



## **SCHRS Technical Review for 2020**

From: William Sunnucks SCHRS Technical Committee  
To: SCHRS World Council

3<sup>rd</sup> January 2020

### **Review of 2019 activity**

Welcome to the annual technical review of SCHRS.

This year we will also publish the performance statistics prepared by Jean-Claude-Rouves – once we have had input from Technical Committee and World Council members. The performance statistics are used to validate the formula and keep in touch with new trends, but they do not influence individual ratings. SCHRS remains a formula-based rating system.

#### **Proposed formula change**

We propose an increase in the spinnaker penalty from 11% of rated area to 12%. This helps non-spinnaker boats by about 0.8%.

We are not proposing a specific deck sweeper penalty, believing that correct measurement of the longer mainsail luff provides a sufficient penalty. A deck sweeper penalty could cause problems for classes such as f18 which would be split by it.

#### **Proposed data changes**

The Goodall Viper Foiling is now included as a production boat with a rating of 1.00 compared to 1.05 for the standard Viper

RSCat14XL spi is now added to the list. This was measured by Alain Champy November 2019

The SL16 was remeasured at the Paris Boat show and the new list includes the new and slightly harsher rating.

The F18 jib measurement has been adjusted following a change in their class rules. Thus a 50mm head which was previously ignored is now included. The resultant area increase from 4.15m<sup>2</sup> to 4.3m<sup>2</sup> is significant: the F18 will remain the scratch boat at 1.000 but all other classes will see their rating increased by 0.4% or more.

The Hobie 20 is described as 'Hobie 20 with spi' to reduce confusion arising in USA.

The Nacra 16sq is not included on the list: this Australian Nacra, which is now also in Hong Kong, will continue to be rated on an individual basis to avoid confusion with the Nacra f16.

Just two versions of the Nacra 20 carbon are included on the list. The Nacra F20 carbon on .877 and the Nacra F20 FCS version on .856. There has been pressure to provide a rating for the Nacra F20 'EVO' which is the FCS with C foils but the manufacturer has requested that the same rating be used whether C or L foils are used.

We have changed the description of the rating numbers to make it clear that they are Time Dividing Factors.

### **Effect of these changes**

All boats will benefit from higher rating number except the F18 which remains as the scratch boat. It is disadvantaged by both the jib measurement change and the increase in spinnaker penalty.

The range of adjustments is from 0.000 for the F18 to 0.016 on the Topcat Chico, which is still less than 1%. As ever we try to avoid radical changes to the numbers and the adjustments are very small in relation to the range of one design performance.

### **Performance review autumn 2019**

We have a detailed review of the FFV data on actual results during 2019 prepared by Jean-Claude Rouves. We need to keep in touch with actual results to help us keep the formula up to date. We don't use the data to change the handicap of any particular class.

The C1 results suggest that the A class classic and Nacra 15 are underperforming ie. their race results are worse than suggested by the formula.

- The proposed changes for 2020 go some way towards addressing the A class underperformance: the increase in the spi penalty will favour all boats with no spinnaker. It should also be acknowledged that some of the more experienced A class sailors will now be racing with foils,
- The Nacra 15 underperformance is a concern given its status as the new youth boat with many talented sailors joining the class. This boat is known to be fast in breeze and slow in lighter winds due to its high wetted surface compared to sail area. The underperformance could be attributable to weather conditions during the key 2019 regattas.

Summary chart	AHPC Viper Double	Nacra 20 carbone	Formula 18	A Class classic	Nacra 17 "C"	Nacra 15
Ratings SCHRS 2019	1,045	0,881	1,000	1,008	0,995	1,098
Ratings on average performances 2019	1,045	0,887	0,997	1,025	0,996	1,115
Gap ratings SCHRS 2019 / performances	0,000	0,006	-0,003	0,017	0,001	0,017

### The C3 comparisons

The C3 results suggest that the formula is working well, with no boat more than 1% out of line. The biggest misalignment, the Hobie 16 spi, could be attributable to some top crews switching to the non-spinnaker version particularly in heavy winds.

Comparison performance ratings 2019 - 2018	SL 15,5	SL 16	Hobie 16 Spi.	Hobie 16	Dart 18
SCHRS ratings / performances 2019	1,230	1,127	1,149	1,195	1,208
SCHRS ratings / performances 2018	1,230	1,122	1,140	1,193	1,204
Gap SCHRS Perf.ratings between 2018 and 2019		0,005	0,009	0,002	0,004

**SCHRS statistical review 2019**  
**November 24, 2019**

List of the main topics mentioned in this report:

- Analysis of the evolution of the relative performances of the C1 target group
- Should we add an additional penalty for deckweepers? See paragraph Formula 18.
- Nacra 15 – New target boat in C1 group.
- Analysis of the evolution of the relative performances of the C3 target group
- Comparison of relative performances between SL16 and HC16 Spinnaker
- Comparison of relative performances between Dart 18 and Dart 18 Solo
- New boats appeared in 2019

In introduction, it is useful remembering that two facts were taken into account in calculating the SCHRS 2019 ratings.

The first relates to the replacement of the calculation related to the "LTM" by a calculation related to the type of mainsail, allowing to overcome some anomalies found in the calculation of deckweepers.

This change has had practically no effect on the SCHRS rating 2019.

Second, the total length of the luff was included in the deck-sweepers classes, which hardened their relative SCHRS ratings around 0,005 point.

Keeping the SCHRS rating 2019 of the Formula 18 at 1.000, caused a slip of the SCHRS rating of 0.005 point, for all boats not equipped with deck-sweeper. As confirmed by the tables below:

**1. Analysis of the relative performances of catamarans in 2019 for the C1 Group. (See Excel attached file)**

- Comparison ratings 2018 - 2019

Summary chart	AHPC Viper Double	Nacra 20 carbone	Formula 18	A Class classic	Nacra 17 "C"	Nacra 15
Ratings SCHRS 2019	1,045	0,881	1,000	1,008	0,995	1,098
Ratings on average performances 2019	1,045	0,887	0,997	1,025	0,996	1,115
Gap ratings SCHRS 2019 / performances	0,000	0,006	-0,003	0,017	0,001	0,017
Conversion time per hour	00:00:00	00:00:23	00:00:09	00:00:59	00:00:03	00:01:00

Summary chart 2018	AHPC Viper Double	Nacra 20 carbone	Formula 18	A Class classic	Nacra 17 "C"
Ratings SCHRS 2018	1,040	0,877	1,000	1,002	0,991
Ratings on average performances 2018	1,040	0,885	0,993	1,015	0,988
Gap ratings SCHRS 2018 / performances	0,000	0,008	-0,007	0,013	-0,003
Conversion time per hour	00:00:00	00:00:32	00:00:25	00:00:47	00:00:20

Comparison SCHRS ratings	AHPC Viper Double	Nacra 20 carbone	Formula 18	A Class classic	Nacra 17 "C"	Nacra 15
2019 - 2018						
SCHRS ratings 2019	1,045	0,881	1,000	1,008	0,995	1,098
SCHRS ratings 2018	1,040	0,877	1,000	1,002	0,991	1,091
Gap SCHRS ratings between 2018 and 2019	0,005	0,004	0,000	0,006	0,004	0,007

- The second table below shows that performance differences were only slightly affected by this change.

Comparison performance ratings 2019 - 2018	AHPC Viper Double	Nacra 20 carbone	Formula 18	A Class classic	Nacra 17 "C"	Nacra 15
SCHRS ratings / performances 2019	1,045	0,887	0,997	1,025	0,996	1,115
SCHRS ratings / performances 2018	1,040	0,885	0,993	1,015	0,988	1,110
Gap SCHRS Perf.ratings between 2018 and 2019	0,005	0,002	0,004	0,010	0,008	0,005

## 2. Evolution of ratings on performances and SCHRS ratings since 2011 (C1 Group)

### Target boats of the C1 GROUP (Catamarans with daggerboards)

#### ➤ **Formula 18 against Viper double:**

As expected the use of deck sweepers started in 2017 continued in 2018 to equip in 2019 the majority of Formula 18 participating in regattas.

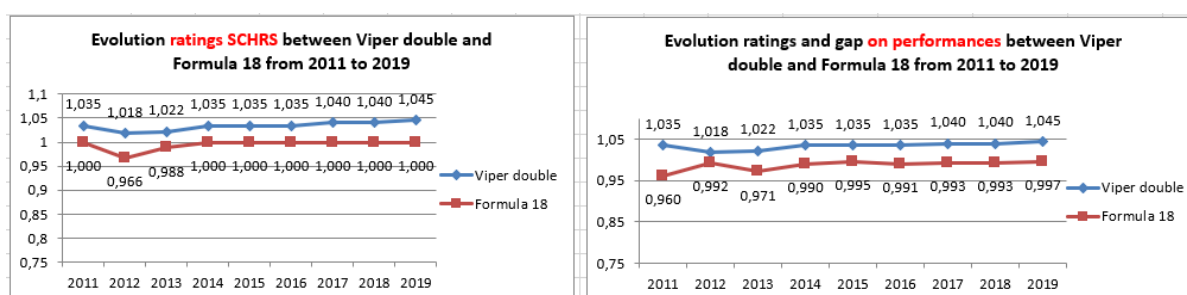
The question that must be asked is: What is the real impact of the deck sweeper on the performance of the Formula 18?

After interviewing many competitors, it seems that the deck sweeper advantage afforded by this sail is dependent on the power of the wind or/and the sea state, making a possible penalty difficult to evaluate.

In 2019, after the inclusion in the SCHRS calculation of the change in luff length for the deck sweepers, the rating gap between Formula 18 and Viper is 0.045 points, for a performance difference of 0.048 points.

The Class Formula 18 having decided in 2019 to bring the area of the jib from 4.15m<sup>2</sup> to 4.30m<sup>2</sup>, which represents around 0.002 rating point, which will allow to have in 2020 a difference of evaluation in adequacy with the current gap performance.

Comparison SCHRS ratings										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Viper double	1,035	1,018	1,022	1,035	1,035	1,035	1,040	1,040	1,045	
Formula 18	1,000	0,966	0,988	1,000	1,000	1,000	1,000	1,000	1,000	
										Averages
Gap ratings SCHRS	0,035	0,052	0,034	0,035	0,035	0,035	0,040	0,040	0,045	0,039
Gap ratings SCHRS %	3,38%	5,11%	3,33%	3,38%	3,38%	3,38%	3,85%	3,85%	4,31%	3,77%
Comparison PERFORMANCE ratings										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Viper double	1,035	1,018	1,022	1,035	1,035	1,035	1,040	1,040	1,045	
Formula 18	0,960	0,992	0,971	0,990	0,995	0,991	0,993	0,993	0,997	
										Averages
Gap performances	0,075	0,026	0,051	0,045	0,040	0,044	0,047	0,047	0,048	0,047
Gap performances %	7,20%	2,51%	4,96%	4,35%	3,86%	4,25%	4,52%	4,52%	4,59%	4,53%
									Average gap in value	0,008
									Average gap in %	0,76%

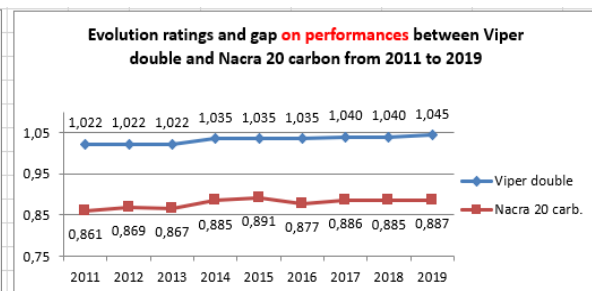
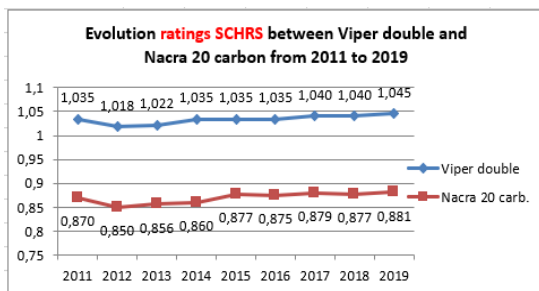


➤ **Nacra 20 carbon against Viper double:**

The Nacra F20 carbon with a difference of 0,04 between SCHRS ratings and the performance ratings 2019 continues to follow consistent curve.

A new Class rules has been published by Nacra in 2019 which increases the weight of this boat from 165 kg to 182 kg, accepts heavier rudders of Nacra 20 FCS, and the decksweeper mainsail, what should have an influence on its 2020 rating.

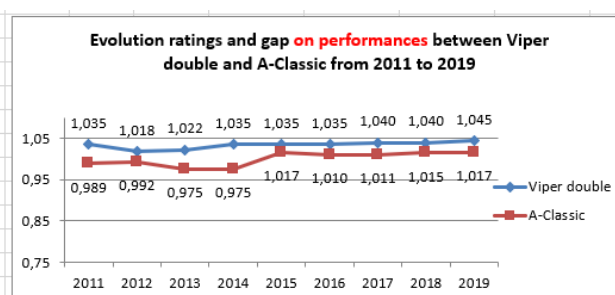
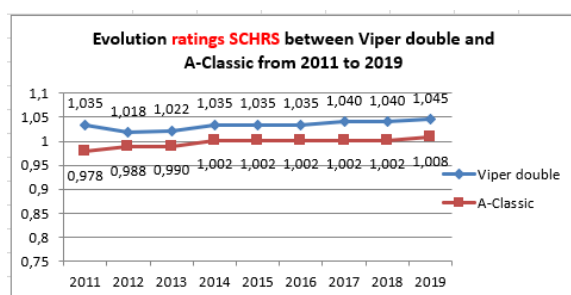
Comparison SCHRS ratings											
	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Viper double	1,035	1,018	1,022	1,035	1,035	1,035	1,040	1,040	1,045		
Nacra 20 carb.	0,870	0,850	0,856	0,860	0,877	0,875	0,879	0,877	0,881		
										Averages	
Gap ratings SCHRS	0,165	0,168	0,166	0,175	0,158	0,160	0,161	0,163	0,164	0,164	
Gap ratings SCHRS %	15,94%	16,50%	16,24%	16,91%	15,27%	15,46%	15,48%	15,67%	15,69%	15,91%	
Comparison PERFORMANCE ratings											
	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Viper double	1,022	1,022	1,022	1,035	1,035	1,035	1,040	1,040	1,045		
Nacra 20 carb.	0,861	0,869	0,867	0,885	0,891	0,877	0,886	0,885	0,887		
										Averages	
Gap performances	0,161	0,153	0,155	0,150	0,144	0,158	0,154	0,155	0,158	0,154	
Gap performances %	15,78%	15,01%	15,17%	14,49%	13,91%	15,27%	14,81%	14,90%	15,12%	14,94%	
										Average gap in value	-0,010
										Average gap in %	-0,97%



➤ **A-Classic against Viper double:**

Since 2015, the A-Classic continues to underperforms against the Viper. This situation seems be due essentially at the passage of the best competitors from the A-Classic to the A-Class (foils), fewer participation in the regattas and also aging competitors (over 60 years on average).

Comparison SCHRS ratings										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Viper double	1,035	1,018	1,022	1,035	1,035	1,035	1,040	1,040	1,045	
A-Classic	0,978	0,988	0,990	1,002	1,002	1,002	1,002	1,002	1,008	
										Averages
Gap ratings SCHRS	0,057	0,030	0,032	0,033	0,033	0,033	0,038	0,038	0,037	0,037
Gap ratings SCHRS %	5,51%	2,95%	3,13%	3,19%	3,19%	3,19%	3,65%	3,65%	3,54%	3,56%
Comparison PERFORMANCE ratings										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Viper double	1,035	1,018	1,022	1,035	1,035	1,035	1,040	1,040	1,045	
A-Classic	0,989	0,992	0,975	0,975	1,017	1,010	1,011	1,015	1,017	
										Averages
Gap performances	0,046	0,026	0,047	0,060	0,018	0,025	0,029	0,025	0,028	0,034
Gap performances %	4,47%	2,56%	4,57%	5,80%	1,74%	2,42%	2,79%	2,40%	2,68%	3,27%
										Average gap in value
										-0,003
										Average gap in %
										-0,29%



➤ **Nacra 17 "C" (Ex.Olympic):**

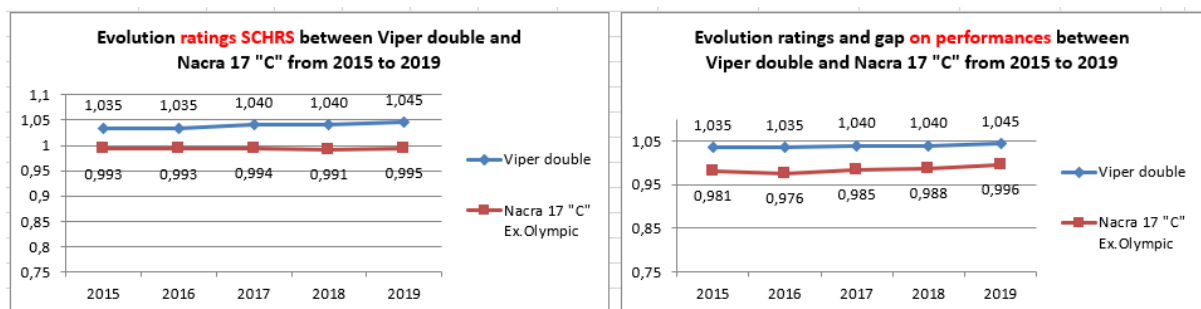
In 2018, all the best sailors have received their new Nacra 17 Olympic full foilers. We thought then that the performance of this boat inter-series should decrease, but the figures 2018 have contradicted this prediction.

To our surprise, the results 2019 confirm that top-level competitors with no Olympic ambitions continue to perform on the Nacra 17 "C".

In 2019, the SCHRS rating (0.995) and the rating in performance (0.996) are very closed.



Comparison SCHRS ratings						
	2015	2016	2017	2018	2019	
Viper double	1,035	1,035	1,040	1,040	1,045	
Nacra 17 "C" Ex.Olympic	0,993	0,993	0,994	0,991	0,995	
					Averages	
Gap ratings SCHRS	0,042	0,042	0,046	0,049	0,050	0,046
Gap ratings SCHRS %	4,06%	4,06%	4,42%	4,71%	4,78%	4,41%
Comparison PERFORMANCE ratings						
	2015	2016	2017	2018	2019	
Viper double	1,035	1,035	1,040	1,040	1,045	
Nacra 17 "C" Ex.Olympic	0,981	0,976	0,985	0,988	0,996	
					Averages	
Gap performances	0,054	0,059	0,055	0,052	0,049	0,054
Gap performances %	5,22%	5,70%	5,29%	5,00%	4,69%	5,18%
					Average gap in value	
					0,008	
					Average gap in %	
					0,77%	



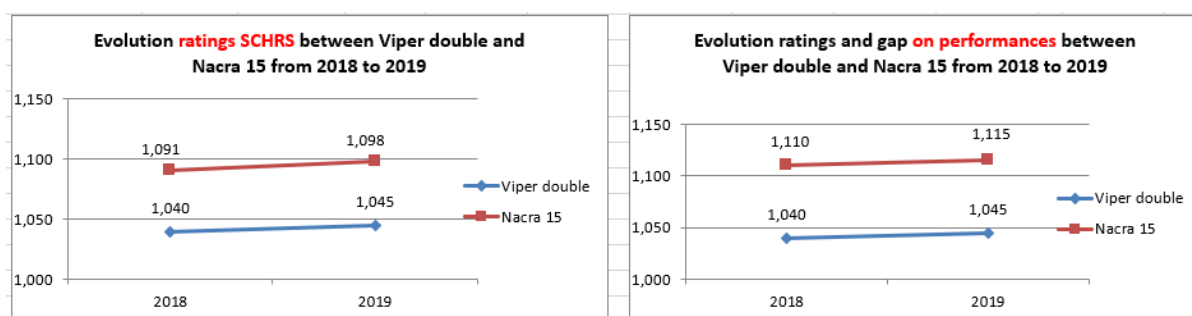
### ➤ Nacra 15:

Although this boat is sailing mainly in the Nacra 15 series, that is the first year where we could have enough results in inter-serial regattas to obtain consistent statistical results, which show that the Nacra 15 underperform of 0.010 point compared with SCHRS rating.

Today, we do not have the capacity to say if it is the best crews who participate in inter-series races, which could explain this gap between the SCHRS rating and the performance rating.

Nacra has put on the market in 2019 the Nacra 15 FCS (Full foiling), which already seems to attract the best crews.

Comparison SCHRS ratings			
	2018	2019	
Viper double	1,040	1,045	
Nacra 15	1,091	1,098	
			Averages
Gap ratings SCHRS	-0,051	-0,053	-0,052
Gap ratings SCHRS %	-4,90%	-5,07%	-4,99%
Comparison PERFORMANCE ratings			
	2018	2019	
Viper double	1,040	1,045	
Nacra 15	1,110	1,115	
			Averages
Gap performances	-0,070	-0,070	-0,070
Gap performances %	-6,73%	-6,70%	-6,71%
	Average gap in value		-0,018
	Average gap in %		-1,73%



➤ **A-Classic compared to A-Class (foils):**

Following the recommendations of certain Federations concerning the separation of fleets of flying boats and the fleets of Archimedian boats or the will of the Classes not to make run the A-Classic and A-Class full foiling together, this year in the lack of reliable results it was impossible to make a comparison between the performances of A-Classic and A-Class full foiling.

➤ **A-Class (foils) compared to Formula 18:**

However, a few open races were organized in Holland, USA and Australia, which compared the relative performances of A-Class Flying and Formula 18. The table below shows that the difference in performance remains relevant and in line with the SCHRS 2019 ratings table.

Comparison of rating gap between SCHRS 2019 and performances ratings				
	Formula 18	A-Class foils	Ecart %	Time/ h
Ratings SCHRS 2019	1,000	0,978	-2,20%	00:01:20
Ratings on performances	1,000	0,980	-2,04%	00:01:15

➤ **Flying boats :**

- First observation, the number of Flying boats participating in inter series regattas mixing flying and Archimedean catamarans is very small.
- Second observation, for safety reasons the regatta organisers make separate departures and often different routes for Flying boats.
- Third observation, some of these boats like the Flying Phantom, the Nacra 17 Olympic full flyer, A-Class full foiling, sail mainly in real time in the One design groups.

In these conditions, it is impossible today to make serious statistics on this type of boat.

**3. Analysis of the relative performances of catamarans in 2019 for the C3 Group. (See Excel attached file)**

Target boats of the C3 GROUP (Catamarans without daggerboard)

- Comparison ratings 2018 2019

Summary chart	Ref 15.5	SL16	HC16 spi	HC16	Dart 18
Ratings SCHRS 2019	1,230	1,141	1,146	1,197	1,215
Ratings on average performances 2019	1,230	1,127	1,149	1,195	1,208
Gap ratings SCHRS 2019 / performances	0,000	-0,014	0,003	-0,002	-0,007
Conversion time per hour		00:00:43	00:00:10	00:00:05	00:00:22

The observation of C3 group in table 2019 continues to be in line with that observed in 2018, with the SL16 and Dart 18 outperforming the performance against other C3 group target boats.

Summary chart 2018	Ref 15.5	SL16	HC16 spi	HC16	Dart 18
Ratings SCHRS 2018	1,225	1,140	1,143	1,193	1,215
Ratings on average performances 2018	1,225	1,122	1,149	1,193	1,204
Gap ratings SCHRS 2018 / performances	0,000	-0,018	0,006	0,000	-0,011
Conversion time per hour		00:00:56	00:00:20	00:00:00	00:00:32

Like for the C1 Group, the comparison of the 2019 and 2018 tables requires several comments.

Taking into account the luff length of catamarans equipped with deck sweeper like the Formula 18, resulted in an average slip of around 0.005 rating points to maintain a rating around 1.000 at F18. What has been reflected in all the ratings of the SCHRS 2019 table.

The second table below shows that performance differences were only slightly affected by this change.

Comparison SCHRS ratings	SL 15,5	SL 16	Hobie 16 Spi.	Hobie 16	Dart 18
<b>2019 - 2018</b>					
SCHRS ratings 2019	1,230	1,141	1,146	1,197	1,215
SCHRS ratings 2018	1,230	1,140	1,143	1,193	1,215
Gap SCHRS ratings between 2018 and 2019		0,001	0,003	0,004	0,000
Comparison performance ratings 2019 - 2018	SL 15,5	SL 16	Hobie 16 Spi.	Hobie 16	Dart 18
SCHRS ratings / performances 2019	1,230	1,127	1,149	1,195	1,208
SCHRS ratings / performances 2018	1,230	1,122	1,140	1,193	1,204
Gap SCHRS Perf.ratings between 2018 and 2019		0,005	0,009	0,002	0,004

### Evolution of ratings on performances and SCHRS ratings since 2010 (C3 Group)

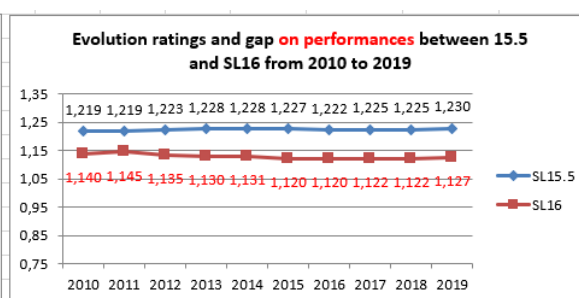
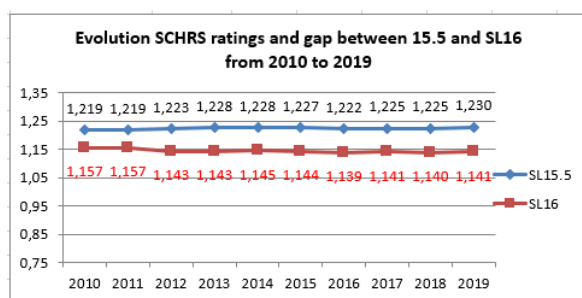
For the catamarans of C3 Group, the tables and the charts below allow to have a good visibility on the impact of change occurred in SCHRS Formula over 10 years

#### ➤ SL16 against SL15.5

Although the Nacra 15 replaced the SL16 as a support for the Youth World Championships, the SL16 remains the reference boat of the 2019 French Youth Championship, which partly explains why this boat continues to outperform.

It is interesting to note that the difference between the SCHRS rating and the performance rating decreased from 0.018 to 0.014 points.

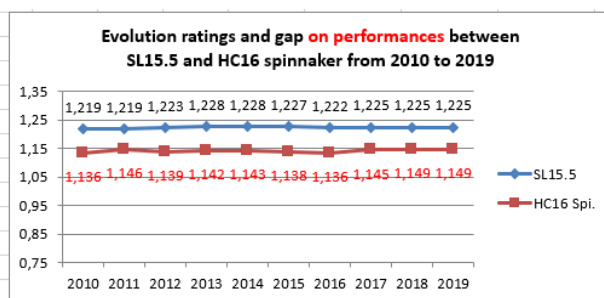
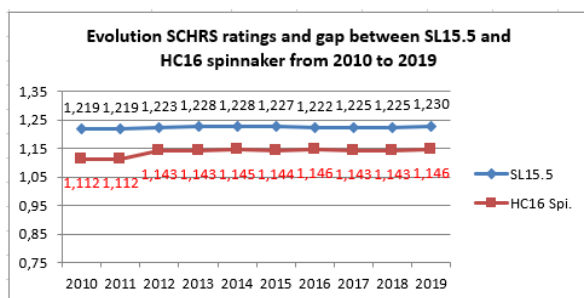
Comparison SCHRS ratings											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
SL15.5	1,219	1,219	1,223	1,228	1,228	1,227	1,222	1,225	1,225	1,230	
SL16	1,157	1,157	1,143	1,143	1,145	1,144	1,139	1,141	1,140	1,141	
Averages											
Gap ratings SCHRS	0,062	0,062	0,080	0,085	0,083	0,083	0,083	0,084	0,085	0,089	0,082
Gap ratings SCHRS %	5,09%	5,09%	6,54%	6,92%	6,76%	6,76%	6,79%	6,86%	6,94%	7,24%	6,66%
Comparison PERFORMANCE ratings											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
SL15.5	1,219	1,219	1,223	1,228	1,228	1,227	1,222	1,225	1,225	1,230	
SL16	1,140	1,145	1,135	1,130	1,131	1,120	1,120	1,122	1,122	1,127	
Averages											
Gap performances	0,079	0,074	0,088	0,098	0,097	0,107	0,102	0,103	0,103	0,103	0,097
Gap performances %	6,48%	6,07%	7,20%	7,98%	7,90%	8,72%	8,35%	8,41%	8,41%	8,37%	7,93%
Average gap in value										0,016	
Average gap in %										1,28%	



➤ **HC16 spinnaker against SL15.5**

Over a period of 10 years the difference of ratings in value -0,003 and -0.24 in percentage, show for these two boats that ratings stay in adequacy.

Comparison SCHRS ratings											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
SL15.5	1,219	1,219	1,223	1,228	1,228	1,227	1,222	1,225	1,225	1,230	
HC16 Spi.	1,112	1,112	1,143	1,143	1,145	1,144	1,146	1,143	1,143	1,146	
											Averages
Gap ratings SCHRS	0,107	0,107	0,080	0,085	0,083	0,083	0,076	0,082	0,082	0,084	0,085
Gap ratings SCHRS %	8,78%	8,78%	6,54%	6,92%	6,76%	6,76%	6,22%	6,69%	6,69%	6,83%	6,91%
Comparison PERFORMANCE ratings											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
SL15.5	1,219	1,219	1,223	1,228	1,228	1,227	1,222	1,225	1,225	1,225	
HC16 Spi.	1,136	1,146	1,139	1,142	1,143	1,138	1,136	1,145	1,149	1,149	
											Averages
Gap performances	0,083	0,073	0,084	0,086	0,085	0,089	0,086	0,080	0,076	0,076	0,082
Gap performances %	6,81%	5,99%	6,87%	7,00%	6,92%	7,25%	7,04%	6,53%	6,20%	6,20%	6,67%
										Average gap in value	-0,003
										Average gap in %	-0,24%

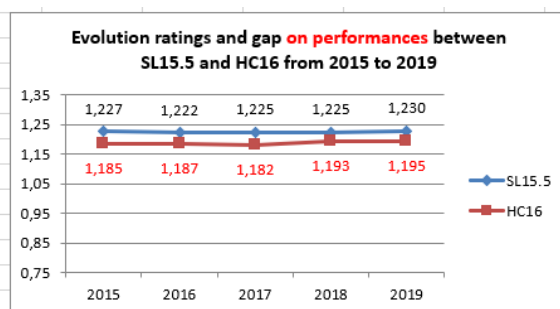
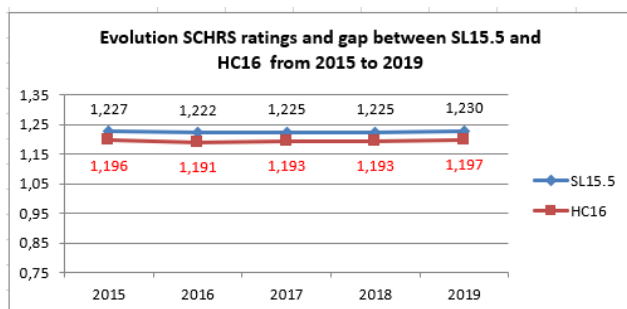


➤ **HC16 (without spinnaker) against SL 15.5**

As for the HC16 spinnaker the difference of ratings between SL15.5 and HC16 in value 0,006 and 0.46 in percentage. We can consider that's rating stay in adequation with a balanced practice.

In France, before 2015 almost all young and adult sailors sailed on HC16 spinnaker in inter serial, that is why we have not data for HC16 before this date.

Comparison SCHRS ratings						
	2015	2016	2017	2018	2019	
SL15.5	1,227	1,222	1,225	1,225	1,230	
HC16	1,196	1,191	1,193	1,193	1,197	
Averages						
Gap ratings SCHRS	0,031	0,031	0,032	0,032	0,033	0,032
Gap ratings SCHRS %	2,53%	2,54%	2,61%	2,61%	2,68%	2,59%
Comparison PERFORMANCE ratings						
	2015	2016	2017	2018	2019	
SL15.5	1,227	1,222	1,225	1,225	1,230	
HC16	1,185	1,187	1,182	1,193	1,195	
Averages						
Gap performances	0,042	0,035	0,043	0,032	0,035	0,037
Gap performances %	3,42%	2,86%	3,51%	2,61%	2,85%	3,05%
Average gap in value					0,006	
Average gap in %					0,46%	

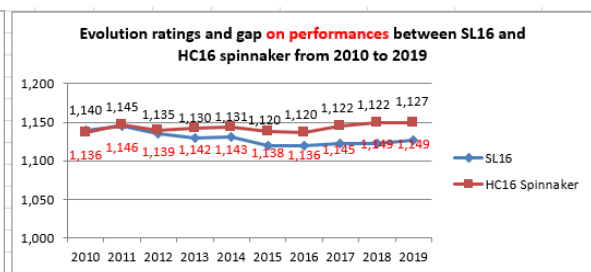
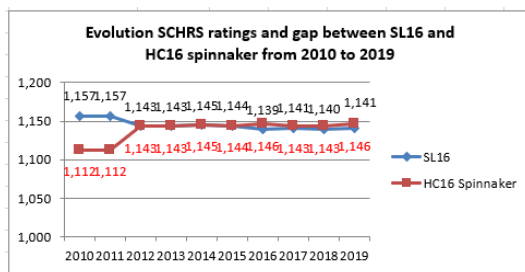


### ➤ SL16 against HC16 spinnaker

The choice of SL16 in 2013 as support catamaran for the youth Mondial Championship to the detriment of HC16 spinnaker has led a migration of young talented sailors toward SL16. Today the gap on performance between these two boats seems stabilized with a difference of ratings in value of -0,018 and -1.60 in percentage, but seems **too favorable** to the SL16.

The evolution of the performance variations between SL16 and HC16 spinnaker for 10 years has been explained in a previous report.

Comparison SCHRS ratings											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
SL16	1,157	1,157	1,143	1,143	1,145	1,144	1,139	1,141	1,140	1,141	
HC16 Spinnaker	1,112	1,112	1,143	1,143	1,145	1,144	1,146	1,143	1,143	1,146	
Averages											
Gap ratings SCHRS	0,045	0,045	0,000	0,000	0,000	0,000	-0,007	-0,002	-0,003	-0,005	0,003
Gap ratings SCHRS %	3,89%	3,89%	0,00%	0,00%	0,00%	0,00%	-0,61%	-0,18%	-0,26%	-0,44%	0,27%
Comparison PERFORMANCE ratings											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
SL16	1,140	1,145	1,135	1,130	1,131	1,120	1,120	1,122	1,122	1,127	
HC16 Spinnaker	1,136	1,146	1,139	1,142	1,143	1,138	1,136	1,145	1,149	1,149	
Averages											
Gap performances	0,004	-0,001	-0,004	-0,012	-0,012	-0,018	-0,016	-0,023	-0,027	-0,022	-0,015
Gap performances %	0,35%	-0,09%	-0,35%	-1,06%	-1,06%	-1,61%	-1,43%	-2,05%	-2,41%	-1,95%	-1,33%
Average gap in value										-0,018	
Average gap in %										-1,60%	

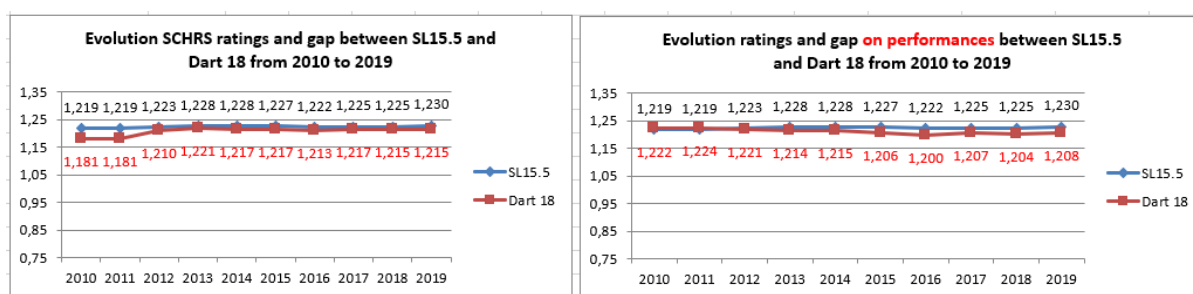


### ➤ Dart 18 against SL 15.5

Over 10 years, the average difference of ratings between SL15.5 and Dart 18 are 0.001 in value and 0.06 in percentage.

Comparison SCHRS ratings											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
SL15.5	1,219	1,219	1,223	1,228	1,228	1,227	1,222	1,225	1,225	1,230	
Dart 18	1,181	1,181	1,210	1,221	1,217	1,217	1,213	1,217	1,215	1,215	
Averages											
Gap ratings SCHRS	0,038	0,038	0,013	0,007	0,011	0,010	0,009	0,008	0,010	0,015	0,013
Gap ratings SCHRS %	3,12%	3,12%	1,06%	0,57%	0,90%	0,81%	0,74%	0,65%	0,82%	1,22%	1,10%
Comparison PERFORMANCE ratings											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
SL15.5	1,219	1,219	1,223	1,228	1,228	1,227	1,222	1,225	1,225	1,230	
Dart 18	1,222	1,224	1,221	1,214	1,215	1,206	1,200	1,207	1,204	1,208	
Averages											
Gap performances	-0,003	-0,005	0,002	0,014	0,013	0,021	0,022	0,018	0,021	0,022	0,014
Gap performances %	-0,25%	-0,41%	0,16%	1,14%	1,06%	1,71%	1,80%	1,47%	1,71%	1,79%	1,16%
Average gap in value										0,001	
Average gap in %										0,06%	





➤ **Dart 18 against Dart 18 solo**

It should be noted that most class Dart 18 Double and Solo events are run in Class and in real time, which explains the low number of exploitable data.

However, 135 races have been examined where the Dart 18 solo and Dart 18 double were mixed. If we compare the table 2018 and 2019, the rating on performance 2019 of the Dart 18 Solo is getting closer to the SCHRS rating.

Comparison SCHRS ratings 2018 - 2019	Dart 18 double	Dart 18 solo	Ecart	Time/ h
SCHRS ratings 2019	1,215	1,232	1,40%	00:00:50
SCHRS ratings 2018	1,215	1,230	1,23%	00:00:44
Gap SCHRS ratings between 2018 and 2019	0,000	0,002		
Comparison performance ratings 2018 - 2019	Dart 18 double	Dart 18 solo	Ecart	Time/ h
SCHRS ratings / performances 2019	1,215	1,234	1,56%	00:00:56
SCHRS ratings / performances 2018	1,215	1,232	1,40%	00:00:50
Gap SCHRS Perf.ratings between 2018 and 2019		0,002		

#### **4. New serial boats appeared in 2019**

##### **New boats**

Goodall Viper Foiling

IFLY 15 Double

IFLY 15 Double + code "F"

IFLY 15 solo

IFLY 15 solo + code "F"

Nacra 15 FCS

Nacra 15 ONE

Nacra 18 FCS

##### **New business names and modified datas**

Nacra F16 double

Nacra F16 double - curved foil

Nacra F16 One

Nacra F16 One - curved foil

##### **New Class rules and modified datas**

Nacra F20 Carbon

Nacra F20 Carbon FCS