

# Contrasting risk patterns from humans and a large carnivore influence the habitat selection of shared prey

Giorgia Ausilio<sup>1</sup>, Camilla Wikenros<sup>2</sup>, Hakan Sand<sup>2</sup>, Olivier Devineau<sup>3</sup>, Petter Wabakken<sup>1</sup>, Ane Eriksen<sup>1</sup>, Malin Aronsson<sup>4</sup>, Jens Persson<sup>5</sup>, Karen Mathisen<sup>6</sup>, and Barbara Zimmermann<sup>3</sup>

<sup>1</sup>Inland Norway University of Applied Sciences

<sup>2</sup>Grimsö

<sup>3</sup>Affiliation not available

<sup>4</sup>Swedish University of Agricultural Sciences

<sup>5</sup>SLU

<sup>6</sup>Inland Norway University of Applied Sciences - Evenstad Campus

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## Abstract

Spatial patterns of human hunting and predation risk are mediated by the physical landscape, with human hunting risk often associated with habitat features contrasting those linked to risk from large carnivores. Risk patterns from hunters and large carnivores can also vary in time, which may allow prey species to adjust anti-predator strategies not only in risky places but also during risky times. We examined whether moose (*Alces alces*) in south-central Scandinavia adjusted diel habitat selection during and after the hunting season in response to contrasting human hunting and wolf (*Canis lupus*) predation risks. We found evidence for a diel and seasonal shift in habitat selection of moose consistent with a behavioural adaptation to no human hunting risk at night and after the hunting season. We found no evidence that moose responded to the spatiotemporal variation in wolf predation risk since moose selected habitats of high wolf predation risk both day and night during and after the hunting season. Human hunting risk was therefore the main driver of moose habitat selection during the hunting season while decreasing in importance during times when hunting did not occur. However, since we did not find evidence for a diel or seasonal shift in habitat selection consistent with an increase in the importance of wolf predation risk during the night and after the hunting season, our study is in line with the notion that moose in Scandinavia are currently naïve to wolves. Our findings show the importance of including the effects of humans in studies of predator-prey dynamics within anthropogenic landscapes. An increased understanding of the risk effects arising from humans and large carnivores and the responses of prey might be important for managing ungulate populations, since behaviours aimed at reducing exposure to risk may also affect crucial demographic traits like growth and reproduction.

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