Practical Navigation Tips: Beyond the Basics

Now that you've learned the meat-and-potatoes techniques that every navigator uses regularly to be successful in finding her way, it's time to move on to the more advanced skills.

Baselines
In the field, baselines come into play on a regular basis as you seek to find your way. A baseline is a long line that can easily be identified and used as a point of reference on a map. A river, trail, fence line, power line, railway, road, river, or even a long and easily identifiable ridge can serve as a baseline. When two identifiable baselines intersect, that provides an indisputable reference point on the map. Even if you've never stepped onto a trail, I'll bet you've used baselines in giving directions to your home or a meeting place in the city. “Stay on First Street [one baseline] until you hit Meridian [another baseline] and turn left. Follow Meridian to Broadway [yet another baseline] and turn right. Drive 1 mile and my house is on the right.” The practice remains the same in the field. “Hike 2 miles on the Tuolomne Trail from Bear Lake Campground until you arrive at the Twin Summits Trail. Turn right and hike until Twin Summits crosses Sparkling Creek. Our campground will be in the meadow just North of the crossing on the left side of the trail.”

Skiers, hikers, and hunters frequently use baselines when heading out into the woods to explore, especially when leaving a camp or a vehicle next to a road or trail. The beauty of a good baseline is that you don't really have to keep detailed tabs on your particular course. If your camp is sitting next to a river that runs generally East–West, you could head off to the South or North, explore for a while, reverse your direction, and be assured that you'll once again arrive at the baseline—in this case, the river. No real navigational headaches here.

There is, however, one minor question: Once you get to the baseline (the river), should you head North or South to get back to camp? This may seem like a tough question to answer if you haven't been paying close attention to your wanderings. But fortunately, there are several easy ways to solve this dilemma without having to resort to the time- and energy-sapping method of trial and error.

Fixing Your Position on a Baseline
So you've arrived back at the river and have no idea which way to turn? No problem. First, orient your map. Then, standing next to the baseline (the river), take a bearing on a distant and recognizable landmark. To do this, hold your compass level at waist height and point the direction-of-travel arrow at the landmark. Rotate the compass housing until the red end of the magnetic compass needle is centered (boxed) within the orienting arrow. Your bearing can be read in degrees at the center index point—where the compass housing meets the direction-of-travel arrow on the compass baseplate. Taking care not to move the map, place one edge of the compass baseplate directly on the landmark, with the direction-of-travel arrow pointing from the baseline (river) toward the landmark. Now, without moving the compass housing or moving the map in any way, pivot the compass around the landmark point until the red end of the magnetic compass needle is centered (boxed) within the orienting arrow. Draw a line, either in pencil or in your imagination, along the edge of the baseplate until it intersects with the baseline (river) you're standing beside. Your location on the river is where the two lines intersect. Assuming you know where your camp is on the river, you should know whether to
head East or West to return to your shelter.

**Aiming Off**
Another way to find your camp along the river is to intentionally miss the camp so far to the North or South that you’ll know which way to head. In other words, make your mistake so bad that it becomes an intentional error you can correct once you arrive at the river. For instance, you wandered well away from camp in a generally northerly direction and want to head back. You’re somewhat sure where the camp lies—you can see a saddle in a distant ridge behind you and know your camp is somewhere below that. The problem is, if you head toward the saddle and arrive at the river, will you arrive just east or just west of the camp? You have no way of knowing. The solution: Pick a route that will position you well east of the saddle. That way, once you arrive at the baseline (river), you’ll know for certain that camp lies to the west. Now all you do is hike along the river until you reach camp. Simple!

**Bracketing**
This technique, frequently used by hunters, wildlife watchers, and fishers, involves a little more detailed analysis of your location along a baseline. Called bracketing, it’s especially useful when you leave a vehicle parked alongside a remote forest service road. A bracket is nothing more than an identifiable boundary that lets you know you should turn around and head the other way on a baseline to get to your destination. A bracket is also useful in helping you determine if the baseline you’re on is actually the baseline you want; this is extremely valuable when wandering the mountains of the West, where the forests are crisscrossed with forest service roads that look decidedly similar.

I frequently use brackets when I leave my vehicle beside a remote road to go backcountry skiing. On the drive in I’ll identify one landmark that I know is about 0.5 mile from where I want to park, and then another one within 0.25 mile, and one more within a few hundred yards. Most often I drive past my parking area to establish similar brackets in the other direction. If the road is blocked to vehicles but continues on, I’ll head off on my skis to establish the brackets before I dare head away from the road. Brackets can be bridges, road signs, rockfalls, large boulders, deadfalls, a large and recognizable tree, and the like. Forget trying to remember the brackets. Instead, record them meticulously on a sheet of paper. Once I return from my skiing to the road, I use the brackets to tell me which way to turn to get back to my vehicle.

**Making a Bearing a Baseline**
You’re camping in the desert and there are no rivers, fence lines, roads, trails, or anything else that you can see fit to use as a physical baseline. Nevertheless, you want to go off exploring, and you’d like to be reasonably sure you can return to camp without difficulty. What do you do? When there isn’t a baseline to be had, make your own. No, I don’t mean begin construction of a fence or trail. This baseline will be imaginary.

To do this, take a bearing off a prominent landmark while standing in your camp by holding your compass level at waist height and pointing the direction-of-travel arrow at the landmark. Rotate the compass housing until the red end of the magnetic compass needle is centered (boxed) within the orienting arrow. Your bearing can be read in degrees at the center index point—where the compass housing meets the direction-of-travel arrow on the compass.
baseplate. Write this bearing down. It and the line of sight you just took have become your baseline.

So off you go, merrily exploring the desert terrain. The time comes to return to camp. Set your compass so that your baseline bearing is at the index point. Point the direction-of-travel arrow at the landmark you sighted off earlier that day and begin walking to the right or left until you have once again centered the magnetic compass needle within the orienting arrow. You’re now back on the baseline. Of course, the question now arises: Which way do you turn on the baseline? Well, if you were smart, you aimed off as described above, ending up on the baseline closer to the landmark so that you know you’ll have to follow a back bearing from the landmark to return to camp along the baseline bearing.

You can eliminate the worry of having to aim off by adding a second baseline to the mix. Before you leave camp, establish a bearing toward a second easily recognizable landmark and write that bearing down. What you’re banking on here is the fact that two straight lines can intersect in only one place (Mr. Frumplemeyer’s ninth-grade geometry class covered this if you had been paying attention). This comes into play once you’ve arrived back at your first baseline. If you have a map and know where the camp is on the map, you can quickly determine which way you should head. First, orient the map. Next, draw the first baseline on the map so that it becomes visible, not imaginary. Now hold your compass level at waist height and point the direction-of-travel arrow at the second landmark. Rotate the compass housing until the red end of the magnetic compass needle is centered (boxed) within the orienting arrow. Your bearing can be read in degrees at the center index point — where the compass housing meets the direction-of-travel arrow on the compass baseplate. Taking care not to move the map, place one edge of the compass baseplate directly on the second landmark, with the direction-of-travel arrow pointing from the baseline toward the landmark. Now, without moving the compass housing or moving the map in any way, pivot the compass around the landmark point until the red end of the magnetic compass needle is centered (boxed) within the orienting arrow. Draw a line, either in pencil or in your imagination, along the edge of the baseplate until it intersects with the baseline you’re standing next to. Your location on the baseline is where the two lines intersect. You should now know which way to turn to get back to your camp.

**What if you don’t have a map?** Hold your compass level at waist height and point the direction-of-travel arrow at your second landmark. Rotate the compass housing until the red end of the magnetic compass needle is centered (boxed) within the orienting arrow. Read the bearing. Compare it with the bearing you wrote down when you sighted off this landmark from camp. Now move to the right or the left on your baseline and take another bearing off the second landmark. Compare it again to the bearing you wrote down. The closer your bearing is to the bearing you wrote down, the closer you are to camp, which means that’s the direction you should head.

**Pinpointing Your Position: Triangulation**

It’s important to realize that even with the best navigator and the best handheld compass, error still manages to creep into the mix. On average, each bearing may be off anywhere from 1 to 4 degrees, depending on many factors that can influence the outcome. This means that if you
really want to establish an exact location, or as close to exact as you're going to get, you'll need to establish not one, not two, but three baselines. Where those three baselines intersect is your location on the map. Establishing your absolute position fix using triangulation will be much more effective if you can select landmarks that are relatively near you and as spread out as possible around the points of the compass.

First, orient the map. Then hold your compass level at waist height and point the direction-of-travel arrow at the first landmark. Rotate the compass housing until the red end of the magnetic compass needle is centered (boxed) within the orienting arrow. Your bearing can be read in degrees at the center index point—where the compass housing meets the direction-of-travel arrow on the compass baseplate. Taking care not to move the map, place one edge of the compass baseplate directly on the landmark, with the direction-of-travel arrow pointing toward the landmark. Now, without moving the compass housing or moving the map in any way, pivot the compass around the landmark point until the red end of the magnetic compass needle is centered (boxed) within the orienting arrow. Draw a line in pencil along the edge of the compass's baseplate. Repeat the steps with a second and third landmark. The area or triangle bounded by all three lines will be the area in which you are located. The farther away the landmarks you sight off, the larger the triangle. The closer the landmarks, the smaller the triangle and the more accurate your fix.

**Ded Reckoning**

I once thought that this referred to navigating from the hip because all your other resources were exhausted. Then I began sailing. That was when I learned that the term is based in nautical history (ancient mariners relied on this method to find their way across uncharted waters) and refers to reckoning by logical deduction. The word dead actually came from a contraction of deduction—ded. So, in reality, this is “ded (deduction) reckoning,” which makes much more sense to me.

Ded reckoning isn’t as accurate as other forms of navigation, but it will suffice, especially in those circumstances when the identifiable land features are few and far between. You must start with an established point of origin or a fix. Mark this point on the map. From this point, establish a compass heading and then stick to it for a measurable distance. Military personnel are taught to silently count off the number of steps they have walked; and that’s as good a method as any. Consider that for the average human, each normal walking step is approximately 2 1/2 feet long. So if you count one for every time your right foot hits the ground, you can tally up 5 feet of distance covered. If you want to be really accurate, put a pebble in a pocket for every one hundred times your right foot hits the ground. Each pebble in your pocket will then equal about 500 feet.

Estimate your second established point on the map by counting pebbles and multiplying by 500. Since 1 mile equals 5,280 feet, you can use the map’s scale to estimate how far on the map you have traveled. Mark the second point on the map. That point has been established by ded reckoning. For obvious reasons, the longer the distance you cover, the more likely you are to make a larger error. If you decide to change direction at this second point, establish another compass heading and begin counting steps anew. Each time you change direction, establish another ded reckoning point on the map. In this way you can roughly chart your course and
Another useful application for dead reckoning doesn’t involve a map at all—only your compass and an accurate measurement of time or distance. Say you have no map, but want to head out from point A to explore the surrounding terrain and still have a reasonable shot at arriving back at point A again. The terrain is featureless, so establishing a bearing as a baseline is out of the question. What do you do? From point A, head out at an established bearing, making sure you write it down so that you don’t forget it. Either keep time with your watch or measure your steps as outlined above. When it comes time to change direction, mark it down as point B. Record the elapsed time or steps counted between points A and B, establish your new bearing, and then remember to write the new bearing down. Repeat these steps every time you change direction until you decide it’s time to head back to point A again. To be precise, you must first establish a distance scale so that you can accurately draw a map using your recorded elapsed time or distance measurements. For instance, you might establish that every fifteen minutes or 250 steps represents 1/4 inch. Beginning with point A either drawn on a piece of paper or scratched into the dirt, measure your elapsed distance to point B using the same bearing you followed earlier in the day. From point B, place the bearing to point C on the index line of the compass, point the direction-of-travel arrow toward point C, and once again measure the correct distance covered. Repeat this until you’ve plotted your course on the ground or on the paper with one last leg left unplotted—the leg returning you to point A. Pointing your direction-of-travel arrow at point A from the last point plotted—say point L—turn the dial and center (box) the magnetic needle with the orienting arrow. Read the bearing at the index point—this is the bearing you will follow to get back to A. Keep in mind that you’ve been using dead reckoning, so don’t expect to be exact. If you were careful, though, you should come very close.

**Estimating Distance**

Estimating distance is useful to paddlers, hunters, or any adventurers who may be contemplating a paddle or trek to a distant peak, island, or point in the desert that appears deliciously close. Remember, my friends, things are not always as they appear. Objects will assuredly look closer than they are if the atmosphere is brilliantly clear or if they’re viewed across flat, open terrain such as sand, water, or snow. If you’re carrying a range finder, you’re home free. Chances are, though, that you’ve opted to save the expense, weight, and bulk of this item—which leaves you to estimate.

One tried-and-true method involves winking. Ever notice that if you alternately open one eye and then the other, objects you are gazing at appear to move back and forth? Well, you can use this to your advantage, providing you know the width in miles or feet of the object from which you’re estimating your distance. For paddlers, this involves finding out how wide a distant point or island is. For hunters or hikers, you’ll need to know how wide a plateau or mountain is. With one eye closed, extend your arm and hold up one finger. Using the open eye, sight the finger to the opposite side of the object (left eye to right corner or right eye to left corner). Now close that eye and open the other to look at the same finger. Estimate how far across the object your finger appeared to jump—one eighth, one quarter, one half, one? Now divide the width of the object into the fractions represented by your finger observation. For example, if your finger appeared to jump halfway across an object you know to be 1 mile wide,
then the movement equaled 0.5 mile. The formula for establishing distance is to multiply that distance by 10. That means that $10 \times 0.5 = 5$; you're approximately 5 miles from the object.