

Sexually distinct foraging strategies in an omnivorous seabird

Marine Biology

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Online Resource 2

Summary of linear mixed effects models evaluated for four response variables: (1) duration of nest bouts in hours (N), (2) duration of short trips in hours (S), (3) duration of long trips in hours (L), (4) range of long trips in km (R). Sex and breeding status are evaluated as fixed effects, individual birds are considered as a random effect. For each response variable, four models have been evaluated:

- 1) a null model testing the effect of the individual
- 2) a model testing the effect of the individual plus the effect of breeding status
- 3) a model testing the effect of the individual plus the effect of sex
- 4) a model testing the effect of the individual plus the effect of breeding status and sex

For nest bouts a fifth model was evaluated as well:

- 5) a model as 4) but an additional interaction term for the combination of sex and breeding status of 'Failed' (bsx)

The models are ranked according to their corrected Akaike Information Criterion (AICc) and the Akaike weights are being determined to see which model is supported best by the available data (Burnham and Anderson, 2002). If a single model has an Akaike weight higher than 0.8, the alternative candidate models are disregarded. The best models are evaluated through a likelihood ratio test against the null model. In addition, the conditional R² values are calculated (Nakagawa and Schielzeth 2013). Output from the model evaluation procedure is reported below. K is the number of estimated parameters in each model.

Duration of nest bouts

Rank of candidate models according to AICc

K	AICc	ΔAICc	AICcWt	
Nbsx	7	18328.14	0.00	0.77
Nbs	6	18330.51	2.37	0.23
Nb	5	18341.34	13.20	0.00
Ns	4	18573.25	245.11	0.00
N0	3	18584.36	256.22	0.00

Test whether Nbsx is a significant improvement over Nbs, based on a likelihood-ratio test (hence Nbsx is a significant improvement).

	Df	AIC	BIC	logLik	deviance	Chisq	Chi	Df	Pr(>Chisq)
Nbs	6	18331	18367	-9159.2	18319				
Nbsx	7	18328	18371	-9157.1	18314	4.3792	1	0.03638	*

Significance of Nbsx model based on a likelihood-ratio test (Nbs model versus null-model)

	Df	AIC	BIC	logLik	deviance	Chisq	Chi	Df	Pr(>Chisq)
N0	3	18584	18603	-9289.2	18578				
Nbsx	7	18328	18371	-9157.1	18314	264.25	4	< 2.2e-16	***

Coefficients of Nbsx model

Fixed effects:

	Estimate	Std. Error	t value
(Intercept)	5.6829	0.3170	17.927
SimpleStatusChickCare	-2.6609	0.1738	-15.310
SimpleStatusFailed	-2.5589	0.2762	-9.266
SexM	1.4619	0.4330	3.376
Male & Failed	0.9066	0.4321	2.098

Random effects:

Groups Name	Variance	Std.Dev.
Ring (Intercept)	1.234	1.111
Residual	14.853	3.854

Number of obs: 3296
 Groups: Ring, 35
Conditional R² : 0.18

Duration of short trips

Rank of candidate models according to AICc (hence model Ss is not really distinct from the null model).

K	AICc	ΔAICc	AICcWt
S0	3371.94	0.00	0.43
Ss	3372.19	0.25	0.38
Sb	3374.66	2.72	0.11
Sbs	3375.05	3.12	0.09

Significance of Ss model based on a likelihood-ratio test (Ss model versus null-model)

	Df	AIC	BIC	logLik	deviance	Chisq	Chi	Df	Pr(>Chisq)
S0	3	3371.9	3387.0	-1683.0	3365.9				
Ss	4	3372.2	3392.3	-1682.1	3364.2	1.7628	1	0.1843	

Coefficients of the Ss model

Fixed effects:

	Estimate	Std. Error	t value
(Intercept)	1.01292	0.07458	13.582
SexM	-0.15303	0.11189	-1.368

Random effects:

Groups Name	Variance	Std.Dev.
Ring (Intercept)	0.05582	0.2363
Residual	1.09361	1.0458

Number of obs: 1139
Groups: Ring, 34

Conditional R² : 0.05

Duration of long trips

Rank of candidate models according to AICc (hence both the Lb and Lbs could be considered compatible with the data)

	K	AICc	ΔAICc	AICcWt
Lb	5	15410.39	0.00	0.63
Lbs	6	15411.45	1.06	0.37
L0	3	15485.57	75.18	0.00
Ls	4	15486.59	76.20	0.00

Test whether Lbs is a significant improvement over Lb, based on a likelihood-ratio test (hence Lbs is not a significant improvement).

	Df	AIC	BIC	logLik	deviance	Chisq	Chi	Df	Pr(>Chisq)
Lb	5	15410	15438	-7700.2	15400				
Lbs	6	15411	15445	-7699.7	15399	0.9526	1	0.3291	

Significance of Lb model based on a likelihood-ratio test (Lb model versus null-model)

	Df	AIC	BIC	logLik	deviance	Chisq	Chi	Df	Pr(>Chisq)
L0	3	15486	15502	-7739.8	15480				
Lb	5	15410	15438	-7700.2	15400	79.198	2	< 2.2e-16	***

Coefficients of the Lb model

Fixed effects:

	Estimate	Std. Error	t value
(Intercept)	7.5594	0.7038	10.740
SimpleStatusChickCare	-0.9368	0.5995	-1.563
SimpleStatusFailed	6.6898	0.8439	7.927

Random effects:

Groups Name	Variance	Std.Dev.
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```
Ring (Intercept) 8.77 2.961
Residual 112.89 10.625
```

```
Number of obs: 2029
Groups: Ring, 34
```

Conditional R² : 0.12

Range of long trips

Rank of candidate models according to AICc .

```
K AICc ΔAICc AICcWt
Rbs 6 19125.40 0.00 0.99
Rb 5 19136.28 10.89 0.00
Rs 4 19139.79 14.39 0.00
R0 3 19151.24 25.84 0.00
```

Significance of Rbs model based on a likelihood-ratio test (Rbs model versus null-model)

```
Df AIC BIC logLik deviance Chisq Chi Df Pr(>Chisq)
R0 3 19151 19168 -9572.6 19145
Rbs 6 19125 19159 -9556.7 19113 31.874 3 5.563e-07 ***
```

Coefficients of the Rbs model

Fixed effects:

```
Estimate Std. Error t value
(Intercept) 18.765 2.042 9.191
SimpleStatusChickCare 2.908 1.491 1.950
SimpleStatusFailed 8.944 2.090 4.280
SexM 10.571 2.639 4.006
```

Random effects:

```
Groups Name Variance Std.Dev.
Ring (Intercept) 39.31 6.27
Residual 706.48 26.58
```

```
Number of obs: 2029
Groups: Ring, 34
```

Conditional R² : 0.10