

Stepien, Pfister & Wootton – Carbon access traits in macrophytes

**S4 Table. Mean pH\* and  $\delta^{13}\text{C}$  for 51 species from Phylum Ochrophyta.** Species data are compiled and averaged by family membership into 18 families. Mean species pH\* and  $\delta^{13}\text{C}$  are taken from a meta analysis of 76 studies [13]. † indicates data from this study contributed to the species mean. Families in which at least one member has a CCM were designated as having CCMs. Grey shading indicates families, species and data that are categorized as having CCMs based on the given metric. The cutoff for CCM presence in individual species was pH\* > 9.05 and/or  $\delta^{13}\text{C}$  > -30‰. Missing data are indicated by a dash (-). Ambiguous pH\* data (8.90-9.05) that lacked  $\delta^{13}\text{C}$  data were excluded from the dataset (line strikethrough).

family	CCM in at least one family member	mean family pH*	Total n	% species with CCM	% species without CCM	species	mean species pH*	mean species $\delta^{13}\text{C}$ (‰)	species CCM by pH* / $\delta^{13}\text{C}$
Alariaceae	yes	9.23	3	100%	0%	<i>Alaria marginata</i> †	9.42	-13.01	yes / yes
						<i>Alaria esculenta</i>	9.33	-18.16	yes / yes
						<i>Undaria pinnatifida</i>	9.09	-19.60	yes / yes
Chordaceae	yes	9.20	1	-	-	<i>Chorda filum</i>	9.20	-16.22	yes / yes
Chordariaceae	yes	9.68	2	100%	0%	<i>Leathesia difformis</i>	10.15	-14.16	yes / yes
						<i>Leathesia marina</i> †	9.21	-14.21	yes / yes
Desmarestiaceae	yes	8.98	1	-	-	<i>Desmarestia aculeata</i>	8.98	-22.58	no / yes
Dictyotaceae	yes	9.01	3	25%	75%	<i>Dictyopteris muelleri</i>	9.27	-19.08	yes / yes
						<del><i>Dictyota</i> sp. 2</del>	<del>8.99</del>	<del>-</del>	<del>no / -</del>
						<i>Zonaria angustata</i>	8.94	-21.81	no / yes
						<i>Zonaria turneriana</i>	8.82	-19.73	no / yes
Fucaceae	yes	9.77	7	100%	0%	<i>Fucus vesiculosus</i>	10.03	-16.77	yes / yes
						<i>Fucus gardneri</i> †	9.87	-14.37	yes / yes
						<i>Fucus spiralis</i>	9.84	-17.08	yes / yes
						<i>Ascophyllum nodosum</i>	9.72	-17.51	yes / yes
						<i>Fucus serratus</i>	9.70	-17.19	yes / yes
						<i>Pelvetia canaliculata</i>	9.70	-19.14	yes / yes
						<i>Pelvetiopsis limitata</i> †	9.55	-17.18	yes / yes
Himanthaliaceae	yes	9.89	1	-	-	<i>Himanthalia elongata</i>	9.89	-14.58	yes / yes
Hormosiraceae	yes	9.77	1	-	-	<i>Hormosira banksii</i>	9.77	-11.68	yes / yes
Laminariaceae	yes	9.14	6	100%	0%	<i>Saccharina latissima</i>	9.38	-17.28	yes / yes
						<i>Laminaria digitata</i>	9.21	-16.23	yes / yes
						<i>Macrocystis pyrifera</i>	9.14	-17.14	yes / yes

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S4 Table continued. Mean pH\* and  $\delta^{13}\text{C}$  for each of 51 species from Phylum Ochrophyta.

family	CCM in at least one family member	Mean family pH*	Total n	% species with CCM	% species without CCM	species	mean species pH*	mean species $\delta^{13}\text{C}$ (‰)	species CCM by pH* / $\delta^{13}\text{C}$
						<i>Laminaria hyperborea</i>	9.10	-18.21	yes / yes
						<i>Saccharina groenlandica</i> †	9.08	-23.11	yes / yes
						<i>Saccharina sessilis</i> †	8.96	-16.67	no / yes
Lessoniaceae	yes	8.97	1	-	-	<i>Ecklonia radiata</i>	8.97	-18.84	no / yes
Notheiaceae	yes	9.85	1	-	-	<i>notheia anomala</i>	9.85	-13.88	yes / yes
Ralfsiaceae	yes	9.48	1	-	-	<i>Analipus japonicus</i> †	9.48	-16.37	yes / yes
Sargassaceae	yes	9.27	12	100%	0%	<i>Sargassum muticum</i>	9.74	-19.67	yes / yes
						<i>Halidrys siliquosa</i>	9.50	-21.05	yes / yes
						<i>Sargassum lacerifolium</i>	9.38	-18.72	yes / yes
						<i>Sargassum henslowianum</i>	9.37	-	yes / -
						<i>Cystophora retroflexa</i>	9.23	-12.24	yes / yes
						<i>Landsburgia quercifolia</i>	9.20	-18.78	yes / yes
						<i>Carpophyllum flexuosum</i>	9.20	-15.90	yes / yes
						<i>Carpophyllum plumosum</i>	9.17	-	yes / -
						<i>Carpophyllum maschalocarpum</i>	9.15	-	yes / -
						<i>Carpoglossum confluens</i>	9.14	-	yes / -
						<i>Carpophyllum angustifolium</i>	9.14	-	yes / -
						<i>Sargassum heteromorphum</i>	9.08	-18.77	yes / yes
Scytosiphonaceae	yes	8.94	1	-	-	<i>Colpomenia sinuosa</i>	8.94	-13.26	no / yes
Seirococcaceae	yes	9.09	3	100%	0%	<i>Seirococcus axillaris</i>	9.19	-17.57	yes / yes
						<i>Phyllospora comosa</i>	9.09	-18.69	yes / yes
						<i>Marginariella boryana</i>	8.99	-18.07	no / yes
Sporochnaceae	yes	9.35	1	-	-	<i>Carpomitra costata</i>	9.35	-22.54	yes / yes
						<i>Sporochnus sp. 1</i>	8.90	-	no / -
Stypocaulaceae	yes	9.24	2	100%	0%	<i>Halopteris sp. 1</i>	9.25	-	yes / -
						<i>Halopteris paniculata</i>	9.23	-22.82	yes / yes
Xiphophoraceae	yes	9.39	2	100%	0%	<i>Xiphophora chondrophylla</i>	9.45	-14.79	yes / yes
						<i>Xiphophora gladiata</i>	9.34	-18.95	yes / yes