Routine Maintenance and Projects in the BWCAW

This manual - written by wilderness rangers, for wilderness rangers –describes some of the work routinely performed in the BWCAW. Education, law enforcement, and safety are outside the scope of this edition. Tofte and Gunflint Ranger Districts, Superior National Forest, April 2002; revised May 11, 2010.

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Authorities and Guidelines, or Why We Do What We Do

The Wilderness Act of 1964 is the foundation of our wilderness program. The Act defines wilderness in Section 2(c): "A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man …" Wilderness retains "its primeval character and influence, without permanent improvements or human habitation, (it) is protected and managed so as to preserve its natural conditions and 1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; 2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation…" The Act directs in Section 2 (a) that wilderness areas will be administered "…in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character…"

The National Wilderness Preservation System (NWPS) was established by the Wilderness Act. The BWCAW was one of the original 54 areas designated by the Act. In 1964 the NWPS encompassed 9 million acres; now 109.5 million acres are protected within 756 areas.

Untrammeled: self-willed; free of human intent to manipulate, alter, control, or subjugate. In wilderness, the forces of nature should shape the landscape without intentional human interference.

The Boundary Waters Canoe Area Wilderness Act of 1978 affirmed the purposes of the Wilderness Act, established the current boundary of the BWCAW, and addressed motor portages, resorts and other issues. It also dealt with a variety of nonconforming uses: it prohibited logging and defined the limits of allowable commercial, motor boat and snowmobile use.

The National Historic Preservation, Endangered Species, Clean Air, and National Environmental Policy Acts are other federal laws which influence activities in the wilderness.

The Forest Service Manual (FSM Chapter 2320, revision effective January 2007), includes these objectives and policy statements:

FSM Objectives

1. Maintain and perpetuate the enduring resource of wilderness as one of the multiple uses of public land. (Wilderness is meant to be on equal footing with timber, recreation, wildlife, and other resources.)
2. Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influence so that plants and animals develop and respond to natural forces.
3. Minimize the impact of those kinds of uses and activities generally prohibited by the Wilderness Act, but specifically excepted by the Act or subsequent legislation. (Directs us to restrict such things as recreational motor use and commercial uses like towboats to what is specifically allowed in the legislation, as opposed to expanding these non-conforming uses through administrative means.)
4. Protect and perpetuate wilderness character and public values including, but not limited to, opportunities for scientific study, education, solitude, physical and mental challenge and stimulation, inspiration, and primitive recreation experiences.

FSM Policy

1. Where there are alternatives among management decisions, wilderness values shall dominate over all other considerations….
2. Manage the use of other resources in wilderness in a manner compatible with wilderness resource management objectives.
3. In wildernesses where the establishing legislation permits resource uses and activities that are nonconforming exceptions to the definition of wilderness as described in the Wilderness Act, manage these nonconforming uses and activities in such a manner as to minimize their effect on the wilderness resource.
4. Cease uses and activities and remove existing structures not essential to the administration, protection, or management of wilderness for wilderness purposes or not provided for in the establishing legislation.
5. Because wilderness does not exist in a vacuum, consider activities on both sides of wilderness boundaries during planning and articulate management goals and the blending of diverse resources in forest plans. Do not maintain buffer strips of undeveloped wildland to provide an informal extension of wilderness. Do not maintain internal buffer zones that degrade wilderness values.
6. Gather necessary information and carry out research programs in a manner that is compatible with the preservation of the wilderness environment.

The FSM Management Model tells us that unlike work done outside the BWCAW, wilderness maintenance decisions are based on protection of wilderness character, not on economy, convenience, commercial value, or comfort of the visitor. In fact, where a choice must be made between wilderness values and any other activity, preserving wilderness character is meant to be the overriding value *at all levels* of wilderness management.

The 2004 Land and Resource Management Plan for the Superior National Forest contains the Management Direction for the BWCAW, which did not change from the amended (in 1992) 1986 Forest Plan. It says "To retain its enduring value, the Forest Service manages wilderness and its various uses and activities to be compatible with wilderness character." It divides the BWCAW into management areas and defines maintenance standards, which vary across areas. Read BWCAW Management Direction, beginning on page 3-40 of the Plan, and page 33 of this manual.

Wilderness management principles were distilled from the Wilderness Act and agency policy by the four federal agencies that manage wilderness designated by the Act (Forest Service, Park Service, Bureau of Land Management and Fish and Wildlife Service). While they are similar to previously cited guidelines, these are noteworthy because they have gone through the crucible of inter-agency and public debate.

- ➤ Allow natural processes to operate freely within wilderness.
- ➤ Preserve wilderness air and water quality.
- ➤ Preserve outstanding opportunities for solitude or a primitive and unconfined recreation experience in each wilderness.
- ➤ Favor wilderness dependent activities when managing wilderness use.
- ➤ Remove existing structures and terminate uses and activities not essential to wilderness management or not provided for by law.
- ➤ Manage special exceptions provided for in wilderness legislation with minimum impact on the wilderness resource.
- ➤ Manage wilderness as a distinct resource with inseparable parts.
- ➤ Establish specific management objectives, with public involvement, in a management plan for each wilderness.
- ➤ Manage wilderness with interdisciplinary scientific skills.
- ➤ Attain the highest level of purity in wilderness character within legal constraints.
- ➤ Produce human values and benefits while preserving wilderness character.
- ➤ Control and reduce the adverse physical and social impacts of human use in wilderness through education or minimum regulation.
- ➤ Exclude the sight, sound and other tangible evidence of motorized equipment or mechanical transport wherever possible within wilderness.
- ➤ Accomplish necessary wilderness management work with the "minimum tool".
- ➤ Manage the use of other resources and activities in wilderness in a manner compatible with the wilderness resource.
- ➤ Harmonize wilderness and adjacent land management activities.

The most comprehensive and widely used textbook on wilderness management, Wilderness Management; Stewardship and Protection of Resource Values, 3rd edition, by Hendee and Dawson, emphasizes these points in the discussion of wilderness management principles:

In wilderness, promote an ecocentric management philosophy, which suggests management strategies that work to benefit society by maximizing natural conditions and processes. (An anthropomorphic management philosophy, *not* appropriate in wilderness management, would maximize environmental modification to improve human comfort, convenience, and safety.)

Favor wilderness-dependent activities. For example, motorized recreational use of wilderness (which is *not* wilderness dependent) impinges on the experience of non-motorized use, (which *is* wilderness dependent), and so must be restricted to the extent allowable under the enabling legislation.

Set human carrying capacity to recognize limits of use to sustaining wilderness character. This refers both to the ability of elements of the Boundary Waters ecosystem to withstand impacts caused by humans, and the potential for visitors to wilderness to experience qualities defined in the Wilderness Act.

The non-degradation principle is derived from the Wilderness Act and is a key concept in wilderness management. It states that wilderness character - including tangible and non-tangible elements - of any unit of the NWPS shall not be allowed to diminish below the quality and quantity that the area possessed when it was designated. When that measure of character does not achieve the level described in the first sentence of section 2(c) of the Act, our management objective should be to restore it to its untrammeled state.

We are directed to preserve, protect, and perpetuate *wilderness character*. But what *is* wilderness character? Draft USFWS policy contains this discussion: Preserving wilderness character requires that we maintain the wilderness condition: the natural, scenic condition of the land, biological diversity, biological integrity, environmental health, and ecological and evolutionary processes. But the character of wilderness embodies more than a physical condition. (It) refocuses our perception of nature and our relationship to it. It embodies an attitude of humility and restraint that lifts our connection of the landscape from the utilitarian….. to the symbolic realm serving other human needs. We preserve wilderness character by our compliance with wilderness legislation and regulation, but also by imposing limits upon ourselves.

Ed Zahniser, Wilderness Act scholar and son of the Act's author Howard Zahniser, said "Wilderness character may also remain somewhat elusive" (just as the meaning of other elements of the Act may be), "in the sense that love or marriage or friendship remain somewhat elusive. We can try to understand these things, but we must be careful not to try to reduce them to our own knowing."

The FS has begun to monitor (hopefully with care!) how well we steward wilderness character using these qualities: Untrammeled, Natural, Undeveloped, and Solitude or primitive and unconfined.

While some of the discussion of our authorities and guidelines may not seem to have immediate relevance to every day work, remember that wilderness rangers are uniquely able to observe what is actually happening in the wilderness and relate that to office -based managers. Sometimes we are the triggers for changes in the way the Boundary Waters is managed. Well-documented informal observations that have to do with how well our practices and real conditions in wilderness match our policy, objectives, and plans, enhance formal monitoring of social and physical resource conditions.

As wilderness stewards, familiarity with our authorities and guidelines and thoughtful application of them on the ground, along with critical evaluation, are among our best tools.

Despite the plethora of guidelines, some decisions will be judgment calls. Summon humility, exercise restraint, and cleave tenaciously to the Wilderness Act and its intent.

Basics

Human use in the Boundary Waters is high. Designated campsites, with fire grates and latrines, and maintained portages, all of which are arguably inappropriate in wilderness, are concessions to the fact that humans have impacts on wilderness character. *Our job is to soften the inconsistencies between pristine wilderness and the inevitable impacts of 200,000 visitors each year, as well as our own management activities. So, just as visitors are asked to leave no trace, we strive to leave no trace in everything we do as wilderness rangers. We plan the least obtrusive way of doing things, we naturalize the places we disturb, and we disguise evidence of our work.* Our efforts may enable visitors to feel they are the first ones to visit some special place, to experience that elusive sense of solitude.

Become a good observer. Watch how water flows down portages after heavy rains and note the successes and failures of drainage projects. How do different soil types fare under regular human use? Know which wet areas tend to dry out and which are less dependent on seasonal changes. Which plants thrive in perennially damp areas? What are the characteristics of an undisturbed shoreline? How does the plant community arrange itself in undisturbed forest? What is the interplay between rocks and vegetation or old stumps and new growth? On particular campsites, where do people tend to store canoes? Watch large groups at landings and note what they step on and where they set their packs. Knowledge you gain will help in everyday work and in designing projects that will make a difference over time. You can only "naturalize the area", as this manual will direct, if you know what a natural area looks like.

If you are a crew leader (and anyone may find themselves in that role by the end of the season), review campsite and project inventories before you start your trip so you'll know whether there's anything unusual you need to pack, and to help plan the trip. Pack a copy of the campsite inventory, and refer to and update it as you visit each site.

Take notes as you go through your area that include work accomplished and work that needs to be done, with details on proposed projects. Note any developments, such as enlarging landings, dying campsite trees, deteriorating fire grates or latrines. Also note anything that will be of use or interest to visitors, for the front desk staff and other permit issuers to pass along, like water level changes that affect traveling and bear activity. Keep track of patterns in visitor behavior that may call for a focused LNT message or follow-up on the part of permit issuers, FPOs, or the LEO. Note instances of overcrowding and recommendations that occur to you regarding unsustainable use. Some of this information will go on work-accomplished forms and campsite inventories; for the rest, a small notebook is essential.

Suggested Tool Pack Contents

- ✓ large garbage bags and burlap sack
- ✓ collapsible bucket
- ✓ bear rope and pulley
- ✓ parachute cord
- ✓ duct tape
- ✓ shovel
- ✓ safety gear (hard hat, safety glasses etc)
- ✓ Pulaski or grub hoe
- ✓ probe
- ✓ small and large bow saws
- ✓ cross-cut
- ✓ nippers
- ✓ axe
- ✓ first aid kit
- ✓ file
- ✓ camera

Check out **Wilderness.net** – it's a great resource for all things wilderness.

Be prepared for change. Lots of things promote change in how wilderness rangers do things: the way the agency chooses to interpret legislation and write policy fluctuates, as do budgets. Agency interpretations are fine-tuned by courts and by new legislation. Forest plans are revised. Past decisions or long-used methods prove to be wrong. New devices come along. Our understanding of how humans impact wilderness, and what works to mitigate impacts, improves. New supervisors may support different priorities. Adapt, but do what's right.

Most ground disturbing activities are considered projects, which are discussed beginning on page 19.

Portages

Portages provide passable routes between waterways, while at the same time restricting human impact to discrete areas of our choosing. Our objectives are to keep them open and to prevent or minimize resource damage, including compacted or eroded soils; trampled, broken, or otherwise injured vegetation; and sedimentation in waterways due to run-off from portages.

The Management Plan says this about them:
Portages will be constructed and maintained to the minimum standard necessary to protect the resource and provide a safe crossing in hazardous situations. Work will be completed in a way that protects and perpetuates the ecological Wilderness character, so that portages appear to be part of the environment and not an intrusion.

When working on portages, keep tools, gear, and brush piles out of the way of portaging people. Keep landing space clear for visitors: tie your canoe away from landing, or carry it up the portage a ways. Remember that we don't want people to notice our work. More perceptive visitors will realize humans work in the wilderness, but with care on our part that knowledge will hover below the conscious level. Work out efficient strategies. Example: The person with the tool pack carries it across on the first trip, and, having noted what tools are required, returns with them to work sites, as partner continues portaging.

Clearing
All the portages should be cleared of windfalls as early in the season as possible, and in a timely way throughout the season. People confronted with a windfall blocking their path will find ways around it and in no time create a long-lasting trail, complete with soil compaction and crushed and broken vegetation. Cutting downed trees far enough back to keep the right of way totally cleared will make brushing in the future much easier. When dealing with an overhead tangle, picture a tall man wearing a canoe, and clear accordingly. Step-overs may be temporarily left, unless they will affect drainage.

Clearing through a mess of down trees should not result in a well-defined alley of canons; cut at varying distances from tread, and cut sometimes at angles. Rubbing dirt into fresh cuts makes them less conspicuous. Spiky branches protruding from trees fallen parallel to the portage, or from step-overs you intend to leave, should be cut flush to the log. Cut log sections are ideally tipped or swung back, or carried out of the portage right of way. Place them so they won't block the natural flow of runoff and create drainage problems later on. Scatter branches unobtrusively.

Do not "buck up" downed trees. Cut only what you must in order to clear the trail. If possible, leave trees uncut, or at least in the longest lengths possible.

Brushing

Portages need to be free enough from brush, and from branches encroaching from above or from the sides, to be easily passable. People should be able to see the tread beneath their feet. To avoid ending up with a portage that looks like a straight highway right of way, leave the occasional small tree or clump of brushy vegetation so the brushed width varies, and when a portage climbs straight back of a landing, leave a brushy screen to soften the highway effect. It is much easier to brush on an ongoing basis: spot brush here and there as needed (don't hesitate to stop and deal with a trouble spot on your way across), with individual portages brushed completely every 3 to 6 years, rather than wait until you're faced with overgrown tangles.

Brush should be cut flat to the ground because stubs

1. are ugly and obvious signs of humans at work
2. they can be a hazard to a falling camper
3. they're a huge nuisance next time you brush.

Disposing of brush is very important. If you let it lie where it falls, or fling it off to the side, as its leaves wither and brown it will become ridiculously conspicuous. Remember, we strive to leave no trace of our work. So pile brush as you cut, with cut ends facing in the same direction (which makes it much easier to carry off). As piles accumulate, carry them into the woods, and leave in small piles, out of public view.

Push piles of brush down so they're not floating on standing vegetation. You might pile on the far side of a down tree, or find other ways to hide the piles. And watch where you're piling – you don't want to smother a little white pine, for instance, or a clump of lady slippers.

For someone wielding nippers, different plant species call for different responses. Alder and hazel are going to become big, messy problems, so you might as well nip them while they're young and manageable. Bush honeysuckle and blueberries will never grow up enough to be a nuisance; no need to bother them. Thickets of baby balsam firs are cute now, but in a few years they'll be elbowing people off portages; better to cut them while you can, rather than just nipping a few branches. If small firs and brush, especially raspberries, can be pulled, do that: it's a cleaner and longer lasting solution. On a dry, breezy day, mountain maple may form a lovely canopy over the trail, but in rain or snow they may hang down low enough to stop a canoe.

If you cut branches off a tree, do it cleanly and leave a ¼ to ½ inch stub to facilitate healing. This is based on research that shows this is better than the old flush cut recommendation. If you cut part of something (like the trail-side of a mountain maple), cut within ½ inch of a crotch.

Tread, water, and drainage

Few of our portages are really wild; most have undergone major construction, back in the CCC days, or in the days of flown-in portage crews. Thanks to those of old, our expectations of what tread should be are perhaps too civilized for wilderness. Still, there are things we should do. Clear tread of loose rocks and branches that cause clear and unnecessary hazards to portagers. Remove roots if they protrude far enough above soil to present a real tripping hazard. Sometimes the ideal thing is to rock under and around an exposed root, both for the sake of the tree it belongs to, and because it may slow erosion.

Unless a trail is well armed with rocks, it tends toward a gully profile due to the forces of compaction and erosion even when the portage is level. Water on portages always causes problems: Water running down portages erodes tread work and can lead to gullying. Saturated earth mushes out under weight, creating low spots that collect and hold more water. People tend to try to walk around these puddles, causing them to get bigger, and this can lead to broad muddy wallows. Vegetation in wet areas is more vulnerable to damage from trampling, and wet edges of tread are more apt to erode away than when dry. Ideally, all of these things should be mitigated against before the damage becomes too severe.

Ways to get water off portages

Drain puddles
Build water bars
Cap tread
Direct the flow of water

Sometimes the edges of an old retainer cause problems by holding water on the portage, and rock edging or sections of logs may need to be removed to let water flow off the portage.

Rainy weather is a lousy time to create drainage constructs (saturated earth just won't stand the test of traffic), but it's a great time to study flow patterns, note problems, and theorize solutions.

In general, if your project involves rearranging dirt on existing tread work, go ahead and do it. If previously undisturbed earth will be rearranged, this will likely be an official project; see page 19.

Water bars (sometimes referred to as dirt bars, rock bars, or water diversion bars)

Routinely clean out existing water bars and other drainage systems by removing leafy litter, branches, and sediment. This should be done at least yearly. When possible, use this material to replenish berms or tread: don't waste it by throwing it into the woods. Rebuild water bars using material that's eroded out of the bar and off the portage. Installing a whole system of new water bars might be considered a project rather than routine maintenance, but rebuilding bars on a section of portage where they have previously existed is routine.

Wet sections

If a wet area causes no more problem than muddy feet – or even legs - nothing should be done about it. If, however, human traffic is having a significant impact on vegetation, the problem is growing due to people trying to skirt the muck, and there is room for it to continue to grow (no steep edges, wall of vegetation, or rocks to keep damage within a limited area), take action to protect trailside soils and vegetation. First choices:

- Drain standing water, if possible.
- Place stepping stones: Big rocks can be well-placed so they form a stable alternative to skirting.

If these don't do the trick, it's time to discuss options with your supervisor because the next tier of possible solutions requires approval. Gather as much information as possible, with these considerations in mind:

- ✓ Is there a possible reroute to higher ground? If so, plot it.
- ✓ Would the soil type along the reroute withstand the expected volume of foot traffic? Is drainage adequate, or can it be made so?
- ✓ What is the potential for serious erosion?
- ✓ What types and how much vegetation would need to be removed?

If no reroute is possible, or if a reroute would lead to different problems, there may be no choice but to install corduroy, build and fill retainers, or build a boardwalk. See Projects, page 19.

Old structures

Anything that we have constructed should be well maintained. Check old constructs that are still effective for protruding nails, and pound these in. A boardwalk should be stable and free from obstacles. Scrape off soil and pioneering vegetation. Replace rotten boards or logs. Old construction – boardwalk, corduroy, or whatever, that is rotten, sticking out, generally more a hazard than a benefit, should be removed. (Don't assume it needs to be replaced: it may have been put in during an era of now-obsolete practices; analyze the situation afresh.) Pack out or hide the parts out of sight of the portage. Treated wood (which we no longer use in wilderness) must be packed out. If possible, remove nails and pack out; if not, bend nails flat. In some cases old components – logs and nails - are still useable and can be recycled into a new project.

Landings

With gloves on, spend some time picking up litter, including cigarette butts and toilet paper back in the woods (twist a little stick into the TP to pick up, or use the inside-out side of the litter bag between your hand and TP). If feces are involved, carry it and toilet paper on your shovel 150' inland and bury 6" to 8" deep. Clean the shovel before you return to landing by slicing into ground repeatedly and rubbing with ground litter. It's handy to have a small litter bag you can leave out of your pack, and carry it across on your belt or in your pocket, for litter you find along the portage (the Smokey bags given out at the front desks work well). <u>Visitors following wilderness rangers along a route shouldn't find any trash.</u>

According to the Plan, "Landings will blend with the surrounding shoreline to the extent possible."

Occasionally a landing will need a little brushing to make it accessible, but usually the problem is that it's too big and conspicuous. Major projects will be the usual means of pursuing that goal, but you may have a chance to begin to shrink the size of a landing by transplanting a few trees and using windfalls and rocks to block unnecessary clearings and trails. Projects will also address the problem of sediment washing into lakes and rivers from portages; note serious cases of this, and take photos, so project plans can be made.

Campsites

Most campers in the BWCAW spend much of their time on their campsites. Here they have time to sit and contemplate the condition of their surroundings; it's important that all the work done on a campsite be as inconspicuous and natural looking as possible and that any traces left by former campers be removed.

Windfalls

Clear downed trees that block areas of use and travel routes between them: landing, fire grate area, tent pads, and latrine trail. When this isn't done, campers will develop new trails around windfalls, and after just a few hours of use these will begin to show the damage to vegetation and compaction of soil that quickly make them semi-permanent. When trees fall in a way that helpfully blocks off satellite areas and extra trails on campsites where the impacted campsite area has grown too large, leave them. For additional details review Portage Clearing.

The ideal fire grate
Rocks form a minimalist windbreak on the two windiest sides of the grate, leaving the other two sides open for feeding the fire from the log seats. These form a simple one to three - sided seating arrangement. The grate is set, and ashes cleaned out, so there is a clearance of 10" between grate top and around.

Years of burning trash have turned some, or possibly many, fire grate areas into toxic waste sites.
➤Wear gloves and avoid breathing blowing ash as much as possible.
➤Scrub your shovel with needles, etc. after shoveling ashes, instead of washing it in the lake.
➤ Recommendations about how we dispose of ashes may change as we learn more.
➤Keep working on preventing trash burning: education & law enforcement, education & law enforcement, education & law enforcement, education & law enforcement...

Fire Grates

Because a legally designated campsite is defined by the presence of a fire grate, there *must* be a useable grate on each site.

Pick unburned trash, including bits of foil and cigarette butts, from within the grate. Remove large unburnable chunks of wood. People often make big piles of branches, etc. near the grate. These should be moved off live vegetation, and either dispersed or stacked on bare soil. A small stack of burnable wood is all right to leave.

Considerations for how to dispose of extra rocks:

- If you throw or roll rocks into the woods, plants already stressed from being in the campsite area will be injured, so set them in place with care.
- Excess rocks may be useful in a shoreline stabilization project, or to close up an old latrine hole.
- You don't want them to end up black side up,
- You might leave a few suitable ones handy around tent pads for anchoring tents.
- Throwing them in the lake is often easiest, but they may be covered with toxic residue from the burning of trash.
- Wherever they end up, they should look as natural as possible.

If there is a rock ring apart from the fire grate, or if the fire grate has a rock ring extension in front of it, remove the rocks and clean up the area so the next fire will be within the grate. Scrape away charred material with your shovel and then naturalize the fire-scarred area. Remove extra rocks that tend to accumulate; keep the largest flat rocks for fire grate windbreaks.

When a grate is full of ashes, the next campers will either have a fire somewhere else on the campsite or they will dig out the ashes themselves and dump them, complete with unburned litter, right next to the grate - so it's important that we keep them cleaned out to ground level. First feel with bare hand to make sure the last fire is cold out. If it's hot, douse with water and stir until cold. Put on gloves and open up your litter bag next to the grate. As each shovel full comes out, pick out the bits of foil and other trash, and bag them. Ashes should be scattered widely and thinly in the brushiest areas near the campsite. Go to a slightly different area with each shovel full and really give it a fling. Avoid dumping ashes in a conspicuous clump that will inhibit the growth of vegetation. If the campsite is very open and you have a lot of ashes, try filling a depression (like next to a root wad or rock), in an out of the way place, and disguise it with needles, leaves, and other organic debris. Use a bucket or garbage bag to move large quantities of ashes. If you happen to be moving the latrine, ashes can be used to cover the old hole. A small amount in the current hole aids in decomposition (it's a pH thing).

A fire grate should be replaced when its feet (crosspieces) have rusted off so it can be pulled out, when legs are rusted through or broken, or when enough tines are broken or it is so warped as to make cooking difficult. To replace a damaged fire grate take an unassembled one out, making sure before you head out that the hardware fits it, that the feet are included, and that you have the right tools. The easiest way to carry fire grates is to tie them to a hard pack board. The method for installing the grate will be determined by its location on either rock or soil.

Fire grate installations

Dig-in, the preferred method: Dig around the one to be replaced by several inches beyond the length and width. Remove the old one and the buried rocks used as anchors. Roots should have been removed during the initial installation, but if there are roots, or anything flammable in or adjacent to the hole, remove them now.

Assemble the new grate. Place in the hole, so that the top is about 10" from ground level. Use a water bottle as a level, and check from at least two vantage points to make sure it's level. The biggest, heaviest, rocks possible should be laid across the feet as anchors. Flat-bottomed rocks are most stable. Sometimes a windbreak rock can be set in place at this stage so it will be partially buried. Add rocks around and on the anchors by fitting them together like a jigsaw puzzle. Make sure the grate stays level while you do this. Pounding smaller wedge-shaped rocks between a leg and big rock will help anchor it. All the rocks, with exception of windbreak rocks, should be below ground level.

When the process is completed, the grate should be as though set in cement when you yank on it. Mineral soil should be filled in around the rocks up to ground level. Extra soil can be scattered in brushy areas, or if free of ash, used to fill divots in tent pads or eroded areas.

Altar: If the grate must be on bare rock, the "altar" method may be the only choice. An assembled fire grate with cross pieces should be leveled on the desired spot. Place large, very heavy rocks on the cross pieces, and set others around them until the grate is immoveable. Enough rocks should be used so the legs and cross pieces are hidden, but not so many that it takes on the aspect of a massive monument. Set flat rocks about 10" below top for fire to be laid on. Don't expect this installation to be as quick as a dig-in. It takes time to find the perfect rocks and set them artfully in place. When well done, people are less apt to mess with it.

Chain anchor: After several years of testing, this has proven to be the least desirable of the installation methods. However, if there is not enough soil to dig-in a grate and it must be set on bare rock that has some cracks or holes, you may want to try it.

At one time air hammers were flown in and used to drill holes to set grates on shelf rock. Now, many grate legs from that era are rusted through, or soon will be. We no longer drill rock in wilderness, but in many locations, the old drilled holes can be used as anchor points. The grate can be chained to pitons set in the old holes or in cracks in the rock.

Short-legged grates, with cross-bars, are likely to work better than other chain anchor variations. Where possible, chain them to anchor points from two corners, opposite each other, at the juncture of the leg and cross-bar, with the shortest chain possible.

The problem with the older method of chaining one corner of a legless grate to a single anchor point is that the grate can be flipped aside, making room for a big bonfire. This can be somewhat mitigated by keeping the chain short and providing a minimum number of rocks for windbreaks (a big supply of rocks encourages building rock rings, which can lead to multiple fire locations as well as big fires). In general, the critical part of this system is how well the chain is anchored to both rock and fire grate – campers *will* test it. Chain can be pre-cut, before heading out, or cut on-site with a bolt cutter. A quick clip can be closed on-site with a hammer, to complete the chain loop around a corner or corners of the grate leg and cross-bar (or grate itself), and through piton(s).

Other problems: the chain may rust or burn through fairly quickly and pitons pull out – so check regularly.

Old grates can be packed out or stashed, and their location carefully noted for later removal - perhaps by dog team.

Log seats may form a simple one to three - sided seating arrangement. When elaborate "corrals" form, get the extra logs off the campsite. Remove them to places where it will be difficult or impossible to carry them back. Do the same with rotten logs. If there is a windfall on a campsite with a trunk suitable for a log seat, you may want to take the opportunity to replace a rotten log. When visitors fashion their own seats – as they will do – impacts are likely to be greater and the style less wilderness-appropriate than when wilderness rangers do it.

Latrines and Latrine Trails

The proper installation and maintenance of latrines within the BWCAW is essential for maintaining the superior water quality of this unique water wilderness. Following a few simple guidelines will help achieve this goal. Coordination with Heritage Resource specialists is required in latrine relocation.

- A latrine is full, and must be moved, before contents reach the bottom of the runners (or the top of the hole, in the case of accessible latrines) – or will before the next crew comes through. This isn't perfectly straightforward. Considerations include how much the site is used (a 2 inch space on a little-use site can last for years, but 2 inches on a constantly used site might not make it past the next scout troop) and the time of year (a nearly full hole in September may well settle over the winter and last into the next season). In general, if in doubt, dig a new hole.
- Use the old latrine trail for the new location as much as possible. Pick a spot that is high and dry.
- Using a metal probe is essential in locating the best available latrine location. This allows you to find the spot with the most soil and fewest rocks.
- When selecting the location, take care to insure that the latrine is not visible from the campsite. This can be achieved by simply putting a hook or "J" at the end of the latrine trail, so the latrine is not at the end of a straight sight path.

Latrines must be at least 150 feet from any lake or stream. If the old location falls short of that, remedy the situation when you next move the latrine. Just going 150" back from the campsite won't do the trick if the shoreline curves in toward your proposed location, so look carefully through the brush for bays of the lake, small creeks or evidence of major seasonal run-off.

Now that you have located the most suitable latrine location it is important to dig the new hole correctly. Much of the following discussion refers to the round "toadstool" risers, but several points apply to the "accessible" latrines as well.

- **You do not want your hole to be bigger than your latrine.** First measure the inside dimensions of the latrine base with your shovel handle. Shorten these dimensions by 4 to 6 inches to allow for the hole size to be *a little* smaller than the latrine base. Mark out the shortened dimensions by cutting the sod cover with your grub hoe, Pulaski, or shovel. Now peel back this ground cover and set it aside: it will be used later when setting the latrine.
- **You do not want your hole to be too small.** In an effort to avoid the obvious problem of a hole gaping out beyond the latrine edges, don't make yours so small that digging is practically impossible and toilet paper-holding ledges skirt the edges of your hole.

- Be efficient: digging is difficult work and you'll probably take turns with your partner. The person not digging can work on the latrine trail and gather material for naturalizing the site.
- For the first 6 inches or more, depending on the soil, dig straight down: This is the platform the latrine will rest on.
- Below 6 inches you can usually begin to bell the hole: make the hole wider as you dig deeper. Belling is the best way to make your latrine vault larger, so work diligently to create the largest bell possible.
- When digging you will frequently hit rocks or compacted soil. Do not give up! You will often be able to extricate the rock or chip away at the hard-packed soil. Every shovel full of dirt or rock you remove will allow that hole to last a little longer.
- The general rule is to dig as deep as you possibly can. With luck, you'll get a 4 to 5 foot hole; on the toughest sites, bedrock may be a uniform 1 1/2 to 2 feet down. Anything less than that and it's hardly worth the effort: probe around some more until you find a better site.
- The dirt you remove from the hole should be piled off to one side so it can be used later. Flinging dirt all over the place makes for a long and tedious clean up or a very conspicuous, and thus bad, latrine job. Nip all roots from within the hole.

Now that the hole is completed it is time to set the latrine in place.

- Make sure the latrine sits level by eying it and by sitting on it.
- If, despite your best planning, the hole was dug too wide, make sure the extra space is in the back, where the least amount of weight and traffic will be on it. Cover the space with a large, flat, rock, or whatever will do the job (just don't leave it open).
- The ground cover you set aside can be used around the base of the latrine to fill in the cracks between the ground and the latrine base. If you do not have enough ground cover you can use leaves, bark, sticks, or duff. This will prevent the soil you use to backfill around the latrine from falling back in the hole.
- The dirt you excavated from the hole can now be used around the latrine. The soil should come to the top of the latrine runners. Pack it firm with your feet.
- Naturalize the area. Cover all new dirt with organic matter (leaves, needles, etc.). **Leave the area looking like the latrine sprouted from the ground.**

If you've been told to number the latrine, do it neatly **on the back** in a consistent location each time, **in small print**.

Accessible Latrines

- The fiberglass lip serves to stabilize and anchor the latrine: wood runners are not needed.
- Take time to make sure the hole will be the right dimensions, and the seat at the right height. Outline the outside corners of the lips onto the ground, and then dig out within that area just deep enough so that when the latrine is put in place the seat will be 17" to 19" above ground level. Below that point, shrink the hole dimensions enough so that there will be a wide enough solid edge to hold up the latrine, but not so much as to leave a ledge that will catch falling items and make for esthetically unpleasant latrine experiences. Belling should probably not start at 6", as with the latrines that have long runners to support them; make sure you have an adequate wall of support before you begin to bell out the hole.

- Create a soil platform large enough and level enough for a wheelchair on one or both sides of the latrine as you fill around it, if possible.

Latrine trails need to be cleared and well brushed so people will use them. Envision nasty, wet, cold conditions and ill-equipped people wearing shorts who don't want to fight through brush – or even brush against something wet - to get to the latrine: This is the cause of most toilet paper flowers along latrine trails.
When brushing the latrine trail do not leave stubs; always cut the brush at ground level.
When cutting back a limb it is less visible if nipped or sawed at a joint or within ¼ inch of the plant body. All cut brush should be dispersed, out of sight of the trail, as described on page 7.

It is important to do a good job of naturalizing the old latrine hole. Fill what's left of the old hole with rocks. Use the grub hoe to pull soil from around the immediate hole area to cover them. If you have any dirt left over from the new hole, use that. You can also use dirt from the root system of an up-turned tree or ash from the fire grate. Mound the soil – contents will settle as it composts - and pack down with your feet. This will be a test to make sure campers won't break through to an uncomposted layer. Consider planting a balsam, or other tree or shrub in the dirt of the old hole – although this will likely preclude its use as a hole site in the future, after its present filling has decomposed. Then naturalize the area with organic matter. Always block off the old latrine trail with rocks, rotting logs or by planting trees or shrubs in the old walkway. Leave the area looking as natural as possible.

If you have to construct a new latrine trail, make sure people can see it. Our goal is to protect the water quality and the easiest way is to make sure visitors can find the latrine. Remember the "**J**" in the trail: with privacy, people are more inclined to use the latrine. Pull up or grub out all brush within the trail tread.

An old latrine can be carried out whole or you can use your bow saw and cut it into smaller pieces that will fit in a garbage bag or Duluth pack. This may be more palatable if the latrine is left out to be cleansed by the elements until next year. Stash it where it will not be found by visitors, and carefully note the stash site.

Litter
Pick up all litter. Look around carefully for micro-trash – twist ties, package corners, etc. Clean up toilet paper flowers blossoming around site edges and along latrine trail (these can be thrown in the latrine). When possible, retrieve fish remains thrown right offshore – gulls diving offsite usually means fish in shallow water – and bury them well away from the campsite. Paddling down shore, and then going out of sight of the water, is best. If necessary, and if it's possible, clean up food remains from the lake, or discarded cans and other trash.

Unnecessary Structures
Break up and remove any furniture made with ropes or nails. A simple log seating arrangement around the fire grate should be left. When elaborate "corrals" form, get the extra logs off the campsite. Remove them to places where it will be difficult or impossible to carry them back. Break up elaborate rock fish rings or docks at the lakeshore. Take down bear poles if you can do

so safely. Cut abandoned ropes out of trees. High ones can sometimes be cut by duct taping or wrapping cord around a knife at the end of a tent pole or paddle.

Tent Pads
The main tent pads on a campsite are usually kept clear by use, but if they, or trails to them, are blocked or covered by fallen trees, clear them off. Grub out shrubs that may begin to encroach on the pad. When you brush around tent pads, which is sometimes necessary, remember that some people use big tents and are likely to break off branches and brush that sweep against it. Sometimes people dig trenches around the pad; fill these. Often chunks of soil are left next to the trench and can be easily replaced and packed down; naturalize.

Hazard Trees
These are trees that are rotten, leaning heavily, or with broken top or heavy branch hanging down, that threaten to fall on the immediate tent pad or sometimes fire grate area. *Just because a tree on a site is dead, it is not necessarily a hazard.* Cut the hazard tree so it falls away from critical areas, and if possible leave it where it falls. If it must be moved, cut trunk into the longest lengths possible; it's not appropriate to "buck up" logs and leave cut lengths on site.

Graffiti
Graffiti on campsites turns up on trees, latrines, and fire grates, shelf rock – anyplace people find themselves with idle time on their hands. No matter where it is, it should be obliterated; not only does it look bad, it almost always ends up generating more. Use whatever method will cause the least resource damage. On latrines, bug spray works wonders: spray and scrub hard with a handful of leaves. On a tree, try lightly skinning the surface of the bark just until graffiti appears to be nothing more than a natural blemish; rub with damp soil. On rock, scrub with sand and water. If nothing works, hide with rocks or driftwood.

Nails
Remove nails from trees only if you can do so without further injuring the tree. A hacksaw can be used for spikes. Sometimes the best thing is to pound them gently into the tree.

Secondary Trails and Landings
Impact from human use should be confined to the core campsite area. Satellite trails and openings can be blocked; sometimes they're the focus of restoration projects. When blocking these places, remember that you're on a campsite, where anything that looks like firewood or a sitting log will end up at the fire grate. Try planting thick clumps of balsam firs. With the subtle use of plantings and natural objects – half-buried rocks, mossy logs, etc. – traffic patterns on a campsite can be altered to minimize impacts. People tend to take the easiest way. Keep an eye open for new landings and nip the problem in the bud by covering with windfalls, planting with live trees or scattering rocks to prevent further use.

Stumps

Stumps may be found on campsites or along the lakeshore. Winter campers often leave stumps that may be conspicuous in summer. Low-cut human-made stumps in campsite areas and rub damp soil into the fresh cut. If the stump is protecting an island of vegetation in a trampled spot, or if you want to plant a seedling up against it for protection, consider leaving it; bust up the flat surface with Pulaski or axe and rub in soil. Leave any naturally broken- off trees alone unless they block or cover a critical part of the campsite.

A dead cedar, once leaning gracefully out from the shore, becomes an ugly scar when people cut it off for firewood. You can often make it les conspicuous by cutting it off low to the ground. Blacken the stump end with dirt or cover it with ground litter. Masking such damage may help prevent other campers from practicing similar behavior.

Maintaining Old Projects

Do what you can to ensure that previous work wasn't done in vain. Clean out old drainages. Replenish fill and build up berms behind checks and water bars. Re-pile rocks to shore up shoreline stabilization projects. Water and replant areas that have been planted.

User impacted sites

As you come to know your work area you will find places people frequent for breaks or off-site camping and leave visible impacts. Take the time to check these places throughout the summer. The most common impacts are campfires, litter, visible stumps left when collecting firewood, human waste and undesignated campsite use. Most of these are corrected easily, but you need to be looking for them and be willing to stop and fix them. Document all violations on incident reports.

Human waste

Use your shovel to carry away from the lake. Dig a hole, or use a root wad hole, 150 feet from any water source and bury it. Pack out toilet paper when possible; otherwise bury it.

Campfires

Make sure the fire is out. Then remove all tin foil and other debris and put it in your garbage bag. Now you can thoroughly scatter the ashes by flinging them into dense brushy areas. All firewood pieces should be hauled well away from the vicinity. Disperse fire ring rocks, black side down. Then naturalize the fire scar with organic material. Your intent is to make it look as though there hasn't been a fire, so others won't be encouraged to build one.

Litter

Pack out every bit of litter.

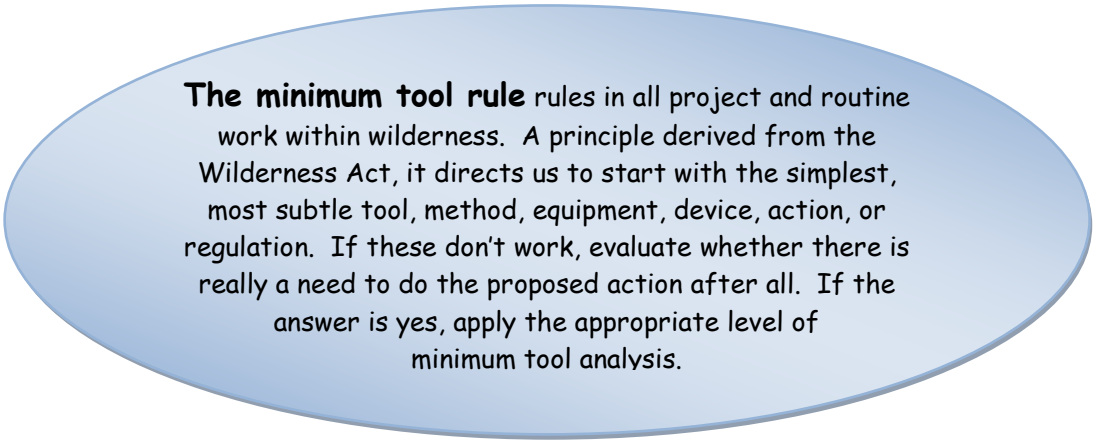
Undesignated campsites

A combination of education, lowered quotas in some travel zones, law enforcement action, and restoration of impacted areas have made camping off-site much less common than it used to be. To avoid sliding back into old patterns be diligent about dealing with this problem whenever you see evidence of it. When you come across illegal camp sites, do everything listed under user impacted sites, if necessary. If the area is used frequently or is extremely inviting, plant rocks or trees to discourage use. Deal with the landing by blocking with rocks in the lake and with windfalls sticking crown-first out toward the water. What was the landing should blend with the undisturbed shoreline. If a poorly placed red dot on a map is part of the problem, make sure the map company is consulted; follow through until the problem is corrected. Regularly used undesignated sites may require full-fledged projects to permanently close them. Monitor often, document use and consult with the ops leader.

Projects

This manual presents an overview of some techniques that have been successful in dealing with impacts to resources within the BWCAW. There are excellent sources that describe trail and campsite construction and maintenance techniques in great detail available through an internet search or visit to wilderness.net.

Most projects in the BWCAW fall into two categories: erosion control and vegetation restoration. They are different from routine work both in scope (time, energy, materials, and potential impact to wilderness character) and because they usually require approval from the operations leader or program manager based on tenets of the Wilderness Act and National Environmental Policy Act. (See NEPA, page 37.)



Project Planning

Projects often require a great deal of time and energy to complete. It is important to plan logistics, finish all associated paperwork and get approval before beginning. It is critical to consult the wilderness operations leader about any concerns or needs. Follow these steps:

1. **Start a Project File.** This includes a general write-up of the project including what the purpose of the project is and what the general plan or design will be, and any specific needs such as locating a borrow pit, felling trees, winter freighting (by dog sled), etc. Project file will also include:
    a. Heritage survey, which must be performed in order to prevent or mitigate the loss of anything of archaeological or historical significance. The file will specify heritage concerns and recommendations that must be followed.
    b. Threatened, Endangered and Sensitive (TES) species survey must be done to protect listed species and their habitats. This is especially important in establishing borrow pits. As with the heritage survey, results of the TES survey will include concerns and recommendations that must be followed.

    Note: Both heritage and TES surveys will be addressed and coordinated through the wilderness operations leader but it is important that the project leader help identify if one or both of these are needed, and perhaps work with the people doing the surveys.

2. **Design the project.** A well-planned and designed project should be based on good observations made during all seasons, especially during wet periods. This is the best opportunity to study water flow, erosion and other tricky spots as conditions change. The project area should be surveyed for available resources like trees, rocks, and tip-ups. Project write-up should include sketches of the project site and include prominent features like boulders, large trees, or slope and any special needs like large crews or specialized equipment.

3. **Consider materials.**

LOGS: Logs are a nice alternative to rock because they are easier to obtain and can require less time to secure in the ground depending on the type of project. However, logs may create an artificial look not appropriate in wilderness. Logs will rot over time and depending on conditions, may rise and fall with the impacts of traffic, water flow, and freezing and thawing. Bark should be peeled off of all logs to slow rot. Logs can be very slippery when used as sidewalls for both causeways and turnpikes. Therefore, it may be good to score the log slightly in order to increase its friction potential. Tamarack, cedar and black spruce are preferred as they will last longer than other species.

ROCK: This is the most durable material for just about any project, from water bars to turnpikes. Look for rocks with some edges to work with. Rocks big enough to use their own weight to remain over time are the most desirable as they stand up better to the effects of erosion, and they are safer for foot travel. Rocks that fit together at their highest points and are set in place so they are effectively locked together are the most likely to resist the effects of erosion and remain in place over time. A rock stretcher - a duffel bag or an old pack stretched between found or cut poles - is a useful tool for conveying rocks to a work site.

SOIL: Sources include borrow pits, root tip-ups and shallows off landings where soil that has eroded away can be recovered. Mineral soil promotes quicker drainage of water; soil with a greater organic component can be better compacted and will help glue a project together. However, too much organic material holds water and slows drainage, and may form a mud slick.

Borrow sites for portages, trails, and campsites

According to the Management Plan, "Borrow sites must be small, inconspicuous, located well away from the portage or campsite and rehabilitated after completion of use. Before digging a borrow pit, an assessment for heritage resources and threatened, endangered and sensitive species must be completed."

Use old pit sites if possible to concentrate impacts, although these may be mined out. Use a probe to find soil deposits and a grub hoe or Pulaski to open up the pit and dislodge rocks. Use an old pack or collapsible bucket to carry soil. Close pits by making slopes gradual, replacing rocks removed during soil mining, scattering with ground litter, and disguising with deadfalls. The trail to the pit should also be closed with inconspicuous deadfalls.

Project approval by the wilderness operations leader is based on

- ✓ the findings of the Heritage and TES species surveys
- ✓ evaluation as to the proposal's consistency with wilderness character
- ✓ priority relative to other projects.

Erosion control projects on the level:

Tread degradation due to compaction and standing water is the problem most likely to call for a project on generally flat sections of portages. If human traffic is having a significant impact on soil and vegetation and the problem is likely to get worse, take action. Gullying and expanding wet areas can be remedied by a number of alternatives.

Capping: Capping replenishes tread and promotes drainage. The process involves filling the gullied out section of the portage with soil until it bulges at the top, creating a rounded cap of soil. This will cause water to run off the sides and allow for the inevitable compaction from visitor travel.

Corduroy: Corduroy involves cutting and peeling logs just longer than the desired tread width. Logs should be placed side to side across the trail. Logs should not be so large as to stick up from the gully. The corduroy is then filled and capped with mineral soil so that logs do not show. Corduroy can be used in gullied out, seasonally wet sections where tread walls are already well established to give the sections stability and reduce compaction.

One problem with corduroy is that individual pieces can shift over time and protrude from the trail tread. This may occur because corduroy can interfere with water flow and runoff is blocked or concentrated in other areas. This may be alleviated by laying corduroy in sections to allow for movement of water. Corduroy requires considerable maintenance and may not represent the best sustainable design, therefore, careful consideration is recommended.

Causeways and Turnpikes

Causeways and turnpikes are raised beds of tread that are filled with different sized layers of rock and/or mineral soil and capped with soil. They are designed to address growing wallows of trampled vegetation and mud, when the impacted area is going to continue to widen, simple drains don't work because the terrain is too level , capping doesn't work because continually wet tread turns to mush and disappears, and stepping stones sink out of sight. They are useful in low-lying bogs and marshes that often have slow to barely discernable drainage.

Causeways are effective where drainage is poor. However, it is still important to build them in sections to allow for high water to drain around them. Be sure to see the area during its high water peak in the spring because this will give a good indicator of how high the tread walls will have to be in order to avoid saturation and overflow.

The causeway should be made of large rocks that are fit together at high points in order to secure the fill inside. Walls should have larger rocks or long rocks that can be secured deep into the ground so as to prevent shifting. Logs are a good alternative for walls as they are flat and can be secured in the ground quickly versus the tedious task of fitting rocks together. However, log ends seem to shift up or down over time due to the high amount of water and the freeze and thaw effect of low-land areas.

Fill should be a multi-layer of rock capped with soil, higher in the middle, to allow for run-off from direct water impacts like rain. A base layer of small rock is an important feature of the fill because over time a causeway will mash out as travelers move through, and create a place for water to pool. Finding rocks on the portages and surrounding landscape may be easy or they may be sparse. If rocks can be found, start with larger rocks at the bottom and use smaller rocks toward the top of the walls. The rocks should be fit together with little space between them because over time they will sink if there are air pockets left. Tamp them down with rock bars or other rocks to eliminate any free space. Finally, mineral soil should be used to cap the causeway. Pack it well and fill in all of the extra spaces around the rock or log walls. Capping should always be done with mineral soil and not wet boggy soil that can create a mud slick when it gets wet.

This photo shows a section of causeway before it has been capped with mineral soil. Vegetation is already beginning to shrink the formerly very wide wallow.

The first step in this project was to remove buried logs from an earlier project that impeded drainage.

Note the pry bar, essential for prying out logs, harvesting rocks from the surrounding area, and jockeying big rocks into place.

When work is completed, vegetation will grow up to the causeway and among the retainer rocks.

Turnpikes are very similar to causeways except that they are more often used where there is better drainage. Turnpikes are built in the same general fashion as causeways in form and structure; however, turnpikes often have French drains or rock culverts between sections, and trenches alongside, to keep water flowing as opposed to allowing it to settle. Turnpikes are also

used when dealing with hill sides that run water onto the portage by providing drainage opportunities on the opposite side.

The French drain should have a rock lined bottom that grades slightly to allow for run-off but does not allow for the accumulation of materials to clog the drain. In many instances it may be better to build a drain versus a rock culvert unless a large, flat, sturdy rock is found that can sustain impact from foot traffic. Cup trenches that are graded downward toward the center of the French drain are also critical in order to get water away from the walls of the turnpike and moving through and out so as not to flood the turnpike.

Note: In both causeway and turnpike situations, great effort should be made to run water off the portage prior to it coming in contact with the causeway or turnpike. In many instances, a water bar can be used to run water directly into the turnpike cup trench drain. Otherwise, water bars and checks may be needed to keep water from running directly onto the tread of the new construction.

Boardwalks:
A boardwalk is considered a "structure" in wilderness and should only be used when all other projects have failed to protect vegetation and soils from ongoing impacts. Boardwalks cannot be built solely for convenience and approval is required. Despite the drawbacks, boardwalks have some appeal. Once vegetation grows back around it, it's arguably more esthetically pleasing, or possibly less obtrusive, than a broad, muddy wallow. Its finished width conforms to the tread width mandated in the Plan, vs. the 3 to 15 foot width of a typical wallow.

Boardwalks can be built in small sections or as one long section. Build the narrowest width that's safe, on the shortest cross pieces possible – you don't want big long cross supports, except as required for stabilizers in a really wet spot. Felled and peeled spruce, cedar, or tamarack trees will usually serve as foundation logs. Planks, which may be hewn from trees cut near the project site or rough cut tamarack or cedar freighted in, should be nailed to cross pieces. Treated wood may not be used.

Design of the boardwalk may call for one plank or two planks (side by side) between cross pieces. Boardwalks should be sturdy and secure to ensure visitors can portage safely. Rocks and boulders can be piled on log ends to help secure it. Rocks and boulders can also be placed around the planks to keep visitors from venturing off the boardwalk and creating more damage.

On this boardwalk the planks of one section over- or under-lap the next. Tying them together like this may help keep the boardwalk in place if the site is prone to seasonal flooding.

The rocks scattered along the edge and placed over the ends of cross pieces serve the same function.

Erosion control projects on slopes

The problem most common on slopes of portages and campsite landings is erosion from running water and compacted soil from foot traffic. This creates a gully effect that leads to a loss of soil. As the gully worsens, project attempts become more difficult with less soil. It is important to mitigate slope erosion issues quickly.

Water Bars

The purpose of a water bar is to run water off an inclined portage before it gathers speed and volume enough to cause serious erosion. The simplest water bars to construct are dirt bars. The most durable water bars are made of rock. Dirt armed with rocks is a good compromise between longevity and ease of construction. Dirt should be mostly mineral soil; organic soil mushes out more readily. Dirt bars should be very substantial to counteract their tendency toward compressing.

Logs are a long-lasting alternative but require a lot of time-consuming steps: felling and peeling trees, cutting and notching logs, digging in log anchors (or setting in rock anchors). Log bars are also an obvious human construct, so less desirable for our purposes.

Water bars must be installed properly to maximize function. Placement of water bars should take advantage of natural drainage patterns on the trail. It is important to extend water bars at least one foot beyond both sides of the tread where people commonly travel. When using rocks or logs, at least half of the bar should be buried, with the upper end anchored firmly in the cut slope, so it won't be dislodged. Bars should be set at a 45 to 60 degree angle from the tread.

Anything less than 45 degrees may lead to clogging while anything greater than 60 degrees may lead to erosion. The steeper the grade, the greater the angle needs to be.

Water running down the grade should be diverted by a dip and a berm before it gets a chance to come in contact with the bar; otherwise the bar will erode out. The dip should be preceded by a long (4'-8'), gently tilted slope that will allow water to flow sedately, in a broad sheet (not in a channel) toward the berm. The slope and the berm should direct the flow off the portage via an outlet, before it reaches the bar. Outlets should be dug wide enough to prevent clogging by debris and steep enough so water won't slow until it is well beyond the portage.

Checks:

Checks are effective at holding soil on a sloped trail when the lay of the land makes it impossible to divert water off the trail. A properly constructed check allows water to soak into the ground or spill gently over the top of the check without taking soil with it. Checks can be made of rock or log, but the longer lasting and more natural looking rocks are preferable. Successive checks - interspersed with water bars when possible - are critical to slow the speed of flow over the length of the slope. Rock checks should align at 90^{o} angles from the perspective of rise over run. In essence, they may appear to be a stairway with extensive landings for foot traffic. Maximum height of checks should be about 8". If there is slope between checks there is a possibility that soil will erode around the upper check and cause it to loosen over time.

When building checks with rock, it is important all rocks are fit together at their highest point to make sure soil does not erode through openings and strip the backfill. When fitting rocks together, make sure they cannot move even before backfilling with soil. Then fill in the gaps tightly with smaller rocks to help lock it all together. Mineral soil should be used to backfill the area behind the check to create a good drain for water to seep through, as well as a flat area for stepping.

On this slope checks are interspersed with water bars; checks are used in locations where the lay of the land makes it impossible to divert water off the trail.

Although the stairway look is generally not appropriate in wilderness, here this concern was over-ridden by the likelihood that the even alignment of rocks will help prevent the erosion likely with sloped checks.

Log checks are built in the same fashion as rock checks. They may be held in place by smaller logs spiked into the notched underside of the check log and buried back into the slope.

Ideally, tread is on the level between checks to reduce erosion underneath the log. Here, an additional check between the bottom two logs would level the tread and protect the upper log from eroding out.

Rock stairs:
Rock stairs are sometimes the best alternative to holding steep slopes. They are generally used only when the slope is so great as to create a situation where checks and fill cannot be used. Sometimes they can be designed to be irregular or in some other way more natural looking than traditional steps. Stairs are always at the mercy of gravity; constant use, and the elements, so care should be taken to ensure they will be secure and safe.

Divert water off the trail upslope from the stairs to protect from erosion, if possible. Forest Service trail-building guidebooks maintain that the average stair height should be around 6”-8”. Guide books also state that each rock should be placed with 1/3 of it secured beneath the rock above it, as it secures the rock below. This is to ensure that gravity is used to hold the rocks together. In some situations, rocks may be so large that they may be placed behind the one below it as long as the bottom rocks are large enough to serve as anchors to hold those above. One final aspect of rock stair construction is to protect the walls of the stairs from erosion by setting rocks in a variety of sizes in place along the edges.

Shoreline Stabilization Projects

Normal use of a campsite impacts soil and vegetation at landings. On some campsites the impacted area is bigger than necessary. Vegetation disappears and soil erodes into the lake. Human use may open up second or third canoe landing areas when only one is necessary or desirable. To address these problems, rocks can be set into place – sometimes among and around exposed

tree roots - or piled along the shore. Sometimes a log is set into place, and filled behind with rocks and sand or gravel from offshore. Rocks can often be found at the site, but take care not to pull them from the shoreline or some other place where they're fulfilling an important function. August, the time of warm water and lower water levels, is a great time to wade around in search of rocks and settle them into place.

As with any rock work, the bigger the rock the better. A pry bar can be helpful. Arm the water with big jagged rocks just offshore from your project to discourage canoes from landing there. At the same time, make the preferred landing more attractive by moving rocks or windfalls that may partially block it and by providing a stable route to the site.

You may use gravel and sand from offshore if it's available, or open a dirt pit, and tamp fill around the rocks. This will help keep them in place and also provide a seed bed. Transplant vegetation in among the rocks if you want.

Rocks can be brought in by canoe load from other parts of the lake. This is where the old aluminum or royalex canoes come in handy. Do not rob a shoreline of important rock armor that is keeping erosion at bay: take only rocks that have already washed out.

If your project doesn't disturb soil, and uses only off-shore gravel for fill, you can do this without seeking approval. Write it up as a project anyway if it's beyond the scope of normal work.

People will use your rocks to build fish pens, to climb around on, and to throw into the lake, plus ice moves rocks, so they should be re-piled and replenished regularly. Ideally, eventually vegetation will take hold among them and hold them in place. Gradually, the project area will begin to look more like the adjacent unchanged shoreline.

Vegetation Restoration

You may want to shrink the size of a campsite or portage landing, close off unnecessary trails or discourage use of undesignated sites by planting trees and other vegetation. Keep these considerations in mind:

- Try to do these projects when the soil has good moisture content and the weather is encouragingly rainy. Work on something else during protracted hot and dry spells.
- Look carefully at the undisturbed forest near the project site to get an idea of what you're working toward. The species composition of your restored site should reflect what's found nearby.
- Paddle away from the campsite, to places visitors are unlikely to frequent, to look for plants to transplant. Aim for diversity of species and size. Include a few trees so big that

they probably won't make it, but while they live they'll add to the green effect, and as dead trees they'll fill up space and help keep people away. When you dig up a young tree, try to include plants growing around its base: grasses, bunchberry, rose. Include plugs of sedges, grasses, and forbs, as well as bushes and trees. Be sure to include some of the same species as those that are successful on the campsite. Plant densely.

- If transplants come from areas where visitors are very unlikely to be, a minimum of naturalizing of holes will be necessary.
- To guard against visitor trampling, plant close to trees, stumps, or rocks. Plant lots of things close together so the new vegetation is really noticeable. Move rocks and plant them among your plantings. Try to route traffic away from new plantings by making it hard to get around within the planted area and by making easy, attractive routes away from the plantings.
- Water your transplants, and water again throughout the season if possible.
- When seeds are ripe in late summer and fall, strip them from plants near the worksite and sprinkle them on disturbed ground. Aster, fireweed, and willow are some that may take.
- Follow up the next year with new transplants to replace those that don't make it.
- Find links to research on seeding and transplanting at wilderness.net

A primary goal of wilderness management is to protect intact ecosystems and to allow natural processes to operate free of human influence. Our Management Plan of 2004 recognizes that an important function of wilderness is to maintain gene pools to ensure a diversity of plant and animal life. In 1993, we understood the Plan's direction to use vegetation that is "indigenous to the BWCAW" to refer to species. Now we think in terms of genetic diversity, and we consider bringing seedlings derived from populations outside the BWCAW to be inappropriate for planting within wilderness.

Current points of debate challenge this thinking. Some would like to try to re-establish white pines as a major component of the BWCAW by extensive seeding and planting. Some think that direct and large scale manipulation of vegetation will be called for by climate change; both endeavors would likely require non-wilderness stock; both would mean significant intentional human manipulation of wilderness.

Fire

Fire has played a dynamic role in the BWCAW ecosystem for thousands of years. During the 20th century, while fire was significantly suppressed by the Forest Service, natural processes were severely impeded and the ecosystem changed. Today, fire is slowly being allowed to return to the wilderness. Lightning ignited fire continues to occur naturally in the BWCAW and is allowed to burn under certain narrowly prescribed conditions. That policy is consistent with wilderness authorities and guidelines. Unlike the situation in all other wilderness areas, here in the BWCAW planned ignitions by the Forest Services for safety (fuel reduction) purposes are authorized by amendments to the Forest Plan (predominantly the 2001 post-Blowdown amendment). Fire related activities, just like other human activities in the Boundary Waters, should be consistent with Wilderness Act tenets and wilderness management policy and principles; some would argue that management prescribed and ignited fire should not be used.

After several decades of little major fire activity within the BWCAW, the 21st century rang in with several large scale fires, both naturally occurring and prescribed. Between 2000 and 2009, 10 prescribed burns were conducted within the East Zone of the BWCAW. Between 2000 and 2005 there were 5 large fires within the BWCAW. One of these, the Ham Lake Fire, was started by an unattended campfire; the other four were lightning ignited. The Cavity Lake Fire had the biggest impact on the BWCAW in the last 30 years. Ignited by lightning in July of 2006, the fire burned over 32,000 acres almost entirely within the Gunflint Ranger District. Nearly 70 campsites and 30 portages were affected.

Closures

Campsites and portages affected by fire often need extensive rehabilitation. Depending on the severity of the damage, campsites are sometimes temporarily or permanently closed. In situations where soils on a campsite have been completely burned away it's recommended that the site be closed for at least a season to allow for vegetation to reestablish. Under these conditions the threat of extensive erosion is very serious and the presence of foot traffic will dramatically expedite the process. Only the natural progression of plant succession can properly anchor the soils and keep them from slipping away. Where fire has burned exceptionally hot it's possible that a site will need to be closed for two seasons or more to allow for vegetation to come back. After less intense burns this process may begin the same season as the burn.

When to close a campsite

√ soils burned in main campsite area
√ potential for severe erosion is high
√ lack of privacy at latrine
√ tent pad soils are burned out
√ abundance of hazard trees

Rehabilitation

The first step in campsite rehab is often the replacement of the latrine. It's common for latrines to burn partially or entirely during a wildfire. In cases where the burned latrine falls into the latrine hole a new hole often needs to be dug.

It's typical for campsites, latrine trails and portages to be clogged with downed trees after a fire. Anticipate a need for extensive clearing. Evenly disperse logs to avoid creating large piles. Hide cut faces if possible and blacken them with soot to further naturalize.

A thorough evaluation of the standing trees surrounding a campsite must be conducted. Burned trees leaning toward any of the amenities (canoe landing, latrine, fire grate area, and tent pads) on a campsite should be considered hazard trees and felled. Trees in close proximity to the main campsite area and in the areas mentioned above that have been burned to the degree that their root systems are compromised should also be felled. It should be noted that not every burned

tree is a hazard tree. Dead trees provide crucial habitat for insects and birds and are a natural part of a wilderness ecosystem. Drop only the trees that are truly hazards.

Portages that have burned extensively often demonstrate new erosion problems that did not exist prior to burning. Portages that run along the side of a hill are typically the most vulnerable to this type of erosion as there is no longer vegetation to anchor loose soils. Use rocks or logs on the down-slope side of the trail to shore up the eroding tread. If possible, cap the tread with mineral soil.

Ogishkemuncie to Kingfisher portage after the Cavity Fire in 2006. The photo on the left shows what the trail looked like shortly after the fire. Rehab crews worked to preserve soils from sliding down the hill by installing rock and log reinforcement. Soil from root wads provided a source for capping.

Fire suppression techniques in the BWCAW should follow the Minimum Impact Management Tactics Handbook. Unfortunately, it's common to find evidence of fire suppression after all the fire fighters have vacated the area. Proper rehab of access trails, firelines, helipads and campsites is essential.

Long Term Maintenance of Burned Sites

Burned campsites and portages sometimes require different maintenance than unburned sites. Overgrown brush is the most common post-fire problem. The problem is particularly exaggerated in places of low use. It's crucial to keep latrine trails open to prevent the improper disposal of human waste. If visitors cannot find the latrine they often make poor choices that potentially threaten water quality. The traditional brushing technique using nippers is typically inadequate in these scenarios. A scythe or weed whip to knock down tall grasses and bindweed are more effective tools. Campsites that are underused also need the fire grate area monitored to

ensure that grasses and other vegetation do not encroach on the grate. Continue to monitor trees surrounding campsites and eliminate new hazard trees.

Social Impacts of Fire

Many visitors to the BWCAW do not understand that fire plays a natural role in the wilderness ecosystem. The Smoky Bear fire suppression campaign in a sense has been too effective. The general public often sees fire as destructive and nothing more than a threat to wildlife and property. To some, burned areas are ugly. But the purpose of wilderness is not to please the eye. There is far more to wilderness than aesthetics, and wildfire is one of the great examples of a process being able to operate free of human constraints. As wilderness rangers, it's part of our job to educate visitors about the benefits and role of fire in the wilderness ecosystem.

Fire can have several social impacts within wilderness. Areas that have burned often see extremely low use for the first several years after the fire. As a result, places that have not burned see an increase in use. After the Cavity Lake Fire in 2006, the surrounding lakes that did not burn experienced long periods of overcrowding.

It's not only the aesthetics that can discourage visitors from camping in burned areas; there are logistical hurdles as well. Places that burned severely may lack trees for hanging bear bags or tarps, for shade (very important on blackened sites in hot weather), and for screens of vegetation to provide privacy at latrines. In some cases firewood is scarce.

As wilderness rangers we can tell visitors what to expect in burned areas and offer useful tips: pack food in bear resistant containers; pack lots of p-cord and extra tent poles (or find dead and down poles) for hanging tarps; be prepared for blackened clothes and gear. We can encourage visitors to utilize and experience the burned areas to help alleviate overcrowding in other places. We can point out how fire-adapted species take advantage of a fresh burn. Wilderness rangers who convey the beauty and power of this great living ecosystem in all its facets will help visitors accept and embrace wilderness on its own terms.

Paperwork

Everyone:

- **Tailgate safety session cards**
  - Do regularly and ***put in file for finished forms.***
- **Campsite** (and sometimes portage) **inventory**
  - Note information required to complete all categories while you're on each site. ***Give to area work leader after every trip***. This will be entered into the computer database by area work leaders or ops leader at least twice over the summer, and possibly after every trip.
- **Notes for area work leaders**
  - While on every trip, write detailed and clear notes including potential projects and work needing to be done. ***Give to area work leaders*** so they can make plans and determine priorities.
- **Notes for front desk**
  - On forms the front desk people provide, or your own format, note any information of interest to the public about the area you were just in (flooded portages, wildlife, mosquitoes, overcrowding in particular areas, berries ripe, etc.). Include problems you see that the front desk people could target with a focused leave no trace message. ***Give to the front desk.***
- **Work survey forms**
  - Document all work done on every trip and ***put in file for finished forms***.
  - Report latrines that have been moved and require further Heritage Resource evaluation. ***Give to ops leader***.
- **Tally of violations**
  - Keep track of all violations you see (cans and bottles, cut vegetation, 9+ people or 4+ canoes, fires outside the grate, fires unattended, litter, camping off-site, etc) and date and location of violation. ***Give to FPO who works in that area.***

Area work leaders:

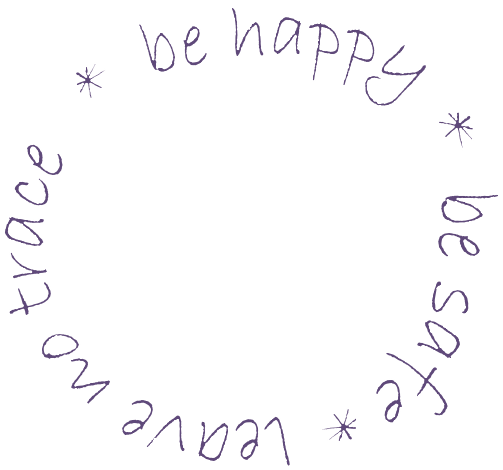
- **Project sheets**
  - For any potential project (erosion work, boardwalk, new campsite, campsite closure, etc.) start a project file. Heritage and plant surveys will be planned and completed using the information provided on these sheets. Sketches of the project help the heritage and plant people. For all photos taken to document pre- and post-project conditions, note date and location and make sure information is attached to photo. The project can't be done until everything is completed. ***Give to ops leader.***

Forest Protection Officers:

- **Violation notices**
  - As needed. ***Give to LEO.***
- **Incident reports**
  - Write these for any violation you find, when you won't be taking other action (ticket or warning) – cutting live vegetation, fire outside grate, etc. Very important: they are the only way to document the many violations that happen when we're not around. ***Give to LEO.***
- Document law enforcement activities that aren't routine, for your own possible use.

Ops leaders and logistics coordinator:

- **Crew schedule**
  - These will be done, with input from area work leaders, on the day crews come in from a trip, so everyone will know what the plans are for the next trip. ***Copies go to supervisor, front desk, and wilderness office areas. A general schedule, based on this, will go to Cook County.***
- **Project inventory**
  - Update this regularly based on input from area leaders and results from heritage and TES surveys.



BWCAW Management Areas and Maintenance Standards

The BWCAW Management Plan and Implementation Schedule of 1993 – which amended the 1986 Plan and was then rolled over into the 2004 Plan - divides the wilderness into management areas and defines maintenance standards.

- 5.1- Pristine: Primitive Management Area – no portages; resource damage will be corrected to a natural – appearing condition.
- 5.2a - Primitive: Portages maintained minimally and likely not every year. Rocks, beaver dams, or other natural features should be used for water crossings. Rustic, unobtrusive crossings may be constructed for resource protection if natural features are not available. Water bars may be used to prevent erosion. Clearing width will be only that which is necessary to allow passage, generally not more than 4 feet total or 2 feet from centerline. Additional width on turns or steep slopes may be necessary. Tread width should be less than 1 ½ feet or the minimum necessary for walking. Loose gravel, rocks, roots, holes, deadfalls and other obstacles remain as long as they don't cause a new path to be completed.
- 5.2b – semi-primitive non-motorized: Portages maintained at minimum level, likely once a year. Minor grading or lift/fill of wet spots is permitted. Rocks, roots, wet spots allowed as long as there is no serious hazard or resource degradation. Clearing width: between 6 and 8 feet. Tread width: less than 1 ½ feet. Remove deadfalls and large rocks. Water bars may be used to divert water. Rustic bridges or walkways may be used to prevent resource damage. Where possible, reroute portage instead of building structures.
- 5.3- semi-primitive motorized: Maintenance frequency related to use levels, but at least once a year. Signs limited to minimum required for safety and to notify users of transition from a motor to a non-motor area when it is not apparent. Water bars may be used to divert water. Rustic bridges may be installed to minimize resource damage or in hazardous situations. Where possible, consider rerouting rather than building structures. Width as required on motorized portages.
- Hiking Trails: Same across management areas: 4 – 6 foot clearing width.

MAINTENANCE STANDARDS	MANAGEMENT AREA				
	5.1 Pristine		**5.2A Primitive**	**5.2B Semi-Primitive Non-Motorized**	**5.3 Semi-Primitive Motorized**
TRAIL/PORTAGE MTCE LEVEL	N/A		1	2	3
VISITOR USE LEVEL	Very light		Light	Medium	Heavy
GENERAL DESCRIPTION	No constructed or maintained trails or portages. People using this area will be seeking a very challenging experience.		Portages off main travel routes in "paddle only" areas. People using these portages will be seeking a more challenging experience.	Portages on main travel routes in "paddle only" areas, and in non-motorized areas where portage wheels are permitted. (International Boundaries). Also, long distance or day-use hiking trails in all Management Areas. People in this MA are seeking an experience with moderate to low degree of challenge.	Portages between motor lakes where portage wheels are permitted. People using these portages are seeking an experience with a low degree of challenge.
FREQUENCY OF MTCE	As needed to protect resource.		Not every year	Once per year as a minimum	Once per year as a minimum
TREAD MINIMUM	Portages	N/A	1-½ feet walking width.	1-½ feet walking width.	3-½ feet dry tread to accommodate portage wheels.
	Hiking Trails	N/A	No greater than 1-½ feet.	No greater than 1-½ feet.	No greater than 1-½ feet.
CLEARING WIDTH (BRUSHING)	Portages	N/A	Only that necessary for passage, generally not more than 4 feet total.	6 to 8 feet total.	Maximum of 10 feet.
	Hiking Trails	N/A	Generally between 4 to 6 feet.	Generally between 4 to 6 feet	Generally between 4 to 6 feet
GRADING	N/A		No cuts or fills. No grading.	Minor grading, or lift/fill of wet spots is allowed.	Grade only where required. A few minor wet spots are allowed.

MAINTENANCE STANDARDS	MANAGEMENT AREA			
	5.1 Pristine	**5.2A Primitive**	**5.2B Semi-Primitive Non-Motorized**	**5.3 Semi-Primitive Motorized**
STRUCTURES/ FACILITIES	None	Utilize rocks, beaver dams, or other natural features for water crossings. Bridges and walkways are less desirable, but may be necessary for resource protection.	Only as necessary for safety in the very hazardous situations, and for resource protection.	Only as necessary to prevent erosion and maintain a dry tread.
DRAINAGE	Resource damage will be corrected to a natural condition.	Existing drainage patterns or water bars if absolutely necessary.	Cross ditch, open culvert & waterbars may be constructed to protect resource.	Cross ditch, open culvert & waterbars may be constructed to protect resource.
REVEGETATION	Methods that allow for natural revegetation are preferred. If planting is done, use vegetation that is indigenous to the BWCAW.	Methods that allow for natural revegetation are preferred. If planting is done, use vegetation that is indigenous to the BWCAW.	Methods that allow for natural revegetation are preferred. If planting is done, use vegetation that is indigenous to the BWCAW.	Methods that allow for natural revegetation are preferred. If planting is done, use vegetation that is indigenous to the BWCAW.
CAMPSITE MAINTENANCE	Will occur on user-built sites only when necessary to protect the biophysical resource.	Sites in this MA may not be maintained each year, depending upon amount of use. Firegrate will be cleaned, litter picked up & user-built structures dismantled and latrines moved as needed.	Sites in this MA will likely be maintained each year and maybe more than once depending upon amount of use. Firegrate will be cleaned, litter picked up & user-built structures dismantled and latrines moved as needed.	Sites in this MA will likely be maintained each year and maybe more than once depending upon amount of use. Firegrate will be cleaned, litter picked up & user-built structures dismantled and latrines moved as needed.

The National Environmental Policy Act of 1969 (NEPA) requires Federal agencies to: use a systematic interdisciplinary approach in planning and decision making; consider the environmental impact of proposed actions; identify adverse environmental effects which cannot be avoided should the proposal be implemented; consider alternatives to the proposed action; consider the relationship between local short-term uses of the human environment and the maintenance and enhancement of long-term productivity; and identify any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

The NEPA process provides what is often the sole avenue for public participation in decision making concerning the use of public lands and may provide the framework for litigation over agency actions and plans.

There are three classifications of NEPA analysis that are commonly used in the Forest Service: a Categorical Exclusion (CE), an Environmental Assessment (EA), and an Environmental Impact Statement (EIS).

A Categorical Exclusion is the most common type of NEPA analysis that is required for routine wilderness work such as re-routing a portage, establishing a new campsite, or constructing a new portage or trail. CE's are generally used for actions that are considered unlikely to have, individually or cumulatively, significant social, economic, or environmental impacts. CE's are the lowest level of NEPA analysis and are fairly common with wilderness work projects.

An Environmental Assessment is prepared when there is uncertainty about the significance of the impacts from a project. The purpose of an EA is to provide sufficient evidence and analysis to determine whether the cumulative effects of a project proposal are significant enough to warrant the preparation of an Environmental Impact Statement. EA's are generally used for large scale vegetation management proposals and are rarely used in routine wilderness work.

An Environmental Impact Statement (EIS) is the most in-depth analysis that is commonly used within the Forest Service. With regard to wilderness work, an EIS is most often used to analyze proposals for congressional designation of new wilderness areas or wild and scenic rivers.

Since we are required by the Wilderness Act to manage wilderness by preserving its untrammeled state - essentially, to leave wilderness alone - that law acts as the first filter: it would be a rare situation that a project proposed for the BWCAW would be of the scope to require an EA or EIS.

Wilderness rangers will sometimes be involved in gathering information for NEPA analysis and may at times be asked to assist the wilderness manager with the preparation of a CE.