APPENDIX N. Results of alternative analysis (Approach 2), where host density is included as a predictor in models of parasite abundance for individual parasite species.

When building models for individual parasite abundance, we were faced with a choice: on one hand, we were interested in the effect of host density on parasite abundance, and so we wanted to include it in the GLMM models for each individual parasite. On the other hand, host density was, for a few host–parasite combinations, collinear with productivity and the power of our models was already stretched thin with covariates that we could not exclude (e.g., host body size, depth of collection of the host). Ultimately, we chose to include in the main text of the paper only the models **without** host density (Approach 1); however, we wanted to make sure our results were robust to this choice. Below are the results that emerge from the analysis that **includes** host density as a predictor in GLMMs for individual parasite species (Approach 2). The results are qualitatively similar to those presented in the main text of the paper; the main difference is that, because power is lower in Approach 2, patterns tend to be weaker by that approach.

Methods

Approach 2 differed slightly from Approach 1. We used a generalized linear mixed effects model (GLMM) with negative binomial error structure and correction for zero-inflation to assess the response of parasite abundance to productivity and fishing pressure for each host–parasite combination in the across-islands dataset. Predictors included productivity (measured as mean [chl-*a*] for each island), fishing status (fished versus unfished), and (in Approach 2 only) **host density** (standardized coefficient for the effect of productivity on host density from ANOVA models performed within host species) as fixed factors and island (Jarvis, Kingman, Palmyra, Teraina, Tabuaeran, Kiritimati) as a random factor to account for the nested observations of parasite abundance for the numerous individual fish from each island. Two additional covariates with the potential to influence parasite abundance were also included: body size of the host (measured as total length) and depth of collection of the host. **Inclusion of host density as a factor in individual parasite GLMMs is the main difference between Approach 2 and Approach 1.** Due to low statistical power, some Approach 2 GLMMs did not converge; these parasite species were excluded from further analysis.

To investigate differences in the response to productivity among groups of parasite taxa detected in the across-islands dataset, we performed meta-analyses. For effect size estimates, we used **(*i*) regression coefficients for the effect of productivity on abundance of each parasite and (*ii*) regression coefficients for the effect of host density on the abundance of each parasite,** extracted from the models described above. We began by calculating a cumulative effect size of productivity across all host–parasite combinations, using a fixed-effects model weighted by the inverse of the variance for each effect size, to test *Hypothesis 1*. We tested our remaining hypotheses with several meta-analytic fixed-effects general linear models. Model 1 included the response "parasite response to productivity" and the moderator higher order taxonomic grouping of the parasite, and was designed to test *Hypothesis 2a.* Model 2 included the response "parasite response to productivity" and the moderators parasite transmission strategy (*Hypotheses 2a and 2b*) and host specificity (*Hypothesis 2c*). Model 3 included the response "relationship between parasite abundance and host density" and the moderators parasite transmission strategy (*Hypotheses 2a and 2b*) and host specificity (*Hypothesis 2c*). All analyses were performed with the *metafor* package in *R*. This meta-analytic approach allowed us to gain power by pooling replication across parasite taxa within parasite groups – essentially, averaging across the idiosyncratic responses of individual taxa to get at the general relationship that characterizes larger groups of taxa sharing certain traits.

Results

Overall, results were consistent between Approach 1 (main text) and Approach 2 (results reported below, in **Tables N1 and N2**), although Approach 2 appeared to have less statistical power to detect effects. A total of 45 parasite species were included in Approach 1 (see main text), but due to lack of power, some models failed to converge by Approach 2 (**Table N1**); we therefore excluded these parasites, leaving a total of 41 parasites for analysis by Approach 2. The cumulative effect size of productivity across all combinations was significantly greater than zero in both Approach 1 (**FIGURE 3A**; mean ± SE = 9.59 ± 1.22, df = 44, $p < 0.0001$) and Approach 2 (mean ± SE = 5.02 ± 2.05, df = 40, $p = 0.0141$), indicating that the overall effect was that parasite abundance increased with increasing productivity by both Approaches, consistent with *Hypothesis 1*. Trophically transmitted parasites had a significantly more positive response to productivity than did directly transmitted parasites, consistent with *Hypothesis 2a,* in both Approach 1 (**FIGURE 3A**; effect of transmission strategy[trophic]: estimate ± SE = 59.2 ± 12.2, $z = 4.86$, df = 39, $p < 0.0001$) and Approach 2 (effect of transmission strategy[trophic]: estimate ± SE = 38.2 ± 7.87, $z = 4.85$, df = 37, $p < 0.0001$). In Approach 1, the response of directly transmitted parasites to productivity did not differ significantly from zero, falsifying *Hypothesis 2b* (**FIGURE 3A**; estimate ± SE = 6.24 ± 15.5, $z = 0.401$, df = 39, $p = 0.68$). In contrast, according to Approach 2, directly transmitted parasites did have a positive response to productivity (estimate ± SE = 24.6 ± 8.14, $z = 3.02$, df = 37, $p = 0.0026$). By Approach 1, both cestodes and trematodes exhibited a significant positive response to productivity, while the response of the remainder of the parasites did not differ significantly from zero (with crustaceans having the most negative, although non-significant, response; **FIGURE 3B**). By Approach 2, only cestodes had a significant positive response to productivity, crustaceans had a significant negative response to productivity, and the remainder of the parasites did not differ significantly from zero (**Table N2**). According to Approach 1, specialist parasites exhibited a more positive response to increasing productivity than did generalist parasites (**FIGURE 3D**; estimate ± SE = –12.2 ± 3.65, z = –3.33, df = 39, p = 0.0009), contradicting *Hypothesis 2c.* The same pattern was observed by Approach 2 (estimate ± SE = –14.6 ± 2.52, z = –19.5, df = 38, p < 0.0001).

Approach 1 and Approach 2 varied in their treatment of the variable host density: Approach 1 used meta-analysis to test the effect of host density response to productivity on the response of parasite abundance to productivity, while Approach 2 calculated the response to host density for every parasite species and then used meta-analysis to summarize patterns across parasite species. The two approaches yield similar results. According to Approach 1, the response of parasite abundance to productivity was positively related to the response of their hosts to productivity for directly transmitted parasites and unrelated for trophically transmitted parasites (**FIGURE 3C**; effect of transmission strategy[trophic]*host density response interaction: estimate ± –16.0 ± 5.05, z = –3.17, df = 39, p = 0.0015). By Approach 2, this difference between directly and trophically transmitted parasites (i.e., with respect to the magnitude and direction of the relationship between “parasite abundance” and “host density response”) matched results from Approach 1 in some ways, but not in others. In Approach 2, the abundance of directly transmitted parasites did not correlate significantly with the density of their hosts (estimate ± –21.7 ± 13.5, z = –1.60, df = 41, p = 0.1085), and the abundance of trophically transmitted parasites correlated negatively with the density of their hosts (estimate ± –43.7 ± 12.5, z = –3.49, df = 41, p = 0.0005). In Approach 1, specialist parasites were less responsive to increases in the abundance of their focal hosts than were generalist parasites (estimate ± SE = 2.97 ± 1.41, z = 2.12, df = 39, p = 0.0343), also contradicting *Hypothesis 2c.* The same pattern was observed in Approach 2 (estimate ± SE = 16.2864 ± 4.25, z = 3.83, df = 41, p < 0.0001).

Discussion

In general, Approaches 1 and 2 yielded similar results, although Approach 2 had less statistical power to detect effects; this is probably due to the inclusion of the additional covariate ("host density") in the individual parasite species GLMMs in Approach 2. We show results only from Approach 1 in the text, and summarize the similarities and differences between findings of Approach 1 and Approach 2 here.

The overall response of parasite abundance to productivity was positive by both Approaches, with trophically transmitted parasites displaying a significantly more positive response than directly transmitted parasites (probably due to the dependence of trophically transmitted parasites on planktonic intermediate hosts whose abundance correlates positively with productivity). It is important to note that this difference between trophically transmitted and directly transmitted parasites exists both when considering the response of parasites to productivity irrespective of the response of their focal hosts to productivity (Approach 1) and when the effect of host density is removed (Approach 2). The response to productivity within the higher-order parasite taxonomic groups was similar between the two Approaches, with cestodes and trematodes having generally positive responses to productivity (although response of trematodes was non-significant by Approach 2), and crustaceans having generally negative responses to productivity (although response of crustaceans was non-significant by Approach 1).

Both Approaches also agreed that directly transmitted parasites responded more positively to increases in the density of their hosts than did trophically transmitted parasites, although the magnitude of the respective relationships between parasite abundance and host density varied between the two approaches (Approach 1: + for directly transmitted parasites, non-significant for trophically transmitted parasites; Approach 2: non-significant for directly transmitted parasites, – for trophically transmitted parasites). The abundance of trophically transmitted parasites may be negatively related to host density if host density is negatively related to the density of some other species that is also a host for the parasite; for example, if a cestode is found in a surgeonfish, that surgeonfish is prey for a shark that is the cestode's final host, and the shark is reduced in abundance by low productivity, surgeonfish abundance may increase in response to release from predation, while cestode abundance may decline in response to loss of a final host. These results are not inconsistent with those presented in the text – they suggest weak relationships between parasite abundance and host density, possibly positive for directly transmitted parasites and negative for trophically transmitted parasites.

Both Approaches showed that specialist parasites had more positive responses to productivity than did generalist parasites. The reason for this difference remains obscure, because both Approaches also agreed that specialist parasites were less responsive to increases in the abundance of their hosts than were generalist parasites. It is possible that specialist parasites are responding to increases in the abundance of hosts other than the hosts from which they were detected.

Appendix Table N1. Results of GLMMs for each host–parasite combination **in the across-islands data set, including host density as a predictor (i.e., by "Approach 2"; "Approach 1", represented by models reported in the main text, does not include host density as a predictor)**. *Z* = standardized regression coefficient or *z*-score for the effect of each parameter on parasite abundance. For the parameter fishing status (fished versus unfished), positive *z*-scores indicate higher parasite abundance on fished islands, and negative *z*-scores indicate higher parasite abundance on unfished islands. *P* values were corrected for multiple comparisons by the FDR method (Benjamini and Hochberg 1995).

Host species	Parasite group	Parasite taxon	Parasite abundance analysis						
			parameter	**estimate**	**SE**	**n**	**Z**	**raw p**	**corrected p for prod. / host density**
Cephalopholis urodeta	Crustacea	Grandiunguid sp.	productivity	–3.4139	10.7980	162	–0.32	0.75	0.95 / 1.0
			host density	1.0184	19.9320		0.05	0.96	
			fishing status	1.9545	0.9581		2.04	0.0414	
			TL	0.0026	0.0051		0.51	0.61	
			depth	–0.0499	0.0142		–3.53	0.0004	
		Hatschekia sp.	productivity	–45.7275	19.8260	162	–2.31	0.0210	0.0810 / 0.64
			host density	18.8012	21.4720		0.88	0.38	
			fishing status	1.4957	1.0921		1.37	0.17	
			TL	0.0424	0.0100		4.24	2.2e-5	
			depth	0.0089	0.0163		0.54	0.59	
	Monogenea	*Neobenedenia* sp.	productivity	51.6678	21.7330	162	2.37	0.018	0.0729 / 0.19
			host density	–70.6678	37.1480		–1.89	0.058	
			fishing status	3.8418	1.7917		2.14	0.0320	
			TL	0.0177	0.0094		1.89	0.058	
			depth	–0.0283	0.0262		–1.08	0.28	
	Trematoda	fin metacercariae	productivity	–37.9536	13.9530	162	–2.72	0.0065	0.0339 / 0.0012
			host density	100.5691	25.1510		4.00	6.4e-5	
			fishing status	–6.1627	1.1864		–5.19	2.1e-7	
			TL	0.0108	0.0059		1.81	0.0706	
			depth	0.0337	0.0189		1.79	0.0738	
		gill metacercariae	productivity	n/a	n/a	n/a	n/a	n/a	Model won't converge
			fishing status						
			TL						
			depth						

		visceral metacercariae	productivity	70.4130	22.5600	162	3.12	0.0018	0.0133 / 0.64
			host density	–31.4572	35.7030		–0.88	0.38	
			fishing status	0.5074	1.9588		0.26	0.80	
			TL	0.0113	0.0095		1.19	0.23	
			depth	–0.0404	0.0381		–1.06	0.29	
		Stephanostomum sp.	productivity	4.4327	11.1430	162	0.40	0.69	0.94 / 0.42
			host density	–31.0452	23.3610		–1.33	0.18	
			fishing status	1.3434	1.0659		1.26	0.208	
			TL	0.0072	0.0041		1.75	0.0800	
			depth	–0.0319	0.0198		–1.61	0.1070	
		Prosorhynchus sp.	productivity	86.0863	45.9390	162	1.87	0.0610	0.19 / 0.19
			host density	–125.906	67.9990		–1.85	0.0640	
			fishing status	5.9581	3.8386		1.55	0.1210	
			TL	–0.0341	0.0204		–1.67	0.0950	
			depth	–0.0881	0.0731		–1.21	0.2280	
	Nematoda	larval nematodes	productivity	16.3587	26.8820	162	0.61	0.54	0.81 / 1.0
			host density	1.5286	47.9690		0.03	0.97	
			fishing status	1.7159	2.9278		0.59	0.56	
			TL	0.0024	0.0105		0.23	0.82	
			depth	–0.0169	0.0505		–0.34	0.74	
		dead nematodes	productivity	–3.1132	8.2469	162	–0.38	0.71	0.94 / 0.78
			host density	9.7351	14.3200		0.68	0.50	
			fishing status	–1.7725	0.7011		–2.53	0.0110	
			TL	–0.0003	0.0057		–0.05	0.96	
			depth	0.0036	0.0123		0.30	0.77	
Ctenochaetus marginatus	Crustacea	Grandiunguid sp. 1	productivity	–86.2248	34.2300	141	–2.52	0.0118	0.0503 / 0.0342
			host density	139.3991	52.1410		2.67	0.0075	
			fishing status	6.4549	1.1283		5.72	1.1e-8	
			TL	0.0096	0.0041		2.35	0.0190	
			depth	–0.0529	0.0223		–2.38	0.0175	
		Grandiunguid sp. 2	productivity	–95.8528	25.1170	141	–3.82	0.0001	0.0012 / 1.98e-6
			host density	176.2106	32.3030		5.45	4.9e-8	
			fishing status	7.4599	0.7841		9.51	< 2e-16	
			TL	0.0168	0.0046		3.62	0.0003	
			depth	–0.0170	0.0198		–0.86	0.3914	
		Lepeophtheirinae sp.	productivity	–4.9533	30.7910	141	–0.16	0.87	1.0 / 0.58
			host density	–91.2863	85.7070		–1.07	0.29	
			fishing status	1.6932	1.7271		0.98	0.33	
			TL	0.0235	0.0084		2.80	0.0051	

			depth	–0.0464	0.0285		–1.07	0.29	
		Gnathiid sp.	productivity	1.13e+2	3.90e+2	141	0.29	0.77	0.95 / 0.95
			host density	-2.13e+2	6.72e+2		–0.32	0.75	
			fishing status	-3.16e+1	2.23e+5		0.00	1.00	
			TL	-2.04e-2	1.36e-2		–1.49	0.13	
			depth	2.10e-2	3.93e-2		0.54	0.59	
	Monogenea	*Ancyrocephalid* sp.	productivity	10.4427	10.2190	141	1.02	0.307	0.58 / 0.62
			host density	–16.0037	17.0170		–0.94	0.35	
			fishing status	0.4260	0.3858		1.10	0.27	
			TL	0.0066	0.0033		2.02	0.0440	
			depth	0.0097	0.0081		1.19	0.23	
	Trematoda	fin metacercariae	productivity	-2.98e+3	7.67e+2	141	–3.89	0.0001	0.0012 / 0.0012
			host density	5.01e+3	1.27e+3		3.93	8.6e-5	
			fishing status	-3.53e+1	8.9100		–3.96	7.6e-5	
			TL	1.43e-3	7.67e-3		0.19	0.85	
			depth	7.18e-1	1.93e-1		3.73	0.0002	
		gill metacercariae	productivity	14.7349	19.0670	141	0.77	0.44	0.73 / 0.45
			host density	–40.9915	32.7230		–1.25	0.21	
			fishing status	–2.5234	0.7750		–3.26	0.0011	
			TL	0.0053	0.0047		1.14	0.26	
			depth	0.0158	0.0105		1.51	0.1311	
		Fellodistomatid sp.	productivity	-1.91e+2	1.94e+2	256	–0.99	0.32	0.58 / 0.52
			host density	3.77e+2	3.28e+2		1.15	0.25	
			fishing status	3.3700	2.9900		1.13	0.26	
			TL	-1.53e-3	1.07e-2		–0.14	0.89	
			depth	4.55e-2	4.36e-2		1.04	0.30	
	Cestoda	Tetraphyllidean sp.	productivity	6.8392	19.0610	141	0.36	0.72	0.94 / 0.94
			host density	13.4332	31.6810		0.42	0.67	
			fishing status	–0.7504	0.7301		–1.03	0.30	
			TL	0.0270	0.0050		5.36	8.2e-8	
			depth	–0.0121	0.0127		–0.95	0.34	
	Nematoda	larval nematodes	productivity	64.6932	38.6600	177	1.67	0.0943	0.25 / 0.1082
			host density	–147.219	67.5770		–2.18	0.0294	
			fishing status	–3.3799	1.8572		–1.82	0.0688	
			TL	0.0546	0.0104		5.23	1.7e-7	
			depth	–0.0592	0.0277		–2.14	0.0326	
		Spirocamallanus sp.	productivity	–88.1644	23.7120	256	–3.72	0.0002	0.0020 / 0.0299
			host density	113.4935	40.2830		2.82	0.0048	

			fishing status	4.3795	0.8062		5.43	5.6e-8	
			TL	0.0186	0.0054		3.47	0.0005	
			depth	–0.0325	0.0180		–1.80	0.0715	
	Acanthocephala	Acanthocephalan sp.	productivity	–803.057	548.280	256	–1.46	0.1400	0.34 / 0.36
			host density	1002.286	695.1900		1.44	0.15	
			fishing status	24.8454	17.4200		1.43	0.15	
			TL	0.1310	0.0847		1.55	0.1200	
			depth	0.2346	0.1196		1.96	0.0500	
Acanthurus nigricans	Crustacea	Lepeophtheirinae sp.	productivity	-4.35e+2	1.96e+4	137	–0.02	0.98	1.0 / 1.0
			host density	1.19e+2	5.53e+3		0.02	0.98	
			fishing status	2.42e+1	1.13e+3		0.02	0.98	
			TL	–4.22e-3	2.10e-2		–0.20	0.84	
			depth	6.73e-3	5.83e+3		0.02	0.98	
	Trematoda	fin metacercariae	productivity host density fishing status TL depth	n/a	n/a	n/a	n/a	n/a	Model won't converge
		gill metacercariae	productivity	–4.3137	4.3719	137	–0.99	0.32	0.58 / 0.75
			host density	5.4436	7.3414		0.74	0.46	
			fishing status	–0.4828	0.5915		–0.82	0.41	
			TL	0.0102	0.0071		1.44	0.15	
			depth	–0.0288	0.0170		–1.70	0.0890	
		Stephanostomum sp.	productivity	-1.16e+1	3.04e+1	137	–0.38	0.70	0.94 / 1.0
			host density	–2.69	1.50e+1		–0.18	0.86	
			fishing status	1.82e+1	2.42e+3		–0.01	0.51	
			TL	–9.00e-3	1.38e-2		–0.65	0.51	
			depth	–8.45e-3	3.28e-2		–0.26	0.80	
		Microscaphiid sp.	productivity	40.1903	4.4561	232	9.02	2e-16	1.6e-14 / 0.96
			host density	–1.8460	6.7800		–0.27	0.79	
			fishing status	0.2500	0.4820		0.52	0.60	
			TL	0.0271	0.0038		7.09	1.4e-12	
			depth	0.0052	0.0154		0.34	0.73	
	Cestoda	Tetraphyllidean sp.	productivity	33.4104	6.3140	137	2.86	0.0042	0.0284 / 0.0032
			host density	–41.2404	11.5300		–3.58	0.0004	
			fishing status	–2.3943	0.8368		–2.86	0.0042	
			TL	0.0111	0.0194		1.65	0.0981	
			depth	–0.0119	0.0194		–0.61	0.5387	

	Nematoda	Cucullanid sp.	productivity	–18.6663	18.9040	232	–0.99	0.32	0.58 / 0.29
			host density	–24.8848	15.7070		–1.58	0.11	
			fishing status	0.5536	1.4462		0.38	0.70	
			TL	0.0061	0.0057		1.06	0.29	
			depth	0.0231	0.0227		1.02	0.31	
Paracirrhites arcatus	Trematoda	fin metacercariae	productivity	-3.28e+1	1.23e+1	129	–2.67	0.0076	0.0342 / 0.0032
			host density	-8.68e+1	2.46e+1		–3.52	0.0004	
			fishing status	–2.05e-1	5.62e-1		0.37	0.71	
			TL	7.72e-3	1.20e-2		0.64	0.5191	
			depth	7.69e-4	2.69e-2		0.03	0.9772	
	Trematoda	gill metacercariae	productivity	–28.3558	16.0440	129	–1.77	0.0770	0.22 / 0.19
			host density	–51.4177	27.0320		–1.90	0.0570	
			fishing status	–0.1109	0.7885		–0.14	0.89	
			TL	0.0457	0.0195		2.34	0.0190	
			depth	0.0325	0.0357		0.91	0.36	
		Stephanostomum sp.	productivity	–23.5162	12.5180	129	–1.88	0.0630	0.19 / 0.0339
			host density	–65.3021	23.7190		–2.75	0.0059	
			fishing status	1.1311	0.8493		1.33	0.18	
			TL	0.0393	0.0164		2.39	0.0167	
			depth	0.0756	0.0326		2.32	0.0205	
		Bucephalid sp.	productivity	–85.0060	83.5390	129	–1.02	0.31	0.58 / 0.33
			host density	–180.741	118.3500		–1.53	0.1300	
			fishing status	–3.7526	2.6197		–1.43	0.15	
			TL	0.0197	0.0256		0.77	0.44	
			depth	0.0740	0.0499		1.48	0.1400	
	Cestoda	Tetraphyllidean sp.	productivity	-4.27e+1	9.25e+2	129	–0.46	0.64	0.94 / 0.52
			host density	-1.37e+2	1.20e+2		–1.14	0.25	
			fishing status	2.4100	2.7000		0.89	0.37	
			TL	4.53e-2	1.34e-2		3.38	0.0007	
			depth	2.62e-3	1.62e-2		0.16	0.87	
	Nematoda	larval nematode	productivity	–10.9226	17.2570	129	–0.63	0.53	0.81 / 0.78
			host density	–22.8513	33.0670		–0.69	0.49	
			fishing status	–2.1689	0.8325		–2.61	0.0092	
			TL	0.0095	0.0173		0.55	0.58	
			depth	0.0263	0.0353		0.74	0.46	
Stegastes aureus	Trematoda	fin metacercariae	productivity	–0.6996	36.4420	143	–0.02	0.98	1.0 / 1.0
			host density	1.0538	39.7440		0.03	0.98	
			fishing status	–0.0807	4.1854		–0.02	0.98	
			TL	0.0089	0.0182		0.49	0.63	

			depth	–0.0011	0.0177		–0.06	0.95	
		Stephanostomum sp.	productivity host density fishing status TL depth	–32.4240 3.0909 1.6547 0.0420 –0.0237	7.9747 7.8034 0.8788 0.0237 0.0144	143	–4.07 0.40 1.88 1.77 –1.64	4.8e-5 0.69 0.0600 0.0770 0.1010	0.0012 / 0.94
	Cestoda	Tetraphyllidean sp.	productivity host density fishing status TL* depth*	102.3410 –42.5380 13.0350 –6.86e-3 –0.6870	5714.600 22317 1876.800 1.28e-1 30.2780	143	0.02 0.00 0.01 –0.05 –0.02	0.99 1.00 0.99 0.96 0.98	1.0 / 1.0
Chromis margaritifer	Crustacea	Grandiunguid sp. 1	productivity host density fishing status TL depth	35.4323 24.0883 –19.5006 –0.0107 –0.0784	2870.900 1050.100 927.1100 0.0430 0.0330	124	0.01 0.02 0.02 –0.25 –2.38	0.99 0.98 0.98 0.80 0.0180	1.0 / 1.0
		Grandiunguid sp. 2	productivity host density fishing status TL depth	-5.01e+3 1.72e+2 2.23e+2 –2.25e-1 -1.83e+1	3.15e+7 1.05e+6 1.44e+6 1.56e-1 2.72e+3	124	0.00 0.00 0.00 –1.44 –0.01	1.00 1.00 1.00 0.15 0.99	1.0 / 1.0
	Trematoda	gill metacercariae	productivity host density fishing status TL depth	–20.0458 0.0699 1.8429 0.0414 –0.0824	15.5810 1.4407 1.3908 0.0422 0.0488	124	–1.29 0.05 1.33 0.98 –1.69	0.20 0.96 0.19 0.33 0.0910	0.45 / 1.0
		Stephanostomum sp.	productivity host density fishing status TL depth	-3.43e+2 8.9500 1.82e+1 –1.78e-3 4.53e-2	1.27e+2 5.2500 5.9400 2.60e-2 4.93e-2	124	–2.71 1.70 3.07 –0.07 0.92	0.0067 0.0882 0.0021 0.95 0.36	0.0339 / 0.25
Pseudanthias bartlettorum	Crustacea	Grandiunguid sp. 1	productivity fishing status TL depth	n/a	n/a	n/a	n/a	n/a	Model won't converge
		Grandiunguid sp. 2	productivity fishing status TL	n/a	n/a	n/a	n/a	n/a	Model won't converge

			depth						
	Trematoda	Microscaphiid sp.	productivity host density fishing status TL depth	144.4724 –0.7755 –7.5415 0.0177 0.1031	348.9700 2.7125 23.2060 0.0423 0.0775	109	0.41 –0.29 0.32 0.42 1.33	0.68 0.77 0.75 0.68 0.18	1.0 / 0.95

APPENDIX TABLE N2. Results of general linear models for meta-analysis **by Approach 2**.

Model 1: Response of parasite abundance to productivity as a function of parasite higher-order taxonomic groups / across-islands analysis

Test of moderators, $Q_M = 39.1811$, $df = 4$, $p < 0.0001$

Test for residual heterogeneity, $Q_E = 194.9657$, $df = 35$, $p < 0.0001$

Parameter	**estimate**	**SE**	***z***	***p***	**hypothesis**
intercept[Cestoda]	30.7801	5.9936	5.1355	<0.0001	H_{2a}
Crustacea	–56.4711	10.2137	–5.5290	<0.001	H_{2a}
Monogenea	–12.8731	11.0201	–1.1681	0.2427	H_{2a}
Nematoda	–39.9157	8.7421	–4.5659	<0.0001	H_{2a}
Trematoda	–26.1896	6.4945	–4.0326	<0.0001	H_{2a}

Model 2: Response of parasite abundance to productivity as a function of parasite traits / across-islands analysis

Test of moderators $Q_M = 37.4926$, $df = 2$, $p < 0.0001$

Test for residual heterogeneity, $Q_E = 196.6542$, $df = 37$, $p < 0.0001$

Parameter	**estimate**	**SE**	***z***	***p***	**hypothesis**
intercept	24.5617	8.1428	3.0164	0.0026	
transmission[trophic]	38.2155	7.8720	4.8546	<0.0001	H_{2a}
host specificity	–14.6207	2.5189	–5.8043	<0.0001	H_{2c}

Model 3: Relationship between parasite abundance and host density as a function of parasite traits / across-islands analysis

Test of moderators, $Q_M = 42.4661$, $df = 5$, $p < 0.0001$

Test for residual heterogeneity, $Q_E = 80.3455$, $df = 41$, $p < 0.0001$

Parameter	**estimate**	**SE**	***z***	***p***	**hypothesis**
intercept	–21.7410	13.5469	–1.6049	0.1085	
transmission[trophic]	–43.6922	12.5158	–3.4910	0.0005	H_{2b}
host specificity	16.2864	4.2486	3.8334	0.0001	H_{2c}