

## Details on the statistical analyses

Models were created separately for data from the wild and captivity and all analyses were performed in R version 3.0.1 (R development core team 2013). “Lifetime” models (ages 1-10 years) were used to describe patterns of body mass change over the lifespan under wild and captive conditions. Senescence was studied in further detail using only measurements at ages  $\geq 5$  years in order to quantify the rates of senescence across settings and sexes since this age has been indicated as the beginning of senescent declines in captivity.

Because of the large number of factors considered and the consequently high number of plausible alternative models, we used an information-theoretic approach for model selection [1]. An *a priori* set of candidate models was created including only biologically meaningful models (Tables S1-S4). Model selection was based on Akaike’s Information Criterion values (AIC, for C10 and W10 data sets) or AIC corrected for small sample size (AICc, C5 and W5 data sets) and differences between the models ( $AIC\Delta$ ) were calculated for the candidate models. The associated AIC-weights (AICw) and log-likelihood ratios were used for model selection. When AICw for the best model was  $< 0.9$ , all models with cumulative AICw of  $\geq 0.95$  (“confidence set”) were used for multimodel inference [1]. This confidence set was used to quantify the relative importance of each variable by calculating the sum of AICw of all of the models in which the term appeared. Variable estimates were computed based on the best model in the confidence set including a given variable since estimates were quantitatively very similar for a given term across the models included in the confidence set in all cases [1].

All continuous predictor terms were log-transformed, scaled (mean/SD) and centered prior to analyses (as recommended in [2, 3]) to more reliably estimate effects of polynomials included in interactions, main effects of terms included in interactions and smoother terms. Body mass was log-transformed to achieve normal distribution. The heterogeneity and distribution of the residuals of the model of highest complexity and each selected best model were confirmed by a visual examination of diagnostic graphs [3]. Where outliers were suspected based on visual inspection of the diagnostic graphs, the models were run again after excluding these outliers (1-2 cases in W5 and C5 data sets). This exclusion had no influence on the conclusions and therefore these outliers were included in the final data analyses.

### Lifetime body mass change with age

Because of the expected non-linear seasonal body mass fluctuation [4] and for describing flexible estimates of the age trajectories of body mass, we used Additive Mixed Modelling

(GAMM, [3]). First, we investigated the potential temporal autocorrelation between consecutive body mass measurements for an individual with the *mgecv*-package [3]. This was done using a reduced model with body mass as the response variable, the year of measurement entered as a fixed effect and a sex-specific smoother of the date of measurement (wild; see below) or photoperiod (captive) as predictors and individual identity nested within cohort (year of birth) entered as a random factor. This model was run with and without an autocorrelation term of time (Julian date in the wild and age in seasons in captivity, to account for the difference in frequency and within-population synchrony of measurements) within the individual (function *corAR1* [5]). The significance of the autocorrelation term in both settings was assessed by comparing the reduced and inclusive model using likelihood ratio tests (LRT). We found significant autocorrelation in the measurements in both settings (wild: LRT=489.89,  $p < 0.0001$ , captive: LRT=27.14,  $p < 0.0001$ ). Therefore, the correlation structure was included in all candidate models for the examination of body mass over lifetime. Since multiple, non-nested random structures cannot be combined with correlation structures in currently available R packages, the random structure was defined as individual nested within cohort in both captivity and the wild. To account for potential subpopulation effects and annual fluctuations, the year of measurement and subpopulation identity were included as fixed factors in all W10 and W5 models.

For the W10 data set, a smoother term was created for “day of year” for each sex in order to allow for the known sex-specific non-linear seasonal trends in Kirindy [4] and alleviate possible variations in recapture rates of the sexes over the course of the year. The smoother terms were estimated using cubic regression splines to permit the computation of smoothers for the large sample [3]. For both settings, a smoother term was also introduced for age (cubic regression spline, maximum number of knots set to 5) in order to describe the age-related changes in body mass.

### Body mass senescence

The rate of decline at old age was quantified in further detail by modelling only data for individuals  $\geq 5$  years (W5 and C5) using Gaussian Linear Mixed Models (LMM, R package *lme4* [6]). This package was used to accommodate a crossed random effects structure in the wild (individual nested within cohort + year of measurement; captive: individual nested within cohort) to improve the explanatory power of models for this smaller data set. The conclusions were confirmed by model selection done with a) the inclusion of an autocorrelation structure using the *nlme* package [7], and b) GAMM of the W5 data, where

sex-specific smoothers of the day of the year were fitted as described above for the lifetime models. The same confidence set of models was indicated in each modelling approach. Therefore, we show results based only on models with the crossed random structure. We also tested for inter-individual variation in rates of senescence with random slopes [2, 8] (using a model with age and season as fixed factors and, additionally, year and subpopulation in W5, including only individuals with more than two measurements available), but since models with random slope structures (with and without correlation of random slope and intercept) were not significantly better than ones without (LRT: all  $p > 0.07$  in captivity and the wild), we chose random intercept models for all analyses in the interest of parsimony.

An identical model set was built separately for the captive (Table S3) and wild (Table S4) populations, differing only in the random effects structure (see above). Only linear effects of log-transformed and scaled age on body mass were entered in the models to acquire estimates of absolute change. In the wild, data were restricted to the months March-May and September-November to exclude times of the year with low trapping probabilities and to reduce noise caused by ecological change during transition between seasons.

## References

- [1] Burnham, K.P. & Anderson, D.R. 2002 *Model selection and multimodel inference: a practical information-theoretic approach*, Springer.
- [2] Grueber, C., Nakagawa, S., Laws, R. & Jamieson, I. 2011 Multimodel inference in ecology and evolution: challenges and solutions. *Journal of evolutionary biology* **24**, 699-711.
- [3] Wood, S. 2006 *Generalized additive models: an introduction with R*, CRC press.
- [4] Schmid, J. & Kappeler, P.M. 1998 Fluctuating sexual dimorphism and differential hibernation by sex in a primate, the gray mouse lemur (*Microcebus murinus*). *Behavioral Ecology and Sociobiology* **43**, 125-132.
- [5] Pinheiro, J.C. & Bates, D.M. 2000 *Mixed effects models in S and S-PLUS*, Springer.
- [6] Bates, D., Maechler, M. & Bolker, B. 2013 lme4: Linear mixed-effects models using Eigen and Eigenfaces. R package version 0.999999-2. <http://CRAN.R-project.org/package=lme4>.
- [7] Pinheiro, J., Bates, D., DebRoy, S., Sarkar, D. & Team, R.D.C. 2013 nlme: Linear and Nonlinear Mixed Effects Models. R package version 3.1-111.
- [8] van de Pol, M. & Wright, J. 2009 A simple method for distinguishing within-versus between-subject effects using mixed models. *Animal Behaviour* **77**, 753-758.

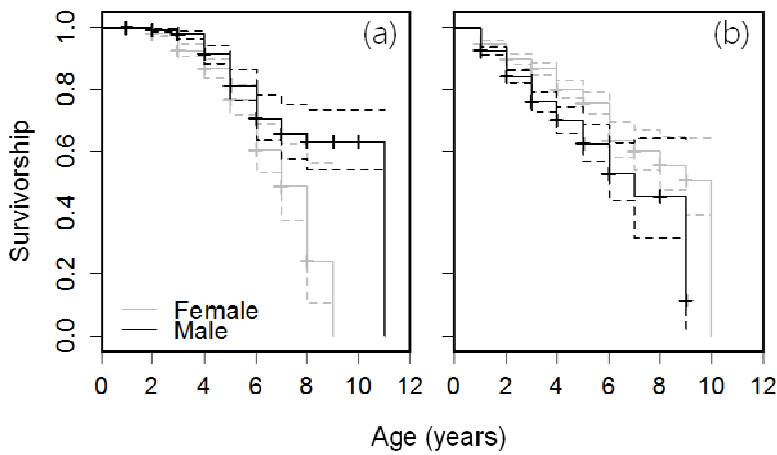


Figure S1: Sex-specific survivorship in the captive population (a) based on date of death and in the wild populations (b) based on age at last capture. Solid lines represent the proportion of the population surviving to a given age; dashed lines indicate 95% confidence intervals.

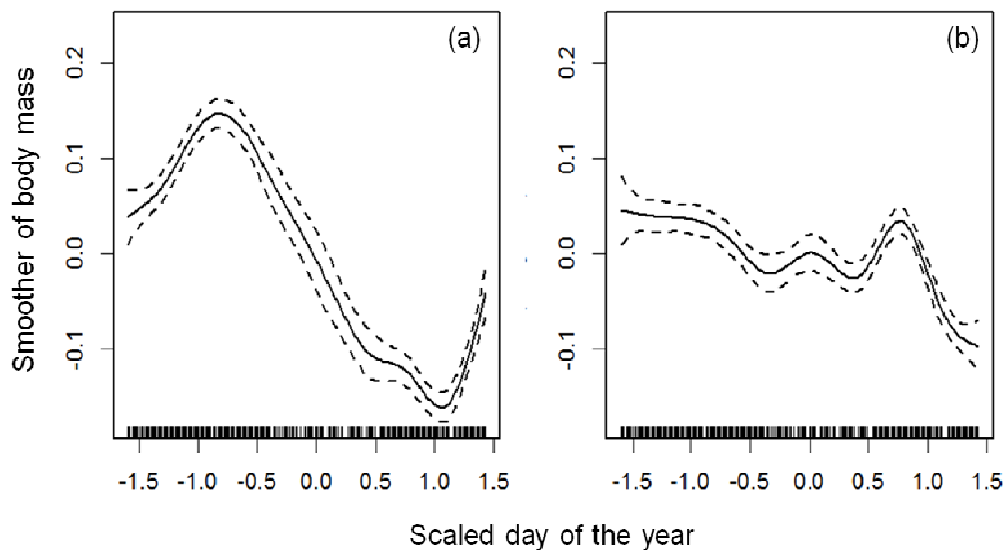


Figure S2: Seasonal body mass change for females (a) and males (b), from March to November in the natural population. The solid lines indicate the best estimate for a smoother of body mass over the course of the year, based on the model receiving highest support in model selection (first model, Table S2:  $s(\text{day of year,by=sex}) + \text{sex} + \text{longevity} + \text{last season} + s(\text{age,by=season}) + \text{year} + \text{subpopulation}$ ), dashed lines show 95% confidence bands.

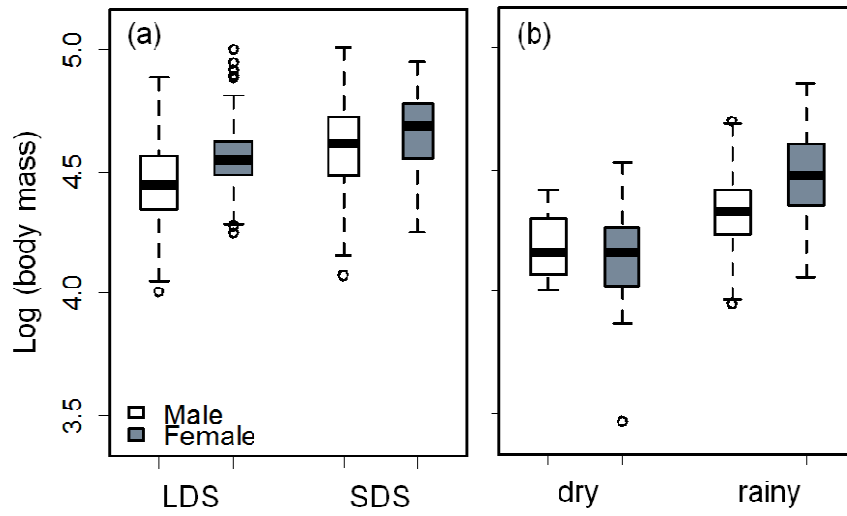


Figure S3: Body mass in captive (a) and wild (b) males and females (ages 5-10 years) in the different seasons. Shown are median, interquartile range, min-max range and outliers; box width corresponds to sample size.

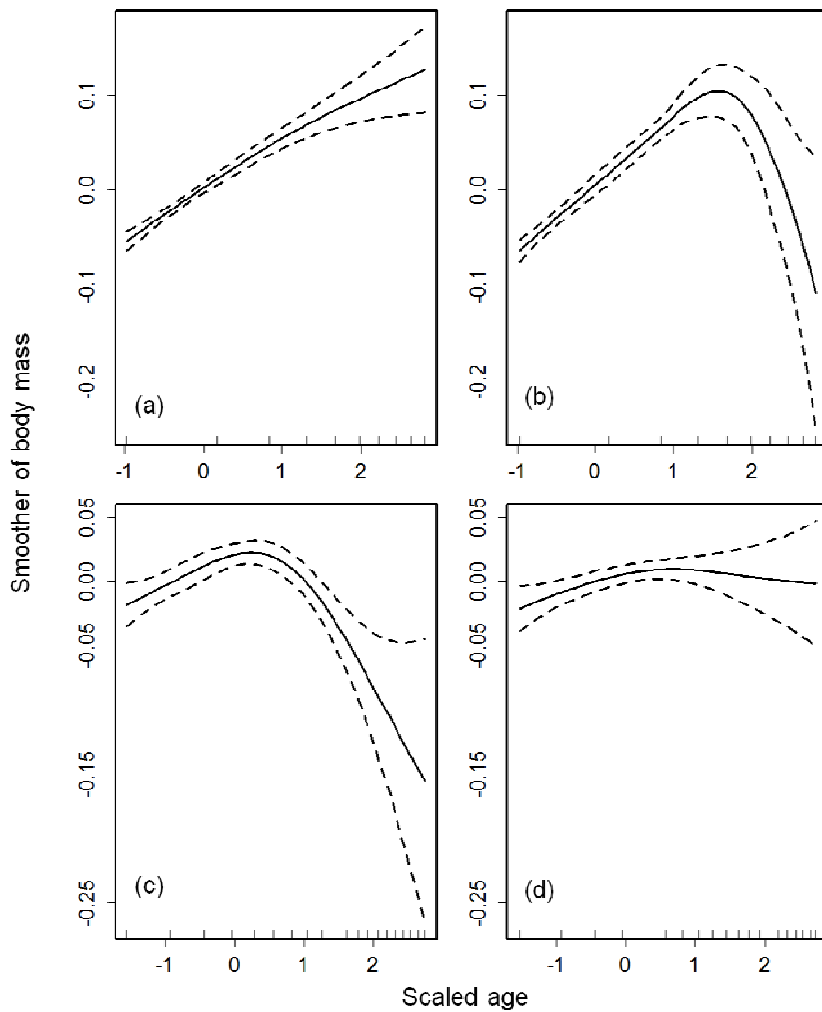


Figure S4: Age-specific smoothers of body mass over lifetime for wild females (a) and males (b) and captive females (c) and males (d). The solid lines indicate the best estimate for a smoother of body mass over the ages 1-11 years (scaled age shown) and dashed lines show 95% confidence bands. Estimates are based on models  $s(\text{day of year, by=sex}) + \text{season} + \text{sex} + \text{longevity} + \text{last season} + s(\text{age, by=sex}) + \text{year} + \text{subpopulation}$  in the wild and  $\text{season} + \text{sex} + \text{season:sex} + \text{longevity} + \text{last season} + s(\text{age, by=sex})$  in captivity. Note that sex-specific smoothers were unsupported by model selection, since season-specific smoothers received very strong support (Tables S1 and S2). Two separate smoothers of the same variable (e.g. sex- and season-specific smoother of age) cannot be included in the same model.

**Table S1: Model selection for lifetime body mass data in captivity (C10)**

Set of candidate models for the captive population lifetime data (C10). The single best model (AICw > 0.99) in bold. N=1773 measurements from 258 individuals.

<b>Model structure</b>	<b>df</b>	<b>AIC</b>	<b>AICΔ</b>	<b>LogLik</b>	<b>AICw</b>
<b>sex + longevity + last season + season:sex + s(age, by=season)</b>	<b>14</b>	<b>-2469.55</b>	<b>0.00</b>	<b>1.000</b>	<b>1.000</b>
season + sex + longevity + last season + s(age, by=season)	13	-2444.06	25.50	0.000	0.000
season + sex + season:sex + s(age, by=season)	12	-2428.10	41.45	0.000	0.000
season + sex + s(age) + longevity + last season + season:sex + last season:sex	13	-2420.68	48.88	0.000	0.000
season + sex + s(age) + longevity + last season + season:sex	12	-2418.82	50.74	0.000	0.000
season + sex + s(age) + longevity + last season + season:sex + longevity:sex + last season:sex	14	-2418.77	50.78	0.000	0.000
sex + last season + last season:sex + s(age, by=season)	12	-2417.21	52.34	0.000	0.000
season + sex + s(age) + longevity + last season + season:sex + longevity:sex	13	-2417.05	52.50	0.000	0.000
season + sex + longevity + s(age, by=sex) + last season:sex	14	-2412.38	57.17	0.000	0.000
season + sex + longevity + last season + season:sex + s(age, by=sex)	14	-2412.23	57.33	0.000	0.000
season + sex + longevity + last season + s(age, by=sex) + longevity:sex + last season:sex	15	-2410.69	58.86	0.000	0.000
season + sex + s(age) + longevity + last season + last season:sex	12	-2410.49	59.06	0.000	0.000
season + sex + longevity + last season + season:sex + s(age, by=sex) + longevity:sex	15	-2410.23	59.33	0.000	0.000
sex + longevity + last season + s(age, by=season)	12	-2408.75	60.81	0.000	0.000
season + sex + last season + s(age, by=sex) + last season:sex	13	-2407.91	61.64	0.000	0.000
season + sex + s(age, by=season)	11	-2406.86	62.69	0.000	0.000
season + sex + s(age) + last season + last season:sex	11	-2406.25	63.30	0.000	0.000
sex + last season + s(age, by=season)	11	-2405.43	64.12	0.000	0.000
season + sex + s(age) + longevity + last season	11	-2401.36	68.19	0.000	0.000
season + sex + s(age) + longevity + last season + longevity:sex	12	-2399.57	69.99	0.000	0.000
season + sex + s(age) + longevity + season:sex	11	-2398.98	70.57	0.000	0.000
season + sex + longevity + last season + s(age, by=sex)	13	-2398.81	70.75	0.000	0.000
season + sex + longevity + last season + s(age, by=sex) + longevity:sex	14	-2396.82	72.73	0.000	0.000
season + sex + s(age) + season:sex	10	-2389.66	79.89	0.000	0.000
season + sex + s(age) + longevity	10	-2384.43	85.12	0.000	0.000
season + sex + last season + last season:sex	9	-2383.64	85.91	0.000	0.000

season + sex + s(age) + longevity + longevity:sex	11	-2382.63	86.93	0.000	0.000
sex + longevity + s(age, by=season)	11	-2382.40	87.15	0.000	0.000
season + sex + longevity + s(age, by=sex)	12	-2382.12	87.43	0.000	0.000
sex + longevity + longevity:sex + s(age, by=season)	12	-2380.62	88.94	0.000	0.000
season + sex + longevity + s(age, by=sex) + longevity:sex	13	-2380.13	89.43	0.000	0.000
season + sex + s(age)	9	-2375.13	94.42	0.000	0.000
sex + s(age, by=season)	10	-2373.13	96.43	0.000	0.000
season + sex + s(age, by=sex)	11	-2373.00	96.55	0.000	0.000
season + s(age, by=season)	10	-2372.30	97.26	0.000	0.000
last season + s(age, by=season)	10	-2368.18	101.38	0.000	0.000
season + sex + season:sex	8	-2366.66	102.90	0.000	0.000
season + s(age) + longevity + last season	10	-2359.92	109.64	0.000	0.000
season + sex + longevity + longevity:sex	9	-2358.32	111.23	0.000	0.000
season + sex	7	-2352.02	117.54	0.000	0.000
season + s(age) + longevity	9	-2342.76	126.79	0.000	0.000
longevity + s(age, by=season)	10	-2340.72	128.83	0.000	0.000
season + s(age)	8	-2340.39	129.17	0.000	0.000
season + s(age, by=sex)	10	-2339.72	129.84	0.000	0.000
s(age, by=season)	9	-2338.36	131.19	0.000	0.000
season + longevity + last season	8	-2338.26	131.29	0.000	0.000
season + longevity	7	-2319.07	150.48	0.000	0.000
Season	6	-2317.34	152.21	0.000	0.000
s(age)	7	-1776.47	693.09	0.000	0.000
s(age, by=sex)	9	-1760.83	708.73	0.000	0.000
last season	6	-1743.74	725.82	0.000	0.000
Sex	6	-1665.91	803.65	0.000	0.000
Longevity	6	-1632.49	837.07	0.000	0.000

Sex-specific seasonal smoother, subpopulation and year of measurement included as forced fixed variables. Temporal within-individual autocorrelation and random structure (individual nested within cohort) applied to all models.

s(age, by=season) = season-specific smoother of age; s(age, by=sex) = sex-specific smoother of age



**Table S2: Model selection for lifetime body mass data in the wild (W10)**

Set of candidate models for the wild population lifetime data (W10). The confidence set of models indicated by model selection (cumulative AICw > 0.98) receiving most support for predicting the body mass in bold. N=3422 measurements from 593 individuals.

Model structure	df	AIC	AICd	L	AICw
<b>s(Day of year, by=sex) + sex + longevity + last season + s(age, by=season)</b>	<b>35</b>	<b>-5110.06</b>	<b>0.00</b>	<b>1.000</b>	<b>0.284</b>
<b>s(Day of year, by=sex) + sex + last season + s(age, by=season)</b>	<b>34</b>	<b>-5109.90</b>	<b>0.16</b>	<b>0.922</b>	<b>0.262</b>
<b>s(Day of year, by=sex) + sex + s(age, by=season)</b>	<b>33</b>	<b>-5109.20</b>	<b>0.86</b>	<b>0.650</b>	<b>0.185</b>
<b>s(Day of year, by=sex) + sex + last season + last season:sex + s(age, by=season)</b>	<b>35</b>	<b>-5109.06</b>	<b>1.01</b>	<b>0.604</b>	<b>0.172</b>
<b>s(Day of year, by=sex) + sex + longevity + s(age, by=season)</b>	<b>34</b>	<b>-5107.30</b>	<b>2.76</b>	<b>0.252</b>	<b>0.071</b>
s(Day of year, by=sex) + sex + longevity + longevity:sex + s(age, by=season)	35	-5105.32	4.74	0.093	0.027
s(Day of year, by=sex) + last season + s(age, by=season)	33	-5036.31	73.76	0.000	0.000
s(Day of year, by=sex) + longevity + last season + s(age, by=season)	34	-5034.31	75.76	0.000	0.000
s(Day of year, by=sex) + s(age, by=season)	32	-5033.61	76.46	0.000	0.000
s(Day of year, by=sex) + longevity + s(age, by=season)	33	-5033.02	77.05	0.000	0.000
s(Day of year, by=sex) + sex + longevity + last season + s(age, by=sex) + longevity:sex	36	-4997.70	112.37	0.000	0.000
s(Day of year, by=sex) + sex + last season + s(age, by=sex) + last season:sex	35	-4996.33	113.73	0.000	0.000
s(Day of year, by=sex) + sex + longevity + last season + s(age, by=sex)	35	-4996.19	113.87	0.000	0.000
s(Day of year, by=sex) + sex + s(age, by=sex)	33	-4995.86	114.21	0.000	0.000
s(Day of year, by=sex) + sex + longevity + last season + s(age, by=sex) + longevity:sex + last season:sex	37	-4995.75	114.31	0.000	0.000
s(Day of year, by=sex) + sex + longevity + s(age, by=sex) + last season:sex	36	-4994.98	115.09	0.000	0.000
s(Day of year, by=sex) + sex + longevity + s(age, by=sex) + longevity:sex	35	-4994.89	115.17	0.000	0.000
s(Day of year, by=sex) + sex + s(age) + last season + last season:sex	33	-4994.53	115.54	0.000	0.000
s(Day of year, by=sex) + sex + s(age)	31	-4994.51	115.55	0.000	0.000
s(Day of year, by=sex) + sex + s(age) + longevity + last season	33	-4994.42	115.64	0.000	0.000
s(Day of year, by=sex) + sex + longevity + s(age, by=sex)	34	-4994.08	115.99	0.000	0.000
s(Day of year, by=sex) + sex + s(age) + longevity + last season + longevity:sex	34	-4993.42	116.64	0.000	0.000
s(Day of year, by=sex) + sex + s(age) + longevity + last season + last season:sex	34	-4993.14	116.93	0.000	0.000
s(Day of year, by=sex) + sex + s(age) + longevity	32	-4992.69	117.38	0.000	0.000
s(Day of year, by=sex) + sex + s(age) + longevity + last season + longevity:sex + last season:sex	35	-4991.66	118.40	0.000	0.000
s(Day of year, by=sex) + sex + s(age) + longevity + longevity:sex	33	-4991.53	118.53	0.000	0.000

s(Day of year, by=sex) + s(age, by=sex)	32	-4930.38	179.69	0.000	0.000
s(Day of year, by=sex) + s(age) + longevity + last season	32	-4924.01	186.06	0.000	0.000
s(Day of year, by=sex) + s(age) + longevity	31	-4923.53	186.53	0.000	0.000
s(Day of year, by=sex) + s(age)	30	-4922.02	188.04	0.000	0.000
s(Day of year, by=sex) + sex + longevity + last season + longevity:sex + last season:sex	33	-4829.41	280.65	0.000	0.000
s(Day of year, by=sex) + sex + longevity + longevity:sex	31	-4824.31	285.75	0.000	0.000
s(Day of year, by=sex) + sex	29	-4778.52	331.55	0.000	0.000
s(Day of year, by=sex) + sex + last season + last season:sex	31	-4775.77	334.29	0.000	0.000
s(Day of year, by=sex) + longevity + last season + longevity:sex	31	-4772.45	337.61	0.000	0.000
s(Day of year, by=sex) + longevity + last season	30	-4769.50	340.56	0.000	0.000
s(Day of year, by=sex) + longevity	29	-4761.17	348.89	0.000	0.000
s(Day of year, by=sex)	28	-4696.35	413.71	0.000	0.000
s(Day of year, by=sex) + last season	29	-4694.46	415.60	0.000	0.000
s(age)	26	-3930.16	1179.90	0.000	0.000
sex	25	-3862.09	1247.97	0.000	0.000
longevity	25	-3800.88	1309.18	0.000	0.000
last season	25	-3788.04	1322.02	0.000	0.000
-	24	-3779.94	1330.12	0.000	0.000

Sex-specific seasonal smoother, subpopulation and year of measurement included as forced fixed variables. Temporal within-individual autocorrelation and random structure (individual nested within cohort) applied to all models.  
 s(age, by=season) = season-specific smoother of age; s(age, by=sex) = sex-specific smoother of age

**Table S3: Model selection for body mass of aged animals in captivity (C5)**

Set of candidate models for the captive population aged animals (C5): confidence set of models (cumulative AICw>0.98) receiving most support for predicting the body mass in bold. N=339 measurements from 105 individuals.

Model structure	df	AICc	AICΔ	LogLik	AICw
<b>season + sex + age + longevity</b>	<b>8</b>	<b>-337.99</b>	<b>0.00</b>	<b>1.000</b>	<b>0.563</b>
<b>season + sex + age + longevity + age:season</b>	<b>9</b>	<b>-337.058</b>	<b>0.93</b>	<b>0.628</b>	<b>0.354</b>
<b>season + sex + age + longevity + longevity:sex + age:season</b>	<b>10</b>	<b>-334.054</b>	<b>3.94</b>	<b>0.140</b>	<b>0.079</b>
season + sex + age + longevity + longevity:sex + age:season + age:season:sex	12	-326.207	11.78	0.003	0.002
season + sex + age + longevity + season:sex + age:sex + age:season + age:season:sex	12	-324.444	13.55	0.001	0.001
season + sex + age + age:sex + age:season	9	-324.181	13.81	0.001	0.001
season + sex + age	7	-323.243	14.75	0.001	0.000
season + sex + age + age:sex	8	-323.14	14.85	0.001	0.000
season + age + longevity + age:season	8	-323.045	14.94	0.001	0.000
season + sex + age + age:season	8	-322.891	15.10	0.001	0.000
season + age + age:season	7	-316.865	21.12	0.000	0.000
season + age	6	-316.824	21.17	0.000	0.000
season + age + last season + age:season	8	-316.779	21.21	0.000	0.000
season + sex + age + season:sex + age:season	9	-315.364	22.63	0.000	0.000
season + sex + longevity	7	-312.688	25.30	0.000	0.000
season + sex + last season + last season:sex	8	-312.289	25.70	0.000	0.000
season + sex	6	-311.101	26.89	0.000	0.000
season + sex + age + season:sex + age:sex + age:season + age:season:sex	11	-310.406	27.58	0.000	0.000
season + last season	6	-309.367	28.62	0.000	0.000
season + sex + longevity + longevity:sex	8	-308.371	29.62	0.000	0.000
season + sex + age + last season + season:sex + age:sex + age:season + age:season:sex	12	-308.297	29.69	0.000	0.000
season + sex + age + last season + season:sex + age:sex + last season:sex + age:season + age:season:sex	13	-307.919	30.07	0.000	0.000
season + sex + season:sex	7	-303.797	34.19	0.000	0.000
season	5	-302.028	35.96	0.000	0.000
season + longevity	6	-298.792	39.20	0.000	0.000
sex + last season	6	-288.892	49.10	0.000	0.000

last season	5	-280.309	57.68	0.000	0.000
sex + longevity	6	-269.882	68.11	0.000	0.000
sex + longevity + longevity:sex	7	-264.064	73.93	0.000	0.000
sex	5	-262.05	75.94	0.000	0.000
sex + age + age:sex	7	-255.243	82.75	0.000	0.000
longevity	5	-254.927	83.06	0.000	0.000
age	5	-252.916	85.07	0.000	0.000

Random effects: individual identity nested within cohort.

**Table S4: Model selection for body mass of aged animals in the wild (W5)**

Set of candidate models for the wild population aged animals (W5): single best model (AICw>0.90) in bold. N=316 measurements from 70 individuals.

Model structure	df	AICc	AICd	L	AICw
<b>season + sex + season:sex</b>	<b>7</b>	<b>-262.75</b>	<b>0.00</b>	<b>1.000</b>	<b>0.908</b>
season	7	-257.71	5.04	0.080	0.073
season + sex	7	-253.78	8.97	0.011	0.010
season + last season	7	-252.86	9.89	0.007	0.006
season + longevity	7	-249.21	13.54	0.001	0.001
season + age	9	-248.42	14.33	0.001	0.001
season + sex + age + season:sex + age:season	9	-246.84	15.91	0.000	0.000
season + sex + last season + last season:sex	8	-245.91	16.84	0.000	0.000
season + sex + age	9	-244.49	18.26	0.000	0.000
season + age + age:season	8	-243.56	19.19	0.000	0.000
season + sex + age + age:sex	9	-239.81	22.94	0.000	0.000
season + sex + age + age:season	10	-239.74	23.01	0.000	0.000
season + age + last season + age:season	8	-238.81	23.94	0.000	0.000
season + sex + longevity + longevity:sex	8	-238.45	24.30	0.000	0.000
season + sex + age + season:sex + age:sex + age:season + age:season:sex	8	-237.17	25.58	0.000	0.000
season + sex + age + longevity	10	-236.30	26.45	0.000	0.000

season + age + longevity + age:season	10	-235.40	27.35	0.000	0.000
season + sex + age + age:sex + age:season	10	-234.12	28.63	0.000	0.000
season + sex + age + last season + season:sex + age:sex + age:season + age:season:sex	9	-231.28	31.47	0.000	0.000
season + sex + age + longevity + season:sex + age:sex + age:season + age:season:sex	10	-228.97	33.78	0.000	0.000
season + sex + age + last season + season:sex + age:sex + last season:sex + age:season + age:season:sex	10	-227.82	34.93	0.000	0.000
season + sex + age + longevity + longevity:sex + age:season	10	-224.67	38.08	0.000	0.000
season + sex + age + longevity + longevity:sex + age:season + age:season:sex	11	-214.24	48.51	0.000	0.000
last season	12	-81.50	181.25	0.000	0.000
sex + last season	11	-76.84	185.91	0.000	0.000
sex	13	-75.01	187.74	0.000	0.000
longevity	14	-73.09	189.66	0.000	0.000
age	14	-70.24	192.51	0.000	0.000
sex + longevity	14	-69.53	193.22	0.000	0.000
sex + longevity + longevity:sex	15	-62.82	199.93	0.000	0.000
sex + age + age:sex	8	-61.10	201.65	0.000	0.000
Subpopulation identity entered as a forced fixed factor in all models. Random effects: individual identity nested within cohort + year of measurement					

## Age-specific body mass values from the raw data

### Captivity

Table S5: Average age-specific body mass (mean  $\pm$  SD) in captivity

Age (years)	Males		Females	
	LDs	SDs	LDs	SDs
1	NA	101.5 $\pm$ 15.3	NA	110.1 $\pm$ 13.6
2	82.3 $\pm$ 12.8	106.0 $\pm$ 17.8	94.7 $\pm$ 14.5	115.7 $\pm$ 16.3
3	85.5 $\pm$ 14.4	108.0 $\pm$ 19.2	98.3 $\pm$ 14.8	114.3 $\pm$ 15.2
4	89.0 $\pm$ 16.0	106.3 $\pm$ 18.7	98.8 $\pm$ 16.6	113.8 $\pm$ 13.5
5	85.4 $\pm$ 14.3	99.8 $\pm$ 19.1	98.6 $\pm$ 16.1	110.8 $\pm$ 14.6
6	87.5 $\pm$ 16.7	101.2 $\pm$ 22.9	94.6 $\pm$ 12.0	103.7 $\pm$ 17.7
7	89.3 $\pm$ 16.3	102.0 $\pm$ 16.4	91.3 $\pm$ 6.3	105.0 $\pm$ 13.4
8	101.6 $\pm$ 10.5	96.6 $\pm$ 10.2	84.8 $\pm$ 14.9	97.1 $\pm$ 0.0
9	94.5 $\pm$ 9.0	86.6 $\pm$ 13.5	95.0 $\pm$ 0	NA
10	93.0 $\pm$ 8.9	96.9 $\pm$ 11.5	NA	NA
11	83.4 $\pm$ 8.4	NA	NA	NA

Age at death: males= 4.7  $\pm$  1.8; females= 4.2  $\pm$  1.5

Mean lifetime body mass: males= 95.4  $\pm$  18.8; females= 105.0  $\pm$  17.0

Body mass in last season: males= 80.6  $\pm$  15.7; females= 94.8  $\pm$  15.4

### Wild

Table S6: Average age-specific body mass (mean  $\pm$  SD) in the natural population

Age (years)	Males		Females	
	Dry season	Rainy season	Dry season	Rainy season
1	62.2 $\pm$ 7.6	61.5 $\pm$ 7.7	62.4 $\pm$ 10.0	71.0 $\pm$ 11.8
2	64.9 $\pm$ 7.4	69.3 $\pm$ 11.8	64.6 $\pm$ 9.7	78.4 $\pm$ 11.4
3	65.4 $\pm$ 7.5	77.3 $\pm$ 14.1	63.9 $\pm$ 9.2	82.7 $\pm$ 11.9
4	67.1 $\pm$ 7.7	75.2 $\pm$ 13.2	64.9 $\pm$ 9.3	87.8 $\pm$ 16.5
5	67.4 $\pm$ 9.0	77.9 $\pm$ 14.2	64.8 $\pm$ 10.2	88.3 $\pm$ 16.0
6	63.9 $\pm$ 9.0	79.3 $\pm$ 16.3	66.3 $\pm$ 8.9	87.6 $\pm$ 14.2
7	59.0 $\pm$ 0.0	NA	66.0 $\pm$ 7.1	91.2 $\pm$ 7.04
8	65.0 $\pm$ 9.9	NA	61.4 $\pm$ 6.7	83.0 $\pm$ 10.3
9	59.0 $\pm$ 5.0	52.0 $\pm$ 0.0	56.8 $\pm$ 11.4	98.3 $\pm$ 5.5
10	NA	NA	NA	103.5 $\pm$ 6.9

Age at last capture: males= 2.7  $\pm$  1.4; females= 3.4  $\pm$  2.0

Mean lifetime body mass: males= 64.8  $\pm$  9.6; females= 71.1  $\pm$  14.5

Body mass in last season: males= 64.9  $\pm$  9.6; females= 72.4  $\pm$  16.2