

WLSC Club Handicapping and Scoring for Fall and Spring Race Series

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Introduction: It is very difficult to conduct a totally equitable race with such a diverse group of boats and people as that found at Watauga Lake. We employ two different handicapping systems in an attempt to address these inequities: Club and PHRF (Performance Handicap Racing Fleet).

This document describes the WLSC Club system used for the Fall and Spring Series Races. The PHRF Time on Distance and PHRF Time on Time will be described in additional documents.

The WLSC Club Performance system is a “results” oriented system. It handicaps each yacht in a race to the yacht having the “winning corrected time”. Thus at the beginning of each race “every” yacht has an “equal opportunity” to win the race. Since it is a “results” based system, it can handicap multiple types of yachts in various stages of racing condition. Handicaps will be recalculated at the end of each race based on each yacht’s “elapsed time”, relative to the “winning yacht’s corrected time.” The Club system stresses crew and captain performance.

WLSC Club System: The initial seed values for our Club system is the PHRF handicap. In previous years, we purchased the US PHRF Handbook to obtain these values. However, the book is relatively expensive. Currently, we are utilizing the average PHRF handicaps which are found in a list (PDF document) on the following US PHRF website:

http://www.ussailing.org/phrf/Tool_%20HI_LO_AVG%20Report.pdf

If a PHRF handicap is not available in the US PHRF list, it is calculated from the boat’s Designated Portsmouth Number (DPN or D-PN) by the following formula:

$$PHRF = (DPN - 55) \times 6$$

The DPN’s can be found at:

<http://www.ussailing.org/portsmouth/index.asp>

The initial club factor calculated from the PHRF is increased by a factor of 1.15 in order not to give new racers an unfair advantage over current racers whose Club factors have been determined from the average of many races. The logic for this adjustment is discussed in a later section entitled “Club Factor Drift.”

A boats corrected time is calculated by multiplying its current club factor by its actual time. If a current club factor is not available for a boat, it is determined by adjusting its Portsmouth or PHRF handicap.

The idea is to calculate a club factor that would have made all boats finish at the same time as the lead boat. This is accomplished by dividing the club corrected time of the winning boat by the each boats finishing time. To average out fluctuations in performance, this club factor that made all boats equivalent in this current race is averaged with the “current club factor” initially used to calculate the current race.

Typical Example: As you can see from the previous paragraph, this is somewhat confusing to explain. Thus, I think an example is in order. *In practice, it is somewhat simple since Jeff Arnfield wrote an Excel spreadsheet to automatically calculate the results.*

The data for the example race is shown in Table 1 which is a partial view of the standard spreadsheet used to calculate the race results for our PHRF TOT and Club Races. The example shows three boats. The “current club factor” is used to correct the measured elapsed time. Both Capt. Arnfield and Capt. Catoe had “current club factors” calculated from previous race results, but Capt. Sparrow, who had recently arrived from the Caribbean, did not. Thus we calculated Captain Sparrows “current club factor” from his PHRF handicap:

$$\text{Capt. Sparrow's "Current club factor"} = [650/(\text{PHRF} + 550)] \mathbf{1.15}$$

$$\text{Captain Sparrow's "Current club factor"} = [650/(228 + 550)] \mathbf{1.15 = .960}$$

We used the 1.15 factor to make sure he did not have an unfair advantage in his first club race until his average club factor is adjusted from his actual performance.

The winner of the race is determined by multiplying the boats elapsed time in seconds by the current club factor. So in the example,

$$\begin{aligned} \text{Arnfield's corrected time} &= 0.793 \times 5475 = 4341.7 \text{ sec} \\ \text{Catoe's corrected time} &= 0.904 \times 5412 = 4892.4 \text{ sec} \\ \text{Capt. Sparrow's corrected time} &= 0.960 \times 5400 = 5184.0 \text{ sec} \end{aligned}$$

The calculations in this example actually reversed the order of the finish!

The final step in the process is to determine the current club factor for the next race. This is calculated from the current results in essentially two steps, but is performed in the spreadsheet in one step. However, I will split the calculation into two steps for clarity.

The first step is to calculate a club factor that would essentially make all the boats corrected time equal to the winning boats time in the current race. Thus, theoretically in

the next race, everyone would start even again. This is accomplished by dividing each one of the boats actual time into the winning boat's corrected time.

Boat's 1st step club factor = (winning boats corrected time)/(boats elapsed time)

Arnfield's 1st step club factor = 4341.7/5475 = 0.793

Catoe's 1st step club factor = 4341.7/5412 = 0.802

Capt. Sparrow's 1st step club factor = 4341.7/5400 = 0.804

As you can see, the winning boats club factor will be the same as the initial club factor used for determining the winner in the current race.

This "1st step club factor" is then averaged with the current club factor to determine the club factor which will be used to calculate the winner in the next race. This is done to include past performance history in the club factor employed in future races.

Arnfield's next club factor = (0.793+0.793)/2 = 0.793

Catoe's next club factor = (0.904+.802)/2 = 0.853

Capt. Sparrow's next club factor = (0.960+.804)/2 = 0.882

As you can see, the winning boats club factor is unchanged for the next race, and all the other captain's club factors for the next race were decreased.

Club Factor Drift: Since the club factors are calculated each time from the actual elapsed time, they can significantly drift away over a year or two from the initial "seed" club factors calculated from the boats' US PHRF handicap and/or PHRF handicap calculated from the Portsmouth Number.

For example, at the end of the last year the average (n=11) the current club factor had drifted down from 0.85 to 0.34. When a new captain/yacht joins the club and races in the Club system, their "seed" club factor calculated from their PHRF is radically different from the average club factor employed for current racers in the fleet. Thus, the number of races for the new captain's club factor to normalize to the average of the fleet is unacceptable.

In order to correct this misalignment at the first of the 2008 race season, we took one boat's (J22) current club factor and found the factor needed to bring its current club factor equal to the J22's initial "seed" value. This factor or ratio used for the J22 was used for all the boats such that the relative difference in club factors between the boats remained the same.

New boats "seed" factors will then be multiplied by 1.15 in order that new boats will not have an initially unfair advantage until their club factor is adjusted by their actual race performance. The value of 1.15 is somewhat arbitrary and should be adjusted by the WLSC Race captain after the club factors are corrected to better align with the initial

“seed” values. This overall process will be performed as needed to keep the actual correction factors reasonably close to the initial “seed” values.

Bill Murdoch suggested that we could adjust the club factors each race by using the winning boat’s initial “seed” value to normalize the club factors for all the boats. If this was done, a factor for adjusting the initial “seed” values would still have to be determined by the WLSC Race Captain.

Table 1: Example for Club Calculation

| Skipper | Vessel Model / Type | Vessel Name | PHRF | Current Club Factor | Elapsed (sec) | Finish Place | Club Place | Club Points | Next Club Factor | Club corrected | 1st step club factor |
|---------------|---------------------|--------------|------|---------------------|---------------|--------------|------------|-------------|------------------|----------------|----------------------|
| Arnfield | Chrysler 26 | Windward | 230 | 0.793 | 5475 | 3 | 1 | 4 | 0.793 | 4341.7 | 0.793 |
| Catoe | Catalina 27 TR | Calico Skies | 201 | 0.904 | 5412 | 2 | 2 | 3 | 0.853 | 4892.4 | 0.802 |
| Capt. Sparrow | Pirate Ship | Black Pearl | 228 | 0.960 | 5400 | 1 | 3 | 2 | 0.882 | 5184.0 | 0.804 |

[written by J. L. Little, May 1, 2008 from initial information supplied by J. Middaugh, J. Arnfield, C. Lucas]