

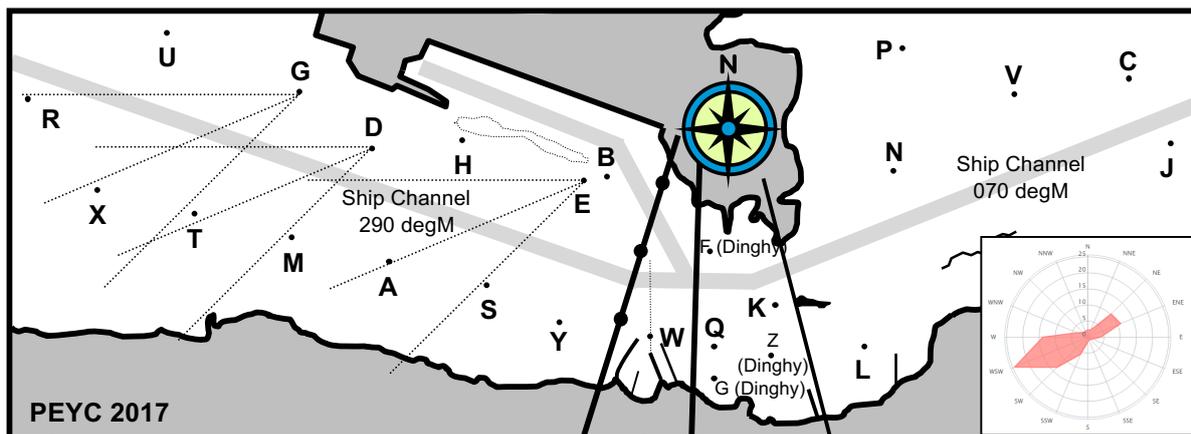
PEYC Yacht Course Design

Should PEYC change its style of 'round the cans' yacht courses? Well, before you suggest something different, let's look at the requirements and how the 2017 courses were designed.

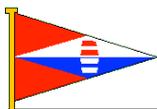
Good racing needs courses with 'true' windward beats, preferably in steady breeze. As shown in the Edinburgh Airport annual wind-rose below, our prevailing winds are in the SW-W sector for about two-thirds of the time and generally NE-E at other times. Although we do race east of Port Edgar, course designs in that area are limited because tanker & cruise ship operations restrict where marks can be laid, while the bridge structures and high ground disturb westerly winds. Hence, we use committee boat starts to race more in the clearer air to the west, where the estuary runs WNW-ESE or about 40 deg to the prevailing wind. Thus, windward legs in typical WSW winds have to cross the river diagonally and are limited by the 0.75 nm useable width between Rosyth and the edge of Society Bank.

The range of yacht handicaps at PEYC is 150%, so the three Divisions need different course lengths to provide similar race durations. We could have just a few marks for windward-leeward or Olympic courses and sail round and round them, but most crews don't like that! The Club has, instead, laid marks along the north & south sides of the west area to provide multiple windward leg options for the prevailing W, WSW, SW, E & ENE winds, aligned within +/-10 deg of the likely winds, that can be linked by reaches to provide longer courses.

Races are managed from one committee boat, so the start & finish lines must be common to all divisions. Mark E in the NE corner of the race area is used as the 'pivot point' for all courses, providing shorten course options and the final finish line. Mark E is also the best start line location for the prevailing SW-W winds and minimises the transit time from Port Edgar Marina.



My design principle is that any course selected should be an achievable distance in the prevailing conditions and scheduled duration. It should have at least two rounds, with the second one half the length of the first, to give the race officer a shorten course option if the wind drops. Each round should have one or more windward legs and whatever reaches & runs can be fitted into the remaining distance. The time limit on Wed evening 'day' races is restricted to 21:05, avoiding 'dying' winds in the later evening while providing up to 2-hours racing. The maximum course length for the Div-3 benchmark yacht of 1040 PY, racing for 1:55 in 20 kt of wind & no current, is about 10 nm. The practical limit for the smallest 2-round course using the current layout of marks is about 4.5 nm. For each prevailing wind direction, I set length targets for five Div-3 courses from 10.0 to 4.5 nm, spaced to slightly skew the list towards shorter distances to better cover lighter winds and adverse tide situations.



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The benchmark average handicaps for the three Divisions are 850, 930 & 1040 PY. Allowing for the extra time that Div-1 & Div-2 race compared to Div-3, because they start earlier, the course length ratios should be 1.33 & 1.17 relative to Div-3. Based on these ratios, the table below shows the target lengths for both the total and individual rounds for each division, assuming that Div-1 & Div-2 sail the same course but with an additional round for Div-1.

Target Course Lengths nm:

Div-3	Ratio:	1.00	Div-2	Ratio:	1.17	Div-1	Ratio:	1.33	
Total	Rd-1	Rd-2	Total	Rd-1	Rd-2	Total	Rd-1	Rd-2	Rd-3
10.0	6.7	3.3	11.7	7.8	3.8	13.3	7.8	3.8	1.6
8.2	5.5	2.7	9.6	6.4	3.2	10.9	6.4	3.2	1.3
6.7	4.5	2.2	7.8	5.3	2.6	8.9	5.3	2.6	1.1
5.5	3.7	1.8	6.4	4.3	2.1	7.3	4.3	2.1	0.9
4.5	3.0	1.5	5.3	3.5	1.7	6.0	3.5	1.7	0.7

The choice of race marks for each round is based on matching the target length as closely as possible. After selecting the first windward beat, alternative routes using the available marks are checked to find the round closest to the target length. I don't attempt to create legs that are specifically tight reaches, broad reaches or runs, but concentrate on getting the correct length. On longer rounds there may be two or more windward legs, linked by reaches, while the return to mark E can be either a series of reaches or a run. For safety, there must be no mark rounding clashes (i.e. rounding in both directions), both within any course or between divisions. Since the handicap difference between the benchmark yachts in Div-1 and Div-2 is only 9% (c.f. Div-3: 22%), they sail the same two rounds but with an additional windward-leeward third round for Div-1 to achieve its desired distance. As an insurance policy in case the wind picks up, every course includes an extra windward-leeward round to allow the race officer to extend the race.

Having designed the courses, which one should be selected? Div-3 yachts are more affected by tidal current because of their lower speed. Hence course choice is always based on the distance achievable by the Div-3 1040 PY benchmark yacht in the wind and current conditions, while Div-1 & Div-2 sail their 'paired' course. The new format OOD Duty Sheets include a 5x5 table of recommended Div-3 courses for W, WSW, SW, E & ENE winds and wind strengths of 20-4 kt, for the scheduled race duration. If the wind strength is insufficient for Div-3 to complete the first round of the shortest course for the wind direction, tidal conditions and scheduled race duration, the Duty Sheet table shows 'n/a' to advise using a windward-leeward course for all divisions. I see little point in designing courses for other than the prevailing winds since they would be very unlikely to ever be used. But if such winds occur, the race officer is advised to set an Olympic or windward-leeward course using appropriate marks.

In summary, I have created matched sets of west and east area courses for three divisions and five prevailing wind directions that cover the vast majority of likely wind & tide conditions and race durations. These 'paired' courses simplify the race officer's task and provide competitors with varied and challenging courses. Although I could safely claim to have more experience of course design around Port Edgar than most, I don't have a monopoly on ideas and would welcome any suggestions that might improve our racing.

Jim Scott - PEYC Sailing Secretary - 12th Oct 2017