

Oikos

o20936

Steiner, C. F., Stockwell, R. D., Kalaimani, V. and Aqel, Z. 2012. Population synchrony and stability in environmentally forced metacommunities. – *Oikos* 000: 000–000.

Appendix 1

Supplementary Materials Appendix 1: Supplemental Figures

Figure A1. pH measured over the course of the experiment for microcosms that received no forcing, forcing pattern A, and forcing pattern B. Shown are means and standard deviations.

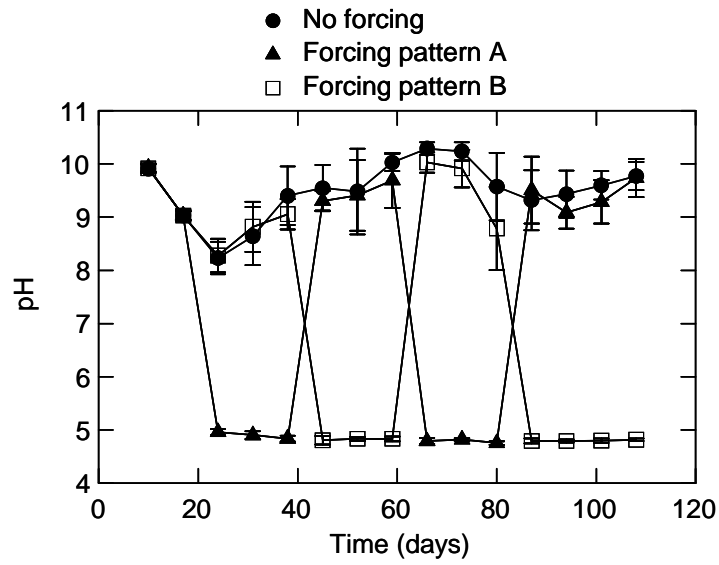
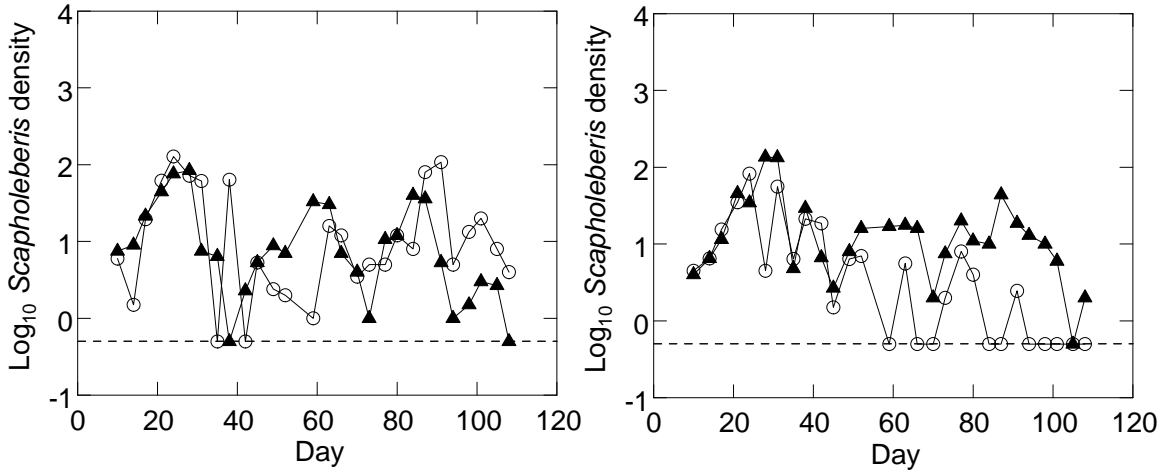


Figure A2. *Scapholeberis* dynamics for all treatment combinations of environmental forcing (none, synchronous, and asynchronous) and dispersal (none, low and high). Each panel displays dynamics for a replicate metacommunity (composed of two paired microcosms). A constant equal to the sampling detection limit was added only to zero values (shown by the horizontal dashed lines). Original units in numbers of individuals per L.

A) No forcing, no dispersal



B) No forcing, low dispersal

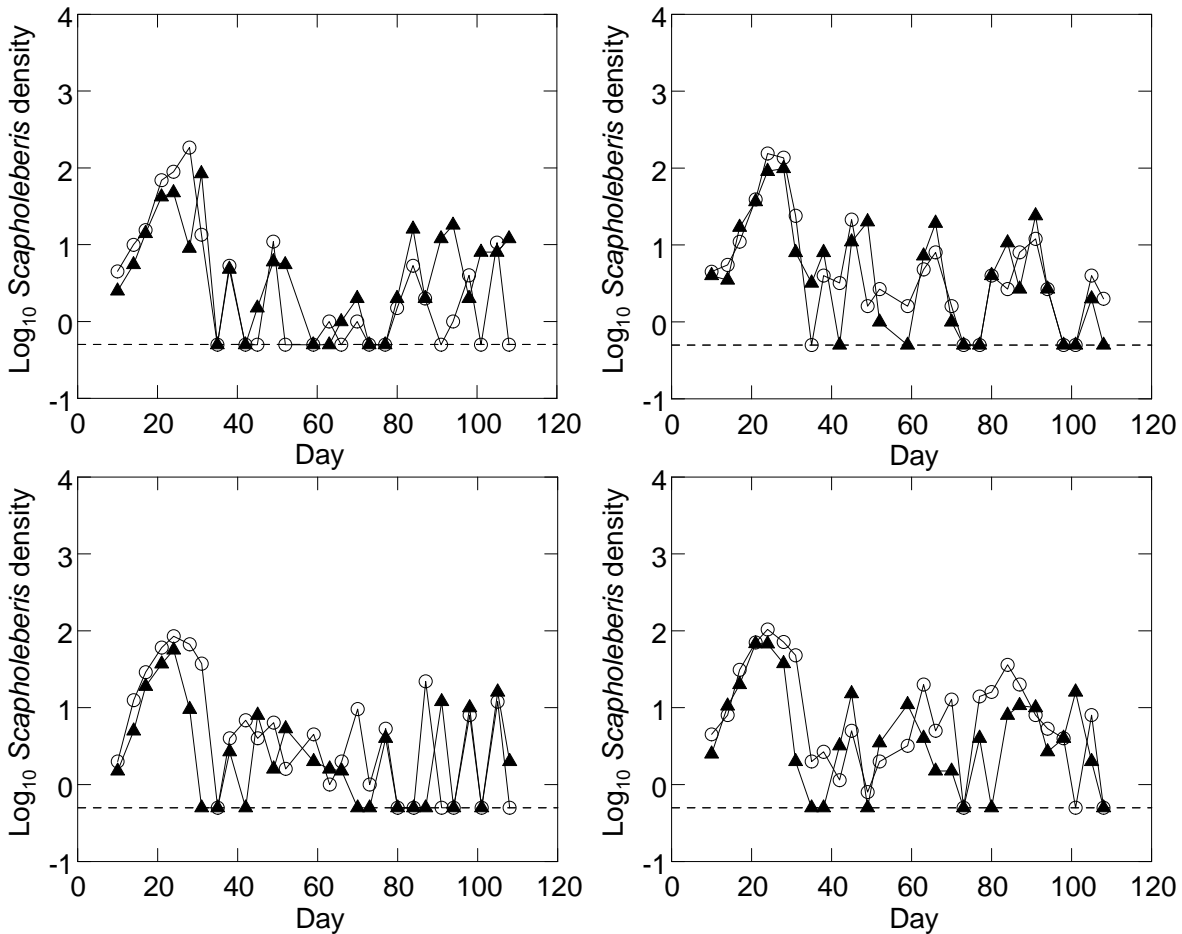
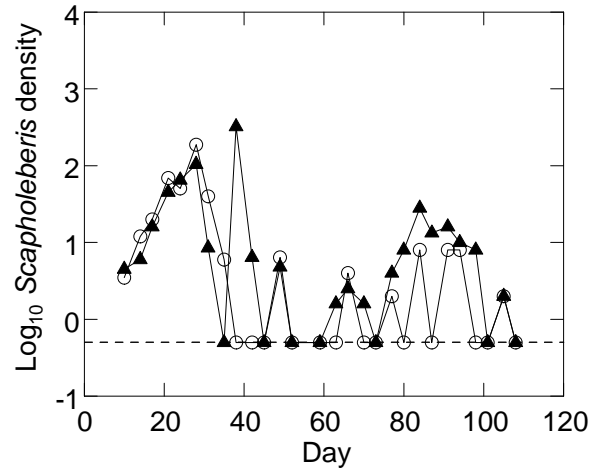
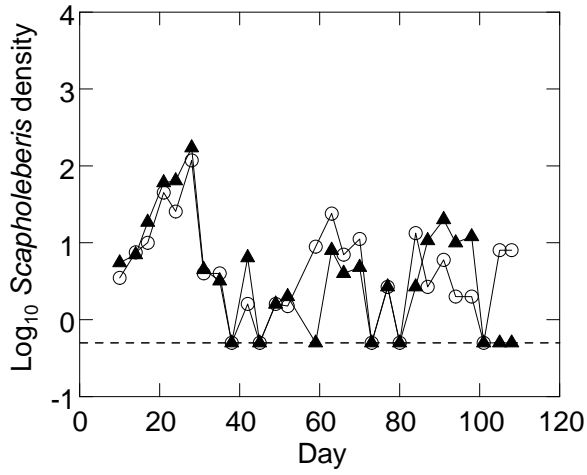
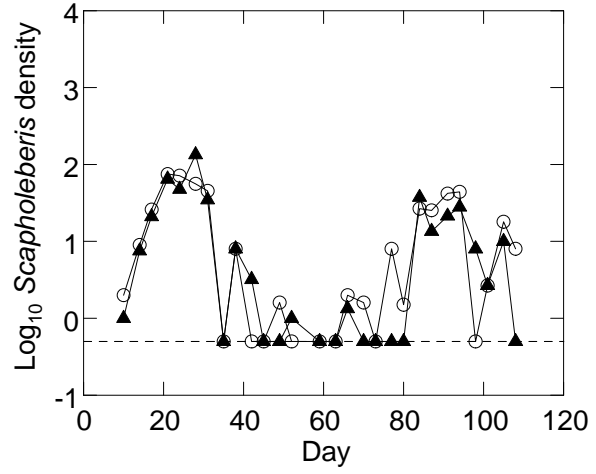
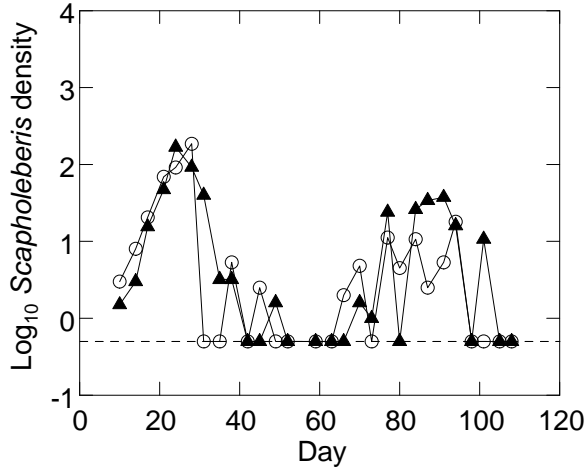


Figure A2.

C) No forcing, high dispersal



D) Synchronous forcing, no dispersal

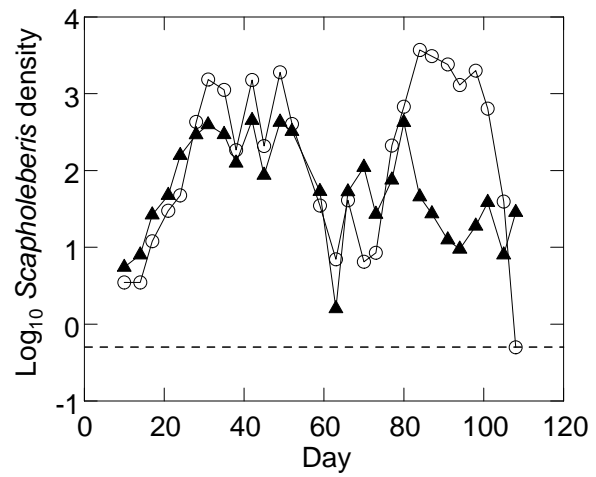
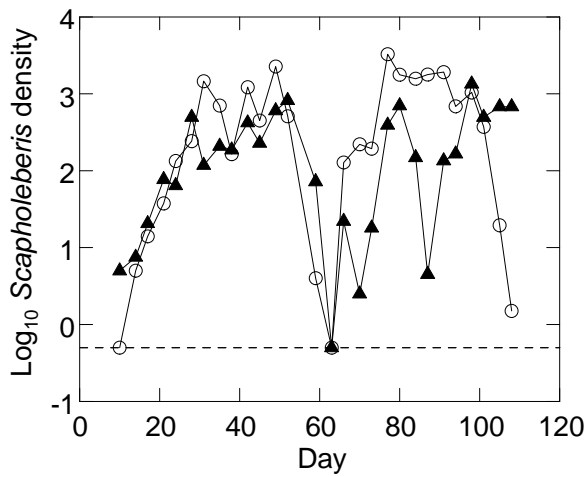
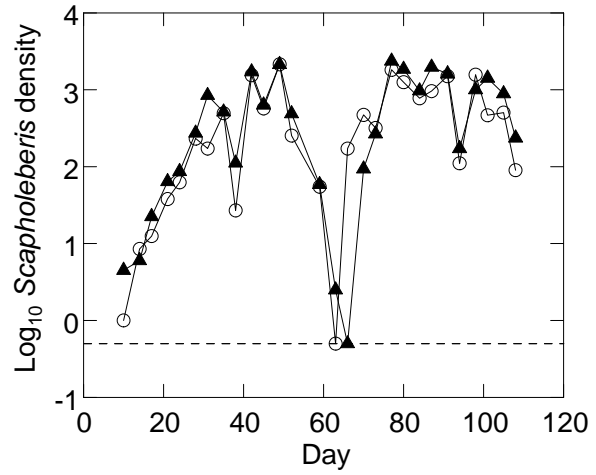
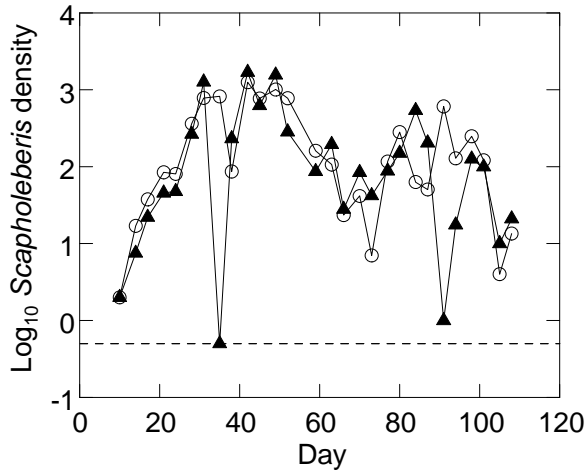
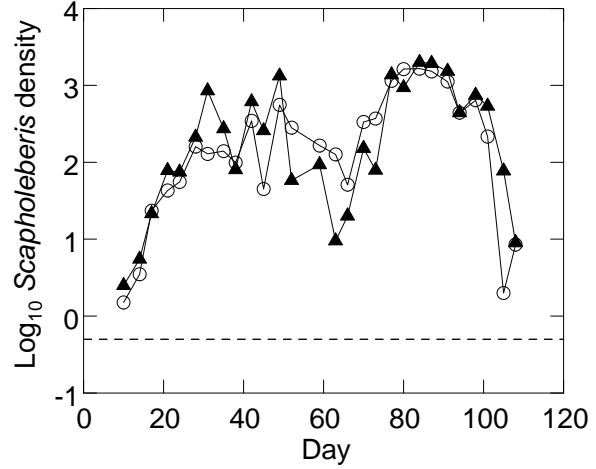
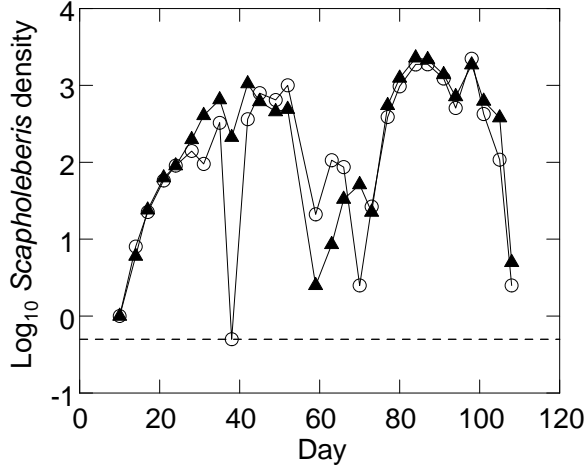


Figure A2.

E) Synchronous forcing, low dispersal



F) Synchronous forcing, high dispersal

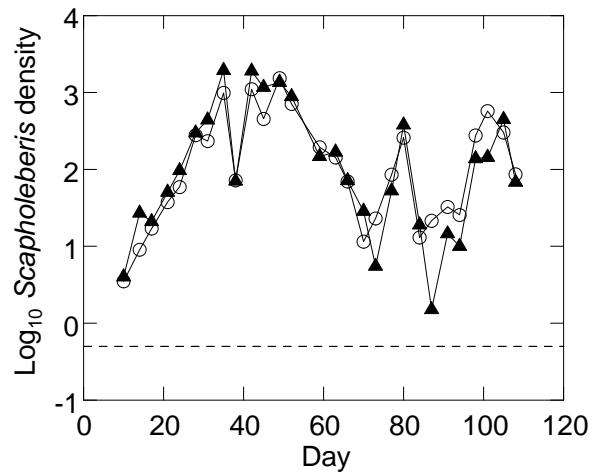
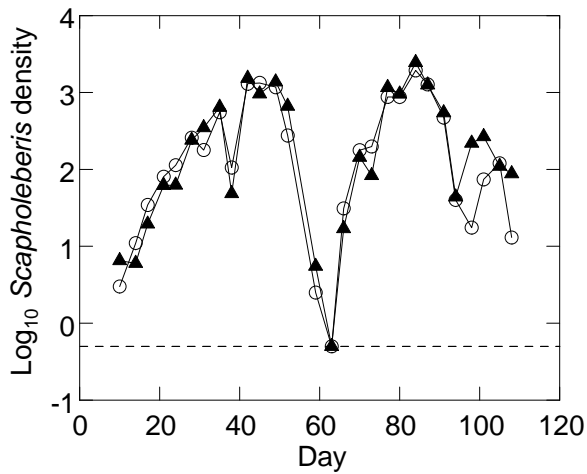
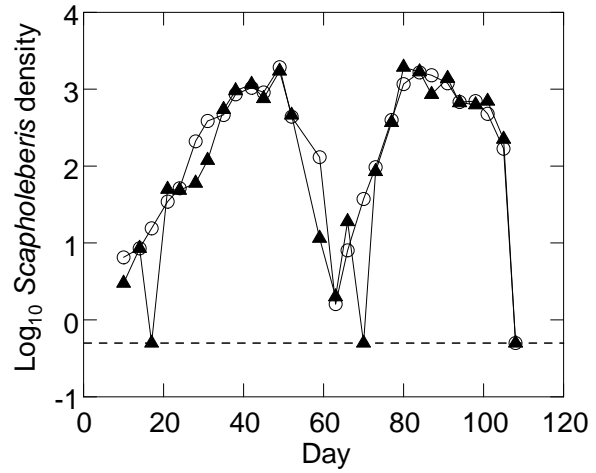
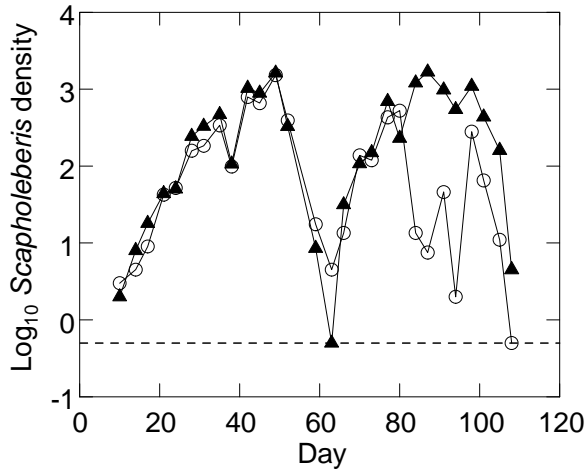


Figure A2.

F) Synchronous forcing, high dispersal



G) Asynchronous forcing, no dispersal

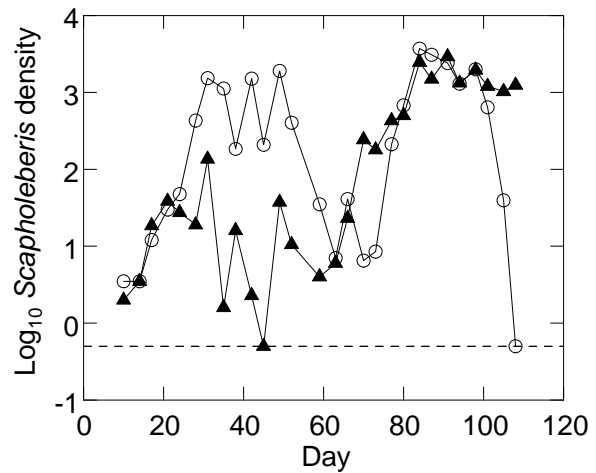
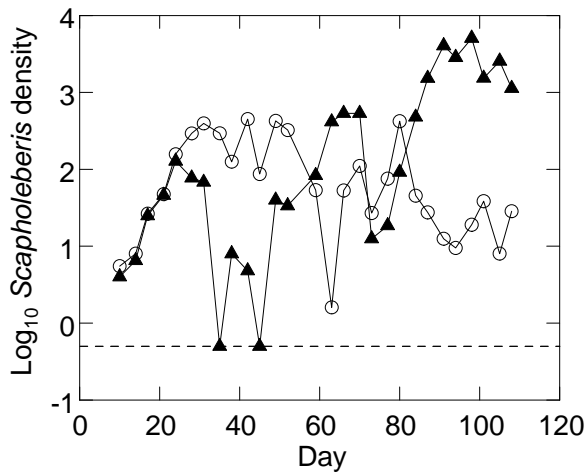
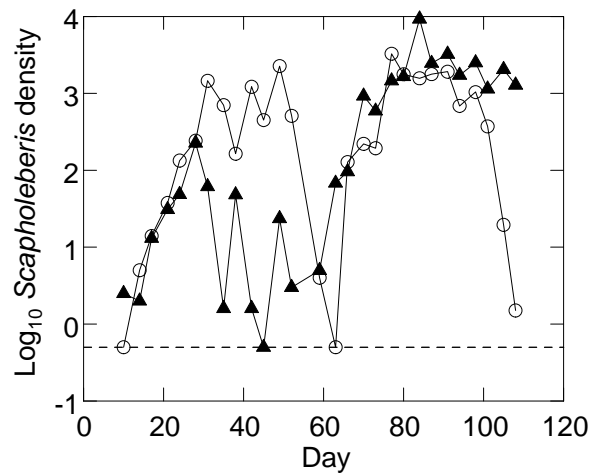
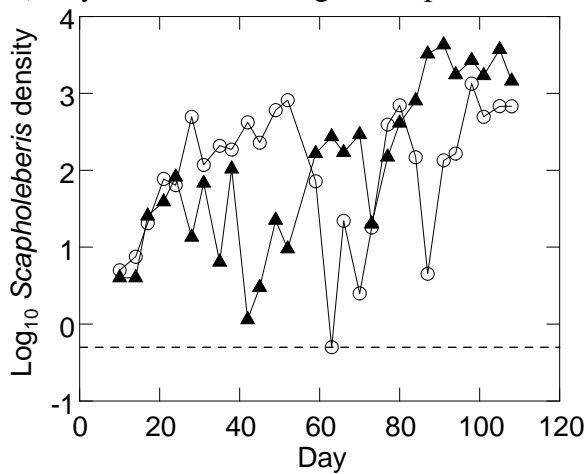
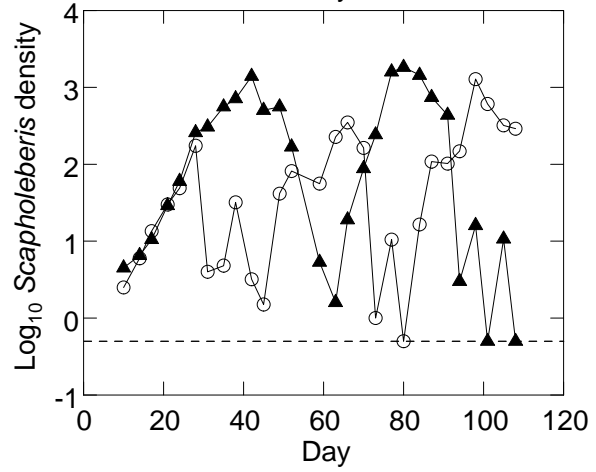
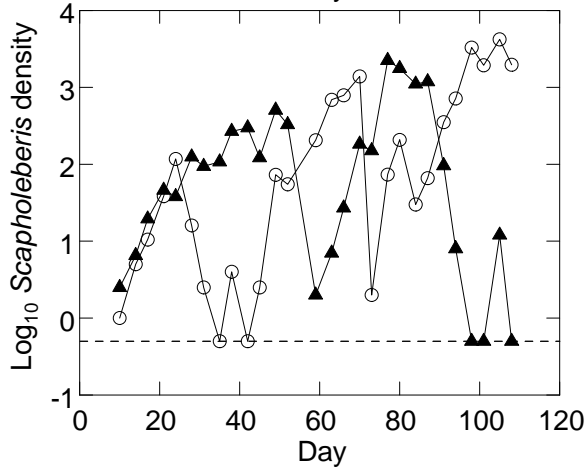
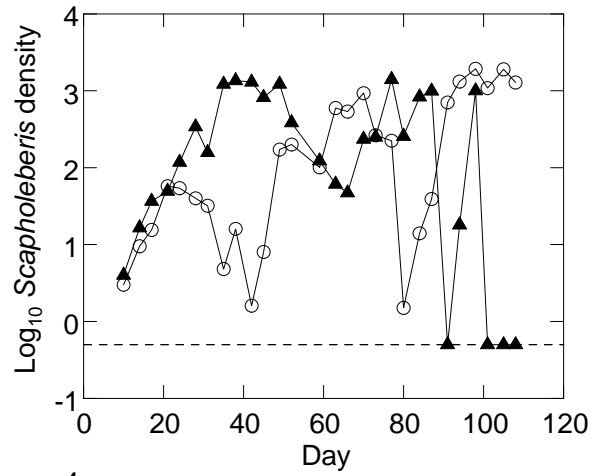
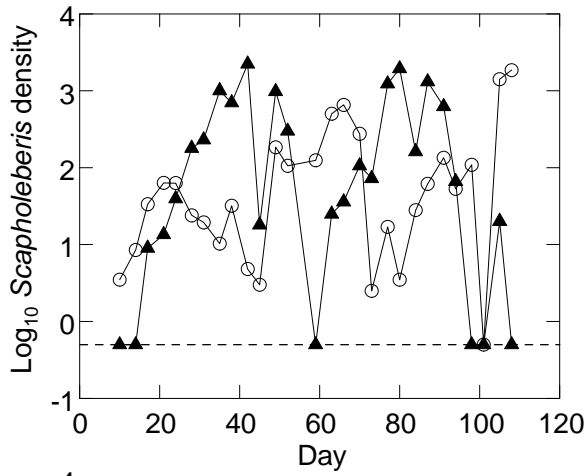


Figure A2.

H) Asynchronous forcing, low dispersal



I) Asynchronous forcing, high dispersal

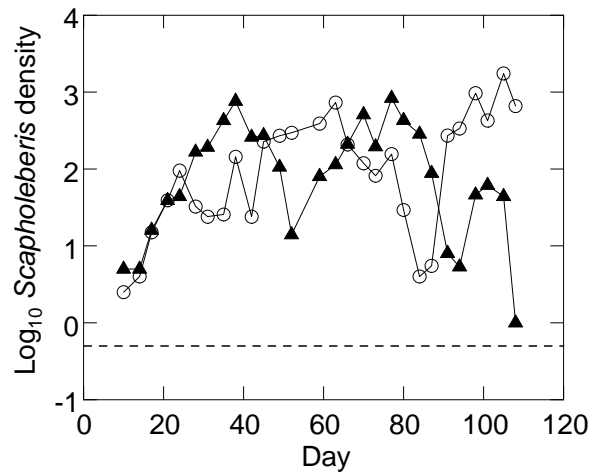
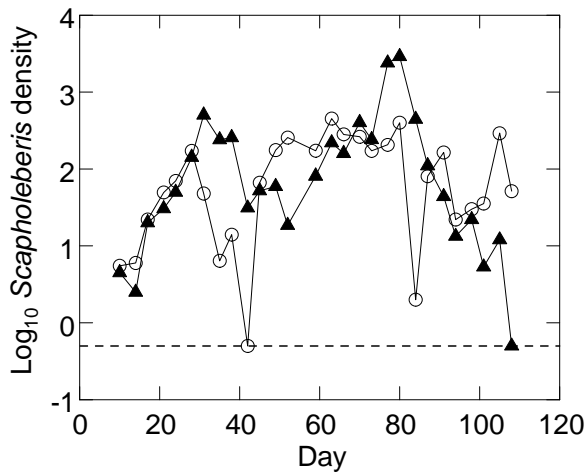


Figure A2.

I) Asynchronous forcing, high dispersal

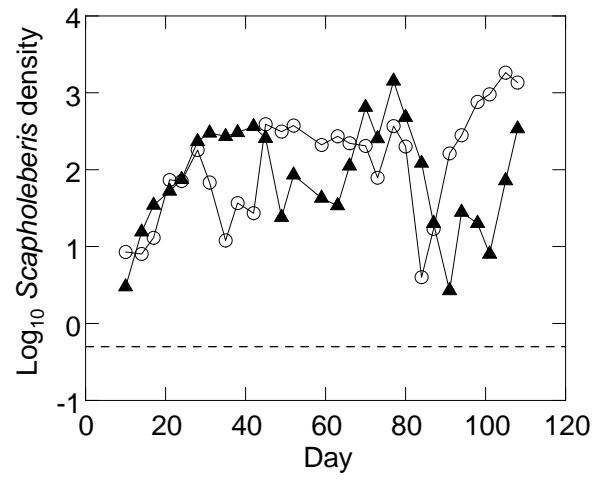
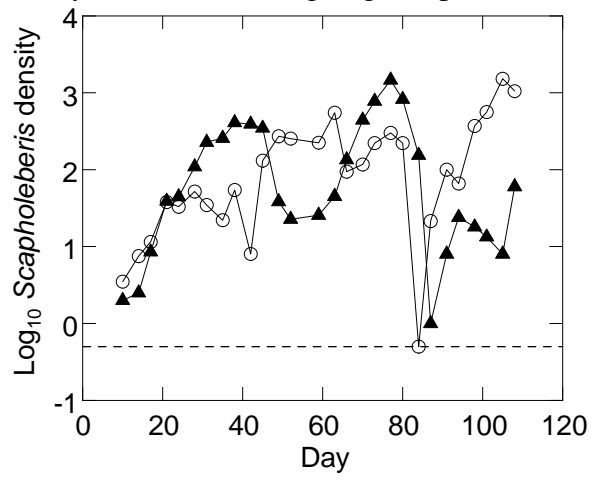
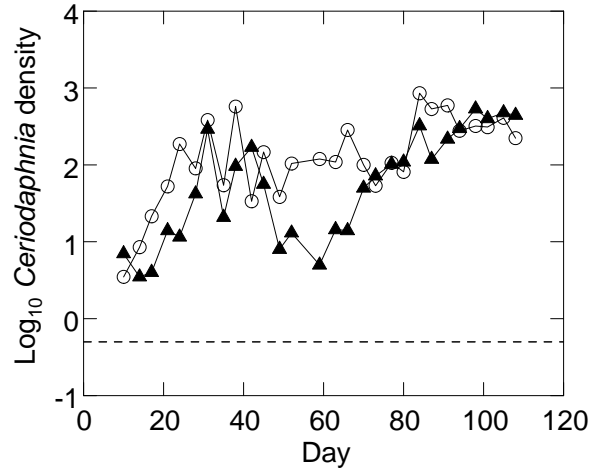
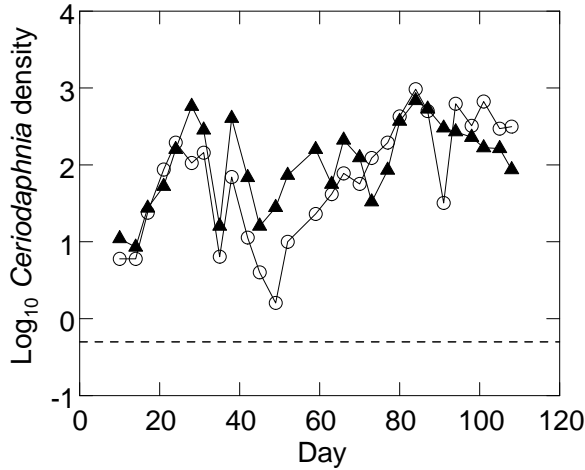


Figure A3. *Ceriodaphnia* dynamics for all treatment combinations of environmental forcing (none, synchronous, and asynchronous) and dispersal (none, low and high). Each panel displays dynamics for a replicate metacommunity (composed of two paired microcosms). A constant equal to the sampling detection limit was added only to zero values (shown by the horizontal dashed lines). Original units in numbers of individuals per L.

A) No forcing, no dispersal



B) No forcing, low dispersal

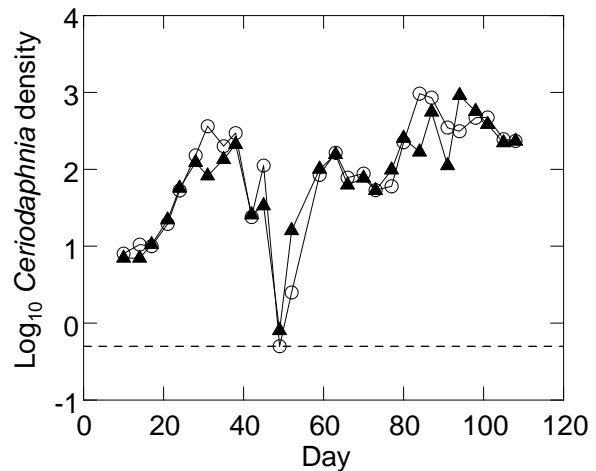
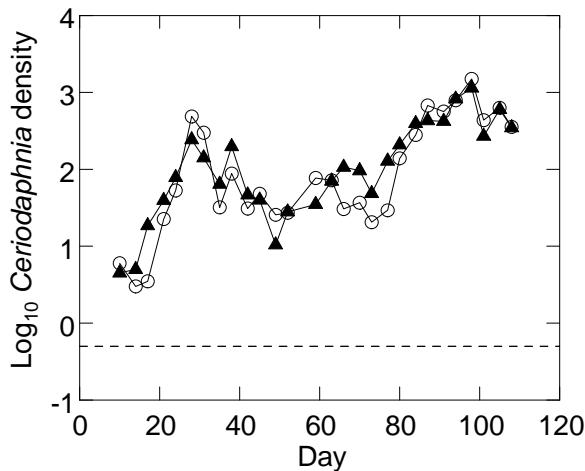
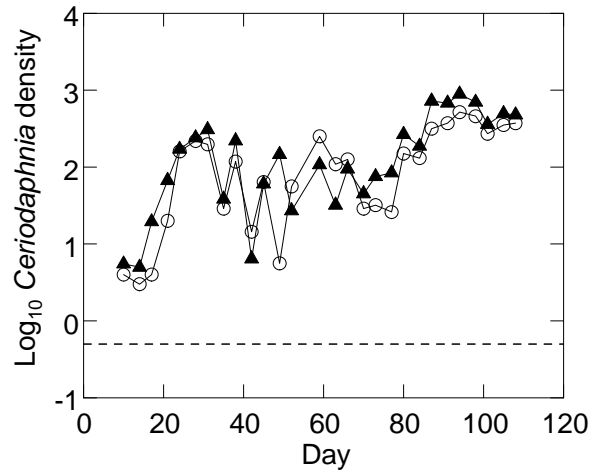
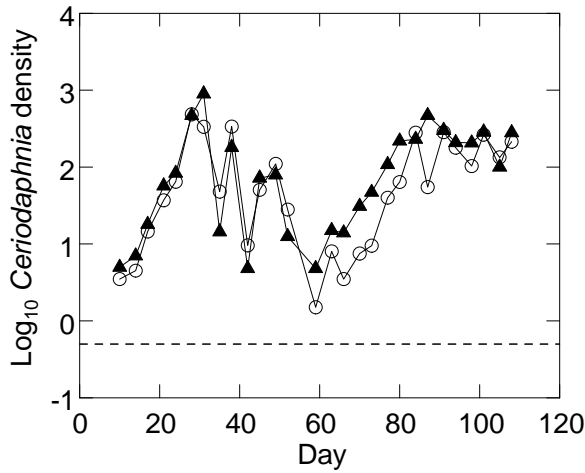
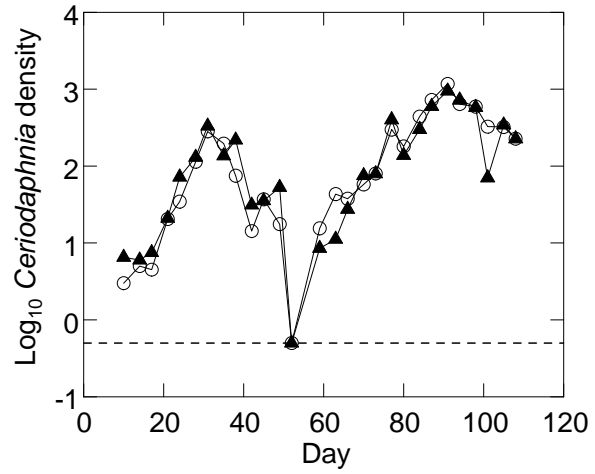
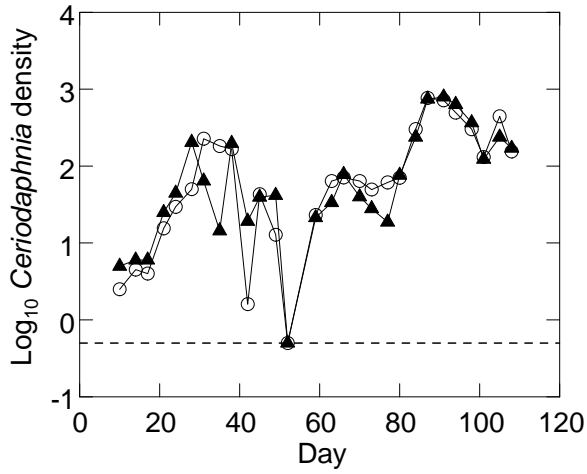
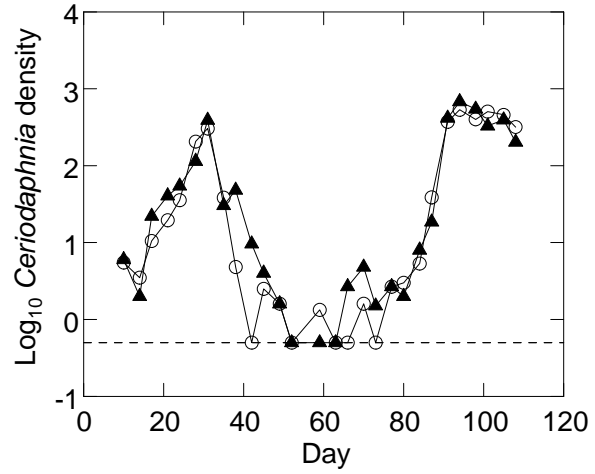
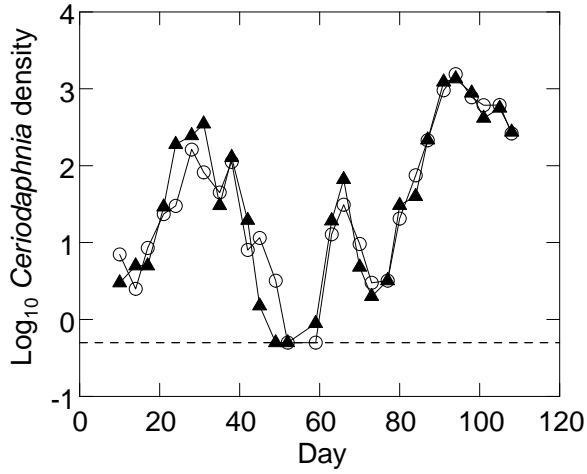


Figure A3.

C) No forcing, high dispersal



D) Synchronous forcing, no dispersal

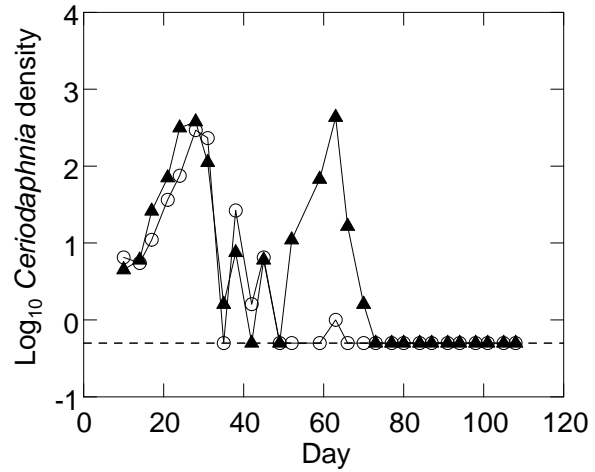
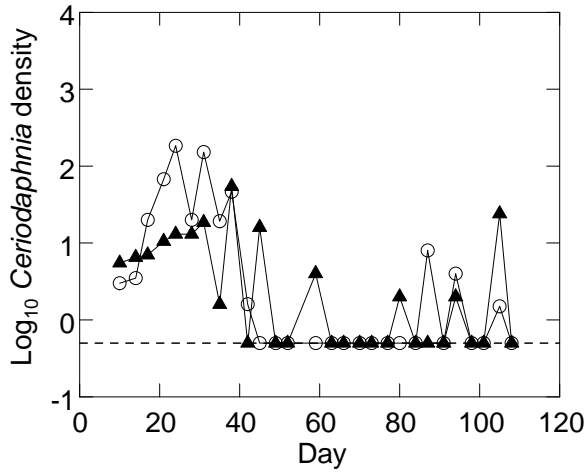
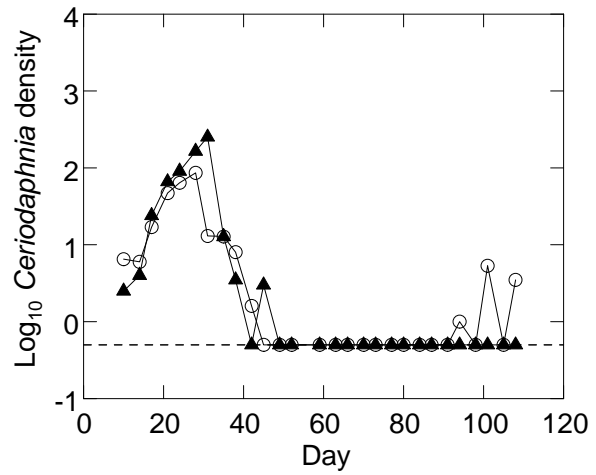
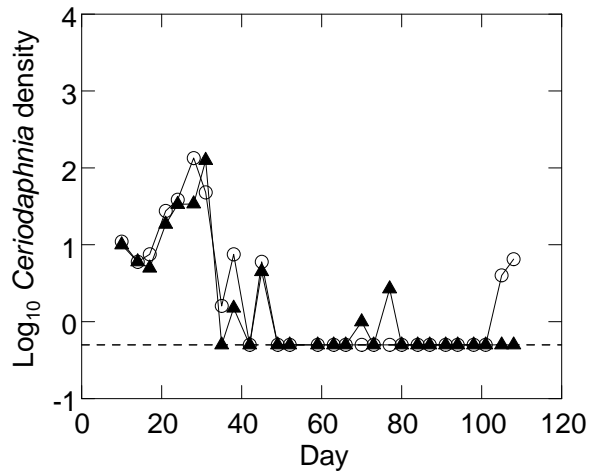
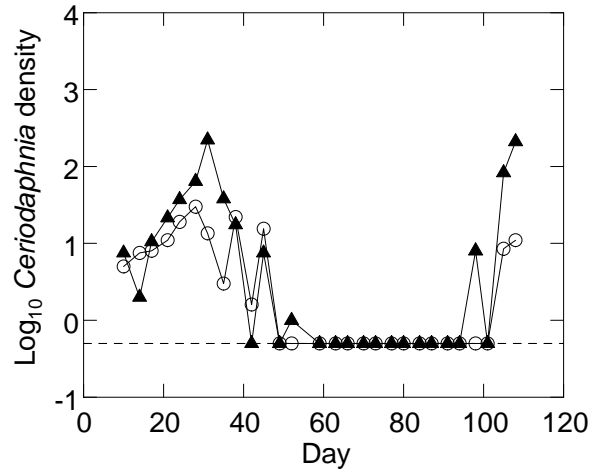
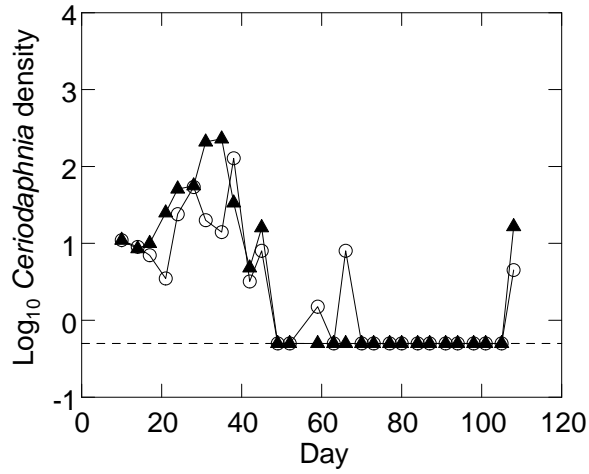


Figure A3.

E) Synchronous forcing, low dispersal



F) Synchronous forcing, high dispersal

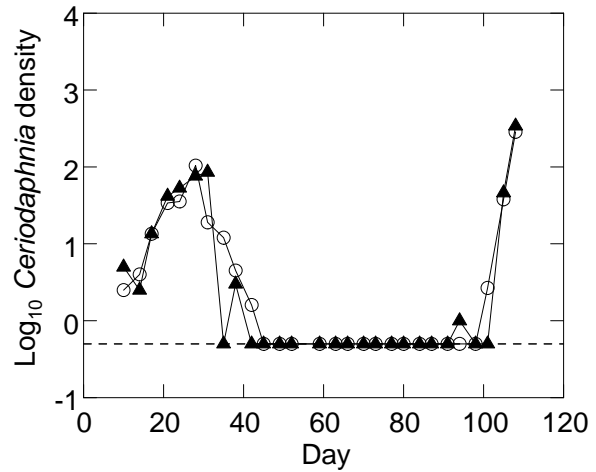
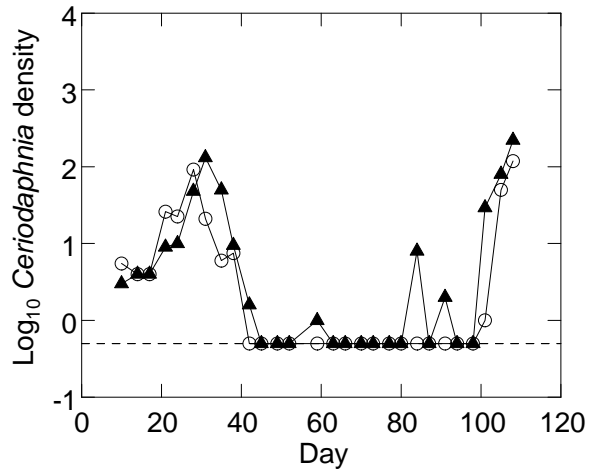
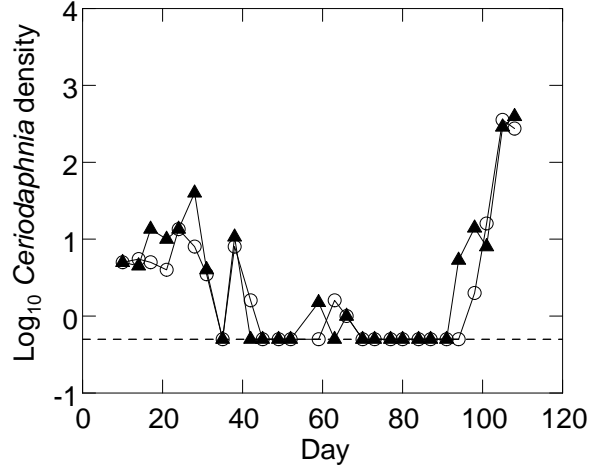
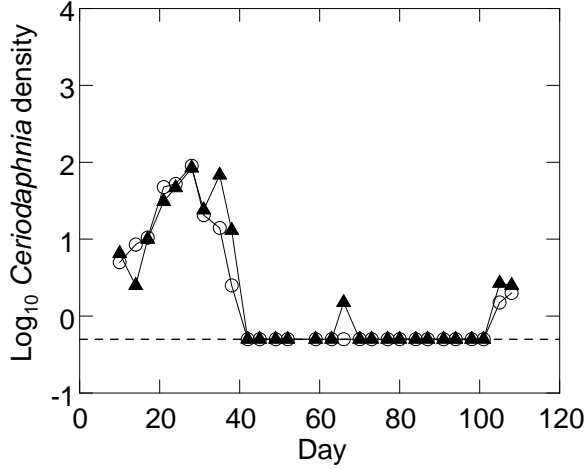


Figure A3.

F) Synchronous forcing, high dispersal



G) Asynchronous forcing, no dispersal

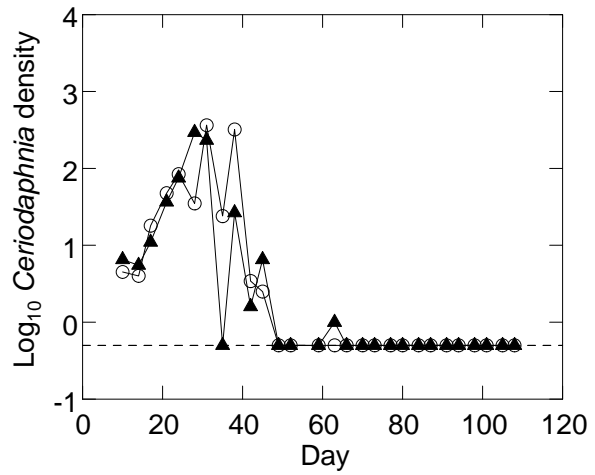
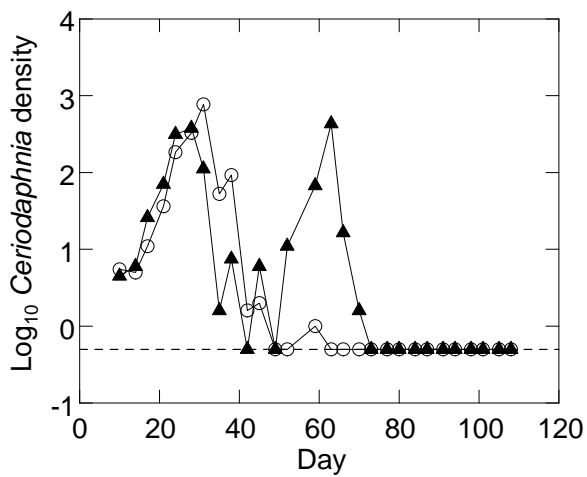
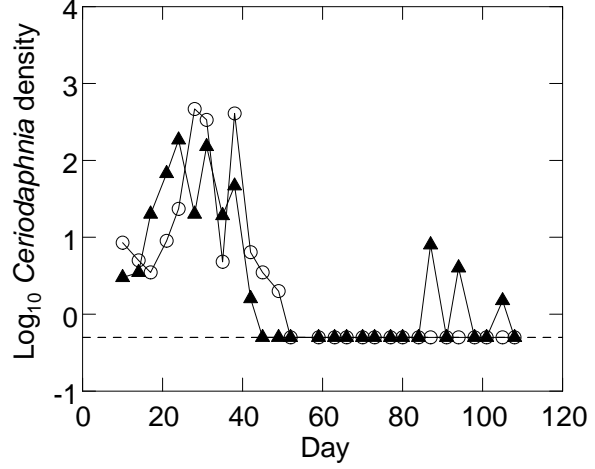
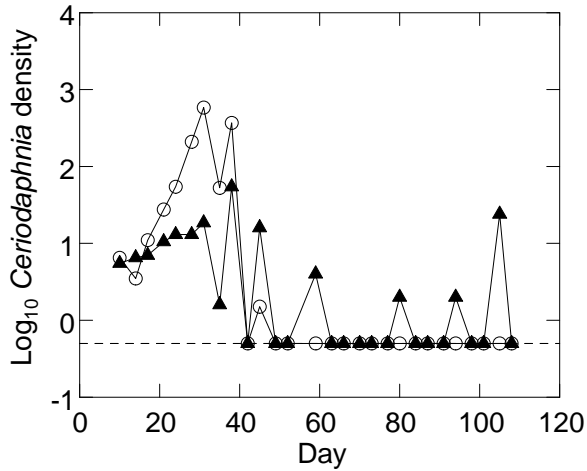
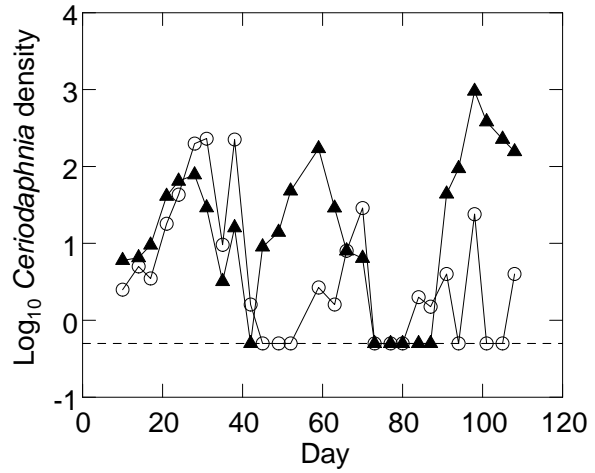
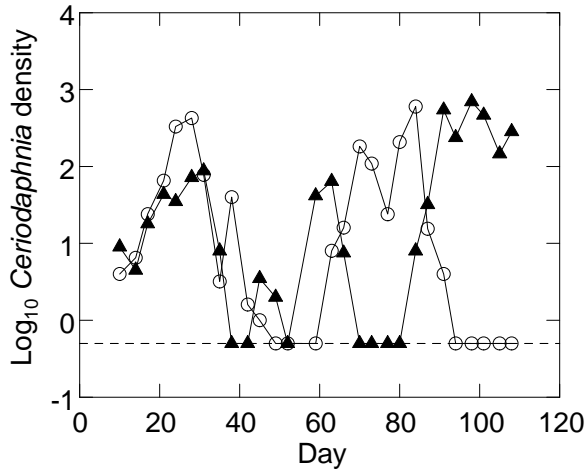
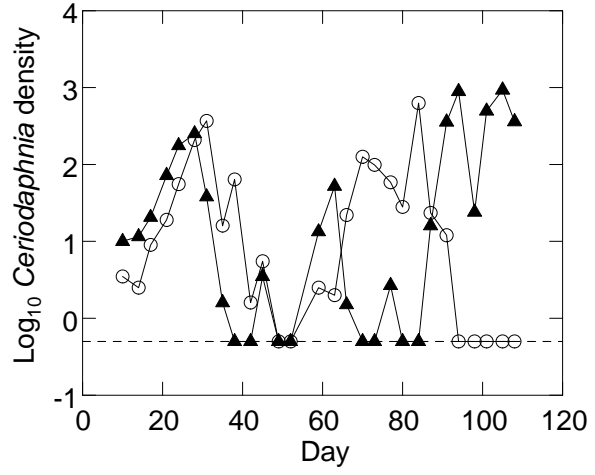
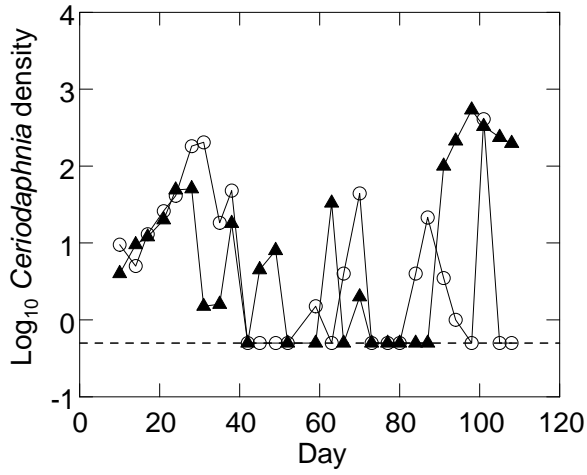


Figure A3.

H) Asynchronous forcing, low dispersal



I) Asynchronous forcing, high dispersal

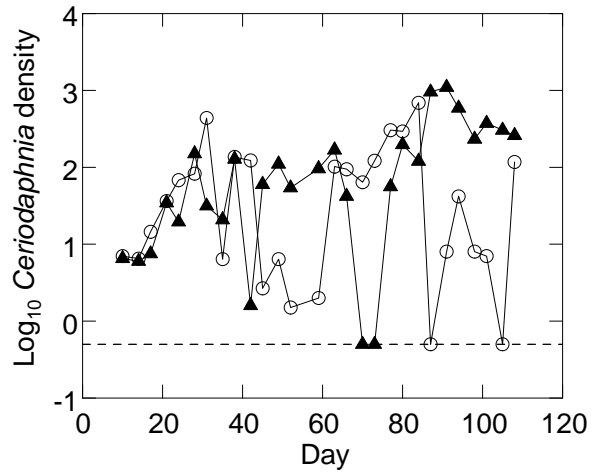
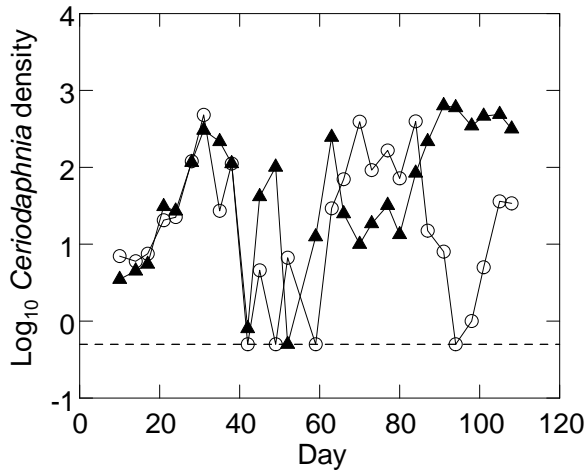


Figure A3.

D) Asynchronous forcing, high dispersal

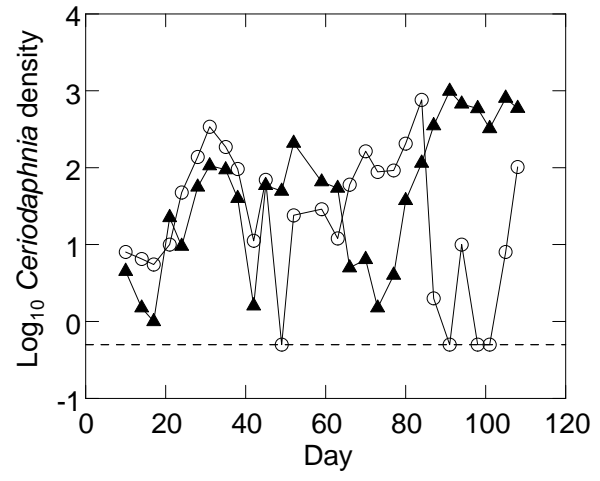
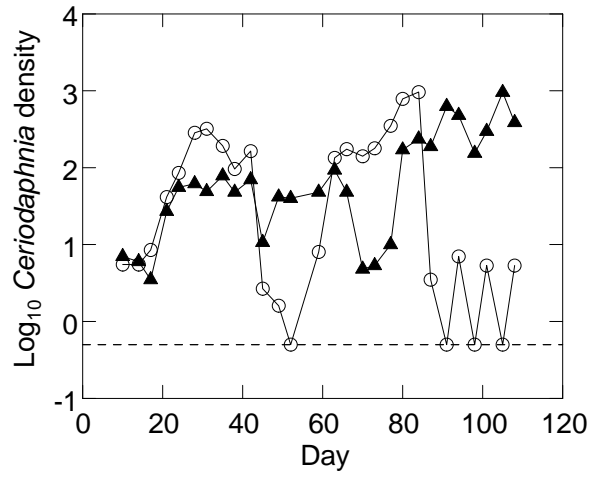
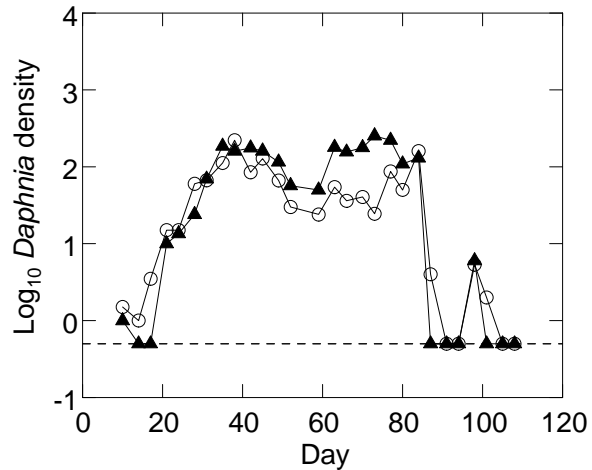
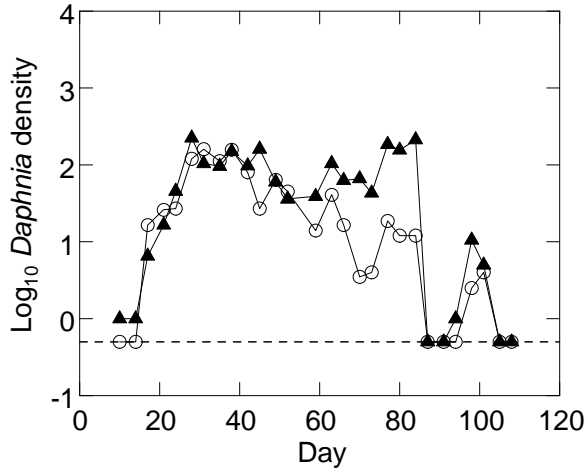


Figure A4. *Daphnia* dynamics for all treatment combinations of environmental forcing (none, synchronous, and asynchronous) and dispersal (none, low and high). Each panel displays dynamics for a replicate metacommunity (composed of two paired microcosms). A constant equal to the sampling detection limit was added only to zero values (shown by the horizontal dashed lines). Original units in numbers of individuals per L.

A) No forcing, no dispersal



B) No forcing, low dispersal

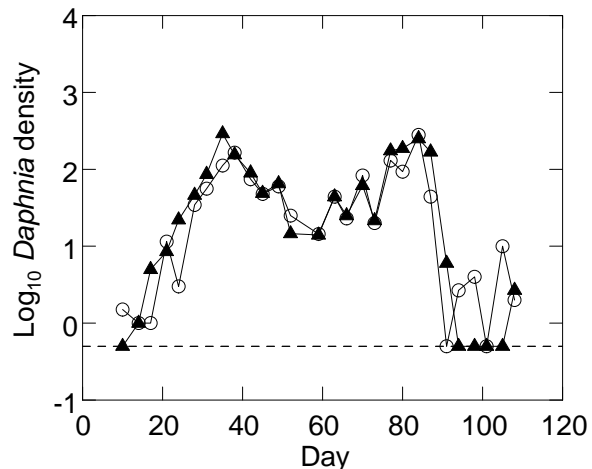
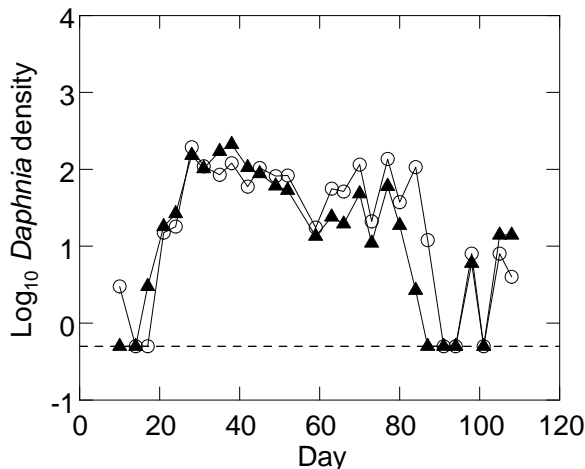
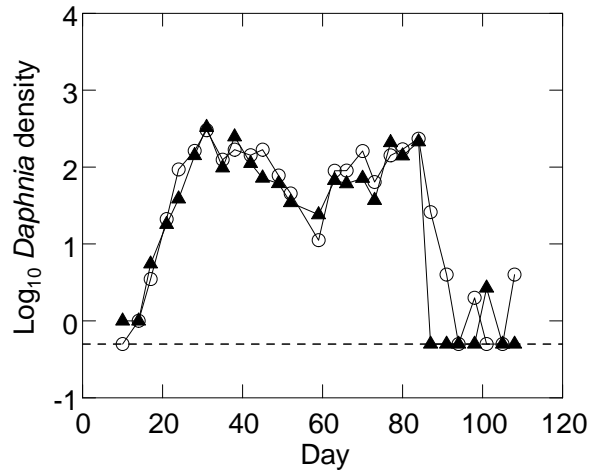
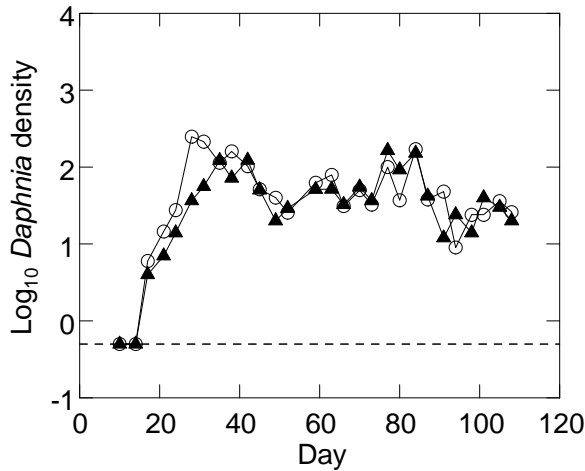
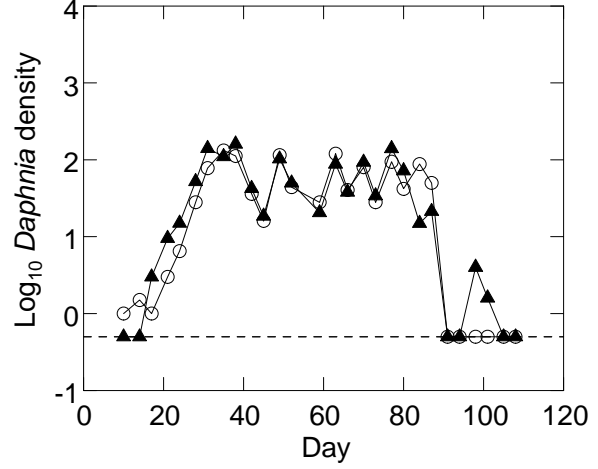
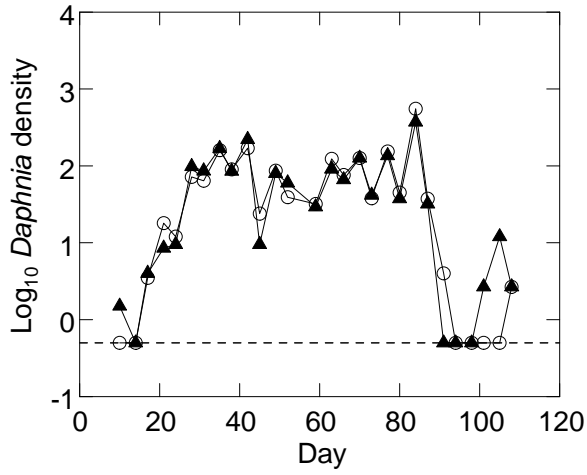
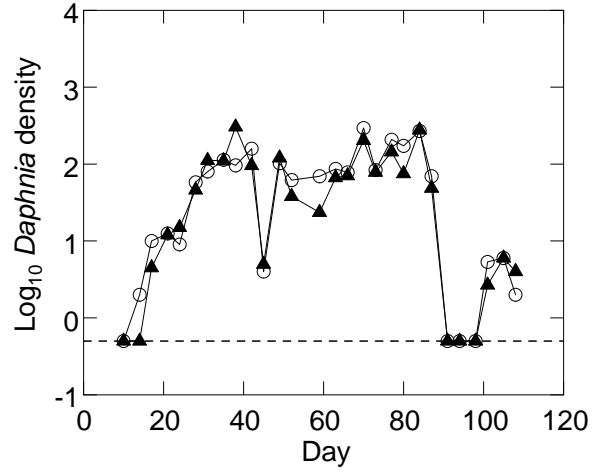
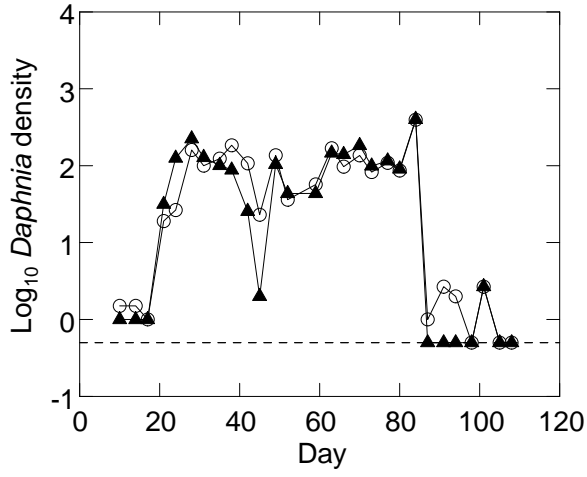


Figure A4.

C) No forcing, high dispersal



D) Synchronous forcing, no dispersal

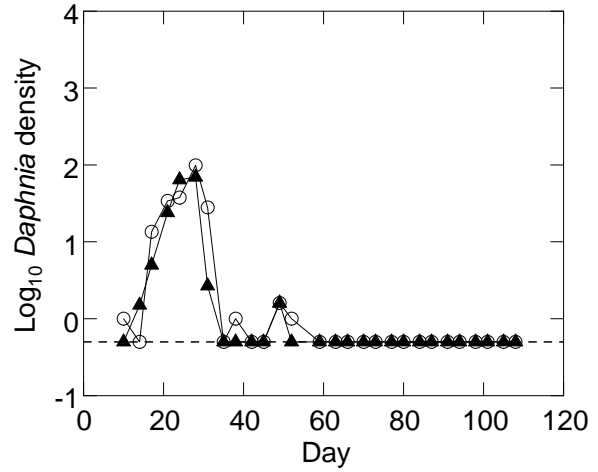
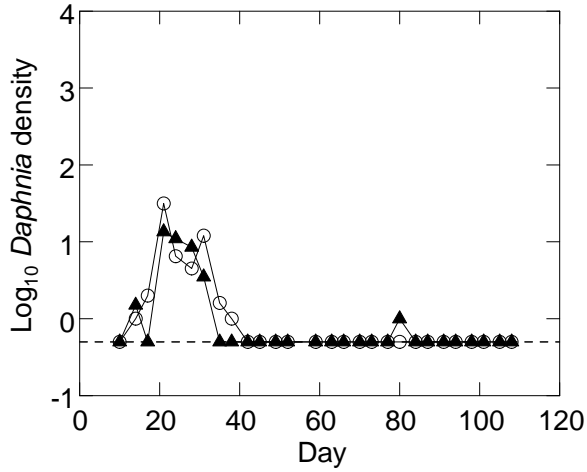
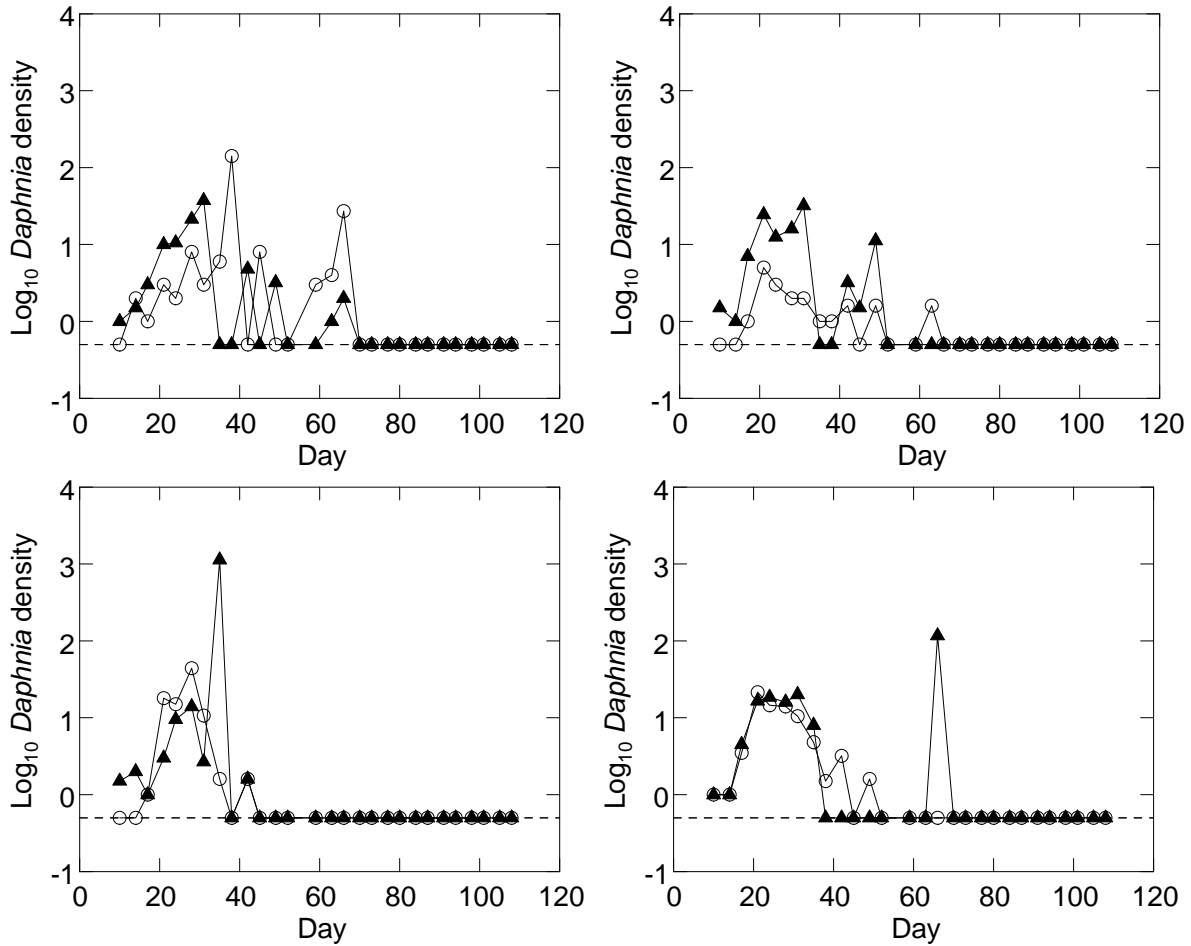


Figure A4.

E) Synchronous forcing, low dispersal



F) Synchronous forcing, high dispersal

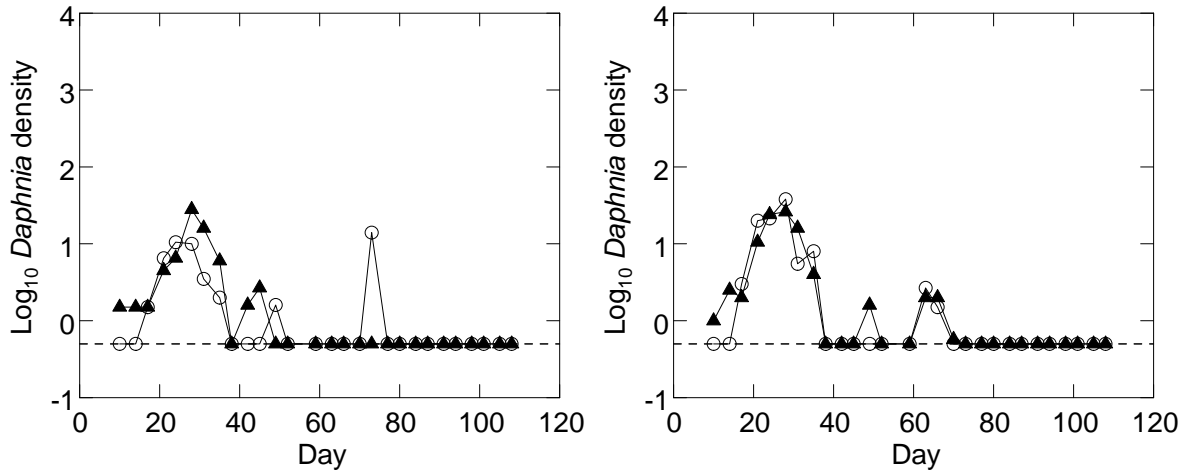
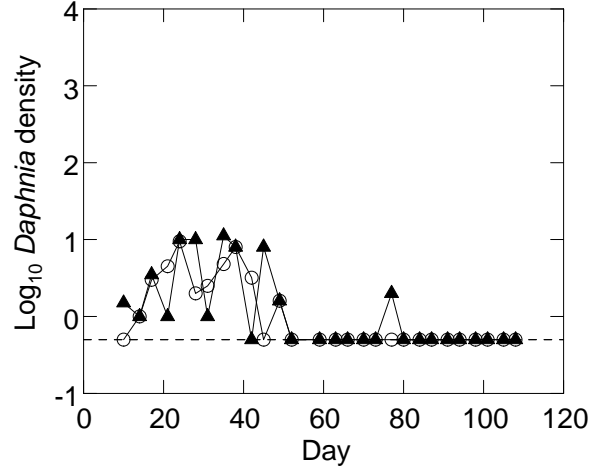
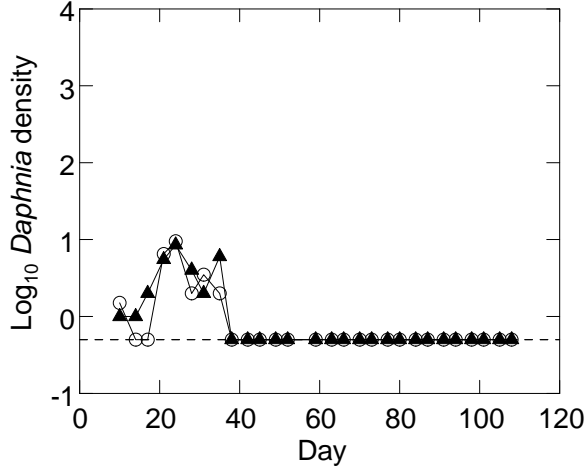


Figure A4.

F) Synchronous forcing, high dispersal



G) Asynchronous forcing, no dispersal

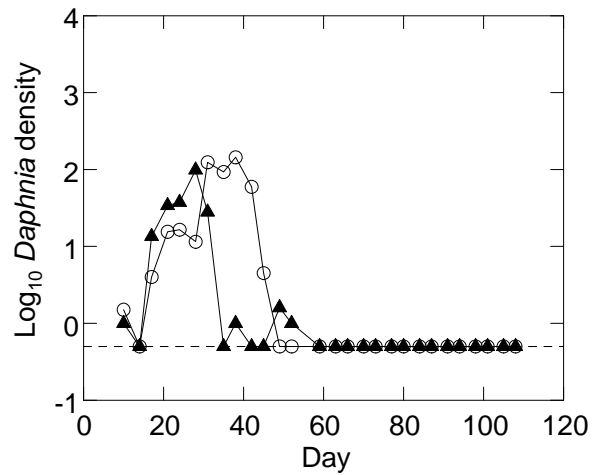
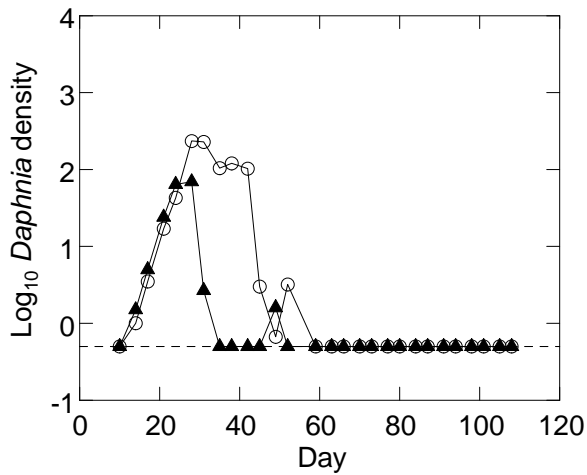
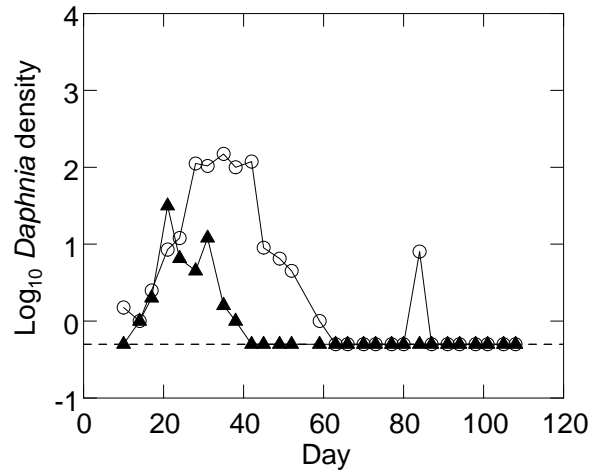
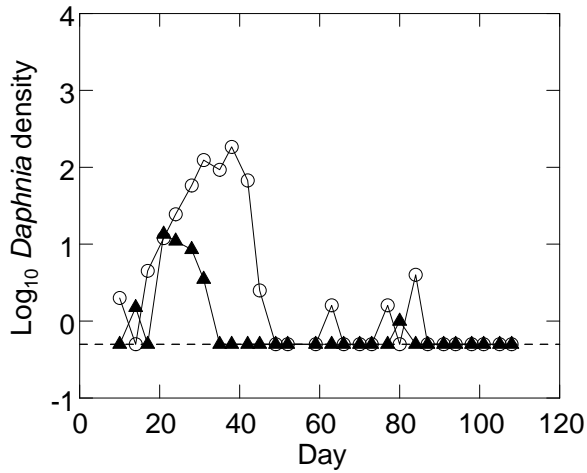
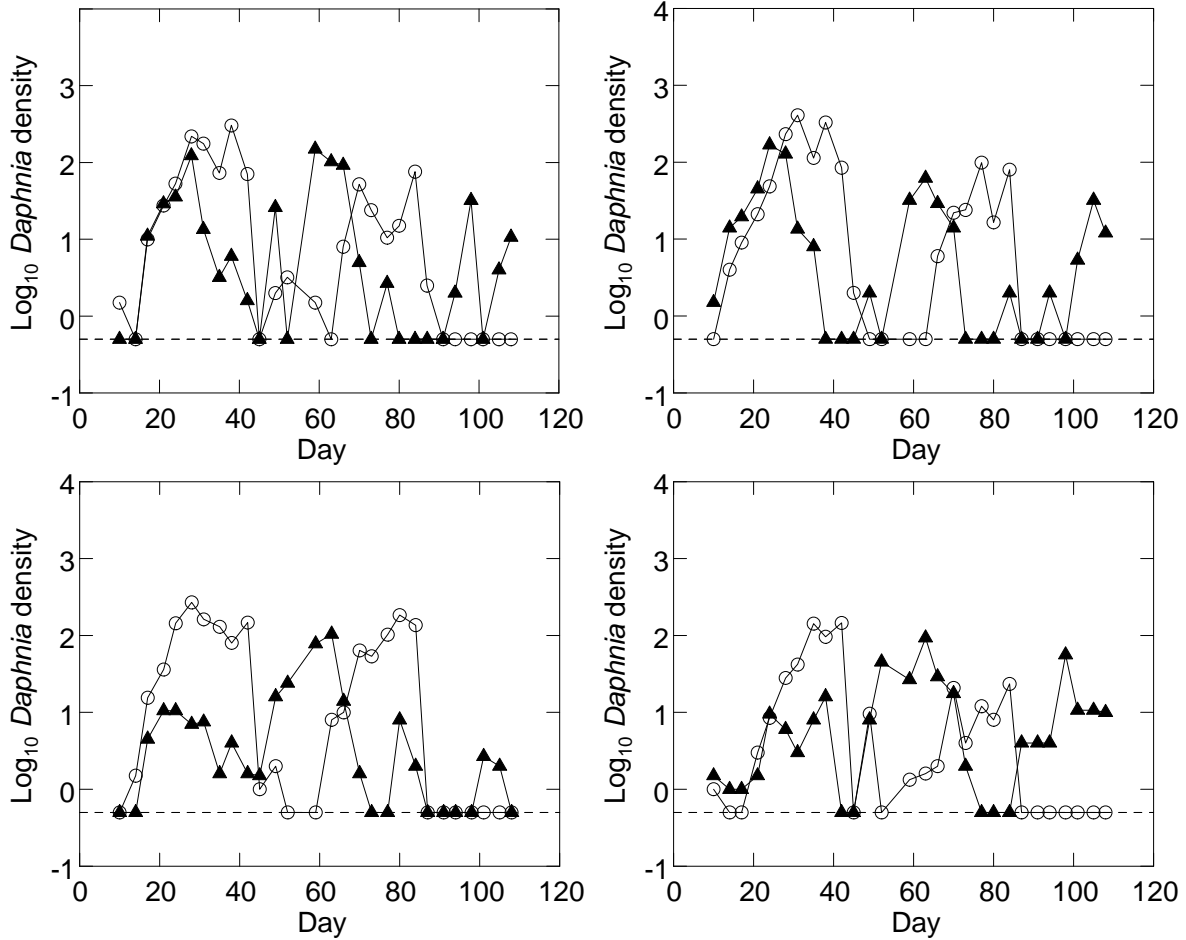


Figure A4.

H) Asynchronous forcing, low dispersal



I) Asynchronous forcing, high dispersal

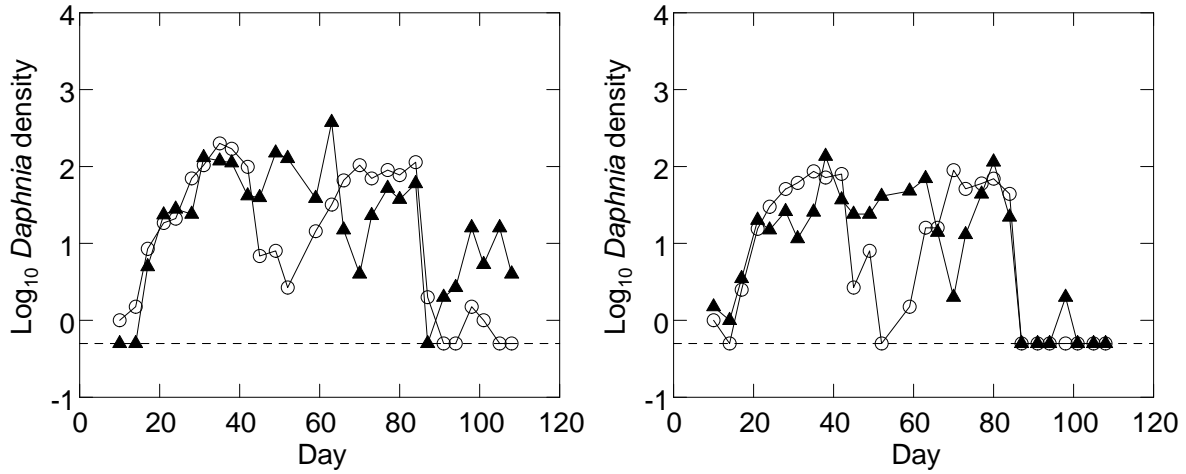


Figure A4.

I) Asynchronous forcing, high dispersal

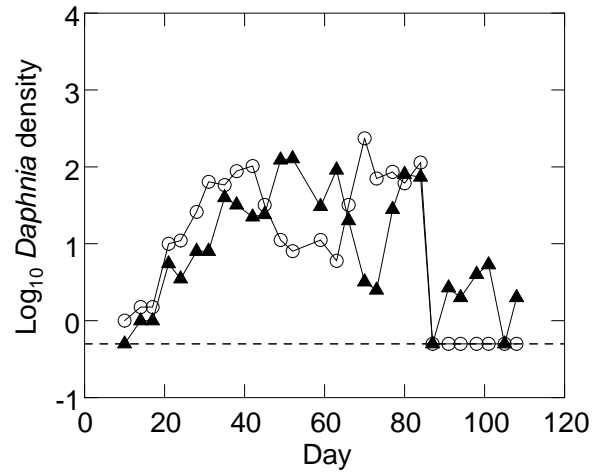
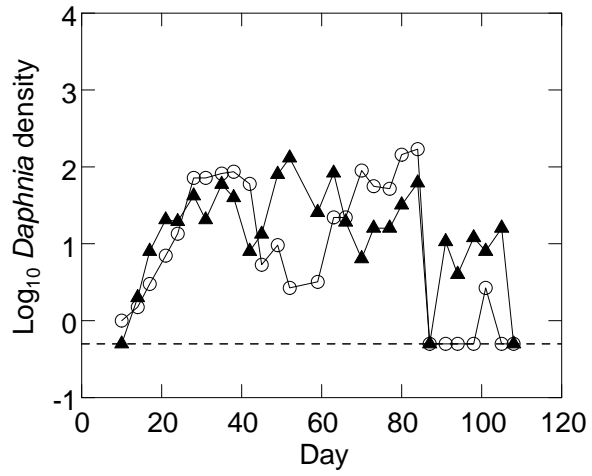
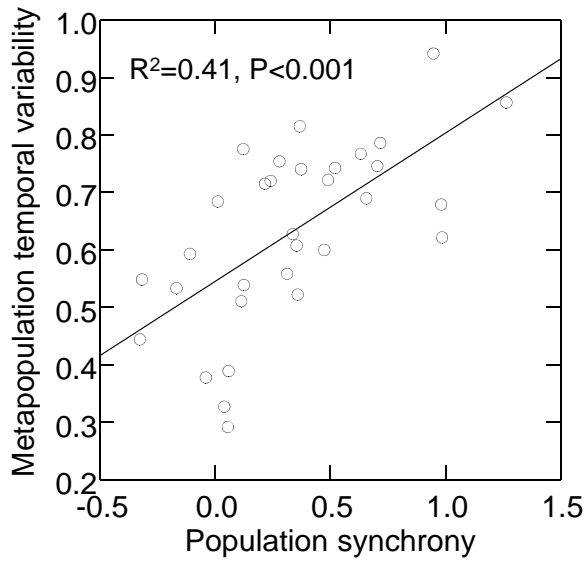
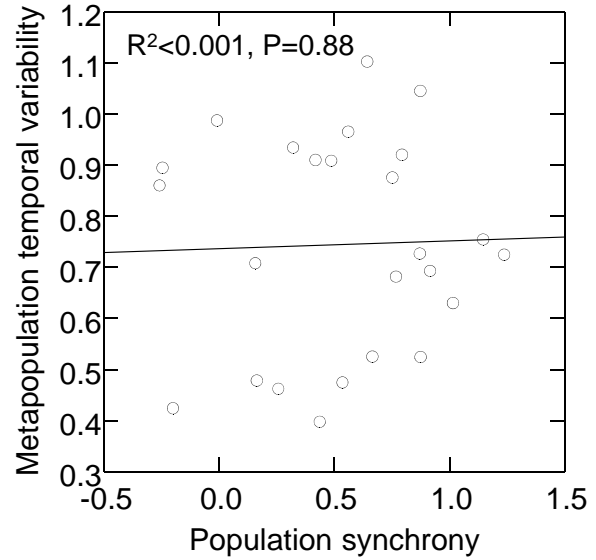


Figure A5. The relationship between metapopulation-level temporal variability and spatial synchrony in population growth rates across all treatments for A) *Scapholeberis*, B) *Ceriodaphnia* and C) *Daphnia*. Populations that went extinct have been excluded. Shown are linear regression fits.

A. *Scapholeberis*



B. *Ceriodaphnia*



C. *Daphnia*

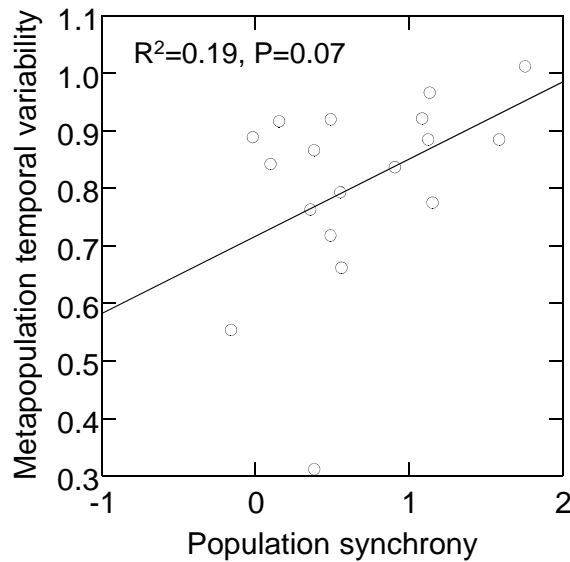


Figure A6. A reanalysis of treatment effects, removing the last 24 days of the experiment, on spatial population synchrony (z-transformed correlation coefficients), metapopulation-level temporal variability and local temporal variability (means, +/-S.E.). A) *Scapholeberis* population synchrony (shown are ANOVA results comparing synchronously forced treatments versus unforced treatments, and asynchronously forced treatments versus unforced treatments), B) *Ceriodaphnia* population synchrony (letters denote treatment means that were significantly different from each other ($P < 0.05$) using max-t tests), C) *Daphnia* population synchrony (letters as in B), D) *Scapholeberis* metapopulation-level temporal variability (shown are ANOVA results as in A), E) *Ceriodaphnia* metapopulation-level temporal variability (letters as in B), F) *Daphnia* metapopulation-level temporal variability (letters as in B), G) *Scapholeberis* local-scale temporal variability (shown are ANOVA results as in A), H) *Ceriodaphnia* local-scale temporal variability (letters as in B), I) *Daphnia* local-scale temporal variability (letters as in B).

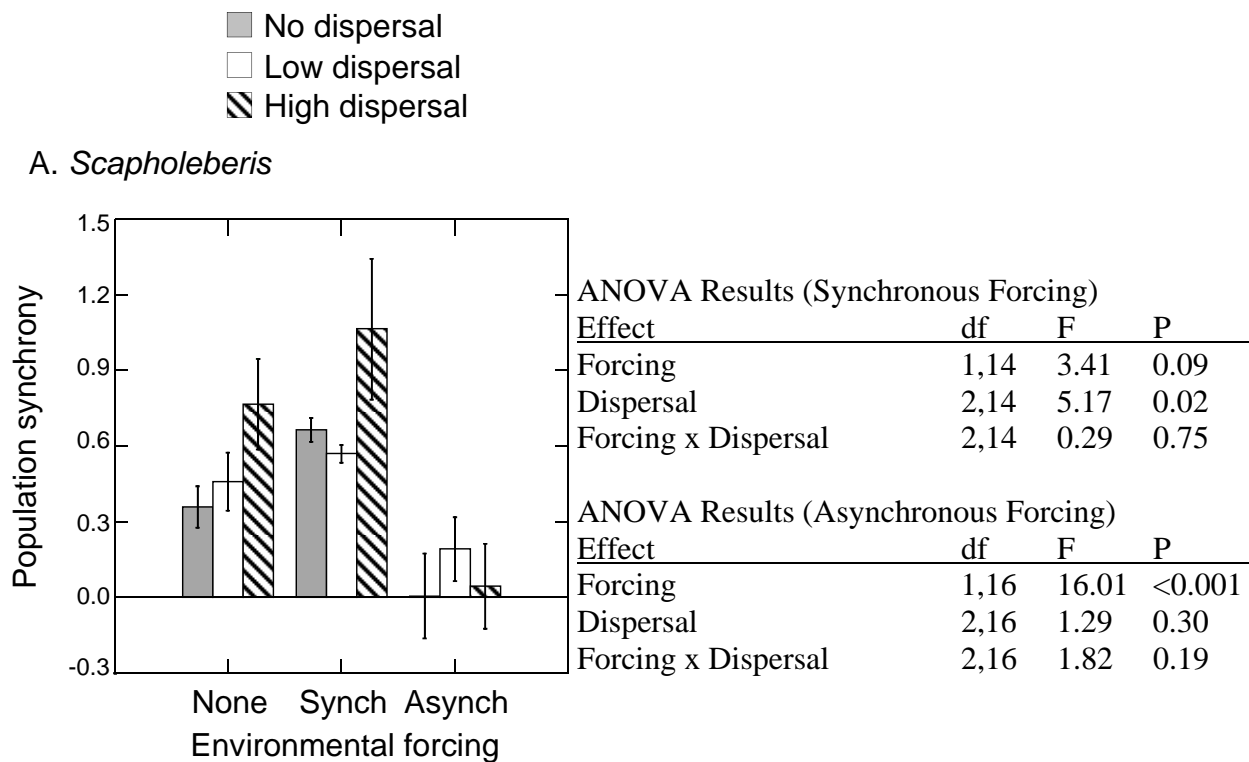
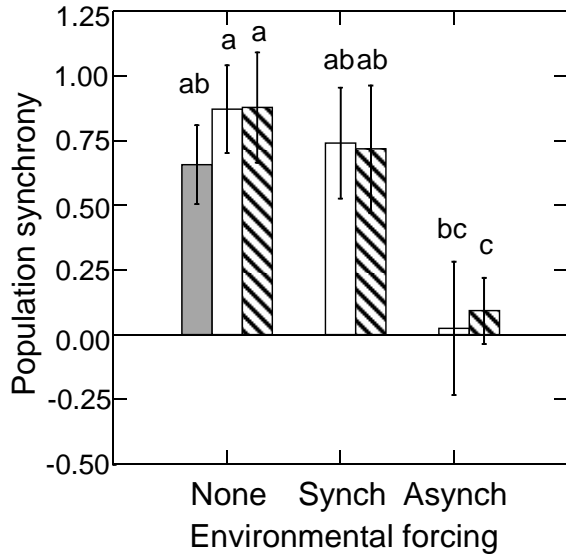
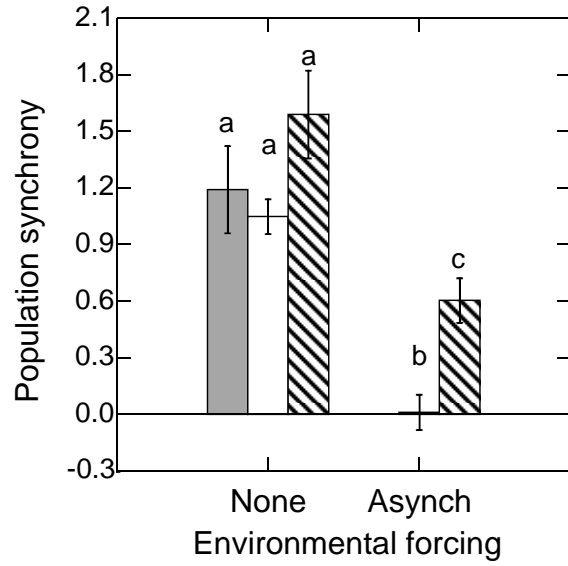


Figure A6.

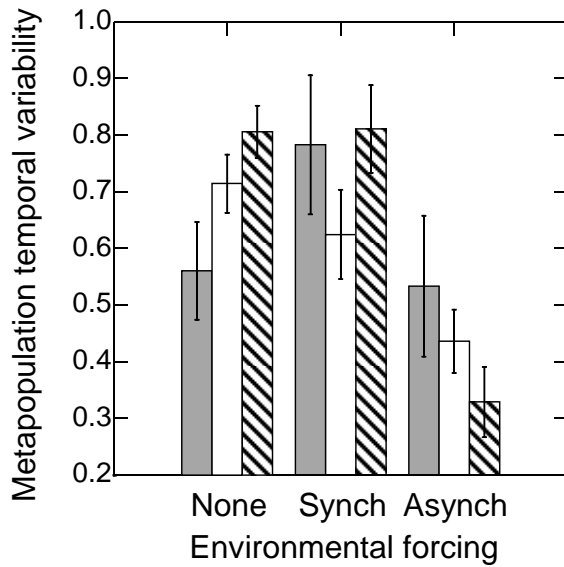
B. *Ceriodaphnia*



C. *Daphnia*



D. *Scapholeberis*



ANOVA Results (Synchronous Forcing)

Effect	df	F	P
Forcing	1,14	0.86	0.37
Dispersal	2,14	4.13	0.04
Forcing x Dispersal	2,14	2.93	0.09

ANOVA Results (Asynchronous Forcing)

Effect	df	F	P
Forcing	1,16	19.74	<0.001
Dispersal	2,16	0.58	0.57
Forcing x Dispersal	2,16	7.82	<0.01

Figure A6.

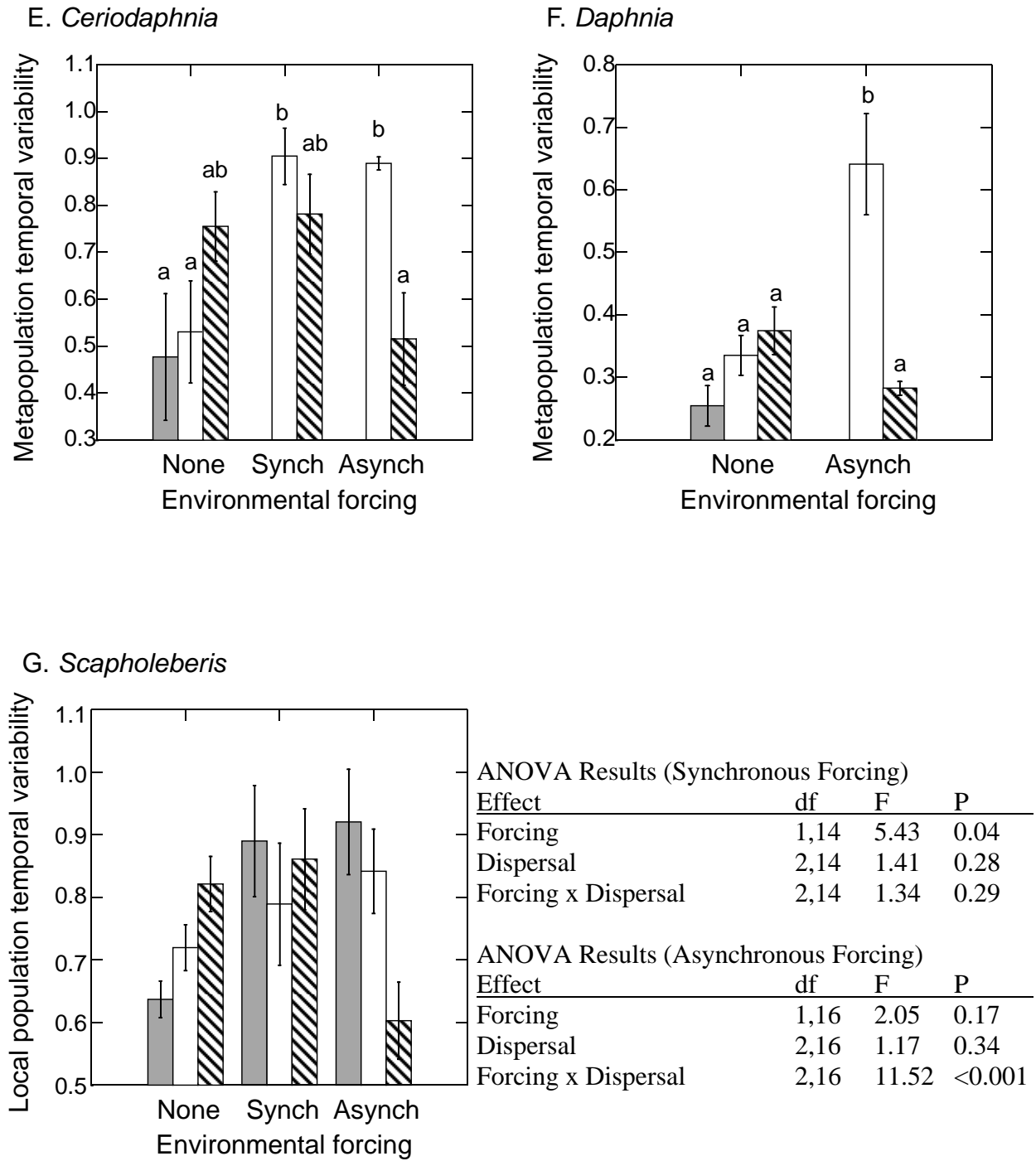


Figure A6.

