



SEAMANSHIP

The Dangers Of Bank Suction

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Weird things can happen to a boat when she runs through a narrow channel, dredged cut, or canal. The larger the vessel, the weirder it gets. And when increased speed and shallow depth are plugged into the formula, the situation can become downright dangerous. It all has to do with the strange effects of "bank suction."

Bank suction as described in Naval Shiphandling by Capt. R.S. Crenshaw, is the tendency of a vessel traveling near a steep underwater bank to move sideways toward that bank while an opposing force pushes the bow away. Although it usually affects large ships, bank suction should also be of particular concern to megayacht captains. Under certain circumstances, it can affect smaller yachts and boats as well. Everything is relative, and the combination of close proximity to a steep bank, shallow depth, and increased speed are the critical factors that determine the severity of the bank-suction effect.

According to Crenshaw, bank suction starts when a vessel strays too close to a bank, restricting the water flow on its bank side. The water-flow velocity increases, causing the water between the vessel and the bank to squeeze out of the area faster than it can flow back in. This causes the water level to drop between the vessel and the bank, and consequently the vessel is pulled sideways into the low-water area.

At the same time, there occurs a second phenomenon known as "bank effect." Here the bow wave reflects off the bank and causes a twisting effect on the entire vessel as the bow sheers away. If you do nothing to counter these effects, your vessel could actually cross the narrow channel and run into the opposite bank.

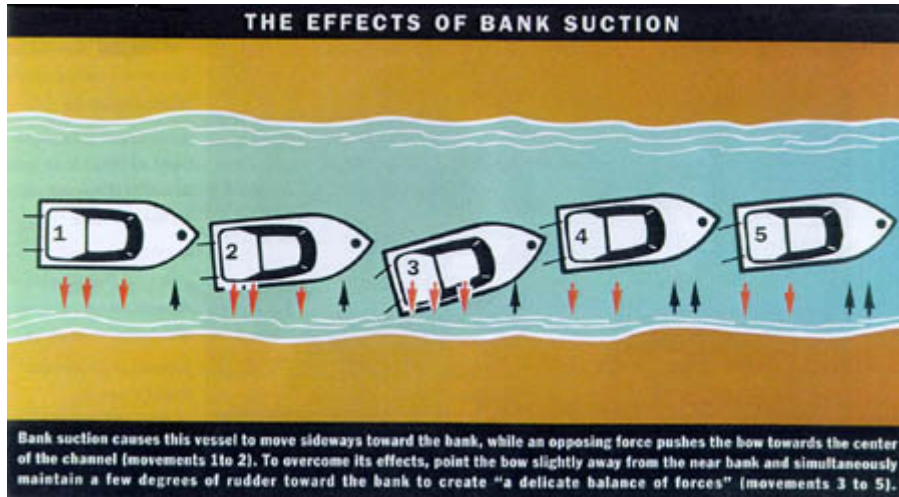
WARNING SIGNS

An example might be the harbor entrance to Alicetown in Bimini, Bahamas, where a steep bank develops as the channel closes with the beach on the final approach. If a crosswind requires an increase in speed to hold the boat in the channel, all the factors for bank suction may be present. Similar circumstances can develop in a narrow canal with swift current. In this case you might have to increase speed through the water to maintain normal speed over the bottom.

Several shallow-water effects can also come into play. First is the tendency of a vessel to sink below her normal draft as her speed increases in shallow water. Just a few knots above idle speed is enough to cause the hull not only to sink down, but to "squat" significantly at the stern. As an extreme example, Crenshaw says that a destroyer doing 30 knots on 30 feet of water would ride eight feet lower than normal at the stern and four feet above normal at the bow. He says that the vessel would be so hunkered down that when viewed from the fantail, the bow wave would be at eye level and the stern wave would be a menacing 13 feet higher than normal.

As a vessel sinks and squats down, steering becomes less responsive and the turning radius increases dramatically. Water flow under the vessel is restricted; it can't flow as is normally does at greater depths and tends to flow more around the hull sides, thus causing a sluggish response to rudder commands. This sluggish response can mean disaster when the effects of bank suction are at work.

The important things to remember are that these shallow-water effects all intensify with speed and combine to further exacerbate the very real difficulties associated with bank suction.



HANDLING TECHNIQUES

To minimize the effects of bank suction, you should throttle back to reduce speed. But what if circumstances make it impractical to bring the vessel to a slow crawl or abrupt halt? In those cases the idea is to keep the bow pointed slightly away from the near bank to overcome the bank suction, while at the same time maintaining a few degrees of rudder toward the bank to compensate for bank effect. This is a tricky and delicate balance of forces so be sure that you stay alert and expect the unexpected.

One result of playing it too close to the edge (no pull intended) is that if the boat momentarily goes too close to the bank at increased speed, the forces that produce bank suction can dramatically overpower the boat. Bank suction takes hold in such an abrupt manner that offsetting rudders can no longer compensate. As the twisting force increases, your boat can go shooting across the narrow channel and hit the opposite bank before you can bring her under control.

A second surprise can happen if the bank is suddenly "removed," as when passing a channel cutout, an anchorage area, or even an unseen underwater break in the bank wall. When abeam of the cutout, the boat will have a strong tendency to veer abruptly into the cutout and perhaps threaten other vessels or even run aground. Crenshaw says this is an especially insidious problem for pilots handling ships in the Suez Canal, where cutouts allow ships to pass each other.

The bottom line on bank suction is that it doesn't just affect big ships—it can happen to you, too. Safe boating dictates that when you're running in narrow channels, give the "big boys" the center and never force anyone too close to the edge of a steep bank. Finally, if you find yourself in a situation where you must increase speed along a bank, be aware of the weird effects and be ready to take action.

Capt. Don Fleming is a professional boating educator and USCG-licensed Master of Oceans with more than 25 years experience.