



Planning Your Route, Finding Your Way with Kayak Navigation

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Related article: [Topo Maps, GPS and UTM Grid Readers](#)

---GLOSSARY OF NAVIGATION TERMS at end of article

There are many reasons for you to learn and understand the fundamentals of kayak navigation and implement them into your trip plan. The art and science of navigation is an ancient one, utilizing simple tools that are readily available.

Using a chart and compass will allow you to find your way through unfamiliar territory and complicated waterways with lots of islands, coves and peninsulas. Such areas possess extraordinary kayaking views and adventures to the paddler familiar with navigation basics.

You will also be able to determine your position and direction of travel in fog, night, and low visibility due to heavy rain. At any time you will be able to know where you are and communicate that to any one who may need to know. You could use GPS devices to achieve these goals, but electronics are not necessarily able to hold up in wet environments, particularly salty ones. Batteries often fail or are forgotten. The use of a good chart or map is still necessary to clearly understand the "lay of the land." Any sensible outdoors person will carry a compass; why not how to use it? GPS has great applications, and I am not discounting their use, but this article does not contain information on how to use them.

You will need, as pictured above:

- A chart and or map
- A hand held and or deck mounted **compass**
- **Parallel rules**
- A pencil (easy to erase)
- A **protractor** can also be handy
- A wristwatch for figuring time and distance is useful

Keeping these simple tools in mind, let me now introduce you to the basic principles involved with good kayak navigation.

- **CHARTS VS. MAPS**
- **MAGNETIC NORTH VS TRUE NORTH**
- **PARALLEL RULERS AND PREPARING YOUR CHART**
- **PLANNING ROUTES IN THE FIELD**
- **MEASURING DISTANCES**
- **TRIANGULATION**
- **RANGES**
- **TIDE TABLES AND COAST PILOT**
- **FINDING YOUR WAY HOME**
- **RESOURCES & LINKS**

CHART VS. MAP - Kayakers, being amphibious, will be able to utilize both charts and topographical maps in planning and enjoying their voyage. What are the differences and advantages?

CHARTS:

A chart is a map for nautical use. A chart will detail information that is of interest to mariners, such as water depth, rocks, wrecks, shoreline terrain; and aids to navigation, such as buoys or lights.

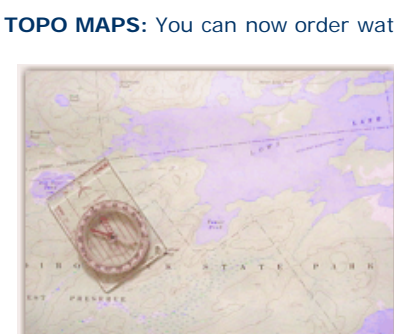
A chart utilizes a "compass rose" consisting of three concentric rings showing all 360 degrees, like a round protractor; the outer one oriented for true north, the middle one for magnetic north.

The innermost ring shows all the compass points, north, east, south and west, etc, just like a compass, without the abbreviations. As kayakers we will want to use the middle ring for numerical magnetic "bearings."

Distances can be measured on a chart using the "scale" (in nautical miles) or the "latitude scale" along the right and left borders of the chart, NOT the longitude, top and bottom. A nautical mile (abbreviated as NM or nm) is equal to 1.15 statute miles or 1.85 kilometers. There is not that much difference but it can add up fast and give you problems if you are not aware of the difference.

Chart #1 is the "chart" that is the legend or key to all the symbols, abbreviations and features that are shown as drawings on any marine chart. By getting this "Chart #1" you will be able to better understand the codes marked next to buoys and lights, and the difference between a sand beach and a rocky beach. Charts, and Chart #1, can be obtained at many marine supply stores. Also check our Resources & Links for this article.

TOPO MAPS: You can now order water-proof topo maps on-line.



A "topographical map" will detail information that is of interest to landlubbers. Topographical maps will show the contours of the land in great detail, roads, trails, springs and "non navigable" (to ships and large power boats) waters that may not be detailed on charts.

This type of map may be the only kind available for inland lakes and rivers. A topo map will also show the declination (or difference) of true north and magnetic north, depicted as an angle. There is however no compass rose.

A topo map has a scale like any other map, and it is in statute miles, just like the ones we use while driving. To make measurements of distance on any map or chart, use a ruler, your fingers or the measuring edge of a compass. Make a measurement of your route and compare to the scale or vice versa. While at home, not in the field, you could use dividers or a compass (the kind you draw circles with) as a measuring instrument. Topo maps have a legend in a separate publication called "Guide to topographic map symbols." You can use this to better understand the symbols, and abbreviation and read your topo maps.

Topo maps and The Guide To Topographic Map Symbols can be obtained at many outdoor and map stores. Also check the Resources & Links for this article.

MAGNETIC NORTH VS TRUE NORTH

True north is the direction to the geographical top of the earth, aka the North Pole. Magnetic north is an area of strong magnetic attraction that is near the North Pole, in Canada. The magnetic north pole is just like an end of a magnet, with the Earth being a very large magnet. Because the true North Pole and the magnetic north pole are close, but in two different places on the globe there is almost always a difference between true north and magnetic north compass bearings. This can be as much as twenty degrees or more in some places. In Northeast America this is usually about fifteen degrees. In the mid west and southern states the numbers are small, zero to ten degrees. On the west coast variation (at sea, charts) or declination (on land, topo maps) is about fifteen to twenty degrees. Check the area you are in carefully for the declination.

YOUR COMPASS

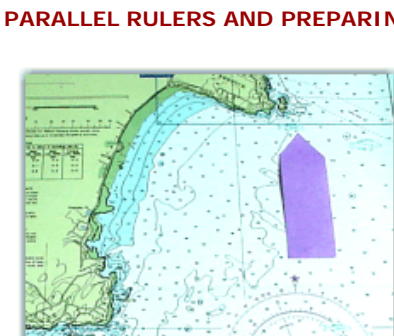
A compass will always point to magnetic north. As a kayaker magnetic north will be the way you will record compass bearings. Compasses come in a variety of styles. A pocket or hand held compass is the most common. This variety should have a straight edge and a rotating dial called an azimuth ring. A pocket compass is very handy to have in your PFD pocket.

A deck-mounted compass is the best for a kayaker to have. It will mount on your kayaks bow deck in a position that you can easily see. It will tell you what direction your kayak is pointed in by displaying the compass degrees to the rider in the cockpit.

Other compasses will have features that allow you to sight a more accurate reading. They can be very useful, but as kayakers we will tend to round off our readings (to the nearest five degree mark) to utilize easy to see and use numbers.

Any compass can be strongly affected by metal nearby. Your compass needle will not be accurate if there is any iron containing metal in close proximity. When using a hand held compass check to make sure your pocketknife is not too close. When loading your kayak make sure that the cargo nearest to your deck-mounted compass does not contain a cast iron fry pan. When in doubt about an item that may affect your compass, slowly bring it near the compass and see if it causes the needle to move. This will tell you how far away to stow that item and if it indeed will affect the compass.

PARALLEL RULERS AND PREPARING YOUR CHART



Parallel rulers are a tool that is used to plot a course on a chart using the chart's compass rose. The parallel rules consists of two rulers that are connected by hinges. They are used to draw two perfectly parallel lines far apart from each other, on your chart. You will likely use the parallel rules, at home, while planing your trip, because their use on the deck of a kayak is impractical. The goal is to draw lines on your map representing the legs of your journey and to transfer those lines to the compass rose in order to obtain compass courses that can be noted on your map.



CHOOSE POINT A (START) & POINT B (END)

To use the parallel rules place your chart on a table. Determine your starting point and a straight line that represents the first leg of your journey.



Place your **parallel rules** on that line and draw the line right on your map using the straight edge of the ruler. Without moving the ruler from your line, hold one rule firmly in place, while you slide the other rule over to the compass rose. Hold the rule, that you have just moved, down firmly and then slide the other rule to catch up with the first. You will have to slide one rule at a time to walk them over to the compass rose. Once you have reached the compass rose align the straight edge through the center of the rose and draw a line right through it.



DRAW A LINE FROM POINT A TO B



(Use a pencil and you can erase later if you wish, but this will make it easy for now.) Always hold one rule down firmly while you move the other rule so that the line on your compass rose is perfectly parallel to the line representing your intended route. This may take some practice to walk the rules across the map.



SLIDE ONE RULE TOWARD COMPASS ROSE



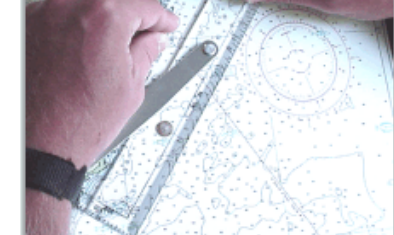
Now you can determine the compass course you will be traveling along during this leg of the trip. Picture your self in the center of the rose. Compare that to the starting point of your trip. Now back to the center of the rose. Look in the same direction you will be going on your route.



Follow the line from the center of the rose in that direction to the middle ring marked "Magnetic." Find the number closest to the line. It is best to round up or down to the nearest five degrees. Your deck-mounted compass will likely show only the spots every five degrees. Write that number next to the line on the map that represents your route. You may want to put the letter M next to that number to indicate that it is a magnetic compass bearing as opposed to a True north bearing. Find other straight legs of your journey and do the same for each leg. This will help you navigate across the large open areas of water, where you will be most susceptible to low visibility or an inability to determine islands, and peninsulas from shoreline in the background.



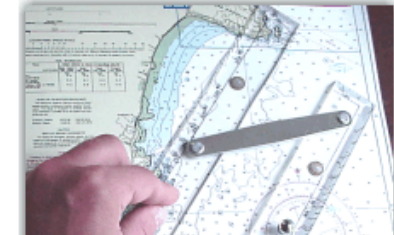
SLIDE SECOND RULE TO COMPASS ROSE



Be careful about determining the correct bearing from the compass rose. It is easy to mistakenly record the complete opposite bearing, such as 180 degrees instead of 0 degrees, which would be the difference between south and north, or 270 degrees instead of 90 degrees, which would be the difference between west and east.



SLIDE FIRST RULE TO CENTER OF COMPASS ROSE & DRAW LINE



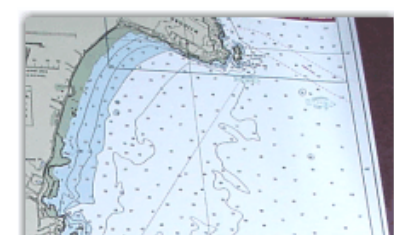
It is, however, practical to know what the opposite direction is, called a "back bearing." There are circumstances where you may want to make an about face and turn back the way you came to escape bad weather, find a slow kayaker, or retrieve a forgotten item on the last beach. If you are good with numbers this will be a snap, but if you are unfamiliar with navigation you may want to indicate the back bearing next to your line of travel on your map.



You will encounter portions of your route that will not be straight. These will generally be along coastlines, or around islands. It is impractical to determine a multitude of compass bearings to describe a curved line. You will use coastlines and landmarks along these areas to help you navigate, if the weather is clear enough to see. If you are paddling in poor visibility you will want to use other aids. The sound of the waves can help you determine where shore and shallows are. Buoys, bells, lights and foghorns can help you pin point where you are if using a chart. Attention to your speed, distance traveled and direction will be important in these situations.



THESE LINES DETERMINE YOUR COMPASS COURSE



You may want to jot down the distance, in miles, for each of these legs next to the line you have drawn on your chart. Use the scale on the map to measure this. It will help you to estimate your progress on that route while paddling it.

You can use your topo map in the same manner. You won't have a compass rose to use, but you can improvise with a protractor; even draw a compass rose on the map, carefully to match the orientation. Make sure you are using the right declination. The magnetic ring of the rose is all you will need.

CONTINUE TO PART TWO

Navigation Terms

Azimuth Ring = rotating outer ring on some hand compasses marked with degrees.

Bearing = compass direction to a landmark.

Chart = a detailed map for nautical use.

Course = direction you want to go.

Dividers = an instrument for dividing and measuring lines.

Easting: The number used in UTM to define how far east or west the position is.

GPS, Global Positioning System: A network of satellites and mobile receivers used in electronic navigation.

Heading = compass direction boat is pointing.

Knot = a nautical unit of speed measurement equal to 1.15 MPH.

Map Case = a waterproof bag made for maps. Freezer quality, Ziplock type bags may do.

NAD, North American Datum: Numbering system with in UTM. NAD 27 being the older and NAD 83 the newer.

Nautical Mile = the average distance on the Earth's surface represented by one minute of latitude.

Northing: The number used in UTM to define how far north or south the position is.

Parallel Rulers = two rulers, or rules, hinged so that they are always parallel.

Pointer = found on some hand compasses, turns with azimuth ring to align with compass needle.

Protractor = a graduated, semi circular instrument for plotting and measuring angles.

Range = Two fixed objects, one behind the other, in line with you and your destination.

Scale: The ratio of distance between the "real" distances on the earth and the distance on the map. Example 1inch = 24,000 feet.

Topographical Map = a detailed map for overland travel.

UTM Grid Reader: A clear plastic sheet used to measure UTM coordinates on a paper map.

UTM, Universal Transverse Mercator: The system used for creating coordinates used with GPS and topo maps. Expressed as NAD 27 or NAD 83.

Waypoint: A location defined by coordinates from a GPS or read from a map.