Use of Bayesian population viability analysis to assess multiple management decisions in the recovery programme for the Endangered takahe *Porphyrio hochstetteri*

DANILO HEGG, DARRYL I. MACKENZIE and IAN G. JAMIESON

APPENDIX Demographic parameters for the takahe *Porphyrio hochstetteri* population model.

TABLE A1 Mean parameters α_1 to α_{10} in the logistic regression equation for takahe *Porphyrio hochstetteri* survival (see Equation 2), with 95% credibility intervals in parentheses, and probability (P) that the environmental parameter of interest (α_5–α_{10}) is > 0. Code implemented in *WinBUGS*, with 2 Markov chains and 100,000 iterations per chain. Adapted from Hegg et al. (2012).

Parameter	Mean	P > 0
α_1. Chick survival	1.05 (0.45–1.67)	
α_2. Adult survival	−1.02 (− 1.62–0.46)	
α_3. Age, linear term	0.53 (0.31–0.74)	
α_4. Age, quadratic term	−0.035 (− 0.054–0.015)	
α_5. Stoat trapping	0.60 (− 0.039–1.29)	96%
α_6. Beech seedfall	−0.34 (− 0.96–0.26)	14%
α_7. Tussock seeding	−0.12 (− 0.88–0.60)	38%
α_8. Winter temperature	0.25 (− 0.33–0.89)	79%
α_9. Total rainfall	0.55 (− 0.25–1.44)	91%
α_{10}. Snowfall	−0.65 (− 1.66–0.19)	6%

TABLE A2 Mean values of takahe survival in the Murchison Mountains (Fig. 1), 1992–2007, with 95% credibility intervals in parentheses. Code implemented in *WinBUGS*, with 2 Markov chains and 100,000 iterations per chain. Adult survival rate is over 1 year and chick survival rate is over the first winter only (March–October). Adapted from Hegg et al. (2012).

	Untrapped area	Stoat control area
Chicks	75% (67–83%)	83% (75–91%)
Adults	83% (79–88%)	91% (80–98%)

TABLE A3 Takahe productivity per nesting pair in the Murchison Mountains (Fig. 1), 1981–2005. 'Management' refers to the transfer of eggs/chicks to the captive-rearing facility. Adapted from Hegg et al. (2012).

	First clutch	Second clutch	Total
Eggs laid per pair	1.69	0.13	1.82
Eggs viable per pair	1.24	0.09	1.34
Eggs hatched per pair	1.09	0.08	1.18
Chicks fledged per pair (unmanaged)	0.40	0.03	0.43
Chicks fledged per pair (managed)	0.35 + 0.28*	0.03	0.66
Failed nests per pair	0.55		

*Contribution of captive-rearing programme

TABLE A4 Models for the probability of takahe breeding as a function of age, from data for island takahe, 1982–2004. P is the probability that a bird will lay eggs in a given year. Model selection according to the Deviance Information Criterion (DIC).

Model	DIC	ΔDIC
$\text{logit}(P) = \alpha_0 + \alpha_1/\text{Age}$	74.77	
$P = \alpha_0 \cdot (1 - e^{-\alpha 1 \cdot \text{Age}})$	110.42	35.65
$\text{logit}(P) = \alpha_0 + \alpha_1 \cdot \log(\text{Age})$	117.03	42.26
$\text{logit}(P) = \alpha_0 + \alpha_1 \cdot \text{Age} + \alpha_2 \cdot \text{Age}^2$	132.51	57.74
$\text{logit}(P) = \alpha_0 + \alpha_1 \cdot \text{Age}$	178.99	104.22

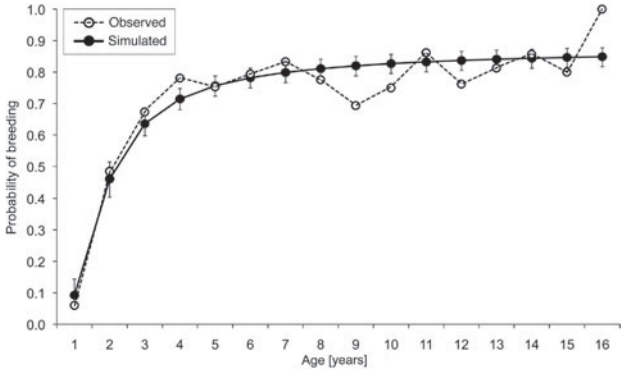

FIG. A1 Probability of breeding as a function of age based on either observed data or on best model (see Table A.4) for 103 island takahe.