

**Appendix 1** Supplemental material for the paper “Changes in spring arrival date and timing of breeding of Ring-billed Gulls in southern Quebec over four decades” by Jean-François Giroux, Martin Patenaude-Monette, Florent Lagarde, Pierre Mousseau, and François Racine.

**Table A1.1.** Ranking of models explaining variation in median spring arrival date of Ring-billed Gulls in southern Quebec determined from Étude des Populations d’Oiseaux du Québec (EPOQ), 1971-2012.

Model†	k	$\Delta AIC_c$	$\omega_i$	Log-Likelihood
Res_MTMA + YEAR	4	0	0.47	-86.01
Res_MTMA + TRMA + YEAR	5	2.347	0.14	-85.89
Res_MTMA + Res_SLSO + YEAR	5	2.354	0.14	-85.9
Res_MTMA + TSMA + YEAR	5	2.561	0.13	-86
Res_MTMA + Res_SLSO + TRMA + YEAR	6	4.934	0.04	-85.82
Res_MTMA + TSMA + TRMA + YEAR	6	5.071	0.04	-85.89
Res_MTMA + TSMA + Res_SLSO + YEAR	6	5.071	0.04	-85.89
YEAR	3	13.977	0	-94.23
Res_MTMA	3	18.997	0	-96.74
Res_MTMA + Res_SLSO	4	21.308	0	-96.67
Res_MTMA + TRMA	4	21.313	0	-96.67
Res_MTMA + TSMA	4	21.344	0	-96.69
Res_MTMA + TSMA + TRMA	5	23.763	0	-96.6
Res_MTMA + TSMA + Res_SLSO	5	23.778	0	-96.61
Res_MTMA + Res_SLSO + TRMA	5	23.809	0	-96.63
TSMA	3	26.316	0	-100.4
Null	2	27.278	0	-102.04
TRMA	3	29.238	0	-101.86
Res_SLSO	3	29.240	0	-101.86

†Res\_MTMA: residuals of mean temperature in March-April regressed against year;

Res\_SLSO: residuals of St. Lawrence Seaway opening date regressed against year;

TRMA: total rain in March-April; TSMA: total snow in March-April; YEAR: year; the

lowest  $AIC_c$  was 181.109 and  $N=42$ .

**Table A1.2.** Ranking of models explaining variation in the median laying date of Ring-billed Gulls at Ile de la Couvée (1978, 2000), Petite Colonie (1979), and Île Deslauriers (2009-2012).

Model†	k	$\Delta AIC_c$	$\omega_i$	Log-Likelihood
MTA	3	0	0.98	-9.52
MTA + YEAR	4	8.450	0.01	-6.75
MTA + RES_SLSO	4	11.302	0	-8.17
MTA + TRA	4	12.008	0	-8.53
MTA + MAD	4	13.600	0	-9.32
null	2	14.050	0	-20.05
YEAR	3	14.930	0	-16.99
MAD	3	16.650	0	-17.85
TRA	3	20.578	0	-19.81
RES_SLSO	3	20.919	0	-19.98
MTMA + RES_SLSO + YEAR	5	46.514	0	-4.78
MTA + TRA + YEAR	5	47.848	0	-5.45
MTA + MAD + YEAR	5	49.985	0	-6.52
MTA + TRA + RES_SLSO	5	50.970	0	-7.01
MTA + MAD + RES_SLSO	5	52.004	0	-7.53
MTA + TRA + MAD	5	53.417	0	-8.23

†MTA: mean daily temperature in April; RES\_SLSO: residuals of St. Lawrence Seaway opening date regressed against year; TRA: total rain in April; MAD: median arrival date; YEAR: year; the lowest  $AIC_c$  was 33.05 and  $N = 7$ .

**Fig. A1.1.** Mean daily temperature in March-April recorded at five stations in southern Quebec (Dorval, Joliette, Lachute, Sainte-Martine, Saint-Hubert, Saint-Jérôme), 1971-2012. The solid line represents the regression function while the dashed lines represent the 95% confidence intervals.

