



• *Conservation USA*

Project Leader Handbook

A comprehensive resource for training and leading
volunteer conservation crews



Acknowledgments:

This Handbook was produced through a partnership of Conservation USA and the many organizations listed below. See page 69 for a brief description of each group.

Nongovernment Organizations

American Camp Association (ACA)
American Hiking Society (AHS)
Association of Fish and Wildlife Agencies (AFWA)
Boy Scouts of America (BSA)
Camp Fire USA
Environmental Alliance for Senior Involvement (EASI)
Girl Scouts of the USA
Izaak Walton League of America (IWLA)
National 4-H Council
National FFA Organization (FFA)
National Outdoor Leadership School (NOLS)
National Recreation and Parks Association (NRPA)
Outdoor Stewardship Institute (OSI)
YMCA of the USA

Government Agencies

Take Pride in America
U.S. Department of Agriculture (USDA)
Cooperative State Research, Education, and Extension Service (CSREES)
Forest Service (FS)
Natural Resources Conservation Service (NRCS)
U.S. Department of Defense (DOD)
US Army Corps of Engineers (USACE)
U.S. Department of Interior (DOI)
Bureau of Indian Affairs (BIA)
Bureau of Land Management (BLM)
Bureau of Reclamation (USBR)
National Park Service (NPS)
US Fish and Wildlife Service (FWS)

The Project Leader Handbook is only available through participation in the Conservation USA Project Leader Training Course. If you have questions about the Handbook or training opportunities, see the Conservation USA Web site, www.conservationusa.org.

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Conservation USA

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Project Leader Handbook

A comprehensive resource for training and leading volunteer conservation crews



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“

I recognize the right and duty of this generation to develop and use our natural resources, but I do not recognize the right to waste them, or to rob by wasteful use, the generations that come after us.”

”

Theodore Roosevelt,
Washington D.C. speech, 1900



I. Introduction

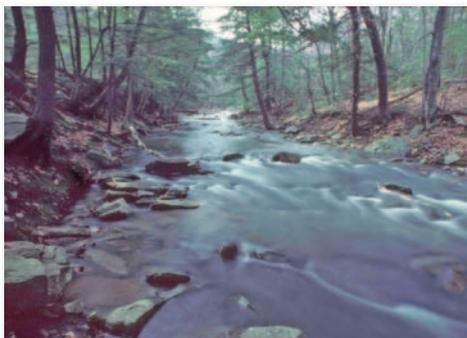
A. Volunteers and a “sense of place”

Since the first settlements in New England, Pennsylvania, and Virginia were established, volunteerism has been an old tree living in the American soil. This spirit of community service spread on its own accord and has been re-asserted, often by necessity, through each subsequent generation. Today, our Nation is blessed with a diverse array of people eager to learn about and to volunteer for service opportunities. These people often volunteer as individuals or as members of a youth, service, fraternal, senior or special interest group. They share a desire for service opportunities that are challenging and satisfying, and for experiences in which their time, talents, and hard work make a difference. What drives many of them to volunteer service is their motivation to contribute their skills and to demonstrate some form of leadership within their volunteer roles. Volunteer service. For many, these words evoke images of people helping others in structured settings such as schools, hospitals, and private homes. For volunteers in natural resources, the image is very different.

Natural resource volunteers sound like people who help the land and wildlife by working on trails, providing backcountry patrols, and educating visitors on land and wildlife stewardship. While this is true, there is much more to it than that.

Volunteers in land and wildlife agencies and entities donate their time for many reasons. Primary among them is the desire to give something back to the land, the place that they love. They feel a strong connection to the land at a visceral level. This sense of place is intrinsic in why people volunteer to give their time, sweat, and energy to a piece of land and the wild inhabitants of that land.

Humans develop a sense of place through an understanding of and appreciation for the characteristics of a place. These characteristics can range from the tangible to the intangible; they define a particular



place to a person or a community. They also make a place significant to a person or group of people. Imagine coming from a small hometown that is now far away. Now, imagine looking at a map and accidentally seeing the name of the town. The act of seeing the town's name may evoke strong emotions and memories because there is a strong sense of place for the former home city. Other people from the same town may experience similar feelings, while a person who never lived there will see only a dot on a map.

The same is true for America's enormous natural and cultural resource areas. What is just a forest to one person will be a place of joy to another. People with a sense of place for natural or recreation areas not only enjoy being in that place, but can experience happiness by bringing to mind the memories of that special place. This emotional attachment makes it meaningful and worthy of protection.

A developed sense of place can also help to maintain a region's cultural heritage and strengthen relationships between land managers and volunteer land stewards. The characteristics of a place will stand a better chance of being preserved if partners and managers recognize them, believe in them, and take an active role in maintaining them. Historic sites, wildlife, and landscapes could benefit greatly from these actions.

The passion that sense of place evokes in many natural resources volunteers also serves conservation programs well. Satisfied volunteers recruit many new volunteers for these programs. New volunteers have a chance to develop their sense of place for the land and pass this enthusiasm on to others.

Agency staff can see the devotion and work that volunteers perform on the land, in board meetings, and at community events. The end result is sustainable partnerships that work well for everyone.

Volunteers may start with a passion for a place, but the reasons they stay are because they believe in the importance of conservation work, they feel valued by the organization, they like what they do, and they enjoy working outdoors. Natural resource volunteer programs that can provide these opportunities and values by understanding a sense of place will have long-term and satisfied community partners.¹

B. Volunteers and conservation

Across the nation people of all ages and backgrounds are eager to learn about and care for the environment. They are interested in action that makes a difference and are willing to work as a part of a group to provide meaningful conservation and restoration service.

Conservation is an idea with roots deep in America's relationship to the land. The early identification of parks, wildlife refuges, and waterways as part of a civic trust carried with it the understanding that all citizens would help shoulder the responsibility for caring for those areas. Americans have entrusted agencies to manage and conserve public and private lands in the best interest of everyone. However, the complexity and challenge of managing public and private land and cultural resources in the United States greatly exceeds the resources and capabilities of governmental agencies.

Today's conservation professionals, entrusted to manage America's public and private natural and cultural resources, struggle to complete management tasks under the burden of having insufficient staff and funds. These professionals, either in the public or private sector, share a mandate to provide quality service, to maintain safe surroundings, to conserve natural and cultural resources, and to offer enjoyable outdoor experiences for visitors. Even the most dedicated staff needs volunteer assistance to complete this ever-growing list of tasks.

The sheer volume of backlogged conservation work and the immensity of priority work in areas such as fire pre-suppression/restoration, invasive species abatement/removal, and restoration of healthy

¹ Adapted from Wumkes, K. (2008). *A sense of place: Why people volunteer for land and wildlife*. Presented at Building Capacity to Connect People and Nature Workshop, Salt Lake City.

forest and wildlife habitat necessitate a national training program for conservation crew leaders. A significant portion of this diverse workload can be preformed by volunteers. Before harnessing a voluntary workforce, however, we must have volunteer crew leaders trained to lead others in conservation service projects and to help administer volunteer programs.

Conservation USA volunteers work on crews to complete conservation management tasks such as construction, renovation, and trail maintenance. They learn and develop through active participation in thoughtfully organized service experiences that meet actual community needs. A volunteer can take on the role of a project leader, consult with a land manager to identify project goals, and then direct a crew in carrying out a project. To prepare for a service experience, a volunteer leader must first complete the Conservation USA Project Leader Training Course and meet Conservation USA certification requirements.

C. The Conservation USA Project Leader Handbook

This handbook is the text for the Conservation USA Project Leader Training Course. It serves to reinforce classroom discussion and to provide information for further exploration. Content covers the skills necessary for a crew leader to provide a safe, fun, and productive experience for volunteers working on land improvement projects. A mastery of the concepts and skills outlined in the Handbook will help leaders work with land managers more efficiently.

The *Project Leader Handbook* provides information to help leaders plan, organize, and conduct a safe group project including sections on:

- Leadership and group management techniques
- Safety and risk management concerns
- Step-by-step planning objectives

It also serves as a reference source for methods, tools, and safety information that the user can refer to throughout his/her tenure as a volunteer conservation leader. Sample topics, found in the appendices include:

- Fire and fuel reduction
- Invasive species
- Environmental surveying and monitoring
- Revegetation and restoration
- Trail maintenance and construction

Other materials may be used during the Training Course, including the U.S. Forest Service, *Trail Construction and Maintenance Notebook*, the Colorado Outdoor Training Initiative (COTI), *Guide to Crew Leadership for Trails*, and others.

Conservation USA envisions a future where people are inspired to work together to be wise and caring stewards of our natural and cultural resources.



“

It is our task in our time and in our generation, to hand down undiminished to those who come after us, as was handed down to us by those who went before, the natural wealth and beauty which is ours.”

John F. Kennedy

”



II. Take Action with Conservation USA

A. What is Conservation USA?

Conservation USA's is a partnership of America's public and private, natural and cultural resource agencies. The Conservation USA mission is to teach volunteer leaders specialized skills for training and leading volunteer crews to carry out conservation projects. This course will prepare you to lead conservation projects.

Conservation USA's fundamental goal is to encourage youth and adults to increase the level of ownership and stewardship of their environment through volunteerism and skills development. The program provides opportunities for youth and adults to develop their volunteer leadership skills through understanding and appreciation of the value of volunteerism. Specific goals include:

- Create and sustain a vibrant partnership program.
- Teach and apply a set of core competencies for project leaders.
- Achieve tangible, long-lasting natural and cultural resource benefits.
- Instill a life-long commitment to continued environmental caring, learning, and service.

The Conservation USA program provides:

- Volunteer leadership development efforts with resources, training, information, and technical assistance supporting the use of best practices
- Development opportunities for volunteers to improve their knowledge, skills, and abilities
- A collaboration of organizations that share Conservation USA's mission to offer the broadest range of volunteer leadership training and development efforts
- A network of councils to effectively address regional conservation needs and best identify regional training leadership
- Certificate of completion for volunteer leaders that fosters effective, inclusive, and meaningful projects

Conservation USA is a national partnership of public and private agencies that connects land managers and volunteers, provides training that promotes environmental stewardship, and enables people to contribute to the future.

See Appendix A, About Conservation USA (p. 65), to learn more about the history and mission of the organization.

B. What can you accomplish as a Conservation USA project leader?

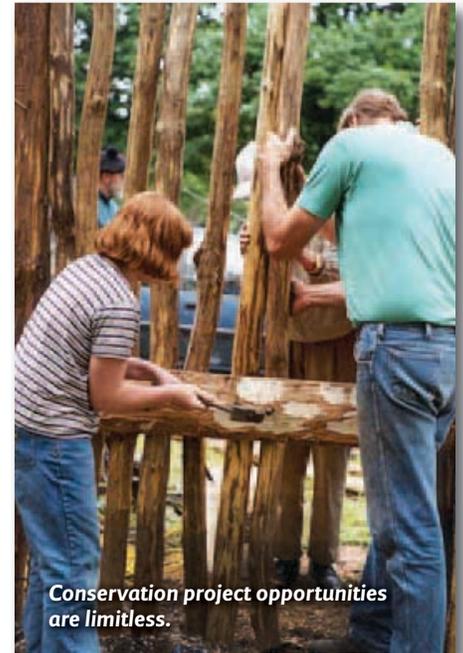
"If a child is to keep alive his inborn sense of wonder, he needs the companionship of a least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in."

Rachel Carson, naturalist and author

Conservation USA provides natural and cultural resource professionals and resource managers with reliable volunteers trained to provide leadership in completing a variety of tasks. Opportunities for meaningful conservation efforts are limitless.

Over the years, volunteer groups have completed an amazing array of worthwhile conservation and service projects. The following list suggests the variety and importance of what volunteers can accomplish:

- Construct and install nesting boxes and feeders
- Build structures in arid regions to hold water for wild animals
- Stabilize threatened stream banks with riprap, revetments, or gabions
- Return degraded campsites and trails to their natural conditions
- Plant vegetation to control erosion, produce shade, and provide food and shelter for wildlife
- Remove invasive plants and restore native vegetation
- Monitor the quality of streams, rivers, and lakes
- Prepare and install educational signs at natural areas and at historic sites
- Build fences to prevent the overgrazing of riparian areas
- Clean up urban waterways
- Stock fish in lakes and streams
- Build observation decks and blinds in wildlife refuges
- Clean and repair statues, gravestones, and other historic monuments
- Restore historic buildings
- Assist in protecting and studying archeological sites
- Develop interpretive demonstrations, tours, and living history exhibits
- Increase accessibility of resource area facilities for disabled visitors
- Construct and maintain trail systems
- Offer conservation-oriented presentations to schools, youth organizations, and civic groups
- Prepare informational brochures to distribute at visitor centers in natural and historic areas
- Train others in appropriate conservation work skills



Conservation project opportunities are limitless.

C. Benefits for volunteers and resource managers

“There are two things that interest me: the relationship of people to their land and the relationship of people to each other.”

Aldo Leopold

In almost every case, the benefits of becoming involved as a volunteer in Conservation USA far outweigh the effort.

For project leaders

Conservation USA project leaders gain experience to plan and direct conservation activities for their groups. They acquire a foundation of conservation knowledge and technical skills that will increase each time they go into the field.

Conservation projects give leaders the opportunity to make environmental education come alive. Through their actions and enthusiasm, leaders can act as role models demonstrating a wise, hands-on approach to caring for the environment. Project leaders have the satisfaction of interacting and building relationships with others interested in conservation. This would include landowners, federal land managers, fish or wildlife specialists, park rangers, and other resource managers.

For crew members

Volunteer crew members who help protect and enhance the environment learn how to accept responsibility. Rather than assuming they have no power to solve problems, they become active stewards of the land. The long-term effects of that awareness may be as valuable to the environment as the projects that volunteers complete.

Conservation USA volunteers working on public and private lands learn about the people who manage those areas:

- Managers' responsibilities
- Difficulties managers face on the job
- Challenges, opportunities, and rewards of management work

This heightened awareness can increase the public appreciation of professional conservation staff and the work they do.

Taking part in conservation projects led by project leaders can be fun. No matter what a person's age, gender, or background, Conservation USA gives volunteers the opportunity to work with old and new friends, learn useful skills, and feel a sense of accomplishment.

For resource managers

Resource managers with limited time to supervise volunteer groups are more comfortable working with groups that have trained leaders and with participants that are prepared to contribute their own time and energy.

Most resource managers have conservation work they are unable to complete due to lack of time, money or personnel. Conservation professionals working with Conservation USA volunteers can accomplish more in the field, especially on projects that may require more time or personnel than resource managers normally have at their disposal. Groups led by trained CSA project leaders require a minimum amount of supervision by resource managers.

Managers need to meet with project leaders to:

- Contribute to the project planning process.
- Provide standards and guidance for the satisfactory completion of the work.
- Assist in acquiring tools and construction materials.
- Help develop a project evaluation process to help groups effectively assume future projects.

A Conservation USA project is good for leaders, volunteers, and resource managers; it holds promise for everyone involved. By addressing environmental problems with the hands and minds of enthusiastic volunteers and leaders, communities benefit as well.

D. Benefits for communities: Meeting environmental and cultural needs¹

The most effective environmental stewardship projects, those which lead to action and lasting change, are created in response to local concerns.

Aldo Leopold (1887-1948), a wildlife ecologist and forester, was also a prolific writer and conservationist. Over fifty years ago, Leopold wrote his seminal work, *A Sand County Almanac*. Leopold wrote of his personal land ethic and the need for resource managers to extend their own ecological conscience to resource decisions. He understood that we cannot do this important work alone. We must engage different people to partner together for our communities' neighborhood creeks, tree-lined streets, sea-bound rivers, youth camps, playgrounds, parks and forests. Community-based conservation projects, like the barn raisings of old, are re-connecting people to the land that sustains them.

Volunteer conservation efforts can build capacity within communities to address local environmental and cultural needs:

In resource management

Simply defined, resource management is the management of our natural and cultural resources. Natural resources include vegetation, water (rivers, lakes, streams, oceans, groundwater), wildlife (from the biggest animals to the smallest of insects), land (deserts, mountains, cities, and prairies), and air. Resource managers, whether from the Forest Service, National Park Service, or elsewhere, have the responsibility to manage resources in a way that takes all these areas into consideration for the collective good. Cultural resource management is the preservation of our history and culture. Preserving cultural artifacts or historical sites safeguards our history for future generations to learn from and enjoy. An example of cultural resource management would be the preservation of Mt. Vernon, the home of President George Washington, or Mesa Verde, an Anasazi Indian ruin in southern Colorado. We have a responsibility as citizens of the natural world to help resource managers with these endeavors.

In conservation and stewardship

Conservation does not mean merely protecting or fencing in a resource. It involves careful collection and analysis of data using science-based protocols, development of a management plan, and the implementation of that plan. It involves programs that promote prudent use and renewal of our natural resources, that protect resources through minimum impact practices, and that take the responsibility to improve areas, which may have been impacted or devastated by natural or manmade causes.

According to *Merriam-Webster's Collegiate Dictionary*, stewardship is defined as the careful and responsible management of something entrusted to one's care. Each individual has a responsibility to care for the environment in which he or she lives, including both natural and cultural resources. The goal of stewardship is to sustain these resources for the enjoyment, well-being, and benefit of all. Conservation methods for protecting and caring for the environment allow each participant to take an active role and are ideal ways to introduce youth and adults to their natural surroundings.

The collaboration of volunteer stewards and resource managers in solving environmental issues is a new and growing phenomenon in conservation. McVicker and Bryan (2002)² outline important considerations for successful stewardship projects that reap benefits for the community, the resource manager and the individual:

¹ *Building Capacity: Educating for Community Action, U.S. EPA/Cooperative Extension Partnerships - No. 6*, www.uwex.edu/erc/pdf/EPA6.pdf

² McVicker, G., & Bryan, T. (2002). *Community-Based Ecosystem Stewardship*. BLM National Training Center, The Partnership Series: www.ntc.blm.gov/partner/files/principles.pdf

- Stewardship is a way of thinking and acting that leads to a sustainable and productive relationship between people and the land. Although the essence of stewardship is to serve the larger interests of society (including future generations), to be practical it must also serve self-interest.
- There is strong evidence that communities of people tend to share a common “sense of place” relative to the surrounding landscapes and environments. This natural connection of people (i.e. communities) and landscapes can potentially serve as a powerful tool for restoring and managing landscapes to the benefit of people who live there, as well as the society at large.
- Stewardship can neither be imposed nor regulated but is a matter of free will and choice.
- Peer pressure, as expressed through commonly held land and environmental ethics, can be a powerful influence supporting stewardship.
- When government assumes too much responsibility for stewardship, its practice at the community level can diminish or fail to grow and be practiced in a manner that reflects the larger interests of society.
- Local economies and social/cultural settings are interdependent with their landscapes.
- Ecosystems must be thought of as including these human endeavors if they are to be managed successfully.
- Ecosystems at landscape scales need to be understood as combinations of mostly natural, partially altered, and highly altered land units of diverse ownership. Citizen-centered stewardship should be oriented toward managing these land units with an understanding of their relationship to the larger ecosystem, not withstanding self-interest and freedom of choice.
- Ecosystem stewardship should, in part, be oriented toward sustaining a full array of native flora and fauna, and ecological processes that optimize ecosystem functions and services.

The critical component for making your Conservation USA project a successful service learning experience is to relate project activities to learning objectives.

In service learning

The Conservation USA program not only promotes sound conservation practices and stewardship, but also emphasizes a newer but similar idea called service learning. Service learning emphasizes learning by doing or experiential learning. It is a form of experiential learning that employs service as its *modus operandi*, or method of procedure. Actively engaging participants in their own education, through experiential learning in course-relevant contexts, fosters lifelong connections between participants, their communities, and the world outside the classroom. Service learning is now a part of the required curriculum in over 65 percent of our public schools. Participants in the Conservation USA program have the opportunity not only to learn about their natural world but, through service learning, to give back to their natural and civic communities. It also provides the opportunity to learn about other vocational options for future projects. It gives participants a healthy respect for the work involved in the management of the natural community of which they are a part.

Performing service promotes a concern for community issues and a commitment to involvement that mark an active citizen. Conservation USA follows on the heels of programs like America’s Promise, www.americaspromise.org, and the President’s Student Service Awards, www.presidentialserviceawards.org/tg/PSSA/. Each of these programs, recognized by the President and the national community, builds on the promise of America’s youth for the promise of America’s future. It recognizes the importance of involving youth in community projects, creating ongoing relationships with adults, giving youth safe places, providing them with marketable skills, and recognizing their efforts that have had a significant impact in meeting the needs of local communities.

E. Conservation USA project leader preparation

“In the end, we conserve only what we love. We will love only what we understand. We will understand only what we are taught.”

Baba Dioum, Senegalese poet

1. Who can participate in the Project Leader Training Course?

Volunteer groups young and old, large and small, participate in conservation projects. Many participants belong to youth organizations, natural resources organizations, service clubs, camp or school groups, special interest membership organizations or groups, and some are from the business community. Participants volunteer to work on natural and cultural resources located on federal, state, and private land. They work to better their community’s conservation efforts and improve the land on which they live and visit.

Leading a volunteer workforce benefiting natural and cultural resources is a leadership challenge that requires training, skills development, and commitment. The Conservation USA Project Leader Training Course covers five widely recognized fundamental practices of exemplary leadership:

- Challenging the process
- Inspiring a shared vision
- Enabling others to act
- Modeling the way
- Encouraging the heart

It is important to realize that the leadership challenge is everyone’s challenge. Together we will start a new journey to achieve these five practices of exemplary leadership and at the end of the journey we will have helped to preserve and protect our precious natural resources for future generations.

2. Program objectives and core competencies

“...conservation education focused on youth is imperative to developing a stewardship ethic, an understanding and connection to natural resources, and, ultimately, to conservation of the Nation’s natural resources.”

Former Forest Service Chief Dale Bosworth, 2005

The Conservation USA program is designed for teens and adults to learn and to develop through active participation in thoughtfully organized service experiences. Conservation USA projects meet actual community needs and are coordinated in collaboration with other organizations. They provide participants with the opportunity to put newfound knowledge and practical skills into real life practice on-site and in their own communities. It enhances what participants have already learned, and helps to foster a sense of ownership and respect for the environment while developing a sense of caring for others.

The Training Course covers basic conservation concepts to help you select a project appropriate to your setting and the skills of your volunteers. Trainees, however, will need to find other opportunities to learn more about management techniques or skills needed to accomplish specific project activities.

Working first-hand with resource managers on Conservation USA projects creates environmental awareness and promotes sound environmental ethics. Environmental awareness is an understanding of our natural environment, our impact on the environment, and the complexity of the relationships between the living and non-living components within an ecosystem. Environmental ethics are a guiding philosophy or principles about the environment. The Leave No Trace Program is an excellent example of environmental ethics promoted by environmental awareness. It is a program dedicated to building awareness, appreciation, and most of all, respect for our public recreation places¹. Many people practice Leave No Trace principles (environmental ethics) because they understand that it protects the environment (environmental awareness). For example, concentrating on using existing trails and campsites prevents development of impact areas. Impact areas could lead to unintentional development of trails and later erosion of the soil. Practicing Leave No Trace principles takes a proactive approach to protecting the environment.

Core competencies

Eight core competencies have been identified as essential educational components of the Project Leader Training Course and Conservation USA projects. These core competencies are as follows:

- Provide leadership for volunteer projects
- Coordinate with relevant federal, state, and local agencies and landholders
- Provide a safe experience for volunteer crews
- Identify conservation project needs
- Understand general conservation project guidelines
- Have knowledge of resources available and be able to define additional resources
- Understand resource management and stewardship
- Introduce career opportunities in cultural and natural resource management and youth services

At the end of this course each project leader should have knowledge and understanding of each competency. Project leaders should also be able to pass this knowledge along and motivate volunteer crews to learn during the conservation projects.

3. Leader preparation: The Conservation USA Project Leader Training Course

The Project Leader Training Course is a basic course meant to give a future project leader the ability to work with resource managers to take volunteer groups onto public and privately-owned lands for conservation projects. Prospective leaders should complete the following courses before taking the Conservation USA training:

- Cardiopulmonary resuscitation (CPR) and first aid certification
- *Tread Lightly! Awareness Course (online)*
www.treadlightly.org/course/inc/frameset/lessonframe.htm
Tread Lightly! is a nonprofit organization offering a variety of tools to arm recreationists and the industries that serve them with essential outdoor ethics. Their mission is to proactively protect recreation access and opportunities in the outdoors through education and stewardship initiatives.²
- *Leave No Trace Awareness Workshop*
www.lnt.org/training/awarenessworkshops/index.html
The Leave No Trace Center for Outdoor Ethics is an international nonprofit organization dedicated to promoting and inspiring responsible outdoor recreation through education, research and partnerships. The Leave No Trace curriculum focuses on techniques for learning and teaching minimum impact outdoor ethics. An Awareness Workshop is any formal Leave No Trace presentation that is one-day or less in length.³

¹ Leave No Trace Web site, www.lnt.org

² From the Tread Lightly! Web site, www.treadlightly.org/

³ From the Leave No Trace Web site, www.lnt.org/training/awarenessworkshops.php

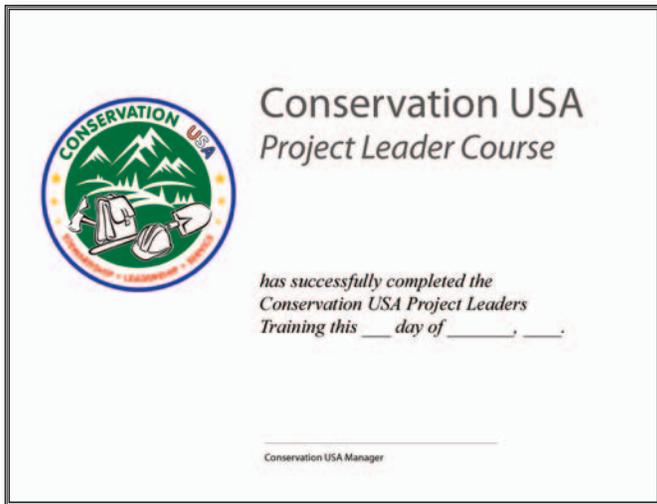
- FEMA Emergency Management Institute: *Incident Command System (ICS) Training ICS-100 and ICS-200*, and the *Introduction to the National Incident Management System, IS-700*
http://training.fema.gov/EMIWeb/IS/ICSResource/ICSResCntr_Training.htm
 ICS provides training on and resources for personnel who require a basic understanding of emergency management responsibilities. [The FEMA courses are recommended for everyone but not required unless working on large projects with the federal government.]

The in-person training course has been developed by Conservation USA and is delivered by seasoned conservation instructors. Training sessions are held across the nation and are organized by regional councils. Course participants take part in indoor and outdoor training activities on leadership, project evaluation, safety, trail management, invasive species, fire restoration, and tool safety.

Training materials include the Project Leader Handbook and classroom handouts related to specific project needs.

4. Certification

A Certificate of Completion is awarded to a participant who successfully concludes the Project Leader Training Course. Conservation USA will certify individual trainees as leaders possessing the knowledge needed to effectively manage volunteer crews in a wide array of outdoor and often remote settings. Resource managers will recognize this Certificate of Completion and expect that the project leader possesses the skills taught in the course. This certification process sets national standards for volunteer crew leaders with additional protocols for extended leadership and conservation volunteer care situations in specific disciplines.



F. Organizational support

“When we try to pick out anything by itself, we find it hitched to everything else in the Universe.”

John Muir

A number of people are involved in the accomplishment of any conservation project. Each person helps make the project go smoothly and be successful. In Conservation USA, the different roles and people that are involved include the federal agencies and national partnering organizations, the regional coordinator, the local resource manager, the instructor, the project leader, and the volunteer crew members.

Public and private agency partners

Conservation USA is working with the American Camp Association (ACA), Boy Scouts of America (BSA), Take Pride in America, the Outdoor Stewardship Institute (OSI), the Environmental Alliance of Senior Involvement (EASI), National Outdoor Leadership School (NOLS), and other partners to provide strong organizational support to ensure high quality services. This national partnership provides developmental and operational support, oversight, guidance, and evaluation of the Conservation USA volunteer crew leader training and certification program.

See the list of Conservation USA supporters on the acknowledgements page of this handbook. A brief description of each organization can be found in Appendix B, (p. 69).

Regional councils

Conservation USA regional councils serve as local-level steering committees comprised of natural and cultural resource professionals selected to represent local city, county, state and federal governmental agencies, along with representatives from conservation and youth organizations. They will collaboratively develop local, conservation-focused volunteer projects. This collaborative planning process will ensure the exchange of information and encourage the early identification of collaborative opportunities to harness volunteer workforces in a collective resolve to help protect, restore, and improve the environment. These regional councils will provide a forum for interagency and public interest consultation and action. The regional council members will work to determine the potential for implementing joint projects that address conservation challenges in a more effective manner.

As they evolve, these Conservation USA regional councils may well develop regional action strategies designed to define major issues, special focus areas, goals, and objectives within each region and specify the processes whereby joint projects are identified and implemented. Within the framework of each regional strategy, site-specific volunteer conservation projects, addressing habitat loss, trail building and maintenance, fire restoration, and/or those projects considered unique to the region, are identified and planned.

Finally, Conservation USA regional councils will establish priorities for project implementation from a suite of proposed collaborative projects.

Regional coordinator

The regional coordinator is the main contact for most project leaders. Regional coordinators' names and contact information can be found at www.conservationusa.org.

Once a volunteer group has decided to conduct a conservation project, the first person the project leader needs to contact is the coordinator for the area in which they would like to do the project. For example, if the volunteer group is located in Bloomington, Indiana, and they would like to do a conservation project in Hoosier National Forest, the project leader should contact the regional coordinator that has Hoosier National Forest within his or her region. Or, if the same group would like to do a project in the Angeles National Forest in Arcadia, California, the project leader will want to contact the regional coordinator that has the Angeles National Forest within his or her region. The regional coordinator will make the initial contact with the resource manager for the land on which the project leader would like to do the conservation project. Once the initial contact has been made, the regional coordinator will give the project leader the resource manager's contact information (including best times to contact, if possible).

The purpose behind the regional coordinator making this initial contact is twofold. First, it helps to regulate the number of project requests one resource manager may receive and can help spread projects out within a region. Second, it helps maintain positive relationships between resource managers and volunteers within the Conservation USA program. Each regional coordinator maintains working relationships with the resource managers in his or her region, and maintains



This successful clean-up effort involved a large crew of volunteers.

records of conservation projects completed. If a group is unsure of where they would like to do a project, the regional coordinator can suggest possibilities for each group, aiding in the decision-making process. The project leader should consider the regional coordinator the main support for conservation projects.

Resource manager

The resource manager works with each project leader to put together a project plan. Resource managers should provide any equipment (such as shovels, saws, etc.) or resources to obtain the technical equipment for each project. The resource manager will also be a valuable resource for emergency procedures and for aiding the project leader with information about medical help availability for the project area. Finally, the resource manager will meet the group on-site. Each volunteer group should have the opportunity to learn more about what the resource manager does and ask questions about his or her professional field.

Once the project plan is completed, the manager should have an opportunity to approve it before the start date. Keep in mind that the resource managers are the experts for their land, and project leaders will need their guidance and instruction for the project plan to be carried out smoothly. This type of communication also strengthens the relationship between the project leader and the resource manager.

Instructor

Instructors are persons within partnering organizations and other individuals who train project leaders within a specified region or organization. Their main role is to train a project leader to carry out conservation projects and pass on knowledge to the volunteer groups locally. They also transfer records of all the courses they teach and leaders they train to Conservation USA at www.conservationusa.org.

Project leader

The project leader is the core of the Conservation USA program. The other roles were developed based on aiding, supporting, and training the project leaders. Each project leader is responsible for his or her volunteer group's physical, mental, and spiritual safety during the planning, implementation, and evaluation of the conservation project. Project leaders are trained to be group leaders and to carry out all aspects of their project plans. Their leadership gives confidence to resource managers that the land and the group will be cared for at all times during a conservation project. The project leader should ensure that each group will be motivated, safe, and have some knowledge of natural resources. Hopefully, many groups will return to the area for multiple conservation projects.

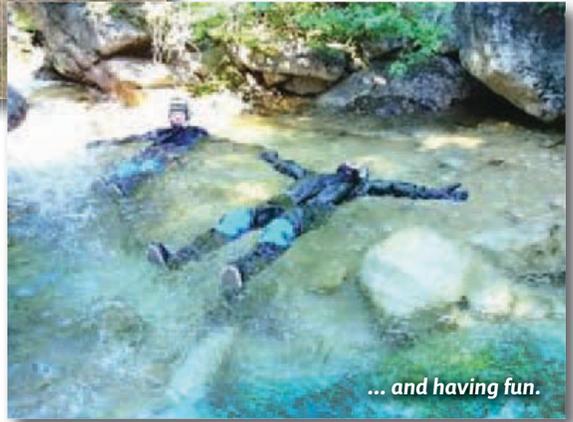
The project leader is expected to work with the set of eight core competencies. Several aspects of the conservation project plan are based on these core competencies and are easily transferred to the volunteer group. The project leader will also be expected to carry out some administrative duties, such as evaluating projects and turning this information into the regional coordinator. Overall, the project leader, as the core of the Conservation USA program, puts all the final pieces into place to do successful conservation projects and to educate the public about the rewards of stewardship for the earth.

Volunteer crew member

Last, but not least, are the men and women who volunteer to make the project work plan a reality. Under the guidance of the project leader, they develop knowledge about ecosystems and natural resources, about conservation and restoration management skills, about group dynamics, and about themselves.



Volunteers working hard...



... and having fun.



“

The first responsibility of a leader is to define reality. The last is to say thank you. In between the two, the leader must become a servant and a debtor. That sums up the progress of an artful leader.

Max DePree

”



III. The Conservation USA project leader training course

A. Developing leadership skills¹

Leadership is not reserved for people who are born leaders. Leadership is a skill that can be learned and improved. To be an effective leader, one must work to improve one's skills, take the time to understand the group one will be leading, and learn how to apply the appropriate leadership style for the group and situation.

Leadership style depends, in part, upon the profile of the group and its stage of development. A leader's chosen style may hinder or help the group develop as a team. A leader needs to be familiar with the typical stages of group development and the most effective style of leadership for each stage. These stages, and the leader's role in helping a group move through them, are fully explained in Section B, *Knowing and guiding your group*, page 20.

There is no absolute rule book for leadership, but this section presents some of the various tools and theories, as well as suggestions, that will help project leaders improve their skills and judgment when working with volunteer groups.



1. Types of leadership skills

Leadership skills can be divided into three categories: technical, human relations, and conceptual. Effective leaders work to improve and combine these skills in ways that help their groups accomplish their goals.

Technical skills are specific to accomplishing tasks. People with technical skills know how to perform the tasks required to get the job done. Having the skill does not necessarily mean, however, that one can motivate and teach others. For example, a good swimmer may not be able to teach others to swim.

Human relations skills involve interaction with others. These include:

- Good communication skills
- The ability to understand group dynamics, and facilitate cooperation and trust
- The ability to inspire and motivate people, and to help them feel valued and respected.

Conceptual skills involve the ability to communicate and share a vision. People with conceptual skills can help a group foresee the results of their work, understand why the work is important, and develop a plan to get there. Conceptual skills involve the ability to analyze, anticipate, and use critical thinking and problem solving skills.

2. Leadership styles

Most people who study leadership believe that choosing an appropriate leadership style depends on a number of factors, including the leader's experience and comfort level, the stage of group development, the age and or experience of the group, and the situation. Three basic styles reflect the common understanding of leadership:

¹ Adapted from the American Camp Association: www.acacamps.org/knowledge/leadership/

A benevolent autocratic leader concentrates on the task at hand with little recognition as to how the group is working together or of the relationships within the group. An example might be a leader who says, “I understand you’re tired, but we need to get this done as promised.”

A democratic leader considers the task equally important to group morale and relationships. Democratic leaders focus on group goals and objectives while encouraging individuals to meet their personal goals and objectives. Building relationships and working together are central to the process and success of the project. A democratic leader may say, “I understand that you are tired, so let’s sit down and talk about what is needed to complete the project and meet our goals and objectives.”

A free-rein leader is considered to be the opposite of the democratic leader in that they are not concerned with relationships or the task. They will give up control of the task and let the group take care of itself. They are rarely seen monitoring the group or checking on goals and

Table 1. Leadership styles and characteristics			
Style	Characteristics	Effective when	Ineffective when
Benevolent Autocratic	<p>Skilled, experienced</p> <p>Relies on authority, makes decisions, tells others what to do, maintains control</p> <p>Possesses high concern for task and lower concern for people</p>	<p>Time is limited</p> <p>Group lacks skill and knowledge</p> <p>In an emergency situation</p> <p>Group is motivated</p> <p>Group members do not know each other</p>	<p>Team building is the goal</p> <p>Skills and knowledge exist in the group</p> <p>Group wants some say or spontaneity in project</p>
Democratic (Participative)	<p>Knowledgeable of group and task, focused on how the team is accomplishing the task</p> <p>Involves group in decisions, shares responsibility and authority, empowers others</p> <p>Fair, good listener</p>	<p>Time is available</p> <p>Group is motivated and functioning as a team</p> <p>Group has some confidence, skills and knowledge</p>	<p>Time is limited</p> <p>Group is unmotivated</p> <p>High degree of conflict is present</p> <p>Group members do not know each other</p>
Free-rein (Laissez-Faire)	<p>Gives up control, no sense of being in charge, relinquishes authority</p> <p>Trusts the group’s ability; relaxed</p> <p>Inconclusive, only offers opinion when asked, non-judgmental</p>	<p>A high degree of skill and motivation exists</p> <p>Routine is familiar to group</p> <p>Sense of team exists, everyone has an equal say, creative thinking by the group is desired, and in autonomous groups</p> <p>Time is unlimited</p>	<p>Group expects to be told what to do</p> <p>There is a lack of skills or knowledge in group</p> <p>Group is uncooperative</p> <p>Group is coming together for the first time, unless strong leadership emerges</p>

objectives. A free-rein leader allows the team to make its own decisions. A leader like this might say, “We’ve promised to complete this project by 5 p.m., you decide what you want to do.”

See Table 1 for more on the characteristics of these leadership styles and for tips on when they are and are not effective.

A fourth type of leadership, *facilitative*, could be described as combining the previous three types as appropriate to each situation. A facilitative leader understands the problem or task and the people. This leader works to empower volunteers, building their skills and motivation. The facilitative leader takes charge when necessary but delegates responsibility whenever possible.

This leader could also be described as an instigator. The instigator gets things started but works with others to identify management skills within the group.

In the 1960s, Dr. Paul Hersey developed a model of leadership called *situational leadership*.¹ It states that leaders must use appropriate leadership styles with various people and various situations. For example, if the situation is an emergency and quick precise action is needed, an autocratic leadership style may be the most appropriate. The situation should dictate the appropriate style, and at times each leadership style is important. The real challenge is to understand and become a situational leader, one who uses the appropriate leadership style to fit the group and the situation’s needs.



3. Exemplary leadership practices

Even as a group develops and leadership styles vary accordingly, effective leaders show certain common characteristics or behaviors throughout. The following five behaviors were identified in research by Kouzes and Posner (2002) and described in *The Leadership Challenge*.² Their research consistently revealed that these practices were repeatedly found in effective leaders.

As your leadership style varies with different situations and group stages, it is important to keep in mind the following “Five Practices of Exemplary Leadership” from *The Leadership Challenge*:

- **Leaders challenge the process** – They search for opportunities to change the *status quo*. They look for innovative ways to improve the organization. They experiment and take risks. And since risk-taking involves mistakes and failure, leaders accept the inevitable disappointments as learning opportunities.
- **Leaders inspire a shared vision** – They passionately believe that they can make a difference. They envision the future, creating an ideal and unique image of what the community, agency, or organization can become. Through their strong appeal and quiet persuasion, leaders enlist others in the dream. They breathe life into the shared vision and get people to see the exciting future possibilities.
- **Leaders enable others to act** – They foster collaboration and build spirited teams. They actively involve others. Leaders understand that mutual respect is what sustains extraordinary efforts;

¹ For more on Hersey and situational leadership see the Center for Leadership Studies Web site: www.situational.com/

² Kouzes, J. M., & Posner, B. Z. (2002). *The Leadership Challenge*, 3rd Edition. San Francisco: Jossey-Bass.

they strive to create an atmosphere of trust and human dignity. They strengthen others by sharing information and providing choice. They give their own power away, making each person feel capable and powerful.

- Leaders model the way – They create standards of excellence and then set an example for others to follow. They establish values about how constituents, colleagues, and customers should be treated. Because complex change can overwhelm and stifle action, leaders achieve small wins. They unravel bureaucracy, put up signposts, and create opportunities for victory.
- Leaders encourage the heart – Getting extraordinary things done in organizations is hard work. To keep hope and determination alive, leaders recognize contributions that individuals make in the climb to the top. And because every winning team needs to share in the rewards of team efforts, leaders celebrate accomplishments. They make everyone feel like a hero.

Again, different situations will call for different leadership styles. Each style will also call for stronger use of one or more of the above leadership practices. It is important to remember that very few leaders are able to use all practices all the time. For example, when an emergency arises very few leaders will find themselves concentrating on “inspiring a shared vision,” but they will find themselves “modeling the way” by their actions and “encouraging the heart” to avoid panic among group members. Once the emergency is over, it may be time to “inspire a shared vision” of what the future may hold for the group, and challenge the group to look above the disaster and embrace the new situation. Therefore, various practices will be needed at various times, similar to leadership styles. It is important to try to check yourself to see if you are encouraging your group members, if you are modeling the way, if you are challenging the process. Take time to evaluate yourself and to receive feedback from your group.

4. Self-assessment

Take a moment to think about your leadership skills:

- Can you describe your behavior as a leader in any of these ways?
- Which trait is strongest?
- Which trait is weakest?
- What kind of situations do you see yourself encountering as a project leader?
- What kind of styles fit these situations?
- Where do the principles fit in?
- What would you like to change about your own style of leadership?

There are no rules of leadership that say you must use one leadership style for a specific situation. This is because each leader and each group is different. As a leader, you must be aware of your group’s characteristics and stage of development and decide which style to use according to the situation. The above information is a guideline to help you strengthen your leadership and be more effective with your groups. Try to recognize what you want to change or improve, and evaluate the new changes by their effectiveness on your group experiences.

B. Knowing and guiding your group

“Conservation is a state of harmony between men and land.”

Aldo Leopold, A Sand County Almanac, 1948

1. Getting to know your group

Getting to know your crew is the first step involving a volunteer group in conservation work. Determine your group members' interests and capabilities. The following questions can help with that assessment.

► *What does your group like to do?*

Conservation projects can be a natural extension of activities a group enjoys doing. People who enjoy fishing, canoeing, kayaking, and rafting are often eager to improve the water quality of the lakes and streams they use. Bird-watchers might want to enrich wildlife habitats by planting hedges, trees, and grasses. Hikers, bicyclists, and horseback riders may want to repair the trails on which they travel. Curiosity about the past can inspire people to recondition monuments, cemeteries, and historic buildings. Others may be interested in caring for favorite urban greenbelts, parks, picnic grounds, and beaches. A love of discovery may lead volunteers to study and document changes in soil, plants, wildlife, and other aspects of ecosystems.

Many outdoor activities can be tailored to include environmental work. Hiking, camping, and canoeing trips, for example, may take group members to locations needing erosion control and re-vegetation. Conservation projects can also offer the social pleasure of planning and doing something worthwhile with friends, and offer the enjoyment of meeting resource managers and other land users.

► *What are the abilities of group members?*

Some people are ready to pull on their gloves and throw themselves into hard physical labor. Others may be more interested in compiling records in historical libraries and conservation offices, caring for plants in seedbeds, or developing environmental education activities to enliven a group's conservation outings.

Carefully consider the abilities of group members, but don't sell anyone short. Every person who is motivated can add something to an environmental project. Remember, too, that people often welcome a chance to challenge themselves mentally and physically.



This group did hard physical labor on a wetland restoration project. What are the abilities of your group members?

► *How much time are people willing or able to devote?*

If group members are enthusiastic about conservation work, discuss with them the amount of time they want to commit to planning and completing projects. Encourage them to be realistic. Families, jobs, schoolwork, and other responsibilities all take time. If the project is part of another activity such as a canoe trip, discuss how much time they want to spend doing conservation work while on the trip. Completing a small project the first time will give group members a chance to become familiar with what is expected of them, how they work together, and how much they can do. As they gain experience and increase their skills, they may want to adjust their schedules so they can contribute more time to the environment.

As you consider the responses to the questions above, be honest with yourself about the degree of enthusiasm (or the lack of it) group members express for volunteering to do

conservation work. It is frustrating for group leaders and land resource management staff to invest time and energy in planning projects, only to discover that the volunteers would rather be doing something else.

A group's reluctance to participate in conservation projects may stem from inexperience with relevant work and doubts about what is expected. You can encourage the group to get a taste

Table 2. Stages of group development		
Stage	Behavior indicators	Leader's role
Saying Hello	<ul style="list-style-type: none"> Generally inhibited around group members Unsure of their role within group Still getting to know each other May not share personal opinions yet Dependent on leader 	<ul style="list-style-type: none"> Clarify expectations Build comfort with group Avoid personal feelings Encourage interaction and involvement Give clear directions, be assertive, focus the group on the project
Saying Who	<ul style="list-style-type: none"> Developing roles within the group Testing limits Opinionated, concerned about themselves, argumentative, assuming Questioning of leader's authority 	<ul style="list-style-type: none"> Be aware of power struggles Help with conflict resolution Encourage two-way communication Focus on the project and the group working together to accomplish it
Saying Why	<ul style="list-style-type: none"> Understanding role within the group Showing concern for the good of the group Developing norms and common ground Sharing responsibility 	<ul style="list-style-type: none"> Help with group problem solving Encourage accountability Help with development of common standards for group behavior Encourage two-way communication
Saying We	<ul style="list-style-type: none"> Acknowledgement of each other's strengths Respect for others' opinions Two-way communication Interdependent, independent of the leader Sharing feelings 	<ul style="list-style-type: none"> Delegate the task Comment when asked Acknowledge success and failure Encourage independence Allow the time for creativity and discussion Be aware of exhaustion
Saying Goodbye	<ul style="list-style-type: none"> Reflecting on experience Mixed feelings of leaving Recognizing growth and change Desire to maintain ties to the group 	<ul style="list-style-type: none"> Encourage and direct reflection Transfer experience to their local community and daily actions Allow time for contemplation

of environmental work by helping plan and complete a small project of a few hours that is assured of success. You also can emphasize the fun and fellowship of conservation work and the opportunities to combine projects with hikes, campouts, career exploration, and other related activities. If group members make it clear that they are not interested, then it is a disservice to them and to resource managers to force the issue. Perhaps in the future the group will become more open to the idea of exploring conservation projects.

2. Group development

A group usually goes through five stages of development before it is dissolved, although many groups will never progress beyond the first two stages described in Table 2. Table 2 describes typical group member behavior at each step and suggests how a leader can help alleviate uncertainties and facilitate a cooperative effort.



3. Group dynamics and behavior management

In any group activity, there should be a purpose, goal, or specific task to be completed. Individuals with different talents and strengths become a group as they learn about and from each other and accept a common goal. This acceptance and common pursuit of a goal, if orchestrated properly, will supersede individual differences.

Productive group behavior is dependent on both the attitude of the group and the attitude and actions of the leader. A strong leader will exhibit certain attributes: guidance, organization, coordination, delegation of authority, dependability, fairness, consideration, respect, and consistency. When these qualities are present in a leader, the morale and efficiency of the group will be higher.

Although most of these suggestions for managing behavior apply to youth and teens or young adults, some of the suggestions may be helpful in dealing with problems between adults or in groups that have a wide age range.

► Reinforcing positive behaviors

There are a number of positive ways in which leaders can encourage individuals to behave well. One is to establish an equal, caring relationship with crew members by opening lines of communication and encouraging them to come to you if there is a problem. When leaders praise positive acts and ignore negative ones, the message is sent that members must behave in a positive way to gain attention. Another way of encouraging good behavior is to create an atmosphere that is full of cooperation and fun. Help and encourage participants before they begin complaining.

► Inappropriate group behavior

When dealing with people from a variety of backgrounds and family situations in a setting where they can test new and different behaviors, there will be instances when those behaviors are unacceptable. The following are some of the key issues involved in managing group behavior and suggestions for dealing with inappropriate group behavior.

- **Peer pressure** – As children get older, the opinions and acceptance of their peers become more and more important. Individuals may go along with an activity that will get them in trouble or harm themselves or someone else because they want to be part of the group. The leader can praise those who are willing to voice their opinions and help them with negative peer pressure by discussing situations where it is difficult to stand against the group.

- **Stereotypes/prejudices** – Youth and teens are influenced by media role models, parents, teachers, and expectations and experiences drawn from their own backgrounds. Crew members may be all the same sex, or can share similar economic, religious, racial or ethnic characteristics. This can present barriers to group development, because people tend to act out behaviors that reinforce stereotypes or reflect their own experiences. The example the leader sets reflects his or her values, expectations, background, and experiences. It is of great importance because crew members tend to imitate their adult role models. The challenge for the leader is to examine their own prejudices, feelings, and actions, and determine the expectations the program has as a role model for the group.
- **Group rowdiness** – A work crew can get carried away, especially in the second and third stage of group development when the members are struggling for roles and testing authority. Competitive activities may overstimulate them and lead to inappropriate group behaviors or cause an accident. Also, at times when the crew is bored or waiting, traveling or otherwise not in structured activities, negative peer pressure may emerge. The leader should be sensitive to what is happening in the group, having identified warning signs and ways to gain control.
- **Practical jokes** – Pranks and hazing can be inappropriate individual behavior but can often become inappropriate group behavior as the stages of the group progress. The joke might be directed at an individual or another work crew and can be destructive to equipment or the environment. The leader needs to be aware of the ramifications and appropriateness of the group's behavior. Many of these incidents begin as team- or group-building fun and develop into retaliation and destructive behavior.
- **Abusive behavior** – What in the past may have been considered a prank, hazing, or retaliation or punishment is today often considered abuse. Some of the sexual behavior identified as a normal aspect of human growth and development may become abuse when a crew member exhibits that behavior toward a younger member or by force on a peer. Occasionally a young person is unable to judge the appropriateness of sexual or physical abusive behavior because of a family or personal experiences.

► *Preventing inappropriate group behavior*

Most incidents and accidents come when there is free time or participants are “horsing around.” A well-planned project, timed so crew members are not idle or bored while waiting for others, is key to the prevention of inappropriate behavior.

Before discipline becomes an issue, there are some considerations that need to be understood and accepted by crew leaders. Youth, teens, and young adults:

- Have the occasional need to test limits.
- Cannot always manage self control.
- Have a strong tendency to imitate the values of a peer group.
- Have the right to make mistakes.
- Have the right to be respected as individuals, regardless of unattractive attributes.

Discipline problems can be prevented by helping participants have an understanding of expectations for behavior while participating in a conservation project, by earning their respect (by giving respect), by maintaining control, listening and reading signals, and by trying to be one step ahead of them.

► *Ideas for dealing with inappropriate group behavior*

- Explain the importance of rules and ask the crew to establish some group rules.
- Talk about possible ramifications of inappropriate actions.
- Listen to what the members are saying, not just how they are acting.
- Don't be judgmental and look for the cause of the behavior.
- Provide support to the members in trying to find a solution.
- Participate with the crew and model the behavior you want to see in your group.
- Deliberately mix members into different sub-groups.

- Talk with members in a non-shaming, non-accusatory way.
- Explain that it is normal to have different opinions, and explain the importance of respecting the opinions of others.
- Help members discuss feelings of anger, resentment, not belonging, power, fear, shame, etc.
- Discuss what it means to be a friend and what it means to be a part of the group.
- Play cooperative and team-building games.
- Discuss alternative actions to deal with boredom, spare time, tiredness and unpleasant tasks.

► *Ideas for dealing with inappropriate individual behavior*

If initial attempts to control or change an unacceptable behavior have failed, these processes may help:

- Maintain the initiative and try to persuade the individual that it is better to conform.
- Avoid specific threats by using a broad warning of a possible course of action. Rather than saying, “If you do that again, you will be sent home,” try, “There are consequences for breaking rules or not cooperating.” A specific threat commits you to carry it out or back down and may even dare the participant to test you, whereas a general warning reinforces the idea that compliance will be better than defiance.
- Review any punishment before setting it. Does it fit the offense? For example, if a participant has peppered another’s dessert, is it fair that the culprit goes without dessert? Is punishment necessary to deter a repetition of the behavior? Any persistently antisocial behavior should not be allowed to pass without some appropriate action. Some individuals respond better to negative consequences while others respond better to rewards or positive reinforcement.
- Look for causes. Avoiding difficult situations is much better than having to deal with them once they arise. Youth, teens, and young adults with too much energy can get into trouble; overtired ones are prone to react badly to provocation. If there is a participant more prone to negative behavior, try to start each day in a manner that will encourage proper behavior. Try to identify individuals who might cause problems and have strategies in mind to deal with them; having a plan will keep the problems from seeming overwhelming.

Good behavior management helps crew members know their limits, provides a safe experience, helps accomplish the goals of the project, and meets the expectations of parents, land managers, and organizations.

C. Project planning and logistics

“The purpose of conservation: The greatest good to the greatest number of people for the longest time”

Gifford Pinchot, first Chief of the U.S. Forest Service

1. Identifying project possibilities

All resource managers work with a land use plan. A land use plan is simply a map that outlines how an area is to be managed with regard to wildlife, land, and water, usually with input from a variety of natural resource professionals who have expertise in these areas. Land use plans are updated on a regular basis to ensure the best management practices are in place for a particular area. Resource managers will use this plan when determining what projects to do with conservation groups.

Resource managers continually work to identify projects that will help improve a natural area. Some management areas are so large that to be able to see everything all the time would require extensive staffing and budgets. Inevitably, problems will develop that may go unnoticed. Conservation USA crews may find opportunities to assist as well as learn from resource managers, either while working on a project or when simply walking through an area. Crew members may assist by identifying problems and reporting what they find to the resource manager. A good example of this would be a work crew finding a tree down across a trail. If the tree is too big to step over, people hiking the trail might go off the path and around the tree to get by, trampling vegetation and causing erosion. Alerting the resource manager to this situation could result in a quicker response to the problem, thus minimizing adverse impacts to the trailside area.

Successful planning insures that programs are directed toward the results that matter most. Plans establish goals and objectives, identify actions to be taken, and are modified and updated through monitoring and evaluation, amendment, and revision. Project leaders must be very comfortable in developing plans for the conservation projects and the crews of volunteers that they are going to lead. While the land manager has the responsibility to care for the land and must make the final decision, the project leader can greatly assist that land manager by providing them with a properly developed plan that addresses all of the issues and presents several alternatives. To be effective a personal relationship must be established between the project leader and the land manager. The project leader must have sufficient knowledge to not only develop the initial plan but be able to recognize when conditions are not what was anticipated and be able to adapt and modify the plan.

A good planning process to follow is the one that is identified in the National Environmental Policy Act (NEPA) and the regulations that implement it. While Conservation USA does not need to be as rigorous as that act requires, following these steps may make communication with federal land managers much easier as well as help them to complete some of the work that they require in the term that they must use. In some cases the land manager or your local Conservation USA regional council may have already completed all of the planning process and simply need volunteers to help implement it. In others you may bring a new idea to the attention of the land manager and you may need to work through the entire process. Or your situation may be somewhere between these two examples. In each case your knowledge of the planning process and willingness to help the land manager will greatly strengthen your relationship with him or her. It will also make working with the manager on future projects much easier. The six steps to plan a project are:

- Identification of management issues, public concerns, and opportunities
- Assessment of the current conditions and collection of data
- Identification of possible alternatives and their consequences
- Selection of a proposed alternative and description of expected conditions and outcomes
- Implementation of the proposed alternative
- Evaluation and monitoring of the results

2. Working with local resource managers

► *Finding your local resource manager*

The relationship that the project leader forms with the resource manager affects the success of the conservation project. One of the first steps in beginning this relationship is contacting the regional coordinator for the area in which the volunteer group would like to do the conservation project. Find names and contact information for regional coordinators on the Conservation USA Web site: www.conservationusa.org. Regional coordinators have ongoing relationships with the resource managers in their regions and will help project leaders find the appropriate resource managers for their projects. The regional coordinators are also able to suggest possible places for projects and spread the number of conservation projects out across their regions.

► *Meeting and planning*

Once the regional coordinator has contacted the resource manager, he or she will pass the resource manager's contact information along to the project leader. Once a project is decided on, the two will be working together to design the project plan. Although not always possible, Conservation USA recommends that at least one initial meeting and discussion take place prior to the actual project date to help the parties get acquainted and to facilitate planning. It may be helpful to include one or two additional volunteer leaders and crew members in this meeting. Some groups and resource managers may request that this meeting be set up several months prior to the project date(s). These groups may be doing longer-term or ongoing projects and need additional preparation time to order supplies or set schedules. Prior to the meeting, the project leader should consider what he or she and the resource manager may want to learn from the experience.

The resource manager may want to know:

- What evidence is there that members want to undertake projects to help the environment?
- What is the group's purpose, and what kinds of activities have members enjoyed in the past?
- How much time are group members willing to dedicate to conservation work?
- What sorts of projects would the group like to do?
- Does the group leader have past experience working with a resource manager?
- Do volunteers and their leaders already have work skills that could be of use in environmental projects?

The project leader might ask the resource manager:

- Do you have experience working with volunteers? What successes have volunteers had in the past?
- What sorts of projects would you like to accomplish if you had sufficient staff, particularly those efforts requiring labor-intensive work that is beyond the time limitations of current personnel?
- Would you be interested in having the group involved in conservation work on a long-term basis (one weekend every month, for example), especially if group leaders can supervise work efforts and complete projects to agency standards (if this is of interest to the volunteer group)?

Also during the first meeting, the project leader and the resource manager may want to begin looking at the suggested items that are covered in project planning. Resource managers are experts in the field of conservation and can be a strong resource in planning, implementing, and evaluating conservation projects. The resource manager can also provide important information about local resources such as emergency facilities, and supply and equipment sources.

Prior to the project date, it is recommended that the resource manager approve each project plan. That way, if there is anything about the conservation project that the resource manager disagrees with or is incorrect, adjustments can be made ahead of time, reducing the amount of confusion at the project site. Most importantly, approval of the project plan will help ensure that both the project leader and resource manager have similar expectations of the volunteer group and the results of the conservation project. The better the relationship the volunteer group has with the resource manager, the better the experience the volunteer group will have. Involving the resource manager in the plan's development will help him or her gain confidence in the group's preparedness for the conservation project.

► *Establishing a partnership between local resource manager and volunteer group*

A partnership between a volunteer group and a land management agency or organization generally starts small. As the relationship grows, a foundation of trust and understanding is built

and strengthened over time. Such a relationship allows volunteers to explore the environmental opportunities available to them, while resource managers can learn the most effective ways to involve volunteers in conservation work.

Agency personnel who become acquainted with group members and know that they are willing to plan ahead will often be enthusiastic about suggesting environmental projects with opportunities for learning, for service, and for fun. Not all relationships will be the same; they may exist in several forms depending on the type of project that the volunteer group is planning.

- Short-term relationships will be built when the volunteer group is planning to do a one-day or one-time conservation project.
- Long-term relationships may be built if the volunteer group is planning on a project that will take place over an extended, but defined, period of time.
- Ongoing or enduring relationships may form when a volunteer group is planning on adopting an area and maintaining the conservation health of that area indefinitely.

► *Taking time to learn about land management goals*

The importance of connecting project goals to ecosystem concepts is explored in Section IV, (p. 49). It is also important to relate those concepts to conservation or management goals set by the agency that has responsibility for the property. Opportunities for the work crew to learn more about management practices, such as trail maintenance or riparian revegetation techniques, may present themselves either at the project site or en route. This is another situation where the resource manager's expertise can be invaluable. For example, the crew may walk past a river or stream and notice the area they planned to work in has been flooded. Upon further inspection, they find that beavers have built a dam on the river, resulting in the damming of water and flood conditions. The first instinct might be to remove the dam so that the water will flow back in the course of the river. However, the resource manager knows that doing so would destroy the animals' habitat and alter the environment. It is a good opportunity to talk about the possible solutions to this problem.

Sometimes volunteers may encounter a situation that looks like a problem when, in fact, it was created by a land manager to address a conservation need. An example of this might be if a work crew spots an area devastated by fire or notices a fire burning a good distance away. The first instinct might be to go and clean up the area, plant new seedlings, and make it look more aesthetically pleasing, or to tell the resource manager about the fire so it can be put out. However, fire is a natural management tool and is sometimes used to help improve an area (depending on what the land use plan says). Many species of plants need fire to reproduce; the intense heat is the only thing that will open the pinecones or seed pods for reseeding. Fire is also important in "cleaning house" when the undergrowth of a forest gets too thick. Some management areas set fires deliberately to help promote growth of an area or to clear an area if a new species is planned for introduction.

Identifying possible problem or project areas serves several purposes. First, it provides a great educational opportunity to learn more about the environment, increase environmental awareness, and learn about resource management practices. Second, it allows the crew to be a part of the resource management team, identifying problem areas and helping resource managers with the implementation of the land use plan and conservation of the area. Remember, however, that work crews should not take it upon themselves to attempt a project in a problem area without discussing it with the resource manager or without prior authorization.

3. Involving your group in planning

One of the most effective ways to provide a sense of ownership of the project is to involve the group in the entire process right from the start. What are their opinions? What would they like to do? How

much time would they like to spend on a project? What would they like to eat? Where would they like to stay?

Planning as a group helps establish a working relationship and provides order, clarity, and purpose to the task. It is the responsibility of the project leader to facilitate the discussion by encouraging crew members and giving them opportunities to participate. Participation in the group discussion requires involvement, motivation to contribute, and acceptance of responsibility for one's actions. Keep in mind that some participants may be reluctant to take part because they are unfamiliar with the project, the environment, or are shy. Refer to Section B1, Getting to know your group (p. 21), for more information on group assessment.

► *Leading a discussion*

Build on and encourage comments – It's important to get everyone's input in the planning process. Participants should be encouraged to give their opinions in a constructive manner. Using everyone's input in the decision-making process forges a sense of ownership.

Take time to listen to each other – Remind group members that it is important to listen to others' ideas even if they do not agree with another person's opinion. Everyone doesn't have to agree at all times, but it is important that participants feel that they are being heard.

Ask key questions that will stimulate interest – It's important to give the group some direction. Have a list of questions put together that will generate ideas and discussion about the project plan: "Where would you like to go?" or "What kinds of projects interest you?" Then provide a few examples. The more organized your questions are, the more organized the discussion will be and the more interest the participants will show. The discussion will be more organized and the participants will be more interested if your questions are well thought out.

It's okay not to have all the answers – Even the best prepared leaders are going to come across questions that leave them stumped. Use this opportunity to learn as a group, and help participants understand that no one has all the answers. It's never a good idea to make up an answer; it is better to tell the group that you will find out and let them know.

► *Making decisions*

Now that everyone is gathered to talk about the project, there are many decisions that need to be made. Use the Project planning worksheet (Appendix C1, p. 80) to help the group plan the conservation project. Group members who help set their own rules and who take part in planning will be more likely to follow the rules, help hold their group accountable, and have a sense of pride and accomplishment about the overall project.

Does your organization have policies regarding group travel and involvement in work projects? Before sanctioning the activities of its members, many organizations require that group leaders fill out forms and establish safety guidelines. Refer to Section D, Safety and risk management (p. 32) for more information. Early in the process of planning conservation work, check your organization's policies and address any concerns that may affect your group's plans.

► *Questions the group will need to address*

Why is the group doing this? What is the purpose or the intent of the project? Why does the group want to participate in a conservation project?

When and where is the group going? Group readiness, weather, time of year, and the physical attractions of the area will all determine where the group would like to go. Remember to allow

enough time from the decision to go to the actual time of the trip. It is important to have enough preparation time to plan your route and transportation means, procure and pack food and equipment, raise funds if necessary, and contact and meet with the local resource manager.

How long will the group stay? The crew needs to decide how long the project will take. If the project is part of an already planned camping trip, it could be as short as a day or as much as a week. Time for travel, project activities and recreation should all be part of your estimate.

What will the group do at the location? Going back to the “why” of the project will help you focus on what needs to be done at the project site. Coordinating with the resource manager will assist you in determining specific work details. The site and surroundings will also determine what kind of recreation the crew wishes to plan (hiking, swimming, etc.).

How many adults need to go and who will that be? There should be at least two adults for every work crew. If there are more than 12 children or youth in a crew, include at least one adult for every six to eight additional members. The advantage to having more than one adult per work crew is that, should an emergency arise or if one adult becomes incapacitated, the other can go for help or assist the crew members.

What will it cost? No matter how short or long the project, there will be costs involved. It is important that the whole group be aware (not just the adults) of the costs and take responsibility to help fund the project.

Part of planning is to establish a budget for each specific project. It is good to get estimates for each of the areas where money is needed. Transportation, food, lodging (whether in cabins, hotels, or campsites), equipment rental and/or purchases and miscellaneous expenditures will all take money. Complete a Budget worksheet (Appendix C2, p. 81) to help track expenses.

How will the group pay for it? It is important as a group to decide where the money is coming from to pay for the project. Will it be taken from the group’s treasury and, if so, how much? How much is each participant responsible for? Will there be fundraising events to help raise money? Remember that even if adults are using their personal cars for a project, money should be budgeted to cover the cost of gas and mileage.

► *Timeline*

The work crew will need to set up a planning schedule, noting when things must be done. For example, what is the deadline for getting contact and emergency information in? It should be at least a week before the trip so the crew leaders can make sure that information is completed for all participants. When must supplies and equipment be obtained and made ready? How far ahead must cars be reserved and transportation plans be finalized?

4. Practical considerations

While planning a project you will have to consider things that might affect your group’s ability to do a project. These include logistical concerns such as transportation, clothing and personal gear, ratio of leaders to crew members, and any policies your organization has that might apply to the project.

5. Environmental awareness and responsible behavior

Conservation volunteers should be expected to do certain things and behave in certain ways.

See Planning Tips, Appendix D (p. 89), for information on these planning guidelines:

- Transportation
- Food & menu planning
- Food preparation
- Shopping for supplies
- Packing out
- Daily chores
- Equipment

These environmental expectations fall into two main categories: 1) expected treatment and use of the natural resources and 2) expected group behaviors. It is recommended that the volunteer group discuss these expectations prior to arriving at the project site and be reminded of these expectations upon arrival.

Environmental awareness is an understanding of the natural environment, the human impact on the environment, the things that comprise the environment and how they interact within the ecosystem. No matter where a conservation project takes place, the volunteer group is there to improve the current state of the land and community.

The constant care for the well-being of our communities is commonly known as minimum impact. Minimum impact applies to all places, including those outside of the wilderness. Minimum impact is specifically described as “leaving a site as close to, or better than, the condition it was in when the group arrived.”¹ A group doing a conservation project is going into an area to make improvements and conserve a natural resource for others to view and use. Therefore, while the group is on-site it is important that all members practice minimum impact skills.

Two outdoor ethics organizations, *Leave No Trace* and *Tread Lightly!*, offer training opportunities for helping your group adopt minimum impact skills.

► *Leave No Trace*²

In order to guide us in caring for our communities, an organization called Leave No Trace (LNT) was created by federal land management agencies. LNT principles might seem unimportant until you consider the combined effects of millions of outdoor visitors. One poorly located campsite or campfire may have little significance, but thousands of such instances seriously degrade the outdoor experience for all.

LNT has designed seven guidelines that allow people to use their communities with minimal impact. These seven guidelines offer some standards for each volunteer group while at the project site and should be extended into each volunteer’s use of his or her community:

- Plan ahead and prepare
- Travel and camp on durable surfaces
- Dispose of waste properly – “pack it in, pack it out”
- Leave what you find
- Minimize campfire impacts
- Respect wildlife
- Be considerate of other visitors

In order to explore these guidelines in more detail, we encourage each project leader to participate in a *Leave No Trace Awareness Workshop* (www.lnt.org/training/awarenessworkshops/index.html).

It is recommended that each Conservation USA group be aware of these seven minimizing impact techniques. As the group goes into an area to perform conservation work, it does not want to do further damage to the area. Each resource manager will be able to give specific details about the ecosystem for the particular project site.

Leave No Trace is about awareness and attitude rather than a set of rules. It applies in your backyard or local park as much as in the back country. We should all practice Leave No Trace in our thinking and actions – wherever we go.

¹ American Camp Association, Outdoor Living Skills, www.acacamps.org/campmag/009impact.php

² Adapted from Leave No Trace, <http://www.lnt.org>



This Tread Lightly! mile marker (Tongass National Forest, Alaska) reminds trail users to minimize impacts.

► *Tread Lightly!*¹

Tread Lightly! focuses on minimum impact awareness for outdoor enthusiasts that use motorized and mechanized vehicles. The *Tread Lightly! 101 Online Awareness Course* is designed to teach the basics about the organization and more importantly, how to minimize recreational impacts on the environment. To participate in the Awareness Course go to www.treadlightly.org/page.php/education-onlinecourse/Online-Awareness-Course.

D. Safety and risk management

“As strenuous challenge or contemplative retreat, the parks and other units of the national lands offer welcome respite from the world, a safety valve for body and spirit.”

T.H. Watkins

Good risk management planning is essential to providing a safe experience for crew members and leaders. Risk management plans are also intended to reduce or prevent legal and public relations problems. For the purpose of this publication we are defining “risk management” as those aspects that pertain to the organization’s exposure and risk, and “safety” as those aspects that pertain to individual or crew safety and health.

1. Understanding legal responsibility

Legal liability is a concern whenever volunteer groups consider working on public or private lands. If an accident occurs, who is responsible for medical expenses? To what degree can a leader be held accountable if something happens to a member of his or her crew? What are the legal obligations of the landowner and/or resource managers?

No agency, person, or organization, regardless of the plan, is exempt from litigation. An increased awareness of the ramifications of actions and non-actions may save both time and money associated with legal entanglements. A good public relations plan may also build confidence in a program and create the perception that qualified, trained leaders operate safe, well-run programs. People may be less likely to challenge such a perception, especially when a project is sponsored by a respected organization.

Volunteer leaders – The legal responsibility of a project leader may differ depending on whether the leader is working as a volunteer or staff member of a sponsorship organization, or as an individual acting on his or her own. For example, organizations such as the Boy Scouts, Conservation Corps, Sierra Club, or a camp owned by an individual, religious organization, or non-profit agency will have policies or standards their leaders are expected to follow. If the leader is participating as a volunteer or a paid staff member of an agency or organization, he or she is generally considered an agent of the organization.

¹ Adapted from Tread Lightly!, www.treadlightly.org/page.php/home/Home.html

Sponsoring organization – Under the doctrine of *respondeat superior*, the corporate entity is accountable for the action of employees or volunteers unless they are acting outside the scope of their responsibilities and authority, or if they cause intentional injuries.

Federal agency liability – Federal government agencies deem volunteers under “Volunteer Agreements” to be Federal employees only for purposes of tort claims and compensation from work-related injury. All volunteers performing any work on federal land are required to be covered in a signed volunteer agreement. The Federal Tort Claims Act protects volunteers, while acting within the scope of their volunteer agreements. The law generally requires that a person act with the care that a reasonable person would exercise to prevent harm. For example, if a volunteer assisting in an agency-sponsored conservation project accidentally harms a person or his or her property, the law recognizes that the agency is responsible for the actions or inactions of its volunteers. The Federal Employees Compensation Act provides compensation for work-related injury for volunteers injured on the job and the claims are adjudicated by the Department of Labor. As “government employees,” the government is also at risk for any tort claims. In other words, the volunteers also increase the government’s exposure to lawsuits; not just if someone sues the government, but if someone sues the volunteer.

There are several considerations that might reduce or help minimize legal liability. These include:

- Informing participants, legal guardians, and staff of procedures to make sure they are knowledgeable of any risks they are assuming related to the project.
- Having a clear set of emergency procedures and acting quickly and effectively to render aid and/or secure medical help or other appropriate help.
- Notifying a supervisor, resource manager (and if appropriate, a lawyer and/or insurance carrier) in the event of an incident.
- Being helpful when discussing an incident, but knowing who the appropriate spokesperson is and referring questions to that individual.
- Refraining from unnecessary remarks, placing blame, or making statements that might be admission of fault. Stick to the facts without making judgments.
- Preparing any written reports promptly, including the sequence of events and names of witnesses. It may be helpful to take pictures of the scene if that would clarify a fact or situation.
- Refraining from offering a statement or agreeing to pay any expenses without first consulting the sponsoring organization and/or an attorney.
- Writing down all the details about an event. Remember that the legal system often takes years before a case comes to court. Be sure to record the details so you are not dependent on your memory or that of someone else.



► *Transfer of risks*

Many groups or organizations transfer risks to another party through insurance agreements or contracts. Be sure you are familiar with the insurance coverage you, your organization, or the managers of the project site may have. Who is covered? Does a volunteer have to be a member to be eligible for coverage? What information, forms, or signatures are required?

Some organizations carry accident insurance to cover injuries and liability policies to protect leaders who act within reasonable guidelines. It is not unusual for a group to expect an individual’s personal insurance to cover medical expenses in case of an accident, leaving the sponsoring organization to cover all costs over the limits of the insured person’s coverage.

Federal, state, and local land management agencies usually insure volunteers involved in sanctioned activities, but requirements and limitations may apply. Check with your resource manager about this.

If you as the crew leader are uneasy with the liability coverage or accident insurance protecting volunteers, you may want to work out alternative arrangements with your group, organization, and resource manager.

► *Waivers or hold harmless statements*

Some organizations have policies or requirements about transferring the responsibility for certain actions to individual participants or their families.

While a minor or a minor's guardian cannot waive the minor's rights, "hold harmless" statements do show the parent was knowledgeable that the minor was participating in the project and that there was some risk involved. A waiver signed by an adult participant may be more binding in court. See the Sample liability form (Appendix C4, p. 84) for ideas about what the waiver should include. You or your organization may want an attorney to review your forms.

2. Safety and health considerations

As a Conservation USA project leader, you are responsible for the safety of your work crews from the moment the volunteers arrive to the moment they leave. To make the Conservation USA project a positive experience, it is important to ensure the safest situation possible. Conservation USA fully supports the use of a Job Hazard Analysis as defined by OSHA and many federal agencies. As a project leader you are responsible for seeing that these documents have been fully completed and reviewed by all involved in the project. See a sample of a Job Hazard Analysis form in Appendix C5 (p. 85) of this Handbook. Check the Conservation USA Web site (www.conservationusa.org) for guidelines on how to fill out a Job Hazard Analysis form.

► *General safety*

Safety on the project starts with the leader. What you say and do as a leader can have a lasting impact on the performance of your crew before, during, and after the event. It is important to "practice what you preach" – even if you wouldn't do it that way at home. If the rule is to wear safety goggles when using a saw, the crew leader should set an example by wearing them. What is expected of the crew should first and foremost be expected of the leader.

Throughout the duration of your project, you will be responsible for making quick decisions. The first question you always need to ask yourself in any situation that may arise is "Is this safe?" If you have more than one option to do something (in most cases you do), always choose the safest way.

Before you embark on your Conservation USA project, it is important to establish specific guidelines to help ensure a safe and well-planned project. Project safety guidelines and procedures include all specific information about your project, including logistical details, emergency and rescue procedures, the nature of specific activities you are going to be involved in and their risks, availability and accessibility to emergency assistance, and documentation and contact information in the case of an emergency. If possible, visit the project site before the actual work date. This will allow the project leader and resource manager to discuss the project and identify any safety hazards in the area. They can also decide if safety equipment, such as goggles and gloves, is necessary.

Whether you are going out to work on a project for a half-day, a day, several nights, or a week, it is important to decide on what safety information you need and to collect it for the well-being of all involved. All of this information should be copied, taken with the project leader, and filed with the parent organization or responsible party at your home base. Everyone involved with the project should review the completed Job Hazard Analysis form (Appendix C5, p. 85). In addition it is important that you start every day and every new work project with a brief safety meeting to recall the issues that the crew may face. Some agencies or organization refer to these as tailgate safety

sessions. These sessions insure that everyone is thinking about specific safety issues as they pertain to the job that they are doing as they begin work. Use the Safety Meeting Record form (Tailgate Sessions, Appendix C, p. 87) to organize what you want to cover at the meeting.

...The Tailgate Safety Session is an excellent way to start your day, whether building a bridge or maintaining trail. The Session can set the tone for safety and still have everyone rip-raring to go!

The idea couldn't be simpler. Prior to hitting the trail, gather everyone around, presumably at a tailgate, though a trunk, kiosk, picnic table or patch of ground will work just as well. Once everyone is gathered, discuss the project, potential hazards, required safety equipment, and anything else they should know.

Five minutes at the start of the day, can make the rest of the day safer for all of us.

Deb Blick, Florida Trail Association, 2005

Project logistics

A detailed project plan should include a full itinerary of where you are going, how you are getting there (mode of transportation, driving directions, who's driving), stops you plan on making, your location and contact numbers for every night you are gone, participant information, and emergency information. If you are not working with a resource manager who knows your plan and whereabouts, it is a good idea to contact the local law enforcement agency and let them know your group will be in the area working on a project. In the event of an emergency, they should be familiar with your location and how many are in your group.

Documentation on crew members

Project leaders should carry with them copies of home addresses and phone numbers for each member of the group, emergency contact information, health history, and insurance information. If the participant is a minor, the leader should have signed permission from parents or guardian, along with permission to treat during an emergency. Adults should also have signed health history and permission to treat forms should they become incapacitated and unable to grant medical personnel permission to treat in the event of an emergency.

A *Sample participant questionnaire* form is found in Appendix C3, (p. 83). The sponsoring agency may supply a health history and permission to treat form. See the Boy Scouts of America Web site for an example of what information is typically required: www.scouting.org/forms.aspx.

Establishment of project safety guidelines

Now that you have identified possible safety hazards, it is important for safety guidelines to be established. Safety guidelines vary depending on a variety of factors, including the age of the crew members, equipment being used, amount of supervision provided, and safety demonstrations given. Included in the guidelines will be topics such as first aid kits, clothing, weariness, lifting, and weather. Setting guidelines in regard to relevant topic areas is important to the safety and well-being of the entire crew. It is important that each member of the crew understands and practices these guidelines.

Age, size, and experience of the work crew

The type of project your crew will be doing depends on the age, number, and experience of its members. It is important to go over this information with your resource manager so he or she can help determine appropriateness of the project and be aware of any limitations that age, size, or experience might impose. If you are working with youth, see the National Institute for Occupational Safety and Health (NIOSH) publication, *Preventing Deaths, Injuries, and Illnesses of Young Workers*: www.cdc.gov/niosh/docs/2003-128/2003-128.htm.

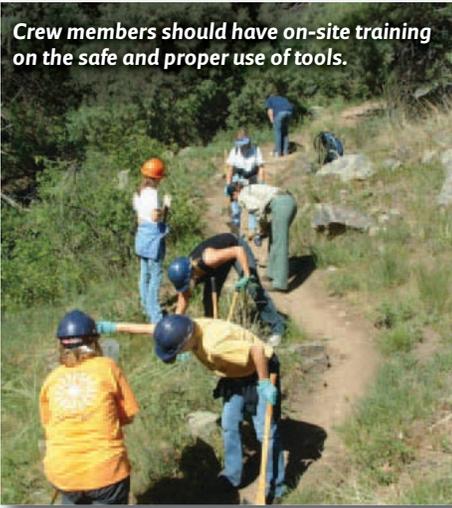
Safe use of equipment

There are many types of equipment that may be used for conservation work. For a list of all equipment that will be needed for your project, contact your resource manager. Limitations

and guidelines for the proper use of equipment should be set for the appropriateness of your crew. Youth groups should not have access to chain saws or other power equipment. However, other equipment such as rakes and clippers might be appropriate, provided the crew has been through a safety demonstration, is under adult supervision, and can demonstrate the proper use of that piece of equipment.

All participants, adults or minors, should have on-site training on the proper use and safety of any equipment they are expected to use. Size, ability, maturity, and adult supervision are all deciding factors of appropriate tool use. Equipment used for cutting (axes, saws, hatchets, or picks) should only be used by those who can demonstrate proper use. Power equipment (mowers, chain saws, or drills) should only be operated by those with the strength and maturity to control and properly handle the equipment. It is important that safety protocols be followed and that appropriate safety equipment and supervision be in place.

Crew members should have on-site training on the safe and proper use of tools.



Everyone should participate in safety demonstrations for every piece of equipment being used, whether they are using the equipment or not, even if they have used the equipment before. Safety demonstrations allow the group to see proper use of the equipment, the danger associated with using the equipment, and the safety mechanisms in place, such as the guard on a saw blade or the use of goggles and gloves. It is important that everyone understand that improper use of equipment can lead to unsafe situations, which could result in injury to the operator or to others.

Safe lifting

Improper lifting techniques can be ineffective and can also result in injury to participants. During the safety demonstration, take time out to go over proper lifting techniques. Remind participants to bend their knees and lift with their legs, not their backs. Show them the correct technique and then have them duplicate the motion.

For heavy objects, emphasize the teamwork approach. Remind team members that they need to communicate clearly on picking up and placing an object. One member should be designated to give commands, and stress that others need to listen and respond appropriately for the safety of all involved. Rocks, logs, and other heavy materials can often be rolled in a controlled manner with far less effort and potential hazard than hoisting them off the ground.

The three most common reasons for an accident:

I didn't see...

I didn't know...

I didn't think...

Supervision

Supervision is a key factor to maintaining safety while on-site. The supervisor may be the project leader for a very small group or, if the group is large, other leaders can be delegated to supervise particular tasks or sub-groups.

Supervisors help keep the project on task, as well as enforce the safety guidelines. It is important, especially when working with minors, that there is an adult or trained leader supervising at all times. If there is only one project leader, plans must be in place for a backup in case that leader is hurt or help is needed in an emergency.

It is recommended that someone be present at the project or associated recreational activities that is certified in the appropriate training for that activity and the equipment being used (such as

chain saws or log splitters). For example, if the work crew is participating in a stream improvement project, or is planning any type of water-related recreational activity such as boating, canoeing, or swimming, someone who is certified as a lifeguard from a certifying body (American Red Cross, YMCA, Boy Scouts, Ellis and Associates, etc.) should be present. These kinds of decisions should be discussed with the resource manager and/or follow the policies of the sponsoring organization.

First aid and first aid kits

One person in your group should hold a current certification in first aid and cardiopulmonary resuscitation (CPR) from a nationally recognized organization (American Red Cross, American Heart Association, National Safety Council, etc.). Health histories give you information about an individual's state of health, including allergies or other conditions. Be aware of allergies to bee or wasp stings. People with these allergies can have a severe reaction known as anaphylactic shock, with symptoms such as itching, swelling of the affected area, difficulty breathing, and swelling and closing of the throat and nasal passages. These symptoms can happen in a matter of minutes with a severe reaction. Generally, people with this type of allergy carry a physician-prescribed kit that will dispense a dose of epinephrine to offset the reaction. This is sometimes in the form of an EpiPen®.

Your group should also carry a fully stocked first aid kit, which is big enough to treat minor medical emergencies and control major medical emergencies. Pre-stocked kits can be purchased through a variety of vendors to supply as few as two people or as many as 100. Wherever you get your first aid kit, use Appendix E (p. 93), *Suggested first aid supplies*, as a guideline for the supplies you will need. Make sure the first aid kit is with you and the group at all times. First aid kits should be in a waterproof container.



What supplies should be included in your group's first aid kit? See Appendix E (p. 93), *Suggested First Aid Supplies*.

Table 3: Examples of clothing and personal items needed

Each crew member will need to bring clothing and personal gear, such as the items listed below:

- T-shirt
- Long-sleeved shirt
- Long pants
- Boots or sturdy shoes
- Gloves for protection or warmth
- Bandana
- Rain gear
- Sweatshirt
- Jacket
- Hat for shade or warmth depending on the season
- Flashlight
- Pocket knife
- Insect repellent
- Sunscreen
- Water bottle
- Sunglasses

Personal clothing and gear

Clothing and personal gear can increase comfort and provide safety during a project. For example, long-sleeved shirts and pants provide barriers against insects, dust, brush, and sunlight, and work gloves may be essential for the safe completion of some tasks. See Table 3 for other examples of clothing and personal items crew members may need.

When to take a break or call it a day

It is the responsibility of the project leader to monitor the work crews on a continual basis. People generally work best when they are rested, comfortable, and interested in what they are doing. Keep an eye on the group's energy levels. If they seem to be tiring, call for a break and take time out to have a snack or water at a place they can sit and rest. Consider taking time to explore the environment, wildlife, and vegetation. Playing games will not only break up the work, but will reinvigorate and reenergize participants. Switching jobs with one another will keep interests peaked and motivation high. If volunteers are uncomfortable due to the weather or are just tiring, low spirits may threaten safety and morale. If this is the case, store your equipment and call it a day.

► *Health and safety considerations*

Weather¹

No matter where your project is located or what time of year it is, weather can play a huge role in the success of the project. Weather conditions can change rapidly, so it is important to be prepared. Plan for all types of weather.

❖ **Cold**

Cold weather can set in at the drop of a hat and if your crew is working in the outdoors, be prepared for it. Layers, layers, layers! Wearing a long-sleeved shirt, a sweatshirt, a vest, a jacket, and a hat allows you to remove layers if you are too warm and replace them when you start getting colder.

Despite all of this, even the best layers or cold weather prevention will not always keep out the cold.

Not only does the cold make you tire faster, it can also lead to hypothermia. Hypothermia is a life-threatening condition that occurs when the body cannot produce heat as fast as it is being lost and the body's temperature falls below 95 degrees. It can happen outdoors, indoors, in southern states and even on a summer day. Signs of hypothermia include shivering, disorientation or change in mental status, and loss of consciousness. It may result in death.

Should any of your crew show signs of hypothermia, treat the condition immediately. Get them to a warm building, shelter, or tent. If no shelter is immediately available, a warm fire, blankets, or sleeping bags will also help get them warm. If they are in wet clothing, have them remove it and put on dry clothing. For mild cases of hypothermia, provide hot liquids to drink or

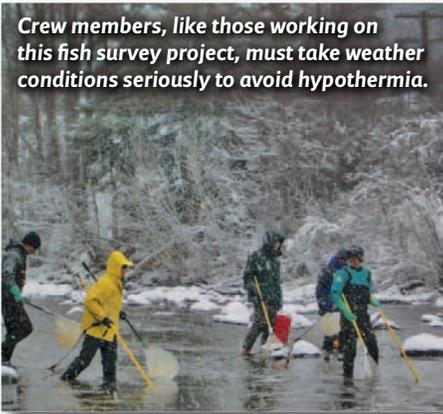
an energy bar to help increase core temperature. For more severe cases of hypothermia have the person lie flat and do not raise the legs as elevating the legs causes cold blood to flow into the body core and adversely affect the heart. Do not allow the person to walk or exercise until his or her body temperature has increased. Call EMS or get medical attention as soon as possible. For more information about hypothermia and how to treat it, refer to a national organization for first aid or someone with current certification in first aid training or higher.

If the weather does not improve or members of your crew are beginning to get cold, you may want to end the activity for the day or take a break until participants have warmed up.

❖ **Heat**

As quickly and easily as the weather can get cold, it can also get very hot. Warm weather can be a pleasure to work in, but be prepared for hot weather that might affect working conditions during the project.

It is incredibly important, especially in hot and humid weather, that all participants are drinking plenty of water or sports drinks. Juice and soda are not always wise choices because they contain sugar, which can dehydrate the body. Make sure that all participants have access to plenty of fresh water during the project and make sure they are taking time out to drink it. To ensure this, it is often a good idea to stop the crew for a water break and also make sure they are drinking it with their meals before they drink anything else. A good rule of thumb is to drink one cup (8 oz.) of water every 20 minutes when working. It is also better to drink in small sips versus large gulps. Wipe cool water on exposed areas of the skin or even dip clothing in water periodically to help cool the body on warm or hot days. A wet bandana tied around the neck while working is sometimes helpful as



Crew members, like those working on this fish survey project, must take weather conditions seriously to avoid hypothermia.

long as it is not a safety issue while working.

Working in warm or hot conditions can lead to heat emergencies. Heat cramps (sudden painful muscular spasms), heat exhaustion (heavy perspiration characterized by normal or slightly above normal body temperatures), or heat stroke (hot, dry skin, no sweating, unresponsiveness or altered mental status) are all serious heat related emergencies that can occur, with heat stroke being the most severe. Participants should be appropriately dressed for the weather, take plenty of breaks to have water and rest in the shade, and stop when they are tired. If a heat emergency arises it is important to cool the body down as rapidly as possible and stop cooling as soon as mental status improves. Continuing to cool when the body temperature has returned to normal can lead to hypothermia. For more information about treating heat related illnesses refer to a national organization for first aid or someone with current certification in first aid training or higher.

Depending on the project, you may need to make adjustments to your plans. If the work you are doing requires participants to be in long pants and sleeves (if you are moving or cutting wood), you may want to have them do this early in the morning or late in the afternoon when the weather is cooler. The temperature of the day is usually always warmest between the hours of 11 a.m. and 2 p.m.

❖ **Sun**

Most people like to work outside when it's sunny. However, it is important that the project leader be aware of the sun and how much exposure your crew has had. Set guidelines for crew members to follow when working outside with long exposure to the sun. The most common effect of sun exposure is sunburn. Simple preventative measures can be made to help reduce the amount of exposure to the sun and the harmful UV rays that are associated with it. Wearing a broad-brimmed hat, wrap-around sunglasses, quality clothing with long sleeves and a collar, and applying sunscreen to areas of exposed skin regularly throughout the day will all help reduce the risk of sun exposure. Have additional items like those mentioned above on hand for those group members who may have forgotten to bring them. Research recommends that sunscreen should have a SPF (Sun Protection Factor) of at least 30 and be a "broad spectrum type." Sunscreen should also be waterproof so it doesn't wear off after volunteers have been working and sweating.

❖ **Rain**

It is possible to work in the rain as long as the crew is prepared to do so, has the appropriate clothing, and most importantly it is safe to do so. If conditions become unsafe – if the ground is slippery or if there is lightning – stop the project until the weather improves. If it is raining but seems okay to keep working, consider:

- Rain coats, rain pants, and other bulky clothing may impede motion.
- Visibility may be restricted, especially for people wearing glasses or safety goggles.
- Footing can turn precarious as the ground becomes slippery.
- Equipment may be more difficult to manage when hands, gloves, and tool handles are wet or muddy.
- Working in the rain for a long period of time may lead to hypothermia as participants get wet or the temperature drops.

❖ **Storms**

Storms can come up suddenly, and with storms comes the possibility of lightning, hail, and tornados. It is often a good idea to listen to the local weather report or a weather radio to be aware of any impending storms.

❖ **Lightning**

Where there is lightning, thunder soon follows. As soon as you hear thunder, get your work crews immediately to a safe area until the storm has subsided.



- Attempt to get to a building or a car wherever possible. If this is not a possibility, get to an open space and squat on the ground as low as possible. It is recommended that your hands are placed on your knees.
 - If you are in a wooded area, find a location protected by a low clump of trees. Never stand under a single large tree in the open.
 - Avoid tall structures such as towers, tall trees, fences, telephone lines, or power lines.
 - Stay away from natural lightning rods such as golf clubs, tractors, fishing rods, bicycles, camping equipment, or any metal objects.
 - Stay from rivers, lakes, or other bodies of water.
- If you are isolated in a level field or prairie and you feel your hair stand on end (which indicates that lightning is about to strike), bend forward, keeping your feet together, remove all metal objects, crouch and put your hands on your knees. Do not lie flat on the ground.

❖ **Hail**

Hail is produced by many strong thunderstorms. Hail can be smaller than a pea or as large as a softball and can be very destructive to plants and a danger to those caught out in a storm. It is important to take cover immediately in a hail storm since the size of hail can change suddenly.



❖ **Tornados**

The most violent of atmospheric storms is a tornado. While tornados can occur in almost any state at any time given the right conditions, spring is traditionally the most active time. Tornados can be the most dangerous and terrifying of weather conditions, reaching winds of up to 300 miles per hour and destroying anything in their paths.

A crew should have a portable radio along whenever possible to listen to the most current and updated forecasts. When a tornado watch is issued (an alert by the National Weather Service stating that the conditions are right for tornados to occur), review with your group the procedures for what to do in the event of a tornado. If the weather is going to be severe, you may want to err on the side of caution and wrap up your project until the storms pass or until another day.

When a tornado warning occurs (an alert by the National Weather Service stating that a tornado has been sighted or indicated by weather radar), take cover immediately!

- If possible, get inside a building.
- Go to the basement, storm cellar, or the lowest level of the building.
- If there is no basement, go to an inner hallway or a smaller inner room without windows, such as a bathroom or closet.
- Get away from the windows – flying glass and debris can cause injury.
- Go to the center of the room. Stay away from corners because they tend to attract debris.
- Get under a piece of sturdy furniture such as a workbench or heavy table or desk and hold on to it.
- If shelter is not available or there is no time to get indoors, lie in a ditch or low-lying area or crouch near a strong building. Be aware of the potential for flooding.
- In all situations, use your arms to protect your head and neck.

► *Other health considerations*

It is wise to check with the resource manager about potential health risks at a particular site. Are there insect risks to consider beyond those associated with common stinging insects? For instance, there are a variety of tick borne diseases in the U.S., such as Lyme disease, that could be of concern for people working outdoors. See the National Institute for Occupational Safety and Health Web site for an overview of tick related disease: www.cdc.gov/niosh/topics/tick-borne/. Are there risks in the area associated with wildlife such as bear and moose? Care should be taken to assess which poisonous plants may be on site as well. For more information on potential health safety considerations see the U.S. Forest Service Web site: www.fs.fed.us/safety/health/index.shtml.

3. Crisis management

An emergency requires immediate and meaningful action. Fear and confusion can add to the stress of an already tense situation. The project leader must be willing and able to make decisions, to make things happen quickly, and to accept responsibility for the results. This is where competent leadership and a well-rehearsed and understood plan will help minimize stress, and prevent further damage or injury while dealing successfully with the crisis. The sponsoring organization may already have emergency plans or special guidelines in place.

It is important to try to review every possible emergency or crisis before it happens and create a plan for dealing with it. Emergencies can take many shapes; their causes fall into several categories, including:

- Natural hazards – animals, insects, cliffs, snakes, etc.
- Natural disasters – lightning, flood, fire, avalanche, etc.
- Program or project activities – equipment use, swimming, climbing, hiking, etc.
- Operation of facility or equipment – electrical, stoves, explosion, food poisoning, etc.
- Behavior of people – harassment, intrusion, fighting, missing persons, drugs, etc.
- Pre-existing medical conditions – asthma, allergies, diabetes, heart condition, etc.

► *Emergency plans*

The emergency plan should be written, rehearsed with the group leadership, and gone over with the entire group prior to departure. This discussion should include what to do in the event of an accident, who to contact, roles and responsibilities, and most importantly, a reminder to remain calm. Find out who should be contacted in case of an emergency in the area in which you will be working. It may be the resource manager, sheriff, fire department, search and rescue, or local hospital. Carry these numbers in an easily accessible location.

A cell phone is highly recommended but the signal may not carry in some areas. Contact your resource manager to see if a cellular signal will reach the area in which you are working. If no signal is available, ask your resource manager if he or she can provide a two-way radio during your project.

Once the emergency is over and the element of danger or potential for additional harm has subsided, the situation may still require crisis management. Establish procedures for dealing with the media, parents, and reporting authorities.

E. Doing the project

“A true conservationist is a man who knows that the world is not given by his fathers but borrowed from his children.”

Audubon

1. On-site briefing

Upon arrival at the project site, remind the work crew(s) about the plan for the day. These are a few key things to go over in the on-site briefing:

- Overview of day, including start and end times and approximate lunch and break times
- Introduction of land managers and their responsibilities
- Type of conservation work being done, why is it being done (land manager may cover this)
- Map of the area where the work crew(s) is working, including facilities such as the location of drinking water, rest rooms, and garbage receptacles
- Location of adults, land manager, crew(s), and first aid kit(s)
- Short review of emergency procedures
- Equipment usage and safety
- Site safety concerns: poisonous plants, ticks, wildlife, etc.
- Any rules or limitations that the land manager has in place or the crew(s) has in place (partially covered under equipment usage)
- Food needs
- Type of wildlife found in the area
- Short review of *Leave No Trace* principles (see p. 31)
- Reminder to have fun
- Time for questions

2. Teachable moments

Your crew has decided to camp for the night during the course of your project. You go to your site, set up your tents, make dinner and then have the evening before dark to explore the area. As you hike a short distance from the campsite, you see a lowland area below you with a path leading to it. A moment later, after hiking down, one of the participants exclaims, “Wow this is cool! Check it out, the ground is really spongy!” You’ve just realized that you are in a bog area. What a great opportunity to talk about this fascinating ecosystem and our responsibility for not disturbing the area. You didn’t plan this as part of your trip and certainly weren’t expecting it. A teachable moment has just presented itself to you.

Throughout the duration of the conservation project, teachable moments may arise anytime and anywhere. They can come in the form of a question from a crew member, as an opportunity to talk about the effect the project will have on the environment, or when discussing possible future service projects. Teachable moments often just happen, such as coming across a bog on an evening hike or uncovering a cultural artifact while digging a post hole. Teachable moments are those little “extras” that can make a world of difference in the outcome of your project.

When an opportunity presents itself, seize the moment to turn it into a learning experience and take the time to discuss it. Even though it might take you off task for a moment, the dialog and learning that takes place is invaluable and may serve to help with future projects. Crew members will walk away from the project not only with a sense of accomplishment but a greater understanding of the world around them.

3. Educational debriefings

► On-site debriefing

At the end of a specific project or at the end of the day, take some time to do an educational debriefing. Educational debriefings are a chance to evaluate the project to date, find out what's working and what's not, ask what the crew members learned, and assess the morale and energy level of the group. Ask them what needs to be adjusted in the project the following day and assess where the group is with the project overall.

At the end of each work day and at the end of the project, remember to initiate discussions that will tie the project's activities back to the learning objectives. This is an important component of a successful service learning project.

The project leader should facilitate this discussion, or if the crew members are working in different areas, each task leader could facilitate. Give all crew members the opportunity to participate in the discussion. Use the following guidelines when debriefing an activity or the day's work:

- Encourage and build on comments.
- Use all of the senses. What did participants see, feel, hear, etc.?
- Take time to listen to participants and remind them to listen to one another.
- Ask key questions that will stimulate interest.
- It's OK not to have all the answers; this provides an opportunity to learn together.
- Ask participants how they might use what they have learned or done at home.

► Post-project debriefing

Upon completion of a project, set up a time back home to bring the group together and discuss the event. Use this time to see if anyone is utilizing some of the skills and knowledge that they gained through the conservation project back in their own communities. It's a good way to complete the circle of learning for the specific project, and can be combined with the post-project evaluation discussion (see Section 4).

Allow some time to talk about how the group might use the skills and knowledge they have acquired in the future. For youth groups, how might their experience apply to future careers? For example, if a participant is looking to be a teacher, how can the teamwork skills help him or her as a teacher? Has the work that the group participated in started them thinking about careers in conservation?

Take a moment to talk about how the tasks that the group is accomplishing are used in a variety of different career fields (see Appendix F, *Careers in conservation*, p. 95). For instance, if your group spent most of the afternoon working on the landscaping at the entrance of a national park, you could talk about related careers, such as landscape design, that might use these skills. This kind of learning also ties back into teachable moments. It's a great opportunity to get participants to think about their futures, or about their roles as environmental stewards in their everyday lives.

4. Post-project follow-up, evaluation, and reporting

► *Following up with the group*

Once the project has been completed, do a wrap-up session and evaluation with the group. This will take place after the completion of the project, but not too long after the group has returned home. You might want to take some time right at the site before you leave for home. If the journey home is an hour or more and the group is all together in one vehicle, use the time to have this discussion. If the distance is short to your home base or you are all traveling in different vehicles, plan at least an hour of time once you have returned home to do a wrap-up session. Educational debriefings help you look at what was accomplished, review what participants learned and how they can use their new knowledge back in their own communities, and provide project closure.

► *Evaluation*

Overall review / Project Outcomes:

Begin by talking about the project's purpose and goals.

- Were the goals accomplished?
- If the group feels they did achieve their goals, how is the completion of their project beneficial, to whom, and why?
- If the group decides they didn't accomplish all they set out to do, what wasn't completed?
- How might that have affected the outcome of their goals?
- You might find that some crew members feel they accomplished the goals of the project while others may not. If this occurs, talk about why they feel that way.

Task completion

Make a list of all the tasks that were a part of the project to share with the entire group. Count up all the tasks that were completed by the end of the project. Even the smallest of things (such as boiling water to cook dinner) should be noted, so volunteers can see all that was achieved and can get a visual understanding of the magnitude of what they did.

Review the specifics

- What was difficult?
- What was easy?
- What went well?
- What didn't work at all?
- What would have made the project better?
- What was the most difficult task?
 - Was this task accomplished?
 - How was it accomplished or what prevented it from being accomplished?
 - How did this task contribute to the completion of the project?
 - Would the project have been accomplished if the task were not done?

Teamwork: A team is more than a sum of its parts

Talk about the importance of teamwork and the importance of individual effort – projects usually require both. For example, if your group was participating in trail construction and renovation, it

might have required brush removal that was done individually, or the removal of larger trees and shrubs that took the effort of several people.

Remind them that it takes everyone doing their parts to accomplish the goal of the entire group. Tell them the project could not have been completed without the work of each individual, and that if everyone (not just people in the group) contributes to the preservation and conservation of our communities, we all win.

Use this time as an opportunity to talk about the importance of teamwork. Point out that when difficulties arise, persistence and perseverance help overcome obstacles when tackled together as a group.

Environmental impacts

Talk about the work the group did and how that will help the environment, whether in a city park, a national forest, a cultural center, or other location. Emphasize the importance of their work as stewards and how their accomplishments will not only benefit the natural or cultural community, but also everyone who uses the area. Describe the history of conservation work and how the group is now a part of the movement that started almost two centuries ago and is still going strong to preserve and protect the environment.

Learning assessment

Ask participants to name one specific thing they learned on the project site and how they can use that skill or knowledge back home in their own communities or environment. Talk about what each participant learned through the entire experience. How much did the crew learn about nature, land use, conservation, and their community?

Future planning

Talk with the group about the opportunity to do this type of project again. What kind of projects would they like to do in the future? Where would they might like to go for the next project?

Getting their input gives them a sense of ownership in the planning and will encourage them to participate in a future project.

Closure

Close the project with an awards ceremony to present certificates and patches. These acknowledgments of their efforts will help participants feel a sense of accomplishment and pride. They will always have something to help them remember the project and something they can show their families, friends, and communities.

► Following up with the resource manager

Just as it is important to conduct an evaluation with the group, it is also important to have an evaluation with the resource manager. A time should be scheduled for the project leader and the resource manager to talk about the project either in person or over the phone. What information did you receive in the group follow up that might benefit the resource manager? Possible topics for discussion:

- Original goals of the project: Find out if those goals were the goals met, and if not, why not. What was missing or what was difficult to do and why?
- Specific tasks that were accomplished (i.e. trail was built, fire ring was replaced, brush was removed, trees trimmed, etc.)
- Problems that were encountered
- Assistance by the resources manager if expected

- Adequacy of tools
- Things that would have helped the project
- Whether the expectations of the resource manager were met in regard to the group
- Whether the expectations of the group were met in regard to the resource manager
- Interest for the group or the resource manager to do another project
- Additional comments, questions, or concerns

► *Reporting Volunteer Information and Accomplishments*

Tracking volunteer information is a challenge for many organizations. Conservation USA needs to identify the contributions made not only by you as a trained project leader but of all of the people that you lead doing a conservation project. Many of the organizations that manage the land, as well as the organizations that supply the volunteers, may also need this information. Information on the volunteers may be needed for a number of reasons such as funding proposals, scheduling purposes, budget development, or recognition efforts, just to name a few.

Recognizing volunteers and their contributions is very important to Conservation USA. A simple “thank you” not only acknowledges their service but inspires volunteers to continue caring for this great land of ours. Outside organizations like USA Freedom Corps and Take Pride in America also offer recognition for volunteers. It therefore becomes a very important task for the project leader to report the information about the conservation project and the volunteers on the Conservation USA Web site (www.conservationusa.org). From there the information can be shared with all of the other organizations that need it without further demands on the project leader.

F. Careers in conservation

Conservation USA projects may spark interest in conservation careers among crew members. Conservation organizations exist on a variety of levels. They include public agencies as well as private and non-profit conservation agencies.

Public agencies administer the largest expanses of public lands in the country. They include the National Park Service, U.S. Forest Service, U.S. Army Corps of Engineers, Environmental Protection Agency, U.S. Fish and Wildlife Service, Bureau of Land Management, Natural Resources Conservation Service, Cooperative State Research, Education and Extension Service, Soil Conservation Service, and the Bureau of Reclamation. Conservation agencies tend to direct their efforts toward a particular kind of work, such as the improvement of wildlife habitats in certain geographic areas. They include organizations such as the Nature Conservancy, Sierra Club, American Forestry Association, American Hiking Association, and Appalachian Trail Conference, just to name a few. Conservation management and education encompass a wide range of careers; a variety of agencies and organizations hire natural resource professionals to help them meet management goals.

Be sure to discuss career opportunities with the group during the project and after. Brief descriptions of the following careers can be found in Appendix F (p. 95):

- Forestry
- Resource management
- Soil resources
- Waste resources
- Water resources
- Wildlife
- Cultural resource management
- Law enforcement and resource protection
- Youth agencies





“

We can never have enough of nature.

Henry David Thoreau, Walden, 1854

”



IV. Connecting project goals to ecosystem concepts

A Conservation USA project is a valuable opportunity for crew members to learn about the environment and natural resources, their communities, and themselves. A project leader armed with a basic knowledge of natural cycles and ecosystems can take advantage of the “teachable moments” during a project to increase the volunteers’ understanding of conservation issues and challenges.

Whatever a leader’s background or expertise, it is important that he or she have a basic knowledge of natural cycles and ecosystem concepts in order to:

- Help crew members connect ecosystem concepts to project objectives.
- Illustrate how project stewardship efforts fit into ecosystem management goals.
- Work with a land manager to apply the latest research/scientific methods in the project work plan.

A. Natural cycles

To truly understand conservation issues at a local level, we must consider activities that are happening on a larger scale that impact local ecosystems. Managers must understand changes at the watershed level as well as conditions that might be attributed to larger scale, global changes. Solving many of the important conservation issues facing us today will depend on our understanding of global cycles of elements called biogeochemical cycles, on which life and climate are dependent.

The Earth is a closed system for matter, except for small amounts of cosmic debris that enter the Earth’s atmosphere. This means that all the elements needed for the structure and chemical processes of life come from the elements that were present in the Earth’s crust when it was formed billions of years ago. This matter, the building blocks of life, continually cycle through Earth’s systems, the atmosphere, hydrosphere, biosphere, and lithosphere, on time scales that range from a few days to millions of years. These cycles are called biogeochemical cycles, because they include a variety of biological, geological, and chemical processes.¹

The Environmental Literacy Council

Among the most important of the biogeochemical cycles are water, carbon, nitrogen, oxygen, and phosphorous. The Environmental Literacy Council provides an explanation of each:

www.enviroliteracy.org/subcategory.php/198.html

Please don’t be overwhelmed by the list. You don’t need to become an expert in biogeochemical cycles, but at least become familiar with the water, carbon, and nitrogen cycles to better understand management issues. You might also want to illustrate for your crew the relationship of a particular cycle to their conservation work. For instance, having a basic knowledge of the water cycle (Figure 1) is important when discussing a variety of issues from the condition of the local pond to the impacts of land use decisions in a watershed. Please refer to the U.S. Geological Survey site (<http://ga.water.usgs.gov/edu/watercyclehi.html>) for a summary about the water cycle.

¹ The Environmental Literacy Council Web site: www.enviroliteracy.org/subcategory.php/198.html

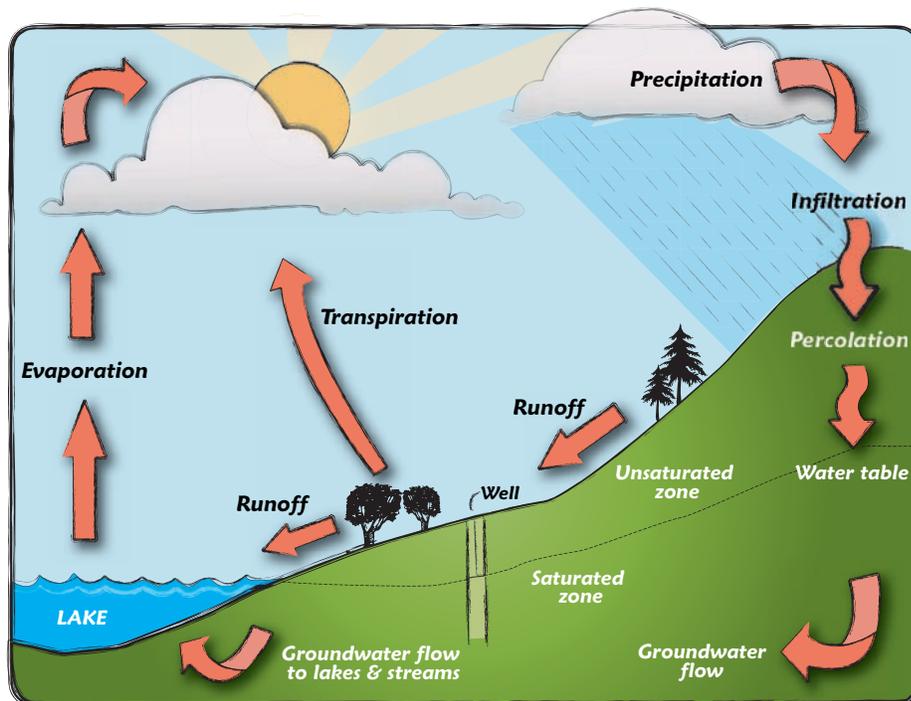


Figure 1: The Water Cycle

B. Ecosystems and ecosystem management¹

Over the past 30 or 40 years, “ecosystem” has been defined in a variety of ways. When we use the term in this handbook, we mean a system that has a source of energy (the sun) and includes living and nonliving components. The living components include among other things, plants, animals, insects, and human beings. The nonliving components include soil, rocks, water, air, and other physical features. Resource managers use a number of concepts when discussing ecosystems. The major ones include scale, connections, cycles and change (including both change over time and change over space), diversity, and balance.

Scale

Ecosystems are like communities – they occur at different scales. There are small “communities” such as the living and nonliving components interacting in a pond, and larger communities, such as watersheds. At the global level, all the living and nonliving elements of the planet are interacting. Ecosystems exist wherever plants, animals, and people have an interdependent relationship within the context of their physical environment. For purposes of study we can draw an imaginary circle around communities at different scales to examine the relationships of elements within the circle. When doing this, however, it is important to remember that small ecosystems are nested within larger ecosystems. This means that what happens at one scale affects what happens at every other scale, with varying degrees of impact.

Connections

The humans, plants, animals, and other physical elements of an ecosystem are connected in an interdependent web. Ecosystems are connected to one another at various scales. Some of these connections are very complex and difficult to detect or even imagine. For example, scientists have observed a thinning of the ozone layer but have not yet developed a full understanding of all of the contributing causes.

¹ Adapted from *Understanding Ecosystem Management: The Ecosystem Sustained*, U.S. Bureau of Land Management Web site: www.blm.gov/education/00_resources/articles/understanding_ecosystem_management/article.html

Cycles and Change

All materials in an ecosystem cycle and change over time and space. Some changes occur as a result of natural cycles, such as the carbon cycle and the water cycle, or as a result of natural phenomena such as hurricanes, earthquakes, tornadoes, volcanoes, storms, or fires. Humans bring about other changes through migration, urbanization, population expansion, agriculture, industrialization, war, and other interactions with their environment. Changes that occur over long periods of time, such as the adaptation of species or the drifting of continents, are difficult for humans to perceive.

Diversity

Biological diversity, or biodiversity, is a key part of healthy ecosystems. It refers to the variety of plants or animals within a single species, the variety of the species themselves, and the variety of ecosystems. Diversity strengthens the potential of populations and species to respond or adapt to changing environmental conditions. Since plant and animal resources provide products and processes important to agriculture, medicine, industry, art, and music, plant and animal diversity also affect human welfare.

In all the Earth's long and varied history, there has never been the massive disappearance of plants and animals that is occurring today. Since the arrival of the Europeans in North America, over 500 animal and plant species have become extinct, while the rate of loss at the demise of the dinosaurs was only one species every 10,000 years. The main reason for this greatly accelerated pace of extinction is habitat loss caused by direct or indirect human interference.

Balance

Although constantly cycling and changing, the plants, animals, and other parts of healthy ecosystems are able to regulate themselves to adapt and respond to changes and stresses. Ecosystems at risk or dying have lost this resiliency. Just like a basketball that has lost too much air, they cannot bounce back. By dramatically changing environments in which they live, humans can have a profound effect on the ability of ecosystems to respond to stress. The challenge is to find ways in which human needs can be met without exceeding the natural limits of ecosystems.

C. Connecting ecosystem concepts to Conservation USA project objectives¹

In the course of a lifetime, an individual will accumulate environmental knowledge from a combination of school, the media, personal reading, family members and friends, outdoor activities, entertainment outlets, and a wide range of other professional and personal experiences. For a few motivated individuals, this can eventually add up to an accomplished environmental literacy. But for most Americans, it falls far short. Most people accumulate a diverse and unconnected smattering of factoids, a few (sometimes incorrect) principles, numerous opinions, and very little real understanding. Research shows that most Americans believe they know more about the environment than they actually do.

Environmental Literacy in America, NEETF 2005

¹ National Environmental Education & Training Foundation (NEETF). (2005). *Environmental Literacy in America: What Ten Years of NEETF/Roper Research and Related Studies Say about Environmental Literacy in the U.S.* From the NEETF Web site: www.neefusa.org/pdf/ELR2005.pdf

Volunteer crew members might not understand how ecosystem concepts are related to their project tasks unless the project leader takes the initiative to help them make those connections. Let's assume, for instance, a volunteer crew is building nest boxes. The leader could explore the following connections with the group:



Connect ecosystem concepts to project goals - in this case, habitat needs to building bird houses.

- The relationships of the boxes to the habitat needs of the species that will use them
- The importance of snags and cavity trees in providing nesting opportunities
- The concept and importance of structural diversity within the forest ecosystem

See the publication *Wildlife Ecology and Forest Habitat* (Creighton & Baumgartner, 1997) for more on these and other forest ecosystem concepts that might relate to your Conservation USA project objectives.¹

Leaders cannot assume, according to the NEETF report on environmental literacy, that youth know more about the environment than adults. Although students touch on Earth science subjects related to the environment at various times throughout their scholastic careers, they often struggle to connect the pieces of information for a true understanding of ecosystem concepts.

Science education researchers, Shepardson, Harbor and Wee, believe that, "An understanding of the watershed concept is essential to comprehending issues about water quality, point and nonpoint source pollution, and the impact of land use and personal actions or behavior on water quality." Yet, in their study, *Students' Ideas about Watersheds* (2005),² they found that:

- For sixth and some seventh grade students a watershed is a water storage facility or a facility that supplies water.
- Eighth and ninth grade students' ideas about a watershed focused on a mountainous stream.
- Older students also incorporated the hydrologic cycle, but rarely represented linkages between land and watercourses.
- For all students, humans do not appear to be a part of a watershed, but separate from it.

The relationships between ecosystem concepts and a particular Conservation USA project may not always be obvious. Consult with a land manager or other community natural resource professional to help make the connections. Then when those "teachable moments" arise during the project, you'll be able to share that information with crew members to make their experiences more meaningful. See related topics in this text on *Taking time to learn about land management goals*, p. 28, and *Teachable moments*, p. 42.

¹ Creighton, J. H., & Baumgartner, D. M. (1997). *Wildlife Ecology and Forest Habitat*. Pullman: Washington State University, Cooperative Extension: <http://cru.cahe.wsu.edu/CEPublications/eb1866/eb1866.pdf>

² Shepardson, D. P., Harbor, J., & Bryan, W. (2005). Water Towers, Pump Houses, and Mountain Streams: Students' Ideas about Watersheds. *Journal of Geoscience Education*, 53 (4), 381-386





“

*Never a day passes but that I do myself
the honor to commune with some of
nature's varied forms.*

George Washington Carver

”



V. Basic scientific and management information

Planning and leading a Conservation USA project is not a cookie cutter endeavor. Each leader and project will differ and will require different sets of skills and knowledge. This section briefly covers a number of basic ecological and ecosystem topics, management techniques, archaeology and historic preservation techniques, trail maintenance and construction tips, and tools and safety guidelines. The goal is to provide a brief introduction to topics and issues, and to provide references and links to allow leaders to explore topics of relevance to their projects in more depth.

A. The “four threats” to forests and grasslands¹

In the 21st century, the nation’s forests and grasslands face four threats identified by former U.S. Forest Service Chief Dale Bosworth as fire and fuels, invasive species, loss of open space, and unmanaged recreation. Addressing each threat requires a variety of management tasks that could provide opportunities for Conservation USA projects.

1. Fire and fuel

Wildlands are always changing, sometimes subtly and sometimes dramatically. Fire is one of the important natural agents of change.²

► Fire

Fire ecology considers the adaptation of plants and animals to periodic fire, fire history, fire regime and fire effects on ecosystems. The focus of fire ecology is on wildland fire and its relationship to the environment that surrounds it, both living and non-living.

A wildland fire is any fire that is burning in a natural environment. Fire is a natural process and ecosystems have evolved over time with fire as a periodic visitor, influencing the kinds of vegetation that thrive on a site, and the distribution and abundance of plants and animal habitats. Historic patterns of wildland fire varied from one place to another, depending on climate, type of vegetation, and human influence. Present fire patterns differ substantially from historic patterns.

Wildland fires can both benefit and damage the environment and people’s interests. Where fire has been excluded from fulfilling its natural role, appropriate fires of sizes and intensities similar to those that have burned in the past should be allowed where possible, balancing risks, values, and consequences. By working together with an understanding of fire ecology, people can maximize the benefits of wildland fire and minimize the damages, including threats to public health.

Fire has helped shape North America’s wild areas for thousands of years. The presence of fire is essential for the survival of many plants and animals.



¹ Adapted from USDA Forest Service, *Four Threats to the Nation’s Forests and Grasslands*, Web page: www.fs.fed.us/projects/four-threats/index.shtml

² From U.S. Forest Service, *Ecology of Fire* Web page, www.fs.fed.us/fire/fireuse/txfire/ecology/

► Fuel and fuel reduction

The effects of fire range from subtle to extreme. Effects are influenced by the amount and condition of the fuels that burn, and the weather variables that directly affect the fire.

Many of our fire-adapted forests have become overgrown and unhealthy. For example, historically ponderosa pine forests were extremely open, with a few dozen trees per acre. Today, we might have hundreds or even thousands of small trees crowded into the same area. All those trees have to compete for a limited amount of water and nutrients. Instead of an open stand of big, healthy trees like the ones the first European settlers saw, we see thickets of small-diameter trees that are more susceptible to drought, disease, and insects.

Another concern to land managers is that more and more people are migrating from urban areas and populating rural areas, often adjacent to or within forests. This zone, where humans live intermingled with undeveloped forests and rangelands, is known as the wildland urban interface (WUI). Homes and businesses found in WUIs are the most vulnerable to wildfires. Residents in the WUI are advised to take steps to prevent fires from engulfing their properties. Useful information for project leaders working on fire reduction with homeowners is available at www.firewise.org.



A conservation crew's fuel reduction effort.

Decades of fuel buildup in many forest types have led to fires that burn out of control with uncharacteristic intensity, unprecedented damage to ecosystems and communities, and high suppression costs. You might think of this widespread fuel buildup as an environmental debt, like a toxic dump. While great

strides have been made in reducing hazardous fuels, much remains to be done.

Fuel reduction and fire recovery are management areas that provide many project opportunities for volunteer leaders and crews. Various erosion control and soil stabilization techniques are used in burned areas to prevent soil loss and promote plant growth. Tree planting, seeding, and erosion control are just some of the volunteer projects designed to promote recovery of burned wildlands.

For more on fire, fuels, and the need for fuel reduction see the U.S. Forest Service Web site: <http://www.fs.fed.us/projects/four-threats/index.shtml>

Other resources of interest:

- *Fire's Role in Ecosystems: A Hot Topic!* (an eFieldTrip for students), Bureau of Land Management, www.efieldtrips.org/Fire/
- *Learning Landscapes Explores Fire* (teacher/student resource), Bureau of Land Management, www.blm.gov/education/LearningLandscapes/explorers/lifetime/fire.html

2. Invasive species¹

A **native species** is a living organism that reaches its location without assistance from humans. Not all non-native species become pests, or even survive, in new locations. But when they do, they often displace a whole suite of native species to become dominant. They then take on new labels as exotic or invasive species.

An **exotic species** is a non-native plant or animal introduced into a new location by human activity, either intentionally or by accident. An **invasive species** is a non-native species that has or is capable of moving aggressively into a habitat and outcompeting native species for resources such as light, nutrients, water, and space to the detriment of other species. Invasives are also species introduced

from other parts of the world that upset the local balance of nature, cause economic harm, or harm to human health.

Healthy native ecosystems are dynamic and ever-changing, but their changes occur within a range of natural variability. Some kinds of non-native plants and animals can tip the balance of nature. They can cause havoc when, accidentally or intentionally, they are released outside their normal range into a new region. The gypsy moth, nutria, zebra mussel, hydrilla, sea lamprey, and kudzu are examples of non-natives that have caused massive economic and ecological losses in new locations because the natural controls of their native ecosystems were not there. Their impacts are insidious because they often invade the open space areas we have preserved for native flora and fauna, as well as farmlands, forests and suburbs.

How big is the problem caused by invasives? Consider the following:

- Damages from invasive species, including only those damages that can be expressed in monetary terms, have been estimated as high as \$ 138 billion per year. These damages affect agriculture, rangeland, forests, people's homes and yards, human and animal health, food supplies, fishing and boating, outdoor recreation, and many other areas;
- Invasive species are thought to have been involved in 70% of this century's extinctions of native aquatic species, and 42% of current endangered species are impacted significantly by invasive species;
- In January 2003 the Director of the US Fish and Wildlife Service called invasive species "the biggest environmental threat to this country...it's something everyone needs to take very, very seriously."

Conservation USA project volunteers might consider work on invasive species management projects that involve a variety of tasks including plant removal, vegetation mapping, and native plant restoration.

For more on the threat of invasives to wildlands:

- *Four Threats to the Health of the Nation's Forests and Grasslands: Invasive Species*, www.fs.fed.us/projects/four-threats/index.shtml#species
- *An Introduction to Invasive Species Management*, The Nature Conservancy, <http://tncweeds.ucdavis.edu/methods.html>
- The National Invasive Species Information Center, www.invasivespeciesinfo.gov/index.shtml
- U.S. Forest Service Position Paper: *Invasive Species*, www.fs.fed.us/publications/policy-analysis/invasive-species-position-paper.pdf

3. Loss of open space¹

Open space is vital to our health, economy and well-being. Public and private lands, including wilderness and working land, provide public benefits and ecosystem services we all need and enjoy. These include clean water, natural flood control, wildlife habitat and biodiversity, recreation and relaxation, timber and other forest products, and jobs.

Rapid development of wildlands is jeopardizing the long-term health and function of our forests, wetlands, and grasslands. More than 34 million acres of open space were lost to development between 1982 and 2001, about 6,000 acres per day, 4 acres a minute. Of this loss, over 10 million acres are in forestland.

Examples of Invasive Species

Mammals

Feral cats
Norway rat
Feral pigs
Nutria

Birds

Starlings
House sparrows
Cowbirds

Fish

Snakehead fish
Bass
Rainbow trout
Chain pickerel

Insects

Gypsy moth
Compsilura (fly)
Asian longhorn beetle



An invasive species management project might include plant removal.

¹ Adapted from U.S. Forest Service, Open Space Conservation Web site: www.fs.fed.us/openspace/

The loss of open space has a direct or indirect impact on almost all ecosystems in the United States. Challenge crew members to identify possible impacts of development in the area in which they are working. What are the impacts on the ecosystem? What are the impacts on the community?

4. Unmanaged recreation

The phenomenal increase in the use of natural areas for recreational activities raises the need to manage most forms of recreation, particularly the use of off-highway vehicles (OHVs). OHVs are motorized vehicles such as all-terrain vehicles (ATVs), snowmobiles, sport utility vehicles (SUVs), off-highway motorcycles, motorized trail bikes, and similar means of transportation.

Managing recreation opportunities in wildlands protects the land for the benefit of all users.

Project leaders might work with land managers to build and maintain recreational trail systems, or create educational tools, or deliver educational programs on responsible use of recreational areas.

In addition to the four threats outlined above, U.S. Forest Service Chief Abigail Kimbell recently identified three crosscutting challenges that we all must face. These are climate change, water issues, and the loss of a connection to nature, especially for children.



Conservation of wildlands often includes the management of OHVs.

B. Ecosystem management

1. Environmental surveying and monitoring

Resource managers can wisely oversee public and private lands but only if they know what those resources are and what is happening to them. For example, many agencies would be interested in measuring the amount of vegetation in certain areas to determine their condition. Repeating those surveys each year could indicate the quantity and quality of vegetation, and suggest reasons for any changes that may be occurring. That information would help resource managers determine whether the changes are within acceptable limits and, if not, explore better ways to maintain the area.

The following survey and monitoring topics can be found in Appendix G, section 1 (p. 99):

- Resource surveys
- Transects
- Stream monitoring
- Wildlife surveys

2. Revegetation and restoration

Vegetation is critical to the health of the environment. Plants provide shelter and food for wildlife of all sizes and habits. With leaves and branches that break the force of rainfall, and with root systems that hold the soil in place, vegetation helps prevent the ravages of erosion. The rich diversity of plant species suggests an environmental complexity we are only beginning to understand.

See Appendix G, section 2 (p. 104) for more on revegetation and restoration:

- Setting goals
- Project possibilities
- Steps in revegetation and restoration
- Transplanting vegetation
- Planting trees
- Work project notebook
- Public information

Lakeshores, stream banks, trails, abandoned roads, campsites, meadows, alpine tundra and many other areas of public and private lands subject to human use show signs of vegetation loss and the subsequent erosion of soil. Sometimes the harm is caused by loving the land to death – too many people walking, playing, and camping in the same areas, or riding horses, bicycles, or motorized vehicles over plant communities. Damage also can be caused by working the land too hard or using unwise practices of livestock grazing, logging, and mining.

Nurturing damaged vegetation back to health requires a commitment of time and energy that can make this kind of work inviting to volunteers. Progress may be slow, but as group members return many times to address the needs of a project site, they will see dramatic long-term improvement.

► *Definitions*

Agency personnel who specialize in repairing damaged lands sometimes differentiate between restoration and revegetation. It may be helpful for project leaders to understand what those terms mean.

Revegetation is the art of reintroducing plant communities to an area where, for some reason, vegetation has been discouraged from growing. Transplanting trees and sowing grass seed on top of mine tailings is an example of revegetation.

Restoration is the process of restoring an area to the condition it was in before its natural integrity was disrupted. Restoration of mine tailings includes contouring the terrain, bringing in topsoil and seed, and doing whatever else is necessary to make an area look as it would have had there never been a mining operation.

Revegetation can improve the appearance of an area, protect it from erosion, and enhance wildlife habitats. Restoration does that too, but goes further toward reconstructing the original appearance of an area.

Agencies have been restoring historic buildings for a long time, so upgrading significant structures may not seem unusual to us, but the idea of restoring old campsites, abandoned mining and logging operations, and overgrazed meadows is a fairly new and exciting concept. Of course, it is not always possible to restore a site to the condition it was in before human activity disturbed it. A centuries-old climax forest that has been cleared cannot be recreated within the lifetimes of volunteers, no matter how hard they try. However, they can reestablish the early stages of such an ecosystem so that it can more efficiently move on its own toward becoming a mature forest again.

3. Wildlife management

The well-being of birds, fish, mammals, and other animals is so dependent upon the condition of the environment that any projects that improve an ecosystem will probably also enhance many wildlife populations. Group leaders can draw upon a variety of skills to supervise projects that will benefit wildlife.

4. Riparian area conservation

Defined as land directly influenced by permanent water, riparian areas are the green zones along the banks of streams and rivers and around springs, bogs, wet meadows, lakes, and ponds. They are among the most richly diversified ecosystems. Their abundant vegetation purifies water and eases the effects of droughts and floods. They also provide essential habitats and nourishment for wildlife, fish, and many other organisms both in and out of the water.



Revegetation reintroduces plant communities to an area.

See Appendix G, section 3 (p. 109) for ideas about wildlife management enhancement projects: wildlife inventories, brush piles, bird houses.



Conservation USA projects can recreate lush, healthy riparian areas that are attractive to wildlife and people.

See Appendix G, section 4 (p. 111), for tips on planning a project in a riparian area:

- Riparian vegetation
- Cuttings
- Transplanted root stock
- Seeding
- Fencing riparian areas
- Riprap
- Rock deflectors
- Tree revetments
- Catcher dams

No ecosystem remains static for long. Changes in water depths and in the shapes of shoreline and stream channels drive the natural evolution of riparian areas. When natural processes are disrupted by activities such as concentrated recreational use by humans or heavy grazing by livestock, riparian areas may be severely damaged by erosion, pollution, and the loss of vegetation and wildlife.

Volunteer groups can work in partnership with resource managers to monitor conditions in riparian areas, then repair many kinds of damage and limit future degradation. A project as simple as strengthening an old beaver dam can significantly enhance wildlife habitat; so can the installation of nesting boxes designed to accommodate species that frequent a particular riparian area. The ability of riparian areas to support wildlife can sometimes be augmented with the construction of small dams to slow stream currents or enlarge and preserve marshes. Other valuable projects include building revetments to protect stream banks from erosion and putting up fences to exclude riparian areas from overgrazing.

C. Archeology and historic preservation

We often think of conservation as it relates to forests, meadows, seashores, waterways, and other resources of our natural heritage. But the conservation of archeological sites, historic buildings, cemeteries, battlegrounds, and other cultural resources is also of great importance. Those reminders of our collective history provide an exciting and essential window through which we can view and learn from the past. Unlike many natural resources, the pieces of our cultural heritage are nonrenewable. Once they are gone, they and the lessons they might teach can never be replaced.

Partnerships among trained historians, archeologists, and volunteer groups can help educate the public about the meaning and importance of cultural resources. Volunteers can do much to protect those resources, restore weathered buildings, care for historic sites, conduct research, and develop ways to share the past. With careful supervision, volunteers may assist with archeological work in the field, in museums, and in their communities.

1. The importance of context

Archeology is the systematic recovery and examination of material evidence (buildings, artifacts, graves) left behind by historic and prehistoric peoples. By investigating artifacts found in place, archeologists attempt to reconstruct past ways of life, give a sense of order to the events of long ago, and explain how and why changes occurred at specific locations.

The relationship of artifacts to their surroundings is called context. An archeological site that has been undisturbed over the years is said to have retained its context. When all pieces are in their original places – that is, in context – archeologists can reconstruct a complete picture of the past. When an artifact is disturbed or removed without being properly recorded and then studied, that all-important context is disrupted. A piece is gone from its place in the historic puzzle and the larger picture is much more difficult to understand.

The fragility and importance of context makes it clear that dealing with artifacts must be done only under the supervision of trained specialists. Otherwise, people hunting for arrowheads, digging for pots, looting burial grounds, and carrying away artifacts can destroy the context of thousands of years of history. So serious is this threat to our cultural heritage that it is against local, state, and federal laws to collect artifacts on public lands.

2. The role of project leaders in archaeology

Every state has an archaeology society that encourages the public to learn how to protect archaeological sites. Each state also has a state historic preservation officer who integrates local, state, and federal archaeological activities into an overall preservation plan.

Project leaders interested in historic preservation usually will find local, state, and federal archaeological officials eager to discuss the opportunities that may exist for groups to learn about and enhance archaeological efforts in their areas. Consider a few projects that volunteer groups have completed:

- Building fences around archaeological sites to protect them from livestock and motorized vehicles.
- Presenting programs that educate the public about the appeal of archaeology and the importance of protecting the context of artifacts and sites.
- Researching, designing, and installing signs that explain the meaning of archaeological sites and the public's responsibility to protect those areas.
- Stabilizing eroded sites and repairing damage caused by illegal artifact collectors.
- Assist archaeologists with identifying artifacts; recording rock art; and locating, mapping, and excavating sites. This work may include cleaning and analyzing artifacts and writing reports.

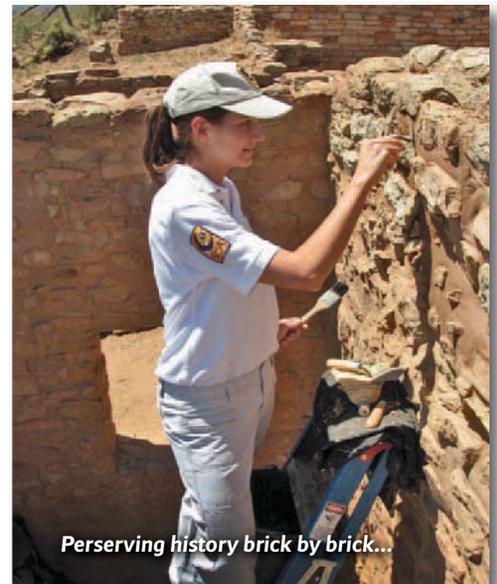
3. Historic preservation

Helping archaeologists protect and make sense of prehistoric sites and artifacts is not the only way volunteers can use their talents to illuminate the past. Many agencies, historical societies, and other organizations involved in keeping history alive may welcome the assistance of Conservation USA volunteer groups.

The kinds of work that volunteers can do will be partially determined by the skills they and their leaders bring to a project. Those with experience in carpentry might help stabilize the condition of historic buildings and return them to their original appearance. Those who enjoy doing research might use their talents to explore library records, prepare historic reports, and draft documents to nominate sites for the National Registrar of Historic Places. Volunteers with theatrical interests might develop living-history presentations or educational programs to present in schools and at fairs.

The field of historic preservation is so broad that project opportunities available to volunteers are limited only by the imaginations of their leaders, the agencies or organizations with which they are working, and themselves. Consider, for example, these successful historic preservation activities:

- Restoring a cemetery, collecting data, and developing public information
 - › Clearing away overgrown brush, mowing grass, repairing and painting the surrounding fence, and cleaning tombstones with approved methods that will not harm them.
 - › Documenting the information on each tombstone, noting on a map the stone's location in the cemetery.
 - › Using records in local and state libraries to research the names from the tombstones. Forwarding that information to local and state historical societies and using it to develop informational programs that can be presented at school and community gatherings.



Perserving history brick by brick...

- Stabilizing or restoring historic statues on public lands.
- Reconstructing historic buildings; In one case, a state agency provided the materials and specific plans for the reconstruction of a historic lighthouse. Project leaders who were experienced carpenters supervised a group of volunteers doing the work. In addition to completing the reconstruction, volunteers constructed extensive research on the history of the lighthouse, then prepared and installed informational signs to explain to park visitors the significance of the lighthouse.
- Using the techniques of oral history to collect and record the stories of senior citizens living in a small town or the neighborhood of a city. Project leaders, in cooperation with local historical societies, can help volunteers develop questions to document a bygone era of a community, then assist them in interviewing longtime residents and in recording the sessions on audio or videotape. The volunteers can edit the information into a form suitable for use by interested historical societies, schools, and libraries.



If project leaders or crew members are particularly interested in archaeology and historic preservation projects, explore the USDA Forest Service program, Passport in Time (PIT). PIT volunteers work with professional Forest Service archaeologists and historians on national forests throughout the U.S. on such diverse activities as archaeological survey and excavation, rock art restoration, survey, archival research, historic structure restoration, oral history gathering, and analysis and curation of artifacts. For more on PIT: <http://www.passportintime.com/>

D. Trail maintenance and construction

Trail types vary considerably ranging from primitive, such as a game trail, to those designed for heavy or specialized use, such as those that provide access for wheelchair users. This section provides general background information; once you've determined what trail(s) you will be working on, you will need to learn more about maintaining or constructing that specific type of trail.

Trails are an essential means of access for work and recreation on many public and private lands. Strollers and picnickers enjoy pathways in city parks. Hikers and campers use trails to travel far from highways. People who enjoy fishing and hunting take advantage of trails leading into areas appropriate as those used for sports. Rangers follow trails to patrol remote territory and make back country rescues. While many trails are limited to pedestrian use, others are open to people on horseback, mountain bikes, snowmobiles and motorized dirt bikes.

Good trails are designed with visitor safety and satisfaction in mind. They also protect the environment by encouraging users to stay within trail corridors where human impact can be monitored and damage to surrounding natural resources minimized. Consider, for example, a trail leading a short distance from a parking lot to a scenic overlook. If the trail is smooth and the grade is gentle, many people can enjoy the experience of going to the overlook. The trail will be inviting to even more users if it has been surfaced with asphalt, concrete, or wooden decking and is wide enough to accommodate visitors in wheelchairs. Railings and directional curbing can make the trail manageable for people with visual impairments. Informational signs can expand all visitors'

understanding of the environment around the trail. The signs may be in a variety of languages, and in Braille.

Now consider a trail that leads deep into a rugged wilderness. It probably will be much narrower than the scenic overlook trail, and its surface rougher. Streams along the route may have no bridges. Roots and rocks may further limit trail access to those people able to climb over and around natural obstructions. Instead of following signs, travelers may need to rely on their maps and their wits to find the way.

While these trails are very different from one another, they also share much in common. Both safeguard the environment by funneling human use along a well-defined tread. Each trail has been constructed and maintained to serve certain user groups. While backpackers would not be satisfied with the short distance of the overlook trail, visitors with limited time, energy, or physical ability might have difficulty getting far up the wilderness pathway.

By having a variety of trail types in a region, resource managers can satisfy the needs of many sorts of visitors. In addition, conservation professionals can encourage people to use some trails and avoid others, thereby controlling the flow of human activity into sensitive areas.

Of course, trails are inviting to use only when they are in reasonably good condition. A route overgrown and cluttered with deadfall will attract only the hardest hikers.

Maintaining trails is among the most labor-intensive responsibilities of many land management agencies and organizations. Unfortunately, demands on personnel and financial resources often limit the amount of trail maintenance many managers are able to complete.



Good trails are designed with visitor safety and satisfaction in mind.

For more information on common maintenance and construction techniques see Appendix H, (p. 115):

- Maintaining Tread
- Brushing
- Remove slough and berm
- Building water bars
- Maintaining water bars
- Creating turnpikes
- Creating rock walls
- Timber projects
- Trail markings
- New trail construction

E. Safety and tools¹

Tools can make a crew leading experience either enjoyable or miserable, depending on whether the right tool is available at the right time and whether crew members know how to use tools safely. The information provided in Appendix I gives the basics for hand tools in a project setting. Only basic hand tools used on a project will be covered in this training.

There are many specialized tools available for 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 work project.

For more information on safety and tools see Appendix I (p. 121).

¹ Adopted from COTI *Guide to Crew Leadership for Trails* (2006): <http://www.voc.org>

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Appendix A. About Conservation USA

For several decades land management agencies have benefited from volunteer natural and cultural resource project work with public sector organizations. Many of these volunteers are members of youth, environmental, or senior organizations who work as part of teams or conduct repeat assignments with public sector organizations. Without a doubt, their service is invaluable and their contributions irreplaceable.

All the land management agencies have identified a tremendous backlog of conservation project work. The need is acute for the types of volunteer services that go undone because of staff shortages, turnover in coordination, and budget shortfalls. At the same time, there are many thousands of citizens, young and old, who are willing and able to work in parks, forests, refuges, and other public lands principally for personal satisfaction. Clearly, there are volunteers interested in leadership training and in learning a variety of conservation skills.



History

For the last several years a small group of natural resource and volunteer program professionals have worked to develop a volunteer training network known as Conservation USA. All sectors of society can provide leadership to increase the scope of the network. Additionally, each has skills and expertise it can share with others: the land managers can provide the opportunities and tools; the business community can provide organizational structure and funding; and the volunteers can provide the energy and enthusiasm.

Conservation USA activities promote environmental stewardship. They are modeled after a program called TRAIL Boss, which was originally designed in 1971 by the USDA Forest Service (USFS) and Boy Scout leaders in the Los Angeles Council to restore and to maintain sites in the Angeles National Forest. The project not only helped make the sites usable but also provided a way for the Scouts to give something back to the land they treasured. The project was expanded nationally through a partnership between the Boy Scouts of America and the USFS and included training of volunteer leaders to oversee conservation work. The USFS recognized that trained TRAIL Boss leaders could be trusted to do conservation work that met agency standards and that volunteers showed a long-term commitment to stewardship of the natural environment. In 1991 the partnership grew to include the six federal land management agencies and the Environmental Protection Agency (EPA). The name of the program was changed to T.R.A.I.L. (Teaching Resources and Individual Leadership) to move away from being perceived as having a “trails only” emphasis to one with a more comprehensive emphasis on environmental awareness and volunteer crew leadership training.

The six federal land management agencies are:

- Army Corps of Engineers (USACE)
- Bureau of Reclamation (USBR)
- Bureau of Land Management (BLM)
- National Park Service (NPS)
- U.S. Fish and Wildlife Service (FWS)
- U.S. Forest Service (USFS)

In 1996 the President’s Council on Sustainable Development called for partnerships between industry and environmental organizations to address pressing environmental issues. One of the Council’s vision statements reads “Environmental progress will depend on individual, institutional, and corporate responsibility, commitment and stewardship.” In 1999 the federal agencies approached several organizations involved in conservation and outdoor programs, and all of the major youth serving

organizations, to collaborate with them on the re-design of the older program. They also wanted to begin a new national partnership known as Conservation USA. In 2005 the Environmental Alliance for Senior Involvement (EASI) was selected to be the host organization for this new program. EASI succeeded the American Camp Association (ACA) that had served in that capacity since 1999. With EASI's involvement, the program was positioned to serve both ends of the age continuum. This is significant because all successful volunteer programs should reflect society itself: people of all age groups with a wide range of skills and abilities and people from a variety of cultures and life experiences as diverse as society itself. The greatest challenges for volunteer programs are to develop and retain the leadership of this great community resource. Conservation USA is ready to meet these challenges.

Mission

Conservation USA's mission is to teach volunteer leaders specialized skills for training and leading volunteer crews to carry out conservation projects resulting in education and greater stewardship of natural and cultural resources. Towards achievement of its mission, Conservation USA will fulfill a pronounced need to train and support a talented pool of volunteers who will serve as volunteer supervisors and community resources.

Conservation USA is being created to teach individuals volunteer leadership skills and a set of core competencies dealing with volunteer administration and conservation skills. It will:

- Provide volunteer development efforts with leadership resources, training, information, and technical assistance supporting the use of best practices.
- Provide volunteer development opportunities for individuals to improve their leadership knowledge, skills and abilities.
- Identify and work collaboratively with the broadest range of volunteer leadership training and development efforts that share Conservation USA's mission and vision.
- Promote the establishment of regional councils and the importance of creating a certification for volunteer leadership training that together will foster effective, inclusive, and meaningful volunteer project work.

Goals

Conservation USA's fundamental goal is to encourage youth and adults to increase the level of ownership of the environment and of participation in stewardship activities through volunteerism and skills development. As envisaged, the program will provide opportunities for youth and adults to develop their volunteer leadership skills through understanding and appreciation of the value of volunteerism. Specifically, the goal is to teach and apply a set of core competencies. Project leaders will have the competencies to:

- Provide leadership for volunteer projects.
- Coordinate with federal, state, and local agencies and landholders.
- Provide a safe experience for volunteer crews.
- Identify conservation project needs.
- Understand general conservation project guidelines.
- Have knowledge of resources available and be able to define additional resources.
- Understand resource management and stewardship.
- Introduce career opportunities in cultural and natural resource management and youth services.
- Create and sustain a vibrant partnership program.
- Achieve tangible, long-lasting natural and cultural resource benefits.
- Instill a life-long commitment to continued caring, learning, and service.

Supporting agencies and organizations

Conservation USA is designed to be very inclusive; it is open to all organizations that wish to participate. Many public and private organizations have contributed to the growth and development of Conservation USA.

A description of each partner organization can be found in Appendix B (p. 69).

Organization of Conservation USA

All too often field offices of our public land agencies operate independently of other entities. This creates a vacuum, impedes collaboration, and forces these offices into a reactive rather than a proactive mode. Coupled with this deficiency there is an inordinate and epidemic high turnover in volunteer coordination in the ranks of the public land management agencies. The number of full time volunteer coordinators in the federal sector nationwide is less than a dozen individuals. The brunt of the coordination in the volunteer program area is performed by individuals who are working several other jobs.

As part of the remediation of this coordination problem, Conservation USA advocates the creation of regional councils. Regional councils serve as local-level steering committees comprised of natural and cultural resource professionals from city, county, state and federal governmental agencies. These regional council members routinely meet with volunteer group members. Collectively they serve as local/regional communication and training committees. Overall, the regional councils utilize public/private local level partnerships and function to help identify volunteer projects and to build a foundation for effective communication, training, and conservation and leadership skill development.

The regional councils are not advisory committees as defined under the provisions of the Federal Advisory Committee Act (FACA) since they operate primarily as discussion sessions, with no permanent or designated membership. They are not decision-making bodies and do not seek to address regulatory or planning/environmental issues. Regional councils function as information sharing and diversified citizen-based groups that meet voluntarily to communicate, collaborate, and coordinate their local level conservation and environmental education efforts. These efforts maximize their members' contributed time, talents, and energies among a variety of public and private sponsored projects and programs. Improved communication between these disparate groups fosters integration among volunteers and agencies based upon ecological projects, lessening competition, and increasing productivity.

Section II, F. *Organizational support* (p. 12) has more about the structure and function of Conservation USA.



Appendix B. Conservation USA Partner Organizations

This appendix provides a brief description of the Conservation USA partner organizations, as outlined on each organization's Web site.

Nongovernment Organizations (NGOs)



American Camp Association (ACA)

www.acacamps.org

ACA accredits over 2,400 camps. ACA-Accredited® camps meet up to 300 standards for health, safety, and program quality. As a leading authority in child development, ACA works to preserve, promote, and improve the camp experience. Our association is committed to helping our members and all camps provide:

- Camp communities committed to a safe, nurturing environment
- Caring, competent adult role models
- Healthy, developmentally-appropriate experiences
- Service to the community and the natural world
- Opportunities for leadership and personal growth
- Discovery, experiential education, and learning opportunities
- Excellence and continuous self-improvement



American Hiking Society

<http://www.americanhiking.org/>

As a recreation-based non-profit organization, American Hiking Society champions conservation issues, builds partnerships between public and private stakeholders, and provides critical resources to plan, fund and develop foot trails.



Association of Fish and Wildlife Agencies

www.fishwildlife.org

The Association provides its member agencies and their senior staff with coordination services that range from migratory birds, fish habitat, and invasive species, to conservation education, leadership development, and international relations. The Association represents its state agency members on Capitol Hill and before the Administration on key conservation and management policies, and works to ensure that all fish and wildlife entities work collaboratively on the most important issues. The Association also provides management and technical assistance to both new and current fish and wildlife leaders.



Boy Scouts of America (BSA)

www.scouting.org/

Across the country, young people are making a difference through the Cub Scout, Boy Scout, and Venturing programs. Cub Scouting is a year-round family program designed for boys who are about 7-10 years old. Parents, leaders, and organizations work together to achieve the purposes of Cub Scouting. Boy Scouting is a year-round program for boys around ages 11-17. Through the Boy Scout program, young men can achieve the core objectives of strengthening character, personal fitness, and good citizenship. Venturing is a youth development program of the Boy Scouts of America for young men and women who are about 14-20 years of age. Venturing's purpose is to prepare young people to become responsible and caring adults.



Camp Fire USA

www.campfireusa.org

Camp Fire USA is one of the nation's leading youth development organizations. Founded in 1910, the organization serves both boys and girls in hundreds of communities across America. Many of its nearly 750,000 members participate in traditional club activities while hundreds and thousands of others are served by our camping and in-school programs. Camp Fire youth develop leadership skills while contributing to their families and communities.



Environmental Alliance for Senior Involvement (EASI)

www.easi.org/

The Environmental Alliance for Senior Involvement (EASI) is a national nonprofit coalition of environmental, aging, and volunteer organizations established in 1991 as the result of a visionary agreement between the US Environmental Protection Agency and the American Association of Retired Persons. EASI's mission is to increase opportunities for older adults to play an active, visible role in protecting and improving the environment in their communities. Through its national network of 12,000 local organizations, EASI selects local hosts to recruit, train, and recognize senior volunteers who carry out a wide range of environmental activities. EASI also provides how-to information on all aspects of senior environmental volunteer programs and helps individual Senior Environment Corps become self-sustaining.



Girl Scouts of the USA

www.girlscouts.org/

Girl Scouts of the USA is the world's preeminent organization dedicated solely to girls—all girls—where, in an accepting and nurturing environment, girls build character and skills for success in the real world. In partnership with committed adult volunteers, girls develop qualities that will serve them all their lives, like leadership, strong values, social conscience, and conviction about their own potential and self-worth. From sports skill-building clinics to career mentoring, world travel and cultural exchanges to local community service projects, environmental stewardships to financial literacy, the Girl Scout program enables girls to reach their dreams.



Izaak Walton League of America (IWLA)

www.iwla.org/

Founded in 1922, the Izaak Walton League of America is one of the nation's oldest and most respected conservation organizations. It offers a unique blend of community conservation and advocacy for common-sense conservation policy that has positioned them as a voice of reason in the various debates over access, habitat and species protection, clean air and water, wetlands, renewable energy, public lands, and many other issues. Throughout more than three hundred communities, IWLA chapters advance the mission of the League—restoring watersheds, reducing air pollution, fighting litter, protecting wildlife habitat and open spaces, and instilling conservation ethics in outdoor recreationists. Their commitment to communities has allowed them to endure for more than eight decades.



National 4-H Council

www.4-h.org

The National 4-H Council mission is to advance the 4-H youth development movement to build a world in which youth and adults learn, grow, and work together as catalysts for positive change. National 4-H Council is the national, private sector non-profit partner of 4-H and the Cooperative Extension System. National 4-H Council focuses on fundraising; brand management; communications; legal and fiduciary support to national and state 4-H programs; and operation of the full-service National 4-H Youth Conference Center in Chevy Chase, Md., and the National 4-H Supply Service, the authorized agent for items bearing the 4-H Name and Emblem.



National FFA Organization (FFA)

www.ffa.org

The National FFA Organization is dedicated to making a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education.

Founded in 1928, the FFA organization represents a large diversity of over 300 careers in the food, fiber, and natural resources industry. FFA is an integral part of a school system.

FFA uses agricultural education to create real-world success. Agriculture teachers become advisors to local FFA chapters, which students join. More than 7,000 FFA chapters are currently in existence; their programs are managed on a local, state and national level. Each chapter's Program of Activities is designed with the needs of the students in mind. Activities vary greatly from school to school, but are based in a well-integrated curriculum. Chapter activities and FFA programs concentrate on three areas of our mission: premier leadership, personal growth and career success.



National Outdoor Leadership School (NOLS)

www.nols.edu/

The mission of the National Outdoor Leadership School is to be the leading source and teacher of wilderness skills and leadership that serve people and the environment. NOLS founder Paul Petzoldt's idea was simple: take people into the wilderness for an extended period of time, teach them the right things, feed them well and when they walk out of the mountains, they will be skilled leaders. The core of his idea was the extended expedition, one of sufficient length that a person could learn

and practice the skills over and over again. That is the backbone of every NOLS course and today the school is widely recognized as the world's leader in the extended expedition, from two weeks to twelve.



National Recreation and Park Association (NRPA)

www.nrpa.org/

The Mission of the National Recreation and Park Association is "To advance parks, recreation and environmental conservation efforts that enhance the quality of life for all people." The Goals of the National Recreation and Park Association are:

- To promote public awareness and support for recreation, park, and leisure services as they relate to the constructive use of leisure and thereby to the social stability of a community and the physical and mental health of individuals. NRPA strives to promote public awareness of the environmental and natural resource management aspects of recreation and leisure services.
- To facilitate the development, maintenance, expansion, and improvement of socially and environmentally relevant public policy that supports recreation, parks and leisure programs and services.
- To enhance the development of parks, recreation, and tourism professionals and to provide services that contribute to the development of NRPA members.
- To promote the development and dissemination of the body of knowledge in order to improve the delivery of service, increase understanding of leisure behavior and expand the body of knowledge relative to parks and recreation programs and services.



Outdoor Stewardship Institute (OSI) / Volunteers for Outdoor Colorado

www.voc.org/

The Outdoor Stewardship Institute was formerly known as the Colorado Outdoor Training Initiative. OSI is a sponsored program of Volunteers for Outdoor Colorado (VOC), a volunteer-driven nonprofit organization and aims to be the primary source for conservation leadership and land stewardship skills training across Colorado. Led by seasoned instructors, OSI hosts crew leader workshops, land stewardship skills trainings, and other educational programming in cooperation with a wide variety of land management agencies and non-profit organizations. OSI training:

- increases the quantity and quality of trained individuals participating in land stewardship projects,
- builds stewardship capacity by training skilled crew leaders to work in partnership with land management agencies,
- and provides more opportunities for Colorado citizens to gain skills that help them maintain and improve the state's natural resources



YMCA of the USA

www.ymca.net/

The nation's 2,686 YMCAs respond to critical social needs by drawing on our collective strength as one of the largest not-for-profit community service organizations in the United States.

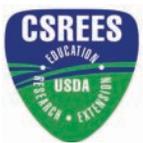
Today's YMCAs serve thousands of U.S. communities, uniting 21 million children and adults of all ages, races, faiths, backgrounds, abilities and income levels. Our reach and impact can be seen in the millions of lives we touch every year. Across the nation, YMCAs are committed to helping:

- Children and youth deepen positive values, their commitment to service, and their motivation to learn.
- Families build stronger bonds, spend time together, and become more engaged with their communities.
- Individuals strengthen their spiritual, mental and physical well-being.

All YMCA programs are tools YMCAs use to accomplish their mission, achieve their vision of building strong kids, strong families and strong communities, and reinforce the YMCA core values of caring, honesty, respect and responsibility. YMCAs also use an asset-building approach in their work. Each association is different, reflecting the needs of the local community.

Government Agencies

► U.S. Department of Agriculture (USDA)



Cooperative State Research, Education and Extension Service (CSREES)

www.csrees.usda.gov/

The Cooperative State Research, Education, and Extension Service is an agency within the U.S. Department of Agriculture (USDA), part of the executive branch of the federal government. CSREES is one of four USDA agencies that make up its Research, Education, and Economics (REE) mission area. CSREES' unique mission is to advance knowledge for agriculture, the environment, human health and well being, and communities by supporting research, education, and extension programs in the Land-Grant University System and other partner organizations. CSREES doesn't perform actual research, education, and extension but rather helps fund it at the state and local level and provides program leadership in these areas. CSREES and its partners focus on critical issues affecting people's daily lives and the nation's future. The advanced research and educational technologies we support empower people and communities to solve problems and improve their lives on the local level.



Forest Service (FS)

www.fs.fed.us/

Established in 1905, the Forest Service is an agency of the U.S. Department of Agriculture. The Forest Service manages public lands in national forests and grasslands. The mission of the USDA Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. As set forth in law, the mission is to achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people by:

- Advocating a conservation ethic in promoting the health, productivity, diversity, and beauty of forests and associated lands.
- Listening to people and responding to their diverse needs in making decisions.
- Protecting and managing the National Forests and Grasslands so they best demonstrate the sustainable multiple-use management concept.
- Providing technical and financial assistance to state and private forest landowners, encouraging them to

practice good stewardship and quality land management in meeting their specific objectives.

- Providing technical and financial assistance to cities and communities to improve their natural environment by planting trees and caring for their forests.
- Providing international technical assistance and scientific exchanges to sustain and enhance global resources and to encourage quality land management.
- Helping states and communities to wisely use the forests to promote rural economic development and a quality rural environment.
- Developing and providing scientific and technical knowledge aimed at improving our capability to protect, manage, and use forests and rangelands.
- Providing work, training, and education to the unemployed, underemployed, elderly, youth, and disadvantaged in pursuit of our mission.



Natural Resources Conservation Service (NRCS)

www.nrcs.usda.gov/

Since 1935, the Natural Resources Conservation Service (originally called the Soil Conservation Service) has provided leadership in a partnership effort to help America's private landowners and managers conserve their soil, water, and other natural resources.

NRCS employees provide technical assistance based on sound science and suited to a customer's specific needs. We provide financial assistance for many conservation activities. Participation in our programs is voluntary.

We reach out to all segments of the agricultural community, including underserved and socially disadvantaged farmers and ranchers, to ensure that our programs and services are accessible to everyone.

We manage natural resource conservation programs that provide environmental, societal, financial, and technical benefits.

Our science and technology activities provide technical expertise in such areas as animal husbandry and clean water, ecological sciences, engineering, resource economics, and social sciences.

We provide expertise in soil science and leadership for soil surveys and for the National Resources Inventory, which assesses natural resource conditions and trends in the United States.

We provide technical assistance to foreign governments, and participate in international scientific and technical exchanges.

► **U.S. Department of Defense (DOD)**



**US Army Corps
of Engineers®**

Army Corps of Engineers (USACE)

www.usace.army.mil/

The United States Army Corps of Engineers is made up of approximately 34,600 civilian and 650 military members. Our military and civilian engineers, scientists, and other specialists work hand in hand as leaders in engineering and environmental matters. Our diverse workforce of biologists, engineers, geologists, hydrologists, natural resource managers, and other professionals meets the demands of changing times and requirements as a vital part of America's Army. Our mission is to provide quality, responsive engineering services to the nation including:

- Planning, designing, building, and operating water resources and other civil works projects (Navigation, Flood Control, Environmental Protection, Disaster Response, etc.)
- Designing and managing the construction of military facilities for the Army and Air Force. (Military Construction)
- Providing design and construction management support for other Defense and federal agencies. (Interagency and International Services)

► U.S. Department of Interior (DOI)



Bureau of Indian Affairs (BIA)

www.doi.gov/bia/

Indian Affairs is the oldest bureau of the United States Department of the Interior. Established in 1824, IA currently provides services (directly or through contracts, grants, or compacts) to approximately 1.7 million American Indians and Alaska Natives. There are 562 federally recognized American Indian tribes and Alaska Natives in the United States. Bureau of Indian Affairs (BIA) is responsible for the administration and management of 66 million acres of land held in trust by the United States for American Indian, Indian tribes, and Alaska Natives. Bureau of Indian Education (BIE) provides education services to approximately 44,000 Indian students.

The Bureau of Indian Affairs mission is to:

“... enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes, and Alaska Natives.”

The Bureau of Indian Education mission is to:

“... provide quality education opportunities from early childhood through life in accordance with the tribes’ needs to cultural and economic well being in keeping with the wide diversity of Indian tribes and Alaska Native villages as distinct cultural and governmental entities. The Bureau considers the whole person (spiritual, mental, physical and cultural aspects).”



Bureau of Land Management (BLM)

www.blm.gov/wo/st/en.html

The Bureau of Land Management is responsible for carrying out a variety of programs for the management and conservation of resources on 258 million surface acres, as well as 700 million acres of subsurface mineral estate. These public lands make up about 13 percent of the total land surface of the United States and more than 40 percent of all land managed by the Federal government. Most of the public lands are located in the Western United States, including Alaska, and are characterized predominantly by extensive grassland, forest, high mountain, arctic tundra, and desert landscapes. The BLM manages multiple resources and uses, including energy and minerals; timber; forage; recreation; wild horse and burro herds; fish and wildlife habitat; wilderness areas; and archaeological, paleontological, and historical sites. Working with its partners at the local, state, and national levels, the BLM will meet its mission of sustaining the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.



Bureau of Reclamation (USBR)

www.usbr.gov/

Today, the Bureau of Reclamation is a contemporary water management agency with a strategic plan outlining numerous programs, initiatives, and activities that will help the Western States, Native American Tribes, and others meet new water needs and balance the multitude of competing uses of water in the West. Our mission is to assist in meeting the increasing water demands of the West while protecting the environment and the public's investment in these structures. We place great emphasis on fulfilling our water delivery obligations, water conservation, water recycling and reuse, and developing partnerships with our customers, states, and Native American Tribes, and in finding ways to bring together the variety of interests to address the competing needs for our limited water resources.



Fish and Wildlife Services (FWS)

www.fws.gov/

The Fish and Wildlife Service is a world leader and trusted partner in conservation and a family of professionals who share a deep commitment to our country's natural resources. Regardless of the challenge – whether it's managing for climate change or connecting people with the outdoors – we can be proud of our role in conserving the nature of America. The mission of the U.S. FWS is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The FWS focuses on the National Wildlife Refuge System, landscape conservation, migratory birds, threatened and endangered species, and aquatic species and fish habitat.



National Park Service (NPS)

www.nps.gov/

Most people know that the National Park Service cares for national parks, a network of nearly 400 natural, cultural, and recreational sites across the nation. The treasures in this system – the first of its kind in the world – have been set aside by the American people to preserve, protect, and share, the legacies of this land. The American system of national parks was the first of its kind in the world, and provides a living model for other nations wishing to establish and manage their own protected areas. The park service actively consults with these nations, sharing what we've learned and gaining knowledge from the experience of others. Beyond national parks, the NPS helps communities across America preserve and enhance important local heritage and close-to-home recreational opportunities. Grants and assistance are offered to register, record, and save historic places; create community parks and local recreation facilities; conserve rivers and streams, and develop trails and greenways.



Take Pride in America

www.takepride.gov/index.html

Take Pride in America is a national partnership program aimed at increasing volunteer service on America's public lands. It is the goal of Take Pride to empower volunteers from every corner of America to maintain and enhance our natural, cultural, and historical sites. Take Pride encourages citizen stewardship through an innovative public awareness campaign and an interactive Web site that showcases volunteer opportunities at natural and cultural sites.





Appendix C. Sample project planning forms

Appendix C contains sample forms that project leaders will need to plan and execute a successful project. Copies of all forms can be downloaded from the Conservation USA Web site: www.conservationusa.org

Sample budget worksheet

Transportation		# of vehicles	Days needed	Cost/day	Total vehicle cost
Type of transportation	Supplier				\$
Estimated mileage	Fuel cost/gallon	# of vehicles			Total fuel cost \$
				Total transport costs	\$

Driver name _____ Driver Information (address, license #, etc.) _____

Lodging		# of rooms needed	# of nights needed	Cost/night	Total lodging costs
Type of lodging	Location				Total lodging cost \$

Equipment needs		# needed	Days needed	Cost/day	Total
Item	Supplier				
				Total equipment costs	

Insurance needs

Policy information (carrier, policy #, contact info, etc.)		Total insurance cost

APPENDIX C1: Sample project planning worksheet

Sample project planning worksheet	
Project name:	
Project location:	
Project dates:	Supervising Agency:
Project manager:	Office phone:
Cell phone:	Email:
Project type and specifications (e.g. trail standards):	
Background and goals:	
Work crew description (number, ages, special considerations):	
Local agency personnel:	
Special local regulations:	
Special local health or safety concerns:	
Emergency procedures:	
First aid/CPR certified staff onsite:	
Nearest medical facility:	
Documents required (liability waivers, permission to treat forms, emergency contact info for crew members):	

APPENDIX C2: Sample budget worksheet

Sample budget worksheet					
Transportation					
Type of transportation	Supplier	# of vehicles	Days needed	Cost/day	Total vehicle cost
					\$
Estimated mileage	Fuel cost/gallon	# of vehicles			Total fuel cost
					\$
				Total transport costs	\$
Driver name	Driver information (address, license #, etc.)				
Lodging					
Type of lodging	Location	# of rooms needed	# of nights needed	Cost/night	Total lodging costs
				Total lodging cost	\$
Equipment needs					
Item	Supplier	# needed	Days needed	Cost/day	Total
				Total equipment costs	\$
Insurance needs					
Policy information (carrier, policy #, contact info, etc.)					Cost
				Total insurance costs	\$

Sample budget worksheet (continued)

Food				
Meals	Items needed	Number	Estimated cost/ meal	Food costs
Breakfast				\$
Lunch				\$
Dinner				\$
Snacks AM				\$
Snacks PM				\$
			Total food costs	\$
Food storage/preparation equipment and supplies				
Items	Supplier	#/amount needed	Cost/unit	Equipment/ supply costs
				\$
				\$
			Total equipment/ supply costs:	\$
Special considerations (special diets, dietary needs or restrictions):				
Recreational activities				
Activity			Cost per person	Recreation costs
				\$
				\$
Additional equipment needs			Total recreation costs:	\$
Fundraising				
Activity				Dollar goal
				\$
				\$
			Total funds raised:	\$

APPENDIX C3: Sample participant questionnaire

Sample participant questionnaire		
Participant information		
Name:		
Address:		
Home phone:	Cell phone:	
Email:	Fax:	
Age:	Gender:	Occupation:
Relevant work experience:		
Any physical limitations or concerns?		
Any dietary restrictions or preferences?		
Liability form returned?	Yes	No
Emergency contact #1		
Name:		
Address:		
Home phone:	Office phone:	Cell phone:
Emergency contact #2		
Name:		
Address:		
Home phone:	Office phone:	Cell phone:

APPENDIX C4: Sample liability form

Conservation USA Individual Release of Liability

By signing below, I acknowledge that I understand that during my participation in this volunteer project I may be exposed to a variety of hazards and risks, foreseen or unforeseen, which are inherent in each project and cannot be eliminated without destroying the unique character of the project. These inherent risks may result in loss, damage, injury, or death.

With full knowledge of these dangers, I hereby agree for myself, all of my family and heirs, to RELEASE Conservation USA and any of its employees, members, project leaders, chapters, groups, representatives, or agents from liability, claims, demands, or any causes of action, and NOT TO USE OR OTHERWISE MAKE ANY CLAIM against Conservation USA or any of its member groups, representatives, or agents whatsoever which may arise during my participation in any activities of Conservation USA.

To the extent allowed by law, I intend this RELEASE OF LIABILITY to be effective whether or not any loss, damage, injury, or death results from negligence of Conservation USA or any of its agents, leaders, instructors, guides, officers, directors, or representatives. I understand that negligence means a failure to do an act which a reasonable, careful person would do, or the doing of an act which a reasonable, careful person would not do, under the same or similar circumstances, to protect himself, herself, or others from injury or death.

I assume the risk and full responsibility for any personal injuries, including injuries resulting in death, which might occur, even if caused by the negligence or lack of care of Conservation USA, its employees, members, project leaders, member groups, representatives, or agents. I agree to be solely responsible for my own safety and to take every precaution to provide for my own safety and well-being while participating in activities of Conservation USA.

I have read this document in its entirety and I freely and voluntarily assume all risks of such injuries and hazards and notwithstanding such risks, I agree to participate in the project.

VOLUNTEER PROJECT: _____

PARTICIPANT'S NAME: _____

PARTICIPANT'S SIGNATURE: _____ DATE: _____

IF UNDER 18 YEARS OF AGE, PARENT OR GUARDIAN MUST ALSO READ AND SIGN BELOW

I am the legal guardian of the above minor and have read the above RELEASE. I hereby consent to the terms of the RELEASE on behalf of the named minor, and give my consent to the participation of the above named minor in all activities of Conservation USA on the terms stated.

PARENT OR GUARDIAN'S NAME (please print): _____

PARENT OR GUARDIAN'S SIGNATURE: _____ DATE: _____

APPENDIX C5: Job hazard analysis

FS-6700-7 (11/99)

U.S. Department of Agriculture Forest Service	1. WORK PROJECT/ACTIVITY	2. LOCATION	3. UNIT
JOB HAZARD ANALYSIS (JHA) References-FSH 6709.11 and -12 (Instructions on Reverse)	4. NAME OF ANALYST	5. JOB TITLE	6. DATE PREPARED
7. TASKS/PROCEDURES	8. HAZARDS	9. ABATEMENT ACTIONS Engineering Controls * Substitution * Administrative Controls * PPE	
10. LINE OFFICER SIGNATURE	11. TITLE	12. DATE	

Previous edition is obsolete (over)

The JHA shall identify the location of the work project or activity, the name of employee(s) involved in the process, the date(s) of acknowledgment, and the name of the appropriate line officer approving the JHA. The line officer acknowledges that employees have read and understand the contents, have received the required training, and are qualified to perform the work project or activity.

Blocks 1, 2, 3, 4, 5, and 6: Self-explanatory.

Block 7: Identify all tasks and procedures associated with the work project or activity that have potential to cause injury or illness to personnel and damage to property or material. Include emergency evacuation procedures (EEP).

Block 8: Identify all known or suspect hazards associated with each respective task/procedure listed in block 7. For example:

- a. Research past accidents/incidents.
- b. Research the Health and Safety Code, FSH 6709.11 or other appropriate literature.
- c. Discuss the work project/activity with participants.
- d. Observe the work project/activity.
- e. A combination of the above.

Block 9: Identify appropriate actions to reduce or eliminate the hazards identified in block 8. Abatement measures listed below are in the order of the preferred abatement method:

- a. Engineering Controls (the most desirable method of abatement). For example, ergonomically designed tools, equipment, and furniture.
- b. Substitution. For example, switching to high flash point, non-toxic solvents.
- c. Administrative Controls. For example, limiting exposure by reducing the work schedule; establishing appropriate procedures and practices
- d. PPE (least desirable method of abatement). For example, using hearing protection when working with or close to portable machines (chain saws, rock drills, and portable water pumps).
- e. A combination of the above.

Block 10: The JHA must be reviewed and approved by a line officer. Attach a copy of the JHA as justification for purchase orders when procuring PPE.

Blocks 11 and 12: Self-explanatory.

Work supervisors and crew members are responsible for developing and discussing field emergency evacuation procedures (EEP) and alternatives in the event a person(s) becomes seriously ill or injured at the worksite.

Be prepared to provide the following information:

- a. Nature of the accident or injury (avoid using victim's name).
- b. Type of assistance needed, if any (ground, air, or water evacuation).
- c. Location of accident or injury, best access route into the worksite (road name/number), identifiable ground/air landmarks.
- d. Radio frequencies.
- e. Contact person.
- f. Local hazards to ground vehicles or aviation.
- g. Weather conditions (wind speed & direction, visibility, temperature).
- h. Topography.
- i. Number of individuals to be transported.
- j. Estimated weight of individuals for air/water evacuation.

The items listed above serve only as guidelines for the development of emergency evacuation procedures.

JHA and Emergency Evacuation Procedures Acknowledgment

We, the undersigned work leader and crew members, acknowledge participation in the development of this JHA (as applicable) and accompanying emergency evacuation procedures. We have thoroughly discussed and understand the provisions of each of these documents:

SIGNATURE	DATE	SIGNATURE	DATE
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

APPENDIX C6: Tailgate safety sessions form

SAFETY MEETING RECORD (Tailgate Sessions)	Unit:	Date:	Time:
	Place:		
Conducted By: (Name)	Title:	Signature:	
Subject:			
Reference Material (Site Source and Code Numbers):			
Attendance (Names):			
Equipment or Tools Used on Job:			
Hazards Occurring on This Job:			
Demonstrations Given (if any):			
Employees' Suggestions:			
Summary (use back if necessary):			
Supervisor	SO Safety Representative	Line Officer	



Appendix D. Planning tips

Transportation

How will work crews reach the project site? In some cases crew members may be able to reach work locations in their neighborhoods by walking. In urban areas, public transportation may be the answer. Depending on the size of the group, you might drive cars or vans, or lease a bus for the duration of the project. If you do lease a bus or arrive (especially if it is a long distance) by train or plane, what transportation will you need to have on the arriving end? If a bus is taken to the project destination, will you need additional vehicles to use around the site or to travel to different project areas? Sometimes crews can use canoes or bicycles for traveling to worksites depending on the project and the equipment you need to transport.

Design a practical transportation plan with your group. Will vehicles be available when and where they are needed? The vehicles used should be designed for carrying passengers and should have the appropriate number of seatbelts for the total number of people in the group. You should be assured that the vehicles are in good condition and have had a recent safety check. If the group is going by car, van, or bus, it is important that the driver of each vehicle be safe and appropriately licensed and insured. If drivers are required, who will they be, will they need special licenses to drive, and will they have the proper insurance coverage to drive?

Food and menu planning

This is one of the biggest considerations when planning a project, whether it is only over lunch or for a whole week. Please remember that there is never (or usually never) going to be a group consensus at all times on what meals or snacks are being planned, but food is an important part of any project. Keep the meals simple but nutritious and satisfying. When planning meals, be sure to think about what kind of project your group will be completing.

Food tips:

- Peanut butter is a quick, easy emergency staple, very high in protein and carbohydrates (watch out for nut allergies).
- On-site lunches can be no-cook lunches like crackers and cheese, fruit bars, sandwiches, and chips. Meals that require more preparation can be scheduled for breakfast or dinner.
- It's not easy to cook hamburgers over an open fire in the midst of a downpour! "Just add hot water" foods such as instant soup, ramen noodles, and hot cocoa can be quickly made if the weather turns cold or rainy.
- GORP (Good Old-fashioned Raisins and Peanuts – adding a few M&M's to this mix is always popular) and energy or nutrient bars are calorie- and energy-rich foods.
- Almost anything can be eaten out of a bowl or cup.
- Snack breaks can also help break up the monotony of a project and increase energy levels. Youth are often accustomed to having snacks throughout the day.
- No-cook meals may be the best choice for short projects or when taking a heat source (i.e. carting a camp stove on your back when hiking to the project site)
- Cold weather work crews need more food than those sweating through a summer project. All will need plenty of water.
- Consider food allergies and special diets for religious or health reasons, as well as ethnic preferences of members. For example, vegetarians may not enjoy a hot dog supper.



As you determine and finalize your menus it is important to break each meal and snack down and make an ingredient list. This will make shopping at a later time easier for the group and will give you a checklist from which to work. Quantity is very important; a good rule of thumb is to allow one serving per person.

Food preparation

Who is going to prepare the food? What equipment will you need in order to prepare a meal (knives, spoons, pot holders, cutting boards – there aren't too many tables in the woods – camp stoves, pots, pans, etc.). What other resources might you need?

Shopping for supplies

Shopping for supplies can be a time-consuming process, but if you have a list and are organized it doesn't have to be. First, decide who will do the shopping and then choose a time to shop. See what you need and then find out if anyone has something on that list that they would be willing to contribute, such as sugar, pepper, salt, etc. Don't forget the incidental items such as soap, toilet paper, and matches! Soap should be biodegradable (Ivory or other non-detergent brands). Consider using packets of condiments (ketchup, mayo, mustard) as these will keep without refrigeration.

Packing out

Packing out is a term used for packing and storing your food and equipment. How is the group going to transport the food and equipment from home to the project site? Will there be one large pack or will the participants need to split up the supplies into their own packs? Do you have coolers available for foods that might spoil, such as meat, mayonnaise, and milk? When packing, consider splitting the food into the following categories: food to be frozen or cooled; boxed and canned food; any accessory items such as napkins, scouring pads, soap and towels.

Remember to practice "Leave No Trace" principles and dispose of waste properly. Minimize the use of over-packaged items and bring bags or containers to carry waste out.

Daily chores

Who is responsible for what? Each crew member should be assigned to daily tasks – everyone pitches in, everyone helps out. Try devising a chore list or chart to help with daily tasks, such as cooking, dishwashing, equipment maintenance, food packing and preparation, establishing a safety monitor, etc.

Equipment

There are three areas of equipment that need to be considered. Group equipment, individual equipment, and work equipment.

- *Group equipment* includes the supplies needed for use by the whole group. This can include cooking equipment, utensils, camp kits, tents, packs, and stoves. Who is responsible for bringing it? Form an equipment list to help you with this process.
- *Work equipment* includes items specific to the project you will be doing, such as shovels, saws, rakes, gloves, safety goggles, etc. The resource manager can help decide what and how many of each is needed for project completion.

- *Individual equipment* includes the items that each person needs to bring. This can include things like a sleeping bag, toiletries, clothes, sunscreen, bug spray, and other personal items. The group will need to consider what type of work will be done and if there are specific types of clothes that they will need (long pants, long sleeves). Do participants have access to work clothing and personal gear?

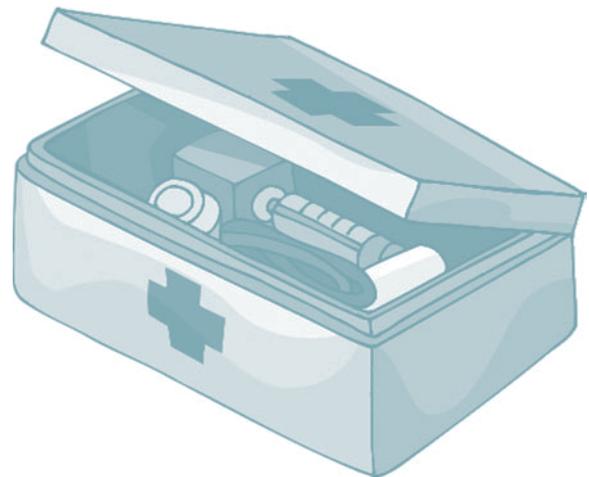
Conservation work can be muddy, wet, and hard on clothes. Volunteers may need sturdy clothing that will keep them warm or cool as the weather demands. They may need clothing to protect them from insects and brush. Work gloves are important for many projects, as are sturdy boots. The volunteers will need flashlights if the group is staying overnight. Water bottles and rain gear often add to the comfort and safety of environmental tasks. Pocket knives are handy personal tools unless the sponsoring organization has rules against participants bringing them.



Appendix E. Suggested first aid supplies*

**per every 25 crew members*

- 16 - Plastic Adhesive Bandages (1"x3")
- 16 - Woven Adhesive Bandages (1"x3")
- 10 - Woven Adhesive Bandages (Med Fingertip)
- 8 - Woven Adhesive Bandage (Knuckle)
- 4 - 2" Bandage Compress
- 1 - 4" Bandage Compress
- 6 - 1/8 oz Certicaine Burn Cream
- 1 - Burn Dressing Unit (Burn Gel/2 Pads/Tape)
- 1 - CPRotector (CPR Mask)
- 1 - 5"x7" Certicool Cold Pack
- 1 - Eye Dressing Unit (Eyewash/2 Pads/ Tape)
- 1 - 24"x72" Gauze Compress
- 4 pairs - Latex Gloves
- 10 - Insect Sting Swabs
- 10 - PVP Iodine Wipes
- 1 - 40"x40" Triangular Bandage w/Pins
- 10 - 1 gram Triple-Antibiotic Ointment
- Wire Splint
- 10 - BZK Towelettes
- 1 - Tourniquets
- 1 - Tweezers
- 1 - Major Trauma Dressing
- 1 - Splinter Remover
- 1 - Scissors





Appendix F. Careers in conservation

Forestry

The field of forestry is incredibly diverse. Forestry professionals can be responsible for meeting the demand for forest products, enhancing and monitoring biological diversity, providing wildlife habitat, assisting in the reduction of global warming, meeting the expanding demand for outdoor recreation, and bringing environmental education and nature to urban settings. Careers include timber manager, forest ranger, procurement officer, park superintendent, urban forester, arborist, landscape designer, maintenance supervisor, naturalist, park ranger, public relations officer, environmental advocate, international consultant, and many more.

Resource management

Resource management emphasizes interactions of humans with their environment and the use of natural resources. Resource managers help educate others in responsible decision-making and the impact their actions have on the environment. Careers include interpreters at national parks, environmental educators, land use planners, and youth agency workers, such as directors or program directors of year-round organizations, summer camps, or other youth agencies.

Soil resources

Soil resource specialists concentrate their work on the health and wellness of the soil ecosystem. Soil is a renewable resource and important to the health of the environment as a whole. Careers in soil resources include soil conservationists, certified soil scientists, farmers, or consultants to farming organizations.

Waste resources

Waste resource specialists work with waste by-products, such as human waste, garbage, and recyclable materials. The waste management aspect allows us to analyze the degree to which we recycle safely and in a sustainable manner. Careers in this area include water treatment plant managers, landfill operators or managers, and managers of land application companies.

Water resources

Water resource specialists concentrate on the study of biological, physical, and chemical characteristics of rivers, streams, lakes, groundwater, and the interaction of water with land. Careers include fishery biologists, groundwater specialists, and researchers, among others.

Wildlife

Wildlife professionals are responsible for sound stewardship of wildlife resources. Wildlife managers manipulate habitats to control game and other wildlife populations. Wildlife researchers conduct experiments to help solve problems facing the wildlife manager. Many professionals have employment with businesses specializing in the preparation of environmental impact statements.

Cultural resource management

Cultural resource management focuses on the tools and techniques necessary for the planning, preservation, interpretation, and protection of our cultural resources. An example of this would be the preservation of Native American ruins at Bandalier National Monument in Bandalier, New Mexico. Careers include park interpreters, archeologists, cultural landscapers, curators, historical architects, and historians.

Law enforcement and resource protection

Just as we need law enforcement to protect our civic laws and rights, the environment also needs protection through enforcement of rules and regulations. Law enforcement duties include federal law and regulation, human relations, patrol operation, resource protection, and criminal investigation. Careers include game wardens, US Park Police, FBI agents, and positions with the Environmental Protection Agency.

Youth agencies

Youth agencies work with a human dimension of natural resources: youth. Even though it may seem odd for a youth agency to be listed as a conservation organization, many youth organizations plan conservation or environmental projects as part of their programs. Careers with youth agencies are wide and varied and can include camp directors, program directors, youth workers, recreation specialists, environmental educators, naturalists, and health care specialists to name a few. Youth agencies include the Boys and Girls Club, Boy Scouts of America, Camp Fire USA, Girl Scouts of the USA, Youth Corps, and residential and day camps.





Appendix G. Environmental management topics and issues

1. Environmental surveying and monitoring

a. Resource Surveys

Almost any survey information that volunteers gather accurately and properly record can be of value to resource managers, especially when initial surveys are followed with updates over months and years. Consider the following survey possibilities:

- Backcountry campsite locations, sizes, and conditions
- Vegetation types and amounts
- Inventories of damage to forests from insect infestations
- Depth of snowpack
- Quality of streams, lakes, and riparian zones
- Public use of lakeshores, beaches, picnic areas, and other recreation areas
- Extent of erosion on campsites, on hiking trails, in agricultural areas, and along streams
- Bird counts and nest locations
- Census of wild animals
- Locations of heavy concentrations of selected nonnative plants
- Soil surveys

b. Transects

A transect is a simple, effective way to gather information on plants, animals, and the impact of human activities. It is designed to be repeated at future intervals to ascertain whether long-term changes are occurring.

For example, resource managers may want to know if human impact on a lakeshore is harming vegetation. A volunteer group can use transects to measure the amount of ground that is bare. Where human impact is heavy, bare areas may indicate that the soil is too compacted to support plant growth. By repeating the survey at six month intervals, the group can determine whether the amount of bare ground is increasing or decreasing, and thus provide evidence of vegetation trends.

Conducting this kind of study can lead volunteers to a greater awareness of the complexity of the environment. As they monitor amounts of bare ground, they can see firsthand the connection between erosion and water quality, between water quality and fish populations, and so on throughout an ecosystem.

► *How to proceed*

Begin building a transect at an area by selecting a reference point near the edge of a site – a large rock, tree, or other object that should be there for years to come. Place the end of a tape measure at the base of the reference point, then stretch the tape across the site.

Use a compass to determine the orientation of the tape measure (for instance, 15°). Write down detailed location information about the reference point, where the tape touches it, and the compass bearing of the tape. The idea is to provide future surveyors with the guidance they need to place their tapes in exactly the same location as you have put yours.

Beginning at the zero meter end of the tape, measure the extent of vegetation and bare ground under the tape. Note each measurement to the nearest centimeter and write it in your transect notes. Sometimes the tape will pass over the widest part of a plant, or over only a leaf or two. Measure only the amount of vegetation touching your tape. Any variations should average into a representative sample of the area.

If parts of plants extend above the tape rather than lying beneath it, mentally extend the vertical lines down from the edges of the plant to see where they would meet the tape. Record that measurement just as you would if the plant were under the tape.

Once the information has been collected, you can determine the percentage of each species you have charted or the amount of bare ground versus soil covered by vegetation. Add up the number of yards/feet where “species X” occurs along the transect. Divide the sum by the length of the transect and then multiply that answer by 100. The resulting number is the percentage of the transect occupied by species X.

The information from a survey will be more valuable if you run several transects spaced about three yards apart across the site and then average the findings from all of the transects. These transects can be either parallel or perpendicular to the original transect. In each case, make careful notes of reference points and compass bearings so that future surveyors can place their tapes along the same transects you are using.

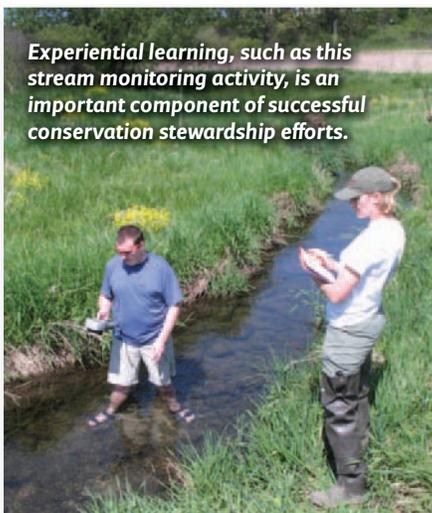
c. Stream monitoring

Federal and local government agencies currently monitor the water quality of only about 30 percent of the nation’s rivers and streams. Volunteers can collect data that will help chart the conditions of many other waterways. Where the data indicate deteriorating water quality, volunteers can bring survey information to the attention of resource managers and become involved in the process of restoring a waterway to health.

The primary sources of water pollution are point and nonpoint. As its name implies, point source pollution enters a stream from a factory discharge pipe, a sewage treatment plant, or other specific point of origin.

Nonpoint source pollution is not so easily traced. Runoff from farmlands can contain pesticides, fertilizers, sediment, and manure. In urban areas, rain draining from lawns, golf courses and parking lots can carry chemical and nutrient pollution into streams. Construction site sediment can smother stream beds and clog the gills of fish. Storm drains may carry oil and anti-freeze into streams from streets and parking areas. Landfills sometimes leach toxins into waterways through overland flow and groundwater systems.

The Izaak Walton League’s Save Our Streams (SOS)¹ program is an effective model for involving people in monitoring and improving the condition of America’s waterways. Volunteers use nets to collect organisms from the water, then count them and use the tallies as indicators of a stream’s



Experiential learning, such as this stream monitoring activity, is an important component of successful conservation stewardship efforts.



¹ . Izaak Walton League, *Save Our Streams* Web page, www.iwla.org/index.php?id=19

overall health. By repeating the process four times a year, volunteers can determine whether the condition of a stream is improving, staying the same, or worsening. Those findings will help groups and agencies decide how to best protect and enhance stream quality.



Bristle Worm

► How to proceed

Monitoring can be done at one spot in a stream or, for more representative findings, at quarter-mile intervals. For example, if you want to monitor a mile-long segment of a stream, select three or four monitoring locations. Write down an exact description of each monitoring station, including distinctive landmarks. Note compass bearings to help you or other volunteers find the places to monitor in the future.



Crawling Water Beetle



Crayfish

Don't monitor a site more than once each season (spring, summer, fall, winter). Repeatedly disturbing a location can damage the environment you are trying to survey.

When monitoring several stations, begin with the one farthest downstream so that organisms disturbed by your first test will not wash into your net.



Tadpole

Rocky bottom stream sampling

Select a stream riffle – a shallow, fast-moving section with a depth of three to 12 in. and bottom stones two to 10 in. across or larger.

Place a kick-seine at the downstream edge of the riffle, fitting the bottom of the seine tightly against the streambed so that no organisms will slip under the net. (You may want to use rocks to hold down the edge of the seine.)

Disturb the streambed for a distance of 3 ft. upstream of the kick-seine. Brush your hands over all rock surfaces to dislodge attached insects. Stir up the bed with your hands and feet until the entire 3-foot-square area has been disrupted and the current has carried any insects into the net. Finally, shuffle your feet with a sideways motion toward the net to bring up organisms from under the streambed.

Lift the net from the water without allowing any insects to be washed from its surface.

Muddy bottom stream sampling

Use a dip net rather than kick-seine to gather organisms from streams with mud bottoms or slow currents. Dip the net in the water and scrape the stream bottom so that organisms go into the net. Scrape the mouth of the net along the submerged tree roots, logs, and leaf packs and scoop a good sampling of organic debris into the net.

Recording your sample

Spread the kick-seine or dip net on the shore on a dry, flat, light-colored surface. Using tweezers, gently remove all the creatures from the net and place them in your containers. Collect everything that moves, no matter how small. Many insects will be the same color as wet leaves and other debris, so look closely.

Use a macroinvertebrate identification guide like those in Table 1 for help in separating the organisms into look-alike groups. Clues to their identity include the number of tails and legs,

Table 1: Macroinvertebrate identification guides:

The Izaak Walton League, Save Our Streams
www.iwla.org/index.php?id=19

Virginia SOS Stream Insects and Crustaceans Card
www.vasos.org/ModifiedBugIDCardoct2004.pdf

Wisconsin Water Action Volunteers

Biotic Index

<http://watermonitoring.uwex.edu/pdf/level1/data-Biotic.pdf>

Key to Macroinvertebrate Life in the Pond

<http://watermonitoring.uwex.edu/pdf/level1/pondkey.pdf>

Key to Macroinvertebrate Life in the River

<http://watermonitoring.uwex.edu/pdf/level1/riverkey.pdf>



Dobsonfly Larva



Mayfly Larva



Water Boatman



Water Strider

length of antennae, whether they have claws, and how they move.

Total the number in each group, record your findings on a tally sheet from one of the guides, such as the SOS Stream Quality Survey, and tabulate your results to determine water quality. The tally sheets will guide you in dividing insects into three groups:

- *Indicators of good water quality.* Mayflies, caddis flies, and stone flies must have abundant levels of oxygen. They will not survive in water with much pollution.
- *Indicators of fair water quality.* Crayfish, crane flies, sow bugs, and others in this group can tolerate some pollution.
- *Indicators of poor water quality.* Leeches and worms, midge fly larvae, and other organisms that can endure with quite heavy pollution.

Studying the data

Filling out a macroinvertebrate tally sheet, such as the SOS Stream Quality Survey (www.iwla.org/publications/watersheds/01_sosdatasheet.pdf), will give a stream sample a rating of excellent, good, fair, or poor. Increase the accuracy of your results by taking two additional samples from riffles in the same general areas as the first. New locations should always be upstream of any others you have monitored that day to ensure that the organisms you catch are not those dislodged from previous test sites. Of the three sites, record the one that gives the highest quality rating for the stream. Resource managers will help your group give meaning to the numbers.

The League can give you further guidance in conducting stream monitoring, carrying out waterway improvement projects, and referring you to water quality experts in your area. Other sources of stream monitoring information, data sheets, and equipment may be found at:

- Natural Resources Conservation Service (NRCS):
www.whmi.nrcs.usda.gov/technical/monitoring.html
- National Extension Volunteer Monitoring Program:
www.usawaterquality.org/volunteer/

Constructing a kick-seine net

Materials needed:

- 3 ft. x 6 ft. nylon screening (1/2 in. mesh)
- 4 strips of heavy canvas (6 in. x 36 in.)
- 2 broom handles or wooden dowels, each 6 ft. long
- Thread, sewing machine, finishing nails, hammer, iron

Procedure:

- Fold over 1/2 in. of the edges of the canvas strips and sharply crease the folds by pressing them with a hot iron to prevent the canvas from unraveling.
- Fold the nylon screen in half (3 ft. x 3 ft.).
- Sew a strip of canvas across the doubled screen and another strip across the top.
- Sew the remaining canvas strips down the sides of the net so that each forms a sheath large enough to accommodate broom handle or dowel.
- Insert the broom handles or dowels in the side sheaths and nail them in place with finishing nails.



A kick-seine is a simple tool for collecting stream "bugs" or macroinvertebrates.

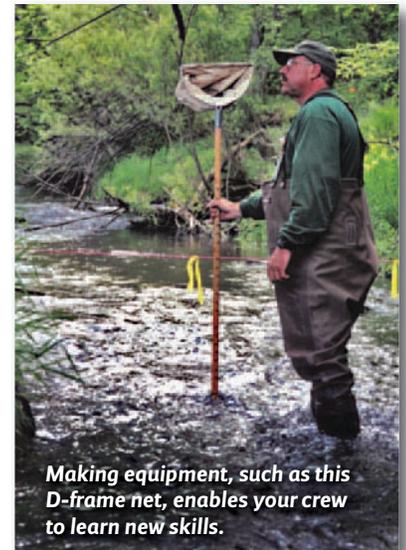
Constructing a D-frame net

Materials needed:

- 4 triangles of nylon netting (1/2 in. mesh), each piece 10 in. x 12 in.
- Bias tape or scrap fabric, 40 in. x 1 in.
- Wire coat hanger
- Broom handle or wooden dowel, 4 ft. long
- Drill with bit
- Pliers and duct tape
- Thread, scissors, sewing machine

Procedure:

- Sew the four triangles of netting together to form a cone-shaped net.
- Cut a 40-in. strip of bias tape or fabric to make a casing open for the insertion of a wire frame
- Untwist the wire coat hanger, slip it into the net casing to form the net's frame, and re-twist the wire.
- Cut off the hook of the hanger. Drill a hole in the end of the broom handle and insert the remaining neck of the hanger.
- Bend the hanger hook into the shape shown in the illustration. Position it to hold the D-frame net against the broom handle and push the bent ends of the hook into holes drilled in the handle. Wrap with duct tape.



Making equipment, such as this D-frame net, enables your crew to learn new skills.

d. Wildlife surveys

Visual counts of animal populations can be exciting and educational for volunteers and of great value to resource managers. The specific skills project leaders need to supervise groups conducting a wildlife survey will depend upon the species being studied and the habitat in which it lives. Bird counts, for example, may be done from blinds or observation decks, or during walks through selected areas. Volunteers will need binoculars, identification books, and notebooks or bird census forms. Other surveys may draw upon information gathered from the frequency and kinds of animal droppings, types and quantities of insects captured in nets, or any dozens of other methods. A den tree survey is an example of a useful type of wildlife inventory.

► Den tree survey

Many birds and mammals make their nests in the cavities of trees. A few species, such as the woodpecker, can create their own holes. Most species, however, must find cavities that are the result of insect activity or of branches torn away by wind, snow, or other natural processes. Trees with dens are so vital to certain species that wildlife managers often take steps to protect and nurture the development of existing or potential den trees. They can only do that if they know where those trees are located and the condition of each one.

Volunteers may be able to provide an important service to wildlife by documenting the location of den trees in a selected area. The primary tools for such a survey are good observation skills and much patience. Binoculars, a detailed topographical map, a notebook, and a compass are other necessities.



Bear researchers and volunteers work quickly to fit sow with a radio collar.

With the help of a resource manager, draw a line on the map to indicate the border of the area to be studied. Study the topography of the area and devise a scheme to survey all of it. Perhaps you can plot a hiking route that follows features of the terrain to bring you within visual range of most parts of the area. If the terrain is difficult or if heavy vegetation limits visibility, consider following the compass bearings through the area, spaced to maximize the volunteers' likelihood of finding den trees.

Once in the field, group members make a careful search for trees with cavities. Pay special attention to dead standing trees and watch for the activities of birds and other animals that may reveal the locations of dens. Seed husks or shells, scat, and other signs at the base of a tree may be clues that there is a den above.

Accurately mark on a map the location of each tree and give it a number. Record the number in a notebook and write a description of the tree and the den. Be specific, noting the size of the cavity opening and its height above the ground, its current use by wildlife, the diameter and height of the tree, its overall condition, and the composition of surrounding wildlife habitat. Resource managers also may suggest that you mark each tree, perhaps by attaching a metal tag to it or by using permanent paint to mark it discreetly with its survey number. Volunteers repeating the survey in the future can use that marking to help monitor changes in the condition of each tree and its den.

2. Revegetation and restoration



Although often slow to make progress, revegetation efforts can result in dramatic long-term improvement of damaged lands.

a. Setting goals

Many valuable projects involving revegetation are simple. Planting trees for windbreaks, stabilizing stream banks with proper vegetation, transplanting grasses and shrubs into barren ground, removing exotic species so that native plants can thrive – all these efforts can be extremely important in enhancing the environment.

In contrast, some of the most complex restoration initiatives involve designated wilderness areas. Through legislation, protection, and ongoing repair work, agencies attempt to preserve the appearance of selected lands as they looked during the era of American frontier. The pioneer spirit of that time is often embedded in the details of wilderness concept; for example, riding horses is allowed, but not riding bicycles. Crosscut saws and other hand tools may be used for trail repair, but chain saws may not.

The importance of these differences is simply this: For revegetation and restoration work, project leaders and agency staff must have a clear goal in mind before a project begins. The goal may be to improve the appearance of a place, to ensure basic erosion control, or to do everything necessary to return the area to a pristine condition. A group with a well-considered goal can work toward it with productive intent.

b. Project possibilities

The most visible damage that occurs when an area is overused by humans or livestock is the breaking, crushing, or close cropping of vegetation. Plant cover becomes thin and beaten down, or disappears altogether.



The damage you do not see may be of even greater concern. Heavy use often packs the earth, collapsing small air pockets and hardening the soil. Tiny root ends may no longer be able to push through. Fungi, bacteria, and other microscopic organisms essential to the vitality of vegetation may be unable to survive. Compacted soil cannot absorb water quickly, which leads to more runoff, erosion, and declining water quality.

Most areas damaged by the impact of humans or livestock can be revegetated or restored. Two that respond especially well to volunteer efforts are social trails and inappropriate campsites.

► *Social trails*

A trail 2 ft. wide represents nearly a quarter acre of bare ground per mile. Because the tread is so compacted, little will grow upon it, which helps make a planned trail an inviting place for people and animals to walk. By concentrating use on the trail rather than upon the surrounding environment, impact can be limited to the already-hardened tread. An intentional trail is a sacrifice zone that we accept because it encourages people to restrict the negative effect of their travel to the pathway.

Social trails appear when users stray from a designated trail, trampling vegetation and compacting soil elsewhere. These unplanned trails often radiate from campsites to parking lots, outhouses, water sources, hitch rails, and main trails. A confusing tangle of pathways may meander through a heavily used area.

A goal of many resource managers is to determine the best route through an area and enhance a single trail to carry all traffic, and then restore the rest of the area by closing and revegetating social trails.

► *Inappropriate campsites*

Wherever people camp, the concentration of human activity in a small area may injure the vegetation and soil. Gathering kindling, building open fires, parking vehicles, or picketing livestock can further scar the land.

Many agencies and organizations encourage people to camp in small groups, cook over stoves rather than fires, and avoid digging ditches around tents. While these minimum impact camping methods lessen the potential for environmental damage, the most important decision campers make is choosing an appropriate site in the first place.

Heavily used campsites often are so devoid of vegetation that more camping on them will cause little additional damage. Conservation professionals may encourage people to continue using those campsites as a way of protecting undamaged vegetation elsewhere. Where there are too many campsites or campsites in inappropriate places, however, agency personnel may wish to close certain sites and restore their natural appearance. Volunteers can create visual boundaries that will discourage people from camping where they shouldn't. Loosening compacted soil and planting vegetation will help damaged areas recover.

c. Steps in revegetation and restoration

As with any other kind of conservation project, resource managers and project leaders should conduct careful planning well before a group arrives at a restoration work site. The planning process will help determine attainable goals for a group and can increase the environmental education opportunities for volunteers.

► *Study the area*

During a pre-project site visit, determine the extent of damage and the causes. Consider the soil type, the amount of moisture it receives, the length and timing of the growing season, and the kinds of plant communities native to the area. Estimate the amount of time volunteers are willing to devote to improving the area. Are they interested in a long-term, adopt-an-area commitment that will include regular visits to the site? Or are they more interested in a one-time project without much follow-up?

► *Provide options for human activity*

Attempts to restore vegetation will not be effective if people continue to trample and compact newly repaired sites. One solution is to provide alternative routes and sites that are attractive enough to persuade people to use them.

► *Loosen compacted soil*

Volunteers can loosen the top inches of soil in barren areas with shovels, garden forks, Pulaskis, or picks. Loosen but don't turn soil – leave the topsoil in place. Loosened soil is an inviting bed for seeds drifting in from surrounding vegetation. Watering the soil during summer may further encourage growth. You can also scatter leaves on the loosened soil to create mulch that will enrich the soil and protect seedlings from drying out or being eaten by animals.

Loosening soil may be inappropriate in areas especially susceptible to erosion by water and wind, or in some mountainous regions where soil is fragile and thin. Before beginning this or any other restoration efforts, closely consult with resource managers.

► *Install barriers and camouflage*

Visual barriers are an important part of restoration work. Their purpose is to discourage people from entering places you don't want them to go, while making those areas look as natural as possible. You can often use materials close at hand to camouflage revegetation sites and give them time to heal.

Here are some tips:

- Install rocks, logs, and other inanimate objects in the site, placing them similar to the way they appear in the surrounding terrain.
- Transplant native species, especially prickly or spiny varieties such as cactus and devil's club.
- Allow your efforts to spill into undisturbed areas to help erase the boundary between a repaired site and the environment around it.
- Step back and examine what you have done.
- Make adjustments and then stand back for another look. Persist until your restoration work blends convincingly into its surroundings.

Use the same approach to close and restore unwanted trails. The temptation may be to simply throw armloads of sticks onto an abandoned trail, but the result is usually a long obvious window of dead brush. Instead, blend rocks, brush, and transplanted vegetation into the loosened tread to block access to the old trail in a way that does not draw attention to itself.

► *Other barriers*

Meadows, stream banks, and other revegetation areas may not lend themselves to the subtleties of camouflage. It may be necessary to protect repaired sites by encircling them with string and stakes. Educate the public by putting signs that explain the work and ask visitors to stay off new vegetation to allow the area to heal.

d. Transplanting vegetation

Transplanting bushes, clumps of grass, and saplings into loosened soil can speed the healing of a restored area. The success of transplanting depends upon the knowledge of local vegetation, proper planting times and methods, and a commitment to ongoing plant care.

In many regions, autumn is the best time to transplant. Most vegetation is becoming dormant then, and will be less affected by the shock of being moved. Transplanting in late spring and summer can stress plants, especially when most of their energy is being devoted to the production of flowers, seeds, and new roots.

Transplanted clumps of grass often thrive in new locations. Select native species from surrounding plots so that the new vegetation taking root will be the same as what was there before trampling occurred. Pay attention to the conditions at potential donor sites; take plants from those spots that are similar to the restoration area in terrain and amount of sunlight. If, for an example, plants from a moist, shady forest are transplanted to the edge of a dry, sunny meadow, they are not likely to survive.

Roots exposed to the air are in danger of drying out. Before you dig up a plant that you intend to move, excavate the hole that will receive it and pour in some water and perhaps a mixture of vitamin B1 and a natural fertilizer such as fish meal. Carefully remove the plant from its original location and immediately transplant in the new hole.

Some restoration efforts include propagation of greenhouse stock for transplanting, especially for damaged alpine areas where fragile native vegetation grows very slowly. Volunteers may become involved in the year-round activities of agency greenhouses – planting seeds, starting cuttings, fertilizing, watering, and wintering parent stock, and preparing plants to be moved.

e. Planting trees

Planting a tree encourages volunteers to take long-term responsibility for another living thing. Many trees will not reach full maturity within the lifetimes of the people who plant and care for them. Tree planting is thus an act of generosity to the present and of faith in the future. As group members act in the best interests of their world today, they also are improving the environment for years to come.

To be of lasting value, trees must be planted correctly. Selecting the wrong kinds of trees, planting them in the wrong locations, or neglecting trees after they are in the ground does a disservice to the trees, to the volunteers who plant them, and to the people who must deal with the trees in the future. The solution, of course, is careful planning.

► Before you plant

Talking with nursery workers, gardeners, city officials, and resource managers will allow project leaders and group members to learn why trees are important and why many areas would benefit by having more of them. The experts might suggest specific places where groups can plant and care for trees.

Wherever trees are to be planted, increase the chances of success by answering the following questions:



Tree planting— an act of generosity to the present and of faith in the future.

- Has permission been obtained from landowners or resource managers to plant on the selected site?
- What species of tree should be planted? Are they suitable for the soil, climate, and location?
- Is the planting site free of overhead and underground utility lines? Is neighborhood, city, or agency approval required before planting can occur?
- Who will furnish the trees? Agencies may supply seedlings to be planted on public lands. Organizations, landowners, and interested businesses might fund the purchase of young trees.
- Planting requires shovels, buckets, water, mulch, and sometimes stakes and padded wire. Where will volunteers obtain those items? Can they be borrowed or donated?
- Who will teach volunteers proper planting techniques? Always involve an experienced gardener, forester, agency professional, or other knowledgeable person to provide guidance until you have gained the skills to offer that leadership.
- Is your group willing to care for the trees after they have been planted?

► *How to proceed*

Trees to be planted may range in size from 12-in. seedlings to saplings more than six ft. tall. Whatever its size, a tree's roots will probably be protected by plastic or burlap, or enclosed in a bucket or box. Keep young trees in a cool, shaded location to prevent them from drying out before planting.

Dig a hole only deep enough to hold the roots and, if it has one, the ball of soil and bottom of the hole so that tiny roots can more easily push into the soil.

If the tree is in a pot or other container, remove it and gently straighten any twisted roots or those growing around the root ball. Ease the tree into the hole. The crown at the top of the roots should be even with the surface of the ground. See that the tree is standing straight, then push loose soil around the roots and press it down firmly. Fill the hole to the crown (where the roots and tree trunk meet), but no deeper.

After the hole is filled, shape the extra soil into a dam around the tree. Soak the soil with water then soak it again. A newly planted seedling needs several gallons of water. A larger tree can require 10 gallons or more. If the tree is drooping, use stakes and padded cord or wire to give it temporary support.

Cover the ground around the base of the tree with several inches of wood chips, composted leaves, straw, grass clippings, or sawdust. Mulch holds moisture, enriches the soil, and discourages other plants from competing with the young tree. Spread mulch as far as the branch tips of the tree and replenish it every year until the tree is well established.

► *Following up*

One of the pleasures of planting trees is enjoying their long-term care. Resource managers can give volunteers guidance on when and how to water, mulch, prune, and straighten trees. Group members should plant trees only if they are willing to look after them.

f. Work project notebook

Whatever the focus of your group's efforts, a record of what you have done and how well it has succeeded is an essential part of revegetation and restoration work. Include "before" and "after" photographs of repaired areas. When coupled with the written record of a notebook, repeating the photographs at intervals of weeks, months, and years will provide a valuable account of ongoing progress.

g. Public information

Successful revegetation and restoration require the public's cooperation. The more that people learn about this work, the more likely they are to recognize and respect repaired sites and allow them to heal.

When people happen upon a group involved in a revegetation project, volunteers have a perfect opportunity to educate the public. Group members might take turns explaining the work they are doing and the importance it has for the land.



Management strategies may call for activities, such as fence building, to reduce livestock or wildlife damage of natural areas.

3. Wildlife management

All species of wild animals must have food, water, shelter, and space. When these are available in quantity in an area, a species will thrive. When one or more are in short supply, the animals dependent upon them will decline.

Not every species needs the same kinds or amounts of the four essential habitat requirements. Changing the quality and quantity of any of these components will improve conditions for some species, but may be detrimental to others. For example, clearing a portion of a forest can increase forage and open space for deer, but may reduce the number of dead snags that woodpeckers, owls, and squirrels require for their nests. Whenever changes occur in an ecosystem, whether planned or not, the species composition of the local wildlife may alter: some species may decline, while others may dramatically increase in numbers.

Conservation professionals entrusted with the regulation of wildlife strive to establish and maintain a diversity of habitats that can support many animal species. Much of their work involves policy decisions that seek to balance the needs of wildlife with hunting, livestock grazing, timber harvesting, construction, recreation, and other human demands for those same resources.

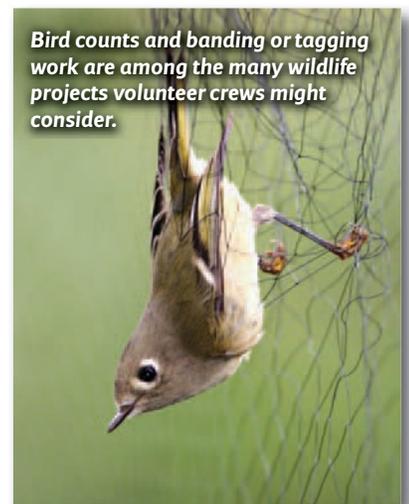
Wildlife management enhancement projects

The well-being of birds, fish, mammals, and other animals is so dependent upon the condition of the environment that any projects that improve an ecosystem will probably also enhance many wildlife populations. Group leaders can draw upon a variety of skills to supervise projects that will benefit wildlife.

► Wildlife inventory

Volunteers might begin by preparing an inventory of the wildlife populations in an area. With guidance from project leaders and wildlife professionals, they can document the locations and numbers of various reptiles and amphibians, songbirds, upland game birds, waterfowl, hawks and owls, game and furbearing mammals, non-game mammals, and threatened or endangered species. Volunteers can categorize the populations of various species as abundant, occasional, or rare based on the number of sightings. The information they collect will provide a baseline to determine long-term population trends.

Using aerial photos and topographical maps, volunteers also can make trips into the field to inventory and map the kinds of wildlife habitat found in the study area.



Bird counts and banding or tagging work are among the many wildlife projects volunteer crews might consider.



Conservation professionals can determine the practicality and method of improving conditions for wildlife by using the species inventory and habitat mapping. Some areas are best left alone. Others might be improved by the efforts of volunteers undertaking some of the following projects:

- Establishing and maintaining openings in a forest.
- Selectively clearing away heavy underbrush and exotic vegetation to produce seedbeds for natural grasses, legumes, and shrubs beneficial to wildlife.
- Fencing wetlands and woodlands to control excessive livestock grazing.
- Protecting den trees and other nesting areas for birds, squirrels, raccoons, wood ducks, and other animals.
- Following timber stand improvement practices that will ensure diversity in the ages and species of trees, and a mix of forest, brushy areas, and clearings.
- Planting conifers to benefit cottontails, grouse, and other small birds and mammals. Low branches provide shelter, while herbaceous vegetation growing between young trees supplies food.
- Encouraging the growth of dense plant communities where ruffed grouse and other species can find cover any season of the year, especially in winter.
- Helping resource managers protect forests, marshes, and fields from uncontrolled wildfires and aiding in using prescribed burning to alleviate wildfire hazards and to encourage natural succession of plant communities.

The results of habitat improvement projects are neither immediate nor dramatic. Wildlife is secretive and to the unskilled observer, practically invisible. Resource managers and project leaders may find that volunteers will be more motivated to work on long-term projects (revegetation, timber stand improvement, etc.) if they also do work that gives the satisfaction of immediate results – building brush piles or constructing birdhouses, for example.

► *Brush piles*

Wild animals avoid areas where they cannot find shelter. Where the lack of cover makes an area unattractive to wildlife, volunteers can establish brush piles to substitute for dense, natural vegetation.

Properly constructed brush piles will provide small animals and birds with nesting habitat; protect them from rain, wind, snow, and heat; conceal them from predators; and encourage seed germination and plant growth.

The edges of fields, wetlands, and woods are promising locations for brush piles. They should be built about 5 ft. high and 20 ft. long using branches that might be gathered from nearby timber stand improvement projects or trail corridor clearing. A tall stump or rock in the center will extend the life of a brush pile by lifting it off the ground and slowing the process of decay.

► *Birdhouses*

Many species of birds seek the hollows of trees as locations for their homes. Birdhouses increase the number of sites where birds are likely to nest. Well-made birdhouses also protect eggs and chicks from the elements and from predators.

Local bird enthusiasts and resource managers can guide volunteers in choosing birdhouse designs appropriate for birds of their areas.

If you paint the birdhouse, use nontoxic paint free of creosote or lead that could harm birds. Do not paint the inside of a birdhouse or the edges of the entrance hole.



Check the Internet for free birdhouse building plans.

Late winter and early spring are the best times to put up birdhouses. Mount them on fence posts or trees. They should be oriented so that entry holes face away from prevailing winds that might blow rain inside. Remove the top after each nesting season and clean the interior to prepare it for the following year's birds.

4. Riparian area conservation

Planning projects in riparian areas

As with all conservation work, project leaders planning projects in riparian zones should always rely heavily upon the advice of resource managers familiar with local conditions. Solutions that work well in one riparian zone may be useless or even detrimental somewhere else. Since riparian repair often involves public waterways, project leaders and resource managers may need to obtain authorization from local, state, or federal agencies before beginning projects.

► *Riparian revegetation*

Vegetation plays many essential roles in the vitality of a riparian area. It deters erosion by binding soil in place. It provides food for fish, insects, and terrestrial wildlife and gives them a place to rest, to breed, and to hide from predators. Its shadows can help moderate water temperature. Its networks of roots can play a part in filtering sediment from streams and lakes.

Riparian vegetation can be improved by planting desirable species to increase the densities of existing plant communities or to replace plant populations that have been disturbed or destroyed. As a general rule, using native species gives the best results.

The restoration methods most appropriate for volunteer projects are using cuttings, transplanting dry root stock, and planting seeds. These may be available from nurseries, Natural Resources Conservation Service plant material centers (<http://plant-materials.nrcs.usda.gov/centers/>), or gathered near planting sites with guidance from resource managers.

► *Cuttings*

Willows, cottonwoods, and similar woody species can be effectively reestablished in a riparian area by using cuttings. Begin by collecting native cuttings from sites as near the project as possible, but choose donor sites that will not be harmed significantly by the loss of the cuttings.

Harvest each cutting by pruning it at a 45° angle. When replanted, the top of each cutting should stand 8 in. to 15 in. above the ground while its butt end must be buried deeply enough to touch soil that is always wet. Cuttings survive best if they are transplanted immediately, though it is possible to store them for up to several days in buckets of water containing a commercial root-growth hormone.

► *Transplanted root stock*

The methods of planting described in *Revegetation and restoration*, (Section 2 c-e, p. 105-108), also apply to transplanting of saplings, shrubs, and grass clumps in riparian areas. Usually, the most appropriate vegetation to transplant is gathered from nearby locations that are similar in terrain and growing conditions to the areas undergoing restoration.

► *Seeding*

Grasses and broad-leaved annuals may be used to help stabilize gently sloping stream banks. Seeds should be carefully selected to produce plants that are suitable for the area and, ideally, native to the location. In most parts of the country, seeds should be sown in autumn as vegetation is going dormant

or in early spring at the beginning of the growing season. Volunteers can broadcast seeds by hand or with a seed spreader. It is also good to rake the seeds into the soil to improve chances of germinating.

► *Fencing riparian areas*

Fencing a riparian area is an effective way to protect new plantings or seedlings, to restrict access of livestock to stream bank vegetation, and to control the flow of human traffic through an area. The kind of fence to be constructed should be decided in consultation with conservation professionals. Take into consideration terrain, climate, type of riparian zone, wildlife migration patterns, visual impact, livestock and recreational users, the need for public entrances such as stiles, and water access points for livestock and large wildlife.

As a rule, fences should not be located in a riparian zone itself. Wildlife might be hindered in its movements through the area and the part of the zone outside the fence would be subject to the overuse or abuse the fence is meant to stop. Improperly placed fences also may trap debris during periods of high water, leading to upstream flooding.



Fencing can be an effective means of diverting livestock, wildlife, and humans from sensitive riparian areas.

► *Riprap*

Riprap can be used to curtail erosion on the outside bends of small streams, generally those less than 12 ft. across. Place rocks along the base of the eroded bank, using enough stone to slope gently up the bank from the stream bottom to a point above the level of normal flow. Over time, the bank above the riprap will reshape itself as soil crumbles from steep sections. Seeding the bank or transplanting grass clumps, saplings, or willow cuttings will speed the process of stabilization and healing.

► *Rock deflectors*

Deflectors built of rock can divert water from eroding stream banks and direct flow toward more suitable channels. Deflectors provide hiding and resting places for fish. Rather than acting as dams that abruptly change water direction, deflectors built in a triangular shape gently turn water away from the bank.

Rocks used in deflectors should be large enough to withstand the force of high water. Place the largest rocks on those parts of the structure most likely to be affected by stream flow.

A deflector should be no more than a few inches higher than the normal water levels, but the point where it connects with the bank should be protected with riprap laid higher than the flood stage. High water and debris will flow over the deflector without seriously altering the current, while the riprap will shield the shoreline from erosion.

► *Tree revetments*

A revetment is a facing used to protect an embankment. Revetments made of discarded Christmas trees can be especially effective in curtailing bank erosion on the outside curves of small streams so that vegetation can take root.

Install one tree per yard of embankment, arranging the trees so that their tops point downstream. Use wire to fasten the trees to log anchors called “deadmen” buried in the stream bank. Place riprap rock all along the revetment to prevent the current from scouring behind the trees.

► *Catcher dams*

A variety of structures can be installed in low-velocity streams to allow sediment to settle and form natural basins that are inviting to aquatic and riparian vegetation, wildlife, and fish. These structures may be as simple as a line of rocks placed across the current or a log embedded in the streambed perpendicular to the shore. Low wire fences sometimes are positioned to catch debris, as with wedge dams made of logs that have been notched, fitted together, and backed with wire and rock.

Whatever design is deemed appropriate by conservation professionals, locate catcher dams on straight portions of streams where tall vegetation on the banks can provide cover and shade. Securely anchor the dams in the stream banks to prevent them from washing away in high water. Check them several times a year to perform maintenance that will keep them in good working condition.



Appendix H. Trail maintenance and construction

Volunteer involvement in maintenance projects allows people who enjoy trails to care for the pathways they use. By providing experienced leadership in completing repairs, project leaders can help their groups and the agencies make the most of the trail work opportunities.

Trail maintenance and construction techniques vary greatly across the county because of changes in soils types, use patterns, climate zones, management prescriptions, user groups, and other factors. This appendix will provide you with a basic understanding of common tasks. Be sure to work with the resource manager and your regional council to learn the techniques that they want you to use on your specific project.



1. Anatomy of a trail

The ideal trail lies lightly on the land. It follows the contours of the terrain, curving around the hillsides, dipping into valleys, and climbing at reasonable grades.

The initial designing and surveying of a trail is usually done by resource managers. The intent is to lay out a trail that will:

- Lead people to destinations they want to reach, using routes that make getting there an enjoyable part of the experience.
- Protect the environment by encouraging users to stay on the trail, thus limiting their impacts.
- Withstand the general wear and erosion caused by rain, melting snow, and trail users.

A goal of trail builders and maintainers is to do their work so well that travelers will be aware of the natural environment unfolding around them, but rarely notice the pathway on which they are walking. The best trails provide access to the outdoors without drawing attention to users.

The tread of a trail is the part upon which users travel. Trails designed primarily for hikers have a tread 18 to 24 in. wide, while those used by horses and pack animals are generally 36 in. wide. Trails designed for wheelchairs, dirt bikes, and other users may require great tread widths.

The tread is slightly outsloped – or tilted to the outside – to shed water. The outslope should be barely noticeable; usually no more than about 1 in. of outslope for every 18 in. of tread width.

The uphill side of a trail is its backslope. The backslope is smoothed to remove soil that might fall or wash onto the tread. The downhill side of a trail is called the downslope. The downslope usually requires little construction or repair work. Groups maintaining trails should try to avoid damaging downslope vegetation that is stabilizing hillside soil.

The best trails provide access to the outdoors without drawing attention to users.

2. Common maintenance tasks

Maintaining tread

Almost every trail will be exposed to water during the year from rain, melting snow, or springs. The outslope of a good trail allows water to flow immediately off the surface. If water is trapped on a pathway and allowed to run along a trail, it may erode the tread. As erosion carves increasingly deep ruts, the pathway will eventually be destroyed.

Brushing

Brushing is the task of removing branches, bushes, vines, windfall, uprooted trees, and other vegetation that has encroached upon a trail. The purpose of brushing is to maintain a travel corridor of sufficient width and height to allow trail users to pass easily.

As they stand in the center of a trail, volunteers can estimate the corridor clearance by stretching their arms sideways, then reaching over their heads. Trails intended primarily for hiking require a travel corridor about 6 ft. wide and 8 ft. high. Trails for horseback riders require a larger corridor – about 8 ft. wide and 10 ft. high.

The tools most useful for brushing are loppers, bush saws, clippers, and pole saws. Anyone using a pole saw should be encouraged to wear a hard hat and goggles as protection from falling sawdust and branches.

The following guidelines will help volunteers brush a travel corridor so that it looks as natural as possible:

- Cut bushes and saplings flush with the surface of the ground. Don't leave stumps sticking above the earth where they can trip a hiker or injure the foot of a horse.
- Undercut tree branches by sawing through about one-third of the diameter from underneath, then complete the cut from the above. This technique will prevent the falling branch from stripping live bark off the tree.
- Cut branches close to tree trunks to avoid leaving "hat racks" that can snag clothing, packs, or horses. Rather than cutting most of the limbs off a small tree, consider removing the entire tree. Young trees encroaching on the sides of a trail can be removed with loppers or handsaws.
- Consult resource managers before cutting large trees in the trail corridor. Their removal may not be necessary or desirable.
- Cut all stumps flush with ground level. Rub stump cuts and limb scars with soil so that they blend into the background.
- Carry brush and branches out of view of the trail and scatter over a wide area. Vegetation lying on the ground will decompose quickly.

Removing slough and berm

A common trail problem is the buildup of silt on the inside edge of the tread (where it is called slough) and the outside edge (where it is called berm). As slough and berm become compacted, they narrow the usable part of the tread and make a passage more difficult. Water trapped between slough and berm can flow along the trail and gouge the trail.

Mattocks, Pulaskis, McLeods, shovels, and rakes are effective tools for removing compacted slough and berm. Loosened dirt can be packed into ruts to smooth the trail, scattered in a wide area across the downslope, or loaded into wheelbarrows or buckets and used to repair ruts elsewhere on the trail.

Building water bars

Removing slough and berm can erase many signs of erosion, but discouraging future water damage may require the installation of water bars at points along the trail where they can turn water away from

the tread. Water bars can be built with logs at least 8 in. in diameter or with rocks that can be fitted tightly together.

Dig a trench across the trail at a 30° to 45° angle and position the log or rocks. The trench should be deep enough to bury the water bar so that only a few inches rise above the level of the trail tread. Set the log or the rocks very firmly in the trench. A water bar must withstand many years of impact from the feet of hikers and sometimes the wheels of bicycles and the hooves of horses. Don't be satisfied with a water bar you are building until it stays in place when you jump up and down on it.

Outslope the tread up the trail from the bar so that water flowing down the pathway will curve off the tread before it hits the log or rocks. The bar itself should be a barrier of last resort to turn any water that flows beyond the outsloped tread. Place some rocks on the downslope to prevent erosions by water that the bar has steered from the trail.

Water bars are not used in some places due to environmental conditions or use patterns. These places may use rolling dips or other devices to remove water from the tread of the trail. The design of these devices varies from place to place and research is continually being done to improve them. Project leaders should work with the local resource manager and regional council to learn the specific construction and maintenance techniques that will work best in your area and for your project.

Maintaining water bars

Over time, silt can build up behind a water bar and render it useless. With a shovel, McLeod, mattock, or the heel of your boot scrape away the silt and restore the shape of the drainage slope so that the water bar will again be effective. Replace rotted logs and reset or replace loose rocks.

Creating turnpikes

A turnpike will raise trail tread high enough to keep it dry as it crosses an area that is frequently boggy. Begin by digging a foundation ditch on either side of the proposed tread, keeping the inside edges of the foundations about 36 in. apart.

If you're building with stone, lay a row of rocks in each ditch. Use the same care as you would for building any rock structure – match the rocks to form a fairly flat top surface, embed each rock solidly in the earth, and place every rock tightly against the rocks on either side of it. A properly placed rock should not move when you stand on it.

If timber is available, use a log at least 8 to 10 in. in diameter for each side of the turnpike. Bury at least half of the logs in the trenches. Driving wooden stakes will help hold the logs in place.

The best materials for filling a turnpike are layers of small stones or crushed rock covered with 6 in. of soil. The stones will allow moisture to flow through the turnpike while soil, crested up in the center, makes a suitable tread that sheds water.

Creating rock walls

Retaining walls carry trails around switchbacks, across rugged terrain, and over tree roots and outcroppings of stone. Most rock walls constructed in rustic settings are drywalls – structures built without mortar. Gravity holds the stones in place. Every stage in drywall construction augments the effectiveness of gravity, and thus increases the sturdiness of the wall.

- Begin by digging down until you reach solid, undisturbed earth, then clear a shelf a bit wider than the average width of the rocks you will be using. Tilt the footing slightly inward so the wall will lean into the hillside.



Water bars protect trails from erosion.

- Ideal stones for building walls (or any other rustic rock structure) have well-defined edges and large, relatively smooth faces. Bigger is usually better than smaller; angular is better than round.
- Lay the first rock at the lower end of the foundation. Because it will act as a buttress for the entire wall, use one of the largest rocks you have. If possible, butt it against an existing stone outcropping to anchor it in place.
- Excavate beneath the rock to provide a snug fit in the footing (like settling a large tooth into a gum line). A garden trowel can be useful for shaping the foundation. Use small stones and gravel to fill any voids behind the rock.
- Place the next rocks tightly beside the first so there is solid contact between them. If the top surfaces are roughly level, you will have an easier time laying the subsequent tiers. Wedge small stones behind the rocks to stabilize them. Fill material will bury those wedges and lock them into place. Stones wedged into the front of a wall may be loosened by freezing and thawing.
- As you place each rock, see that it makes solid contact with neighboring rocks, then stand on it and bounce up and down. There should be no movement in the rock. If the rock is loose, secure it with stones wedged from behind, or pull it out and try other rocks until you find one that fits well.
- Lay the upper tiers with the same care. Wherever possible, rocks in the second tier should “break the joints” of the row beneath to link together all the tiers of wall. As each tier is completed, fill behind it with stones, soil, or crushed rock.
- Save some larger rocks for the top tier. Known as capstones, their weight will help hold all of the tiers in place. Fill behind the capstones with small rocks and, if it is available, spread 4 to 6 in. of soil over the top of the fill to form an inviting tread surface for hikers and pack animals.

3. Construction considerations

Timber projects

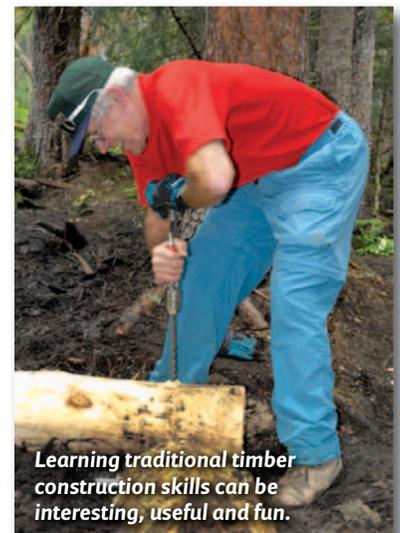
Trail workers in many parts of the country have a tradition of using logs and milled lumber as materials for building retaining walls, overlooks, steps, bridges, boardwalks, shelters, and cabins. Wooden structures can be very durable and often blend well with natural surroundings. In remote locations, timber secured near project sites may be the only construction material available.

An added attraction of working with wood is the craftsmanship it involves. The techniques used today to build rustic structures are essentially the same methods practiced for hundreds of years by pioneers, shipwrights, and foresters. The saws, chisels, axes, and other tools of timber work were used in the early days of the American frontier. Volunteers and group leaders interested in learning traditional timber construction are tapping into a wealth of skills that can be interesting, useful, and satisfying.

Through Conservation USA, group leaders and resource managers skilled in rustic timber construction can share their expertise with other leaders and volunteers who are willing to dedicate time to learn the art of working with wood. Workers can complete important projects in the field while also keeping alive the legacy of traditional timber construction methods.

Trail markings

Agencies often mark prospective trail work so that crews can find project sites, understand what they are to do, and accurately record their progress. While marking methods vary, the most common procedure uses wooden stakes driven into the ground at key locations along a trail. Numbers written on each stake indicate how far it is from the beginning of the trail. For example:



Learning traditional timber construction skills can be interesting, useful and fun.

- 00 + 00 (no distance; appears at the beginning of a route)
- 00 + 50 (50 ft. beyond the beginning of the route)
- 01 + 00 (100 ft. beyond the beginning of the route)
- 03 + 75 (375 ft. beyond the beginning of the route)

Equipped with a measuring wheel and a pack full of stakes, resource professionals can mark all of the maintenance work to be done on a trail and produce a list that volunteer groups can use to find their projects. A few lines of a work list might look like this:

- 00 + 75: Install water bar
- 01 + 10: Begin rock retaining wall
- 01 + 22: End rock retaining wall
- 02 + 44: Cut back tree roots



Project leaders reading the list can lead their groups directly to the projects that resource managers have decided will most benefit a trail. Following the list above, for example, a volunteer could walk 75 ft. along the trail and come to a stake in the ground marker 0 + 75. Written on the stake or on a piece of flagging tape tied to the stake will be the message “build water bar.”

New trail construction

Volunteer groups are sometimes invited to help construct new trails. The route of a proposed trail should be carefully surveyed and marked by the resource manager before volunteers arrive. Wooden stakes generally are used to show where the tread will be built. A single row of stakes can signify the center of the proposed tread or stakes may be placed to mark the inside and outside edges of the trail.

Building trails across flat or gently rolling terrain may require little more than clearing brush, moving rocks, and making the route obvious. As hikers use the new trail, their steps will beat down the tread.

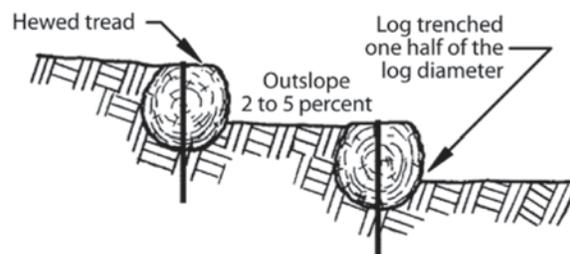
Trails that cross steep hillsides are often built by digging a full bench cut so that the entire width of the tread lies on solid undisturbed earth. An effective way to direct a crew building such a trail is to use a mattock or shovel to scratch a line on the ground where the inside edge of the tread will be. Station crew members at 15- to 20-ft. intervals and instruct them to dig straight down along that line until they have uncovered a trail tread of the proper width.

Trail widths usually are 24 in. for hiking trails and 36 in. for trails used by horses. Give volunteers a quick way to measure that width by marking each tool handle with duct tape at 24 in. or 36 in. By laying a tool handle across the tread, workers can determine when the tread they are building is wide enough.

Once the tread has been roughed out, the groups can smooth it into shape with shovels and McLeods.

Volunteer trail builders usually leave the tread sufficiently outsloped for good drainage even when they think they have made it level. You can judge whether the tread has too much outslope simply by walking on the trail. If it feels tilted under your feet, then it needs to be made more level.

Finally, the crew can form the backslope. Remove any soil, rocks, and gravel from the backslope that is likely to fall onto the tread during rainstorms.



Individual Steps—Logs



Appendix I. Safety and Tools*

It is imperative that your crew members are protected from head to toe when using potentially dangerous tools.



*This section has been adapted from the *COTI Guide to Crew Leadership for Trails* (2006), produced by Colorado Outdoor Training Initiative (COTI), copyrighted by Volunteers for Outdoor Colorado (VOC), and funded in part by Great Outdoors Colorado (GOCO) through the Colorado State Parks Trails Program. It is used with permission from the COTI, now known as the Outdoor Stewardship Institute (OSI), <http://www.voc.org>.

1. Safety and tools

Tool talk

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 with the crew. The order of tool presentation is up to the crew leader. However, certain subjects regarding tools must be covered. These subjects will be 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.
- 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. Crew members need to be responsible for maintaining the correct distance from the person immediately preceding them down the trail.
- Watch where tools are pointed at all times.
- Let the slowest crew member set the pace for the group.
- Announce “coming through” or “bumping by” when approaching other crews working. Stop and wait for the crew members to cease work. The person who is working has the right of way and will cease work and yield when comfortable for them to do so. “Coming through” or “bumping by” is always a request for passage and never a demand.

“U” – Using Tools

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

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



Project leaders must teach crew members how to use tools safely and effectively.

- Before using any tool, check to make sure the handle is not loose or split. Tag all damaged tools for repair. Any tool with flagging on the handle is not safe to use.
- 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 between crew members at all times. Be sure someone else's space is not compromised while using a tool. Do not bunch up or crowd one another. Some organizations will maintain at least a 10-foot distance between workers as a safe operating distance when using tools.
- Full "roundhouse" swings with tools are not generally acceptable unless a crew member has extensive experience with this technique. Using a tool this way can be dangerous and may cause the user to quickly tire.
- In the rare occasion a roundhouse swing is necessary, check to make sure the work site is safe and advise people nearby that you will be swinging. Before starting to work, clear away any brush or limbs that might unexpectedly catch a swinging tool. Yell "Swinging!" before lifting the tool to work.
- Use all tools in a motion parallel to the body rather than towards the body.
- Demonstrate to the crew how to lift with the legs instead of the back. "Head up, butt down" is the order of the day.

"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.
- Tool sheaths, due to their small size, are easily lost and should be gathered by the crew leader.
- Store all tools on the uphill side of the work section or trail 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, or impalement and tripping hazards.

The storage of rock bars requires special attention. Rock bars are heavy and have pointed tips that can severely injure someone if they slide or roll down a hillside. To store rock bars, place the tool on the ground, parallel with the contour, and preferably centered behind a tree or rock for security. They should never be stored in such a way that they can escape downslope and create a javelin-like hazard.

"S" – Safety with Tools

Carrying, using, and storing tools present different safety issues. It is important for crew leaders 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.
- Avoid "roundhouse" swings. You could injure someone else and you increase the likelihood of a miss-stroke and hitting yourself. Roundhouse swings are very tiring and unsustainable over extended time periods.

- Tools come in a variety of sizes, shapes, and intended uses. They are all dangerous if not treated with respect.
- Misused tools can break and are a danger to future users. They also cost time and money to repair.
- Remove all broken tools from use immediately, and tag for repair before you forget and the tool is used again.
- Stay alert when others are using tools nearby.
- Do not set a tool down “just for a minute” in the wrong place. It will become a hazard.
- Safety with rock bars is very important; they are a hazard especially when stored improperly.
- Trade off on tools occasionally for relief from repetitive stresses. Repetitive stress may cause more injuries particularly towards the end of the day.
- Always “CUSS” your tools, even if you have a crew of veteran members. The refresher is helpful for everyone.
- Be thinking about the consequences of every move. When working with a rock or log, think ahead so as not to be standing in the wrong place when it moves. Be ready to toss the tool aside and jump free. Avoid cutting toward any part of your body and watch out for your coworkers. Use skill, not brute force.

Everyone has different levels of coordination. Some members of your crew may need to use a given tool several times before they are able to overcome their awkwardness. For others, new tools may come as second nature. Spend an appropriate amount of time training each individual to ensure safe and efficient work habits.

2. Tool descriptions and uses glossary

Knowing what a tool is designed for is important. The following tool descriptions contain usage and safety concerns for each tool. Safe and proper tool usage cannot be overemphasized.

Always be on the lookout for crew members using tools improperly. If a crew member is using the wrong tool for the job, it can lead to overexertion and increase the potential for an accident or broken or damaged tools. You need to be sure that the right tool is being used for the job.

Common examples of tool misuse are:

- Using a shovel to pry rocks or to dig in hard, rocky soil instead of a rock bar or mattock
- Using the axe blade of a Pulaski to break up soil
- Using the grubbing end of a Pulaski to pry up big roots and rocks
- Using an Adze hoe to cut larger vegetation, such as tree roots
- Chipping or prying rocks with a McLeod
- Cutting into dirt or rock with a bow saw
- Chipping rock without safety glasses
- Throwing a tool

When you see these things happening, politely instruct the crew member how to use the tool safely. Always keep in mind – safety first!

Tools for measuring

Altimeter: An instrument for measuring altitude.

Clinometers: A clinometer is a simple instrument for measuring grades. Most clinometers have two scales, one indicating percent of slope, the other showing degrees. Percent slope, the relationship

between the amount of rise in elevation or drop over a horizontal distance, is the most commonly used measure. Don't confuse percent and degree readings. It is easy to do! Expressed as an equation:

$$\% \text{ Grade} = \text{Rise} \div \text{Run} \times 100\%$$

A section of trail 100 ft. long with 10 ft. of elevation difference would be a 10% grade.

Levels: A device for establishing a true horizontal line or plane by means of a bubble in a liquid that shows adjustment to the horizontal by movement to the center of a slightly bowed glass tube.

Carpentry and construction levels, line levels, and laser levels are different types of levels that can be used for construction of fencing, stone walls, boardwalks, and bridges. Levels also help to determine the slope of a trail tread.

Abney Level: Hand-held instrument that is adjusted like a sextant and can be set to a fixed gradient. The user sights through the Abney to a fixed reference (usually a second person) until the crosshair bisects the bubble; this indicates the preset grade.

Global Positioning System (GPS) Receiver: A hand-held, battery powered device used to determine the location (latitude and longitude and/or meridian) and altitude using a network of global positioning satellites.

Measuring Wheel: A device that records the revolutions of a wheel and hence the distance traveled by rolling the wheel over a trail or land surface. (Cyclometer)

Other Measuring Devices: The tilt of the handle on an upright McLeod can be used to measure outslope of tread. A partially filled, clear water bottle can be used as a level. Pulaski's are useful as measuring gauges since the handles are exactly 3 ft. long and most heads are 1 ft. from end to end. Use a tape measure or mark off commonly used measurements on your tools. Know the length of your feet, arms, fingers, and other handy rulers as a ready reference on the trail. Get to know the length of your pace over a known course so you can easily estimate longer distances.

Tools for cutting, sawing and brushing

Bow Saws: Bow saws come in many sizes and consist of a tubular steel frame designed to hold a sharp and deeply toothed steel blade. Blade lengths can vary from 16 to 36 in.

Bark Spud: A tool with a 1- to 4-ft. wood handle and a dished blade used to remove bark from logs by sliding between the bark and the wood.

Bush Hook: A long handle and either double- or single- edged curved blade gives the bush hook a powerful cut.

Chain Saw: A portable gas-operated saw with an endless chain carrying cutting teeth.

Cross Cut Saws: A crosscut saw is a large saw intended for cutting through downed timber. This type of saw should be used with wedges to hold the kerf (cut) open to prevent the log being cut from sagging and pinching the saw. The crosscut saw has two handles connected by a long steel saw blade. This saw requires two people to use it. Correctly pushing the saw in sync and at the same speed, while your partner pulls, allows the saw to work to its full potential. After a few pulls, a smooth rhythm may be obtained. Crosscut saws are another tool that takes practice and experience to use safely and effectively and may require certification.

Draw Knife: A tool with a sharp blade and handles at both ends used to strip bark from small diameter logs. (raw knife)



Using a cross cut saw successfully takes patience and practice.

Froe: An old hand tool used originally for splitting shingles and shakes. It consists of a heavy, 12-in. straight steel blade with a wooden handle. The cutting edge of the blade is placed against the wood to be cut and a club or mallet is used to hit the face.

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 in. long, and should be used on live limbs approximately 1 in. diameter or smaller. Pruning shears have shorter handles and should be used on small branches with 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 in. in diameter.

Machete: A large knife used to clear succulent vegetation.

Pole Saw: A pruning saw with a telescoping handle to trim branches that would otherwise be out of arm's reach. Some models have built-in loppers that can be operated from the ground with a rope. (tree pruner)

Pruning Saws: Single handled, straight bladed pruning saws are useful for limbing, some brushing, and removing small downfall; especially where space is limited and cutting is difficult. Folding pruning saws are handy.

Scissors: Heavy duty scissors or utility shears are used to cut erosion mat, straw wattles, and twine used in erosion control.

Swedish Safety Brush Axe: A machete-like tool with a protected short, replaceable blade and a 28-in. handle used to cut through springy hardwood stems. (Sandvik)

Timber Carrier: A tool, with a long handle and hooks, which allows two people on each side of the carrier to transport logs or timber.

Weed Cutters: Weed cutters are used for cutting light growth like grasses and annual plants that grow along trails. They are lightweight and durable and usually swing like a golf club. Tool with a serrated blade at the end of a wooden handle. (grass whips, weed whip, swizzle stick, swing blade)

Wire Cutters: Various pliers-like tools, some with cutting blades only, some with cutting and gripping blades – such as needle-nose pliers or fencing pliers – are used for cutting wire and wire mesh in the construction of protective tree cages, barrier fences, etc.

Tools for pounding and hammering

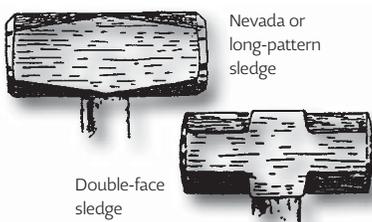
Hammers: A variety of hammers may be used on projects. Sledgehammers or “double jacks” should be used carefully. They are used to drive spikes or to break rocks or concrete. Carry sledges by your side, by gripping the handle near the head. Nail or claw hammers have heads with heat-treated steel faces for driving nails, and claws on the other end for pulling nails. Three and four pound sledges (“single jacks”) are used with a rock chisel for shaping stone. Carry the hammer by gripping it near the head,

holding the tool away from your body as you walk. Protective glasses must be worn when using hammers, especially a sledge with a chisel. Claw hammers are for driving nails only and should never be used with a rock chisel.

Rubber Mallet: A short handled hammer with a large diameter, hard rubber head used for driving the wire staples that hold erosion matting in place. Fist-sized rocks are a good substitute if they are available.

Single-Jack Hammer: A short handled hammer with a 3 to 4 pound head. Can be used alone to drive timber spikes, or with a star drill to punch holes in rock.

Sledgehammer: A long handled heavy hammer with a 6- to 8-pound head, usually held with both hands.



Star Drill: A foot-long tool, weighing about a pound, used with a single-jack hammer to punch holes in rock or open a seam/crack. Chisel end is star shaped.

Tools for Lifting and Hauling

Austin Rock Sling: An Austin rock sling is a carrying device made of steel chain configured in a web pattern with rope or steel ring handles. It is generally used to transport large rock for use in walls or other structures. Several Austins used together can be utilized to move large logs and beams for bridges or turnpikes.

Brewery Blanket: A brewery blanket is a heavy nylon blanket generally 6 to 8 square ft. and originally used in the filtering process at a brewery. It is useful for transporting duff, soil, and rocks. For heavy loads, a brewery blanket can be knotted at the corners or a golf ball sized rock wrapped in each corner of the blanket to provide the volunteers with a better handhold.

Buckets: Usually a five-gallon plastic container with a heavy wire handle (bail) useful for transporting soil, duff, and small hand tools.

Cable, Wire: A thick, heavy rope, made of wire strands.

Cable Gripper: A device that clamps onto a cable when tension is applied to the attachment point.

Cable Rigging: Cable works and hoists used to lift and move large, heavy rock or logs.

Cable Strap: A pre-cut length of wire rope (that may have eyes on both ends) that is used in rigging applications.

Cant Hooks and Peaveys: Cant hooks and peaveys afford leverage for moving or rotating logs. To roll a heavy log, use a series of short bites with the hook and maintain your progress by quickly resetting it. Catch the log with the hook hanging on top of the log. Rotate the log using the leverage of the handle, working the tool like a ratchet. Moving large logs may require several hooks working together. Avoid taking large bites; a heavy log will roll back and pin the handle before the hook can be reset.

Canvas Bags: The canvas bag or coal sack is a large heavy canvas tote bag with two handles that can be used to carry large volumes of light material such as duff, needles, or leaves. It has the same capacity as about two full buckets.

Clevis: A U-shaped metal piece with holes in each end through which a pin or bolt is run. Used to attach two objects together. (shackle)

GripHoist: A brand name for a manually operated hoist that pulls in a cable at one end and expels it from the other end; used to move rock or timber needed for trail structures.

Hay Hooks: A sturdy steel hook, also called "bale hook," equipped with D-handles that are designed to be slammed into bales of hay or straw, providing a grip for dragging or lifting them. Hay hooks are also used to grip the mesh or handles of wire baskets enclosing the burlapped root balls of balled and burlapped trees to aid in moving and positioning them.

J-Straps: Nylon loop straps attached to a shoulder pad are used to carry rock bars comfortably by transferring the weight to a shoulder.

Log Carriers: Log carriers enable teams of workers to move logs. The tool hooks the log, allowing persons on either side of the handle to drag it. Several carriers could allow four or more persons to carry a large log.



Ratchet Winches or Come-Alongs: A hand operated winch. Ratchet winches (also called come-alongs) are useful for pulling stumps and for moving large rocks and logs. These winches offer mechanical advantage – the grip hoist is a specialized winching system that provides a mechanical advantage of 30:1 or more.

Rope: A large stout cord of strands of fibers or wire twisted or braided together.

- Working end: The end of the rope being used at the time to tie a knot.
- Standing part: The part of the rope not being used at the moment.
- Bight: A curve or bend in the rope. This is usually a loop through which the working end is passed.

Skyline: Rigging system with a highline by which a load is moved via a pulley, pulled by a separate rope.

Slackline: Rigging system with a highline, which is lowered to pick up a load, then tightened to move the load.

Snatch Block: Pulley with hinged side plate allowing attachment anywhere along a fixed rope.

Sod Stretcher: A carrying device similar to a medical stretcher, consisting of a large rectangle of fabric (usually a brewery blanket) with sleeves sewn into its long sides to receive two rock bars or aluminum pipes which serve as stiffeners and carrying handles. The pipes are usually held apart by plywood spacers slipped over the pipes at the ends of the blanket. Sod stretchers are used to carry chunks of sod, plant plugs, and small tree plugs that are being harvested or transplanted.

Tumpline: A strap slung over the forehead, to anchor a backpack.

Wheelbarrows: Wheeled tub used to transport loose materials.

Winch: Applicable to a broad array of devices that use a drum, driven by a handle and gears, around which a cable is wound, to provide mechanical advantage for moving heavy objects.

Wire Cable: A thick, heavy rope made of wire strands.

Zipline: Rigging system with a taut, stationary wire rope highline for moving loads on a movable pulley.

Tools for Chopping and Grubbing

Cutter mattock



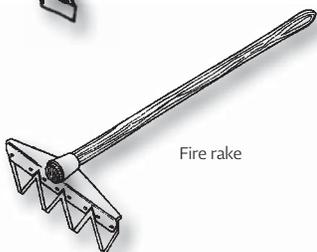
Adze Hoe: The modern adze hoe has a forged steel head with a large, almost flat blade set at a 90-degree to a 3 ft. wooden or fiberglass handle. The head is “friction fitted” to a bent “adze style” handle. You use an adze hoe to chip or break up clumps of soil when constructing new trail or outsloping an existing tread.

Axes: Axes are of two basic types – single or double bit. Single-bit axes have a cutting edge opposite a flat face. Double-bit axes have two symmetrically opposed cutting edges. One edge is maintained at razor sharpness and the other is usually somewhat duller as result of chopping around rocks or dirt.

Cutter Mattock: A cutter mattock has a broad mattock blade, but also a short stout axe or cutter blade in place of the pick point.

Fire Rake: A tool with triangular tines used to cut duff and debris from firebreaks or trail corridors.

Fire rake



McLeods: The McLeod combines a heavy-duty rake with a large, sturdy hoe. The hoe edge of the McLeod is about 9 1/2 in. wide and the head is 11 in. at its widest point. The head can be used for tamping soil or crusher fines. The McLeod is also useful as a slope gauge. When planted standing upright on a trail tread, the tilt of the handle will indicate the slope of the tread. You can clearly see whether the trail is insloped or outsloped.

McLeod tool



Pick Mattock: A pick mattock has a broad adze or mattock blade instead of the clay point. The mattock blade is good for working in most soils and may be used to cut roots or chop clumps of grass.

Railroad Pick: The modern railroad pick is a heavy digging tool with a stout forged steelhead. The head has an “eye” or socket for a handle and two points. The “chisel” or “clay” point is flat and used to work hard packed clay soil. The point is tapered and is a good tool to use for general digging in rocky soil.

Pulaskis: The Pulaski combines an axe and an adze hoe in one multi-purpose tool. The tool is named for Edward Pulaski, circa 1910, a Forest Service Ranger and part-time blacksmith. He developed the tool especially for firefighting purposes.

Rakes: Lightweight rakes are usually used for smoothing and leveling surfaces, for spreading and seeding.

Tools for Digging, Scooping and Planting

Auger, Soil Auger: T-shaped tool with a spiral tip for turning into soil to probe its content.

Auger, Power Auger: Consists of a vertical shaft with a spiral tip for digging into the soil, and a small motor mounted on the top of the shaft for turning it. These are used by some agencies to dig planting and fencepost holes in non-wilderness settings. Various models may be operated by one or by two or more people.

Dibble: Essentially a tapering, pointed stick used to open a hole for small plants (e.g. grass plugs) by thrusting the point into the soil and moving the handle with a circular motion to enlarge the diameter of the hole. Dibbles may be long or short, thin or thick, wood or metal, and may be equipped with a cross-piece to grip on the handle. They are frequently used in wetland restoration for planting plugs of grasses or sedges.

Digging-Tamping Bar: A long bar with a small blade at one end for loosening compacted or rocky soil and a flattened end for tamping.

Planting Bar: A heavy steel tool consisting of a 3 ft. rod-steel handle tipped with a steel wedge that has a foot plate projecting from one side, near the ground. The wedge is stepped into the ground with foot pressure applied to the foot plate and the handle is pushed away from the user to open a hole to receive a small plant, such as a tree seedling or grass plug. Perhaps best used with one person opening holes and a partner installing the plants.

Posthole Digger: Consists of a hinged pair of clam-like blades attached to long handles. Spreading the handles apart causes the blades to close, making it possible to grip and remove pre-loosened soil from a narrow hole. Occasionally used to dig signpost, fencepost, and small planting holes.

Rockbars: Mild steel bars, 6 ft. long and designed with a chisel tip for loosening dirt or prying rocks and a pointed end for prying or a tamping end for compacting soil.

Sharpshooter: A short handled spade with a D-grip and a long, narrow, round-tipped blade, which is useful for digging and lifting transplants and for cleaning soil out of trenches.

Shovels: Shovel blades are either square-edged for scooping (good for piles of loose material) or pointed for digging in soft or pre-loosened soil, with either a wooden or fiberglass handle that can vary from 3ft. to 5 ft.

Trowel: A small planting tool, usually a foot or less in length, with a straight handle and shovel-like blade.



Pick mattock

Pulaskis

Tools for Personal Protection

Clothing: Long sleeved shirts and long pants are suggested clothing when working and may actually be required by some agencies. Shorts are not recommended.

Dust Masks: Dust masks can be used for some types of rockwork and in extremely dusty conditions.

Ear Protection: Ear protection is needed when working near most motorized equipment and working in any environment with loud, repetitive noises such as chipping rock with a manual jackhammer.

Footwear: Sturdy shoes or boots are preferred due to the rugged terrain associated with trail or outdoor work. They are necessary to protect the feet from glancing tools, loose rock, dense vegetation, and cactus. They also provide good footing when working.

Gaiters: Coverings that zip or snap around the ankles and lower legs to keep debris and water out of your boots. (leggings, puttees)

Gloves: Work gloves are necessary to protect the hands from blisters, thorny brush, poison ivy, or any other minor scratches associated with outdoor work. Gloves also help with gripping tools.

Hardhat: A hard shell worn on the head as protection during trail work. Hardhats are an agency requirement for many types of work, especially when working in timber or when there is a chance of being hit on the head and risk of head injury.

Safety Goggles or Glasses: Eye protection is important for any type of work whether digging, cutting, sharpening, sawing, chipping rock or for when there is a chance of something getting into your eyes.

Safety Harness: A body belt or strap usually made of nylon, for use while working near steep drop-offs. Must be of approved construction and design, in good repair, and attached to a secure anchor point with carabiners and approved climbing rope.

Sheath: Protective covering made of leather or plastic used to cover sharp blades of tools while in storage or when the tools are transported.

Suggested Tools per Crew

The following table outlines the suggested range of tools needed for equipping crews for various types of work. Evaluate the tool needs for each crew as it relates to the work project and adjust the list accordingly. This table is based on a crew size of seven workers.

► Some basic tips:

- Two tools can be carried per worker (one in each hand).
- Smaller tools can be carried in pack or buckets.
- Carry tools with protective sheaths on them.
- Tools can be carried in a wheelbarrow to the worksite.



Suggested tools for specific conservation tasks

TOOLS													
	Adze hoe	Bow saw	Br. blanket	Buckets	Canvas bag	Lopper	McLeod	Pick mattock	Pulaski	Rake	Rock bar	Shovel	Wheelbarrow
WORK DESCRIPTIONS													
New trail Construction: Rocky, forest slopes		1	1	4		1	3	2	2		2	3	
Easy trail construction: Grassy meadows	1	1	1	4		1	3	1	2		1	3	2
Trail maintenance: Corridor clearing, tread maintenance, drainage structure maintenance	1	2		4		2	3	2	2		1	3	
Trail closure: Other tools may be needed such as small trowels.			2	6	1		4		1		1	4	2
Crusher fines: Assumes trenching has been completed by machinery. Crew does finishing work on trench and transports and spreads fines material.	1						5		1	2	1	5	4
Tree planting: Other tools will be needed such as wire cutters and hammers.			3	6			2	1	2		2	4	
Habitat Restoration: Closing old trail or road; preparing the soil, seeding, and transplanting some native plants. Installing erosion matting if needed on slopes would require additional tools such as a scissors, landscape staples, and 2 small sledgehammers per crew.		1	2	2			3	2	1	1	1*	2	1

* 1 rock bar every other crew to be shared if possible.







• *Conservation USA*

Project Leader Handbook

www.conservationusa.org



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