



# OSI GUIDE TO INDEPENDENT STEWARDSHIP FOR TRAILS

PRODUCED BY

Outdoor Stewardship Institute

Outdoor Stewardship Institute (OSI) is a program of  
Volunteers for Outdoor Colorado.

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# 1: About OSI Guide to Independent Stewardship for Trails

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# 1.1 Acknowledgements

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OSI would like to acknowledge the people and organizations that volunteered their time and resources to authoring, editing, producing and piloting these training materials. The majority of this information is based on pre-existing sources, including the OSI Guide to Crew Leadership for Trails and other resources provided by Volunteers for Outdoor Colorado, Roaring Fork Outdoor Volunteers, USDA Forest Service, and IMBA.

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### *Illustration and Photography Credits*

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## 1.2 Purpose

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This training was developed to teach the fundamentals of basic trail maintenance to volunteers working independently in groups of three or less people. Local, state and federal land management agencies will benefit from this training because participants will gain skills that allow them to perform needed routine trail maintenance with minimal supervision and coordination. Land management agencies will therefore know what to expect when individuals and groups trained with these materials perform such routine trail maintenance. Volunteer stewardship groups and organizations can benefit because this training is less time consuming than a standard Crew Leader training, it strengthens the base of their training program, and it opens up new volunteer opportunities that volunteers can take advantage of on a flexible time basis.

When the course concludes, trainees will know how to identify and perform basic trail corridor, trail tread and drainage structure maintenance, as well as how to recognize and report on other more complex maintenance needs that are beyond the intended scope of this training. Trainees will also be taught basic safety and risk assessment and how to appropriately work with and represent volunteer organizations and land management agencies. Individual land management agencies may have their own established protocols. Ultimately, newly-trained Independent Stewards will need to check with these entities to get any additional training and information that is specific to that land management agency.

Another desired benefit of this training is that all groups that use the standardized training materials will have a common point of reference when discussing trail maintenance, safety and tool use.

This is a basic course for independent trail maintenance. The limited scope of this course may not allow trainees sufficient time to practice all the skills covered. The Outdoor Stewardship Institute (OSI) recommends that trainees gain further confidence in their skills prior to working independently by mentoring under an experienced trail worker. We also recommend that a trainee's skills be evaluated by their sponsoring organization before being allowed to perform trail maintenance independently.

This basic course prepares newly-trained individuals to engage in independent trail maintenance with a maximum of 2 un-trained

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volunteers. This *is not* intended as a Crew Leader for Trails training. Those wishing to learn more about crew leadership, trail maintenance and construction, or volunteer project management, should seek additional training opportunities with their sponsoring organization or the Outdoor Stewardship Institute.

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# 2: Agency Protocols, Safety & Risk Management

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## 2.1 Know Agency and Organization Protocols

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### 2.1.1 Working and Communicating With Land Managers and Volunteer Organizations



This unit reviews what information needs to be gathered by Independent Stewards before beginning trail maintenance efforts.

OSI-trained Independent Stewards may work with many different agencies and organizations. "Land management agency" refers to local, state, and federal government land management agencies. "Organization" typically refers to non-governmental or non-profit groups that act as the sponsoring volunteer organization for trained Independent Stewards.

Undertaking Independent Stewardship work requires gaining a high level of trust from the land management agency. Every agency and organization has its own "**protocols**," or ways of doing business. These protocols typically include, among other things, requirements for volunteer safety and effective communication. Communication in this context can include:

- Understanding and establishing the agency or organization's maintenance needs and priorities;
- Protocols regarding contact with other trail users while undertaking Independent Stewardship;
- Clear understanding of volunteer accomplishment reporting expectations; and
- How to report back on further needs observed while in the field.

Often, volunteers will be working for an agency through an organization and will need to know similarities and differences between protocols and requirements for each.

Finally, the OSI Independent Steward Training is meant to teach the base level skills, and in no way certifies an individual as qualified to work on his or her own without prior approval. Each agency will have standards on when and if an individual has demonstrated proficient skills, allowing them to work independently on public lands basic trail maintenance needs.



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### **2.1.2 Getting Ready for Independent Trail Maintenance**

Before you undertake any independent trail maintenance work, you will need to have approval to work on specific trails or trail systems. If working with a sponsoring volunteer organization, the organization will likely have determined (in conversation with one or more land management agencies) which local trails are available and prioritized for trail maintenance.

If you are not working with an organization, you will need to contact the land management agency directly to secure information and pre-approval. Some land management agencies may be familiar with your Independent Stewardship training and volunteer trail experience, but others may not. Remember that land managers need to understand the benefits of using Independent Stewards and you will need their strong support to gain approval for any volunteer trail maintenance activities you want to provide on their property. This may take some time and may not always result in success.

Before beginning trail maintenance work on a pre-approved trail or trail system, be sure that you understand the maintenance goals and trail standards set by the agency. This should include knowing any specific, prioritized maintenance needs such as removing trees across the trail or other, woody vegetation overgrowth within the trail corridor. Be sure to also plan in advance where you will get the tools you need for the planned trail maintenance.

It is also critical to know any relevant land management agency or organizational safety protocols while undertaking trail maintenance. For more information about this important topic, please refer to the Basic Safety & Risk Assessment section.

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### **2.1.3 Importance of On-the-Trail Demeanor**

Independent Stewards volunteer their time and effort to the benefit of all trail users. In this role, they represent the interests of their sponsoring volunteer organization, the land management partner, and their own perspective as a trail user who wants to see their favorite trails maintained in great condition.

In order to continue the growth and effectiveness of the Independent Steward program, a friendly and professional demeanor is required for the times that you encounter trail users while you are undertaking or hiking to/from trail maintenance efforts on public lands. Remember that safety is always a primary

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concern in such encounters. Most often, you'll have time to step out of the way with your trail tools in hand, allowing the trail users to pass by with ease. Often, trail users may thank you for your volunteer effort, or ask about your work. When responding in such situations, here are a few important tips to keep in mind:

1. Be courteous;
2. Explain your work as simply maintaining the existing trail; and
3. Assure them that your volunteer work has been pre-authorized by the land manager.

Spreading the word about your training could very well inspire trail users to volunteer for future trail projects!

Before undertaking trail maintenance as an Independent Steward, it is also important to understand other needs and expectations the agency or organization may have in your role as a trail "ambassador." For example, you may be required to:

- Understand exactly how you will be expected to engage and interact with the public while performing trail work;
- Ask volunteers you are leading to get additional training;
- Invite other volunteers to become an organizational member or leader; and
- Ensure crew members evaluate their experience.

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#### **2.1.4 Agency and Organization Protocol Checklist**

Before performing independent trail maintenance work, it is ESSENTIAL that you understand land management agency protocols and priorities and do everything you can to collect details.

**Before you undertake independent trail maintenance:**

1.  Contact the sponsoring agency or organization.
  - a.  Find out the appropriate liaison's name, title, and other information.
  - b.  Give the liaison YOUR contact information.
  - c.  Ensure that you have approval to volunteer independently

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- d.  If applicable, sign appropriate volunteer agreement or waiver
2.  Contact the agency and/or organization liaison to make sure you have all the necessary information:
- a.  What does the stewardship area include? What trails are a high priority?
  - b.  What, if any, known maintenance needs are there?
  - c.  What are the goals of the work? How much does the agency expect you to accomplish?
  - d.  What is the background or context for the work? Why are you doing it?
  - e.  Where do you get the tools for the work?
  - f.  What are the specifications you need to follow (for example, desired trail clearances)?
  - g.  Are there any special regulations for the area?
  - h.  How are you expected to engage with trail users and other volunteers (i.e. is there any specific information you need to impart?)
  - i.  Is there an existing, specific safety or emergency plan that you need to follow?
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## 2.2 Basic Safety & Risk Assessment

The most important part of trail maintenance is your personal well-being and safety. Safety must be part of each workday; no stewardship work is so urgent or important that it cannot be done safely.

Do you know your limitations? Do you have the skills you need? Every Independent Steward is responsible for working in a safe manner and should point out unsafe practices and hazards to others.

### 2.2.1 Important Terms Used in this Section

A **Hazard** is defined as the “potential for harm.” In practical terms, a hazard is an unsafe act or unsafe condition that, if left uncontrolled, can result in an injury or illness.

**Risk Assessment** is the qualitative and quantitative estimate of risk associated with various aspects of a trail maintenance project and should be completed and reviewed before performing trail maintenance. The risk assessment process should also be internalized and practiced continuously by Independent Stewards while working on the trail. Most agencies and organizations will have a formal Risk Assessment form that volunteers must complete prior to performing trail maintenance. In addition to the information presented in this section, a common risk assessment form, called a Job Hazard Analysis (JHA), can be found in Appendix B of this manual.

An **Emergency Plan** should be in place for each day you are on the trail. The object of this plan is to provide volunteers with the information to adequately respond in the event of an accident or emergency. The plan may consist of the following elements: communication, medical response, evacuation, and follow-up. The sponsoring agency or volunteer organization may already have a plan in place. If available, obtain a copy and carry it with you. An example of an emergency plan can be found in Appendix C of this manual.

**Personal Protective Equipment (PPE)**, such as gloves, boots, hardhats, safety glasses, hearing protection, long sleeves and pants, must be used as appropriate for the task or if required by the sponsoring agency or organization.

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### 2.2.2 Safety at the Start of the Day: The Morning Safety Review

Whether working independently or with a small group, start the day with a safety review. Issues to address should include potential or known hazards that could affect the wellbeing of the Independent Steward and any other volunteers or trail users. Examples of topics to review include:

- Environmental hazards
- Avoiding slips and falls
- Proper use of tools
- Dehydration
- Hypothermia
- Hazard trees
- Strenuous hiking/altitude sickness.
- Any existing required safety/risk assessment document (i.e. a Job Hazard Analysis)
- Review the emergency plan for the work day and the proper response in case of emergency

When working in a small group, also cover the following:

- Make sure all volunteers have appropriate footwear, clothing and other required personal protective equipment (PPE).
- Do they have their lunch, water, gloves, hat, sunglasses, and sunscreen as needed?
- Have they completed a waiver? (Or Volunteer organization/Agency agreement if required).
- Ask that volunteers notify you about any specific health concerns.
- Ask if anyone is certified in First Aid/CPR and, if so, what level of certification.
- Discuss the need to stay hydrated and consume fluids at least every half hour.

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### 2.2.3 If An Accident Occurs...

- If accident warrants, and cellular or satellite service exists, call or text for emergency assistance. Activate a Personal Locator Beacon if available.
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- If at all possible, one person should stay with the accident victim. The person with the highest level of medical training (i.e. primary medical provider) should stay with the accident victim.
  - Make sure you can give clear directions about the accident victim's location. Be prepared to send others (trail stewards, bystanders, etc) to strategic locations as a flag, or to notify medical personnel.
  - Do not attempt anything medically that you or someone in your small group have not been trained to do.
  - When the accident victim has stabilized, contact your sponsoring volunteer organization to relay details of the accident.
  - Do not talk to the media. Refer them to sponsoring volunteer organization or agency personnel.
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## 2.3 Tool Safety

Tools can make a trail stewardship experience either enjoyable or miserable, depending on whether the right tool is available at the right time and whether you know how to use tools safely. The information provided in this course gives the basics for hand tools in an independent trail stewardship setting. Only basic hand tools used for trail maintenance will be covered in this training.

There are many specialized tools available for trail work projects including rockwork tools, power tools, and motorized equipment. All of these specialized tools require training before using in the field and will not be covered in this component. It is essential to know what tools your agency or organization will allow on a trail maintenance effort.

### 2.3.1 Tool Talk



Prior to heading out on the trail as an Independent Steward, it's always best practice to remind yourself to "CUSS" your tools. In the event that you are bringing along an additional volunteer or two on your day's trail maintenance effort (remember, larger groups require Crew Leader Training for Trails), this acronym becomes a very important teaching strategy.

When working in a small group, the tools to be used during the day should be introduced in a logical order to allow an effective discussion of their use and safety. The order of tool presentation is up to the individual. However, certain subjects regarding tools must be covered. These subjects are referred to as "CUSS":

- Carrying tools
- Using tools
- Storing tools
- Safety with tools

#### *"C" – Carrying Tools*

There are basic safety requirements for carrying tools to and from the work site. Be alert and make sure the safety guidelines are enforced throughout the day:

- Always wear gloves while carrying tools.

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- Safety sheaths should be properly in place on the tool.
  - Pick up a tool and feel for the balance point. The balance point is the place where there is equal weight in front of and behind your hand. Carrying a tool at the balance point results in less strain on wrist and arms. Carrying a tool vertically requires tensing the wrist and provides minimal control over movement of the tool. The best possible control over motion of the tool is obtained when it is gripped at the balance point.
  - Always carry tools in hands with arms at sides. The blade or most dangerous part of the tool should point downward.
  - Never carry tools propped on your shoulder.
  - Tools should be carried on the downhill side of the trail. This is so that the tool can be thrown clear in case of a stumble or fall.
  - When it is necessary to carry tools in both hands, carry the heaviest or most dangerous tool on the downhill side.
  - Maintain a safe distance between people when walking to the work site. Everyone should be an arm and a tool-length from the next person on the trail while walking. Each individual in a group needs to be responsible for maintaining the correct distance from the person immediately preceding them on the trail.
  - If appropriate, and you are using a mountain bike or horse to access a remote trail maintenance location, be sure that your tools are safely stowed and secured in a manner that ensures that all sharp parts of the tool will not cause a hazard in the event of a fall. When biking, use portable tools designed for a special use case whenever possible, and use a tool trailer if one is available.
  - Watch where tools are pointed at all times.
  - Let the slowest hiker set the pace for the group.

### *“U” – Using Tools*

Each tool has its proper and improper methods for use. Here are some of the general considerations when using tools:



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Before using any tool, make sure you know what it is used for and how to use it safely

- Adopt the proper stance for using the tool. This will save strain on your back and make the tool more effective to use.
- Establish secure footing before using tools. Be especially careful when working in wet, slippery conditions.
- Maintain a safe working distance from others at all times.
- Full “roundhouse” swings with tools are not acceptable.
- Use all tools in a motion parallel to the body rather than towards the body.

### *“S” – Storing Tools at the Worksite*

Tools are dangerous when not stored properly at the worksite; any tool is a potential risk. Here are some things to remember about tool storage:

- Concentrate all tools not currently in use in one area if possible.
- If accessing the trail to be maintained by mountain bike, be sure that your bike is placed completely off of the trail during your maintenance work.
- Store all tools off the trail on the uphill side of the work section so they are not a hazard, but can be reached easily. Store them with the handles pointed down towards the trail or work section, and the sharp or business end furthest uphill.
- Store shovels with the sharp edge towards the ground.
- Never sink axes, Pulaskis, picks, or similar edged tools into the ground or in stumps where they become dangerous obstacles, i.e., impalement and tripping hazards.

### *“S” – Safety with Tools*

- Carrying, using, and storing tools present different safety issues. It is important to emphasize tool safety at all times. Remember these tool safety tips:

- Dis-CUSS tools in the morning and re-emphasize “CUSS” all day long.
- Be careful how you carry, use, and store tools at all times. Set a good example for your crew by always being “tool safe”.
- Always use proper personal protective equipment like hardhats, gloves, and safety glasses when using tools.
- Use the right tool, the right way, for the job at hand.
- Tools come in a variety of sizes, shapes, and intended uses. They are all dangerous if not treated with respect.
- Do not set a tool down “just for a minute” in the wrong place. It will become a hazard.
- Misused tools can break and are a danger to future users. They also cost time and money to repair.

### 2.3.2 Basic Risk Assessment



Independent Stewards are responsible for the safety of themselves and others, and therefore need to understand the basics of risk assessment. Independent Stewards should perform risk assessments before undertaking trail maintenance and constantly throughout their workday. They need to assess potential hazards while travelling to and from the maintenance sites, while performing maintenance at the sites, and even during rest breaks.

Risk management is a cognitive process of identifying, assessing, and mitigating risks or hazards. A risk assessment can provide a systematic approach that allows the ranking of risks. The level of risk is determined by three factors:

1. What is the Hazard?
2. What is the likelihood that the Hazard will occur?
3. What is the severity of the potential outcome of the Hazard?

Once you have identified and assessed the hazards of an activity, you can think about how to mitigate or lessen the likelihood or probability of severe consequences by developing abatement actions or controls, and making decisions about how to implement them. The decisions should be reevaluated and revised as needed if the situation or conditions change.

### 2.3.3 Risk Assessment Matrix

To help you identify and assess the potential risk of a hazard or activity, we have provided the following Risk Assessment Matrix.

In this suggested tool, there are four risk levels:

**Low**—First aid or minor medical treatment, minor system damage.

**Moderate**—Minor injury, lost workday accident, compensable injury or illness, minor system damage, minor property damage.

**High**—Permanent partial disability, temporary total disability in excess of 3 months, and major system damage, significant property damage.

**Extreme**—Death or permanent disability, system loss, major property damage.

Relative Risk Matrix	Severity			
	Negligible	Marginal	Critical	Catastrophic
Likelihood	Negligible	Marginal	Critical	Catastrophic
Frequent	Moderate	High	Extreme	Extreme
Probable	Moderate	High	Extreme	Extreme
Occasional	Low	Moderate	High	Extreme
Remote	Low	Moderate	Moderate	High
Improbable	Low	Moderate	Moderate	Moderate

The matrix also includes a Severity Scale that includes four levels from which to rate potential hazards or activities:

Severity Scale Definitions	
Negligible	Less than minor injury and/or less than minor system damage

<b>Marginal</b>	Minor injury and/or minor system damage
<b>Critical</b>	Severe injury and/or major system damage
<b>Catastrophic</b>	Results in fatalities and/or loss of the system

Finally, the matrix includes five options to rank how often a potential hazard or activity is likely to occur:

<b>Likelihood Scale Definitions</b>	
<b>Frequent</b>	Likely to occur often, continuously experienced
<b>Probable</b>	Likely to occur several times
<b>Occasional</b>	Likely to occur sometime
<b>Remote</b>	Unlikely to occur, but possible
<b>Improbable</b>	So unlikely, it can be assumed it will not occur

To understand how to use this matrix as a risk assessment tool, here are two examples:

1- The Independent Steward has determined that there are small, loose rocks present along the trail. It is possible that the small, loose rocks could cause a volunteer to slip and fall to the ground. Using best judgement, the Independent Steward assesses this risk as follows:

**Likelihood:** An Independent Steward may slip and fall occasionally.

**Severity:** The steward may receive scrapes or bruises, but there is only a marginal risk that the steward would be more severely injured.

**Relative Risk Level :** moderate

2- The walk to the work site is located in an area that has a considerable number of dead trees that have been killed by insects. It is possible that a tree(s) could fall and hit an Independent Steward. Using the matrix, the Independent Steward assesses this risk as follows:

**Likelihood:** There is a remote probability that a tree(s) may fall and hit an Independent Steward.

**Severity:** A falling tree hitting an Independent Steward could be critical to catastrophic.

**Relative Risk Level:** moderate to high

If the probability of risk and severity of consequences are both low for a given situation, an Independent Steward may choose to do nothing to mitigate the risk other than following normal safety standards. If the severity could be high (even if the likelihood is low), we will probably choose to take some mitigating action.

When working independently and confronted with a high risk situation, it is important to err on the side of caution. In a situation as described above, when the likelihood of risk is relatively low, but the severity of the potential outcome could be high, Independent Stewards should adhere to safety standards already in place by following applicable agency protocols, work within their knowledge, abilities, and certifications, and should choose to leave the situation and report it later if the hazard has a significant probability of undesirable consequences.

### 2.3.4 Risk Assessment Exercise

Using the chart below and the following pictures complete your own risk assessment and follow up plan:

Risk or Hazard	Likelihood	Severity	Need to mitigate? Y / N	What measures are already in place?	What should be done?
1-Traveling along rocky trail – potential to slip and fall					
2-Hazard tree(s) along trail – potential to fall on volunteer					



### 2.3.5 Independent Steward Safety Talk Checklist

When leading a small group of volunteers, there are many points Independent Stewards must cover to ensure the group is prepared to work safely throughout the day. Use this checklist to help ensure all relevant points are covered.

- Has everyone reviewed an up-to-date Risk Assessment?
- Have all individuals completed a liability waiver or volunteer agreement as required?
- Make sure all volunteers have appropriate Personal Protective Equipment such as boots, clothing, eye and ear protection, helmet and gloves.
- Does everyone have lunch and enough water?
- Does everyone have sun protection (hat, sunscreen, sunglasses, and lip balm?)
- Discuss the project goals, specifications, and context (refer to Know Your Agency and Organization Protocols).
- Specify the length of hike and type of maintenance.
- Explain any site- or project-specific hazards.
- Ask that persons with specific health concerns notify you about them in advance. Some items you should know about include: back problems, allergies (insect, plant, and medication), diabetes, heart and lung problems, epilepsy, and other serious physical conditions.
- Ask if anyone has emergency medical training. Ask if anyone is certified in CPR or Wilderness First Aid. Establish primary and secondary medical chain of command within the stewards.
- Explain to all volunteers the daily safety plan and the chain of communication for the project. (Refer to Know Your Agency and Organization Protocols). If available, select someone to act as an alternate leader to start the safety plan process should you become incapacitated.
- Explain "Coming Through!" or "Bumping By" and practice it at all times.
- Demonstrate why safe working distances are important. Be sure that people working near a hazard (chipping stone, lumber cutting, etc.) stay at a safe distance and are wearing eye and/or ear protection.

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- Hardhats should always be worn if there is any risk of head injury or if required by the agency.
  - Demonstrate how to lift with the legs and not with the back. Get help and/or tools to move heavy objects or leave the situation and report it later.
  - Reiterate through the day that volunteers need to drink water, even when they may not be thirsty (try to drink water every 15-30 minutes). By the time you feel thirsty, you may already be dehydrated. Enforce water breaks by taking them throughout the day.
  - Stress the need to wear sunscreen. Watch for sunburn throughout the day.
  - In areas where disease from insects may be a concern, stress the need to wear repellent and protective clothing.
  - Consider warm up and stretching exercises at some point before beginning maintenance activities. Use the opportunity to provide further information on additional safety issues.
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## 2.4 Accomplishment Reporting

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Reporting volunteer work accomplished is an important part of Independent Stewardship. Metrics gathered and successfully reported allow sponsoring volunteer organizations and land managers to readily:

- Calculate total volunteer days and hours for an individual, a trail system, or the program;
- Understand type and quantity of volunteer work accomplished
- Understand trail maintenance needs that should be scheduled for future group work sessions or additional independent trail stewardship.

Sponsoring agency or organizations have different accomplishment reporting protocols. Some organizations will rely on self reports submitted via email to a volunteer coordinator who manually inputs data into a spreadsheet. Other self reporting may help reduce administrative burden by enabling volunteers to enter data through a database linked website application. As mentioned above, Independent Stewards help land managers identify any problems or future work that needs to be addressed. For more information about this, see Priorities in Trail Maintenance in the Trail Maintenance section.

Reporting needs vary widely among different groups. It is important that Independent Stewards work closely with their sponsoring agency or organization to understand precise requirements for self-reporting of accomplishments, and how accomplishment reports should be submitted. Certain items, such as total volunteers and volunteer hours, description of work accomplished and providing photo documentation of maintenance performed are common among most agencies and organizations.

An example of an accomplishment reporting form with the type of information you may be required to collect and report, can be found in Appendix D.

## 2.5 Independent Steward's Daily Reminder

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### 2.5.1 Prior to Trail Maintenance Efforts

CONFIRM that you have approval to work on selected trail or trail segment.

- Check with your sponsoring volunteer organization and/or land manager.
- Ensure you have signed all required liability waivers and agreements.

NOTIFY a friend or loved one of where you are going and when you will be back.

- Your sponsoring volunteer organization and/or land manager may also want this information.

CHECK condition of tools to **be sure that they are in working order.**

ENSURE you have a fully charged emergency communication device.

- This can be a cell phone, 2-way radio, satellite communication device, etc. Consider bringing a backup power supply or extra batteries.

When working solo, REMIND yourself of the heightened awareness required to reduce risk and maintain a safe experience when working alone. CUSSing (Carrying, Using, Storing, and Safety) your tools, and performing an independent safety review and risk assessment are of paramount concern in this situation.

When working with a small group, DISCUSS trail maintenance expectations, objectives and specifics of the selected trail, including how far/difficult the hike/ride is to the site of trail maintenance, and what type of work will be done.

When working with a small group, PROVIDE Safety / Tool Talk.

- Discuss safety and first aid.
  - Find out any special health needs within the group.
  - Make sure everyone has water, food, clothing, boots, and gloves for the day.
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- Determine if anyone has medical/first aid training, and explain your level of first aid training and where a first aid kit is located.
- Explain the Safety Plan.
- (CUSS) Carry, Use, Storage and Safety of tools being used that day.

LEAD Safety Stretch Exercises (may be done upon arrival at the worksite).

HIKE/RIDE to the work site at a pace everyone can handle, with slowest up front. Check for proper tool Carry and Safety on the way to the site.

### 2.5.2 Ongoing throughout Trail Maintenance Effort

EXPLORE the maintenance site and discuss findings.

- Find out what talents, experience or expertise everyone may have.
- Explain tasks and trail maintenance standards. Utilize project notes, if provided.

DEMONSTRATE trail maintenance techniques and tool use. Provide a short talk on trail terminology.

DECIDE as a group which tasks each person would prefer to work on.

PROMOTE a safe work environment.

CUSS tools.

- Take breaks as needed.
- Continually assess for risks.
- Encourage everyone to work at a comfortable pace.

PROVIDE a positive work environment. Praise and recognize everyone's efforts. Utilize active listening techniques; give appropriate feedback.

Keep in mind what work is NOT pre-approved for Independent Stewards: rock based water bars, trail re-routes (minor or otherwise), new trail construction, bridge / boardwalk / structure repair.

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	<p>TAKE NOTES (and photos - on your smart phone or other device) regarding trail maintenance accomplished and trail issues identified that require future efforts by a larger group's efforts (potential re-routes, huge trees across trail, bridge needs repair, etc.)</p> <p>HAVE FUN!</p>
<b>2.5.3 End of Trail Maintenance Effort</b>	<p>WALK the trail maintenance site at end of effort to assess work accomplished.</p> <ul style="list-style-type: none"><li>• Gather tools, packs, clothing, trash, etc. so that nothing is left behind.</li><li>• Give thanks to everyone for a job well done and encourage them to volunteer again.</li><li>• Check tool Carry and Safety on the way back to the trailhead.</li></ul> <p>ENCOURAGE everyone to provide feedback on his or her experience. Have them fill out an evaluation form if one is available from your sponsoring volunteer organization. Share information with everyone on how they can become a trained Independent Steward!</p> <p>SUBMIT your accomplishment report to appropriate recipient.</p> <p>Work with your sponsoring agency or organization to determine what metrics are required and how to submit your report. Whenever possible, include before and after pictures of work accomplished, as this will document the work accomplished and quality of the work.</p>

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# 3: Trails Overview

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## 3.1 Trail Planning, Objectives and Standards



Knowing how trails are planned for sustainability, and understanding how different impacts and objectives influence maintenance standards, will enhance your ability to perform effective trail maintenance.

During the planning process, agencies will consider various environmental factors as well as establish goals and objectives for trail development. Trails vary considerably by area management objectives, intended user groups, environmental conditions, location, and past use patterns.

Developing sustainable trails is a planning objective for most agencies. Characteristics of a sustainable trail include:

- Supports current and future intended use with minimal impact to the area's natural systems.
- Produces negligible soil loss or movement with minimal impact to vegetation and fauna that inhabit the area.
- Pruning or removal of certain plants may be necessary over time.
- Accommodates existing use while allowing only appropriate future use.
- Requires little rerouting and minimal long-term maintenance.

### 3.1.1 Trail Objectives



It is also important to understand the objectives and intended user groups for a trail before beginning any trail work. Knowing how the trail is intended to be used will inform best maintenance practices. Objectives can be compromised or changed unintentionally through new construction, reroutes, or maintenance activities. For example, if a trail is designed as a universally accessible trail to an overlook but, during maintenance work a step or drainage dip is installed, the trail objectives have been compromised. Similarly, if a trail is intended for mountain bike and equestrian use and steps are installed, trail objectives will be compromised.

Examples of trail objectives:

- Provide high quality recreation experiences for families
- Provide access for physically challenged individuals or groups



- Provide high quality recreation experiences for mountain bikers
- Provide high quality recreation experiences for motorized recreation
- Provide opportunities for interpretation and environmental education
- Provide access to an area for camping or hunting
- Provide for multiple-use opportunities
- Provide access to scenic or cultural opportunities
- Reduce resource impacts from unplanned trails and establish manageable use patterns
- Manage conflict among existing users
- Localize use to minimize impact on other areas

Some examples of different trail users and user groups:

- Experienced trekkers, hikers and backpackers
- Casual weekend users
- Families and children
- Mountain bikers
- Horseback riders
- Motorized vehicle users
- Winter recreationists (snowmobile, ski, snowshoe)

All trail users have legitimate rights and responsibilities regarding ethical trail use. They also have different needs and motivations. Understanding and tolerance of all trail users can promote a positive share-the-trail ethic and may help with conflict resolution.

### 3.1.2 Trail Impacts

Trails can have impacts, both desirable and undesirable. Undesirable impacts can be environmental such as erosion, stream sedimentation and contamination, and habitat fragmentation or social such as conflict among trail users, attracting undesired users, etc. Desirable impacts include new and expanded recreation opportunities, increased understanding of conservation issues, and increased tourism revenues.

### 3.1.3 Trail Maintenance Standards

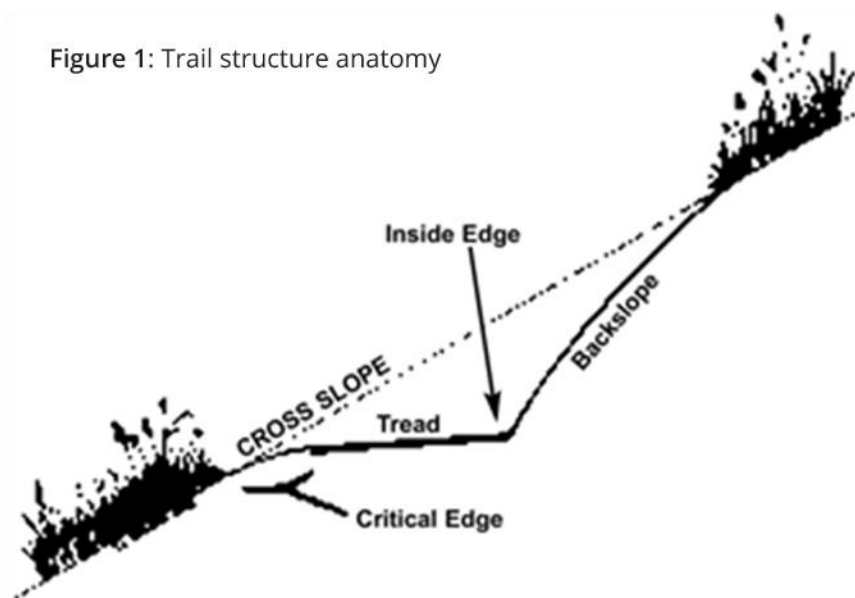
Ultimately, the planning, objectives and impacts of a trail will influence the maintenance standards that are applied. Land management agencies have trail standards that relate to their physical characteristics, users, location, and environmental factors. The trail corridor height, tread width, grades, and surface will vary, depending upon the intended user groups, location, the projected usage level, and environmental factors such as soil type and drainage patterns. Agency standards promote trail objectives, sustainability, uniformity, minimal maintenance, and cost effective trails.

Environmental factors are also taken into consideration when establishing agency standards for trails. Topography, water features, drainage patterns, soils, wildlife, and vegetation can have an influence on land management agency standards.

### 3.1.4 Trail Anatomy & Terminology

Understanding trail terminology will assist Independent Stewards in understanding trail issues while also increasing confidence in communicating trail concepts to others. Figure 1 represents the basic structural components of a trail, which are as follows:

Figure 1: Trail structure anatomy



**Cross Slope:** The slope or gradient of the undisturbed hillside is called cross slope. It is generally referred to in percent, not degrees. A good analogy is to alpine skiing terminology – fall line, or the line or path water follows downhill.

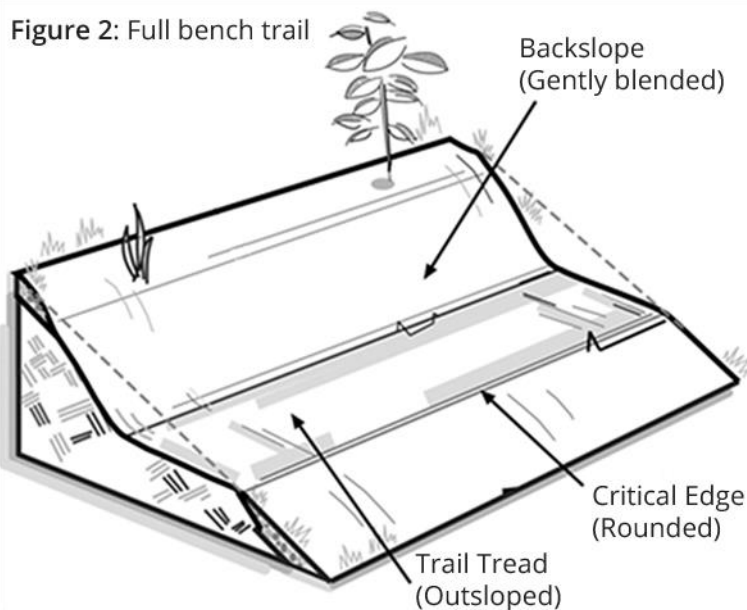


**Backslope:** The excavated slope rising above the inside edge of the tread is called the backslope. The slope is cut back to mimic the original hillside. The backslope is a merger or transition of the natural hillside cross slope with that of the tread. It is “laid back” or reclining into the native hillside. When vegetation returns, the backslope will blend into the hillside and the trail will seem like it has always been there.

**Critical Edge:** The rounded outside edge of the trail is called the “critical edge” because this is where critical trail maintenance problems usually begin. Rounding the outside edge helps water to flow off of the trail.

**Tread:** The tread is the surface of the trail on which users walk or ride. The tread may be either built as a “partial” or “full bench” trail. Partial bench trail is essentially cut-and-fill, where all or part of the trail is composed of excavated (loose) soil, which can be prone to erosion. Full bench construction (Figure 2) means the trail is built entirely on native mineral soil, and is less likely to erode.

The width of the tread will vary from agency to agency and from trail to trail. Hiking and biking trails will be narrower than trails built to accommodate horses or all-terrain vehicles (ATVs). The land management agency will establish the width of the tread in their construction or maintenance standards for trails under their jurisdiction.

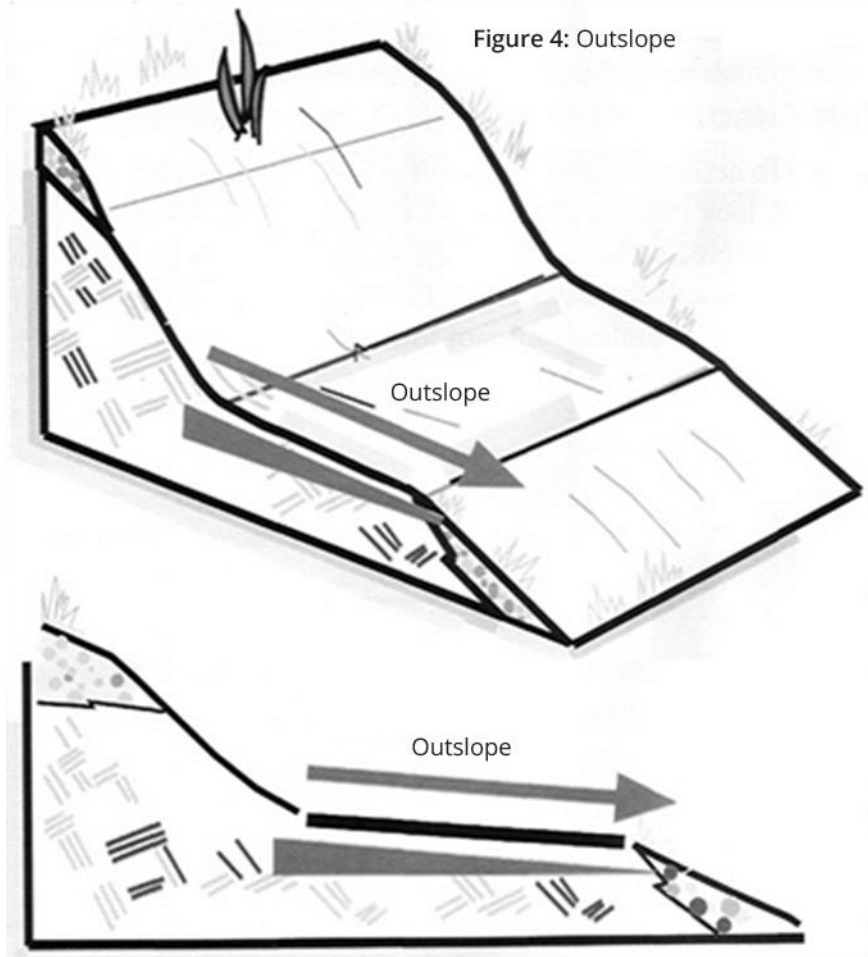


**Sheet Flow** (Figure 3): The ideal trail drainage pattern is called Sheet Drainage. Water flowing down the hillside simply crosses the trail and continues down the hill. If the slope of the trail tread is adequate, water will flow across the surface of the trail tread to the critical edge, moving away from the trail.

**Figure 3: Sheetflow**

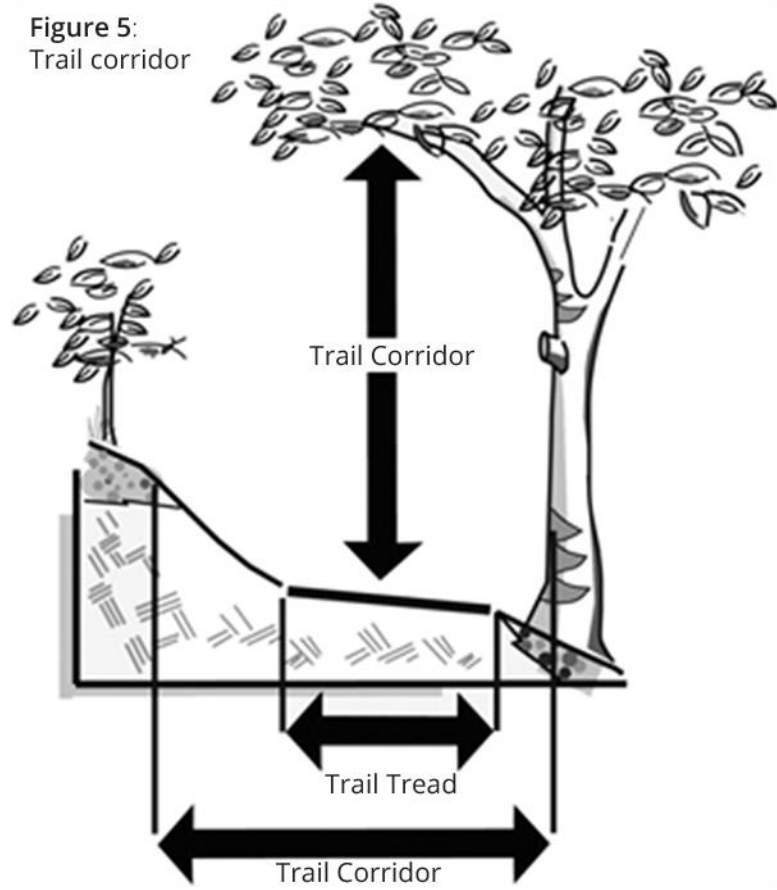


**Outslope** (Figure 4): Like the hillside, the tread slopes downward. Outsloping a trail is one technique to get water to flow across the tread rather than follow it or stay on the trail causing puddles. Trails that are insloped or have no outslope will tend to allow water to flow down the trail, causing erosion or a puddle on the trail which causes users to walk around the puddle, widening the trail. The trail tread is usually outsloped by 1" to 2" for every 12" in width of the trail tread. Hence, a 24" wide trail would have an outside edge 2" to 4" lower than the inside. Generally, outslope is good while insloped tread is not desired with traditional trail construction. Note that insloped tread may be utilized for some modern trail types, but only in combination with aggressive outsloped drainage just a short distance down the trail.



**Trail Corridor** (Figure 5): The area of passage of the trail, including all cleared and managed parts above, below and adjacent to the tread. This trail corridor is wider than the tread surface itself and is as high as necessary for the trail users. Trail corridors that blend in with the landscape and accommodate traffic will encourage appropriate trail use. When the trail corridor is not maintained, trail users will leave the trail tread and cause unnecessary trailside impact.

Figure 5:  
Trail corridor



## 3.2 Trail Maintenance

Land management agencies usually have maintenance plans with established maintenance standards and priorities for each trail. Agency personnel, volunteer organization staff and representatives, and/or trail adopters will regularly inspect trails to locate and identify problems such as safety concerns, areas of excessive erosion, vandalism and potential segments of trail for re-routing. The maintenance trail crew's task is to correct those problems according to the established maintenance standards and priorities.

### KNOW THE AGENCY STANDARDS BEFORE BEGINNING MAINTENANCE WORK ON ANY TRAIL

#### 3.2.1 Purpose of Trail Maintenance



- To restore tread and the trail corridor to a safe, usable condition.
- To repair trails damaged by flood, avalanche, fire, user abuse, or heavy use.
- It is cost effective to keep trails in good shape. Failing to care for trails can lead to extensive maintenance, closure, or complete loss of trails.
- To increase visitor safety and reduce liability risk.
- To protect the resource by reducing unwanted impacts.

Trail maintenance is a critical activity to ensure the success of a trail program. Trails built without conformance to sustainability concepts will require more maintenance and cause more resource damage. Finding solutions for erosion problems, boggy areas, loose soils, and widening or braiding of trails requires experience and skill. Serious problems need to be reported to the agency so they can develop a plan on how best to remedy the situation

#### 3.2.2 Priorities in Trail Maintenance

Lacking a specific land management agency maintenance plan, the following four priorities can be used to determine which tasks to complete and in which order:

1. Correct unsafe situations. This could mean repairing impassable washouts along a trail on a steep and exposed hillside or removing blowdown from a steep section of an equestrian trail.

2. Correct natural resource damage – erosion, sedimentation and off-trail trampling, for instance.
3. Restore the trail to the planned design standard. This means that the ease of finding and traveling the trail matches the construction standard for the recreational setting and anticipated user group. Actions may range from simply cutting back the encroaching vegetation to repairing eroded tread or failed structures.
4. Be careful to not change the “character of a trail” when performing maintenance as this is part of the planned design standard. A good example is a more technical biking trail where having more rocks and obstacles is desirable.

At the work site, determine what projects can be accomplished as basic maintenance, what projects can be deferred, and what projects will need major work. Always inform the land management agency of any work completed and tasks needing attention.

### 3.2.3 Basic Trail Maintenance

Only basic trail maintenance will be included in this training module. More advanced techniques such as construction of most drainage structures, turnpikes, and rock walls are outside the purview of Independent Stewards and are offered in advanced skills OSI training modules. Only hand tools will be used in performing basic maintenance techniques.

The topics covered in detail are:

#### Trail Corridor Maintenance

- Plant removal
- Pruning

#### Tread Maintenance

- Re-establish alignment
- Remove roots and stumps
- Remove rocks
- Remove slough and berm
- Improve backslope

#### Drainage Structure Maintenance

- Surface water control
- Types of drainage control structures
- Maintaining a swale, knick, dip or waterbar
- Installing a knick

### 3.2.4 Trail Corridor Maintenance

#### *Plant removal*

Plants growing into a trail corridor or trees falling across a tread surface are a threat to user safety and trail integrity.

Encroaching plants such as thistles or dense willows may make travel unpleasant or even completely hide the trail. If people have trouble traveling through the trail corridor, they will likely impact surrounding areas by traveling off of the established tread. It doesn't take a full obstruction of the tread to push users to one side or the other. Anything that impinges on the user's visual perception of how clear the trail is will push them to one side or the other. For example, a low branch that comes to within a foot of the tread, when it is about at eye level, will subconsciously push the user to the other side of the trail.



Most trail corridors are cleared an equal distance on either side of the tread centerline. Construction or maintenance standards are established by the agency for a specific trail determine the height and width of a trail corridor. An Independent Steward needs to know the trail standards. Within the trail corridor, plant material and debris are cleared all the way to the ground. Large trees and boulders within this corridor are obvious exceptions and shall remain. The critical corridor dimension is the safe, unhindered passage of the user (hikers, stock, OHV, horses fully packed and with a rider, if applicable.)

Some trail corridors may need to be cleared several times a year while other trail corridors may only need corridor maintenance once every few years depending on the type of vegetation near the trail. For example, a trail in a scrub oak area requires more frequent corridor clearing than a trail in a lodgepole pine forest. Trail corridor maintenance can also be accomplished at the same time a volunteer or staff person is performing a monitor and evaluation of trail conditions.

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Only remove trees or shrubs that are 6-inches in diameter or less and can be cut with loppers or a hand saw.

- Walk away from trees that are larger than 6-inches in diameter. Felling standing trees (including snags) or large branches are statistically one of the most dangerous activities in which a trail worker can engage. Do not consider felling trees unless you have been trained and certified.
- Mark any hazardous trees that you are unable to safely remove and inform the land management agency representative.
- If you find a fallen tree lying parallel with the trail and the trunk of the tree is not within the clearing limits, you can leave it in place and prune the limbs flush with the trunk.

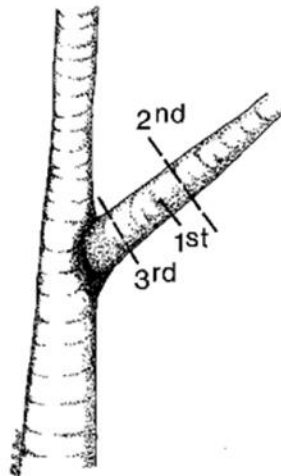
**Pruning** of the trail corridor provides an unimpeded passage for trail users.

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- For a clean pruning cut, use the three-cut method (Figure 6) that allows for a clean cut and prevents the limb from peeling bark off the tree as it falls. Use the three-cut method to remove large limbs (2 inches or more in diameter). Make the first cut about 8 to 12 inches up the branch from the collar on the underside of the branch. Make the second cut on the top side opposite the first cut, and the third cut to remove the stub flush with the limb collar. (Most trees have a pronounced collar where the branch meets the trunk. If the branch is cut just short of the collar, the bark will cover the cut as the tree grows.) Do not use an ax for pruning. Loppers and saws are best for pruning as using an ax above knee height can be very hazardous.

Figure 6: Three-cut method



- Trim back all limbs to the trunk and cut intruding brush back at the base of the plant rather than in midair at the clearing limit boundary. Cut small trees and brush flush with the ground leaving nothing that could impale or grab trail users, their stock or their equipment.
- Prune the entire circumference of the tree, not just the side facing the trail
- If over half of a tree or any other large plant needs pruning, it is usually better to cut it down instead (Figure 7).

**Figure 7:** These trees should have been removed rather than pruned.



- If a limb is too high or too large to cut at its base, try to cut it at a “fork” of the branch as close as possible to the trunk.
- Never rub dirt or duff into the cut on a live tree or shrub. Microorganisms (pathogens) in the soil can be introduced through the exposed cut.
- Dispose of cuttings and vegetation in an acceptable manner. Whenever possible, branches, limbs, and especially small trees should be moved out of sight of the hiker or rider on the trail. Often a small clearing behind a tree or shrub will suffice to deposit cut limbs. Take special care that the cut, butt-end of a tree is not visible from the trail.
- Some land management agencies may want cuttings piled up for wildlife habitat. In addition, some agencies may have concerns relating to wildfire that direct how the slash is to be disposed. Other agencies may require that vegetation be spread below the trail to impede runoff.

### 3.2.5 Tread Maintenance



Tread maintenance ensures a solid, obstacle-free tread is established and enough protection is provided to keep it in place. Remember that multiple use trails, primarily those that include bicycle traffic, will sometimes leave obstacles to provide additional challenge to bicycle riders or limit bicycle speeds, as long as these clearly do not present a hazard to foot traffic.

Tread work requires maintaining tread to its desired width. This means removing slough and berm and filling ruts, holes, and low spots. This may include removing obstacles such as protruding roots and rocks, however, take care not to change the trail's character without good reason. Do not leave any exposed roots or root stubs, as exposed roots usually die. Cut these root stubs 3" to 5" below the tread surface. It also means repairing any sections that have been damaged by landslides, uprooted trees, or washouts.

Tread maintenance aims for a solid, outsloped surface. Remove all the debris that has fallen on the tread including the sticks, stones and candy wrappers. Remove and widely scatter organic debris well beyond the clearing limits, preferably out of sight.

#### *Remove roots and stumps within the tread surface*

- A sharpened pick mattock or Pulaski is most often used to chop out roots. Cut the root 3" to 5" below the tread.
- Not all roots and stumps outside of the tread are problems. A stump may have been left during trail construction to help keep the trail from creeping downhill. Roots and stumps outside the tread but inside the clearing limits should be cut as flush to the ground as possible to eliminate tripping or impaling hazards.
- Leave roots that are important to holding the tread or critical to the health of the tree and that are not a tripping hazard. Some large, exposed roots may require ramping the trail over them using rocks and fill dirt.

#### *Remove rocks within the tread surface*

- Rock removal ranges from shoveling loose cobble to moving large rock off the tread.
- When moving large rock, think first. Plan where the rock should go, and anticipate how it might roll. Communicate

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with other workers about how the task is progressing and what move should occur next.

- The two most common injuries in rockwork are pinched (or smashed) fingers and tweaked (or blown out) backs. Work safely when removing large rock!
- Do not throw or kick rock off the trail. Always place or roll a rock to a safe location. An out-of-control rock might hit someone below.
- Always keep your back straight and lift rock with the strong muscles of your legs.
- Not all rock within a tread surface needs to be removed. If it is not a tripping hazard, you can leave them.

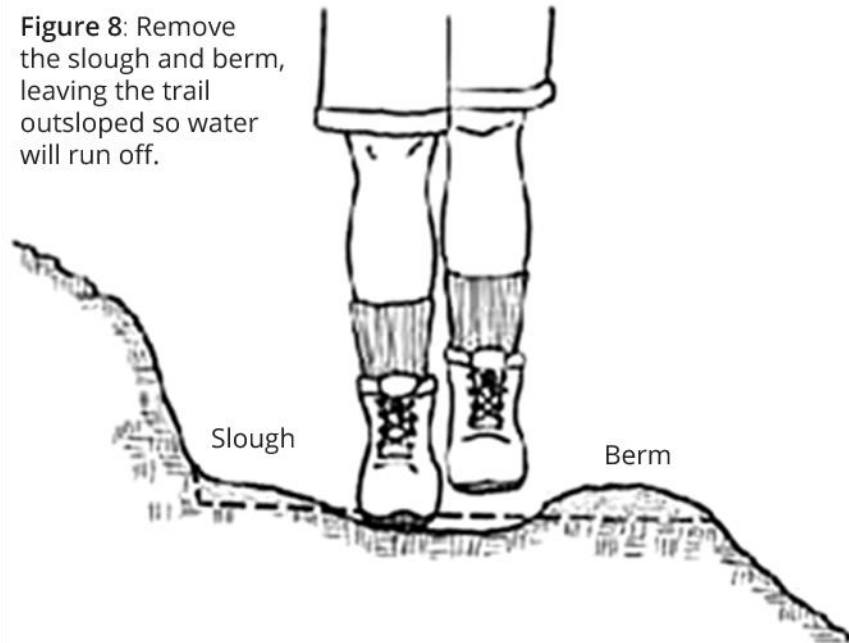
### *Remove slough and berm*

Berm formation is the single largest contributor to erosion of the tread surface and its removal is the most important task for trail maintenance. Berm is soil that has built up on the critical edge of the tread, forming a barrier that prevents water from running off the trail. Berms are a natural consequence of tread surface erosion and re-deposition or inadequate compaction during construction.

Berms may form a false edge. A false edge is unconsolidated, unstable material, often including significant amounts of organic material that has almost no ability to bear weight. This is probably the least stable trail feature and a major contributor to accidents.

Remove slough and berm (Figure 8) that has formed on the tread or is blocking the critical edge. Slough is soil, rock, and debris that has moved downhill and built up on the tread, narrowing it. Slough needs to be removed. Leaving slough may cause the trail to “creep” downhill as users are forced off the tread.

**Figure 8:** Remove the slough and berm, leaving the trail outsloped so water will run off.



- Loosen compacted slough with a pick mattock or Pulaski, then remove the soil with a shovel or McLeod. Use excess soil to fill holes in the tread or on the downhill side of waterbars and drainage dips where it won't be washed away.
- Blend the slope of the tread into the backslope area.
- The outside berm along the trail tread must be periodically removed. Removing berms also promotes natural drainage and runoff patterns. Remove and disperse any organic material and extra soil.

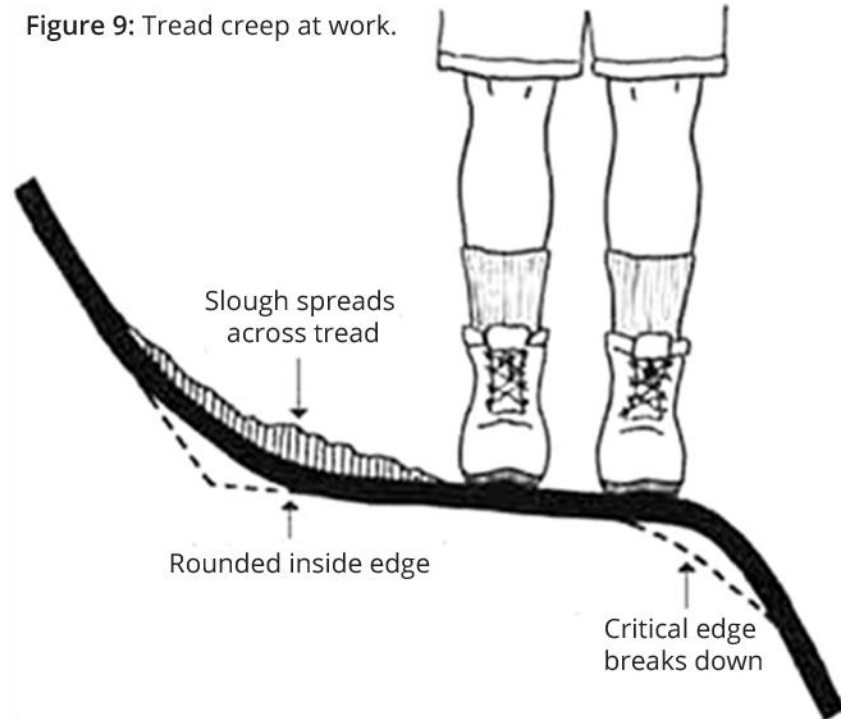


### *Reestablish the tread alignment*

Most livestock, bicycle and ATV use, and some people have a natural tendency to follow the outside edges of trails. Additionally, any sloughing down from the backslope will make the trail edge the flattest place to walk. As the tread narrows, it causes trail users to travel closer to the outer edge. Another possible result is tread creep (Figure 9), in which the trail actually moves down the hill from its intended location within the established corridor. Other causes of tread narrowing and tread creep are constructing a trail that is too narrow or with backslopes that are too steep. The trail crew's job is to bring the trail back to its original location and width.

- Trees, log ends, rocks, and stumps left close to the downhill edge of the trail will keep animals and people to the middle of the tread. Good places for off-trail objects like this are at the crest of a hill, between the tread and a tree trunk, adjacent to a dip, steps or other structures, or along the inside edge of a turn in a trail. These “guide structures” should be outside the tread and not impede the natural drainage pattern across the tread surface.

**Figure 9:** Tread creep at work.



### *Improve the backslope of the trail*

The backslope is an important interface or transition between the trail and the slope above the tread. The backslope controls how water enters the tread area and it is a distinct and recognizable boundary on the uphill side of the tread.

- The backslope, where at all possible, should not be too steep, but should be cut on an angle that allows for revegetation, blends into the slope of the hillside and prevents any free flowing water from leaving the ground and accelerating erosion. This may not be possible on a steep slope where a trail is cut into the hill. Do what you can to

avoid a vertical backslope. A vertical backslope can eventually cause sloughing of the soil onto the trail.

### 3.2.6 Drainage Structure Maintenance



The erosive force of water is usually the most destructive element acting upon a trail. A properly outsloped trail will allow water to flow across the tread rather than straight down the trail. However, a poorly laid out trail, maintenance problems, or local site conditions (such as steep trail profile grade) may allow water to be captured and the result will be water flowing down the tread. Proper maintenance of trails includes correcting drainage problems.

Independent Stewards must be able to analyze various trail drainage problems and develop appropriate solutions. The more fluent a Steward is in understanding the causes of a trail drainage problem, the better they can communicate the corrective work required for the situation. Always try to identify the source of the trail drainage problem. Often just looking uphill will help locate the source of a problem. Frequently, the solution to a drainage problem may be in a less obvious location away from where the problem is manifesting itself.

To effectively analyze a drainage problem, an Independent Steward must understand the dynamics of water. Water erodes soil surfaces by picking up soil particles and carrying them. Water in the erosion mode will strip tread surface, undercut support structures, and blast apart fill on its way downhill. How much damage is done depends on the volume of water involved and how fast it is flowing.

If you slow water down, it loses its ability to carry soil and drops soil particles (deposition). If you abruptly turn or block water, it slows. This deposit ability is what helps create berms and fills in drainage structures. (This has some advantages if you are restoring eroded tread and use check dams to capture waterborne soil.)

Water can also affect soil strength. Generally, drier soils are stronger (more cohesive) than saturated soils, but it is also true that fine, dry granular soils can be washed or blown away. More experienced trail workers can identify basic soils in their areas and know their wet, dry, and wear properties.

#### *Surface Water Control*

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Flowing water erodes tread and support structures and can even lead to loss of the trail itself. Diverting surface water off the trail is part of an effective maintenance program.

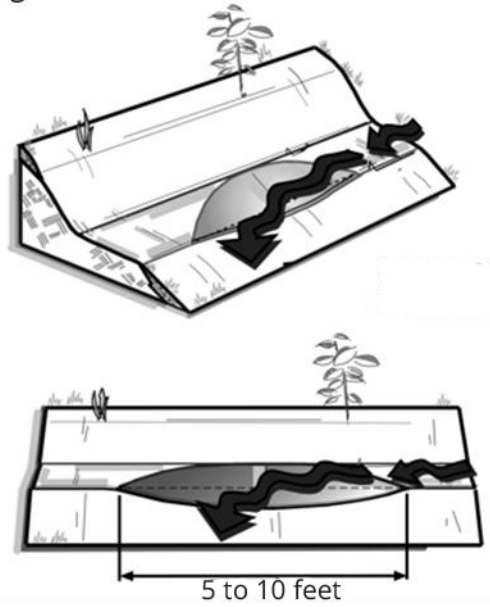
The most effective drainage is designed and built during the original trail construction. A properly outsloped trail will allow water to flow across the tread rather than straight down the trail. A good drainage structure is relatively self-maintaining, requiring minimal care, but there will be times when more work is needed to promote effective drainage.

### *Types of drainage control structures*

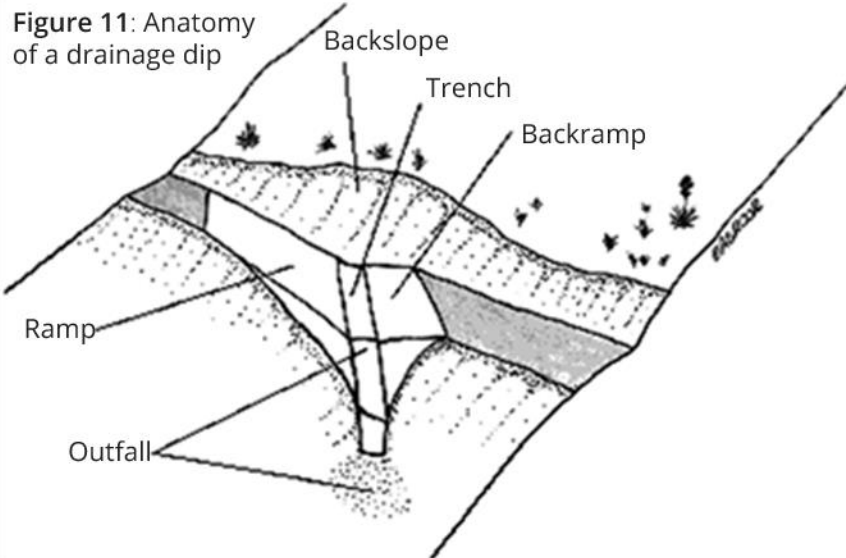
- **Grade reversal dip or rolling grade dip.** These drainage control structures use a reversal in grade to force water off the trail without the need for any other structures. This type of dip works best when designed and built where needed during the original trail layout and construction in places where water moving down the hillside is not intercepted and carried down the tread. Grade reversal dips are the most unobtrusive of all drainage structures if constructed with smooth grade transitions.
- **Knicks/swales.** (Figure 10) Shaved-down sections of tread with an exaggerated outslope. Used to shed water off a trail and is a useful remedy for wet spots on relatively flat trails without berms.



Figure 10: Knick/swale



- **Drainage dip.** (Figure 11) A diagonal depression constructed in the trail to catch water running down the trail and to divert (at a 45 to 60 degree angle from the tread) the water off the trail. Usually constructed in a trail after the original trail layout and construction has been completed.

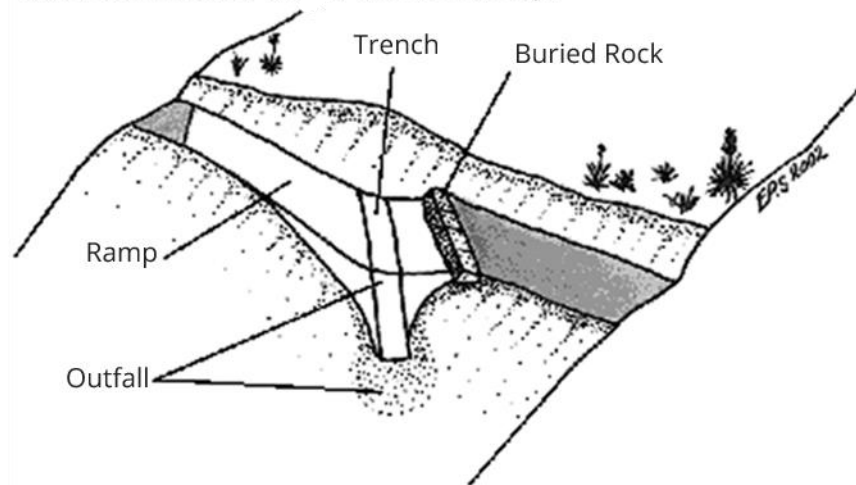


- **Reinforced drainage dip.** (Figure 12) A reinforced drainage dip is a drainage structure which has a rock water bar

buried under a layer of compacted soil at the top of the backramp.

- **Water bar.** An exposed stone or timber barrier set into the trail. The hardened barrier deflects water in case of major water flow. This type of drainage structure is no longer recommended for construction or use on trails, but previously constructed water bars need to be maintained or replaced.

**Figure 12: Anatomy of a reinforced drainage dip.**  
In this example, the waterbar itself is a row of fitted and buried stones, which reinforce the dip.



### *Maintaining a knick/swale, dip, or waterbar*

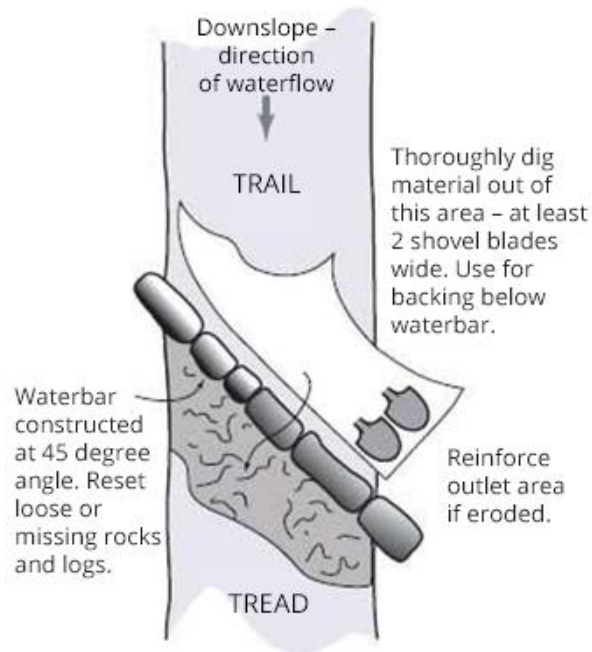
The biggest maintenance issue for drainage structures is sediment build up. If a drainage structure clogs, water will find its way down the tread, creating erosion channels or puddles. The best drainage structures are self-cleaning, but realistically, most drains collect debris and sediment that must be removed. (Figure 13)

Most problem drainage structures are improperly installed dips and water bars. If water is slowed before it can exit the tread by hitting the backramp or stone barrier, sediment can build up. Inadequate outsloping of the trench and/ or the outfall, or an outfall that is straight or is too narrow can compound this. An effective outfall allows for an unimpeded flow of water off of the trail.

- When maintaining a water bar or dip, anticipate where the runoff goes and remove excess sediment where needed.

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- If not overly constrained by a berm or other obstacles reestablish or locate the outfall or drain outlet to naturally turn the water off the trail before it reaches the water bar or the backramp of the drainage dip.
  - Dig the outfall wide (up to two shovel widths) and outsloped so water does not slow before it exits the trail. Make sure outfalls do not allow water to return to the tread below the drainage structure.
  - Clear the outfall of all logs, rocks, and other debris, and even consider cutting logs and roots if needed to insure the flow of water off the trail. The exception is that some rocks, logs or other debris can be left to dissipate the energy of flowing water once it clears the tread.
  - Mineral soil removed from an outfall can be placed on the downhill side of the dip or waterbar on the trail and compacted. This will promote a smooth ramp up and over the dip or waterbar.
  - The ramp or downhill approach to the drainage structure will usually begin when possible at a minimum of five to six feet above (up to 10 to 20 feet for steeper trails) and will be a steady grade several degrees steeper than the trail and outsloped as much as possible.
  - Below the drainage structure, the approach will extend about five feet below the drainage structure and will be a steady and consistent grade across the entire width of the trail.
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Figure 13: Maintaining a Drainage Dip or Water Bar



# Appendix A: Common Trail Maintenance Tools

## Glossary

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### Pruning Saw



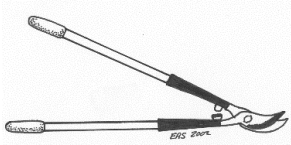
Pruning saws are useful for clearing small trees and trimming limbs (“limbing”). Pruning saws come in many sizes and consist of a handle with a tapering straight or curved blade. Folding saws are a common type of pruning saw.

When using any saw, let the saw do the work. Apply a little downward force with each stroke but not enough to bend the blade. Forcing the blade into the cut (or “kerf”) may bind or break it. Use as much of the length of the blade as possible; the saw will cut smoother and stay sharp longer. Do not twist the blade or try to bow it while sawing as the blade can break.

The teeth are sharp so wear gloves when sawing and keep hands clear of the cut and the blade. Be aware of the people around you to keep limbs from falling on someone. Carry the saw on your downhill side with the blade pointed down and sheathed.

Pruning saws are relatively small tools and are easily forgotten when packing up for the day. Keep the saw in a safe location (near or in your pack or near other tools that are being stored) when not in use.

### Lopping and Pruning Shears



Lopping and pruning shears are similar in design and use. However, lopping shears have longer handles to improve reach and increase leverage for cutting thicker stems. Handles on lopping shears range from 26 to 36 inches long, and should be used on live limbs approximately 1 inch in diameter or smaller. Pruning shears have shorter handles and should be used on small branches with a diameter of approximately 3/8 of an inch. A

good rule of thumb is not to cut anything bigger than your thumb. Use a bow saw for limbs larger than 1 inch in diameter.

### McLeod



The McLeod combines a heavy-duty rake with a large, sturdy hoe. McLeods work well for constructing trails through light soils and vegetation, and as finishing tools. They are inefficient in rocky or unusually brushy areas. Do not use the McLeod to chop turf or in rocky soil. The shaft attaching the head to the handle socket is relatively fragile.

To carry the tool, grip the handle near the head with the rake teeth pointing down, and carrying it on the downhill side as you walk. Store the McLeod with the tines pointed towards the ground.

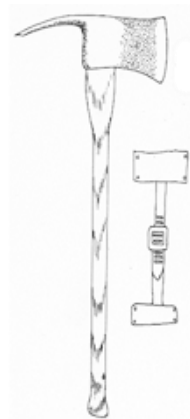
### Pick Mattock



When using any pick, stand comfortably with your feet apart and one foot slightly forward. Grasp the handle with one hand near the head and the other hand near the end of the handle. Bend over and keep your knees bent. Work the pick like a Pulaski with short, deliberate, downward strokes. Let the weight of the head do the work. Avoid raising the pick overhead while swinging; this wastes energy and creates a safety hazard.

To seat the head, hold the tool by the end of the handle and tamp the head straight down against a rock until it is firmly seated in place. It is a good idea to do this before using any pick.

### Pulaski



The Pulaski combines an axe and an adze hoe in one multi-purpose tool.

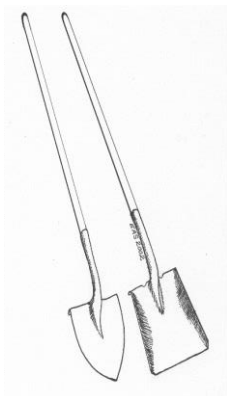
Carry the Pulaski at your side; grip the handle firmly near the head, and point the axe edge down.

When using the adze hoe blade, stand with your back straight, knees bent, and one foot slightly forward. Hold the handle with both hands, and use short, smooth, controlled swings. Always work across the front of your body, roughly parallel with your shoulders. Let the weight of the head do the work. We rarely use the axe blade (and NEVER below ground level). Instead, we use the grub or adze hoe end.



In cutting roots, use the hoe for all but the largest roots. Use the axe end to chop the largest roots only after the dirt has been thoroughly cleared. This is the only time you need to lift the head of the tool above your shoulders.

## Shovel



Shovel blades are either square-edged for scooping or pointed for digging. When shifting or scooping materials, bend your knees and lift with your legs, not your back. Use your thigh as a pivot point. This makes the handle an efficient lever and saves your energy and your back. Carry shovels with the head forward. Grip the handle near the head and point it down.

## Portable Tools

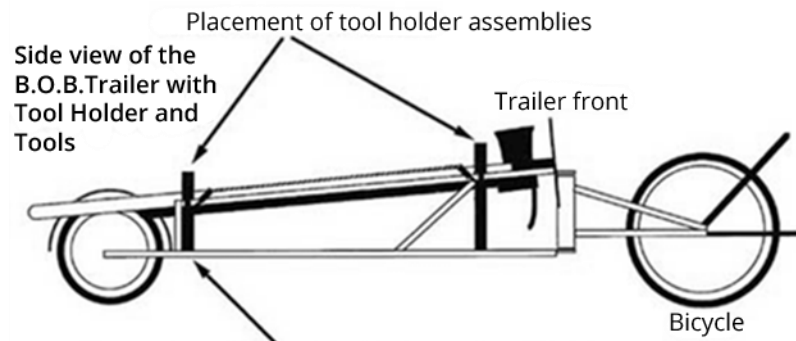


Specialized tools designed for portability are available in configurations that are lightweight and packable. Mountain bikers and equestrians accessing remote trail segments may seek out these types of tools for the safety they provide while riding to the maintenance site. These tools may be modular in design with handles that break down into multiple segments with a variety of tool heads available to provide similar function as a traditional Pulaski, Mcleod, or Shovel. When packing these tools, use sheaths and additional padding to ensure sharp metal edges will not harm you when taking an unexpected fall from a bike or a horse. These portable tools are generally designed for light trail maintenance work as opposed to heavy duty new trail construction. Use the tools properly and wisely to ensure they are not damaged. Clean tools after each use (especially threaded mating points) to ensure modular segments will join together properly during their next use. Hand Saws, Folding Saws, and Lopper/Shears with collapsing handles require very special care to ensure safety of the rider. Ensure tools are carried and packed in such a manner that they cannot cause an injury.

## Tool Trailer

Traditional tools can be transported to a trail maintenance site using a special trailer designed to attach to a mountain bike. Additional accessories allow for Pulaski, Mcleod, shovel, etc. to be

properly secured to the trailer and stay in place while traveling over rough terrain.



Use 8-32 x 1/2-inch hardware to attach the tool holders. Place the large washers on the wire-mesh bottom of the trailer to prevent the nuts from pulling through. Secure it with the lock nuts.



# Appendix B: Example Job Hazard Analysis Form

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U.S. Department of Agriculture Forest Service		1. WORK PROJECT/ACTIVITY <b>Volunteer Activities</b>	2. LOCATION <b>District wide</b>	3. UNIT <b>South Platte RD</b>		
COMBINED Risk Assessment and JHA References-FSH 6709.11 and -12 (Instructions on Reverse)		4. NAME OF ANALYST <b>Bradt/Mitchell</b>	5. JOB TITLE <b>Recreation Management</b>	6. DATE PREPARED <b>01/25/2016</b>		
7. TASKS/ PROCEDURES	8. HAZARDS	9. ABATEMENT ACTIONS Engineering Controls * Substitution * Administrative Controls * PPE			10. POST ABATEMENT ACTION RISK RATING (from the Severity/Probability Matrix)	
				<b>Severity</b>	<b>Probability</b>	<b>Risk Level</b>
Vehicle Travel	Accidents	Everyone in vehicle must wear safety belts at all times. Drive defensively: look far down the road to get the "big picture" and avoid accident situations caused by the mistakes of others. Never exceed posted speed limits. Compensate for road and weather conditions. Passengers will never ride in the bed of a pickup truck. Tools and materials will always be secured before a vehicle is moved. Flammable liquids shall not be transported in passenger compartment, approved containers shall be used.				
Public contacts	Negative contacts	Observe the person and the surroundings on approach. Avoid hostile persons. Stay at least an arm's length away. If uncomfortable with the contact or situation, do not make initial contact, or if contact has already been made, back out of it. Position yourself so that you are not surrounded in a group. Do not antagonize a uncooperative visitor by word, deed or action. Do not make contact if drugs/alcohol are present. Don't exceed your comfort zone.				
	Dogs	If carrying a tool, keep the tool between you and the dog. Be assertive, but not aggressive. If owner is nearby, ask that the dog be leashed. If approaching a camp where dogs are present, call out on approach and have owner leash dogs before approaching.				

	Stock	When hiking and stock approaches on trail, stand on down hill side of trail with no sudden motions and speak calmly to stock users.			
General Safety	General	Safety is your first priority. Always stay within your skill level and comfort zone. Nothing we do is more important than your safety. Always let someone know where you will be for the day and the time you plan to return. Never depend on cell phone coverage to be available. Do not travel or work alone in isolated areas without a detailed emergency plan and radio. When traveling in remote areas, you should have a first-aid kit, compass and map, matches (waterproof), pocketknife, flashlight, extra food, warm clothing, signal mirror, and plenty of drinking water. Remain aware of your surroundings at all times. Be aware of elemental hazards and take appropriate actions (i.e. weather, avalanche, lightning, stream crossings, snags). Know the weather forecast. Carry and know how to use your map and compass. Work in pairs if possible. Basic orienteering skills are required.			
	Hydration	Always carry adequate water and stay hydrated. Always treat wild water through filtration, chemical treatment or boiling before drinking.			
	Slipping/Tripping	Boots are to have slip-resistant heels and soles with firm, flexible support. The required ankle support will vary with terrain. When contouring a steep slope, do not lean into the hill. This tends to loosen footing. Erect posture or slightly leaning out gives more secure footing. Plan ahead, select safe routes, watch out for changes in ground surface, slick spots, or unusual hazards. Select each step carefully and do not shift body weight until you are sure the spot is solid. If you feel yourself slipping, pick a landing spot. Do not stick your arms out to break a fall, roll with the fall. In heavy undergrowth lift your knees high to clear obstacles or walk around. When going downhill, keep most of your weight on your heels and shorten your stride. Do not run.			

	Blisters	Wear broken-in, well-fitting boots and clean snugly fitting quality socks. Protect tender spots with mole skin or adhesive tape when redness first appears. Treat blisters promptly.			
	Getting Lost	If lost, keep calm, don't panic. If carrying a cell phone or radio, try to make contact. Follow any roads, trails, telephone or power lines that may be present until you can determine you are moving in the right direction. As a last resort travel downhill parallel to a stream or drainage. Do not walk aimlessly. If unsuccessful in attempts to find your way, stay in one place, conserve your strength, and build a fire in a safe place so that smoke may be seen by searchers. If signal mirror is available have ready for immediate use. Select a warm shelter. Shelter, warmth and liquids are much more important than food. Prepare camp and gather firewood well before dark.			
	Allergic Reactions	If you have any known allergic reactions, carry the appropriate medicine to arrest the reaction (e.g. sting kit, medical inhaler).			
	Injury	Anyone doing strenuous work should perform stretching or other warm-up exercises appropriate to the work project or activity. If you sustain a serious injury while in the forest on foot, follow the guidelines for being lost, provide first aid as best you can. Keep calm and don't panic. Make yourself as comfortable as possible. If possible, report your location and wait for assistance. Walk to a location where you can be picked up if possible. If you need to move to a different location, do it slowly. Conserve your energy.			
	Weather Exposure	Conditions change quickly in the mountains. Wear sunscreen and carry raingear. Layering your clothing is the most effective way to dress for the woods. Clothing can be shed as you exert yourself and put back on as you cool down.			

	Lightning	Afternoon thunderstorms are common in the summer. Plan to be off high, exposed ground by early afternoon. If caught in a lightning storm, move to lower sheltered ground.			
	High wind	High winds can blow down standing dead trees (snags) and even snap healthy trees. Avoid burned areas with numerous snags during high winds. Also, be aware of wind chill factor in cold windy weather.			
	Insects	Be aware of bee and wasp nests. Use insect repellents and avoid areas with high concentrations of mosquitos (West Nile Virus). Periodically check for ticks (Lyme Disease, Tick Fever).			
Tools	Injures from improper use of tools	<ul style="list-style-type: none"> <li>• Know proper handling, carrying, and use of tools.</li> <li>• Check that tools are properly maintained, clean, and in good condition.</li> <li>• Only sharp and properly maintained tools should be used.</li> <li>• Use proper tool for the job.</li> <li>• Never modify tools. Make sure all safety guards are in place during and after use.</li> <li>• Keep tools in a safe place on and off the job. When tools are not in use, place them in a predetermined location away from persons and with cutting edges shielded.</li> <li>• Never throw tools. Never direct the tool toward the body or anyone else's body.</li> <li>• Use appropriate PPE (i.e. sturdy footwear, gloves, eye &amp; ear protection, long pants &amp; sleeves, hard hat, shields, barriers, masks/respirators, etc)</li> </ul>			
Qualifications/ Training	Specific qualifications or certifications are required for many work	Examples are:Chain Saw Operation, Crosscut Saw Operation, Specialized Tools, Pesticide Use, Heavy Equipment, Driving. Before beginning any work project or activities, participants must be trained in the basic safety and heald precautions they need to follow. Participants must possess all required certifications such as First Aid/CPR, Sawyer, Drivers Licence prior to beginning activities.			

	projects and activities				
Lifting	Back strain	Use proper lifting techniques; bend knees when lifting; lift with legs and not with back; do not exceed your personal ability; "eyes to the sky" – look upward to keep balance and better alignment; do not twist or turn while carrying a heavy load.			
Wildlife encounters	Mountain Lions	If approached by a mountain lion, do not run. Face the animal and stand your ground. Raise your arms and look big. Speak loudly in a firm voice. Do not corner a lion, leave it a means of escape. Be alert for a second lion. If attacked, fight back.			
	Bears	Never approach bears or cubs, and never get between a mother bear and her cubs. Give bears plenty of room. Make noise and do not startle a bear. Do not run from a bear. If approached by a bear, raise arms and appear big. Make as much noise as possible.			
	Other	Avoid animals exhibiting unusual behavior or when young are present. Do not place animals in a situation they cannot leave easily. Always observe animals from a distance and don't feed them			
Backcountry camping	Weather, falling trees, rising waters, animals	Carefully select your campsite. Look up, look around. Sites should be free of; hazard trees, danger from rolling rocks and slides, danger from flash floods or rising waters, known animal problems or signs (tracks, scat, scrapes, kills and claw marks). Keep camp areas clean and food stored out of reach at a distance from camp.			
<b>11. LINE OFFICER SIGNATURE</b>		<b>12. TITLE</b>		<b>13. DATE</b>	

# Appendix C: Sample Emergency Plan

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## Volunteers for Outdoor Colorado - Independent Stewards Program South Platte Area Emergency Response Protocol

### In the event of an emergency:

1. Check to make sure the scene is safe before entering to provide care.
2. In an urban/front country (less than one hour from definitive medical care) environment immediately call 911 for appropriate emergency personnel (fire, police, ambulance, etc.).
  - a. If electronic communications are not available runners leaving the field should be in groups of three if possible, but no less than two.
  - b. If you choose to send runners for help, always leave the person with the highest level of first aid training to attend to the injured person(s).
3. In a backcountry environment (one hour or more from definitive medical care), prior to requesting outside emergency assistance, and if time and conditions permit, each trail steward should have all information pertaining to the incident, including a "SOAP (Subjective, Objective, Assessment, Plan) Note" with vitals and patient information, and a detailed description of the patient's location.
  - a. Runners should carry a copy of all information pertaining to the incident including a SOAP Note with vitals and patient information, a detailed description of the patient's location, and emergency numbers on the Emergency Protocols Form.
4. If the weather becomes threatening, the trail steward will move the participants to the most sheltered or safest location that is reasonably available.

### General Emergency Policies:

1. The trail steward with the highest level of medical training should respond to the incident or accident and treat the sick or injured person(s) utilizing only those treatment techniques for which he or she has been trained and certified. If a third party has a higher level of medical training and wishes to assume responsibility in treating the sick or injured party, trail stewards will, where appropriate, allow this person to do so and attempt to assist the third party as requested.
2. If trail stewards will require outside assistance in treating the sick or injured party on site (e.g. evacuation by litter and or higher level medical expertise and or equipment), then trail stewards should contact the appropriate County Sheriff's office and ask them to assist (see below for contact numbers and communication systems).
3. If trail stewards deem it unnecessary to contact the County Sheriff's office for assistance but still feel it necessary that the sick or injured party be evaluated by an individual with a higher level of medical training, then trail stewards should transport the sick or injured party to an appropriate medical facility (see below for directions to local facilities).
4. Trail stewards should follow VOC's Emergency Response Protocol as follows:
  - a. In the event of an emergency and as soon as conditions allow, contact must be made with one of the individuals listed as the emergency contact (if available).



- b. VOC will designate a spokesperson to respond to media inquiries. All VOC board members, staff, and volunteers should refer any media to the designated spokesperson and not comment in any way about the incident. Stress that only the designated spokesperson is authorized to speak for VOC. Do not speculate with the media or any other party about the cause of the incident or accident or who may have been at fault.

**5. Always complete and file VOC and sponsoring agency incident and accident report forms immediately after the situation is stabilized.**

**IMPORTANT PHONE NUMBERS AND RADIO COMMUNICATION CHANNELS**

In the event of a life threatening emergency:	Phone # 911
Clear Creek County Sheriff:	Phone # (303) 679-2376
Park County Sheriff:	Phone # (719) 836-4121
Jefferson County Sheriff:	Phone # (303) 277-0211
Douglas County Sheriff:	Phone # (303) 660-7505
USFS: Pueblo Interagency Dispatch Center	Phone # (719) 553-1600
USFS: South Platte Ranger District	Phone # (303) 275-5610

**PREFERRED COMMUNICATION SYSTEMS**

Communication Equipment & Policies (listed in the order in which they should be used):

*Coverage listed here is of a general nature. There may be "dead spots" that are not known.*

- Cellular Phone: Cell phones have intermittent coverage generally in areas with good lines of sight or at high points. Coverage is also available near towns including Idaho Springs, Georgetown, Grant, Shawnee, Bailey, and Conifer.
- Satellite Phone: If available, a satellite phone may be used when locations with good cell coverage or radio reception are deemed excessively far from the site of the incident or accident. Satellite reception may vary significantly depending on cloud cover.
- Personal Locator Beacons: PLB's are a manually activated personal safety device designed to alert search and rescue responders and allow them to locate you in the event of an emergency. Some PLB's can also be utilized for routine check-in, check-out purposes.
- Two-Way Radios: These can provide communication for up to 2 miles (depending on terrain, weather, and batteries) and can be used to communicate between the location of the incident and a location where outside communication is available via USFS radio, cell phone, or satellite phone.
- USFS Radio: *If available, volunteer shall make an effort to determine the general extent of radio coverage on the project.*

**MEDICAL FACILITIES NEAR THE I-70 CORRIDOR**

St. Anthony Hospital (Nearest Hospital in Denver Area):

Distance – 37 miles from Georgetown, CO (40 minutes)

Directions – Take 1-70 East 32.9 miles to exit 261 for US-6 E/6<sup>th</sup> Avenue. Take 6<sup>th</sup> Avenue 2.2 miles, Exit onto Union Blvd. Follow Union Blvd for .2 miles, turn left onto W 2<sup>nd</sup> Place .1 mile. Take 1<sup>st</sup> right onto Healing Way. St. Anthony Hospital,

Address: 11600 W 2<sup>nd</sup> Place, Lakewood, CO 80228.

Types of Services – Full Service Level 1 Trauma Center.  
Hours of Operation – 24 Hours, 7 Days  
Phone Number – (720) 321-0000

#### MEDICAL FACILITIES NEAR THE HWY 285 CORRIDOR

##### Swedish Hospital (Nearest Hospital in Denver Area):

Distance - 50 miles from Grant (1 hour) \*Note it is the same distance and time to travel to St. Anthony from Grant)

Directions - Take Hwy 285 into Denver. 285 turns into Hampden. Take Hampden past Broadway. Turn left on South Logan. Take your first right onto Old Hampden Rd and proceed one block to the hospital.

Address: 501 E Hampden Ave, Englewood, CO 80113

Types of Services – Full Service Medical Facility with Emergency Room

Hours of Operation – 24 Hours, 7 Days

Phone Number - (303) 788-5000

# Appendix D: Sample Independent Steward Accomplishment Report Form

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## Independent Steward Accomplishment Report Form

Independent Steward's Name	
Additional Volunteers and Contact Info	
Date of Project(s)	
Total # of Volunteers	
Total Volunteers 18 years old or <i>younger</i>	
Total Volunteer Hours (Including Travel Time)	
Total "Stipend" Volunteer Hours (youth corps or others receiving compensation)	
Land Management Agency/Organization	
Location of Project(s)	
<b>Description of Work Accomplished</b>	
Tread Maintained (Feet)	
Corridor Maintained (Feet)	
# Trees Cleared	
#Drainage Structures Maintained	
#Drainage Structures Constructed	
Other (Please be specific)	
Issues identified for future maintenance or volunteer project	
<b>Summary of work day</b>	
Project Summary	
Special Notes or Key Concerns	
Description of Accidents/Incidents	

# Appendix E: Sample Independent Steward Agreement & Liability Waiver

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The following template is for use by sponsoring volunteer organizations. Customize items. While this template is adapted from a Waiver used by Roaring Fork Outdoor Volunteers, please have your organization's legal counsel review and revise prior to use.

**Independent Steward / Trail Agent Program AGREEMENT AND WAIVER**

**[insert current year]**

PLEASE PRINT LEGIBLY

Name \_\_\_\_\_ Phone (h) \_\_\_\_\_ Email \_\_\_\_\_

Mailing Address \_\_\_\_\_ City / State / Zip \_\_\_\_\_

**INDEPENDENT STEWARD / TRAIL AGENT PROGRAM - AGREEMENT**

The Independent Steward / Trail Agent training was developed to teach the fundamentals of basic trail maintenance to volunteers working independently. Having completed the program's course, I know how to identify and perform basic trail corridor, trail tread and drainage structure maintenance, as well as how to recognize and report on other more complex maintenance needs. Having completed the program's course, I understand basic safety and risk assessment and how to appropriately work with and represent my Sponsoring Volunteer Organization and Land Management Agencies in order to work within their protocols.

I understand that as a trained individual, I may engage with a maximum of 2 un-trained volunteers to accomplish basic trail maintenance. My training is not intended as a Crew Leader for Trails training. My training does not give me permission to re-route trails or build new trails. If I wish to learn more about crew leadership for volunteer groups, new trail construction, or volunteer project management, I will seek additional training opportunities with [insert Sponsoring Volunteer Organization(s)] or with the Outdoor Stewardship Institute.

I agree to abide by the rules and regulations of [insert SVO(s)] while participating in this program. I further agree to submit a timely report on the Independent Stewardship activities I conduct throughout [insert current year]. I will utilize the reporting structure provided to me by [insert SVO(s)], and will submit a report for each day or session that I volunteer my time as an Independent Steward / Trail Agent. I will report on the basic trail maintenance accomplished and also report on other more complex trail maintenance needs that can be addressed by [insert SVO(s)] and Land Managers on a scheduled basis. I will represent this program, [insert SVO(s)], and Land Managers in a positive light when I encounter other trail users.

Signature \_\_\_\_\_ Date \_\_\_\_\_

**WAIVER AND RELEASE  
THIS IS A RELEASE OF LIABILITY - PLEASE READ CAREFULLY BEFORE SIGNING**

In return for receiving permission from [insert Sponsoring Volunteer Organization(s)] to participate as a volunteer with the Independent Steward / Trail Agent Program during [insert current year], I agree to assume all risks of loss and injury that may arise out of my participation and I agree to waive any and all claims against [insert SVO(s)] and the other parties described below.

I hereby release, and agree to indemnify and hold harmless [insert SVO(s)], program participants, and anyone else involved with this program and their respective agents, representatives, officers, employees, successors, assigns and insurers, hereinafter referred to collectively as "the Releasees", from any and all liability, claims, demands or actions or causes of action whatsoever, arising out of damage, loss or injury to my person or property, whether anticipated or unanticipated, while participating in any of the activities contemplated by this agreement, whether such damage, loss, or injury results from the negligence of the Releasees, their respective agents, officers, employees, successors, assigns and insurers or from some other cause. This release and agreement shall be binding upon me, my heirs, successors, assigns, administrators and executors.

I expressly acknowledge, represent and agree that expressly identifying and explicitly naming the respective agents, representatives, officers, employees, successors, assigns and insurers of the parties released, all of whom I intend to be released by this document, is a practical impossibility for the parties. The undersigned and the parties released herein expressly acknowledge that, for good and valuable consideration, the terms "respective agents, representatives, officers, employees, successors, assigns, and insurers", however used in this Waiver and Release Agreement are expressly and explicitly intended to include all and each and every individual, person, firm, entity and corporation who are now, or at any time may have been included in the specifically listed categories.

I realize that working within this program may involve the use of tools as well as other risks and hazards. I may be working around other program participants who may not be accustomed to this type of labor. I am aware of the risks and hazards inherent in participating and do hereby assume sole responsibility for all such risks and waive all claims against the Releasees, their respective agents, representatives, officers, employees, successors, assigns and insurers.

I grant [insert SVO(s)] and other program sponsors permission to utilize my image in photographic recordings of the project and I waive any right to claim compensation in exchange for participating in the program.

I agree to abide by the rules and regulations of [insert SVO(s)] while participating in this program. I hereby acknowledge that I have read, understood, and voluntarily agreed to the foregoing waiver and release agreement.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Signature and contact email of parent or guardian if volunteer is less than 18 years of age:

Signature \_\_\_\_\_ Date \_\_\_\_\_

Printed Name \_\_\_\_\_

Person to contact in case of an emergency:

Printed Name \_\_\_\_\_ Email Address \_\_\_\_\_ Phone \_\_\_\_\_

# Appendix F: Training for Crew Leaders & New Trail Construction

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This Independent Steward training curriculum, focused on basic trail maintenance, is adapted from a more detailed, and more involved Crew Leader Training curriculum.

If you appreciate the value of leading groups of volunteers larger than the 2-3 maximum group size recommended within the Independent Steward Training curriculum, then Crew Leader Training may be right for you. Knowing how to motivate individuals to produce a desired end result in a safe manner is a gratifying skill set that can be developed through a combination of classroom style learning and practical field experience. The time commitment required for training is generally greater than that required for training as an Independent Steward.

Crew Leader Training offers a deeper dive into trail design and alignment while providing a real understanding of new trail construction techniques. In order to lead a crew of volunteers in constructing a new trail, it becomes important to understand individual learning styles and listening skills while having a good handle on conflict and dispute resolution. As many volunteers on a given crew may be inexperienced in both trails and volunteering, knowing how to assess risks and avoid injuries becomes of paramount concern.

Being part of a volunteer New Trail Construction project can be a rewarding experience, especially for those in a Crew Leader role. Even with proper training, accomplishing a new trail, or even a re-routed trail is always multi-step process, with a given land manager's approval always required prior to the trail's construction.

To learn more about new trail construction techniques and best practices for managing and leading larger groups of volunteers, contact Volunteers for Outdoor Colorado's Outdoor Stewardship Institute ([www.voc.org](http://www.voc.org)), or your local sponsoring volunteer organization, and ask about Crew Leadership for Trails.