Nutritional relationships animals have with their winter environments often underpin survival and reproduction, consequently, influencing population dynamics [1]. Severe winter conditions can compound the nutritional bottleneck common to winter environments because increased snowfall can further reduce access to forage and increase energy expenditure associated with thermoregulation and locomotion [2]. As a result, severe winter conditions may result in reduced nutritional condition (i.e., fat reserves) of individual animals that is needed to promote overwinter survival and future reproductive efforts. Although the deleterious effects of severe winters on adult and juvenile survival are well documented [1], the duration and influence of carryover effects on reproduction following severe winter conditions are rarely identified. We aim to understand the enduring effects of a severe winter on population dynamics of mule deer. We expected that the suppression in nutritional condition following a severe winter would have cascading effects on reproductive allocation and success, regardless of improved foraging conditions on summer range. Following extreme winter conditions in 2016-2017, we evaluated the relationship between nutritional condition and trends in reproduction of 75 adult and 67 neonate mule deer of the Wyoming Range in western Wyoming. Nutritional condition of female mule deer following severe winter conditions was lower than the preceding 4 years (2.3%IFBFat in 2017 compared with 4.0–5.3%IFBFat in 2013–2016, Figure 1), which resulted in suppressed fetal development (1 mm smaller eye diameter), delayed timing of parturition (4-7 days later), reduced birth mass of neonates (0.5kg lower), and a rise in neonate mortalities resulting from stillbirths (>100% increase). Our preliminary findings unveil the lasting effects of severe winter conditions on population dynamics resulting from the carryover effects of nutritional condition and its subsequent effect on reproductive success the following summer.
Figure 1. Percent ingesta-free body fat (IFBFat ±SE) in March and December for adult (>1yr) female mule deer in the Wyoming Range, 2013–2017.

Seasonal Changes in Body Fat

References