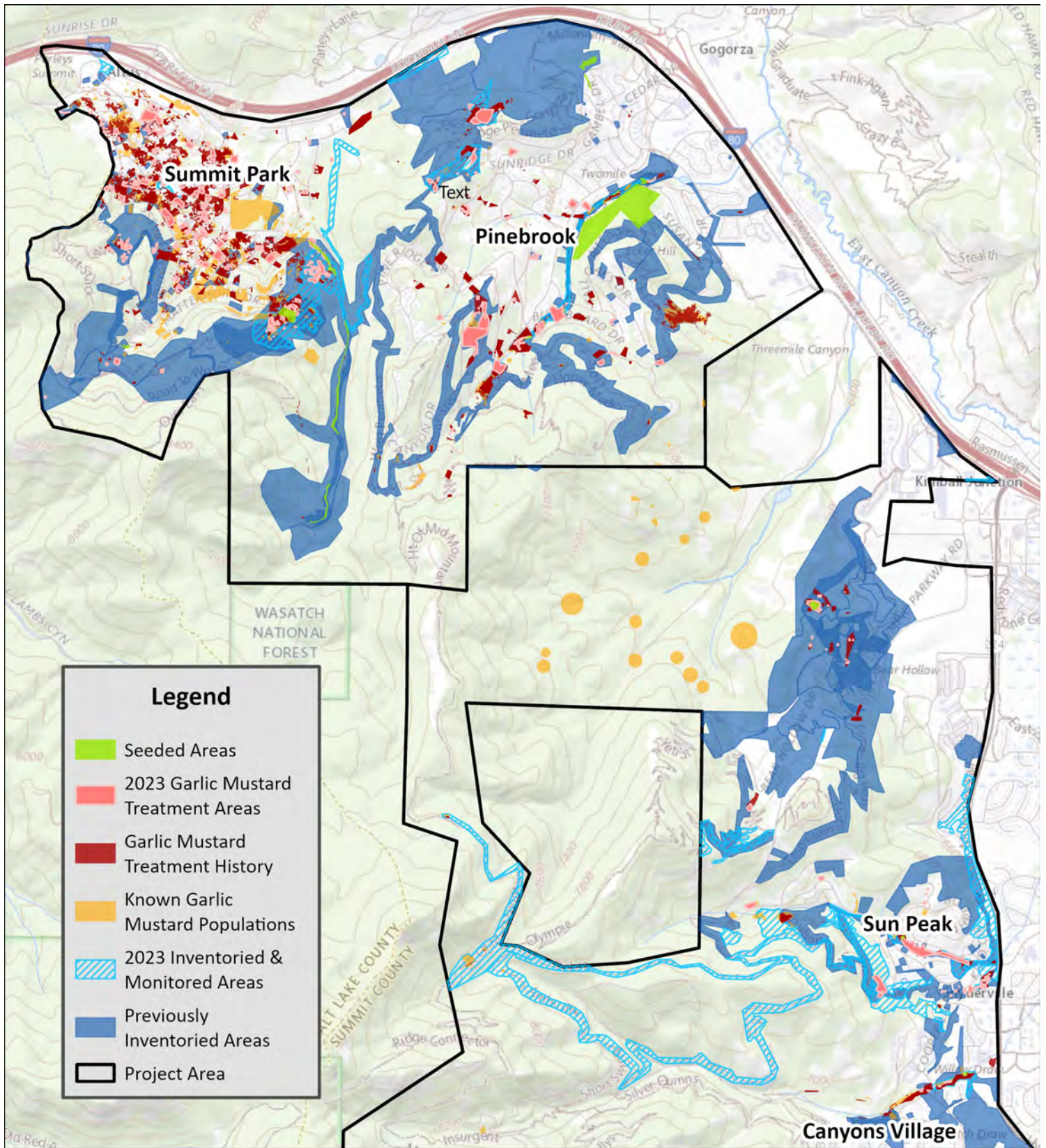


2023 Summit CWMA High Elevation Garlic Mustard Control Program

Seeded areas, treatment areas & history, inventoried/monitored areas & history, and known populations of garlic mustard within the full 2023 high elevation garlic mustard project area. Known populations data are cumulations of data since 2018.

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 by Betsy Hochman
 Ecology Bridge LLC

0 0.5 1 2 Miles

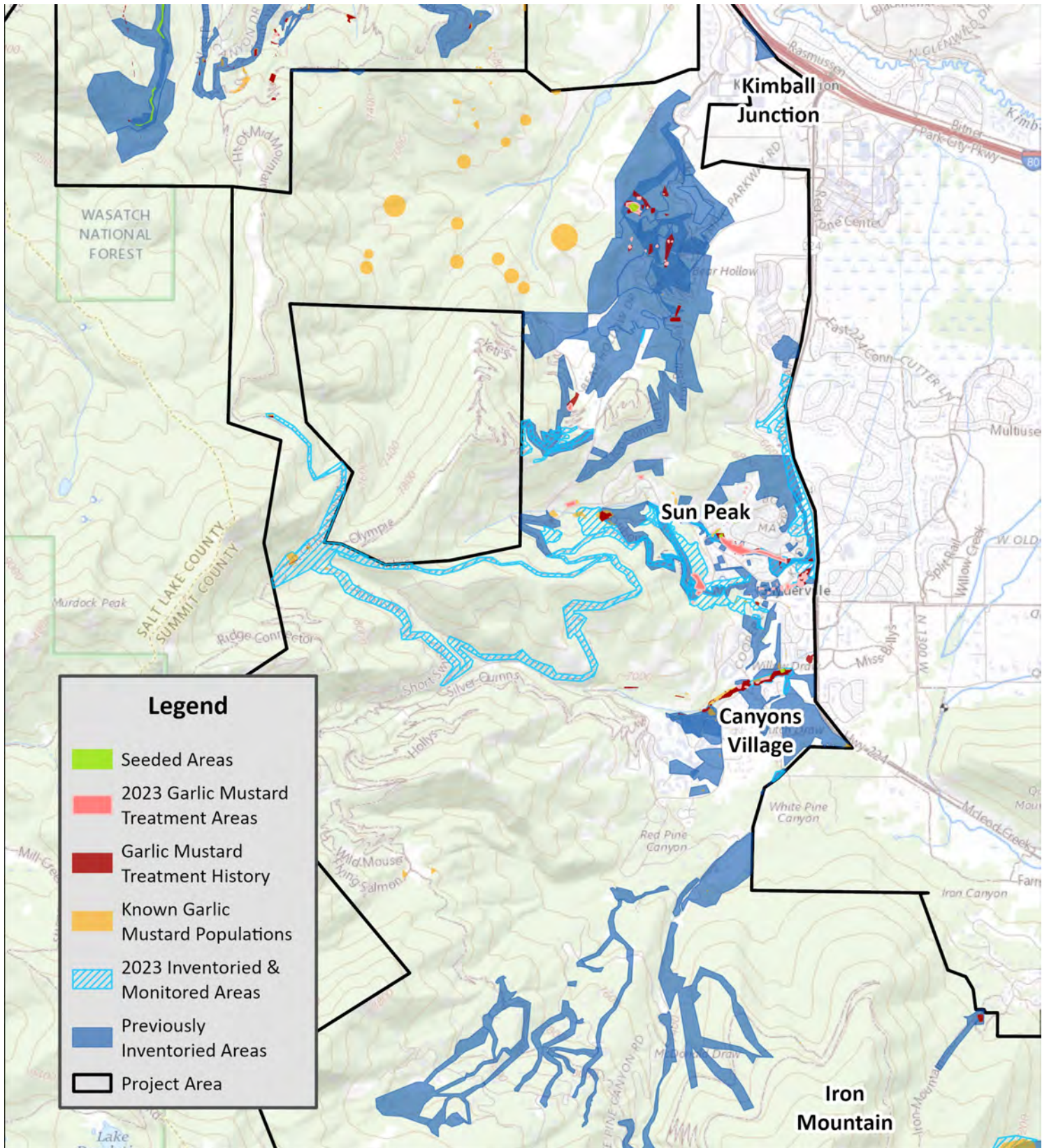


2023 Summit CWMA High Elevation Garlic Mustard Control Program - Summit Park & Pinebrook

Seeded areas, treatment areas & history, inventoried/monitored areas & history, and known populations of garlic mustard within Summit Park, Pinebrook, and Sun Peak HOAs and the surrounding open space properties. Known populations data are cumulations of data since 2018.

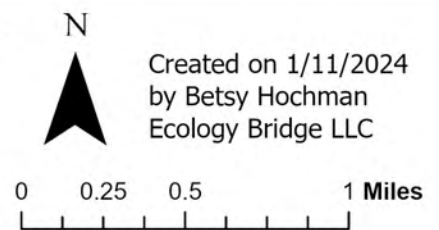
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 by Betsy Hochman
 Ecology Bridge LLC

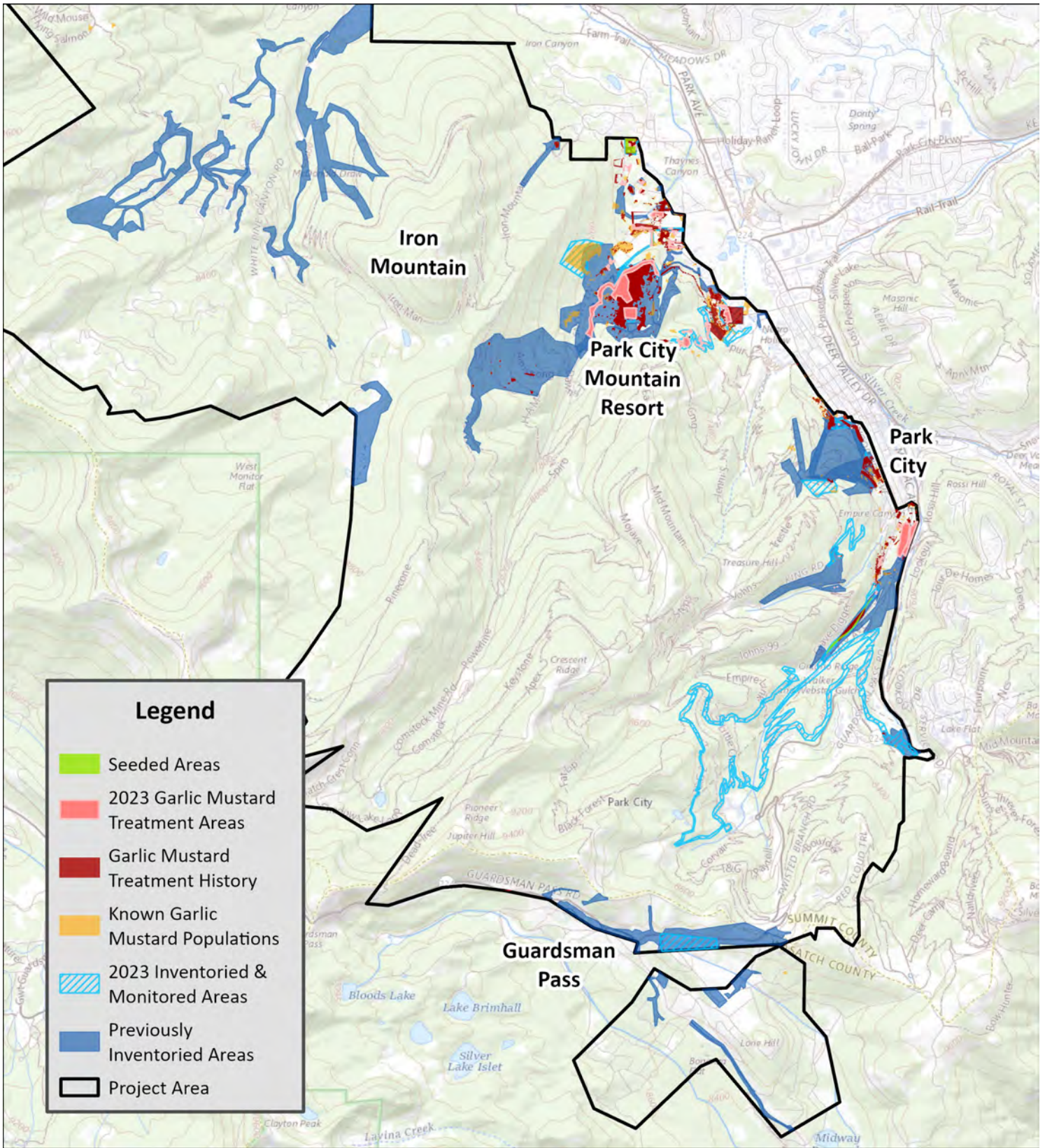
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2023 Summit CWMA High Elevation Garlic Mustard Control Program - Sun Peak

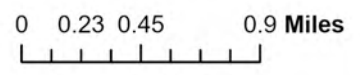
Seeded areas, treatment areas & history, inventoried/monitored areas & history, and known populations of garlic mustard within Sun Peak HOA, the Canyons section of Park City Mountain Resort, and the surrounding open space. Known populations data are cumulations of data since 2018.



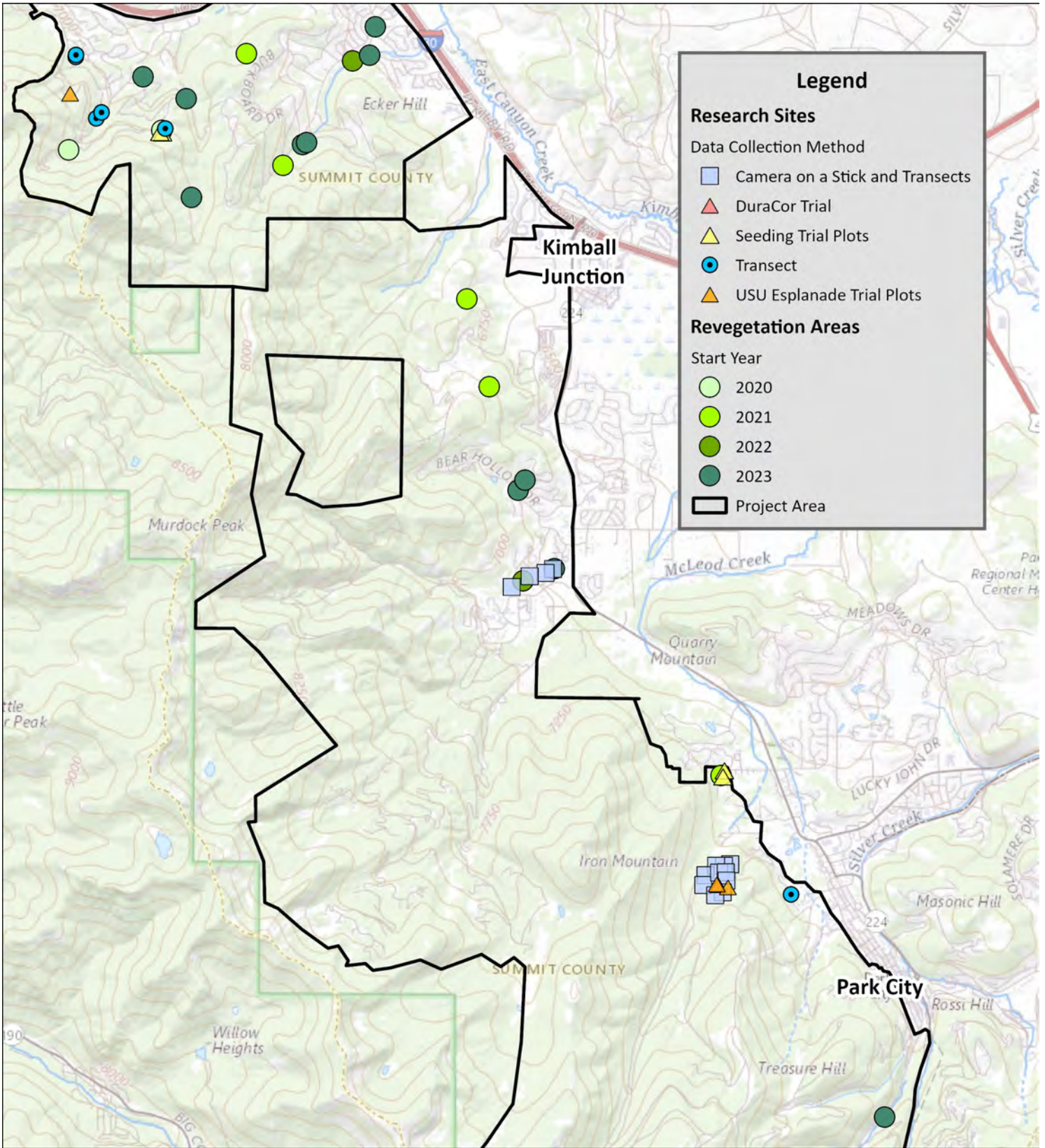


2023 Summit CWMA High Elevation Garlic Mustard Control Program - Park City

Seeded areas, treatment areas & history, inventoried/monitored areas & history, and known populations of garlic mustard within Park City open space, Park City Mountain Resort, and surrounding residential areas. Known populations data are cumulations of data since 2018.



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by Betsy Hochman
Ecology Bridge LLC



2023 Summit CWMA High Elevation Garlic Mustard Control Program

Research sites and ongoing restoration areas within the high elevation garlic mustard project area. Restoration sites established in previous years were assessed in 2023 and received supplemental seed, soil amendments, or other treatment where necessary.

