



Course 207. Trail Decommissioning & Wildland Restoration

Learn how to put a campsite and section of trail to bed so that it returns to nature without erosion. Some call this “trail magic,” or “Zen and the Art of Wilderness Gardening” because, if properly done, the old scars disappear, replaced by a natural-appearing landscape. Methods include transplanting, seed collection, and rock placements. There are no prerequisites for this class, though students should have interest in working with plants and be willing to get dirty. Patience and a good eye for design help.

STUDENT SKILL OUTCOMES:

- Understanding how to stop erosion on old trails.
- Restoring old trails back to nature.
- Safe transport and natural burial of large rocks.
- Proper site closure and transplanting techniques.

KEY TERMS:

wildland restoration, trail decommissioning, abandoned trail, user trail, system trail, renegade trail, scarify, planted rocks, rock shopping, fall-line, check dam, transplanting, nurse log, borrow pit.

TOOLS NEEDED PER 8 STUDENTS:

2 log carriers or slings, 3' hand saw (or small chain saw), 2 fire shovels, 1 planting spade, 1 McLeod, 1 hard-tined rake, 1 digging fork, 1 adze hoe, 2 Pulaskis, 1 pick mattock, 2 small chisel-tipped rock bars, 1 single jack (aka mash hammer), 1 rock stretcher &/or rock sling, a wheelbarrow (if outside wilderness), staple gun, 50-100' measuring tape, pruning clippers.

MATERIALS NEEDED:

4 five-gallon buckets or canvas dirt bags, 10 closure signs, 15 x 24" surveyor stakes, ball of biodegradable (cotton, jute or hemp) string, 40 pin flags, 4 clipboards with grid paper, pencils, and permanent markers, 8x 1-gallon plastic bags, 4 five-gallon filled water jugs (if water is not available on site, and they can be transported there by vehicle or wheelbarrow), native plants from a nursery, if available.

WORK SITE REQUIREMENTS:

A section of trail in need of decommissioning and an impacted area in need of shrinking or closing.

KEY CONCEPTS:

- 1) Safety Documents: Pre-trail work paperwork:
 - Personal Protective Equipment (PPE), Job Hazard Analysis (JHA), Tailgate Safety Session (TSS), Emergency Action Plan (EAP)
- 2) Trail Decommission:
 - Jumbo, natural-looking drainage & check dams.
 - Scarify compacted tread.
 - Plant large rocks as natural-looking check dams.
 - Import fill to repair gulying.
 - Local/native transplants uphill of rocks.
 - Collect, scatter & rake in native seed, if available.
 - Import & scatter organic debris.
 - Make invisible or install closure signs.
- 3) Wildland Restoration:
 - Develop a plan: what is to be restored? What is available? Drainage issues?
 - Basically same steps as Trail Decommissioning, with a site plan
 - Signage is likely to be useful
- 4) More on Transplanting and Seeds:
 - Consult with local managers about best practices
 - Match plants to the site conditions (e.g., dry, wet etc.)
 - Tap-rooted plants don't transplant well
 - Grasses, rushes, and sedges transplant easily
 - Woody plants may offer the most disguise to impacted areas
 - Dig hole as wide as the drip line

- Water in the transplant, eliminate air pockets
- Return later to water the transplants if possible
- Scatter ripe seeds in receptive soils
 - Collect from local native plants or
 - Local managers may have access to appropriate seeds

BACKGROUND

For those who enjoy landscaping and working with plants, **wildland restoration** offers great satisfaction. When done skillfully, with patience, care, and persistence, it is possible to assist Mother Nature to heal the scars of erosion and human impacts.

 **Quality Work:** “If you’re gonna do it, do it right.”

Simply trying to disguise a trail or campsite with scattered limbs is wholly inadequate. New plants will not grow well, erosion will continue, and very likely users will remove the limbs and access the trail or site again. To thoroughly decommission a trail or restore a campsite requires a complete series of steps--skipping even a few often leads to complete failure of the project. The outcome needs to look like the surrounding terrain.

Trail Decommissioning: This work may be necessary for various reasons, including: 1) a poorly-designed **system trail** has been replaced with a new, better-designed section of trail; 2) multiple **user trails** leading to the same lake may need to be reduced to the single best trail; 3) an illegal **renegade trail** may need to be eliminated to protect an ecological or archeological site, or; 4) an **abandoned trail** may be eroding badly and need help to return to nature.

The steps to thoroughly decommission a trail are as follows:

First, if the trail is eroding (or likely to), drainage must be tended to for the long haul, since the trail may never be visited by a crew again. Identify key drainage points and install the largest possible water bars. They are not meant to be walked over, so there is no need to make them comfortable from a user standpoint. In fact, it is better if they appear irregular. No need for these to be pretty, just effective for the long term. It can be sufficient to drag sections of large diameter logs across the trail at an angle (no need to peel them). Fill any gaps where water might run through with rocks and debris. Then excavate a MAJOR side opening trench to divert water, ramping the dirt on the uphill side of the log. The key is to leave a monster structure that will divert water for many years until the trail is grown over and no longer erodes. If the trail follows the **fall line** and is impossible to drain, the only option is a series of mega **check dams**.

Second, **scarify** the soil to a depth of 2-6” on any portions of the trail that are compacted. A variety of tools can be useful for this depending on the soil and the workers’ strength. The key is to leave soil that can absorb moisture and serve as a bed for wind deposited or hand scattered seeds.



Figure 1. Large check dams, over the years, will help this gully fill in. These check dams need an apron of loose rocks down from each log to prevent water scouring. Scarifying, planting rocks and transplants, adding fill, seeds, and debris will speed the process. (IMAGE COURTESY OF THE USFS)

Next transport and **plant rocks** in the trail bed to slow water moving down the trail and to disguise the old path -- the larger and more irregular the rocks the better. Excavate holes 1/3 the thickness of the rocks, locate them perpendicular to the fall line, and refill the soil around the rocks, tamping it so that they look like they have always been there. Such rocks also serve to discourage use of the old trail and to collect water for new growing plants. They serve a function similar to check dams. The ideal rock is should be big enough that it takes two or more people to carry it, though it's safer to skid or roll large rocks. In many locations ideal rocks are hard to come by, though always be willing to scour the landscape to find the best available (an endeavor known to some as **rock shopping**.) Getting folks to look far and thoroughly enough is a challenge, but must be emphasized.

If the weather allows (just before a rainy or snowy season is usually best) and there are suitable plants available, **transplant** the largest plants feasible just uphill of the rocks. It is necessary to seek local expertise about what species and sizes of local plants are appropriate for transplanting. Your local land manager may prefer you to use native plants cultivated and brought in for this purpose. However, if your local manager approves of local transplanting, make sure to dig up live plants from a sufficient distance and random locations, so as not to leave a new denuded area. Be sure to disguise all holes created by digging up plants.

If available, transplanting **nurse logs** make fine additional check dams and often increase the likelihood of the plants surviving. If it can be arranged for someone to come back and water the transplants and nurse logs through the first dry season, plant success can be increased significantly. See next section for additional details about transplanting.

Of course, it is ideal to select plants that will survive, but if plants are abundant it may be appropriate to "plant" large stature plants that likely won't survive, simply to block and disguise the trail. Sometimes, already dead plants are "planted" in a process some call "vertical mulching." This may also be done with logs or heavy limbs that still have a few branches. Plant the butt end of the limb 12" in the ground, and lean the other end against an existing trailside tree.

If necessary, import soil to reduce gullying that is greater than 6" deep. Obtain the soil from a hidden **borrow pit**. When available, the root wads & wells of wind-thrown trees offer ideal borrow pits, because you don't have to dig a hole and disturb new ground. When done, break down edges and fill the pit with rocks and organic debris so that it is not too unsightly a scar or hazard.

If available, collect local native seeds and scatter them over the most receptive soils of the project. Rake them in lightly.

Finally, scatter organic debris over the trail: branches, needles, leaves, duff... to provide cover for seeds and shade for seedlings when they sprout. Make your best effort to leave the ground surface looking as natural as possible, so users will not even see the old trail. This is the "Zen" part of wilderness gardening and requires a special touch.

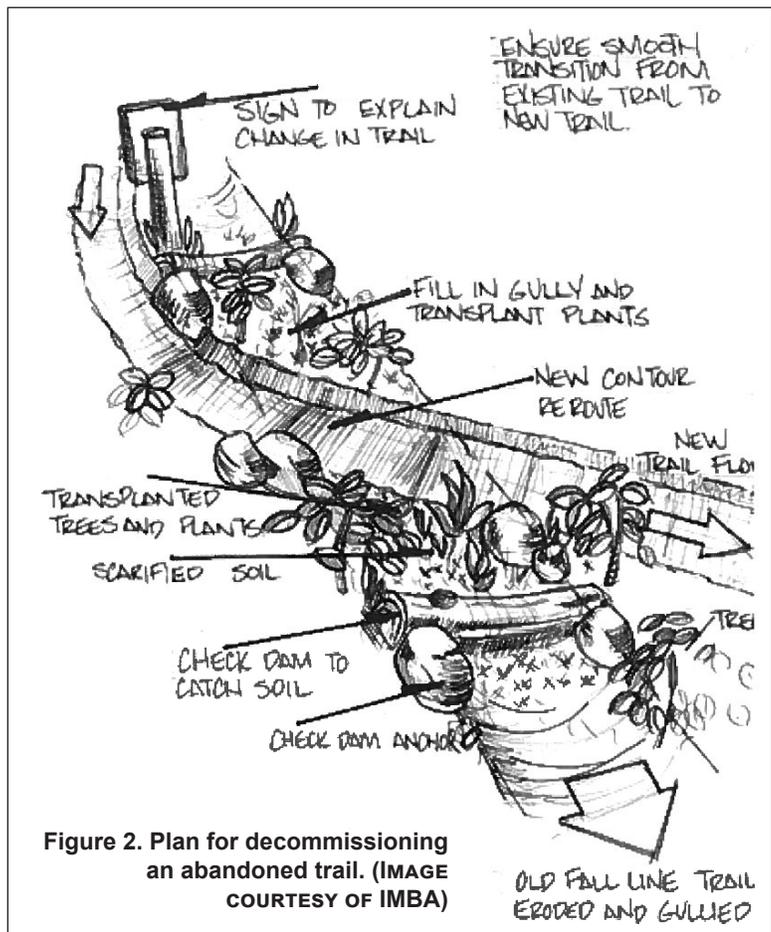


Figure 2. Plan for decommissioning an abandoned trail. (IMAGE COURTESY OF IMBA)

The very last matter is whether to install a sign marking the old trail “Closed for Restoration”, or a similar message (local managers may have a preferred sign). If you achieve the goal of making the decommissioned trail invisible, and users are unlikely to be looking for it, a sign may be counterproductive, drawing users’ attention needlessly to the old trail. In other circumstances it will be necessary to post the old trail emphatically closed and even announce the fine for trespassing. Each situation is unique. Sometimes a temporary sign explaining the project and/or clearly directing users where they belong is needed, as well.

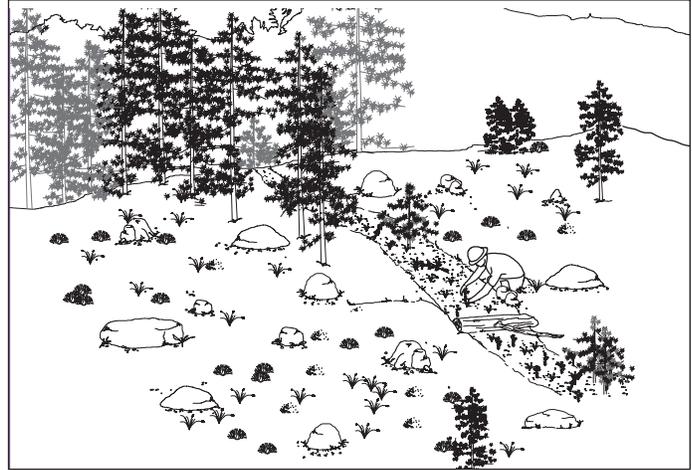


Figure 3. Decommissioned trails and campsites need to be blocked off and restored effectively, and with sensitivity. Plant rocks, small trees, native grasses and other plants to look like the surrounding area. Use shrubs or deadfall to fill the openings. (IMAGE COURTESY OF THE USFS)

When planning out a trail decommissioning project, special attention must be given to the first 100-200’ of trail, or wherever it is visible from the old trail. While the entire trail should get attention to drainage and obliteration, for the visible sections it is essential to take all the steps to make the trail disappear completely. If users can still see the trail, many will be tempted to follow it. Assign members of your crew to various tasks according to their abilities and temperaments to achieve the best results. Some do great finishing touches while others are better suited to constructing large drainages.

Note: any ***mineral soil*** excavated during the project should be stockpiled, not just scattered about. If there is excess dirt after the project is complete, look for gullied tread to fill -- never let good dirt go to waste.

If you choose to build rock check dams, see Course 203: Waterbars and Checks for background details.

Site Restoration: Most of the steps needed to restore a campsite, or any large impacted area, are the same as for decommissioning a trail. The major difference for restoration is that it is a good idea to make a more detailed plan before starting work. The plan can be drawn in detail on a scaled site-map or simply marked out on the ground with pin flags. The key is to know what areas will be left as is and which will be restored. It can also be useful to use pin flags to mark out where large rocks will be planted to discourage future use and where drainage structures are needed.

If closing part or all of a site do not scatter branches or logs on the surface; they will just become firewood or benches for campers. Logs must be half buried if they are to be used. Finally, “Closed for Restoration” signs are a must for site restoration in popular areas; both for clarity and to support follow up enforcement. Sometimes using stakes and string to clearly mark out the closed area is helpful. Laminated closure signs with holes punched in them can be hung on the string. Wood signs mounted on a post are the alternative, if available. Follow up enforcement and restoration from year to year is essential for success of site restoration, adding more planted rocks and plants as needed.

More on Transplanting: Some plants survive transplanting well, others not at all. Seeking advice from experienced locals can improve success dramatically. As mentioned earlier, your local land manager may prefer you to bring in cultivated native plants rather than using on-site transplants. Generally, any plant with a deep tap root, such as large lupines will not survive transplanting. Of course, riparian plants from a lake or stream shore will not survive in a dry upland site, and vice versa. Concentrate most transplants within 6-12” of planted rocks to afford them protection from being stepped on.

Grasses, rushes, and sedges generally transplant most easily and offer the advantage of being easily dividable into multiple plants. They are also fairly durable, though their small stature does not much discourage people from using a closed area. Small herbaceous plants (flowers without woody stems) can add texture to a restored area, but are very vulnerable to crushing-- best to plant them very close to buried rocks. When choosing plants to transplant, match plants to site to be closed.

Woody plants (trees and shrubs) offer the most discouragement to future use of a site. The ones most likely to survive transplanting are less than 2' tall; 6-12" is best. Dig a circle around the drip line of the plant selected, driving in the shovel vertically as far as you can. If, when you use the shovel to lift up the plant, there are deep roots still attached, use pruning clippers to cut them cleanly.

To prepare for a transplant, dig a generous hole, at least 12-16" deep, 3" deeper and 4" wider than the size of the transplant root ball. With the tip of the shovel, loosen the dirt in the bottom of the hole so that roots can penetrate easily. Pour in enough water to thoroughly moisten the bottom of the hole and leave 1-2" of water remaining. Insert the root ball of the transplant such that the base of the stem is 2" below the surrounding terrain. This will leave a dished area to collect rainwater, snow melt, and to hold additional water from a bucket after transplanting. Fill in dirt around the transplant and tamp it well so that there is no air around the roots (air pockets can kill a transplant). Add more water to fill the dished area around the plan.

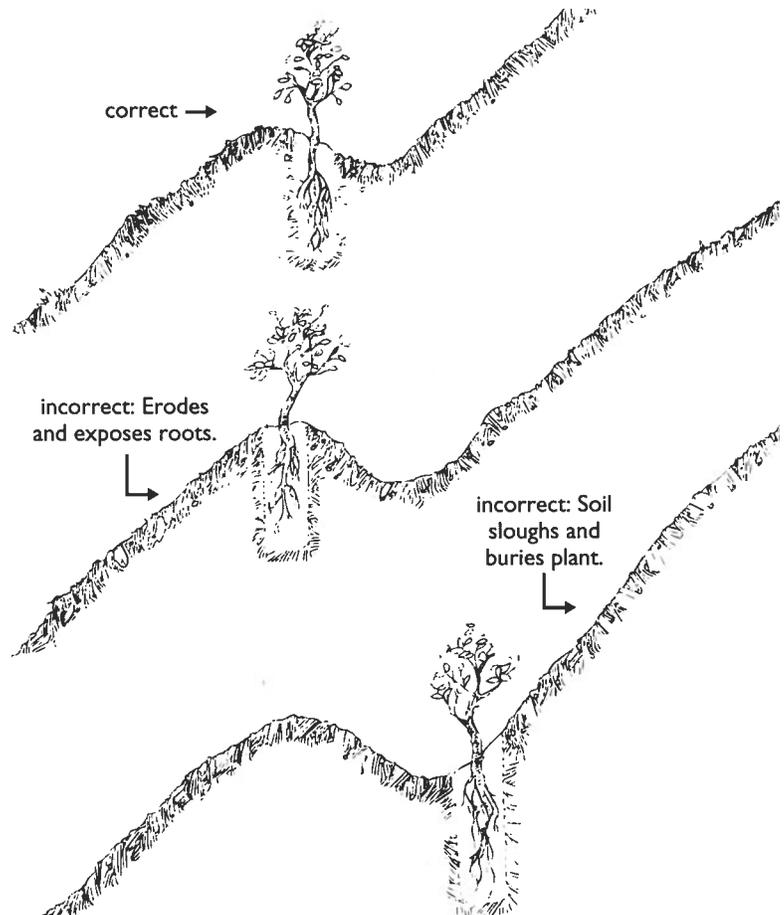
Some restoration workers use root hormone, soil amendments, and other products to give transplants a better chance of surviving. There are also various products to provide water to roots for an extended period of time. Local experts will be able to help determine what the best protocol for your area is.

If funds and potted native plants are available, purchasing appropriate species from a native plant nursery can speed the restoration process immeasurably. Be sure to consult with local land managers for guidance to appropriate local genetic plant stock, especially for use in Wilderness areas.

Seed Collection: Consult local experts on which plants provide for the most successful seed collection and planting. Generally, plants that produce abundant seeds are easiest to collect, such as some grasses, lupines, and desert shrubs. Fortunately, many trees do a good job of scattering their seeds naturally. Proper timing for collection of ripe seeds is essential and, of course, varies from year to year depending on weather. Some years there is a very limited seed crop. Some agencies can provide bulk native seed that they have had grown from local native seeds.

Final Note: In most cases, it is essential to return in following years to reinforce the work previously done, especially to find out if the trail or site has been reopened by users. If the previous year

Figure 4. Transplants on steep slopes must be properly placed for plant success. (IMAGE COURTESY OF THE SCA)



transplanting or seeding were inappropriate due to season, make an effort to time a return visit better the following year. Not following through on a project can result in completely losing the initial work.

TEACHING TIPS & TECHNIQUES:

Trail Decommissioning: With students, walk the trail to be decommissioned and discuss what the conditions call for. Then give each pair of students a few pin flags and ask them to mark candidate locations for waterbars, check dams, rock placements, borrow pits, etc. Have them describe why they chose their locations. Refine the plan as a group then set each pair to work carrying out various sections of trail decommissioning.

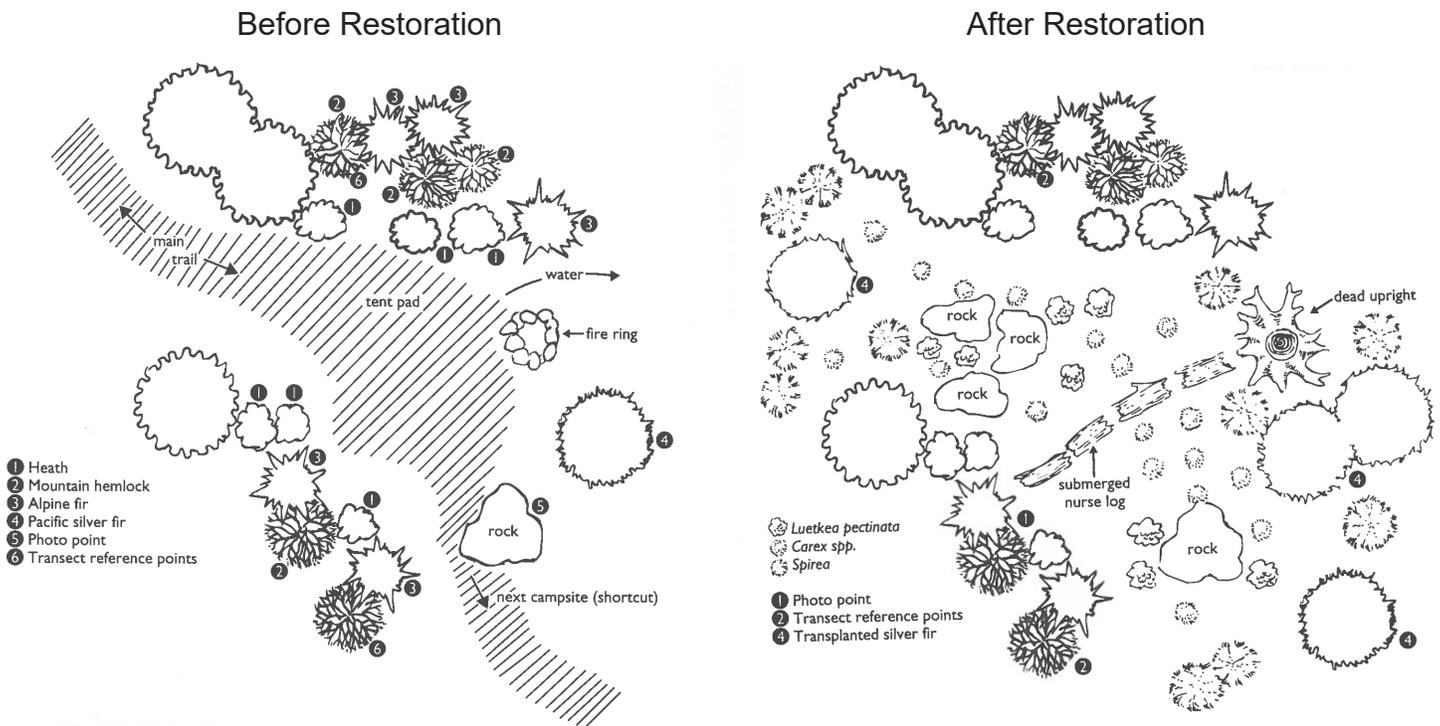
Supervise closely to be sure that rocks and logs are large enough and the rocks of appropriate shapes. Encourage students to find and flag a few candidate rocks and have an instructor evaluate them before they are transported to the trail. It is essential that students use rocks and logs of sufficient size. Ask students to redo their work if it is unsatisfactory; though try to catch it early to minimize frustration.

Rock Shopping: Look uphill or along the sidehill -- The main thing is that rocks need to be big and irregularly shaped, and it often takes patience and persistence to find and transport the right ones.

Rock and drainage work, of course, are not everyone's cup of tea. If someone in your group has no aptitude or interest in such heavy work, assign them to collecting other needed material. Especially in restoration, there are many different jobs -- the key is to find the right job for each person.

Site Restoration: Walk the site with the class to discuss the relevant issues. Then give each team of two a clipboard and supplies to prepare a site restoration plan for their assigned area. Some may want to prepare a detailed plan on paper first, while others may prefer simply to use pin flags. Discuss how drawing a before and after site plan with photos is essential if it is important to document the work completed and monitor the success of the project. Detailed site plans can help evaluate the success of different species of plant survival.

Figure 5. Detailed before and after drawings of restoration sites (along with photos) allow monitoring success of the project and survival of specific species of transplants. (IMAGE COURTESY OF THE SCA)



Have each group present their plans to everyone and solicit suggestions for improvement. Then set them to work on their projects.

 **Trail Eyes:** Seeing where a rock placement or transplant is needed to create a natural look is an acquired and essential art. Hands-on practice with guidance is the best way to develop this skill for “Zen and the Art of Wilderness Gardening”. The best advice is simply to strive to match the restored site to look just like the surrounding natural habitat.

 **Safety Awareness:** Working with large rocks, logs, and transplants can cause strain on knees and backs. Be sure everyone works within their limits and helps one another with heavy work. Swinging tools to scarify compacted soil can throw dirt & rock shards into eyes. Require full PPE during heavy work and, of course, demonstrate the proper stance and technique for each of the tools and especially rock moving to minimize body strain. Emphasize the importance of doing everything slowly and carefully with rock, to avoid injuries.

 **Tool Care:** Take extra care that any equipment you use for moving large rocks is in good shape to ensure that they will not fail.

 **Rockbars & Moving Rock:** Demonstrate safe excavation and moving large rocks. If rocks are being skidded or carefully rolled down a steep hill, make sure the area below is cleared of people. Trail workers have been killed by runaway rocks. Remember, if a rock gets away, SHOUT “rock!” ASAP so all can hear.

Demonstrate proper use of a rock stretcher, boulder sling, or Austin rock sling, if you have one. At the very least let them know such things exist and where they can buy them. Trail Services, Inc. sells nice boulder slings www.trailservices.com. A wheel barrow, of course, is an option outside of Wilderness areas, if not too far from the trailhead.

 **Quality Work:** Stress the importance of handling transplants carefully. If improperly planted, survival rates will be greatly reduced and the effort (and plant) wasted.

TRAIL FUN

For a fun wrap-up do a fast-paced “Jeopardy”-style quiz based on the KEY CONCEPTS.

REFERENCES

Lightly on the Land: The SCA Trail Building and Maintenance Manual. 2005. Robert Birkby. The Student Conservation Association and Mountaineers Books. See Chapter 17: “Environmental Restoration” pp. 253-277, and Chapter 18: “Arid Lands Restoration”, pp. 279-290. Preview sections of this book at <http://books.google.com/books?id=xD6ThtJNgLkC&printsec=frontcover&dq=Lightly+on+the+Land#>

OSI Trail Skill Series. Outdoor Stewardship Institute, a program of Volunteers for Outdoor Colorado. 2009. VOC, www.voc.org in cooperation with Wildland Restoration Volunteers, www.wlrv.org, has developed excellent materials about trail closure, revegetation, and wildland restoration.

Trail Construction and Maintenance Notebook. 2007. Woody Hesselbarth. USDA Forest Service. This can be viewed in entirety at <http://www.fhwa.dot.gov/environment/fspubs/07232806/index.htm> See especially section “Reclaiming Trails” and “Check Dams”, pp. 135-140. A free copy can be ordered at: <http://www.fhwa.dot.gov/environment/rectrails/trailpub.htm>



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STUDENT SKILL OUTCOMES:

- Understanding how to stop erosion on old trails.
- Restoring old trails back to nature.
- Safe transport and natural burial of large rocks.
- Proper site closure and transplanting techniques.

KEY TERMS:

Wildland Restoration: the conversion of degraded backcountry trails and landscapes to more natural conditions through a series of tasks, including: scarification, planting rocks, seeding, and transplanting.

Trail Decommissioning: the intentional conversion of a trail that is no longer needed back to nature through a series of wildland restoration tasks.

Abandoned Trail: a trail no longer in use, often eroded for lack of maintenance. May be user-trail or an official system trail that never received proper trail decommissioning.

User Trail: (aka renegade, social, bootleg, non-system, or informal trail); a trail created by the feet of users without proper design, construction, or maintenance. Some present few problems, while others are prone to erosion and damage habitat. A common problem is the development of a net of many such trails in an area, leading to user confusion and excessive impact on plants. In contrast to a **system trail.**

System Trail: a formal trail with an official name and number, managed by the agency responsible for the land through which the trail passes. Maintenance is scheduled and carried out by professional trail crew or trained volunteers who have officially adopted the trail. In contrast to a user trail.

Renegade Trail: (aka illegal trail) a trail built by individuals and groups without the permission or guidance of professional land managers. Such trails often are poorly designed, constructed, and maintained, leading to erosion and damage to wildlife, plant, and archeological resources.

Scarify: (aka tilling or human-powered rototilling) in a wildland restoration project, the loosening of compacted soil to allow intentional and natural seeding to occur.

Planted Rock: (aka iceberg or dummy rocks, gargoyles) a large irregular-shaped rock relocated and partially buried in a wildland restoration project to discourage further use of the area and/or reduce erosion.

Rock Shopping: the thorough search for quality rocks for construction for walls, water bars, check dams, etc. Generally the search is uphill or across the side slope, for ease of transport, since quality rocks will be larger than one person can carry.

Fall Line: the shortest and steepest way down a hill, as indicated by a clinometer, water, or a rolling ball. Trails that follow the fall line are likely to erode badly and are impossible to drain. Ideally they should be relocated to follow the side slope at a grade less than 10% or have check dams installed to slow further erosion.

Check Dam: (aka check step) a log or row of rocks perpendicular to a gullied fall line trail, embedded in both banks, to slow the rate of water erosion. If several are constructed on a horse trail, they should be 6', 12, 18', or 24' apart to approximately match the gait of a horse.

Transplanting: in wildland restoration refers to digging up plants for replanting in a nearby impacted area such as a closed campsite or trail. May also refer to planting potted native plants from a nursery, though this really us "planting."

Nurse Log: a partially rotted log on which native plants have started to grow. Sometimes relocated as part of a wildland restoration project. Nurse logs are common only in moist forests.

Borrow Pit: a hole excavated to obtain mineral soil for a trail project. Ideally it is in an inconspicuous location and filled in with natural debris when no longer being used.

KEY CONCEPTS:

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- 4) More on Transplanting and Seeds:
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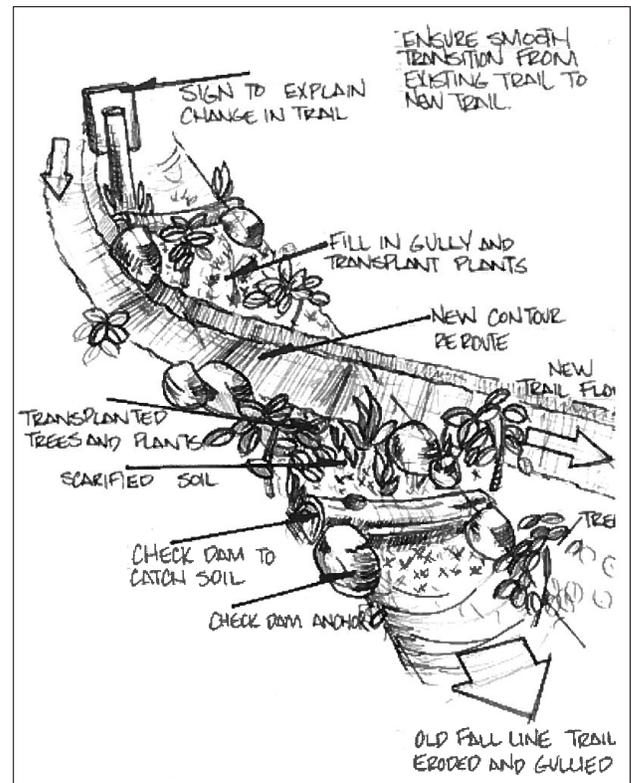


Figure 2. Plan for decommissioning an abandoned trail. (IMAGE COURTESY OF IMBA)

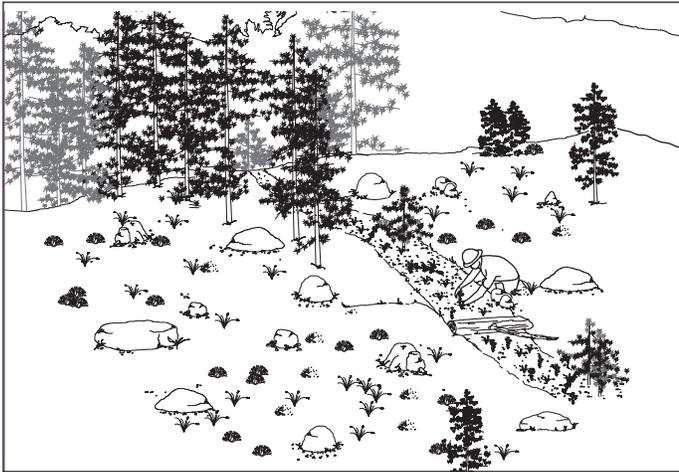


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Figure 4. Transplants on steep slopes must be properly placed for plant success. (IMAGE COURTESY OF THE SCA)

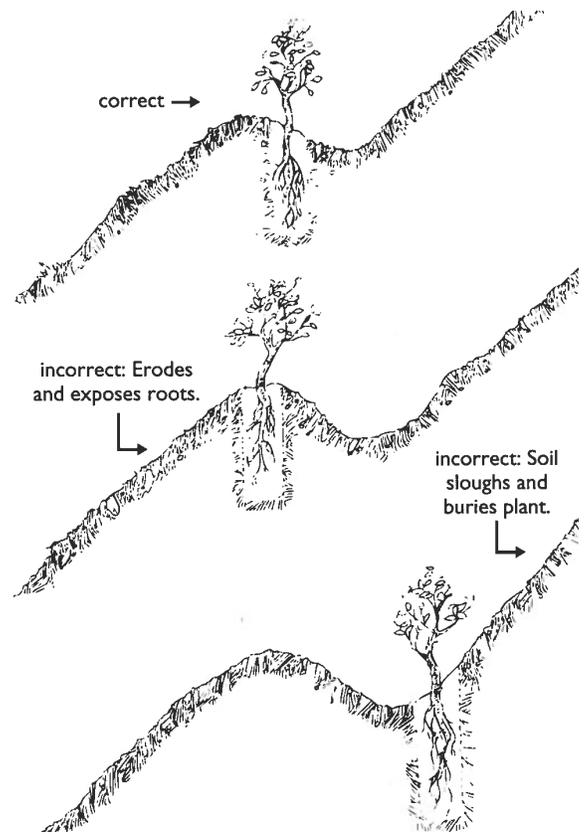
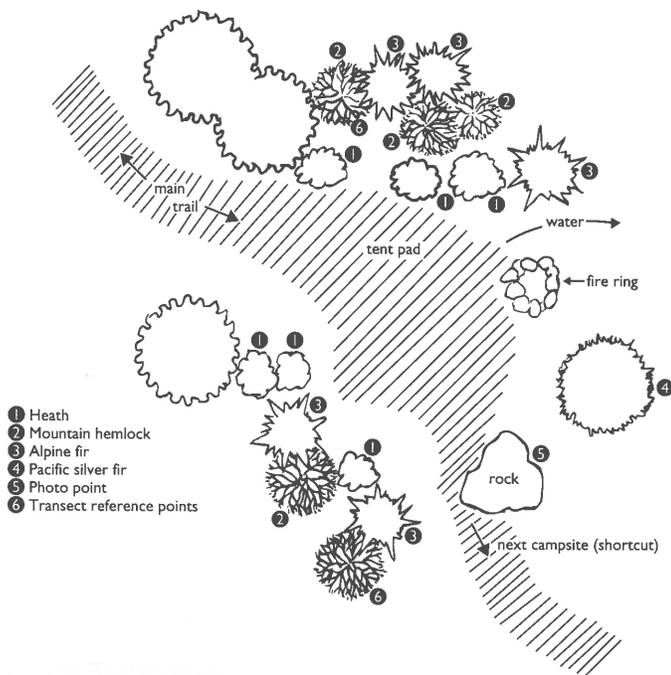


Figure 5. Detailed before and after drawings of restoration sites (along with photos) allow monitoring success of the project and survival of specific species of transplants. (IMAGE COURTESY OF THE SCA)

Before Restoration



After Restoration

