

# The Secrets of Bow and Drill Fire Starting A Pocket Field Guide



By Chadwick H. Clifford

Illustrator: Tania K. Marsh

Copyright: Chadwick H. Clifford & Wilderness Rhythms 2011

## **Disclaimer**

There are inherent risks in all wilderness activities. This book is intended for your reading enjoyment only.

# Introduction

The 'bow and drill' fire to the wilderness skills enthusiast is like the 'Eskimo roll' to the kayaker, or like 'riding a bike' to a child; it is an important skill, very useful, but often frustrating to learn. In accomplishing this challenge, you realize that your world has just been broadened. Like a child who can now ride a bike across town, the outdoor enthusiast can now make fire if matches fail or get lost. Lastly, there is a connection to nature you attain by learning these sorts of skills, part of which require an advanced knowledge of the surroundings.

Like most outdoor skills, one should be practiced in various contexts before relying on it. In support of this, I once heard a primitive skills enthusiast on t.v. state that:

...people who do NOT know how to make a bow and drill fire, occasionally forget their matches. People who know how to make a bow and drill fire NEVER forget their matches.

That stated, as your skills progress, going back to starting fires with matches will seem exceedingly easy.

---

**CAUTION:** You must first know how to safely handle a knife before you try this. Moreover, wilderness activities have inherent dangers. This guide is for your reading pleasure.

---

## The Four Steps

In four steps, you will have all the knowledge you need to start a fire without matches. Step four points out the common mistakes I see beginner students make. Note too that, this skill takes time to develop. Pay close attention to the details given.

### **1. Gathering Materials**

### **2. Bowing Form & Burn-in**

### **3. From Dust to Coal to Flame**

### **4. Trouble Shooting: A step you will need to take**

## **1. Gathering Materials**

Tinder and all fire building materials can be gathered year round in the woods. It is most convenient to collect these materials as you travel so you do not need to search them out when you decide to start the fire.

This important section will outline key points to collecting your materials. Many people fail at fire starting because of poorly chosen materials.

**Overview of Bow and Drill Parts & Tinder** Top Row: Cattail head, fibrous plants, wood chips, Pine sap  
Mid Row: Handhold, spindle, baseboard Bottom Row: Bow with rope



## Tinder

Tinder may be gathered while raining, snowing, or 40 degrees below freezing. In general, gather your tinder on a South facing slope and not in the bottom of a valley. These areas will produce drier tinder (i.e., area with sun exposure & less heavy dews). Gather two types of tinder. 1) dead, fluffy plant material and 2) dead, fibrous plant material. The fluffy stuff is found on plants after they go to seed--available year-round. You do not need to know names of plants, just look for the seed pods and seed heads of plants (it is up to you to know and avoid the poisonous ones to touch or breath fumes from--Poison-ivy is one to avoid). A few plants that I have used include the Cattail head, Milkweed, Bullrush, and Goldenrod--there is good material everywhere. The fibrous material is even easier to find or craft. Look for a plant that is dead and brittle. You can use dry leaves, bark, and wood (i.e., softwood sp.) chips too. Just make sure it is dry! Material on or near the ground is assumed wet, unless the sun has had a chance to dry it well. One last point: the fluffy tinder holds the coal, the fibrous tinder ignites. Use 1/3 fluff to 2/3 fibre and your tinder will ignite.

The photo shows a tinder bundle mixed with the proper ratio of fluff and fibre. Note that it is compacted well too. Make sure your hands are dry when you compact this material and do not place it on the ground--it is like a sponge for moisture.



Tinder bundle. Mixture of cattail and cedar bark.

## Bow

The ideal bow length is the distance from your armpit to fingertip. The bow should be sturdy and bend a little to not at all. The thickness can be anywhere the thickness of your thumb to three inches. Ideally, it should be light and easy to handle. It may be curved somewhat or straight. Attaching the string has caused frustration to thousands--I am sure. The problem is, you have to adjust the string. Attaching the string has caused frustration to thousands--I am sure. The problem is, you have to adjust the string--especially during your initial set-up. Below is how I like to attach a string.

At one end, I simply loop the rope over a pointed end--unadjustable. The other end (the part I hold in my hand), I thin the wood to 1/4 inch and drill a hole with my knife thru it. Then, I feed the rope thru and simply adjust by making new knots in the rope.



The tension of the rope needs to be as follows: After the spindle is twisted in rope, it should be difficult for you to slide the spindle in the rope without it spinning. Note too for later, the spindle is on the outside of the rope, as opposed to being on the inside by the bow itself. The tension needs to be quite accurate so take your time and be patient in getting it right. The string can be made from almost anything too. For practice, try parachute chord or nylon rope. Natural materials work well too and slip and stretch less. In nature, you can use a shoe lace, braided cloth, leather, or natural fibre ropes you make yourself.



## Spindle

All shapes and sizes. Generally, the ideal shape is always straight and eight to ten inches long and the thickness of your thumb. Taller people should use longer pieces and shorter people.... The thumb thickness allows a smaller person to possess the strength to spin a smaller piece of wood with less friction. Bigger pieces cause more friction which in turn requires greater strength. This will make more sense later.



Most importantly, the spindle and baseboard need to be dry and the right hardness. When searching for the appropriate wood, consider areas where the sun keeps the tree dry on Southern slopes. Avoid any wood found on the ground. You do not need to know one specie of tree from another--but it helps. Heres what you look for: Find a standing or leaning dead tree. Ideally, it should be a manageable size--or the branch should be. The first question you ask yourself is if the wood is dry enough? The second question is if it is hard enough?

### Dryness check

Shave a piece off the outer wood. Put the inside of your wrist on this exposed area. If it feels cold (regardless of ambient temperatures), for more than a couple of seconds then there is too much moisture in this wood. The tree may be dry three feet higher up though.



### Hardness check

Is this piece of wood the right hardness? Drive your thumbnail into the shaved area. Look at the dent it made. Generally, if it slightly leaves a dent it is too hard of wood--move on. If it easily left a dent then move on--it is too soft. You guessed it, somewhere in between is just right. There is a hardness diversity between species where some species can be used even though a little on the hard side and vise-versa.



For those of you who know your trees look for Cedar, Willow, Poplar, Aspen, Basswood, Balsam (maybe) and Tamarack (maybe). Do not limit your choices to these either. It all comes down to the hardness and dampness check. Moreover, as you experiment, you will begin to understand the look of an appropriate tree within a certain specie. This will take some time.

If you find a branch that is the size of your thumb then you saved yourself work--good for you and those waiting to get warm. If not, start whittling. Next, you shape the spindle ends. The top is tapered to a point over the distance of one inch. The bottom is tapered to a point over the distance of 1/2 inch. DONE! Do not put this on the ground-as it may soak up enough moisture to limit your success.

## Hand Piece



The hand piece should fit comfortably in hand. The size is somewhat important as your fingers should not easily wrap around it enough to get in the way when the spindle is in place. Its purpose is to hold the spindle in place and apply downward pressure.

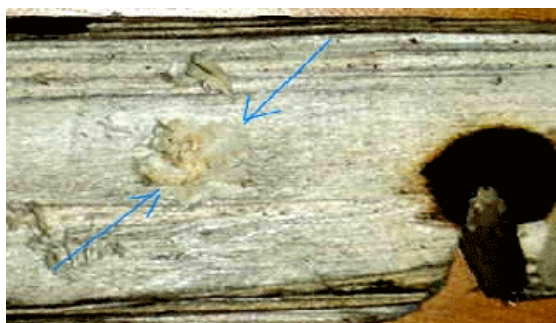
Here are a variety of holds and sizes that have worked well for myself. The one on the bottom right is a piece of antler. The hardness of this piece of wood or bone should be the same or greater than the spindle and the baseboard as you do not want it to heat up much. In fact, it should be lubricated to stop it from heating. It is made by simply notching out a round hole with a knife or rock--the spindle will burn the rest away. After a suitable hole is burned (enough to hold in spindle), you lubricate it with soap, wax, Pine sap or pine needles. The black oozing material seen in the pictures is an accumulation of pine sap lubrication.

## Base Board

To locate a baseboard in the woods first follow the steps laid out for finding a spindle. The baseboard can often be found on the same branch as the spindle. In fact, all parts of a bow drill can be located on one branch.



Next, you need to locate the spot where the spindle will contact the board. This should be about 1/4 inch in from the edge--just make sure the spindle is roughly centred on the baseboard with this 1/4 inch consideration. After you locate this position, take a rock or a knife and gouge out a round hole for your spindle to grip. Done! Now do not let this touch the ground, it will absorb moisture.



## 2. Bowing Form & Burn-in

Proper form is pretty important. There are a few key points to remember. Let us go thru them. First, place the arch of your foot upon the baseboard about two inches from the gauged circular hole. Place something under your foot to keep moisture off wood--I usually take my shoe off and place Birch bark between my foot and the board. Also, place bark or something to keep the wet or damp ground away from the board.



Spindle top and handhold (lubricated with evergreen sap). Now hold your bow near the end, after you have placed the spindle in it. Put the spindle on the board, hold it there with your hand hold piece.

Before you start bowing, your body position needs to be sturdy. Basically, anchor your shoulder upon your knee and your wrist against your shin. Thru this, keep the spindle straight. Your shin should be vertical as well. Find your balance with your rear leg.

Now you are ready to start. You will need to visit Step Four (Trouble Shooting) frequently at this point, or soon after. You will soon know why. Start the bow moving, keep it parallel to the ground. Get use to this motion. Slowly speed up the bowing--use the full length of the bow. Increase downward pressure as you are able. There will soon be smoke!! Yes you are well on your way. Getting smoke does take a bit of practice.

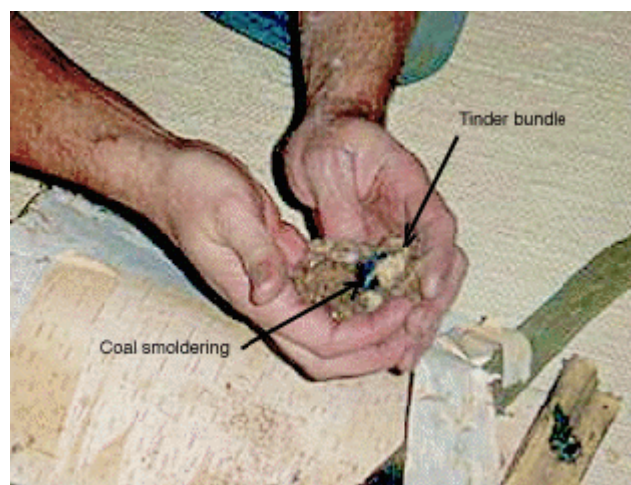
At this point, you are only burning in your equipment. Hence, the baseboard should blacken to the width of your spindle and your hand hold will also blacken--to a narrower black circle. Once this occurs stop. You need to carve out a V notch in the baseboard with a knife or rock. The V should be an 1/8 slice of pie out of this black circle. Once you have accomplished this, you are ready to start a fire.



### 3. Dust to Coal to Flame



Assume proper form and place tinder under your baseboard as shown previously. Begin bowing and continue a dozen strokes beyond the point of getting a lot of smoke. The notch should be full of dust and beginning to compress upon itself. Carefully hold top of coal with knife or stick and roll the baseboard away. The coal or dust will be sitting on the tinder-unmoved. That is the key, the coal should not have moved--if it broke at this point, you may have just halved your chance of getting a fire. Now let the dust just smolder for a second or two. You may not have to do anything for a while as the coals grows on its own. You may have to gently blow on the dust to get the coal to grow. As the coal grows, gently lift the tinder and cradle the coal into the centre of the tinder bundle. Gently blow the coal into the tinder. Your tinder bundle will let you know what needs to happen next. If it flames up-good job on the tinder bundle. If it does not, you did not put appropriate fibrous materials into it.



No big deal, just put the bundle back onto the bark on the ground and place small sticks on top. Hold down these sticks and blow onto coals like you would with any stubborn fire. Note: a good tinder bundle will not go out. Hence, you have some time to work with it-relax, take your time.



F.Y.I., this fire took 38 seconds from bowing to flame. After every failed or successful fire starting attempt you should evaluate the dust you created. This is very useful to you as you begin to recognize your next step / option based on the dust created. With my students, I can pretty much tell them what aspect of equipment / form needs to be modified on this alone.



Consider the photograph to the left. The residue left on the baseboard contains dark somewhat fluffy dust--perfect! This dust demonstrates that the right proportions of pressure and speed were used--not to mention the right wood.

Also look at the top of your spindle and handhold. Basically, you want this union to be well lubricated and shallow. If the hole in the handhold becomes deep or is not lubricated, the friction increases. If friction increases here, it will begin to smoke--where the friction then creates dust too. This extra friction will take away the energy that should be going into the baseboard and bottom of the spindle. You do not want that!

## 4. Trouble Shooting

This section will be the most important part of the process to digest--Earmark it. It is here where you should carefully analyze what you see happening prior to calling for help. Do not hesitate to completely abandon the materials you have and start over. It is through practice that your skills develop into reliable bushcraft / survival skills. Moreover, comparing one bow and drill fire set to another points out many clues to what works for you.

Once you are able to start a few fires with one set-up, put it aside. Go back into the woods and find another set. Experiment with materials and even try making a set with no knife. Search for appropriate rocks to replace the knife and be choosy in terms of finding materials that need little work to take the parts of the bow and drill fire set.

### **Spindle flies out of bow-string**

1. Ensure your bow remains parallel to the ground.
2. Often people will let the tip of the bow rise at the end of their stroke and fall upon recoiling.
3. Spindle may be too short--less than 5 inches makes bowing more difficult.
4. Circular groove in base board or hand piece is not large enough--make it a little deeper.
5. When the wood heats up, more friction occurs causing spindle to escape--ease up and keep speed going.
6. Spindle is not being held perpendicular to base board. Re-check your form.

### **String *slips* on spindle**

1. Tighten the string to the point where it does not slip.
2. Apply tension to the string with your thumb and index digits while bowing.
3. Apply evergreen sap to string or area of slippage.
4. Roughen the spindle with knife (hexagon shape).

### **Spindle wobbles**

1. Noticeable by the un-circular pattern it leaves on base board. This slows your bowing and usually has poor results. Replace spindle with a straight one. It may be possible to carve crooked part of spindle out.

### **Spindle burns thru base quickly**

1. Either find a base that is harder or a spindle that is softer.
2. Are you keeping good form while bowing?

## **No smoke**

1. Keep trying--concentrate on long even strokes, get speed up, and then apply more pressure slowly. Sometimes it takes a while initially for smoke to appear. Even damp wood will smoke.

## **Spindle smokes, but at the top end**

1. Lubricate the top after each use. Do not let the top notch or groove become too deep.

## **Little dust made: notch does not fill with dust.**

1. Apply more downward pressure.
2. Spindle and/or base board is too hard. Switch to softer wood.
3. You are not bowing long enough (you may need to last one to two minutes). Not to rub it in, but it is possible to get a coal in under 15 seconds and a flame in under 40 seconds once you are well practiced and have good wood

## **Black dust: brittle little pieces of charred dust and not a lot of dust**

1. You are bowing fast enough causing good heat--consider applying more downward pressure.
2. Your wood is too hard--try softer wood.
3. Look at your spindle at point of contact. Is it 'glassy' and polished looking? If so, try roughening this surface. If problem returns, consider the two points listed above.

## **Brown dust: light fluffy plenty of dust**

1. Not enough heat being produced. Ease off on downward pressure and increase bow speed.
2. Wood is too soft--replace with harder wood.

## **Coal forms (smokes) but then goes out**

1. Congratulations. You're getting close.
2. Consider the amount of dust and the colour / texture of it. Re-read the above info on dust.
3. Try an extra dozen strokes (after you get really good smoke).
3. After the notch fills, concentrate more on speed and form with less pressure. This will compact the dust and turn into a coal.

## **Coal does not spread into tinder**

1. Tinder loosely packed or damp. Try igniting with a match-blow out any flame and see it spreads into a coal now. If it does, maybe your coal was not big enough or broke upon placing into tinder.
2. Remember, it is the downy material that holds a good coal--the fibrous part makes flame.
3. Tinder should be density of a cotton ball or pink insulation to work well.

There are various other traditional fire lighting techniques to explore but the bow and drill fire is perhaps the most robust and functional method I have come across.

Best of luck with your bow and drill fire, let me know how it turns out.

---

---

A Riddle to Explore

A tinder never lying is true  
A conk not fertile to use  
A notch with a sliver should do

---

---

# About the Author



Chad has a keen interest in studying and facilitating quality wilderness experiences. He has numerous university degrees in his field and has performed various research projects. He has lived in various locations across Canada including a remote Inuit Village and enjoys teaching and learning land skills. Chad has taught wilderness related skills to people of diverse ages and back grounds and has done consulting for B.B.C.s survival challenge series: The Bare Necessities & other programs.

For more information, resources, and training:  
visit  
[www.WildernessRhythms.com](http://www.WildernessRhythms.com)

Other books:

The Secrets of the Bow and Drill Fire.

Animal Tracks-discover the rhythms of the wilderness.

The Magic of Iglu Building.

Natures Wireless-writings on nature.

and others--search author for frequently added books and guides.