SKILLS, TIPS, AND GEAR FOR LIVING ON THE LAND

THRIVE

LONG-TERM WILDERNESS SURVIVAL GUIDE

JUAN PABLO QUIÑONEZ

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WARNING:

This book has been written and published strictly for informational purposes. It is not intended to serve as a manual and in no way should be used as a substitute for actual instruction with qualified professionals. **The author and publisher assume no liability for personal injury, property damage, consequential damage, or loss, however caused, from using the information in this book.**

All survival scenarios by nature are life-threatening, and many activities related to wilderness survival are dangerous. The survival techniques described in this book are for use in dire circumstances only, when the survival of individuals depends upon them. **Many techniques described herein are illegal outside true survival situations.** Some of the information presented in this book, if misused, could help kill you.

The author and publisher urge all readers to be aware of their own outdoor experience and health status, to consult all laws relating to the protection of land, property, plants, and animals, and to consult health care and outdoor professionals before engaging in any potentially hazardous activity.

PREFACE

I've studied hundreds of books related to wilderness survival to prepare for my 180 days in the wild and 100 days in the boreal forest during winter. Unfortunately, none of these books tackle the subject from a modern, long-term perspective; therefore, I decided to write this book.

Here, you'll find advice on developing a strategy and preparing for a wilderness survival situation lasting up to one year. While writing this book, I've asked myself: if I could carry only one book on survival, what information and advice would it contain?

I spent a lot of time gathering and cross-referencing the information and concepts in this book; although they may have appeared in other publications, they have been modified or recreated to best illustrate the points I want to make.

This is the book I wish I had read before embarking on my survival adventures. I wrote it because I felt a personal need for it and to organize the lessons I've learned through experience and research. I hope it becomes a stepping-stone for survival enthusiasts.

Here, you won't find comprehensive information on some topics, such as identifying wild edibles or performing basic wilderness first aid. However, you'll find an attempt to tackle the vast subject of long-term survival from a broad perspective, with an emphasis on a survival mindset.

This book doesn't include a lot of beginner information on survival skills. I do go over various foundational skills, but it is assumed that you have a separate field guide for wilderness first aid and perhaps wild edibles, and that you already own a book or two on wilderness survival.

The next decades will certainly bring numerous challenges caused by climate change and disruptions to ecology and energy sources. Being more connected to our land, water, food, and power will make us more resilient to these challenges. Living in the wild is not the answer to our converging predicaments, but it sure helps to develop resilience and a perspective that will be increasingly useful in the future.

I have a desire to share what I've learned. The result is this book, *Thrive,* which is what it is: a bunch of drawings and notes on long-term wilderness survival.

Juan Pablo Quiñonez

To my parents,
Juan Pablo Quiñonez and Claudia Saldaña,
and my partner,
Jennifer Ford,
for their love and support.

ACKNOWLEDGMENTS

Thrive would never have been written without the support of my partner, Jennifer Ford, and my family. I'd like to acknowledge that this book was written on Indigenous hunting and gathering grounds. I'm grateful for living next to the boreal forest, not too far away from the truly remote wilderness, and having had the privilege to pursue the adventures that form the basis of this book. The outdoors has given me direction and encouraged me to be grounded. It has allowed me to experience the freedom that few people will ever experience. Without nature, there is nothing.

Thanks so much to all my alpha readers for taking the time and making the effort to not just read my drafts, but to send me detailed comments and feedback. This book is far better thanks to you. Special thanks to Adam Riley, Benji Hill (**benjihill.com**), Bruce Zawalsky (**boreal.net**), Dave Holder (**mahikan.ca**), D.J. Tudino (**bearessentialsoutdoors.ca**), Jessie Krebs (**owlsskills.com**), Karie Lee (**karieleeknoke.com**), Nathan Martinez, Robert Weir (**panaceax.com**), Dr. Teimojin Tan (**survivaldoctors.com**), Terry Burns, Torjus Gaaren, Trevor Page, and Woniya Thibeault (**buckskinrevolution.com**).

I'd like to thank my copy editor Lianne Fontaine for all her hard work and attention to detail. You made this book readable. I would also like to thank Nicole Boyse for her diligent proofreading of this book.

I'm grateful to all those who passed down their knowledge in print—people such as Cody Lundin, Laurence Gonzales, Les Stroud, Paul Auerbach, Ray Mears, Mike Pewtherer, Mors Kochanski, Mykel Hawke, and many others. I would also like to acknowledge all the bushcraft and survival bloggers and YouTubers for sharing their knowledge and ideas.

It would be impossible to identify and credit all the sources I relied on for this book. Many of the facts came from various sources, including books, peer-reviewed articles, and websites. You will find a list of selected references at the end of this book.

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INTRODUCTION

This book is not the usual wilderness survival guide, and it's not for beginners. There is a vast difference between a short-term survival situation (typically lasting 72 hours) and a long-term situation (lasting more than 30 days). Most books on wilderness survival focus on primitive skills and bushcraft or on staying alive in the short-term while a search and rescue team finds you. *Thrive* is different. Its guiding idea is: if one had to live in the wild for up to one year with only a single book, what would it contain?

Thrive provides strategies, tips, and techniques that could be used if you need to survive in the wild for an extended period. This book is for survivalists, bushcrafters, back-to-the-landers, and anyone interested in knowing what it takes to live in the wilderness for an extended period of time, including obtaining a significant portion of food through hunting, foraging, trapping, and fishing.

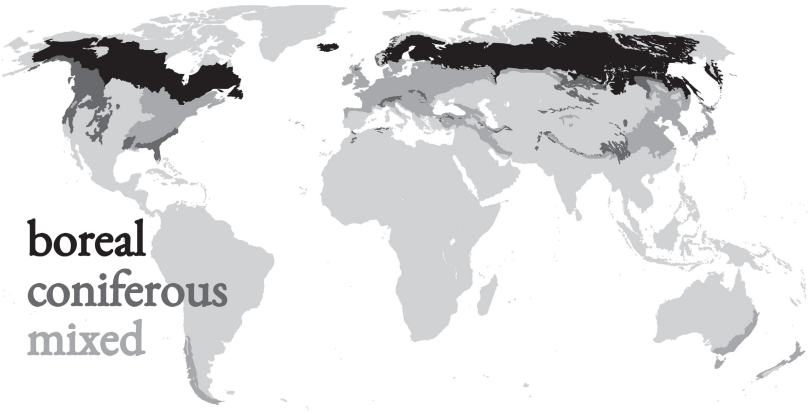
I don't want to discourage the survival- and preparedness-minded readers from putting this book in their bug-out bag, but I want them to know that bugging out during an extended emergency to "live off the land" is not wise. You are better off sheltering in a small community that can withstand natural disasters by feeding itself, protecting itself, and providing its own energy—localization is the main idea. Nevertheless, many of the techniques and information here are helpful in a wide range of situations, including sheltering in place.

This guide is meant to be used for both preparation and reference in the field. It is organized using a pattern common in many survival books, but

that shouldn't trick you into thinking its contents are the same. Although I will barely scratch the surface of some topics, others will be covered in depth.

Thrive covers all seasons, particularly winter, and emphasizes survival in the boreal forest. This guide focuses on remote wilderness locations, and is more appropriate for northern areas, such as Alaska, the Northern United States, Canada, Scandinavia, and Russia. Nevertheless, people in more temperate climates will still find information relevant to their local regions.

My partner and I spent six months living in the wilderness in 2016, complementing our rations with food that we harvested from the boreal forest. In 2019, I spent a hundred days solo in the boreal forest during the winter months, foraging to complement my small rations. Most recently, I was a participant on Season 9 of The History Channel's survival series *Alone*.



PREPARATION

"What kept the Baileys, the Robertsons, and Poon Lim alive? Experience, preparation, equipment, and luck."
— Steven Callahan, *Adrift*

Proper planning prevents piss-poor performance, or at least it aims to. Long-term wilderness survival is tough—you must have every edge to your advantage. That's why a very well-thought-out approach and not falling in love with the original plan is critical. Making a plan will help you spot any holes in your strategy, determine what gear you need to change or acquire, and figure out which skills you need to improve. The bottom line is to always have a plan but never expect it to work out without improvisation.

Having written this, I believe the transformation from knowledge into instinct-like responses through extensive experience is also as important—or even more so—as having a plan.

SURVIVAL PRINCIPLES

Before starting preparations, it's good to consider what I call *survival principles*. The following ideas help guide every aspect of a plan, from gear selection to foraging strategies:

KNOW THYSELF

Be aware of your and your group's strengths and weaknesses. Be mindful of your actual skill level, and take on challenges gradually, according to your experience. Don't start a challenge for the wrong reasons or without being sufficiently prepared.

MURPHY'S LAW

Anything that can go wrong will go wrong. Murphy's Law is not about being pessimistic. It's about proper risk management.

When you are in a situation in which a minor incident can escalate, you must be aware of any potential failures (in your gear, strategy, health, and so on). And you should make plans to deal with those failures. Be ready for unexpected adversity, and be flexible. You can't truly design a resilient strategy with backup plans if you believe it will be all rainbows and sunshine.

Err on the side of caution: if things going south have dangerous consequences, then it's best to be proactive and prevent an incident from happening in the first place.

KEEP IT SIMPLE

This principle goes along with Murphy's Law. If your plans, gear, and techniques have multiple moving parts, they will have numerous points of failure. By simplifying things, you can rely on them more, and your backups will also be more straightforward. Simplicity is better than complexity in rapidly changing situations.

REDUNDANCY

Two is one, and one is none. Redundancy is a buffer that allows you to function if there is a failure. In mountaineering, redundancy is a principle to live by; ignoring this principle means risking death. In wilderness survival, redundancy can be just as vital. It doesn't mean that you must have backups for your backups for everything—you must prioritize. If a component of your plan or equipment is critical, you should have a backup or two.

For gear, it's better to have alternative means of achieving something instead of just having duplicate equipment. The idea is to decrease weight and bulk and have versatile gear.

For instance, you could have an axe and a saw instead of having two axes. If you lose one of them, you can still cut firewood with the other. The

combination is much more versatile than having two axes or two saws. Also, having alternative means of accomplishing a task results in less likelihood of experiencing the same failure twice. Diversity is resilience.

TEN ESSENTIALS

Hiking organizations recommend carrying these 10 essentials when traveling in the backcountry: navigation, headlamp, sun protection, first aid, knife, fire starter, shelter, extra food, extra water, and extra clothing. It is a basic list, but it's a helpful reminder when preparing a gear list. As people become more experienced in backcountry travel, they may need less stuff and only pack exactly what they need for regular outings. The problem is that long-term survival is not a typical outing. To compensate for the tendency of only bringing what you need, consider the 10 essentials and add extra gear in each category. It's simple and it works.

RISK VERSUS REWARD

Never seek a reward that is not worth the risk. For example, eating a questionable plant or mushroom that is not found in great abundance. Why risk getting severely sick—or worse—for a meager amount of calories? If your actions carry more risk, it must be because that added risk makes an essential difference in your results. If that's not the case, perform your tasks more safely. For example, cut kindling with a knife and a baton instead of holding the kindling with one hand and using a hatchet.

ENERGY RETURN ON INVESTMENT

Energy is everything. In survival, you'll recognize it as heat in firewood or calories in food. Everything you do in long-term survival should first go through a quick mental calculation: will it give you more energy than you will spend? To increase the energy you are acquiring, you should be efficient with your work and always try to conserve energy. Aim to achieve maximum return for the minimum effort.

Work smart. Avoid working above 60%–70% of your maximum heart rate, for it is less energy efficient. Slow down or take a break if you're short of breath or your heart is pounding. In addition, your body needs fewer calories when asleep, so sleep more. Work with nature, not against it: use natural cycles and animal habits to your advantage. If you don't have to stand, then sit; if you don't have to sit, then lie down. Rest often. Plan

ALWAYS GIVE 100% EFFORT THE FIRST TIME

Do not rush things when you lack resources and energy. Do a task properly from the start to avoid spending time and effort later redoing the task. Avoid cutting corners unless you absolutely have to.

I've struggled to start a fire in the rain or with a bow drill because I'm taking shortcuts, not fully prepared, or just rushing things. I end up spending more time and energy doing tasks more than once. The irony is that instead of taking shortcuts in difficult circumstances, one should be adequately prepared and give a total effort from the start.

SAFETY FIRST

The more hazards you have around you, the more you need to manage risk. It's not the time to take unnecessary risks, but the time to be extra cautious. It can be challenging, but you must be disciplined and use safe techniques and protective equipment.

Wearing safety glasses when bushwhacking or leather gloves when using a saw might seem overly cautious to some people. It may seem excessive when surrounded by others, with hospitals just a couple of minutes away. But suppose I'm in a remote area relying on just myself or a small group. In that case, I can't afford to have an eye injury or to rip my fingers apart—and neither can my group. I err on the side of caution and wear safety gear and use safe techniques, especially when I'm tired or my mind is not at its 100%.

Having the discipline and humility to take fewer risks allows you to navigate circumstances that others deem too dangerous.

NEVER PASS UP AN OPPORTUNITY

Use different routes when walking to increase the chances of finding something useful. Explore your surrounding area thoroughly: there may be important resources you missed.

Nature works in cycles of feast and famine, so if you catch plenty of food, don't stop—preserve your bounty and keep foraging. And never come back to camp empty-handed: bring back something useful, like firewood or kindling.

FINDING INSTEAD OF MAKING

It is generally easier to find stuff than to make it yourself. Take the time to find the ideal materials, such as a particular tree branch for a bushcraft project.

DON'T LOSE GEAR

Losing gear sucks, but losing something critical like a knife or a fire starter could be devastating (been there, done that). If it happens, don't dwell on it; accept it and party on.

To avoid losing gear in the first place, you can do a few things: paint it with bright colors, attach colored lanyards, and avoid having small items in earth tones. Thoroughly test your tool sheaths and holsters to see if they could fail, always close them properly, and even modify them to hold your tools more securely.

One of the most common times in which a survivalist loses or destroys a fire starter or knife is while lighting a fire.

Always sweep your resting spots, lunch spots, campsites, or anywhere you sit down. To do an area sweep, slowly walk over all the places where you could have left or dropped something; look at the ground and around any tree branches. Finally, when traveling, make sure any item that could fall out of your pockets or off the sides of your pack, sled, canoe, and so on is tied down. Ensure your gear will stay attached even if it hits a branch. When paddling, always tie down your gear to the boat or to something else.

GRATITUDE

When your basic needs are not fully met, it is vital to acknowledge what you have. This will help you stay calm and more satisfied. Read true survival stories. It helps to put things in perspective and think about stories of people who went through much more demanding circumstances. Take the time to enjoy little things like a nice sunset or a drink of water. These moments of gratitude will recharge you.

BE HERE, NOW

Being present is the most important habit for survival and life in general. It is helpful in two ways: as a healthy mental habit and for adaptation. There is no fear or worry in the present. Focus on the present if you want to have a grounded mind during a survival situation. Suppose you're constantly thinking about the future or the past. In that case, the present will pass you by, and it will be harder for you to seize opportunities to be grateful. As a result, your resilience will decrease.

In addition to the benefits of being mindful, being present-minded will increase your awareness of the changing surroundings and environment, and awareness is the foundation of adaptation.

SURVIVAL WISDOM

INDIGENOUS APPROACH AND PRIMITIVE TECH

It is important to analyze Indigenous peoples' approaches for survival in your local bioregion. Many hunter-gatherers lived sustainably in their bioregions for centuries or millennia. We all can learn a lot from their approaches, but we can't survive the same way today. Their regions likely had more plants and animals, and the habitats where they lived were more abundant. They also lived in tribes and their knowledge of the land was passed down over generations. What worked for them won't work for you today.

The use of primitive technology has advantages and disadvantages, much like modern technology. The main benefits of primitive tech are that it is sustainable (it doesn't need nonrenewable resources); it is relatively easy to repair, maintain, and create; and it is mainly made from local materials. Some disadvantages are that it tends to deteriorate sooner, it is generally less effective, it requires more knowledge and skill, and it needs more maintenance and care than modern technology requires.

a large territory: the sea, the land, the water upstream, and opportunities for foraging, fishing, hunting, and trapping.

Inland, the next best thing is a very large lake with a big inlet stream and with a major outlet stream leading to the sea. Another alternative is a large river that leads to the sea. Water is a theme here, and so is change or transition. Other locations won't be as good, but they could still sustain you.

Life is more abundant in transition zones: where the land meets the air, a lake meets a river, a forest meets a prairie, the mountains meet the plains, the coast meets the ocean, and so on. For instance, a relatively recent wildfire provides berries in the summer and creates transition zones along a forest.

However, coastal areas or rivers often entail close contact with civilization. So being in a more remote and less desirable place—at least to civilization—as well as in a warmer climate (less need for calories and work) with greater plant and animal diversity makes sense for a modern hunter-gatherer.

WATER AND FOOD

Choose a location that has clean water and abundant fish and mammals. A lake with many inlets and outlets has more fish, and the bigger the lake or river, the more fish it will have. Find out how the local Indigenous peoples in your area fed themselves 500 years ago. Did they hunt bison? Did they grow maize, beans, and squash? What were their main staples? These questions can give you hints about which areas are best. The major staples in my neck of the woods were wild rice, moose, caribou, and fish. So an ideal location in my area has habitats for those.

Transition zones have more food, so naturally, an ideal place has numerous types of terrain with diverse and healthy populations of plants and animals. Look at maps or statistics of ungulate or predator populations to give you a better idea of the viability of an area.

VEGETATION

A place with varied terrain offers different vegetation and provides more food. A site with various species of coniferous and deciduous trees will provide better shelter materials and resources than a place with just one or two species of trees.

ACCESS

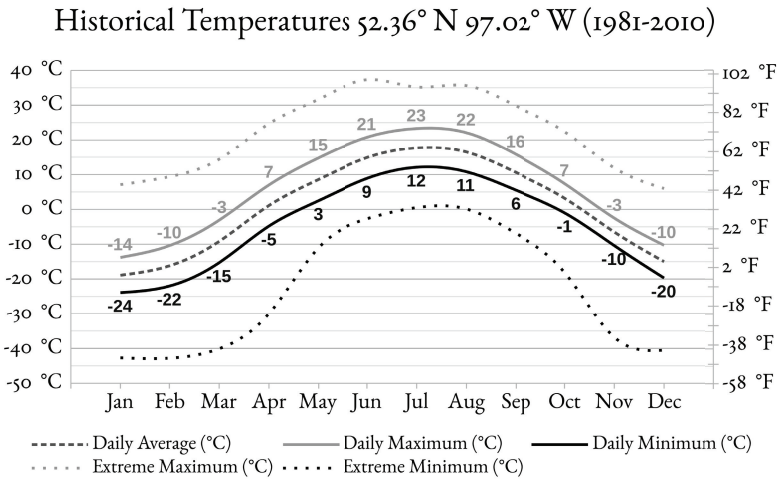
The location should be relatively accessible (in and out) but still remote enough. Ideally, there should be snowmobile routes or paddling routes nearby. The more remote an area, the less likely you are of encountering others, but the harder it will be to get rescued or walk out. In an emergency, poor access and continually changing conditions could be a deadly combination.

CLIMATE

Gather information on the local climate, including temperatures, precipitation, wind, freeze-up and breakup seasons, water levels, and snow cover. Your notes will help you visualize the challenges you might face and allow you to plan accordingly.

TEMPERATURES

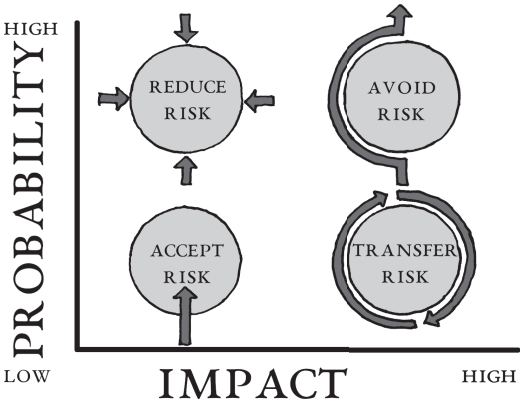
Look at graphs of both monthly mean temperatures and extreme monthly temperatures of the nearest weather stations or towns. Those should give you a good indication of what kind of weather you should prepare to deal with during different seasons.



Data: Environment Canada

To find a diagram of your local weather station, check out **meteoblue.com** or **weatherspark.com** and search for its historical temperatures.

fires, poisoning, harmful wildlife encounters, drowning, cold weather issues, infections, and death.



PERSONAL SURVIVAL KIT

A good kit needs to be portable because if you don't have it with you, what's the point? When building your kit, think about the possible scenarios you could use it for. How is it going to play a role? There are seven primary needs that a basic 72-hour survival kit should cover: first aid, navigation, fire, signaling, knife, water, and shelter.

Unfortunately, space blankets and other disposable shelters can't be relied upon. In buggy areas, head nets are life-changing. I recommend having them. In winter, an excellent addition to a kit is a pot, bottle, or can for melting snow and boiling water (an empty can may be used if the inside lining is burned first). Another item to consider adding is a pocket chainsaw.

THE BARE MINIMUM

When I spent 100 days solo in the boreal forest during winter, I carried a small kit that consisted of a lighter (in a plastic bag), a Personal Locator Beacon, and a signal mirror. That's usually the same kit I carry in my Personal Flotation Device (PFD) when wilderness canoe tripping. The idea behind this minimal kit is that if I'm separated from my gear and my life or limb is in danger, I can fire up my PLB and spend a few nights with just those items waiting to be rescued.

CACHING

Caching gear and food is a time-tested technique used for long expeditions. Cached rations and equipment (woodstoves, steel traps, fishing nets, etc.) are a tremendous asset in a long-term situation. In remote areas where there are no paddling routes and everything has to be carried on foot, caching food and gear makes a lot of sense.

Once you have determined what you'll cache, you can look for a potential site. Topographic maps and satellite imagery can help you pick an area, but you must visit the site to see if it is viable. When visiting potential locations, have a map, compass, tape measure, GPS, notepad, and a small shovel to test the ease of digging if you are burying your cache.

If it will be a long time before you retrieve your cache, place it in a location that is relatively easy to find with instructions. There should be specific landmarks that can be used to take compass bearings and locate the site. Consider the changing seasons and weather conditions with regards to site location. Will changes in the seasons leave the cache site exposed or make it impossible to retrieve? Is the cache difficult for wildlife to access?

Once you have found a suitable location for your cache, prepare straightforward instructions for locating the site. Don't rely solely on your memory. The instructions should be clear enough so that someone who has never been in the area could use them to recover the cache.

The two most practical ways of making a wilderness cache are burial

or concealment. Burial is an easy method for a small cache as long as it is packaged in a waterproof container, but a big cache might need to be concealed instead.

Concealment uses natural features to hide the cache, and it requires less effort and equipment than burial. For example, a concealment cache may be hidden beneath a natural deadfall. The primary disadvantage to concealment is the possibility of accidental discovery. Therefore, concealment is best used in remote areas or when rapid access is needed.

There are two main threats to your cache: people and wildlife. It is easier to guard against discovery by concealing the site thoroughly. But animals are harder to protect against, particularly bears. The best prevention is having gear with minimal or no attractive odors. An airtight food cache with flour, grains, sugar, salt, and other powdered foods that don't emit odors should work.

If the main concern is bears, then try one of the following:

- Store your cache on an island or peninsula.
- Have a hanging or raised cache.
- Bury your cache and cover it with big rocks as a deterrent.

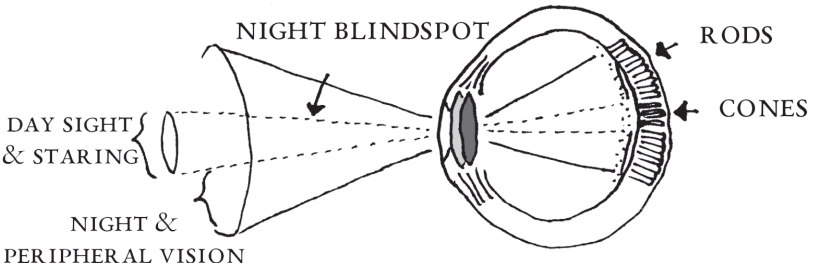
A determined bear is a formidable adversary, so it's better to make your cache unattractive in the first place by ensuring there are no alluring odors.

Surplus ammo boxes, buckets with lids (with functioning O-rings), and large diameter pipes are potential cache containers. One of the most practical containers is the five-gallon bucket. Although carrying a bucket is a bit awkward, it holds a lot of stuff, and it's cheap and waterproof. If you use a smaller container, like an ammo box, check that the gasket is in good condition. And check that it is watertight by filling it with water and turning it upside down. Even if you believe your cache is waterproof, you should still place the contents in waterproof bags. For food caches, Mylar bags are a good option. If moisture could be an issue, place silica gel packets inside.

MISCELLANEOUS TIPS

- Keep your gear well organized. Always have a designated place for each item. Never leave equipment down on the snow or ground. Place it in a pack, a pocket, or hang it in a visible spot.
- Prioritize knots that can be easily undone, such as the bowline, friction hitch, or clove hitch; this is particularly helpful in cold weather. Don't cut cordage unless you truly need to.

- Don't discard scraps of plastic, cloth, cordage, or metal. They may be useful later on.
- When scouting an area, instead of covering the area by foot, use a monocular (or binoculars) to save energy.
- To better observe a faraway object with plain sight, form a small hole with your closed fist and look through it.
- To better listen and pinpoint a faint sound, cup your ears with your hands and slowly rotate your head side to side.
- It takes your eyes about 20 minutes in the dark to get dark-adapted. You can't see colors in full dark-adapted mode because you only use *rods* (see below). If you want to preserve your night vision, only use the faintest light possible. In very low light, you can see best by not looking directly at an object but slightly off to the side. If the light is brighter and you start to see some colors, you're beginning to use your *cones*, and your night vision will decrease. It's more important to keep your light source extremely dim than to use specific colors (green is best anyway). If you require color vision—for instance, when reading a map—then use dim light and close one eye to keep it fully dark-adapted.



MINDSET

THE WILL TO SURVIVE

Survival is 90% mental. Gear and training are useless if you're an emotional wreck. The *will to survive* is the most vital survival aid. It is the fusion of various key mental factors. Some of those factors are purpose, attachment, character, humor, training, and preparation.

This chapter will describe the components of a survival mindset and recommend techniques for strengthening your mental toughness and resilience. In the long run, your mindset is everything.

WHAT IS RESILIENCE?

Resilience is the choice to move through difficulties, find strength in your weaknesses, and serve a purpose bigger than yourself.

It starts by taking responsibility for how you respond to what happens to you. Instead of taking the path of excuses, find the strength and purpose to face the path of pain and hardship, of fear and suffering.

Intelligence, creativity, and motivation allow a resilient person to find ways of coping. To apply those traits confidently and persistently, optimism is needed. Optimism requires finding a sense of control within the chaos. Optimism, intelligence, creativity, and motivation lead to genuine hope, confidence, and resilience.

RESILIENT PEOPLE

Resilient people are exceptionally determined and persistent and will keep going when the only choice is to continue or die. In dangerous, unpredictable circumstances, they can stay focused to attain their goals. After a significant threat passes, their stress response goes back to normal.

They tend to be honest and possess a robust set of values that they strive to follow. Altruism, helpfulness, empathy, and compassion are some of their traits. They turn tragedy into action by helping others. Resilient people often have a good sense of humor. They understand that change is normal and can see it as an opportunity for growth.

People who plan for the future tend to be more resilient. They know life will be hard at times, so they prepare for hardships. They are determined and persistent in pursuing their goals while maintaining a relatively balanced life.

FOUNDATION

IDENTITY

Your identity provides guidance during difficult times. By distinguishing who you are, who you are not, and who you want to be, you can further integrate strengths found in others.

Have role models, and do as they do. Identity is powerful: it guides our actions, and our actions shape our feelings.

PURPOSE

> "Those who have a why to live can bear almost any how."
> — Friedrich Nietzsche

Why are you in this world? Why is that reason so important that you are willing to go through blood, sweat, and tears for it? What really drives you? Be prepared to have those answers at your fingertips when you hit the walls of hardship and doubt.

Without purpose, we can survive, but we cannot thrive. Your beliefs, assumptions, and expectations about the world and yourself shape your personal meaning. The sense that your life has meaning will enable you to withstand greater adversity. History has proven that having a purpose is an excellent aid to survival.

You must create your own purpose. Finding meaning through tending to others' needs is a good starting point. Often, it boils down to serving something greater than yourself.

Finally, in survival, having a purpose is not enough. It must also be broken down into simple tasks so that you can handle tough times one step at a time.

RESPONSIBILITY

"God grant me the serenity to accept the things I cannot change, the courage to change the things I can, and the wisdom to know the difference." — Reinhold Niebuhr

Taking responsibility for your life is the most important habit to build. The more ownership you take for your actions, life, and happiness, the more resilient you are likely to be.

You are responsible for your reactions, your intentions, and your attitude. We have limited control over the world, yet we are responsible for our happiness. No one else is. The only choice entirely in our power is to accept or reject whatever we cannot control. Focus your power on what you can control.

Even if events are outside their control, resilient people find something to be responsible for. The less power we have over external events, the more crucial it is to practice agency in yourself.

"Everything can be taken from a man but one thing: the last of the human freedoms—to choose one's attitude in any given set of circumstances, to choose one's own way." — Viktor Frankl

CONFIDENCE

Having a realistic belief in your ability to manage challenges is key to a resilient mindset. This belief is forged through training and similar experiences. Resilient people show self-reliance by meeting their needs or solving their problems by themselves, and not depending solely on others. Assessing your strengths—such as the personal, social, and material resources at your disposal—will reduce the stress from your challenges.

Having an inventory of the obstacles you have overcome and remembering what it was like to overcome them will give you a confidence boost.

On the other hand, over-positivity can be toxic and disastrous. There is incomprehensible wisdom in our intuition, so it's extremely important to listen to it.

WORLDVIEW

Survival worldviews are very personal. What works for one person may have the opposite effect on another. Ultimately, you must develop your own worldviews from within.

PRAYER

When things get very tough, people pray. Praying is so common among survivors that its importance can't be ignored. It aids a person's survival by reducing anxiety and keeping hope alive. Prayer unites many tools of resilience: gratitude, perspective, humility, and purpose. Announcing your needs, desires, worries, and goals in a focused attitude can help you become aware of the actions you may need to take.

"Prayer cannot bring water to parched fields, or mend a broken bridge, or rebuild a ruined city; but prayer can water an arid soul, mend a broken heart, and rebuild a weakened will."
— Abraham Joshua Heschel

SPIRITUALITY

To endure, you must draw on a belief or emotion for strength—it may be faith in a higher power or a relationship with a significant person in your life. Some draw strength from belief in themselves and their abilities.

When some people get thrown into a new, harsh environment, they become uprooted and disoriented. Their world is gone, and they cannot adapt. On the other hand, people with a solid personal ideal will carry that ideal wherever they go. They are rooted in their ideal. It doesn't have to be religious or intellectual. As long as this belief cannot be shattered, it will be a source of strength.

Spirituality and religion may give meaning to one's suffering, making it easier to adapt to challenges and even see them as opportunities for spiritual growth.

they happen, and it can also remind you to feel grateful for the good times. For positive visualization, see the Tactics section.

MEDITATION

Meditation is recommended again and again as an aid to resilience. There are countless benefits, but ultimately, regular meditation teaches you that your thoughts are not your mind. Meditation helps you truly integrate that idea and not just understand it at an intellectual level. That is such a simple but powerful lesson. Once you incorporate this understanding, it becomes easier to practice mindfulness (observing thoughts without judging or being caught up by them). This separation from your thoughts allows you to be more effective at staying calm, practicing self-control, and dealing with challenges.

SIMPLE CONCENTRATION PRACTICE

The following is a simple meditation practice that calms and focuses the mind. Find a quiet, comfortable place to sit or lie down. Don't try this if you are tired and will fall asleep. Find a time of day that works. If time is in short supply, set an alarm for 10 or 20 minutes. A simple technique for tracking time is to use meditation beads (a similar idea to pace count beads).

If your mind is agitated, try 10 minutes of square breathing right before meditation (see the next page).

Focus your awareness on the sensations of breathing. Try to focus on your inhalations and exhalations throughout the entire practice. If it helps, count each full breath up to four or ten, then repeat. If you lose track, start over at one. You can also use words such as *in/out*, *inhale/exhale*, or *rising/falling* instead of counting. If you notice your mind wandering, gently return your attention to your breath.

Relax as you breathe. Let thoughts, sounds, and feelings come and go. Don't try to silence your mind. Instead, disengage from your thoughts; neither resist nor pursue them. Simply try to be in the present. Let go of the past, and don't plan for the future. You are setting this time exclusively for meditation. There is nothing to solve and no other place to go. Without effort, see if you can feel a sense of peace and contentment.

With regular practice, you might find that you have fewer distracting thoughts and start to feel separated from them. This sense of separation will allow you to detect when negative thoughts arise and as a result, gently

redirect your mind into a positive place. Another significant benefit of meditation is the tranquility gained from being present in the now.

With concentration practice, the aim is not to calm your mind, but this might happen indirectly. You should never try to forcefully quiet your mind because that's like shaking a snow globe to stop the snow from falling. If you want to still your mind, you can focus slightly on your breath and let your "snow globe" calm itself with the help of time and meditation.

DEEP BREATHING

Deep breathing is a ridiculously simple but powerful technique. Breathe in fully and exhale fully. Take a short pause and start again. Doing a series of 10 or 20 deep breaths is an effective way to calm your body and mind. Use it whenever you feel anxiety or stress creeping in.

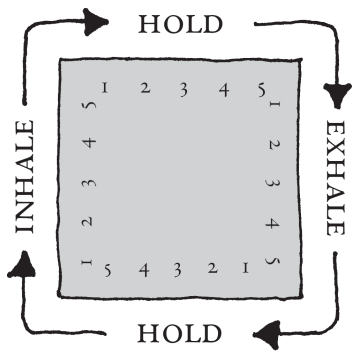
Breath control is an essential practice for developing mental toughness. You can almost always control your breath, and controlling your breath will help shape your feelings, thoughts, and actions. Slow, deep breaths help calm your body; your mind will soon follow.

Breath control can promote healing, build energy, balance your emotions, and help you perform under stress. Concentrating on a single thing helps calm yourself down and increase your sense of control. It becomes easier to choose what to pay attention to, and to leave worries, stressors, fears, and distractions outside of your focus. In short, breath control helps dial down your body's stress response.

SQUARE BREATHING

Square breathing is a simple yet very effective technique for focusing and calming your mind. This technique is named after its equal intervals of inhalation, retention, exhalation, and suspension.

Square breathing requires more concentration than just taking deep breaths. It is easier to practice in distracting or challenging conditions because it requires more attention. It helps to do a few breathing cycles before



Repeat at least 5 times

doing something way outside your comfort zone or if you need to calm yourself down.

Start by exhaling all the air from your lungs. Inhale through your nose for a count of five, and hold your breath for a count of five. Exhale slowly through your nose for a count of five, and hold the exhaled breath for a count of five. Repeating a powerful mantra on each hold may increase the benefits. Practice square breathing at least once a day for five to ten minutes. This skill is very useful because it can be applied during highly stressful conditions.

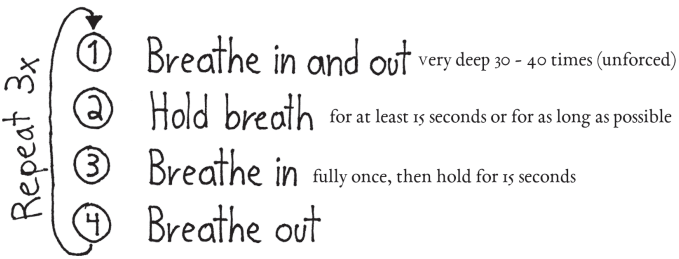
POWER BREATHING

This breathing technique developed by Wim Hof uses a combination of controlled hyperventilation and breath-holding to induce a short stress response from your body—the opposite aim of square breathing. This brief stress trains your body to tolerate stress and become more mentally and physically resilient.

It is recommended to practice this right after waking up or on an empty stomach.

This exercise involves hyperventilating, so don't do it in environments where fainting is dangerous, such as around water. Sit or lie down. Follow these steps:

1. **Hyperventilate:** close your eyes and focus on your breath. Breathe in deeply through the nose or mouth, and breathe out unforced through the mouth. Breathe through the belly, then chest, and let go. Repeat 30 to 40 times at a fast pace. It is normal to feel light-headed and a tingling sensation.
2. **Exhale and hold:** after the last exhalation, take a final breath as deep as possible and let it out completely. Hold the exhalation for as long as possible until you can't resist the urge to breathe again.
3. **Recover:** take a big breath in. Hold it for 15 to 20 seconds and let it go; this completes one cycle.



CLOTHING

Clothing is your first line of defense against weather and bugs, so it is vital. Your clothing should be durable, compact, lightweight, and versatile. Keep in mind that clothing should:

- still fit you as you lose weight;
- be suitable for historical temperature extremes, not just typical highs and lows;
- strike a compromise between being durable and lightweight (unfortunately, lightweight clothing is not very durable, and durable clothing is bulky and heavy); and
- protect you from mosquitoes and other bugs.

Your metabolism slows down when you don't eat as much, drastically lowering your body heat. Bring extra articles of clothing and clothes that are warmer than what you normally need when you're well-fed.

CLOTHING MATERIALS

Clothing materials are grouped into five categories: cotton, wool, synthetics, down, and flame-resistant.

- Cotton has minimal use in the backcountry. It's somewhat useful as an outer layer when around fires because it burns less easily than synthetics. However, this is limited to dry, cold weather only or when there is no risk of getting wet. Another potential use is briefs. Cotton

has almost no place in temperate and colder regions because it holds moisture and is hard to dry. As the saying goes, cotton kills.

- Wool absorbs a lot of water but keeps it at the center of its fibers, making it warmer than cotton when wet. That's why wool works great for outdoor socks. It is also slightly more fire-resistant than synthetics. On the other hand, it may shrink if you don't wash it properly.
- Synthetic clothing is divided into two categories: insulated and non-insulated. Insulated synthetic clothing is lightweight like Polartec Power Grid, fleece, and PrimaLoft. Synthetics are slightly more flame-resistant, insulate better when wet, and dry much better than down. However, they are bulkier and heavier.
- Non-insulated synthetic clothing dries very fast, and it's light and compact. For things like shirts and pants, I prefer nylon over polyester, for nylon washes better and is more durable. A drawback of synthetic clothes is that they burn easily.
- Down is exceptionally light and very warm. Nevertheless, it's almost useless when wet. Down clothing also burns extremely easily, and once there's a hole, the down will escape.
- Nomex's and Polartec's fire-resistant clothing is very valuable for survival. Flame resistance is an excellent quality in jackets, gloves, and winter mukluks. Some newer army surplus and military clothes are sometimes flame-resistant (look for "FR" added to the item's name).

Color makes a real difference under the sun in both heat and cold. Wear light earth tones (such as khaki) in hot conditions, as lighter tones reflect more sunlight. Wear darker tones in the cold, for they are warmer and dry faster under the sun.

Color patterns can also make your outline a bit less evident to wildlife. Camouflage and plaid patterns are nice but not entirely necessary.

The common layering system of base layer, insulation, and waterproof shell is not perfect. Gear manufacturers like to think that their products are magical, but they are not—they are full of compromises.

The best approach is to have a versatile system that effectively manages moisture from the body and the environment and still provides a reasonable amount of insulation if wet. A survival clothing system should consist of moisture-wicking, insulating, windproof, and waterproof layers. The emphasis is on synthetic and wool clothing that breathes well and dries fast.

The use of waterproof hard shells is minimized because they don't

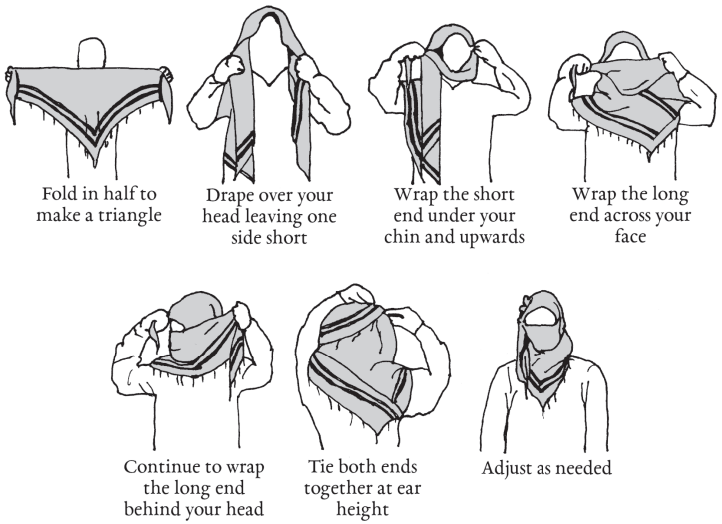
SUNGLASSES AND SAFETY GLASSES

Sunglasses protect your eyes from snow blindness during winter. Use a strap to avoid losing them.

In the wilderness, safety glasses help prevent significant injuries. Use them when chopping wood or bushwhacking.

SHEMAGHS

Shemaghs are not ideal headwear for frigid climates. They are, however, versatile and could be used as a last resort for improvised clothes and repairs. Shemaghs are not ideal in moist, cold weather because they are typically made of cotton and take longer to dry. They are also bulky and don't excel at any particular use (except in arid regions for protection from the sun and sand).



MOISTURE-WICKING LAYERS

The purpose of base layers is to wick moisture away from your skin. Top and bottom base layers are not needed until the weather dips below freezing. Base layers made with Power Grid fabric—such as the ECWCS level 2—are warmer, lighter, and more compact than equivalent synthetic base layers. Merino wool base layers have antimicrobial properties and won't melt to your skin if burnt, but they don't have as good of a warmth-to-weight ratio as Power Grid base layers do.

TRAVEL

Your decision on how and when to travel will impact everything else. It's best to time your travel when the conditions are optimal for moving efficiently and carrying lots of supplies—work with nature, not against it. For long-term survival, waterways provide the best way to travel.

Prepare special meals that are easy to cook and provide lots of calories to fuel you while accessing or exiting your main location.

TRAVEL ON FOOT

Traveling on foot to your main camp is the worst possible strategy, as you can't carry much weight when walking.

Off-road hiking trailers with a single wheel can carry huge loads, but that's nothing compared to a canoe or a sled. Custom expedition trailers, like those used for desert crossings, can transport a lot of gear, but they are not suitable for narrow trails, uneven terrain, or bushwhacking. Walking severely restricts the amount you can carry, and relying on a trailer is precarious. Unless you distribute gear among a large group of people, transporting an appropriate amount of equipment and supplies for long-term survival on your back is naive. On the other hand, if you have placed caches of gear and supplies, travel on foot should work.

Walking is even more unsuitable in places where the cold is severe because the climate requires more clothing and a bulkier sleeping bag. However, pulling a sled in the winter is a great way to travel.

If you choose to travel to your basecamp on foot, you won't be able to carry a significant quantity of food rations. That puts you at a great disadvantage for months-long endeavors.

BACKPACKS

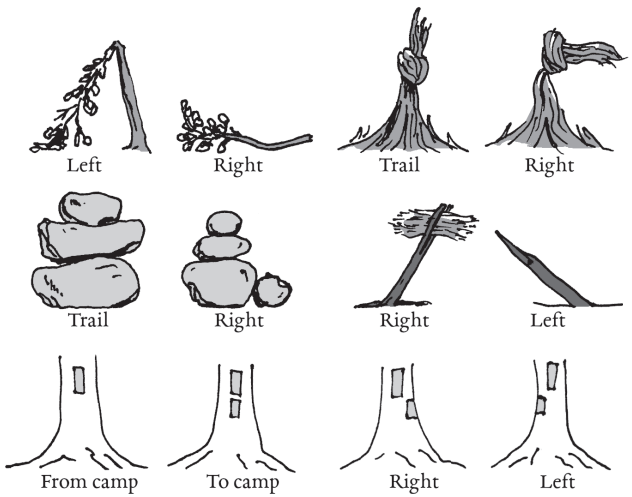
Carrying lots of gear in a backpack sucks, no matter what. Look for a backpack made with fabric of at least 500 denier so that it lasts.

A cheap backpack won't last long carrying lots of weight. Army surplus packs may be a good option. Their volume should be between 80 and 130 liters. The latter size is massive, but the harsher the winter is in your area, the larger your pack should be.

TIPS

If you are carrying lots of weight on your back, use hiking poles or a walking stick. Having a walking stick is also the best way to provide stability and avoid falling, twisting an ankle, or worse.

TRAIL BLAZES



BUSHWHACKING

If you are going to bushwhack in thick forests, wear safety glasses to protect your eyes from branches. Bushwhacking is extremely demanding and exhausting where there is thick vegetation and lots of fallen trees; in waterlogged terrain, wet feet can be a big problem. Try to follow animal

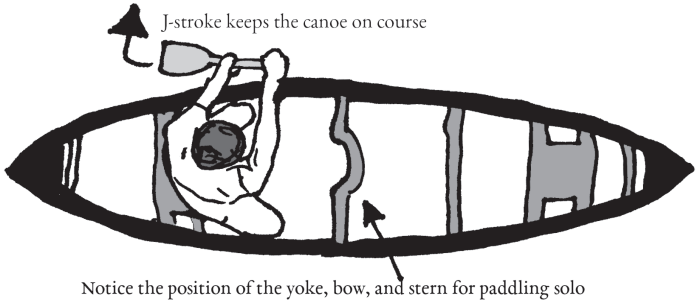
trails so long as they take you roughly toward your destination (animals are drawn to water). Traveling along ridgelines and higher ground may be the most efficient way. Having satellite imagery saved on your phone for offline viewing will help immensely. Another option is to plot a set of waypoints based on satellite imagery and topographic maps before heading out and follow the way points with a GPS or a map and a compass—but you won't have as much room for improvisation.

WATER TRAVEL

Water travel is the most efficient way to carry a lot of supplies in the wilderness—that's why it is the best travel method.

CANOEING

A thorough section on canoeing is beyond the scope of this book; nevertheless, I will make some brief comments on canoe tripping.



The wind is a major consideration when canoeing because strong winds make travel very slow or impractical. When planning a trip, allow for an extra day every three to five days if you get windbound. Wind can be a considerable aid, particularly in large lakes. A neat trick is to rig a tarp as a sail using extra paddles or sticks. When large lakes get very windy, big waves form, and those waves can swamp your canoe if you lack the skill to negotiate them or if you make a mistake.

Paddlers should learn two essential skills: self-rescue and doing a "T" rescue after a canoe upset.

The most resilient canoes out there are made of T-Formex or Royalex (discontinued). Unfortunately, they are relatively heavy.

Pack paddling gear, such as a repair kit, personal flotation devices (PFDs) with survival kits, a bailer, and a floating rope.

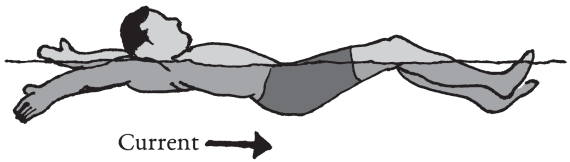
SWIFTWATER

Wilderness paddling may involve rapids. The most appropriate thing in a survival situation is to portage most rapids. Nevertheless, there are a few occasions where that is not an option. That's why it's important to have white water canoe skills. After paddling a few rivers with rapids, take a white water course, and learn from instructors or experienced paddlers. White water paddling can be very dangerous. Some risks include getting trapped underwater by a big wave (hole) or trees (sweepers and strainers).

Consider packing white water helmets (optional), a throw bag, lining rope, and an extra paddle.

A helpful portaging technique, or rather a technique for avoiding a portage, is to "line" the canoe downstream using floating ropes attached to the ends of the bow, stern, or both. Lining is tricky and works best with short "pool drop" rapids. Both paddlers walk on the shore and guide the canoe with the help of ropes. One paddler lets the canoe float downstream with all the gear attached. Another paddler grabs the rope attached to the upstream end of the canoe and accompanies the canoe as it rapidly floats downstream. Having firm footing and a long rope helps.

You should know how to do defensive swimming if paddling in moving water. Defensive swimming aims to avoid getting your feet trapped underwater and protect your body from rocks and other dangers if you fall out of the canoe.



PORTAGING

To portage is to travel overland between lakes or rivers. Portages in remote areas can be pretty challenging, especially if you carry a lot of gear. Resting frequently during long portages helps a lot.

Consider using a tumpline when carrying very heavy loads. A tumpline is a broad strap that rests on the forehead and transfers the load to the spine rather than the shoulders or hips, and they can be rigged to canoes and packs.

A useful technique to use during long portages is to "leapfrog." This technique breaks up a portage into shorter stages, adding rest breaks between carries. One person portages the canoe in one go. The second person brings gear to the midpoint, then returns to the start of the portage for more. The

WATER

TO TREAT OR NOT TO TREAT

Assessing the risk versus reward of certain choices is vital in wilderness survival. Treating water found close to civilization is a no-brainer. It is likely polluted with agricultural runoff, industrial waste, and waterborne pathogens.

Suppose you are in a remote place in the wilderness next to a big, clean lake or river. In that case, you may decide that the energy and effort saved from not treating water outweighs the risks in the long run. One of the strongest arguments for drinking untreated water is that it's easier to stay well hydrated, as you don't need to be constantly making a fire or treating water. This is way more relevant the longer you stay out in the wilderness.

It's like choosing to eat questionable street food, but the difference is that if you get sick, you are on your own. And gastrointestinal issues are incredibly tough to diagnose in the field.

I've drank untreated water regularly, including on a 99-day Pacific Crest Trail thru-hike, on innumerable canoe trips, during 180 days in the wild, and on a 100-day winter trip; I've never had anything more serious than diarrhea. Still, I've worked for years on building resistance to questionable water by drinking untreated water whenever I'm on a hike or overnight trip. I also grew up in a country where my immune system had more opportunities to build up resistance. Nevertheless, the risk of getting seriously sick is always there, so this approach is not for most people.

Drinking untreated water can also help you develop resistance against *some* pathogens that are hard to avoid in the wild.

In short: water that is close to civilization should be treated. Treat your water unless you know what you are doing and are comfortable taking risks.

PUREST WATER SOURCES

If you decide to drink water as is, try to get it from deep, big lakes. Lakes are usually better than streams because of a settling effect in which pathogens sink to the bottom.

Water taken directly from springs and seeps is usually fine because it's been filtered by sediments—as long as it is actually groundwater and not surface water channeled underground.

Look for clarity (dilution). Cloudy water is more likely to be contaminated. In rainy seasons and winter, the natural factors that help purify water are less active.

The primary consideration is to ensure that the water source is not directly or indirectly downstream from human or animal activities.

WATER TREATMENT

There are two viable options for treating water for long-term survival: filtering and boiling. Other treatments are not as appropriate for the long-term because they are single-use: chemical treatments, tablets, and drops. UV lights are an alternative that works year-round, although not a very reliable one (due to the need for recharging).

FILTERING

The best filters for long-term use are squeeze filters and gravity filters. These filters are convenient, don't require much effort to use, and can filter a lot of water. Pump filters are not practical because they are slow, have many points of failure, and require much more effort to use. A disadvantage of filters is that they don't remove viruses (but purifiers with 0.02 micron filters do), and they need to be maintained regularly to clear clogs.

I recommend the Sawyer Squeeze (rated to 1 million gallons) paired with the Cleaning Coupling adapter. The adapter allows you to backwash the filter in the field with any standard plastic bottle instead of using a

FIRE

FIRE FOR SURVIVAL

FIRE STARTING BASICS

Fire is one of the foundations of wilderness survival. Fire is crucial because fulfilling your basic needs would be very difficult without it. It is a universal aid—from melting snow and boiling water, to washing and drying your clothes, and everything in between. Fire is the reaction that happens when there is a sufficient ratio of heat to oxygen to fuel. When these elements are unbalanced, the fire gives hints; for example, it will smolder. The most reliable way to start a fire is to gather lots of good, dry tinder, enough dry kindling, and some firewood.

Combustible materials are divided into tinder, kindling, and fuel. Nowadays, tinder describes a material that can ignite with a spark from a ferrocerium rod. Tinder is usually very fine—like grass. Kindling is used to sustain and grow a small flame. Kindling's thickness is usually between a pencil lead and a finger. Firewood is generally wider than a wrist, and it sustains a fire.

When you start a fire, the heat source is a tiny flame, so you must feed it with really thin kindling, like red pine needles. Once the burning kindling produces more and more heat, the fire can handle fuel. Gradually feeding the fire with larger fuel—as the fire grows bigger and more capable

to consume it—is a reliable strategy. If the fire smokes a lot, blowing on its base will help, as will reducing the size of the fuel.

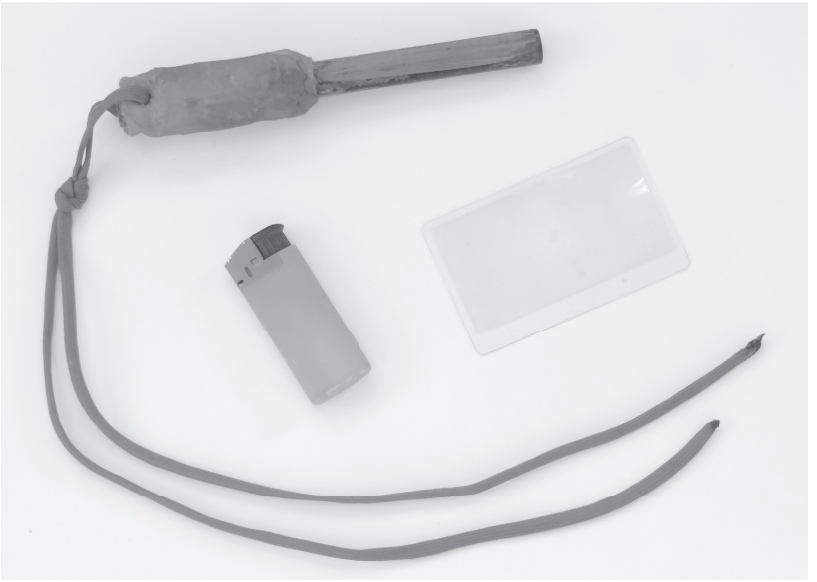
FIRE SAFETY

Always choose a proper place for a fire. Sometimes roots and organic soil (peat moss) can ignite underneath a campfire and remain smoldering underground for weeks until they find enough oxygen to light up in flames. So make sure you minimize this possibility by insulating the ground below the fire with ashes, sand, or rocks.

Always take the time to fully extinguish a fire. Carefully remove and scatter the remaining wood; ensure it won't start a fire somewhere else. Then, stir up the remaining ashes and embers, and pour water over them until there is no smoke coming up from the ground.

Never use rocks that could contain lots of moisture for a fire ring, such as those near the water line. The fire's intense heat can cause a pressure buildup inside and make them burst violently.

FIRESTARTERS FOR LONG-TERM SURVIVAL



1 – Lighter
Longevity 3 / 5 Durability 4 / 5 Practicality 5 / 5

BIC lighters are extremely easy to use and work very well. Piezoelectric lighters are more reliable than regular lighters because they light up faster after getting wet and are less likely to leak because the button is harder to press. A full-sized lighter can light up to 3,000 fires, and a mini lighter can light up half of that (in practice, the actual number is a fraction of that estimate).

Regular (non-piezoelectric) lighters do need to be fully dry to work. Sometimes you can strike the flint of a moist lighter a couple of times to dry it (or just wait a few minutes).

Lighters stop working in very frigid temperatures, but you can prevent this by keeping one in a warm pocket next to your body. Always remove the child safety of your outdoor lighters for ease of use in challenging conditions.

2 – Ferrocerium rod
Longevity 4 / 5 Durability 5 / 5 Practicality 3 / 5

In theory, a 1/2″ ferro rod can start up to 10,000 fires, and the Swedish FireSteel can start around 3,000. In practice, however, they last closer to only one-quarter of that. One of the main advantages of ferro rods is that they can be wiped dry and used right after getting wet. However, they do require practice and fully dry tinder. Ferro rods are a must-have firestarter because they are so reliable and straightforward.

To avoid losing your ferro rod, I recommend spraying it with high-visibility paint, adding a bright handle (hot glue mixed with paint), and attaching a lanyard.

3 – Magnifying lens
Longevity 5 / 5 Durability 3 / 5 Practicality 1 / 5

You could light unlimited fires with a magnifying glass, but you have to rely on the sun. Card-sized Fresnel lenses work great, and they are incredibly lightweight, simple, and compact, so having them is a no-brainer. Although, they scratch easily—so carry a few.

I don't mention flint and steel or fire pistons because ferro rods have made them obsolete: ferro rods weigh the same or less, are easier to use, and are more practical.

A Swedish FireSteel (or 3/8″ ferro rod), three piezoelectric BIC lighters, and a few card-sized Fresnel lenses make a reliable and compact kit.

FIRE SKILLS

SINGLE-MATCH FIRE

One of the first fire skills to practice is the single-match fire. The challenge is to light a fire using only natural materials, one match, and a match striker. Practicing this helps you push your skill level further and gives you more confidence in challenging conditions. Any remote wilderness traveler should fully dominate the single-match fire in any weather condition.

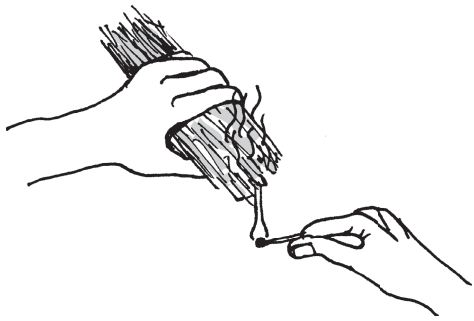
There are three key points to focus on when starting a fire with only one match:

- Have lots of dry tinder and kindling.
- Choose a location sheltered from wind, rain, and snow (or set a tarp).
- Slowly light the match underneath the tinder bundle.

Preparation is key to starting a single-match fire. If the ground is moist, lay a platform of wood. If everything is wet and you can't find dry tinder under trees or fallen logs, you can carve shavings out of dry wood. The cores of wood will almost always remain dry.

It's best to combine tinder and fine kindling in a bundle. Otherwise, it can light up too quickly without triggering a chain reaction; this often happens with inferior tinder.

Try to strike the match underneath and very close to your tinder bundle. Or build a platform for that purpose. When striking your match, grab it close to the head so it won't break. Once it catches on fire, turn its head downwards to light the match and tinder fully. Avoid making sudden movements.



While most people focus on building a tipi, a more reliable strategy is to have lots of tinder, kindling, and fuel at hand, ready to be gradually placed over the fire.

Once you want to restart your banked fire, you just have to find some burning embers among the ashes and, if there is enough heat, place some fine tinder over them. Then you can just let time do its thing or blow steadily toward the embers until the tinder catches fire. If the embers are tiny and there is not much heat, you can place the embers on a tinder bundle and use the technique described in the next section.

One drawback of banking the fire is that you use more wood than you would normally use if you just let the fire die out.

TINDER BUNDLE

A few fire-starting techniques may require you to start a fire from a small ember, such as when using a bow drill, a magnifying glass, or restarting a fire from a banked fire. Therefore, it's essential to know how to make a fire from a tiny ember.

To make an excellent tinder bundle, use two layers of tinder and one of fine kindling. If there aren't many options for materials, you can build it using only two layers, but it might not be as reliable.

OUTER LAYER

The outer layer of the bundle gives it its structure and cradles the inner two layers. This outer layer of fine kindling ensures you can sustain and build a fire once your tinder bundle bursts into flames. Additionally, the outer layer keeps your tinder off the snow or away from the moisture from the ground, and allows you to hold the bundle in your hands without burning them.

Red pine needles work well as an outer layer. But you can use strips of birch bark, dry inner bark, or dry twigs. The point is to wrap the tinder bundle with materials that will catch a flame easily and burn longer.

MIDDLE LAYER

The middle layer should be made of fine tinder that ignites very easily. Dry grass is one of the most abundant tinders for this purpose, but you can also use dry, shredded inner bark or a bird's nest. The point of this layer is to catch on fire when exposed to an ember, so it must be fine and dry.

INNER LAYER

This layer does the job of a coal extender. If you're working with a tiny ember, this layer is critical. Punkwood is the most widespread natural material for this layer. It may be used without much preparation as long as it is dry.

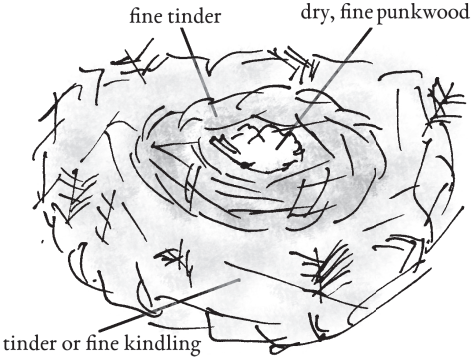
Adequate punkwood is usually found inside rotten tree stumps and dead standing trees. You're set if you find soft and dry punkwood that can be rubbed down into a fluffy powder. Compress the powder tightly and place it in the center of the tinder bundle.

To start a fire from an ember:

1. Place the ember on top of your inner layer.
2. Carefully wrap the tinder bundle around the ember and hold it loosely.
3. Gradually blow into the tinder bundle, or if the wind is strong, allow it to blow through it. The nest should start smoking soon.

Once the smoke is dense, blow onto the ember consistently until it catches on fire. When you need to take a breath, swing the bundle in the air to keep the ember supplied with a steady source of oxygen.

If the tinder bundle is dry and properly made, it should catch on fire as the smoldering tinder grows hotter. Once you see a flame, place the nest on the ground and cover it with thin kindling. Continue adding kindling of bigger diameters, and eventually, fuel wood.

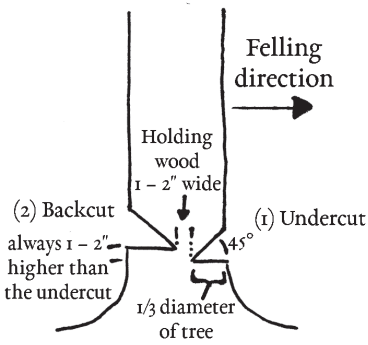


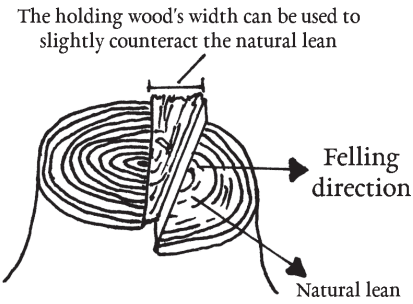
MAGNIFYING LENS FIRE

The main reason for using a magnifying lens to start fires is to conserve your fire starter. In addition, starting fires with a magnifying lens is an excellent way of learning how to blow a small ember into a flame.

With patience and ideal conditions, you can improvise many ways of concentrating sunlight , such as using a water bottle or a clear plastic bag. However, I recommend using a magnifying glass of at least 2″ (5 cm) or a card-sized Fresnel lens.

Make a tinder bundle using the instructions from the previous section. Ensure the inner coal-extender layer is thoroughly dried and fluffy. Compress the punkwood fluff to form a small ball and place it inside the tinder bundle. Adding a tiny bit of ash to the coal extender may make it catch on fire faster.



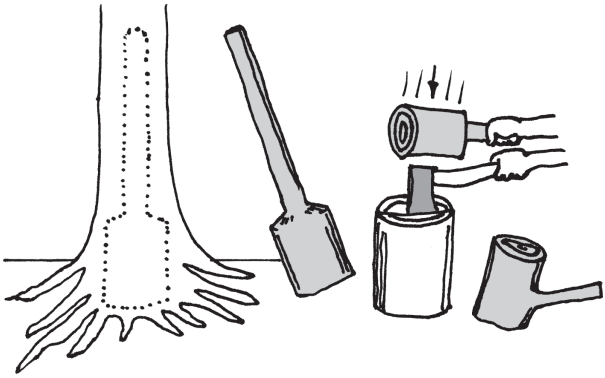


Once the tree begins to fall, don't waste time and back away using your escape route. Be careful of swinging branches and trees (widow-makers) that may be launched toward you. Try to anticipate any possible dangers.


Don't stand behind!

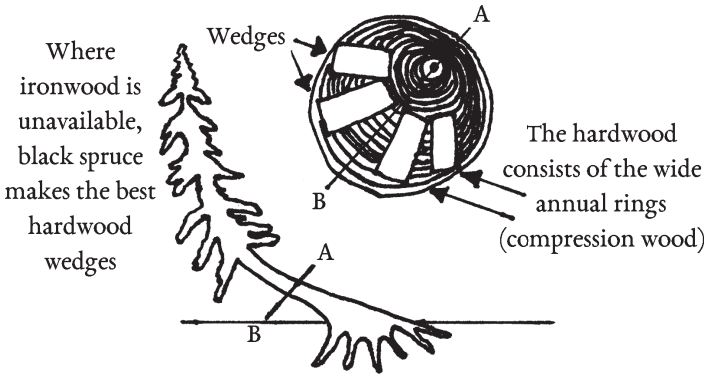
MAUL OR MALLET

A maul can be easily carved from a green hardwood branch or tree. Mauls are useful for splitting wood and for safely splitting kindling. A maul can transform your axe into a chisel or a wedge and give you much more control than if you were to swing your axe.

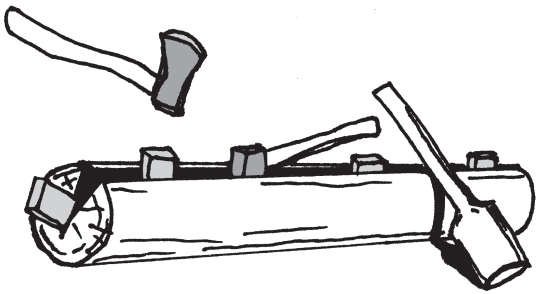


WEDGE

Wedges are used for splitting wood. Make them from green hardwood or the strongest wood available.



SPLITTING WOOD WITH A WEDGE



SHARPENING

IMPROVISED SHARPENING

A knife's edge can be maintained with sand and smooth stones. Experiment with different stones to determine what works during the coarse grinding stages, and coat a flat piece of wood with wet sand for the finishing phases. The sand may need to be crushed for the last stages of sharpening.

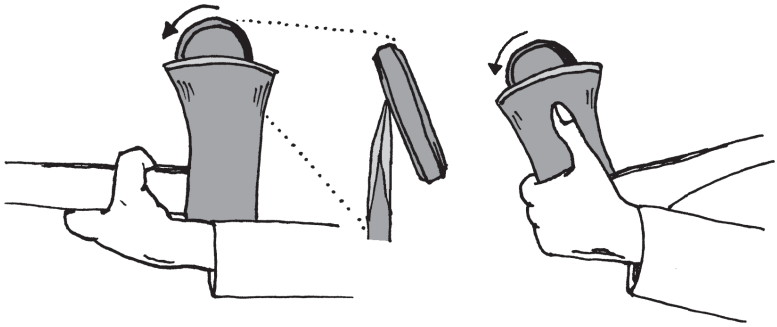
TOOLS

For a minimal sharpening kit, I recommend the double-sided (fine and coarse) Diafold Sharpener by DMT and a Lansky The Puck Dual-Grit

Sharpener for axes. Compact, double-sided sharpening stones are also a good choice. Another option is the Corona Sharpening Tool: a compact and quick sharpener that works well but is quite aggressive.

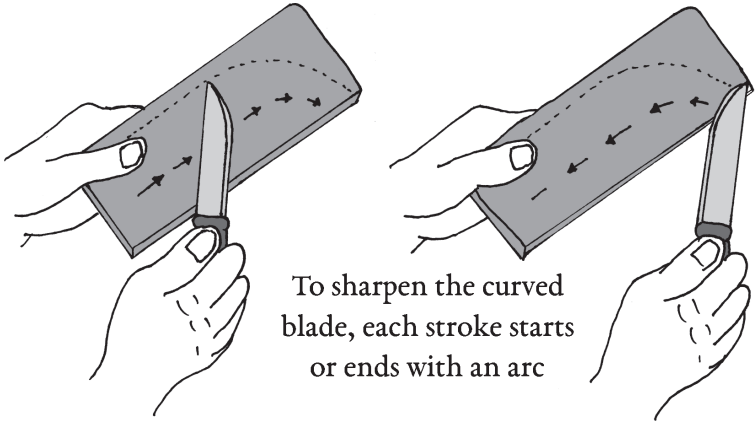
SHARPENING AN AXE

Axes can be sharpened with an axe stone or similar to a knife.



SHARPENING A KNIFE

For wood carving, your knife should be pretty sharp, and for cutting meat and skinning, your knife should be able to shave wet hair from your forearm with one stroke.



SHELTER

SLEEPING GEAR

SLEEPING BAGS

A high-quality sleeping bag is one of the essential items to have in a long-term survival scenario. Sleeping bags are a game-changer.

MATERIALS

Down is the number one choice for backpackers because it's highly compressible and has the best warmth-to-weight ratio.

Yet, down is not perfect. A sleeping bag should be moisture-resistant and easy to dry in the field, even in winter. The problem with down is that moisture will accumulate over time in rainy or subfreezing conditions, both from your body and from condensation outside the bag.

Synthetics are a good option for a long-term survival bag, but they are not outstanding. Synthetics retain some insulation when wet or moist, while down is worthless when wet. In addition, it is next to impossible to dry a wet down sleeping bag in the field, while a synthetic bag will dry relatively well.

Although modern synthetic bags are not as bulky as they used to be, they are still pretty bulky and heavy compared to down sleeping bags. That

is not as important if you carry your bag on a sled or canoe, but it is likely a deal-breaker for backpacking.

Ultimately, the best all-around approach is a hybrid: a high-quality down sleeping bag tucked inside a synthetic sleeping bag (attached together with Velcro or bra hooks). This approach works over a wide range of temperatures, saves weight and bulk, and retains moisture resistance.

I've had a custom expedition sleeping bag made that is basically a down sleeping bag nested into an integrated synthetic sleeping bag, and I am pretty impressed with its ability to dry off any moisture or condensation.

SHAPE

Stay away from rectangular bags, for those are bulkier, heavier, and colder than mummy bags. Sure, mummy bags are not as comfortable, but they are warmer.

MOISTURE

The problem in freezing conditions is that your body continually produces water vapor. When moisture travels from your body toward the outer layers of your sleeping bag, it reaches the outer fabric—which is way colder than the inside of the sleeping bag—therefore, condensation occurs. Condensation is not an issue if you use the bag for a few days or even a week or two, but it will impact its insulating effect if you go past that.

TEMPERATURE RATINGS

Once you know the lowest temperature you expect to encounter, including historical extremes, you can begin to search for an appropriate set of sleeping bags.

In long-term survival, your metabolism slows down a lot. A lack of a full belly, exhaustion, and many other factors make it much harder for you to stay warm. That's a challenge because sleeping bags work by using the heat your body produces, and if you're not producing much heat at all, the sleeping bag may not keep you warm.

You can check the loft of a sleeping bag by laying it on the ground and then placing a very light stick on top of the middle of the sleeping bag. If you measure the distance from the stick to the ground, you'll have the loft.

I created this chart as a rough guide for choosing a sleeping bag or combination of sleeping bags based on their average loft. This rough

When using a sleeping bag in extreme cold, wear a neck warmer and a beanie. Pull the neck warmer up over your mouth and pull the beanie down over the tip of your nose. Then close the sleeping bag's hood snugly around your face. You might take some time getting used to this, but an added benefit is that the air you breathe will be pre-warmed by the neck warmer.

Down sleeping bags need to have their down regularly worked to redistribute it evenly throughout the sleeping bag and reduce clumping.

Dark colors are preferred for the outside and inside fabrics of sleeping bags because these fabrics dry faster than lighter tones under sunlight; this is even more important in winter.

If you have to sleep near an open fire, use a barrier for sparks. A sleeping bag liner, contractor bag, or a bivvy bag might work as a protective shield.

For remote expeditions in severe cold, your bag should have double zippers for redundancy if the zipper fails (Feathered Friends makes good expedition-grade sleeping bags).

BIVVY BAGS

A bivvy bag is a good complement for your sleeping bag. It prevents your sleeping bag from touching the walls of a snow shelter, and when sleeping under a tarp, it protects the sleeping bag from rain. Even GORE-TEX bivvy bags trap some moisture inside, especially in winter, so that is something to watch for.

I recommend a compact and minimalist bivvy bag like the Special Forces Bivvi by Snugpak or the Co-op Shell Bivy by REI. They make great emergency shelters when coupled with a sleeping bag. Bivvy bags are useful, but they are not needed if you have a fully rainproof shelter.

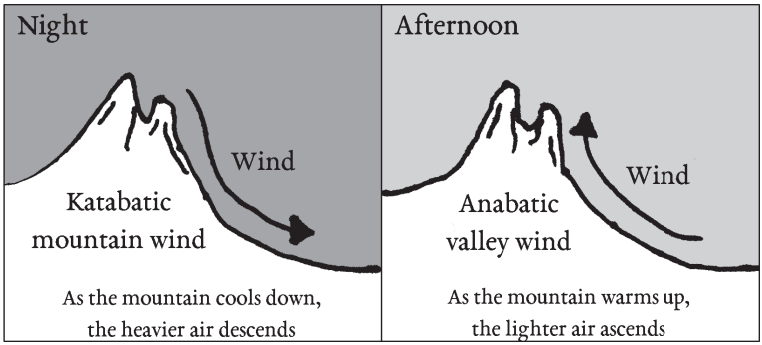
SLEEPING PADS

Sleeping pads are pretty handy when traveling and when you don't want to spend time collecting materials for a bed. In addition, they can have a significant impact on your comfort level and ability to sleep well.

These are some recommendations for sleeping pads:

- Place clothes between your sleeping bag and pad to reduce condensation in your bag.
- Use a closed-cell foam pad for three-season use because they are quite resilient to sparks and punctures. They are virtually indestructible, but their thickness wears off, and they aren't very warm or comfortable.

they will blow snow, rain, and smoke into or away from your shelter. In addition, the winds will also steal your shelter's warmth, so plan accordingly. Lastly, your shelter should not be too exposed to the wind in case of a strong storm.



WIGGLIES

If mosquitoes and flies are abundant in your area, carefully choose your location. Don't settle near stagnant water—choose a breezy spot instead. The wind is a significant help for blowing away bugs, but this is counterproductive during winter. Plan for that and make a compromise. Maybe have a day area for cooking and daily activities in an exposed spot, and position your all-season shelter in a protected place. Bugs tend not to like being in exposed areas.

If the bugs are too much to handle and you have no mosquito net, consider setting up an overnight camp on a small island on a lake. Some Indigenous peoples built platforms in the middle of lakes to sleep on during the peak mosquito season. They didn't have the luxury of mosquito netting.

WOOD

There should be enough firewood around to last for the time you'll be there. Estimate how much wood you'll need, then triple that amount; that is a good rule of thumb for how much available wood should be near your camp.

Try some of the following strategies to reduce your firewood use: have a small, well-insulated shelter that requires less firewood to heat; use efficient cooking methods, such as making a wood cookstove from sand and mud or clay and rocks; or use an efficient fire for cooking. In the winter, use a metal woodstove. Finally, if you have a boat, stay close to a waterway to gather firewood from nearby areas.

WIDOW-MAKERS

Some hazards to watch for are falling trees and branches, also known as widow-makers. One preventive measure is to cut down any dead trees and limbs that might fall your way. An alternative—if other options are impractical—is to build your shelter strong enough to withstand a tree falling on top of it. Even if you have a temporary shelter like a tent, you can still make a strong tripod or A-frame to better protect your shelter from a widow-maker. Utilize natural protections to your advantage; for instance, place your shelter near strong trees and big rocks to give you partial protection.

BUILDING MATERIALS

Will you use pine boughs, poles, clay, moss, and so on? There should be abundant materials to make your bed, roof, walls, and other projects—you don't want to haul those materials from a place far away.

SUNLIGHT

The sun provides light, heat, vitamin D, and a necessary morale boost, so make sure your site gets sunlight by paying attention to the cardinal directions and the sun's path. Ensure your shelter will shade you from the sun when it is at its peak during the summer months, when the sun is south and at a high angle. Consider having your shelter facing southeast so that it receives sunlight during the first half of the day during the winter months.

FOOD AND FORAGING

EDIBILITY

One myth I'd like to dispel is that edible plants are abundant: they are not. At least not in higher latitudes. The majority of plants labeled as *edible* in wild edibles books are highly seasonal, low in energy content, generally only found in insufficient quantities, or hard to digest in high amounts.

TESTING FOR EDIBILITY

The universal edibility test (UET) found in many survival manuals is not practical. That's why it's not included here. It's best to think about the UET as a way to test if you are allergic to an edible plant, but not as a practical way to test if an unknown plant is edible. The UET takes a long time. It requires you to only test one plant at a time and eat exclusively from that plant, so if you happen to have other food around, you can't eat it until the UET is finished.

In response to the UET (and inspired by Graves' and Hawke's tests), I've come up with a common sense edibility test for trying wild plants that seem familiar and are likely to be edible, but aren't entirely identified. The common sense edibility test (CSET) is not for the uninitiated. It must be used with extreme caution and not-so-common common sense. No test will ensure 100% that a questionable plant is edible—and not deadly poisonous.

The first part of the CSET is to see if the plant is abundant. That is the risk versus reward equation. It is not worth the risk to eat a questionable plant that will only give you a tiny amount of nutrition if edible. Even if it is relatively abundant, it should provide you with more than just a couple of meals to be worth the risk. Take into account that even if plentiful, many wild edibles are actually only marginally edible and can only be eaten in small quantities.

The second part is to assess its familiarity. Does it look like something you've eaten before? Or something you know?

The third part is to observe, smell, touch, and taste the "edible" part of the plant, one step at a time. As primates, our bodies have evolved ways to try to detect potential poisons. The first one is sight. If the potential food looks familiar, healthy, and clean, it may be edible. The next safeguard is smell. If it smells okay, you can proceed with the next sense and touch it. Touch your lips to the plant for a minute to feel for a burning or itching sensation. If no sensation occurs, then taste it for a minute without swallowing. If it tastes all right, it is probably edible. If you sense any burning, acrid, milky, rotten, or unpleasant flavors, avoid it. You should eat only a tiny portion and gradually increase the amount over the following days if no adverse effects occur.

When doing the taste stage, be aware of flavors of almond, bitterness, or extreme acidity: these are signs of danger.

Numerous toxins are found in wild plants, but two are particularly relevant. One is hydrogen cyanide (hydrocyanic acid), which tastes like bitter almonds. It is a dangerous poison that dissolves in water. If you find this taste in a plant, question its edibility—unless you are sure what it is and know safe methods for preparing it.

The other poison is calcium oxalate and can be recognized by a sharp stinging, burning, or numbing sensation caused by tiny barbs irritating the tongue, mouth, and lips. For example, this poison is found in relatively small quantities in rhubarb leaves.

Calcium oxalate can cause intense pain and swelling of the tongue, throat, and lips. Poisoning from swallowing oxalate-containing plants is rare because the intense mouth pain prevents people from eating significant quantities.

Other poisons may have no distinctive flavors and may be fatal. The only warning signs they give are severe symptoms after it's already too late. *All plants are edible, some only once*.

The fourth part of the CSET is that an edible plant is one that tastes relatively good and is somewhat pleasant to eat. Marginally edible plants and "emergency" wild edibles are not a good source of sustenance.

This common sense edibility test should only be used on things that are very likely food, such as berries, nuts, and other plants that are not likely poisonous. One should observe, smell, and then taste only a minimal amount without swallowing if the plant seems okay. If one of the warning tastes is present, spit it out.

Generally, the dose makes the poison. But some plants like water hemlock can be lethally poisonous even when minuscule amounts are eaten.

Many edible plants will fail the taste test because they need to be processed or cooked (often by boiling) to make them edible, so you may want to taste test the plant again after boiling.

This common sense edibility test should never be applied to mushrooms and plants closely associated with poisonous species. The onset of symptoms from eating poisonous mushrooms may occur 6 to 24 hours after ingestion (in some species, up to 21 days afterwards), and fatal mushroom poisoning is generally associated with a delayed development of severe symptoms. Kidney or liver failure may be one of the first severe indications of mushroom poisoning. Never eat raw mushrooms regardless of species.

WILD FOOD SEASONALITY

Another myth I'd like to dispel is that a survival expert can just go into the wild and live off mushrooms, berries, lichen, and inner bark. Getting a meal that provides half the calories your body needs for a day is not easy, let alone providing the total amount of calories, day after day, rain or shine, winter or summer.

A handful of insects, mushrooms, and rodents is not a full meal, and it won't even cover one-quarter of the daily calories a person needs. It doesn't matter much in short-term survival if you eat a few calories or not, for the bulk of your energy and nutrients will come from what the body has already stored: fat.

Wild foods are highly seasonal, and more so the farther north you are. Weather and animals ensure that most highly productive wild edibles don't remain available for long. Not only are practically all wild edibles and animals seasonal, but they also have good and bad years. For instance,

you are out of luck if you count on snaring hares and you happen to be at the low point in their decade-long cycle.

SURVIVAL FORAGING CALENDAR

The calendar below is intended for the boreal forest. It's best to make your own calendar based on your region; nevertheless, this calendar can be helpful. Find out what is available in your area and note the optimal times for harvesting food (check your local regulations).

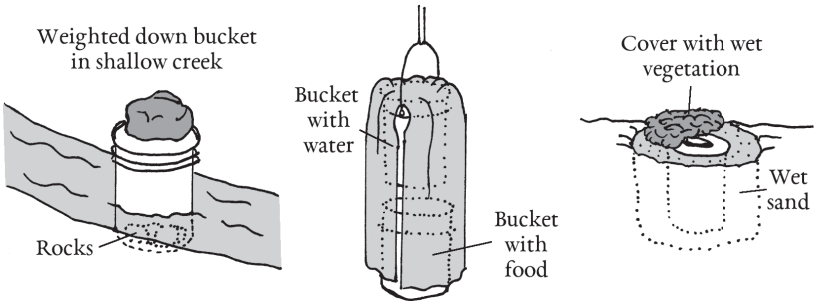
SPRING

Collect cattail rhizomes and wapato tubers.
Collect young cattail shoots.
Collect birch or maple water.
Fish for pike, trout, walleye, and catfish (with rods, setlines, trotlines, and nets).
Hunt waterfowl (late spring).
Trap muskrats (late spring).
Hunt and snare snowshoe hares and rabbits (early spring).
Hunt large animals (early spring).
Hunt grouse.

SUMMER

Gather currants, saskatoons, bunchberries, raspberries, and blueberries.
Collect cattail pollen, immature cattail pikes, and cattail laterals.
Collect crayfish.
Fish for pike, walleye, and catfish (with rods, setlines, trotlines, and nets).
Gather hazelnuts (before the squirrels do).
Gather acorns (late summer).
Harvest wild rice (last week of August to the first week of September).
Trap beavers and muskrats.
Hunt waterfowl.
Hunt grouse.

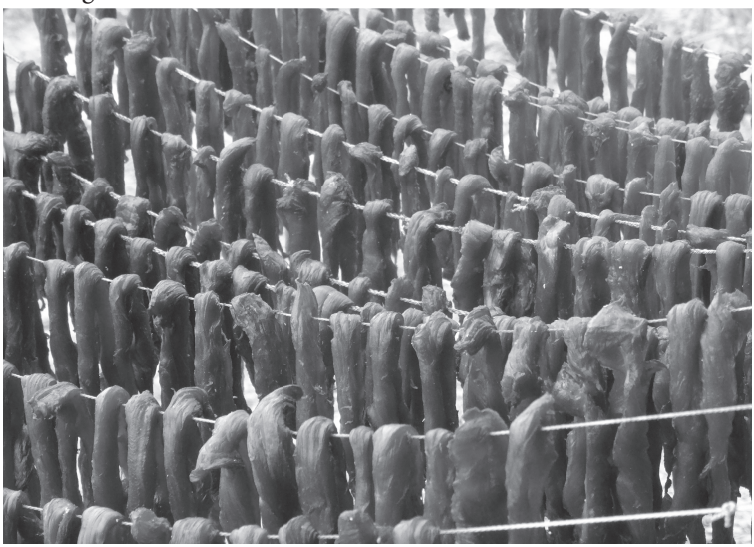
its ends are touching the water. The stream will cool down the container through convection and the cloth through evaporation.



Spring cooler | Evaporation cooler | Underground cooler

DRYING

Drying is one of the simplest and easiest methods of long-term food preservation. Jerky is made by dehydrating meat gradually under the sun or over a slow fire. Keep in mind that this only works with lean meat—fatty meat will go rancid—so cut off all the fat.

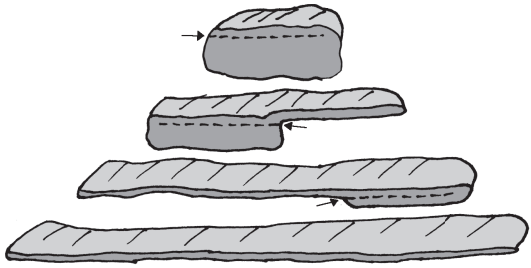


The meat should be fresh. Slice it across the grain into thin strips of around 1/4″–3/8″ (0.5–1 cm) thick. The thinner, the better.

Flies are an issue because they will lay their eggs on the meat, but there are ways to prevent this. Smoke can be used to deer flies at first until the surface of the flesh dries. Once the surface is dry, flies won't lay their eggs

can attempt to reach this temperature by heating the jerky on a frying pan or over hot coals for three minutes, to the point where the jerky is too hot to hold. An optional step before the drying process is to dip the slices of meat one at a time in a boiling pot before they are hung to dry (this also speeds up the drying process). Finally, you can also heat the finished jerky to 170°F (75°C) or boil it briefly before eating it.

To store jerky, you have two general options depending on the weather. If the air is dry, pack it in a breathable, open weave bag. If you pack the jerky in plastic, condensation and mold may form. If the air is humid, pack the thoroughly dried meat in an airtight container to prevent it from reabsorbing moisture from the air. Properly dried and stored meat will keep for a few years, but expect something closer to six months in the field. The dried meat from fish and other animals can also be ground and stored as a powder.



Butterfly cut for making jerky

BURYING

A less conventional but straightforward method of preserving meat is to bury it. Burying was used extensively by hunter-gatherers worldwide, and it can be used to preserve meat for weeks or months. Keep in mind that, if the meat is stored for too long, it will "ferment" and have a very strong taste. Due to the danger of botulism and other pathogens, you must take extra precautions.

To bury meat for storage, make a pit 1.5–2 ft. deep (45–60 cm) in a well-drained spot. Salty or sandy soil works well. Line the pit with a thick layer of sphagnum moss, grass, or leaves. The important thing is to let oxygen circulate. Leaving the skin on the meat helps preserve its juices and keeps it cleaner. Lay the meat on the grass, and cover it with another thick layer of grass; this prevents soil from getting on the meat. Fill the pit with dirt, and cover the spot with rocks or logs to prevent scavengers from digging it up. Typically, you may store meat like this for a month or two.

One of the main risks with this method is botulism. There are ways to minimize the risk, but it will still be there. Never use plastic bags or

containers with this method because they increase the potential for botulism. Salt helps inhibit botulinum bacteria, so use it if available. Bury the food when the ground temperature is cold, ideally below 36°F (2°C). Wash your hands and the meat to keep it as clean as possible.

Finally, cooking the meat in water heated to a rolling boil before eating destroys the botulinum *toxin*. The internal temperature of the meat must reach the boiling point. Consume the meat immediately after cooking because toxins could develop again with time. See the section in the "Health" chapter for more information about botulism.

RENDERING AND STORING FAT

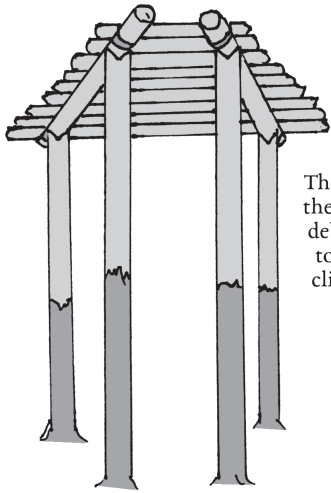
Animal fat is stored in cells, and rendering is the process used to rupture those cells to extract the liquid fat. Two relevant methods of processing fat are dry and wet rendering (frying and boiling, respectively).

For the dry method, dice the fat into small chunks—the smaller, the better—and fry over low heat, stirring frequently, until the pieces become crisped and shriveled. Strain them to separate the hot oil from the nourishing cracklings. Avoid overheating: don't let the fat caramelize or the cracklings turn brown because they will not keep as long. Store the fat in a container that vents moisture out, unless the fat will be stored very cold.

For the wet method, just prepare the fat as you would for frying, but place the chunks of fat in a pot and cover them with water. Bring the water to a boil for several minutes, or let simmer for a few hours. Remove from heat. As the mixture cools, the fat should solidify at the top. Skim it off and place it in a pot over low heat to evaporate any residual water (until there is no condensation on the pot's lid). That will help the fat keep longer. This method can also be used to extract fat from greasy bones.

The result should be semi-solid fat or oil, which won't spoil quickly if appropriately stored, unlike raw fat. If the fat is rendered correctly and there is no moisture content, bacteria won't grow. Leaving the fat uncovered allows moisture to evaporate. The other thing to watch for is oxidation, so airtight containers will help in the long run. Store the fat in a cool, dry, dark place to lengthen its shelf life. The more solid the fat is at room temperature, the longer it is likely to last. It should keep at least between two to six months.

weight but small enough in diameter to make it hard for bears to climb. Sawing off the tops of the trees can be very dangerous (keep yourself and the ladder clear of the falling top). Once the treetops have been cut, you can debark a long section of the upper tree and chop off all the lower branches to slightly deter animals from climbing. Then, fell any surrounding trees that could be used to get into the cache. You may want to leave one tree standing a few meters away from the cache so that you can lean a ladder against it to save energy and effort.



The top of the trees is debarked to deter climbers

The floor can be built using lashings and sawed-off notches. A broad-based ladder can be fashioned from two poles tied at the top. The rungs can be secured with nails, dovetail notches, or notches and lashings to prevent the rungs from moving.

SURVIVAL GARDEN

In multi-year wilderness survival, having a garden may be crucial. This section will briefly scratch the topic of survival gardens in a wilderness environment because it only makes sense for a situation spanning multiple seasons. The Lykov family spent over 40 years isolated in the Russian boreal forest. Their garden was fundamental for their survival because potatoes were their main crop and staple.

Developing a survival garden takes time and effort because forest soil may be inadequate. Nevertheless, soil can be improved by adjusting its pH and fertility. Some techniques that might be useful are using raised beds; using compost to build soil; fertilizing with wood ash, urine, and green manure; enriching the earth with muck from the bottoms of bodies of water; composting fish discards; and planting your garden in Hügelkultur beds (mounds of soil over piles of rotting logs).

Regarding which plants to grow, focus on calories and resilience, not on nutrients, for nutrients are widely available in wild foods while calories are scarce. Plants such as potatoes have the most potential, and your efforts should be focused on them.

EDIBLE PLANTS

Most edible plants are overhyped. A handful of collected greens is not a meal. The truth is that in temperate regions, most wild edibles can only complement staples like meat and fat, and in practice, they won't provide many macronutrients. Only a few dozen species of edibles can serve as a decent and practical source of nutrition, and only a handful of those have the potential of becoming true food staples. Knowing this, you don't have to spend time learning about marginal food plants. Instead, focus on learning which edible plants are the most useful as a food source. Only tubers, roots, fruits, nuts, and seeds contain enough calories to serve as staples.

Even though most greens don't provide many calories, they are still a good source of micronutrients and constipation-preventing fiber.

I include the profiles of some of the most valuable wild edibles found in the boreal forest because there are only a few, and they are truly useful as a source of nutrition in a real-world survival situation.

The edibles relevant to your location will be different from those below. My advice is to research the main staples of the Indigenous hunter-gatherers in your bioregion and focus on those food sources.

There are a few edibles that I don't cover thoroughly because, in most areas, they generally won't be abundant enough to form a substantial part of a survivor's diet. Still, I'd like to highlight them below so that you can learn to recognize them.

Gooseberries and currants can be a bit sour, but they are pretty easy to identify, and they are one of the first berries to ripen. Saskatoons (serviceberries) taste better than blueberries and ripen earlier.

Raspberries need no introduction. A significant drawback of raspberries is that they are very fragile and usually won't stand being stored in a container. Their fresh or dried leaves make a very nutritious tea. Harvest the leaves in spring before flowers emerge and the leaves turn bitter. If you want the full nutritional value of the tea, let the leaves stand in cold water overnight.

In winter, depending on your latitude, you may be limited to stored edibles and what you can harvest year-round. A few vitamin-rich teas that I recommend for their taste or nutrition are:

- Spruce needle tea from young needles
- Wild rosehip tea (high in vitamin C)
- Juniper needle tea
- Labrador tea (found in mid-US to far north)

ACORN

Oak *Quercus* spp.
Range: US and Canada.
Calories: 387 kcal / 3.5 oz. (100 g) raw acorns (shelled).
Harvest: Gather in the fall, when the acorns turn dark brown and fall. This period usually happens from late August to October and may last a couple of weeks.

Abundance: Acorns can be very bountiful, but bountiful trees tend not to be common in the heart of the wilderness.
Identification: Oaks are hardwood trees 65–130 ft. (20–40 m) tall (shorter in the north). Their acorns have a woody, scaly cap. They can be roughly divided into red or black oaks and white oaks. Red and black oaks have leaves with pointed tips and lobes, and their acorns contain high amounts of bitter tannins. On the other hand, white oaks have leaves with rounded tips and lobes, and their acorns contain fewer tannins, and some are considerably less bitter.
Habitat: Oaks are found in open woods, deciduous forests, and dry prairies.
Preparation: Acorns found on the ground with the cap still attached likely have worms. Discard those, as well as those with obvious wormholes. Usually, the first acorns to fall are damaged. You can also drop them in water to separate good and bad acorns. Acorns that have sprouted are okay—as long as the nutmeat hasn't turned green—just break off the sprout.

Drying the acorns by a fire (slow, *low* heat) or under the sun makes the shells easier to crack. Crack the nuts by pressing or whacking with a wooden spoon for containment.

Red, black, and white oak acorns contain bitter tannins that must be leached. But some white oaks may be less bitter and require no leaching (but they will still contain tannins). There are two basic processing methods: repeated boiling or cold water leaching. Keep in mind that having more surface area exposed makes the tannins leach out faster. You'll have to experiment. Use the following methods to process the nutmeats.
Boiling: Boil the whole or *lightly* chopped nutmeats in various changes of water until the water remains clear or lightly colored. Have the changes of water already boiling before adding the acorns or the bitter taste will remain. The acorns should change color from yellowish-white to dark brown and lose all of their bitterness. If the acorns are still bitter, they are not done leaching. This method is not recommended because of the labor involved, and some of the nut oil may be lost.
Cold leaching: Leave the coarsely ground nutmeats in a porous bag or basket in a running stream for several days until the raw acorns are no longer bitter. Or soak them over a couple of days, rinsing the acorns and changing the water at least daily until it no longer darkens and the nutmeat is not bitter.

The "sweet" or leached acorns can be eaten raw, roasted, boiled, or as porridge.
Storage: Acorns store well in their shell. Don't shell the nuts unless you'll process them right away. Once leached, dry or roast the nuts and store them in a cool, dry place.

FISHING

Check your local regulations! Many tools and techniques described in this chapter—and book—may be illegal in non-survival circumstances.

Where fish are plentiful, they usually make up a significant portion of the available food. There are a few reasons for this. Fish can reliably be caught year-round. Fish are limited to bodies of water (versus land animals), so they can be "ambushed" in specific spots. And fish usually make up a large percentage of the wild food biomass in a given area.

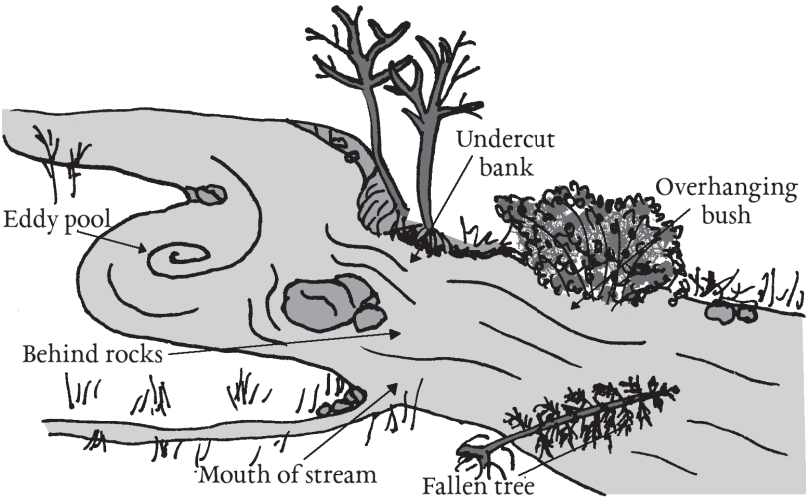
In places where fish migrate, hunter-gatherers would secure most of their fish during the fall runs. The hunter-gatherers would set weir traps in rapids upstream where fish ascended to spawn. For some species, the heaviest runs occurred at night. By November, almost no fish would be migrating, so some hunter-gatherers would travel to large lakes with ample fish populations to spend the winter.

FISHING LOCATIONS

General rules of thumb regarding fishing locations:

- Ninety percent of the area in a body of water holds no fish.
- Take the time to sit and observe. Notice the subtle clues on land and on the water's surface.
- Fish are often near cover, or *structure*, to live and commute.
- Fish tend to concentrate in areas with good cover.

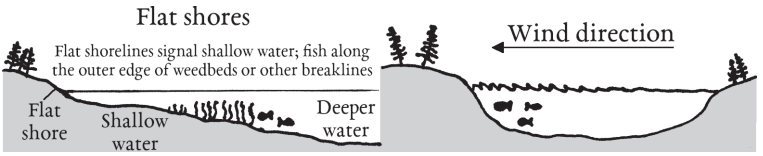
- Inactive fish are more likely to be in heavy cover or deep waters (try passive fishing techniques there).
- Fish tend to stage in areas where they can spend the least energy while having the highest chance of having food brought to them.
- Be mindful of how you approach any body of water (think of it as hunting).
- Notice the sun direction—avoid casting a shadow on the water.



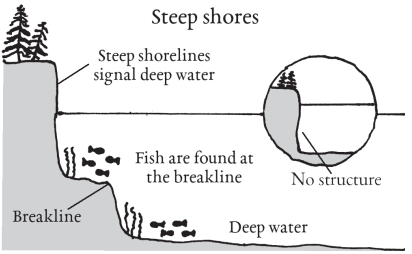
SEASONS

	Spring	Summer	Fall
Rivers	Walleye, trout	Trout	Trout, salmon, char
Lakes	Shallow water: pike, trout, walleye, bass	Shallow water: pike, bass Deeper water: trout, walleye	Shallow water: trout, pike, bass
Time	Any time of the day (as the water warms it gets better)	Morning and evening fishing is best at higher temperatures	Any time of the day

Strong winds push cool water and insects to shore, attracting fish to feed.



Irregularities on the lake or river bottom provide fish with cover, or structure, throughout their travel from deep waters (home) to shallow waters (work). Fish often use breaklines (e.g., drop-offs, weedbeds, or logs) and channel edges as their commuting routes from deep to shallow waters.



LAKE LOCATIONS

1. Stream inlets: inlets are excellent fishing spots because they bring in food for baitfish and game fish, and usually have good hiding spots, such as weeds, deep holes, or rocks.

2. Rapids: above and below the rapids are excellent fishing spots. Large fish are often near rapids.

3. Points: fish the ends and corners of points that provide access to deep waters. Big fish tend to hang out around the tip of those points.

4. Weedbeds and lily pads: these are excellent areas when they give access to deep waters. Weedbeds produce food (indirectly) for baitfish and also provide cover—fish the shallow edges in spring and fall. Fish use the deeper edges as commuting routes due to their cover.

5. Reeds: reeds that connect to marshes or creeks are excellent spots in early spring for bass or pike.

6. Stream channels: in lakes that are part of a river system, a deeper main river channel may provide a commuting route from deep to shallow waters. The edges of this channel are excellent fishing areas.

5. Bays and backwaters: spots with little or no current provide spawning grounds for walleye, bass, and northern pike. Fish them in early spring.

6. Stream inlets: great areas to fish for pike during early spring and throughout the summer.

7. Rocks: the downstream edges of rock piles provide good cover for fish lying in ambush. A good strategy is to fish above the boulders and let bait float downstream. Target also the still water in front of the rocks or other obstructions.

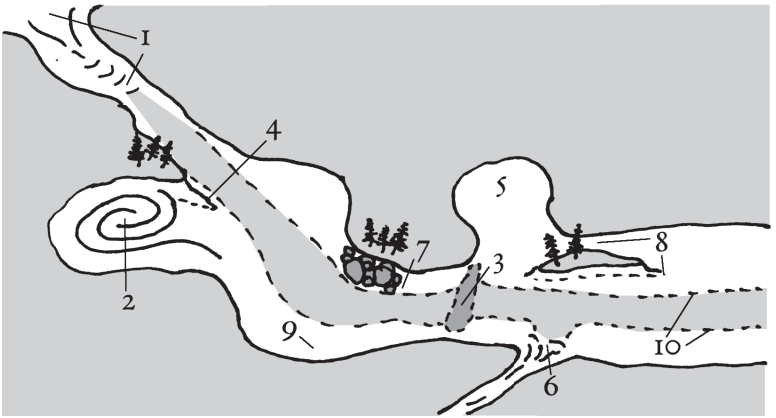
8. Islands: fish the sides of the islands opposite the main channel and along the downstream points.

9. Outside bends: the shores of outside river bends, where the current flows faster, are good fishing areas.

10. Main channel edges: the edges of the main river channel are excellent fishing areas, particularly downstream of rapids.

11. Current seams: the current seams, where faster water meets slower water, are good places for fishing closer to the surface.

12. Riverbeds: there are current breaks near the bottom where fish stage, conserving energy, while waiting for food to come.



It's important to use swivels on a setline. If you don't have swivels, use a perfection loop or a non-slip loop knot. And keep in mind that you may need a heavy mono line or wire leader if northern pikes are around. You may add improvised floats and sinkers to adjust your setline.

AUTOMATIC YO-YO

The mechanical fisher or automatic yo-yo is a small, durable contraption that reels the line in and "plays" the fish once triggered. Many people use them successfully in setlines and limblines.

GILL NETS

For long-term survival, gill nets are a must-have. Gill nets are one of the most efficient methods of catching fish. That's why commercial fishermen use gill nets in rivers and lakes, in summer and winter, in freshwater and salt water. Gill nets are so effective that they are outlawed in most places. The "tax stamp" or commercial permit can be pretty expensive. Check your local regulations.

The advantage of a gill net over other techniques is that you don't need bait, and the net will work even if fish are not biting at the time. The disadvantage of gill nets is that they may get tangled or break if you are not careful. Gill nets must be used with respect and without compromising the present and future fish populations.

Gill nets are very effective in rivers during early spring, but the high water and floating debris can easily damage them. So during that time, it may be best to stand by near the gill net in case you need to protect it. In the fall, a gill net can be used just like a weir to catch migrating fish, but it should only be left for a short time. In seasons or areas that are less busy and where the gill net is less likely to get damaged, check your catch in the mornings, evenings, or preferably both.

If you want a gill net for long-term survival, my advice is to purchase a monofilament line net 65–100 ft. (20–30 m) long by 3–6 ft. (1–1.8 m) high with a foam-core floating line (1/4″–3/8″) and lead-core sinker line

TRAPPING

Check your local regulations! Many tools and techniques described in this chapter—and book—may be illegal in non-survival circumstances.

Trapping is passive, but there is a lot of work involved. Traps need to be constantly checked and adjusted for the changing weather conditions. A lot of experimentation needs to happen to find what works and what doesn't.

Trapping animals for food is different from trapping animals for fur, particularly if you don't have a motor vehicle. Your trapline will be short, so your catch will be much more limited. As with everything else, always think about calories in versus calories out.

Find natural bottlenecks or funnels along animal corridors, and set up your traps in those "ambush" areas. It may be good to add sticks or logs to reinforce the funnels.

To prevent animals from accessing your bait from behind the traps, incorporate a fence or barrier (backing) around them: use rocks, sticks, logs, debris, trees, or stumps. For clarity, the funnels and backing are not depicted in the relevant trap illustrations.

In survival, almost everyone recommends focusing on small animals. But for long-term survival, that is not the only way to go. Be strategic and target the animals that can give you the most calories for your effort. Those will often be medium and big animals, as well as rabbits and hares if they are in peak years.

There are many different traps shown in this section for thoroughness—but I don't have experience with all of them. I used countless sources to cross-reference and confirm that the information is as accurate as possible.

I included many illustrations of primitive traps and snares, but this isn't an endorsement. It's good to know how to make them as a complement or backup for modern traps. Do you think it's more effective to fish using primitive hooks and lines or modern fishing gear? The same is also valid for trapping and snaring techniques.

PRIMITIVE TRAPS

Primitive traps are not as easy to use or as effective as modern traps. They require time and effort, and they can be complicated and finicky to set up. Rain, wind, and weather often trigger or disrupt the functioning of the trap. And animals that are not your target species—such as rodents—can steal the bait or trigger the traps and leave you empty-handed.

Treat primitive traps as a backup or a last resort, but not as part of your main strategy. Having said that, primitive traps are truly sustainable, and if you stay in one spot for a long time and have the energy and effort, they could be worth the trouble.

For clarity, not all the illustrations of deadfall traps below have a hard bottom (rock or log), but having a solid bottom (anvil) is required to provide a hard surface for the deadfall to lethally "sandwich" the target.

A disadvantage of some of the traps shown below, such as the figure-4 and Paiute, is that stone slabs are not generally easy to find. The traps that work with a log deadfall may be more practical.

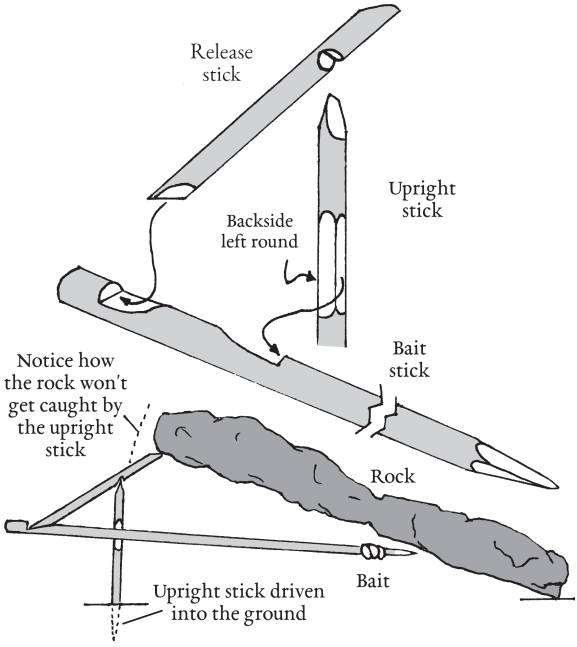
SMALL TRAPS

This section introduces various improvised traps for small animals. The Paiute, Arapuca, and hook traps are the most versatile and practical. For medium animals, or when stone slabs are not available, log deadfalls like those shown in the next section are the best option.

FIGURE-4 DEADFALL

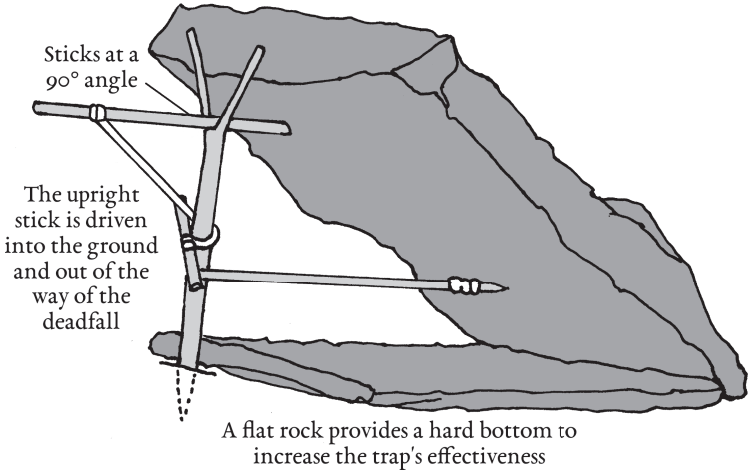
The figure-4 deadfall is one of the most well-known traps, but its popularity is not due to its efficiency or ease of use. Paiute traps are usually better because they are faster to make, but they require cordage.

Fence the sides of the figure-4 trap. The upright stick can be driven into the ground for stability, but it must not be below the weight.



MODIFIED PAIUTE DEADFALL

The modified Paiute deadfall is very quick to make, and it can be set in a way that can be triggered very easily. A disadvantage is that it needs a short

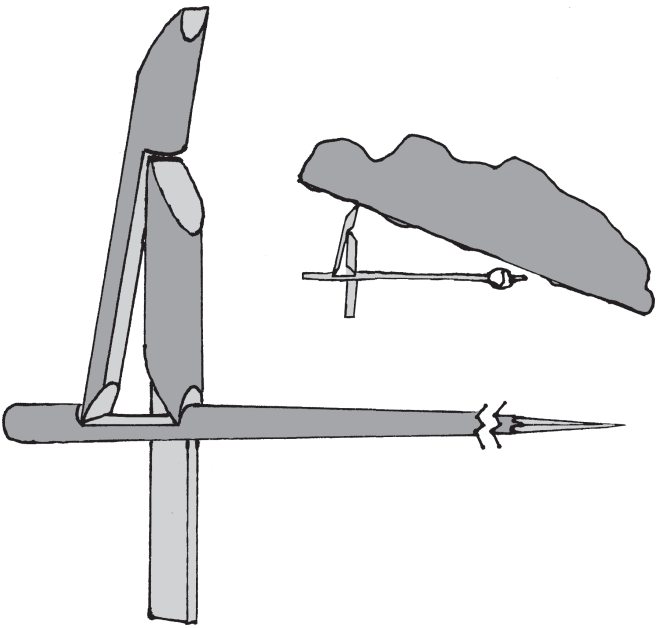


piece of cordage. The bait is placed on the horizontal baited stick, as in the figure-4 trap. Once the horizontal baited stick is disrupted, the tethered stick wrapped around the upright stick gets dislodged, releasing the lever stick that rests over the fork. The upright stick can be driven into the ground for stability, but it must not be below the weight.

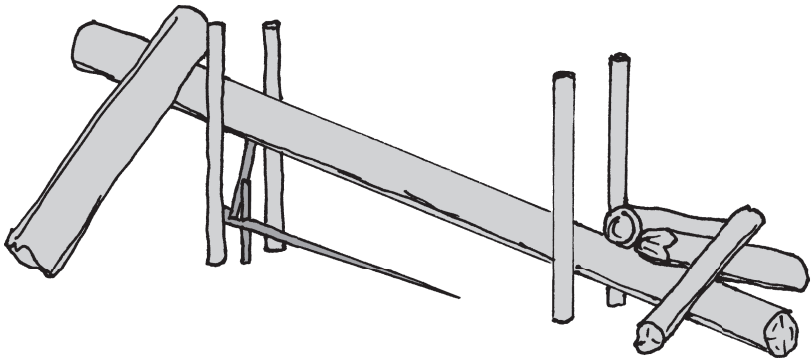
The Paiute trigger is excellent; it can be adapted to various traps for small and large animals with a bit of imagination and creativity.

"SLICK" TRIGGER

This trap requires more time to make and the sticks should be carved out of hardwood so that the contact points don't round easily.
The "slick" trigger is used for deadfalls that target birds and small animals, but it can also be used for traps for medium and even large animals (the trigger must be 1″ in diameter). The trigger is placed directly under the deadfall, but it's not driven into the ground.

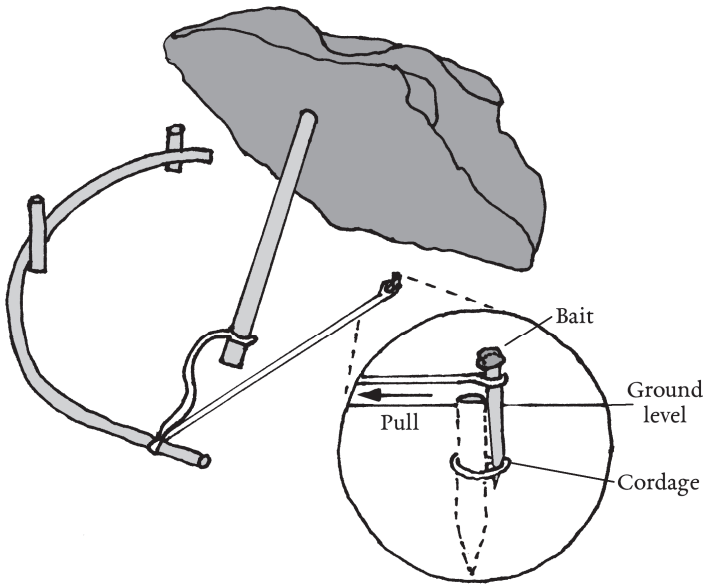


Notice how the animal could escape fast enough to avoid the deadfall if the trigger is activated by its mouth in the setup on the next page.



MCPHERSON DEADFALL

This trap (created by John McPherson) uses cordage and a "spring" stick. The trigger is baited at the top. As the animal moves the bait to the sides of the peg, the trigger and upright sticks get released. The main advantage of this trigger is that it can be set before the deadfall is positioned.



KOOLYOMKA TRAP

The Koolyomka, which originated in Siberia, was shown in the documentary *Happy People*. It is used for trapping martens and sables for fur, and its clever trigger can be adapted for deadfalls. When the bait stick is dislodged, the two upright trigger pieces collapse and get launched out of the way for the weight to fall on the animal.

HUNTING

Check your local regulations! Many tools and techniques described in this chapter—and book—may be illegal in non-survival circumstances.

When preparing for a hunt, practice as much as possible. Put in the effort to ensure good shot placement and a quick kill. Study shot placement frequently, including different profile angles. Practice shooting in real-world scenarios, including the following: from uncomfortable angles, including uphill and downhill; through trees; near brush; or from a stand or blind. Practicing diligently is a way to pay respect.

HUNTING STRATEGIES

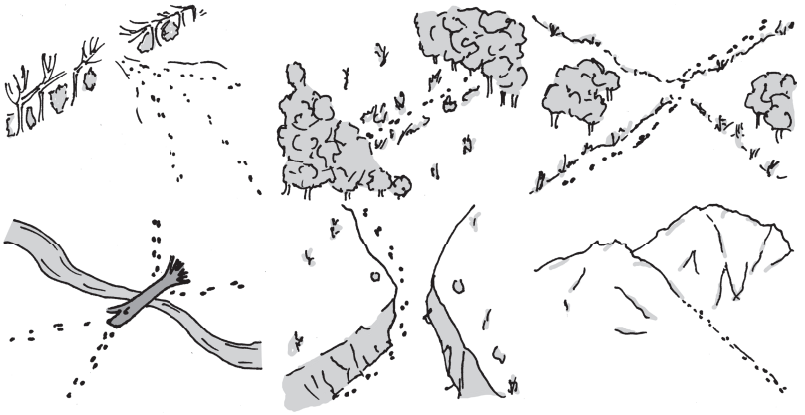
AMBUSH

Ambush or stand hunting consists of waiting in a stand or near a spot where animals are likely to come. Animals are creatures of habit, so their patterns and movements can be predicted. Once a watering hole, feeding area, well-used trail, or funnel has been identified, the hunter positions themself in a spot within a comfortable shooting distance. They must be able to see the animal clearly without being seen, heard, or smelled. An ambush is an effective way to hunt deer, geese, bears, and moose.

In long-term survival, you have to use ambush hunting sparingly, and only when you have the maximum chance of having a successful hunt.

Animals usually spend most of their time resting, feeding, or traveling between resting and feeding spots. It's best to avoid targeting resting or bedding areas because they are usually sheltered among thick vegetation (making shots difficult). Moreover, animals don't tolerate being disturbed there and will leave the site for good if they don't feel safe.

Focus instead on feeding areas; those are easier to identify and predict. They tend to be more open and enable better shot opportunities. When animals are feeding, they move around, thus providing multiple angles and shooting positions.



Observe the landscape to predict any natural ambush funnels and choke points.

Take advantage of natural choke points. If pinpointing a feeding spot or watering hole is difficult, concentrate on well-used routes from the resting to feeding grounds or between feeding areas. Another good strategy is to use bait or call the animals in.

Hunters usually wait in a blind or on a stand. Blinds are setups that provide visual concealment. They can be built out of local materials. For example, a dome shelter (wigwam) can be made with a frame of green poles and covered with interwoven pine or spruce limbs. A short cabin-like wall also works. If rain is a possibility, it's best to set a tarp. Some pit blinds take advantage of depressions or are dug in the ground.

Stands are usually elevated, such as a tree stand. Sitting high in a tree is effective because few animals look up. A stand can be improvised by securing horizontal logs to strong branches or weaving a platform with green sticks. It must be comfortable so that you can spend a long time sitting motionless on it.

You don't necessarily need a special setup. You may use a large tree to obscure your outline or lie flat on the ground in tall grass or dense brush, as long as you have a clear view. Below are some useful tips.

Movement: Stay as still as possible when waiting in ambush. It's best to position yourself so that you won't make any movements—or where you can minimize them when taking a shot. If you have to move, wait until the animal is facing away, until its head is behind a tree, or until it's eating. Move slowly and steadily.

Outline: It's also crucial to hide or blend your silhouette. Use terrain or sparse vegetation to cover your front, and use a complex or uneven backdrop to break up your outline. Wearing camouflaged clothing helps.

Sound: Minimizing noise is easy and essential. Do a few jumps with all your gear on to find potential noisemakers and address them. Soundproof your stand by clearing branches that may catch on you and make noise. Practice aiming in various directions to notice any likely noisemakers.

Smell: Use the wind to your advantage. Position yourself downwind from the trails, and have alternative ambush spots if the wind changes direction. Use campfire smoke to mask your odor.

Animals are usually most active right around sunrise and sunset, so get in position an hour earlier. Listen carefully. Noise may alert you in advance of an approaching animal.

Be warm, dry, and comfortable. Have extra ground insulation and clothes to keep you warm and still. If you must take a nap, remain in a slightly uncomfortable sleeping position to wake up easily. Be prepared to stay in ambush from dawn to dusk.

STILL-HUNT

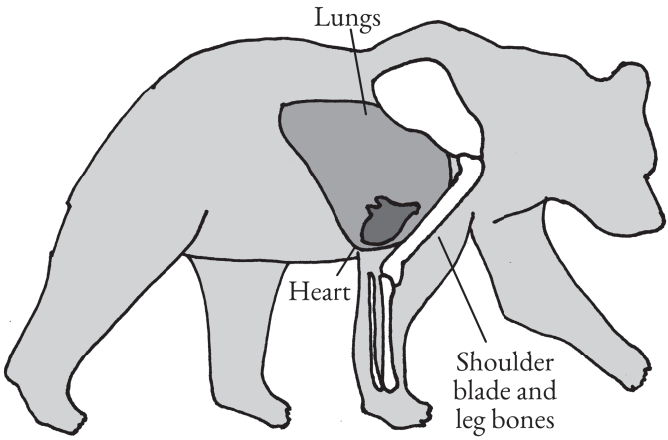
Still-hunting consists of carefully choosing and planning a route and moving through it very slowly and stealthily with the intention to encounter animals. This technique is demanding: the hunter must stay still most of the time, listening and observing. It's like being permanently on the final approach of a stealthy stalk. Naturally, places where it's challenging to walk silently are not conducive to still-hunting.

BIG ANIMALS

SPECIES

BEAR

The best seasons for hunting black bears are the spring and fall—when they are at their most hungry—either during the first weeks after hibernation or the four to six weeks before. Hunting a bear in the fall is best because the bear is much fatter.



A good strategy is to set a stand near a natural food source, such as a grove of beech, oaks, or a berry patch. Baiting is also quite effective, as bears can smell bait from up to 3 mi. (4.8 km) away. Piles of guts, fish, or a carcass work as bait. Hang the bait, or cover it with heavy logs, so that smaller scavengers don't steal it. Place the bait near a well-used bear trail or a natural food source. The area should have enough cover to make the bear feel secure enough to visit the bait during the day. Bait a site a few times so that bears get familiar with it.

Bears feed the most during cool morning and evening hours, and they avoid being in direct sunlight during hot days due to their dark fur. Bears are not generally very abundant, averaging only one bear for every 2 sq. mi. (5.2 sq km).

Use at least a .30-caliber cartridge and bullets that weigh at least 165 grains (10.7 g) for bear hunting. Set a stand nearby, and always keep the wind direction in mind. Needless to say, bears can be unpredictable and

Lure: The tarsal glands from a dead buck or doe can also be used as a scent lure during the rut and year-round. These glands are located on the deer's rear legs, at knee-level, beneath a dark patch of hair.

Ambush: Scout the area before setting an ambush to ensure there are recent signs of deer activity. A prime location for a stand is near the intersections of well-used deer trails or in an area with fresh scrapes in the trees. An elevated stand will give you a better view and keep your scent above the ground; in addition, deer don't usually look up. Otherwise, just hide behind a tree or a pile of brush. You're more likely to see deer during the day's final moments.

TRACKING AFTER A SHOT

You should make your first shot as precise and well-placed as possible. Nevertheless, always be ready to follow up with a second shot with a rifle or a bow. If an opportunity for another shot arises, take it. It may be unnecessary sometimes, but it's best to be sure.

Ideally, the animal you shot will die in its tracks; if it does, take a moment to feel gratitude for its gift. But if you're hunting a larger animal or using a bow, you'll likely need to do some tracking, even with a perfect heart or double-lung shot.

After a shot and follow-up, pay attention to the placement of the wounds, the animal's movements as it runs away, the location where it was standing and last seen, and the direction it took. These insights will help you with tracking. Look for a spot of blood on the animal for evidence of shot placement; this will be obvious if an arrow was used. A shot limb would be bad news. If the rear legs or all four legs fold, you probably hit the spine and may need to shoot again at the head, neck, or lungs.

The next step is to wait. If you're confident of your shot placement, you should wait about half an hour before approaching the impact site; if you're not so sure, wait 45 minutes to an hour.

Stay attentive to any noise the animal makes as it flees. Make a blaze to mark the location you took the shot from, and take the time to observe and memorize the features of the spot where the animal was when it was hit.

Waiting is essential because you don't want the animal to stand up and run far away. If the animal feels secure, it will likely just find a spot nearby and lie down to die. If it might rain or snow soon, you'll need to start tracking earlier because precipitation will obscure the signs.

After the waiting period is up, go to the impact site where the animal was shot. Mark the site with a blaze and search for any signs. Look for blood

or hair on the ground or vegetation. Assess the clues to determine how much time you should wait before proceeding to track the animal. Even if you don't find signs of a successful hit, show due respect by tracking it down for a while in case you see signs of a wound later on.

Neither the amount of blood nor its absence will provide definitive clues about the shot's lethality or even indicate a miss. It's entirely possible that the bleeding is primarily internal.

Hopefully, you'll find a trail of blood. The color of this blood may give you hints about the wound. Frothy, pinkish blood indicates a lung shot, and rich red blood—but not frothy—suggests bleeding from a major blood vessel. Dark blood mixed with what appears to be stomach or intestinal contents indicates a stomach or gut shot. As a rule of thumb, wait four to five hours before tracking an animal shot in the stomach, and 10 hours if it was shot in the intestines.

Following a blood trail requires patience and discipline.

If the trail seems to have ended, mark the spot with a blaze for reference. Systematically follow different directions for a short distance in search of any signs. Get down on your hands and knees to look, but be careful not to disturb the signs.

If you can't find blood, look for other signs, such as tracks, disturbed ground and vegetation, and overturned leaves. Don't search for blood exclusively on the ground; look for it on foliage, logs, and tree trunks as well. Be open to unconventional signs, and think outside the box.

Wounded animals sometimes head toward water or move erratically. Two people may track faster if one focuses on the blood trail, and the other looks around for signs of a change in direction. If you find your prey still alive, approach it stealthily, and be ready to shoot.

HANDLING MEAT

The internal organs of a large animal should be removed soon after it dies to cool down the meat. This slows down the growth of bacteria and prevents the meat from spoiling quickly. Removing the hide and placing it over the meat also helps it cool down.

If you cannot relocate the meat to a secure spot, or camp at the site of the kill, you'll have to leave some of it unattended overnight. Prioritize packing the fat, organs, and meat with high fat content. Remove the guts and place them in a pile, away from the rest of the meat and prized organs. This gut pile will serve as a decoy. Scavengers often devour the gut pile and ignore the meat. Leave the carcass with the fur still on in a hidden spot, and

place a bunch of spruce boughs or leaves over it. If you have a rope, you might be able to hang some of the meat from a tree. You may also try weak deterrents such as peeing on the ground around the meat or improvising a crude scarecrow out of your clothes, trash, or tarp.

When storing meat in camp, keep three concepts in mind: cool, clean, and dry. Ideally, hang and air-dry the meat if the insects are not a huge issue. Air-drying builds up a dry crust that protects the meat; this is better than placing it straight away in a game bag—and in dry, breezy conditions, this dry crust may develop quickly. Otherwise, if the bugs are plentiful, place the pieces of meat immediately into breathable game bags and hang them in a shaded and breezy area. Ensure the meat stays in the shade throughout the day.

Air should be able to flow between the quarters and large pieces of meat. Don't place them close together because there will be moisture trapped between them. If you cannot hang the meat, place it on the ground over a base of rocks or sticks to allow air to circulate underneath. If you are using plastic or a tarp to protect the meat from precipitation, ensure you leave space or a buffer made of brush to keep the material from touching the meat. If you are transporting meat in a non-breathable bag, such as your pack or a dry bag, take the meat out and hang it to dry as soon as possible.

If you have a canoe, you can take advantage of the cooler temperature of the water by placing the meat inside the canoe and over a pile of brushes; this makes sense primarily when traveling.

RIFLES

.22 LONG RIFLE

Many consider the .22 Long Rifle (LR) to be the ultimate survival round. It is inexpensive, versatile, relatively quiet, and accurate at ranges under 50 yd. (45 m). The advantage of the .22 LR is portability: .22 rifles are lighter than center-fire rifles, and a pack of 500 rounds weighs 3.7 lb. (1.7 kg) and takes up the same space as a pack of 150 .223 REM rounds.

During day-to-day activities, you're more likely to encounter small animals (e.g., grouse, squirrels, or rabbits) than large animals. Nevertheless, suppose you spot a large animal. In that case, you could still kill it if you're at close range and exercise proper shot placement. The .22 doesn't have the kinetic power of center-fire rifles, but if necessary, it can kill deer-sized animals at 50–75 yd. (45–70 m) with a well-placed shot.

- Carry two accessories with you: a dependable scope and a good sling.
- Avoid bringing your rifle inside a warm place in cold weather or condensation will form. Remove any oil from your firearm and substitute it for graphite powder.

ARCHERY

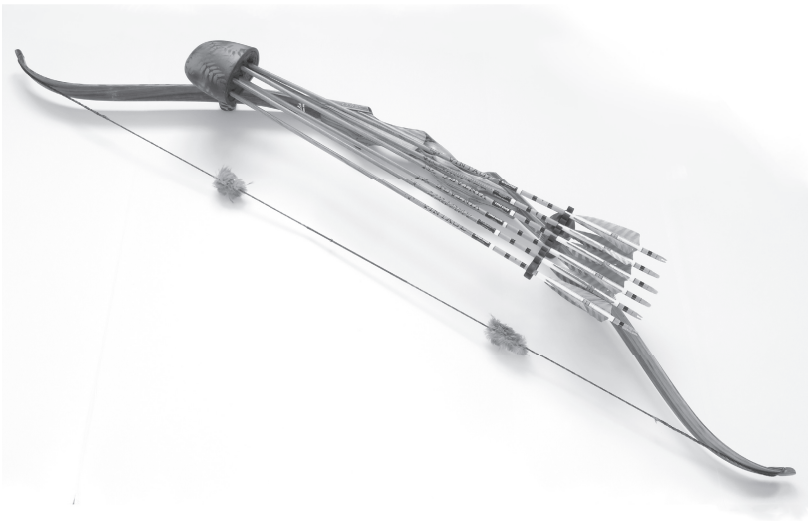
Bows are the other main option for a hunting weapon. Their main advantages are that arrows can be reused and that they are silent. Some of their disadvantages are their shorter range and that shooting accurately requires more skill and practice.

Compared with a .22 firearm, the advantage of reusing arrows is not as crucial because packing 500–1,000 rounds is not hard. The fact that bows are pretty quiet is generally not that important, but it's a nice feature when there's a group of small animals.

I'm not considering crossbows or compound bows for these purposes because they are not as compact or lightweight, and their designs are not as resilient and straightforward as a traditional bow.

Takedown recurve bows work well for survival. The takedown feature is not crucial, but it does make it easier to transport.

Recurve bows are shorter and more compact. But recurve limbs are less resilient and may break when twisted or if the bow is strung without a stringer tool.



BUSHCRAFT

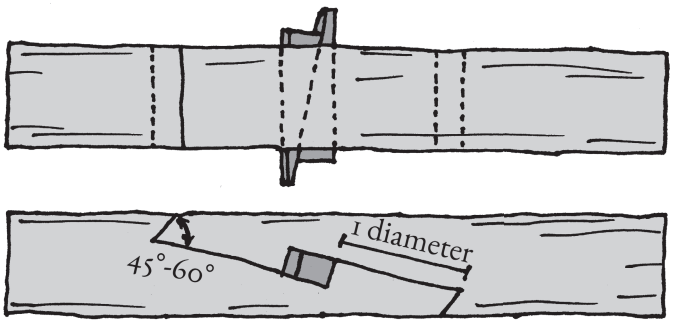
TECHNIQUES

WOOD CARVING

Wood carving is easier with softwoods, but sometimes you'll have to work with hardwoods. Use a mallet, hatchet, or saw to speed up the process.

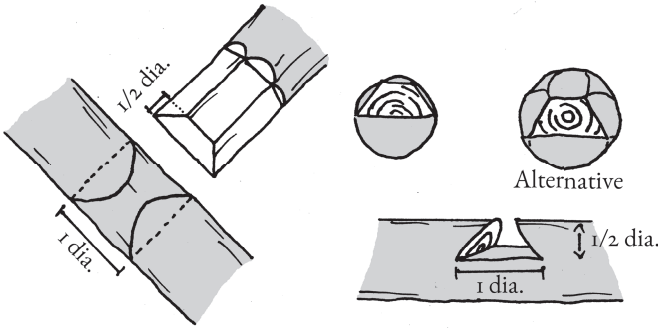
JOGGED AND WEDGED SPLICE

This splice is used to join two logs or sticks together end to end. Two wedges are inserted to secure the splice.



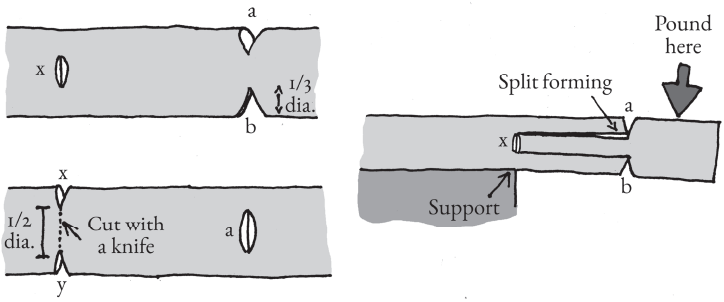
DOVETAIL NOTCH

The dovetail notch is a handy way to make items such as a mallet or a table. Start dovetail notches at about halfway through the diameter of the piece of wood. It's best to carve the notch first and then adapt the stick to the notch, and not the other way around.



SPEAR NOTCH

The spear notch is used for fitting arrowheads and for other projects. A stick with a straight grain is best for this purpose. The V notches *A* and *B* shouldn't be deeper than one-third of the diameter, or the stick will break. Notches *X* and *Y* should be made one-quarter deep at a narrow angle. Once the notches are cut, the stick is laid on a flat surface with the surface's edge below the *X* and *Y* notches. The stick is then hit with increasingly harder blows until a snap is heard. Turn the stick and repeat the process to split the other side. Then move the stick back and forth until the notch breaks away.

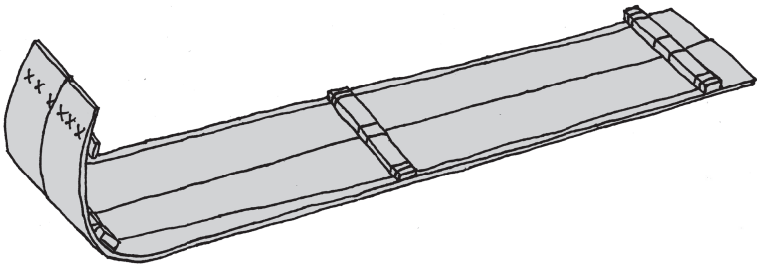


KNIFE TIP MORTISE

The stick must first be carved down to cut a hole with just a knife. Then the knife is used to cut a square hole through both sides. Making a round

The reference lines for hewing the boards can be made by rubbing charcoal onto a cord, stringing it in a straight line, and then pulling it and snapping it down on the log. Score the log close to the desired depth with a saw or axe, and hew it using the scores as an aid. Expect to spend a full day of work on the boards alone.

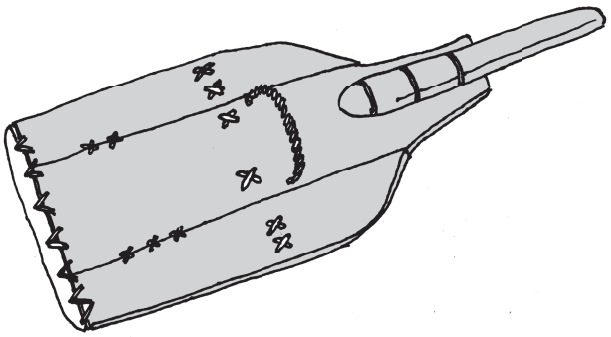
Finally, steam-bend the boards and fasten a few cross-pieces. Traditionally, they were lashed with rawhide.



SNOW SHOVELS

A snow shovel can be improvised following an Inuit design by using two or three wooden boards and a wooden handle, and joining everything with rawhide stitches. Finally, a hand strap is attached to the middle of the shovel. Traditionally, the shovels had a piece of bone at the blade's tip to protect the boards.

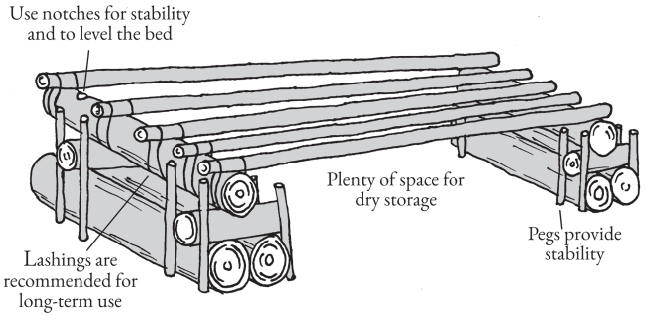
Another way to improvise a snow shovel is to make a wooden paddle with a concave blade.



CAMP FURNITURE

BED

A bed frame can be improvised with sticks and poles. Some people make a bush mattress straight on the ground or over a pile of compacted snow between two wide logs, but I prefer a bed about the height of a chair. In an insulated shelter, the higher the bed, the warmer it is. In addition, high beds can be built on uneven ground, and they provide dry storage underneath.



These frames don't move as much as you might think; nevertheless, you can minimize any movement by using stakes, lashings, or rough notches.

Balsam fir boughs are an excellent material for the top of a bush mattress. Save the softest and best boughs for last and concentrate them around the part where your trunk and head will rest. The problem with balsam fir is that the needles flatten and drop more quickly than spruce. It's best to have spruce as the bulk of the cushioning and add a top layer of balsam fir for softness, but the spruce layer is what gives the bed its springiness. Boughs can be laid one by one for multiple layers or in a single layer of small handfuls, if time is of the essence.

Pay attention to the boughs' curves and lay them with an upright arch. Depending on how much comfort and insulation you need, you'll need a compressed thickness of at least four fingers to one handspan. Remember that your weight will compress the mattress overnight to about one-third of the starting thickness, so you'll have to add a fresh layer of boughs after a couple of days.

Where pine boughs are unavailable, you can use multiple layers of thin sticks, brush, reeds, grass, and leaves; these beds can be just as comfortable as spruce bough beds as long as you use progressively finer materials and make the top layers quite thick.

CLAY

Making primitive pottery is not a priority in survival, but clay can be useful for making a fireplace, stove, or chimney.

Clay is finer than sand or silt, so it tends to float for a longer time in the water. That's why clay is found in areas that once had water over them; for instance, river floodplains and the bottoms of ponds or lakes. Clay is often found near the surface or underground at some depth. Eroded hillsides, stream banks, and eroded lakeshores are good places for finding clay deposits.

Good clay can be identified by rolling a coil of malleable clay around your finger (you may need to add water and knead it). If it's good clay and it's moist enough, the coil shouldn't crack.

Dry clay can be prepared for use by breaking it into small pieces and removing as much debris as possible. Gradually add small amounts of water and mix it in. Repeat until the clay is easily molded into shape.

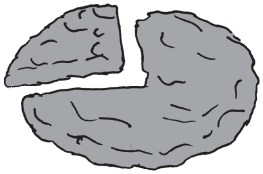
Another way to prepare dry clay is to crush it and pour it into a bucket with water to form a slurry. You can filter the slurry through a screen to remove any impurities, but this step is optional. Allow the clay to settle at the bottom and pour off the excess water. Finally, pour the clay slurry over a tarp to dry it, or place it in a cloth bag instead. Shape the clay before it dries completely.

If you find clay that is already naturally moist, just remove as much foreign matter as possible to use it.

Even if you don't have an obvious source of clay, you can use two buckets to extract clay from soil with a high clay content. This is also an effective way of separating debris. Fill a bucket half-full with soil and fill the rest with water. Stir the soil and water until it is evenly mixed. Then, just let it settle until the water clears up. The clay will settle at the top layer. Carefully pour out the water without mixing up the layers of clay and soil. Then slowly pour the clay layer into another bucket, trying not to bring any of the dirt from the bottom layer with it. To clean out the clay further, you can repeat the previous process: add water, mix it, let it settle, pour out the water, and separate the clay at the top. Dry the clay slurry as described earlier.

Before shaping the clay, it must be tempered. Temper helps reduce shrinking and cracking during firing and makes the pottery better able to withstand heat shock. Fine sand makes a good temper, as do some organic materials, such as cattail fuzz. To find the proper ratio of clay and temper,

mix some samples—with different ratios—into pencil-sized pieces, and let them dry. The ones that do not crack are likely good ratios.



Form clay into a thick pancake and cut a 1/4 piece off

Form a dam with the removed piece

Fill the void with temper

Usually, a temper of 20% works well. To get that ratio, make a pancake with clay, remove a quarter of it, and fill that part with a temper, as shown above.

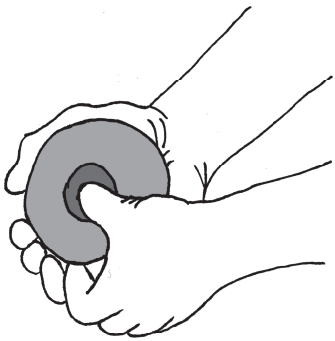
If your pottery keeps cracking after trying different approaches, break up and grind down the cracked pottery and use the powder as a temper.

Parts sand	Parts clay	Temper
1	9	10%
1	6	14%
1	4	20%
1	3	25%
1	2	33%

PRIMITIVE POTTERY

Making primitive pottery that can be used for holding water and cooking is more complex than making a clay fireplace. For making vessels, the steps for drying and firing need to be done much more gradually and carefully.

The next step after tempering is to dry the pottery. To prevent cracks, it should be dried as slowly as possible, so place it in the shade and out of the wind.



Roll the clay into a ball and push your thumb into the center

Gradually pinch the sides to make them thinner

with a bowline and its variants. The other 20% can be done with the figure-eight bend, trucker's hitch, friction hitch, girth hitch, clove hitch, Klemheist knot, Prusik knot, jam knot, and a tripod lashing, among other types.

I emphasize practical and versatile knots that can be untied even if tightly pulled under heavy loads. That is very important in a survival context where synthetic cordage is limited and cutting cordage is almost taboo.

CORDAGE

Have three or four cords of different diameters. Avoid earth-toned cords because they are easy to lose. Modern cordage is extremely valuable in the wild, so you'll have to be very strategic when rationing it. Try not to use cordage that is stronger than what is needed. Don't count on using paracord inner strands or cannibalizing other cords; that is a last resort, not a plan.

Paracord should be the largest diameter cord. Anything stronger is overkill and adds unnecessary weight and bulk for most circumstances.

Genuine MIL-SPEC 550 parachute cord is a static cord with seven inner strands and a minimum strength of 550 lb. (250 kg). Authentic MIL-SPEC paracord is best because its inner strands have three strands each instead of only two. The three-ply strands work much better for various applications, while the inner strands of commercial paracord unravel easily.

Paracord can be used for bear hangs, tripod lashings, or shelter lashings. Pack about 150 ft. (45 m) of paracord.

As a precaution, consider the *safe* working load of paracord to be half of its rated strength. Paracord should never be used for climbing because it is not a dynamic cord, and the force exerted in a fall (mass times acceleration) easily exceeds its strength.

Bank line is an excellent option for anything water-related, such as trotlines and setting nets. Pack about 150 ft. of tarred braided nylon line of 200 lb. test (Catahoula #30).

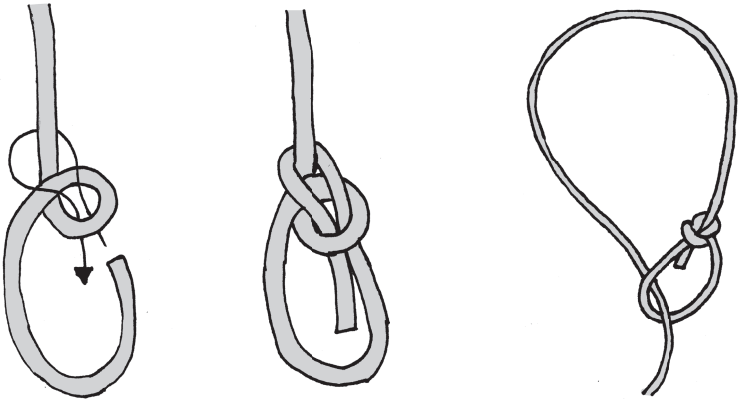
Furthermore, pack 300 ft. (100 m) of cheap, lightweight 1.8–2 mm diameter cord for multiple uses. This guyline-type cord is likely what you'll use the most.

Finally, if you want a thinner cord, pack 150 ft. (45 m) of braided fishing line, 0.4 mm in diameter (50–65 lb. test). Keep in mind that braided line is often waxed, so knots may slip.

BOWLINE

The bowline is a very secure and easy-to-tie knot. An essential feature of this knot is that it will loosen up even if pulled extremely tight.

A useful variant of the bowline is the running bowline. This knot allows you to quickly tie and untie things without undoing the bowline.



Bowline Running bowline

BOWLINE ON A BIGHT

The bowline on a bight is useful for creating a loop in the middle of a cord, and if the bowline gets tight, it is easier to untie than a regular overhand knot.

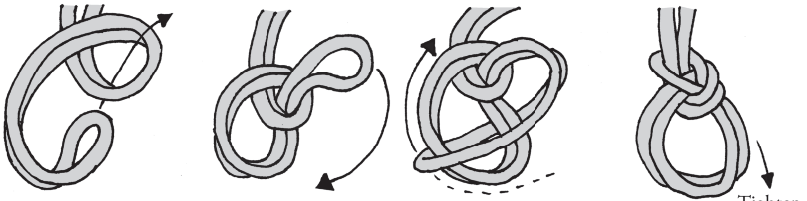


FIGURE-EIGHT BEND

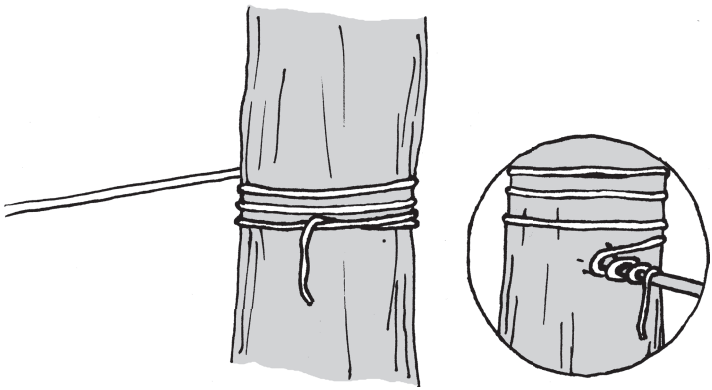
For joining two cords, use the reverse traced figure-eight bend (Flemish bend) instead of the double fisherman's knot. The figure-eight bend may take a bit longer to tie, but the advantage of this knot over an overhand knot or a double fisherman's knot is that, if the cord is pulled under very heavy tension, it can be untied much more easily than the other knots. A regular overhand knot will generally do if the two cords are tied permanently.

FRICTION HITCH

The friction hitch can be very strong, but its reliability depends on multiple factors: each knot is unique. To be clear, don't use it for situations that could put someone in danger.

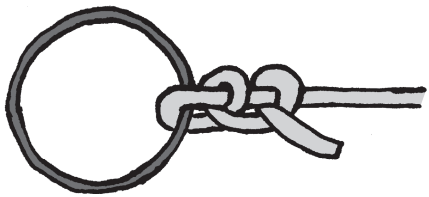
I like the friction hitch because it is extremely simple and unties without difficulty, no matter how tightly it was pulled. It can be adjusted relatively easily (like the taut-line hitch) and tied and untied with mitts. To tie the hitch, just roll a long cord around a solid tree or branch a couple of times. That's it.

Due to the texture and surface area of a tree or branch, the rope won't come loose no matter how hard you pull. If the cord only allows you a couple of turns, it's best to tie the loose end; otherwise, you can finish it however you want. You can pass it underneath the rope to hold it or let it hang. The main drawback of the friction hitch is that you need a long cord.



DOUBLE HALF-HITCH

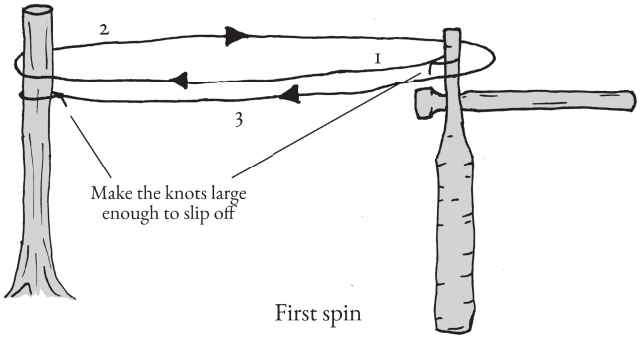
The double half-hitch is handy when working with a short rope end and when finishing lashings and other knots, but it's not very secure if used by itself. Add extra half-hitches for more security. This knot is not easy to untie when tied as the primary knot. That's why I usually use it for the excess tail of a different knot.



The other method has more steps and creates a very strong and durable cord. Unfortunately, this method yields only about one-tenth of the original length of the strands.

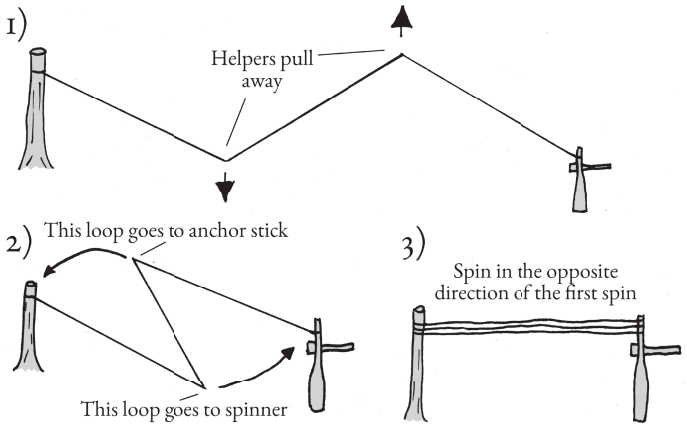
First, find an anchor stick that allows you to slip the loops of the cord on and off easily. Tie the cord to the rope twister. Then, pass it around the anchor stick and the rope twister, and then loop the end over the anchor stick as shown. For really long strands, a rope twister can be used at each end.

Stretch the cord a bit to ensure the three strands are under even tension. Then, use the rope twister to twist the cord in the same direction as the original twist in its strands. Once you feel moderate tension from twisting, the first spin is done.



First spin

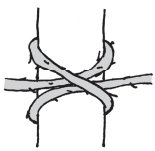
For the second spin, you must loop the cord around the anchor stick and the rope twister, as shown, while maintaining tension in the cord to avoid kinks. Stretch the strands evenly and twist them in the opposite direction of the first spin. Overtighten the twist, and pull the cord tightly to set it. Then, release the cord to let it settle. Finally, whip or melt the ends.



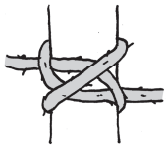
Second spin

KNOTS FOR NATURAL BINDINGS

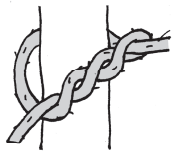
Natural cordage is not often as strong or as flexible as regular cordage. The knots shown below work better with rough, natural bindings, such as grass, withes, or roots.



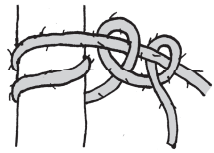
Clove hitch



Constrictor knot



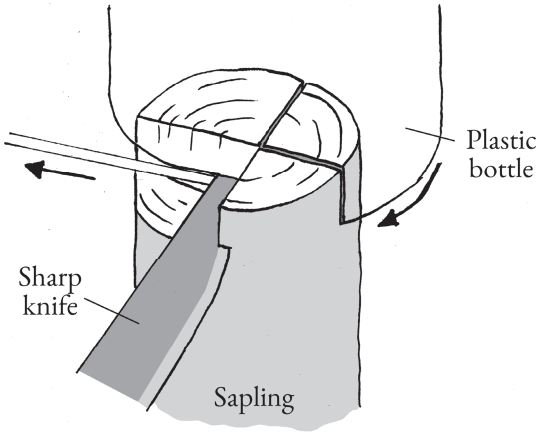
Timber hitch



Round turn and double half-hitch

PLASTIC CORDAGE

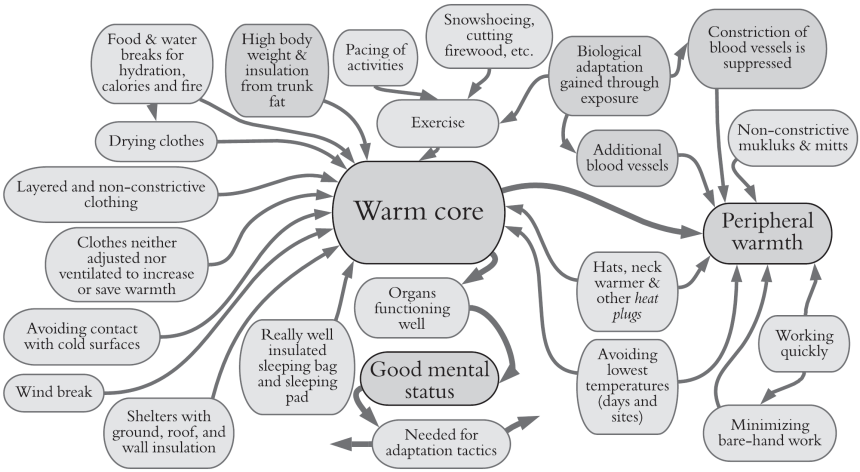
To make plastic cordage out of a plastic bottle, cut the first bit of cordage manually. Then rig up a knife and stump as shown below, and feed the bit of cord between the blade and stump. Then, pull the cordage through to cut more of it.



WINTER

LONG-TERM WINTER TIPS

Mind map dealing with cold



Modified from *Boreal forest adaptations*.

FALLING THROUGH ICE

In the "Travel" chapter, you'll find the procedure for getting out of a hole in the ice; here, you'll find what to do afterward in subfreezing conditions.

After your boots or clothes get soaked, some people recommend rolling in the snow so that the snow absorbs some of the moisture. In practice, rolling won't make much of a difference if you are entirely soaked. You're better off just focusing on creating a long-lasting fire and finding a place where you can spend a few hours drying your clothes. Or, if you have a dry set of clothes, change into them and get inside a sleeping bag; otherwise, follow the steps below.

If you can manage to walk with boots full of water, don't bother taking them off. At this stage, removing and wringing your clothes and boots is unnecessary. Even if you do, everything will still stay wet, and water from your upper clothing will move downward and soak your footwear again.

Stay active and make a fire. Then sit by the fire, wring your clothes, and dry them at a safe distance. You might have to do this one piece of clothing at a time, starting at the top.

If making a fire is not possible, wring your clothes as best as possible, get inside your shelter, and crawl into a *synthetic* sleeping bag. Eating will help you warm up.

LAYERING

The key to being warm in subfreezing temperatures is to wear multiple layers of insulating clothing. It's equally important to think of your body as a system that distributes warmth and blood flow from its central furnace into the extremities. If it's hard to keep your feet and hands warm, put more insulation over your head and core. If your core gets warm, your extremities will eventually warm up.

In cold weather, you should avoid overdressing and sweating. Still, sweating is not a "death sentence" if you can dry your clothes by a fire. In long-term, chronically cold conditions and when your body is exhausted and energy-deprived, it is better to be a bit overdressed than a bit underdressed.

In survival conditions, the aim is to be comfortably warm, not comfortably cool. Always be proactive and put on or take off layers to avoid sweating too much or getting cold. Pacing yourself to prevent excessive sweating is crucial.

Slightly overdressing and rarely adjusting clothing can be a deliberate tactic to increase the core temperature as a buffer against the cold, particularly in preparation for periods of inactivity. The techniques mentioned above are essential when the temperatures are freezing, and your body finds it hard to warm up due to food deprivation, fatigue, and chronic cold.

MITTEN HARNESS

Mittens can be crossed and thrown toward the back when fine dexterity is needed.

SOCKS

It isn't easy to keep winter socks in optimal condition when they are constantly being used. Have at least two pairs of winter socks per month of use.

Socks must be turned out often and fluffed up to prevent their fibers from matting and staying compressed. Insoles can be switched from foot to foot to avoid constantly compressing the same spots.

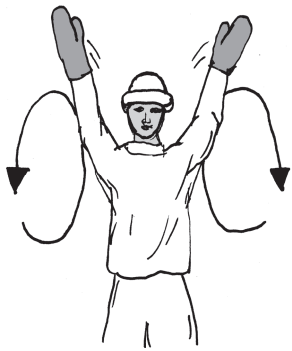
PRE-WARMING CLOTHES

It is helpful to warm up clothes before putting them on in the extreme cold. Try to pre-warm everything! Place any clothes you'll wear (e.g., hats, gloves, socks, boot liners) inside your sleeping bag overnight so that they are warm in the morning. Dressing inside a sleeping bag is also an excellent way to warm up. Keep metal contact gloves in a warm pocket as close to your body as possible, ready for use.

If you are forced to put on cold footwear, an effective Northerner trick is to place your bare feet in the snow until there's a lot of blood circulating. Then, wipe your feet dry and put on your socks and boots. The enhanced blood flow should quickly warm up the insulation in your boots.

REWARMING HANDS AND FEET

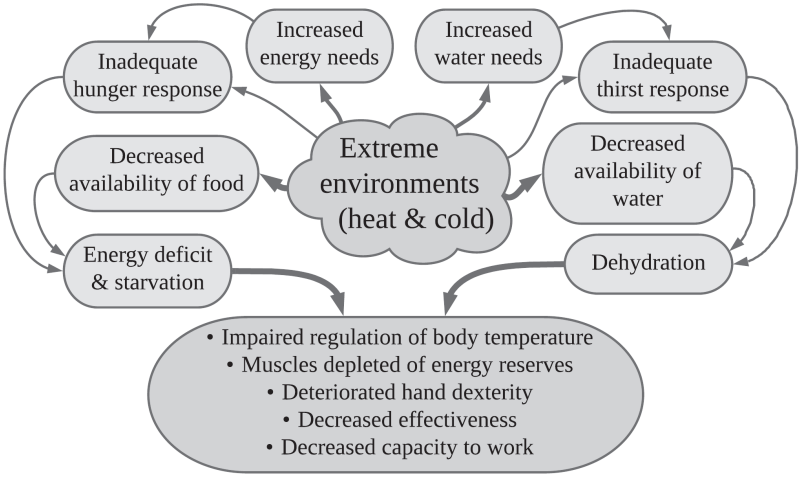
Arm windmills force warm blood down into the tiny capillaries of the fingers for temporary warmth.



HEALTH

Disclaimer: Nothing within this chapter—or book—should be misconstrued as medical advice. The information and techniques described herein are for educational purposes only. Any information or techniques you use are at your own risk. If you need medical advice, find a medical professional in your jurisdiction who can advise you accordingly.

Influence of wilderness environments on performance



Modified from *Wilderness Medicine*.

FIRST AID KIT

I highly recommend taking a 40- or 80-hour wilderness first aid course (WAFA or WFR, respectively) to learn how to manage emergencies and use a first aid kit in remote areas.

To build a first aid kit, start with a good quality prebuilt kit, such as the ones sold by Adventure Medical Kits (like the Mountain Explorer and Mountain Guide kits) and add items specific to your circumstances.

Some recommendations for additional items are:

- hypothermia thermometer
- dishwashing soap
- single-use superglue or medical glue (for superficial wound closure)
- SAM Splint
- duct tape
- ziplock bags
- gloves
- antiseptic towelettes
- first aid tape
- waterproof notepad and pencils for SAMPLE/SOAP notes
- suture kit (for particular circumstances, and only under full knowledge of the risks)
- extra gauze and bandages
- clove oil
- emergency dental kit
- over-the-counter meds, such as aspirin, ibuprofen, Benadryl, and acetaminophen
- general antibiotics, such as ciprofloxacin, cephalexin, and amoxicillin (see appendix)
- antibiotic ointment
- lighter
- knife
- shears
- signal mirror
- Fresnel lens
- pocket WFA manual (*The Field Guide of Wilderness & Rescue Medicine* by Jim Morrissey)
- two EpiPens (if your group has a history of severe allergic reactions)
- compression bandages
- combat application tourniquet (CAT)
- triangular bandages

Always keep the first aid kit inside a waterproof dry bag, as many of its contents must always stay dry. The appendix goes more in depth into WFA kits and special considerations for long-term contexts.

MONITORING YOUR HEALTH

In remote and challenging environments, it's wise to be proactive and monitor your overall health. Don't wait until you have an issue to start monitoring. There are various signs and symptoms that are relatively easy to notice.

HYDRATION

Good hydration is extremely important because dehydration severely decreases your mental and physical performances. For that reason, dehydration can quickly lead—directly or indirectly—to an emergency.

Staying well hydrated in survival contexts can be particularly challenging depending on the availability of water, the energy and time needed for water treatment, the climate, and your level of exertion.

The color of your urine is one of the best ways of monitoring your hydration. Darker, yellow-colored urine indicates a water deficiency, and paler, lemonade-colored urine suggests adequate hydration.

SIGNS

Your resting heart rate is an easy sign to monitor if you have a watch, but be consistent with taking the measurements at the same time and in the same context each day. It's best to check your resting heart rate right after waking up. If your heart rate tends to be significantly higher or lower than your usual heart rate, that's a warning sign.

Blood pressure can't be accurately measured without instruments, but you can be aware of it indirectly. During a long-term survival situation, it's likely that your blood pressure will drop, and you'll often suffer a head rush whenever you stand up quickly.

Your stool can be a good way of checking how your digestive system is doing. Pay attention to your stool's consistency and adjust your diet if possible.

If you feel pain, monitor it over time by keeping a journal based on the OPQRST mnemonic: onset, provokes, quality, radiates, severity, and time.

ENERGY

Keep a rough log of how much food you are eating. Also, observe and note how much fat you have throughout your body and how the distribution of fat changes as you lose weight.

Keep track of how many hours you are sleeping. If you look up at the sky and it appears to be receding, you're probably exhausted.

In a survival context, sexual drive can help signal overall energy levels and physical condition.

MIND

Some symptoms that you should note are forgetfulness, distraction, and irritability.

STARVATION

Starvation is quite the slippery slope; you must avoid getting onto the steep part. For someone who has never gone truly hungry—over a few days or even several weeks—the experience can hit them like a truck. The lack of energy can quickly become a vicious cycle because you need energy to forage. That is why having a significant reserve of fat and pacing yourself is crucial for delaying the effects of starvation.

Adults can survive for weeks or months without food, depending on the amount of fat in their bodies, among other factors. A well-nourished adult has sufficient fat stores to live without food for 40 to 60 days. Fat stores vary, but they are typically between 22–33 lb. (10–15 kg) or about 27% of an adult's bodyweight. Each pound of body fat holds approximately 3,500 kcal of energy (1 kg of body fat = 7,700 kcal). Protein is another emergency source of energy. An average male weighing 154 lb. (70 kg) may have about 13 lb. (6 kg) of muscle or protein, roughly 20,000 kcal. A healthy, nonobese adult may die practically any time after 50% of their starting weight has diminished.

People who have undertaken prolonged starvation may suffer from low sodium (hyponatremia), low calcium, low serum magnesium, severe anemia, and impaired membrane and cardiovascular functions. Taking a multivitamin and half salt (salt and potassium chloride blend) might help counteract some of those effects.

Starving people do not adapt well to temperature extremes; the cold is particularly difficult to deal with because shivering uses lots of energy. One

of the first things the body does when it's starving is to reduce its energy use. It lowers its metabolism and reduces its readily available energy. That is an effective life-prolonging strategy, but unfortunately, it makes the body susceptible to the cold.

I was cold during the last stage of my 180 days in the wild even though I didn't experience severely cold weather. I experienced living in a constant state of "hitting the wall" in terms of lacking energy and feeling cold. I learned a good lesson: have lots of warm clothes and a very warm sleeping bag (or two).

Mors Kochanski advocated fasting for *short-term* survival. He argued that it was preferable not to eat at all than to eat less than the minimum number of calories needed by the body (basal metabolic rate or BMR). For fasting, he recommended drinking far more water than usual, and boiling it and drinking it as hot as possible.

If gathering your daily energy needs in a long-term context is next to impossible, it is easier to manage your energy budget by fasting rather than attempting to forage enough food. You must ensure that you spend less energy gathering, processing, and digesting food than what you gain from that food. That is incredibly hard to manage in an unsuitable or restrictive environment. Moreover, fasting causes physiological changes that save energy and help the body prolong its life in a context of severe food deprivation.

Another advantage of fasting is that it reduces the discomfort from hunger pangs. In addition, fasting leaves more time for resting and other activities.

Obviously, fasting is not sustainable in the long term, but it may be forced on you by extreme environments and conditions. If possible, leave that area.

I suspect the most effective way to combine the physiological advantages of fasting with those of eating in a survival context is by doing interval fasting. If you fast for a few days, preserve food for later, and then eat for a few days—meeting the BMR energy needs of your body—you should get some of the benefits of fasting (energy preservation) as well as some much-needed nourishment. On the other hand, you may also find that eating a little everyday instead of interval fasting is better for your body.

If you are refeeding after a long period without food, start with 400 kcals and gradually go from there as needed. Some of the variables used when calculating the amount of calories for refeeding are bodyweight, length of

GENERAL ISSUES

DEHYDRATION

After oxygen, water is the most important substance for maintaining bodily functions. Water is an essential ingredient for most chemical reactions and processes happening inside our bodies. If we lack water, these vital reactions can't occur.

Dehydration is a slippery slope that can lead to hallucinations and death, sometimes within hours or days. Do not rely on feeling thirsty as a way to signal that you are dehydrated; often, there is a significant lag in this trigger.

Even mild dehydration will begin to impair your mental status, making it easy to make dumb mistakes that can lead to worse mistakes, and so on. The best defense against this slippery slope is to always be adequately hydrated and to recognize the early warning signs of dehydration.

First signs and symptoms of dehydration:

- thirst
- headache
- decreased urination
- dark, strong-smelling urine
- light-headedness, dizziness, or fainting when standing up

Checking the color of your urine is an excellent way to assess your hydration levels.

In the winter, you may get complacent because you don't have other environmental triggers, like the hot sun and heat, to remind you to drink water. But water is as essential in the winter as in the summer. In addition, the body can handle the cold much better when it is adequately hydrated.

Generally, drinking about 17–25 fl. oz. (500 – 750 mL) of water per hour should be more than enough when dehydration may be an issue. Nevertheless, there are many variables, so it's best to be mindful of your body and watch for any warning signs.

HYPONATREMIA

Hyponatremia is the lack of sodium. Not eating enough food and sweating a lot can result in losing too much sodium, leading to dizziness, fainting, and even collapsing. That can be prevented by consuming one teaspoon (5 g) of table salt per day. If salt is not available, then avoid sweating excessively.

Common symptoms include watery diarrhea (without blood or pus), abdominal cramps, nausea, flatulence, and sometimes vomiting and mild fever.

Most people recover without treatment within one to two weeks. In order to facilitate a full recovery, try to minimize vomiting and dehydration.

GIARDIASIS

Giardiasis (beaver fever) is an illness caused by protozoan parasites. Giardia is primarily transmitted through drinking water, and has an incubation period of one to two weeks. Around half of people with giardiasis have no symptoms.

The symptoms can be quite variable. Sometimes there is a sudden onset of explosive diarrhea, abdominal cramps, flatulence, fever, and vomiting. Usually, this stage lasts three to four days. Then, the symptoms decrease in intensity and come and go. The stools can be soft and foul-smelling, but there is no blood or pus.

Metronidazole can be used to treat giardiasis (250 mg q6h ×5–7 days), but it can cause nausea and discomfort.

E. COLI

E. coli bacteria is the most common cause of traveler's diarrhea. Some of *E. coli*'s strains can cause severe food poisoning. The main symptoms are persistent diarrhea (sometimes bloody), stomach cramps, nausea, and vomiting. Traveler's diarrhea usually resolves itself, so focus on proper hydration.

COLD WEATHER ISSUES

HYPOTHERMIA

Hypothermia is the drop in temperature of the body's core. The following conditions make the perfect recipe for hypothermia: cold, wet, and windy conditions; inadequate clothing; insufficient water and food intake; and fatigue.

It's important to recognize and deal with mild hypothermia early on when the body can quickly be warmed back up. But if moderate or severe hypothermia develops, it will turn into a full-scale emergency.

If you can't rely on others to notice a sudden lack of coordination or mental deficit in you, then you must be very conscious and notice even the slightest signs of hypothermia. If you miss those early signs while you can still recover, the hypothermia will worsen and eventually, you are done. Once your ability to function and think properly is gone, it will be practically impossible to rescue yourself.

Some first clues to watch for are feeling very cold and shivering. Although these clues don't necessarily mean your core temperature is low, they should trigger you to correct your situation.

MILD HYPOTHERMIA

With mild hypothermia—a core temperature of 95°–90°F (35°C–32°C)—the temperature regulation mechanisms in your body still work normally. One of these mechanisms is shivering, which is mainly how the body warms itself unless it has no energy left or you consumed drugs. Exercise and prolonged starvation may also inhibit shivering, making it difficult for you to notice the onset of hypothermia.

Uncontrollable shivering occurs when the core temperature falls to about 93°F (34°C). The inability to touch your thumb to the little finger of the same hand or shivering aggressively is the final warning for you to warm up. These circumstances signal the last chance for self-help.

Fine motor skills are impaired first, followed by gross motor skills. Mental impairment follows once the core temperature approaches 90°F (32°C).

The mildly hypothermic individual "umbles":

- Fumbles (fine motor)
- Stumbles (gross motor)
- Tumbles (gross motor)
- Mumbles (mental)
- Grumbles (mental)

MODERATE AND SEVERE HYPOTHERMIA

The core temperature of someone experiencing moderate hypothermia ranges from 90°F–82°F (32°C–28°C). In this stage, the body's warming

Almost no one recovers fully from trench foot: most are left with a permanently reduced tolerance to cold. If the injuries are severe, gangrene may occur, and amputation may be necessary.

FROSTNIP

Frostnip is the freezing of the skin's surface (first-degree frostbite). It usually occurs on noses, cheeks, earlobes, and fingertips. The skin may have a white frost spot and feel waxy, numb, and cold, but it will still be relatively soft. Frostnip may look like a superficial burn (first-degree burn). Wind chill is the usual cause for frostnip on the face, and contact with cold metal is the typical cause for frostnip on fingertips.

Frostnip is relatively common and not serious. To treat frostnip, thaw the spot with a warm hand or warm water until the skin returns to normal. It should take a few seconds. Never rub the area. The outer layer of skin may turn reddish and later peel, like a sunburn. If frostnip is not dealt with in time, it can progress to partial-thickness frostbite (second-degree frostbite).

FROSTBITE

Be aware of the threat of frostbite, recognize it, and treat it early. Early symptoms of frostbite begin with pain, then progress to numbness. As the freezing deepens, all sensation, including pain, disappears. However, people can experience different symptoms.

Partial-thickness frostbite (second-degree frostbite) is a more severe skin freezing injury. The skin may initially resemble frostnip: white, waxy, numb, and cold. However, it will feel harder and will dent if pressed. Often, it is impossible to assess the depth of damage before rewarming. When second-degree frostbite is thawed, a blister will form within minutes, or even hours later. Protect the blister with dressings, and avoid bursting or freezing it.

Full-thickness frostbite (third-degree frostbite) means the skin appears pale white and is frozen solid, and the person will have no sensation in the area. Again, the total damage can only be assessed after rewarming. The tissue damaged by third-degree frostbite dies, but part of the extremity could be saved. Once thawed, third-degree frostbitten extremities can't be used due to the excruciating pain.

The treatment for second- and third-degree frostbite is rapid rewarming and minimizing the post-warming circulatory impairment. Rapid rewarming reduces the severity of the damage, but it shouldn't be performed if the area may freeze again or if the person needs to walk on third-degree frostbitten

feet for a medevac. If there is a risk of accidentally refreezing the tissue, it's best not to thaw it, for the cycle of thawing and refreezing inflicts far more damage.

To thaw the injury, submerge the affected part in a warm water bath at a temperature of 99° F–102°F (37°C–39°C). Heating the water to above the recommended temperature is more painful for the injury, doesn't improve the situation, and may cause burns. Do not use dry heat (campfires) to thaw the tissue! And don't rub! Too much time in warm water (overthawing) is better than not enough time (underthawing). Monitor the temperature to keep it at an appropriate warmth; add warm water often. If you don't have a thermometer, dip your bare elbow in the water. It should feel comfortably warm but not hot.

Once the area is fully thawed, air-dry the skin then cover it in antibiotic ointment and dressings and keep it elevated. Protect the injury from trauma and irritation. One or two aspirin tablets should be taken while the tissues are still frozen and every six hours afterward to improve blood circulation in the area. Strong painkillers are recommended.

SNOW BLINDNESS

Snow blindness can be crippling and quite painful, but it's easy to prevent by wearing dark sunglasses. Clear glasses can be smoked or taped, and snow goggles may be improvised with tape or birchbark.

If you expose your eyes to excessive amounts of sunlight, you risk severe pain in your eyes a few hours later. A cold, water-soaked cloth might offer relief. Keep your eyes covered, and remain in a dark place. If the exposure was not severe, you might feel better the following day. Otherwise, snow blindness may last up to three days. Fortunately, it usually heals by itself.

OTHER INFECTIONS AND DISEASES

The following diseases are relatively rare, but anyone handling wild meats has a higher risk of contracting them. Use gloves whenever you handle uncooked meat, wash your hands afterward, and cook meat thoroughly.

TRICHINOSIS

Trichinosis is an infection caused by microscopic roundworms. It is contracted by eating undercooked meat and fat containing trichinella cysts.

The adult worms reproduce in the intestines, and the young worms travel throughout the body to form cysts in different places. Trichinosis is generally carried by omnivores and carnivores like bears, hogs, bobcats, wolves, coyotes, foxes, raccoons, and skunks.

To prevent trichinosis, cook food to an internal temperature of 170°F (75°C). Boiling is an easy way to tell you've reached a high enough temperature. Otherwise, roast the meat until it is thoroughly heated. Then, slice through the thickest part and check for signs of steaming, or insert your finger: if you can't touch the meat for more than a second, you have probably reached the proper temperature. Keep the meat in the heat for a few minutes, just to be sure. Freezing or drying the meat is not effective against trichinosis.

The first symptoms of trichinosis include abdominal discomfort, diarrhea, nausea, fatigue, and fever. They are usually followed by muscle pain, fever with chills, aching joints, swelling around the eyes, and bleeding around the fingernails and in the whites of the eyes. Symptoms may appear after a few hours to five days after ingestion, and they may persist for up to six weeks before the infection clears. A severe case could lead to death.

No safe, effective drug is available for combating the larvae. Mebendazole (400 mg q8h × 13 days) or albendazole (400 mg q12h × 8–14 days) works against adult worms in the intestine, but these drugs won't work for worms outside it. Supplement them with prednisone (30–60 mg/day PO ×10–30 days) to relieve severe swelling.

TULAREMIA

Tularemia (rabbit fever) is a bacterial infection commonly associated with rabbits, but it is also carried by rodents, hares, moles, hogs, beavers, muskrats, squirrels, rats, mice, grouse, and ticks. It is transmitted by handling dead animals, eating undercooked meat, drinking contaminated water, as well as from tick and fly bites. Animals usually get it from water contaminated with carcasses, and carriers typically have small white spots on their livers, spleens, lungs, or kidneys.

The symptoms begin with an abrupt fever, cough, vomiting, and headache. The symptoms may relapse several days after a period of abatement and can affect many parts of the body. The lymph nodes may swell, and a small boil-like eruption or an ulcer may appear at the site of the infection. Symptoms usually appear in two to four days, and the disease lasts about two weeks.

Adult deer tick (*Ixodes scapularis*, female)

REMOVING A TICK

Regardless of species, all ticks should be removed as soon as they are discovered. Use tweezers to grasp the tick as close to the skin as possible and remove it straight up in a steady motion. That will give you the best chance of pulling it out intact. Don't twist, turn, or jerk. If removed at an angle, the mouthparts sometimes remain in the skin and can cause slight irritation.

Don't burn or squeeze ticks because they may vomit into the bite and introduce pathogens. If you don't have tweezers, use a toothpick-sized stick to gently dislodge the tick.

LYME DISEASE

Lyme disease is usually transmitted by the black-legged tick *Ixodes scapularis* (aka deer tick) and the western black-legged tick *Ixodes pacificus*. Typically, the ticks must be attached for more than 36 hours to transmit the disease.

The symptoms usually begin seven to 10 days after the bite and include fever, chills, headache, fatigue, and muscle and joint aches. Usually, a distinctive rash develops at the bite site: it starts as a red circle, and as it expands, it may resemble a bull's-eye target. The symptoms later include severe headaches, neck stiffness, facial palsy, pain along the body, irregular heartbeat, and arthritis.

When the disease is diagnosed early in a medical facility, these oral antibiotics are given: amoxicillin (500 mg q8h ×14 days) or doxycycline (100 mg q12h ×14 days).

In the wild, you could try a single dose of doxycycline (200 mg for adults) as a preventive measure if *all* the following criteria are met:

1. the attached tick is an adult or nymphal black-legged tick;
2. the tick was attached for over 36 hours (engorgement or time estimate);
3. the antibiotics will be given within 72 hours of the tick's removal; and
4. the person is not under eight years of age, pregnant, or lactating (doxycycline is contraindicated in those cases).

LEECHES

Leeches shouldn't be pulled off like ticks because they have serrated teeth. If you find a leech early enough before it bites, you may pull it off, as long as you make sure it's hanging from its big end (its bottom) and not its small end (its mouth).

If the leech is already attached, place your fingernail next to its mouth and gently push the mouth sideways. Or try poking its mouth gently with a toothpick-sized stick. Try a sprinkle of salt or ash on its body if it doesn't release, or touch it with a lit stick. Try the gentle ways first to minimize the risk of the leech vomiting into the bite.

POISONOUS PLANTS

POISON IVY

Typically, poison ivy (*Toxicodendron radicans* and *T. rydbergii*) grows east of the Rocky Mountains, and poison oak grows west of the Rocky Mountains.

Posion ivy has three separate leaflets each 1.2″–4.7″ (3–12 cm) long. It is a climbing shrub often found in wooded areas growing up the trunks of trees. The stems holding the leaves alternate on each side, rather than branching off directly opposite from each other. The middle stem holding the largest leaflet is always longer.

Toxicodendron radicans

Poison oak is found in wooded areas on the west coast of North America. It is a shrub with multiple stems that form three leaflets shaped like oak leaves.

Toxicodendron diversilobum

hallucinations, paralysis, psychosis, and gangrene. This parasitic fungus takes the place of grain kernels and looks dark purple, white-purple, or black. Usually, ergot kernels are slightly larger than typical grains, and they look quite distinct.

If you are harvesting a grass like wild rice, you should be on the lookout for this fungus. You'll likely harvest multiple ergot kernels among your wild rice. Pick the ergot kernels by hand or try submerging the grains in salty or plain water to remove them. Most of them should float. Look for any remaining ergot kernels among the grains.

It is not the end of the world if you eat a few kernels by accident. Poisoning happens when moderate or high doses are eaten in a short time.

MEDICINAL PLANTS

USNEA

Usnea spp. (old man's beard) is a lichen found year-round hanging from trees. It is usually gray to pale green and contains usnic acid. This acid has antibiotic, anti-inflammatory, and pain-relieving properties. It has been used throughout the world to treat various ailments.

To distinguish *Usnea* from similar species, break it to confirm that it contains a slightly elastic white inner core.

Nick Rowland / CC BY-ND 2.0

ELECTRONICS

SOLAR PANELS

Solar chargers with integrated battery packs are problematic because lithium-ion batteries won't charge when they are too hot or too cold. Integrated batteries introduce numerous points of failure and reduce the versatility of the chargers.

The most resilient chargers are just simple solar panels that can directly charge electronics without an intermediate battery. These solar panels must feature a restart function that kicks in after a cloud passes by, for most devices will stop charging after the current decreases, and they won't resume charging even if the current goes back up again.

The solar panel should have an output of at least 5–7 W if it's a high-quality panel, but I would recommend at least 10 W and 1.7 A. Keep in mind that advertised wattage tends to be higher than the actual output. The panel should also feature a regular female USB port. The surface area of the solar cells is crucial: small panels don't work well.

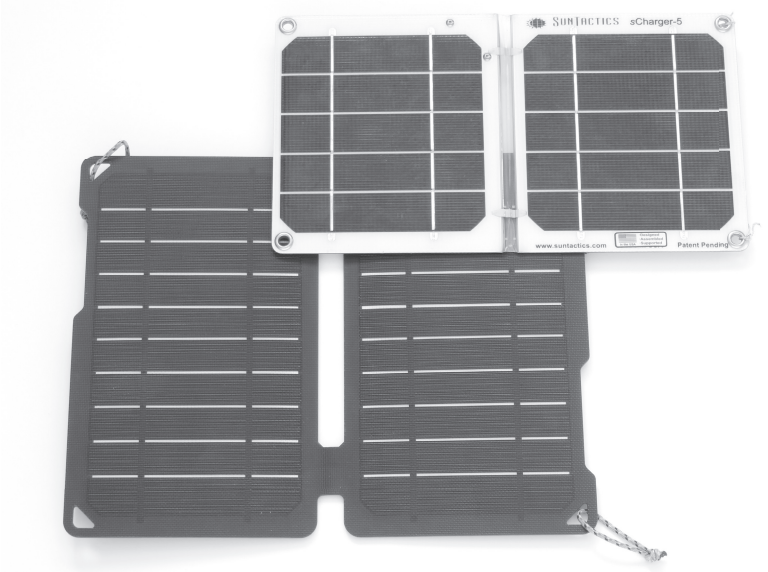
To get the advantages of a solar charger with an integrated battery but without the drawbacks, have multiple battery packs. That way, you can charge the battery packs during the day and then charge the devices at night.

Check the operating temperature of your solar panel if you will experience extreme cold.

A challenge when using solar panels is repositioning the panel throughout the day to face the sun. Rain, snow, and clouds are also an issue.

You can place the solar panel and battery pack inside a waterproof map case when water protection is crucial, such as when canoeing.

Despite all their drawbacks, solar panels are still the best recharging option because they work reasonably well without taking up much time from your day.



I recommend the Renogy E-Flex 10W (bottom left) and the Suntactics S5 (top right) solar panels. Both panels are light, simple, water-resistant, and reliable.

BATTERY PACKS

Battery packs are the other component needed for solar charging. You can get by without them by charging your devices directly from the solar panels, but it is inconvenient, and solar panels can't store energy for overcast days.

Battery packs should be waterproof, shockproof, and have a capacity of at least 6000–10,000 mAh to make full use of an entire day of charging.

Lithium-ion batteries won't charge in subfreezing temperatures, so the battery pack must be kept warm and insulated. You can wrap a hot water bottle and battery pack together inside a bundle of insulated clothes and connect the battery pack to the solar panel to charge. You can also substitute the hot water bottle for a rock that has been heated near a fire—make sure it's not too hot, or it could melt the battery pack or clothes.

BATTERIES

For headlamps and other electronics, the best option is to use rechargeable NiMH AA batteries and have extras for clouded periods as well.

Neither NiMH nor lithium-ion batteries charge at freezing temperatures; they must be warm to charge.

Cables are a point of failure, so have spares and avoid twisting them. Have long cables so you can charge your battery packs and devices from inside your shelter. Short cables are quite durable because they don't twist much.

For charging AA batteries, I recommend the Olight Universal Charger because it's compact and simple, but it only charges one battery at a time.

HEADLAMPS

There is no doubt that headlamps are more versatile and practical than flashlights. Having a reliable headlamp with a long battery life is crucial, especially throughout the winter in northern latitudes when the darkness dominates.

Headlamps with different brightness levels allow you to increase their run time if needed. In an emergency, conserving your battery could be a big deal.

Nothing ruins your night vision faster than a bright light. Contrary to popular belief, the color of the light is not as important for preserving your night vision as is the ability to dim the light really low. Use the dimmest setting. When you use your night vision, you retain your peripheral vision and awareness and the ability to see outside the range of the light.

A survival headlamp must be fully waterproof: certified to IPX7 or IPX8 standards, meaning the device can stay submerged for at least 30 minutes under 1 m of water.

It should also work with a single AA rechargeable battery. The reason why the AA battery is the way to go is because a device that takes AA batteries can also work with a AAA battery with the help of some aluminum foil. In contrast, a headlamp that takes AAA batteries can't use a AA battery. Although both batteries contain about the same energy per weight, it's best to have AA batteries because they pack more charge.

THERMOMETERS

Watch thermometers are not very useful because you must take off the watch and wait 15 to 20 minutes for an accurate temperature reading. In addition, most watch thermometers won't take readings if it is colder than 14°F (-10°C), which is precisely when knowing the temperature is important. For these reasons, I highly recommend having a field thermometer.

Most keychain thermometers are highly inaccurate, so the only ones I recommend are the Digital Zipogage by Sun Company, or a liquid-in-glass field thermometer (with an integrated metal case and window).

SMARTPHONES AND TABLETS

At first glance, smartphones and tablets don't seem like they belong in the wilderness, but smartphones and tablets can be a considerable aid for long-term survival. There are clear benefits of having them: satellite imagery, topographic maps, offline GPS, and a medical library.

You can store thousands of books on a smartphone. Some books that are particularly useful are field guides on wild edibles and medical books for researching specific health issues. Check the references at the end of this book for some suggestions.

I recommend having a few e-books on the topics of wilderness, remote, and expedition medicine and a few in-depth medical books, such as medical guides for ships and a recent copy of the Physicians' Desk Reference.

Install a few apps to read e-books and PDFs, such as Librera Reader and Moon+ Reader for Android or iBooks for iOS. Another considerable help—particularly if you have a vast library—is an app for searching text inside multiple e-books or PDFs at once. I recommend DocSearch+ for Android or QuickSearch PDF Reader for iOS.

In addition to books on survival, I suggest you store copies of the operating manuals of all the relevant electronic devices and other references.

Furthermore, download the Kiwix.org app on your device and store a ZIM file of the entire Wikipedia (40–90 GB) or just its medical section (800 MB–1.8 GB) in a microSD card for offline use.

Videos are another good reference to have. Download a good video player app like VLC Media Player and store videos of wilderness skills—for instance, net-making or moose calling.

If you use satellite communications, check if there are companion apps available. For example, when using a Garmin inReach device, it's

NATURAL HAZARDS

LIGHTNING

There is no place in the wild that is safe from lightning, except for substantial buildings—with wiring and plumbing—and metal-topped vehicles. There are two general approaches to lightning in the wilderness: avoid the risk and stay indoors or accept that there is a lightning risk. Sitting on a pad, positioning your body a certain way, and staying inside a tent won't lower the risk. Depending on their size and height, small shelters may actually increase the risk because sideflashes can hit the occupants.

When a storm is approaching, avoid exposed areas, such as ridges, open water, isolated tall objects, or the bases of trees. Lightning may travel as far as 10 mi. (16 km) or more from a thunderstorm, and it can strike before, during, and after the storm.

The 30/30 rule—seek shelter when the time between the flash and crash is less than 30 seconds and remain there 30 minutes after the last flash or crash—is meant for civilization and is often impractical to follow in the wilderness. But keep it in mind.

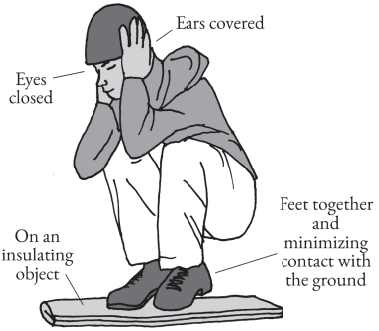
If you're caught in the forest, seek shelter in a low area, under a thick growth of saplings or small trees. If you're in a group, spread out at least 20–50 ft. (6–15 m), but keep visual contact. Get low and insulate yourself from the ground as much as possible (e.g., using sleeping pads, ropes, or PFDs); this may help if the strike hits nearby.

LIGHTNING POSITION

The lightning position may help slightly reduce the chance of a direct strike and some effects of lightning, but it is no substitute for getting to a safer place. There is controversy around how much difference the lightning position makes, but there is at least comfort in action.

The lightning position consists of putting your feet together to significantly reduce the effects of ground current and squatting or crouching and balling up to slightly mitigate the impact of sideflashes. In addition, wrapping your arms around your legs, closing your eyes, and covering your ears helps reduce the effects of the current and blast.

The lightning position is challenging to hold for a long time, so it is more practical to sit down on your bum with your legs crossed or stretched out in front of you, and your arms around your legs. Keep your feet together, and place an insulating object underneath you if you can.



WILDFIRES

Evacuation is the ideal way of dealing with wildfires. If you are in an area near large bodies of water, those could provide a safer area to retreat to instead of doing a full evacuation. But smoke inhalation and radiant heat could still be significant issues.

If all protection and prevention measures have been exhausted, and you're down to desperate choices, this is what you can do:

LAST-RESORT WILDFIRE SURVIVAL TECHNIQUES

RETREAT INTO A SAFE ZONE

1. Go to an area that won't burn; the bigger, the better. Or choose an area with the least combustible material.
2. Use every means possible to protect yourself from the heat and hot air currents.

3. Protect your airway from the heat at all costs, and minimize smoke inhalation.
4. Remain as calm as possible.

Unless there is an apparent escape, do not run. Move downhill. Conserve your strength. If you become exhausted, you will be more prone to heatstroke, and you might miss an opportunity to take refuge.

BURN OUT A SAFETY AREA

If you are in dry grass or low shrubs and the flames are too high to run through, burn out an area as large as you can between you and the fire front. It takes time for the vegetation to burn down, so this may not be effective as a last-ditch attempt, nor does this work well in an intense fire. Go into the burned-out area, and hunker down, covering as much of your skin as possible.

HUNKER DOWN IN PLACE

Protect yourself from the heat at all costs. Many people die way before the flames reach them. The heat from a fire can quickly cause heatstroke, so find cover from it in an area that won't burn, such as a hole, large rock, stream, pond, or lake. Cover your head and skin with clothing or dirt to protect yourself from the heat.

Slow down your breathing. Avoid inhaling smoke: keep your face close to the ground, where there is less smoke. Hold a damp cloth over your nose, and try to breathe in the least amount of smoke. If breathing excessively hot air is a possibility, place a dry—not moist—cloth over your mouth. The lungs can withstand dry heat better than moist heat.

Lie facedown in an area that won't burn. If the fire overtakes you, you have a better chance of survival in this position than standing upright or kneeling.

RUN THROUGH THE FIRE INTO A BURNED-OUT AREA

Running through the flames into a burned area can be a viable last resort in dry grass or low shrubs. Enter the burned area whenever and wherever possible. Move quickly, parallel to the fire front. Choose a place where the flames are less than 3 ft. (1 m) deep, where you can see through them clearly,

AFTERWORD

Surviving in the wilderness for an extended period is a widespread idea in the survival, bushcraft, and prepper communities.

The idea of bugging out to the woods in case of a widespread disaster or societal collapse is a bit misguided: you are wiser to shelter in place in a resilient community.

I wrote this book with a long-term perspective because it can be useful for those who live at the edge of civilization and those interested in long-term wilderness living and survival.

FUNDAMENTAL PRINCIPLES OF LONG-TERM SURVIVAL

- **Work with nature:** work smart by following the rhythms of nature instead of struggling against the infinite or imposing yourself on nature's rhythms.

- **Improvise, experiment, and adapt:** make do with what you have, be creative and think laterally, change your expectations and mindset, and adjust to the changing conditions.

- **Have an edge:** don't stay stuck in the past. Don't bring a knife to a gunfight. The context in which our hunter-gatherer ancestors lived was very different: they lived in tribes and in a world where wild foods were more abundant. Use any available advantage, but be respectful.

- **Err on the side of caution**: don't take unnecessary risks. Always keep in mind the risk versus reward of your actions.

- **Develop a resilient mindset:** exercise and practice a survivor attitude. Your mindset can either be your greatest asset or your greatest liability.

- **Experience trumps skills and knowledge:** you can be well-versed in the skills and know all the theory around survival, but dirt time really matters. With enough experience, you'll naturally learn the skills and knowledge. And you'll know which questions to ask!

- **Be efficient:** improve your energy return on investment by minimizing the energy and time you spend and maximizing the energy and time you gain.

- **Imitate the ultimate survivalists:** the local animals and plants use strategies that have been developed over millennia. Those strategies work.

- **Respect nature:** cultivate an attitude of gratitude and humility. Without respect and sustainability, the ability to survive long-term is unattainable.

- **There are no rules in survival:** there are only guidelines. Ultimately, you'll have to adapt those guidelines to each unique context.

APPENDIX

SHELTER

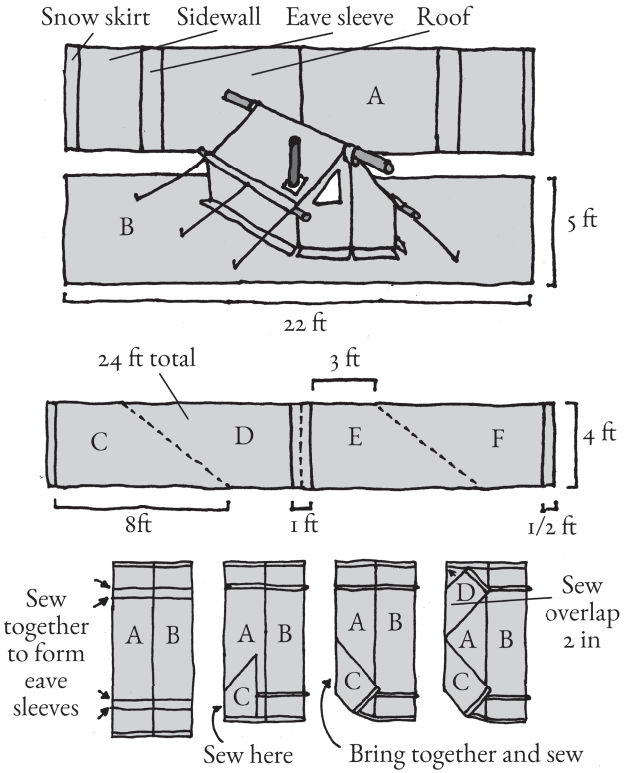
PATTERN FOR A TENT

Having spent an entire winter in the boreal forest in a homemade sil-nylon tent, I think a good size for a long-term tent for one or two people is 8 ft. × 10 ft. (2.4 ×3 m), a 3 ft. (90 cm) sidewall, and a 7.5–8 ft. (2.3–2.4 m) tall ridge. Shorter sidewalls significantly reduce the usable space, and taller sidewalls collect more snow. The ridge height leaves some room for hanging things and increases the usable space on the sides. The overall area allows enough space for a portable stove and two beds.

Unlike canvas tents, waterproof wall tents gather lots of condensation. That is not a complete deal-breaker, but it is something to consider. To reduce condensation problems in a DIY sil-nylon tent, keep the roof's angle shorter than 80 degrees so that condensation slides to the sidewalls instead of dripping over your sleeping bag.

I highly recommend adding windows of marine-grade, cold-resistant PVC or vinyl. That increases the illumination inside the tent and boosts morale a lot. But the windows should be attached to the tent with Velcro to make them easily removable. That allows you to set up the tent and warm up the rolled windows inside it. Once warmed, the PVC windows can be easily unrolled (they can't be folded and unfolded in freezing temperatures or they will crack). The windows must be rolled up before packing and storing;

otherwise, they may break at the folds if folded. Position the windows close to the stove to minimize condensation, frost, and ice blocking the view.



Suggested materials: Polyurethane coated 1.9 oz. (70D) ripstop nylon (tent); 1.1 oz. uncalendered ripstop nylon (optional liner); noseeum mesh (bug net); #8 zippers; MARA 70 thread; stove jack material; guyline cord; and 1″ nylon webbing.

FOOD AND FORAGING

EDIBLE WEIGHTS OF WILDLIFE

Note: the edible weights and calories are intentionally conservative. Unfortunately, studies on edible weights are scarce, so take these figures with a grain of salt.

Animal	Edible weight	Calories
Caribou	100 lb. (45 kg)	57,150
Woodland caribou	150 lb. (68 kg)	86,360
Moose	438 lb. (199 kg)	202,980
Mountain goat	80–150 lb. (36–68 kg)	39,240–74,120
Dall sheep	70–150 lb. (32–68 kg)	–
Deer	80 lb. (36 kg)	43,200
Mule deer	100 lb. (45 kg)	54,000
White-tailed deer	100 lb. (45 kg)	54,000
Elk	300 lb. (140 kg)	155,400
Snowshoe hare	2 lb. (0.9 kg)	1,026
Muskrat	1–1.4 lb. (0.45–0.64 kg)	–
Beaver	17–30 lb. (8–13 kg)	11,680–18,980
Porcupine	10.5 lb. (4.7 kg)	–
Squirrel	0.9 lb. (0.4 kg)	480
Otter	10.5 lb. (4.7 kg)	–
Lynx	8.5 lb. (4 kg)	–
Black bear	150–210 lb. (68–95 kg)	109,480–152,950
Grizzly bear	200 lb. (90 kg)	–
Waterfowl	1.4 lb. (0.67 kg)	–
Geese	3.5 lb. (1.6 kg)	2,128
Canada geese	4.7 lb. (2.1 kg)	2,793
Ducks	1.7–2.6 lb. (0.7–1.2 kg)	861–1,476
Mallard	1.9 lb. (0.85 kg)	–
Swan	10.4 lb. (4.75 kg)	–
Loon	2.5 lb. (1.1 kg)	–
Grouse	0.7–1 lb. (0.3–0.5 kg)	336–560
Sandhill crane	9 lb. (4.1 kg)	–

Raw portion 3.5 oz / 100g	Kcal	Protein %	Fat %
Acorn (raw)	387	6.15	24
Arrowroot	65	4.24	0.2
Balsam poplar (bark)	230	1.9	-
Bitterroot (dry)	343	4	0.6
Black cottonwood	31	0.2	0.5
Black hawthorn	73	0.3	1.4
Black walnuts	607	25.4	58.9
Blackcap raspberry	87	1.2	1.4
Bog blueberry	51	0.7	0.6
Bunchberry	76	0.6	0.8
Burdock root	72	1.53	0.15
Butternut	629	23.7	61.2
Cattail rhizome (dry)	-	7.7	4.9
Cattail shoots	25	1.18	0
Chokecherry (pitted)	162	3.04	1.69
Cottonwood (inner bark)	27	0.2	0.5

Raw portion 3.5 oz / 100g	Kcal	Protein %	Fat %
Perennial lily root	95.4	1.4	0.2
Persimmon	127	0.8	0.4
Pigweed	56	6	0.9
Plantain, greater (leaves)	61	2.5	0.3
Prickly pears	42	0.12	0.11
Purslane	20	2.3	0.36
Red elderberry	110	2.9	4.8
Red huckleberry	56	0.8	0.5
Rice roots	102	2.9	0.3
Rosehip	82	1.6	0.6
Salal berries	63	2.1	0.7
Salmonberry	52	1.4	0.8
Salmonberry shoots	31	0.5	0.6
Saskatoon berry	99	0.7	1.2
Seaweed, kelp	43	1.68	0.56
Seaweed, laver	303	24.4	1.4

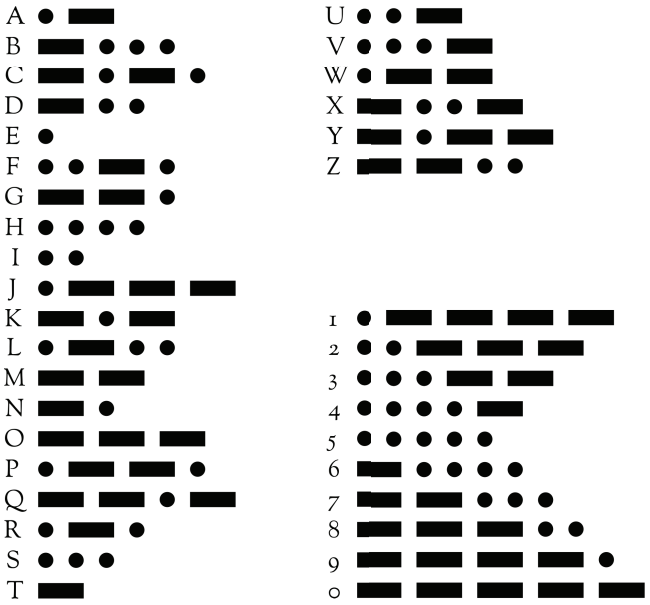
Cow parsnip stems	20	0.2	0.3
Crowberry	45	0.2	0.7
Curly dock	24	2.6	0.3
Dandelion greens	45	2.7	0.7
Desert parsley roots	190	2.2	1
Dulse (red algae) dry fronds	323	19.9	0.6
Fireweed shoots	30	0.3	0.4
Goosefoot, lamb's quarters	43	4.2	0.8
Grey blueberry	54	1.1	0.5
Hazelnut, beaked	628	14.89	53
Hickory nuts (dried)	657	12.7	64
Highbush cranberry	42	0.1	0.4
Horsetails	20	2.1	-
Jerusalem artichoke	77	2.6	0.5
Kelp, laminaria	43	1.7	0.6
Kinnikinnick berry	102	0.7	1.1
Sheep sorrel	48	1.1	0.6
Shepherd's purse	33	3	0.5
Silverweed roots (steamed)	136	3.1	0.6
Soapberry	80	1.8	0.7
Sow thistle	20	1.9	0.3
Spiny wood fern	128	2.5	1
Springbank clover rhizomes	73	0.7	0.5
Stinging nettle	44	1.8	0.6
Stink currant	70	0.8	1.2
Sugar maple syrup	348	0.1	-
Swamp gooseberry	66	1.5	2.3
Thimble-berry	110	1.7	1.2
Thimble-berry shoots	28	0.6	0.4
Trembling aspen	-	1.3	-
Wapato (arrowhead)	99	5.3	0.29
Watery blueberry	74	0.9	0.6

COMMUNICATION CODES

Variations of the tap code and the International Morse Code may be used to communicate through simple messages by using light, whistles, or two-way radios (outside their range).

International Morse Code

1. The length of a dot is 1 unit.
2. The length of a dash is 3 units.
3. The space between parts of the same letter is one unit.
4. The space between letters is 3 units.
5. The space between words is 7 units.



TAP CODE

Each letter is transmitted by tapping two numbers: the first tap designates the row (down)—then pause—and the second tap specifies the column (across).

	1	2	3	4	5
1	A	B	C/K	D	E
2	F	G	H	I	J
3	L	M	N	O	P
4	Q	R	S	T	U
5	V	W	X	Y	Z

HEALTH

FIRST AID KIT EXTRAS

In addition to the first aid kit components mentioned in the "Health" chapter, add some of the following items depending on your specific needs for your wilderness first aid kit (WFAK).

Category	#	Item, type, and notes
Diagnostic tools	1	Digital hi/low thermometer w/ extra batteries (Adtemp 419 Digital Hypothermia Thermometer). For the evaluation of fever and hypothermia.
		Urine test strips (e.g., Clinitek). To evaluate abdominal pain, renal stones, and urinary symptoms.
Misc.	4	Examination gloves
	1	1″ × 10 yd. waterproof adhesive tape
	6	Cotton swabs (Q-tips)
		Duct tape
	4	Large safety pins
		Trauma shears and medical scissors
		Ziploc bags
		Headlamp and lighter
		Signal mirror/dental mirror
		Small, flat Fresnel-lens magnifier
		Permanent markers (Sharpie)
		Notepad
		SAMPLE/SOAP notes. To guide your first aid assessments (printables: **bit.ly/SOAP-f**, **bit.ly/SOAP-b**)
		WFA pocketbook: *The Field Guide of Wilderness & Rescue Medicine* by Jim Morrissey
Wound management	1	Dishwashing soap bottle or a small piece of solid soap
		Alcohol-based gel for hands
		Clean and sterile gloves
		Irrigation syringes (1 cc to 60 cc)
		Alcohol pads and gels
		Antiseptic towelettes

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Find below in bold letters some recommended reading. In addition, the letters in brackets indicate the chapters where the selected references were used: Preparation [PR], Mindset [MI], Clothing [CL], Travel [TV], Water [WA], Fire [FR], Shelter [SH], Food, Foraging, and Edible Plants [FF], Fishing [FS], Trapping [TP], Hunting [HU], Bushcraft [BU], Winter [WI], Health [HE], Electronics [EL], Natural Hazards [NH].

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ABOUT THE AUTHOR

Juan Pablo Quiñonez is a survival expert and outdoor professional with over 10 years of experience in outdoor recreation and survival.

His outdoor and survival experiences include backpacking the entire Pacific Crest Trail (2,650 miles) in 99 days; paddling over 1,500 miles during numerous remote whitewater canoe trips; living for six months in the wild with his partner, foraging to complement their meager rations; spending 100 days foraging in solitude during the winter in the boreal forest (supported only by small rations); and being a participant in Season 9 of the hit survival series *Alone*. He holds a degree in Applied Ecotourism and Outdoor Leadership.

The author loves adventure, enjoys type 2 fun, and is passionate about living off the land. He believes it's important to practice and share the skills and wisdom of our hunter-gatherer ancestors. In his eyes, strengthening a genuine connection to the land is essential for resilience in this age of ecological disruption and the decline of global civilization. He lives in Canada at the edge of the boreal forest and can be contacted at **jp@jpquinonez.com**.

Check out **jpquinonez.com** to find his latest blog posts, gear recommendations, and survival courses.