Supplementary Information 3

Table SI.3.1. Membership information for six trophic role groups derived from REGE analysis.

Food web name	Group ID	Group Member ID
Bar	Group 1	38, 38.1, 38.2, 37, 39, 40, 41
	Group 2	3, 9, 9.1, 7, 1, 1.1, 1.2
	Group 3	32, 20, 11, 8, 8.1, 8.2, 8.3, 18, 18.1, 8.4, 8.5, 8.6, 8.7, 8.8, 10, 8.9, 16, 6, 13, 8.1, 2, 2.1, 2.2, 30, 30.1, 28, 28.1, 30.2, 22, 33, 27, 35
	Group 4	29, 29.1, 34, 34.1, 31, 36
	Group 5	23, 21, 21.1, 21.2, 23.1, 21.3, 23.2, 23.3, 21.4, 17, 5, 15, 19, 25, 23.4, 23.5, 23.6, 24, 26
	Group 6	4, 4.1, 4.2, 14, 14.1, 14.2, 12, 12.1
Pws	Group 1	6, 6.1, 23, 5, 5.1, 14, 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9, 11, 8, 9, 12, 4, 10
	Group 2	29, 29.1, 29.2, 29.3, 29.4
	Group 3	18, 1, 2, 13, 13.1
	Group 4	44, 43, 44.1, 45, 45.1, 45.2, 45.3, 45.4, 46, 47, 48
	Group 5	33, 36, 33.1, 36.1, 33.2, 36.2, 20, 16, 20.1, 20.2, 7, 17, 15, 15.1, 15.2, 15.3, 3, 3.1, 3.2, 33.3, 36.3, 33.4, 36.4, 24, 24.1, 39, 39.1, 21, 33.5, 36.5, 39.2, 33.6, 36.6, 37
	Group 6	34, 35, 30, 27, 22, 25, 26, 31, 28, 28.1, 28.2, 41, 42, 34.1, 35.1, 34.2, 35.2, 34.3, 35.3, 34.4, 35.4, 41.1, 42.1, 41.2, 42.2, 41.3, 42.3, 41.4, 42.4, 41.5, 42.5, 38, 40, 38.1, 32, 19
Chs	Group 1	25, 25.1, 25.2, 25.3, 25.4, 25.5, 41
	Group 2	43, 42, 44, 45
	Group 3	18, 20, 22, 11, 12, 13, 13.1, 13.2, 30, 34, 35, 32, 38, 39, 40
	Group 4	36, 24, 24.1, 23, 24.2, 24.3, 24.4, 23.1, 24.5, 24.6, 24.7, 24.8, 4, 23.2, 23.3, 16, 17, 1, 2, 6, 7, 8, 21, 10, 21.1, 23.4, 15, 15.1, 15.2, 15.3, 15.4, 14, 27, 27.1, 31
	Group 5	28, 28.1, 28.2, 5, 3, 26, 37
	Group 6	29, 29.1, 29.2, 9, 19, 19.1, 33
Car	Group 1	14
	Group 2	70, 71
	Group 3	74, 83, 75, 54, 69, 82, 81, 55, 58, 44, 51, 65, 64, 63, 59, 61, 62, 57, 45, 66, 60, 79, 77, 53, 80, 76, 78, 67, 68, 42

	Group 4	38, 39, 41, 52, 48, 50, 49, 40, 23, 72, 24, 47, 43, 73, 56, 46
	Group 5	1, 2, 3, 4, 5, 6, 7, 8
	Group 6	11, 19, 15, 18, 20, 22, 21, 16, 29, 30, 32, 31, 17, 25, 26, 27, 28, 35, 33, 34, 37, 36, 13, 10, 12, 9
Gad	Group 1	70, 72, 76, 80, 83, 69, 79, 64, 89, 67, 77, 78
	Group 2	34, 37, 36, 35, 38, 39, 42, 46, 40, 45, 44, 43, 41
	Group 3	85, 74, 75, 68, 47, 52, 57, 58, 62, 61, 48, 63, 60, 55, 54, 53, 56, 59, 71, 66, 81, 82, 84, 86, 88, 65, 87, 1, 13, 33, 73
	Group 4	16, 15, 21, 31, 29, 26, 25, 28, 30, 24
	Group 5	95, 11, 96, 17, 93, 90
	Group 6	14, 12, 94, 51, 3, 2, 49, 50, 22, 91, 19, 5, 4, 23, 20, 6, 7, 10, 27, 8, 9, 32, 18, 92

Table SI.3.2. Membership information for six trophic role groups derived from TSM analysis.

Food web name	Group ID	Group Member ID
Bar	Group 1	32, 17, 19, 25, 26, 29, 29.1, 30, 30.1, 28, 28.1, 30.2, 31
	Group 2	20, 4, 4.1, 4.2, 11, 18, 18.1, 14, 14.1, 14.2, 5, 10, 15, 16, 13, 12, 12.1, 34, 34.1, 33, 38, 38.1, 38.2, 35, 36, 37, 39, 40, 41
	Group 3	3, 9, 9.1, 7, 1, 1.1, 1.2
	Group 4	23, 23.1, 23.2, 23.3, 23.4, 23.5, 23.6, 24
	Group 5	8, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 6, 8.1, 2, 2.1, 2.2
	Group 6	21, 21.1, 21.2, 21.3, 21.4, 22, 27
Pws	Group 1	44, 43, 44.1, 45, 6, 6.1, 23, 18, 5, 5.1, 1, 2, 29, 29.1, 29.2, 29.3, 29.4, 13, 13.1, 30, 20, 16, 27, 11, 20.1, 8, 20.2, 7, 17, 22, 25, 9, 12, 4, 15, 15.1, 10, 26, 31, 15.2, 15.3, 3, 3.1, 3.2, 28, 28.1, 28.2, 41, 24, 24.1, 41.1, 41.2, 41.3, 39, 39.1, 21, 41.4, 41.5, 38, 40, 38.1, 39.2, 32, 45.1, 45.2, 45.3, 45.4, 19, 37, 46, 47, 48
	Group 2	34, 35, 34.1, 35.1, 34.2, 35.2, 34.3, 35.3, 34.4, 35.4
	Group 3	33, 33.1, 33.2, 33.3, 33.4, 33.5, 33.6
	Group 4	36, 36.1, 36.2, 36.3, 36.4, 36.5, 36.6
	Group 5	14, 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9
	Group 6	42, 42.1, 42.2, 42.3, 42.4, 42.5
Chs	Group 1	43, 36, 28, 28.1, 28.2, 4, 5, 16, 17, 1, 2, 3, 6, 7, 18, 8, 10, 20, 22, 11, 12, 13, 13.1, 13.2, 14, 27, 26, 27.1, 30, 31, 34, 35, 32, 37, 38, 39, 40, 41, 42, 44, 45
	Group 2	29, 29.1, 29.2, 9, 19, 19.1, 33
	Group 3	24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8
	Group 4	25, 25.1, 25.2, 25.3, 25.4, 25.5
	Group 5	23, 23.1, 23.2, 23.3, 23.4
	Group 6	21, 21.1, 15, 15.1, 15.2, 15.3, 15.4
Car	Group 1	38, 39, 70, 71, 14, 41, 52, 48, 50, 49, 42, 40, 23, 72, 24, 47, 43, 73, 19, 56, 46, 32, 27, 28, 1, 2, 3, 4, 5, 6, 7, 8
	Group 2	11, 15, 18, 20, 16, 29, 30, 31, 17, 25, 26, 13, 10, 12, 9
	Group 3	74, 83, 75, 69, 81, 65, 64, 63, 59, 61, 66, 60, 77, 78, 67, 68
	Group 4	54, 82, 51, 79, 53, 80, 76
	Group 5	55, 58, 44, 62, 57, 45
	Group 6	22, 21, 35, 33, 34, 37, 36

Gad	Group 1	85, 74, 75, 68, 47, 52, 57, 58, 62, 61, 63, 60, 55, 54, 53, 56, 59, 71, 66, 81, 82, 84, 86, 88, 65, 87, 73
	Group 2	70, 72, 76, 80, 83, 69, 79, 64, 89, 67, 77, 78
	Group 3	16, 14, 21, 31, 29, 26, 25, 28, 30, 24
	Group 4	15, 95, 11, 12, 96, 94, 51, 2, 49, 50, 17, 22, 91, 19, 23, 20, 34, 93, 27, 32, 90, 48, 18, 92, 1, 13, 33
	Group 5	3, 5, 4, 6, 7, 10, 8, 9
	Group 6	37, 36, 35, 38, 39, 42, 46, 40, 45, 44, 43, 41

Table SI.3.3. Testing our null hypothesis of random species assemblage using various numbers of trophic role groups for Barents Sea food web.

Number of clusters	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
3	**1**	**65(3)**	**5.90**	**6.27**	**0.09**	**0.001**
	2	**7(0)**	**4.10**	**6.25**	**0.73**	**0.007**
	3	**7(4)**	**2.67**	**6.31**	**0.72**	**0.001**
4	1	32(2)	5.86	6.26	0.26	0.060
	2	**7(0)**	**4.10**	**6.26**	**0.76**	**0.004**
	3	33(1)	5.84	6.26	0.24	0.045
	4	**7(4)**	**2.67**	**6.29**	**0.74**	**0.001**
5	1	32(2)	5.86	6.28	0.24	0.045
	2	**7(0)**	**4.10**	**6.32**	**0.71**	**0.001**
	3	**27(0)**	**5.20**	**6.26**	**0.28**	**0.001**
	4	6(1)	4.80	6.27	0.78	0.035
	5	**7(4)**	**2.67**	**6.24**	**0.78**	**0.001**
6	1	32(2)	5.86	6.26	0.25	0.061
	2	**7(0)**	**4.10**	**6.28**	**0.76**	**0.005**
	3	8(0)	5.54	6.25	0.65	0.140
	4	**19(0)**	**4.58**	**6.27**	**0.38**	**0.001**
	5	6(1)	4.80	6.26	0.78	0.045
	6	**7(4)**	**2.67**	**6.31**	**0.72**	**0.001**
7	**1**	**10(2)**	**4.04**	**6.28**	**0.59**	**0.001**
	2	**22(0)**	**5.20**	**6.28**	**0.35**	**0.003**
	3	**7(0)**	**4.10**	**6.28**	**0.74**	**0.004**
	4	8(0)	5.54	6.30	0.67	0.139
	5	**19(0)**	**4.58**	**6.26**	**0.37**	**0.001**
	6	6(1)	4.80	6.27	0.82	0.044
	7	**7(4)**	**2.67**	**6.23**	**0.73**	**0.001**
8	**1**	**10(2)**	**4.04**	**6.30**	**0.57**	**0.001**
	2	**22(0)**	**5.20**	**6.26**	**0.33**	**0.002**
	3	**7(0)**	**4.10**	**6.28**	**0.72**	**0.003**
	4	6(0)	5.53	6.27	0.83	0.179
	5	**19(0)**	**4.58**	**6.26**	**0.37**	**0.001**
	6	**2(0)**	**2.00**	**6.31**	**1.72**	**0.013**
	7	6(1)	4.80	6.28	0.81	0.044
	8	**7(4)**	**2.67**	**6.28**	**0.78**	**0.001**
9	**1**	**10(2)**	**4.04**	**6.29**	**0.58**	**0.002**

	2	**22(0)**	**5.20**	**6.27**	**0.32**	**0.002**
	3	**7(0)**	**4.10**	**6.21**	**0.73**	**0.003**
	4	6(0)	5.53	6.31	0.82	0.158
	5	**19(0)**	**4.58**	**6.27**	**0.37**	**0.001**
	6	**2(0)**	**2.00**	**6.29**	**1.80**	**0.014**
	7	6(1)	4.80	6.21	0.81	0.049
	8	**3(0)**	**2.67**	**6.28**	**1.37**	**0.009**
	9	4(4)	0.00	NA	NA	NA
10	**1**	**10(2)**	**4.04**	**6.26**	**0.59**	**0.001**
	2	**22(0)**	**5.20**	**6.26**	**0.34**	**0.001**
	3	**7(0)**	**4.10**	**6.30**	**0.74**	**0.004**
	4	6(0)	5.53	6.27	0.83	0.171
	5	**17(0)**	**4.49**	**6.27**	**0.41**	**0.001**
	6	2(0)	3.00	6.30	1.83	0.052
	7	**2(0)**	**2.00**	**6.27**	**1.75**	**0.020**
	8	6(1)	4.80	6.26	0.81	0.054
	9	**3(0)**	**2.67**	**6.30**	**1.43**	**0.011**
	10	4(4)	0.00	NA	NA	NA

Table SI.3.4. Testing our null hypothesis of random species assemblage using various numbers of trophic role groups for Prince William Sound food web.

Number of clusters	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
3	**1**	**11(3)**	**3.46**	**6.57**	**0.54**	**0.001**
	2	**70(2)**	**6.16**	**6.56**	**0.13**	**0.003**
	3	**31(0)**	**5.69**	**6.56**	**0.28**	**0.003**
4	**1**	**11(3)**	**3.46**	**6.56**	**0.53**	**0.001**
	2	36(1)	6.38	6.56	0.25	0.245
	3	**34(1)**	**5.62**	**6.56**	**0.26**	**0.001**
	4	**31(0)**	**5.69**	**6.57**	**0.28**	**0.002**
5	**1**	**11(3)**	**3.46**	**6.59**	**0.55**	**0.001**
	2	36(1)	6.38	6.56	0.24	0.225
	3	**34(1)**	**5.62**	**6.55**	**0.26**	**0.002**
	4	21(0)	5.98	6.56	0.36	0.067
	5	**10(0)**	**4.27**	**6.58**	**0.56**	**0.001**
6	**1**	**11(3)**	**3.46**	**6.57**	**0.54**	**0.001**
	2	36(1)	6.38	6.55	0.24	0.234
	3	**34(1)**	**5.62**	**6.56**	**0.26**	**0.002**
	4	21(0)	5.98	6.57	0.37	0.067
	5	**5(0)**	**3.60**	**6.61**	**0.90**	**0.002**
	6	**5(0)**	**2.60**	**6.55**	**0.88**	**0.001**
7	**1**	**11(3)**	**3.46**	**6.58**	**0.51**	**0.001**
	2	24(1)	6.06	6.59	0.33	0.052
	3	**34(1)**	**5.62**	**6.55**	**0.24**	**0.001**
	4	21(0)	5.98	6.54	0.35	0.062
	5	**5(0)**	**3.60**	**6.57**	**0.91**	**0.003**
	6	**5(0)**	**2.60**	**6.59**	**0.85**	**0.001**
	7	**12(0)**	**5.33**	**6.54**	**0.53**	**0.012**
8	**1**	**11(3)**	**3.46**	**6.56**	**0.54**	**0.001**
	2	24(1)	6.06	6.57	0.34	0.061
	3	**24(1)**	**5.73**	**6.57**	**0.34**	**0.010**
	4	**10(0)**	**4.73**	**6.57**	**0.57**	**0.002**
	5	21(0)	5.98	6.56	0.35	0.062
	6	**5(0)**	**3.60**	**6.59**	**0.88**	**0.001**
	7	**5(0)**	**2.60**	**6.51**	**0.93**	**0.001**
	8	**12(0)**	**5.33**	**6.55**	**0.50**	**0.008**
9	**1**	**11(3)**	**3.46**	**6.59**	**0.55**	**0.001**

	2	**21(1)**	**5.77**	**6.57**	**0.37**	**0.021**
	3	**24(1)**	**5.73**	**6.58**	**0.34**	**0.008**
	4	**10(0)**	**4.73**	**6.54**	**0.59**	**0.003**
	5	21(0)	5.98	6.55	0.37	0.068
	6	**5(0)**	**3.60**	**6.58**	**0.89**	**0.001**
	7	**5(0)**	**2.60**	**6.54**	**0.89**	**0.001**
	8	**3(0)**	**2.67**	**6.58**	**1.28**	**0.002**
	9	**12(0)**	**5.33**	**6.56**	**0.50**	**0.010**
10	**1**	**2(0)**	**2.00**	**6.47**	**1.75**	**0.012**
	2	**9(3)**	**3.67**	**6.56**	**0.62**	**0.001**
	3	**21(1)**	**5.77**	**6.56**	**0.36**	**0.018**
	4	**24(1)**	**5.73**	**6.57**	**0.33**	**0.009**
	5	**10(0)**	**4.73**	**6.57**	**0.57**	**0.001**
	6	21(0)	5.98	6.56	0.36	0.052
	7	**5(0)**	**3.60**	**6.52**	**0.91**	**0.001**
	8	**5(0)**	**2.60**	**6.57**	**0.91**	**0.001**
	9	**3(0)**	**2.67**	**6.60**	**1.27**	**0.003**
	10	**12(0)**	**5.33**	**6.57**	**0.51**	**0.010**

Table SI.3.5. Testing our null hypothesis of random species assemblage using various numbers of trophic role groups for Chesapeake Bay food web.

Number of clusters	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
3	1	26(7)	5.22	5.09	0.26	0.309
	2	**35(0)**	**4.26**	**5.09**	**0.20**	**0.001**
	3	14(0)	5.68	5.07	0.39	0.054
4	1	19(6)	5.05	5.10	0.33	0.443
	2	**35(0)**	**4.26**	**5.08**	**0.20**	**0.001**
	3	14(0)	5.68	5.09	0.40	0.066
	4	7(1)	4.00	5.07	0.63	0.058
5	1	4(3)	0.00	NA	NA	NA
	2	**35(0)**	**4.26**	**5.08**	**0.19**	**0.001**
	3	14(0)	5.68	5.09	0.41	0.075
	4	7(1)	4.00	5.09	0.64	0.047
	5	15(3)	4.89	5.09	0.37	0.295
6	1	4(3)	0.00	NA	NA	NA
	2	**35(0)**	**4.26**	**5.09**	**0.20**	**0.001**
	3	7(0)	4.67	5.08	0.62	0.250
	4	**7(0)**	**6.48**	**5.08**	**0.62**	**0.009**
	5	7(1)	4.00	5.12	0.62	0.042
	6	15(3)	4.89	5.07	0.39	0.320
7	1	4(3)	0.00	NA	NA	NA
	2	8(0)	4.32	5.08	0.59	0.092
	3	7(0)	4.67	5.08	0.62	0.254
	4	**7(0)**	**6.48**	**5.09**	**0.60**	**0.007**
	5	**27(0)**	**3.99**	**5.08**	**0.25**	**0.001**
	6	7(1)	4.00	5.11	0.63	0.042
	7	15(3)	4.89	5.08	0.39	0.314
8	1	4(3)	0.00	NA	NA	NA
	2	8(0)	4.32	5.10	0.56	0.090
	3	7(0)	4.67	5.13	0.62	0.236
	4	**7(0)**	**6.48**	**5.07**	**0.64**	**0.006**
	5	**27(0)**	**3.99**	**5.08**	**0.24**	**0.001**
	6	7(1)	4.00	5.11	0.62	0.038
	7	12(1)	4.84	5.06	0.42	0.319
	8	3(2)	0.00	NA	NA	NA
9	1	4(3)	0.00	NA	NA	NA

	2	8(0)	4.32	5.09	0.57	0.093
	3	7(0)	4.67	5.15	0.63	0.217
	4	**7(0)**	**6.48**	**5.10**	**0.62**	**0.014**
	5	**17(0)**	**3.93**	**5.09**	**0.34**	**0.001**
	6	7(1)	4.00	5.09	0.60	0.040
	7	**10(0)**	**3.84**	**5.09**	**0.50**	**0.008**
	8	12(1)	4.84	5.06	0.44	0.309
	9	3(2)	0.00	NA	NA	NA
10	1	4(3)	0.00	NA	NA	NA
	2	8(0)	4.32	5.07	0.57	0.096
	3	7(0)	4.67	5.07	0.60	0.243
	4	**7(0)**	**6.48**	**5.09**	**0.64**	**0.011**
	5	**17(0)**	**3.93**	**5.08**	**0.34**	**0.001**
	6	7(1)	4.00	5.10	0.63	0.047
	7	**10(0)**	**3.84**	**5.10**	**0.50**	**0.005**
	8	**8(0)**	**3.29**	**5.10**	**0.57**	**0.002**
	9	3(2)	0.00	NA	NA	NA
	10	**4(1)**	**2.00**	**5.12**	**0.90**	**0.001**

Table SI.3.6. Testing our null hypothesis of random species assemblage using various numbers of trophic role groups for Carpinteria Salt Marsh food web.

Number of clusters	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
3	1	16(0)	6.09	6.72	0.40	0.064
	2	**34(8)**	**5.55**	**6.74**	**0.22**	**0.001**
	3	**33(0)**	**5.41**	**6.73**	**0.22**	**0.001**
4	1	16(0)	6.09	6.73	0.40	0.058
	2	**26(0)**	**5.55**	**6.72**	**0.28**	**0.001**
	3	**33(0)**	**5.41**	**6.73**	**0.23**	**0.001**
	4	8(8)	0.00	NA	NA	NA
5	1	16(0)	6.09	6.74	0.39	0.046
	2	**26(0)**	**5.55**	**6.73**	**0.27**	**0.001**
	3	**32(0)**	**5.45**	**6.74**	**0.23**	**0.001**
	4	1(0)	0.00	NA	NA	NA
	5	8(8)	0.00	NA	NA	NA
6	1	16(0)	6.09	6.73	0.39	0.051
	2	**26(0)**	**5.55**	**6.73**	**0.28**	**0.001**
	3	**30(0)**	**5.39**	**6.73**	**0.25**	**0.001**
	4	**2(0)**	**2.00**	**6.69**	**1.89**	**0.010**
	5	1(0)	0.00	NA	NA	NA
	6	8(8)	0.00	NA	NA	NA
7	1	16(0)	6.09	6.75	0.39	0.055
	2	**24(0)**	**5.66**	**6.71**	**0.30**	**0.001**
	3	**30(0)**	**5.39**	**6.73**	**0.25**	**0.001**
	4	**2(0)**	**2.00**	**6.68**	**1.94**	**0.016**
	5	1(0)	0.00	NA	NA	NA
	6	2(0)	5.00	6.76	1.93	0.173
	7	8(8)	0.00	NA	NA	NA
8	1	9(0)	5.50	6.74	0.62	0.029
	2	**24(0)**	**5.66**	**6.73**	**0.29**	**0.002**
	3	**30(0)**	**5.39**	**6.72**	**0.24**	**0.001**
	4	**2(0)**	**2.00**	**6.59**	**1.98**	**0.014**
	5	1(0)	0.00	NA	NA	NA
	6	7(0)	5.43	6.77	0.72	0.047
	7	2(0)	5.00	6.75	1.91	0.189
	8	8(8)	0.00	NA	NA	NA
9	1	9(0)	5.50	6.75	0.58	0.029

	2	**24(0)**	**5.66**	**6.72**	**0.30**	**0.001**
	3	**30(0)**	**5.39**	**6.73**	**0.25**	**0.001**
	4	**2(0)**	**2.00**	**6.76**	**2.00**	**0.017**
	5	1(0)	0.00	NA	NA	NA
	6	7(0)	5.43	6.69	0.71	0.053
	7	2(0)	5.00	6.71	1.91	0.177
	8	3(3)	0.00	NA	NA	NA
	9	5(5)	0.00	NA	NA	NA
10	1	5(0)	5.40	6.68	0.95	0.099
	2	**24(0)**	**5.66**	**6.74**	**0.30**	**0.001**
	3	**30(0)**	**5.39**	**6.73**	**0.25**	**0.001**
	4	4(0)	4.83	6.72	1.13	0.059
	5	**2(0)**	**2.00**	**6.78**	**1.97**	**0.012**
	6	1(0)	0.00	NA	NA	NA
	7	7(0)	5.43	6.72	0.71	0.050
	8	2(0)	5.00	6.71	1.92	0.187
	9	3(3)	0.00	NA	NA	NA
	10	5(5)	0.00	NA	NA	NA

Table SI.3.7. Testing our null hypothesis of random species assemblage using various numbers of trophic role groups for Grande de Gredos food web.

Number of clusters	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
3	**1**	**44(5)**	**6.25**	**7.39**	**0.21**	**0.001**
	2	**12(3)**	**4.61**	**7.38**	**0.60**	**0.001**
	3	**40(2)**	**5.39**	**7.39**	**0.23**	**0.001**
4	**1**	**44(5)**	**6.25**	**7.39**	**0.22**	**0.001**
	2	**12(3)**	**4.61**	**7.40**	**0.57**	**0.001**
	3	**10(0)**	**4.24**	**7.40**	**0.64**	**0.001**
	4	**30(2)**	**5.57**	**7.38**	**0.30**	**0.001**
5	**1**	**44(5)**	**6.25**	**7.38**	**0.21**	**0.001**
	2	**12(3)**	**4.61**	**7.36**	**0.56**	**0.001**
	3	**10(0)**	**4.24**	**7.40**	**0.65**	**0.002**
	4	**24(2)**	**5.48**	**7.41**	**0.35**	**0.001**
	5	**6(0)**	**5.13**	**7.41**	**1.00**	**0.016**
6	**1**	**31(5)**	**6.30**	**7.39**	**0.29**	**0.001**
	2	**12(3)**	**4.61**	**7.39**	**0.57**	**0.001**
	3	**10(0)**	**4.24**	**7.38**	**0.67**	**0.001**
	4	**24(2)**	**5.48**	**7.40**	**0.35**	**0.001**
	5	**6(0)**	**5.13**	**7.41**	**0.99**	**0.019**
	6	**13(0)**	**4.77**	**7.39**	**0.55**	**0.001**
7	**1**	**31(5)**	**6.30**	**7.40**	**0.30**	**0.001**
	2	**12(3)**	**4.61**	**7.38**	**0.61**	**0.001**
	3	**10(0)**	**4.24**	**7.36**	**0.66**	**0.001**
	4	**12(2)**	**5.56**	**7.40**	**0.57**	**0.002**
	5	**6(0)**	**5.13**	**7.38**	**0.97**	**0.015**
	6	**12(0)**	**5.24**	**7.41**	**0.57**	**0.002**
	7	**13(0)**	**4.77**	**7.39**	**0.55**	**0.001**
8	**1**	**31(5)**	**6.30**	**7.38**	**0.27**	**0.001**
	2	**12(3)**	**4.61**	**7.39**	**0.55**	**0.001**
	3	**10(0)**	**4.24**	**7.42**	**0.65**	**0.001**
	4	**12(2)**	**5.56**	**7.42**	**0.57**	**0.001**
	5	**6(0)**	**5.13**	**7.41**	**0.99**	**0.018**
	6	3(0)	3.33	7.35	1.93	0.036
	7	**9(0)**	**5.06**	**7.39**	**0.70**	**0.002**
	8	**13(0)**	**4.77**	**7.38**	**0.53**	**0.001**
9	**1**	**28(3)**	**6.40**	**7.39**	**0.31**	**0.004**

	2	**12(3)**	**4.61**	**7.41**	**0.56**	**0.001**
	3	**10(0)**	**4.24**	**7.44**	**0.63**	**0.001**
	4	**12(2)**	**5.56**	**7.37**	**0.59**	**0.004**
	5	6(0)	5.13	7.35	1.03	0.028
	6	3(0)	3.33	7.37	1.88	0.026
	7	**9(0)**	**5.06**	**7.40**	**0.71**	**0.001**
	8	**13(0)**	**4.77**	**7.39**	**0.52**	**0.001**
	9	3(2)	0.00	NA	NA	NA
10	**1**	**28(3)**	**6.40**	**7.39**	**0.32**	**0.001**
	2	**12(3)**	**4.61**	**7.38**	**0.59**	**0.001**
	3	**10(0)**	**4.24**	**7.39**	**0.65**	**0.001**
	4	**12(2)**	**5.56**	**7.37**	**0.60**	**0.009**
	5	4(0)	5.00	7.32	1.45	0.066
	6	2(0)	7.00	7.48	2.45	0.433
	7	3(0)	3.33	7.44	1.93	0.026
	8	**9(0)**	**5.06**	**7.44**	**0.70**	**0.001**
	9	**13(0)**	**4.77**	**7.42**	**0.57**	**0.001**
	10	3(2)	0.00	NA	NA	NA

Table SI.3.8. Testing our null hypothesis of random species assemblage with phylogenetic constraint (REGE-based). Significant results are in bold font. Random groups were generated with *w*=1 (see main text).

Food webs	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
Bar	**1**	**7(4)**	**2.67**	**6.55**	**1.11**	**0.001**
	2	**7(0)**	**4.10**	**6.49**	**0.61**	**0.001**
	3	32(2)	5.86	6.21	0.25	0.087
	4	6(1)	4.80	6.48	0.78	0.028
	5	**19(0)**	**4.58**	**6.04**	**0.38**	**0.001**
	6	8(0)	5.54	6.25	0.62	0.134
Pws	1	21(0)	5.98	6.59	0.33	0.031
	2	**5(0)**	**2.6**	**6.54**	**0.80**	**0.001**
	3	**5(0)**	**3.6**	**6.46**	**0.85**	**0.002**
	4	**11(3)**	**3.46**	**6.50**	**0.61**	**0.001**
	5	**34(1)**	**5.62**	**6.46**	**0.25**	**0.001**
	6	36(1)	6.38	6.60	0.24	0.174
Chs	1	7(1)	4	4.99	0.65	0.071
	2	4(3)	0	NA	NA	NA
	3	15(3)	4.89	5.16	0.36	0.228
	4	**35(0)**	**4.26**	**4.98**	**0.19**	**0.001**
	5	7(0)	4.67	5.11	0.55	0.205
	6	**7(0)**	**6.48**	**5.39**	**0.56**	**0.022**
Car	1	1(0)	0	NA	NA	NA
	2	**2(0)**	**2**	**6.55**	**1.93**	**0.022**
	3	**30(0)**	**5.39**	**6.59**	**0.23**	**0.001**
	4	16(0)	6.09	6.68	0.36	0.053
	5	8(8)	0	NA	NA	NA
	6	**26(0)**	**5.55**	**6.75**	**0.25**	**0.001**
Gad	**1**	**12(3)**	**4.61**	**7.13**	**0.67**	**0.001**
	2	**13(0)**	**4.77**	**7.28**	**0.51**	**0.001**
	3	**31(5)**	**6.3**	**7.36**	**0.31**	**0.001**
	4	**10(0)**	**4.24**	**7.13**	**0.70**	**0.001**
	5	**6(0)**	**5.13**	**7.16**	**0.90**	**0.016**
	6	**24(2)**	**5.48**	**7.19**	**0.39**	**0.001**

Table SI.3.9. Testing our null hypothesis of random species assemblage with phylogenetic constraint (REGE-based). Significant results are in bold font. Random groups were generated with *w*=2 (see main text).

Food webs	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
Bar	1	7(4)	2.67	6.28	1.31	0.028
	2	**7(0)**	**4.10**	**6.22**	**0.66**	**0.002**
	3	32(2)	5.86	6.09	0.22	0.147
	4	6(1)	4.80	6.20	0.77	0.064
	5	**19(0)**	**4.58**	**5.53**	**0.39**	**0.006**
	6	8(0)	5.54	6.09	0.56	0.161
Pws	1	21(0)	5.98	6.49	0.31	0.048
	2	**5(0)**	**2.6**	**5.99**	**0.97**	**0.001**
	3	**5(0)**	**3.6**	**5.93**	**0.86**	**0.004**
	4	**11(3)**	**3.46**	**6.12**	**0.70**	**0.001**
	5	**34(1)**	**5.62**	**6.17**	**0.24**	**0.010**
	6	36(1)	6.38	6.62	0.23	0.156
Chs	1	7(1)	4	4.74	0.59	0.110
	2	4(3)	0	NA	NA	NA
	3	15(3)	4.89	5.18	0.32	0.184
	4	**35(0)**	**4.26**	**4.78**	**0.18**	**0.001**
	5	7(0)	4.67	5.04	0.47	0.204
	6	7(0)	6.48	5.88	0.50	0.101
Car	1	1(0)	0	NA	NA	NA
	2	2(0)	2	5.52	2.33	0.105
	3	**30(0)**	**5.39**	**6.24**	**0.26**	**0.001**
	4	16(0)	6.09	6.50	0.34	0.130
	5	8(8)	0	NA	NA	NA
	6	**26(0)**	**5.55**	**6.44**	**0.27**	**0.001**
Gad	**1**	**12(3)**	**4.61**	**6.43**	**0.73**	**0.006**
	2	**13(0)**	**4.77**	**6.55**	**0.62**	**0.003**
	3	**31(5)**	**6.3**	**7.01**	**0.33**	**0.014**
	4	**10(0)**	**4.24**	**6.10**	**0.88**	**0.020**
	5	**6(0)**	**5.13**	6.60	0.90	0.055
	6	**24(2)**	**5.48**	**6.57**	**0.45**	**0.013**

Table SI.3.10. Testing our null hypothesis of random species assemblage with phylogenetic constraint (REGE-based). Significant results are in bold font. Random groups were generated with *w*=3 (see main text).

Food webs	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
Bar	1	7(4)	2.67	4.91	1.65	0.156
	2	7(0)	4.10	5.04	0.71	0.104
	3	32(2)	5.86	5.95	0.16	0.302
	4	6(1)	4.80	5.46	0.70	0.235
	5	19(0)	4.58	4.98	0.31	0.086
	6	8(0)	5.54	5.78	0.40	0.275
Pws	1	21(0)	5.98	6.21	0.23	0.160
	2	5(0)	2.6	4.29	1.17	0.096
	3	5(0)	3.6	4.80	0.84	0.062
	4	**11(3)**	**3.46**	**5.01**	**0.72**	**0.016**
	5	34(1)	5.62	5.86	0.18	0.085
	6	36(1)	6.38	6.50	0.17	0.241
Chs	1	7(1)	4	4.37	0.50	0.252
	2	4(3)	0	NA	NA	NA
	3	15(3)	4.89	5.08	0.25	0.215
	4	35(0)	4.26	4.50	0.14	0.039
	5	7(0)	4.67	4.85	0.34	0.307
	6	7(0)	6.48	6.25	0.32	0.244
Car	1	1(0)	0	NA	NA	NA
	2	2(0)	2	3.62	2.26	0.305
	3	**30(0)**	**5.39**	**5.74**	**0.20**	**0.025**
	4	16(0)	6.09	6.27	0.27	0.252
	5	8(8)	0	NA	NA	NA
	6	26(0)	5.55	5.92	0.23	0.038
Gad	1	12(3)	4.61	5.46	0.61	0.078
	2	13(0)	4.77	5.54	0.52	0.047
	3	31(5)	6.3	6.60	0.27	0.152
	4	10(0)	4.24	4.95	0.69	0.146
	5	6(0)	5.13	5.79	0.72	0.176
	6	24(2)	5.48	5.91	0.36	0.124

Table SI.3.11. Testing our null hypothesis of random species assemblage with phylogenetic constraint (REGE-based). Significant results are in bold font. Random groups were generated with w=4 (see main text).

Food webs	Cluster k	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
Bar	1	7(4)	2.67	4.18	1.47	0.231
	2	7(0)	4.10	4.32	0.42	0.369
	3	32(2)	5.86	5.88	0.09	0.429
	4	6(1)	4.80	5.00	0.45	0.413
	5	19(0)	4.58	4.67	0.16	0.352
	6	8(0)	5.54	5.60	0.19	0.427
Pws	1	21(0)	5.98	6.04	0.13	0.356
	2	5(0)	2.6	3.03	0.77	0.352
	3	5(0)	3.6	3.94	0.52	0.300
	4	11(3)	3.46	4.22	0.62	0.137
	5	34(1)	5.62	5.69	0.11	0.268
	6	36(1)	6.38	6.42	0.10	0.354
Chs	1	7(1)	4	4.13	0.29	0.390
	2	4(3)	0	NA	NA	NA
	3	15(3)	4.89	4.96	0.16	0.343
	4	35(0)	4.26	4.33	0.09	0.187
	5	7(0)	4.67	4.73	0.20	0.422
	6	7(0)	6.48	6.41	0.16	0.391
Car	1	1(0)	0	NA	NA	NA
	2	2(0)	2	2.37	1.22	0.450
	3	30(0)	5.39	5.48	0.12	0.232
	4	16(0)	6.09	6.14	0.16	0.407
	5	8(8)	0	NA	NA	NA
	6	26(0)	5.55	5.64	0.14	0.296
Gad	1	12(3)	4.61	4.94	0.43	0.263
	2	13(0)	4.77	4.96	0.29	0.291
	3	31(5)	6.3	6.40	0.16	0.357
	4	10(0)	4.24	4.44	0.40	0.344
	5	6(0)	5.13	5.31	0.40	0.381
	6	24(2)	5.48	5.59	0.20	0.353

Table SI.3.12. Testing our null hypothesis of random species assemblage with phylogenetic constraint (TSM-based). Significant results are in bold font. Random groups were generated with *w*=1 (see main text).

Food webs	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
Bar	1	13(0)	5.64	6.34	0.43	0.053
	2	29(6)	6.61	6.31	0.30	0.147
	3	**7(0)**	**4.10**	**6.49**	**0.61**	**0.001**
	4	**8(0)**	**4.32**	**6.04**	**0.66**	**0.009**
	5	**15(0)**	**5.09**	**6.10**	**0.44**	**0.018**
	6	7(1)	5.60	6.17	0.71	0.203
Pws	1	72(5)	6.61	6.57	0.13	0.397
	2	**10(0)**	**3.38**	**6.47**	**0.54**	**0.001**
	3	**7(0)**	**3.81**	**6.30**	**0.70**	**0.001**
	4	**7(0)**	**3.81**	**6.27**	**0.74**	**0.001**
	5	**10(0)**	**4.09**	**6.65**	**0.53**	**0.001**
	6	6(0)	5.87	6.68	0.75	0.135
Chs	1	41(7)	4.91	5.08	0.18	0.176
	2	**7(0)**	**6.48**	**5.36**	**0.58**	**0.023**
	3	9(0)	4.11	5.05	0.50	0.033
	4	6(0)	4.00	4.96	0.63	0.066
	5	**5(0)**	**2.40**	**4.89**	**0.74**	**0.001**
	6	7(0)	3.90	5.02	0.57	0.033
Car	1	32(8)	6.57	6.70	0.26	0.292
	2	**15(0)**	**5.10**	**6.71**	**0.38**	**0.001**
	3	**16(0)**	**5.29**	**6.60**	**0.40**	**0.003**
	4	**7(0)**	**4.76**	**6.59**	**0.67**	**0.004**
	5	**6(0)**	**4.00**	**6.57**	**0.77**	**0.001**
	6	**7(0)**	**4.95**	**6.77**	**0.66**	**0.009**
Gad	**1**	**27(2)**	**6.40**	**7.36**	**0.33**	**0.002**
	2	**12(3)**	**4.61**	**7.11**	**0.68**	**0.001**
	3	**10(0)**	**4.24**	**7.08**	**0.75**	**0.001**
	4	**27(5)**	**5.82**	**7.28**	**0.38**	**0.001**
	5	**8(0)**	**4.71**	**7.09**	**0.85**	**0.009**
	6	**12(0)**	**3.92**	**7.21**	**0.57**	**0.001**

Table SI.3.13. Testing our null hypothesis of random species assemblage with phylogenetic constraint (TSM-based). Significant results are in bold font. Random groups were generated with *w*=2 (see main text).

Food webs	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
Bar	1	13(0)	5.64	6.15	0.34	0.069
	2	29(6)	6.61	6.44	0.27	0.276
	3	**7(0)**	**4.10**	**6.21**	**0.65**	**0.002**
	4	8(0)	4.32	5.53	0.67	0.034
	5	15(0)	5.09	5.78	0.41	0.043
	6	7(1)	5.60	5.94	0.71	0.302
Pws	1	72(5)	6.61	6.58	0.12	0.423
	2	**10(0)**	**3.38**	**5.79**	**0.66**	**0.001**
	3	**7(0)**	**3.81**	**5.52**	**0.75**	**0.010**
	4	**7(0)**	**3.81**	**5.57**	**0.78**	**0.010**
	5	**10(0)**	**4.09**	**6.28**	**0.56**	**0.001**
	6	6(0)	5.87	6.68	0.73	0.139
Chs	1	41(7)	4.91	5.02	0.16	0.238
	2	7(0)	6.48	5.89	0.50	0.105
	3	9(0)	4.11	4.91	0.48	0.049
	4	6(0)	4.00	4.77	0.64	0.124
	5	**5(0)**	**2.40**	**4.38**	**0.78**	**0.003**
	6	7(0)	3.90	4.84	0.54	0.040
Car	1	32(8)	6.57	6.63	0.25	0.407
	2	**15(0)**	**5.10**	**6.30**	**0.43**	**0.002**
	3	**16(0)**	**5.29**	**6.21**	**0.41**	**0.010**
	4	**7(0)**	**4.76**	**6.16**	**0.72**	**0.023**
	5	**6(0)**	**4.00**	**5.95**	**0.88**	**0.009**
	6	**7(0)**	**4.95**	**6.44**	**0.70**	**0.017**
Gad	1	27(2)	6.40	7.04	0.33	0.032
	2	**12(3)**	**4.61**	**6.36**	**0.72**	**0.008**
	3	**10(0)**	**4.24**	**6.04**	**0.90**	**0.025**
	4	**27(5)**	**5.82**	**6.82**	**0.40**	**0.008**
	5	**8(0)**	**4.71**	6.27	1.01	0.070
	6	**12(0)**	**3.92**	**6.29**	**0.70**	**0.001**

Table SI.3.14. Testing our null hypothesis of random species assemblage with phylogenetic constraint (TSM-based). Significant results are in bold font. Random groups were generated with *w*=3 (see main text).

Food webs	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
Bar	1	13(0)	5.64	5.84	0.25	0.224
	2	29(6)	6.61	6.56	0.18	0.395
	3	7(0)	4.10	5.02	0.71	0.108
	4	8(0)	4.32	4.81	0.51	0.175
	5	15(0)	5.09	5.35	0.30	0.203
	6	7(1)	5.60	5.73	0.49	0.384
Pws	1	72(5)	6.61	6.59	0.09	0.447
	2	**10(0)**	**3.38**	**4.52**	**0.65**	**0.024**
	3	7(0)	3.81	4.65	0.69	0.117
	4	7(0)	3.81	4.58	0.67	0.136
	5	10(0)	4.09	5.09	0.62	0.057
	6	6(0)	5.87	6.24	0.55	0.280
Chs	1	41(7)	4.91	4.95	0.13	0.376
	2	7(0)	6.48	6.27	0.32	0.258
	3	9(0)	4.11	4.55	0.40	0.125
	4	6(0)	4.00	4.35	0.47	0.255
	5	5(0)	2.40	3.54	0.72	0.039
	6	7(0)	3.90	4.38	0.43	0.141
Car	1	32(8)	6.57	6.59	0.19	0.438
	2	15(0)	5.10	5.62	0.36	0.055
	3	16(0)	5.29	5.67	0.32	0.106
	4	7(0)	4.76	5.40	0.64	0.153
	5	6(0)	4.00	4.87	0.80	0.116
	6	7(0)	4.95	5.57	0.66	0.177
Gad	1	27(2)	6.40	6.64	0.27	0.194
	2	12(3)	4.61	5.44	0.62	0.088
	3	10(0)	4.24	4.92	0.70	0.160
	4	27(5)	5.82	6.27	0.30	0.058
	5	8(0)	4.71	5.23	0.77	0.291
	6	12(0)	3.92	4.90	0.61	0.036

Table SI.3.15. Testing our null hypothesis of random species assemblage with phylogenetic constraint (TSM-based). Significant results are in bold font. Random groups were generated with *w*=4 (see main text).

Food webs	Cluster *k*	Number of nodes*	m_k	Mean m_{k_random}	S.E. for m_{k_random}	p-value
Bar	1	13(0)	5.64	5.69	0.15	0.399
	2	29(6)	6.61	6.58	0.12	0.416
	3	7(0)	4.10	4.34	0.44	0.352
	4	8(0)	4.32	4.46	0.30	0.379
	5	15(0)	5.09	5.15	0.17	0.418
	6	7(1)	5.60	5.65	0.31	0.463
Pws	1	72(5)	6.61	6.59	0.06	0.427
	2	10(0)	3.38	3.72	0.42	0.222
	3	7(0)	3.81	4.04	0.41	0.351
	4	7(0)	3.81	4.05	0.42	0.341
	5	10(0)	4.09	4.32	0.38	0.329
	6	6(0)	5.87	5.97	0.33	0.446
Chs	1	41(7)	4.91	4.92	0.08	0.447
	2	7(0)	6.48	6.41	0.17	0.408
	3	9(0)	4.11	4.26	0.25	0.322
	4	6(0)	4.00	4.08	0.28	0.437
	5	5(0)	2.40	2.83	0.50	0.219
	6	7(0)	3.90	4.04	0.27	0.374
Car	1	32(8)	6.57	6.57	0.12	0.439
	2	15(0)	5.10	5.23	0.22	0.322
	3	16(0)	5.29	5.38	0.18	0.344
	4	7(0)	4.76	4.94	0.36	0.364
	5	6(0)	4.00	4.24	0.45	0.342
	6	7(0)	4.95	5.12	0.40	0.392
Gad	1	27(2)	6.40	6.46	0.15	0.423
	2	12(3)	4.61	4.94	0.42	0.260
	3	10(0)	4.24	4.44	0.40	0.343
	4	27(5)	5.82	5.98	0.20	0.208
	5	8(0)	4.71	4.83	0.39	0.441
	6	12(0)	3.92	4.18	0.38	0.287