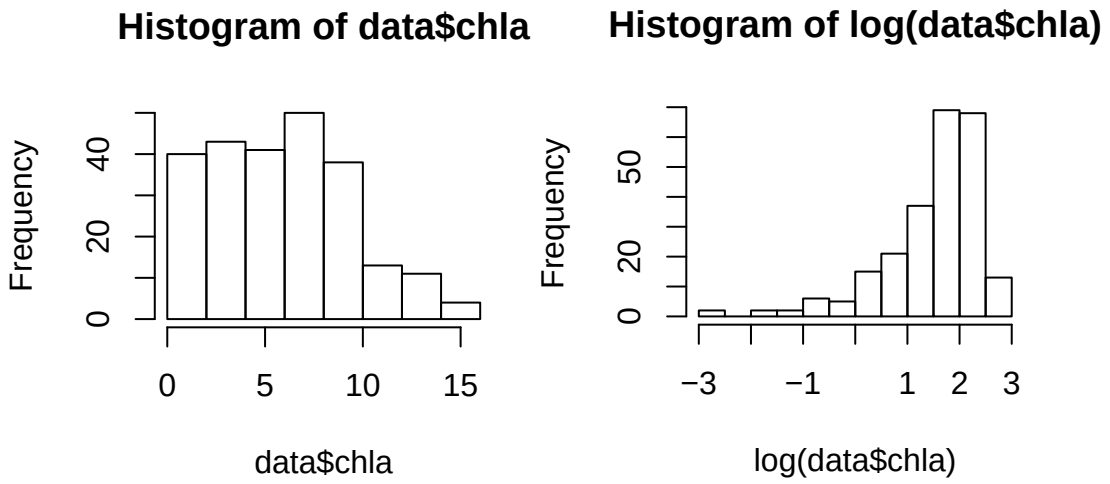
Supplementary material for Garzke et al manuscript. This file includes analyses and model outputs supporting phytoplankton and oxygen flux results in main text.

1. Trophic Cascade Results: Figure 2

2. Figure 3, Table 2

2.1 Phytoplankton abundance



2.1.1 Phytoplankton abundance candidate models

```
#### Phytoplankton coefficients for Figure 2
modPBF <- lme(log(chla) ~ 1 + I(invTi - invTT) + trophic.level + trophic.level*I(invTi - invTT) + I(inv
modPB8 <- lme(log(chla) ~ 1 + trophic.level*I(invTi - invTT) + trophic.level*I(invTT - mean(invTT)), ra
modPB7 <- lme(log(chla) ~ 1 + I(invTi - invTT) + trophic.level + trophic.level*I(invTT - mean(invTT)),
modPB6 <- lme(log(chla) ~ 1 + trophic.level*I(invTi - invTT), random = ~ 1 | Tank, data=data, method="M
modPB5 <- lme(log(chla) ~ 1 + I(invTi - invTT) + trophic.level, random = ~ 1 | Tank, data=data, method=
modPB4 <- lme(log(chla) ~ 1 + I(invTi - invTT)*I(invTT - mean(invTT)), random = ~ 1 | Tank, data=data,
modPB3 <- lme(log(chla) ~ 1 + I(invTi - invTT) + I(invTT - mean(invTT)), random = ~ 1 | Tank, data=data
modPB2 <- lme(log(chla) ~ 1 + I(invTi - invTT), random = ~ 1 | Tank, data=data, method="ML", na.action=
modPB1 <- lme(log(chla) ~ 1 + trophic.level, random = ~ 1 | Tank, data=data, method="ML", na.action=na.
modPB0 <- lme(log(chla) ~ 1, random = ~ 1 | Tank, data=data, method="ML", na.action=na.omit)

PPres <- data.frame(model.sel(modPB0, modPB1, modPB2, modPB3, modPB4, modPB5, modPB6, modPB7, modPB8, m
```

‘r table_nums(‘tab_1’)’

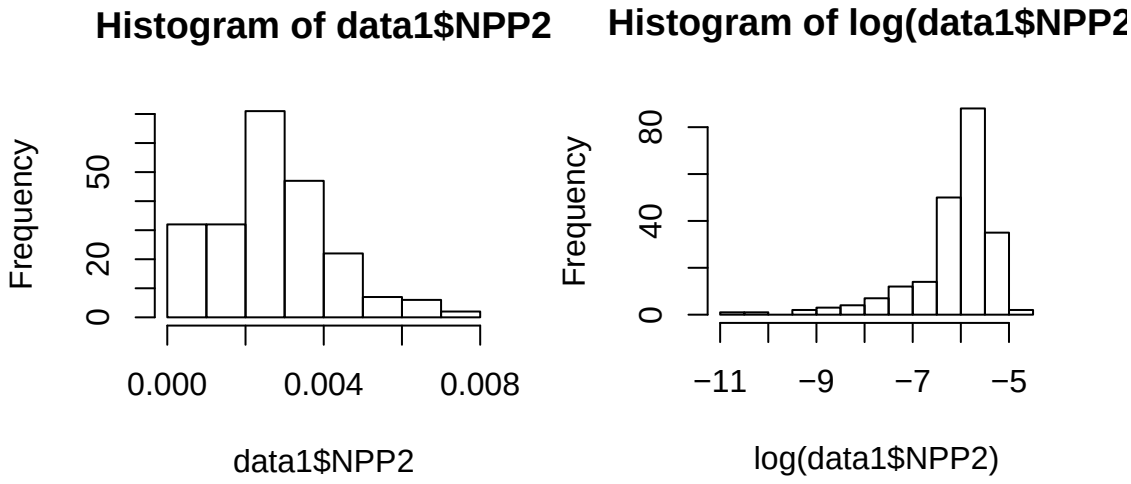
Table 1: Table S2: Confidence intervals for PB (For MS Table 2)

	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modPB8	2.05	+	-0.66	1.30	NA	+	+	11	-162.86	348.87	0.00	9.528923e-01
modPB7	2.05	+	-0.96	1.30	NA	NA	+	9	-168.05	354.89	6.02	4.698179e-02

	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modPBF	2.14	+	-0.52	2.16	1.34	+	NA	10	-172.89	366.74	17.86	1.259313e-04
modPB4	1.50	NA	-0.96	1.70	0.96	NA	NA	6	-207.95	428.26	79.38	5.511062e-18
modPB6	1.91	+	-0.66	NA	NA	+	NA	8	-206.58	429.79	80.92	2.557666e-18
modPB3	1.50	NA	-0.96	1.71	NA	NA	NA	5	-211.74	433.74	84.86	3.556642e-19
modPB5	1.91	+	-0.96	NA	NA	NA	NA	6	-211.45	435.27	86.40	1.653514e-19
modPB2	1.50	NA	-0.96	NA	NA	NA	NA	4	-218.40	444.98	96.11	1.286913e-21
modPB1	1.90	+	NA	NA	NA	NA	NA	5	-257.21	524.68	175.81	6.345675e-39
modPB0	1.49	NA	NA	NA	NA	NA	NA	3	-264.15	534.41	185.54	4.902314e-41

	Ea	lower	upper
P	1.303404	0.8451553	1.761653
PZ	3.148076	2.7610496	3.535103
PZN	1.647056	1.1909790	2.103133

2.2 Net ecosystem oxygen production




```
##                numDF denDF  F-value p-value
## (Intercept)        1   189 9426.329  <.0001
## trophic.level      2    27    0.907  0.4156
```

Table 3: Table S3: Model selection results for Net Ecosystem Oxygen Production, with 1|Tank as a random effect. Model terms are: intercept (Int), trophic treatment (TL), Temperature - weekly average (Tw), temperature - expt average (Tt), interaction terms and statistical estimates

	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modNPP8	-6.42	+	0.29	-1.41	NA	+	+	11	-266.46	556.20	0.00	3.880444e-01
modNPPF	-6.42	+	0.37	-1.42	0.84	+	+	12	-265.54	556.59	0.39	3.199070e-01
modNPP7	-6.41	+	0.03	-1.39	NA	NA	+	9	-269.68	558.21	2.01	1.421772e-01
modNPP3	-6.15	NA	0.02	-0.96	NA	NA	NA	5	-274.37	559.02	2.81	9.506575e-02

	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modNPP4	-6.15	NA	0.02	-0.96	0.61	NA	NA	6	-273.87	560.13	3.92	5.458021e-02
modNPP0	-6.15	NA	NA	NA	NA	NA	NA	3	-283.15	572.41	16.20	1.177095e-04
modNPP2	-6.15	NA	0.03	NA	NA	NA	NA	4	-283.13	574.44	18.24	4.256459e-05
modNPP1	-6.26	+	NA	NA	NA	NA	NA	5	-282.25	574.78	18.58	3.589977e-05
modNPP6	-6.26	+	0.27	NA	NA	+	NA	8	-279.83	576.34	20.14	1.642404e-05
modNPP5	-6.26	+	0.03	NA	NA	NA	NA	6	-282.23	576.85	20.65	1.275902e-05

Table 4: Table S4: Confidence intervals for averaged models for NPP

	2.5 %	97.5 %
(Intercept)	-6.6350115	-6.2022444
trophic.levelPZ	0.0069534	0.6122069
trophic.levelPZN	0.1353210	0.7573874
I(invTi - invTT)	-0.1727966	0.8302769
I(invTT - mean(invTT))	-2.3050667	-0.5223231
I(invTi - invTT):trophic.levelPZ	-1.7451252	-0.1777806
I(invTi - invTT):trophic.levelPZN	-0.8891894	0.5535809
I(invTT - mean(invTT)):trophic.levelPZ	-0.9557973	1.3590478
I(invTT - mean(invTT)):trophic.levelPZN	-0.8211948	1.6651411
I(invTi - invTT):trophic.levelPZ	-1.7451252	-0.1777806
I(invTi - invTT):trophic.levelPZN	-0.8891894	0.5535809
I(invTi - invTT):I(invTT - mean(invTT))	-0.4045218	2.0885219

NPP Coefficients for Figure 3B

Table 5: Table S5: Confidence intervals for N (For MS Figure 3)

	Ea	lower	upper
P	-1.4136949	-2.246656	-0.5807340
PZ	-1.2120696	-2.358576	-0.0655636
PZN	-0.9917217	-2.100454	0.1170108

FIGURE 3B: NPP

2.2 Net ecosystem oxygen consumption (ER)

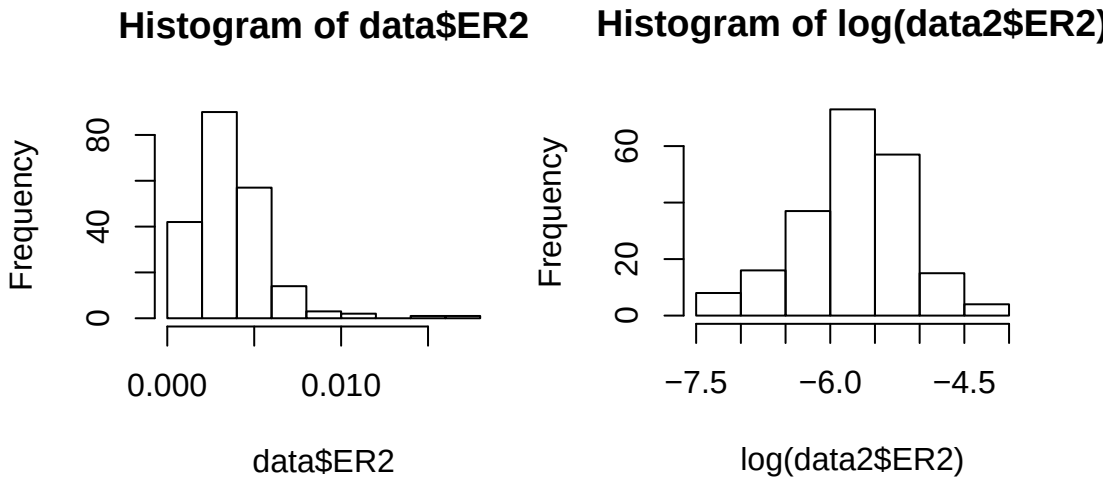


Table 6: Table S6: Model selection results for Net Ecosystem Oxygen Consumption (ER), with 1|Tank as a random effect. Model terms are: intercept (Int), trophic treatment (TL), Temperature - weekly average (Tw), temperature - expt average (Tt), interaction terms and statistical estimates

	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modER7	-6.03	+	0.26	-1.32	NA	NA	+	9	-158.72	336.33	0.00	8.117512e-01
modER8	-6.03	+	0.19	-1.32	NA	+	+	11	-158.19	339.72	3.39	1.492212e-01
modERF	-5.98	+	0.25	-0.81	0.57	+	NA	10	-160.65	342.41	6.08	3.885201e-02
modER3	-5.74	NA	0.26	-0.68	NA	NA	NA	5	-172.34	354.98	18.64	7.257027e-05
modER4	-5.74	NA	0.26	-0.64	0.60	NA	NA	6	-171.28	354.98	18.65	7.255858e-05
modER5	-5.89	+	0.26	NA	NA	NA	NA	6	-172.51	357.43	21.09	2.134098e-05
modER6	-5.89	+	0.19	NA	NA	+	NA	8	-172.00	360.71	24.38	4.134606e-06
modER1	-5.90	+	NA	NA	NA	NA	NA	5	-175.56	361.42	25.09	2.892592e-06
modER2	-5.74	NA	0.26	NA	NA	NA	NA	4	-177.02	362.24	25.90	1.927201e-06
modER0	-5.76	NA	NA	NA	NA	NA	NA	3	-180.12	366.35	30.02	2.461395e-07

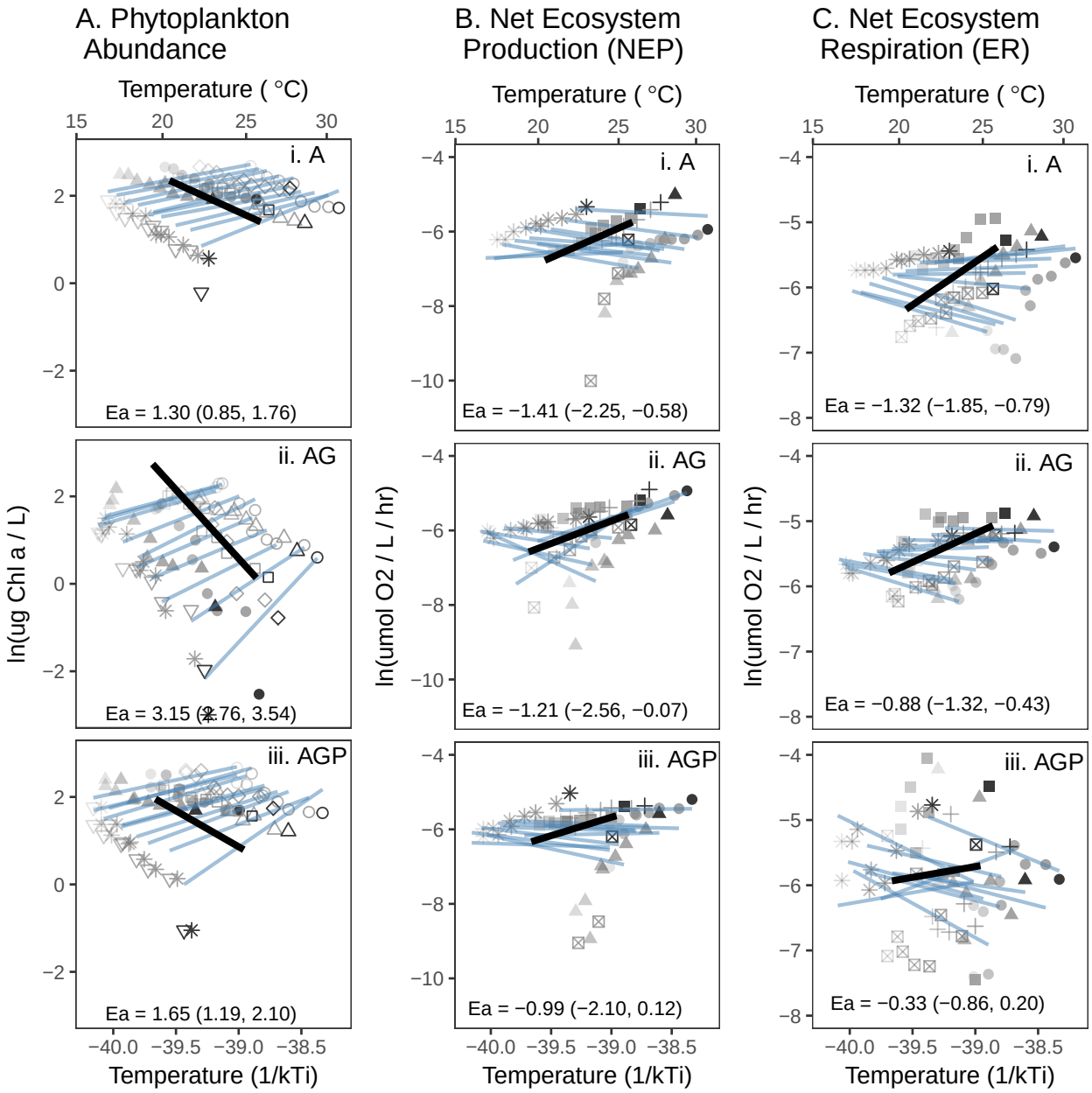
ER coefficients for Figure GHI

Table 7: Table S7: Confidence intervals for ER (For MS Figure 3)

	Ea	lower	upper
P	-1.3163396	-1.8455347	-0.7871445
PZ	-0.8777488	-1.3246951	-0.4308026
PZN	-0.3295142	-0.8562013	0.1971728

FIGURE 3C: ER

Figure 3 (Full)


A. Phytoplankton Abundance
B. Net Ecosystem Production (NEP)
C. Net Ecosystem Respiration (ER)
Temperature (°C)
15
20
25
30
i. A
ii. AG
iii. AGP
Ea = 1.30 (0.85, 1.76)
Ea = 3.15 (2.76, 3.54)
Ea = 1.65 (1.19, 2.10)
Ea = −1.41 (−2.25, −0.58)
Ea = −1.21 (−2.56, −0.07)
Ea = −0.99 (−2.10, 0.12)
Ea = −1.32 (−1.85, −0.79)
Ea = −0.88 (−1.32, −0.43)
Ea = −0.33 (−0.86, 0.20)
ln(ug Chl a / L)
ln(umol O2 / L / hr)
−40.0
−39.5
−39.0
−38.5
Temperature (1/kTi)

```
## pdf
##   2
```