



PCTA Trail Skills College Curriculum Field Reference



Course 100. Intro to Trail Maintenance

STUDENT SKILL OUTCOMES:

- A basic understanding of hillside hydrology and how trails work.
- Understanding of the importance of “Safety Awareness” in trail work and what is required of them to be safe volunteers, especially PPE.
- A taste of basic principles for trail brushing and hand sawing.
- A taste of what it takes to identify and clean drain dips and waterbars effectively.
- An introduction to “Trail Eyes”.

KEY TERMS:

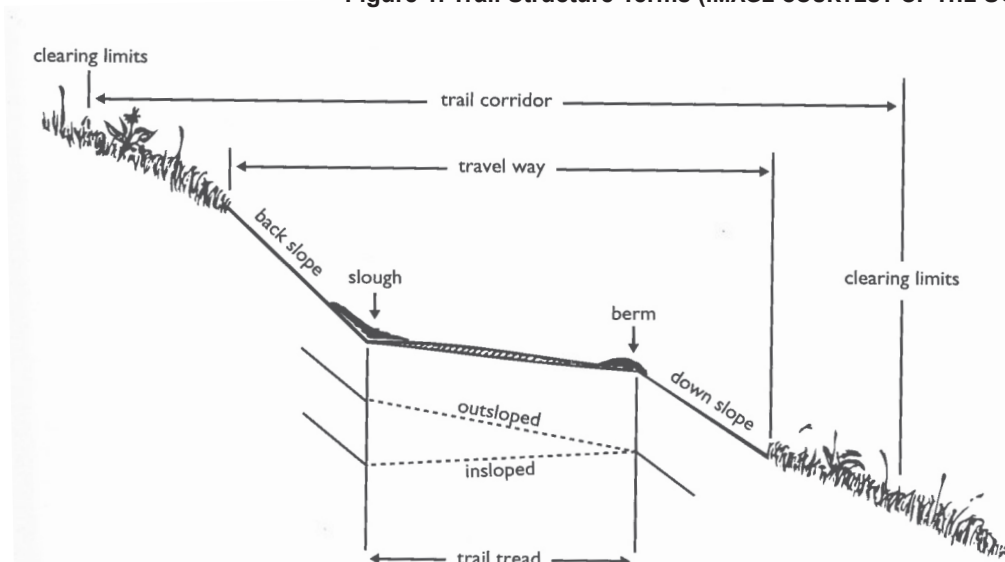
Use a copy of PCTA’s “Trail Terminology”

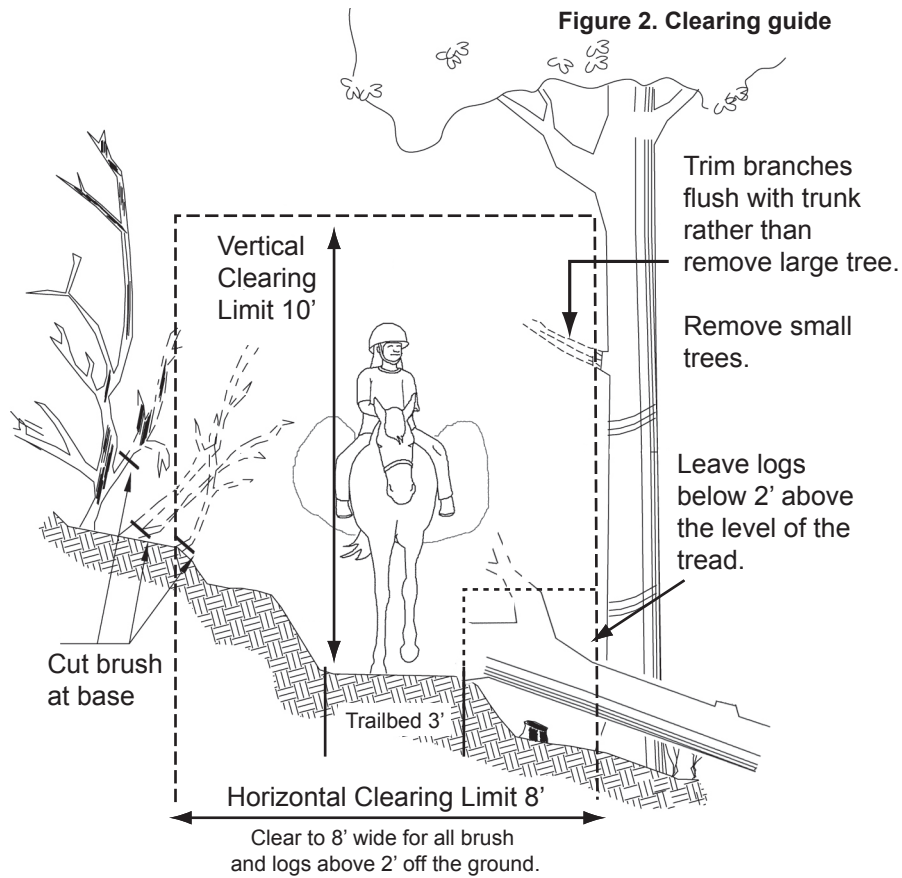
KEY CONCEPTS:

- 1) Where Do Trails Come From, and How Do They Work:
 - Concept of trail design and management
 - Hillside hydrology and water erosion on trails
 - Ideal tread surface and drainage structures
- 2) Safety Awareness, Documents, and Concerns:
 - Personal Protective Equipment (PPE), Job Hazard Analysis (JHA), Tailgate Safety Session (TSS), Emergency Action Plan (EAP)
 - Ten essentials

- Go/No go
- 3) Brushing and Hand Saw Clearing:
 - Proper/ improper tool care and use
 - Lopper, hand saw, pole saw, Pulaski
 - Develop “Trail Eyes,” visualize trail corridor large enough for delivery truck to pass through
 - Standard clearing limits and basic brushing techniques
 - Cut brush flush with ground, tree trunk, limb junction
 - Recognize and safely remove spring poles
 - Log out small blow down and limb larger blow down
 - 4) Cleaning Drain Dips and Waterbars:
 - Proper/improper tool care and use
 - Shovel, McLeod, adze hoe, Rheinhard, Pulaski
 - Develop “Trail Eyes,” suggest hiking in rain to better understand water on trails
 - Clear dip and outfall ditch of any plants, roots, debris
 - Reestablish the apron, pack soil well
 - 20 – 30’ in length, 15% or greater out-slope to help self clean
 - If present, keep inside ditch clear of plants, roots, debris
 - 5) Report Work Promptly

Figure 1. Trail Structure Terms (IMAGE COURTESY OF THE SCA)





** These are general trail-wide clearing guidelines.
Please work with your local land manager to determine
if different guidelines are used in your local area.*

Figure 3. Saw branches almost flush with the trunk to avoid leaving "hat racks." (IMAGE COURTESY OF THE SCA)

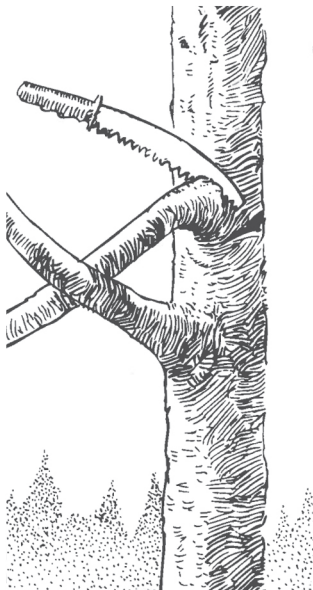


Figure 4. Look out for spring poles (trees or limbs that are held down by other trees.) Spring poles can release with great force, causing serious injuries. Make a series of small cuts on the inside of the bend when severing a spring pole. (IMAGE COURTESY OF THE USFS)

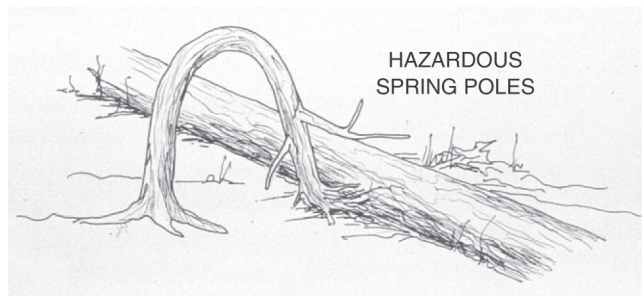
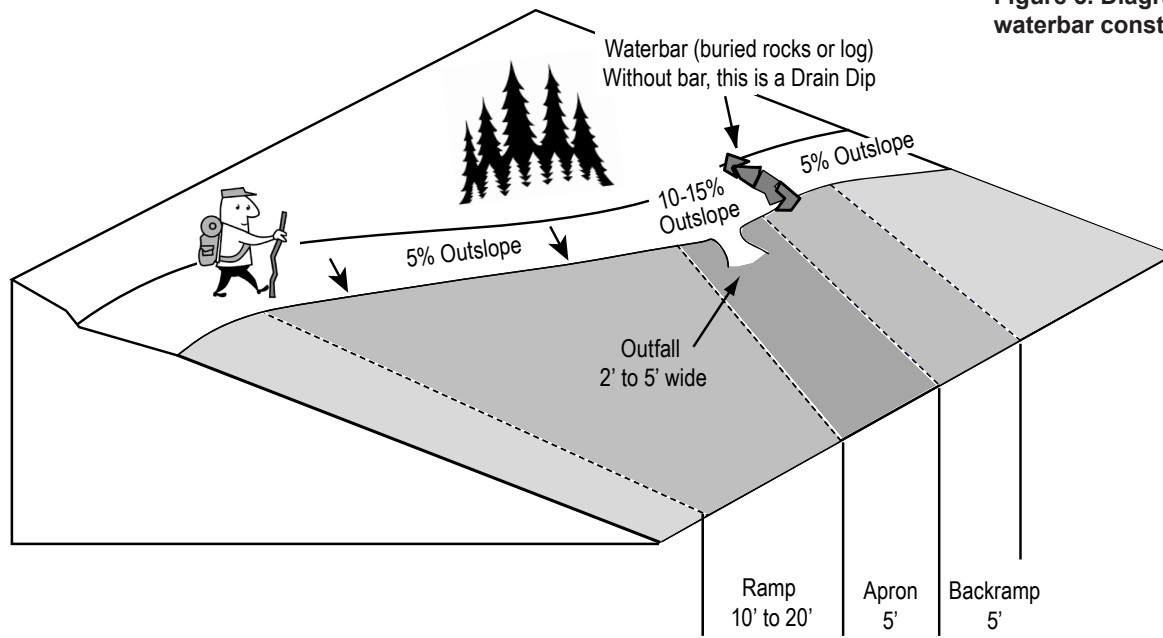


Figure 5. Diagram of modern waterbar construction





PCTA Trail Skills College Field Reference



TRAIL TERMINOLOGY

As with any pursuit, trail work has its own vocabulary which can vary from region to region, organization to organization, and even person to person. Defined here are the standard trail terms the PCTA prefers to use, in hopes of increasing understanding among volunteers and staff. Similar terms used elsewhere are referred to as “aka”=also known as.

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.

Agency Partners: because the PCT passes through lands managed by various government agencies, it has many partners. Each agency has differing goals, with which PCTA volunteers need to become familiar before setting to work. The following are some PCTA agency partners:

The **Forest Service** is a federal agency within the U.S. Dept. of Agriculture. It is PCTA's lead partner because most of the PCT lies on Forest Service land, spread among dozens of different National Forests. As the lead partner, the Forest Service has staff dedicated to the management of the PCT. The Forest Service is multiple use agency, meaning it manages its land for a wide range of purposes including logging, watershed health, recreation, cultural resources, and **Wilderness**. PCTA stewards and crew leaders work regularly with trail managers from the various Districts that make up each National Forest.

Bureau of Land Management (generally referred to as “BLM”) is a federal agency within the U.S. Department of Interior. BLM manages public lands for multiple purposes. In most western states these are arid grasslands, but in Oregon include forested lands.

National Park Service is a federal agency within the U.S. Department of Interior. The Park Service manages National Parks, most National Monuments, and other important sites designated by Congress to protect their ecological, geological, historical, and scenic wonders for the enjoyment of people.

State Parks are set aside by state governments for varied purposes, though primarily recreation. They are managed by

each state's respective department of parks. Regulations often vary from park to park, depending on the purposes for which the park was created. The PCT goes through five California State Park lands.

Apron: (aka knick, swale, dip) the portion of a drain dip or modern waterbar that is excavated out of the trail tread to divert water off the trail. It consists of a descending ramp and rising back-ramp. The exact shape of the apron, though always broad and gradual, varies according to two different schools of thought. Some make it wider at the **inside edge** of the trail leading to a narrower **outfall ditch** and others make it wider at the **outside edge** without an outfall ditch.

Armored Swale: (aka armored grade dip, armored dip, stone dip) a natural channel or excavated depression in a trail that has been hardened with rock or (rarely) wood. See also **swale** and **rock armoring**.

Backramp: (aka ramp) the descending and ascending facets of a drain dip or waterbar. Always well outsloped to shed water efficiently. Combined, they comprise the drain dip apron.

Back Slope: the portion of an excavated trail that connects the tread to the natural slope up hill.

Batter: the inward slope of the outside face of a rock wall. Expressed as a ratio of rise to run, as in 3:1, meaning 3 inches or feet of rise to 1 inch or feet of run. Such batter helps stabilize a rock wall.

Bear Boxes: metal or thick plastic resin containers with bear-resistant closures, often designed as panniers for pack stock.

Bear Hang: a method of suspending food off of the ground, to make it more difficult for a bear to obtain the food.

Bench: what is left after excavation of a hillside to create a back slope and trail tread. Full bench

trail utilizes no fill. Partial bench uses some excavated tread and some fill.

Berm: the mound of soil that develops at the outside of tread. Berm disrupts tread out-slope and prevents water from leaving the tread to the down-slope.

Berm Removal: (aka outsloping and daylighting) refers to excavating berm to restore out-slope to the tread, so it again sheds water.

Bind: forces that cause compression in a log, thus pinching the saw blade while **bucking** it.

Bite/Bitter End: Bite is middle of a rope. Bitter end is the untied tail end.

Blow Down: (aka wind fall) any trees fallen across a trail, though usually the result of high winds, most commonly in the winter storm season.

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.

Brushing: removal of brush, saplings, and tree limbs to open the trail corridor to proper clearing limits for a given trail.

Bucking: cutting a log into sections, perpendicular to its length. In trail work, bucking a log is usually done to remove a section to clear **blow down**.

Cairn: (aka ducks or rock ducks) a carefully stacked 3' cone of quality rocks (similar to a rock wall) built only in open rocky areas where the tread is impossible to make distinct. It may have a post built into it to extend its height if late lying snow regularly obscures the trail. "Rock ducks", small piles of rocks, may be used for a short time to clarify new tread, but should be removed as soon as the tread becomes clear. In general and especially in Wilderness, rock ducks are inappropriate and should be removed whenever found.

Cap Rock: the top tier of large stones on a constructed rock wall. Must be large and stable enough to withstand horse traffic. An irregular top is ideal to encourage trail users to stay away from the edge.

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.

Clearing Limits: (aka clearing specifications, trail specs) exactly how wide and how high to cut tree limbs, shrubs, blow down and tree saplings to open the trail corridor for users. For the PCT, from the ground to 24" high, cut an opening 3' wide. From 24" to 10' cut an opening 8' wide. This large corridor allows from some vegetation regrowth before **packstock** are obstructed. Other kinds of trails have different specifications.

Control Points: specific locations on a landscape that a newly designed trail must pass through (positive control points) or avoid (negative control points). Examples of positive control points include low mountain passes, the best trailhead location, and ideal bridge locations. Negative control points include areas of highly erodable soils, avalanche chutes, and boulder fields, among others.

Copper Napthenate: a chemical solution, in 2010, commonly available in hardware stores used to hand treat wood to reduce rot and thus extend the life of wood in contact with soil. Over the years, the chemicals used for wood preservation have changed to reduce potential harmful effects on humans and other organisms. Thus, copper napthenate may be replaced at some point. Whatever chemical treatment is used, eye and skin protection should be provided and the solution stored, carried, and utilized with caution.

Cross Slope: the slope or **grade** of the trail tread perpendicular to the direction of travel. May be out-sloped (most common) or in-sloped, meaning tilted toward the **outside edge** or **inside edge** of the trail, respectively. An intentionally in-sloped trail sometimes has an **inside ditch**.

Culvert: a closed passage under a trail (or road) for water. Can be made using metal or plastic pipe, or constructed of rock, lumber, or logs.

Cupped Tread: trail tread that is dished out by users feet loosening the soil and then water (and/or wind) carrying the soil away. Such tread holds water on the trail leading to cupping erosion on grades above a few percent.

Cutters: the alternating offset teeth of a crosscut

saw that scribe the wood to be chiseled out by the slightly shorter **rakers**.

Decommissioning: (aka obliteration, closure, reclamation, rehabilitation) the restoration of closed trails, whether official, user, or renegade, to a relatively natural condition that can not be used again, will not erode and quickly re-grows native vegetation. (www.imba.com/resources/trail_building/reclaiming_trail.html)

Design Parameters: Specific guidelines for the design and construction of trails that are based on the **intended users**, **trail class** and **difficulty level** of the trail. (www.fs.fed.us/recreation/Chapter_20.pdf especially pages 16-19.)

Difficulty Level: the level of challenge experienced by trail users based on many factors, including grades, elevation gain, and tread roughness, among others. Easiest, More Difficult, and Most Difficult are the most commonly used terms. The US Forest Service has charts that guide the selection of an official difficulty level for a trail.

Down Slope: the natural slope of the land downhill from a trail's **outside edge**.

Drain Dip: (aka dip, drainage dip, earthen waterbar, and rolling grade dip; a close cousin but different from a grade dip, Coweeta dip, knick, swale and bleeder.) A broad, gradual excavated trail feature to shed water off the trail at regular intervals to prevent tread erosion by interrupting the normal grade of a section of trail. Soil excavated is mounded and compacted down the trail from the dip. Ideally 15-30' long and 8-12" deep. To withstand horse use, drain dips should only be built in very durable soil with trail grades below 10-12%, ideally in the late fall when the soil is moist and just before winter, allowing snow to compact the dip before use in the spring.

Drainage Crossing: (aka cross-drain) any of several types of trail structures that get flowing water across a trail tread without erosion. Common types include: **French drains**, **step-down drains**, **armored swales**, and **culverts**. In a sense, bridges are drainage crossings as well.

Drainage Structures: the general term for all the different types of constructed trail features intended to divert water away the trail. Examples include waterbars, culverts, and drain dips.

Dutch Oven: a thick-walled (usually cast iron)

cooking pot with a tight fitting lid.

Emergency Action Plan (EAP): a PCTA form to be filled out by a crew leader and reviewed with the crew before leaving the trailhead. Designates roles for who will be the situation manager, first aid leader, and communications leader.

Erosion: the transport of soil by water, wind, or gravity, usually in a manner that degrades the preexisting soil condition.

Fall Line: the shortest and steepest way down a hill, indicated by a clinometer 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.

Feeder Trail: a trail that is commonly used to connect a trailhead on a road to the PCT.

Ford: a wet crossing of a flowing water, ideally at a wide shallow place with a firm base. May be only for horses, with stepping stones or a small bridge for hikers, or in Wilderness for hikers and horses.

Forest Service Trails Handbook: the official document guiding Forest Service trail planning, design, construction, and management. One of many handbooks guiding all types of Forest Service operations. http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?2309.18

Foundation Rock: very large base stones of a constructed rock wall, all set on a solid insloped base. Flat on top and insloped for next tier of rocks. Ideally the lowest one is held in place by bedrock a solid boulder.

French Drain: (aka rock drain) an excavated cross drain that has been filled with rocks or gravel to the level of the trail tread, with enough open space among the rocks to redirect surface and ground water across the trail. Used to drain muddy areas. May be wrapped in **geotextile** and/or underlain with perforated drain pipe.

Geotextile: synthetic fabric used to contain drainage rock and exclude smaller sediment from penetrating the rock. Increasingly specified by engineers for trailwork in wet areas, it is still somewhat experimental with sometimes unsatisfactory results (some would say disastrous, because removing the fabric is

extremely difficult. Not appropriate for use in **Wilderness** areas.

Go/No Go: analysis to determine if trail workers should proceed with a task or walk away to insure their safety. Crew leaders sometimes exercise such judgement for a group, but it is essential that every trail worker develop these critical thinking skills for times when they work on their own. Such analysis evaluates all the hazards present and balances them against the skills they have. *For a decision to proceed, a trail worker should be able to predict with a high confidence level, exactly what will happen during the task (such as which way logs will move in a series of cuts in a pile up). If they are unable to predict the outcome with confidence they should walk away.*

The most important thing every trail worker needs to know is that it is totally OK, and they show the very best judgement, when they walk away from danger without completing a task. Of course, it is essential to report the need for a more skilled crew to complete the hazardous work.

GORP: Traditionally this stands for “Good Old Raisins and Peanuts”, but it has come to represent just about any type of trail mix.

wGrade: the angle or slope of any surface, though here most concerned with the grade trails climb, as well as that of tread out-slope, back-slope, and also of the natural hillside fall line or side slope. In trail work, grade is expressed as a percentage (%), determined by dividing rise (vertical) over run (horizontal). Most commonly in trail work grades are measured with an instrument called a clinometer. Note that clinometers have both a percent scale (usually on the right) and degree scale, which are not the same.

Grade Dip: (aka swale) a type of **grade reversal** in which a short section of new trail is designed to shed water by descending briefly into and then ascending out of a small topographical draw. If hardened with rock it is called an **armored swale**.]

Grade Reversal: regular ups and downs designed into a new trail alignment is the best way (in combination with outslope) to shed water from a new trail (www.imba.com/resources/trail_building/up_down.html). Such ups and downs can be added to an existing trail with great labor by constructing waterbars and drain dips (aka rolling grade dip).

Guide Features: (aka dummy rocks/logs, gargoyles) large embedded rocks or logs set just at the edge of the desired tread width to keep users on and in the middle of the trail. Without such features some trail users will walk above drainage features causing a new, widened tread or on the outside, collapsing the edge initiating **tread creep**.

Guide Rocks: (aka dummy or corral rocks, gargoyles, planted rock) large rocks buried solidly on the outside edge of tread on a steep side slope can keep horses to the middle of the tread, preventing them from collapsing the outside edge initiating **tread creep**.

Guide Signs: term used by Forest Service Sign Manual to describe trailhead and junction signs that include trail name and/or number, and if outside **Wilderness**, trail destinations and mileages.

Gullied Tread: an extreme variant of **cupped tread** that has eroded more than 12” deep. Severe gullying can exceed 36” and requires major **trail reconstruction**.

Hand-washing Station: A dedicated mechanism for washing hands with soap and water in basecamp.

High Line: Rope strung tight between trees. Packstock are then tied to the highline instead of being tied to trees, thus avoiding damage to trees

Hillside Hydrology: generally describes how water from rain, melting snow, and seeps travels down natural slopes. Here we are especially concerned with how such water interacts with trails. Troy Parker uses the additional term, “tread watersheds”, to describe the subsections of a hillside that shed water to a particular piece of trail between two drainage structures.

Inside Ditch: (aka wing ditch) a ditch running along the inside edge of an insloped section of trail tread. It carries water from seeps in the back slope to a drainage structure (such as a culvert) to carry it across and off the trail.

Inside Edge: (aka heel) the point where the tread meets the bottom of the **back slope**.

Intended Users: the specific users for which a given trail is designed, constructed, and maintained such as horse riders, hikers,

bicyclists, OHVs or disabled persons. Trails for different intended users are built to different **design parameters** (aka design specifications) and are further driven by the intended **trail class** and **difficulty level** of the trail.

Job Hazard Analysis (JHA): a formal Forest Service document written by a crew leader and signed annually by a District Ranger or his designee. It describes the hazards of a particular trail project and how to reduce them. A crew leader reviews this document with their crew before beginning work and each crew member signs it.

Kerf: the opening in a log cut by a saw. A wedge is often placed behind the saw to prevent the kerf from closing and pinching the blade.

Lead Rope: A rope, usually attached to a halter, used to lead an animal

Leave No Trace (LNT): Ethics overarching everything trail crews do on the trail and in camp. Leave No Trace is built on seven core principles that are used to communicate the best available minimum impact guidance for enjoying the outdoors responsibly. The Seven Principles of Leave No Trace were developed to help educate and guide recreationists in sustainable minimum impact practices that mitigate or avoid recreation-related impacts. These Principles are the most robust and widely utilized minimum impact outdoor practices. Although Leave No Trace has its roots in backcountry and wilderness, the practices have been adapted so that they can be applied anywhere - from the backcountry, to local parks, to your backyard - and for any recreational activity. Each Principle covers a specific topic and provides detailed information for minimizing impacts.

The Seven LNT Principles:

- Plan Ahead and Prepare
- Travel and Camp on Durable Surfaces
- Dispose of Waste Properly
- Leave What You Find
- Minimize Campfire Impacts
- Respect Wildlife
- Be Considerate of Other Visitors

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Level of Difficulty: a label applied by agencies and guidebooks to trails and trail bridges to guide management and decisions by users whether to use a given facility. Choices of Easiest, More Difficult, and Most Difficult are based on a variety

of criteria including steepness of grade and tread width and smoothness, among others.

Log Out: trail work removing blow down; usually in the spring to open the trail for high use season. In **Wilderness** areas the work is done with hand tools such as crosscut saws; while elsewhere it is usually done with chain saws.

Log Waterbar (see **waterbar**)

Managed Use: the primary trail users for which a trail is designed, constructed and maintained. Thus a trail that allows multiple different user groups is usually managed for the one that requires the most rigorous **design parameters**. For example, the managed use of a trail that allows horses, hikers and bikes is usually managed for horses because they need a wider more durable tread. Sometimes trail politics override such logic, such as when hikers or bike volunteers build a trail that is open to horses, they might insist on hiker trail design specifications.

Manty: Gear bundled and tied in a canvas tarp then tied on the side of a packsaddle.

Maximum Sustainable Grade: Each trail's tendency to erode will be influenced by many factors, including Use type and level; Season of use; Precipitation volume and intensity; Soil type and durability. The more prone to erosion the tread is, the more gentle its maximum grade should be. See also **grade**.

Mechanical Advantage: in essence, the multiplication of ones strength by using simple machines such as levers (rock bars), inclined planes (wedges) and pulleys (blocks & tackle). Most trail tools, such as a pick mattock for example, are combinations of levers (the handle) and wedges (the pick and mattock).

Mineral Soil: dirt than includes little or no organic material, ideal for trail tread and fill. Ideally it is a mix of grain sizes including sand and small gravel so that it drains well. 100% clay is not a good choice.

National Scenic Trail: National scenic trails are trails designated by Congress to provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which they pass.

NEPA: A trail that is to be built or significantly

relocated on any Federal land must follow guidelines of the National Environmental Policy Act to be sure that trail construction and use do minimal damage to fragile ecological, historical, or archeological resources. This involves the analysis by a variety of specialists, including botanists, wildlife and fisheries biologists, and archeologists.

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.

“Old School Drain Dip”: an excavated drainage structure that is too abrupt (short and deep). A modern **drain dip** or **rolling grade dip** is current standard.

“Old School” Waterbars: still seen many places and in some books, these are constructed so that water is deflected by the “bar” of rock or log. Such structures fail more quickly, as water and horse hooves directly undermine and erode the bar.

Outfall Ditch: (aka outwash, outlet or outflow ditch), 24” wide excavation to carry water away from the trail at a drain dip or waterbar. Ends when it is 12” below the trail grade or as far as it needs to go to keep water from returning to the trail.

Outside Edge: (aka critical edge or toe) point where the trail tread drops off to the natural slope of the land, aka **downslope**; often susceptible to collapse especially on steep side slopes. Generally the outside edge should be slightly rounded and include occasional plants and/or naturally buried large rocks to encourage trail users to stay on the middle of the trail.

Out-Sloped Tread: a trail surface that tilts to the downhill side of the trail to shed any water that arrives from above. Trails should be constructed and restored with 8-16% outslope (1-2” of drop per 12” of tread width) so that they will age to hold 5-10%. Less durable soils require greater outslope. On rare occasions tread is in-sloped, shedding water to an **inside ditch** just uphill of the trail, later crossing the trail through a culvert or other drainage structure.

Pack Saddle: Designed just for packing loads.

Packstock: (aka pack animals) animals carrying gear for trail users or workers, loaded with panniers, side boxes or gear lashed to a frame on

the animal. Most common packstock are horses or mules, but can include llamas and even goats. The wide loads, especially when several animals are strung together along a trail, require the wide clearing limits specified for the PCT. Llamas and goats can also be trained to carry a load.

Pack String: a group of packstock tied together in strings of usually up to six animals, often led by a single mounted or walking person. Loaded with panniers, boxes or tools, such a pack string needs every inch of PCT clearing limits, especially on corners.

PCT Plan: the Comprehensive Management Plan developed by the U.S. Forest Service (the lead agency for the PCT) to guide design, construction and management of the Congressionally-designated Pacific Crest National Scenic Trail.

Pannier: Containers that hang off the packsaddle; one on each side. Can be made of canvas, wood or plastic.


Personal Protective Equipment (PPE): standard required safety gear, including hard hat, long pants, long-sleeved shirt, gloves, sturdy leather boots, and eye protection. Some tasks require additional items such as ear plugs and saw chaps for chainsaws.

Planted Rock: (aka iceberg rocks) 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.

Pole Sawing: (aka overhead limbing) using a sharp saw attached to the end of a pole, which is sometimes extendable, to remove tree limbs that extend into the upper portion of the trail corridor.

Pressure-treated Wood (posts & lumber): (aka PT) round logs and dimensional lumber that has been through an industrial process to penetrate the wood with chemicals to prevent rot and thereby extend the useful life of the post. For trail work material rated for “ground contact” must be used. Industry standards claim such materials will last 50 years, whereas most untreated wood lasts only 5-10 years in contact with dirt. Some native materials, such as juniper or locust, can last considerably longer because of naturally occurring chemicals in their fibers. Native wood can also be hand-treated (usually only the portion in the ground) with a preservative such as Copper Naphthenate.

Private Land: some sections of the PCT cross private property over negotiated legal easements.

Quality Work:  the critical commitment to doing trail work that will function well and last a long time, so that it doesn't need to be done again any sooner than necessary. This is a difficult concept to get across, especially when trail workers are tired and uncomfortable in adverse weather. Consider that a hastily completed task will often only last a season, whereas adding an extra hour of effort can allow it to last decades, clearly worth the effort. This calls for patience and persistence to slow down and do a job right the first time. The trail maxim is: "If you're going to do it, do it right."

Rakers: the slightly shorter forward-facing teeth on a crosscut saw that chisel out the chips of wood scribed by the offset **cutters**.

Ramp: (aka backramp) the descending and ascending facets of a drain dip or waterbar. Always well outsloped to shed water efficiently. Combined, they comprise the drain dip apron.

Reassurance Markers: (aka blazes, blazers, diamonds, tags, markers) on the PCT these are 3 1/2", 9", 18" plastic triangles or 5 1/2" wood squares (used in wilderness areas) all with the PCT logo imprinted. They are installed north and south of each side trail junction, and occasionally in unclear locations along the trail. On other trails they may be colored diamonds, notches cut in a tree, or painted stripes.

Re-Cut Tread: (aka tread reconstruction) a specific trail reconstruction technique that re-digs tread, on its existing alignment, that has slipped or lost its **outslope**. If the soil is durable and the trail grade less than 15%, this can be an alternative to installing drainage structures.

Renegade Trail: (aka illegal trail, social trail, way 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.

Reporting: the essential final step of volunteer trail work. Prompt reporting allows PCTA to send out a crew to complete unfinished work and to notify the public on its website which trails are maintained. It also allows the PCTA to calculate the total volunteer work done each year which is

critical to their fund raising efforts. http://pcta.org/help/volunteer/vol_rec.asp

Riprap: (aka scree or junk wall) medium to large angular rocks loosely (or ideally carefully) stacked on an unstable slope to slow erosion. In trail work, riprap may be placed adjacent to steps or check dams on the sides of **gullied tread**, or to stabilize tread **backslope** or downslope. In some locales, riprap instead refers to **rock armoring** of tread.

Right of Way: (aka ROW) the corridor followed by roads and trails across property not owned by the agency responsible for the road or trail. The manager of the trail or road has legal rights and responsibilities for maintaining their facility, but does not own the property. When one ROW crosses another ROW, the authority is ceded to the larger facility. Thus when the PCT crosses a highway, the agency managing the road has the responsibility for any signing and maintenance inside its ROW. Note: ROW usually extends 10-50' beyond the edge of the road; the larger the roadway the further it likely extends.

Rock Armoring: (some places aka riprap) creating a solid dry tread by installing tightly-fitted rocks (preferably large). Various techniques include: flagstone paving, stone pitching, boulder causeway.

Rock Crush: small pieces of angular rock (essentially gravel) created by smashing larger rocks with a sledge. Used for fill around rock placements to stabilize them. Small angular rocks can also be collected if readily available. Round rocks and gravel act as ball bearings and thus are unacceptable for rock work.

Rock Shopping: the thorough search for quality rocks for construction for walls, water bars, checks, 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.

Rock Waterbar (see **Waterbar**)

Rowing Rocks: the lateral swing of a rock bar over a fulcrum to adjust a large rock sideways.

Saddle Pad: Needed under the saddle for animal comfort.

Safety Awareness:  (aka situational awareness) the ever-present focus of every member of a trail crew on hazards that are

present and how best to reduce their threat to health and wellness. Includes understanding and commitment to all PCTA safety requirements and reporting, including proper PPE, EAP, TSS, and JHA forms.

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

Sheet Flow: the passage of rainwater and snow melt down a hillside as a thin layer, causing minimal erosion until it reaches a drainage. Such sheet flow, when it reaches a uniformly outsloped trail, simply crosses the trail and continues down the hillside. If it is interrupted by a flat, cupped, or insloped tread, the water is diverted down the trail and erodes the tread.

Sign Inventory: a comprehensive list of every sign in a given area that provides the details of sign location, message, and material. In the past they were hand written and stored in notebooks. Today they are more likely entered into a computer and include digital photos as well as text. The US Forest Service includes sign inventory as part of its INFRA and TRACS (TRail Assessment Condition Survey) systems.

Situational Awareness: a subset of Safety Awareness that refers to safety concerns specific to crosscut and chain saws. (www.fhwa.dot.gov/environment/fspubs/04232822/page16.htm#sit)

Slipped Tread: the gradual movement of trail tread downhill from its original position, usually by a combination of circumstances including: slough, brush and/or high traffic pushing users to the outside of the trail resulting in gradual collapse of the outside edge. It is more common in soft soils and exacerbated dense tree roots.

Slough: the debris deposited on the inside of tread at the base of the back-slope, primarily delivered by gravity from the back-slope above. Its accumulation causes the tread to narrow, forcing users to the out side of the tread, which can lead to collapse or tread slip.

Soil Types: for trail design purposes, a naming classification based on grain size: loam, sand, clay, gravel, etc., that indicates the durability of the surface.

Spring Pole: a severely bent green sapling tree or branch held by a larger downed tree in such a

way to produce dangerous energy in the sapling that can be released suddenly when cut. Very dangerous, especially because it does not look threatening to the uninitiated.

Step-Over: a log fallen across a trail that is not a priority for log out -- typically less than 10" in diameter lying flat on the ground, at roughly 90 degrees to the trail direction. If blowdown is heavy such step-overs can be **triaged** to a future year, if necessary.

Step-Down Drain: (aka curbed stone channel or open drain) an open drainage structure made of log or rock that allows trail users to either step down into a small stream crossing or simply step over it if small enough.

Stepping Stone: carefully selected and places large stones that allow hikers to safely cross a stream by stepping from one stable surface to the next. Usually in conjunction with a horse ford.

Swale: (aka grade dip) a type of **grade reversal** in which a short section of new trail is designed to shed water by descending briefly into and then ascending out of a small natural topographical draw. If hardened with rock to reduce erosion it is called an **armored swale**. In some cases a swale can be excavated in a trail to shed water, sometimes in association with an **inside ditch**. Such excavation ranges from 12-24" deep over a section of trail 10-20' long.

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**.


Tailgate Safety Session (TSS): A discussion of the hazards about to be encountered and how best to reduce them. Generally held at the beginning of each day before leaving vehicles, though if tasks or circumstances change during the day (such as a thunderstorm approaches or a particularly dangerous task arises), it should be revisited.

Tail Up: Tie the packstock head to tail.

Ten Essentials: items carried in every pack to be prepared for a trail emergency requiring an overnight stay. They are listed variously by different sources, but generally include: first

aid kit, rain gear & extra clothes, food & water, emergency shelter & cord, map & compass, headlamp, sunglasses & sunscreen, fire starter & matches, pocket knife, water purification, whistle.

Tool Can: A deep narrow plastic trash can adapted for use hauling trail tools via pack stock.

Tool Care:  proper use, maintenance, and storage of tools so they are safe, sharp, effective and never lost

Top Pack: Preferably soft gear tied in a bundle and tied on top of packsaddle and panniers.

Topographic Turn: Better than a switchback or climbing turn, because they utilize a feature in the topography to wrap the trail around. Unlike “stacked” switchbacks, they are less detectable, and therefore less prone to cutting and erosion.

Trail Analysis: a complete evaluation of a section of trail to document all the work that needs to be done, including the tools, personnel, and time needed to complete the tasks. PCTA volunteers use out “Trail Work Project Planning” form.

Trail Class: A rating indicating the level of development of a given trail. It is based on many factors including the land through which it passes, the **intended users** for whom it is designed and built, the resulting **design parameters** and its likely level of maintenance. Forest Service Trail Classes are 1 to 5 with 1 being most primitive, such as a faint wilderness trail, and 5 most developed, such as a paved trail. (www.fhwa.dot.gov/environment/fspubs/07232806/page03.htm especially pages 6-10) A trail class is closely related to its **difficulty level**


Trail Clearing: the combination of cutting brush, tree limbs, and fallen logs to clear a trail corridor that meets the clearing limits for a particular trail


Trail Cross-Section: a cutaway view of a trail to show its various parts. From highest to lowest: side (or natural) slope, back slope, inside edge, bench or tread, outside (or critical) edge, and down slope

Trail Corridor: (aka travel corridor or trail prism) best thought of as a tunnel through the woods, it includes all the elements of a trail affected by construction and maintenance workers including the excavated back-slope and tread, and the entire area within the clearing limits.

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

Trail Design: The lay out of where a trail will travel through a landscape from its beginning to end. Ideally, a new trail is carefully designed and then constructed by people who know exactly where and how to make a trail so that it functions well, with the least amount of maintenance necessary. There are many different approaches to trail design, from simple to highly engineered. What's essential is a designer who understands hillside hydrology, soils, who the **intended users** will be, the construction budget, and who will build and maintain the trail (and how much time they will dedicate to the tasks). Trails on Federal and State lands must also be designed to minimize impact to archeological and ecological resources such as petroglyphs and endangered plants & animals. See also **design parameters**, **trail class**, **difficulty level** .

Trail Eyes:  the ability to see how a trail is functioning in the landscape, and most importantly what trail work needs to be done to bring it into good shape. Primarily includes attention to clearing limits and drainage, but also tread condition, hillside hydrology

Trail Fun:  a crew leader's effort to help trail volunteers have a good time during work parties so they will want to return. Depending on the leader, Trail Fun may include lively conversation, story telling, games, singing, or other activities. Requires striking a balance between fun and other important objectives (safety, quality work, tool care). While some volunteers will focus on socializing or enjoyment of the outdoors while they do some work, others will strive to accomplish the most quality work possible. It takes a special touch for a crew leader to balance all the volunteers' diverse needs. Over time, successful trail volunteer programs will develop a dedicated cadre of volunteers who find that doing safe quality trail work is itself fun. Certain leaders are best suited for leading such trail volunteers while other leaders may be better at the more social type of volunteer trail work.

Trailhead Communications Plan: a PCTA document filled out by a crew leader prior to going to the work site, and reviewed with the crew before leaving the trail head.

Trail Realignment: moving a very short section of trail to a more optimal location within or adjacent to the existing trail corridor to remedy issues. Realignments typically don't require the same level of consultation and labor as trail relocations.

Trail Reconstruction: the process of revamping a badly eroded or slipped section of trail using all appropriate means such as re-cutting tread, tread reconstruction, construction of drainage structures, and minor relocations.

Trail Relocation: (aka relo) moving a section of trail to a new corridor, usually because the existing trail is failing badly and unmaintainable. On Federal land, proposed relocations require consultation with the host agency in case environmental analysis is needed to insure that archeological and ecological resources will not be damaged. Because trail relocation includes **decommissioning** the old trail, as well as constructing new trail, it should only be done when **trail reconstruction** is significantly greater effort.

Trail Stewards: PCT volunteers who take responsibility for insuring the proper maintenance of a section of the PCT, or a **feeder trail**. Such stewards monitor the condition of the trail and either arrange for others to do the needed work or do it themselves.

Trail Triage: when there is more work to do than available labor (almost always), we must make choices about which work to do now and what to postpone. Usually problems that threaten the safety of users or are causing serious erosion are top priority. This term derives from battlefields where medics must decide which of multiple wounded soldiers to attend to first, and which to ignore.

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".

Tread: the surface of a trail, on which users walk or ride.

Tread Creep: (aka slipped tread) the gradual movement of trail tread downhill from its original position, usually by a combination of circumstances including: slough, brush &/or high traffic pushing users to the outside of the trail

resulting in gradual collapse of the outside edge. It is more common in soft soils and exacerbated by dense tree roots.

Tread Hardening: use of gravel, cement, bentonite, rock cobbles, or other techniques to reduce tread erosion where drainage is impossible, a smooth surface is needed, (such as for handicap accessible trails) or over-steep trails receive heavy use.

Tread Reconstruction: re-cutting existing tread that has slipped or lost its water shedding outslope. If the soil is durable and the trail grade less than 15%, this can be an alternative to installing drainage structures.

Turnpike: (aka raised tread) a rock or log-edged section of trail, constructed in successive layers of large fitted rock, smaller rock, then mineral soil, to lift the tread out of a wet area. If on a side slope a drainage crossing of some sort needs to be part of the turnpike.

Under-bucking: **bucking** a log by cutting up from underneath, rather than the top down, to prevent top bind.

User Trail: (aka social trail, bootleg trail, non-system, or informal trails) 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**. See also, **renegade trail**.

Washout: (aka blowout) extreme erosion that occurs when a flash flood on a small or intermittent stream washes away a section of trail.

Waterbar (Rock or Log): (aka rock or log reinforced drain dip). As constructed by the PCTA, this trail drainage structure includes a drain dip reinforced by a peeled log or row of large rocks. The reinforcing log or rocks are buried securely at about a 45 degree angle across the tread and 36" down the trail from the bottom of the dip—thus water leaves the trail well before it reaches the log or rocks. Waterbars are generally required on trail grades in excess of 15%, rather than drain dips. See also, **"Old School Waterbar"**.

Watershed: (aka hydrological system) the

ridge-top to valley bottom landscape from which all the water of a stream originates. Such water originates as rain and melting snow, both running over the land and as ground water. Climate, geology, soils, and vegetation of a given watershed all influence running water including seeps, springs, and streams. Trail workers must understand the particular watershed that leads to a drainage crossing for which a structure is contemplated. Any structure must be designed to accommodate fluctuations in water levels, especially high water.

Widow Makers: overhead hazards associated with trees that could fall on a trail worker. They include large broken branches precariously hung up high in trees, dead limbs or tops ready to break off, leaning dead trees. When trail crews stop to work, rest, or camp they should immediately look up to assess any danger of widow makers—of course, named for the many woods workers who have been killed by such falling hazards.

Wilderness: with a capital “W” refers to named Federal lands designated by the U.S. Congress under the Wilderness Act of 1964. They may be designated within any category of Federal public land, such as Forest Service, BLM, or Park Service, though management regulations

may vary slightly among them. Much of the PCT passes through such Wilderness areas. Most important to trail workers, motorized tools and mechanized transport such as chainsaws, wheel barrows, and bicycles are prohibited, unless a waiver is obtained from land managers (generally not easily granted). Signs in Wilderness intentionally provide less information, to require more skill of their visitors. Group sizes, including volunteer trail crews, are usually limited to no more than 12 people. Heavily used areas such as alpine lakes may have additional regulations such as no campfires. More can be read about the topic of “Minimum Requirements” and “Minimum Tool Analysis” in Wilderness at <http://www.wilderness.net/MRDG/>.

Small “w” wilderness generally refers to any remote area largely undisturbed by motorized vehicles. If not designated by Congress, such areas usually do not limit group sizes or use of mechanized equipment, though may have some interim management restrictions to protect the potential for future designation as Wilderness.

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**.