Date: **14 February 2024**

From: **Brad Wheeler, Chair TPYC Technical Committee**

Subject: **Forecast- TCF (F-TCF)**

The Technical Committee was requested to review and provide a recommendation around using an alternative Transpac TCF generation system, known as Forecast-TCF. In short, the Technical Committee (including the support of Jim Teeters of US Sailing), is recommending that TPYC move forward with the alternative F-TCF, with some operational caveats still to be finalized. 8 of 9 Technical Committee members have provided comments and approve of moving to F-TCF (no comment from the 1 remaining member)

Issue: The Transpac race has historically used the legacy Wind Matrix and each boats' ORR polar performance, to develop a Time Correction Factor for each boat. In reality, the actual wind seen on the course during a given Transpac race is different than the Wind Matrix suggested, and with 3 separate Start Days, the wind is variable even within the Transpac fleet. It was suggested that a more Start Day specific TCF could be derived from the weather GRIBs to provide the best fit of weather derived TCF to the actual weather that each Start Day would see. This was very evident in 2023, when the Day 3 starters encountered extreme light air for 12-20 hours at the beginning of the race. All Day 3 starters sailed in the same wind and therefore had reasonable racing among those starters, however, it immediately eliminated those Day 3 starters, from any overall podium positions, no matter how well they sailed to the wind they had.

The Alternative: Several alternatives were looked at in the last few years (single day starts, daily TCF, etc.), but only a single alternative known as Forecast- TCF (or F-TCF) was deemed viable. Jim Teeters was requested to look at the 2023 Transpac race and to see if a TCF based on a given days weather forecast was a viable approach to delivering a TCF more closely resembling the wind a given day starters would see, and further to see how the overall race would be impacted.

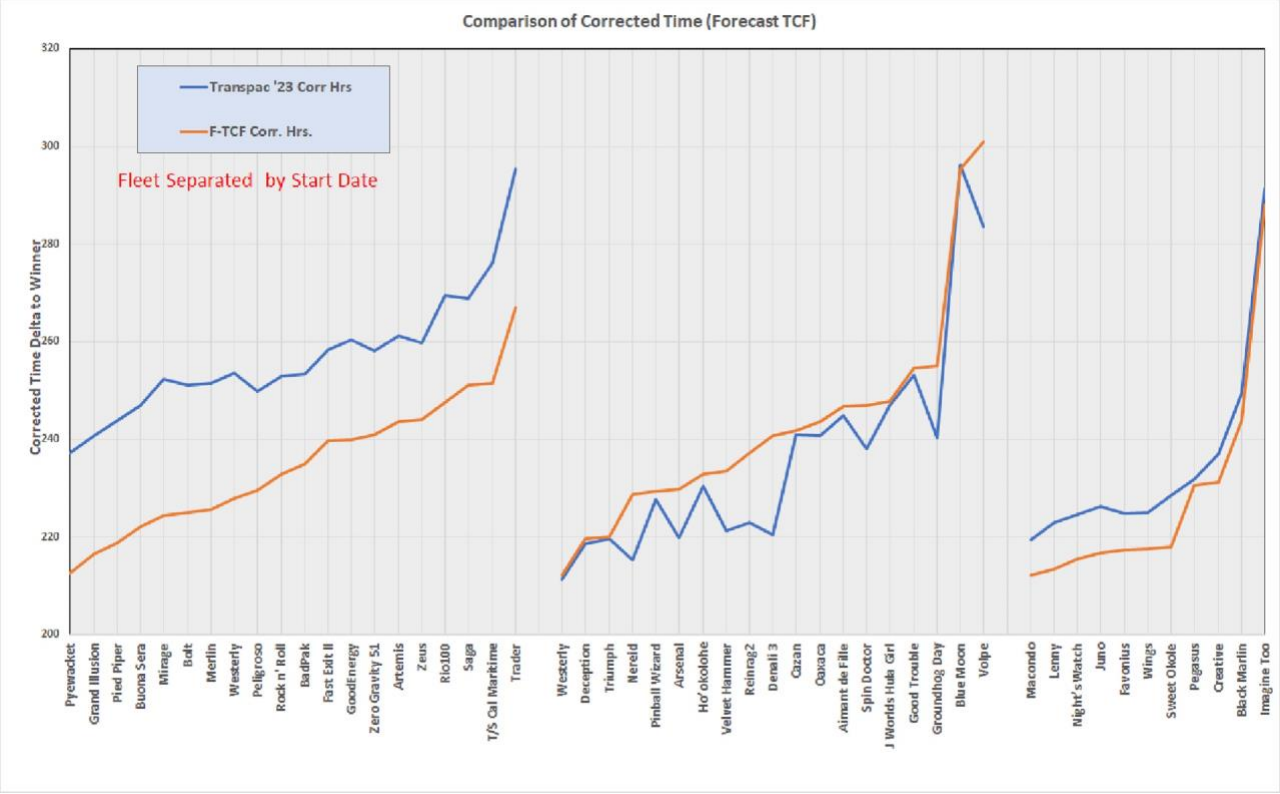
Through discussions with Technical Committee members, Jim Teeters of US Sailing, Nick White of Expedition Software, and several members of NOAA, that a consolidated GRIB file consisting of a High Resolution for coastal waters and the NOAA GFS for offshore waters, would likely be the best option to develop an F-TCF and would be viable from an operational point of view.

Jim Teeters ran a number of TCF developments using Start Day GRIBs for the entire 2023 TP fleet, and then subsequently for 17 boats of the 2021 TP fleet for which also raced in 2023 (to make analysis easier). Basically, Jim ran a simulated 'race' for each boat using the GRIBS that

were available just prior to the start, and then used each boat's optimized 'best elapsed time' to develop fleet TCFs. Those Forecast based TCFs were then applied to the actual Elapsed Time that each boat sailed in the race, and the corrected times were then compared to the Actual Corrected Times for each boat in the race.

Results: The result of the analysis is that the F-TCF tends to bring the days racers closer together in Corrected Times, eliminating some of the variability associated with different wind patterns

EG: in 2023, Day 1 starters reduced their corrected times by avg of 8 hours, Day 2 starters were mixed bag and actually increased their average corrected times by 1 hour, and it reduced the Day3 starters by approximately 20 hrs). There was little change in individual division placing, but there was significant impact in overall fleet placing, with what previously was a Day 2 with overall 1,3,5 in the top 10 and the rest being Day1 – now we see Day1, with just 1 in the top 10 (still with Westerly as the overall winner) Day 2 with 7 top 10 and Day 3 with 2 in the Top 10 (Pyewacket and Grand Illusion).



EG: in 2021 (with only 17 boats scored due to using 2023 ratings/configs), the starter days in the top 10 stayed the same (none from Day1, 7 from Day2, and 2 from Day3), but there was a bit of

jiggering in actual places, mostly within Day2. Corrected times for F-TCF vs standard TCF were closer than the 2023 spread and had more +/- variance.

In summary, it appears that the F-TCF does provide more standardized racing when the wind of the various day starts are extremely different, as shown in 2023. And further, it tends to minimize the 'horses for courses' impact even within divisions as each boat will be rated for the expected (and likely wind) and they will be tested against the actual conditions.

There still remains a bit of luck as even the GRIBs may be wrong, and there still remains the ability of boats and crews to sail well against their own boat's expectations, but the luck of having a severely impacted wind condition is minimized making for a better overall racing experience.

Caveats: there are a number of caveats that must be worked through, namely:

- Since it takes time to develop the TCF from the GFS and HRRR GRIBs, and we have a desire to deliver the days TCFs prior to the race start (and hopefully before the boats leave the docks), an operational plan must be put in place to decide which GRIBs (the night before, or right before a given start) and a plan for distribution. US Sailing is expected to have the manpower and time (they are 3 hours ahead of California), there remains risk to try to get the TCFs out to close to the start. The 2024 Newport- Bermuda race will be a test case for F-TCF scoring. They have run a simulation of developing the F-TCF in December and believe they can run the TCFs as soon as possible to the starting times and distributed via email.
- Utilize HRRR out to 120 degrees 30 min W (first 160nm), and then switch to GFS for remainder of the race. GFS is not as accurate in and around the SoCal islands but is more accurate in offshore waters.
- Whichever TCFs are provided for a given day start, they must remain as is – no late changes.
- We will need some very specific explanation and FAQ around the process. There is also discussion that each boat must understand the process enough to be able to develop their own TCFs that match the official TCF – this could lead to protests if not an easily repeatable process.
- It is likely there will be a modest labor expense associated with developing the F-TCF handicaps shortly before each start day. US Sailing will be equipped with each boat's polars ready to run optimized routing in batch mode shortly after NOAA posts the GRIB files online.

TPYC Technical Committee Members:

Brad Wheeler, Chair
Dan Nowlan
Bill Lee
Keith Kilpatrick
Piet Van Os
Stan Honey
Greg Stewart
Alan Andrews
Eric Berzins