

# Supplementary Information

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## 1 **Appendix S1: details of food web sources and selection**

2 We combined published food webs from [1], [2], and [3]. Of the 358 food webs available  
3 from [1], 59 were rejected because their original source was unpublished or could not be  
4 retrieved. We further eliminated 13 source or sink webs (which describe feeding links  
5 flowing from or to a particular resource or top predator rather than the interactions of  
6 an entire community), 8 plant-pollinator webs, 33 host-parasitoid webs, and 2 networks  
7 describing competitive interactions. Finally, we eliminated 2 webs describing inferred  
8 interactions in an extinct community, 10 “generalised schemes” that were not based on  
9 direct field data, and 4 webs where it was not clear which of several described study sites  
10 were used to construct the food web (and therefore the latitude of the food web could not  
11 be included). This left us with 226 webs from [1].

12 To these, we added 7 webs from [3] that were originally used to assess the roles

13 of parasites within food webs. As all but 3 of the webs from [1] contained only free-  
14 living species, we removed the parasites (and all interactions involving them) from these  
15 webs (and the 3 webs containing parasites from [1]) leaving free-living species only. In  
16 addition, we included 30 of the 40 webs from [2]. Nine of the remaining webs in the [2]  
17 dataset were also included in the [1] dataset, and the last web was derived from an  
18 unpublished source. This gave us a database of 263 webs. As a measure of quality-control,  
19 we then eliminated any food web which did not have at least one each of basal resources,  
20 intermediate consumers, and top predators. Webs which did not meet this requirement  
21 tended to be very small and poorly-resolved. Our final sample size was thereby reduced  
22 to 196 food webs.

23 See Table S1 for a list of rejected webs and reasons for their exclusion.

**Table S1:** Sources of food webs considered for use in this study. “Collection” indicates the direct source of the food web (i.e., where the interaction matrix was obtained) while “Original source” indicates the original publication of the food web. We also show the ecosystem type, country of origin, and latitude for each food web, as well as whether it was ultimately included in the study. Collection 1 is [2], collection 2 is [3], and collection 3 is [1].

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
Alamitos	1	[4]	stream	37,12,25 N	Yes	
Alford	1	[5]	lake	44,15,41.59 N	Yes	
Beaver	1	[5]	lake	44,18,58.13 N	Yes	
Bere	1	[6]	stream	50,45,7 N	Yes	
Bridge	1	[5]	lake	44,09,42.66 N	Yes	
Broad	1	[7]	stream	45.896938 S	Yes	
Broadstone	1	[8]	stream	51,01,05 N	Yes	
Calero	1	[4]	stream	37,11,09 - 20 N	Yes	
Canton	1	[7]	stream	45.752 S	No	Duplicated in GlobalWeb (web 235)
Carpinteria2006	1	[9]	estuary	34.41 - 34.40 N	Yes	
Chub	1	[5]	lake	43,31,39.36 N	Yes	
Coachella	1	[10]	terrestrial	33,54 N	Yes	
Connery	1	[5]	lake	44,18,42.10 N	Yes	
Corte	1	[4]	stream	37,56,28 - 37,57,39 N	Yes	
Coyote	1	[4]	stream	37,53,11.66 - 37,53,17.06 N	Yes	
German	1	[7]	stream	44.97 S	No	Duplicated in GlobalWeb (web 227)
GrandeCl	1	[11]	terrestrial	46,47,09 N	Yes	
GrandeSc	1	[11]	terrestrial	46,47,09 N	Yes	
Guadalupe	1	[4]	stream	37,27,54 - 37,21,17 N	Yes	
Hainich	1	Unpublished	terrestrial		No	Could not locate original source
LittleKyeBurn	1	[7]	stream	45 S	No	Duplicated in GlobalWeb (web 230)
LittleRock	1	[12]	lake	45,44,07.94 N	Yes	
Mondego	1	[13]	estuary	40,08 N	Yes	
Montane Forest	1	[14]	terrestrial	36,5-37 N	No	Duplicated in GlobalWeb (web60)
Reef	1	[15]	marine	18,29 - 17,53 N	Yes	
Sierra	1	[16]	lake	36,50 - 37,02 N	Yes	
SimberloffE1	1	[17]	terrestrial	24,40,37.29 N	Yes	
SimberloffE2	1	[17]	terrestrial	24,40,33 N	Yes	

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
SimberloffE3	1	[17]	terrestrial	24,41,23.82 N	Yes	
SimberloffE7	1	[17]	terrestrial	25,15 N	Yes	
SimberloffE9	1	[17]	terrestrial	25,01,59.64 - 25,02,55.44 N	Yes	
SimberloffST2	1	[17]	terrestrial	24,36,16 N	Yes	
Skipwith	1	[18]	lake	53,40 N	Yes	
Stink	1	[5]	lake	43,37,55.88 N	Yes	
StMarks	1	[19]	estuary	30,05 N	No	Duplicated in GlobalWeb (web 288)
Stony	1	[7]	stream	45.58 S	No	Duplicated in GlobalWeb (web 231)
TreleaseWoods	1	[20]	terrestrial	40,09,47 N	No	Duplicated in GlobalWeb (web 59)
Tuesday	1	[21]	lake	46,13 N	Yes	
Weddell Sea	1	[16]	marine	58,20.8 - 60,10.4 S	No	Duplicated in GlobalWeb (web 341)
Ythan	1	[22]	marine		No	Duplicated in Dunne (YthanDunne)
BahiaDunne	2	[23]	estuary	30.43 - 30.46 N	Yes	
CarpinteriaDunne	2	[23]	estuary	34.41 - 34.40 N	Yes	
EsteruDunne	2	[23]	estuary	31.78 - 31.69 N	Yes	
FjordDunne	2	[24]	estuary	54.92 - 54.75 N	Yes	
OtagoDunne	2	[25]	estuary	45.78 - 45.88 S	Yes	
SyltDunne	2	[26]	estuary	54.83 - 55.12 N	Yes	
YthanDunne	2	[22]	estuary	57,18,32 N	Yes	
1	3	[27]	estuary		No	Could not locate original source
2	3	[28]	estuary		No	Could not locate original source
3	3	[29]	estuary	41,03,11 N	Yes	
4	3	[30]	estuary		No	Sink web
5	3	[31]	estuary	31,28,38 N	Yes	
6	3	[32]	estuary	36,48,18 N	Yes	
7	3	[33]	marine	41,45 - 41,30 N	Yes	
8	3	[34]	estuary	41,33,00 N	Yes	
9	3	[35]	stream		No	Could not locate original source
10	3	[36]	marine	41 - 47 N	Yes	
11	3	[36]	marine	41 - 47 N	Yes	
12	3	[36]	marine	45,45 - 49 N	Yes	
13	3	[36]	marine	45,45 - 49 N	Yes	
14	3	[37]	estuary	21,26,09 N	No	Could not locate original source
15	3	[37]	estuary	21,26,09 N	No	Could not locate original source

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
16	3	[38]	estuary		No	Could not locate original source
17	3	[39]	marine	4,30 - 15 N	No	Generalised scheme
18	3	[40]	terrestrial	1,01,29 - 1,06,23 N	Yes	
19	3	[41]	lake		No	Could not locate original source
20	3	[42]	terrestrial		No	Could not locate original source
21	3	[43]	marine	70-85 S	Yes	
22	3	[44]	terrestrial	74,27,54 N	Yes	
23	3	[45]	terrestrial	50,25,17 N	Yes	
24	3	[45]	terrestrial	50,25,17 N	Yes	
25	3	[45]	terrestrial	50,25,17 N	Yes	
26	3	[45]	terrestrial	50,25,17 N	Yes	
27	3	[46]	terrestrial		No	Could not locate original source
28	3	[47]	estuary	45,51,30 S	Yes	
29	3	[48]	marine		No	Generalised scheme
30	3	[49]	marine		No	Generalised scheme
31	3	[50]	marine		No	Could not locate original source
32	3	[50]	marine		No	Could not locate original source
33	3	[51]	lake	11,36,39 S	Yes	
34	3	[52]	stream	51,41 - 51,55 N	Yes	
35	3	[53]	stream	37,18,26 N	Yes	
36	3	[37]	estuary	21,26,09 N	No	Could not locate original source
37	3	[54]	marine	41,02,49 N	Yes	
38	3	[51]	lake	11,36,39 S	Yes	
39	3	[51]	lake	11,36,39 S	Yes	
40	3	[55]	terrestrial		No	Generalised scheme
41	3	[56]	marine		No	Could not locate original source
42	3	[57]	marine		No	Study site unclear
43	3	[58]	marine	32,57 N	Yes	
44	3	[59]	marine	17,26,21 N	Yes	
45	3	[60]	stream	41,22,55 N	Yes	
46	3	[61]	lake	33,54 N	Yes	
47	3	[62]	lake		No	Study site unclear
48	3	[63]	marine		No	Extinct species
49	3	[63]	marine		No	Extinct species
50	3	[64]	marine		No	Generalised scheme
51	3	[65]	marine	42,38,56 N	Yes	

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
52	3	[66]	marine	58,27 N	Yes	
53	3	[66]	marine	48,19 - 48,37 N	Yes	
54	3	Unpublished	marine		No	Unpublished
55	3	[67]	estuary		No	Could not locate original source
56	3	[67]	estuary		No	Could not locate original source
57	3	[59]	marine	17,26,21 N	Yes	
58	3	[68]	lake	51,46 N	Yes	
59	3	[20]	terrestrial	40,09,47 N	Yes	
60	3	[14]	terrestrial	36,5-37 N	Yes	
61	3	[69]	terrestrial	77,52,30 N	Yes	
62	3	[69]	terrestrial	77,52,30 N	Yes	
63	3	[70]	stream	52,25,08 N	Yes	
64	3	[71]	stream	41,39,33 N	Yes	
65	3	[72]	stream	34,21,20 - 34,23,21 N	Yes	
66	3	[73]	stream	51,30 N	Yes	
67	3	[74]	stream	40,24,16 N	Yes	
68	3	[75]	lake		No	Could not locate original source
69	3	[76]	estuary		No	Could not locate original source
70	3	[77]	estuary	28,54,08 N	Yes	
71	3	[78]	lake	48,00 N	Yes	
72	3	[79]	lake	46,02 N	Yes	
73	3	[80]	lake		No	Could not locate original source
74	3	[81]	marine	34,15,00 S	Yes	
75	3	[82]	lake	47,11 N	Yes	
76	3	[80]	lake	47,42 - 47,54 N	Yes	
77	3	[76]	lake		No	Could not locate original source
78	3	[83]	lake	0	Yes	
79	3	[84]	lake		No	Could not locate original source
80	3	[84]	lake		No	Could not locate original source
81	3	[85]	marine		No	Could not locate original source
82	3	[76]	marine		No	Could not locate original source
83	3	[76]	lake		No	Could not locate original source
84	3	[86]	lake	42,28,42 N	Yes	
85	3	[87]	lake		No	Could not locate original source

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
86	3	[88]	marine	34,36 - 35,38 N	Yes	
87	3	[89]	terrestrial	72,46,34.95 N	Yes	
88	3	[90]	stream		No	Could not locate original source
89	3	[91]	stream	52,13 N	Yes	
91	3	[76]	terrestrial		No	Could not locate original source
92	3	[92]	terrestrial		No	Generalised scheme
93	3	[93]	terrestrial	45 N	Yes	
94	3	[94]	terrestrial		No	Could not locate original source
95	3	[95]	terrestrial	70,11,14.18 N	Yes	
96	3	[76]	terrestrial		No	Could not locate original source
97	3	[76]	terrestrial		No	Could not locate original source
98	3	[96]	terrestrial		No	Could not locate original source
99	3	[97]	terrestrial	32,36 N	Yes	
100	3	[76]	terrestrial		No	Could not locate original source
101	3	[76]	lake		No	Could not locate original source
102	3	[98]	marine	10 S - 15 N	Yes	
103	3	[99]	marine		No	Generalised scheme
104	3	[36]	marine	4,48,04 N	Yes	
105	3	[100]	marine	42,40 N	Yes	
106	3	[101]	marine		No	Could not locate original source
107	3	[102]	marine	39,52,02 N	Yes	
108	3	[103]	marine	36,37 N	Yes	
109	3	[104]	marine		No	Could not locate original source
110	3	[65]	marine	42,38,56 N	Yes	
111	3	[65]	marine	42,38,56 N	Yes	
112	3	[65]	marine	42,38,56 N	Yes	
113	3	[65]	marine	42,38,56 N	Yes	
114	3	[105]	lake	17,54,11.90 S	Yes	
115	3	[106]	marine		No	Could not locate original source
116	3	[107]	lake	35,09,19 S	Yes	
117	3	[108]	lake	9,11,31.50 N	Yes	
118	3	[109]	lake	56,41,18.71 N	Yes	
119	3	[110]	stream	51,27 N	Yes	
120	3	[111]	lake	0,00,58 N	Yes	
121	3	[112]	estuary	53,20 - 53,15 N	Yes	
122	3	[34]	estuary	41,33,04 N	Yes	

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
123	3	[113]	terrestrial	40,45,28 N	Yes	
124	3	[114]	stream	44,34 N	Yes	
125	3	[115]	marine		No	Generalised scheme
126	3	[116]	lake	61,26,00 N	Yes	
127	3	[117]	lake		No	Could not locate original source
128	3	[117]	lake		No	Could not locate original source
129	3	Unpublished	terrestrial		No	Unpublished
130	3	[118]	estuary	27,12 N	Yes	
131	3	[119]	lake	4,12,37 N	Yes	
132	3	[119]	lake	4,12,37 N	Yes	
133	3	[119]	lake	7,52,22 N	Yes	
134	3	[119]	lake	19 S	Yes	
135	3	[119]	lake	4,40,46 S	Yes	
136	3	[120]	lake		No	Could not locate original source
137	3	[121]	lake	22,14-22,17 N	Yes	
138	3	[122]	lake		No	Could not locate original source
139	3	[122]	lake		No	Could not locate original source
140	3	[123]	terrestrial	10,21 N	Yes	
141	3	[124]	terrestrial		No	Competition network
142	3	[124]	terrestrial		No	Competition network
143	3	[125]	lake	34,41,45 N	Yes	
144	3	[125]	lake		No	Could not locate original source
145	3	[126]	terrestrial		No	Host-parasitoid web
146	3	[126]	terrestrial		No	Host-parasitoid web
147	3	[126]	terrestrial		No	Host-parasitoid web
148	3	[126]	terrestrial		No	Host-parasitoid web
149	3	[127]	terrestrial		No	Host-parasitoid web
150	3	[128]	terrestrial		No	Host-parasitoid web
151	3	[129]	terrestrial	51,20,04 N	Yes	
152	3	[130]	terrestrial		No	Source web
153	3	[131]	terrestrial	40,06,38 N	Yes	
154	3	[131]	terrestrial	39,56,41 N	Yes	
155	3	[132]	terrestrial		No	Host-parasitoid web
156	3	[133]	terrestrial		No	Host-parasitoid web
157	3	[133]	terrestrial		No	Host-parasitoid web
158	3	[133]	terrestrial		No	Host-parasitoid web



Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
159	3	[133]	terrestrial		No	Host-parasitoid web
160	3	[133]	terrestrial		No	Host-parasitoid web
161	3	[133]	terrestrial		No	Host-parasitoid web
162	3	[133]	terrestrial		No	Host-parasitoid web
163	3	[133]	terrestrial		No	Host-parasitoid web
164	3	[133]	terrestrial		No	Host-parasitoid web
165	3	[133]	terrestrial		No	Host-parasitoid web
166	3	[133]	terrestrial		No	Host-parasitoid web
167	3	[133]	terrestrial		No	Host-parasitoid web
168	3	[134]	terrestrial		No	Host-parasitoid web
169	3	[134]	terrestrial		No	Host-parasitoid web
170	3	[134]	terrestrial		No	Host-parasitoid web
171	3	[134]	terrestrial		No	Host-parasitoid web
172	3	[134]	terrestrial		No	Host-parasitoid web
173	3	[134]	terrestrial		No	Host-parasitoid web
174	3	[134]	terrestrial		No	Host-parasitoid web
175	3	[134]	terrestrial		No	Host-parasitoid web
176	3	[134]	terrestrial		No	Host-parasitoid web
177	3	[134]	terrestrial		No	Host-parasitoid web
178	3	[134]	terrestrial		No	Host-parasitoid web
179	3	[135]	terrestrial		No	Source web
180	3	[136]	terrestrial	36,01,02 N	Yes	
181	3	[136]	terrestrial	36,01,02 N	Yes	
182	3	[136]	terrestrial	36,01,02 N	Yes	
183	3	[136]	terrestrial	36,01,02 N	Yes	
184	3	[137]	terrestrial		No	Could not locate original source
185	3	[138]	terrestrial		No	Source web
186	3	[139]	terrestrial		No	Source web
187	3	[139]	terrestrial		No	Source web
188	3	[140]	terrestrial		No	Source web
189	3	[141]	terrestrial		No	Could not locate original source
190	3	[141]	terrestrial		No	Could not locate original source
191	3	[141]	terrestrial		No	Could not locate original source
192	3	[141]	terrestrial		No	Could not locate original source
193	3	[141]	terrestrial		No	Could not locate original source
194	3	[141]	terrestrial		No	Could not locate original source

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
195	3	[142]	terrestrial		No	Could not locate original source
196	3	[142]	terrestrial		No	Could not locate original source
197	3	[143]	terrestrial		No	Source web
198	3	[144]	terrestrial		No	Source web
199	3	[145]	terrestrial		No	Source web
200	3	[146]	terrestrial		No	Source web
201	3	[146]	terrestrial		No	Source web
202	3	[147]	stream	38,50,21 N	Yes	
203	3	[114]	stream	44,24 N	Yes	
204	3	[51]	lake	11,36,39 S	Yes	
205	3	[148]	stream	51,01,05 N	Yes	
206	3	[52]	stream	51,41 - 51,55 N	Yes	
207	3	[149]	stream	41,57 - 42,14 N	Yes	
208	3	[150]	stream	37,56 N	Yes	
209	3	[53]	stream	37,18,26 N	Yes	
210	3	[151]	stream		No	Generalised scheme
211	3	[152]	stream		No	Could not locate original source
212	3	[152]	stream		No	Could not locate original source
213	3	[153]	stream	53 N	Yes	
214	3	[154]	stream	44,40,44 N	Yes	
215	3	[154]	stream	40,40,52 N	Yes	
216	3	[154]	stream	35,02,50 N	Yes	
217	3	[154]	stream	35,03,50 N	Yes	
218	3	[155]	stream	45.79 S	Yes	
219	3	[155]	stream	44.64 S	Yes	
220	3	[155]	stream	46.29 S	Yes	
221	3	[155]	stream	46.41 S	Yes	
222	3	[155]	stream	45,57,0 S	Yes	
223	3	[155]	stream	46.08 S	Yes	
224	3	[155]	stream	46.08 S	Yes	
225	3	[155]	stream	46.115 S	Yes	
226	3	[155]	stream	45.61 S	Yes	
227	3	[155]	stream	44.97 S	Yes	
228	3	[155]	stream	44.95 S	Yes	
229	3	[155]	stream	44.96 S	Yes	
230	3	[155]	stream	45 S	Yes	

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
231	3	[155]	stream	45.58 S	Yes	
232	3	[155]	stream	45.61 S	Yes	
233	3	[155]	stream	45.782 S	Yes	
234	3	[155]	stream	45.803 S	Yes	
235	3	[155]	stream	45.752 S	Yes	
236	3	[155]	stream	46.29 S	Yes	
237	3	[155]	stream	46.41 S	Yes	
238	3	[155]	stream	45,57,0 S	Yes	
239	3	[155]	stream	46.08 S	Yes	
240	3	[155]	stream	46.08 S	Yes	
241	3	[155]	stream	46.115 S	Yes	
242	3	[155]	stream	46.29 S	Yes	
243	3	[155]	stream	46.41 S	Yes	
244	3	[155]	stream	45,57,0 S	Yes	
245	3	[155]	stream	46.08 S	Yes	
246	3	[155]	stream	46.08 S	Yes	
247	3	[155]	stream	46.115 S	Yes	
248	3	[156]	estuary	45,51,28 S	Yes	
249	3	[157]	stream	24,30 S	Yes	
250	3	[158]	lake	22,57,38 S	Yes	
251	3	[158]	lake	22,57,38 S	Yes	
252	3	[159]	stream	18,40 S	Yes	
253	3	[160]	marine	5 - 17,15 S	Yes	
254	3	[161]	stream	21 S	Yes	
255	3	[161]	stream	21 S	Yes	
256	3	[161]	stream		No	Could not locate original source
257	3	[162]	estuary	40,08 N	Yes	
258	3	[162]	estuary	40,08 N	Yes	
259	3	[162]	estuary	40,08 N	Yes	
260	3	[162]	estuary	40,08 N	Yes	
261	3	[162]	estuary	40,08 N	Yes	
262	3	[162]	estuary	40,08 N	Yes	
263	3	[163]	lake	45,58,50 N	Yes	
264	3	[164]	terrestrial	39,06,27 N	Yes	
265	3	[165]	marine	22,27 N	Yes	
266	3	[166]	marine	60 - 69 S	Yes	

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
267	3	[167]	marine	23.15 - 22.9N	Yes	
268	3	[168]	marine	18,45 - 18,50 N	Yes	
269	3	[169]	lake	29,32,35 N	Yes	
270	3	[170]	marine	42,17,37 - 42,19,29 N	Yes	
271	3	[171]	lake	69,07 N	Yes	
272	3	[172]	lake	48,03,29 N	Yes	
273	3	[173]	stream	69,1 N	Yes	
274	3	[173]	stream	69,1 N	Yes	
275	3	[173]	stream	69,1 N	Yes	
276	3	[173]	stream	69,1 N	Yes	
277	3	[174]	lake	42,08,6 - 42,07 N	Yes	
278	3	[175]	lake	43.7 N	Yes	
279	3	[175]	lake	43.7 N	Yes	
280	3	[176]	stream	43,58 N	Yes	
281	3	[176]	stream	44,58 N	Yes	
282	3	[176]	stream	45,58 N	Yes	
283	3	[176]	stream	46,58 N	Yes	
284	3	[176]	stream	47,58 N	Yes	
285	3	[176]	stream	48,58 N	Yes	
286	3	[176]	stream	49,58 N	Yes	
287	3	[176]	stream	50,58 N	Yes	
288	3	[19]	estuary	30,05,39 N	Yes	
289	3	[177]	lake	11,15 N	Yes	
290	3	[178]	marine	43 - 48 N	Yes	
291	3	[178]	marine	44 - 48 N	Yes	
292	3	[178]	marine	45 - 48 N	Yes	
293	3	[178]	marine	46 - 48 N	Yes	
294	3	[179]	lake	47,37,30 N	Yes	
295	3	[180]	lake	37.66 N	Yes	
296	3	[181]	lake	24,55 S	Yes	
297	3	[182]	stream	37,40 S	Yes	
298	3	[182]	stream	37,40 S	Yes	
299	3	[182]	stream	37,40 S	Yes	
300	3	[182]	stream	37,40 S	Yes	

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
301	3	[182]	stream	37,40 S	Yes	
302	3	[182]	stream	37,40 S	Yes	
303	3	[182]	stream	37,40 S	Yes	
304	3	[182]	stream	37,40 S	Yes	
305	3	[182]	stream	37,40 S	Yes	
306	3	[182]	stream	37,40 S	Yes	
307	3	[182]	stream	37,40 S	Yes	
308	3	[182]	stream	37,40 S	Yes	
309	3	[183]	marine	61,13,88 N	Yes	
310	3	[184]	lake	12,45,25 N	Yes	
311	3	[185]	terrestrial		No	Source web
312	3	[186]	terrestrial		No	Plant-pollinator web
313	3	[186]	terrestrial		No	Plant-pollinator web
314	3	[187]	terrestrial		No	Plant-pollinator web
315	3	[187]	terrestrial		No	Plant-pollinator web
316	3	[187]	terrestrial		No	Plant-pollinator web
317	3	[187]	terrestrial		No	Plant-pollinator web
318	3	[187]	terrestrial		No	Plant-pollinator web
319	3	[187]	terrestrial		No	Plant-pollinator web
320	3	[188]	marine	42 - 49 N	Yes	
321	3	[188]	marine	43 - 49 N	Yes	
322	3	[188]	marine	44 - 49 N	Yes	
323	3	[188]	marine	45 - 49 N	Yes	
324	3	[188]	marine	46 - 49 N	Yes	
325	3	[189]	terrestrial		No	Host-parasitoid web
326	3	[189]	terrestrial		No	Host-parasitoid web
327	3	[190]	stream	29,13 S	Yes	
328	3	[190]	stream	29,20,0 S	Yes	
329	3	[190]	stream	29,35 S	Yes	
330	3	[190]	stream	29,13 S	Yes	
331	3	[190]	stream	29,20,0 S	Yes	
332	3	[191]	stream	31.70 N	Yes	
333	3	[192]	marine	33,51 - 44,49 N	Yes	
334	3	[193]	lake	41,26,36 N	Yes	
335	3	[193]	lake	41,26,05 N	Yes	
336	3	[193]	lake	41,26,36 N	Yes	

Web ID	Collection	Original Source	Ecosystem	Latitude(degrees)	Used	Reason for rejection
337	3	[193]	lake	41,26,05 N	Yes	Could not locate original source
338	3	[194]	marine		No	
339	3	[195]	marine	37-39 S	Yes	
340	3	[196]	marine	74-78 S	Yes	
341	3	[197]	marine	58,20.8 - 60,10.4 S	Yes	
342	3	[198]	marine	57,00 - 60,45 S	Yes	Host-parasitoid web
343	3	[199]	lake	28,12 S	Yes	
344	3	[200]	terrestrial		No	
345	3	[201]	lake	47,38,10 N	Yes	
346	3	[202]	stream	17,7 S	Yes	
347	3	[203]	stream	23,03 S	Yes	Could not locate original source
348	3	[204]	marine	37,13 N	Yes	
349	3	[204]	marine	37,13 N	Yes	
350	3	[204]	marine	37,13 N	Yes	
351	3	[18]	lake		No	
352	3	[205]	stream	54,06 N	No	describes compartments, not species
353	3	[205]	stream	54,06 N	No	describes compartments, not species
354	3	[206]	terrestrial	18,03 N	Yes	Study site unclear
355	3	[207]	lake	46,13 N	Yes	
356	3	[207]	lake	46,13 N	Yes	
357	3	[208]	marine	34,21 - 16 S	No	
358	3	[209]	terrestrial		No	
359	3	[210]	lake		No	Study site unclear

## Appendix S2: forms of scaling relationships with species richness

### Methods

The scaling relationships between link density ( $Z$ ) and species richness ( $S$ ) has been shown to be a power law [211] of the form

$$Z_i \sim \alpha S_i^\beta, \quad (1)$$

which is often re-expressed in logarithmic form

$$\log Z_i \sim \log \alpha + \beta \log S_i. \quad (2)$$

Although these relationships are very similar, they imply different error distributions [212]. Specifically, equation (1) implies a normally-distributed, additive error and equation (2) a lognormal, multiplicative error. As we have no *a priori* reason to believe that our dataset has one error distribution over another, we follow the recommendations in [212] and compared the two model formulations explicitly. The model with the error distribution that best approximates the one observed in the empirical data was then used to test for potential effects of latitude.

Although scaling relationships between species richness and generality or species richness and vulnerability have not been explicitly examined (but see scaling relationships for the standard deviations of each property in [211]), we expect that they will follow power laws similar to that of the relationship between species richness and links per species. This is because the links taken into account in calculating generality and vulnerability are subsets of the total links included when calculating links per species. As with links per species, we explicitly compared the error distributions of models for generality and vulnerability using both the power-law and logarithmic formulations. In each case, we

used the best-fitting equation as a template when assessing the effect of latitude on scaling with species richness.

## Results

When considering the relationships between species richness and all response variables (link density, generality, vulnerability), equation (2) had a lower AIC than did equation (1). This indicates that the data support an assumption of multiplicative lognormal error better than an assumption of additive normal error. That is, models where  $\epsilon$  is modelled as an additive term on the logarithmic scale provide a better description of the data than models where  $\epsilon$  is modelled as an additive term on the arithmetic scale. We therefore used logarithmic-form models when assessing the effect of latitude on scaling relationships with species richness.



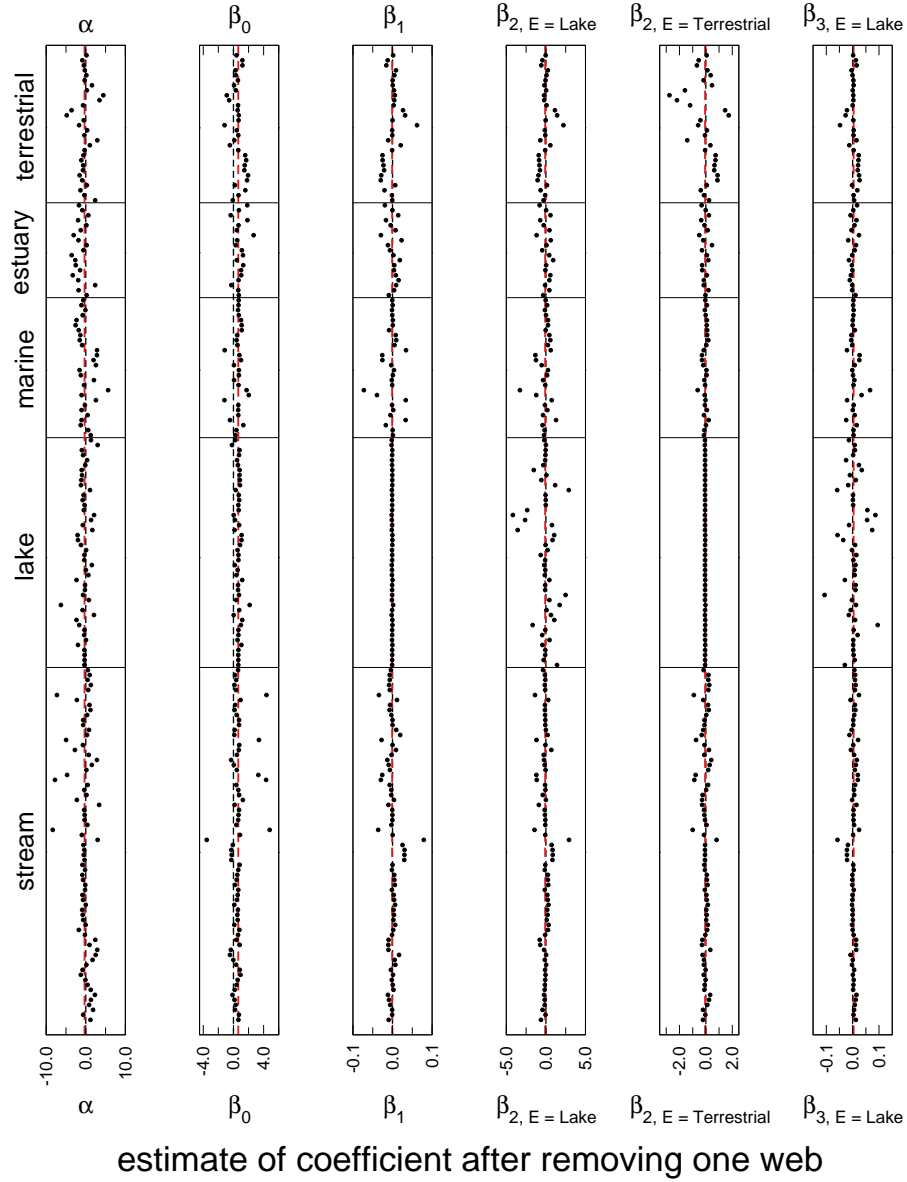
## Appendix S3: testing for effects of sampling effort

### Methods

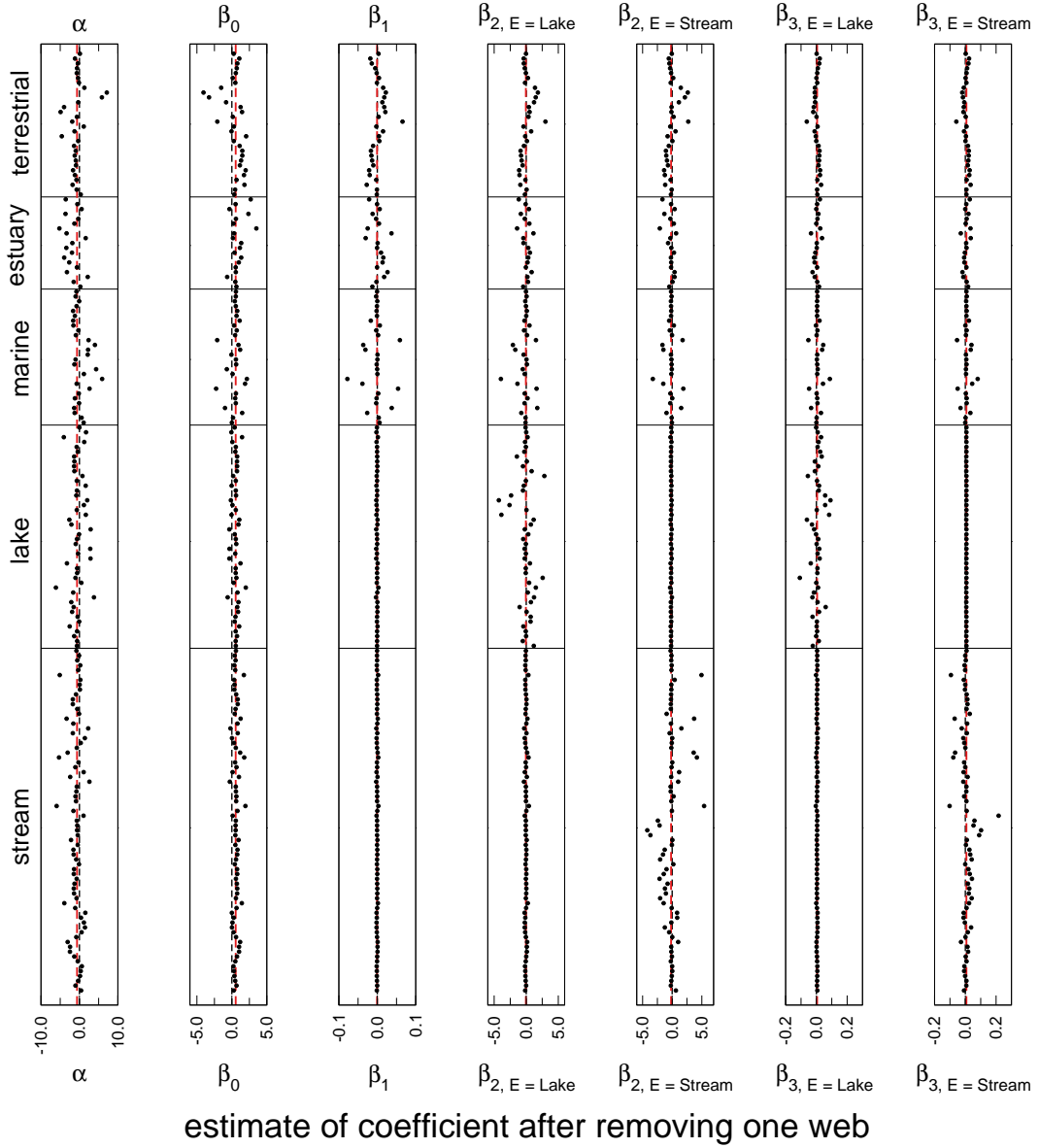
As our dataset consists of food webs published over several decades, from many countries, and by many research groups, there are differences in the procedures used to assemble the food webs and likely also differences in the amount of sampling effort allocated to each web. In order to ensure that our results were not driven by particularly unusual food webs, or by unusually well- or poorly-sampled webs derived from any particular research group, we performed two jackknife tests of our results. In the first test, we removed one web from our dataset and re-fit our models, then repeated this process for all webs in the dataset. We then compared the estimates for each coefficient in each of our models in order to determine whether the omission of any web dramatically changed the resulting model and conclusions. In the second test, we removed groups of webs assembled by a given author (or authors, where two or more authors assembled identical sets of food webs) and again plotted the resulting collection of estimates for each coefficient. We did not plot the coefficients resulting from the removal of authors who compiled a single food web, as these were included in the first test. This allowed us to determine whether the inclusion or exclusion of the webs assembled by a particular researcher or group of researchers affected our results.

### Results

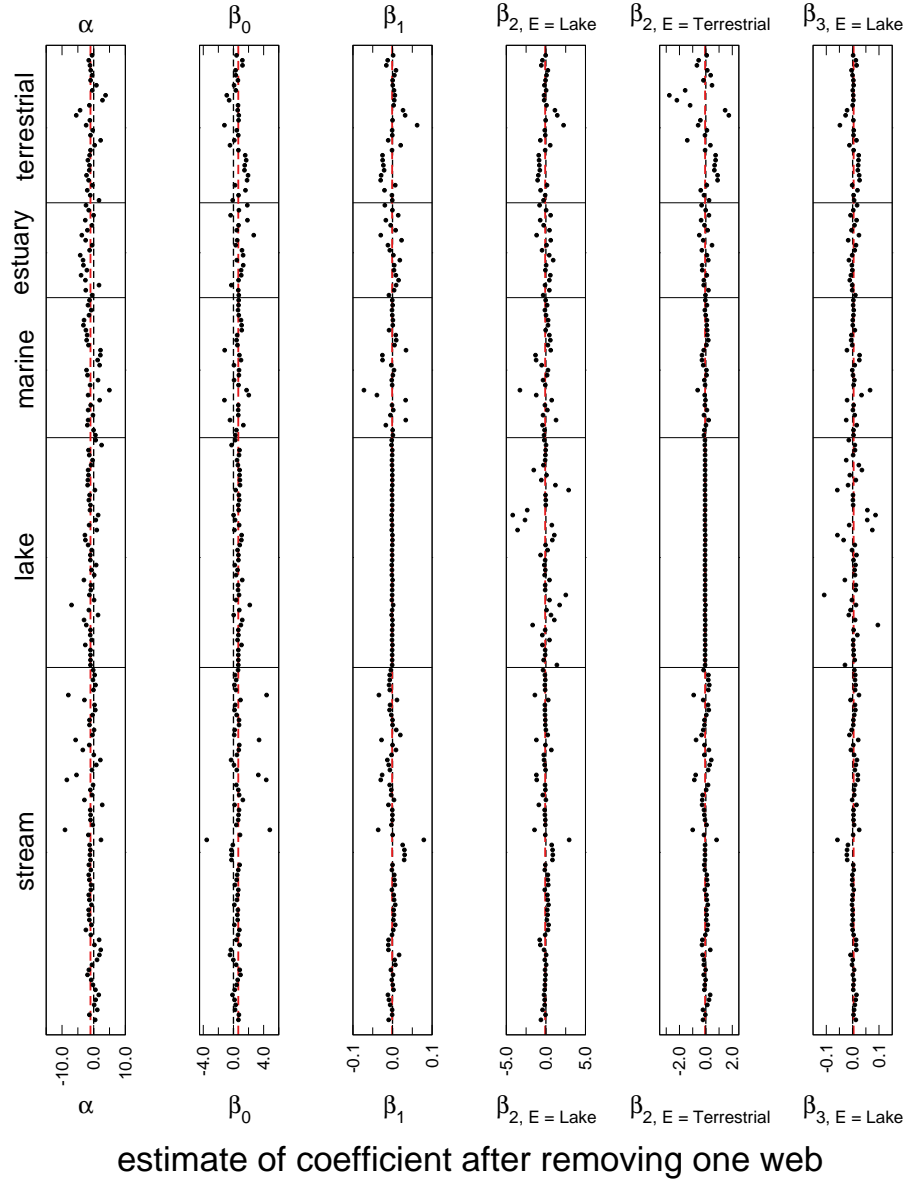
None of our models were greatly affected by the removal of any single food web or by the removal of a set of webs compiled by a common author (or group of authors). Estimates of coefficients from all jackknifed datasets were extremely similar (Figs. S1,S2,S3,S4,S5,S6). We are therefore very confident that, while there are undoubtedly differences in the methods used to compile food webs, these differences do not explain the trends we report.



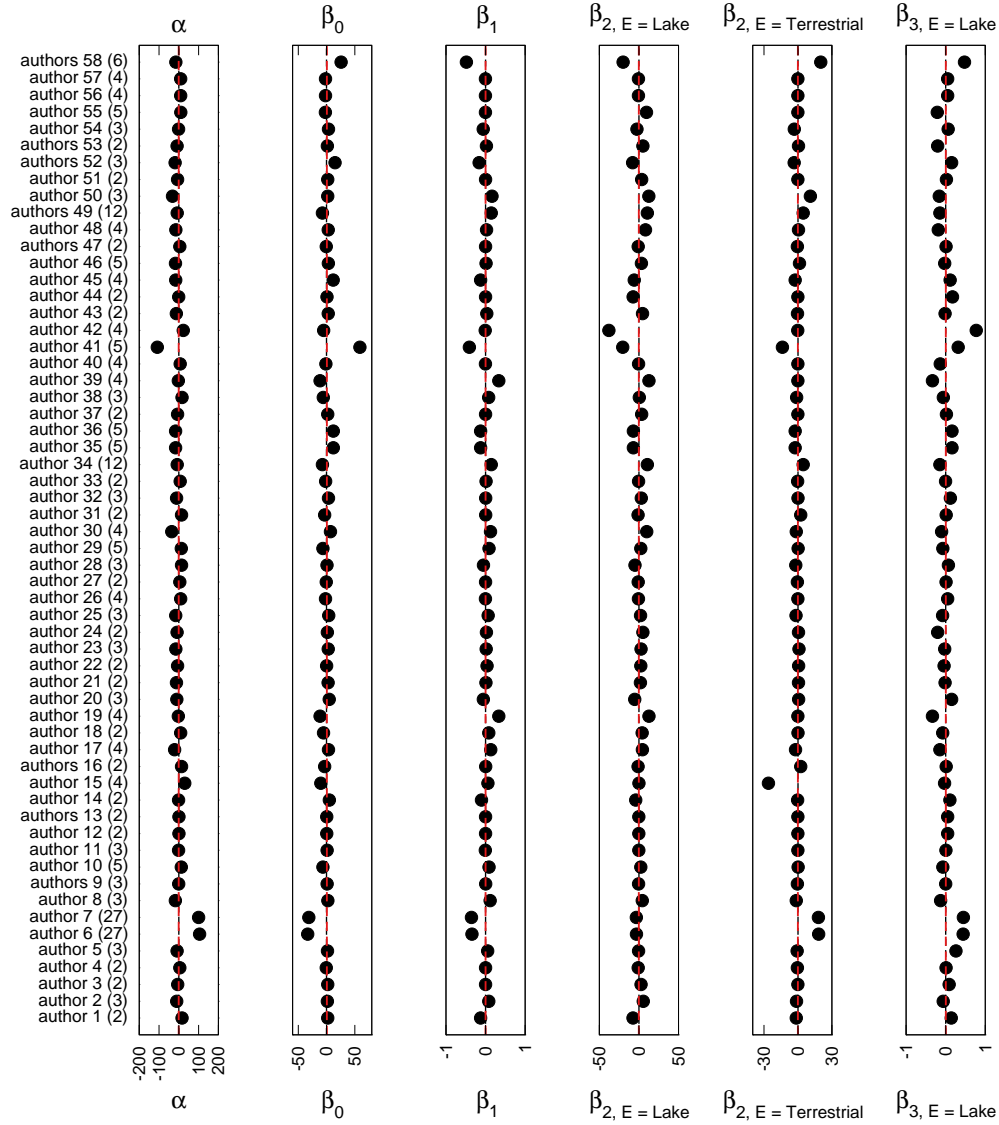
**Figure S1:** Estimates of the coefficients for scaling of link density with species richness in equation 5 (main text) do not vary significantly when jackknifing across food webs. We show the pseudovalues for each coefficient in the equation after the removal of each web in the dataset. The estimate for the full, non-jackknifed dataset is indicated by the red, dashed line.



**Figure S2:** Estimates of the coefficients for scaling of generality with species richness (see equation 5, main text) do not vary significantly when jackknifing across food webs. We show the pseudovalues for each coefficient in the equation after the removal of each web in the dataset. The estimate for the full, non-jackknifed dataset is indicated by the red, dashed line.

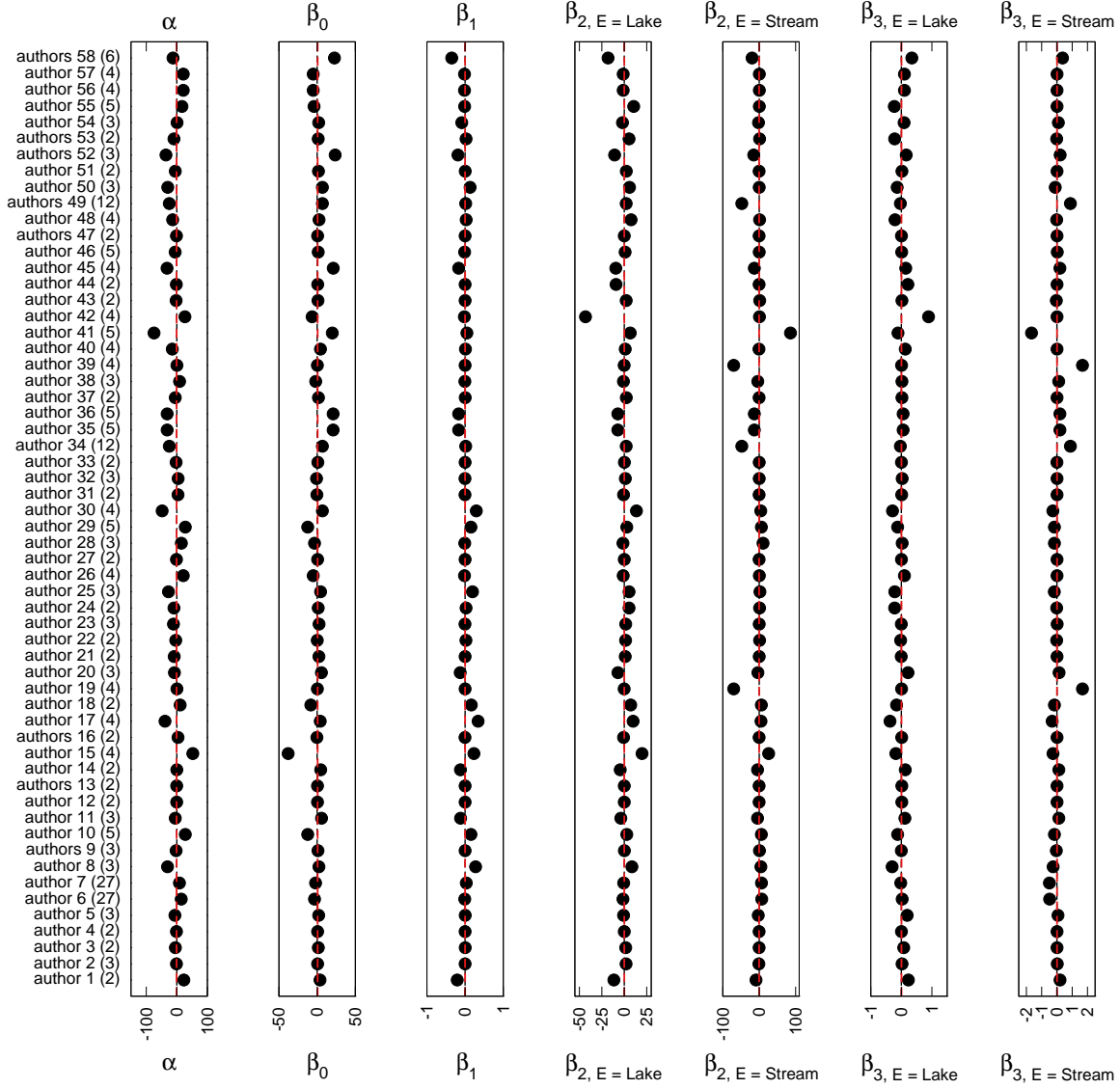


**Figure S3:** Estimates of the coefficients for scaling of vulnerability with species richness (see equation 5, main text) do not vary significantly when jackknifing across food webs. We show the pseudovalues for each coefficient in the equation after the removal of each web in the dataset. The estimate for the full, non-jackknifed dataset is indicated by the red, dashed line.



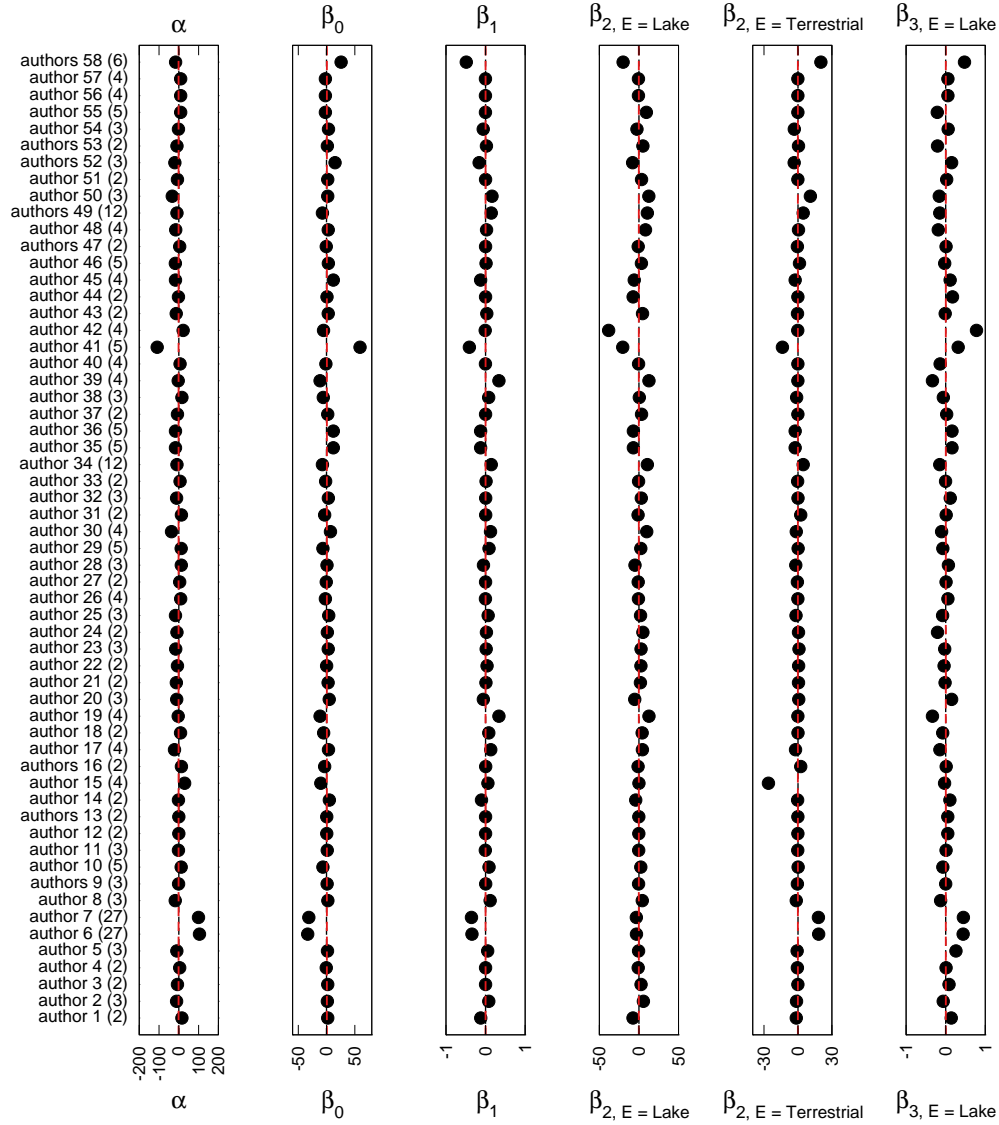
estimate of coefficient after removing webs with a common author

**Figure S4:** Estimates of the coefficients for scaling of link density with species richness in equation 5 (main text) do not vary significantly when jackknifing across authors of the published food webs used in this study. We show the pseudovalues for each coefficient in the equation after the removal of all webs compiled by each author (or set of authors where multiple authors compiled identical sets of webs) in the dataset. Authors who compiled only a single web were jackknifed as part of the by-web jackknife. The estimate for the full, non-jackknifed dataset is indicated by the red, dashed line, and the number of webs removed in each jackknife is given in parentheses.



estimate of coefficient after removing webs with a common author

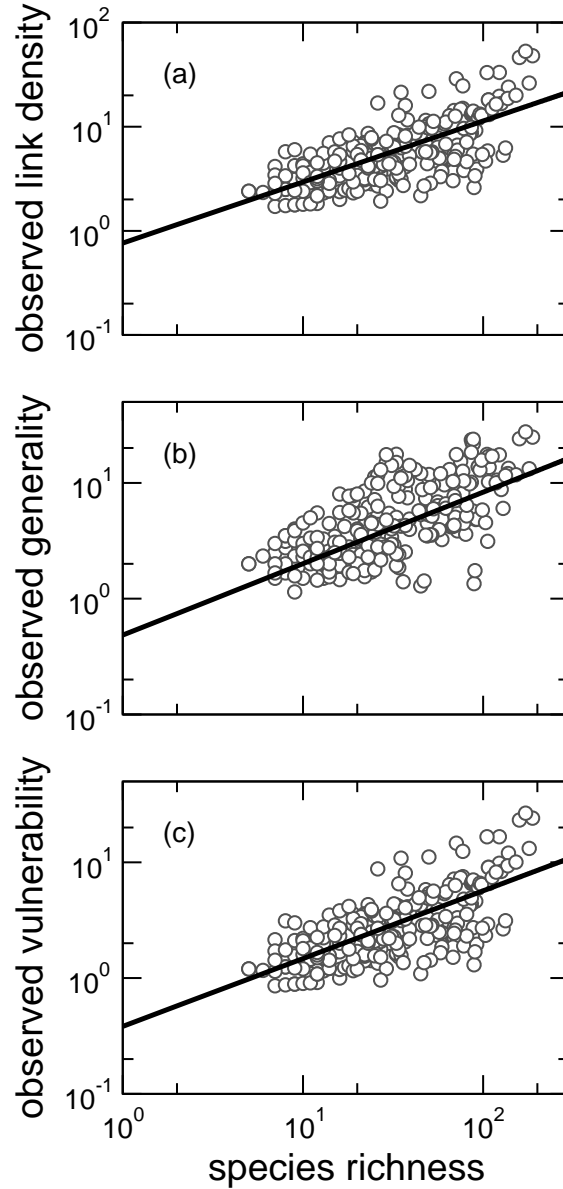
**Figure S5:** Estimates of the coefficients for scaling of generality with species richness (see equation 5, main text) do not vary significantly when jackknifing across authors of the published food webs used in this study. We show the pseudovalues for each coefficient in the equation after the removal of all webs compiled by each author (or set of authors where multiple authors compiled identical sets of webs) in the dataset. Authors who compiled only a single web were jackknifed as part of the by-web jackknife. The estimate for the full, non-jackknifed dataset is indicated by the red, dashed line, and the number of webs removed in each jackknife is given in parentheses.



estimate of coefficient after removing webs with a common author

**Figure S6:** Estimates of the coefficients for the scaling of vulnerability with species richness (see equation 5, main text) do not vary significantly when jackknifing across authors of the published food webs used in this study. We show the pseudovalues for each coefficient in the equation after the removal of all webs compiled by each author (or set of authors where multiple authors compiled identical sets of webs) in the dataset. Authors who compiled only a single web were jackknifed as part of the by-web jackknife. The estimate for the full, non-jackknifed dataset is indicated by the red, dashed line, and the number of webs removed in each jackknife is given in parentheses.

79 **Appendix S5: supplemental figure**



**Figure S7:** Scaling relationships for link density, generality, and vulnerability relative to species richness of a food web. For each relationship, we show observed values (white circles) and a simplified form of the scaling relationship described in equation 2 (*Main Text*), neglecting any effects of habitat type or latitude (black line,  $N=196$  food webs). See Fig. 1 (*Main Text*) to compare with observed values correcting for the effects of habitat type and latitude.



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