

Figures and Supplementary Material

Main text figures

Figure 1:

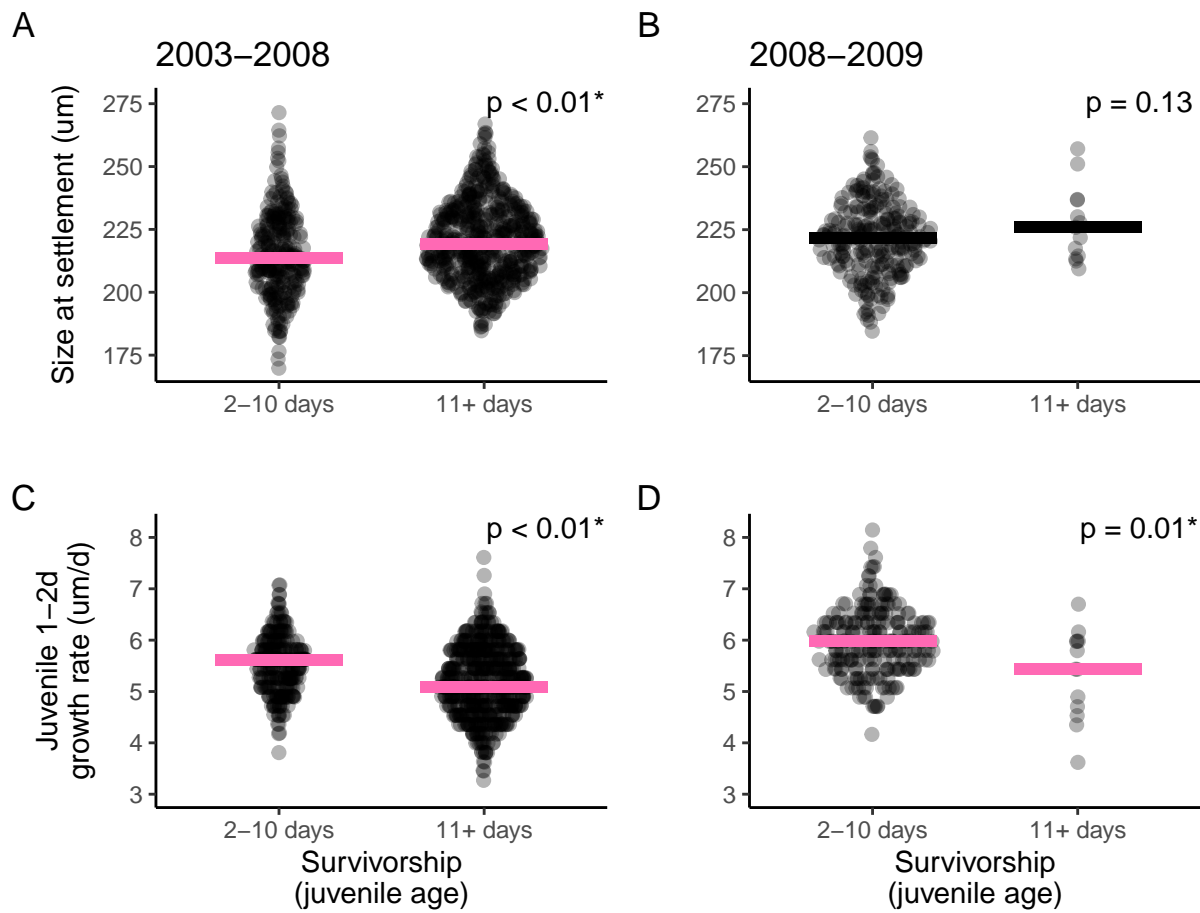


Figure 2:

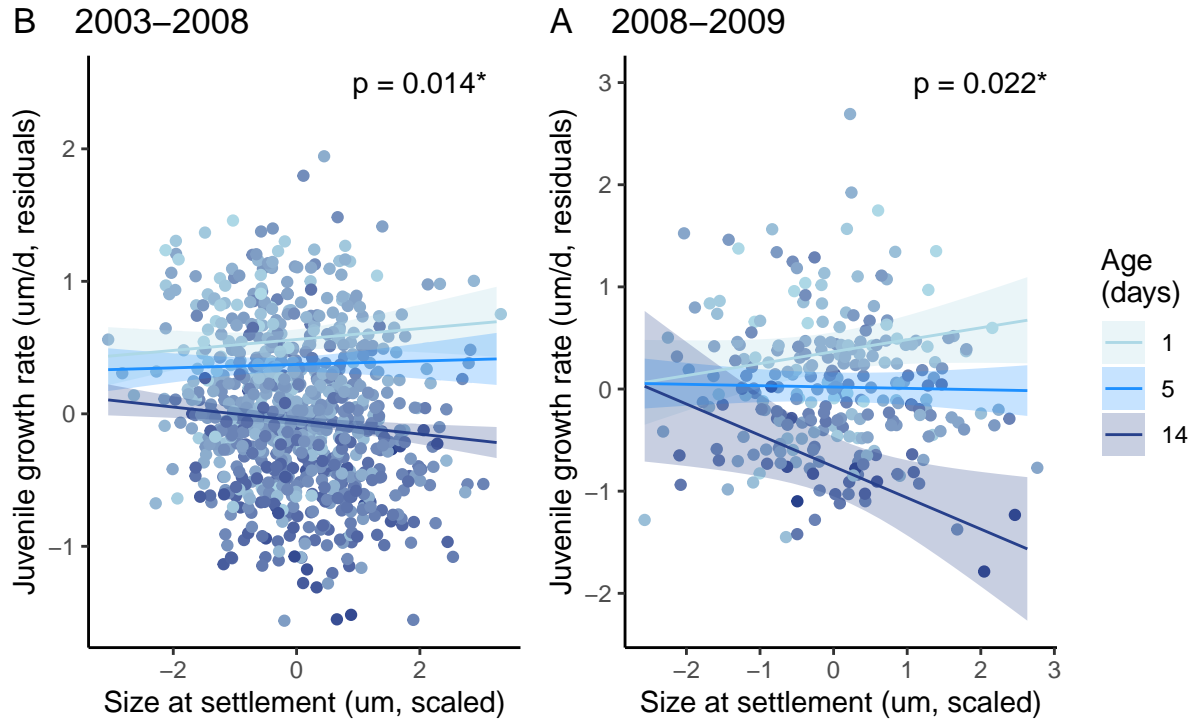


Figure 3:

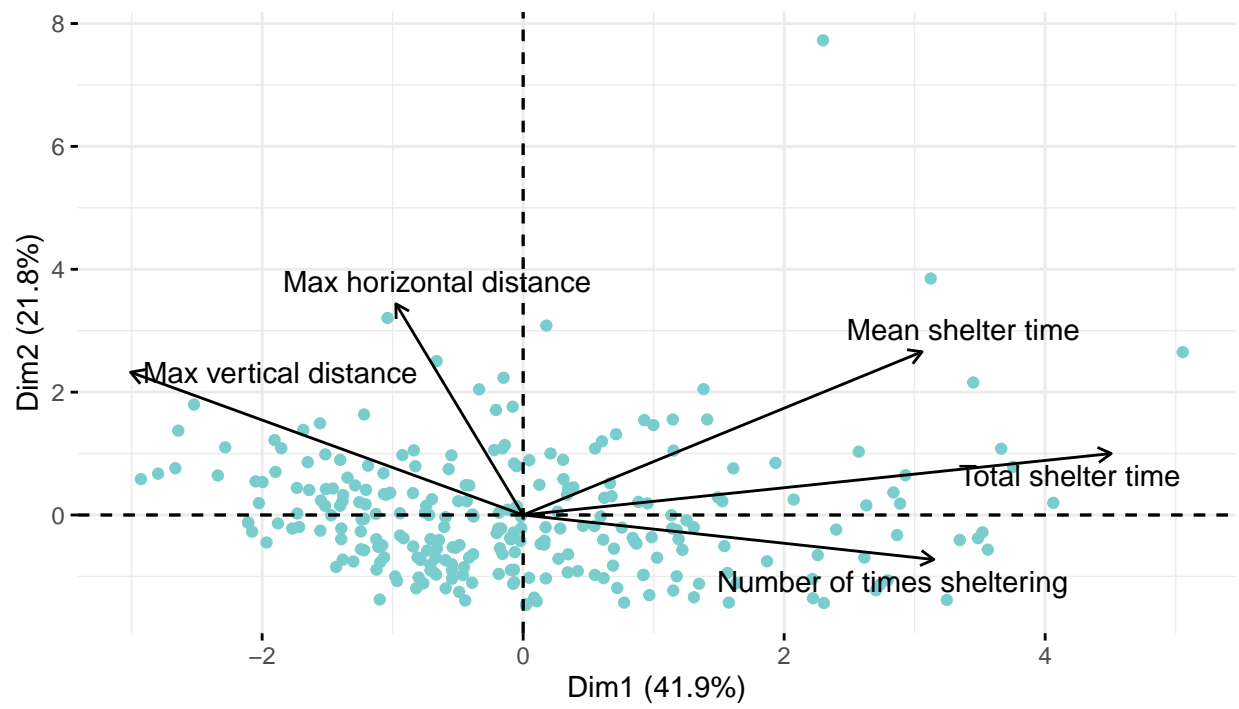


Figure 4:

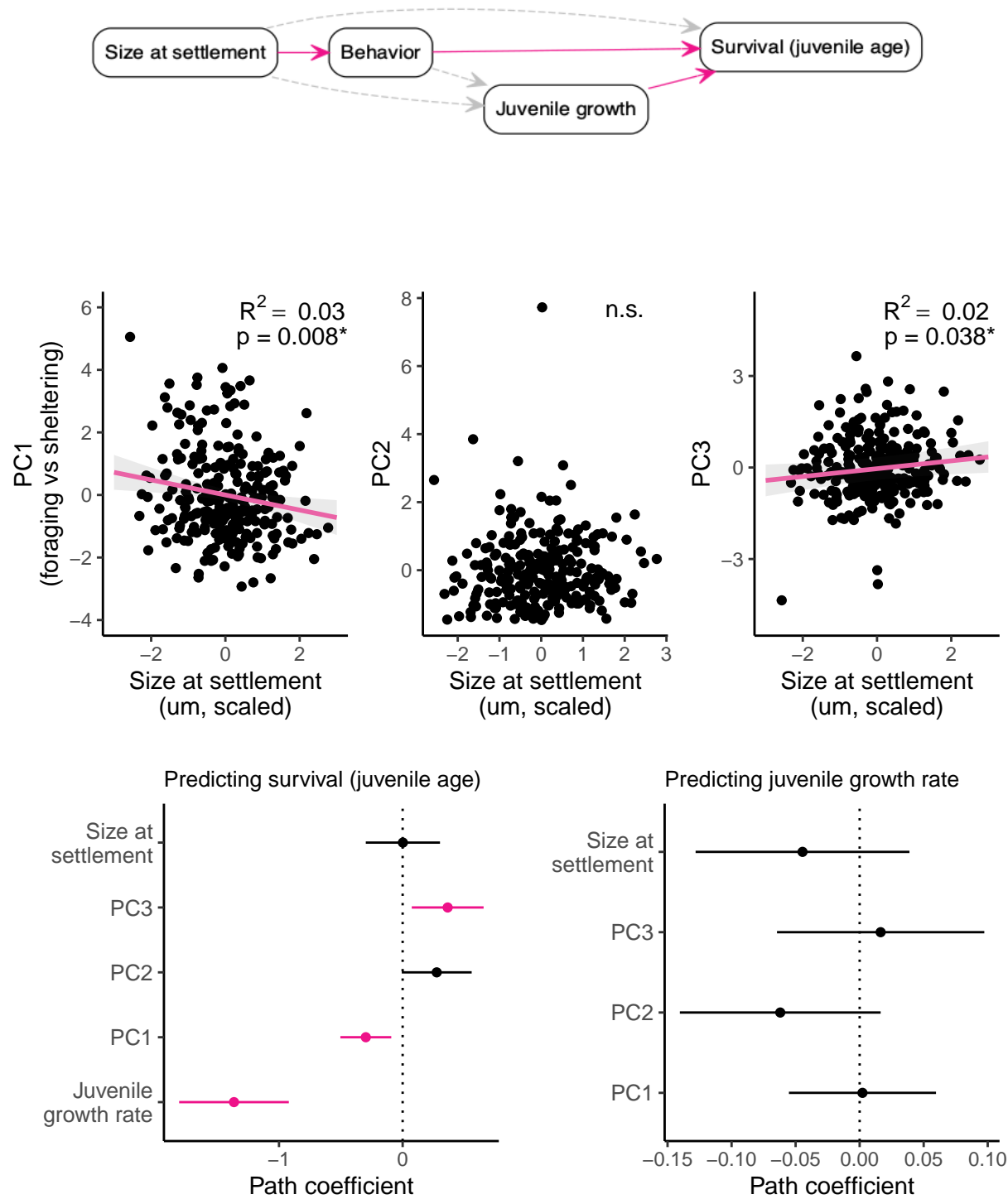
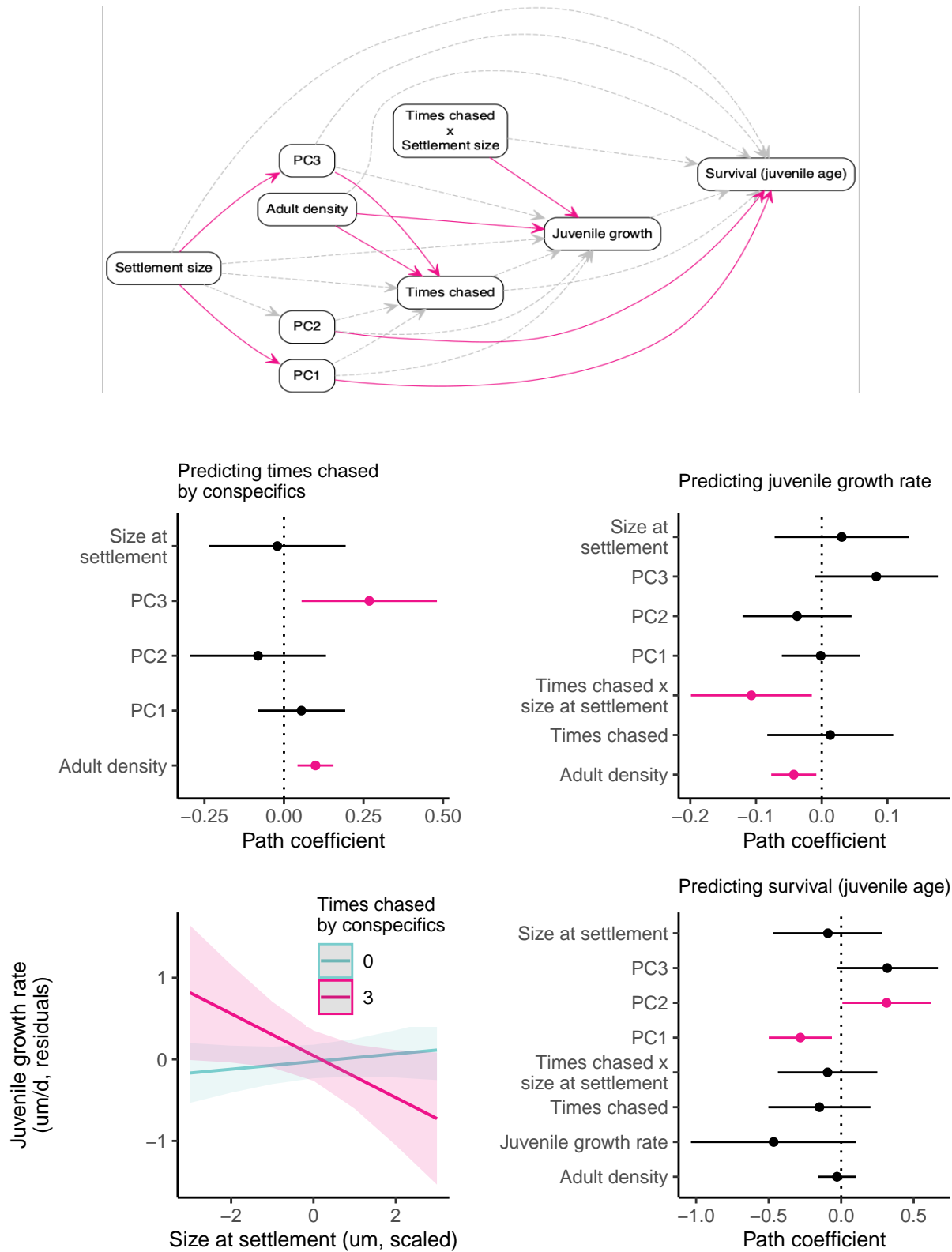


Figure 5:



Supplementary Figures

Figure S1:

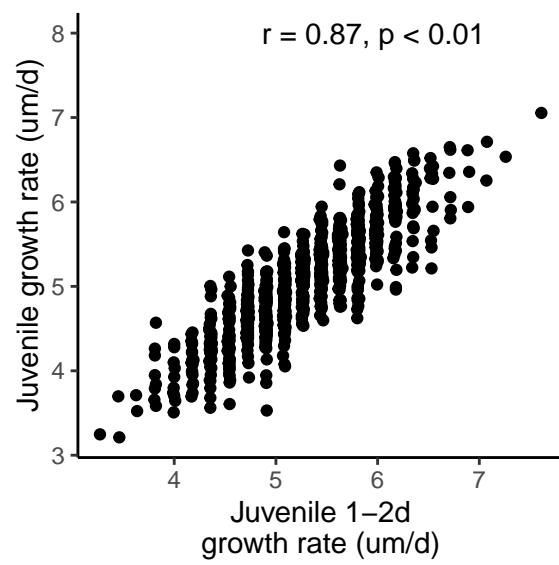


Figure S2:

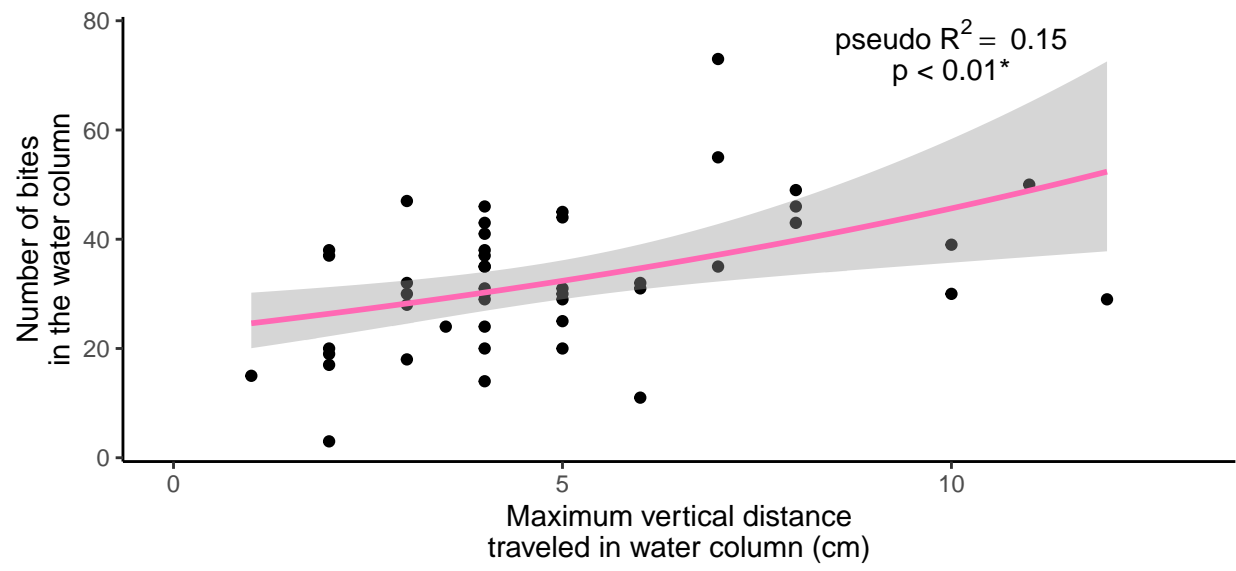


Figure S3:

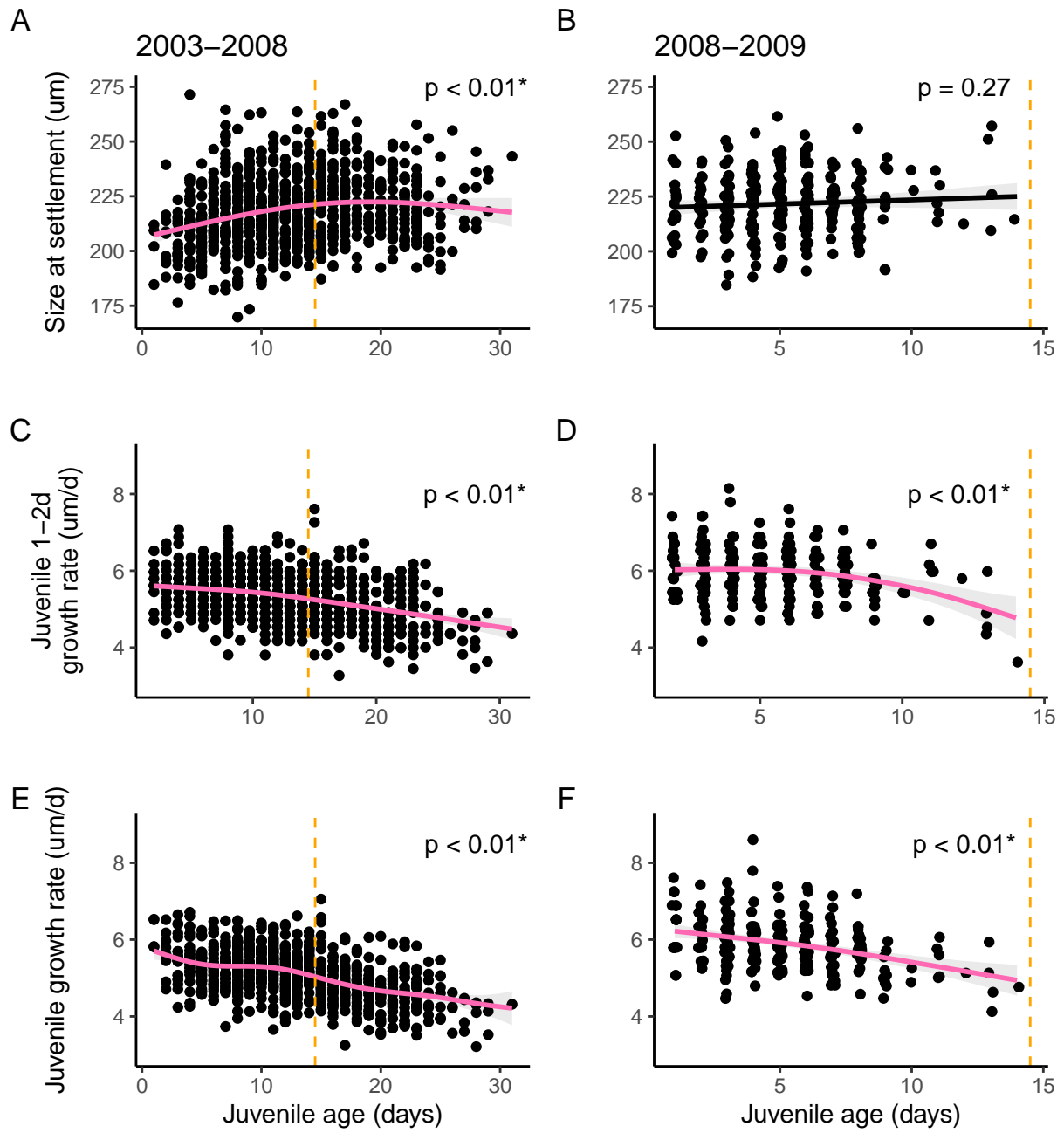


Figure S4:

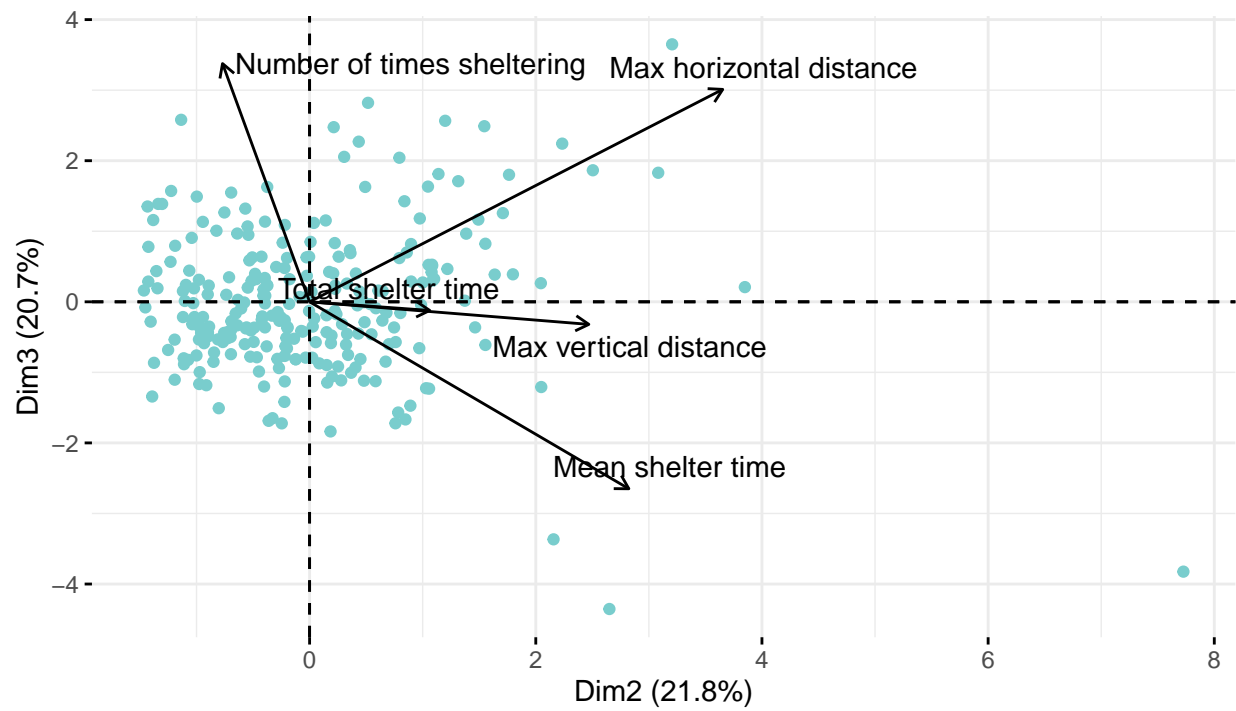
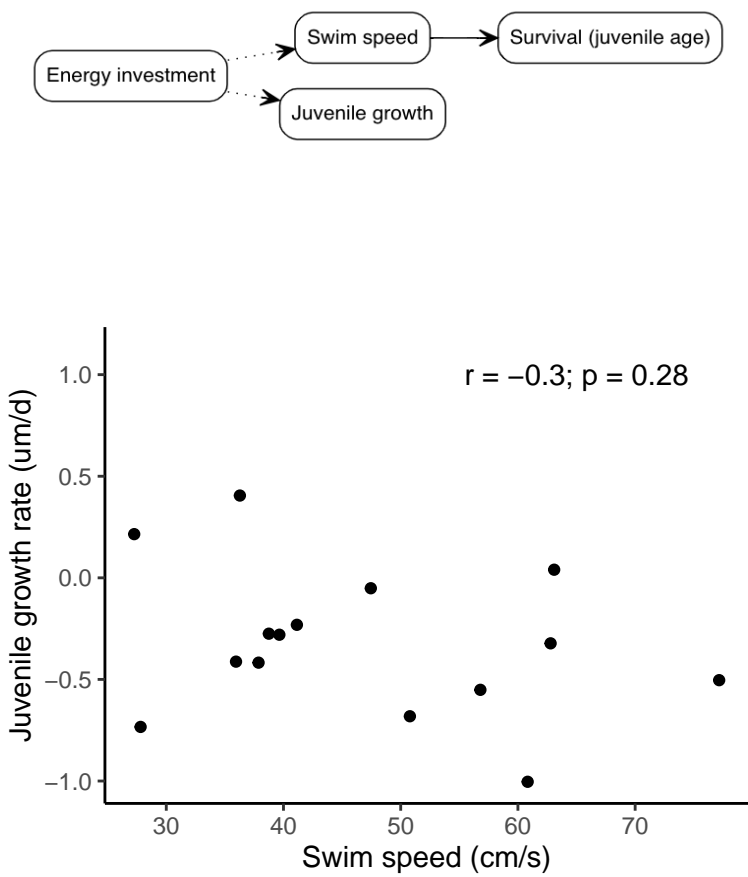


Figure S5:



Supplementary Tables

Table 1: Generalized linear model (GLM) with a negative binomial error structure predicting number of times fish take bites in the water column.

	Estimate	Std. Error	z value	p value
(Intercept)	3.13	0.12	25.28	<0.001
Max vertical distance	0.07	0.02	3.08	0.002

Table 2: Linear mixed effects model (LMM) predicting juvenile growth rate (um/d, residuals) in the 2008-2009 dataset, with random intercepts for collection site.

	Estimate	Std. Error	df	t value	p value
(Intercept)	0.45	0.11	4.50	4.26	0.010
Settlement size	0.15	0.09	249.51	1.75	0.081
Juvenile age	-0.09	0.01	251.60	-5.84	<0.001
Settlement size x juvenile age	-0.03	0.01	251.47	-2.30	0.022

Table 3: LMM predicting juvenile growth rate (um/d, residuals) in the 2003-2008 dataset, with random intercepts for collection site.

	Estimate	Std. Error	z value	p value
(Intercept)	0.61	0.04	14.67	<0.001
Settlement size	0.05	0.04	1.22	0.223
Juvenile age	-0.05	0.00	-16.05	<0.001
Settlement size x juvenile age	-0.01	0.00	-2.47	0.014

Table 4: Path coefficients for the DAG in Figure 4A. The model is well fit to the data (C-statistic = 1.33, df = 6, p-value = 0.97). A p-value < 0.05 would indicate that the hypothesized structure in the DAG is not supported by the data. Estimates correspond to partial regression coefficients and can be interpreted as the expected change in the response given a unit change in the predictor. Standardized estimates are calculated by scaling these estimates by the ratio of the standard deviation of the predictor over the standard deviation of the response.

Response	Predictor	Estimate	Std.Estimate	Std.Error	DF	Crit.Value	P.Value
PC1	Settlement size	-0.24	-0.17	0.09	254	-2.69	0.008
PC2	Settlement size	0.04	0.03	0.07	254	0.54	0.591
PC3	Settlement size	0.13	0.13	0.06	256	2.08	0.038
Juvenile age	Juv. growth rate	-1.36	-0.35	0.23	250	-6.03	<0.001
Juvenile age	Settlement size	0.00	0.00	0.15	250	0.01	0.989
Juvenile age	PC1	-0.30	-0.16	0.10	250	-2.84	0.005
Juvenile age	PC2	0.28	0.11	0.14	250	1.91	0.057
Juvenile age	PC3	0.36	0.14	0.15	250	2.46	0.015
Juv. growth rate	PC1	0.00	0.00	0.03	251	0.08	0.939
Juv. growth rate	PC2	-0.06	-0.10	0.04	251	-1.55	0.123
Juv. growth rate	PC3	0.02	0.03	0.04	251	0.40	0.691
Juv. growth rate	Settlement size	-0.04	-0.07	0.04	251	-1.05	0.297

Table 5: R-squared values for component models for the DAG in Figure 4A.

Response	Family	Link	Mixed model	Marginal R2	Conditional R2
PC1	Gaussian	identity	No	0.03	NA
PC2	Gaussian	identity	No	0.00	NA
PC3	Gaussian	identity	Yes	0.02	0.08
Juvenile age	Gaussian	identity	No	0.19	NA
Juvenile growth rate	Gaussian	identity	No	0.01	NA

Table 6: Path coefficients for the DAG in Figure 5A. The model is well fit to the data (C-statistic = 13.55, df = 12, p-value = 0.33). A p-value < 0.05 would indicate that the hypothesized structure in the DAG is not supported by the data. Estimates correspond to partial regression coefficients and can be interpreted as the expected change in the response given a unit change in the predictor. Standardized estimates are calculated by scaling these estimates by the ratio of the standard deviation of the predictor over the standard deviation of the response.

Response	Predictor	Estimate	Std.Estimate	Std.Error	DF	Crit.Value	P.Value
Times chased	Adult density	0.10	0.13	0.03	162	3.44	0.001
Times chased	Settlement size	-0.02	-0.01	0.11	162	-0.19	0.848
Times chased	PC1	0.05	0.04	0.07	162	0.78	0.435
Times chased	PC2	-0.08	-0.04	0.11	162	-0.75	0.454
Times chased	PC3	0.27	0.14	0.11	162	2.47	0.014
Juv. growth rate	Adult density	-0.04	-0.19	0.02	159	-2.43	0.016
Juv. growth rate	Times chased	0.01	0.02	0.05	159	0.26	0.792
Juv. growth rate	Settlement size	0.03	0.05	0.05	160	0.58	0.560
Juv. growth rate	PC3	0.08	0.14	0.05	145	1.74	0.084
Juv. growth rate	PC1	0.00	0.00	0.03	160	-0.05	0.959
Juv. growth rate	PC2	-0.04	-0.07	0.04	159	-0.89	0.375
Juv. growth rate	Chased:Settlmt size	-0.11	-0.19	0.05	159	-2.29	0.024
Juvenile age	Juv. growth rate	-0.47	-0.13	0.29	159	-1.60	0.111
Juvenile age	Times chased	-0.15	-0.06	0.18	158	-0.84	0.404
Juvenile age	Settlement size	-0.09	-0.04	0.19	159	-0.48	0.634
Juvenile age	PC3	0.32	0.14	0.18	157	1.78	0.076
Juvenile age	PC2	0.31	0.15	0.16	158	2.01	0.046
Juvenile age	PC1	-0.28	-0.20	0.11	159	-2.54	0.012
Juvenile age	Adult density	-0.03	-0.03	0.07	158	-0.43	0.665
Juvenile age	Chased:Settlmt size	-0.09	-0.04	0.17	158	-0.54	0.593
PC1	Settlement size	-0.26	-0.16	0.12	166	-2.11	0.036
PC2	Settlement size	-0.01	-0.01	0.09	166	-0.08	0.936
PC3	Settlement size	0.21	0.20	0.08	168	2.68	0.007

Table 7: R-squared values for component models for the DAG in Figure 5A.

Response	Family	Link	Mixed model	Marginal R2	Conditional R2
Times chased	Poisson	log	No	0.13	NA
Juvenile growth rate	Gaussian	identity	Yes	0.08	0.10
Juvenile age	Gaussian	identity	Yes	0.09	0.13
PC1	Gaussian	identity	No	0.03	NA
PC2	Gaussian	identity	No	0.00	NA
PC3	Gaussian	identity	Yes	0.04	0.10