Tidal Currents – Capt. Geoff

The waters around Campbell River are among the most beautiful in the world. There are hundreds of miles of sheltered channels surrounded by majestic mountain views. There is fishing, diving, whale, bear and other wildlife watching; as well as beachcombing opportunities almost everywhere.

However this same geography creates special challenges. Where the channels are constricted, the currents are among the strongest in the world. Where even moderate currents occur in semi-open waters, small wind driven waves can be changed into steep, dangerous breaking seas.

But with knowledge these dangers can be avoided and even turned to advantage.

Introduction to currents

For people on the water, in this area of narrow channels, tidal currents can be as important or even more important as tide height. In constricted areas such as Seymour Narrows, currents can reach almost 16 knots (almost 30kph). And it is not just the current strength that is the problem when transiting. As the shoreline and bottom are often not smooth or straight, water gushing through these narrow passages creates cross currents, eddies, whirlpools and upwellings that can throw even a larger vessel around quite violently.

What can cause confusion when planning your voyage, is that the time of high or low water (when the water level stops rising or falling) can be several hours different from "slack" water (when the horizontal motion ceases). And the time of both high/low water and slack water changes as you move up or down the channels.

For me, the way to make sense of it, is to think of a long ditch running into a pond at one end. We want to fill the pond, but only have enough water hose to reach the other end of the ditch. As we start to add water, the water level near the hose starts to rise, then the bulk of the water will start to flow down the ditch to fill the pond, as nature requires all the connected water levels in our ditch and pond to be the same. If the ditch is very long, the current may not reach the pond end for a while. Even when the water is moving along the whole ditch, the current and rising level will be much less noticeable in the pond, as the water flow spreads out. If there is a narrow spot in the ditch, the water level on the hose side may be higher, as the water piles up, trying to get through the narrow part. Once we shut off the water, the water near the hose end may actually drop, as the water continues to move towards the pond, until the water level is the same throughout the ditch and pond. If we now replace our water hose with a suction hose to pump the water out, of course everything reverses.

From the North end of Vancouver Island, down through Johnstone and other straits and passages to Cape Mudge, at the south end of Quadra Island, is about 120 nautical miles.

Often the channel is less than two miles wide, sometimes half that, with pinch points like Seymour Narrows less than half a mile wide, and then it opens up into the Strait of Georgia. So it does bear some resemblance to our ditch and pond, hugely scaled up.

The complex lunar and solar gravitational effects that create tidal rise and fall mainly affect the open ocean. As the tidal height of the outer coast rises and falls, water moves into or out of the inside passages (this acts like our hose at the end of the ditch). In Vancouver Island's case, the water flows in from both the north and south end of the Island, meeting just south of Mitlenatch Island (think of another ditch on the opposite side of the pond, which we are also putting water into or pumping out of). So for Campbell River area, the Flood current is a southerly flow, while from Courtenay and south, the Flood is northerly.

This is a very simplified model, but hopefully it illustrates why high or low water is often not the same as slack water. Add to this, the changing nature of our tides (mixed, predominantly semidiurnal) along with springs and neaps, and a consistent rule to predict slack water from tide height would be very inaccurate. The only way to accurately determine slack water is to look at actual current predictions. Canadian Hydrographic Services publishes this information in print and on the web. There are also computer programs that can predict this information. It is important to note that other factors, particularly strong winds, can affect these predictions.

Introduction to Currents part 2

Now you have an understanding of how tidal currents work in this area, how do you avoid their dangers, and use them to best advantage?

First, any place where the flow is constricted, by channel depth, and or width, very strong currents can occur, creating dangerous conditions for transit. The best option is to transit them near slack water. It is important to remember that time of slack water at each place is different - for example, up to an hour different between Seymour Narrows and Surge Narrows, which are only about 10 miles apart as the crow flies.

Also, be prepared to meet other traffic, as most people transit around slack. When transiting Seymour Narrows, if possible, listen in on the Traffic Frequency, Channel 71, and you will hear any large vessels, or tugs and tows that are transiting as they make passage arrangements.

For areas where currents are less powerful, you can save a fair amount of fuel, particularly with a displacement hull, if you transit with the current. If you arrange to run with a three knot current, rather than opposing it, that is a six knot boost. Off Cape Mudge currents can run at up to 9 knots.

The weather is the wildcard when dealing with currents. Beyond simple wind speed, the main issue is 'fetch', the distance that the wind travels over open water. The greater the fetch, the

more time the wind has to make the waves bigger. Generally, the area's worst winds are Southeaster's, which is also the direction of the greatest fetch. Even after a few hours, a SE gale can generate waves up to a couple of metres in height by the time they reach Quadra Island.

When currents are added to this situation, it can make things much worse.

Cape Mudge is the most obvious example of this. The flood current, running south between Quadra and Vancouver Islands, pushes into the wind generated waves coming from the South East As the current pushes into the waves, it decreases the length between them and increases their height. The seas become very short and steep, and are often breaking. When this occurs, it is an incredibly dangerous place for a small boat, and even larger vessels have been damaged and some sunk there.

At the opposite extreme, still with our SE wind, but the ebb running north off Cape Mudge, the waves in the channel actually get longer between crests, and lower in height. For someone looking from the Campbell River side, or on the water, this is deceiving, as it looks a lot calmer farther out than it is, and if slack is near, it can quickly change to the high, short seas talked about above.

The same type of effect can be felt on the Ebb, when there is a strong Northerly or Northwest wind. It is particularly noticeable around Seymour Narrows, and in areas of some fetch, such as Johnstone Strait. The effect is not as severe, but it can still be a hazard, and at the least very uncomfortable.

There are no magic numbers for maximum wind speed or current to ensure a safe passage. It depends on your vessel, your training, experience and comfort level. And there is always the unexpected. Choppy, confused waters can stir up sediment or water in your fuel tank; it can also start shifting things that you thought were secure. Water in your bilges can splash onto electrical circuits, passengers can take ill, etc.

There are many aspects that we have not covered in this short introduction, but I would like to pass on one more tip while we are on the subject of currents. If you break down, a natural reaction is to anchor, however if the current is running at say six knots, once the anchor sets, it is as if you have suddenly been taken under tow at six knots. If you are still holding the rode, it will try to pull you overboard, if the rode is secured, the shock could rip out the cleat, and if that holds, the boat can start rapidly sheering from side to side.

While a lot of this article is cause for concern, it is not intended to put people off boating in this area. We have some of the best cruising grounds in the world. If you understand the dangers, which, in part, can be avoided by knowing the current and weather, it is a magnificent area to explore and enjoy. However, currents are only part of the puzzle when it comes to safe boating. There is Navigation, Chartwork, Rules of the Road, and many other facets that can be just as critical.

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