Appendix B1.1: Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
VC	None	$\begin{pmatrix} 27.98 & & & & & & & & \\ & 27.98 & & & & & & & \\ & & 27.98 & & & & & & \\ & & & 27.98 & & & & & \\ & & & & 27.98 & & & & \\ & & & & & 27.98 & & & \\ & & & & & & 27.98 & & \\ & & & & & & & 27.98 & \\ & & & & & & & & 27.98 \end{pmatrix}$		$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3334.9	3339.2	334.9
	Intercept only	$\begin{pmatrix} 20.06 & & & & & & & & \\ & 20.06 & & & & & & & \\ & & 20.06 & & & & & & \\ & & & 20.06 & & & & & \\ & & & & 20.06 & & & & \\ & & & & & 20.06 & & & \\ & & & & & & 20.06 & & \\ & & & & & & & 20.06 & \\ & & & & & & & & 20.06 \end{pmatrix}$	8.13	$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3247.6	3251.8	3247.7
	VC	$\begin{pmatrix} 19.39 & & & & & & & & \\ & 19.39 & & & & & & & \\ & & 19.39 & & & & & & \\ & & & 19.39 & & & & & \\ & & & & 19.39 & & & & \\ & & & & & 19.39 & & & \\ & & & & & & 19.39 & & \\ & & & & & & & 19.39 & \\ & & & & & & & & 19.39 \end{pmatrix}$	$\begin{pmatrix} 7.76 & \\ & 0.07 \end{pmatrix}$	$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3247.4	3253.7	3247.5

Appendix B1.1 (cont): Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
VC	CS	$\begin{pmatrix} 22.00 & & & & & & & \\ & 22.00 & & & & & & \\ & & 22.00 & & & & & \\ & & & 22.00 & & & & \\ & & & & 22.00 & & & \\ & & & & & 22.00 & & \\ & & & & & & 22.00 & \\ & & & & & & & 22.00 \end{pmatrix}$	$\begin{pmatrix} 0.19 & 0.19 \\ & 0.19 \end{pmatrix}$ *	$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3280.8	3285.0	3280.9
	CSH	$\begin{pmatrix} 18.55 & & & & & & & \\ & 18.55 & & & & & & \\ & & 18.55 & & & & & \\ & & & 18.55 & & & & \\ & & & & 18.55 & & & \\ & & & & & 18.55 & & \\ & & & & & & 18.55 & \\ & & & & & & & 18.55 \end{pmatrix}$	$\begin{pmatrix} 12.83 & -0.98 \\ & 0.21 \end{pmatrix}$	$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3243.8	3252.1	3243.8
	ARH(1)	$\begin{pmatrix} 18.55 & & & & & & & \\ & 18.55 & & & & & & \\ & & 18.55 & & & & & \\ & & & 18.55 & & & & \\ & & & & 18.55 & & & \\ & & & & & 18.55 & & \\ & & & & & & 18.55 & \\ & & & & & & & 18.55 \end{pmatrix}$	$\begin{pmatrix} 12.83 & -0.98 \\ & 0.21 \end{pmatrix}$	$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3243.8	3252.1	3243.8

Appendix B1.1 (cont): Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
VC	UN	$\begin{pmatrix} 18.55 & & & & & & & & \\ & 18.55 & & & & & & & \\ & & 18.55 & & & & & & \\ & & & 18.55 & & & & & \\ & & & & 18.55 & & & & \\ & & & & & 18.55 & & & \\ & & & & & & 18.55 & & \\ & & & & & & & 18.55 & \\ & & & & & & & & 18.55 \end{pmatrix}$	$\begin{pmatrix} 12.83 & -0.98 \\ & 0.21 \end{pmatrix}$	$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3243.8	3252.1	3243.8
CS	None	$\begin{pmatrix} 28.19 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 \\ & 28.19 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 \\ & & 28.19 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 \\ & & & 28.19 & 8.13 & 8.13 & 8.13 & 8.13 & 8.13 \\ & & & & 28.19 & 8.13 & 8.13 & 8.13 & 8.13 \\ & & & & & 28.19 & 8.13 & 8.13 & 8.13 \\ & & & & & & 28.19 & 8.13 & 8.13 \\ & & & & & & & 28.19 & 8.13 \\ & & & & & & & & 28.19 \end{pmatrix}$		$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3247.6	3251.8	3247.7
	CSH	$\begin{pmatrix} 16.52 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 \\ & 16.52 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 \\ & & 16.52 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 \\ & & & 16.52 & -2.03 & -2.03 & -2.03 & -2.03 & -2.03 \\ & & & & 16.52 & -2.03 & -2.03 & -2.03 & -2.03 \\ & & & & & 16.52 & -2.03 & -2.03 & -2.03 \\ & & & & & & 16.52 & -2.03 & -2.03 \\ & & & & & & & 16.52 & -2.03 \\ & & & & & & & & 16.52 \end{pmatrix}$	$\begin{pmatrix} 14.86 & -0.98 \\ & 0.21 \end{pmatrix}$ **	$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3245.8	3256.2	3245.9

Appendix B1.1 (cont): Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
CS	TOEP	$\begin{pmatrix} 31.17 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 \\ & 31.17 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 \\ & & 31.17 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 \\ & & & 31.17 & 12.62 & 12.62 & 12.62 & 12.62 & 12.62 \\ & & & & 31.17 & 12.62 & 12.62 & 12.62 & 12.62 \\ & & & & & 31.17 & 12.62 & 12.62 & 12.62 \\ & & & & & & 31.17 & 12.62 & 12.62 \\ & & & & & & & 31.17 & 12.62 \\ & & & & & & & & 31.17 \end{pmatrix}$	$\begin{pmatrix} 0.21 & -0.98 \\ & 0.21 \end{pmatrix}$ *	$\begin{pmatrix} 22.36 \\ -3.30 \\ -0.78 \\ -0.90 \end{pmatrix}$	3243.8	3252.1	3243.8
CSH	None	$\begin{pmatrix} 121.58 & 87.36 & 36.46 & 33.44 & 39.00 & 29.91 & 29.97 & 37.77 & 47.29 \\ & 151.28 & 44.01 & 37.30 & 43.51 & 33.36 & 33.43 & 42.13 & 52.75 \\ & & 30.86 & 16.85 & 19.65 & 15.07 & 15.10 & 19.03 & 23.83 \\ & & & 22.17 & 16.65 & 12.77 & 12.80 & 16.13 & 20.19 \\ & & & & 30.15 & 14.89 & 14.92 & 18.81 & 23.55 \\ & & & & & 17.73 & 11.44 & 14.42 & 18.06 \\ & & & & & & 17.80 & 14.45 & 18.09 \\ & & & & & & & 28.28 & 22.81 \\ & & & & & & & & 44.32 \end{pmatrix}$		$\begin{pmatrix} 17.14 \\ -6.65 \\ -0.31 \\ -0.54 \end{pmatrix}$	3124.2	3145.2	3124.7
	CSH	$\begin{pmatrix} 97.58 & 54.40 & 22.07 & 19.88 & 21.60 & 13.01 & 12.76 & 18.76 & 26.63 \\ & 121.75 & 24.66 & 22.21 & 24.13 & 14.53 & 14.25 & 20.96 & 29.74 \\ & & 20.05 & 9.01 & 9.79 & 5.90 & 5.78 & 8.50 & 12.07 \\ & & & 16.26 & 8.82 & 5.31 & 5.21 & 7.66 & 10.87 \\ & & & & 19.20 & 5.77 & 5.66 & 8.32 & 11.81 \\ & & & & & 6.96 & 3.41 & 5.01 & 7.11 \\ & & & & & & 6.70 & 4.92 & 6.98 \\ & & & & & & & 14.48 & 10.26 \\ & & & & & & & & 29.17 \end{pmatrix}$	$\begin{pmatrix} 6.48 & 0.06 \\ & 0.08 \end{pmatrix}$	$\begin{pmatrix} 17.87 \\ -6.32 \\ -0.28 \\ -0.50 \end{pmatrix}$	3092.7	3120.0	3093.4

Appendix B1.1 (cont): Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
CSH	ARH(1)	$\begin{pmatrix} 97.58 & 54.40 & 22.07 & 19.88 & 21.60 & 13.01 & 12.76 & 18.76 & 26.63 \\ & 121.75 & 24.66 & 22.21 & 24.13 & 14.53 & 14.25 & 20.96 & 29.74 \\ & & 20.05 & 9.01 & 9.79 & 5.90 & 5.78 & 8.50 & 12.07 \\ & & & 16.26 & 8.82 & 5.31 & 5.21 & 7.66 & 10.87 \\ & & & & 19.20 & 5.77 & 5.66 & 8.32 & 11.81 \\ & & & & & 6.96 & 3.41 & 5.01 & 7.11 \\ & & & & & & 6.70 & 4.92 & 6.98 \\ & & & & & & & 14.48 & 10.26 \\ & & & & & & & & 29.17 \end{pmatrix}$	$\begin{pmatrix} 6.48 & 0.06 \\ & 0.08 \end{pmatrix}$	$\begin{pmatrix} 17.87 \\ -6.32 \\ -0.28 \\ -0.50 \end{pmatrix}$	3092.7	3120.0	3093.4
	UN	$\begin{pmatrix} 97.58 & 54.36 & 22.06 & 19.87 & 21.59 & 13.00 & 12.75 & 18.75 & 26.61 \\ & 121.72 & 24.64 & 22.19 & 24.11 & 14.52 & 14.24 & 20.94 & 29.72 \\ & & 20.04 & 9.01 & 9.78 & 5.89 & 5.78 & 8.50 & 12.06 \\ & & & 16.26 & 8.82 & 5.31 & 5.20 & 7.65 & 10.87 \\ & & & & 19.19 & 5.77 & 5.65 & 8.32 & 11.80 \\ & & & & & 6.96 & 3.41 & 5.01 & 7.12 \\ & & & & & & 6.69 & 4.91 & 6.97 \\ & & & & & & & 14.48 & 10.25 \\ & & & & & & & & 29.16 \end{pmatrix}$	$\begin{pmatrix} 6.48 & 0.06 \\ & 0.08 \end{pmatrix}$	$\begin{pmatrix} 17.87 \\ -6.32 \\ -0.28 \\ -0.50 \end{pmatrix}$	3092.7	3120.0	3093.4
AR(1)	None	$\begin{pmatrix} 28.88 & 15.79 & 8.63 & 4.72 & 2.58 & 1.41 & 0.77 & 0.42 & 0.23 \\ & 28.88 & 15.79 & 8.63 & 4.72 & 2.58 & 1.41 & 0.77 & 0.42 \\ & & 28.88 & 15.79 & 8.63 & 4.72 & 2.58 & 1.41 & 0.77 \\ & & & 28.88 & 15.79 & 8.63 & 4.72 & 2.58 & 1.41 \\ & & & & 28.88 & 15.79 & 8.63 & 4.72 & 2.58 \\ & & & & & 28.88 & 15.79 & 8.63 & 4.72 \\ & & & & & & 28.88 & 15.79 & 8.63 \\ & & & & & & & 28.88 & 15.79 \\ & & & & & & & & 28.88 \end{pmatrix}$		$\begin{pmatrix} 22.47 \\ -2.94 \\ -0.68 \\ -0.97 \end{pmatrix}$	3180.4	3184.6	3180.4

Appendix B1.1 (cont): Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
AR(1)	Intercept only	$\begin{pmatrix} 24..05 & 10.96 & 5.00 & 2.28 & 1.04 & 0.47 & 0.22 & 0.10 & 0.04 \\ & 24..05 & 10.96 & 5.00 & 2.28 & 1.04 & 0.47 & 0.22 & 0.10 \\ & & 24..05 & 10.96 & 5.00 & 2.28 & 1.04 & 0.47 & 0.22 \\ & & & 24..05 & 10.96 & 5.00 & 2.28 & 1.04 & 0.47 \\ & & & & 24..05 & 10.96 & 5.00 & 2.28 & 1.04 \\ & & & & & 24..05 & 10.96 & 5.00 & 2.28 \\ & & & & & & 24..05 & 10.96 & 5.00 \\ & & & & & & & 24..05 & 10.96 \\ & & & & & & & & 24..05 \end{pmatrix}$	4.82	$\begin{pmatrix} 22.43 \\ -3.02 \\ -0.70 \\ -0.96 \end{pmatrix}$	3177.4	3183.7	3177.4
	VC	$\begin{pmatrix} 24..05 & 10.96 & 5.00 & 2.28 & 1.04 & 0.47 & 0.22 & 0.10 & 0.04 \\ & 24..05 & 10.96 & 5.00 & 2.28 & 1.04 & 0.47 & 0.22 & 0.10 \\ & & 24..05 & 10.96 & 5.00 & 2.28 & 1.04 & 0.47 & 0.22 \\ & & & 24..05 & 10.96 & 5.00 & 2.28 & 1.04 & 0.47 \\ & & & & 24..05 & 10.96 & 5.00 & 2.28 & 1.04 \\ & & & & & 24..05 & 10.96 & 5.00 & 2.28 \\ & & & & & & 24..05 & 10.96 & 5.00 \\ & & & & & & & 24..05 & 10.96 \\ & & & & & & & & 24..05 \end{pmatrix}$	$\begin{pmatrix} 4.83 & \\ & 0 \end{pmatrix}$ *	$\begin{pmatrix} 22.42 \\ -3.02 \\ -0.70 \\ -0.96 \end{pmatrix}$	3177.4	3183.7	3177.4
	CSH	No convergence					
	ARH(1)	No convergence					
	UN	$\begin{pmatrix} 24.06 & 10.98 & 5.01 & 2.29 & 1.04 & 0.48 & 0.22 & 0.10 & 0.05 \\ & 24.06 & 10.98 & 5.01 & 2.29 & 1.04 & 0.48 & 0.22 & 0.10 \\ & & 24.06 & 10.98 & 5.01 & 2.29 & 1.04 & 0.48 & 0.22 \\ & & & 24.06 & 10.98 & 5.01 & 2.29 & 1.04 & 0.48 \\ & & & & 24.06 & 10.98 & 5.01 & 2.29 & 1.04 \\ & & & & & 24.06 & 10.98 & 5.01 & 2.29 \\ & & & & & & 24.06 & 10.98 & 5.01 \\ & & & & & & & 24.06 & 10.98 \\ & & & & & & & & 24.06 \end{pmatrix}$	$\begin{pmatrix} 6.57 & -0.22 \\ & 0 \end{pmatrix}$ *	$\begin{pmatrix} 22.42 \\ -3.02 \\ -0.70 \\ -0.96 \end{pmatrix}$	3179.1	3187.5	3179.2

Appendix B1.1 (cont): Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
ARH(1)	None	$\begin{pmatrix} 38.07 & 32.09 & 14.75 & 6.06 & 3.93 & 1.66 & 0.95 & 0.76 & 0.61 \\ & 75.14 & 34.53 & 14.19 & 9.21 & 3.90 & 2.21 & 1.79 & 1.43 \\ & & 44.07 & 18.11 & 11.75 & 4.97 & 2.83 & 2.28 & 1.83 \\ & & & 20.67 & 13.41 & 5.68 & 3.23 & 2.60 & 2.08 \\ & & & & 24.18 & 10.24 & 5.82 & 4.69 & 3.76 \\ & & & & & 12.04 & 6.84 & 5.51 & 4.42 \\ & & & & & & 10.80 & 8.70 & 6.98 \\ & & & & & & & 19.49 & 15.62 \\ & & & & & & & & 34.80 \end{pmatrix}$		$\begin{pmatrix} 21.15 \\ -4.20 \\ -0.60 \\ -0.80 \end{pmatrix}$	3097.6	3118.6	3098.0
	VC	$\begin{pmatrix} 47.42 & 19.19 & 3.05 & 0.84 & 0.30 & 0.06 & 0.02 & 0.01 & 0.00 \\ & 73.18 & 11.64 & 3.21 & 1.13 & 0.22 & 0.07 & 0.03 & 0.02 \\ & & 17.45 & 4.81 & 1.70 & 0.33 & 0.10 & 0.05 & 0.02 \\ & & & 12.49 & 4.41 & 0.86 & 0.26 & 0.13 & 0.06 \\ & & & & 14.68 & 2.87 & 0.86 & 0.45 & 0.20 \\ & & & & & 5.30 & 1.59 & 0.82 & 0.37 \\ & & & & & & 4.52 & 2.33 & 1.04 \\ & & & & & & & 11.30 & 5.07 \\ & & & & & & & & 21.39 \end{pmatrix}$	$\begin{pmatrix} 7.96 & \\ & 0 \end{pmatrix}$ *	$\begin{pmatrix} 20.02 \\ -4.94 \\ -0.43 \\ -0.65 \end{pmatrix}$	3083.6	3106.6	3084.1
	CSH	$\begin{pmatrix} 45.78 & 18.71 & 3.11 & 0.83 & 0.30 & 0.06 & 0.02 & 0.01 & 0.00 \\ & 71.55 & 11.89 & 3.19 & 1.14 & 0.22 & 0.07 & 0.03 & 0.02 \\ & & 18.50 & 4.96 & 1.77 & 0.35 & 0.10 & 0.05 & 0.02 \\ & & & 12.43 & 4.44 & 0.87 & 0.26 & 0.13 & 0.06 \\ & & & & 14.87 & 2.90 & 0.87 & 0.45 & 0.20 \\ & & & & & 5.30 & 1.59 & 0.82 & 0.37 \\ & & & & & & 4.45 & 2.30 & 1.05 \\ & & & & & & & 11.17 & 5.07 \\ & & & & & & & & 21.52 \end{pmatrix}$	$\begin{pmatrix} 5.05 & 0.25 \\ & 0.01 \end{pmatrix}$	$\begin{pmatrix} 20.11 \\ -4.89 \\ -0.45 \\ -0.66 \end{pmatrix}$	3084.5	3109.6	3085.1

Appendix B1.1 (cont): Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
ARH(1)	ARH(1)	$\begin{pmatrix} 45.78 & 18.71 & 3.11 & 0.83 & 0.30 & 0.06 & 0.02 & 0.01 & 0.00 \\ & 71.55 & 11.89 & 3.19 & 1.14 & 0.22 & 0.07 & 0.03 & 0.02 \\ & & 18.50 & 4.96 & 1.77 & 0.35 & 0.10 & 0.05 & 0.02 \\ & & & 12.43 & 4.44 & 0.87 & 0.26 & 0.13 & 0.06 \\ & & & & 14.87 & 2.90 & 0.87 & 0.45 & 0.20 \\ & & & & & 5.30 & 1.59 & 0.82 & 0.37 \\ & & & & & & 4.45 & 2.30 & 1.05 \\ & & & & & & & 11.17 & 5.07 \\ & & & & & & & & 21.52 \end{pmatrix}$	$\begin{pmatrix} 5.05 & 0.25 \\ & 0.01 \end{pmatrix}$	$\begin{pmatrix} 20.11 \\ -4.89 \\ -0.45 \\ -0.66 \end{pmatrix}$	3084.5	3109.6	3085.1
	UN	$\begin{pmatrix} 44.74 & 19.28 & 3.54 & 0.96 & 0.36 & 0.07 & 0.02 & 0.01 & 0.01 \\ & 70.60 & 12.95 & 3.53 & 1.33 & 0.27 & 0.08 & 0.05 & 0.02 \\ & & 20.19 & 5.51 & 2.07 & 0.42 & 0.13 & 0.07 & 0.03 \\ & & & 12.76 & 4.81 & 0.98 & 0.31 & 0.17 & 0.08 \\ & & & & 15.39 & 3.13 & 0.98 & 0.53 & 0.25 \\ & & & & & 5.42 & 1.70 & 0.93 & 0.44 \\ & & & & & & 4.53 & 2.47 & 1.17 \\ & & & & & & & 11.42 & 5.40 \\ & & & & & & & & 21.72 \end{pmatrix}$	$\begin{pmatrix} 1.45 & 0.66 \\ & 0 \end{pmatrix}$ *	$\begin{pmatrix} 20.18 \\ -4.82 \\ -0.46 \\ -0.67 \end{pmatrix}$	3083.4	3105.5	3083.4
TOEP	None	$\begin{pmatrix} 28.68 & 15.67 & 10.49 & 7.24 & 4.52 & 2.49 & 3.73 & 8.87 & 6.50 \\ & 28.68 & 15.67 & 10.49 & 7.24 & 4.52 & 2.49 & 3.73 & 8.87 \\ & & 28.68 & 15.67 & 10.49 & 7.24 & 4.52 & 2.49 & 3.73 \\ & & & 28.68 & 15.67 & 10.49 & 7.24 & 4.52 & 2.49 \\ & & & & 28.68 & 15.67 & 10.49 & 7.24 & 4.52 \\ & & & & & 28.68 & 15.67 & 10.49 & 7.24 \\ & & & & & & 28.68 & 15.67 & 10.49 \\ & & & & & & & 28.68 & 15.67 \\ & & & & & & & & 28.68 \end{pmatrix}$		$\begin{pmatrix} 22.72 \\ -2.93 \\ -0.81 \\ -1.01 \end{pmatrix}$	3173.1	3192.0	3173.5

Appendix B1.1 (cont): Parameter estimates for simplistic linear models under the various covariance structures for the ecological data set.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
TOEP	CS	$\begin{pmatrix} 33.32 & 20.75 & 16.84 & 15.44 & 15.04 & 16.29 & 21.09 & 31.04 & 33.01 \\ & 33.32 & 20.75 & 16.84 & 15.44 & 15.04 & 16.29 & 21.09 & 31.04 \\ & & 33.32 & 20.75 & 16.84 & 15.44 & 15.04 & 16.29 & 21.09 \\ & & & 33.32 & 20.75 & 16.84 & 15.44 & 15.04 & 16.29 \\ & & & & 33.32 & 20.75 & 16.84 & 15.44 & 15.04 \\ & & & & & 33.32 & 20.75 & 16.84 & 15.44 \\ & & & & & & 33.32 & 20.75 & 16.84 \\ & & & & & & & 33.32 & 20.75 \\ & & & & & & & & 33.32 \end{pmatrix}$	$\begin{pmatrix} 0.76 & -2.82 \\ & 0.76 \end{pmatrix}$ *	$\begin{pmatrix} 23.58 \\ -3.28 \\ -1.15 \\ -0.84 \end{pmatrix}$	3173.4	3196.4	3173.9
	TOEP	$\begin{pmatrix} 33.32 & 20.75 & 16.84 & 15.44 & 15.04 & 16.29 & 21.08 & 31.04 & 33.01 \\ & 33.32 & 20.75 & 16.84 & 15.44 & 15.04 & 16.29 & 21.08 & 31.04 \\ & & 33.32 & 20.75 & 16.84 & 15.44 & 15.04 & 16.29 & 21.08 \\ & & & 33.32 & 20.75 & 16.84 & 15.44 & 15.04 & 16.29 \\ & & & & 33.32 & 20.75 & 16.84 & 15.44 & 15.04 \\ & & & & & 33.32 & 20.75 & 16.84 & 15.44 \\ & & & & & & 33.32 & 20.75 & 16.84 \\ & & & & & & & 33.32 & 20.75 \\ & & & & & & & & 33.32 \end{pmatrix}$	$\begin{pmatrix} 0.76 & -2.82 \\ & 0.76 \end{pmatrix}$ *	$\begin{pmatrix} 23.58 \\ -3.28 \\ -1.15 \\ -0.84 \end{pmatrix}$	3173.4	3196.4	3173.9
UN	None	$\begin{pmatrix} 63.60 & 70.29 & -0.29 & -1.89 & -2.65 & -3.80 & -2.83 & 1.17 & 13.98 \\ & 83.17 & 0.29 & -5.38 & -5.44 & -4.99 & -3.56 & 1.07 & 16.37 \\ & & 25.79 & 11.76 & 16.95 & 12.95 & 12.20 & 9.52 & 12.23 \\ & & & 17.21 & 10.87 & 8.12 & 9.01 & 6.65 & 5.48 \\ & & & & 24.28 & 12.56 & 11.73 & 10.34 & 10.13 \\ & & & & & 14.99 & 11.11 & 11.58 & 11.61 \\ & & & & & & 14.06 & 11.75 & 8.04 \\ & & & & & & & 19.45 & 9.45 \\ & & & & & & & & 24.86 \end{pmatrix}$		$\begin{pmatrix} 19.50 \\ -4.54 \\ -0.21 \\ -0.65 \end{pmatrix}$	2929.0	3023.2	2937.4

* Covariance matrix not positive definite
** Final Hessian of model not positive definite

Appendix B1.2: Parameter estimates for quadratic models under the various covariance structures for the ecological data set. In the case of the quadratic mean models, only output for the models considered in detail are shown.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
UN	None	$\begin{pmatrix} 0.065 & 0.021 & 0.083 & 0.035 & 0.050 & 0.039 & 0.033 & 0.032 & 0.034 \\ & 0.067 & 0.021 & 0.013 & 0.005 & 0.012 & 0.012 & 0.014 & 0.023 \\ & & 0.035 & 0..060 & 0.039 & 0.029 & 0.029 & 0.028 & 0.027 \\ & & & 0.039 & 0.086 & 0.044 & 0.038 & 0.045 & 0.036 \\ & & & & 0.044 & 0.056 & 0.039 & 0.045 & 0.047 \\ & & & & & 0.039 & 0.050 & 0.042 & 0.035 \\ & & & & & & 0.042 & 0.082 & 0.040 \\ & & & & & & & 0.082 & 0.041 \\ & & & & & & & & 0.075 \end{pmatrix}$		$\begin{pmatrix} 3.040 \\ -0.090 \\ 0.009 \\ 0.109 \\ 0.226 \\ -0.387 \\ -0.047 \\ 0.271 \\ 0.327 \end{pmatrix}$	-167.9	-73.6	-159.3
ARH(1)	UN	$\begin{pmatrix} 0.001 & 0.001 & 0.001 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ & 0.010 & 0.011 & 0.003 & 0.001 & 0.000 & 0.000 & 0.000 & 0.000 \\ & & 0.092 & 0.025 & 0.011 & 0.003 & 0.000 & 0.000 & 0.000 \\ & & & 0.050 & 0.021 & 0.005 & 0.002 & 0.001 & 0.000 \\ & & & & 0.065 & 0.016 & 0.005 & 0.003 & 0.001 \\ & & & & & 0.027 & 0.009 & 0.005 & 0.002 \\ & & & & & & 0.023 & 0.014 & 0.004 \\ & & & & & & & 0.058 & 0.019 \\ & & & & & & & & 0.044 \end{pmatrix}$	$\begin{pmatrix} 0.063 & -0.007 \\ -0.007 & 0.002 \end{pmatrix}$	$\begin{pmatrix} 3.067 \\ -0.106 \\ 0.011 \\ 0.079 \\ 0.213 \\ -0.356 \\ -0.053 \\ 0.253 \\ 0.303 \end{pmatrix}$	-125.3	-98.0	-124.6
AR(1)	UN	$\begin{pmatrix} 0.040 & 0.011 & 0.003 & 0.001 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ & 0.040 & 0.011 & 0.003 & 0.001 & 0.000 & 0.000 & 0.000 & 0.000 \\ & & 0.040 & 0.011 & 0.003 & 0.001 & 0.000 & 0.000 & 0.000 \\ & & & 0.040 & 0.011 & 0.003 & 0.001 & 0.000 & 0.000 \\ & & & & 0.040 & 0.011 & 0.003 & 0.001 & 0.000 \\ & & & & & 0.040 & 0.011 & 0.003 & 0.001 \\ & & & & & & 0.040 & 0.011 & 0.003 \\ & & & & & & & 0.040 & 0.011 \\ & & & & & & & & 0.040 \end{pmatrix}$	$\begin{pmatrix} 0.024 & -0.001 \\ -0.001 & 0.001 \end{pmatrix}$	$\begin{pmatrix} 3.027 \\ -0.096 \\ 0.010 \\ 0.120 \\ 0.243 \\ -0.335 \\ -0.050 \\ 0.231 \\ 0.281 \end{pmatrix}$	-79.7	-69.2	-79.5

Appendix B1.2 (cont): Parameter estimates for quadratic models under the various covariance structures for the ecological data set. In the case of the quadratic mean models, only output for the models considered in detail are shown.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
VC	UN	$\begin{pmatrix} 0.033 & & & & & & & & \\ & 0.033 & & & & & & & \\ & & 0.033 & & & & & & \\ & & & 0.033 & & & & & \\ & & & & 0.033 & & & & \\ & & & & & 0.033 & & & \\ & & & & & & 0.033 & & \\ & & & & & & & 0.033 & \\ & & & & & & & & 0.033 \end{pmatrix}$	$\begin{pmatrix} 0.034 & -0.002 \\ -0.002 & 0.001 \end{pmatrix}$	$\begin{pmatrix} 3.034 \\ -0.095 \\ 0.009 \\ 0.112 \\ 0.231 \\ -0.346 \\ -0.048 \\ 0.243 \\ 0.292 \end{pmatrix}$	-62.6	-54.3	-62.6
AR(1)	Intercept only	$\begin{pmatrix} 0.046 & 0.017 & 0.006 & 0.002 & 0.001 & 0.000 & 0.000 & 0.000 & 0.000 \\ & 0.046 & 0.017 & 0.006 & 0.002 & 0.001 & 0.000 & 0.000 & 0.000 \\ & & 0.046 & 0.017 & 0.006 & 0.002 & 0.001 & 0.000 & 0.000 \\ & & & 0.046 & 0.017 & 0.006 & 0.002 & 0.001 & 0.000 \\ & & & & 0.046 & 0.017 & 0.006 & 0.002 & 0.001 \\ & & & & & 0.046 & 0.017 & 0.006 & 0.002 \\ & & & & & & 0.046 & 0.017 & 0.006 \\ & & & & & & & 0.046 & 0.017 \\ & & & & & & & & 0.046 \end{pmatrix}$	0.0237	$\begin{pmatrix} 3.024 \\ -0.096 \\ 0.010 \\ 0.123 \\ 0.246 \\ -0.331 \\ -0.051 \\ 0.227 \\ 0.278 \end{pmatrix}$	-79.3	-73.0	-79.3
TOEP	None	$\begin{pmatrix} 0.070 & 0.041 & 0.034 & 0.031 & 0.023 & 0.019 & 0.019 & 0.017 & 0.023 \\ & 0.070 & 0.041 & 0.034 & 0.031 & 0.023 & 0.019 & 0.019 & 0.017 \\ & & 0.070 & 0.041 & 0.034 & 0.031 & 0.023 & 0.019 & 0.019 \\ & & & 0.070 & 0.041 & 0.034 & 0.031 & 0.023 & 0.019 \\ & & & & 0.070 & 0.041 & 0.034 & 0.031 & 0.023 \\ & & & & & 0.070 & 0.041 & 0.034 & 0.031 \\ & & & & & & 0.070 & 0.041 & 0.034 \\ & & & & & & & 0.070 & 0.041 \\ & & & & & & & & 0.070 \end{pmatrix}$		$\begin{pmatrix} 3.015 \\ -0.092 \\ 0.009 \\ 0.122 \\ 0.251 \\ -0.331 \\ -0.051 \\ 0.237 \\ 0.269 \end{pmatrix}$	-77.1	-58.3	-76.8

Appendix B1.2 (cont): Parameter estimates for quadratic models under the various covariance structures for the ecological data set. In the case of the quadratic mean models, only output for the models considered in detail are shown.

ω_i	Σ	Estimated ω_i	Estimated Σ	β	AIC	BIC	AICc
VC	None	$\begin{pmatrix} 0.069 & & & & & & & & \\ & 0.069 & & & & & & & \\ & & 0.069 & & & & & & \\ & & & 0.069 & & & & & \\ & & & & 0.069 & & & & \\ & & & & & 0.069 & & & \\ & & & & & & 0.069 & & \\ & & & & & & & 0.069 & \\ & & & & & & & & 0.069 \end{pmatrix}$		$\begin{pmatrix} 3.034 \\ -0.095 \\ 0.009 \\ 0.112 \\ 0.231 \\ -0.346 \\ -0.048 \\ 0.243 \\ 0.292 \end{pmatrix}$	132.3	136.6	132.3