



World Sailing Race Management

**An extract on factors of
current affecting start
lines and race courses**



World Sailing

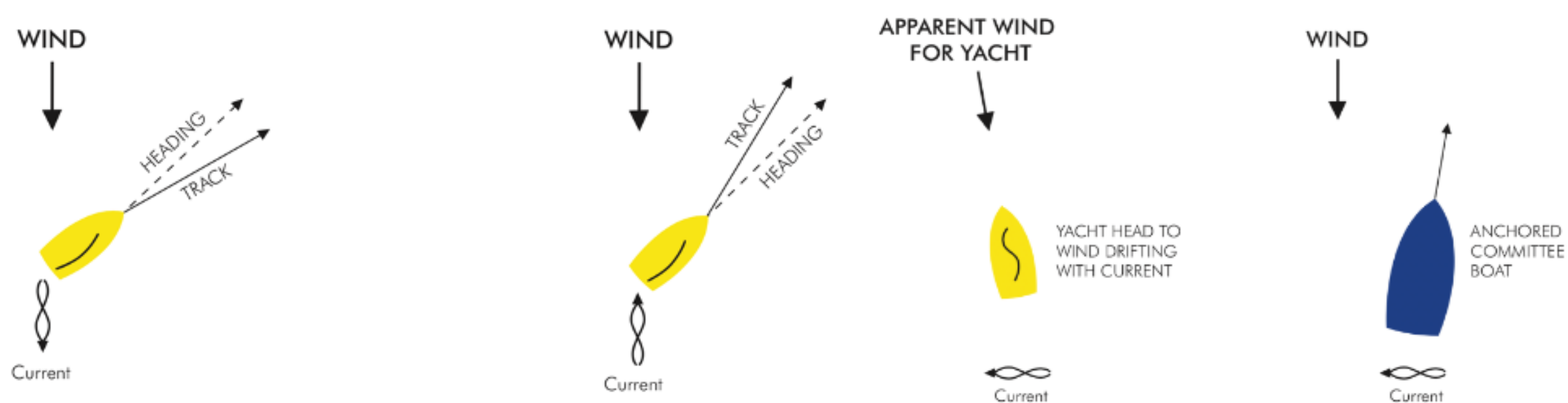
Race Management Manual

L.6.6 General effects of a current

We have considered the effects of wind changes on a course. Now we need to consider currents, usually tidal and therefore varying. Currents are particularly important, when relatively strong and associated with light winds. With anchored marks in a current it is not possible to set a course which is correct for all legs. However, this section considers how the elements of a course are affected by currents and how they may be adjusted.

When adjusting a course in a current a Course Race Officer must use considerable judgment. If significant adjustments are required it may be wise to delay or racing. With any current the apparent wind experienced by a boat is different from that experienced on an anchored Committee Boat.

If the current is in the same direction as the wind, the apparent wind is less than the true wind and a close-hauled boat's track is further from the wind than its normal track. With the current in the opposite direction to the wind the apparent wind is greater and the boat's close-hauled track closer to the wind.

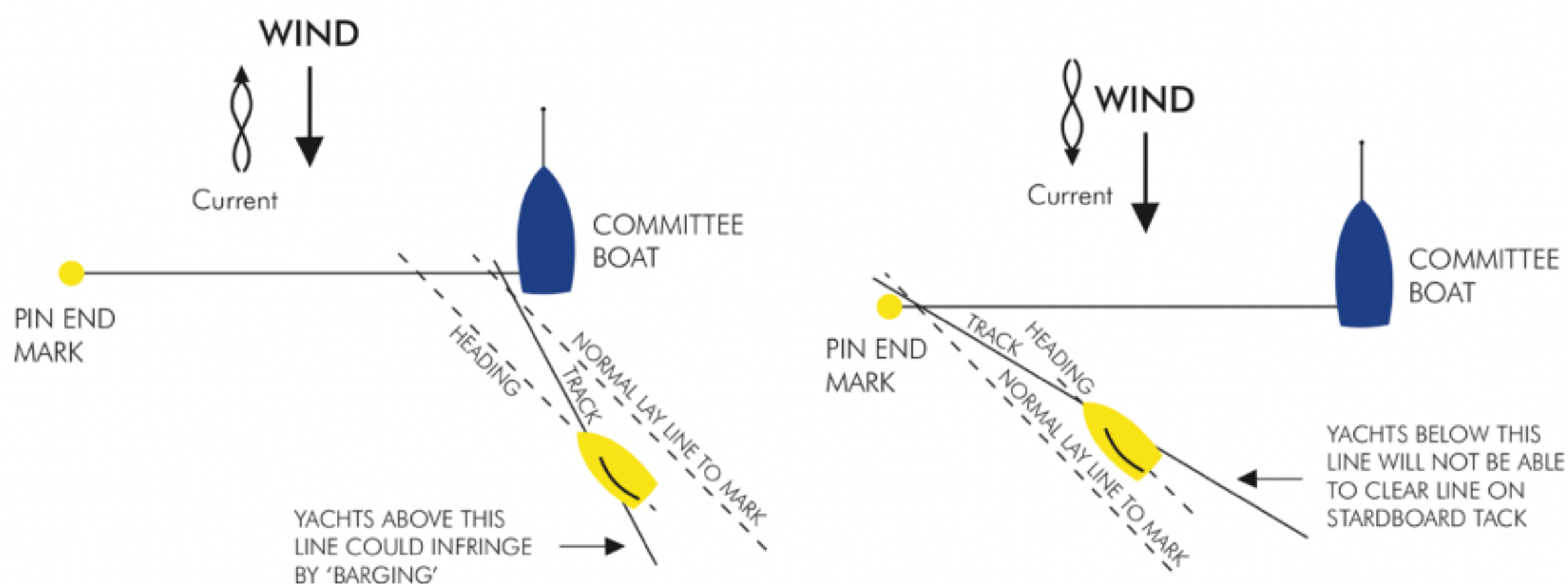


L.6.7 Effect on the starting line

With a current parallel to, and in the same direction as the wind, a boat starting on starboard tack passes closer to the pin end mark than it would with no current. With a relatively strong current, boats starting on starboard tack near the pin end may have difficulty in clearing the mark. Some authorities recommend that in these circumstances the line should be biased to starboard to give starboard tack boats a greater opportunity to clear the line.

However, the Course Race Officer must decide if starboard tackers should be favoured over port tack boats. An alternative method to compensate is to lengthen the starting line.

If the current is parallel to and against the wind the most significant problem on the starting line is current-induced barging at the starboard end. This will most likely occur at the starboard end and more port hand bias will alleviate it. The use of a distance mark will protect the Race Committee Signal Boat.



If there is a cross current the starting line should be approximately at a 90o angle, with appropriate bias, to the wind perceived by a boat stationary in the water. This can be calculated by vectors, or a luffing boat can be observed or an unanchored Committee Boat can be asked to take a wind bearing.

L.6.8 Effect on windward leg

A current will normally be constant during a start and therefore it is appropriate to consider adjusting a starting line to allow for it.

A current parallel to the wind changes the velocity but not the direction of the apparent wind. It also alters the track of close-hauled boats but no course adjustment is necessary to ensure equal times on each tack to reach the windward mark.

The correct bearing to a mark may be altered drastically by a cross-current. A cross-current carries boats downstream while they are beating and therefore the windward mark should be located downstream to ensure boats sail equal times on each tack and fulfil the ideal of maximum sailing area.

The correction required in a cross-current varies with the speed of the boats. The faster the boats the less time they take to reach the top mark and therefore the smaller correction required. In our example in paragraph L.7.1 above, with a true wind of 7 knots and a cross-current of 1 knot the apparent wind was from 8° downstream of the true wind.

L.6.9 Effect on downwind legs

A current parallel to the wind changes the velocity but not the direction of the apparent wind. It also alters the track of close-hauled boats but no course adjustment is necessary to ensure equal times on each tack to reach the windward mark.

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L.6.10 General

Current and wind are unlikely to be parallel or at a 90° angle. The easiest method to determine apparent wind is to watch a competitor luffing head to wind.

To determine the correct bearing of the windward mark, have a boat sail from the Race Committee Signal Boat close-hauled on one tack for, say, one minute and then tack and sail on the opposite close-hauled course. The boat's bearing when it has sailed for equal times on both tacks is the required bearing of the windward mark to give equal times on each tack.



A wing mark should be set at the usual bearings from the windward and leeward marks, although this will not give the required reaches. To give correct orientation of all legs, the marks would have to drift with the current with the course orientated towards the apparent wind from a drifting boat! Light winds and strong currents, particularly with slow boats, require large corrections.

In Match Racing two windward marks are often used to compensate for tidal current.

For example, in our previous calculation for the position of the windward mark, for a boat with a speed of 3 knots, the mark should be 32° down current, or four times the difference in wind angles.