

**Appendix 1.** To assess the level of Brown-headed Cowbird (cowbird; *Molothrus ater*) presence on each of five Black-capped Vireo (vireo; *Vireo atricapilla*) breeding sites, we conducted variable distance point-counts. We based the number of point-count locations roughly on the relative area of each site and conducted counts at seven locations on Taylor Valley, nine on Maxdale, five on West Range, five on San Saba, and 13 on Colorado Bend. Point-count locations were at least 200 m apart. At each location, we conducted three rounds of 10-minute counts in 2013 and three in 2014, noting the distance to any cowbirds we detected. Using our point-count observations, we conducted detection-dependent density modelling using the packages “Distance” and “mrds” in R v.3.1.1 (Laake et al. 2014, Miller 2014, R Core Team 2014). We compared detection models with half-normal or hazard-rate key functions, cosine or simple polynomial adjustment functions with an optimized number of adjustment terms, and variations in data truncation using Akaike’s Information Criterion (AIC; Akaike 1974, Table A1.1). We compared models with no truncation of the data, left truncation only, right truncation only, and both right and left data truncation. In several cases, adjustment functions did not improve the model and, in total, we compared 19 models using AIC (Akaike’s Information Criterion; Akaike 1974) and model weights (Table A1.1). The best detection model estimated cowbird density using the hazard rate key function, no adjustment terms, and both left and right truncation of the data (Table A1.1).

**Table A1.1.** Detection models used to evaluate cowbird density at five Black-capped Vireo breeding sites, comparing half-normal or hazard-rate key functions, cosine or simple polynomial adjustment functions, and variations in data truncation (truncation distances are in km).

Cowbird Detection Model	AIC	$\Delta$ AIC	$w_i$
Hazard-Rate, No adjustments, Left Truncation at 0.01, Right Truncation at 0.091	-558.64	0.00	0.37
Hazard-Rate, No adjustments, Left Truncation at 0.01, Right Truncation at 0.097	-558.39	0.25	0.32
Hazard-Rate, No adjustments, Left Truncation at 0.01, Right Truncation at 0.087	-557.80	0.83	0.24
Half-Normal, Cosine (2) adjustments, Left Truncation at 0.01, Right Truncation at 0.091	-552.60	6.04	0.02
Half-Normal, No adjustments, Left Truncation at 0.01, Right Truncation at 0.087	-552.24	6.40	0.02
Half-Normal, No adjustments, Left Truncation at 0.01, Right Truncation at 0.091	-551.97	6.67	0.01
Half-Normal, No adjustments, Left Truncation at 0.01, Right Truncation at 0.091	-551.97	6.67	0.01
Hazard-Rate, No adjustments, No Left Truncation, Right Truncation at 0.091	-550.00	8.64	0.005
Half-Normal, No adjustments, Left Truncation at 0.01, Right Truncation at 0.097	-549.92	8.72	0.005
Hazard-Rate, No adjustments, No Left Truncation, Right Truncation at 0.097	-549.71	8.93	0.004
Half-Normal, Cosine (2) adjustments, No Left Truncation, Right Truncation at 0.091	-542.09	16.54	< 0.001
Half-Normal, No adjustments, No Left Truncation, Right Truncation at 0.091	-540.90	17.74	< 0.001
Half-Normal, No adjustments, No Left Truncation, Right Truncation at 0.097	-539.39	19.24	< 0.001
Hazard-Rate, No adjustments, Left Truncation at 0.01, No Right Truncation	-536.64	22.00	< 0.001
Hazard-Rate, No adjustments, No Left Truncation, No Right Truncation	-527.91	30.72	< 0.001
Half-Normal, Cosine (2) adjustments, Left Truncation at 0.01, No Right Truncation	-520.94	37.70	< 0.001
Half-Normal, Cosine (2) adjustments, No Left Truncation, No Right Truncation	-512.09	46.54	< 0.001
Half-Normal, No adjustments, Left Truncation at 0.01, No Right Truncation	-487.62	71.02	< 0.001
Half-Normal, No adjustments, No Left Truncation, No Right Truncation	-480.27	78.37	< 0.001