**Electronic supplemental material Table S1.** Results of model comparison for the 2008 experiment. ΔAICc is used to compare contrasting models, lower ΔAICc indicate a better model. Models that were substantially better, as evidenced by a ΔAICc of at least 2.0 of the next best model, are bolded. All models were basic linear models on either untransformed or transformed data. *P*-values refer to the significance of the model against a null model of no relationship.

Response Variable Factor ΔAICc *R2**P*-value

**Invert mass1 Crayfish 0 0.33 0.02**

Invert mass1 Temperature 6.4 0.002 0.88

Invert mass1 Light 6.2 0.093 0.72

**Invert abundance1 Crayfish 0 0.59 0.005**

Invert abundance1 Temperature 11.6 0.15 0.13

Invert abundance1 Light 14.3 0.002 0.86

Algae--control Crayfish 0.0 0.08 0.29

Algae--control Temperature 1.3 0.002 0.88

Algae--control Light 1.1 0.013 0.67

**Algae—elevated Crayfish 0.0 0.29 0.03**

Algae—elevated Temperature 5.5 0.00 0.99

Algae—elevated Light 4.6 0.05 0.40

**K Crayfish 0 0.64 0.0002**

K Temperature 16.4 0.003 0.85

K Light 16.0 0.03 0.54

**Carbon1 Crayfish 0 0.39 0.02**

Carbon1 Temperature 4.6 0.09 0.26

Carbon1 Light 5.5 0.035 0.488

Nitrate and nitrite2 Crayfish 3.6 0.08 0.27

**Nitrate and nitrite**2 **Temperature 0.0 0.27 0.04**

Nitrate and nitrite2 Light 5.0 0.000 0.93

Phosphorus2 Crayfish 0.7 0.002 0.85

Phosphorus2 Temperature 0.0 0.049 0.41

Phosphorus2 Light 0.1 0.042 0.45

Ammonium2 Crayfish 0.2 0.082 0.28

Ammonium2 Temperature 1.2 0.020 0.61

Ammonium2 Light 0.0 0.093 0.25

1These variables were log transformed prior to analysis

2These variables represent averages of three measurements over the course of the experiment. Running these analyses with date-specific values had similar lack of strong predictor models (analyses not shown).