

Fire Basics

By Steven Dykeman

Be safe
Have fun
Better yourself



Why build a fire?

Fire building is considered the most important skill to have by most survival experts. The reason for this is that it can help in solving all three of the most critical dangers which are: warmth, water, and food.

- Warmth

If you do not have adequate clothing and shelter from the cold, a condition known as hypothermia may set in. This is a very dangerous condition where your body temperature is not able to maintain itself at 37C (98.6F). When this occurs your thinking may become impaired and you do dumb things that put your life into even greater danger. As a general rule, 3 hours is roughly the amount of time before this condition sets in. Fire making therefore is an important skill that may save your life.

When out on a nice camping trip and survival is not an issue, the warmth of a fire can also be quite comforting. In the early morning or late evening, a fire can provide a means to continue activities, and not be constrained to your sleeping bag.

- Cooking

Cooking over a fire is an excellent alternative or addition to using a camp stove. There are many ways to use a fire for cooking almost any meal. See the article on [cooking over an open fire](#). From a survival standpoint, having a fire to cook meat and boil water is extremely important. As a rule of thumb, a person can last three days without water. Any water found needs to be boiled

to make it safe to drink. Also, any animal caught in the wild needs to be cooked to make it safe to eat.

- Fellowship

Most campers enjoy a nice fire in the evening. The campfire is an essential outdoor tradition that for generations has served as the center for outdoor gatherings. The fire may often allow campers time to enjoy the company of others while winding down the day. Campfire stories, marshmallow roasting, or even s'mores are a pleasant evening activity. The ability to safely build and enjoy a campfire is one of the many pleasures of camping. Try to plan your fuel usage to minimize the effort of putting out the fire. As the fire burns, move embers to the center to burn them completely. Ideally, you should reduce embers to white ash to make extinguishing the fire much more easy.

- Keep animals away

I was considering not having this as a reason to have a fire, but it is something that should be discussed. For the most part, a camp fire does not keep away animals. The smoke from a fire may help to reduce some insects, but that's about it. What often does keep some animals away is the presence of humans. Many animals may associate fire with humans and therefore keep away. Other animals may associate fire with humans and head straight for your camp. There is no rule that is 100%. Don't trust in what you see in the movies.

What is fire?

Fire occurs whenever combustible fuel in the presence of oxygen at an extremely high temperature becomes gaseous. Flames are the visual indicator of the heated gas. Fire can also occur from lower-temperature sources. Over time, combustible materials such as smoldering embers can reach their ignition temperature.

Heat

A heat source is responsible for the initial ignition of fire, and is also needed to maintain the fire and enable it to spread. Heat allows fire to spread by drying out and preheating nearby fuel and warming surrounding air.

Fuel

Fuel is any kind of combustible material. It's characterized by its moisture content, size, shape, quantity and the arrangement in which it is spread over the landscape. The moisture content determines how easily it will burn.

Oxygen

Air contains about 21 percent oxygen, and most fires require at least 16 percent oxygen content to burn. Oxygen supports the chemical processes that occur during fire. When fuel burns, it reacts with oxygen from the surrounding air, releasing heat and generating combustion products (gases, smoke, embers, etc.). This process is known as oxidation.

Safety

Absolutely without question; safety is the most important consideration when dealing with fire. It is important that a trained person that is knowledgeable about fire safety be in charge of the fire from start to finish. Read this article in its entirety prior to beginning any fire. Know how to put out a fire before starting a fire. Read the article [Putting out a Fire](#). Fire safety information may also be found at: <https://smokeybear.com/> A good video on fire safety is located here: <https://permit.preventwildfiresca.org/>

1 Personal

Some personal safety concerns are burns, cuts, and poisoning. It is pretty obvious that a fire can cause burns. Caution should be taken to avoid contact with the flames, coals, or any object that has been heated by the fire. Another potential hazard associated with fire is cuts. Sharp tools are most often used in the preparation of kindling and fuel wood for the fire. It is important that only persons trained in the use of knives, saws, and axes use these tools. A third safety concern is poisoning. Often (however not recommended), liquid or solid fuel starters are used. These chemicals may be toxic. It is highly recommended to not use toxic fuel starts. Know how to treat burns and cuts before preparing a fire.

2 Environment

Fire can be a serious danger to the environment. 90% of fires are caused by human carelessness. Since 1960 the number of fires in the U.S. has tripled; and guess what; the number of humans has also tripled. The increase of fires is due to population increase, not global warming as the government wants you to believe. 10% of the fires are due to lightning and electrical fires. The electrical fires are also a result of human carelessness and neglect.

You need to understand this so maybe we can help reduce the problem. We cannot solve problems if we are lied to. The bottom line is to be careful with fire. No one should be making a fire if they have not been properly trained. Study the material in this article and also read the article on [how to put out a fire](#).

3 Tools

Tools used for fire making are; knife saw, axe, and shovel. You should know how to use these tools properly before leaving on your next outdoor trip. Read the article on [wood tools](#). Proper use and care of your tools will ensure that they last long and will help minimize accidents.

Making a safe fire site

- Get a camp fire Permit if required. Campfire permits are required for the use of campfires, charcoal fires, or portable gas stoves in many locations. These are free and available at all Forest Service, or BLM offices or [online](#). Remember to check for fire restrictions before you go! Know the rules for your camp area

- Check with the governing authority of the land that you will be camping on. This could be the U.S. Forest Service, The National Park Service, The Bureau of Land Management, The State Park System, or other. Many areas do not permit a camp fire at all, or restrict fires to low fire danger seasons. Some locations may permit charcoal fire, but no campfire. Some locations may require a fire permit. Some locations may permit a camp stove only.
- Use existing fire rings whenever possible. It is important that we leave our campsite the way we found it or better. Do not add anything or take away anything. If there is no existing fire ring and you add one, you need to clear it away when you are done so that the area looks as it was before you came.
- Make your fire no larger than needed. Please be responsible. A large fire can get out of control; cause many sparks that can drift into the trees. A large fire is difficult to extinguish. A large fire will burn your food.
- Your fire site should be where nothing will burn except for the fuel you provide, and cannot spread beyond your fire ring. Avoid areas with overhead branches that could catch a spark
- Rake away pine needles, leaves, and twigs to clear an area of 10 feet in diameter.
- Your fire should be on bare earth. Many areas have a deep layer of organic material such as decaying pine needles or peat that can unknowingly combust and spread your fire.
- Keep a pot or bucket of water close by. If you don't want to carry a large bucket in your gear, you can purchase a collapsible plastic or canvas bucket that takes up little space and will expand into a large volume bucket for water. Another possibility if you forgot your bucket is to have a large pot full of water handy.
- Follow the rules of LNT (Leave No Trace) <https://lnt.org/>

Rules

- Obtain a fire permit as required
- Understand and obey the local rules
- Never leave a fire unattended
- Never build a fire larger than needed.
- Always keep a shovel and pail of water and/or sand nearby
- Avoid the temptation of unnecessarily poking at the fire
- Avoid the temptation of throwing unnecessary items into the fire
- Follow the rules of LNT (Leave No Trace)

The Fire Site

Build fires in designated fire rings, grills or fireplaces when available. Most developed campground will mandate the use of existing sites. Using a fire ring will lessen your impact and keep your fire contained.

Evaluate the site before starting a fire. Be sure the site does not have low-hanging branches overhead, and rake away any pine needles, leaves, and twigs within 5 feet.

In dry conditions, fly-away embers could easily ignite a wildfire.

Gather Fire Wood



To burn a successful fire, you'll need three types fuel: tinder, kindling and firewood. Gather all materials before starting your fire. Have a bucket of water and a shovel nearby.

Tinder (small) includes small twigs, dry leaves, needles or forest duff.

Kindling (medium) consists of small sticks, typically less than one inch around.

Firewood (large) is any larger piece of wood and is what will keep your fire going long into the night.

Use only local firewood. Nearby stores often carry firewood, and sometimes campground hosts offer bundles of firewood or kindling for sale. Wood can be a vehicle for introducing harmful insects into an area.

Call the campground or a local ranger office in advance for information and advice.

If you forage for firewood in the backcountry, gather only downed wood far from your site. Never cut live trees or break off branches from standing trees, even dead trees. Birds and wildlife make use of dead branches and snags.

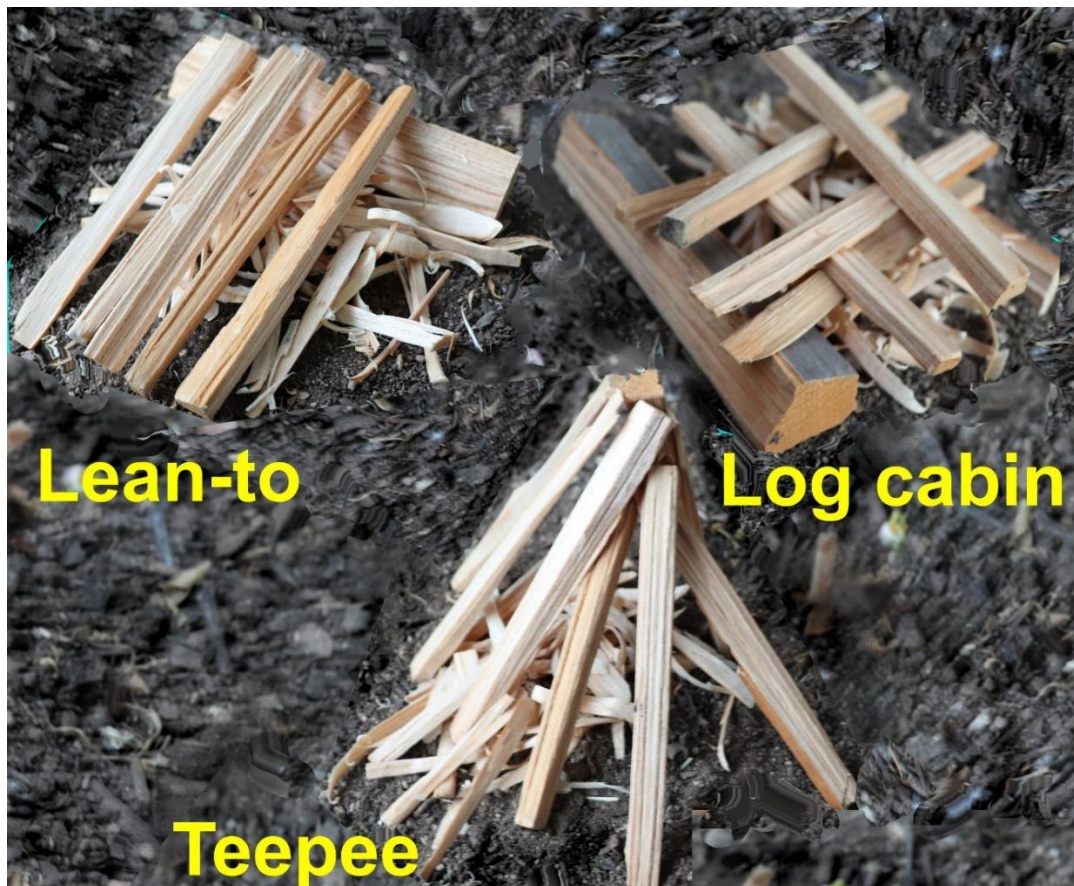
Do not gather or burn pieces thicker than an adult's wrist. This is because thick chunks of wood are rarely allowed to burn completely and are typically left behind as blackened, unsightly scraps.

Remember to follow [Leave No Trace](#) principles when gathering wood.

Build the Campfire

A structure built with your fire making materials is often called a fire lay. Some form of fire lay is always required, however many experienced fire builders often use a build-as-you-go method where a very minimum structure is formed prior to lighting, and further materials are slowly added. The most often used structure for this technique is the “lean-to” where materials are simply leaned against a larger piece of wood allowing space for air to reach the fire.

Other structures (lays) such as the teepee, and log cabin are shown in the picture below. Variations and combinations of these three lays are also possible and no particular lay is considered superior. It is best that you as a fire builder experiment with different lays and find what works best for you.



Light the Campfire

Most often the tinder is lit with a match or lighter. Many other lighting methods are possible and articles written on using these methods are available here: [Fire Starting](#)

Many fire-starting aids are available for purchase and can greatly enhance the starting of your fire. An article that covers the majority of these fire starters is available here: [Purchased Tinders](#)

Some fire starters or tinders can easily ignite from a spark. Fire-making materials are considered an essential item to take with you on any hiking or camping outing.

As the fire burns, move embers to the center to burn them completely. Ideally, you should reduce them to white ash.

Putting out a fire



The first step to putting out a fire is to let it die down. **DO NOT BUILD A FIRE LARGER THAN NEEDED.** A large fire is difficult to put out. To help the fire to die down, you can sometimes separate the burning parts. Do not strike the fire with a shovel or stick; this may cause sparks to escape into the air.

To put out your campfire, first pour water over it. Next, give it a good stir to mix the hot coals with the water. Pour more water over the hot parts and give it another stirring. Repeat the water and stirring until the fire is “cold out”. Cold-out means that you can put your hand on the fire without feeling hot. Don’t actually place your hand on the fire until you can be sure it is cold.

Clean your fire site to have it look nicer than the way you found it. If it was a pre-existing site, leave it clean. If it was a site you made, leave it to where no one can tell that you had a fire there.



Drown the fire with water



Stir: Repeat drowning and stirring as necessary



The fire is "Cold Out" when the fire is cool enough to touch

Clean up

Burn trash items only if they can be fully consumed by fire and turned to ash. Do not attempt to burn plastic, cans or foil. If you do burn something that's not fully consumed, collect the remains when the fire is out and either pack it out or put it in a trash receptacle. Using dirt or sand to extinguish a fire is problematic because it can insulate coals, which can become uncovered later and ignite a wildfire.

When you're in the backcountry, pack out any trash found in your pit. Extract any charcoal pieces left inside your ring, carry them away from your site, crush the chunks, then scatter the remnants and dust throughout a broad area. Dismantle any structure you might have built.

Fire Making Kits and fire starters

The best fire kit out there is the "Ferro Fire Kit" by Tactical Bush Gear. The reason it is the best is that it contains a large variety of items to ensure success in a variety of conditions and with persons of any skill level. You may be an expert and think you can manage without certain items, but what if you become injured and need someone less skilled to make a fire? Don't let your ego get in the way of safety. [Click here to learn more.](#)



See [fire making videos](#) and other [fire making articles](#) to learn how to use all of the items.

Fire Starter Blocks are made from wax impregnated wood fiber. It is absolutely the most versatile fire starter product on the market. The Fire Starter Blocks will start most any type of fire in almost any condition. They are the best choice for lighting your camp fire, wood stove, charcoal, fire place, and more. The fire starter blocks come conveniently packaged in a pack of 24 blocks shown below. You can also purchase a box of 8 packs (192 blocks total).



Unlike other camp fire starters and charcoal starters, the wood fiber blocks can start from a spark. This makes them ideal for backpacking and survival fire kits as well.

When the blocks are broken apart, they may have very ragged edges. This is a big advantage allowing them to light easily. These blocks will easily light with a match or lighter; but why be limited to that. They can also easily light from the spark of a ferro rod. By simply breaking off a small amount off the corner and crushing it into fine fibers you will have tinder which will light from a spark.

[Click here to learn more](#)

Further information

You can always learn more and better your skills. Read as much as you can from as many sources as you can. There is a lot of bad information out there, however, so use your head to filter the good from the bad. If it doesn't make sense, it is probably wrong. Over time you can develop a sense of what sources to trust. You can also get a lot of information from government web sites.

US Forest Service <https://www.fs.usda.gov/>

<https://discovertheforest.org/>

<https://www.youtube.com/user/usdaForestService/videos>



About the author:

Steve Dykeman is an experienced outdoorsman and survivalist. He has written many articles and produced many videos on subjects relating to outdoors and survival. He has been a course director and instructor to both youth and adults. He has also been a technical consultant to manufacturing companies relating to outdoor gear. He has over 40 years of experience working with space and defense related electronics. He brings his advanced technical abilities to the outdoors, exposing the many myths and fallacies.

In recent days he is educating people to survive into our uncertain future.

