



Overview of the ORC Rating System

Dobbs Davis – ORC Communications Director & US Sailing Measurer

October 17, 2022
Cortez Racing Association



- What is ORC?
- What are ORC resources?
- ORC Principles
- Other ORC Benefits



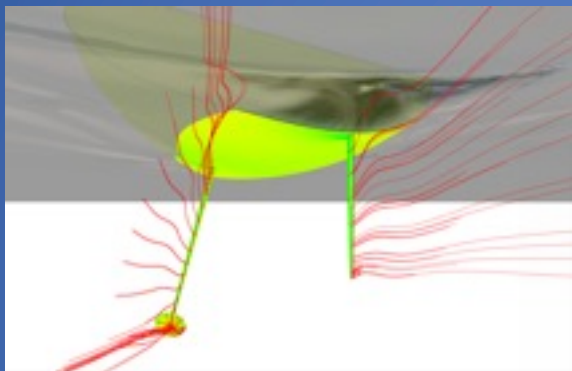


What is ORC?

- Offshore Racing Congress (ORC): founded 1969 by the Royal Ocean Racing Club (RORC) and the Cruising Club of America (CCA) to develop a handicap standard for the international community
- Supported IOR, IMS, and currently ORC rating systems
- Currently issues >12,000 certificates in 40 countries, 1000 in US
- ORC ratings based on a Velocity Prediction Program (VPP) using hull, appendage, rig and sail measurements to predict performance

VPP science

Drag force: hull, keel, propeller



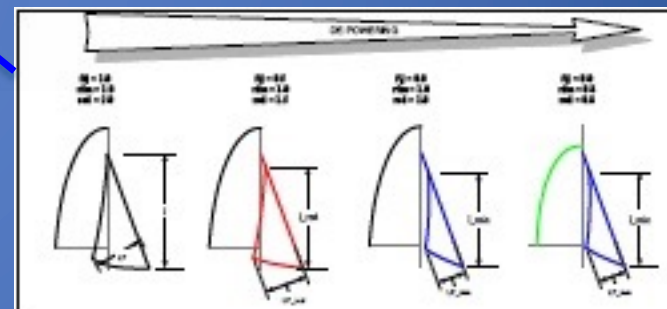
Heeling force



VPP:
balance
of forces



Stability force



Drive force: Sails



...ratings determined by science and an analysis of >2000 boat designs...



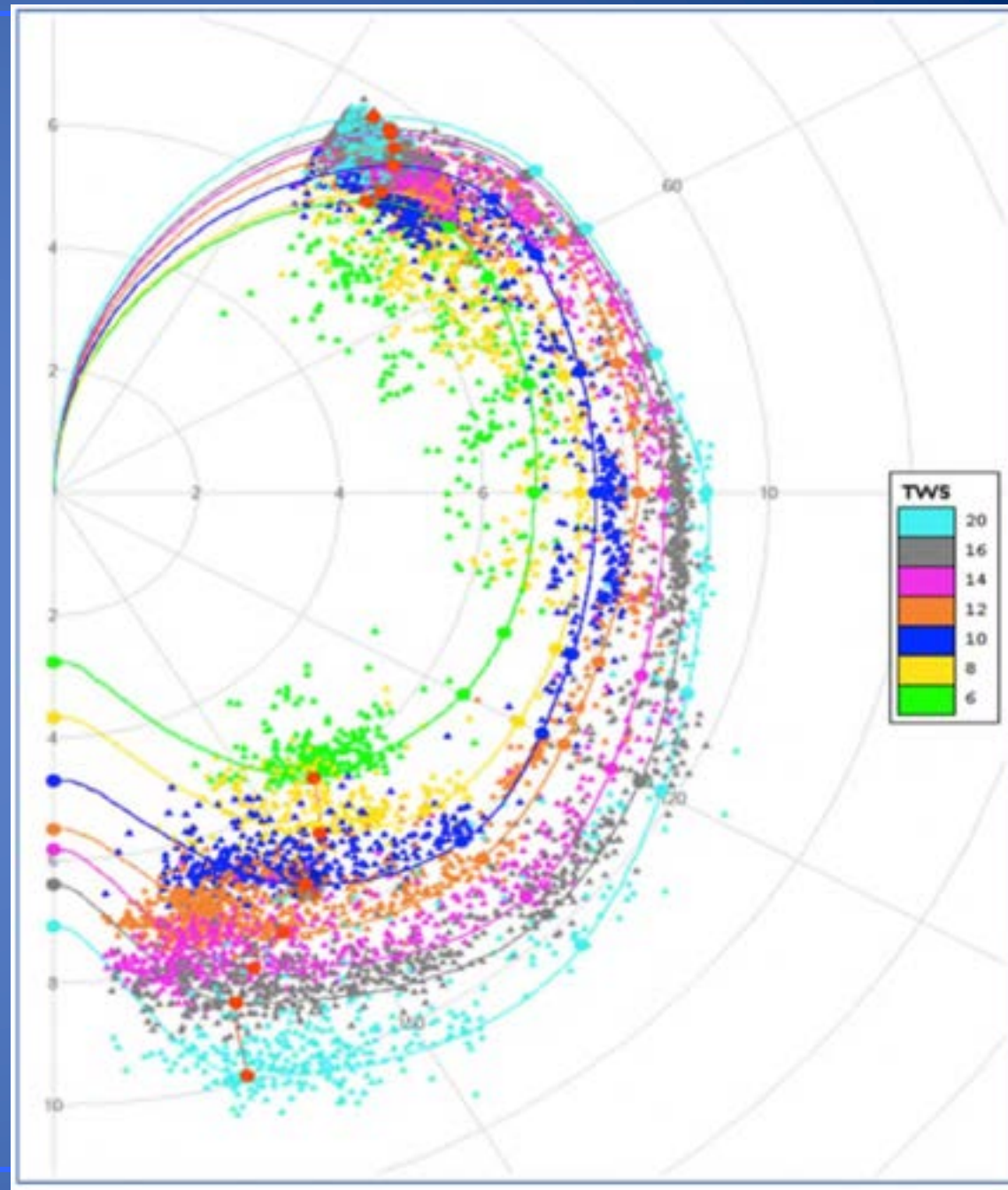
ORC technical talent

International Technical Committee meets 5x yearly, with research budget of up to €50K/year

- Andy Cloughton (GBR), ex-Wolfson Unit & team member of ETNZ & Team Origin
- Alessandro Nazareth (ITA), Vallicelli Yacht Design
- Marcus Mauleverer (GBR), Ker Yacht Design hydro CFD modelling expert
- Robert Ranzenbach (USA), aerodynamic expert, ex-Quantum sails
- Matteo Polli (ITA), Polli Yacht Design
- ORC technical staff & programmers
- Manalo Ruiz de Elvira (ESP), ex-Team Oracle
- David Lyons (AUS), structures expert
- Antoine Cardin (FRA), Judel/Vrolijk
- Jim Schmicker (USA), Farr Yacht Design
- Jason Ker (GBR), Ker Yacht Design
- Several new research associates for 2022: Bruce Nelson, Mark Mills, Stu Bannatyne, Jeremy Elliott, Adolfo Carrau, Chris Williams, Antoine Lauriot, Prevost

Example ITC research

KND (Valencia) partners with ORC to evaluate instrument log data as a validation tool for the ORC VPP – polar curves are derived from data plots





ORC Principles

- Transparency – all ratings and rules are published. VPP may be purchased, ORC Sailor Services gives full access for rating tests at only \$15/each
- Science – Int'l Technical Committee meets 4x yearly, ratings determined objectively
- Accuracy – supports measurer training & the UMS concept
- Inclusion – submission process solicits feedback
- Professionalism – Full-time technical staff available for development and support



Certificate Options

US Sailing offers two standard options for rating certificates:

- ORC Club Certificate:
 - Owner fills out application with known info (eg, PHRF cert or builder data)
 - Remaining data supplied by US Sailing based on measured data or other sources
 - Sail measurements from sailmakers or measurers necessary
- ORC International (ORCi) Certificate:
 - Boat, spar and sail measurements provided by Certified Measurer
 - More accurate because no default values are used
 - Often better ratings than Club ratings generated from default data
- ORC One Design certs *others coming soon for the US: eg, J/105, J/35, etc
 - For a select set of one designs adhering to their one design class rules
 - Includes* Farr 30 and 40; J/80; Melges 24, 32, 37...others need definition from US Sailing
- Double Handed ... Non-Spinnaker ... also Superyacht ... & MultiHull

ORC certificate design

APH: **556.5** CDL: **9.319**
GPH: **623.4** CertNo: **US7057**

BOAT

Class **FIRST 36.7**
Designer **FARR**
Builder **BENETEAU**
Age date **10/2003**
Series date **10/2001**
Offset file **FIRST367.off**
Data file **US7057 Test**

HULL

Length Overall **10.667 m**
Maximum Beam **3.458 m**
Draft **2.232 m**
Displacement **5,735 kg**
DLR **6.5621**
IMS Division **Cruiser/Racer**
Dynamic Allowance **0.040%**
Age Allowance **0.487%**

PROPELLER

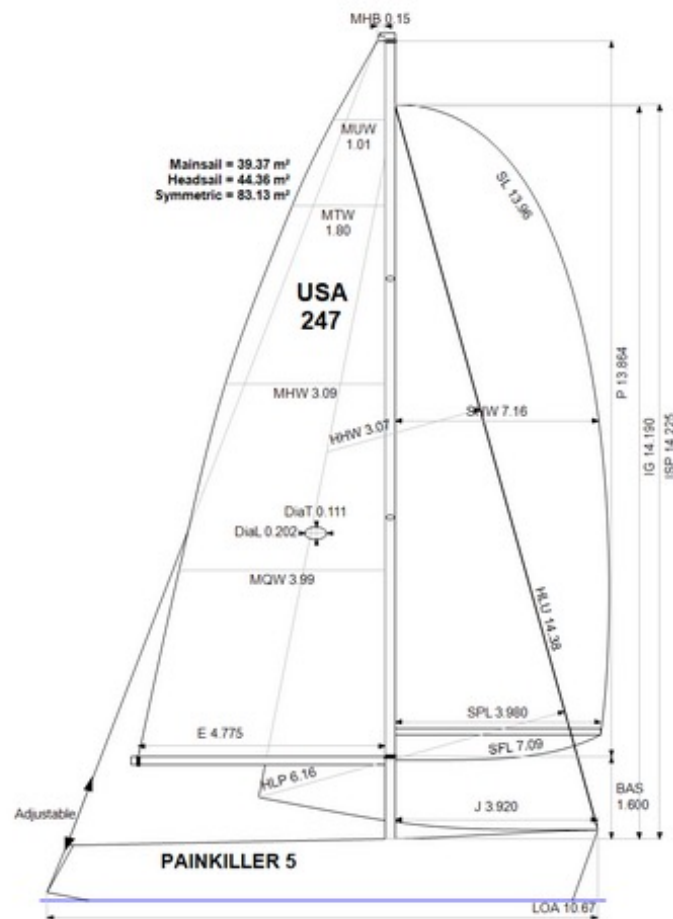
Installation **Strut**
Type **Folding 2 blades**
Diameter **0.405m**

CREW

Maximum weight **816 kg**
Minimum weight **612 kg** * when applied
Non Manual Power **No**
Crew Arm Extension **0.00 m**

SAIL AREAS (m²)

	Measured	Rated
Mainsail	39.37	40.15
Headsail	44.36	44.36



Rated boat velocities in knots



Club
Certificate
2022

Boat
EAGLE
USA-38006



Rated boat velocities in knots

US SAILING
1 ROGER W
BRISTOL, RI

APH: **509.**

GPH: **570.6**

BOAT

Class
Designer
Builder
Age date
Series date
Offset file
Data file

HULL

Length Over
Maximum Be
Draft

Displacement

DLR

IMS Division

Dynamic Allowance

Age Allowance

PROPELLER

Installation

Type

Diameter

CREW

Maximum weight

Minimum weight

Non Manual Power

Crew Arm Extension

SAIL AREAS (m²)

Mainsail

Headsail Luffed

Rated boat velocities in knots							
Wind Velocity	6 kt	8 kt	10 kt	12 kt	14 kt	16 kt	20 kt
Beat Angles	42.6°	41.1°	39.0°	37.6°	37.6°	37.2°	37.0°
Beat VMG	3.86	4.69	5.27	5.49	5.59	5.68	5.78
52°	5.86	6.96	7.51	7.69	7.78	7.82	7.98
60°	6.18	7.21	7.69	7.90	8.01	8.07	8.27
75°	6.44	7.38	7.83	8.17	8.41	8.54	8.70
90°	6.49	7.53	8.03	8.37	8.64	8.99	9.37
110°	6.31	7.43	7.99	8.54	9.10	9.61	10.35
120°	5.98	7.22	7.88	8.43	9.05	9.71	11.01
135°	5.33	6.61	7.50	8.01	8.56	9.18	10.74
150°	4.46	5.63	6.69	7.49	7.98	8.49	9.69
Run VMG	3.86	4.88	5.79	6.58	7.21	7.74	8.68
Gybe Angles	141.5°	146.6°	150.1°	156.5°	166.4°	177.2°	176.6°

ORC Ref 03880001P3P Issued on 14/01/2022 Valid until 31/03/2023

4.4373

0.000%

0.487%

Strut

Folding 2 blades

0.410m

839 kg

629 kg * when applied

No

0.00 m

Measured

Rated

51.06

38.88

52.22

38.88

Mainsail 51.06 52.22

Headsail Luffed 38.88 38.88

Headsail Flying

Symmetric 103.90 103.90

Asymmetric 86.84 86.84

(1 asymmetric(s) with SHWSFL < 85%)

STORM SAIL AREAS (m²)

Trysail 14.83

Storm Jib 12.74

Heavy Weather Jib 34.40

SAIL LIMITS

Headsails 6

Spinnakers 4 * Asymmetric may be tacked on the pole

STABILITY

Righting Moment 164.8 kg·m

Stability Index N/A

COMMENTS

10 GAL FUEL FOR INCLINE FBDS ADJ

The owner and any other person in charge is responsible that boat is complying with her certificate in accordance with RRS 78.1 and ORC Rule 304.

VPP ver: 2022 0.92beta | © ORC | www.orc.org

- Scale drawing with sail and rig dimensions
- Basic hull dimensions
- Propeller type and size
- Rated boat speed table
- GPH ratings: use to determine class splits
- Crew weight: default or declared
- Sail limitations
- Stability: unmeasured or measured

ORC certificate design – Page 2 USA Scoring options

Time Allowances in sec/10M							
Wind Velocity	6 M	8 M	10 M	12 M	14 M	16 M	20 M
Beat VMG	833.2	767.1	682.7	655.7	644.4	633.8	623.1
52°	614.7	517.1	479.2	467.9	462.8	460.1	450.9
60°	582.8	499.1	468.1	455.5	449.7	446.2	435.2
75°	559.2	487.8	458.6	440.8	428.3	421.5	414.0
90°	554.7	478.0	448.3	430.1	416.5	400.3	384.0
110°	570.7	484.3	450.3	421.7	395.5	374.8	347.8
120°	601.6	498.8	457.0	427.0	397.8	370.6	326.8
135°	676.0	544.7	480.0	448.3	420.6	392.3	335.2
150°	807.2	639.1	538.4	480.7	450.9	424.1	371.7
Run VMG	932.0	738.0	621.6	547.2	499.4	465.2	414.9
Selected Courses							
Windward / Leeward	832.6	752.5	652.1	601.4	571.9	549.5	519.0
All purpose	712.6	587.4	525.3	493.5	473.1	456.1	429.7

Single Number Scoring Options		
Course	Time On Distance	Time On Time
Windward / Leeward	628.0	0.9554
All purpose	509.2	1.1793

Custom scoring options for United States of America

Single Number	Time On Distance	Time On Time
Triple Number All Purpose Low	650.0	0.9231
Triple Number All Purpose Medium	506.8	1.1839
Triple Number All Purpose High	450.5	1.3320
Triple Number Windward/Leeward Low	642.6	0.7121
Triple Number Windward/Leeward Medium	623.5	0.9623
Triple Number Windward/Leeward High	543.7	1.1036
Predominantly Upwind	549.5	1.0918
Predominantly Downwind	520.5	1.1528
Predominantly Upwind Low	718.5	0.8351
Predominantly Upwind Medium	565.0	1.0620
Predominantly Upwind High	530.8	1.1303
Predominantly Downwind Low	720.0	0.8333
Predominantly Downwind Medium	519.7	1.1544
Predominantly Downwind High	427.7	1.4029
Chicago-Mac Upwind		1.0754
Chicago-Mac All Purpose		1.1020
Chicago-Mac Downwind		1.1332
Bayview-Mac Cove Island		1.0293
Bayview-Mac Shore		1.0405
Harvest Moon Regatta	448.3	1.3383
Victoria-Maul		1.2176

S-Band	Time On Distance	Time On Time
Windward/Leeward		
S-Band Low	818.7	0.6531
S-Band Low / Medium	770.1	0.7792
S-Band Medium	613.1	0.9786
S-Band Medium / High	552.5	1.0809
S-Band High	524.3	1.1445



Scoring Options, cont.

- Summarized on Page 2 of USA-CAN certificates
- Single number W/L and All Purpose also available at top of the page:

Single Number Scoring Options		
Course	Time On Distance	Time On Time
Windward / Leeward	601.8	0.9971
All purpose	486.3	1.2338

Custom scoring options for United States of America

Single Number	Time On Distance	Time On Time
Triple Number All Purpose Low	650.0	0.9231
Triple Number All Purpose Medium	506.8	1.1839
Triple Number All Purpose High	450.5	1.3320
Triple Number Windward/Leeward Low	842.6	0.7121
Triple Number Windward/Leeward Medium	623.5	0.9623
Triple Number Windward/Leeward High	543.7	1.1036
Predominantly Upwind	549.5	1.0918
Predominantly Downwind	520.5	1.1528
Predominantly Upwind Low	718.5	0.8351
Predominantly Upwind Medium	565.0	1.0620
Predominantly Upwind High	530.8	1.1303
Predominantly Downwind Low	720.0	0.8333
Predominantly Downwind Medium	519.7	1.1544
Predominantly Downwind High	427.7	1.4029
Chicago-Mac Upwind		1.0754
Chicago-Mac All Purpose		1.1020
Chicago-Mac Downwind		1.1332
Bayview-Mac Cove Island		1.0293
Bayview-Mac Shore		1.0405
Harvest Moon Regatta	448.3	1.3383
Victoria-Maui		1.2176

5-Band Windward/Leeward	Time On Distance	Time On Time
5-Band Low	918.7	0.6531
5-Band Low / Medium	770.1	0.7792
5-Band Medium	613.1	0.9786
5-Band Medium / High	552.5	1.0859
5-Band High	524.3	1.1445



Custom Scoring Options

- Eg, Bayview Mac race options
 - Cove Island course
 - Shore course

Chicago-Mac Upwind		1.1296
Chicago-Mac All Purpose		1.1374
Chicago-Mac Downwind		1.1406
Bayview-Mac Cove Island		1.0590
Bayview-Mac Shore		1.0798
Harvest Moon Regatta	416.4	1.4409
Victoria-Maui		1.2096

Bayview-Mac Cove Island Course

Wind (knots):	6	8	10	12	16
VMG Up	6.000%	8.125%	6.250%	3.938%	1.250%
60	5.250%	7.500%	6.250%	4.500%	1.875%
90	0.000%	2.500%	5.000%	6.750%	5.000%
120	0.000%	1.875%	3.750%	5.063%	3.750%
VMG Dn	3.750%	5.000%	3.750%		

Bayview-Mac Shore Course

Wind (knots):	6	8	10	12	16
VMG Up	6.000%	6.250%	5.000%	3.000%	1.000%
60	6.000%	6.250%	5.000%	3.000%	1.000%
90	2.000%	3.750%	5.000%	5.000%	3.000%
120	1.000%	3.125%	5.000%	5.500%	3.500%
VMG Dn	5.000%	5.625%	5.000%	3.500%	1.500%



www.orc.org/Sailor Services

The online search portal to all ORC products:

- Certificate copies
- Extensive search resource
- 158k measurement records
- Test certificates
- Scratch sheets
- Speed Guides & Target Speeds

A screenshot of the ORC Sailor Services website. The header features the ORC logo with the tagline 'world leader in rating technology' and the title 'Sailor Services'. Below the header is a banner image of a sailboat with the name 'KONELAMINOLA' and a '50' anniversary logo for the years 1969-2019. The main content area includes a navigation menu on the left with options like 'Home', 'News', 'Software', and 'Search for Certificates'. The main text area displays a personalized greeting 'Hello Dobbs Davis!' and a notification: '131951 boat certificate records are online.' Below this, there are three news items with dates: '30/1/2021 ORC VPP 2021 version 1.01 has been inst producing 2021 test certificates.', '8/5/2020 ORC Speed Guide with new interactive features is nov and the press release.', and '24/2/2020 Attention Microsoft Edge users: There is a know Please download and install the latest version from experience of this website.' The footer includes a 'Main ORC Site' link.

Time allowances

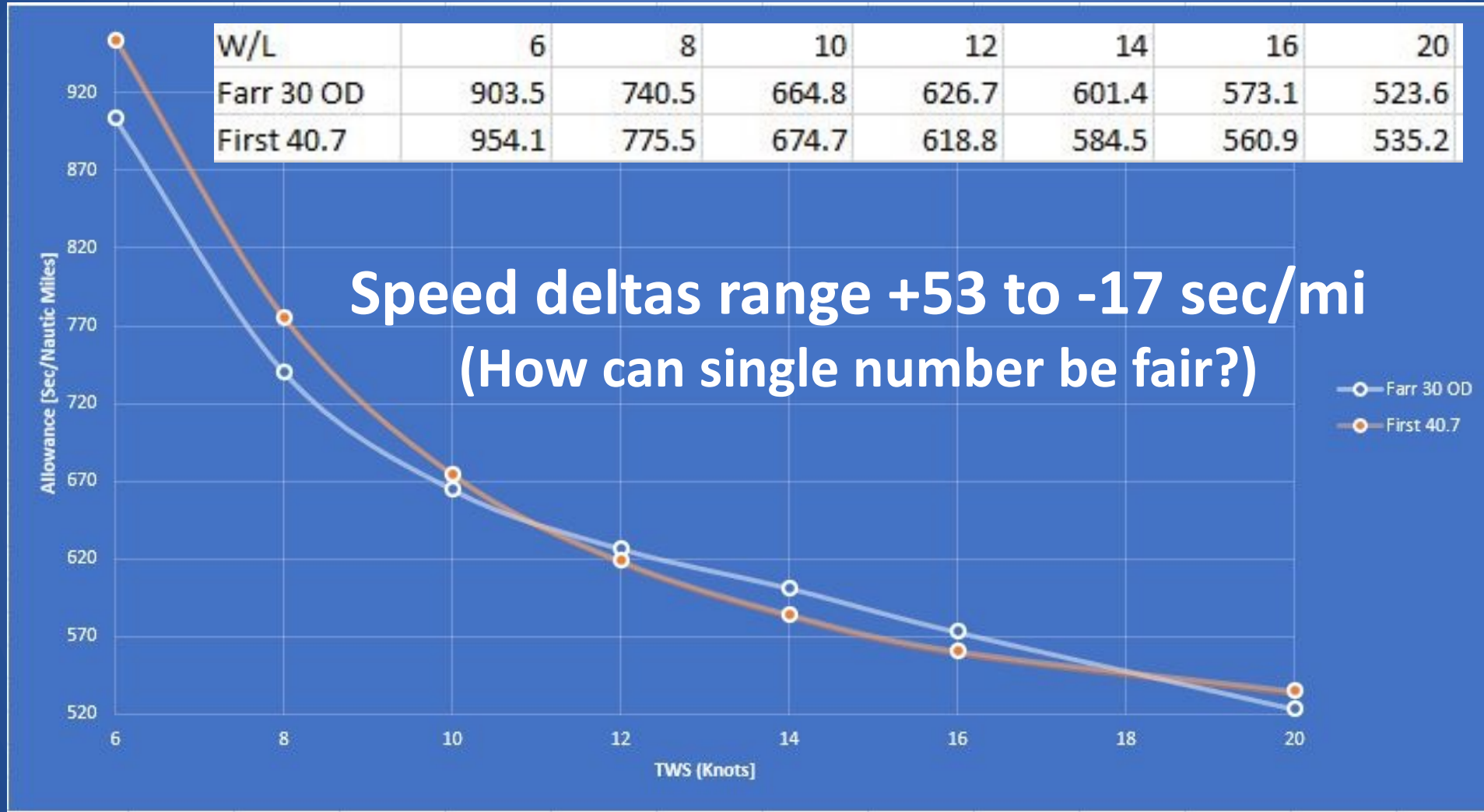


Scratch Sheet

Triple ToT Windward/Leeward Low

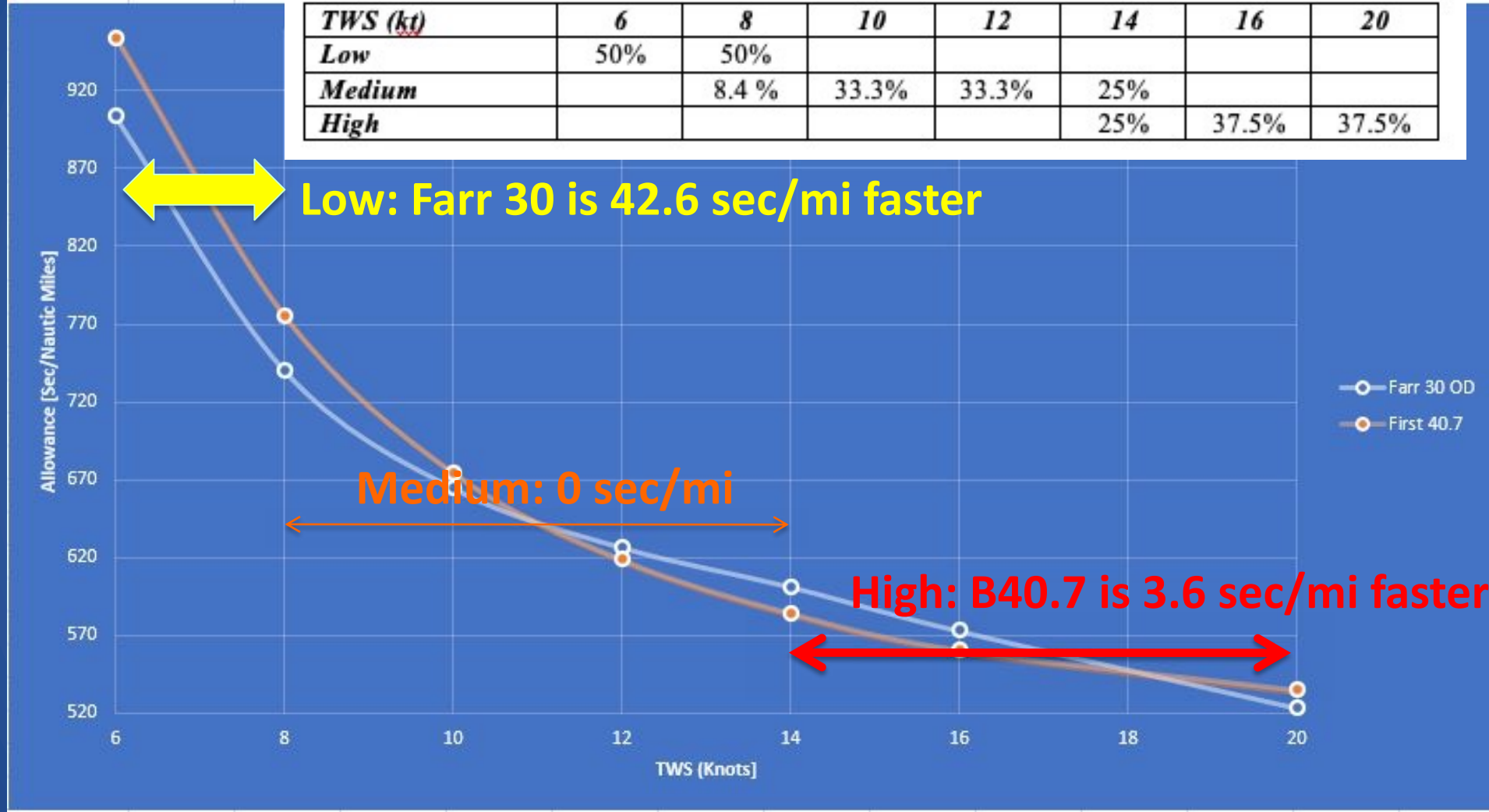
	Yacht Name	Sail No	Type	GPH	TOT	1 min	5 min	10 min	20 min	30 min	60 min	300 min
<input type="radio"/>	Lorelei	USA 140	Hanse 348	705.3	0.5485	26.9 00:00:27	134.5 00:02:15	269.0 00:04:29	538.0 00:08:58	807.0 00:13:27	1613.9 00:26:54	8069.6 02:14:30
<input type="radio"/>	REVOLUTION	4515	CS 30	676.0	0.6206	16.8 00:00:17	84.0 00:01:24	168.0 00:02:48	336.1 00:05:36	504.1 00:08:24	1008.2 00:16:48	5040.9 01:24:01
<input type="radio"/>	Growth Spurt	USA 261	J-109	610.6	0.6629	11.9 00:00:12	59.5 00:00:60	119.0 00:01:59	238.0 00:03:58	357.1 00:05:57	714.1 00:11:54	3570.7 00:59:31
<input type="radio"/>	Overproof	USA 61388	Open 30	589.7	0.7232	5.9 00:00:06	29.5 00:00:30	59.1 00:00:59	118.1 00:01:58	177.2 00:02:57	354.4 00:05:54	1772.1 00:29:32
<input type="radio"/>	ARTEMIS	USA 21	Italia 13.98	546.8	0.7381	4.6 00:00:05	22.9 00:00:23	45.8 00:00:46	91.5 00:01:32	137.3 00:02:17	274.6 00:04:35	1373.0 00:22:53
<input type="radio"/>	Second Wind	51316	J130	548.3	0.7415	4.3 00:00:04	21.4 00:00:21	42.8 00:00:43	85.6 00:01:26	128.4 00:02:08	256.8 00:04:17	1284.2 00:21:24
<input checked="" type="radio"/>	PALAEON	USA 93145	J-145	514.0	0.7944	0.0 00:00:00	0.0 00:00:00	0.0 00:00:00	0.0 00:00:00	0.0 00:00:00	0.0 00:00:00	0.0 00:00:00
<input type="radio"/>	XL	USA-45000	ANTRIM 40	517.9	0.7968	-0.2 00:00:00	-0.9 00:00:01	-1.8 00:00:02	-3.6 00:00:04	-5.4 00:00:05	-10.8 00:00:11	-54.2 00:00:54
<input type="radio"/>	Rigadoon	103	DUNNING 44	460.6	0.8789	-5.8 00:00:06	-28.8 00:00:29	-57.7 00:00:58	-115.4 00:01:55	-173.1 00:02:53	-346.1 00:05:46	-1730.6 00:28:51
<input type="radio"/>	GLORY	USA 88008	TRANSPAC 52	452.4	0.9006	-7.1 00:00:07	-35.4 00:00:35	-70.8 00:01:11	-141.5 00:02:22	-212.3 00:03:32	-424.5 00:07:05	-2122.6 00:35:23

Farr 30 – Beneteau 40.7 W/L course



Triple Number W/L course

TWS (kt)	6	8	10	12	14	16	20
Low	50%	50%					
Medium		8.4 %	33.3%	33.3%	25%		
High					25%	37.5%	37.5%



Low: Farr 30 is 42.6 sec/mi faster

Medium: 0 sec/mi

High: B40.7 is 3.6 sec/mi faster



Other ORC Benefits

Speed Guide & Target Speeds*

*now FREE for 2022 - \$75 value!



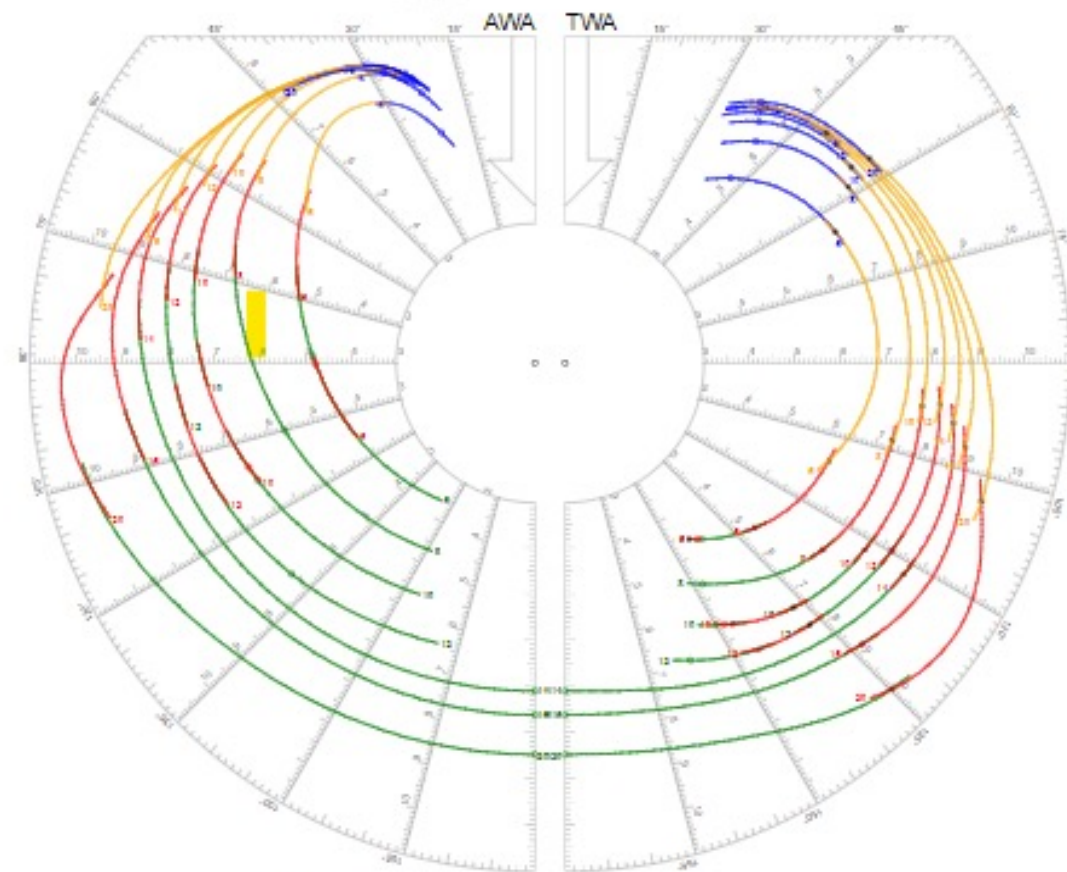
Target Speeds for PARAGON OF VIRTUE (US-12345)

www.orc.org
2020

TWS	AWA UP	BS UP	TWA DN	BS DN
6	22°	5,39	142°	4,85
8	23°	6,35	148°	5,64
10	23°	6,73	150°	6,56
12	24°	6,87	157°	7,00
14	25°	6,97	180°	7,10
16	26°	7,01	180°	7,62
20	28°	7,10	180°	8,48



Speed Guide



Name PARAGON OF VIRTUE
Sail # US-12345
Class TRIFF 40
Designer TRIPP
Builder

This page contains the polar curves for all wind speeds. The curves are trimmed to highlight the intersection points between different sails. The legend describes the type of sails, also transferring the sail area when applicable. Note that the headwell sail flying, as shown here, is a virtual sail representing the blended performance of individual sails of this kind.

- TWS: 6, 8, 10, 12, 14, 16, 20
- Headwell, 40.33 m²
 - Symmetric, 91.52 m²
 - Asymmetric on Centerline, 87.94 m²
 - Headwell sail flying



ORC certificate costs...2023?

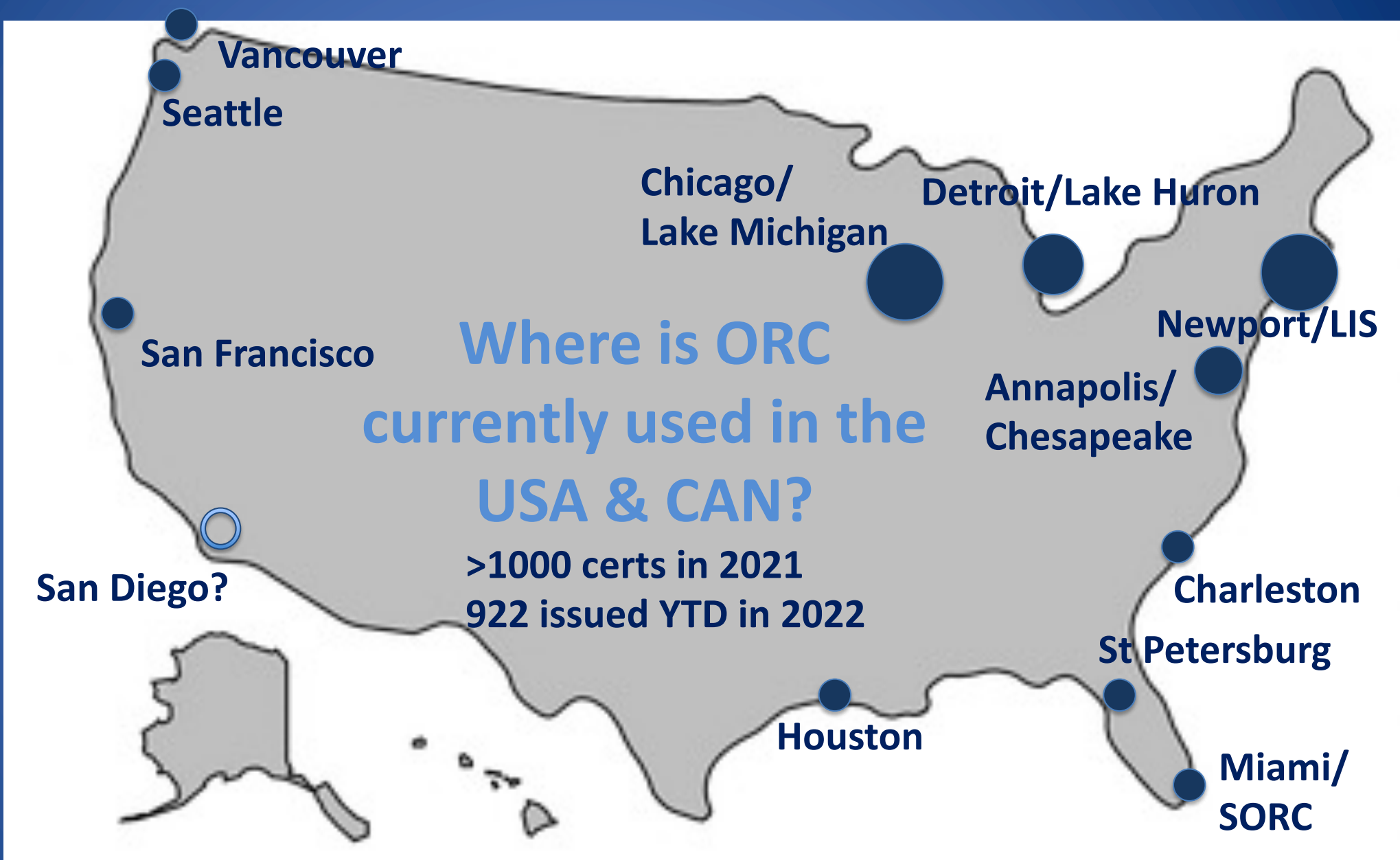
ORC 2022 Fee Schedule					
LOA	<29.99 ft	30-39.99 ft	40-49.99 ft	50-59.99 ft	>60 ft
ORCi New or Owner Transfer (per foot)	\$7.50	\$8.50	\$9.50	\$10.50	\$11.00
ORCi Renewal (per foot)	\$6.40	\$7.25	\$8.10	\$9.00	\$9.35
ORCi Amendment (per foot)	\$3.75	\$4.25	\$4.75	\$5.25	\$5.50
ORC Club New	\$3.00	\$4.00	\$5.00	\$6.00	\$7.00
ORC Club Renewal	\$2.55	\$3.40	\$4.25	\$5.10	\$5.95
ORC Club Amendment	\$1.50	\$2.00	\$2.50	\$3.00	\$3.50

***ORC policy: one paid cert + ORC DH and/or Non-spin cert free**



Overall goal is to present a system that is fair and gives all well-sailed boats a chance to win







Resources

Online at US Sailing – TBA, under development now

All applications need sail measurements from sailmaker – forms are at:

<https://cdn.ussailing.org/wp-content/uploads/2018/12/UMS-Mainsail-Certificate-2019.xls>

<https://cdn.ussailing.org/wp-content/uploads/2018/12/UMS-Headsail-Certificate-2019.xls>

<https://cdn.ussailing.org/wp-content/uploads/2018/12/UMS-Symmetric-Spinnaker-Certificate-2019.xls>

<https://cdn.ussailing.org/wp-content/uploads/2018/12/UMS-Asymmetric-Spinnaker-Certificate-2019.xls>

Questions and help:

Offshore office US Sailing: offshore@ussailing.org

Dobbs Davis, certified measurer and ORC Communications Director: dobbs.davis@orc.org

