Supplementary Information

for Taylor, N.G. & Dunn, A.M.

Predatory impacts of alien decapod Crustacea
are predicted by functional responses and explained by differences in metabolic rate

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1. Measurements of decapods used in each experiment

Table S1 Statistical comparisons of body size of decapod species used in each experiment. *Body size* is derived from principal components analysis of *mass* and maximum carapace dimension (*cmax*). For crayfish, cmax is carapace length (from tip of rostrum to posterior edge); for crabs, cmax is carapace width. For functional response (FR) experiments, each usage of an animal contributes its body size to the data set (so size data are weighted for the number of times a predator was used). For switching and metabolism experiments, each predator was only used once.

FR prey	Predator	Wet mass (g) mean ± SE	cmax (mm) mean ± SE	Body size mean ± SE	Test of equal overall body size		
					Kruskal Wallis χ^2	df	*p*
Amphipod	*A. pallipes*	9.9 ± 0.4	31.0 ± 0.4	−0.56 ± 0.19	1.13	2	0.567
	P. leniusculus	10.0 ± 0.3	32.1 ± 0.3	−0.27 ± 0.16			
	E. sinensis	11.8 ± 0.4	30.2 ± 0.3	−0.34 ± 0.18			
Chironomid	*A. pallipes*	10.8 ± 0.4	32.1 ± 0.3	−0.08 ± 0.16	1.48	2	0.477
	P. leniusculus	10.2 ± 0.2	32.6 ± 0.2	−0.09 ± 0.11			
	E. sinensis	12.1 ± 0.4	30.5 ± 0.3	−0.18 ± 0.18			
Gastropod	*A. pallipes*	10.4 ± 0.3	33.0 ± 0.3	0.03 ± 0.15	0.80	2	0.672
	P. leniusculus	10.1 ± 0.2	32.7 ± 0.2	−0.10 ± 0.09			
	E. sinensis	12.3 ± 0.3	30.8 ± 0.3	−0.06 ± 0.17			

Experiment	Predator	Wet mass (g) mean ± SE	cmax (mm) mean ± SE	Body size mean ± SE	Test of equal overall body size		
					ANOVA *F*	df	*p*
Switching	*A. pallipes*	10.6 ± 0.6	32.2 ± 0.5	−0.09 ± 0.25	0.08	2,92	0.920
	P. leniusculus	10.6 ± 0.6	32.4 ± 0.6	−0.04 ± 0.28			
	E. sinensis	12.7 ± 0.5	30.9 ± 0.4	0.05 ± 0.22			
Metabolism*	*A. pallipes*	12.1 ± 1.0	33.7 ± 0.9	0.63 ± 0.44	0.13	2,27	0.880
	P. leniusculus	11.7 ± 0.4	34.4 ± 0.4	0.70 ± 0.21			
	E. sinensis	14.3 ± 0.4	32.5 ± 0.3	0.83 ± 0.17			

* For analysis in the main text, metabolic rates were adjusted to the mean mass of animals used in FR experiments (Equation 7, main text). Analyses of metabolic rates adjusted to a common mass (11 g) are presented in Section S8.

2. Respirometry apparatus and cycle

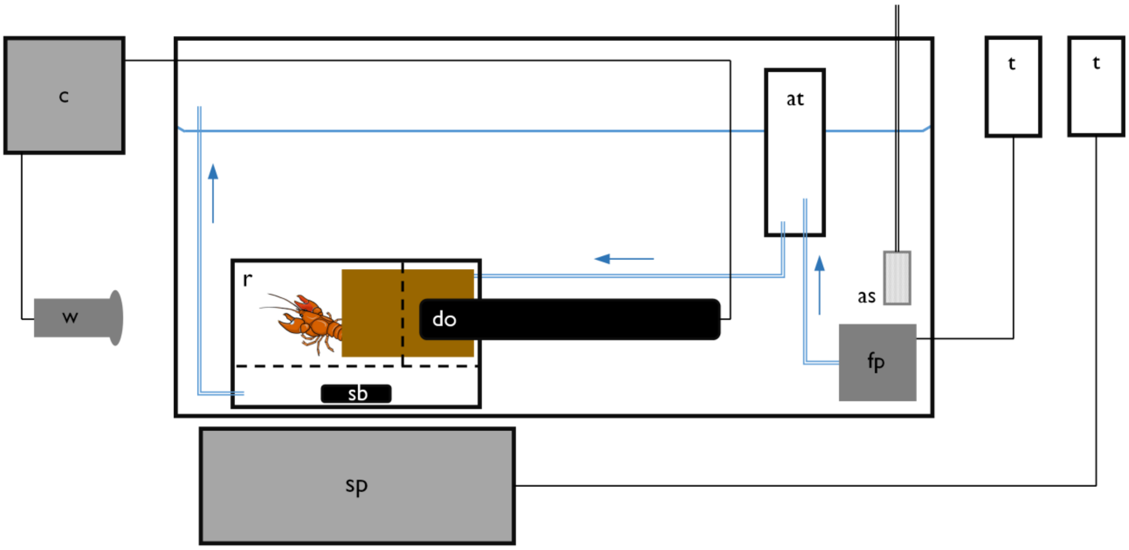

Fig. S2.1 Respirometry apparatus. *as* – air stone; *at* – air trap; *c* – computer for logging data; *do* – optical dissolved oxygen probe; *fp* – flush pump; *r* – respirometer, containing crayfish and shelter above a plastic mesh; *sb* – magnetic stir bar; *sp* – magnetic stir plate; *t* – electronic timers to control flush pump and stir plate; *w* – webcam. *Double blue lines* – 3 mm meter silicone tubing; *solid black lines* – electronic cables; *solid blue line* – water level in holding tank; *blue arrows* – direction of water flow. Filter/ultraviolet steriliser also present in holding tank and in continual operation (but not shown on diagram). Crayfish image: Emily Imhoff.

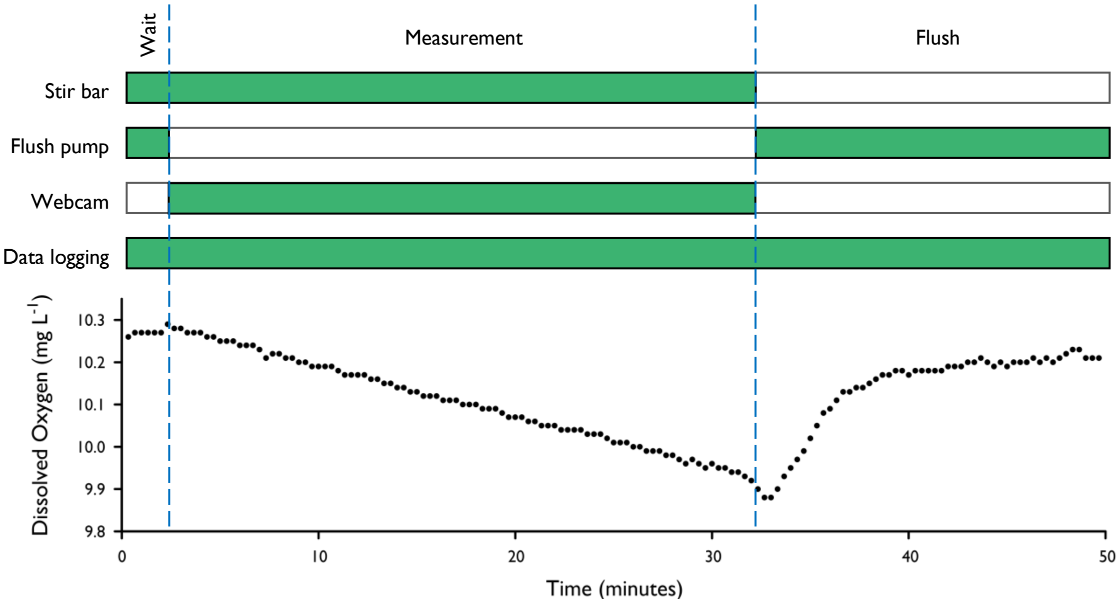

Fig. S2.2 One respirometry cycle for crayfish (2 minutes wait; 30 minutes measurement; 18 minutes flush). For crabs, the measurement phase was shorter (20 minutes), so the flush phase was extended (28 minutes) to maintain the overall cycle length. Eighteen cycles were completed per animal: nine in the dark phase and nine in the light phase. At the start of each 50 minute cycle, the magnetic stir bar was switched on (by an electronic timer; green in upper panel). After a 2 minute wait phase, the flush pump was switched off (by an electronic timer; white in upper panel) and the measurement phase began. Animals were recorded by webcam during the measurement phase. After the measurement phase, the stir bar was switched off and flush pump switched back on to replenish the respirometer with oxygenated water. Temperature- and pressure-compensated [DO] (mg O_2 L^{-1}) and temperature (°C) were logged every 20 seconds.

3. Details of main functional response analyses (size-matched predators, prey consumed)

Table S3.1 Parameter estimates and significance levels, from second order logistic regression of the proportion of prey consumed by decapod predators against initial prey density. Quasibinomial errors were used due to overdispersion. ϕ –dispersion parameter estimate; N_0 – first order term; N^2_0 – second order term.

A Type II FR is indicated by a significantly negative linear term, and a Type III FR by a significantly positive linear term followed by a significantly negative quadratic term. A non-significant linear term suggests a Type I FR (Juliano 2001; Alexander et al. 2012).

Prey	Decapod	ϕ	Intercept	*p*	N_0	*p*	N^2_0	*p*	Type
Amphipod	*A. pallipes*	2.64	−0.227	0.180	−0.018	< 0.001	3.733 x 10^{-5}	< 0.001	II
	P. leniusculus	3.03	0.891	< 0.001	−0.029	< 0.001	6.810 x 10^{-5}	< 0.001	II
	E. sinensis	4.02	2.216	< 0.001	−0.026	< 0.001	5.202 x 10^{-5}	< 0.001	II
Chironomid	*A. pallipes*	18.05	2.444	< 0.001	−0.007	< 0.001	3.760 x 10^{-6}	< 0.001	II
	P. leniusculus	25.90	3.122	< 0.001	−0.007	< 0.001	2.471 x 10^{-6}	< 0.001	II
	E. sinensis	29.54	3.565	< 0.001	−0.002	0.169	−1.032 x 10^{-6}	0.311	*II
Gastropod	*A. pallipes*	2.32	−1.240	< 0.001	−0.009	0.050	9.588 x 10^{-6}	0.545	*II
	P. leniusculus	2.05	−0.646	0.001	−0.011	0.003	1.296 x 10^{-5}	0.322	II
	E. sinensis	5.12	0.945	< 0.001	−0.029	< 0.001	6.195 x 10^{-5}	0.002	II

* Type II fit deemed to be most appropriate by comparing AIC values for Type I and Type II fits. Type II fits had lower AIC.

Table S3.2 Comparison of functional response parameter estimates for decapod predator consumption of macroinvertebrate prey, based on analysis using indicator variables in the *frair* package (Pritchard et al. 2017). Raw *p* values are presented; significant differences, after Holm-Bonferroni correction of α (0.05) within each prey group, are indicated in bold. *a* – attack coefficient (tanks.day^{-1}); *h* – handling time (days.prey item^{-1}); *D* – difference; *SE* – standard error.

Prey	Base Group	Comparison		Estimate (*Da* or *Dh*)	SE	*z*	*p*
Amphipod	*A. pallipes*	*P. leniusculus*	*a*	1.184	0.211	5.60	**< 0.001**
			h	< 0.001	0.003	−0.32	0.751
	P. leniusculus	*E. sinensis*	*a*	0.625	0.248	2.52	**0.012**
			h	−0.027	0.002	−15.06	**< 0.001**
	A. pallipes	*E. sinensis*	*a*	1.808	0.174	10.40	**< 0.001**
			h	−0.028	0.003	−10.73	**< 0.001**
Chironomid	*A. pallipes*	*P. leniusculus*	*a*	1.938	0.037	53.07	**< 0.001**
			h	< 0.001	< 0.001	−6.39	**< 0.001**
	P. leniusculus	*E. sinensis*	*a*	1.076	0.039	27.45	**< 0.001**
			h	−0.001	< 0.001	−39.92	**< 0.001**
	A. pallipes	*E. sinensis*	*a*	3.187	0.036	87.43	**< 0.001**
			h	−0.002	< 0.001	−28.60	**< 0.001**
Gastropod	*A. pallipes*	*P. leniusculus*	*a*	0.196	0.072	2.70	**0.007**
			h	0.012	0.008	−1.38	0.167
	P. leniusculus	*E. sinensis*	*a*	1.514	0.235	6.45	**< 0.001**
			h	< 0.001	0.005	0.02	0.984
	A. pallipes	*E. sinensis*	*a*	1.710	0.232	7.38	**< 0.001**
			h	−0.011	0.008	−1.49	0.136

4. Details of functional response analyses (size-matched predators, prey killed)

cf. analyses in main text using prey consumed as response variable. These data sets are for the same animals as used in the main text, but with a different response variable.

The death of prey that are not subsequently consumed will have implications for prey populations in the wild. Inferences based on consumption and killing may differ if consumption and killing are decoupled (e.g. if predators kill but do not completely consume prey; Dick et al. 2002).

Analyses generating FR curves using all prey killed were both qualitatively and quantitatively similar to the analyses presented in the main text and Section S3 (based on prey consumption): all curves were, or trended towards, Type II; significant differences between attack coefficients and handling times were as for Table 2 (main text); and attack coefficients were within 2% of those based on consumption. Maximum killing rates were always greater than maximum consumption rates (Table S4.4), indicating some partial consumption of prey (Table S4.5). In all predator species, partial consumption was more frequent on amphipod and gastropod prey (maximum killing rates 1.03 to 1.08 times maximum consumption rates; individual decapods consuming as little as 55% of the flesh of the prey they killed) than on chironomid larvae (maximum killing rates no more than 1.01 times maximum consumption rates; individual decapods consuming at least 95% of the flesh of the prey they killed).

Table S4.1 Parameter estimates and significance levels, from second order logistic regression of the proportion of prey killed by decapod predators against initial prey density. Quasibinomial errors were used due to overdispersion. ϕ – dispersion parameter estimate; N_0 – first order term; N^2_0 – second order term.

A Type II FR is indicated by a significantly negative linear term, and a Type III FR by a significantly positive linear term followed by a significantly negative quadratic term. A non-significant linear term suggests a Type I FR (Juliano 2001; Alexander et al. 2012).

Prey	Decapod	ϕ	Intercept	*p*	N_0	*p*	N^2_0	*p*	Type
Amphipod	*A. pallipes*	2.59	−0.194	0.245	−0.017	< 0.001	3.717 x 10^{-5}	< 0.001	II
	P. leniusculus	3.03	0.890	< 0.001	−0.029	< 0.001	6.620 x 10^{-5}	< 0.001	II
	E. sinensis	4.20	2.209	< 0.001	−0.025	< 0.001	4.899 x 10^{-5}	< 0.001	II
Chironomid	*A. pallipes*	17.82	2.461	< 0.001	−0.007	< 0.001	3.774 x 10^{-6}	< 0.001	II
	P. leniusculus	25.80	3.120	< 0.001	−0.007	< 0.001	2.457 x 10^{-6}	< 0.001	II
	E. sinensis	29.60	3.568	< 0.001	−0.002	0.168	−1.021 x 10^{-6}	0.317	*II
Gastropod	*A. pallipes*	2.30	−1.231	< 0.001	−0.009	0.041	1.129 x 10^{-5}	0.468	II
	P. leniusculus	1.99	−0.652	< 0.001	−0.011	0.003	1.327 x 10^{-5}	0.298	II
	E. sinensis	5.38	0.952	0.001	−0.028	< 0.001	5.943 x 10^{-5}	0.003	II

* Type II fit deemed to be most appropriate by comparing AIC values for Type I and Type II fits. Type II fit had lower AIC.

Table S4.2 Estimates of functional response parameters for decapod predators on three macroinvertebrate prey species, with *prey killed* as the response variable, extracted from Rogers' random predator equation fitted to data in the *frair* package (Pritchard et al. 2017). *a* – attack coefficient (tanks.day^{-1}); *h* – handling time (days.prey item^{-1}); 1/*h*T – maximum feeding rate (prey.day^{-1}), where T = time in days; *SE* – standard error. *Diff.* – within each prey item and for each parameter, different letters in this column indicate significantly different parameters (after Holm-Bonferroni correction for multiple comparisons).

Prey	**Decapod**	***a***	**SE**	**Diff.**	***h***	**SE**	**1/*h*T**	**Diff.**
Amphipod	*A. pallipes*	0.735	0.082	a	3.996×10^{-2}	2.425×10^{-3}	25.0	a
	P. leniusculus	1.878	0.189	b	3.968×10^{-2}	1.678×10^{-3}	25.2	a
	E. sinensis	2.487	0.148	c	1.297×10^{-2}	3.879×10^{-4}	77.1	b
Chironomid	*A. pallipes*	2.457	0.088	A	3.281×10^{-3}	6.285×10^{-5}	304.8	A
	P. leniusculus	4.373	0.130	B	2.879×10^{-3}	3.600×10^{-5}	347.3	B
	E. sinensis	5.450	< 0.001	C	1.542×10^{-3}	1.282×10^{-5}	648.3	C
Gastropod	*A. pallipes*	0.292	0.042	α	5.398×10^{-2}	6.965×10^{-3}	18.5	α
	P. leniusculus	0.482	0.056	β	4.247×10^{-2}	4.012×10^{-3}	23.5	α
	E. sinensis	1.972	0.218	γ	4.260×10^{-2}	2.405×10^{-3}	23.5	α

Table S4.3 Comparison of functional response parameter estimates for decapod predation (*killing*) of macroinvertebrate prey, based on analysis using indicator variables in the *frair* package (Pritchard et al. 2017). Raw *p* values are presented; significant differences, after Holm-Bonferroni correction of α (0.05) within each prey group, are indicated in bold. *a* – attack coefficient (tanks.day^{-1}); *h* – handling time (days.prey item^{-1}); *D* – difference; *SE* – standard error.

Prey	**Base Group**	**Comparison**		**Estimate (*Da* or *Dh*)**	**SE**	***z***	***p***
Amphipod	*A. pallipes*	*P. leniusculus*	*a*	1.143	0.206	5.55	**< 0.001**
			h	< 0.001	0.003	−0.10	0.922
	P. leniusculus	*E. sinensis*	*a*	0.609	0.240	2.54	**0.011**
			h	−0.027	0.002	−15.51	**< 0.001**
	A. pallipes	*E. sinensis*	*a*	1.751	0.169	10.38	**< 0.001**
			h	−0.027	0.002	−11.00	**< 0.001**
Chironomid	*A. pallipes*	*P. leniusculus*	*a*	1.918	0.037	52.46	**< 0.001**
			h	< 0.001	< 0.001	−6.33	**< 0.001**
	P. leniusculus	*E. sinensis*	*a*	1.079	0.039	27.53	**< 0.001**
			h	−0.001	< 0.001	−39.87	**< 0.001**
	A. pallipes	*E. sinensis*	*a*	2.994	0.035	84.57	**< 0.001**
			h	−0.002	< 0.001	−28.83	**< 0.001**
Gastropod	*A. pallipes*	*P. leniusculus*	*a*	0.190	0.070	2.73	**0.006**
			h	0.011	0.008	−1.43	0.153
	P. leniusculus	*E. sinensis*	*a*	1.490	0.225	6.61	**< 0.001**
			h	< 0.001	0.005	0.03	0.979
	A. pallipes	*E. sinensis*	*a*	1.679	0.222	7.56	**< 0.001**
			h	−0.011	0.007	−1.54	0.123

Table S4.4 Comparison of modelled attack coefficients (a; tanks.day^{-1}) and maximum feeding rates (1/hT; prey.day^{-1}) for decapod predation on macroinvertebrates, using prey consumed or prey killed as the response variable. h – handling time (days.prey item^{-1}); T – time (days).

Prey	**Decapod**	**Attack coefficient *a***			**Maximum feeding rate 1/*h*T**		
		Prey consumed	**Prey killed**	**killed/ consumed**	**Prey consumed**	**Prey killed**	**killed/ consumed**
Amphipod	*A. pallipes*	0.721	0.735	1.02	23.9	25.0	1.05
	P. leniusculus	1.905	1.878	0.99	24.5	25.2	1.03
	E. sinensis	2.529	2.487	0.98	71.7	77.1	1.08
Chironomid	*A. pallipes*	2.444	2.457	1.01	303.2	304.8	1.01
	P. leniusculus	4.382	4.373	1.00	346.3	347.3	1.00
	E. sinensis	5.456	5.450	1.00	647.0	648.3	1.00
Gastropod	*A. pallipes*	0.298	0.292	0.98	17.6	18.5	1.05
	P. leniusculus	0.494	0.482	0.98	22.1	23.5	1.06
	E. sinensis	2.006	1.972	0.98	22.1	23.5	1.06

Table S4.5 Observed consumption rates in functional response experiments, calculated as total amount of flesh consumed/total number of prey killed. The amount of flesh consumed was estimated from prey and parts of prey left after each feeding period. A value of 1 indicates that all prey was completely consumed. A value of 0 would indicate that some prey were killed but no flesh was consumed. Decapods that did not kill any prey were excluded from these calculations.

FR prey	**Predator**	**Mean**	**Range**
Amphipod	*A. pallipes*	0.96	0.55–1.00
	P. leniusculus	0.99	0.84–1.00
	E. sinensis	0.98	0.77–1.00
Chironomid	*A. pallipes*	>0.99	0.95–1.00
	P. leniusculus	>0.99	0.99–1.00
	E. sinensis	>0.99	0.98–1.00
Gastropod	*A. pallipes*	0.99	0.82–1.00
	P. leniusculus	0.98	0.66–1.00
	E. sinensis	0.97	0.81–1.00

5. Details of functional response analyses (mass-matched predators, prey consumed)

cf. analyses in main text where decapod predators are matched by body size (a combination of mass and maximum carapace dimension). Data sets were rarefied to ensure matching by body mass, removing one replicate for each species at each density. Thus, these analyses are based on five replicates per predator species x prey species x density combination (compared to six in the main text, Section S3 and Section S4).

Table S5.1 Sizes of animals used in each experiment, when matched by body mass. *cmax* – maximum carapace dimension: carapace length for crayfish and carapace width for crabs. *Body size* data not included as they are not relevant for these animals. Each usage of an animal contributes to the data set (so data are weighted for the number of times a predator was used)

Prey	**Decapod**	**Wet mass (g)**	**cmax (mm)**	**Body size**	**Difference in body mass**		
		Mean ± SE	**Mean ± SE**	**Mean ± SE**	**Kruskal Wallis χ^2**	**df**	***p***
Amphipod	*A. pallipes*	10.0 ± 0.4	31.1 ± 0.4	–	3.47	2	0.177
	P. leniusculus	10.5 ± 0.3	32.8 ± 0.3	–			
	E. sinensis	11.1 ± 0.3	29.8 ± 0.3	–			
Chironomid	*A. pallipes*	10.7 ± 0.4	32.0 ± 0.4	–	0.98	2	0.613
	P. leniusculus	10.4 ± 0.2	32.9 ± 0.3	–			
	E. sinensis	10.9 ± 0.3	29.6 ± 0.3	–			
Gastropod	*A. pallipes*	10.4 ± 0.3	32.9 ± 0.3	–	1.23	2	0.542
	P. leniusculus	10.4 ± 0.2	32.9 ± 0.2	–			
	E. sinensis	10.9 ± 0.3	29.3 ± 0.3	–			

Table S5.2 Parameter estimates and significance levels, from second order logistic regression of the proportion of prey consumed by decapod predators against initial prey density. Quasibinomial errors were used due to overdispersion. ϕ – dispersion parameter estimate; N_0 – first order term; N^2_0 – second order term.

A Type II FR is indicated by a significantly negative linear term, and a Type III FR by a significantly positive linear term followed by a significantly negative quadratic term. A non-significant linear term suggests a Type I FR (Juliano 2001; Alexander et al. 2012).

Prey	**Decapod**	**ϕ**	**Intercept**	***p***	**N_0**	***p***	**N^2_0**	***p***	**Type**
Amphipod	*A. pallipes*	2.60	−0.197	0.281	−0.018	< 0.001	3.965×10^{-5}	< 0.001	II
	P. leniusculus	2.91	0.852	< 0.001	−0.029	< 0.001	6.647×10^{-5}	< 0.001	II
	E. sinensis	3.30	1.964	< 0.001	−0.024	< 0.001	4.934×10^{-5}	< 0.001	II
Chironomid	*A. pallipes*	19.82	2.448	< 0.001	−0.007	< 0.001	3.773×10^{-6}	< 0.001	II
	P. leniusculus	21.34	3.413	< 0.001	−0.007	< 0.001	2.958×10^{-6}	< 0.001	II
	E. sinensis	32.93	3.578	< 0.001	−0.002	0.218	-9.723×10^{-7}	0.408	*II
Gastropod	*A. pallipes*	2.30	−1.240	< 0.001	−0.009	0.050	9.588×10^{-6}	0.545	*II
	P. leniusculus	1.86	−0.535	0.004	−0.015	< 0.001	2.875×10^{-5}	0.027	II
	E. sinensis	5.67	0.449	0.115	−0.027	< 0.001	6.254×10^{-5}	0.004	II

* Type II fit deemed to be most appropriate by comparing AIC values for Type I and Type II fits. Type II fits had lower AIC.

Table S5.3 Estimates of functional response parameters for decapod predators on three macroinvertebrate prey species, with *prey consumed* as the response variable, extracted from Rogers' random predator equation fitted to data in the *frair* package (Pritchard et al. 2017). *a* – attack coefficient (tanks.day^{-1}); *h* – handling time (days.prey item^{-1}); 1/*h*T – maximum feeding rate (prey.day^{-1}), where T = time in days; *SE* – standard error. *Diff.* – within each prey item and for each parameter, different letters in this column indicate significantly different parameters (after Holm-Bonferroni correction for multiple comparisons)

Prey	**Decapod**	***a***	**SE**	**Diff.**	***h***	**SE**	**1/*h*T**	**Diff.**
Amphipod	*A. pallipes*	0.725	0.090	a	4.217×10^{-2}	2.822×10^{-3}	23.7	a
	P. leniusculus	1.749	0.190	b	3.982×10^{-2}	1.865×10^{-3}	25.1	a
	E. sinensis	2.200	0.147	b	1.317×10^{-2}	4.651×10^{-4}	76.0	b
Chironomid	*A. pallipes*	2.409	0.095	A	3.211×10^{-3}	6.898×10^{-5}	311.4	A
	P. leniusculus	4.538	0.147	B	2.725×10^{-3}	3.675×10^{-5}	367.0	B
	E. sinensis	5.418	< 0.001	C	1.547×10^{-3}	1.413×10^{-5}	646.6	C
Gastropod	*A. pallipes*	0.298	0.043	α	5.669×10^{-2}	7.208×10^{-3}	17.6	α
	P. leniusculus	0.499	0.060	β	4.787×10^{-2}	4.453×10^{-3}	20.9	α
	E. sinensis	1.372	0.174	γ	5.173×10^{-2}	3.465×10^{-3}	19.3	α

Table S5.4 Comparison of functional response parameter estimates for decapod consumption of macroinvertebrate prey, based on analysis using indicator variables in the *frair* package (Pritchard et al. 2017). Raw *p* values are presented; significant differences, after Holm-Bonferroni correction of α (0.05) within each prey group, are indicated in bold. *a* – attack coefficient (tanks.day^{-1}); *h* – handling time (days.prey item^{-1}); *D* – difference; *SE* – standard error

Prey	**Base Group**	**Comparison**		**Estimate (*Da* or *Dh*)**	**SE**	***z***	***p***
Amphipod	*A. pallipes*	*P. leniusculus*	*a*	1.025	0.210	4.88	**< 0.001**
			h	−0.002	0.003	−0.70	0.485
	P. leniusculus	*E. sinensis*	*a*	0.450	0.241	1.87	0.061
			h	−0.027	0.002	−13.86	**< 0.001**
	A. pallipes	*E. sinensis*	*a*	1.475	0.173	8.55	**< 0.001**
			h	−0.029	0.003	−10.14	**< 0.001**
Chironomid	*A. pallipes*	*P. leniusculus*	*a*	2.128	0.040	53.01	**< 0.001**
			h	< 0.001	< 0.001	−7.04	**< 0.001**
	P. leniusculus	*E. sinensis*	*a*	0.441	0.038	11.67	**< 0.001**
			h	−0.001	< 0.001	−36.73	**< 0.001**
	A. pallipes	*E. sinensis*	*a*	3.009	0.038	78.57	**< 0.001**
			h	−0.002	< 0.001	−25.19	**< 0.001**
Gastropod	*A. pallipes*	*P. leniusculus*	*a*	0.201	0.074	2.71	**0.007**
			h	0.009	0.008	−1.04	0.298
	P. leniusculus	*E. sinensis*	*a*	0.872	0.184	4.74	**< 0.001**
			h	0.004	0.006	0.68	0.494
	A. pallipes	*E. sinensis*	*a*	1.074	0.179	5.99	**< 0.001**
			h	−0.005	0.008	−0.62	0.536

6. Switching analyses (size-matched predators, prey killed)

cf. analyses in main text using prey consumed as response variable

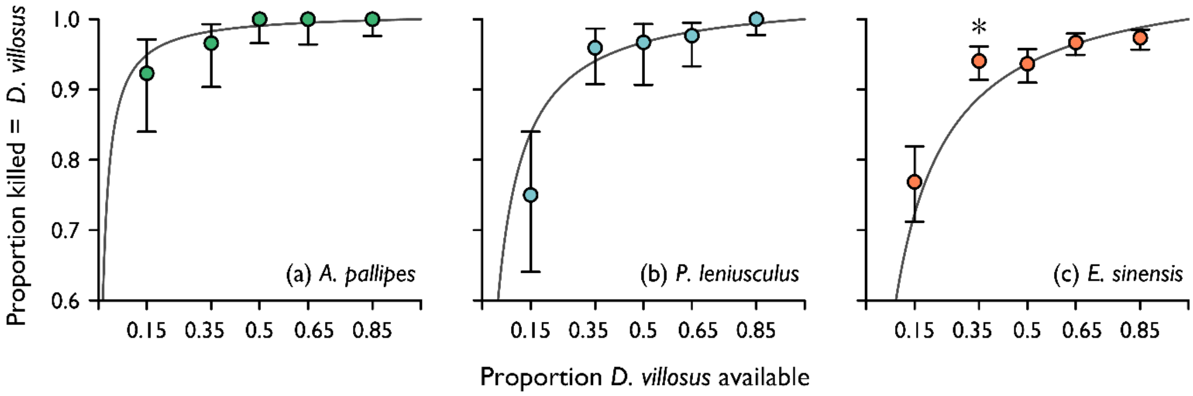

Fig. S6 Proportion of *D. villosus* killed by decapod predators at varying relative densities of *D. villosus* to *B. tentaculata*. At all relative densities, total prey density was fixed at 280 tank^{-1}. Note that y axes begin at 0.6. *Points* are population proportions with 95% binomial confidence intervals. *Curves* are expected proportions in the absence of preference, based on killing when prey types are equally available. *Asterisk* indicates significant deviation from null hypothesis (Fisher's exact test *p* = 0.009)

7. Switching analyses (mass-matched predators, prey consumed)

cf. analyses in main text where decapod predators are matched by body size (a combination of mass and maximum carapace dimension). Mean ± SE masses A. pallipes *10.6 ± 0.6 g,* P. leniusculus *10.6 ± 0.6 g*, E. sinensis *11.4 ± 0.4 g. ANOVA for difference in body mass of decapod species $F_{2,82}$ = 0.72, p = 0.492. n = 5 for* A. pallipes *and n = 6 for* P. leniusculus *and* E. sinensis.

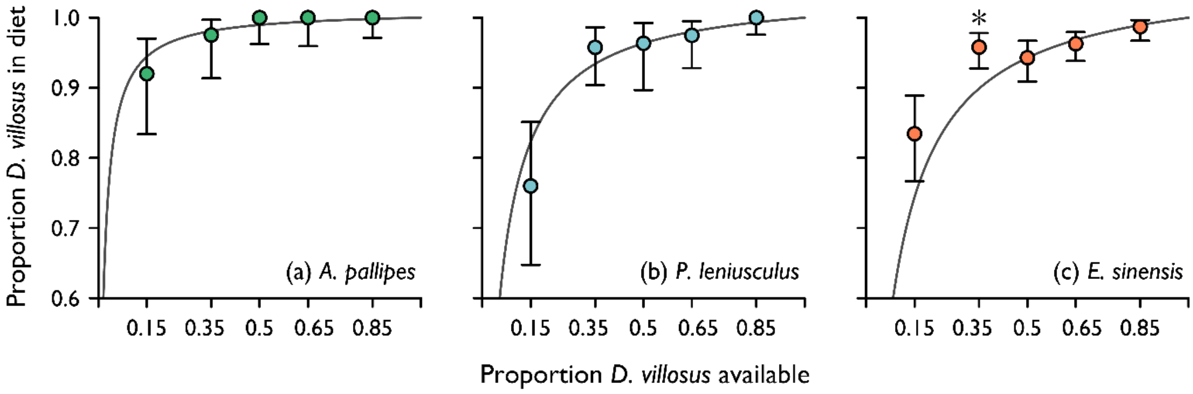

Fig. S7 Proportion of *D. villosus* in the diet of decapod predators at varying relative densities of *D. villosus* to *B. tentaculata*. Symbols as for Fig. S6. Note that y axes begin at 0.6. *Asterisk* indicates significant deviation from null hypothesis (Fisher's exact test *p* = 0.009). For *E. sinensis* at Proportion *D. villosus* available 0.15, *p* = 0.071.

8. Metabolic rates, adjusted to a common body mass (11 g)

When MRs were adjusted to a common body *mass* of 11 g (Equation S8), the differences between decapods became smaller in magnitude than when MRs were adjusted to a common body *size* (see main text). Crayfish MRs were scaled up relative to those of size-matched individuals, whilst crab MRs were scaled down. However, overall patterns were similar. The 11 g mass was chosen as it is intermediate between the mass of crabs and crayfish used in FR experiments (Table S1).

$$MR_{(11\text{ g})} = MR \times \left(\frac{11}{massMR}\right)^{b} \qquad [S8]$$

There was no difference in mass-specific SMR between the three decapod species (Fig. 3a; ANOVA $F_{2,25} = 0.01$, $p = 0.99$). Mean ± SE SMRs for 11 g animals were *A. pallipes* 0.32 ± 0.04 mg O_2 h^{-1}, *P. leniusculus* 0.32 ± 0.02 mg O_2 h^{-1}, *E. sinensis* 0.32 ± 0.03 mg O_2 h^{-1}.

In contrast to SMR, mass-specific RMR did differ between species when data were pooled across day and night (ANOVA $F_{2,27} = 12.18$, $p < 0.001$). Mean ± SE RMRs for 11 g animals were *A. pallipes* 0.52 ± 0.07 mg O_2 h^{-1}, *P. leniusculus* 0.80 ± 0.08 mg O_2 h^{-1}, *E. sinensis* 1.18 ± 0.12 mg O_2 h^{-1}. The mass-specific RMR of *E. sinensis* was signifcantly greater than that of *P. leniusculus* (1.5 times higher; Tukey post-hoc test with Holm-Bonferroni adjustment $p = 0.023$), which in turn had a significantly greater RMR than *A. pallipes* (1.6 times higher; Tukey adjusted $p = 0.023$).

Mass-specific RMRs of the alien species were significantly higher at night than during the day (*E. sinensis* paired $t = 3.09$, df = 9, $p = 0.013$; *P. leniusculus* $t = 4.82$, df = 11, $p < 0.001$), whilst the RMR of *A. pallipes* was marginally higher during the day than at night ($t = -2.02$, df = 7, $p = 0.083$). Consequently, during the day RMR did not differ between the crayfish (Fig. S8b; Tukey adjusted $p = 0.69$) but *E. sinensis* had a higher RMR than both crayfish species (Tukey adjusted $ps \leq 0.009$; overall ANOVA $F_{2,27} = 8.51$, $p = 0.001$). At night, both aliens had a higher RMR than *A. pallipes* (Fig. S8c; Tukey adjusted $ps < 0.001$) but the RMR of *E. sinensis* was not significantly higher than that of *P. leniusculus* (Fig. 3c; Tukey adjusted $p = 0.16$; overall ANOVA $F_{2,27} = 18.81$, $p < 0.001$).

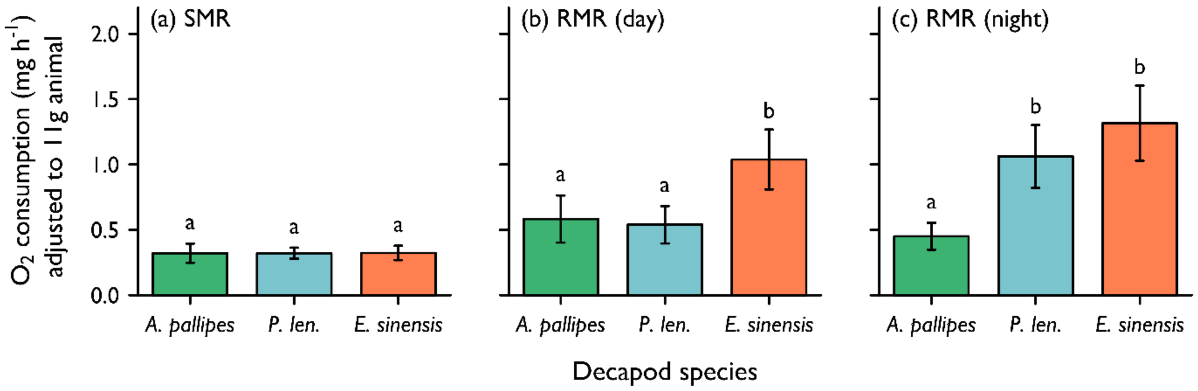

Fig. S8 Mass-adjusted (to 11 g animal) oxygen consumption rates of decapod crustaceans, as proxies for metabolic rates. **(a)** Standard metabolic rate (SMR): the lowest recorded $\dot{M}O_2$ associated with minimal activity **(b)** diurnal routine metabolic rate (RMR): a weighted average of all $\dot{M}O_2$ measurements during the light phase and **(c)** nocturnal RMR: a weighted average of all $\dot{M}O_2$ measurements during the dark phase. *Letters* indicate significant differences (within panels) based on Tukey contrasts with Holm-Bonferroni correction of p values. *Bars* show means ± 2 SE. *P. len*. – *Pacifastacus leniusculus*.

9. References

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