

Look for Changes in Wind Direction

David Dellenbaugh · BDA Magazine 2008 Annual, pp. 10-11

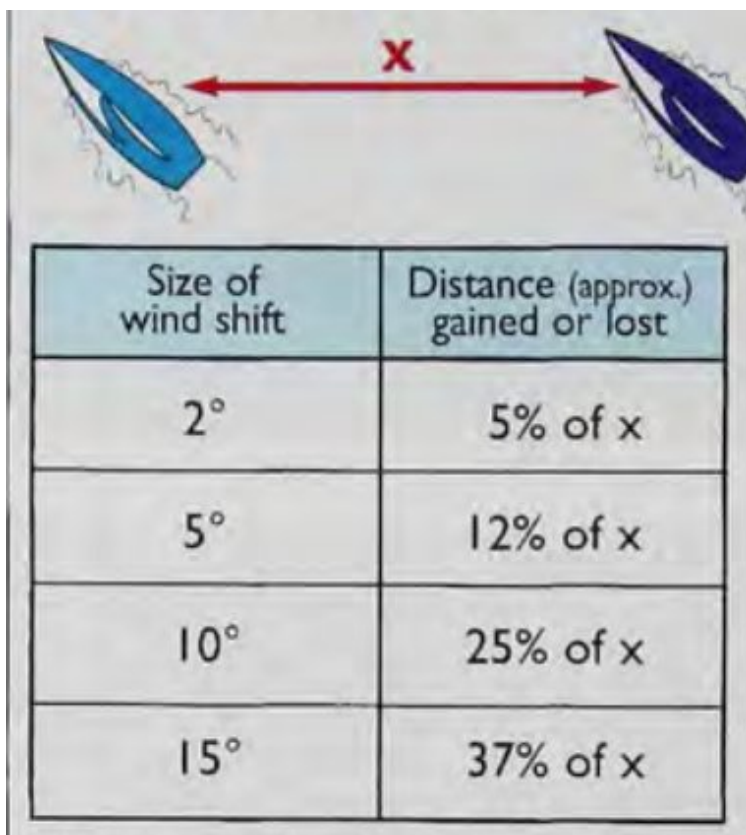
Summary. Why wind shifts are usually the biggest strategic factor in a race, and how to anticipate them. Dellenbaugh stresses local knowledge and your own pre-start observations over large-scale forecasts, the basic principle of sailing toward the next shift, deciding whether the wind is oscillating or persistent, and not mistaking a “velocity shift” for a real one (wait about 30 seconds). A table shows how much two boats a distance x apart gain or lose: about 5% of x for a 2° shift, 12% for 5° , 25% for 10° and 37% for 15° ; sidebars cover geographic effects near land, clouds and the typical sea-breeze pattern.

One thing you can say for sure about the wind direction is that it’s always changing. Even when it seems like a nice steady day, the wind is constantly wriggling back and forth at least a little bit. And whenever the wind shifts, it creates a large opportunity to gain distance on the other boats in your fleet.

Wind shifts are generally the most significant strategic factor of all. Each time the wind changes direction it re-shuffles the fleet standings, and in almost every race the potential gains and losses due to wind shifts are greater than any other factor, including boatspeed!

For all these reasons, it’s very important to understand what the wind is doing – both before and during your race – and how best to use the wind to your advantage.

Why shifts are critical



Why shifts are critical: distance gained or lost by two boats a distance x apart, by size of wind shift.

Size of wind shift	Distance (approx.) gained or lost
2°	5% of x
5°	12% of x
10°	25% of x
15°	37% of x

Changes in wind direction can have a profound impact on the relative positions of boats that are racing upwind. The bigger the shift and the farther apart the boats, the greater the gain and loss that occurs. For example, if two boats are a mile apart in opposite corners of the beat and the wind shifts just one little degree, each boat will gain or lose approximately 150 feet!

- Many windward legs are only 10 or 20 minutes long so general, large-scale forecasts (like the ones you get on the web, radio or TV) are not very helpful. It is much, much more important to rely on:
 - *Local knowledge*: In the specific venue where you are racing, what does the wind usually do when it blows from each direction? Use your own experience from past regattas and ask local sailors to tell you what happens.
 - *Your own observations*: These are even more important than ‘local knowledge’ because they apply to your race area on the specific day when you are racing. Be sure to collect these before the start, and *keep observing during the race*.

- There are many reasons why the wind changes direction. These include the movement of weather systems, thermal heating, changing current, clouds and geographic effects. Keep your head out of the boat and try to understand which of these apply to your particular situation – this will help you know which way the wind will shift next.
- *Sail toward the next shift!* When you expect that the wind will change direction (it happens every beat!), the key idea in your strategic gameplan should be to sail in the direction of the next windshift.
- When making a strategic plan for your windward leg, the relative importance of windshifts will depend on several factors:
 - In light air, windshifts are less critical; wind pressure and current are more important.
 - The importance of windshifts is proportional to their size.
 - Shifts are more critical on longer beats where the boats get more separation (farther apart).
- Windshifts almost always fall into one of two categories – they are either oscillating (shifting back and forth around a median direction) or persistent (changing steadily in one direction). If you want strategic success, you must constantly ask yourself one simple question during each windward leg: Is the wind direction oscillating or persistent?

The way you answer this question will make a huge difference in how you play the shifts. For example, if you think the wind is oscillating and you get headed you should tack. But if you think the wind is shifting persistently, you should keep sailing into the shift.

- Sometimes what appears to be a wind shift is really a change in wind velocity, not in its direction. If you are sailing along and the wind velocity suddenly drops (without changing direction), your apparent wind will shift forward temporarily and it will seem like you're headed.

Be careful not to treat this “velocity shift” like a real change in direction. If you suspect a change in velocity, wait 30 seconds or so and see if the ‘velocity shift’ disappears once your boatspeed adjusts to the new wind velocity.

- Windshifts are different every day. Sometimes it's very easy to see them on the water; other times it's impossible. Sometimes when a shift hits your boat it is solid right away; other times you have to sail farther into the shift to make sure it's real.

When you are trying to make a gameplan to take advantage of the shifts, there is nothing as valuable as sailing around in your race area before the start, just watching (and recording) what the wind is doing.

BASIC PRINCIPLE – Sail toward the next shift.

When the wind direction is changing, your basic strategic move upwind is to sail in the direction where you expect the wind to shift next. For example, if you think the wind will veer (shift clockwise), sail on port tack toward that shift (and vice versa).

By doing this you will end up on a higher “ladder rung” when the wind shifts, and therefore you will be more advanced in the race. Of course, there could always be reasons (e.g. current, wind pressure) when it might pay to sail away from the next shift.



One common cause of changes in the wind direction is the presence of land near the race course. The wind encounters more friction when it flows over the bumpy contours of land, and this often affects its direction. The degree of change is influenced by your proximity to shore (the closer you are, the bigger the shift) and by the angle of the wind to the shoreline.

JH Peterson photo

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Geographic effects

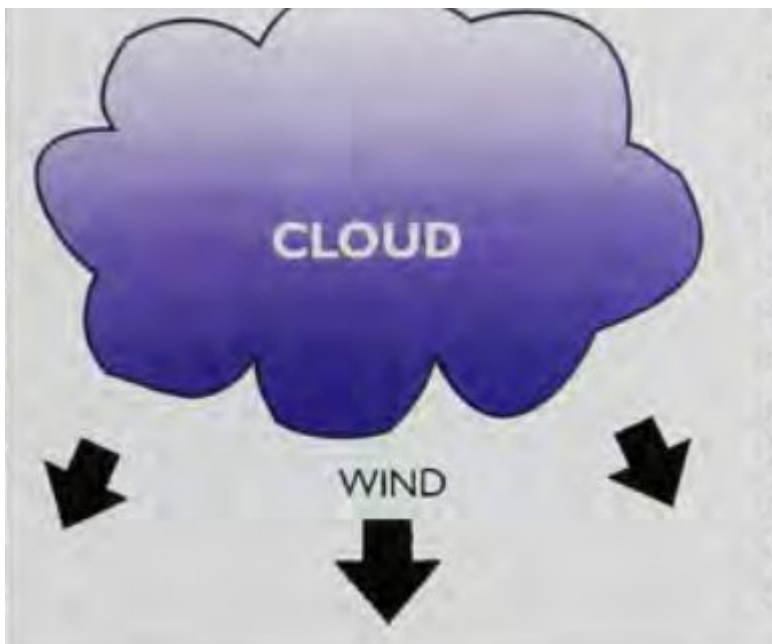


Geographic effects: wind blowing off the land at an angle to the shoreline bends to flow more perpendicularly off the land.

When the wind is blowing from the land at an angle to the shoreline, it tends to shift in direction so it flows more perpendicularly off the land. This effect is more pronounced as you get closer to shore. Usually, if you sail the tack that takes you more directly toward land, you will get progressively headed as you approach the shore. This “geographic shift” is like a basic persistent windshift, but it is easier to predict because it usually happens in the same place and to the same degree (so be sure to check this out before your race).

If the wind is blowing straight off the shore, it will act like an oscillating breeze, so look for more frequent and substantial back-and-forth shifts closer to land.

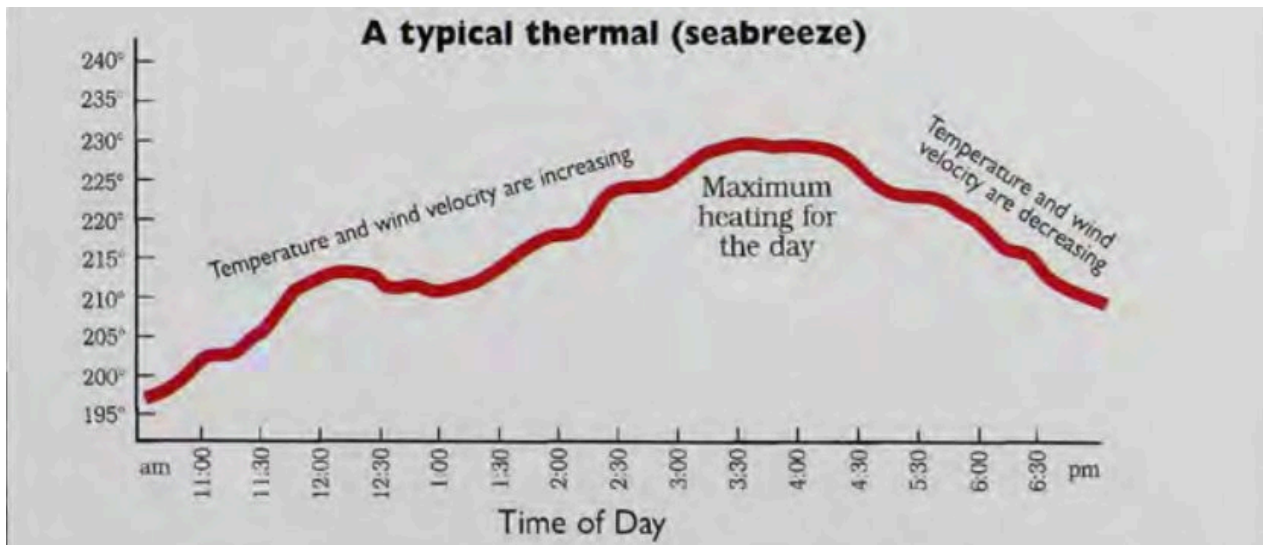
The influence of clouds



The influence of clouds: the wind fans out on the downwind side of a cloud.

Another reason why the wind changes direction is the presence and movement of clouds. The bigger the cloud, the more potential there is for associated windshifts. Usually, the wind on the downwind side of a cloud ‘fans out’ in front of the cloud (and it’s stronger too). Therefore, it’s usually good to sail toward clouds. For example, if there is a big dark cloud coming down the left side of the beat, sail that way because the cloud will probably shift the wind direction left until it passes.

A typical thermal (seabreeze)



A typical thermal (seabreeze): wind direction through the day.

When you are sailing in a thermal “sea breeze”, the wind direction usually changes slowly as the temperature of the land increases or decreases during the day. While the land heats up in late morning and early afternoon, the breeze builds in strength and gradually shifts (often to the right) toward the standard ‘seabreeze direction’ for that venue. Then in the late afternoon, after the warmest part of the day, the land starts cooling and the wind shifts back the other way (decreasing in strength).

Thermal breezes are great examples of persistent shifts. However, as the seabreeze develops it doesn’t always shift constantly in the expected direction. As the graph above shows, there are often some small oscillations as the wind settles in. While these shifts may not be significant on a long beat, they can make a big difference strategically to boats that usually sail short windward legs.

— *David Dellenbaugh*

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