

1 **ELECTRONIC SUPPORTING INFORMATION:**

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3 **Assembling climate data for Long Lake, Alaska**

4 No climate station with long term, consistent data is located within 25 km of the Long Lake site. In addition, fine-scale interpolated  
5 climate data (e.g., PRISM products) are not available for Alaska. Therefore, we averaged climate data from three sites that surround  
6 the site and that together represent regional climate: Gates Glacier, Tebay Lake, and May Creek; these three stations are 30, 34, and 58  
7 km from the Long Lake population site, respectively. Data from all three sites are part of the Western Regional Climate and are  
8 available at: <http://www.wrcc.dri.edu/>. For each site, we used the same summarized climate variables as described for the Creamers  
9 Field site, and then averaged the values for the three stations. Scattered missing values were ignored for mean climate estimates, and  
10 for summed precipitation, we assumed any missing values had the average of all other days in that month at that station. The Gates  
11 Glacier station was off-line for all of May 2010, so to estimate values for this station in this year, we used a regression of each climate  
12 summary for that station on data from the other two stations, and then made predictions based on the values for Tebay and May Creek  
13 in 2010.

14 We also tested whether the averaged climate data from these three stations were more or less predictive of swallow phenology  
15 than were climate data from the May Creek station alone, which is the most similar to LL in elevation and ecological setting. To make

16 this comparison, we ran models for hatch date that included each of five climate variables separately and models with all five  
17 variables, and used the full range of possible climate time periods described in the following section, using either the station-averaged  
18 climate data or data from only May Creek. Across these 330 model pairs the mean difference between the AICc of May Creek-only  
19 models and models using averaged climate data AICc values was 0.41, indicating that climate data averaged from all three stations  
20 provides better predictive power.

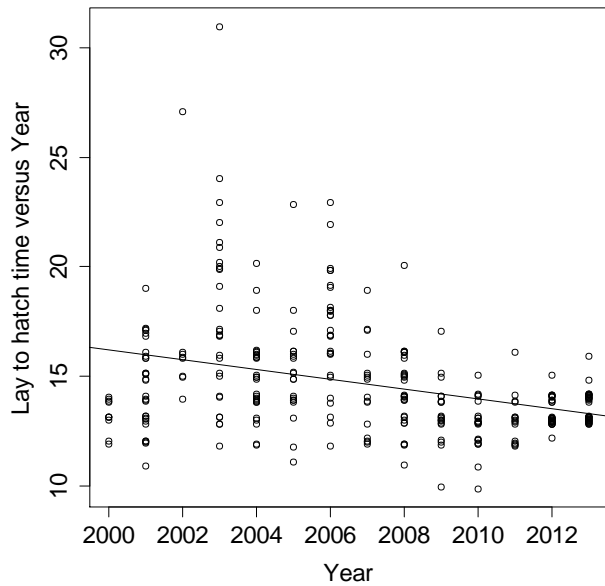
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## 22 **Testing effects of the time period of climate data used in models**

23 We decided before running any models to summarize climate data from May of each year (days of year 121 to 151 in non-leap years)  
24 to use in models predicting lay and hatch date, since this period precedes the vast majority of all initial lay dates, and lay date  
25 determines most, though not all, variation in hatch date (see main text). We also tested whether use of data over all of May and June  
26 (day of year 121 to 181) would yield stronger results, which it did not. In response to reviewer inquiries, we subsequently performed a  
27 more structured test of the effects of climate time period on model power. Specifically, we assembled the same climate data described  
28 in the main text, but for time periods starting on 11 different days (122 to 177, in 5 day increments) and running forward between 15  
29 and 50 days in five day increments, up to day 182. For each population and each set of climate data, we fit a hatch data model that  
30 included all five climate summaries and nest box as a random effect. To judge possible explanatory power, we compared the marginal

31  $r^2$  values of these 55 models at each population, and also took the average  $r^2$  of models for both sites as a combined measure of  
32 explanatory power (table S7). In general, climate data from earlier in the range of possible time periods had higher explanatory power.  
33 The best combined model used climate data from days 122-147. This time period also gave the best results for CF alone. The second  
34 best climate period for CF used days 122-152 and the best for LL used days 137-162. All of these time periods are similar to May  
35 dates: days 121-151. We next ran the full set of 28 alternative climate models with each of the two best climate periods for each  
36 population and determined the model fit and parameters for the best model in each set, as determined by AICc values, to compare with  
37 that from the May data. The best supported models from each set of climate days are largely similar in climate effects and in  
38 explanatory power to each other (table S8) and to use of May data alone (tables S2 and S3), with the only substantial difference being  
39 a negative effect of windy days in the best model for LL that used climate days 137-162 (other models using this range of days  
40 supported a positive effect of wind). Given the comparability of model results using different ranges of climate data, and the statistical  
41 hazards of cherry-picking among very large numbers of climate variables or time periods, we confined the rest of our analyses to the  
42 use of month of May climate data.

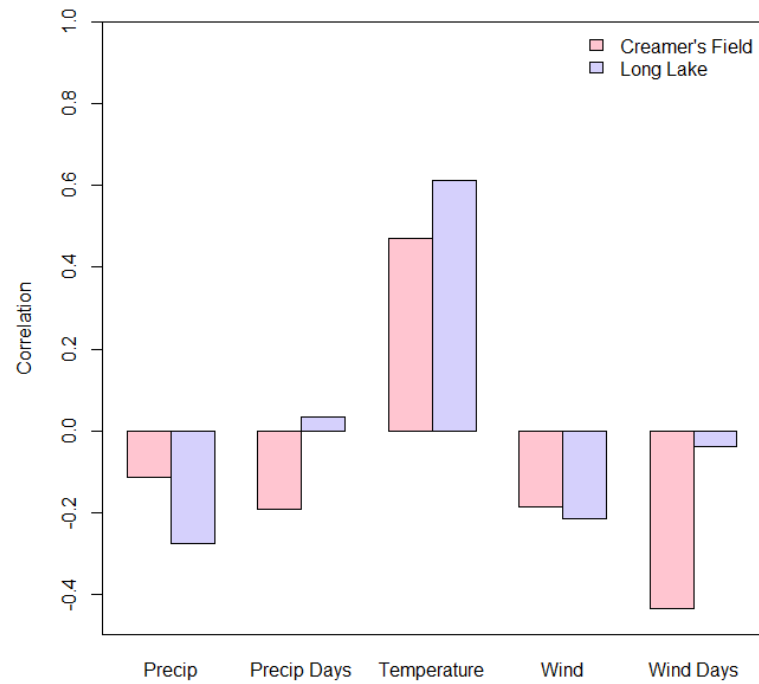
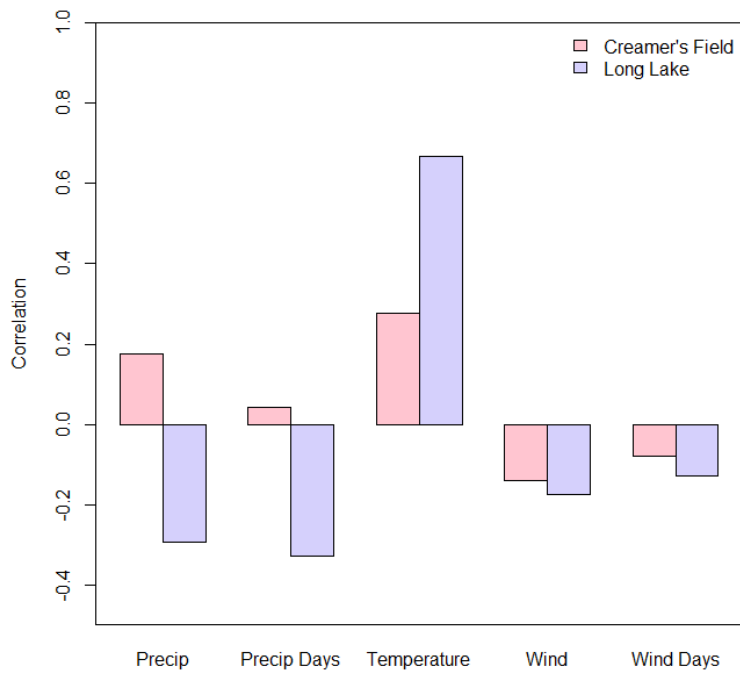
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45 Figure S1. Time from first lay date to hatching (the difference between lay and hatch dates of individual nests) of 417 individual nests  
46 from 2000 to 2015 at CF, showing significant declines in this interval (slope = -0.22,  $p = 1.14e-10$ ). Some higher values are likely to  
47 be errors due to renesting or miscoding, but analyses that either remove values greater than 20 or that use log values (reducing the  
48 effect of high outliers) still show significant decline through time. This decrease in lay to hatch date times contributed modestly to an  
49 advance in hatching date.

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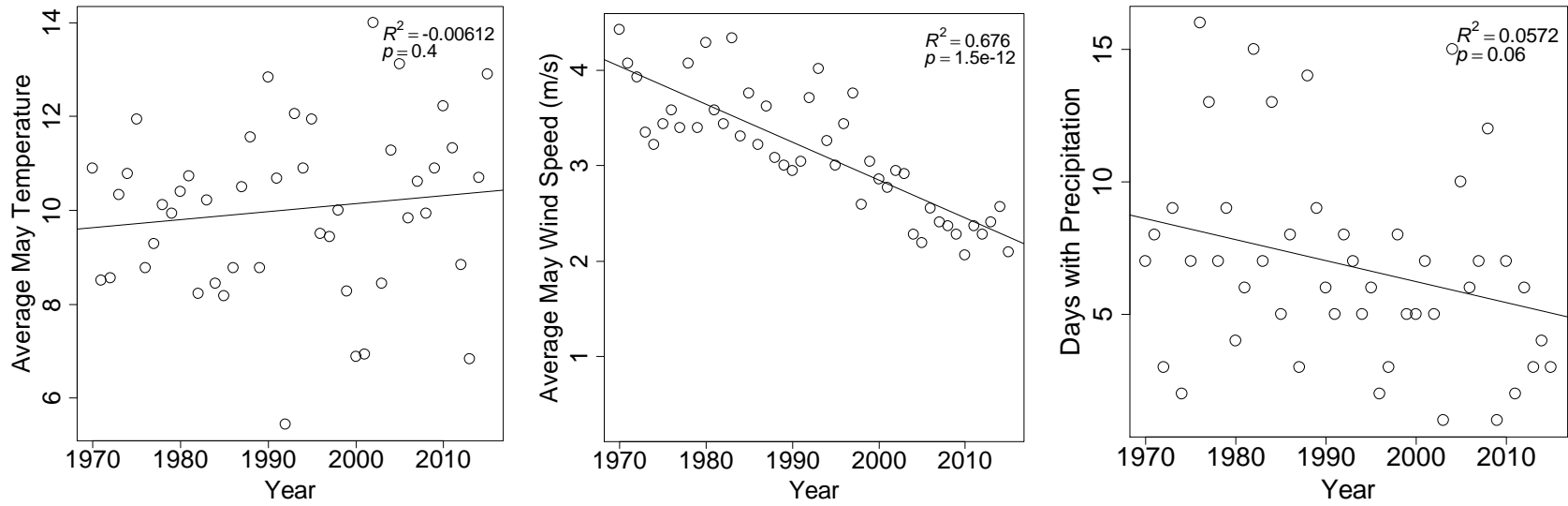


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52 Figure S2. Correlations between local climate variables and A) the Pacific Decadal Oscillation Index or B) the April/May Multivariate  
 53 El Niño/Southern Oscillation Index.

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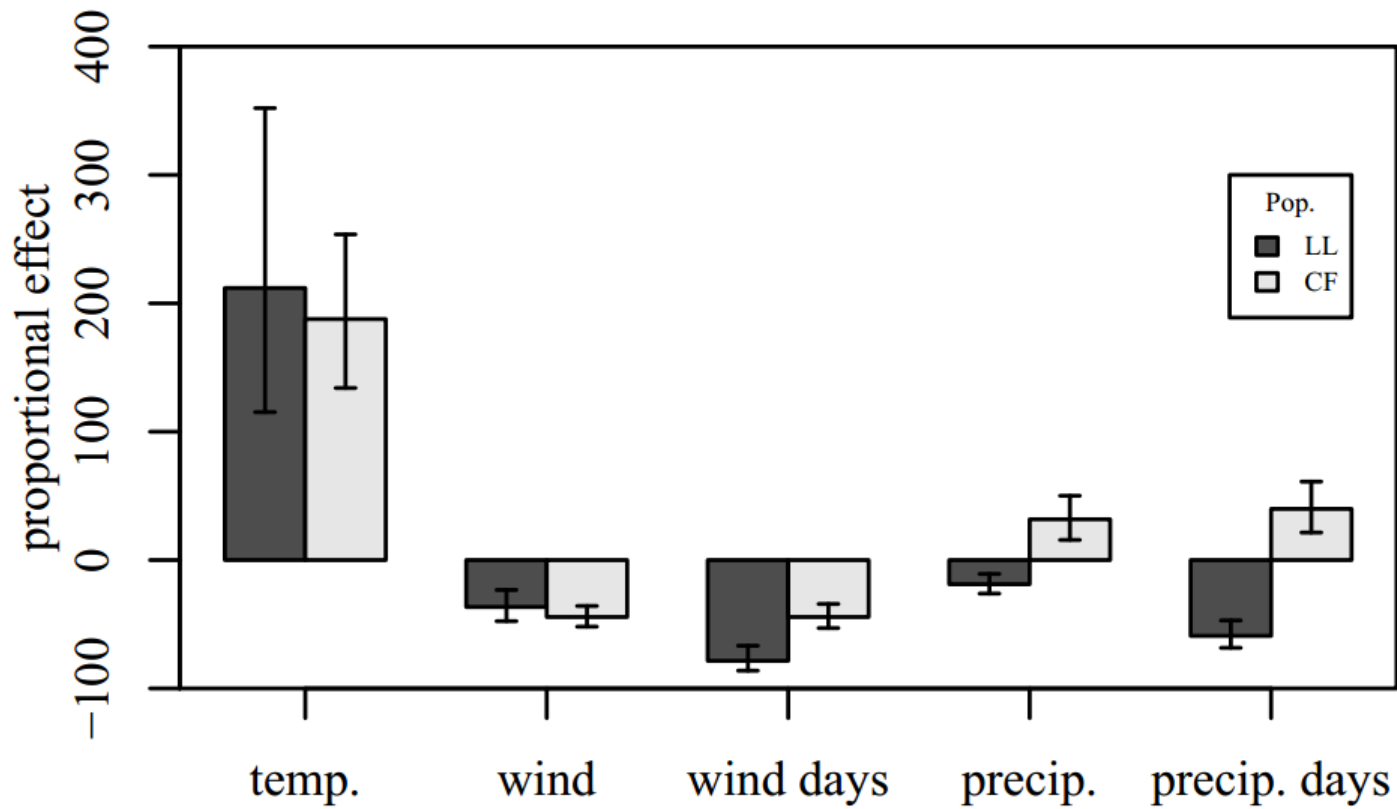


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58 Figure S3. Long term trends in Creamer's Field climate. Panels show annual May climate summaries, estimated as described in the  
59 main text. Statistical results are from simple linear regressions against year. Only wind speed shows a strong trend over time, with  
60 persistent declines in wind speeds over the entire span of years.

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63 Figure S4. Results of Cox proportional hazards models for effects of short term weather on the probability of clutch initiation. This  
 64 figure shows results for mean weather for the 10 days prior to each possible lay date. The strong temperature effect is likely due at  
 65 least in part, if not fully, to seasonal trends in weather (see main text).

66 Table S1. Correlations among annual climate variables at each study site. Correlations are shown for May mean temperature, total  
67 precipitation, number of windy days, and average daily windiness (all defined in main text), along with two regional climate indices,  
68 the Pacific Decadal Oscillation (PDO) and the Multivariate El Nino-Southern Oscillation Index (MEI) calculated for both April/May  
69 and May/June. Upper right correlations are for CF and lower left correlations (in red) are for LL. Correlations are for annual values  
70 during the study period at each site.

	<b>Temp</b>	<b>Precip</b>	<b>Precip. Days</b>	<b>Wind</b>	<b>Wind days</b>	<b>PDO</b>	<b>MEI – April/May</b>	<b>MEI – May/June</b>
<b>Temp</b>		0.0865	0.1570	-0.4017	-0.1818	0.277	0.5169	0.4701
<b>Precip</b>	-0.4288		0.8070	-0.1510	-0.2363	0.177	0.1193	-0.1148
<b>Precip. Days</b>	-0.4506	0.8084		-0.2557	-0.3371	0.0414	-0.0482	-0.1929
<b>Wind</b>	-0.2734	-0.6394	-0.60791		0.8153	-0.1396	-0.2839	-0.1848
<b>Wind days</b>	-0.2605	-0.3395	-0.3702	0.8456		-0.0796	-0.3033	-0.436
<b>PDO</b>	0.6683	-0.2925	-0.3279	-0.1744	-0.1296		0.4962	0.2239
<b>MEI – April/May</b>	0.6506	-0.1313	0.1902	-0.5513	-0.4676	0.4963		0.7548
<b>MEI – May/June</b>	0.6112	-0.2747	0.0353	-0.2136	-0.0384	0.2239	0.7548	

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73 Table S2. Results of all climate-driven models of hatch date for the CF site. Models are ordered by AICc weights. Summed AICc  
 74 weights are shown for each type of climate effect below the main table.

	Ave			Precip		Windy		delta		AICc	STDV	STDV	
Intercept	Temp	Wind	Precip	Precip <sup>2</sup>	Days	Precip Days <sup>2</sup>	Days	r <sup>2</sup> <sub>marginal</sub>	r <sup>2</sup> <sub>conditional</sub>	AICc	weight	Box	resid
151.7016	-0.3526	8.3907			-0.6300	0.0557		0.246	0.281	0.00	0.5741	0.9939	4.4849
151.6815	-0.4028	8.3115	-1.0983	0.3631				0.234	0.269	1.65	0.2510	0.9963	4.5212
143.977		10.0376			-0.5895	0.0529		0.236	0.273	3.01	0.1273	1.0200	4.5090
143.0288		10.1250	-0.8870	0.3133				0.221	0.258	6.54	0.0218	1.0110	4.5560
149.6746	-0.3163	8.3619	0.6011					0.214	0.240	11.14	0.0218	0.8591	4.6060
142.8977		9.8233	0.5836					0.205	0.234	12.55	0.0022	0.8957	4.6218
148.3347	-0.2964	8.6608			0.2014			0.212	0.238	14.27	0.0011	0.8601	4.6106
141.9362		10.0441			0.2003			0.205	0.234	14.99	0.0005	0.9011	4.6224
151.5997	-0.2915	7.7936						0.191	0.209	22.18	0.0000	0.7126	4.6925
145.2905		9.1573						0.184	0.203	22.65	0.0000	0.7382	4.7062
172.2471	-0.8379		-1.249	0.4089			0.4315	0.176	0.213	44.03	0.0000	1.0260	4.6910
170.5722	-0.7577		0.6503				0.4041	0.150	0.174	55.96	0.0000	0.8273	4.7992
179.0279	-0.9618				-0.7953	0.0606		0.152	0.181	60.60	0.0000	0.9077	4.7794
178.3901	-1.0177		-1.3159	0.3730				0.139	0.169	62.06	0.0000	0.9229	4.8149
171.3074	-0.7677				0.1430		0.3378	0.136	0.157	66.68	0.0000	0.7739	4.8480

172.2006	-0.7356				0.3003	0.125	0.144	67.31	0.0000	0.7295	4.8813
176.4999	-0.9346	0.4318				0.117	0.135	70.67	0.0000	0.7089	4.9064
163.4001			-1.0608	0.0795	0.6703	0.133	0.176	72.03	0.0000	1.0920	4.8010
176.5773	-0.8852					0.105	0.122	73.93	0.0000	0.6880	4.9390
176.3157	-0.9237		0.1079			0.111	0.129	76.13	0.0000	0.7048	4.9231
161.5155		-0.7577	0.2911		0.6262	0.097	0.136	87.40	0.0000	1.0530	4.9150
161.0352		0.5981			0.5930	0.083	0.113	90.68	0.0000	0.9155	4.9729
162.7905					0.4923	0.062	0.086	98.93	0.0000	0.8216	5.0418
161.8254			0.1062		0.5263	0.068	0.095	101.41	0.0000	0.8649	5.0232
169.2989			-0.7641	0.0532		0.032	0.068	124.55	0.0000	0.9995	5.1002
167.1413		0.2178				0.003	0.029	128.94	0.0000	0.8537	5.1972
167.6944		-0.7001	0.1938			0.010	0.043	130.33	0.0000	0.9708	5.1677
167.2465			0.0313			0.001	0.026	132.45	0.0000	0.8493	5.2049

Summed AIC weights:

Wind variables 1.0000

Precip variables 1.0000

Temperature 0.8461

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77 Table S3. Results of all climate driven models of hatch date for the LL site.

	Ave				Precip		Windy			delta	AIC	STDV	STDV
Intercept	Temp	Wind	Precip	Precip <sup>2</sup>	Days	Precip Days <sup>2</sup>	Days	r <sup>2</sup> <sub>marginal</sub>	r <sup>2</sup> <sub>conditional</sub>	AICc	weight	Box	resid
158.4984		6.6008			0.7492			0.158	0.398	0.00	0.4571	2.4010	3.8020
164.9394	-0.3129	3.1688			0.6137			0.160	0.401	1.55	0.2108	2.4090	3.8050
174.4178	-0.6335	-1.9881	0.9029					0.135	0.302	4.60	0.0459	1.9710	4.0290
161.5218		5.1443	1.5926					0.125	0.265	4.68	0.0439	1.7930	4.1010
170.0840	-0.4879				0.5118			0.160	0.395	4.98	0.0379	2.3740	3.8070
165.4391		2.7742			-0.1075	0.0533		0.164	0.390	5.06	0.0364	2.3230	3.8200
187.9597	-1.1682	-9.9540						0.123	0.273	5.53	0.0288	1.8600	4.0840
166.6555					0.6058			0.142	0.334	5.58	0.0281	2.1110	3.9360
164.9806					0.6930		0.3039	0.161	0.394	5.65	0.0272	2.3610	3.8060
183.0155	-0.8843	-6.8161	-0.8220	0.2544				0.140	0.272	6.71	0.0159	1.7450	4.0960
168.9457	-0.2010	0.9114			-0.1148	0.0483		0.164	0.389	6.95	0.0142	2.3250	3.8310
167.6989	-0.3160				0.6058		0.2141	0.166	0.414	7.27	0.0121	2.4520	3.7710
171.2714	-0.5229		1.0669					0.136	0.308	8.01	0.0083	2.0000	4.0060
169.5403					-0.4030	0.0695		0.163	0.375	8.12	0.0079	2.2350	3.8410
162.5134		4.5805	1.1727	0.0735				0.124	0.250	8.14	0.0078	1.7010	4.1420
167.7435			1.3131					0.114	0.229	8.91	0.0053	1.6080	4.1690

170.4504	-0.2423			-0.1725	0.0504		0.165	0.391	10.18	0.0028	2.3250	3.8160
166.5341		1.4683				0.2385	0.127	0.266	10.60	0.0023	1.7840	4.0980
167.6775				-0.0417	0.0481	0.1769	0.167	0.395	10.93	0.0019	2.3350	3.8070
171.7467	-0.5079	0.3497	0.1372				0.131	0.288	11.20	0.0017	1.8690	4.0550
170.0008	-0.4250	1.1904				0.1206	0.138	0.310	11.35	0.0016	2.0050	4.0120
168.4239		0.4683	0.1598				0.117	0.214	11.85	0.0012	2.1790	1.4760
166.5022		1.4940	-0.0049			0.2405	0.126	0.263	13.97	0.0004	1.7750	4.1150
170.9253	-0.4592	0.6262	0.0965			0.0633	0.137	0.291	14.49	0.0003	1.8900	4.0620
174.8662	-0.8632						0.073	0.179	16.57	0.0001	1.5390	4.2970
175.9990	-0.9368					-0.1694	0.079	0.181	19.40	0.0000	1.5220	4.3000
174.5965		-4.3520					0.011	0.011	20.62	0.0000	0.0000	4.6650
169.7031						-0.0076	0.000	0.000	28.39	0.0000	0.0000	4.6910

Summed AIC weights:

Wind variables 0.9066

Precip variables 0.9711

Temperature 0.3803

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81 Table S4. Results of all climate driven models of lay date for the CF site.

Intercept	Temp	Ave Wind	Precip	Precip <sup>2</sup>	Precip Days	Precip Days <sup>2</sup>	Windy Days	r <sup>2</sup> <sub>marginal</sub>	r <sup>2</sup> <sub>conditional</sub>	delta AICc	AIC weight	STDV Box	STDV resid
151.9232	-0.6451		0.6720				0.5501	0.1686	0.2002	0.00	0.6032	0.9154	4.6083
153.3977	-0.7183		-0.3372	0.2117			0.5123	0.1746	0.2107	1.09	0.3497	0.9800	4.5832
146.8601	-0.6947	3.6110	-0.8431	0.2951				0.1562	0.1941	6.47	0.0237	1.0048	4.6341
151.7042	-0.6461				0.1747		0.5598	0.1575	0.1871	8.00	0.0110	0.8866	4.6454
145.0523	-0.6101	3.6808	0.5448					0.1437	0.1748	8.71	0.0077	0.9100	4.6832
153.1707	-0.6509						0.4573	0.1424	0.1675	10.25	0.0036	0.8156	4.6958
146.7477	-0.6124	3.2608						0.1257	0.1499	14.26	0.0005	0.8018	4.7463
144.8987	-0.6066	3.7171			0.1198			0.1332	0.1614	16.17	0.0002	0.8657	4.7201
147.3301	-0.6531	3.4905			-0.4403	0.0379		0.1486	0.1868	16.93	0.0001	1.0098	4.6556
158.4843	-0.9650		-0.9585	0.3041				0.1356	0.1705	17.07	0.0001	0.9626	4.6956
156.8530	-0.8837		0.4711					0.1222	0.1487	19.58	0.0000	0.8389	4.7501
144.3990			0.6811				0.7722	0.1167	0.1522	22.13	0.0000	0.9712	4.7416
132.1157		6.4425	0.5476					0.1080	0.1446	22.71	0.0000	0.9855	4.7672
157.1601	-0.8583							0.1086	0.1313	22.80	0.0000	0.7733	4.7930
132.1234		-6.6262	0.2670	0.1732				0.1124	0.1524	24.93	0.0000	1.0328	4.7510
158.7290	-0.9092				-0.5212	0.0408		0.1298	0.1644	26.48	0.0000	0.9585	4.7127
144.4584			0.5841	0.0204			0.7710	0.1165	0.1523	26.71	0.0000	0.9754	4.7464
156.9000	-0.8773				0.0795			0.1119	0.1361	26.88	0.0000	0.7998	4.7848
133.7759		6.0283						0.0894	0.1186	28.05	0.0000	0.8786	4.8304
131.9759		6.4777			0.1248			0.0979	0.1317	29.74	0.0000	0.9476	4.8014
144.1568					0.1783		0.7830	0.1054	0.1400	29.85	0.0000	0.9576	4.7757
145.4248					-0.3503	0.0360	0.7958	0.1196	0.1636	31.50	0.0000	1.0827	4.7180
145.5975							0.6801	0.0895	0.1202	32.03	0.0000	0.9017	4.8245
133.1422		6.4668			-0.3297	0.0308		0.1084	0.1503	33.36	0.0000	1.0576	4.7580
147.9442			0.3565					0.0080	0.0412	68.66	0.0000	0.9377	5.0402
148.1290			0.0294	0.0690				0.0088	0.0438	72.81	0.0000	0.9645	5.0398
148.2299					0.0253			0.0004	0.0318	74.24	0.0000	0.9128	5.0643
149.3897					-0.4358	0.0312		0.0113	0.0501	78.13	0.0000	1.0148	5.0245

Summed AIC weights:	
Wind Variables	0.9998
Precipitation	
Variables	0.9959
Temperature	1.0000

83 Table S5. Results of all climate driven models of lay date for the LL site.

Intercept	Temp	Ave Wind	Precip	Precip <sup>2</sup>	Precip Days	Precip Days <sup>2</sup>	Windy Days	r <sup>2</sup> <sub>marginal</sub>	r <sup>2</sup> <sub>conditional</sub>	delta AICc	AIC weight	STDV Box	STDV resid
158.4984		6.6008			0.7492			0.1577	0.3979	0.00	0.4571	2.4012	3.8019
164.9394	-0.3129	3.1688			0.6137			0.1602	0.4005	1.55	0.2108	2.4091	3.8049
174.4178	-0.6335	-1.9881	0.9029					0.1354	0.3023	4.60	0.0459	1.9707	4.0289
161.5218		5.1443	1.5926					0.1245	0.2649	4.68	0.0439	1.7927	4.1010
170.0840	-0.4879				0.5118			0.1597	0.3949	4.98	0.0379	2.3736	3.8071
165.4391		2.7742			-0.1075	0.0533		0.1638	0.3895	5.06	0.0364	2.3225	3.8201
187.9597	-1.1682	-9.9540						0.1227	0.2734	5.53	0.0288	1.8597	4.0837
166.6555					0.6058			0.1419	0.3336	5.58	0.0281	2.1113	3.9364
164.9806					0.6930		0.3039	0.1609	0.3941	5.65	0.0272	2.3614	3.8058
183.0155	-0.8843	-6.8161	-0.8220	0.2544				0.1396	0.2717	6.71	0.0159	1.7445	4.0958
168.9457	-0.2010	0.9114			-0.1148	0.0483		0.1642	0.3892	6.95	0.0142	2.3249	3.8307
167.6989	-0.3160				0.6058		0.2141	0.1661	0.4139	7.27	0.0121	2.4517	3.7707
171.2714	-0.5229		1.0669					0.1360	0.3084	8.01	0.0083	2.0002	4.0059
169.5403					-0.4030	0.0695		0.1629	0.3746	8.12	0.0079	2.2347	3.8408
162.5134		4.5805	1.1727	0.0735				0.1239	0.2503	8.14	0.0078	1.7009	4.1417
167.7435			1.3131					0.1143	0.2289	8.91	0.0053	1.6075	4.1694
170.4504	-0.2423				-0.1725	0.0504		0.1651	0.3911	10.18	0.0028	2.3250	3.8160
166.5341			1.4683				0.2385	0.1268	0.2659	10.60	0.0023	1.7836	4.0976
167.6775					-0.0417	0.0481	0.1769	0.1667	0.3946	10.93	0.0019	2.3355	3.8066
171.7467	-0.5079		0.3497	0.1372				0.1371	0.2883	11.20	0.0017	1.8686	4.0546
170.0008	-0.4250		1.1904				0.1206	0.1377	0.3100	11.35	0.0016	2.0054	4.0120
168.4239			0.4683	0.1598				0.1169	0.2136	11.85	0.0012	1.4763	4.2101
166.5022			1.4940	-0.0049			0.2405	0.1259	0.2630	13.97	0.0004	1.7749	4.1153
170.9253	-0.4592		0.6262	0.0965			0.0633	0.1368	0.2905	14.49	0.0003	1.8902	4.0618
174.8662	-0.8632							0.0733	0.1786	16.57	0.0001	1.5389	4.2974
175.9990	-0.9368						-0.1694	0.0787	0.1813	19.40	0.0000	1.5218	4.3001
174.5965		-4.3519						0.0111	0.0111	20.62	0.0000	0.0000	4.6648
169.7031							-0.0076	0.0000	0.0000	28.39	0.0000	0.0000	4.6910

Summed AIC weights:	
Wind Variables	0.9066
Precipitation Variables	0.9711
Temperature	0.3803



85 Table S6. Tukey post hoc comparisons of annual hatch dates for the CF and LL populations. All comparisons with significance values  
 86 < 0.05 are highlighted. While many years differ from others, there is no evidence of a small number of obvious outlier years. Early  
 87 years at CF (2000-2004) are largely different in hatch dates from later years, but after these early years, there is not a strong pattern of  
 88 shifting mean values (see also figure 1). At LL, hatch dates in 2012 and 2013 are largely different from those in years either before or  
 89 after.

90 CF results:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
2000		0.9946	0.9992	1	0.933	<0.01	0.0731	<0.01	0.1938	0.0818	<0.01	<0.01	<0.01	0.4409	0.6832	<0.01
2001	0.9946		1	0.7357	1	<0.01	0.4085	<0.01	0.769	0.4534	<0.01	<0.01	0.014	0.9687	0.9991	<0.01
2002	0.9992	1		0.9739	1	0.2152	0.9598	0.0258	0.9955	0.9609	0.0125	0.0325	0.4827	0.9996	1	<0.01
2003	1	0.7357	0.9739		0.2841	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0226	0.0571	<0.01
2004	0.933	1	1	0.2841		<0.01	0.7139	<0.01	0.9575	0.7496	<0.01	<0.01	0.0474	0.9985	1	<0.01
2005	<0.01	<0.01	0.2152	<0.01	<0.01		0.8256	0.998	0.4394	0.8756	0.9773	0.9994	1	0.4941	0.0594	0.1057
2006	0.0731	0.4085	0.9598	<0.01	0.7139	0.8256		0.1267	1	1	0.0541	0.1563	0.9946	1	0.987	<0.01
2007	<0.01	<0.01	0.0258	<0.01	<0.01	0.998	0.1267		0.0245	0.1708	1	1	0.9169	0.0469	<0.01	0.8961
2008	0.1938	0.769	0.9955	<0.01	0.9575	0.4394	1	0.0245		1	<0.01	0.0316	0.888	1	0.9999	<0.01
2009	0.0818	0.4534	0.9609	<0.01	0.7496	0.8756	1	0.1708	1		0.0761	0.2091	0.9968	1	0.9887	<0.01
2010	<0.01	<0.01	0.0125	<0.01	<0.01	0.9773	0.0541	1	<0.01	0.0761		1	0.753	0.0185	<0.01	0.9843
2011	<0.01	<0.01	0.0325	<0.01	<0.01	0.9994	0.1563	1	0.0316	0.2091	1		0.9486	0.058	<0.01	0.8008
2012	<0.01	0.014	0.4827	<0.01	0.0474	1	0.9946	0.9169	0.888	0.9968	0.753	0.9486		0.8741	0.3071	0.0174
2013	0.4409	0.9687	0.9996	0.0226	0.9985	0.4941	1	0.0469	1	1	0.0185	0.058	0.8741		1	<0.01
2014	0.6832	0.9991	1	0.0571	1	0.0594	0.987	<0.01	0.9999	0.9887	<0.01	<0.01	0.3071	1		<0.01
2015	<0.01	<0.01	<0.01	<0.01	<0.01	0.1057	<0.01	0.8961	<0.01	<0.01	0.9843	0.8008	0.0174	<0.01	<0.01	

91

92 LL Results:

	2006	2007	2008	2009	2010	2012	2013	2014	2015
2006		0.99898	0.99985	0.9999	0.93984	0.01397	0.03772	0.72514	0.9814
2007	0.99898		0.96996	1	0.99857	<0.001	0.00112	0.20856	0.99996
2008	0.99985	0.96996		0.98793	0.79636	0.27237	0.35755	0.98874	0.89145
2009	0.9999	1	0.98793		0.99618	0.00132	0.00353	0.33648	0.99977
2010	0.93984	0.99857	0.79636	0.99618		<0.001	<0.001	0.05574	1
2012	0.01397	<0.001	0.27237	0.00132	<0.001		1	0.79422	<0.001
2013	0.03772	0.00112	0.35755	0.00353	<0.001	1		0.85977	<0.001
2014	0.72514	0.20856	0.98874	0.33648	0.05574	0.79422	0.85977		0.08892
2015	0.9814	0.99996	0.89145	0.99977	1	<0.001	<0.001	0.08892	

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94 Table S7. Marginal  $r^2$  values for models predicting hatch dates using climate data from different ranges of days of the year. All models  
 95 included linear effects of each of the five climate variables, plus a random box effect.

96

Creamer's Field

<b>Start day:</b>	<b>End day:</b>	<b>137</b>	<b>142</b>	<b>147</b>	<b>152</b>	<b>157</b>	<b>162</b>	<b>167</b>	<b>172</b>	<b>177</b>	<b>182</b>
122		0.06	0.16	0.19	0.19	0.18	0.15	0.16	0.17	0.17	0.16
127			0.13	0.17	0.17	0.16	0.14	0.13	0.15	0.13	0.12
132				0.15	0.16	0.15	0.12	0.11	0.11	0.10	0.11
137					0.17	0.13	0.10	0.10	0.10	0.10	0.11
142						0.08	0.05	0.06	0.07	0.08	0.09
147							0.01	0.07	0.07	0.09	0.10
152								0.10	0.08	0.11	0.11
157									0.10	0.13	0.14
162										0.11	0.14
167											0.16

Long Lake

<b>Start day:</b>	<b>End day:</b>	<b>137</b>	<b>142</b>	<b>147</b>	<b>152</b>	<b>157</b>	<b>162</b>	<b>167</b>	<b>172</b>	<b>177</b>	<b>182</b>
122		0.12	0.13	0.11	0.09	0.11	0.13	0.13	0.11	0.09	0.08
127			0.10	0.10	0.06	0.11	0.12	0.12	0.09	0.09	0.07
132				0.11	0.08	0.13	0.13	0.12	0.09	0.08	0.06
137					0.07	0.12	0.13	0.11	0.08	0.07	0.04
142						0.08	0.12	0.08	0.08	0.07	0.03
147							0.07	0.06	0.11	0.10	0.04
152								0.12	0.13	0.10	0.04
157									0.06	0.01	0.03
162										0.06	0.08
167											0.08

Averaged r2 for both populations

<b>Start day:</b>	<b>End day:</b>	<b>137</b>	<b>142</b>	<b>147</b>	<b>152</b>	<b>157</b>	<b>162</b>	<b>167</b>	<b>172</b>	<b>177</b>	<b>182</b>
	<b>122</b>	0.09	0.14	0.15	0.14	0.14	0.14	0.14	0.14	0.13	0.12
	<b>127</b>		0.11	0.13	0.12	0.14	0.13	0.13	0.12	0.11	0.09
	<b>132</b>			0.13	0.12	0.14	0.12	0.11	0.10	0.09	0.08
	<b>137</b>				0.12	0.13	0.11	0.10	0.09	0.08	0.07
	<b>142</b>					0.08	0.08	0.07	0.07	0.07	0.06
	<b>147</b>						0.04	0.06	0.09	0.09	0.07
	<b>152</b>							0.11	0.10	0.10	0.08
	<b>157</b>								0.08	0.07	0.09
	<b>162</b>									0.09	0.11
	<b>167</b>										0.12

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100 Table S8. Best-supported hatch date models using May climate data and alternate sets of days of climate information.

101

Creamer's  
Field:

Climate period	Intercept	Temp	Ave Wind	Windy Days	Precip	Precip^2	Precip Days	Precip Days^2	r <sup>2</sup> <sub>marginal</sub>	r <sup>2</sup> <sub>conditional</sub>	AICc
May	151.7016	-0.3526	8.3907				-0.63	0.0557	0.2457	0.281	3051.55
May	151.6815	-0.4028	8.3115		-1.0983	0.3631			0.2340	0.2695	3053.20
May	143.977		10.0376				-0.5895	0.0529	0.2356	0.2728	3054.61
122-147	157.15	-0.5393	7.0575				-0.722	0.064	0.2427	0.2733	3051.76
122-152	157.145	-0.5393	7.0575				-0.7223	0.0636	0.2467	0.2783	3049.97

Long Lake:

May	158.4984		6.6008				0.7492		0.1577	0.3979	916.608
May	164.9394	-0.3129	3.1688				0.6137		0.1602	0.4005	918.157
122-147	165.1697			0.7633			0.7819		0.1682	0.4068	919.149
137-162	211.6008	-0.7832	-1.8798						0.1800	0.2670	914.202

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