

## 1 SUPPORTING INFORMATION - APPENDIX 2

### 2 Life history periods of the seven study species

3 One goal of the study was to examine whether fidelity varies during particular life history  
4 periods (*see* Fig. 3 in main text). We reviewed literature on the life history periods for the eight  
5 ungulates in the study and compiled it below.

6

### 7 Bighorn Sheep

8 Feder, C. J.G.A. Martin, M. Festa-Bianchet, C. Berube, and J. Jorgenson. 2008. Never too late?  
9 Consequences of late birthdate for mass and survival of bighorn lambs. *Oecologia* 156(4):773-  
10 781.

11 Festa-Bianchet, M. 1988. Birthdate and survival in bighorn lambs (*Ovis canadensis*). *Journal of*  
12 *Zoology* 214(4):653-661.

13 Hass, C.C. 1997. Seasonality of births in bighorn sheep. *Journal of Mammalogy* 78(4):1251-  
14 1260.

15 Hass, C.C. 1995. Gestation periods and birth weights of desert bighorn sheep in relation to other  
16 Caprinae. *The Southwestern Naturalist*. 40:139-147.

17 Shackleton, D.M., R.G. Peterson, J. Haywood, and A. Bottrell. 1984. Gestation period in *Ovis*  
18 *canadensis*. *Journal of Mammalogy* 65(2): 337-338.

19

20 **Caribou**

21 Adams, L.G., and B.W. Dale. 1998. Timing and synchrony of parturition in Alaskan caribou.

22 *Journal of Mammalogy* 79(1):287-294.

23 Dauphine, T.C., and R.L. McClure. 1974. Synchronous mating in Canadian barren-ground

24 caribou. *Journal of Wildlife Management* 38:54-66.

25 Lent, P.C. 1966. Calving and related social behavior in the barren-ground caribou. *Ethology*

26 23(6):701-756.

27 McEwan, E.H., and P.E. Whitehead. 1972. Reproduction in female reindeer and caribou.

28 *Canadian Journal of Zoology* 50:43-46.

29

30 **Elk**

31 Haigh, J.C. 2001. The gestation length of wapiti (*Cervus elaphus*) revisited. *Animal*

32 *Reproduction Science* 65:89-93.

33 Kie, J.G., B.K. Johnson, J.H. Noyes, C.L. Williams, B.L. Dick, O.E. Rhodes, R.J. Stussy, and

34 R.T. Bowyer. 2013. Reproduction in North American elk *Cervus elaphus*: paternity of calves

35 sired by males of mixed age classes. *Wildlife Biology* 19(3):302-310.

36 Lantz, D.E. 1910. Raising deer and other large game animals in the United States. *Biol. Surv.*

37 *Bull.* 36. 62 pp.

38 Martinka, C.J. 1969. Population Ecology of summer resident elk in Jackson Hole, Wyoming.

39 *Journal of Wildlife Management* 33(3):465-481.

40 Morrison, J.A., C.E. Trainer, and P.L. Wright. 1959. Breeding season in elk as determined from  
41 known-age embryos. *Journal of Wildlife Management* 23:27-34

42 Noyes, J.H., B.K. Johnson, L.D. Bryant, S.L. Findholt, and J.W. Thomas. 1996. Effects of bull  
43 age on conception dates and pregnancy rates of cow elk. *Journal of Wildlife Management*  
44 60(3):508-517.

45 Noyes, J.H., B.K. Johnson, B.L. Dick, and J.G. Kie. 2002. Effects of male age and female  
46 nutritional condition on elk reproduction. *Journal of Wildlife Management* 66(4):1301- 1307.

47 Simpson, B.D. 2015. Population ecology of rocky mountain elk in the Black Hills, South Dakota  
48 and Wyoming. M.S. Thesis. South Dakota State University.

49 Squibb, R.C. J.F. Kimball, and D.R. Anderson. 1986 Bimodal distribution of estimated  
50 conception dates in Rocky Mountain Elk. *Journal of Wildlife Management* 50(1):118- 122.

51

## 52 **Moose**

53 Ballenberghe, V.V., and D.G. Miquelle. 1993. Mating in moose: timing, behavior, and male  
54 access patterns. *Canadian Journal of Zoology* 71(8): 1687-1690.

55 Bowyer, R.T., V.V. Ballenberghe, J.G. Kie. 1998. Timing and synchrony of parturition in  
56 Alaskan moose: long term-versus proximal effects of climate. *Journal of Mammalogy*  
57 79(4):1332-1344.

58 Keech, M.A., R.T. Bowyer, J.M. Ver Hoef, R.D. Boertje, B.W. Dale, and T.R. Stephenson.  
59 2000. Life-history consequences of maternal condition in Alaskan Moose. *Journal of Wildlife*  
60 *Management* 64(2):450-462.

61 Laurian, C., J.P. Ouellet, R. Courtois, L. Breton, and S. St-onge. 2000. Effects of intensive  
62 harvesting on moose reproduction. *Journal of Applied Ecology* 37:515-531.

63 Saether, B.E., E.J. Solberg, and M. Heim. 2003. Effects of Altering sex ratio structure on the  
64 demography of an isolated moose population. *Journal of Wildlife Management* 67(3):455-  
65 466.

66 Schwartz, C.C. and K.J. Hundertmark. 1993. Reproductive characteristics of Alaskan moose.  
67 *Journal of Wildlife management* 57(3):454-468.

68

## 69 **Mule Deer**

70 Anderson, A.E., and O.C. Wallmo. 1984. *Odocoileus hemionus*. *Mammalian Species*. 219:1-9.

71 Bowyer, R.T. 1991. Timing of parturition and lactation in southern mule deer. *Journal of*  
72 *Mammalogy* 72(1):138-145.

73 Pojar, T.M., and D.C. Bowden. 2004. Neonatal mule deer fawn survival in west-central  
74 Colorado. *Journal of Wildlife Management* 68(3):550-560.

75 Robinette, W.L., C.H. Baer, R.E. Pillmore, and C.E. Knittle. 1973. Effects of nutritional change  
76 on captive mule deer. *Journal of Wildlife Management* 37(3):312-326.

77 Robinette, W.L., N.V. Hancock, and D.A. Jones. 1977. The Oak Creek mule deer herd in Utah.  
78 Utah Division of Wildlife Resources Publication., 77-15:1-148.

79

## 80 **Pronghorn**

81 Clancey, E., S.J. Dunn, and J.A. Byers. Do single point condition measurements predict fitness  
82 in female pronghorn (*Antilocapra Americana*)? Canadian Journal of Zoology 90:729-735.

83 Fairbanks, W.S. 1993. Birthdate, birth weights, and survival in pronghorn fawns. Journal of  
84 Mammalogy 74(1):129-135.

85 Nimmo, B.W. 1971. Population Dynamics of a Wyoming pronghorn cohort from the Eden-  
86 Farson site, 48SW304. Plains Anthropologist 16(54):285-288.

87 Pojar, T.M., and L.L.W. Miller. 1984. Recurrent estrus and cycle length in pronghorn. Journal of  
88 Wildlife Management 48(3):973-979.

89

## 90 **Wildebeest**

91 Estes, R., 1966. Behaviour and life history of the wildebeest. Nature 212, 999-1000.

92 Estes, R.D., 2014. The Gnu's World: Serengeti wildebeest ecology and life history University of  
93 California Press, Berkeley.

94 Estes, R., 1992. The Behavior Guide to African Mammals: Including Hoofed Mammals,  
95 Carnivores, Primates. University of California Press, Berkeley and Los Angeles.

96 Sinclair, A.R.E, Mduma, S.A.R., Arcese P. What Determines Phenology and Synchrony of  
97 Ungulate Breeding in Serengeti? Ecology, 81(8): 2100-2111.

98

99 **Zebra**

100 Estes, R., 1992. The Behavior Guide to African Mammals: Including Hoofed Mammals,  
101 Carnivores, Primates. University of California Press, Berkeley and Los Angeles.

102 Sinclair, A.R.E, Mduma, S.A.R., Arcese P. What Determines Phenology and Synchrony of  
103 Ungulate Breeding in Serengeti? Ecology, 81(8): 2100-2111.