

# Rogue Trail Closure: A Restoration Prescription



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## ***What is Ecological Restoration?***

*Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.* We will be discussing active restoration throughout this class. Active restoration is the process of physically manipulating a site to achieve desired goals. This may include removing noxious weeds, closing rogue trails, or planting native species. Passive restoration usually includes eliminating the source of degradation and allowing the site to heal on its own. Though passive restoration may be suitable in some situations, most sites benefit from some sort of active restoration. For example, rogue trails that have experienced minor impacts could be signed and fenced and allowed to regrow naturally (passive), but tilling the soil and adding native seeds (active) will jump-start recovery. The decision between active and passive restoration should be considered during the planning phases of a project, but when in doubt, active restoration is the best option.

Often, restoration is thought of as adding seed or transplants to a site. While this is an important component of ecological restoration it is certainly not the only aspect. One of the most important things to consider when restoring a site is how to get the processes of that site to function properly. This may include, but is not limited to, nutrient cycling, water retention, biological processes, etc. A sound restoration practice is to determine a “reference site”. This may be an undisturbed site similar to your disturbed site that is used for post-restoration comparison.

### ***1. The forces working against a trail***

Dirt, water, and gravity are the main factors working against your trail. *Dirt* is the material that supports the bed of your trail. Trail maintenance is all about getting dirt to stay where you put it! *Water* is the most powerful force in the world, and it works in conjunction with *Gravity* to move sediment from your trail, downstream.

The most important aspect of trail work is learning how the forces of water can influence a trail. If you put in many years building trails, you will see hundreds of examples of trails built with little understanding of the forces at hand. You will save time, money, and your sanity if you get grounded in the basic physics.

Water can degrade the tread surface of a trail, undercut support structures, and pick up and move sediment on its way downhill. The amount of damage depends on the amount of water involved and how fast it is moving.

Water has *carrying capacity*. More water can carry more dirt. Faster water can carry even more dirt. You need to keep water from running down the trail! When and where you can do that determines the sort of water control or drainage structure you use.

Water also can affect the aggregate stability of a soil (cohesiveness). While the general rule of thumb is that drier soils are stronger (more cohesive) than

saturated soils, fine, dry soils may blow away. The best trail workers can identify basic soils in their area and know their wet, dry, and wear properties.

When dirt, water, and gravity are given the opportunity to work together with a high carrying capacity, they create erosion that can cause serious destruction. This situation is most often found with undesignated, poorly laid-out *rogue trails*.

## **2. What is a rogue trail**

Rogue trails are unofficial, undesignated, user-created trails. These trails are often formed as shortcuts, or lead to an area not accessed by a designated trail. They form over time by visitors who are often unaware they are violating park policy.

Rogue trails can cause serious land management issues. Official trails are properly designed and aligned by professionals with the natural landscape taken into consideration. Professional trail design includes considerations like proper drainage, trail width, suitable vegetation, topography, etc. An improperly designed trail can cause significant damage to the surrounding terrain and to downstream reaches. Water often becomes trapped on trails, which can cause channelization, increased water velocity, and massive sediment movement.





It is vital to minimize rogue trail creation as much as possible, it is much easier to prevent rogue trails than to close and restore already created trails. To avoid the devastating effects caused by rogue trails, it is vital that they are closed as soon as possible. However, these trails can't just be closed, they must be restored to pre-disturbance conditions.

### ***3. Why is restoration important?***

Restoration of impacted areas is a required component of trail closure projects to restore impacted areas back to a healthy condition. By developing restoration-planning activities for social trails, users benefit from reduced confusion, increased landscape aesthetics, and well-managed natural resources.

In areas where multiple rogue trails exist, closing and restoring those trails helps protect natural resources by

- Keeping visitors on designated trails and out of protected areas
- Reducing habitat fragmentation
- Maintaining adequate soil moisture levels on site necessary to support natural plant communities
- Creating a self-sustaining plant community that will protect the
- Restored site from excessive soil erosion and provide wildlife habitat

Well-defined and constructed trails prevent off-trail impacts such as rogue trail creation and soil compaction. Unplanned trails often experience high rates of soil erosion. The result is often trail braiding, trail over-widening, and deep erosion gullies (up to 8 feet deep and 12 feet wide in some areas of the Garden of the Gods and other city parks). Mere closure of these areas often is not adequate to promote natural re-vegetation to occur.

Restoration activities create conditions that hasten the recovery process leading to a self-sustaining plant community in disturbed areas.

## ***The Restoration Process***

Restoration can be a time consuming, costly process. Each project should be properly managed to ensure the highest level of success.

### ***1. Set clearly defined goals***

The restoration goals of a site should be determined by the land management agency prior to the start of any on-the-ground work. Restoration goals can be based upon a set, pre-determined condition, a reference site, or can be determined by the presumed use of the area. Restoration goals often include stabilizing slopes, restoring a native plant community, and achieving visual closure of social trails. In addition to the conservation goals associated with restoring a site, a common social goal is to maintain landscape aesthetics. This is especially important in city parks and open spaces where management goals are sometimes established to enhance the quality of the visitor's recreational experience.

### ***2. Define the problem***

Pre-project site visits are critical to determine the scope of work of the project, including the type and amount of labor and any material requirements. A key aspect to these visits is determining the exact problem on your site. If the problem is not determined you may be spending lots of time and energy on a symptom of the problem but may be missing the cause of the problem! For example, if your site is lacking vegetation you might spend a lot of time and money seeding native species. But if vegetation isn't growing because of steep, unstable banks that are losing soil, seeding may be futile. We need to determine and address the root cause of the problem to restore the ecological processes within the site.

For larger projects, it is often helpful to break restoration work down by specific area. How a project is broken down will vary greatly by project, but are often based upon landscape features (a change in plant communities or soil types) or specific restoration goals (closing a specific trail, constructing structures on a certain section of trail, etc). Breaking down each project into smaller restoration areas facilitates site-specific designs and can make disseminating instructions to other crew leaders and volunteers a much easier task.

Detailed, site-specific restoration notes should be developed for each restoration area within a project. However, it is crucial to walk the entire site to familiarize yourself with the extent of the project before developing these notes. Keep in mind that everything is connected! Sites do not exist in a bubble; damage upstream can affect downstream reaches and vice-versa. It is important to understand the whole system before decided on restoration techniques for a certain area. This will also help you note site-specific resources that may be available. This may include salvageable topsoil, vegetation you want to

transplant, downed slash, and/or local rock. This site-wide survey may also help you determine which resources will need to be acquired from off-site. Materials that may need to be purchased or gathered off site may include native seed, erosion control matting and/or mulch, biodegradable stakes, fill material such as native topsoil, and sometimes fertilizer.

### **3. Determine achievable solutions**

Site-specific notes will help determine which restoration treatments you will use on your projects. All solutions should be approved by the land management agency with whom you are working. A restoration plan should be created and presented to the agencies to ensure all parties understand the roles and responsibilities of other involved parties.

To develop an effective restoration plan:

- Address existing land management goals and objectives
- Provide an introductory project summary
- Summarize labor and material needs
- Include 'before' photos
- Describe the restoration techniques to be used
- Include a general site description for each restoration site on the project
- Develop action plan sequences with their timing
- Clearly articulate the system for monitoring the success of the project

#### *Prioritizing Restoration Treatments*

Prioritizing restoration treatments within a project allows the restoration crew to more effectively allocate limited resources. Several factors are considered when assigning priorities to work sites and workstations within a site:

- The goals of the land management agency
- The level of disturbance
- Whether the site will continue to degrade if no action is taken
- Visibility of the site from nearby trails
- Available material resources

### **4. Implement your restoration techniques**

While every site is different and deserves its own prescription, RMFI uses a 5-step approach that is modified slightly for every site.

***RMFI'S 5-STEP RESTORATION PRESCRIPTION FOR CLOSING ROGUE TRAILS:***

**a. Decompact the trailbed**

It is crucial to decompact the trailbed at least 4-6 inches when closing a rogue trail. Overuse can compact soil, which will make natural establishment of vegetation extremely slow. Roots have a much more difficult time growing into a trailbed than into freshly aerated soil! If the rogue trail is surrounded by native vegetation and is likely to be seeded by natural forces it is not always necessary to reseed the area. However, reseeding with native species will “jump-start” the natural revegetation process and may ensure a quicker recovery time! Additionally, reseeding may help inhibit the invasion of non-native species into the newly aerated soils.

**b. Bring area back to grade**

One of the most important trail maintenance techniques is to recontour the trailbed. This can help prevent water from running the length of the trail, picking up speed and sediment as it moves. The same can be said for a renegade trail. If the trail is not recontoured (or brought back up to grade) water will continue to downcut and move crucial sediment down the old trailbed. Additionally, if the rogue trail is not brought back up to grade it will continue to be perceived as a trail and will attract use. Filling the old trailbed with a native soil is crucial for fully restoring the impacted area. It's also important to remember to ‘overfill’ the area by 1-2 inches since the soil will settle over time.

**c. Re-vegetation**

Once erosion is addressed, re-vegetation treatments should be applied to achieve long-term slope stabilization and develop a self-sustaining, native plant community. Spreading native seed and installing erosion matting or covering with mulch is crucial to fully restoring the eroded area. Revegetation can be supplemented with transplants from the surrounding area to increase the ‘natural’ look of the restored site.

The seedbed should be prepared prior to seeding to ensure the highest germination rates. Rake should be used to break up the ground about 1- 2 cm in depth. Seed should then be hand spread over the prepped seedbed (amount of seed used will depend on the purity of your seed mix, the type of seed used, and cost of the seed). Seed should be lightly raked into the soil to ensure good soil to seed contact and a tamper should be used to firm the soil and prevent erosion.

Seed selection is also an important aspect to consider when restoring a site. Often, the land management agency has a set seed mix that they have approved. If a set mix does not exist ensure the agency has approved your mix before use. Factors to consider when choosing a seed mix should include availability, affordability, and quality of the seed. It is also important to ensure the

seed you are using is adapted to the site in which you are planting and that you have a diversity of species and life forms.

Ensuring that you seed at a proper time is crucial for the success of your restoration project. A good rule of thumb is to seed before you know natural moisture will occur. This can be challenging in CO, but without precipitation your seeds may not germinate and are bound to become a tasty snack for some little critter! Raking the seed into the top layer of soil and tamping is extra protection against seed predation.

RMFI often uses an erosion control matting or mulch in addition to seed. This material can help increase germination by creating favorable microhabitats for seeds, can reduce rodent and bird predation of your seed, and can help minimize additional visitor use. Though mulch is often cheaper, matting is beneficial on steep slopes since it can be physically attached to the soil surface to minimize movement. Mulch should not be spread too thick since it can become a barrier to plant growth.

Finally, timber slash should be placed over the impacted area to provide a microclimate for the seed and to dissuade users from traveling on the restored area.

If adequate vegetation cover is not achieved by the time the erosion control matting or mulch biodegrades, the restored area is in danger of once again becoming eroded. Regardless of techniques used, adequate vegetation cover is the only means to achieve long-term erosion control and should be integrated with all erosion control structures.

#### **d. Minimize the visibility of all rogue trails**

As long as use continues on restored areas, erosion control and re-vegetation attempts will be unsuccessful. Physical structures, such as barriers and debris (fencing, large boulders, vegetation, timber slash, etc.) can help disguise closed trails. Visual barriers in conjunction with educational signage can substantially increase the success rate of any restoration project. Education is often an overlooked portion of restoration, but most people will not walk off-trail if they realize the damage they may be causing.

#### **e. Stabilize the trailbed (additional information)**

Rogue trails that are severely downcut, eroded, or have other structural issues may require more restoration than we have discussed in this class. There are specific structures designed to either keep or collect material to fill eroded trails, and structures designed to reduce additional disturbance downstream. These structures will not be discussed in this class, but if you would like more information please contact the Rocky Mountain Field Institute.



### 5. Monitor and assess the success of your project

All restoration projects should have reasonably attainable goals. Monitoring is the easiest method to determine if goals were achieved. This may be as simple as taking 'before' and 'after' photos to assess effectiveness of restoration treatments. However, more quantitative measures may be required for certain projects and monitoring protocol should always be discussed with and approved by the land management agencies prior to project implementation.

Monitoring is not just helpful for the agencies; adaptive management should be used by anyone completing restoration projects and monitoring can help determine success. If specific techniques are not as successful as anticipated, changes may need to be made to protocol. Valuable data can be gathered by observing successful AND unsuccessful projects. Monitoring data will help determine whether restoration goals were met or if additional restoration is necessary.

**Photographs:** A picture is worth a thousand words, particularly when it comes to trail and restoration work. Having 'before', 'after', and 'during' photos is a great way to show how you did what you did. Taking photos at specific intervals after completion of the project can help determine if additional restoration is required, and is a great way to show the longevity of your work. They are also crucial when writing reports or grants for the same or similar project.



### ***Restoration Projects with Volunteers***

Restoration projects are well suited for small groups of volunteers or Friends Groups whose mission is compatible with restoration ecology. Restoration projects tend to be repetitive in nature and usually can be accomplished by novices while still achieving high quality results. Highly trained staff should be responsible for doing the most technical restoration work (such as treating erosion gullies deeper than 12 inches), while volunteers are employed to complete re-vegetation work, check dams, and other less-technical work. However, it is important to note that the importance of restoration work should not be understated, and this is best avoided by providing oversight by highly qualified staff.





### ***The Common Offenders!***

Prevention is the best way to maintain a weed free site. Ensuring that all tools, vehicles, socks and shoes, and even pets are free of seed before entering a new natural area is your best defense against invasion. If weeds are found on your site during the planning stages it is important to identify which weeds are present, determine their level of invasibility, and come up with a plan for eradication. While many weeds in Colorado can be hand-pulled with great success, there are certain weeds that require specific treatments such as herbicides. In fact, hand-pulling Canada thistle can stimulate plant invasion since this species can sprout from root fragments. Knowing the most effective way to eradicate weeds is important, but knowing when it is best to leave the treatment to professionals is an important part of any restoration project. Check with the local land management agency, they will most likely have an integrated pest management (IPM) plan that will help determine the appropriate level of treatment for each species.

If you would like more information on the weeds common in El Paso County, the County has a very helpful document on their website titled *El Paso County Common Noxious Weeds and Control Methods*. This is a great resource for everyone and can help ensure a successful restoration project! More info can be found at [www.colorado.gov/ag/weeds](http://www.colorado.gov/ag/weeds). Note: all herbicide must be applied by a licensed applicator. If a species requires herbicide application for eradication immediately inform the land management agency.

On the following pages you will find a handful of the most common invasive weeds found in Colorado Springs.

**Myrtle Spurge**  
*Euphorbia myrsinites*



Myrtle spurge is a List A noxious species. This means it is classified as a rare noxious weed within the state that must be eradicated wherever it is found. If this species is found alert the land management agency as soon as possible. If the agency decides the population can be removed by a volunteer group, always ensure positive species identification prior to eradication; there are native spurge species in Colorado!

Small infestations can be mechanically removed (hand-pulled) prior to seed development. If seeds have set or the infestation is large, herbicide application may be required. Follow up treatments are important to ensure the entire population has been removed if hand-pulling this species.

Note: Spurges have a milky sap that can irritate skin; always wear gloves and eye protection when working with this species.

**Canada Thistle**  
*Cirsium arvense*

Canada thistle is a List B noxious species. This means it is distributed statewide and populations are subject to eradication, containment, or suppression to prevent the continued spread of the species. A new plant can form sprout from a ½ inch piece of root; hand pulling should never be used since this will only increase plant production. This species should be mowed continuously throughout the growing season to suppress populations or should be eradicated using herbicide.



Note: Thistles have sharp spines on leaves and stems; gloves should be worn when handling this species.

**Diffuse knapweed**  
***Centaurea diffusa***



Diffuse knapweed is a List B noxious species. This species can be hand-pulled but has a deep tap-root that makes pulling it difficult. It is most effective to sever the roots with a shovel prior to removing the plant from the ground. Plants should be eradicated in the rosette stage (before the stalk grows) and should be confined to plastic bags because seeds may develop on plants even if they are removed from the ground. Herbicide application is also an effective means of control for this species.

Note: Knapweeds have spiny flower heads, gloves should be worn at all times when working with this species.

**Musk Thistle**  
***Carduus nutans***

Musk thistle is a List B noxious weed. This species can be hand pulled but has an extensive tap root that should be severed prior to removing the plant. Plants should be disposed of in plastic bags because seeds will continue to develop and mature on cut plants. Musk thistle can only reproduce by seed; preventing seed production should be a key management goal for this species

Note: This thistle has very sharp spines on leaves and stems; gloves should be worn when handling this species.



Photo by Matt Lavin

**Common Mullein**  
*Verbascum thapsus*

Common mullein is a List C noxious species. This means it is widespread and well-established throughout the state. Complete eradication of these species is not required, but control is recommended. Mullein is often found on disturbed sites and minimizing disturbances is often the best prevention for invasion. It is important to remove the flowering heads before they seed since mullein seeds can survive in the seedbank for many years.



Smaller populations can be eradicated by cutting just below the basal leaves. The plant will not resprout. Herbicide application is also an option for control of this species.

