March 27, 2024

To: Andrea Harbin Monahan, Colorado Water Conservation Board (CWCB)

From: The Watershed Center (formerly Lefthand Watershed Oversight Group)

RE: CWCB Watershed Restoration Grant – Adaptive Management and Planning – Final Report (POGG1, PDAA, 2019-2771)

The purpose of this memo is to provide a final report on activities related to The Watershed Center's Adaptive Management and Planning project. The project timeline is 03/27/2019 – 03/27/2024 and the total project budget is $143,156 with $69,478 from CWCB Watershed Restoration Grant.

1. Project Summary and How the Project Was Completed

Over the last five years, Watershed Management and Planning has been foundational to The Watershed Center's success towards collaborative watershed-wide stewardship actions. Notably, this project was instrumental in supporting collaborative post-fire recovery and community engagement in the years following the 2020 Calwood Fire. Through this project, The Watershed Center 1. Improved watershed-wide weed control, revegetation, and adaptive management and 2. Engaged our community in watershed stewardship. Figure 1. Below summarizes project components and key project deliverables.

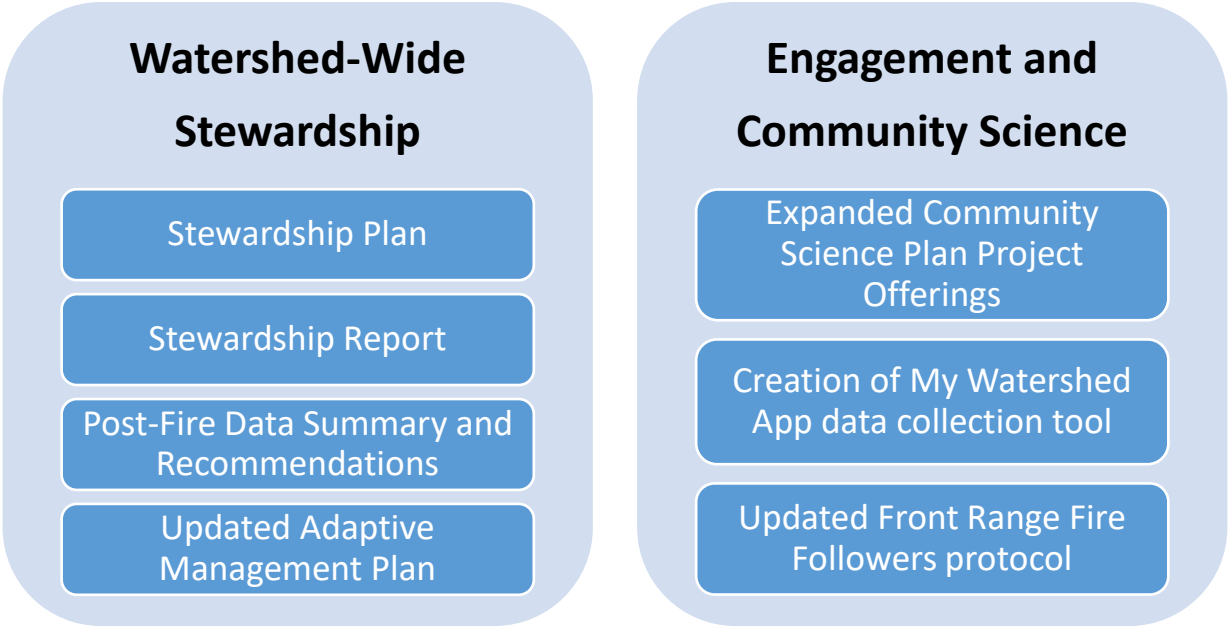

Figure 1 shows the two key components and associated deliverables involved in this project. Each deliverable is discussed in more detail within this report.

2. Obstacles Encountered and Solutions

Throughout this project, we faced obstacles that changed our project approach and garnered lessons learned. These obstacles and resulting solutions are described in the table below.

Obstacle Encountered	Solution
2020 Calwood Fire occurred during project planning and presented an urgent need for collaborative and holistic post-fire stewardship.	Our original stewardship planning was focused on new and gap areas adjacent to rivers. After the Calwood Fire, we realized there would be a weed issue across impacted Left Hand and St. Vrain watersheds during post-fire recovery. As such, we pivoted our watershed focus area to upland weed control in and surrounding the Calwood burn. Since our original planning didn't take into account an event like the fire, we had to shift and re-strategize our prioritization efforts. Our lesson learned is to allow for flexibility in watershed-wide prioritization strategies and consider unexpected events like fire that may re-direct focus.
Establishing a shared cross-boundary stewardship plan was challenging between organizations.	We learned that a shared stewardship plan focused on holistic watershed management would be difficult to enact across organizations. This is because different organizations and departments have different prioritization strategies that fit different systems and scales. As such, we modified our plan to have more flexibility on selecting different prioritization strategies. For example, Boulder County's strategy was focused on listed species control across their lands, while The Watershed Center's was focused on needs within priority areas such as riparian corridors or roads. These two strategies informed each other on what listed species to look out for/control as well as direct where we should work more collaboratively to prioritize needs across property boundaries (e.g. in a priority drainage).
Large acreage of burned areas called for strategic planning and prioritization of where to monitor and implement stewardship actions.	Some of our private parcels covered more than 200 acres of burned area. It was not feasible or practical to assess entire properties at this size, so we opted to prioritize our planning areas. As such we identified four priority areas where stabilization would be important and seed sources could be transported. These areas are described in the Project Plan and included severely burned forests, riparian areas, meadows, and near infrastructure (roads/buildings). Within these areas, we had to prioritize activities with limited resources. This was another obstacle described below.

Allocation of resources considering extensive need and urgency	In the years post-fire, we were challenged to prioritize resources across a large area with extensive and changing needs. This was particularly challenging because we had not originally planned for a post-fire scenario. To meet needs in a strategic way, we implemented broad-scale weed control on listed species and focused efforts in priority work areas (severely burned forests, riparian areas, meadows, and near infrastructure). Anecdotally, we learned that species like Musk Thistle and Mullein would get out-competed over time and didn't need invested resources. As such, we were more concerned with species that could create large mono-cultures like White Top and Canada Thistle. Our Project Plan offered a solution to this obstacle and can be helpful for others in similarly urgent situations.

3. Deliverables and Accomplishments

In order to achieve our project goals of 1. Improve watershed-wide weed control, revegetation, and adaptive management, and 2. Engage our community in watershed stewardship, we completed the following deliverables under project task 1. Watershed Wide Adaptive Management, key accomplishments are described for each deliverable in the table below.

Deliverable	Accomplishments
Task 1 – Watershed Wide Adaptive Management	
Watershed Wide Weed Control Prioritization Plan for the Calwood Burn (Project Plan)	- This Plan was developed in collaboration with Boulder County and is focused on planning and prioritizing stewardship actions in new and gap areas in the Calwood burn area and surrounding Left Hand and St. Vrain watersheds. -This Plan utilizes a holistic watershed-wide approach to prioritize stewardship needs based on broad watershed conditions rather than individual sites. - This Plan's prioritization guidance enabled us to work effectively and efficiently alongside Boulder County and with multiple landowners and implement high priority weed control across broad landscapes.
Calwood Fire Recovery Stewardship in Left Hand and St. Vrain Watersheds (Implementation Report)	- This Report summarizes implemented stewardship accomplishments in new and gap areas of the Calwood burn and adjacent lands, covering public and private properties. Stewardship actions covered 17 acres of handpulling noxious weeds, 4,176 native plantings, 51 acres seeded, 2 acres slash removed, and 72 acres of spot spraying noxious weeds. - This Report summarizes collaborative watershed post-fire stewardship implemented by The Watershed Center and in collaboration with Boulder County, US Forest Service, and three private landowners. Throughout implementation, we held over 10 outreach meetings with private landowners and distributed technical information of weed control priorities.
2022 Post-Fire Vegetation Monitoring Data Summary and Recommendations	- Data results and recommendations for post-fire stewardship from 18 different monitoring locations across the Calwood and Left Hand burn scars and adjacent areas. Sites were categorized and monitored to evaluate post fire impacts to burned and unburned unmitigated forests, pre-mitigated forests, and open meadows. - Data results and recommendations from Front Range Fire Followers data collection across the Calwood burn area. Monitoring was focused on evaluating species present across broad areas of the burn to understand post-fire recovery and identify stewardship needs such as weed control, seeding or planting.

Updated Adaptive Management Plan	- An updated Adaptive Management Plan that incorporates input from Boulder County, City of Boulder, City of Longmont, Keep it Clean Partnership, Mile High Flood District, St. Vrain and Left Hand Water Conservancy District. -Plan includes helpful visualizations of the Adaptive Management Process and was used as a communication tool when reaching out to new stakeholders such as Town of Lyons, Trout Unlimited, and US Forest Service.
Community Science • Community Science Offerings Flyer • My Watershed App • Front Range Fire Followers Protocol	- Expansion of our Community Science Plan to incorporate new project offerings, including: Front Range Fire Followers, Storm Chasers, and Catch the Hatch. - Worked with Colorado State University faculty to update the MyWatershed App, specifically designed to streamline community science project data collection. - Expansion of Front Range Fire Followers data collection protocols that utilize the iNaturalist data collection app. -Engagement of more than 100 volunteers in community science data collection field days.

4. Confirmation of Matching Commitments

Below we provide a confirmation that all matching commitments have been fulfilled.

	Funding Source	Income	Expense	Status
Task 1 – Watershed-Wide Adaptive Management	Watershed Center Donations (Partners, Corporations, Individuals)	$7,304.00	$7,304.00	Complete
	Gates Family Foundation	$9,000.00	$9,000.00	Complete
	Boulder County	$35,000.00	$35,000.00	Complete
	St. Vrain Creek Coalition	$6,684.00	$6,684.00	Complete
	DOLA CDBG-DR Legacy Grant – Adaptive Management	$4,200.00	$4,200.00	Complete
	TASK 1 TOTAL	**$62,188.00**	**$62,188.00**	
Task 2 – Project Management and Planning	Watershed Center Donations (Partners, Corporations, Individuals)	$8,490.00	$8,490.00	Complete
	DOLA CDBG-DR Legacy Grant	$3,000.00	$3,000.00	Complete
	TASK 2 TOTAL	**$11,490.00**	**$11,490.00**	
TOTAL		**$73,678.00**	**$73,678.00**	

5. Summary of Key Deliverables

Task 1 – Watershed Wide Adaptive Management

- **Project Plan and Implementation Reports**:
  - Watershed Wide Weed Control Prioritization Plan for the Calwood Burn (Project Plan): https://watershed.center/wp-content/uploads/2024/03/2022-Calwood-Post-Fire-Stewardship-Plan_Final.pdf
  - Calwood Fire Recovery Stewardship in Left Hand and St. Vrain Watersheds (Implementation Report): https://watershed.center/wp-content/uploads/2024/03/Calwood-Stewardship-Report.pdf
- **2022 Post-Fire Vegetation Data Summary and Recommendations Report**: https://watershed.center/wp-content/uploads/2024/03/Pages-from-SOW-Data-Report-2022_FINAL.pdf
- **Updated Adaptive Management Plan:** https://watershed.center/wp-content/uploads/2019/10/Managing-to-the-Future-Booklet.pdf
- **Community Science Program:**
  - Community Science Offerings Flyer: https://watershed.center/wp-content/uploads/2024/03/Detail-Comm-Sci-Profile-2021.pdf
  - My Watershed App: https://play.google.com/store/apps/details?id=com.nrel.lwog&pcampaignid=web_share&pli=1
  - Front Range Fire Followers Protocol: https://watershed.center/wp-content/uploads/2021/08/Mobile_-Fire-Followers-Collect-Upload2.png

LEFT HAND
watershed center

Watershed Wide Weed Control Prioritization Plan

for the Calwood Burn Area

Since 2020, the Left Hand Watershed Center (Watershed Center) has worked with Boulder County staff and private landowners to implement education and comprehensive weed control efforts in new or gap areas in the Left Hand and South St. Vrain Creek Watersheds. This document serves as our Prioritization Plan for weed control in a focus area: the Calwood Burn Area.

After the 2020 Calwood Fire, the Watershed Center and Boulder County identified the Calwood Burn Area and surrounding watersheds as a focus area for watershed wide weed control efforts. In doing so, staff from both entities are working together with private landowners to collaborate on weed control needs and address priorities throughout the burn area and surrounding watersheds (Figure 1). The focus area includes the Calwood Burn Area as well as adjacent South St. Vrain Creek and Left Hand Creek Watersheds. The broader St. Vrain Creek watersheds are also acknowledged in this focus area, as conditions the greater landscape guide stewardship actions and runoff from the Burn Area impacts downstream waterways through the City of Longmont.

The Watershed Wide Weed Control Prioritization Plan for the Calwood Burn Area was developed with project funds from the Colorado Watershed Conservation Board Watershed Management Plan Grant and Boulder County.

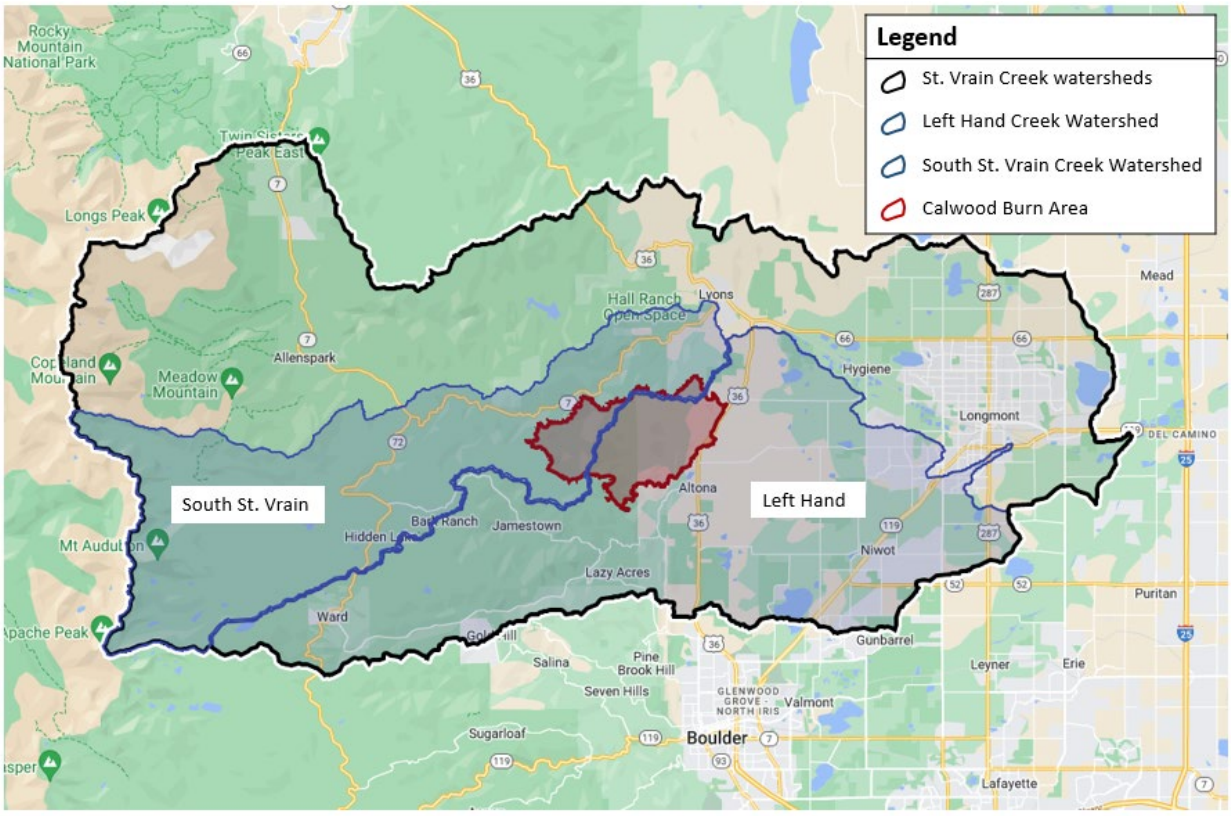

Figure 1. The focus area for watershed-wide weed control, including the Calwood Burn Area and surrounding watersheds.

The purpose of this Prioritization Plan is to describe how we prioritize weed control in the Calwood Burn Area and surrounding watershed. Our approach is founded in adaptive management, an iterative process that leverages collaboration among stakeholders and a holistic understanding of landscape-scale desired conditions as they apply to the post-fire landscape. The outcome is broad-scale weed control management that puts the immediate area on a trajectory towards resilience in the context of the broader landscape.

Adaptive Management Process

Much like the changing post-fire landscape, iteration and adjustment is inherent to the adaptive management process as we learn more year to year. Our adaptive management process is outlined in Figure 2 below and includes six main components. The process begins with identifying **desired conditions** for the post-fire landscape. **Monitoring** then takes place throughout the growing season to assess trends towards desired conditions. Then, we **prioritize actions** using various considerations such as monitoring data, best management practices, priorities, and budget. Based on priority actions, we **implement** stewardship throughout the growing season. As we learn more, there is room to **adjust** each step and conduct **education and outreach** with stakeholders and the broader community.

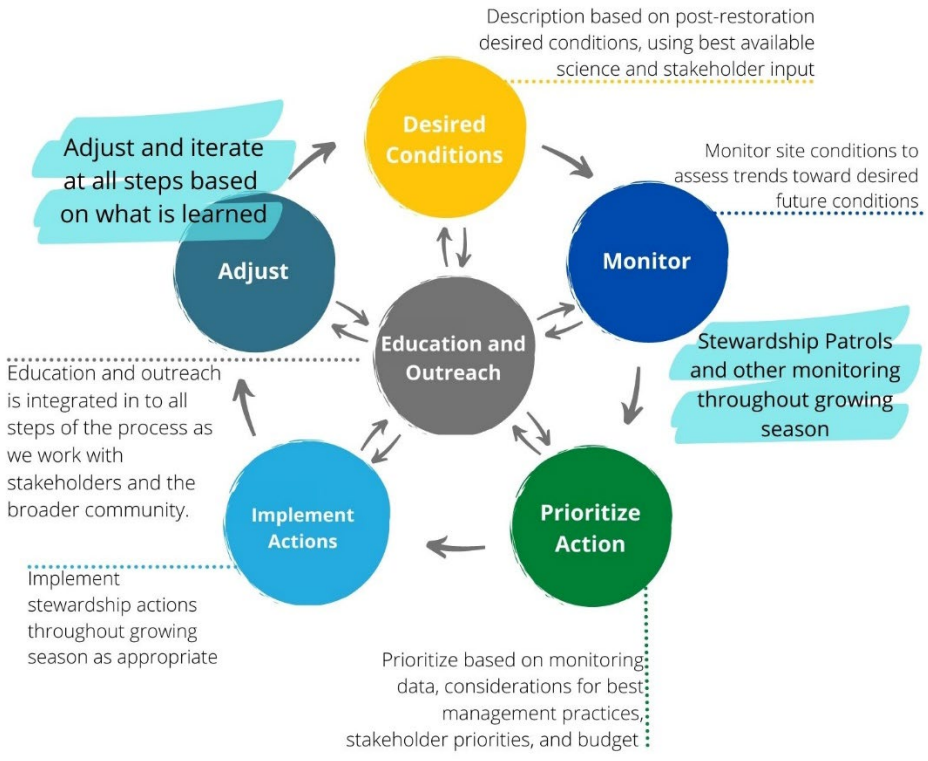

Figure 2. Overview of the adaptive management process used to guide post-fire weed control in the Calwood Burn Area.

LEFT HAND
watershed center

1. Desired Conditions

Desired conditions are goals for ecological conditions in the post-fire landscape and are the first step in the adaptive management process. To begin, desired conditions incorporated considerations related to landscape-scale values for forested areas across the watershed. Then, desired conditions were developed for four priority areas in and surrounding the Calwood Burn Area. Priority areas are where we expect weed control efforts to be most beneficial while conducting broad scale efforts with limited resources. The priority areas include: forests (canopy and understory), riparian areas, meadows, and areas adjacent to infrastructure. Table 1 below summarizes why each priority area was selected.

Table 1. Post-fire priority areas and why they were selected.

Priority Area	Justification
Forests	Forests were burned at higher severity than historic and natural regime, making it difficult for regeneration of a functional forest (e.g. native understory, diverse structure, irregularly spaced trees) and prone to increased hillslope erosion. It will be important for burned forests in this area to reestablish a native understory with good ground cover.
Riparian Areas	Riparian areas are important vegetated buffers that attenuate sediment and nutrients in runoff and convey water into downstream water ways. Regeneration of these areas is critical for attenuating post-fire runoff, especially since high severity burned forests are expected to have increased hillslope erosion.
Meadows	Meadows are important to forest structure and wildfire resiliency, as they function as "gap areas" that reduce likelihood of high severity fire by keeping fire on ground. It will be important for burned meadows in this area to regenerate to a functional meadow with native diversity.
Areas Adjacent to Infrastructure	Infrastructure such as roads and road crossings are important for the operations and safety of Calwood staff and visitors. Increased runoff in the forested and riparian areas but infrastructure at risk. It will be important for areas adjacent to infrastructure to reestablish with native vegetation and good cover to reduce impacts during runoff.

As mentioned above, each desired condition incorporates the landscape-scale value that forested landscapes are adapted to climate change, less susceptible to high-intensity wildfire, and are resilient to wildfire and other disturbances. With that in mind, the following desired conditions for each priority area are:

- **Forests: Forest canopy structure** is diverse, resilient to wildfire disturbances and provides quality habitat with a range of species, age classes, tree sizes, irregularly spaced tree groups, and gaps and openings of various sizes. **Forest understory** stabilizes soil and provides quality habitat with native and structurally diverse vegetation.
- **Riparian Areas** can attenuate water and sediment fluxes and provide quality habitat with native and structurally diverse vegetation.
- **Meadows** can attenuate water and sediment fluxes with native and structurally diverse vegetation and provides wildfire resilience by maintaining gap area size.
- **Areas Adjacent to Infrastructure** (e.g. roads, buildings) are resilient to wildfire and protected from hillslope erosion with native and structurally diverse vegetation.

2. Monitor

Monitoring provides a qualitative or quantitative assessment of trajectory towards desired conditions and how priority areas in the Calwood Burn Area are changing using indicators (data or observations collected). To determine the most informative indicators of post-fire recovery relative to desired conditions, we consider the limiting factors resulting from environmental stressors that are a potential barriers to desired future conditions. Then, we select indicators that assess the impact of limiting factors on desired conditions (Figure 3).

Limiting factors incorporate the impacts of several larger scale environmental stressors, including climate warming, land use/development, prior land management practices, and altered precipitation. These environmental stressors may inhibit achievement of desired conditions now and into the future. Limiting factors are the secondary symptoms of these environmental stressors. For example, hydrophobic soils, increased bare ground, and noxious weed establishment after fire are all limiting factors and are secondary symptoms of high-severity fire as a result of past fire suppression and/or improper forest management. For each desired condition, limiting factors reflect expectations of how they would directly impact a site's ability to achieve a desired condition. Figure 3 below illustrates the process of selecting indicators for monitoring.

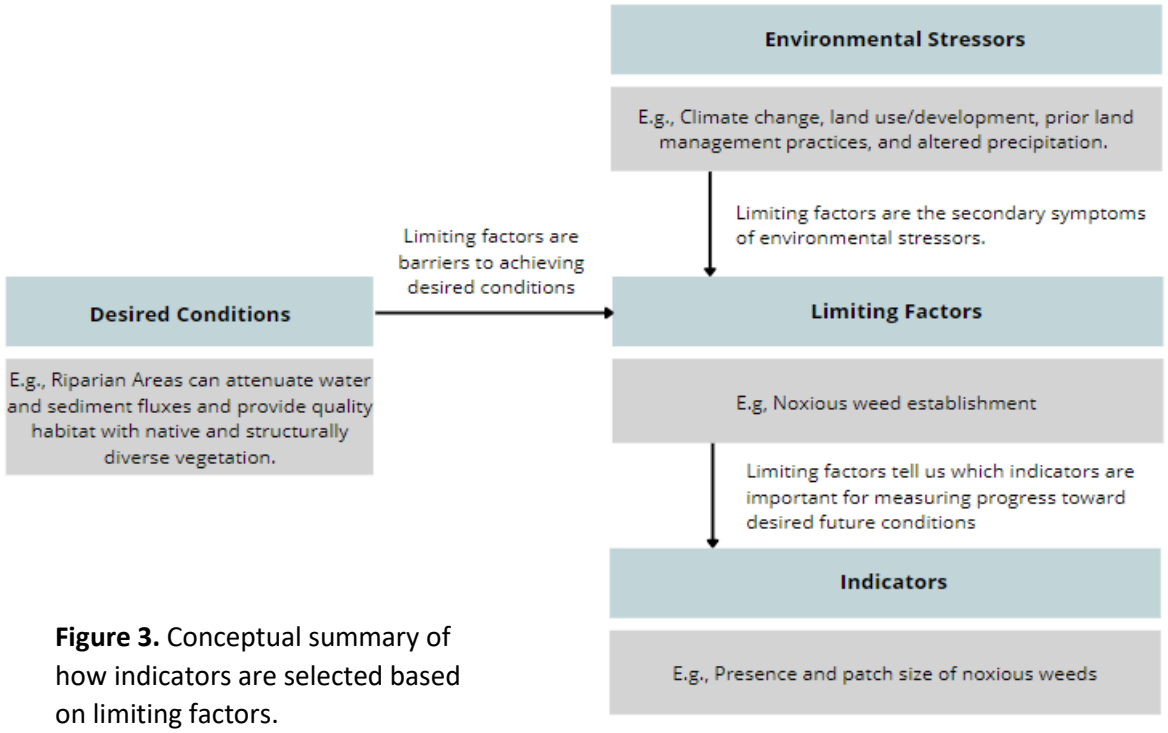

Figure 3. Conceptual summary of how indicators are selected based on limiting factors.

List of Limiting Factors

Limiting factors act as a barrier to achieving desired conditions and aid in the prioritization of what to monitor during site visits/stewardship patrols or what to prioritize during project planning. Limiting factors for the Calwood Burn Area desired conditions include:

- Fire suppression and/or improper forest management
- Tree encroachment in meadow/ gap areas

- Noxious weed establishment
- Poor regeneration
- Hydrophobic soils

List of Indicators

Indicators track status and severity of limiting factors and inform status of achieving desired conditions. They are what we monitor during site visits/stewardship patrols in the priority areas: forests, riparian areas, meadows, and areas adjacent to infrastructure. The three indicators monitored in the Calwood Burn Area are noxious weeds, bare ground, and structural diversity of vegetation. The following list describes considerations for each indicator during monitoring:

- **Noxious weeds**: what is the Noxious Weed Rating (List A, B, C, etc) of the noxious weed or the patch size in the priority area?
- **Bare ground**: how large is the bare ground area and what is the vegetation community (most likely to establish first) surrounding it in the priority area?
- **Structural diversity**: is there existing structural diversity in growth forms (shrubs, herbaceous, and irregular trees) or is the priority area revegetating with multiple growth forms?

Methods

Methods for monitoring Calwood Burn Area indicators include a combination of visual observations, data collection, and collaboration on priorities among partners, depending on needs and capacity (Table 2). Monitoring occurs annually during the growing season and most intensively during the first three years after fire as the landscape recovers. Importantly, sharing knowledge and coordinating efforts is integral to this project. While data collection allows for quantitative assessments on site status, monitoring relies heavily on visual observations (e.g., stewardship patrols) with weed control experts that allow for more landscape coverage. Monitoring method(s) are listed for each indicator in Table 2.

Table 2. List of indicators and methods for monitoring in the Calwood Burn Area.

Indicator	Method(s)
Noxious Weeds	• Stewardship Patrols (visual observations with field staff documenting presence or patch sizes of noxious weeds) • Field Monitoring (transect data collection of percent noxious weeds) • Front Range Fire Followers (photo observations with community scientists documenting presence and distribution of noxious weeds in different forest types) • Regular coordination with Boulder County on priorities
Bare Ground	• Stewardship Patrols (visual observations with field staff documenting presence and size of bare ground) • Field Monitoring (transect data collection of percent pare ground in different forest types) • Regular coordination with Boulder County on priorities
Structural Diversity	• Stewardship Patrols (visual observations with field staff documenting structural diversity in priority areas) • Field Monitoring (transect data collection of structural diversity in different forest types) • Regular coordination with Boulder County on priorities.

3. Prioritize Action

The purpose of prioritization is to weigh the status and severity of limiting factors at a site on an incremental basis and to determine what management actions are required. Prioritization approaches will vary based on the site and indicator. The approach may be a list of considerations, a decision tree, matrix or other. Prioritization for indicators are described below.

Noxious Weeds

While presence of noxious weeds alone may be an indicator of their establishment at a site, there are additional considerations used to prioritize weed control actions. These include the Noxious Weed Rating as determined by the Colorado Department of Agriculture, the extent of a weed's presence or patch size, and the threat it poses to priority species or areas. We use the decision chart in Figure 4 to prioritize weed control actions.

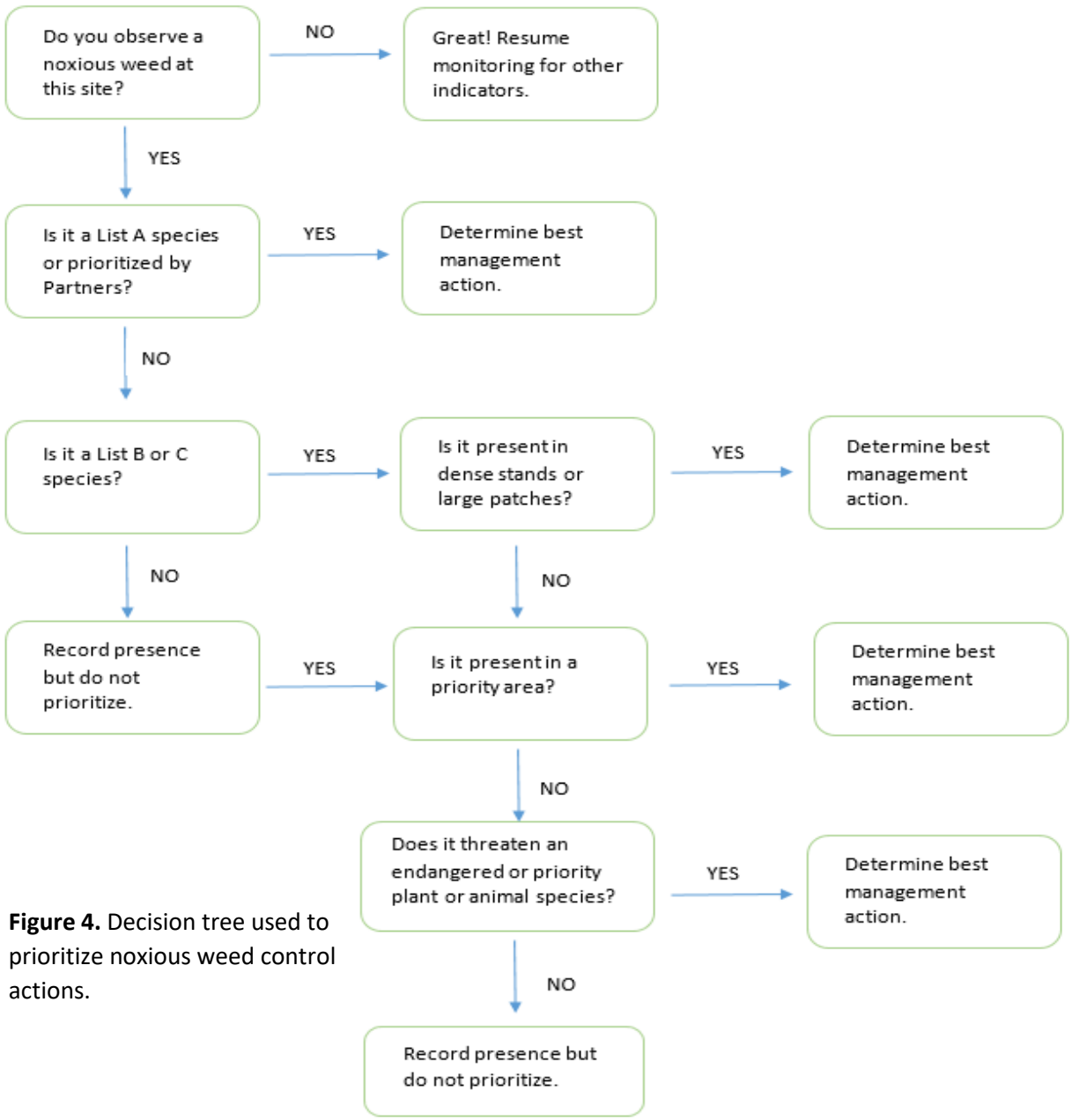

Figure 4. Decision tree used to prioritize noxious weed control actions.

If noxious weeds are List A, a partner priority, and/or a large patch size in a priority area, then possible management actions include herbicide treatment, hand pulling, over-seeding, and/or planting.

Bare Ground

Not only does a lack of organic material increase risk of erosion, but bare ground may be an indicator of the presence of hydrophobic soils. We are specifically concerned about bare ground in steep burned forested slopes, riparian areas, or adjacent to infrastructure. Prioritization for this indicator considers three primary factors:

- The extent of bare ground. Does bare ground cover make up large, continuous patch or patches?
- The location of bare ground. Does the patch occur in a priority area, i.e. on a steep burned forested slope, in a riparian area, or near infrastructure?
- Sensitivity to noxious weed establishment. Is the surrounding vegetated community, which are likely to encroach on the bare ground, include noxious weeds?

If the extent, location, and/or surrounding vegetation of a patch of bare ground are of concern, we will consider one or more management options including seeding, mulching, and planting container stock or plugs.

Structural Diversity

Lack of structural diversity in vegetative cover at a site may be an indicator of poor regeneration, a limiting factor to desired conditions. Diversity of structure, growth form, and species is desirable at all sites, but may present differently depending on the site or priority area. Therefore, the following factors are considered with respect to appropriate conditions for each individual site:

- Is there diversity of structure appropriate to the site?
  - Example: Trees of varying heights and irregular spacing in a forest, shrubs of varying heights in a riparian area.
- Is there diversity of growth form appropriate to the site?
  - Example: Grasses and forbs are present in a meadow, shrubs and forbs are present in a riparian area.
- Is there diversity of species appropriate to the site?
  - Example: A grassland contains a diversity of grass species, while a forest contains a diversity of tree species.

If diversity of structure, growth form, or species are concerning at a site or priority area, then possible management actions include mechanical tree removal, over-seeding and/or planting.

4. Implementation Actions

Once an area has been identified as a priority for a particular management action (e.g., planting, seeding, herbicide, hand pulling, planting, and/or tree removal), staff and Partners will determine what type of implementation would be most effective. Typically implementation will be either a hired contractor or a volunteer group. In some cases, staff may be able to tackle small projects internally. The following are considerations used to determine the appropriate implementation method:

- Type of action. Herbicide treatment is always be conducted by a hired contractor, while hand pulling, seeding, or planting could be accomplished by staff or volunteers.
- Treatment requirements. Some actions require covering a broad area or repeated visits. Broad areas could be accomplished by either contractor or volunteers, while repeated visits may be best suited for a contractor to build in their schedule.
- Volunteer accessibility and feasibility. Action must be accessible to volunteers (e.g., have parking and restroom facilities) and feasible for volunteers (e.g., technical expertise versus general labor).
- Cost and efficiency. Two important considerations. We typically select the most cost-effective option, unless there is an outstanding reason for hiring a contractor or hosting a volunteer event.

5. Adjust and Iterate

Adjusting and iterating at all steps based on what is learned is inherent to adaptive management, ensuring flexibility in management priorities as the landscape recovers. While regular collaboration with Boulder County staff and private landowners occurs at all stages of the process, we document all actions on an annual basis and will report out after three years in a Stewardship Report. Annually, we document actions through maps and photos, treatment details including number of acres, seed or plants or herbicide reports, and associated partners, contractors, and/or volunteer groups. This information allows us to document success over time and identify future needs.

6. Education and Outreach

Staff from Watershed Center and Boulder County will leverage each-others' strengths for the greater benefit of the watershed to engage and educate landowners about weed control, obtain access to private properties, hosts one-on-one landowner meetings and/or workshops as needed. Following this approach, the Watershed Center will lead planning and implementation of all education and outreach and Boulder County will review, provide feedback, and participate in scheduled events by providing technical expertise.

Education and outreach efforts will prioritize private properties within, adjacent to, or downstream from the Calwood Burn Area. The Watershed Center will engage landowners in one-on-one meetings to discuss weed control needs or by disseminating educational materials on priority weed control practices as advised by Boulder County. Additional workshops will be held with Boulder County staff as needed.

CALWOOD FIRE RECOVERY STEWARDSHIP IN LEFT HAND AND ST. VRAIN WATERSHEDS

Final Stewardship Report

Prepared by

THE WATERSHED CENTER

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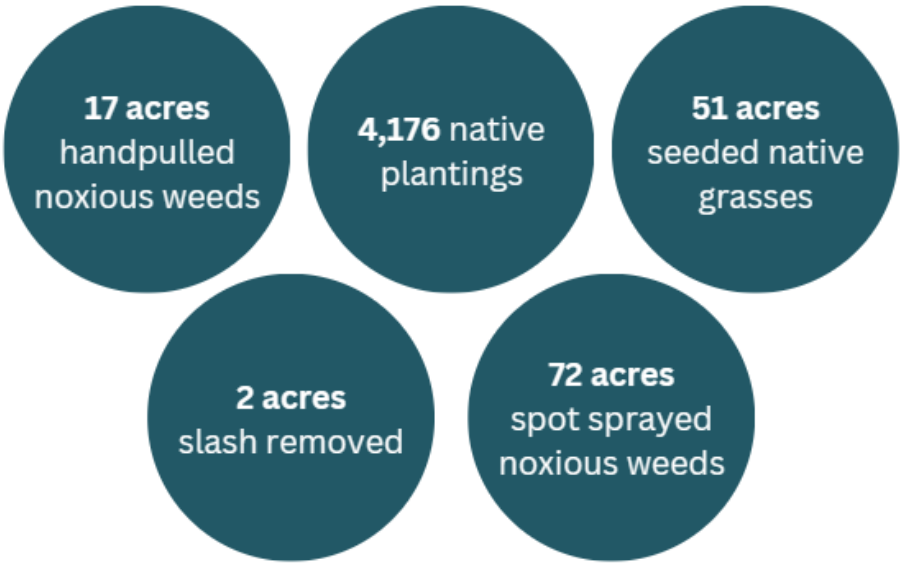
The purpose of this report is to summarize implemented stewardship actions on public and private lands in Left Hand and St. Vrain Watersheds following the 2020 Calwood Fire. Since the fire, The Watershed Center worked collaboratively with Boulder County Parks and Open Space, US Forest Service, and private landowners to implement holistic watershed post-fire stewardship in the Calwood burn scar and adjacent lands. Stewardship actions were identified through field monitoring and stewardship patrols each spring and summer from 2021-2023. Actions were prioritized following guidance in the Calwood Weed Control Plan.

Stewardship activities occurred in 2022 and 2023, and included handpulling, planting, seeding, slash removal, and spot spraying and on four properties. Properties were adjacent to County land, including: Cal-Wood Education Center, Mountain Ridge residential community, Ochs property, and US Forest Service.

In summary, implementation over two years included:



Implemented Stewardship by Property

For each property, this section provides implantation data, as-built documentation, and photos of completed work. This includes stewardship action details (activity, dates, engaged entities) and data (e.g. number of acres treated), implementation maps, and property photos. A table of contents is provided below:

Site Name ..... Page

Cal-Wood Education Center 2

Mountain Ridge 10

Ochs and US Forest Service Land 12

Cal-Wood Education Center

In 2022 and 2023, we partnered with Cal-Wood Education Center to implement post-wildfire stewardship actions. In summary, we implemented 13 acres of hand-pulling, 3616 plantings, 10 acres of seeding, and 20 acres of spot spraying. This work reduced bare ground cover and resulting surface runoff, fostered establishment of native species, and reduced establishment and spread of noxious weeds, notably Canada Thistle, Leafy Spurge, and Musk Thistle in priority hillslopes, drainages and road ways. Work and priorities were identified through field monitoring and stewardship patrols conducted in spring and fall of 2021-2023. The table below summarizes work completed along with supporting as-built implementation maps and photos.

Cal-Wood Education Center Stewardship Summary and Data

Stewardship Task	Date	Count	Unit	Entity
Handpulling	5/18/2022	4.5	acres	Volunteers/Calwood
	6/9/2022	2.5	acres	Volunteers/Calwood
	6/26/2022	3	acres	Volunteers/Calwood
	7/14/2022	1	acres	Volunteers/Calwood
	7/15/2022	2	acres	Volunteers/Calwood
Planting	6/9/2022	100	plants	Volunteers/Calwood
	6/26/2022	200	plants	Volunteers/Calwood
	7/14/2022	37	plants	Volunteers/Calwood
	7/15/2022	36	plants	Volunteers/Calwood
	7/23/2022	77	plants	Volunteers/Calwood
	9/11/2022	350	plants	Volunteers/Calwood
	9/17/2022	283	plants	Volunteers/Calwood
	9/24/2022	223	plants	Volunteers/Calwood
	9/30/2022	17	plants	Volunteers/Calwood
	10/4/2022	75	plants	Volunteers/Calwood
	10/8/2022	142	plants	Volunteers/Calwood
	10/22/2022	76	plants	Volunteers/Calwood
	Spring 2022	1000	plants	Volunteers
	Summer/Fall 2022	1000	plants	Volunteers
Seeding	Spring 2022	10	acres	Volunteers
Spot Spray	9/13/2022	1.8	acres	Contractor
	7/24/2023	5.123	acres	Contractor
	7/26/2023	2.184	acres	Contractor
	7/28/2023	3.724	acres	Contractor
	7/31/2023	2.67	acres	Contractor
	8/9/2023	4.433	acres	Contractor

Cal-Wood Education Center Stewardship Maps and Photos

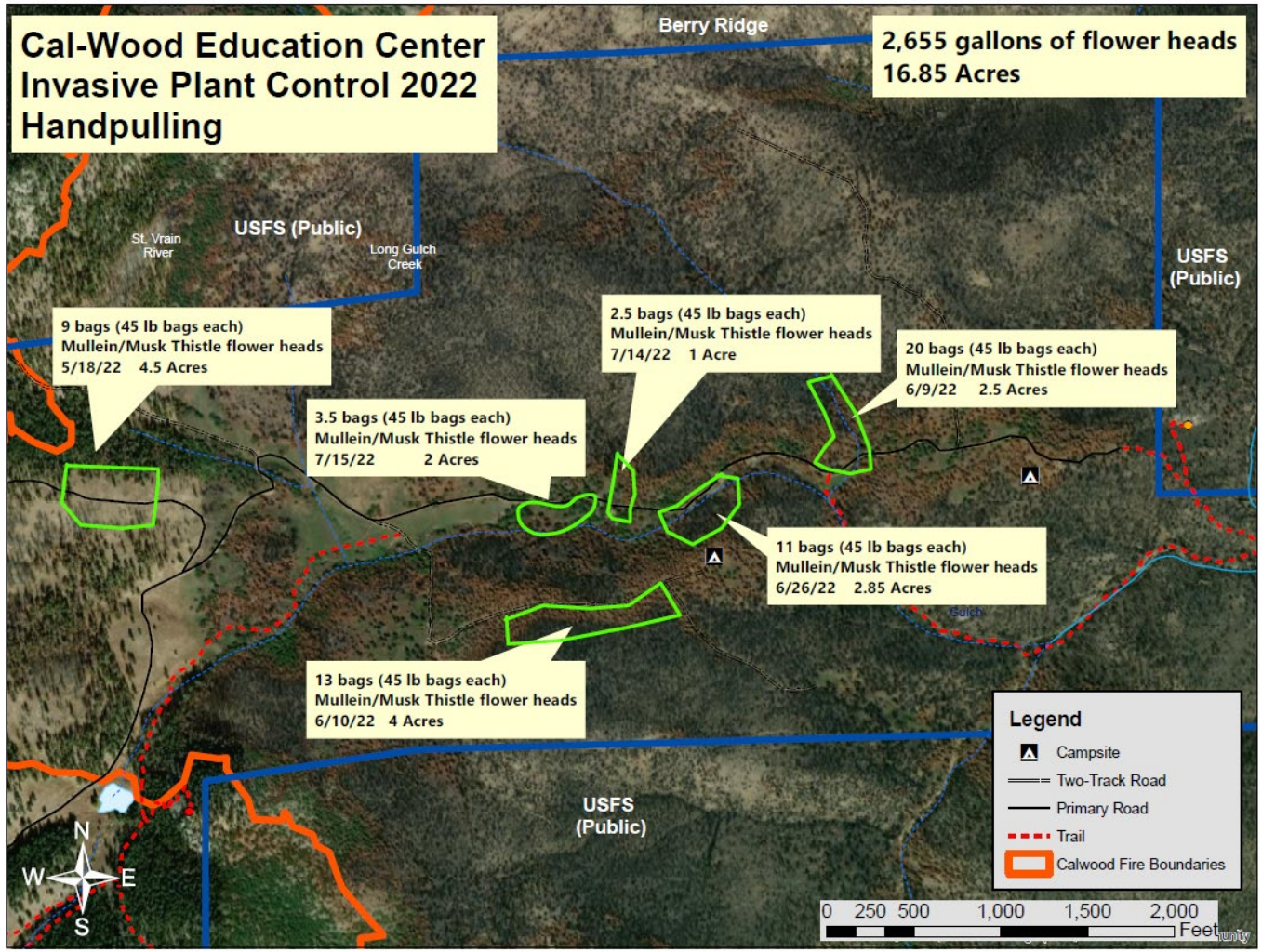


Figure 1. Map of handpulling locations totaling 16.85 acres at Cal-Wood Education Center in 2022.

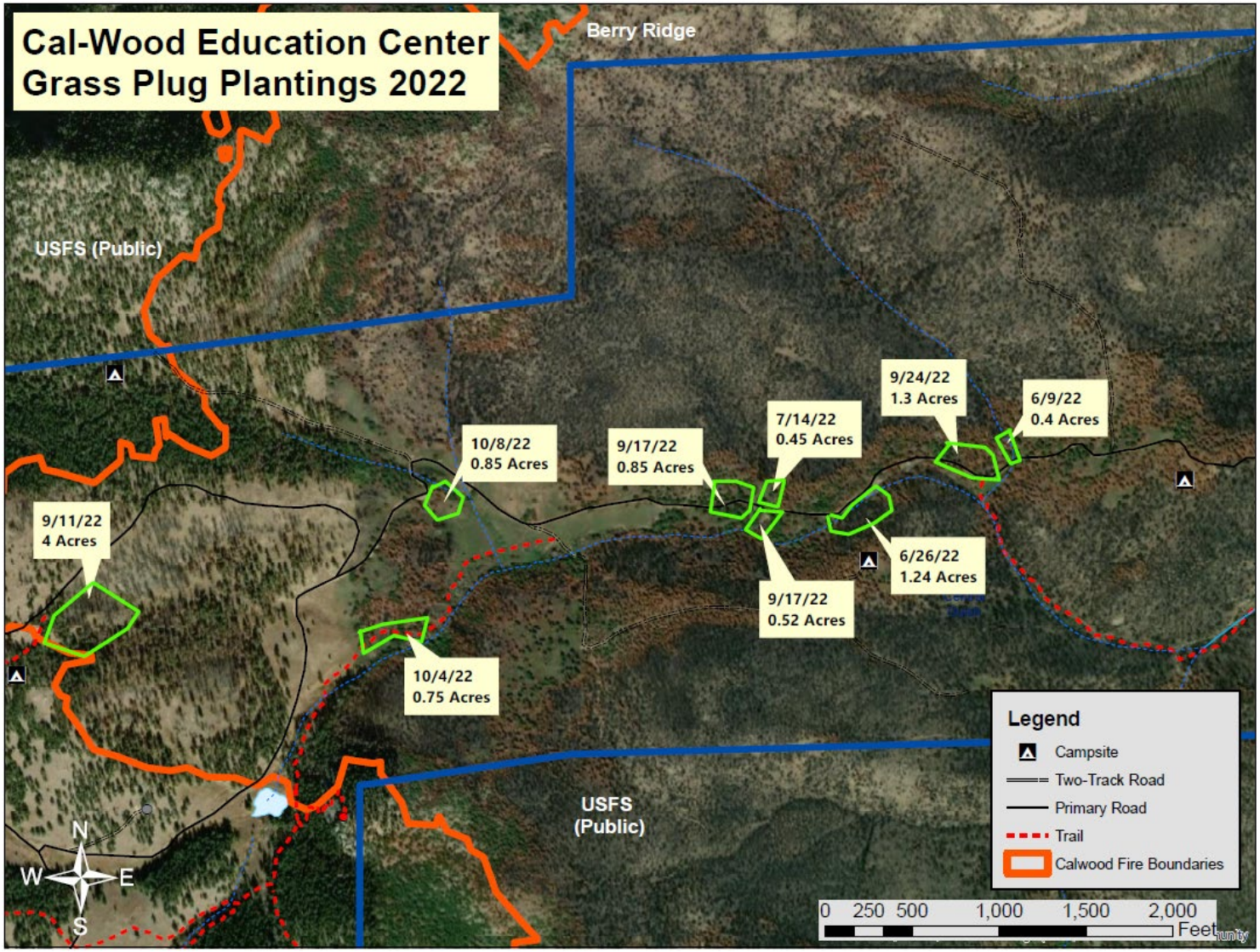


Figure 2. Map of grass plug planting locations contributing to a total of 1,735 plants at Cal-Wood Education Center in 2022.

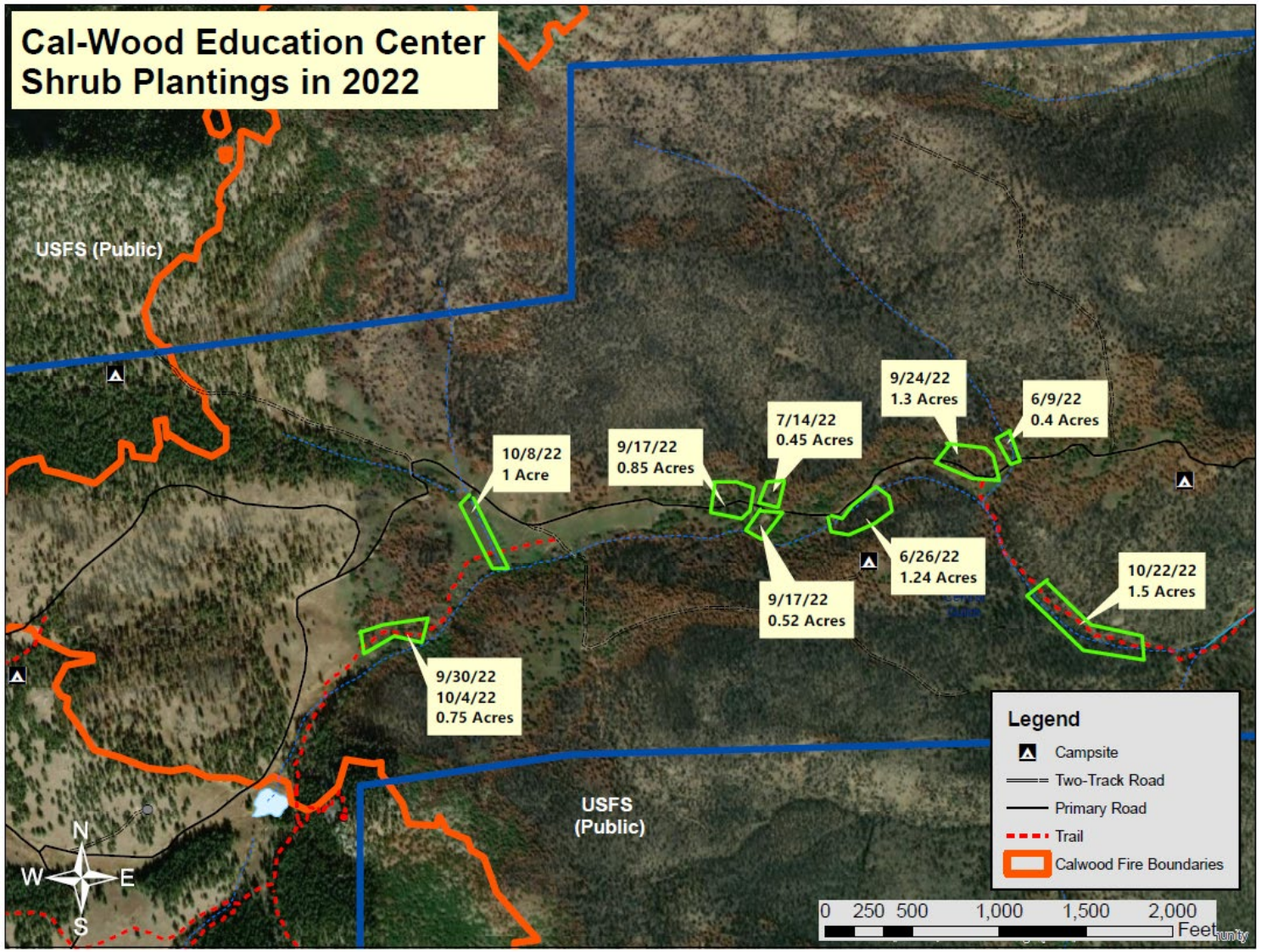


Figure 3. Map of shrub planting locations contributing to a total of 1,735 plants at Cal-Wood Education Center in 2022.

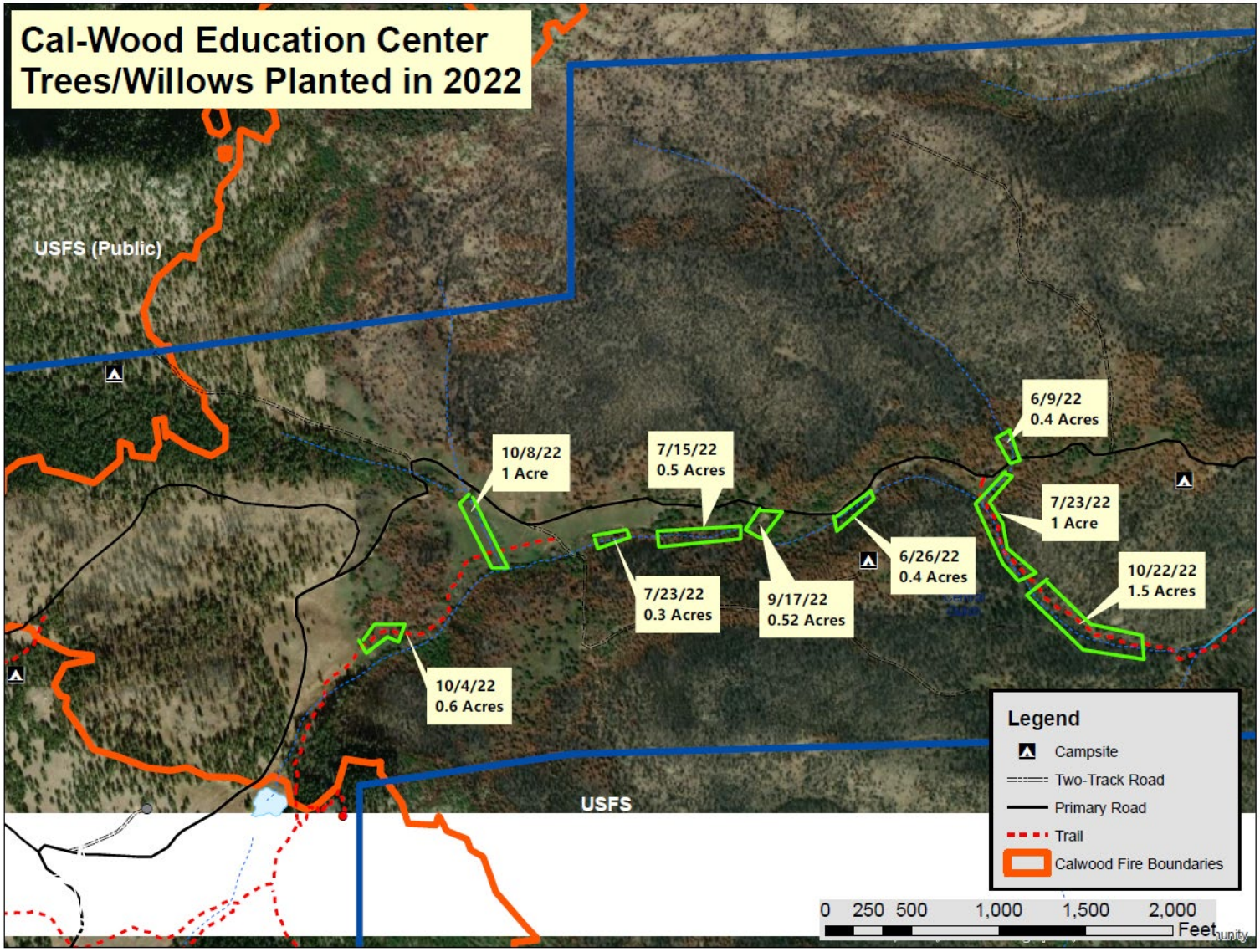
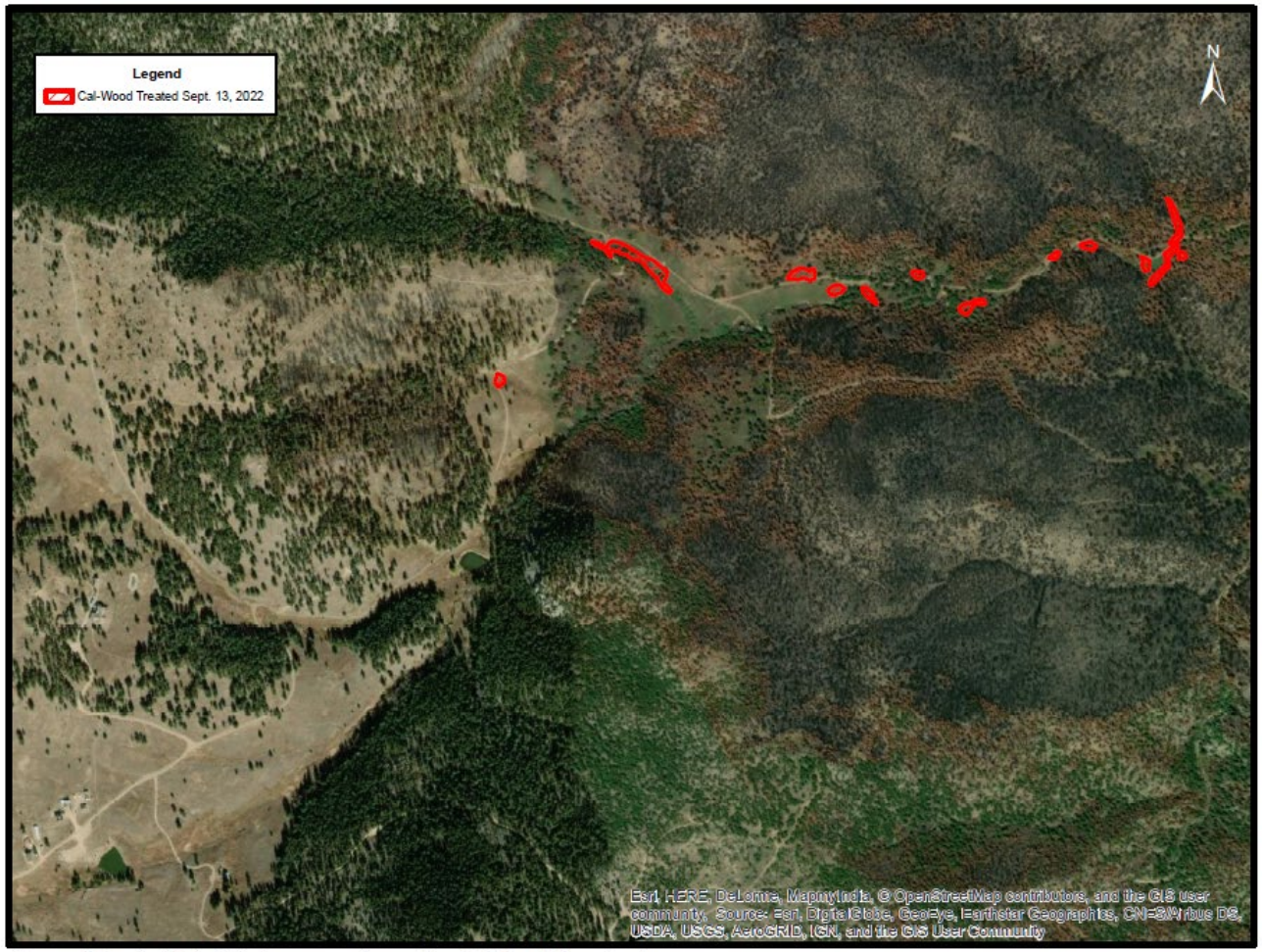

Cal-Wood Education Center
Trees/Willows Planted in 2022
USFS (Public)
USFS
10/8/22
1 Acre
7/15/22
0.5 Acres
6/9/22
0.4 Acres
7/23/22
1 Acre
6/26/22
0.4 Acres
10/22/22
1.5 Acres
7/23/22
0.3 Acres
9/17/22
0.52 Acres
10/4/22
0.6 Acres
Legend
Campsite
Two-Track Road
Primary Road
Trail
Calwood Fire Boundaries
0 250 500 1,000 1,500 2,000
Feet

Figure 4. Map of tree planting locations contributing to a total of 1,735 plants at Cal-Wood Education Center in 2022.



Areas of Canada thistle (Cirsium arvense) treated at Cal-Wood Educational Center by Natural Resource Services, Inc. on September 13, 2022.

0 375 750 1,500 Feet

Natural Resource Services, Inc.
Longmont, Colorado 80502
(303) 915-3211

Figure 5. Map of spot spraying locations totaling 1.8 acres at Cal-Wood Education Center in 2022.

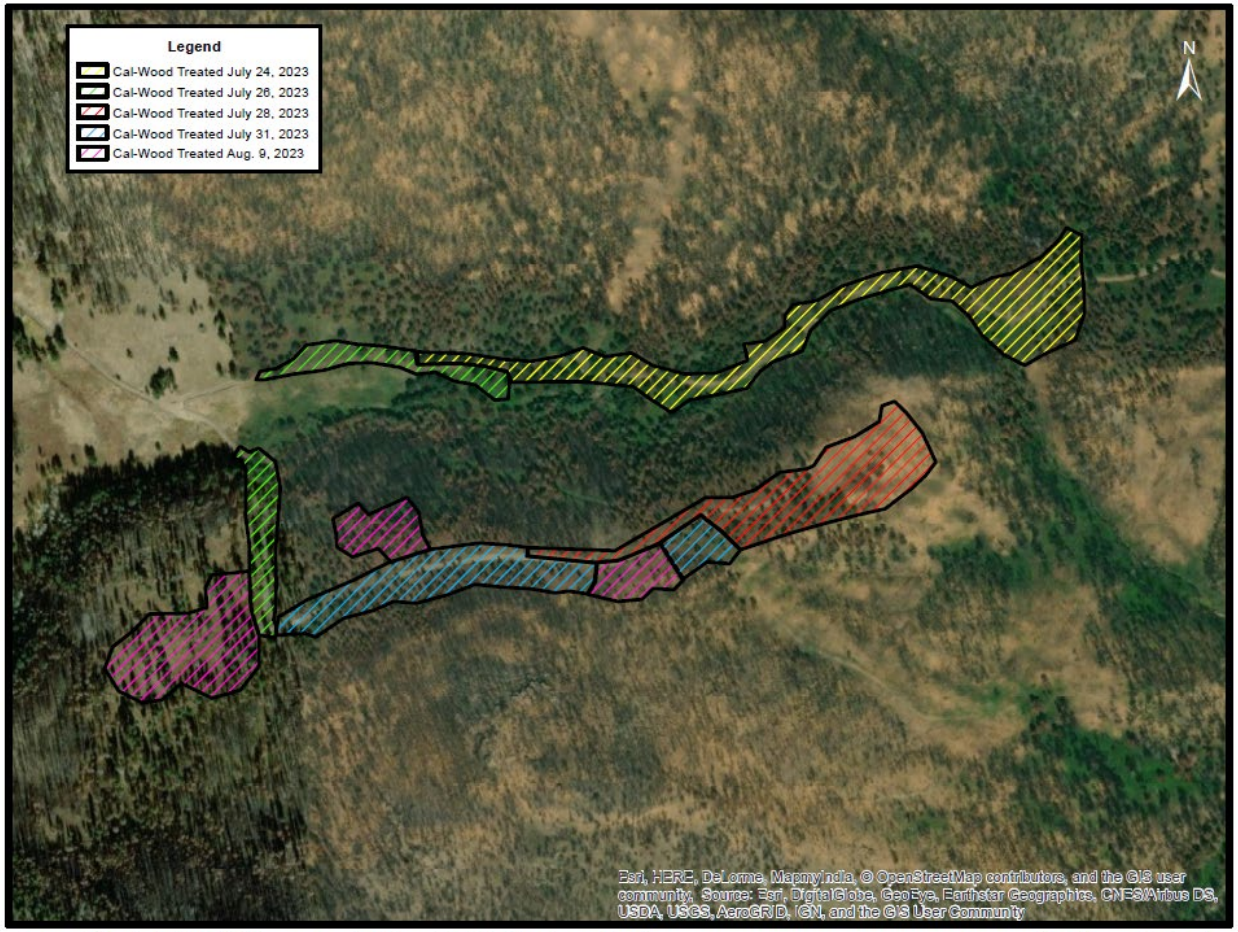


Figure 6. Weed control activities on the Cal-Wood Education Center property that occurred between March and September 2023.

Cal-Wood Education Center Stewardship Photos

Photo taken in spring 2022 at the Cal-Wood Education Center showing priority hill slopes for stewardship action, including spot spraying Canadian and Musk Thistle and seeding to establish native vegetation and ground cover.

Photo taken in spring 2021 and spring 2022 at the Cal-Wood Education Center showing a priority drainage for stewardship action. Straw bales were installed to attenuate sediment (separately funded) and drainages were seeded and planted to establish ground cover and native vegetation.

Mountain Ridge

In 2022, The Watershed Center partnered with Mountain Ridge Homeowners Association to implement post-wildfire stewardship actions. In summary, we implemented 4 acres of handpulling, 360 plantings, 4 acres of seeding, and 2 acres of slash removal. This work reduced bare ground cover and resulting surface runoff, fostered establishment of native species, and reduced establishment and spread of noxious weeds, in a priority hillslope and drainage. Work and priorities were identified through field monitoring and stewardship patrols conducted in spring and fall of 2021-2022. The table below summarizes work completed along with supporting as-built implementation maps and photos.

Mountain Ridge Stewardship Summary and Data

Stewardship Task	Date	Count	Unit	Entity
Handpulling	4/23/2022	2	acres	Volunteers
	5/9/2022	2	acres	Volunteers
Planting	4/23/2022	200	plants	Volunteers
	5/9/2022	160	plants	Volunteers
Seeding	4/23/2022	2	acres	Volunteers
	5/9/2022	2	acres	Volunteers
Slash Removal	4/23/2022	1	acres	Volunteers
	5/9/2022	1	acres	Volunteers

Mountain Ridge Stewardship Summary Map

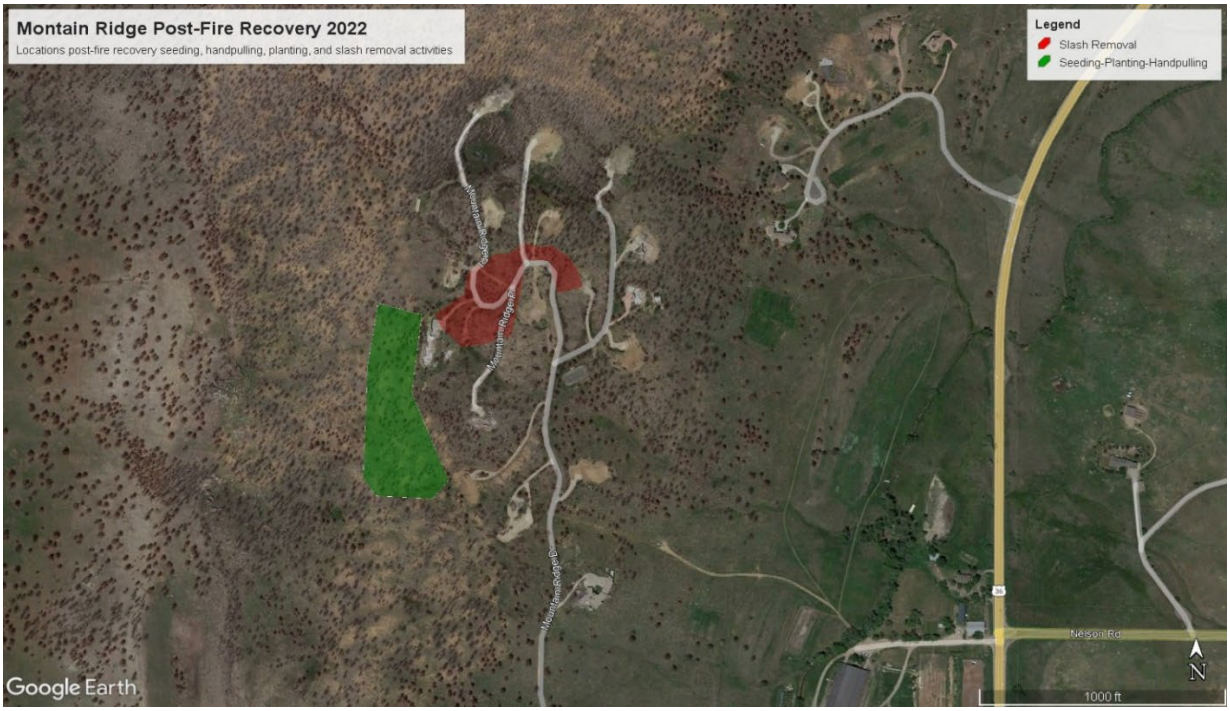


Figure 7. Map of all seeding, slash removal, and planting locations at Mountain Ridge Subdivision in 2022. Activities totaled 4 acres of handpulling, 160 plants, 4 acres of seeding, and 2 acres of slash removal.

Mountain Ridge Stewardship Photos

Photo taken in spring 2022 at the Mountain Ridge community open space showing priority hill slope for stewardship action, including handpulling noxious weeds, seeding, and planting to establish ground cover and native vegetation. Orange flagging placed in priority stewardship zones.

Photo taken in spring 2022 at the Mountain Ridge community showing slash haled from a priority hillslope that will be chipped and used to help establish ground cover.

Photo taken in spring 2022 at the Mountain Ridge community showing a planted chokecherry shrub. Plantings were put in drainages on a priority hill slope to increase groundcover and native vegetation.

Ochs and US Forest Service

In 2022 and 2023, we partnered with the Ochs and US Forest Service to implement post-wildfire stewardship actions. In summary, we implemented 200 plantings, 37 acres of seeding, and 20 acres of spot spraying. This work reduced bare ground cover and resulting surface runoff, fostered establishment of native species, and reduced establishment and spread of noxious weeds, notably Canada Thistle, Leafy Spurge, Musk Thistle, Dalmatian Toadflax, and White Top in priority hillslopes, drainages and road ways. Work and priorities were identified through field monitoring and stewardship patrols conducted in spring and fall of 2021-2023. The table below summarizes work completed along with supporting as-built implementation maps and photos.

Ochs and US Forest Service Stewardship Summary and Data

Stewardship Task	Date	Count	Unit	Entity
Planting	5/15/2022	100	plants	Volunteers
	Fall 2022	100	plants	Volunteers
Seeding	Spring 2022	15	acres	Volunteers
	Fall 2022	15	acres	Volunteers
	10/15/2023	7	acres	Volunteers
Spot Spray	6/20/2022	2.4	acres	Contractor
	6/21/2022	2.2	acres	Contractor
	7/1/2022	3.4	acres	Contractor
	7/12/2022	2.2	acres	Contractor
	7/13/2022	1	acres	Contractor
	7/21/2022	2.6	acres	Contractor
	8/8/2022	7.4	acres	Contractor
	7/18/2023	5.1	acres	Contractor
	7/19/2023	5.4	acres	Contractor
	7/27/2023	5.2	acres	Contractor
	8/15/2023	4.5	acres	Contractor
	8/15/2023	10.7	acres	Contractor

Ochs and US Forest Service Stewardship Summary Maps

Figure 8. Map of all seeding and planting locations totaling 200 plants and 20 acres of seed at the Ochs property in 2022.

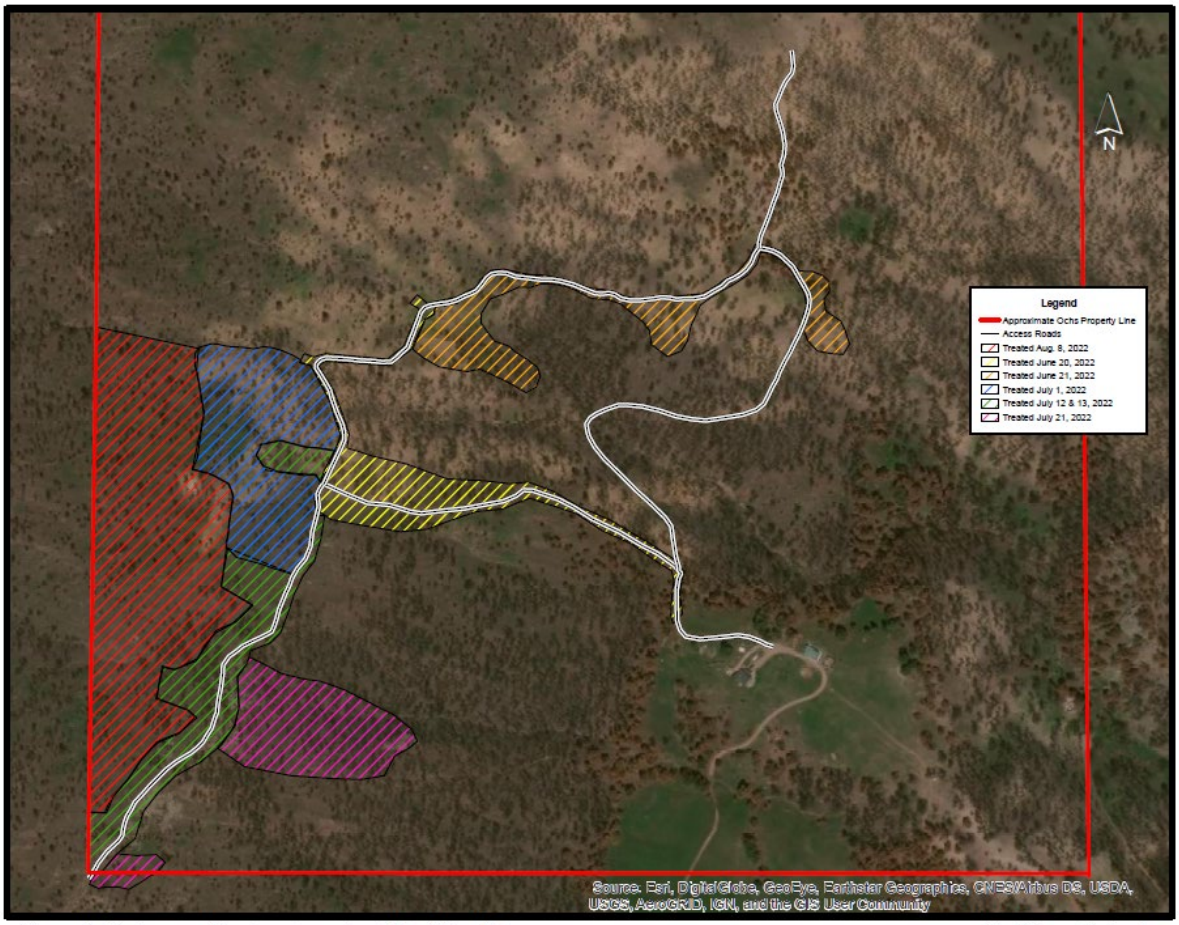


Figure 4. Noxious weed treatment areas treated by Natural Resource Services, Inc. at the Letha Ochs property on June 20 and 21, July 1, July 12 & 13, July 22 and August 8, 2022.

Figure 9. Map of all spot spray locations on the Ochs property in 2022.

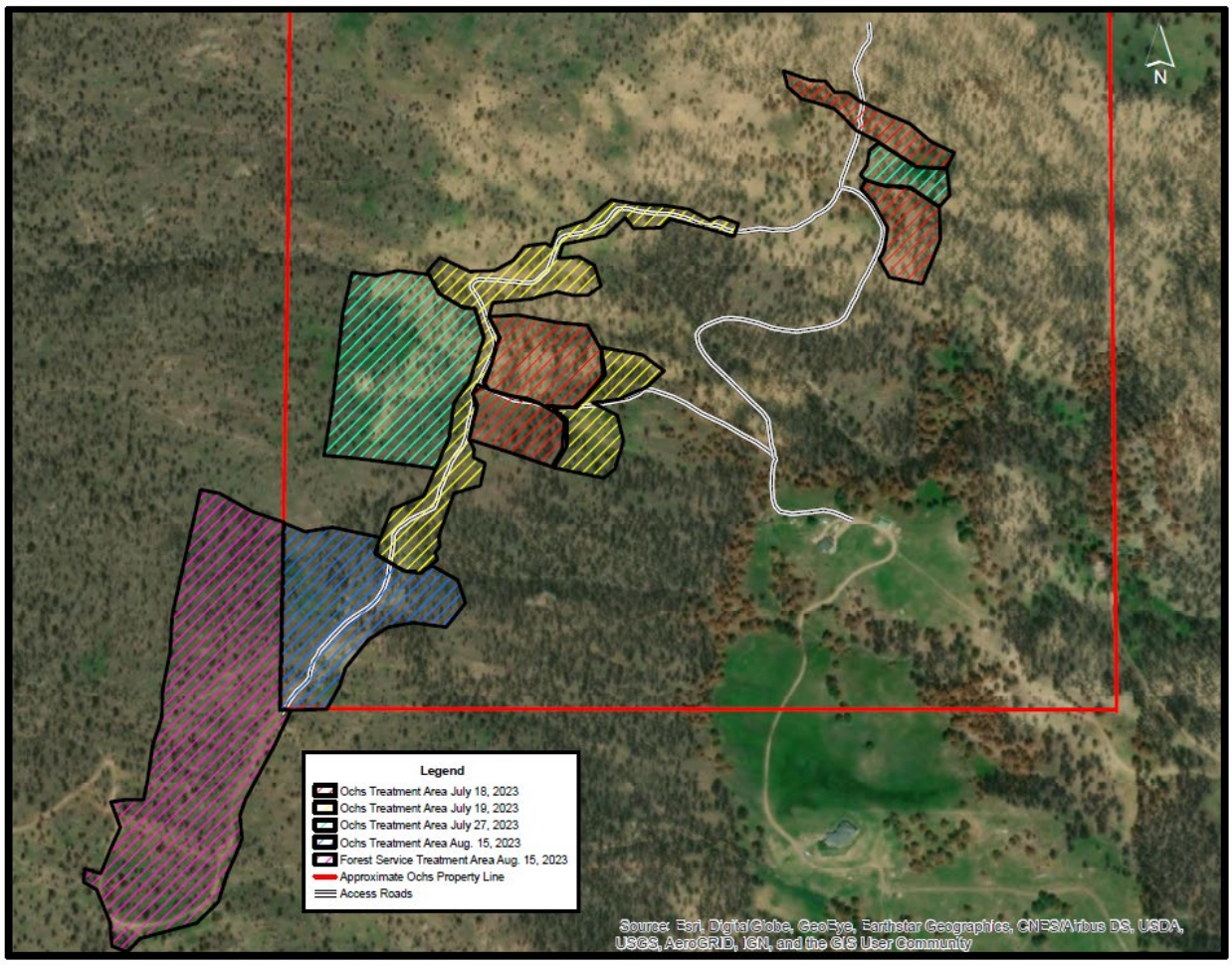


Figure 10. Weed control activities on US Forest Service land and the Ochs property that occurred between March and September 2023.

Ochs and US Forest Service Stewardship Photos

Photo taken in fall 2021 at the Ochs property showing priority hill slope for stewardship action, predominantly seeding and planting to establish ground cover.

Photos of two priority drainages at the Ochs property looking upslope at US Forest Service Land from spring 2022 (left) and spring 2023 (right). These drainages were seeded and planted to increase ground cover and native vegetation as well as spots prayed to reduce spread of noxious weeds, primarily Canadian Thistle, Dalmatian Toadflax, and Leafy Spurge.

Post-Fire Impacts in Forests

High severity fires burn hot enough to crack rock and create hydrophobic soils (water repelling soils).

Known Issue: The Calwood Fire burned over 10,000 acres and the Left Hand Fire burned more than 400 acres in St Vrain and Left Hand Watersheds in October 2020. Due to high burn severity, forest landscapes were left bare and are susceptible to erosion, increases in invasive species abundance, and poor regeneration.

Discrete Monitoring Questions

- How does understory community composition differ among burned and unburned meadows and burned and unburned mitigated and unmitigated forests?
- Is understory community composition more resilient (e.g., more native composition, vegetated cover, structure) in meadows and mitigated forests than unmitigated forests to fire?

Indicators and Why

- Proportion of native vs. introduced cover to assess community cover types and native establishment.
- Species richness to assess composition of cover and potential encroachment of introduced species.
- Structure to assess ground cover types (including bare ground) and understory canopy composition.

Locations and Methods

Our monitoring design assessed three burn sites and six site conditions within the Calwood and Left Hand Fire scars. Burn sites included Left Hand (Left Hand Fire), Calwood (Calwood Fire), and Heil (Calwood Fire) and site conditions included: Unburned Unmitigated Forest, Burned Unmitigated Forest, Unburned Mitigated Forest, Burned Mitigated Forest, Unburned Meadow, and Burned Meadow (Fig. 19). Each burn site had all six site conditions except Heil, which did not have any Unburned Meadows. Each site condition was represented by three transects. Transects were monitored using a transect **line-point-intercept method**. Click the link to read methods.

Post-Fire Impacts in Forests

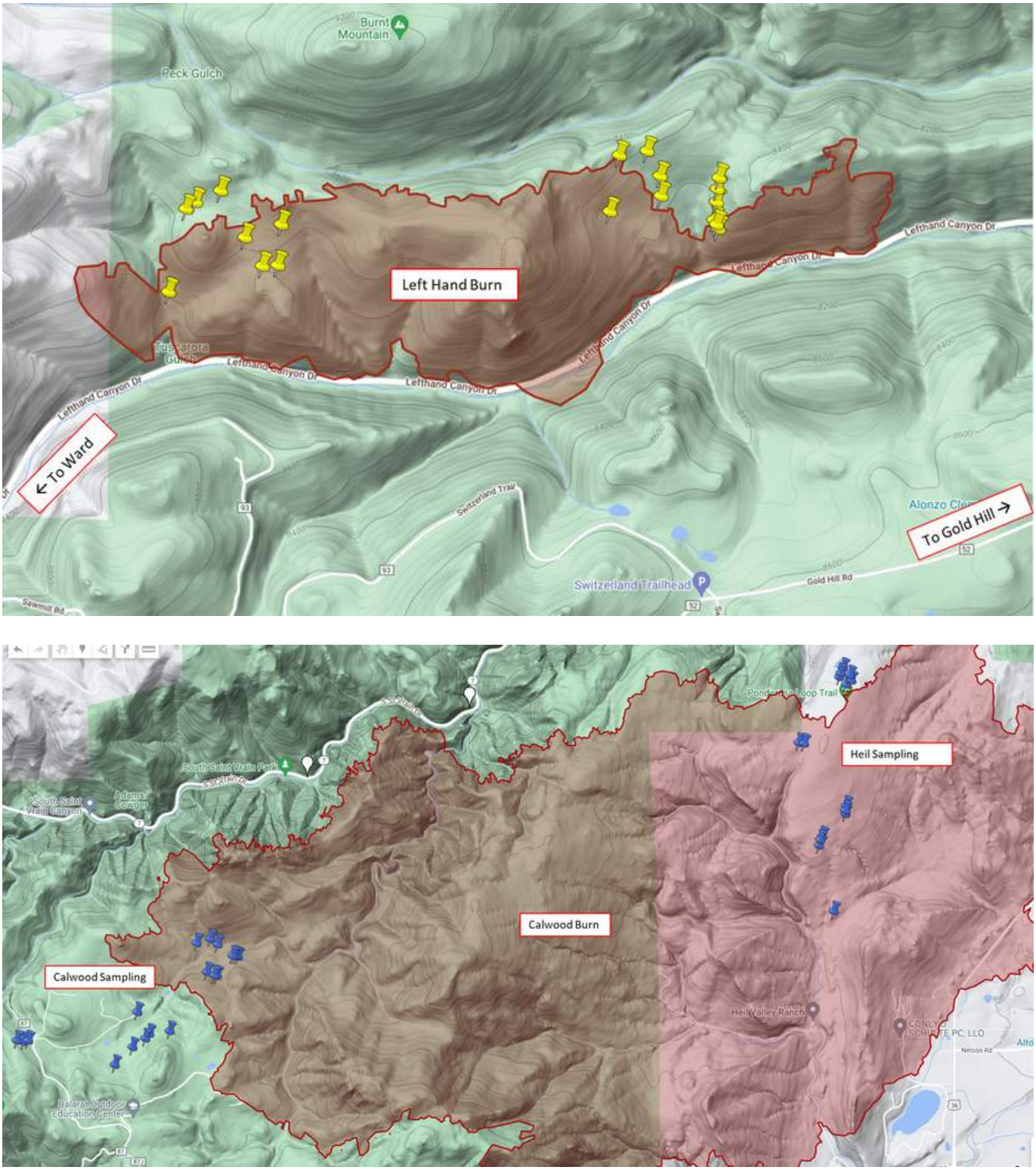


Figure 19. Left Hand Burn transects for all six site conditions on private and Forest Service land (top) and Calwood Burn transects (bottom) for site conditions on Calwood Education Center (Calwood Sampling, bottom left) and Boulder County land (Heil Sampling, bottom right).

Post-Fire Impacts in Forests

Key takeaways and next steps

- Data shown in the figures in this section are from 2021 and reflect the immediate impacts that the Calwood and Left Hand Fires had on vegetation in Left Hand and St. Vrain Watersheds. Notably, the largest impact of the fires was a general increase in bare ground compared to unburned areas.
- **Proportion of native vs. introduced cover** and **richness**: With the exception of mitigated forests at Heil, introduced species do not appear to be an issue as introduced richness and proportion of cover are generally low (Fig. 20 and 21). The high proportion of introduced species in burned mitigated forests at Heil may be due to past mechanical disturbance. Stewardship (weed control and planting/seeding) will be important these areas and areas with high bare ground to prevent introduced colonizer species from establishing.
- **Structural diversity:** Generally, there was a higher proportion of bare ground in burned forests than unburned forests, with burned unmitigated having the most bare ground (Fig. 22). Vegetated areas generally have varying growth forms, indicating good understory structural diversity.
- **Meadows** were most resilient to the fires with little difference in bare ground between burned and unburned conditions. However, introduced species were greater in burned meadows than unburned meadows. Like other burned areas, burned meadows might need extra stewardship to prevent establishment of introduced colonizer species.

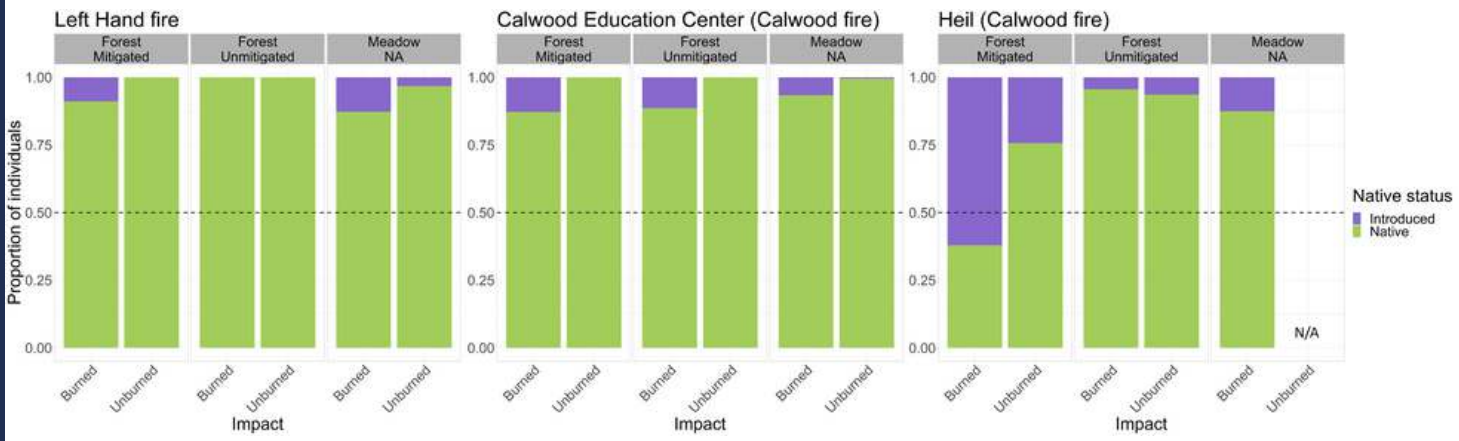
- **What's Next?**
  - These data highlight the need for stewardship in burned areas as the landscape revegetates, focusing on introduced species that can establish and spread faster than native species.
  - These data also highlight the resilience of meadows in forest structure, as vegetative cover rebounded in the first growing season after fire. Meadows and gap areas will be essential parts of future forest restoration projects.
  - We will continue monitoring these locations to inform best management practices in the years to come as the post-fire landscape continues to revegetate and/or introduced species get established and spread.



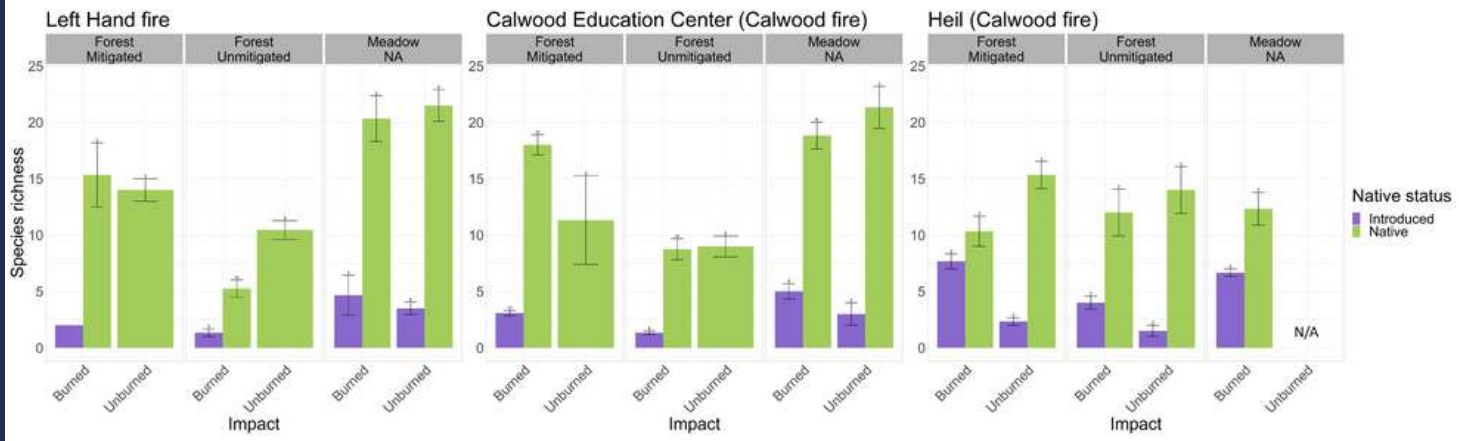
Photos of burned unmitigated forest, burned meadow, and burned mitigated forest conditions from left to right.

Post-Fire Impacts in Forests

Proportion of Native vs. Introduced Cover (Figure 20)



Native and Introduced Species Richness (Figure 21)



Structural Diversity of Cover (Figure 22)

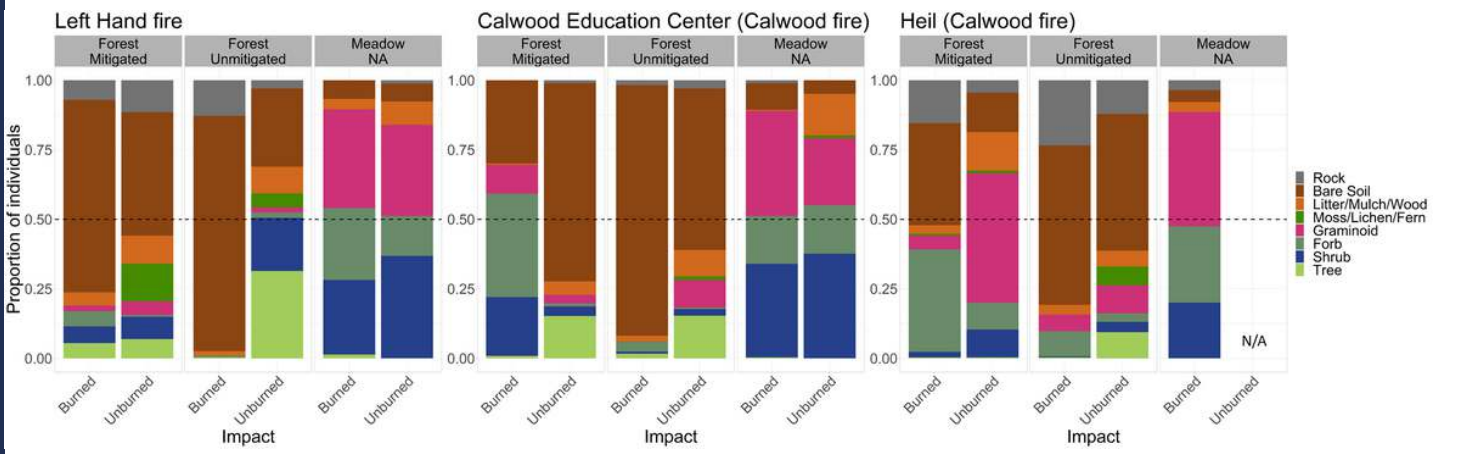
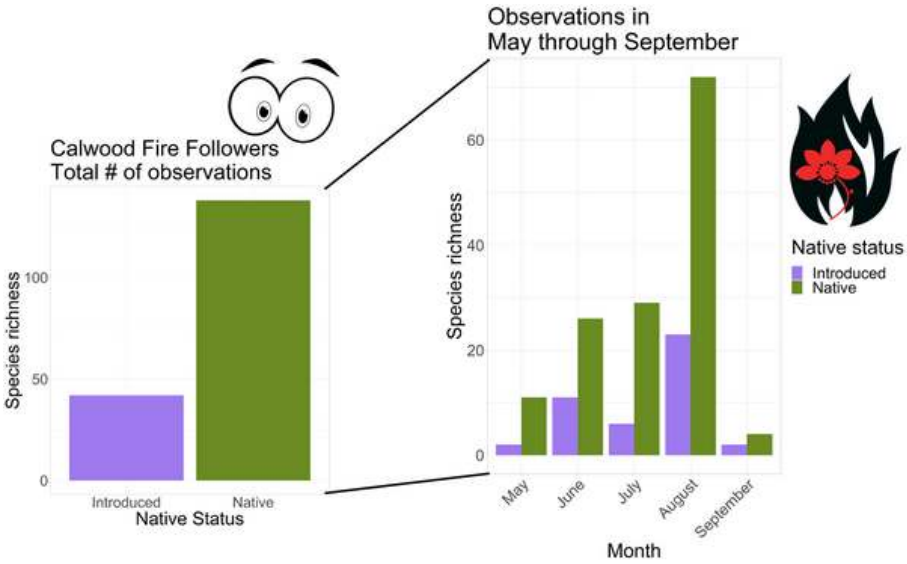


Figure 20-22. Proportion of native and introduced cover (top), native and introduce richness (middle) and structural diversity of cover for six site conditions in Left Hand (left column), Calwood (middle column), and Heil (right column) sites in the Calwood and Left Hand burn scars. Site conditions include Forest Mitigated Burned/Unburned, Forest Unmitigated Burned/Unburned, and Meadow Burned/Unburned. Heil did not have an unburned meadow. The dashed black line at 0.50 represents the 50% proportion line as a visual aid. Species richness error bars = one standard error from the mean and number above = sample size.

Post-Fire Impacts in Forests

The power of community science!

Front Range Fire Followers is a Watershed Center project that leverages volunteer power to capture species observations across the entire growing season in the Calwood and Left Hand burn areas, getting a much more detailed look at vegetation over time than our single annual monitoring effort. This project would not be possible without our partners: Boulder County, Calwood Education Center, and private landowners. See the data collected in the Calwood burn area below!



Fire Followers documented more than 150 species in the Calwood Fire burn area from May through September of 2021 (Fig. 23). This type of community science effort allows us to see how species richness changes over time from year to year and throughout the growing season. We also use these data to prioritize stewardship actions. For example, this year we are focused on conducting weed control on large patches of Canada Thistle - a noxious weed that will take over if left unattended! Thanks to all our volunteers - **join us** again this season!

Figure 23. Native and introduced species richness in the Calwood burn area for 2021 (left) and by month (right). Species were surveyed by Front Range Fire Followers volunteers, a Watershed Center community science project that uses iNaturalist to photo document and identify plant species. Species shown were given "research grade" level of identification, meaning they were identified by more than one individual.

Photos from 2021 Fire Followers events. Photos: Watershed Center staff and Omar Pearlman.

Managing to the Future:

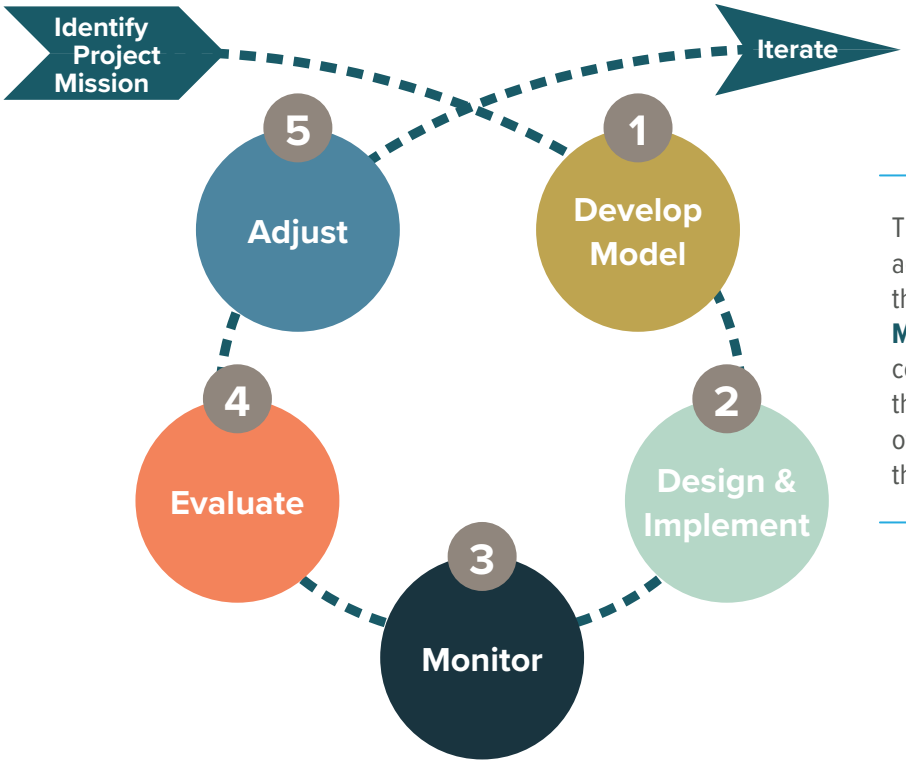
Adaptive Management in Left Hand Watershed

LEFT HAND
watershed center

How do we manage to future conditions?

How do we plan for uncertainty associated with climate change and dynamic watershed processes?

At **Left Hand Watershed Center (the Watershed Center)**, we use an adaptive management process to help reduce uncertainty and manage to the future as we work to improve the health and resilience of watersheds. We chose an adaptive management process because it offers the flexibility necessary to manage complex and changing ecosystems. Using adaptive management, we define our goals, quantitatively track progress toward our goals, and adjust management or monitoring actions iteratively, based on what is learned.



This figure shows each component of the adaptive management process. Based on this process, we developed this **Adaptive Management Plan** to assess watershed conditions and guide informed actions. On the following pages we describe each step of the process as it relates to our plan using the same colors and numbers as in the figure.

About Us

Left Hand Watershed Center works to protect and restore watersheds for people and the environment using a collaborative, science based approach.

LEFT HAND watershed center

Our Organizational Goals:

- Assess watershed health using science-based adaptive management.
- Bring together diverse community members with competing values to develop on-the-ground solutions through open communication and cooperation.
- Build community-wide stewardship ethic rooted in watershed science and place-based, participatory learning.
- Plan and implement on-the-ground projects that advance watershed restoration practices.

Established in 2005, we have strong roots in our community and we are led by a diverse board of enthusiastic stakeholders.

We value science and community, and embrace these values to implement on-the-ground projects.

While we maintain our roots in Left Hand Creek Watershed, we strive to apply our locally-developed tools regionally for the benefit of all Front Range watersheds and communities.

Learn more at www.watershed.center

Project Mission:

Our overarching mission is to maintain or improve ecological conditions and resilience following restoration and recovery from the 2013 floods.

1 Develop Model

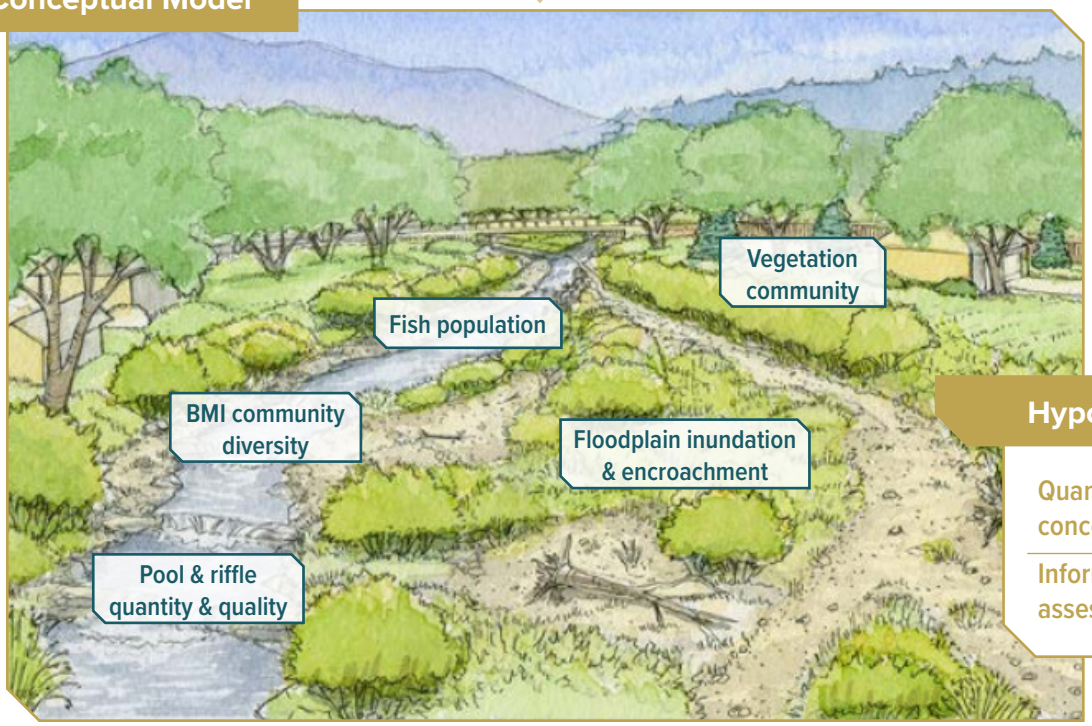
To meet our project mission, we identified the goals listed below. Each of these goals are rooted in the desired future conditions of our watershed, which we characterize using ecological conditions.

Key to our adaptive management approach is representing our goals in a conceptual model. We selected an illustrative approach for our model to inspire deeper and more critical thinking about the future of our watershed. The model was developed collaboratively with technical experts and community members that came together to define a common vision for the watershed. This step provided the essential foundation for (1) developing hypotheses and identifying monitoring parameters that enable us to effectively track progress toward goals while (2) utilizing a shared understanding of the desired future conditions with technical experts and community members alike. A sample section of the model is shown below with goals noted on the illustration.

Management Goals

1. Maintain or improve floodplain and channel connectivity;
2. Maintain or improve channel morphology and physical habitat;
3. Maintain or improve native riparian condition and the native plant community;
4. Maintain or improve benthic macroinvertebrate community;
5. Maintain or improve water quality;
6. Maintain or improve fish community and condition;
7. Reduce hazards and increase flood safety.

Conceptual Model



Hypotheses

Quantifiable and tie to conceptual model

Inform monitoring and assessment efforts

2 Design & Implement

Starting in 2016, we began implementing restoration projects to initiate the trajectory towards a healthy and resilient future. Eleven projects are complete and eight more are underway. Projects were designed to meet stated goals listed on the previous page.

3 Monitor & Assess

Building on hypotheses and goals from Step 1, we developed a robust Monitoring and Assessment Framework to follow our trajectory towards resilience by quantifying changes in the ecological health of our watershed. This approach helps us learn from our restoration efforts in a structured way to enhance the effectiveness of our restoration efforts over time. The aim of this approach is to help resolve why a goal was not achieved and what alternative or additional management actions may be needed for it to succeed. This framework is integral for managing to the future and planning for uncertainty because it provides both the accountability and flexibility needed to manage our complex watersheds. Key components of the framework are described below.

Hypotheses

Ties to goals in Conceptual Model

Performance Standard

Threshold of performance that's needed to meet goals

Management Trigger

Performance that triggers need for action

Actions

Additional data collection, management, or stewardship project

---

Since our project goals focus on maintaining and improving ecological conditions, we chose to focus monitoring efforts on the related ecological parameters. Below we provide an example of this related to **pools**.

Related Management Goal: **2) Maintain or improve channel morphology and physical habitat.**

Hypothesis

Average residual pool depth will be maintained or increased to provide refugia for fish year to year.

Performance Standard

At low flow, average residual pool depth per reach is **maintained or increasing and greater** than 1.0 feet in Plains and Foothills, or 0.8 feet in Canyons.

Management Trigger

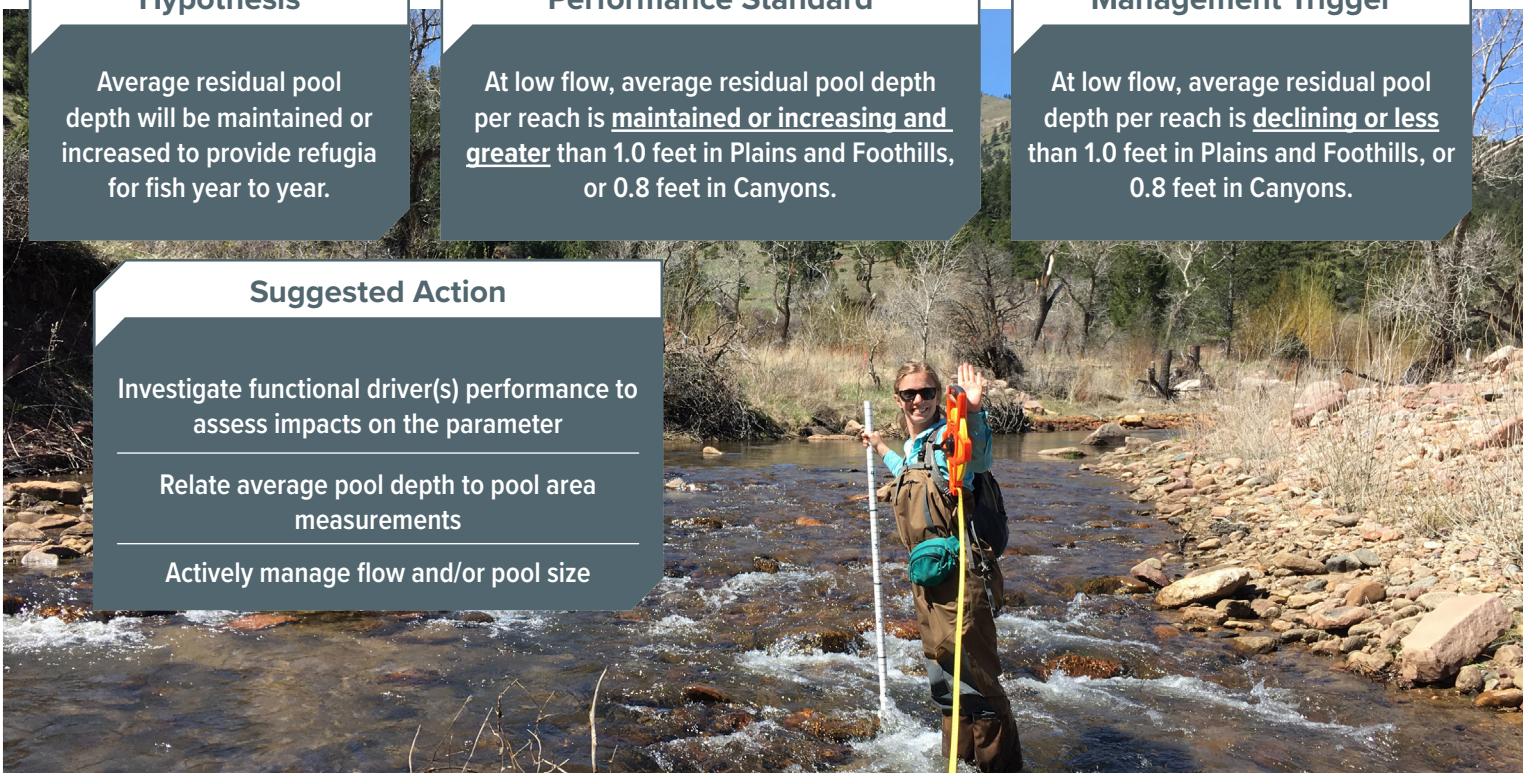
At low flow, average residual pool depth per reach is **declining or less** than 1.0 feet in Plains and Foothills, or 0.8 feet in Canyons.

Suggested Action

Investigate functional driver(s) performance to assess impacts on the parameter

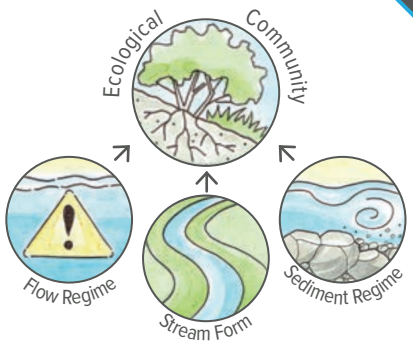
Relate average pool depth to pool area measurements

Actively manage flow and/or pool size



What Sets This Framework Apart?

Holistic



It addresses ecological conditions but accounts for all watershed functions as drivers.

Actionable

On-the-ground management actions are incorporated directly into the monitoring plan.

Flexible

New datasets can be incorporated seamlessly by modifying hypotheses.

Performance standards or management triggers can also be modified to accommodate unique project goals.

Data collection methods can also be adjusted for different systems or watershed needs.

4

Evaluate

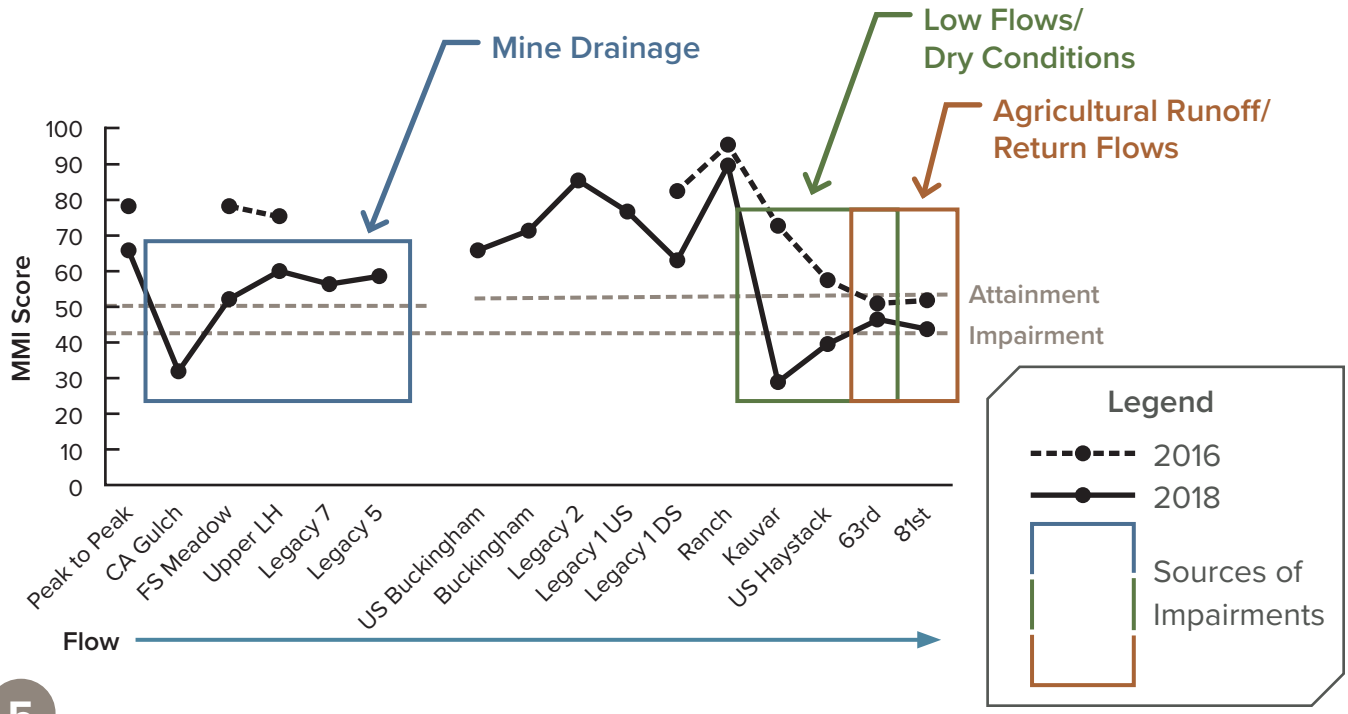
Data evaluation allows us to achieve a core value of adaptive management – learning and adjusting as new information is gathered. Recognizing that we are limited by just one year of data and additional year-to-year comparisons are needed to assess our trajectory towards resilience, we were able to gain some initial impressions by comparing our monitoring results to the conceptual model and our goals. Below we summarize key lessons from evaluating of one year of monitoring data.

Key Takeaways from Year 1:

1. **Annual data collection is important.** Since conditions vary year to year, collecting data each year is important to capture variation and conditions outside the "norm". In 2018, Left Hand Creek experienced a low water year compared to previous four years and a discrete mine drainage event which impacted water quality.
2. **Restoration increased habitat quantity.** Restored locations had broader and more accessible floodplains and more pool habitat than unrestored and pre-project sites demonstrating that project goals to restore floodplain connectivity and increase pool habitat were met in the first year following restoration.
3. **Lower benches and connected floodplains may increase native plant cover.** All sites had greater average native vegetation richness along the creek edge compared to upland zones, and restored locations had greater average percent native cover along the creek edge. The results demonstrated the importance of maximizing lower benches to attain greater levels of vegetation cover and richness.
4. **Three types of water quality impairments exist in Left Hand.** 2018 benthic macro invertebrate data indicated that three types of impairments exist based on location in the watershed (e.g. relative to mine, diversions, ag-water returns). This information presents an opportunity to identify which management actions may be most beneficial for improving watershed health.

Example of Evaluating and Adjusting - Benthic Macroinvertebrates:

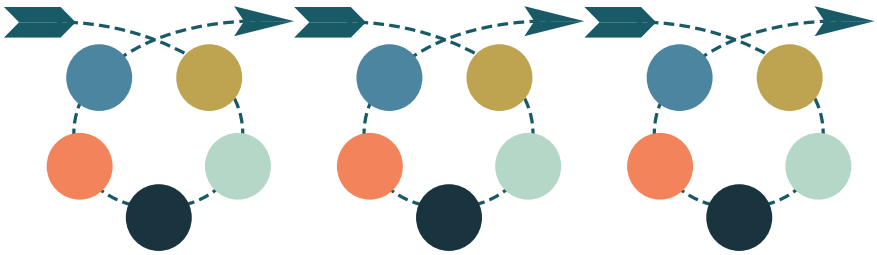
Evaluation of benthic macroinvertebrate data indicated three potential sources of impairments depending on watershed location. The chronic and discrete nature of these impairments highlighted the need to collect BMI data more frequently and the need to correlate flow regime to better understand the causes of water quality impairments. To adjust, we are now collecting data on the location and frequency of dry up periods at low flow to better correlate BMI data results with flow data.



5

Adjust

Adjusting our actions based on what is learned is the last step in the adaptive management process, though iteration of the entire process continues cyclically. Below we summarize adjustments and priorities based on year one results. Moving forward we will implement these actions to improve our trajectory towards resilience.



Adjusting involves identifying and implementing actionable priorities and continuing the adaptive management process through new iterations of the cycle.

Adjustments - Monitoring

- **Real time results for water quality.** Conduct additional water quality monitoring using labs with faster processing time than River Watch to understand if water quality is improving from mine drainage issues.
- **More data on fish & bug recovery.** Conduct additional fish and benthic macroinvertebrate monitoring to understand how these communities are recovering from mine drainage issues.
- **Understand mine impacts.** Conduct comprehensive assessment of existing mines and related water quality issues.
- **Experimental restoration.** Monitor and set up experiments to better understand ecological benefits of different restoration methodologies and stream stages, particularly related to quantifying the relationship between vegetation and floodplain connectivity, as well as resulting resiliency outcomes.
- **Understand if pool conditions are viable for fish populations.** Collect data on pool depth and pool temperature data in summer months to determine whether pools are deep and cool enough to support fish habitat at low flow.

Future Initiatives

As we continue iterating the adaptive management process each year, we are growing our plan in new ways to make it more robust, comprehensive, and inclusive of our community.

Extending Geography

We are extending our geography to the St. Vrain Basin and beyond to expand the reach of our adaptive management approach and better refine drivers, triggers, and actions for diverse watersheds. Our goal is to help advance science to inform the broader conversation about improving watershed health and restoration practices.

Engaging Community

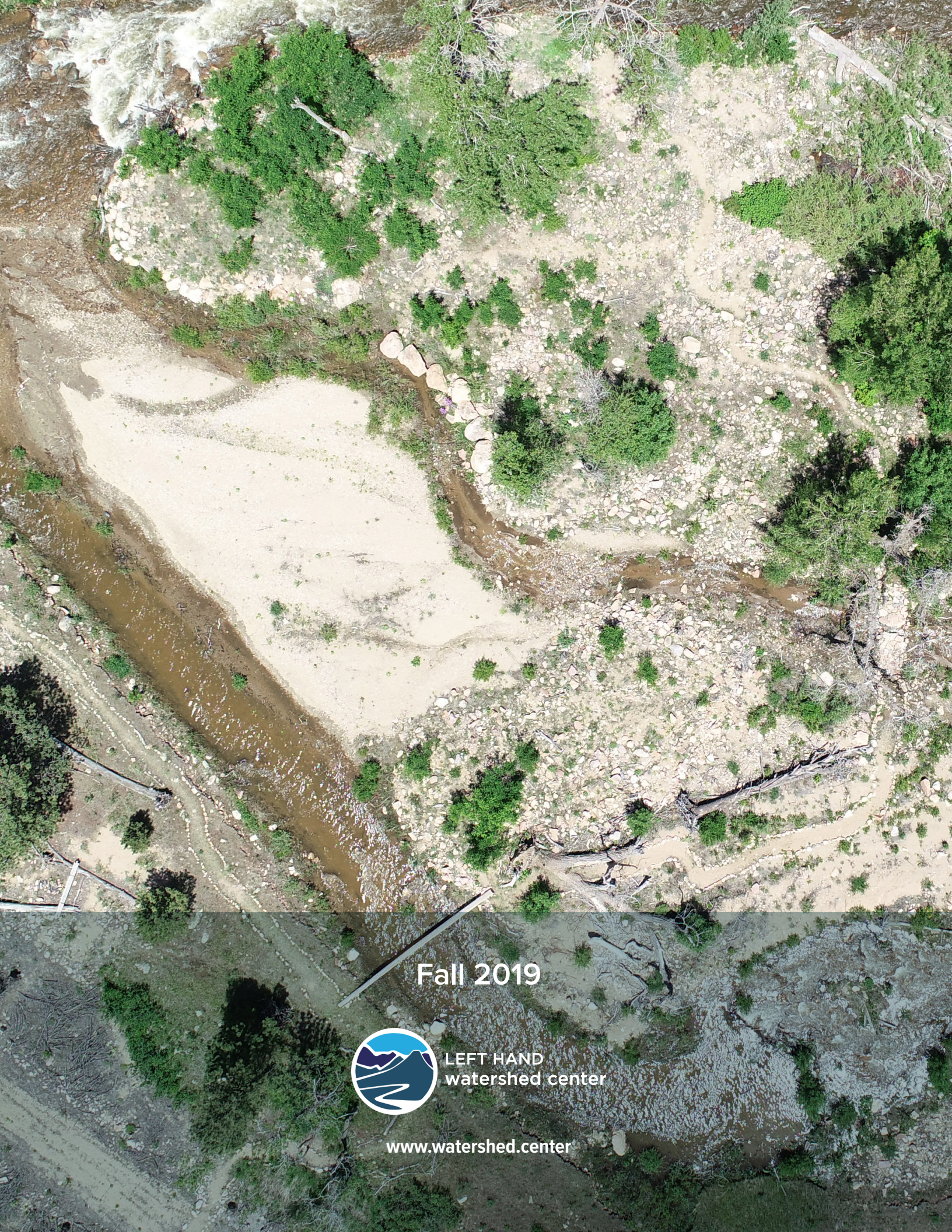
We are engaging our community in adaptive management through science by providing opportunities for place-based participatory learning as part of our Community Science Program. This includes partnering with local schools to adapt our adaptive management plan for K-8 curriculum and developing a "My Watershed" mobile app for community-driven data collection.

Incorporating Forests

We are incorporating upland forests into our process to bridge the forest-river divide for a truly holistic approach to adaptively managing watershed health. Our goal is to help achieve a shared understanding of desired future conditions among our community to help develop the social knowledge and consensus needed for successful forest health projects.

Adjustments - Management

- **Address flow related water quality impairments.** Assess and implement modifications to diversion structures and/or operations in lower reaches to address water quality impairment issues. Discussions with water owners about potential modifications have been initiated and potential options have been identified for nearly all diversions.
- **Re-connect floodplains in reaches without water quality impairments.** Identify areas with disconnected floodplains and implement restoration projects to reconnect the river to the floodplain where possible. Restoration efforts should first prioritize reaches without water quality impairment issues.
- **Prioritize restoration work in unconfined channels.** Identify unconfined reaches or floodplain pockets and implement projects to restore to a stage zero stream where possible.



Fall 2019

LEFT HAND
watershed center

www.watershed.center

SCIENCE AND COMMUNITY.

CATCH THE HATCH

[MAYFLY EMERGENCE TRACKING AS INDICATOR OF WATERSHED HEALTH]

*JUNE 15–JULY 15
*ONE OBSERVATION PER WEEK
*VIRTUAL TRAINING
*PHOTO + VIDEO DOCUMENTATION
*INFORMAL FIELD JOURNALING
*MYWATERSHED APP AS PLATFORM

FIRE FOLLOWERS

[POST-FIRE VEGETATION MONITORING]

*MAY – OCT
*ONE OBSERVATION PER WEEK
*IN–PERSON TRAINING
*PHOTO + VIDEO DOCUMENTATION
*INFORMAL FIELD JOURNALING
*INATURALIST PLATFORM

WATERSHED CENTER COMMUNITY SCIENTIST PROFILE

Help us collect important scientific data on watershed health on your own schedule! As a volunteer community scientist, you will also be an integral part of building our research projects and gaining valuable experience working with scientists and community.

STORM CHASERS

[EROSION + POST-FIRE SEDIMENT MONITORING]

*APRIL–JUNE
*RUNOFF + RAIN EVENT PHOTO MONITORING AS AVAILABLE
*ON–SITE TRAINING
*PHOTO DOCUMENTATION
*STREAMTRACKER PLATFORM

LEFT HAND WATERSHED CENTER

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MOBILE GUIDE

COLLECT IMAGES

Collect detailed images of plants on site. Remember: Someone will be using this image for identification, so capture as many identifiable characteristics as you can.

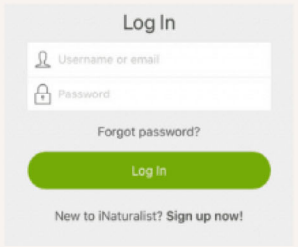
Tip: Using your phone will automatically insert a geo-tag, making it easier to specify your location later.

Tip: Tapping your phone's screen to adjust focus and brightness.

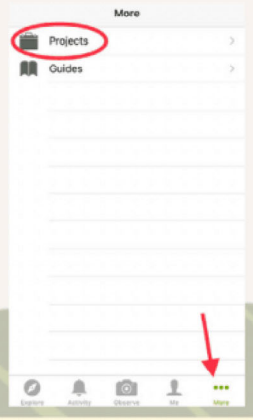
HOW DO PLANT POPULATIONS COMPARE BEFORE & AFTER A FIRE?

UPLOAD YOUR IMAGES

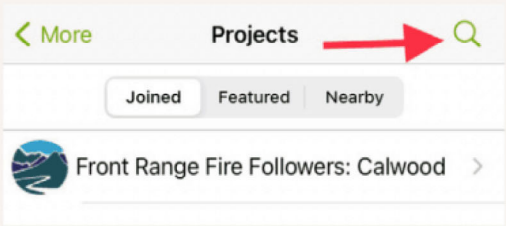
Download the "iNaturalist" app (FREE)



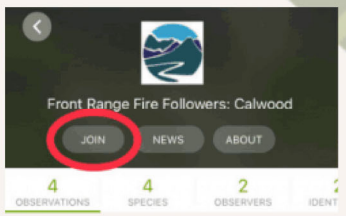
LOG IN OR SIGN UP



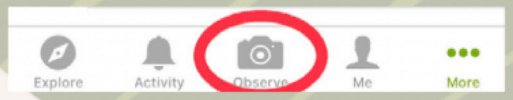
FIND PROJECTS UNDER THE "MORE" TAB



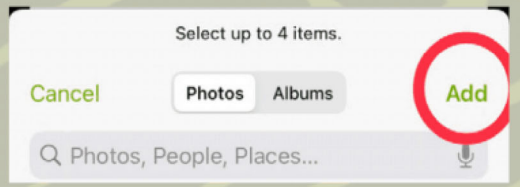
FIND YOUR JOINED PROJECTS OR SEARCH FOR "FRONT RANGE FIRE FOLLOWERS"



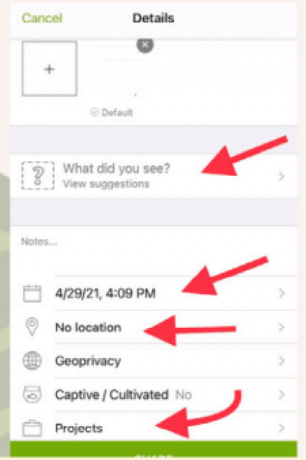
JOIN PROJECTS OF YOUR CHOICE (I.E. "CALWOOD" OR "LEFT HAND")



CHOOSE THE "OBSERVE" ICON



SELECT FROM YOUR CAMERA OR CAMERA ROLL AND CHOOSE "ADD"



AS YOU ARE ABLE, ADD SPE
NAME, DATE, LOCATI
AND PROJE