

Staying ahead of invaders: using species distribution modeling to predict alien species' potential niche shifts

Nicolás Battini*, Nahuel Farías, Clara Belen Giachetti, Evangelina Schwindt, Alejandro Bortolus

*Corresponding author: battini@cenpat-conicet.gob.ar

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Table S1. Records of *Pleurobranchaea maculata* (Quoy&Gaimard, 1832) used in the analyses. NA: Not available.

	Range	Latitude	Longitude	Year	Source
1	Native	42°52'17.2'' S	147°18'59.2'' E	1900	GBIF
2	Native	36°50'57.1'' S	174°47'17.3'' E	1901	GBIF
3	Native	45°44'6.4'' S	170°35'34.7'' E	1918	GBIF
4	Native	45°49'39.8'' S	170°38'26.9'' E	1920	GBIF
5	Native	42°54'57.6'' S	147°23'30.0'' E	1927	GBIF
6	Native	38°28'48.0'' S	145°1'48.0'' E	1935	GBIF
7	Native	38°30'0.0'' S	145°0'0.0'' E	1935	GBIF
8	Native	42°54'2.2'' S	147°20'7.1'' E	1945	GBIF
9	Native	43°8'11.0'' S	147°16'58.1'' E	1948	GBIF
10	Native	38°51'49.8'' S	146°0'16.9'' E	1949	GBIF
11	Native	38°51'51.0'' S	146°0'18.9'' E	1949	GBIF
12	Native	38°27'13.5'' S	145°11'38.4'' E	1950	GBIF
13	Native	38°31'13.7'' S	145°12'7.6'' E	1950	GBIF
14	Native	43°3'30.0'' S	147°20'30.0'' E	1952	GBIF
15	Native	38°46'12.6'' S	143°39'53.3'' E	1956	GBIF
16	Native	38°46'12.6'' S	143°39'53.4'' E	1956	GBIF
17	Native	38°32'42.6'' S	143°59'20.6'' E	1956	GBIF
18	Native	38°29'34.6'' S	144°1'43.6'' E	1956	GBIF
19	Native	38°28'58.8'' S	145°0'57.6'' E	1956	GBIF
20	Native	38°19'48.0'' S	144°45'0.0'' E	1957	GBIF
21	Native	38°17'60.0'' S	144°48'0.0'' E	1957	GBIF
22	Native	43°1'58.8'' S	147°56'48.1'' E	1957	GBIF
23	Native	42°59'1.7'' S	147°19'27.5'' E	1957	GBIF
24	Native	33°43'12.0'' S	151°19'12.0'' E	1958	GBIF
25	Native	33°42'39.4'' S	151°18'37.5'' E	1958	GBIF
26	Native	38°28'12.0'' S	145°19'12.0'' E	1958	GBIF
27	Native	38°28'12.0'' S	145°19'12.0'' E	1958	GBIF
28	Native	43°0'27.4'' S	147°19'34.7'' E	1958	GBIF
29	Native	38°28'48.0'' S	145°1'48.0'' E	1961	GBIF
30	Native	38°30'0.0'' S	145°0'0.0'' E	1961	GBIF
31	Native	38°18'49.4'' S	144°43'9.8'' E	1961	GBIF
32	Native	38°18'49.5'' S	144°43'9.5'' E	1961	GBIF
33	Native	38°18'49.4'' S	144°43'9.5'' E	1962	GBIF
34	Native	38°18'49.7'' S	144°43'9.6'' E	1962	GBIF
35	Native	41°9'45.0'' S	146°21'22.7'' E	1962	GBIF
36	Native	41°4'51.4'' S	146°44'59.4'' E	1963	GBIF
37	Native	42°54'40.0'' S	147°29'42.7'' E	1964	GBIF
38	Native	43°17'60.0'' S	147°11'60.0'' E	1964	GBIF
39	Native	43°21'0.0'' S	147°9'0.0'' E	1964	GBIF
40	Native	29°46'36.0'' S	153°18'0.0'' E	1964	GBIF
41	Native	42°54'40.0'' S	147°29'42.7'' E	1965	GBIF
42	Native	42°54'40.0'' S	147°29'42.7'' E	1965	GBIF

43	Native	42°48'46.8'' S	147°30'51.1'' E	1965	GBIF
44	Native	42°54'40.0'' S	147°29'42.7'' E	1966	GBIF
45	Native	36°48'58.1'' S	174°51'57.0'' E	1969	GBIF
46	Native	33°44'36.5'' S	151°19'1.9'' E	1969	GBIF
47	Native	33°44'36.0'' S	151°19'2.8'' E	1969	GBIF
48	Native	36°54'2.4'' S	149°55'47.7'' E	1969	GBIF
49	Native	36°54'4.9'' S	149°53'55.2'' E	1969	GBIF
50	Native	43°2'42.0'' S	147°20'49.0'' E	1970	GBIF
51	Native	37°6'0.0'' S	149°54'0.0'' E	1970	GBIF
52	Native	37°4'12.0'' S	149°55'12.0'' E	1970	GBIF
53	Native	43°3'5.0'' S	147°20'38.8'' E	1971	GBIF
54	Native	42°55'0.1'' S	147°35'60.0'' E	1971	GBIF
55	Native	42°48'16.6'' S	147°31'46.9'' E	1973	GBIF
56	Native	36°18'0.6'' S	150°8'9.6'' E	1974	GBIF
57	Native	36°18'0.6'' S	150°8'8.3'' E	1974	GBIF
58	Native	43°10'48.0'' S	147°50'60.0'' E	1974	GBIF
59	Native	43°12'0.0'' S	147°54'0.0'' E	1974	GBIF
60	Native	43°3'28.8'' S	147°19'49.8'' E	1975	GBIF
61	Native	28°37'12.0'' S	153°37'48.0'' E	1975	GBIF
62	Native	28°36'0.0'' S	153°35'60.0'' E	1975	GBIF
63	Native	43°1'48.0'' S	147°55'12.0'' E	1975	GBIF
64	Native	43°1'48.0'' S	147°55'12.0'' E	1975	GBIF
65	Native	36°53'36.0'' S	149°55'15.3'' E	1975	GBIF
66	Native	37°48'36.8'' S	148°42'2.5'' E	1976	GBIF
67	Native	41°4'53.6'' S	146°44'59.4'' E	1976	GBIF
68	Native	37°49'12.0'' S	148°43'48.0'' E	1976	GBIF
69	Native	41°4'53.6'' S	146°44'59.0'' E	1976	GBIF
70	Native	41°9'45.0'' S	146°20'28.0'' E	1976	GBIF
71	Native	41°4'53.6'' S	146°44'57.8'' E	1976	GBIF
72	Native	41°4'53.6'' S	146°44'56.2'' E	1976	GBIF
73	Native	41°4'52.7'' S	146°44'56.5'' E	1976	GBIF
74	Native	37°49'12.0'' S	148°43'48.0'' E	1976	GBIF
75	Native	37°48'37.5'' S	148°42'2.5'' E	1976	GBIF
76	Native	41°4'51.7'' S	146°44'59.7'' E	1976	GBIF
77	Native	41°4'47.3'' S	146°44'57.5'' E	1976	GBIF
78	Native	41°4'51.7'' S	146°44'58.1'' E	1976	GBIF
79	Native	33°44'36.5'' S	151°19'2.4'' E	1977	GBIF
80	Native	38°28'3.1'' S	145°24'42.8'' E	1977	GBIF
81	Native	38°28'12.0'' S	145°24'49.1'' E	1977	GBIF
82	Native	41°19'12.0'' S	148°16'48.0'' E	1977	GBIF
83	Native	41°17'60.0'' S	148°18'0.0'' E	1977	GBIF
84	Native	40°55'60.0'' S	148°19'60.0'' E	1977	GBIF
85	Native	40°55'60.0'' S	148°19'60.0'' E	1977	GBIF
86	Native	33°44'35.7'' S	151°19'2.2'' E	1978	GBIF
87	Native	33°44'36.3'' S	151°19'2.5'' E	1979	GBIF
88	Native	46°54'31.3'' S	168°7'21.0'' E	1979	GBIF
89	Native	38°18'49.8'' S	144°43'9.7'' E	1979	GBIF
90	Native	38°17'60.0'' S	144°41'60.0'' E	1979	GBIF
91	Native	41°9'45.0'' S	146°20'28.0'' E	1980	GBIF
92	Native	33°47'57.9'' S	151°18'3.2'' E	1980	GBIF
93	Native	32°43'8.0'' S	152°5'25.0'' E	1980	GBIF
94	Native	32°45'29.8'' S	152°10'32.7'' E	1980	GBIF
95	Native	33°43'57.0'' S	151°18'35.7'' E	1980	GBIF
96	Native	34°0'12.0'' S	151°13'18.0'' E	1982	GBIF
97	Native	36°37'10.4'' S	174°48'20.0'' E	1982	Healy & Willan 1984
98	Native	37°12'57.6'' S	150°1'6.0'' E	1983	GBIF
99	Native	42°23'24.4'' S	145°26'46.0'' E	1983	GBIF
100	Native	37°3'45.0'' S	149°54'34.4'' E	1983	GBIF

101	Native	41°9'28.3'' S	146°21'17.0'' E	1983	GBIF
102	Native	40°51'0.0'' S	145°30'0.0'' E	1984	GBIF
103	Native	41°9'48.0'' S	146°20'23.0'' E	1984	GBIF
104	Native	43°0'57.6'' S	147°55'58.8'' E	1984	GBIF
105	Native	41°7'58.8'' S	146°9'57.6'' E	1984	GBIF
106	Native	41°8'60.0'' S	146°33'57.6'' E	1984	GBIF
107	Native	42°54'30.2'' S	147°20'51.4'' E	1990	GBIF
108	Native	42°52'58.4'' S	147°20'3.1'' E	1992	GBIF
109	Native	42°58'23.9'' S	147°22'26.9'' E	1993	GBIF
110	Native	42°57'55.1'' S	147°22'54.6'' E	1993	GBIF
111	Native	38°22'48.0'' S	141°26'60.0'' E	1994	GBIF
112	Native	38°22'48.0'' S	141°26'60.0'' E	1994	GBIF
113	Native	43°3'28.8'' S	147°19'49.8'' E	1994	GBIF
114	Native	41°9'45.0'' S	146°21'22.7'' E	1995	GBIF
115	Native	38°19'51.2'' S	141°36'41.9'' E	1996	GBIF
116	Native	38°19'51.8'' S	141°36'41.3'' E	1996	GBIF
117	Native	38°20'48.0'' S	141°36'55.2'' E	1996	Parry et al. 1997
118	Native	38°40'39.0'' S	145°37'13.2'' E	1997	GBIF
119	Native	38°40'39.0'' S	145°37'12.0'' E	1997	GBIF
120	Native	36°50'30.0'' S	175°7'47.7'' E	1997	Hayward et al. 1997
121	Native	36°52'7.6'' S	174°52'53.6'' E	2001	Gibson et al. 2003
122	Native	42°52'58.4'' S	147°20'3.1'' E	2002	GBIF
123	Native	35°50'11.6'' S	174°29'26.7'' E	2002	Inglis et al. 2006
124	Native	35°50'11.1'' S	174°29'28.9'' E	2002	Inglis et al. 2006
125	Native	36°49'23.0'' S	174°48'35.0'' E	2009	McNabb et al. 2010
126	Native	36°47'26.0'' S	174°46'57.0'' E	2009	McNabb et al. 2010
127	Native	36°52'0.9'' S	174°54'8.2'' E	2010	Wood et al. 2012
128	Native	35°50'39.8'' S	174°32'6.0'' E	2010	Wood et al. 2012
129	Native	37°0'35.5'' S	174°36'24.1'' E	2010	Wood et al. 2012
130	Native	41°17'12.1'' S	174°49'55.3'' E	2010	Wood et al. 2012
131	Native	36°53'25.3'' S	175°25'25.7'' E	2010	Wood et al. 2012
132	Native	36°49'51.1'' S	174°53'6.1'' E	2010	Wood et al. 2012
133	Native	36°48'46.2'' S	174°48'14.0'' E	2010	Taylor et al. 2015
134	Native	36°46'28.7'' S	174°46'24.4'' E	2010	Taylor et al. 2015
135	Native	36°48'55.7'' S	174°52'8.1'' E	2010	Taylor et al. 2015
136	Native	36°51'38.6'' S	174°53'32.7'' E	2010	Taylor et al. 2015
137	Native	36°52'31.4'' S	175°1'29.6'' E	2010	Taylor et al. 2015
138	Native	41°4'5.0'' S	173°5'21.2'' E	2010	Taylor et al. 2015
139	Native	34°0'2.5'' S	151°14'43.1'' E	2011	GBIF
140	Native	36°48'44.0'' S	174°52'48.0'' E	2011	Salvitti et al. 2015
141	Native	41°3'29.0'' S	173°5'28.0'' E	2012	GBIF
142	Native	37°38'7.0'' S	176°10'29.0'' E	2012	Khor et al. 2014
143	Native	37°34'60.0'' S	176°4'60.0'' E	2012	Khor et al. 2014
144	Native	37°34'36.8'' S	176°0'51.1'' E	2012	Salvitti et al. 2015
145	Native	41°4'60.0'' S	173°5'60.0'' E	2012	Salvitti et al. 2015
146	Native	37°38'38.0'' S	176°8'55.0'' E	2013	Salvitti et al. 2015
147	Native	36°55'45.4'' S	175°11'32.4'' E	NA	Morley et al. 2015
148	Native	36°50'37.6'' S	175°8'6.2'' E	NA	Morley et al. 2015
149	Native	36°47'13.6'' S	175°9'20.2'' E	NA	Morley et al. 2015
150	Native	36°48'16.3'' S	174°56'36.3'' E	NA	Morley et al. 2015
151	Native	36°48'39.3'' S	174°59'35.8'' E	NA	Morley et al. 2015
152	Native	36°46'55.0'' S	174°59'23.0'' E	NA	Morley et al. 2015
153	Native	36°52'48.8'' S	174°59'4.0'' E	NA	Morley et al. 2015
154	Native	36°51'48.0'' S	174°54'35.4'' E	NA	Morley et al. 2015
155	Native	36°53'32.3'' S	174°52'25.2'' E	NA	Morley et al. 2015
156	Native	36°22'43.3'' S	174°48'36.2'' E	NA	Morley et al. 2015
157	Native	36°17'18.2'' S	174°48'32.1'' E	NA	Morley et al. 2015
158	Native	35°48'52.9'' S	174°29'52.9'' E	NA	Morley et al. 2015

159	Native	35°10'1.4'' S	173°8'15.0'' E	NA	Morley et al. 2015
160	Native	35°39'14.0'' S	173°27'21.1'' E	NA	Morley et al. 2015
161	Native	36°50'59.2'' S	174°52'43.9'' E	NA	Morley et al. 2015
162	Native	36°49'29.2'' S	174°42'29.6'' E	NA	Morley et al. 2015
163	Native	36°51'14.3'' S	174°42'3.7'' E	NA	Morley et al. 2015
164	Native	36°49'49.1'' S	174°48'18.3'' E	NA	Morley et al. 2015
165	Native	36°49'45.2'' S	174°46'19.4'' E	NA	Morley et al. 2015
166	Native	36°47'35.8'' S	174°47'2.1'' E	NA	Morley et al. 2015
167	Native	36°37'31.5'' S	174°47'8.8'' E	NA	Morley et al. 2015
168	Native	36°36'20.7'' S	174°53'18.1'' E	NA	Morley et al. 2015
169	Native	36°23'50.3'' S	174°50'19.4'' E	NA	Morley et al. 2015
170	Native	36°23'0.5'' S	174°45'53.2'' E	NA	Morley et al. 2015
171	Native	36°16'9.6'' S	174°47'40.2'' E	NA	Morley et al. 2015
172	Native	36°4'34.2'' S	174°35'52.9'' E	NA	Morley et al. 2015
173	Native	35°30'15.5'' S	174°28'19.9'' E	NA	Morley et al. 2015
174	Native	35°17'26.4'' S	173°9'15.2'' E	NA	Morley et al. 2015
175	Native	35°14'0.1'' S	174°15'17.5'' E	NA	Morley et al. 2015
176	Native	36°47'26.0'' S	174°46'57.0'' E	NA	Chau et al. 2013
177	Native	37°56'15.0'' S	144°50'34.7'' E	NA	GBIF
178	Native	37°54'0.0'' S	144°58'48.0'' E	NA	GBIF
179	Native	37°58'12.0'' S	144°59'31.1'' E	NA	GBIF
180	Native	41°4'11.4'' S	145°53'59.4'' E	NA	GBIF
181	Native	41°9'30.0'' S	146°10'58.8'' E	NA	GBIF
182	Native	43°11'55.4'' S	147°23'3.2'' E	NA	GBIF
183	Native	43°12'5.6'' S	147°24'38.5'' E	NA	GBIF
184	Native	43°4'43.4'' S	147°17'3.6'' E	NA	GBIF
185	Native	42°54'45.2'' S	147°29'10.7'' E	NA	GBIF
186	Native	42°57'51.5'' S	147°31'52.2'' E	NA	GBIF
187	Native	42°50'46.0'' S	147°31'52.4'' E	NA	GBIF
188	Native	42°51'35.6'' S	147°36'34.5'' E	NA	GBIF
189	Native	41°55'44.8'' S	145°10'20.5'' E	NA	GBIF
190	Native	36°51'55.8'' S	174°45'56.1'' E	NA	GBIF
191	Invasive	34°42'9.7'' S	53°33'19.1'' W	2012	GEAC Team (pers. obs.)
192	Invasive	38°2'11.3'' S	57°31'28.9'' W	2012	GEAC Team (pers. obs.)
193	Invasive	39°9'30.3'' S	60°43'54.1'' W	2012	GEAC Team (pers. obs.)
194	Invasive	40°32'18.9'' S	61°40'46.7'' W	2012	GEAC Team (pers. obs.)
195	Invasive	42°44'20.0'' S	65°1'36.2'' W	2012	GEAC Team (pers. obs.)
196	Invasive	40°49'49.9'' S	64°49'46.7'' W	2013	GEAC Team (pers. obs.)
197	Invasive	41°37'51.7'' S	65°1'20.9'' W	2014	GEAC Team (pers. obs.)
198	Invasive	42°37'13.2'' S	64°15'29.8'' W	2015	GEAC Team (pers. obs.)
199	Invasive	42°46'43.6'' S	65°0'0.1'' W	2015	GEAC Team (pers. obs.)
200	Invasive	42°47'36.4'' S	64°56'38.5'' W	2015	GEAC Team (pers. obs.)
201	Invasive	42°44'14.8'' S	65°1'44.8'' W	2015	GEAC Team (pers. obs.)
202	Invasive	44°48'0.3'' S	65°42'1.8'' W	2015	Gastón Trobbiani (pers. comm.)

Slightly modified version of `ecospat.niche.dyn.index` function in the R package ‘`ecospat`’ (Broennimann et al. 2018) used to calculate niche metrics.

```

new.ecospat.niche.dyn.index <- function (z1, z2, intersection = NA) {
  w1 <- as.matrix(z1$w)
  w2 <- as.matrix(z2$w)
  glob1 <- as.matrix(z1$Z)
  glob2 <- as.matrix(z2$Z)
  if (!is.na(intersection)) {
    if (intersection == 0) {
      glob1[glob1 > 0] <- 1
      glob2[glob2 > 0] <- 1
    }
    else {
      quant.val <- quantile(glob1[glob1 > 0], probs = seq(0, 1, intersection))[2]
      glob1[glob1[] <= quant.val] <- 0
      glob1[glob1[] > quant.val] <- 1
      quant.val <- quantile(glob2[glob2 > 0], probs = seq(0, 1, intersection))[2]
      glob2[glob2[] <= quant.val] <- 0
      glob2[glob2[] > quant.val] <- 1
    }
  }
  glob <- glob1 * glob2
  w1 <- w1 * glob
  w2 <- w2 * glob
}
z.enl.cat <- (w1 + 2 * w2)/2
z.enl.cat[z.enl.cat != 1] <- 0
z.exp.cat <- z.enl.cat*glob1
z.exp.cat[z.exp.cat > 0] <- 1
z.enl.cat <- z.enl.cat-z.exp.cat
z.stable.cat <- (w1 + 2 * w2)/3
z.stable.cat[z.stable.cat != 1] <- 0
z.res.cat <- w1 + 2 * w2
z.res.cat[z.res.cat != 1] <- 0
z.unf.cat <- z.res.cat*glob2
z.unf.cat[z.unf.cat > 0] <- 1
z.res.cat <- z.res.cat-z.unf.cat
z12 <- z2$z.uncor/2 + z1$z.uncor/2
obs.exp <- as.matrix(z2$z.uncor) * as.matrix(z.exp.cat)
obs.enl <- as.matrix(z2$z.uncor) * as.matrix(z.enl.cat)
obs.stab <- as.matrix(z1$z.uncor) * as.matrix(z.stable.cat)
obs.stab.2 <- as.matrix(z2$z.uncor) * as.matrix(z.stable.cat)
obs.res <- as.matrix(z1$z.uncor) * as.matrix(z.res.cat)
obs.unf <- as.matrix(z1$z.uncor) * as.matrix(z.unf.cat)
obs.exp.p <- as.matrix(z12) * as.matrix(z.exp.cat)
obs.enl.p <- as.matrix(z12) * as.matrix(z.enl.cat)
obs.stab.p <- as.matrix(z12) * as.matrix(z.stable.cat)
obs.res.p <- as.matrix(z12) * as.matrix(z.res.cat)
obs.unf.p <- as.matrix(z12) * as.matrix(z.unf.cat)
dyn <- (-1 * z.exp.cat) + (2 * z.stable.cat) + z.unf.cat
if (ncol(w1) == 2) {
  dyn <- raster(dyn)
}
expansion.index.w <- sum(obs.exp)/sum(obs.stab.2 + obs.exp + obs.enl)
enlargement.index.w <- sum(obs.enl)/sum(obs.stab.2 + obs.enl + obs.exp)
stability_n.index.w <- sum(obs.stab)/sum(obs.stab + obs.unf + obs.res)
stability_i.index.w <- sum(obs.stab.2)/sum(obs.stab.2 + obs.exp + obs.enl)
restriction.index.w <- sum(obs.res)/sum(obs.res + obs.unf + obs.stab)
unfilling.index.w <- sum(obs.unf)/sum(obs.res + obs.unf + obs.stab)
expansion_p.index.w <- sum(obs.exp.p)/sum(obs.unf.p+obs.res.p+obs.stab.p+obs.enl.p+obs.exp.p)
enlargement_p.index.w <- sum(obs.enl.p)/sum(obs.unf.p+obs.res.p+obs.stab.p+obs.enl.p+obs.exp.p)
stability_p.index.w <- sum(obs.stab.p)/sum(obs.unf.p+obs.res.p+obs.stab.p+obs.enl.p+obs.exp.p)
restriction_p.index.w <- sum(obs.res.p)/sum(obs.unf.p+obs.res.p+obs.stab.p+obs.enl.p+obs.exp.p)
unfilling_p.index.w <- sum(obs.unf.p)/sum(obs.unf.p+obs.res.p+obs.stab.p+obs.enl.p+obs.exp.p)
part <- list()
part$specific.index.w <- c(expansion.index.w, enlargement.index.w, stability_i.index.w, stability_n.index.w, restriction.index.w, unfilling.index.w)
names(part$specific.index.w) <- c("expansion", "enlargement", "stability_invasive", "stability_native", "restriction", "unfilling")
part$pooled.index.w <- c(expansion_p.index.w, enlargement_p.index.w, stability_p.index.w, restriction_p.index.w, unfilling_p.index.w)
names(part$pooled.index.w) <- c("expansion_p", "enlargement_p", "stability_p", "restriction_p", "unfilling_p")
return(part)}

```

LITERATURE CITED

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