

Ecosphere – Emerging Technologies

Snowmelt progression drives habitat selection and vegetation disturbance by an Arctic avian herbivore

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Appendix S2

External model evaluation

Methods

To evaluate the predictive power of the vegetation disturbance model we used independently sampled ground truthing data from the 2019 season. The sampling points were randomly distributed throughout the study area of the fine-scale study site within Adventdalen valley. The ground truthing data consisted of sampling points for disturbance/no disturbance for the moss tundra vegetation class. Thus, we only evaluated the model for moss tundra and using the drone-based fine-scale study site extent. We were able to obtain 207 ground truthing points (128 disturbed, 79 not disturbed). These were collected using a differential GPS (Leica Geosystems GS10) at an accuracy of 2 cm or better. At each ground truthing point we extracted the modelled disturbance likelihood from the fine-scale study site extent. We calculated the receiver operating characteristic (ROC) curve (Figure S1) and the mean predicted disturbance for the two ground truthing classes (Figure S2).

Results

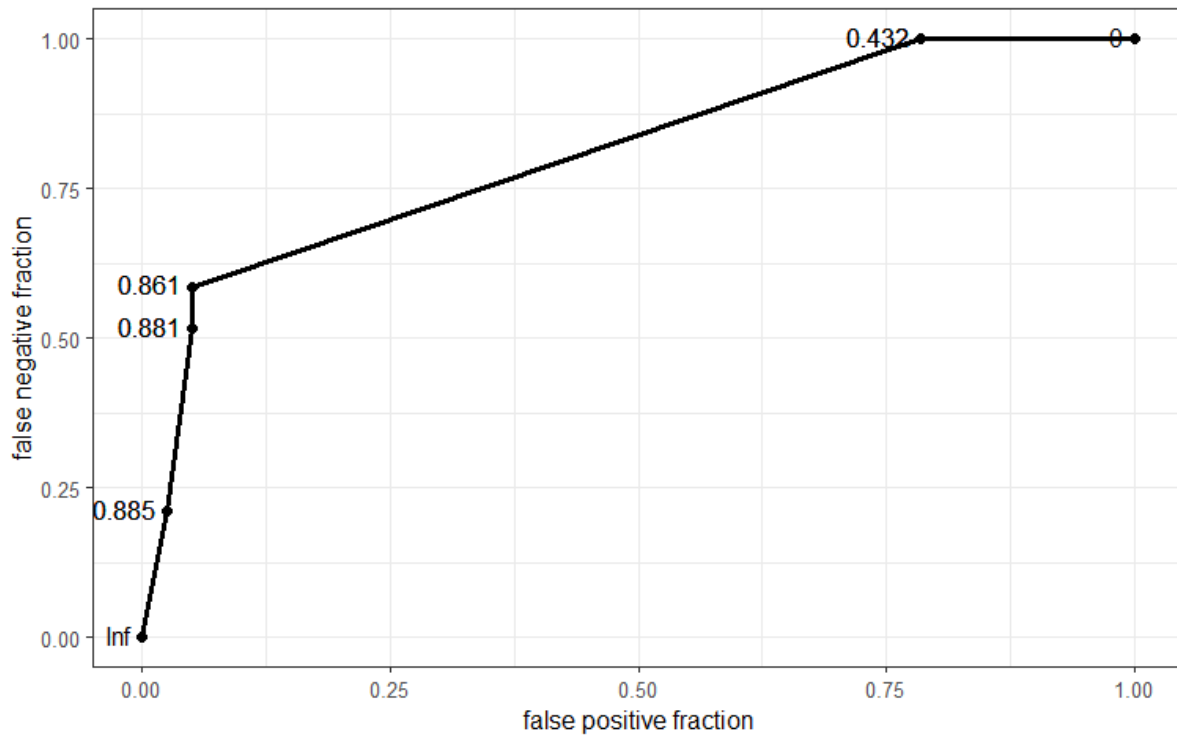


Figure S1: ROC curve for disturbance predictions in moss tundra vegetation class at fine-scale study site.

Choosing a threshold value of 0.861 will result in marginal false positive predictions of disturbance but underestimate grubbing at a rate of approximately 50%. Using a threshold value of 0.432 minimizes the number of false negative predictions to close to 0, i.e., all the disturbance will be detected, but at a cost of disturbance overestimation in a little over 75% of the cases.

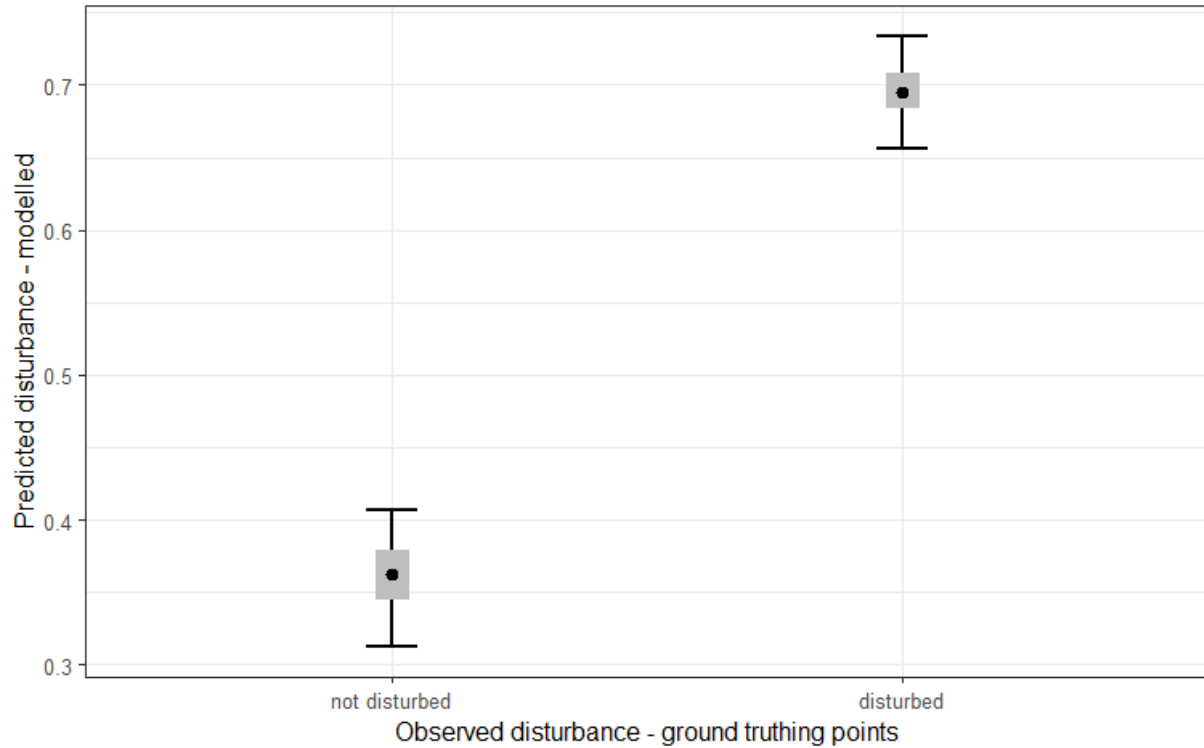


Figure S2: Mean (dots), 50% (boxes) and 95% (bars) confidence intervals for predicted modelled disturbances (extracted from fine-scale, drone-based map) for disturbed and undisturbed moss tundra vegetation class.

The locations that were registered as disturbed had a mean 70% likelihood to have been predicted to be disturbed. The ground truth points that were not disturbed had a modelled disturbance probability of 0.36.

Uncertainty mapping

To show the spatial distribution of the uncertainties of the vegetation disturbance model, we calculated the range of the 95% confidence interval for each of the disturbance levels in the moss tundra and dwarf-shrub heath. We then extrapolated these results to the fine- and valley-scale maps.

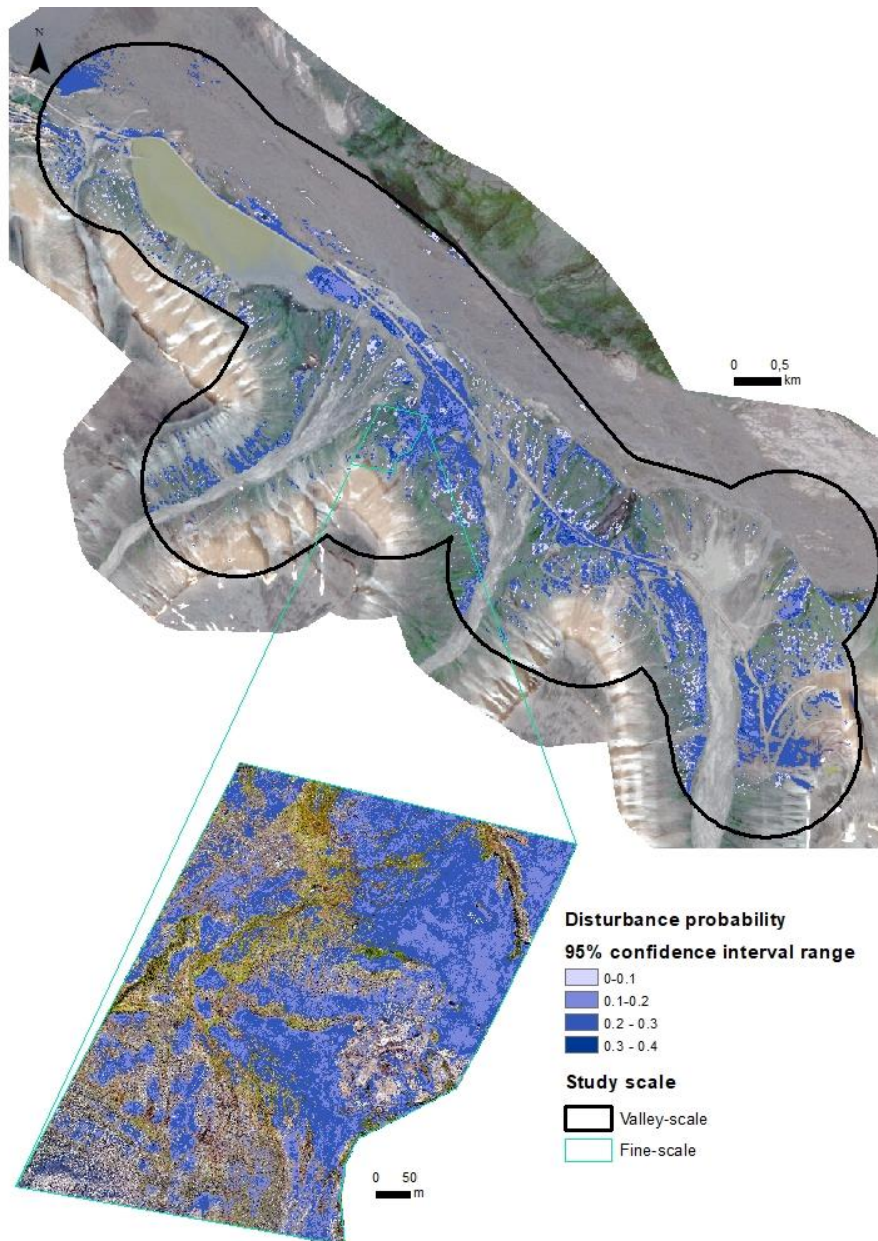


Figure S3: 95% confidence interval range of vegetation disturbance model.