

Supplementary material for: Fuglei E., Ehrich D., Killengreen S.T., Rodnikova A.Y., Sokolov A.A. & Pedersen Å.Ø. 2017. Snowmobile impact on diurnal behaviour in the Arctic fox. *Polar Research* 36. Contact: Eva Fuglei, Norwegian Polar Institute, Fram Centre, P.O. Box 6606 Langnes, NO-9296 Tromsø, Norway. E-mail: eva.fuglei@npolar.no

Supplementary Table S1. (a) Candidate GLMMs applied to model the proportion of photographs with Arctic foxes during day (07:00 – 19:00) and night (19:00 – 07:00) in the experimental area over three years. Three fixed effect explanatory variables were used: Period (day and night), Date (a continuous day number starting with 1 January) and Year (2008, 2009 or 2013). Additive effects are indicated with + and interactions with ×. Models of increasing complexity were compared with likelihood ratio tests in groups of nested models. Groups were assembled to specifically assess the evidence for an interaction Period × Year. Camera-trap and camera-day-ID were included in all models as random effects. The selected model is highlighted in boldface. (b) Parameter estimates for the selected GLMM explaining the proportion of photographs with Arctic fox per time period in the experimental area over three years. Estimates are shown on the logit scale with standard errors and *p* values. The reference levels are night and 2013, the year with the highest proportion of pictures with foxes. The estimates represent contrasts to the reference level.

| (a) | df | LogLik | Chisq | df | <i>p</i> |
|-----------------------------|----------|----------------|--------------|----------|--------------|
| Model | | | | | |
| Period | 4 | -4347.7 | | | |
| Period + Year | 6 | -4276.3 | 142.87 | 2 | < 0.001 |
| Period × Year | 8 | -4274.4 | 3.66 | 2 | 0.160 |
| Period + Year | 6 | -4276.3 | | | |
| Period + Year + Date | 7 | -4274.9 | 2.71 | 1 | 0.099 |
| Period × Year + Date | 9 | -4273.1 | 3.65 | 2 | 0.161 |
| Period + Year | 6 | -4276.3 | | | |
| Period + Year × Date | 9 | -4268.2 | 16.21 | 3 | 0.001 |
| (Period + Date) × Year | 11 | -4266.3 | 3.72 | 2 | 0.156 |

| (b) Parameter | Estimate | Standard error | <i>p</i> |
|------------------|----------|----------------|----------|
| Intercept | -4.337 | 0.401 | < 0.001 |
| Period: Day | -0.599 | 0.023 | < 0.001 |
| Year: 2008 | -4.957 | 0.488 | < 0.001 |
| Year: 2009 | -1.488 | 0.391 | < 0.001 |
| Date | -0.398 | 0.141 | 0.005 |
| Year 2008 × Date | -0.516 | 0.702 | 0.462 |
| Year 2009 × Date | 1.136 | 0.324 | < 0.001 |

Random variable: Camera-trap: var = 1.44, standard deviation = 1.20;
Camera-day-ID: var = 7.93, standard deviation = 2.82.

Supplementary Table S2 (a) Candidate GLMMs applied to model the proportion of photographs with Arctic foxes during day (07:00 – 19:00) and night (19:00 – 07:00) in the three sites Svalbard (control), Nenetsky and Yamal. Three fixed effect explanatory variables were used: Period of the day (day and night), Date (a continuous day number starting with 1 January), and Site (Svalbard, Nenetsky and Yamal). Additive effects are indicated with + and interactions with ×. Models of increasing complexity were compared with likelihood ratio tests. Camera-trap and camera-day-ID were included in all models as random effects. The selected model is highlighted in boldface. (b) Parameter estimates for the selected GLMM explaining the proportion of photographs with Arctic fox per time period in three Arctic sites; Svalbard (control), Nenetsky and Yamal. Estimates are shown on the logit scale with standard errors and *p* values. The reference levels are night for Period and Svalbard for Site. The estimates represent contrasts to the reference level.

| (a) Model | df | LogLik | Chisq | df | <i>p</i> |
|-------------------------------|-----------|----------------|--------------|----------|-------------------|
| Constant | 3 | -5807.8 | | | |
| Site | 5 | -5789.9 | 35.90 | 2 | < 0.001 |
| Period + Site | 6 | -5694.3 | 191.14 | 1 | < 0.001 |
| Period × Site | 8 | -5688.6 | 11.37 | 2 | 0.003 |
| Period + Site | 5 | -5694.3 | | | |
| Period + Site + Date | 6 | -5690.5 | 7.59 | 1 | 0.006 |
| Period × Site + Date | 8 | -5684.8 | 11.45 | 2 | 0.003 |
| (Period + Date) × Site | 10 | -5657.2 | 55.21 | 2 | < 0.001 |

| (b) Variable | Parameter estimate | Standard error | <i>p</i> |
|-----------------------------|-----------------------|-------------------|----------|
| Intercept | -4.550 | 0.252 | < 0.001 |
| Period: Day | -0.289 | 0.021 | < 0.001 |
| Date | -0.173 | 0.117 | 0.140 |
| Site: Nenetsky | -4.192 | 0.574 | < 0.001 |
| Site: Yamal | -1.158 | 0.393 | 0.003 |
| Site Nenetsky × Period: Day | -0.039 | 0.152 | 0.799 |
| Site Yamal × Period: Day | 0.219 | 0.064 | < 0.001 |
| Site Nenetsky × Date | 2.434 | 0.856 | 0.004 |
| Yamal × Date | 1.624 | 0.235 | < 0.001 |

Random variables: camera-trap: var = 7.47, standard deviation = 2.73;
camera-day-ID: var = 0.46, standard deviation = 0.68.

Supplementary Table S3. Number of photographs taken per year and site. Number of photographs with Arctic foxes are given first, and total numbers of photographs are given after the slash.

| Site | 2008 | 2009 | 2013 |
|-----------------------|---------------|--------------|------------------|
| Svalbard experimental | 189 / 19 316 | 643 / 16 234 | 10 423 / 133 452 |
| Svalbard control | – | – | 13 003 / 170 958 |
| Nenetsky | 228 / 20 140 | 15 / 6 488 | – |
| Yamal | 1403 / 40 035 | 567 / 40 292 | – |