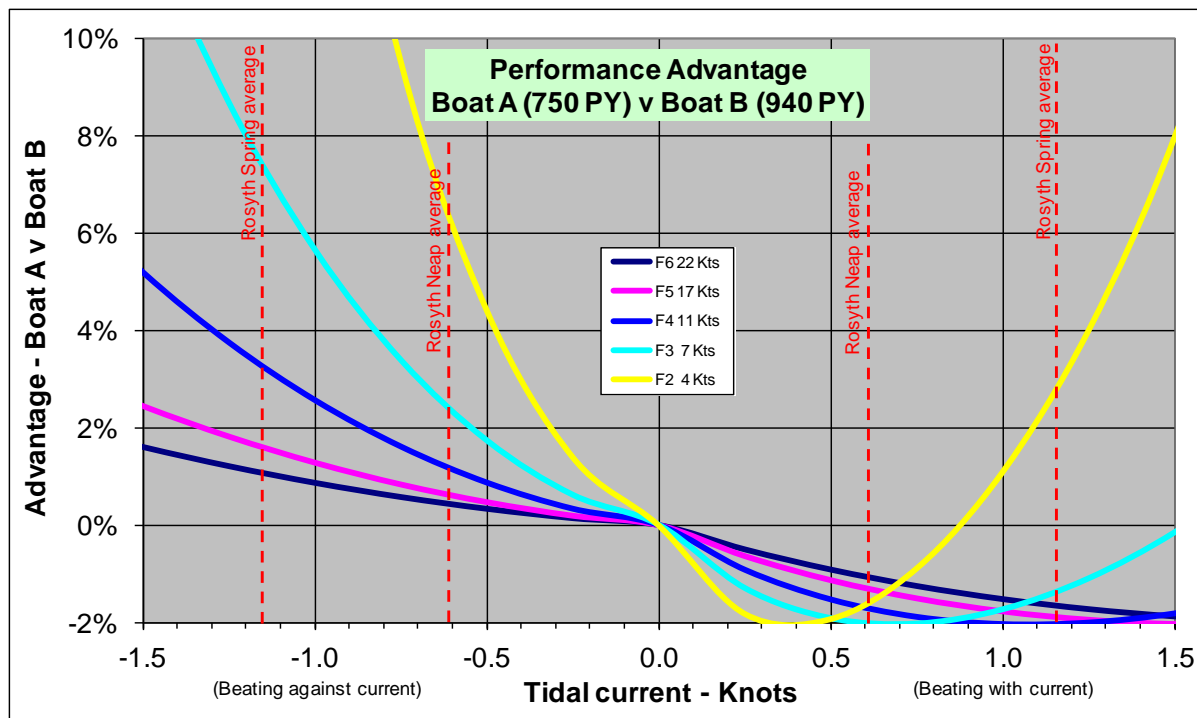


PEYC - Tidal Current Effects on Yachts

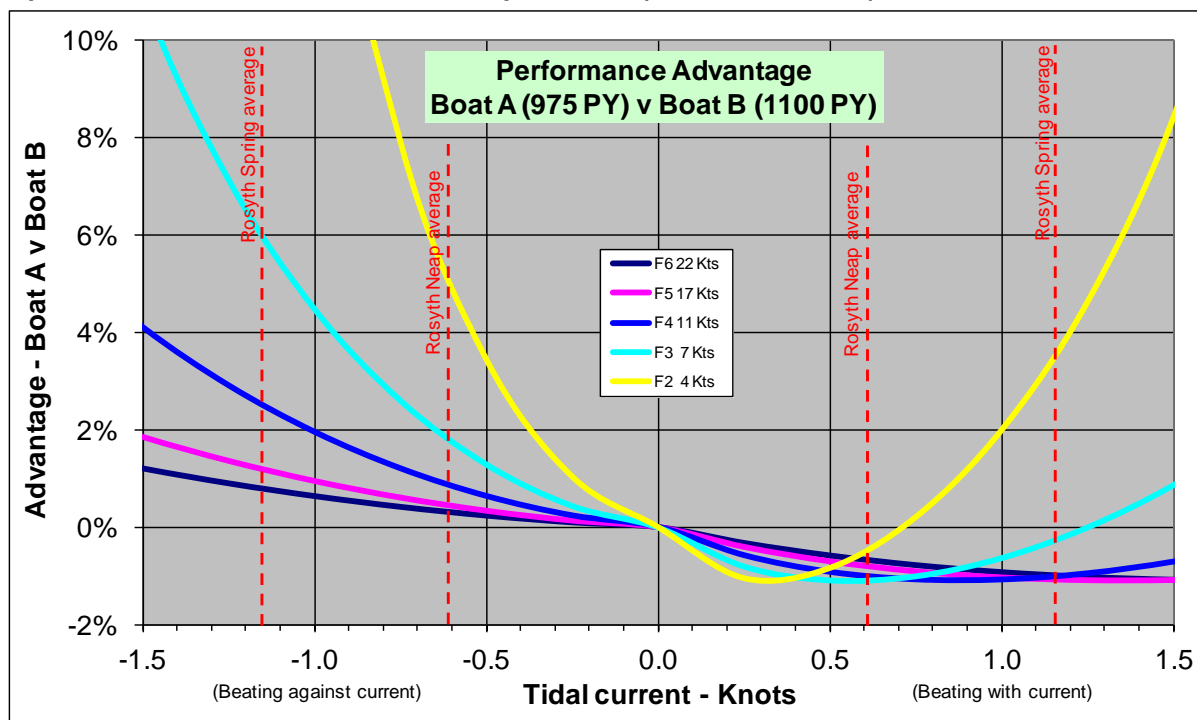
Introduction:

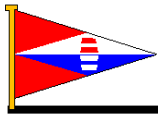
I have been asked to explain the statement in the 'Yacht Divisions - Options for 2016' document that 'The effect of tidal currents on performance across a handicap spread of 13% in Div-2 is virtually the same as for a 22% range in Div-1, across a wide range of wind speeds'. This is based on a simulation model that calculates the advantage/disadvantage of boat A over boat B, racing on a windward-leeward course in a variety of wind speeds and tidal currents. Boat speeds are related to their PY handicaps with the assumption of beating to windward at 80% of their off-wind speed. It is also assumed that the wind is aligned with the current and that on average boats sail in 50% of the current when adverse, by judicious in-shore routing, and 100% of it when advantageous.

Option E: Two Divisions with 974/975 Split - Div-1 (750 PY v 940 PY)



Option E: Two Divisions with 974/975 Split - Div-2 (975 PY v 1100 PY)





PEYC - Tidal Current Effects on Yachts

Comments:

This simulation model is the same as used to generate the Benchmark PY course length selection charts in the PEYC Race Officer Manual. It represents a 'worst case' situation in which the windward-leeward course is aligned with both the wind and the tidal current. In practice, given that the more frequently used west race area runs roughly WNW and the prevailing winds are typically WSW, then the effect of current will be somewhat reduced because it is often at an angle to the course.

It is intuitively obvious that a faster yacht, with higher absolute speed through the water compared to a slower one, is less effected by adverse tidal currents. As adverse current on the beat increases and wind speed decreases, that advantage rises to the point where the slower yacht simply cannot make progress to windward. Conversely, when beating with current on a windward-leeward course, the slower yacht gets a limited advantage (For option E: up to 2% in Div-1 and 1% in Div-2) but at low wind speeds of 4 kt, that disappears as the slower yacht loses out running against increasing current.

Conclusions:

Ideally the handicap ranges for the yacht divisions should be as small as possible but there has to be a compromise with achieving reasonable turnout numbers in each division. In my opinion, we should try to ensure that the impact of tidal currents on the fairness of racing is relatively low and, preferably, no worse in one division compared to another. If we adopt a two division Wednesday evening strategy for 2016, then option E with a handicap split point of 974/975, giving handicap ranges of 22% in Div-1 and 13% in Div-2, achieves that as the two graphs illustrate.

Leaving aside low wind speeds of F2 (4 kt), if we assume racing conditions are evenly spread across wind speeds of 7 to 22 kt and tidal currents of -1.5 to +1.5 kt, then the overall integrated advantage for the fastest yacht over the slowest is +0.5% in Div-1 and +0.6% in Div-2. Compared to the average difference in performance between race positions, that is equivalent to roughly half a position in races.

It is also clear that using our standard courses in low wind speeds of 4 kt, with adverse current on the beats, becomes increasingly unfair for the slower yachts in each division as the current increases. In those circumstances, race officers should consider setting a shorter windward-leeward or Olympic triangle course that gives the maximum opportunity to stay out of adverse tide on the beat.

Jim Scott - PEYC Sailing Secretary - 22nd Sept 2015