Appendix S1

Nutrient availability and invasive fish jointly drive community dynamics in experimental aquatic systems

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Details on wetland nutrient sampling – Between May and July of 2009, we sampled 231 ponds within the San Francisco Bay Area of California (Contra Costa, Alameda, Santa Clara and San Mateo counties) to examine variability in nutrient concentrations that could inform the design of our mesocosm experiment. The habitat surrounding most sampled wetlands consisted of oak chaparral within lands managed for livestock grazing, public use and/or conservation. At each wetland, we collected a 100 mL water sample within an acid-washed Nalgene bottle. Samples were filtered (1.2 μm), frozen, and analyzed for total dissolved nitrogen and total dissolved phosphorus in the Arikaree Environmental Chemistry Laboratory at the University of Colorado, Boulder using standardized methods (see http://niwot.colorado.edu/research/kiowa-lab/the-arikaree-environmental-laboratory). The results of these nutrient analyses are shown in Figure S1.

Table S1. Invertebrate identities and counts added to each mesocosm. All invertebrates were locally collected. Biphasic taxa were all added as aquatic larval stages.

Invertebrate Taxon	Count
Ramshorn snail (*Helisoma trivolvis*)	5
Pond snail (*Physa* sp.)	5
Backswimmer (*Notonecta* sp.)	10
Water Beetle (Dytiscidae)	5
Damselfly (Coenagrionidae)	10
Mayfly (*Baetis* sp.)	15
Dragonfly (*Tramea* sp.)	5
Giant Water Bug (*Belastoma* sp.)	3
Amphipod (*Gammarus* sp.)	20

Table S2. Counts and body sizes of amphibian larvae and mosquitofish added to mesocosms. *Note: Mean length is snout-vent length for amphibian larvae and total body length for mosquitofish. Gosner state of the frogs was approximately 25 to 27.

Taxon	Count	Mean length (mm)*
Pacific chorusfrog (*Pseudacris regilla*)	15	4.04 ± 0.09
Western toad (*Anaxyrus boreas*)	20	8.74 ± 0.20
California newt (*Taricha torosa*)	10	13.82 ± 0.48
Mosquitofish - Male (*Gambusia affinis*)	4	33.05 ± 0.87
Mosquitofish - Female (*Gambusia affinis*)	3	39.05 ± 0.81

Table S3. Mesocosm experiment timeline.

Mesocosm Timeline	
12-May	Added sand and water to mesocosms.
17-May	Added first batch of chemical nutrients.
18-May	Added dry leaves and algae.
20-May	Added zooplankton and tiles for periphyton.
4-Jun	Added second batch of chemical nutrients.
9-Jun	Collected nutrient samples, phytoplankton, zooplankton, tile periphyton.
12-Jun	Added benthic invertebrates to mesocosms.
13-Jun	Added amphibian larvae and mosquitofish.
16-Jun	Collected phytoplankton, zooplankton.
17-Jun	Collected tile periphyton.
23-Jun	Collected phytoplankton, zooplankton.
30-Jun	Collected nutrient samples, phytoplankton, zooplankton.
7-Jul	Collected phytoplankton.
12-Jul	Collected wall periphyton.
13-Jul	Collected nutrient samples, phytoplankton, zooplankton.
15-Jul	Removed amphibians and fish.
16-Jul	Sampled benthic invertebrates.

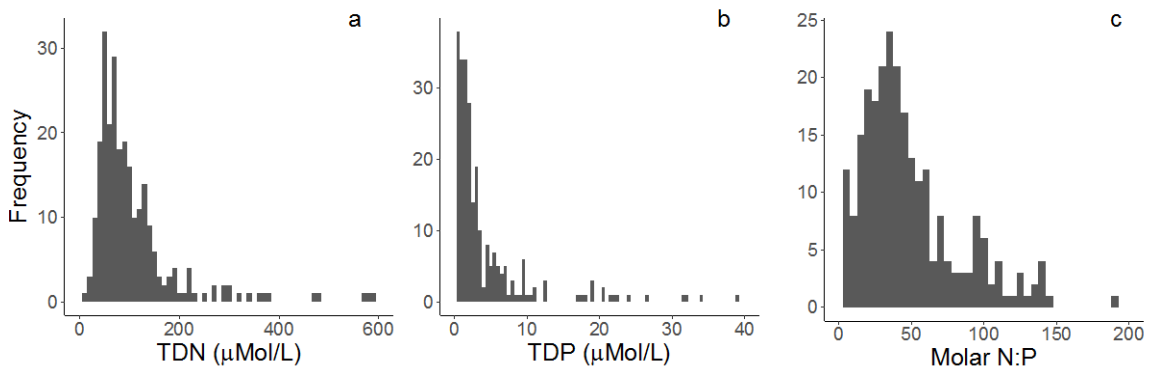

Figure S1. Nutrient concentrations in 231 northern California wetlands, including total dissolved nitrogen (TDN) (a), total dissolved phosphorus (TDP) (b) and molar nitrogen to phosphorus ratios (c).

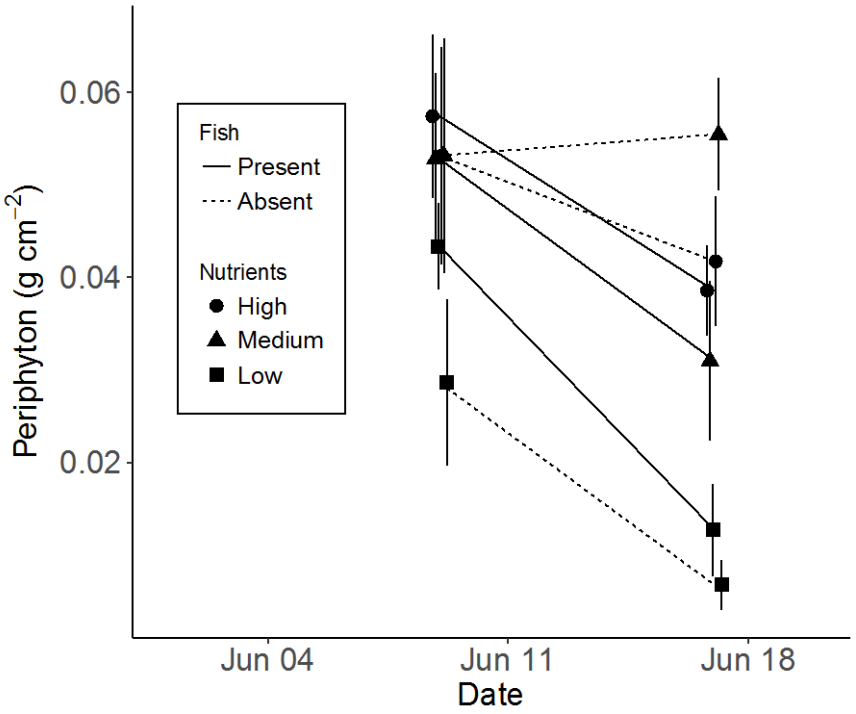

Figure S2. Periphyton biomass measured from clay tiles on two time points at the beginning of the experiment. Periphyton was completely removed from tiles, presumably by grazers, midway through the study. For the final time point we measured periphyton from the walls of the mesocosms (see Fig. 3 in the main text). Fish presence (solid lines) or absence (dotted lines) is indicated by line type and nutrient conditions are indicated by the point shapes. Error bars represent one standard error.