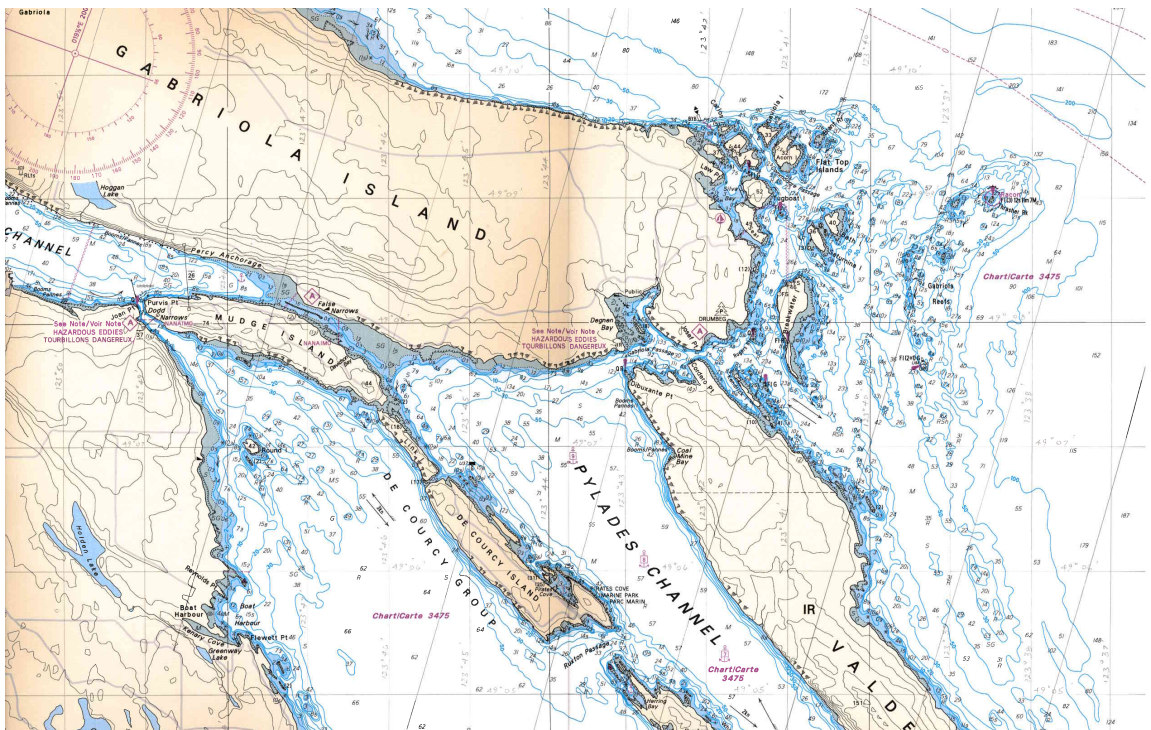




Navigation

You need to know where you are
to know where you're going.



Charts

A grid system, know as longitude and latitude is universally known system used to determine your location on the earths surface.

Size

Large scale - small area covered with lots of detail eg. 1:5,000

Small scale - large area covered with minimal detail eg. 1:250,000

Paddlers usually use 1:20,000 to 1:80,000

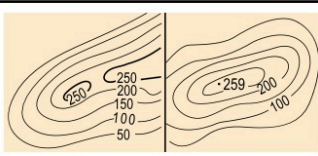
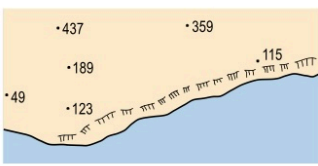
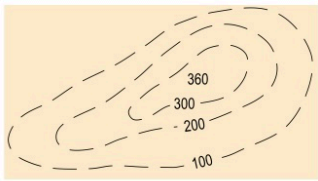

Colours

- White is water deeper than 10 meters
- Blue is water 10 meters or less
- Light Blue 5-10 meters
- Dark Blue is under 5 meters
- Green is intertidal zones - depending on the tides it could be under water or dry land
- Beige is land that is above sea level, it is always dry land

Numbers

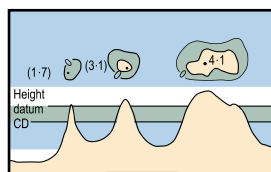
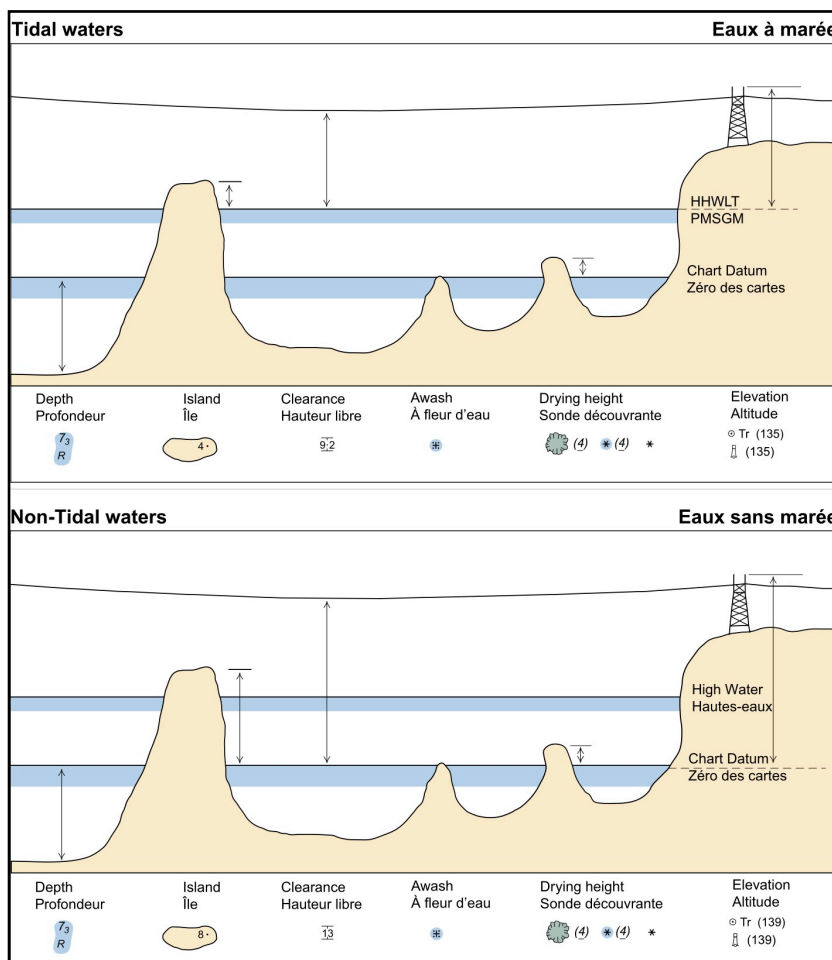
Represent depth and contours

- The closer the contour lines are to one another, represents steeper slopes.
- Wider spaced contour lines represent gentle slopes.
- Numbers on land indicates the height of land such as hills or mountains. The elevation is measured from the **Higher High Water Large Tide (HHWLT)** this is where the green meets the beige.
- If there is a line above the number, the height is the top of the tree top rather than the land. (Some of our trees can grow pretty tall)

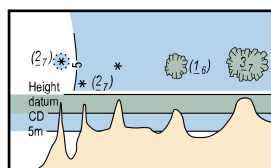
	Contour lines with spot height
	Spot heights
	Approximate contour lines with approximate spot height
	Approximate height of top of trees (above datum)

Numbers on water are always based on the lowest level of water, where the green meets the blue, known as **Lowest Normal Tide (LNT)** also referred to as **Chart Datum**

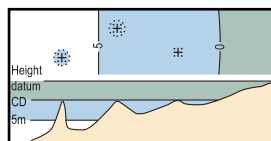
Drying Height is the height of tide required to cover or uncover an object. It has a number representing the water level and it is underlined> on the chart.



Rock (islet) which does not cover, height above the plane of reference for elevations



Rock which covers and uncovers, with height known or unknown above chart datum.



Rock awash at chart datum

Intertidal Shorelines

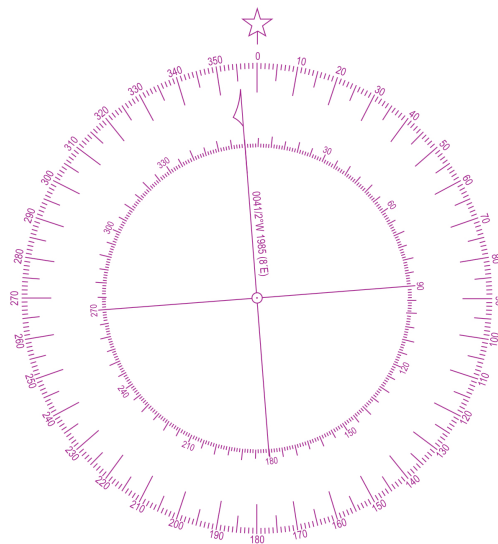
	<p>Areas with stones and gravel</p>
	<p>Rocky area, which covers and uncovers</p>
	<p>Coral reef, which covers and uncovers</p>

Symbols

	<p>Flood tidal stream with rate</p>
	<p>Ebb tidal stream with rate</p>
	<p>Current in restricted waters</p>
	<p>Ocean current. Details of current strength and seasonal variations may be shown.</p>
	<p>Overfalls, Tide rips, Races</p>
	<p>Eddies</p>
	<p>Hazardous Eddies - see Tide and Current Tables</p>

Compass

For years, Mariners have used the earth's magnetic field to find direction. Unfortunately, magnetic north and true north which is on your chart are not the same. The Compass Rose on your chart will indicate true north with a ☆. The line with an arrow will be pointing magnetic north based on the year written on this line. The position of the magnetic pole changes gradually with time, and so the magnetic variation at any given point also gradually changes. These changes can be predicted, and the magnetic variation, as well as annual rate of change has been calculated for most places on earth.



The difference between true north (geographic north) and magnetic north is called **magnetic declination, or sometimes magnetic variation**. This may be different in different locations, so always check the declination for that area.

In this diagram the magnetic north is $4\frac{1}{2}^{\circ}$ W with an annual adjustment of 8' E.

You can go on line and get the current declination for the location required. The current Declination for Nanaimo in 2025: $+15.65^{\circ}$ 40' Declination is Positive (east).

A compass will point to magnetic north provided there is no local influences. Keep this in mind when packing your kayak. Stow items that may influence your compass in your stern hatch, not your bow hatch.

Compass can be mounted on the deck of your kayak. You can also have hand held compasses in addition to a deck compass and/or a chart plotter.

Navigating

Using your compass and your charts to determine where you are. You must know where you are to know where you are going.

Things to know and note:

1. where your start point is
2. where you want to end up
3. a compass bearing to follow
4. the amount of time it will take
5. your group paddling speed (3kn average)
6. the distance you are going

Charting Your Trip

Once you've decided where you want to go, choose your path. If you're hand railing along the shore, a shoelace or string works well to trace your path. Take that string or shoelace and place it on the latitude scale on the side of your chart to determine the distance. If you're doing crossings, use your plotter.

Speed

What speed will you paddle?

Speed Knots	Minutes to paddle one mile
1.0	60
1.5	40
2.0	30
2.5	24
3.0 (average speed)	20
3.5	17
4.0	15
4.5	13

What factors could influence your speed? Wind & Current can effect your speed, SMG 'speed made good'

The kayak speed can be affected by wind speed as follows:

Wind Speed	Approx. effect on speed (knots)	
	Headwind	Tailwind
25 knots	-3	+2.5

20 knots	-2.5	+2
15 knots	-2	+1.5
10 knots	-1	+1

Calculating your Time, Speed & Distance

$$D = S \times T$$

$$S = D/T$$

$$T = D/S$$

Example using average speed : 3 knots x 2 hours = 6 nm travelled

Piloting

Piloting you are able to see and recognize landmarks and navigational aides. You know where you are and where you are going.

When you launch your kayak, stop and turn around. Take a **REALLY GOOD LOOK** at where you came from so you know what to look for when you return. Keeping in mind, it might not look the same when you come back. Water levels and lighting can make things look very different. Note more than one item in your landscape. Notice the blue house or the white fence. Notice a particular large tree. Notice the change in the shoreline, perhaps some cliffs etc. Note things that you'll remember and will stand out.

As you paddle, always track where you are on your chart. **CHECKING CONSTANTLY** especially if you're paddling somewhere you haven't been before. On your chart, notice every bend and bay as they'll all start looking similar after a while. Look for navigational aides that you can identify on your chart such as lights, lighthouses, buoys, cliffs, bays, marinas. You have to know where you are to know where you're going.

When take a bearing on a fix, you can determine your **Line of Position (LOP)**. If you can find another fix, you can determine where you are.

Two crossing LOP is a bisect

Three LOP is a triangulation

This gives you your position

When you're making a large crossing, take a bearing, then pick a spot and aim for it. An option is to aim to the right or left and then handrail towards your destination. By doing this, you're making a planned correction avoiding an unnecessary **backstop**.

Ded Reckoning (deductive reckoning)

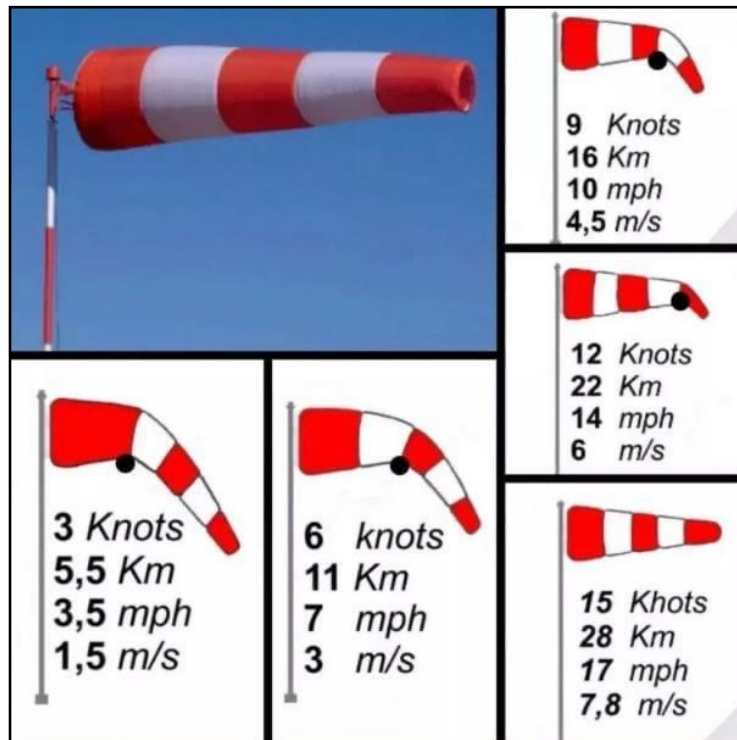
You may not have the landmarks and navigation aides. You may have limited visibility. You have to calculate your speed and time and distance. Then keep track of your position by using a planned course with speed and time.

This is when it's nice to have a GPS

Tides

Check the tides for the area closest to where you'll be launching from

- what's the water level and is it ebbing or flooding when you launch
- What's the water level and is it ebbing or flooding when you return
- What's the water level and is it ebbing or flooding when you stop for lunch



Weather

Always check the weather forecast. Check it every morning and evening and periodically throughout the day.

Beaufort Wind Scale

Force	Wind Speed		Descriptive Term	Effects Observed at Sea	Effects Observed on Land
	Km/h	Knots			
0	Less than 1	Less than 1	Calm	Sea surface like a mirror, but not necessarily flat.	Smoke rises vertically.
1	1 - 5	1 - 3	Light air	Ripples with the appearance of scales are formed, but without foam crests.	Direction of wind shown by smoke drift, but not wind vanes.
2	6 - 11	4 - 6	Light breeze	Small wavelets, still short but more pronounced. Crests do not break. When visibility good, horizon line always very clear.	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.
3	12 - 19	7 - 10	Gentle breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered whitecaps.	Leaves and small twigs in constant motion. Wind extends light flag.
4	20 - 28	11 - 16	Moderate breeze	Small waves, becoming longer. Fairly frequent whitecaps.	Raises dust and loose paper. Small branches are moved.
5	29 - 38	17 - 21	Fresh breeze	Moderate waves, taking a more pronounced long form. Many whitecaps are formed. Chance of some spray.	Small trees with leaves begin to sway. Crested wavelets form on inland waters.
6	39 - 49	22 - 27	Strong breeze	Large waves begin to form. The white foam crests are more extensive everywhere. Probably some spray.	Large branches in motion. Whistling heard in telephone wires. Umbrellas used with difficulty.
7	50 - 61	28 - 33	Near gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.	Whole trees in motion. Inconvenience felt in walking against wind.
8	62 - 74	34 - 40	Gale	Moderately high waves of greater length. Edges of crests begin to break into the spindrift. The foam is blown in well-marked streaks along the direction of the wind.	Breaks twigs off trees. Generally impedes progress. Walking into wind almost impossible.
9	75 - 88	41 - 47	Strong gale	High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility.	Slight structural damage occurs, e.g. roofing shingles may become loose or blow off.
10	89 - 102	48 - 55	Storm	Very high waves with long overhanging crests. Dense white streaks of foam. Surface of the sea takes a white appearance. The tumbling of the sea becomes heavy and shock-like. Visibility affected.	Trees uprooted. Considerable structural damage occurs.
11	103 - 117	56 - 63	Violent storm	Exceptionally high waves. Sea completely covered with long white patches of foam. Visibility affected.	Widespread damage.
12	118 - 133	64 - 71	Hurricane	Air filled with foam and spray. Sea entirely white with foam. Visibility seriously impaired.	Rare. Severe widespread damage to vegetation and significant structural damage possible.

References

BC Marine Trails

BCMT provides maps with information on campsites including landing/launching. Facilities if there are any.

<https://www.bcmarinetrails.org>

Jan Kretz from Advenuress Sea Kayaking provides a course on navigation and seamanship which includes weather.

<https://adventuress.ca>

Beaufort Scale

<https://www.canada.ca/en/environment-climate-change/services/general-marine-weather-information/understanding-forecasts/beaufort-wind-scale-table.html>

Chart 1

<https://charts.gc.ca/publications/chart1-carte1/sections/intro-eng.html#section>