



Seasonal and sex-specific variation in space use and site fidelity of mountain goats in coastal Alaska

YASAMAN N. SHAKERI, *Alaska Department of Fish and Game, Division of Wildlife Conservation, PO Box 110024 Juneau, Alaska 99824 USA*

KEVIN S. WHITE, *Alaska Department of Fish and Game, Division of Wildlife Conservation, PO Box 110024 Juneau, Alaska 99824 USA*

ABSTRACT: Understanding patterns of animal space use and site fidelity have important implications for conservation. For species that live in highly seasonal environments, such as mountain goats (*Oreamnos americanus*), space use patterns are likely to vary due to changing environmental conditions and sex-specific selection pressures. In this study, GPS location data ($n = 123,481$ locations) were collected from 64 radio-collared mountain goats (males, $n = 36$; females, $n = 28$) in a coastal mountain range complex near Haines, Alaska during 2010 – 2017. These data were analyzed a GIS framework using Program R (rhr and adehabitatHR packages) to derive seasonal and sex-specific fixed kernel home range estimates, and to quantify the degree of seasonal home range overlap. Overall, we determined that during the kidding season females with kids (1414 ± 300 ha, $n = 24$) had smaller homes ranges than females without kids (2278 ± 599 , $n = 22$). Presumably this occurred due to the limited physical mobility of neonates and heightened vulnerability to predation. We also determined that females (2636 ± 307 ha, $n = 57$) had larger home ranges than males (1424 ± 155 ha, $n = 74$) during the summer, and males had larger home ranges (2400 ± 155 ha, $n = 67$) than females (848 ± 307 ha, $n = 45$) during the rut; home ranges during winter were similar in size for males (464 ± 89 ha, $n = 66$) and females (543 ± 100 , $n = 57$) but substantially smaller than other times of year. Expansion of female home ranges during summer may be related to high energetic acquisition needs of reproductive females, whereas large male home ranges during the rut is likely related to seeking out mating opportunities; small winter ranges are likely due to movement constraints imposed by deep winter snows. During the summer season, we documented a high degree of site fidelity such that in 100% of cases individual animals returned to the same home range it occupied during the previous summer. During the winter 94% of males and 100% of females returned to the same home range. Within this context, we determined that males and females used large proportion of their previous winter ($58\% \pm 3$) and summer ($79\% \pm 3$) home ranges. The high degree of site fidelity highlights the importance of carefully managing such habitats for conservation.

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KEYWORDS Mountain goat; *Oreamnos americanus*; space use; site fidelity; Alaska.