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The adequacy of aging techniques in vertebrates for rapid estimation of population mortality rates from age distributions

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1 **Appendix S1. Models deducing mortality rate from age distributions.**

Source	Age-categories	Errors included?
(Gompertz, 1825)	0,1,...max	N
(Makeham, 1860)	0,1,...max	N
(Witten, 1987)	0,1,...max	N
(Ricker, 1975)	0,1,...max	N
(Siler, 1979)	0,1,...max	N
(Heligman and Pollard, 1980)	0,1,...max	N
(Finch, 1990)	0,1,...max	N
(Udevitz and Ballachey, 1998)	0,1,...max	N
(Udevitz and Gogan, 2012)	0,1,...max	N
(Ferreira and Van Aarde, 2008)	Four	N
(Sibly et al., 1997)	Three	N
(Ricklefs, 1997)	Two	N
(Green, 2004)	Two	N
(Conn et al., 2005)	Two	Y

2 Depicted are the number of age categories used as well as whether errors in age estimation
 3 were considered in the estimation of mortality rate.

4

5 **References**

- 6 CONN, P. B., DOHERTY, P. F., NICHOLS, J. D., RICKLEFS, R. E. & ROHWER, S. 2005.
7 Comparative demography of New World populations of thrushes (*Turdus spp.*):
8 Comment. *Ecology*, 86, 2536-2544.
- 9 FERREIRA, S. M. & VAN AARDE, R. J. 2008. A rapid method to estimate population variables
10 for african elephants. *Journal of Wildlife Management*, 72, 822-829.
- 11 FINCH, C. E. 1990. *Longevity, senescence, and the genome*, Chicago, University of Chicago.
- 12 GOMPERTZ, B. 1825. On the Nature of the Function expressive of the law of human
13 mortality, and on a new mode of determining the value of life contingencies.
14 *Philosophical Transactions of the Royal Society of London A Mathematical and*
15 *Physical Sciences*, 115, 513–585.
- 16 GREEN, R. E. 2004. A new method for estimating the adult survival rate of the Corncrake
17 *Crex crex* and comparison with estimates from ring-recovery and ring-recapture
18 data. *Ibis*, 146, 501-508.
- 19 HELIGMAN, L. & POLLARD, J. H. 1980. The age pattern of mortality. *Journal of the Institute of*
20 *Actuaries*, 107, 49-80.
- 21 MAKEHAM, W. M. 1860. On the law of mortality and the construction of annuity tables.
22 *Journal of the Institute of Actuaries*, 8, 301–310.
- 23 RICKER, W. E. 1975. Computation and interpretation of biological statistics of populations.
24 *Fisheries Research Board of Canada*, Bulletin 191, 382.
- 25 RICKLEFS, R. E. 1997. Comparative demography of new world populations of thrushes
26 (*Turdus spp.*). *Ecological Monographs*, 67, 23-43.

27 SIBLY, R. M., COLLETT, D., PROMISLOW, D. E. L., PEACOCK, D. J. & HARVEY, P. H. 1997.
28 Mortality rates of mammals. *Journal of Zoology*, 243, 1-12.

29 SILER, W. 1979. A competing-risk model for animal mortality. *Ecology*, 60, 750-757.

30 UDEVITZ, M. S. & BALLACHEY, B. E. 1998. Estimating survival rates with age-structure data.
31 *Journal of Wildlife Management*, 62, 779-792.

32 UDEVITZ, M. S. & GOGAN, P. J. P. 2012. Estimating survival rates with time series of standing
33 age-structure data. *Ecology*, 93, 726-32.

34 WITTEN, M. 1987. Information content of biological survival curves arising in aging
35 experiments: some further thoughts. *In: WOODHEAD, A. & THOMPSON, K. (eds.)*
36 *Evolution of Longevity in Animals*. Springer US.

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