

Supplemental Tables

Table S1. Results of covariates for developmental and post-hatching variables of *A. sagrei*.

Response	Covariate	Covariate results		
		β (SE)	t	p
Water uptake (mg)	Developmental age	4.6 (0.75)	6.1	<0.0001
Heart rate (bpm)	Temperature	7.98 (2.47)	3.2	0.002
O ₂ consumption at 20.7 °C (microL/hr)	Developmental age	0.82 (0.16)	5.1	<0.0001
O ₂ consumption at 26.3 °C (microL/hr)	Developmental age	1.38 (0.21)	6.6	<0.0001
SVL (mm)	Initial egg mass	0.02 (0.002)	13.15	< 0.0001
Body mass (mg)	Initial egg mass	0.69 (0.03)	21.3	< 0.0001
Body condition	Initial egg mass	0.002 (0.0002)	12.35	< 0.0001
Tail length (mm)	Initial egg mass	0.03 (0.005)	7.21	< 0.0001
Sprint speed (m/s)	Initial SVL	0.02 (0.006)	3.03	0.003
Endurance*	Initial SVL	0.10 (0.03)	3.20	0.002
Final SVL (mm)	Initial SVL	0.70 (0.07)	9.58	< 0.0001

β = effect size; SE = standard error; t = t value; p = p value

Table S2. Estimated marginal means for developmental and post-hatching variables of *A. sagrei* that were significantly influenced by season, treatment, or the interaction. Asterisk denotes a variable was log-transformed.

Response	Season	Treatment	Emmean	SE
Developmental Rate*	Early	Con	2.51	0.006
	Early	HrM	2.57	0.005
	Early	Nat	2.59	0.006
	Early	Sine	2.58	0.005
	Late	Con	3.3	0.006
	Late	HrM	3.32	0.006
	Late	Nat	3.29	0.006
	Late	Sine	3.32	0.006
Egg survival (probability)	Early	Combined	0.94	0.02
	Late	Combined	0.98	0.01
Water uptake (mg)	Early	Combined	260.11	7.35
	Late	Combined	166.22	7.35
O ₂ consumption at 26.3 °C (microL/hr)	Combined	Con	34.32	1.04
	Combined	HrM	30.19	0.94
	Combined	Nat	30.37	0.90
	Combined	Sine	31.13	0.90
Endurance (m)*	Early	Con	1.02	0.069
	Early	HrM	1.24	0.064
	Early	Nat	1.36	0.065
	Early	Sine	1.15	0.062
	Late	Con	1.76	0.055
	Late	HrM	1.85	0.061
	Late	Nat	1.72	0.058
	Late	Sine	1.74	0.066
Initial body condition	Early	Combined	-0.034	0.005
	Late	Combined	0.035	0.005
	Combined	Con	-0.01	0.007
	Combined	HrM	0.016	0.007
	Combined	Nat	0	0.007
	Combined	Sine	-0.005	0.007
Initial body mass (mg)	Early	Combined	172.49	0.98
	Late	Combined	178.51	0.98

Initial SVL (mm)	Early	Combined	19.56	0.05
	Late	Combined	19.19	0.05
	Combined	Con	19.35	0.06
	Combined	HrM	19.26	0.06
	Combined	Nat	19.44	0.06
	Combined	Sine	19.46	0.06
Sprint speed (m/s)	Early	Combined	0.148	0.007
	Late	Combined	0.203	0.006
Hatchling survival (probability)	Early	Combined	0.63	0.05
	Late	Combined	0.93	0.02
	Combined	Con	0.6	0.08
	Combined	HrM	0.86	0.05
	Combined	Nat	0.93	0.03
	Combined	Sine	0.81	0.06
Tail length (mm)	Early	Combined	30.18	0.14
	Late	Combined	31.81	0.14

Con = constant; HrM = hourly means; Nat = natural; Emmean = estimated marginal means; SE = standard error

Table S3. Sample size (n), raw mean (Mean), and standard deviation (SD) for all developmental and post-hatching variables according to season and treatment.

Response	Season	Incubation treatment	n	Mean	SD
Heart rate (bpm)	Early	Con	10	62.8	6.55
	Early	HrM	10	67.2	5.98
	Early	Nat	10	64.6	5.56
	Early	Sine	10	63.4	5.76
	Late	Con	10	62.2	4.83
	Late	HrM	9	67.22	8.32
	Late	Nat	10	62.5	7.06
	Late	Sine	10	66.1	5.65
Incubation period (days)	Early	Con	46	81.5	3.75
	Early	HrM	52	76.29	3.52
	Early	Nat	49	75.24	2.31
	Early	Sine	52	75.96	2.94
	Late	Con	50	37.06	1.45
	Late	HrM	47	36.51	1.33
	Late	Nat	49	37.22	1.64
	Late	Sine	50	36.28	1.34
O2 consumption (20.7 °C) microL/hr	Early	Con	12	16.13	3.29
	Early	HrM	11	17.33	3.42
	Early	Nat	12	19.06	3.87
	Early	Sine	12	18.85	4.05
	Late	Con	11	19.85	4.02
	Late	HrM	11	21.44	3.57
	Late	Nat	12	18.68	3.22
	Late	Sine	12	21.78	3.87
O2 consumption (26.3 °C) microL/hr	Early	Con	12	26.25	3.01
	Early	HrM	11	28.37	4.66
	Early	Nat	12	28.98	7.26
	Early	Sine	12	29.62	4.65
	Late	Con	11	35.24	3.84
	Late	HrM	11	34.41	6.36
	Late	Nat	12	32.74	5.42
	Late	Sine	12	34.89	5.39
Survival (probability)	Early	Con	54	0.85	
	Early	HrM	55	0.95	
	Early	Nat	51	0.96	
	Early	Sine	54	0.96	
	Late	Con	51	0.98	
	Late	HrM	50	0.94	
	Late	Nat	50	0.98	
	Late	Sine	50	1	
Water uptake (mg)	Early	Con	12	259.2	64.4
	Early	HrM	12	260.3	88.1
	Early	Nat	12	308.1	42.9
	Early	Sine	12	258.3	45.6
	Late	Con	12	133.5	28.5
	Late	HrM	12	150.8	47.4
	Late	Nat	12	158.3	62.6
	Late	Sine	12	176.7	62.4

Endurance (m)	Early	Con	30	3.05	1.27
	Early	HrM	35	3.7	1.27
	Early	Nat	34	4.2	1.41
	Early	Sine	38	3.59	1.48
	Late	Con	47	6.07	2.08
	Late	HrM	39	6.64	2.32
	Late	Nat	42	5.95	2.17
	Late	Sine	33	5.92	1.8
Final SVL (mm)	Early	Con	8	20.84	1.04
	Early	Nat	22	20.62	0.81
	Early	HrM	17	20.54	0.74
	Early	Sine	15	21.02	0.77
	Late	Con	21	20.46	0.95
	Late	Nat	23	20.34	0.79
	Late	HrM	24	20.48	0.84
	Late	Sine	24	20.54	0.71
Initial body condition	Early	Con	46	-0.05	0.086
	Early	HrM	52	-0.016	0.092
	Early	Nat	49	-0.03	0.072
	Early	Sine	52	-0.033	0.07
	Late	Con	50	0.023	0.075
	Late	HrM	47	0.046	0.069
	Late	Nat	49	0.024	0.082
	Late	Sine	50	0.036	0.072
Initial body mass (mg)	Early	Con	46	170.09	21.22
	Early	HrM	52	172.6	20.37
	Early	Nat	49	175.65	17.63
	Early	Sine	52	175.48	16.79
	Late	Con	50	174.73	17.52
	Late	HrM	47	179.85	17.71
	Late	Nat	49	175.74	20.73
	Late	Sine	50	181	19.5
Initial SVL (mm)	Early	Con	46	19.57	1.01
	Early	HrM	52	19.36	0.74
	Early	Nat	49	19.72	0.71
	Early	Sine	52	19.75	0.67
	Late	Con	50	19.09	0.64
	Late	HrM	47	19.15	0.62
	Late	Nat	49	19.13	0.67
	Late	Sine	50	19.32	0.66
Sprint speed (m/s)	Early	Con	29	0.13	0.075
	Early	HrM	35	0.154	0.077
	Early	Nat	34	0.16	0.074
	Early	Sine	38	0.162	0.095
	Late	Con	43	0.186	0.074
	Late	HrM	37	0.223	0.081
	Late	Nat	40	0.197	0.082
	Late	Sine	31	0.194	0.071
Hatchling survival (probability)	Early	Con	25	0.32	
	Early	Nat	25	0.88	
	Early	HrM	25	0.68	
	Early	Sine	25	0.6	

Tail length (mm)	Late	Con	25	0.84	
	Late	Nat	25	0.92	
	Late	Hrm	25	0.96	
	Late	Sine	26	0.92	
	Early	Con	46	30.00	2.37
	Early	HrM	51	29.75	1.71
	Early	Nat	49	30.58	1.86
	Early	Sine	52	30.39	2.05
	Late	Con	50	32.05	1.68
	Late	HrM	47	31.73	1.98
	Late	Nat	49	31.63	1.65
	Late	Sine	50	31.91	1.47

Con = constant; HrM = hourly means; Nat = natural

Supplemental Figures

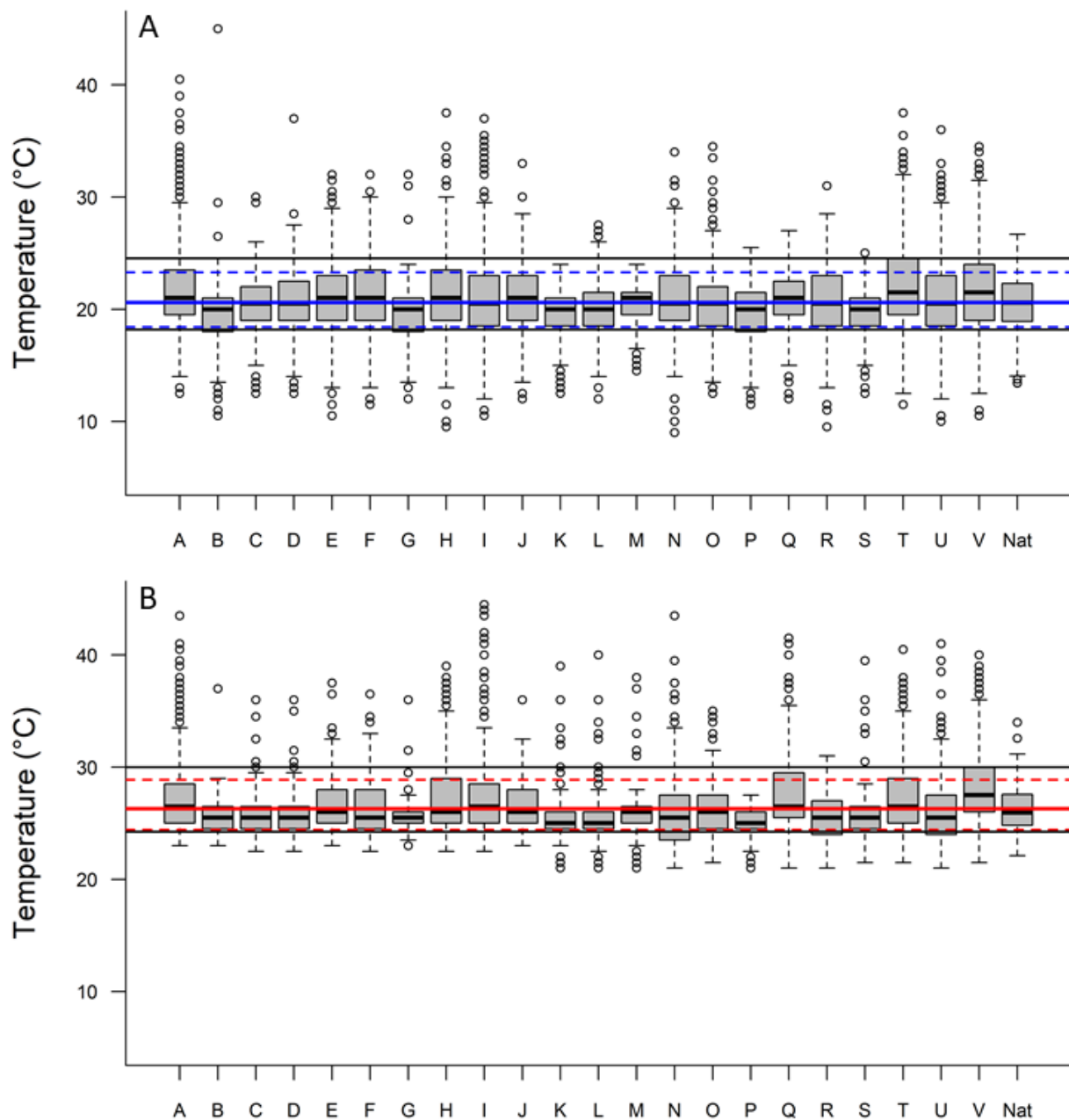


Figure S1. Nest temperatures of the 22 nests used to create the incubation regimes (A-V). Note that on the far right of each panel are the temperatures from the early (Panel A) and late (Panel B) Natural incubation treatments used in this study (i.e. “Nat”). Panel A shows temperatures collected from nests early in the season and panel B shows nest temperatures collected late in the season. Solid blue and red lines show the mean temperatures of each seasonal regime: 20.7 and 26.3 °C, respectively. Broken blue and red lines denote the mean daily maximum and minimum temperatures from the early and late season Natural incubation treatments, respectively. Solid black lines show the mean daily maximum and minimum temperatures across all 22 nests.

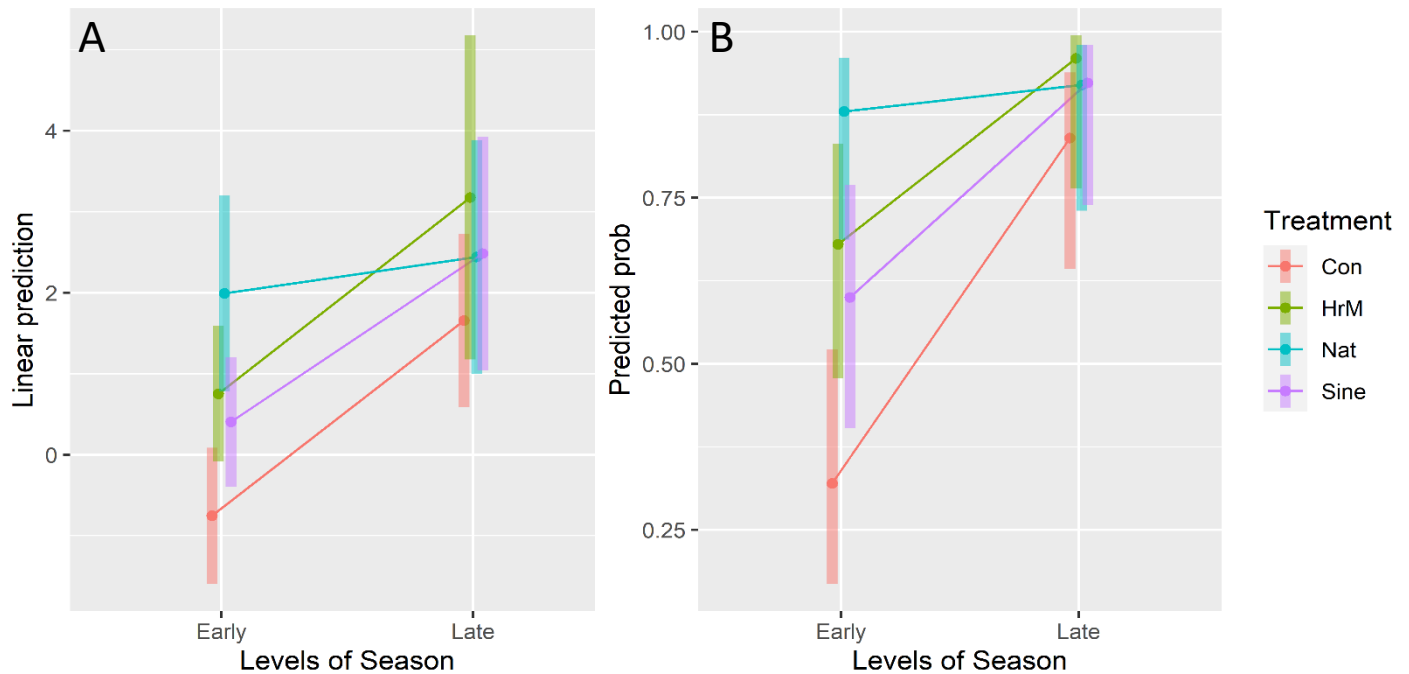


Figure S2. Potential effect of the interaction between season and treatment on hatchling survival shown on the (A) linear prediction scale and (B) response scale. Note that the response scale (B) exaggerates the differences among treatments (i.e. slopes) due to boundary issues. The statistical test is conducted on the linear prediction scale (A) and not the response scale (B). Despite the large effect size, the interaction term was not statistically significant when independently analyzed in R (by JMH; $p = 0.42$), SAS (by DAW; $p = 0.38$), and SPSS (by CJ Thawley; $p = 0.43$). Regardless, post-hoc inspection indicates there are important statistical differences among groups (see Figures S3, S4). Closed circles show the estimated marginal means and bars are the 95% confidence intervals (calculated with the 'emmeans' package in R).

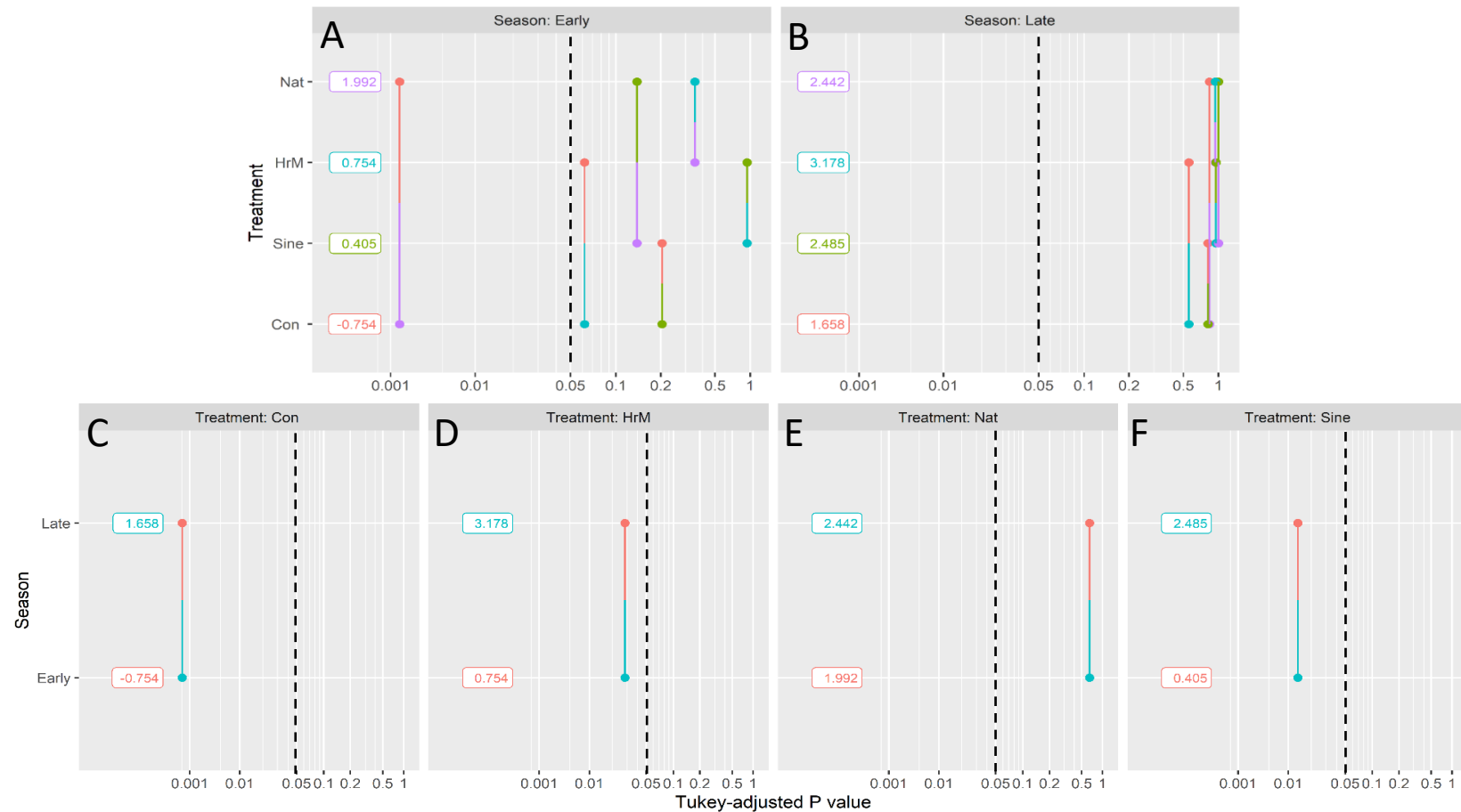


Figure S3. Tukey-adjusted p values for season contrasts of early (A) and late (B) season incubation temperatures and constant (C) hourly means (D) natural (E) and sine (F) incubation temperatures regarding hatchling survival. The vertical dotted lines denote a statistically significant p value ($p = 0.05$). Despite the non-significant interaction term (season by treatment); the post-hoc analysis demonstrates a significant difference between the constant and natural treatments for early season (A) but not late season (B) temperatures and a significant season effect for all treatments except the natural treatment (C-F). Vertical solid lines and closed circles denote the various contrasts. Values at the left of each panel are the estimated marginal means of the linear predictions for each treatment calculated using the ‘emmeans’ package in R. Con = constant; HrM = hourly means; Nat = natural