

BOW MAKING

with Justin Sutera

PART IV



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About the Author

Justin Sutera first got interested in primitive living skills when he was 14 after being introduced to 'The Tracker' written by Tom Brown. Since that time Justin has explored primitive skills deeply (often by trial and error in the early days). He graduated S.U.N.Y. College of Environmental Science and Forestry with a B.S. in Conservation Biology.

While still a student Justin founded ESF Primitive Pursuits Club. Additionally Justin has studied at the Tracker School and worked as an instructor at The Children Of The Earth Foundation before joining Primitive Pursuits as a full time instructor. Justin is particularly passionate about primitive bow (and arrow) making, flintknapping, and hide tanning but truthfully all skills for living with the Earth are of great interest to him.

As a lead instructor with Primitive Pursuits, Justin focuses on teen and adult programming including Wilderness Weekends, the Wilderness Skills Intensive, and the Wilderness Year program.

About Primitive Pursuits

Primitive Pursuits is a non-profit program in partnership with Cornell Cooperative Extension. We provide leadership and wilderness skills education to hundreds of toddlers, youth, teens and adults throughout the Finger Lakes region.

Since 2002 it has been our mission to steward the health of our community by fostering life-long relationships with the natural world through exceptional mentoring and nature education.

Through our mission, we work daily to achieve a cultural intervention that will bring back into our modern lives a necessary and healthy relationship with the natural world and within our human communities.experience,

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Introduction

First of all, I want to mention that there are tons of fantastic books and other resources out there on bow making. Many bowyers have done extensive research and really explored bow making as a detailed science. These are amazing resources, and I highly recommend you utilize them.

The information included here is from direct experience and has proven to work, as both my colleague Sean Cornell and I (pictured below) both successfully hunt deer with our handmade bows and arrows.

The intent of this e-course is to make bow making accessible and simple, and provide you with enough tools to put hatchet to stave, but is in no way complete.

Justin Sutera

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Part IV

Tillering, a conversation with your bow

Up until this point we haven't really been bow making. I know it sounds crazy, but hear me out. We've been making a sculpture of a piece of wood that looks like a bow. Tillering- or studying the bend of your bow- is where bow making really comes alive.

Now we are in conversation with our bow. How it bends informs us as to where we remove wood. We train our eyes to pick up the most subtle differences in bend to make sure both limbs are even as we approach full draw. Are you ready?

Before proceeding, it is important to talk about our staves and moisture content. How dry is your stave? How long has it been in bow blank form? What season of the year did you harvest your stave?

There are lots of variables, and I like to err on the side of caution when proceeding with bow making. If you are in the northeast it is likely your stave still has moisture in it. The ambient humidity around here is never below 40%, and as a result your bow will never dry out to below 8-12% moisture. And we actually don't want the stave below 8-12% moisture, we want it right in there. If your stave was harvested during the colder months of the year, it was likely drier to begin with. If harvested during the summer, it had more moisture in it. Regardless of when it was harvested, once in bow blank form it can be dried more aggressively. I'd recommend at least 2 weeks at room temperature, or a week where it gets heated up several times in a hot attic, near a woodstove, or in a car (during summer).

So it's time to tiller! Even if your stave still has moisture in it you can proceed with tillering, though I wouldn't go past putting your bow at a brace height. Remember floor tillering from last week?

This is where we'll begin. Once the bow shows some bend, switch from a hatchet to a rasp. Using a rasp can be tricky to learn how to do efficiently. A good sharp rasp is incredibly helpful. A rasp works on the push stroke, and works best used on a 45 degree angle.



Floor tillering: (left) showing a stiff bow blank, (right) showing deeper bend from a finished bow



Another look at the floor tiller. These pictures are showing both limbs of a finished bow. Notice the smooth, even curve throughout the limb.



Using a rasp on the belly of the bow

Using a rasp removes less wood than a hatchet, but in a much more controlled way. And it leaves less significant tool marks as well. We want to structure our wood removal so that by the time we are approaching full draw, we are only removing very small amounts of wood with sandpaper, and the bow has no tool marks in it. Always rasp from the back of the bow towards the belly when working on the sides of your bow, as working towards the back of the bow may kick up splinters.



Using a rasp on the side of the bow, being sure to keep the sides perpendicular to the belly



Using a knife as a scraper on the belly of the bow. A pillow is in between my stomach and the bow, allowing me to work towards myself



Another view of using a knife as a scraper on the belly of the bow

Carving Nocks

So now we are at a floor tiller. Both limbs are bending evenly, we are ready to go further. It is time to carve nocks (grooves in the tips for the string to sit). This can be done many ways; with a round file, with 2 hacksaw blades taped together, or with a carving knife. When making nocks it is important to not carve into the back of the bow, only the sides and the belly.



Using a round file to carve in nocks



Picture of nocks on a bow blank (top) and finished bow (bottom)

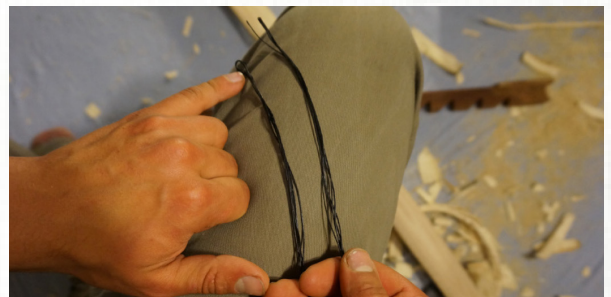
Making a String

Now that you have nocks, we need to make a string. This can be tricky to explain via written text, but I'll do my best. You're going to need a spool of **B50 Dacron fiber**. This is what commercial bow strings are made of. Making a string from wild harvested materials could be an E-course all in itself. You will need to know how to make cordage with the reverse wrap technique.

First, you need to cut you B50 to length. Measure out the length of your bow plus a generous third of the length of your bow. Now make 2 bundles each with 5 strands, all the same length.

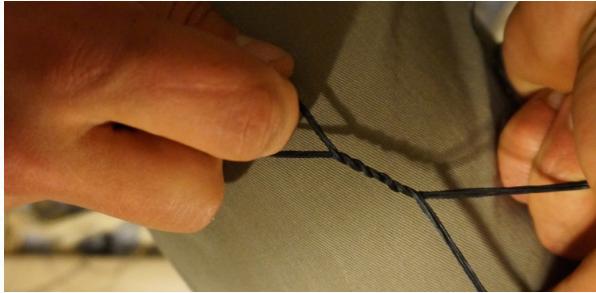


Line up your two bundles, and start 6 inches down from the ends.



Begin to reverse wrap the bundles together from that starting point towards the rest of the string.

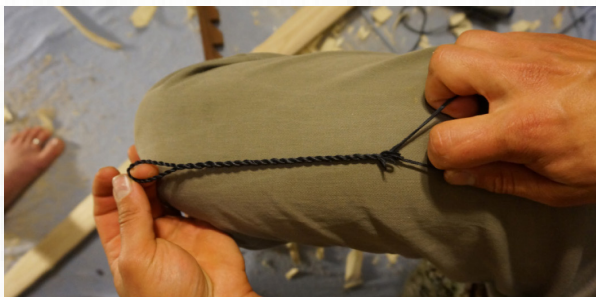
Making a String Photo Guide



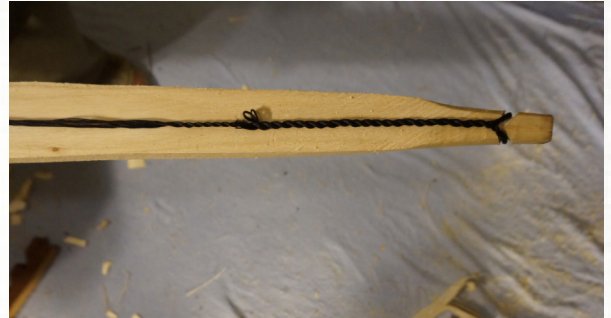
See if you can bear with me, it gets kind of tricky here. The short tails of the string, towards the top of where we started, are going to fold over and blend into the rest of the length of the string. The portion that was reverse wrapped becomes the loop.



Now reverse wrap both bundles together, including the tails that were folded over. Reverse wrap until the tails run out, then go a few more inches.



Place the loop around your nock, and stretch the string along the length of your bow.



Measure about 12 inches down from the other tip of your bow, and at this point begin another tight reverse wrap till you reach the end of your string.



Once you reach the end you can finish it off by tying an overhand knot. Then to finish it up put a twist on the entire string in the direction of the reverse wrap..

The Tillering Stick

The tillering stick can be a helpful tool in observing the tiller of our bow. Now that we have a string made, we can use it to bend the bow in a safe way. Note that our bow is not at a brace height yet. The string has no tension on it, it is completely loose in between the nocks of the bow. A tillering stick is a piece of wood with notches in it so the bow can sit on its handle on one end and the string can be pulled back and held in place by the various notches.

Again it is important to not overstress your bow here. A small problem can quickly become a big problem if you pull the bow too far back. A slight weak spot that is overstressed can become a permanent issue if overstressed.

Keeping the bow on a tillering stick allows us to observe it from different perspectives. Be sure to look at your bow from the front, back, and sides. Each perspective will likely give you more information.

A helpful tool in noticing bend in specific parts of the limb is using a straight edge like a book to observe negative space. The pictures below show the negative space as an indicator of where the bow is bending and where it isn't throughout the length of the limb.



Observing the tiller on a tillering stick

Tying a timber hitch knot



Tillering Stick Photo Guide



Using a tillering stick with a loose string to start to observe tiller more carefully. Note the bow is not at a brace height yet



Notice the bend towards the handle, and the stiffness as we get towards the tips



Using a straight edge (in this case the edge of a book) to observe negative space as an indicator of how much the bow is bending in a specific location



Notice how the negative space is decreasing as we get out towards the tip, all the way to the very tip where we observe practically no bend at all.

Stringing the Bow

When is it time to string your bow, or put it at a brace height? Well, I like to make sure that I know my bow can safely bend that far first before attempting to string it. From what I observed on the tillering stick, this bow can safely bend far enough to string it at a low brace height. Remember, brace height is the distance between the string and the handle. We accomplish this by sliding the fixed loop in our string down the bow limb and tying the loose end of the string to the other nock. Usually the string length is about 3 inches shorter than the length of the bow. Then follow along with the pictures to string your bow. A note of caution— **improper stringing can ruin your bow**. We need to make sure we are bending the bow only from the tips and the handle. Placing your knee on one of the limbs could overstress it there and damage it, even if the bow was otherwise in perfect condition.

If you notice a dramatic imbalance between the bow limbs, quickly unstring your bow. Leaving a bow strung that is drastically out of tiller is overstressing it. Hopefully, if you are stringing your bow you are already confident in its ability to bend this far.

Next you can continue to bend your bow and observe the bend. Please go slowly here and ask for other people's perspective. Getting an eye for tillering can take some time, be patient. Remember you are making something here that has the potential to be a serious hunting tool. A well-made bow can outlive the maker. Do not rush to the finish line because if you get there too soon you may realize you missed a tremendous amount.



Place one of the bow tips on the ground, and the other in your hand.



Lean your knee onto the handle of the bow while pulling up on the tip, this ensures bending the bow evenly as we string it.



Ease off and let the string settle into the bow. Be sure to check your nocks to make sure the string is securely in.

Exercising the Limbs

When we are tillering it is important to exercise the bow in-between removing wood and observing the bend. What does this mean? This means flexing your bow a few times, letting it sit, and then flexing it a little more. This gives the wood a chance to respond to the work you just did. Without doing this, our bow may not show us exactly where it is at, and we may proceed to remove more wood under false pretenses. I can't tell you how many times I've been chasing a stubborn stiff spot in a bow limb only to find that I've tipped the scales the other way, and now it is a weak spot. Go slow, exercise your bow, and observe carefully.

Take the bow in the picture above for example. It has a weak spot in the early limb on the right side of the photo. So where do we remove wood? We will scrape the mid and outer limb on that side, as well as the other limb of the bow. Everything affects everything else, nothing is in isolation. By making the opposing limb weaker, we are making that limb stronger.

NEVER DRY FIRE YOUR BOW

At this point you hopefully have your bow at a brace height, and are starting to draw it back further and further. I recommend starting to shoot your bow at half draw (of course never pulling it farther than you've tillered for), and getting a feel for your bow. When we draw a bow there is a ton of energy stored in the limbs, and upon release it is transferred to the arrow. If we "dry fire" our bow- or release the



Bow at a brace height. Observing the negative space between the bow and the string is a great tool for observing tiller.



Stepping on the string and pulling up on the handle of the bow allows an observer to get a good view of the bow.



Bow being pulled- notice the lack of bend in outer limbs and overbend just past the right fadeout. This is accentuated by the perspective of the photo, though still needs attention moving forward.

string without an arrow in it, that energy can shatter your bow. So please, never dry fire your bow!

At this point you should have the tools you need to work with your bow through tillering. Do not attempt to finish or call your bow done this week. Next week we will look at what full draw means and how to really put the finishing touches on your bow. For now work with your bow from floor tillering through a brace height, and maybe even shooting at half draw. By this point the majority of the wood you are removing should be very controlled, and done with a scraper or sandpaper. The difference between a 60 lb. hunting bow and a 20 lb. kid's toy can be surprisingly subtle sometimes.

I'd also recommend setting your bow aside for periods of time. Sometimes tillering too much can trick your eyes, and you will be chasing an elusive bow far past the finish line.

Good Luck!



Another view of the tiller after removing some wood with a scraper. The differences in bend are subtle, it is important to go slow and get multiple perspectives. In this photo a still outer right limb stands out to me.

