Parameter estimates of population dynamics of black-throated blue warblers (*Setophaga caerulescens*) breeding at the trailing edge of the range in North Carolina (Trailing) and core of the range in New Hampshire (Core). Models were run separately for each of the six study plots allowing recruitment and apparent survival to vary by time (T), annual precipitation (AP), or average daily temperature during the early-breeding period (average lay date to average fledge date of first broods, EBT). The mean, standard deviation, median, lower, and upper 95% credible intervals are shown for estimates of the bounding parameter on recruitment (α), per-capita recruitment rate (γ), apparent survival (ϕ), ratio of ASYs (τ), probability of classifying the bird into a specific age class upon capture (k), capture probability ($p^{(c)}$), and probability of being detected while breeding on plot ($p^{(\eta)}$). Subscripts denote the intercept (0), or the trend effects of climate (w), time (t), or density (D). Note that the density-dependence term was subtracted from the per-capita recruitment intercept in the hierarchical model, so positive values of γ_D indicate negative density-dependence on recruitment. Estimates are from Bayesian analyses in Lewis, W. B., R. J. Cooper, R. B. Chandler, R. W. Chitwood, M. H. Cline, M. T. Hallworth, J. L. Hatt, J. Hepinstall-Cymerman, S. A. Kaiser, N. L. Rodenhouse, T. S. Sillett, K. W. Stodola, M. S. Webster, and R. T. Holmes. Climate-mediated population dynamics of a migratory songbird differ between the trailing edge and range core. Submitted to *Ecological Monographs*.

Range Position	Elevation	Model	Parameter	Mean	SD	Lower CI	Median	Upper CI
Trailing	Low	T	α	0.40	0.12	0.23	0.38	0.71
Trailing	Low	T	γ_0	0.04	0.98	-1.88	0.05	1.98
Trailing	Low	T	γ_t	-1.38	2.44	-6.62	-1.20	3.09
Trailing	Low	T	γ_D	2.84	1.90	0.21	2.48	7.37

Trailing	Low	T	ϕ_0(SY)	1.54	0.99	-0.15	1.44	3.74
Trailing	Low	T	ϕ_0(ASY)	-1.67	0.83	-3.45	-1.62	-0.21
Trailing	Low	T	ϕ_t	-1.22	0.95	-3.28	-1.15	0.48
Trailing	Low	T	τ	0.39	0.19	0.08	0.38	0.79
Trailing	Low	T	k	0.94	0.06	0.79	0.96	1.00
Trailing	Low	T	$p^{(c)}_0$	0.42	0.62	-0.78	0.41	1.66
Trailing	Low	T	$p^{(c)}_t$	1.35	0.65	0.11	1.34	2.66
Trailing	Low	T	$p^{(\eta)}_0$	0.68	0.41	-0.10	0.66	1.53
Trailing	Mid	T	α	0.88	0.27	0.59	0.81	1.62
Trailing	Mid	T	γ_0	0.59	0.85	-1.01	0.58	2.32
Trailing	Mid	T	γ_t	-0.54	0.79	-2.21	-0.49	1.10
Trailing	Mid	T	γ_D	2.82	1.84	0.36	2.43	7.20
Trailing	Mid	T	ϕ_0(SY)	0.21	0.37	-0.47	0.19	0.97
Trailing	Mid	T	ϕ_0(ASY)	-0.76	0.30	-1.37	-0.75	-0.2
Trailing	Mid	T	ϕ_t	-0.35	0.20	-0.75	-0.34	0.02
Trailing	Mid	T	τ	0.46	0.22	0.08	0.45	0.9
Trailing	Mid	T	k	0.97	0.02	0.91	0.97	1.00
Trailing	Mid	T	$p^{(c)}_0$	-0.37	0.20	-0.76	-0.37	0.02
Trailing	Mid	T	$p^{(c)}_t$	0.57	0.16	0.26	0.56	0.89
Trailing	Mid	T	$p^{(\eta)}_0$	1.65	0.33	1.05	1.63	2.33
Trailing	High	T	α	1.24	0.53	0.53	1.13	2.55
Trailing	High	T	γ_0	1.01	0.78	-0.41	0.98	2.62
Trailing	High	T	γ_t	0.17	0.32	-0.36	0.13	0.91

Trailing	High	T	γ_D	0.28	0.15	0.03	0.27	0.62
Trailing	High	T	ϕ_0(SY)	1.14	0.35	0.52	1.12	1.89
Trailing	High	T	ϕ_0(ASY)	-0.12	0.20	-0.52	-0.12	0.26
Trailing	High	T	ϕ_t	-0.11	0.13	-0.36	-0.11	0.14
Trailing	High	T	τ	0.76	0.18	0.34	0.79	0.99
Trailing	High	T	k	0.95	0.02	0.90	0.95	0.98
Trailing	High	T	$p^{(c)}_0$	-0.39	0.17	-0.72	-0.38	-0.06
Trailing	High	T	$p^{(c)}_t$	0.48	0.12	0.25	0.48	0.73
Trailing	High	T	$p^{(\eta)}_0$	1.16	0.18	0.82	1.16	1.52
Core	Low	T	α	0.73	0.09	0.63	0.71	0.97
Core	Low	T	γ_0	0.18	1.00	-1.79	0.18	2.09
Core	Low	T	γ_t	0.67	1.50	-2.03	0.39	4.22
Core	Low	T	γ_D	3.45	1.90	0.32	3.33	7.64
Core	Low	T	ϕ_0(SY)	-0.12	0.20	-0.5	-0.12	0.28
Core	Low	T	ϕ_0(ASY)	-0.87	0.26	-1.38	-0.86	-0.38
Core	Low	T	ϕ_t	-0.38	0.15	-0.67	-0.37	-0.10
Core	Low	T	τ	0.32	0.23	0.01	0.27	0.82
Core	Low	T	k	0.91	0.02	0.87	0.92	0.95
Core	Low	T	$p^{(c)}_0$	0.52	0.15	0.23	0.52	0.82
Core	Low	T	$p^{(c)}_t$	0.15	0.15	-0.14	0.15	0.44
Core	Low	T	$p^{(\eta)}_0$	1.45	0.19	1.08	1.45	1.84
Core	Mid	T	α	0.80	0.11	0.64	0.77	1.08
Core	Mid	T	γ_0	-0.67	0.79	-2.09	-0.72	0.98

Core	Mid	T	γ_t	0.87	0.76	-0.66	0.86	2.46
Core	Mid	T	γ_D	6.03	1.67	2.07	6.08	9.25
Core	Mid	T	ϕ_0(SY)	0.2	0.12	-0.03	0.20	0.44
Core	Mid	T	ϕ_0(ASY)	-0.52	0.13	-0.78	-0.52	-0.28
Core	Mid	T	ϕ_t	0.05	0.08	-0.10	0.05	0.2
Core	Mid	T	τ	0.43	0.09	0.25	0.43	0.61
Core	Mid	T	k	0.94	0.01	0.92	0.94	0.96
Core	Mid	T	$p^{(c)}_0$	0.90	0.10	0.71	0.90	1.10
Core	Mid	T	$p^{(c)}_t$	0.10	0.09	-0.09	0.10	0.28
Core	Mid	T	$p^{(\eta)}_0$	1.41	0.11	1.19	1.41	1.63
Core	High	T	α	0.94	0.31	0.61	0.86	1.77
Core	High	T	γ_0	0.63	0.75	-0.77	0.61	2.16
Core	High	T	γ_t	0.66	0.63	-0.23	0.54	2.26
Core	High	T	γ_D	2.53	1.39	0.62	2.21	6.10
Core	High	T	ϕ_0(SY)	0.45	0.18	0.10	0.44	0.81
Core	High	T	ϕ_0(ASY)	-0.33	0.15	-0.63	-0.33	-0.03
Core	High	T	ϕ_t	-0.27	0.11	-0.50	-0.27	-0.05
Core	High	T	τ	0.43	0.10	0.25	0.43	0.63
Core	High	T	k	0.93	0.02	0.90	0.94	0.96
Core	High	T	$p^{(c)}_0$	0.59	0.12	0.35	0.59	0.83
Core	High	T	$p^{(c)}_t$	-0.15	0.12	-0.38	-0.15	0.08
Core	High	T	$p^{(\eta)}_0$	1.49	0.15	1.20	1.49	1.80
Trailing	Low	EBT	α	0.40	0.15	0.24	0.36	0.82

Trailing	Low	EBT	γ_0	0.28	0.96	-1.55	0.28	2.19
Trailing	Low	EBT	γ_w	-0.73	1.28	-3.38	-0.73	2.01
Trailing	Low	EBT	γ_D	2.93	2.20	0.09	2.57	7.87
Trailing	Low	EBT	ϕ_0(SY)	1.64	0.95	-0.02	1.56	3.74
Trailing	Low	EBT	ϕ_0(ASY)	-0.88	0.59	-2.08	-0.87	0.23
Trailing	Low	EBT	ϕ_w	0.17	0.54	-0.84	0.15	1.31
Trailing	Low	EBT	τ	0.33	0.17	0.06	0.31	0.72
Trailing	Low	EBT	k	0.94	0.05	0.80	0.96	1.00
Trailing	Low	EBT	$p^{(c)}_0$	0.45	0.62	-0.77	0.44	1.68
Trailing	Low	EBT	$p^{(c)}_t$	1.36	0.65	0.10	1.35	2.68
Trailing	Low	EBT	$p^{(\eta)}_0$	0.72	0.41	-0.05	0.71	1.58
Trailing	Mid	EBT	α	0.82	0.21	0.58	0.76	1.38
Trailing	Mid	EBT	γ_0	0.52	0.90	-1.17	0.49	2.35
Trailing	Mid	EBT	γ_w	-0.01	0.58	-1.11	-0.05	1.30
Trailing	Mid	EBT	γ_D	2.85	2.06	0.12	2.50	7.63
Trailing	Mid	EBT	ϕ_0(SY)	-0.05	0.30	-0.61	-0.06	0.55
Trailing	Mid	EBT	ϕ_0(ASY)	-0.85	0.30	-1.46	-0.84	-0.27
Trailing	Mid	EBT	ϕ_w	-0.05	0.22	-0.48	-0.05	0.37
Trailing	Mid	EBT	τ	0.46	0.23	0.08	0.45	0.91
Trailing	Mid	EBT	k	0.97	0.02	0.91	0.97	1.00
Trailing	Mid	EBT	$p^{(c)}_0$	-0.35	0.20	-0.75	-0.35	0.04
Trailing	Mid	EBT	$p^{(c)}_t$	0.56	0.16	0.25	0.56	0.88
Trailing	Mid	EBT	$p^{(\eta)}_0$	1.67	0.33	1.07	1.66	2.37

Trailing	High	EBT	α	1.04	0.45	0.50	0.93	2.20
Trailing	High	EBT	γ_0	1.09	0.86	-0.50	1.03	2.87
Trailing	High	EBT	γ_w	-0.01	0.31	-0.47	-0.05	0.85
Trailing	High	EBT	γ_D	0.20	0.12	0.02	0.19	0.49
Trailing	High	EBT	ϕ_0(SY)	1.01	0.32	0.44	0.98	1.71
Trailing	High	EBT	ϕ_0(ASY)	-0.22	0.17	-0.56	-0.22	0.11
Trailing	High	EBT	ϕ_w	-0.03	0.18	-0.38	-0.04	0.32
Trailing	High	EBT	τ	0.78	0.18	0.32	0.82	0.99
Trailing	High	EBT	k	0.95	0.02	0.90	0.95	0.98
Trailing	High	EBT	$p^{(c)}_0$	-0.4	0.17	-0.72	-0.40	-0.07
Trailing	High	EBT	$p^{(c)}_t$	0.49	0.12	0.25	0.49	0.73
Trailing	High	EBT	$p^{(\eta)}_0$	1.14	0.18	0.80	1.14	1.50
Core	Low	EBT	α	0.82	0.16	0.66	0.77	1.23
Core	Low	EBT	γ_0	-0.13	1.03	-2.12	-0.12	1.92
Core	Low	EBT	γ_w	-0.89	1.39	-3.86	-0.78	2.05
Core	Low	EBT	γ_D	3.05	1.72	0.42	2.77	7.04
Core	Low	EBT	ϕ_0(SY)	-0.27	0.19	-0.65	-0.28	0.11
Core	Low	EBT	ϕ_0(ASY)	-0.94	0.26	-1.47	-0.94	-0.44
Core	Low	EBT	ϕ_w	-0.26	0.18	-0.63	-0.25	0.07
Core	Low	EBT	τ	0.30	0.21	0.01	0.26	0.77
Core	Low	EBT	k	0.91	0.02	0.87	0.92	0.95
Core	Low	EBT	$p^{(c)}_0$	0.52	0.15	0.23	0.51	0.81
Core	Low	EBT	$p^{(c)}_t$	0.16	0.15	-0.12	0.16	0.45

Core	Low	EBT	$p^{(\eta)}_0$	1.44	0.19	1.07	1.43	1.82
Core	Mid	EBT	α	0.74	0.13	0.60	0.71	1.09
Core	Mid	EBT	γ_0	0.15	0.73	-1.33	0.19	1.53
Core	Mid	EBT	γ_w	-0.21	0.36	-0.99	-0.20	0.61
Core	Mid	EBT	γ_D	4.93	1.78	1.74	4.78	8.77
Core	Mid	EBT	ϕ_0(SY)	0.20	0.12	-0.02	0.20	0.44
Core	Mid	EBT	ϕ_0(ASY)	-0.53	0.12	-0.78	-0.53	-0.29
Core	Mid	EBT	ϕ_w	-0.02	0.08	-0.17	-0.02	0.13
Core	Mid	EBT	τ	0.43	0.09	0.25	0.43	0.61
Core	Mid	EBT	k	0.94	0.01	0.92	0.94	0.96
Core	Mid	EBT	$p^{(c)}_0$	0.91	0.10	0.72	0.91	1.11
Core	Mid	EBT	$p^{(c)}_t$	0.10	0.09	-0.09	0.10	0.28
Core	Mid	EBT	$p^{(\eta)}_0$	1.43	0.11	1.21	1.42	1.65
Core	High	EBT	α	1.03	0.32	0.63	0.95	1.86
Core	High	EBT	γ_0	0.59	0.73	-0.74	0.55	2.11
Core	High	EBT	γ_w	0.17	0.20	-0.12	0.13	0.67
Core	High	EBT	γ_D	1.90	0.95	0.41	1.73	4.30
Core	High	EBT	ϕ_0(SY)	0.38	0.18	0.04	0.38	0.75
Core	High	EBT	ϕ_0(ASY)	-0.42	0.16	-0.73	-0.42	-0.12
Core	High	EBT	ϕ_w	-0.26	0.12	-0.51	-0.26	-0.02
Core	High	EBT	τ	0.42	0.10	0.24	0.42	0.63
Core	High	EBT	k	0.93	0.02	0.90	0.94	0.96
Core	High	EBT	$p^{(c)}_0$	0.58	0.13	0.34	0.58	0.83

Core	High	EBT	$p^{(c)}_t$	-0.14	0.12	-0.37	-0.13	0.09
Core	High	EBT	$p^{(\eta)}_0$	1.48	0.15	1.18	1.47	1.79
Trailing	Low	AP	α	0.37	0.11	0.23	0.35	0.62
Trailing	Low	AP	γ_0	0.35	0.93	-1.46	0.36	2.18
Trailing	Low	AP	γ_w	0.47	2.31	-4.17	0.51	4.99
Trailing	Low	AP	γ_D	3.10	2.01	0.18	2.84	7.67
Trailing	Low	AP	ϕ_0(SY)	2.15	1.10	0.27	2.06	4.51
Trailing	Low	AP	ϕ_0(ASY)	-1.08	0.56	-2.24	-1.06	-0.06
Trailing	Low	AP	ϕ_w	0.60	0.81	-1.00	0.60	2.17
Trailing	Low	AP	τ	0.34	0.17	0.06	0.32	0.71
Trailing	Low	AP	k	0.94	0.05	0.80	0.96	1.00
Trailing	Low	AP	$p^{(c)}_0$	0.44	0.62	-0.75	0.44	1.67
Trailing	Low	AP	$p^{(c)}_t$	1.36	0.65	0.12	1.35	2.67
Trailing	Low	AP	$p^{(\eta)}_0$	0.71	0.41	-0.05	0.69	1.55
Trailing	Mid	AP	α	0.79	0.18	0.59	0.75	1.25
Trailing	Mid	AP	γ_0	0.76	0.91	-0.99	0.75	2.56
Trailing	Mid	AP	γ_w	0.78	0.88	-0.85	0.71	2.67
Trailing	Mid	AP	γ_D	2.51	2.03	0.12	1.99	7.36
Trailing	Mid	AP	ϕ_0(SY)	-0.08	0.30	-0.64	-0.09	0.53
Trailing	Mid	AP	ϕ_0(ASY)	-0.86	0.30	-1.48	-0.86	-0.29
Trailing	Mid	AP	ϕ_w	-0.19	0.22	-0.64	-0.19	0.24
Trailing	Mid	AP	τ	0.46	0.21	0.08	0.46	0.87
Trailing	Mid	AP	k	0.97	0.02	0.91	0.97	1.00

Trailing	Mid	AP	$p^{(c)}_0$	-0.36	0.20	-0.75	-0.36	0.03
Trailing	Mid	AP	$p^{(c)}_t$	0.56	0.16	0.26	0.56	0.89
Trailing	Mid	AP	$p^{(\eta)}_0$	1.66	0.33	1.05	1.65	2.36
Trailing	High	AP	α	1.03	0.43	0.54	0.92	2.15
Trailing	High	AP	γ_0	0.93	0.81	-0.58	0.90	2.58
Trailing	High	AP	γ_w	0.31	0.30	-0.12	0.25	1.07
Trailing	High	AP	γ_D	0.18	0.11	0.02	0.16	0.44
Trailing	High	AP	ϕ_0(SY)	1.01	0.33	0.43	0.98	1.74
Trailing	High	AP	ϕ_0(ASY)	-0.24	0.17	-0.59	-0.24	0.09
Trailing	High	AP	ϕ_w	-0.14	0.17	-0.48	-0.14	0.19
Trailing	High	AP	τ	0.76	0.18	0.32	0.8	0.99
Trailing	High	AP	k	0.95	0.02	0.90	0.95	0.98
Trailing	High	AP	$p^{(c)}_0$	-0.39	0.17	-0.73	-0.39	-0.07
Trailing	High	AP	$p^{(c)}_t$	0.49	0.12	0.26	0.49	0.73
Trailing	High	AP	$p^{(\eta)}_0$	1.14	0.18	0.80	1.14	1.50
Core	Low	AP	α	0.83	0.22	0.66	0.76	1.49
Core	Low	AP	γ_0	-0.01	1.01	-2.04	0.02	1.91
Core	Low	AP	γ_w	-0.31	1.20	-2.90	-0.31	2.42
Core	Low	AP	γ_D	2.97	1.87	0.28	2.66	7.33
Core	Low	AP	ϕ_0(SY)	-0.27	0.19	-0.64	-0.27	0.11
Core	Low	AP	ϕ_0(ASY)	-0.95	0.26	-1.48	-0.95	-0.45
Core	Low	AP	ϕ_w	-0.38	0.19	-0.79	-0.38	-0.02
Core	Low	AP	τ	0.31	0.22	0.01	0.26	0.79

Core	Low	AP	k	0.91	0.02	0.87	0.92	0.95
Core	Low	AP	$p^{(c)}_0$	0.51	0.15	0.22	0.51	0.81
Core	Low	AP	$p^{(c)}_t$	0.17	0.15	-0.12	0.17	0.45
Core	Low	AP	$p^{(\eta)}_0$	1.44	0.19	1.08	1.43	1.83
Core	Mid	AP	α	0.75	0.15	0.60	0.72	1.14
Core	Mid	AP	γ_0	0.05	0.64	-1.24	0.05	1.30
Core	Mid	AP	γ_w	0.26	0.28	-0.22	0.22	0.88
Core	Mid	AP	γ_D	4.45	2.08	0.95	4.30	8.94
Core	Mid	AP	ϕ_0(SY)	0.20	0.12	-0.03	0.20	0.43
Core	Mid	AP	ϕ_0(ASY)	-0.54	0.13	-0.79	-0.54	-0.29
Core	Mid	AP	ϕ_w	0.08	0.10	-0.11	0.08	0.27
Core	Mid	AP	τ	0.42	0.09	0.25	0.41	0.61
Core	Mid	AP	k	0.94	0.01	0.92	0.94	0.96
Core	Mid	AP	$p^{(c)}_0$	0.91	0.10	0.72	0.91	1.10
Core	Mid	AP	$p^{(c)}_t$	0.10	0.10	-0.09	0.10	0.29
Core	Mid	AP	$p^{(\eta)}_0$	1.43	0.11	1.21	1.43	1.66
Core	High	AP	α	0.87	0.29	0.58	0.80	1.64
Core	High	AP	γ_0	0.90	0.81	-0.61	0.88	2.53
Core	High	AP	γ_w	0.21	0.24	-0.20	0.18	0.77
Core	High	AP	γ_D	1.78	1.36	0.10	1.48	5.29
Core	High	AP	ϕ_0(SY)	0.34	0.18	0.01	0.34	0.70
Core	High	AP	ϕ_0(ASY)	-0.37	0.15	-0.68	-0.37	-0.08
Core	High	AP	ϕ_w	-0.08	0.12	-0.32	-0.08	0.16

Core	High	AP	τ	0.43	0.10	0.24	0.43	0.63
Core	High	AP	k	0.93	0.02	0.90	0.94	0.96
Core	High	AP	$p^{(c)}_0$	0.58	0.12	0.34	0.58	0.82
Core	High	AP	$p^{(c)}_t$	-0.13	0.12	-0.36	-0.13	0.10
Core	High	AP	$p^{(\eta)}_0$	1.49	0.16	1.19	1.49	1.80