SUPPLEMENTAL MATERIAL

Predator-permanence hypothesis in time: Community dynamics in a seasonally flooded wetland

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Table S1. Logistic regression model-selection results from tethering experiments conducted in 2007 at 4 sites in 2 regions: Water Conservation Area (WCA) 3A and Taylor Slough (TSL) in the Everglades, Florida, USA, testing for effects that predict mortality and mode of predation (entry: 0 vs crushing: 1). Sites were modeled as fixed effects and nested within regions. Sampling period (5/y) represented seasonality and was modeled as a continuous variable. Akaike Information Criterion (AIC) values are the –2 log likelihood for each model, ΔAIC is the difference from the base model. Lower AIC values indicate a better model and the best model in each set is in bold. S = season, R = region, S(R) = sites within regions, Sn = snail size, D = water depth (cm).

		Mortality (n = 389)		Mode (n = 115)	
Variables	K	AIC	ΔAIC	AIC	ΔAIC
S	1	**462.82**	**0.00**	152.04	0.00
R	1	475.19	12.36	151.88	–0.17
S(R)	2	476.41	13.59	155.33	3.28
D	1	476.77	13.95	**143.92**	**–8.12**
Sn	1	475.87	13.04	152.42	0.38
S, R	1	464.12	1.29	153.32	1.28
S, S(R)	2	464.13	1.30	156.90	4.85
S, D	1	**462.46**	**–0.36**	145.62	–6.42
R, D	1	475.89	13.07	145.30	–6.74
S, R, S(R), Sn	2	464.46	1.64	146.75	–5.29
S, R, S(R), Sn	2	465.31	2.49	158.86	6.82
S, R, S(R), D	2	465.74	2.92	150.27	–1.77

S, R, S(R), Sn, D	2	466.69	3.86	152.01	–0.04
S, R, S(R), Sn, D, D × S	2	468.66	5.84	153.96	1.91
S, R, S(R), Sn, D, D × S, D × R	2	468.16	5.34	155.32	3.28
S, R, S(R), Sn, D, D × S, D ×R, D × S(R)	2	470.96	8.14	156.75	4.71

Table S2. Model selection results from different competing models that predicted the change in snail density with exogenous and endogenous independent variables at site 3 in Water Conservation Area (WCA) 3A in the Everglades, Florida, USA. Akaike Information Criterion (AIC) values are the –2 log likelihood for each model, ΔAIC is the difference from the base model, and ω_i is the Akaike weight for each model that gives the relative likelihood. Lower AIC values indicate a better model, and the best model in each set is in bold. D = depth, ΔD = change in depth, DSD = days since dry, LD = lag depth, S = stem density, Pe = periphyton volume, LC = lag crayfish density, LSi = lag snail size, LDe = lag snail density, ΔSi = change in snail size.

Site 3	AIC	ΔAIC	ω_i
Disturbance (Dist.)			
D, ΔD, DSD, DSD^2	494.787	0	2.02E-55
DSD, DSD^2	488.975	–5.8123	3.69E-54
D, ΔD	456.656	–38.131	3.84E-47
LD, ΔD	**436.862**	**–57.925**	**7.64E-43**
D, LD	439.381	–55.406	2.17E-43
ΔD	448.086	–46.701	2.79E-45
LD	437.731	–57.056	4.95E-43
D	458.893	–35.894	1.26E-47
Dist. + Habitat Complexity (Hab Comp.)			
LD, ΔD, S, Pe	438.962	–55.825	2.67E-43
LD, ΔD, Pe	**436.833**	**–57.954**	**7.75E-43**
LD, ΔD, S	438.914	–55.873	2.74E-43
Dist. + Hab Comp. + Biotic interactions			

LD, ΔD, Pe, LC, LSi, ΔSi, LDe	**243.671**	**–251.12**	**0.682287**
LD, ΔD, Pe, LSi, ΔSi	267.807	–226.98	3.91E-06
LD, ΔD, Pe, LDe ΔSi	245.199	–249.59	0.317707
LD, ΔD, Pe, LC, ΔSi	268.654	–226.13	2.56E-06
LD, ΔD, Pe, LSi, LDe	293.562	–201.23	1E-11

Table S3. Model selection results from different competing models that predicted the change in snail density with exogenous and endogenous independent variables at site 11 in Water Conservation Area (WCA) 3A in the Everglades, Florida, USA. Akaike Information Criterion (AIC) values are the –2 log likelihood for each model, ΔAIC is the difference from the base model, and ω_i is the Akaike weight for each model that gives the relative likelihood. Lower AIC values indicate a better model and the best model in each set is in bold. D = depth, ΔD = change in depth, DSD = days since dry, LD = lag depth, S = stem density, Pe = periphyton volume, LC = lag crayfish density, LSi = lag snail size, LDe = lag snail density, ΔSi = change in snail size.

Site 11	AIC	ΔAIC	ω_i
Disturbance (Dist.)			
D, ΔD, DSD, DSD^2	170.678	0	2.71E-26
DSD, DSD^2	174.32	3.64244	4.38E-27
D, ΔD	128.358	–42.32	4.19E-17
LD, ΔD	129.397	–41.28	2.49E-17
D, LD	131.251	–39.427	9.86E-18
ΔD	**120.191**	**–50.487**	**2.49E-15**
LD	141.644	–29.034	5.46E-20
D	135.665	–35.012	1.08E-18
Dist. + Habitat Complexity (Hab Comp.)			
ΔD, S, Pe	127.436	–43.242	6.64E-17
ΔD, Pe	125.512	–45.166	1.74E-16
ΔD, S	**122.05**	**–48.628**	**9.82E-16**
Dist. + Hab Comp. + Biotic interactions			

ΔD, S, LC, LSi, ΔSi, LDe	56.8181	–113.86	0.14351
ΔD, S, LSi, ΔSi	59.6535	–111.02	0.034769
ΔD, S, LDe ΔSi	**53.4205**	**–117.26**	**0.78462**
ΔD, S, LC, ΔSi	59.5275	–111.15	0.037029
ΔD, S, LSi, LDe	71.9851	–98.693	7.3E-05

Table S4. Model selection results from different competing models that predicted the change in snail density with exogenous and endogenous independent variables at site CP in Taylor Slough in the Everglades, Florida, USA. Akaike Information Criterion (AIC) values are the –2 log likelihood for each model, ΔAIC is the difference from the base model, and ω_i is the Akaike weight for each model that gives the relative likelihood. Lower AIC values indicate a better model and the best model in each set is in bold. D = depth, ΔD = change in depth, DSD = days since dry, LD = lag depth, S = stem density, Pe = periphyton volume, LC = lag crayfish density, LSi = lag snail size, LDe = lag snail density, ΔSi = change in snail size.

Site CP	AIC	ΔAIC	ω_i
Disturbance (Dist.)			
D, ΔD, DSD, DSD^2	224.07	0	1.83E-30
DSD, DSD^2	238.33	14.26	1.46E-33
D, ΔD	176.995	–47.076	3.05E-20
LD, ΔD	181.72	–42.351	2.87E-21
D, LD	175.787	–48.283	5.58E-20
ΔD	**171.887**	**–52.183**	**3.92E-19**
LD	193.343	–30.727	8.59E-24
D	184.499	–39.571	7.16E-22
Dist. + Habitat Complexity (Hab Comp.)			
ΔD, S, Pe	178.981	–45.09	1.13E-20
ΔD, Pe	176.798	–47.273	3.36E-20
ΔD, S	**174.896**	**–49.174**	**8.71E-20**
Dist. + Hab Comp. + Biotic interactions			

ΔD, S, LC, LSi, ΔSi, LDe	90.7471	–133.32	0.163166
ΔD, S, LSi, ΔSi	101.778	–122.29	0.000657
ΔD, S, LDe ΔSi	**87.4836**	**–136.59**	**0.834248**
ΔD, S, LC, ΔSi	99.6237	–124.45	0.001928
ΔD, S, LSi, LDe	114.092	–109.98	1.39E-06

Table S5. Model selection results from different competing models that predicted the change in snail density with exogenous and endogenous independent variables at site TS in Taylor Slough in the Everglades, Florida, USA. Akaike Information Criterion (AIC) values are the –2 log likelihood for each model, ΔAIC is the difference from the base model, and ω_i is the Akaike weight for each model that gives the relative likelihood. Lower AIC values indicate a better model and the best model in each set is in bold. D = depth, ΔD = change in depth, DSD = days since dry, LD = lag depth, S = stem density, Pe = periphyton volume, LC = lag crayfish density, LSi = lag snail size, LDe = lag snail density, ΔSi = change in snail size.

Site TS	AIC	ΔAIC	ω_i
Disturbance (Dist.)			
D, ΔD, DSD, DSD^2	233.281	0	5.94E-36
DSD, DSD^2	237.37	4.08968	7.69E-37
D, ΔD	185.777	–47.504	1.23E-25
LD, ΔD	187.572	–45.708	5E-26
D, LD	191.822	–41.458	5.97E-27
ΔD	**178.647**	**–54.633**	**4.34E-24**
LD	209.638	–23.642	8.08E-31
D	193.363	–39.918	2.77E-27
Dist. + Habitat Complexity (Hab Comp.)			
ΔD, S, Pe	185.412	–47.869	1.47E-25
ΔD, Pe	**181.369**	**–51.911**	**1.11E-24**
ΔD, S	182.383	–50.897	6.7E-25
Dist. + Hab Comp. + Biotic interactions			

ΔD, Pe, LC, LSi, ΔSi, LDe	76.7601	–156.52	0.057769
ΔD, Pe, LSi, ΔSi	100.218	–133.06	4.65E-07
ΔD, Pe, LDe ΔSi	**71.1766**	**–162.1**	**0.942205**
ΔD, Pe, LC, ΔSi	100.385	–132.9	4.28E-07
ΔD, Pe, LSi, LDe	92.2719	–141.01	2.47E-05

Table S6. Logistic regression model selection results from long-term data on large fish occurrence in 2 regions and 3 sites: site 3 in Water Conservation Area (WCA) 3A and sites CP and TS in Taylor Slough (TSL) in the Everglades, Florida, USA. Seasonality (sampling period, 5/y) was treated as a continuous variable, while year was modeled as a fixed effect. Akaike Information Criterion (AIC) values are the –2 log likelihood for each model, ΔAIC is the difference from the base model. Lower AIC values indicate a better model and the best model in each set is in bold. S = season, Y = year, D = water depth, DSD = days since site dried.

	WCA (*n* = 93)		TSL (*n* = 221)	
Variable	AIC	ΔAIC	AIC	ΔAIC
S	86.23	0.00	216.01	0.00
Y	88.26	2.03	214.46	–1.55
D	80.36	–5.87	**207.37**	**–8.64**
S, Y	85.52	–0.71	215.58	–0.43
D, Y	86.49	0.26	210.03	–5.97
D, S	**75.01**	**–11.21**	209.33	–6.68
S, Y, D	79.51	–6.72	211.34	–4.66
S, Y, S × Y, D	80.75	–5.48	214.26	–1.74
S, Y, S × Y, D, D × Y	93.70	7.47	216.36	0.35
S, Y, S × Y, D, D × Y, D × S	95.70	9.47	218.35	2.34
S, Y, S × Y, D, D × Y, D × S, DSD, DSD^2	94.96	8.73	220.41	4.40

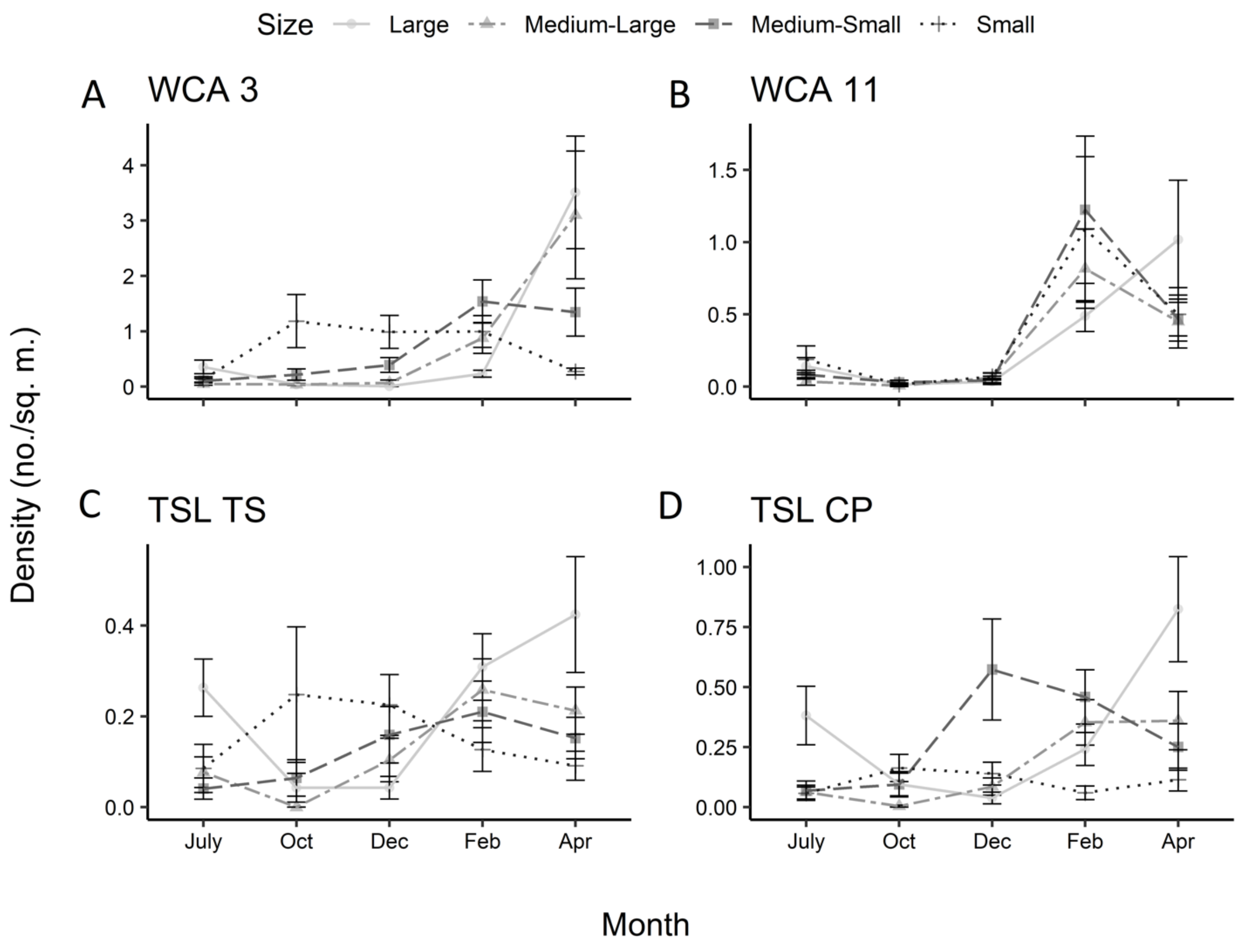

Fig. S1. Snail density (mean ± SE) by size class at 4 sites throughout the water year (July–April) for the 12-y time series. Size classes were determined using size quartiles: small (1.64–7.25 mm), medium-small (7.25–11.01 mm), medium-large (11.01–14.32 mm), and large (14.32–23.74 mm). Sites 3 (A) and 11 (B) are in Water Conservation Area (WCA) 3A, and sites CP (C) and TS (D) are in Taylor Slough (TSL) in the Everglades, Florida, USA.

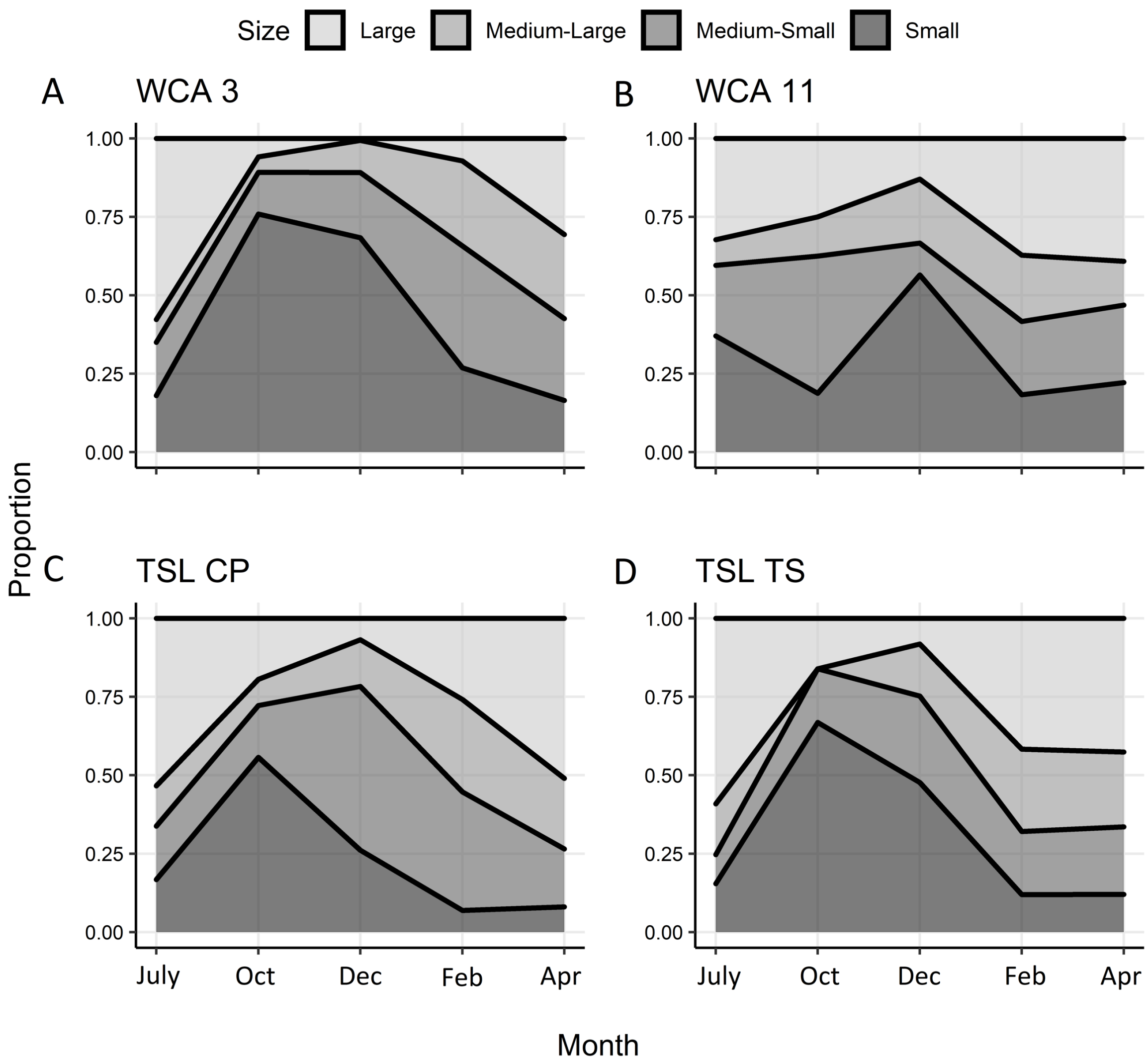

Fig. S2. The proportion of snails by each size class at 4 sites throughout the water year (July–April) for the 12-y time series. Size classes were determined using size quartiles: small (1.64–7.25 mm), medium-small (7.25–11.01 mm), medium-large (11.01–14.32 mm), and large (14.32–23.74 mm). Sites 3 (A) and 11 (B) are in Water Conservation Area (WCA) 3A, and sites CP (C) and TS (D) are in Taylor Slough (TSL) in the Everglades, Florida, USA.

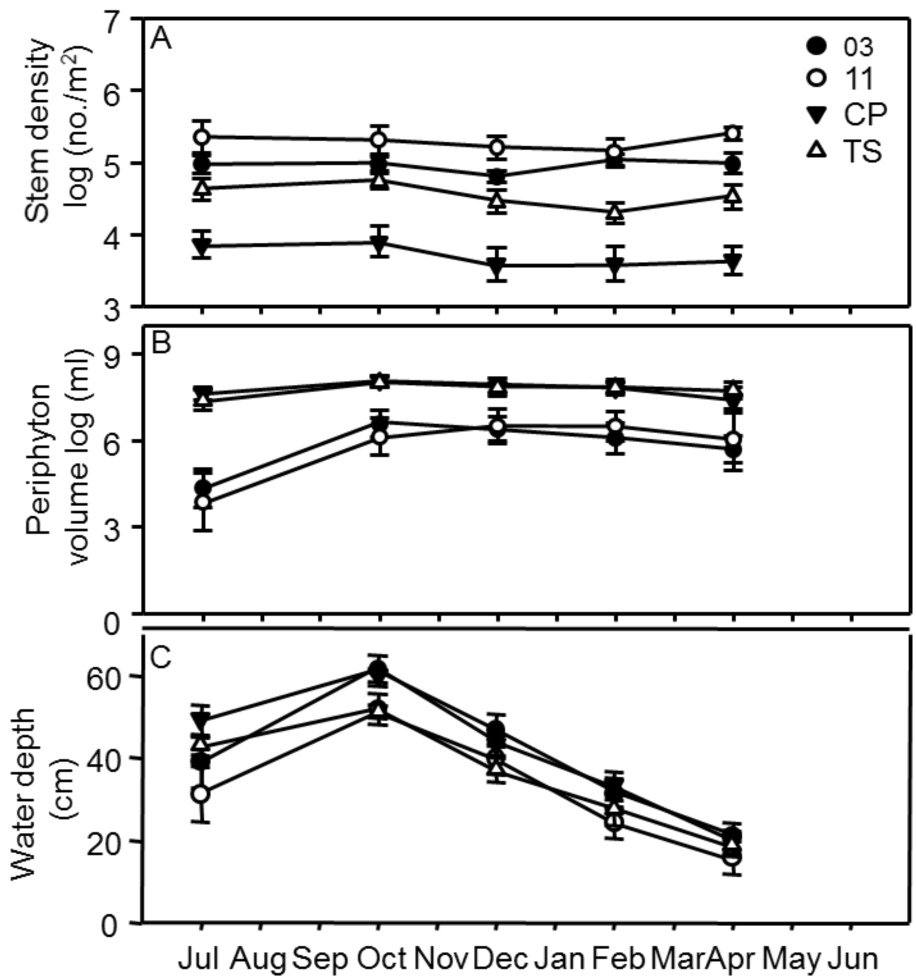

Fig. S3. Seasonal variation (mean ± SE, 12 y) in abiotic variables. Plots show stem density (A), periphyton volume (B), and water depth (C) at sites 3 and 11 in Water Conservation Area 3A and sites CP and TS in Taylor Slough in the Everglades, Florida, USA.