Supplementary material

Predicting the distribution of the Vulnerable Yellow-breasted Pipit (*Anthus chloris*) using Species Distribution Modelling

Darren W. Pietersen[1*], Ian T. Little[2], Raymond Jansen[3] and Andrew E. McKechnie[1]

[1]DST-NRF Centre of Excellence at the Percy FitzPatrick Institute, Department of Zoology and Entomology, University of Pretoria, Private Bag X20, Hatfield, 0028, South Africa

[2]The Endangered Wildlife Trust, Private Bag X11, Modderfontein, 1645, Johannesburg, South Africa

[3]Department of Environmental, Water and Earth Sciences, Tshwane University of Technology, Private Bag X680, Pretoria, 0001, South Africa

*****Address for correspondence:

Department of Zoology and Entomology

University of Pretoria

Private Bag X20

Hatfield

0028

pietersen.darren@gmail.com

+27 82 937 6052

Figure S1. Relative probability of occurrence of the Yellow-breasted Pipit (*Anthus chloris*) using 250 confirmed observations and all 19 BioClim variables as well as Altitude, Vegetation Type (Mucina & Rutherford 2006) and Land Use Cover (Environmentek 2002) as predictor variables. Data from the Second Southern African Bird Atlas Project (SABAP2) includes only observations made between spring and autumn (August to April).

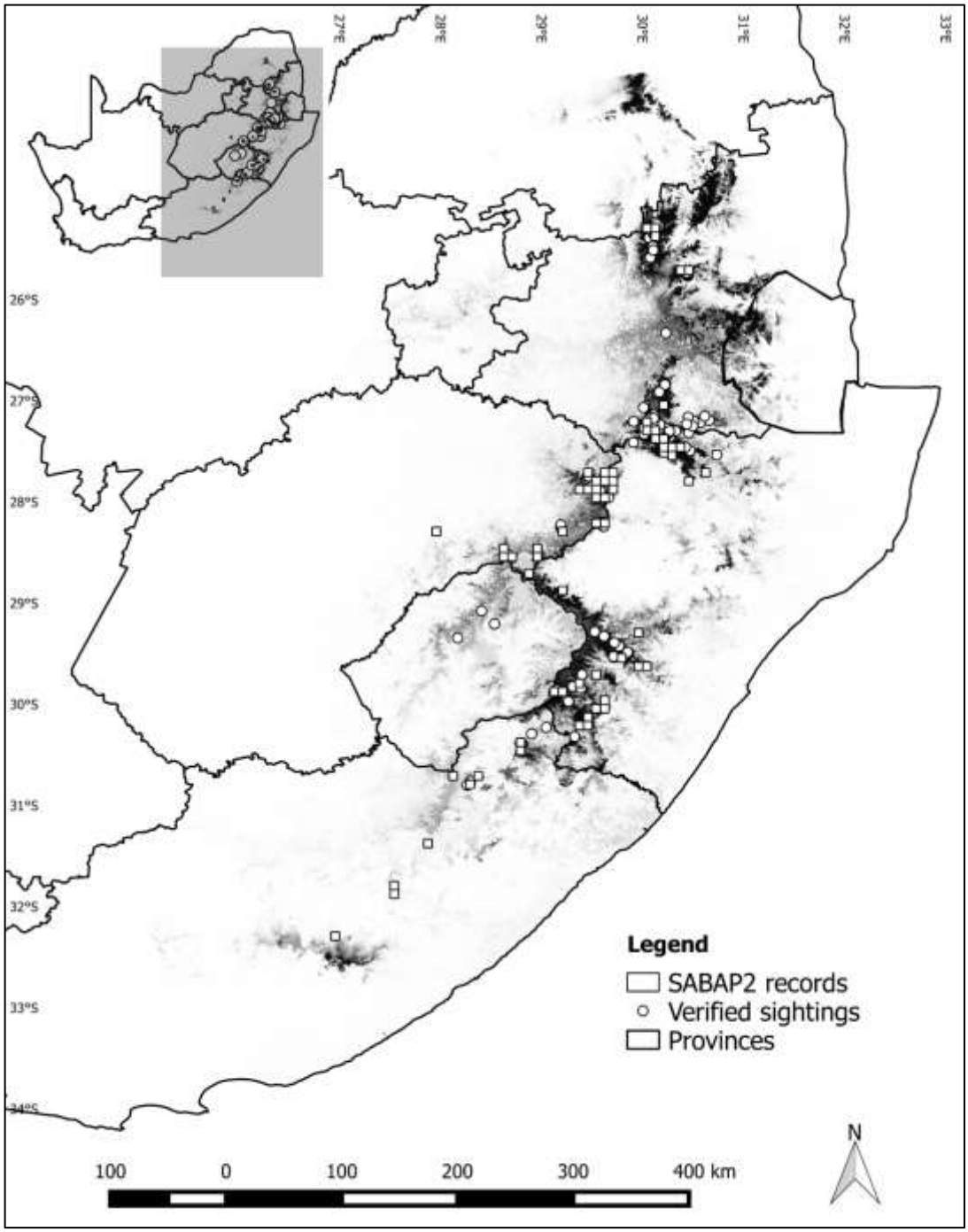
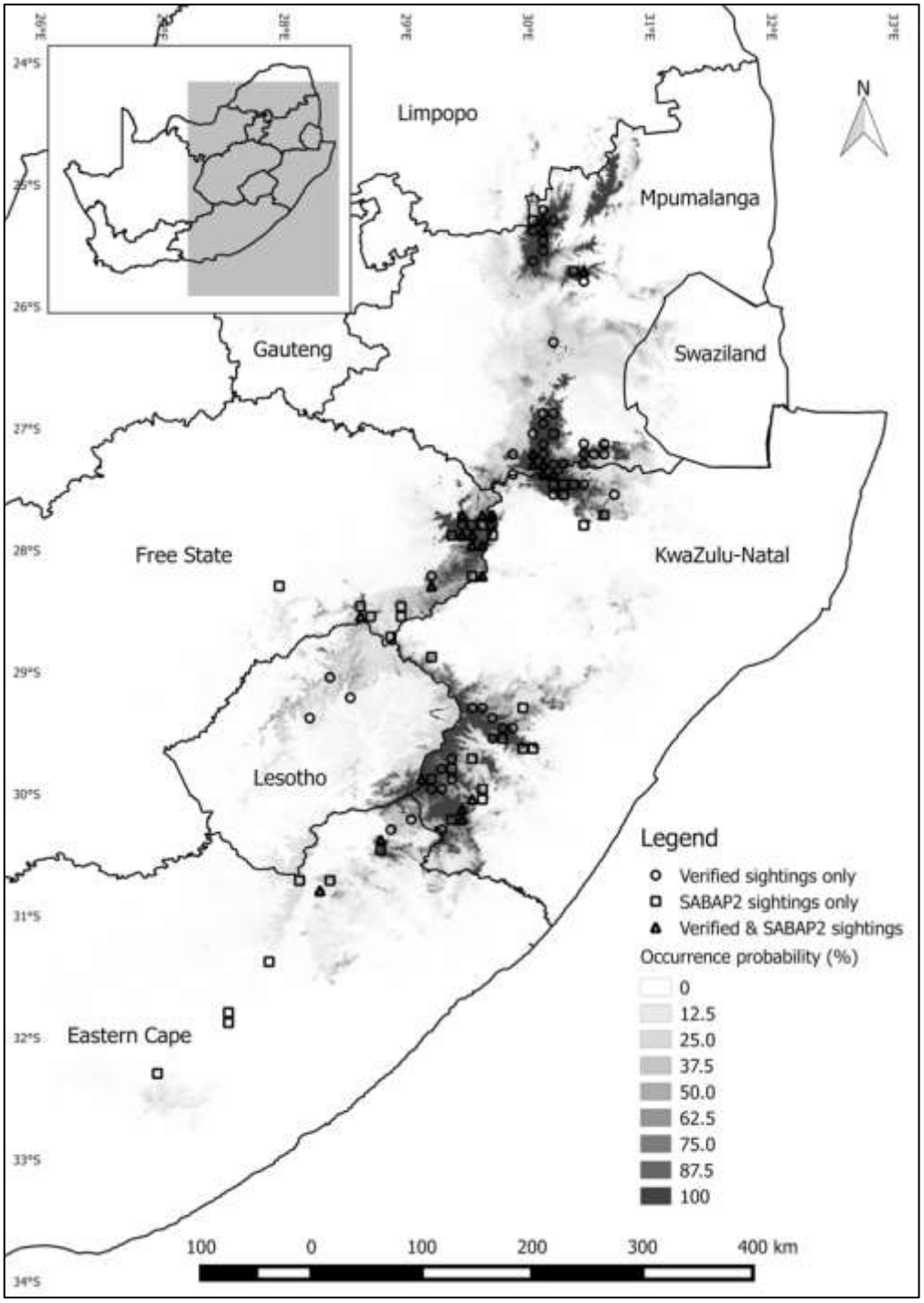


Figure S2. Relative probability of occurrence of the Yellow-breasted Pipit (*Anthus chloris*) in southern Africa as inferred in MaxEnt using 250 verified observations, Vegetation Type (Mucina & Rutherford 2006) and BioClim variables that had a correlation value of ($R < |0.9|$). Data from the Second Southern African Bird Atlas Project (SABAP2) includes only observations made between the austral spring and autumn (August to April), and were not used to predict the distribution of the species. Inset: Map of southern Africa, indicating the magnified region.



Supplementary material S3

MaxEnt Default Settings Used:

- Start from random seed
- Remove duplicate presence records
- Maximum number of background points = 10 000
- Add samples to background
- Convergence threshold = 0.00001
- Adjust sample radius = 0
- Default prevalence = 0.5
- Threads = 1
- Lq to lqp threshold = 80
- Linear to lq threshold = 10
- Hinge threshold = 15
- Beta threshold = -1
- Beta categorical = -1
- Beta lqp = -1
- Beta hinge = -1
- Default nodata value = -9999

Figure S4. Relative probability of occurrence of the Yellow-breasted Pipit (*Anthus chloris*) in southern Africa as inferred in MaxEnt using 250 verified observations, three climatic variables, vegetation type (Mucina & Rutherford 2006) and a regularization factor of one. Data from the Second Southern African Bird Atlas Project (SABAP2) includes only observations made between the austral spring and autumn (August to April), and were not used to predict the distribution of the species. Inset: Map of southern Africa, indicating the magnified region.

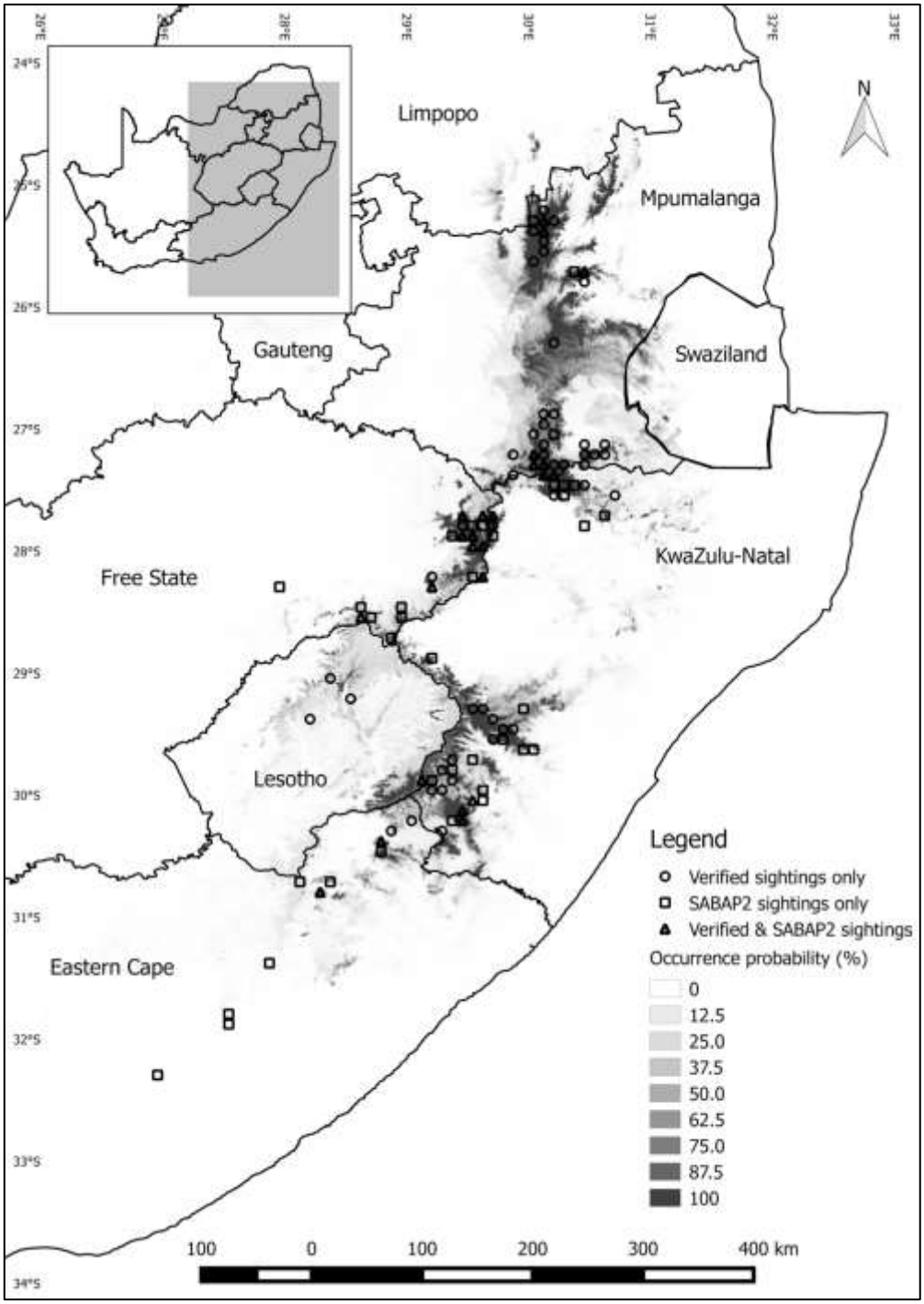


Figure S5. Partial dependence plots showing the mean (red) and standard deviation (blue) marginal response of the Yellow-breasted Pipit (*Anthus chloris*) to each of the four environmental variables used to model its distribution, using a regularization factor of one. Bars in the vegetation partial dependence plot represent each vegetation type, with absent vegetation types having been regularized out of the model. The y-axis indicates logistic output, and the variable importance is indicated below each graph.

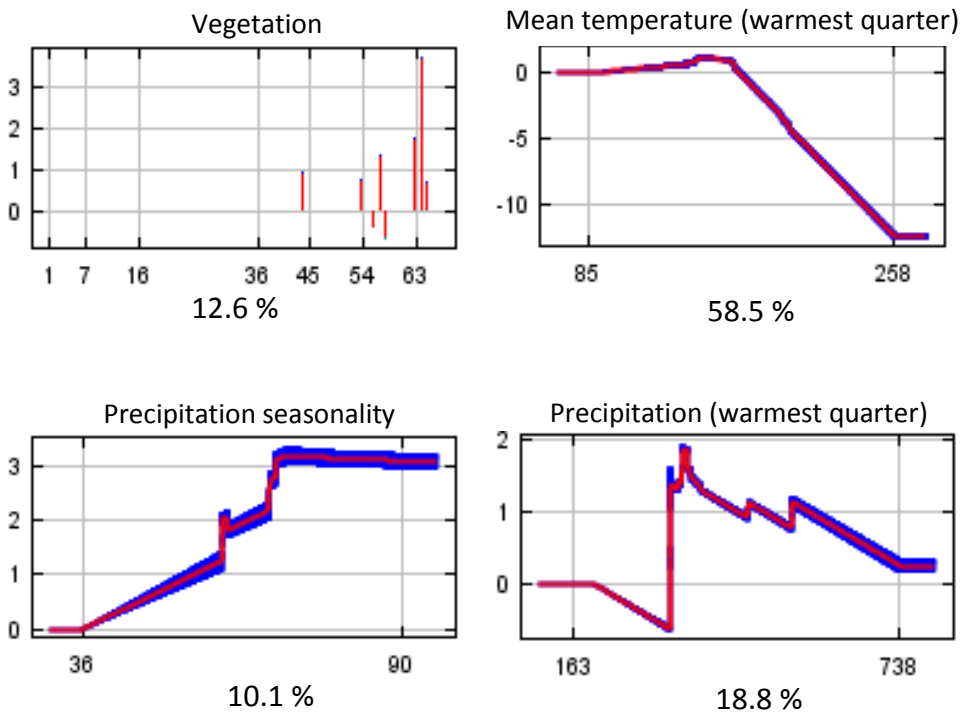


Figure S6. Relative probability of occurrence of the Yellow-breasted Pipit (*Anthus chloris*) in southern Africa as inferred in MaxEnt using 250 verified observations, three climatic variables, vegetation type (Mucina & Rutherford 2006) and a regularization factor of three. Data from the Second Southern African Bird Atlas Project (SABAP2) includes only observations made between the austral spring and autumn (August to April), and were not used to predict the distribution of the species. Inset: Map of southern Africa, indicating the magnified region.

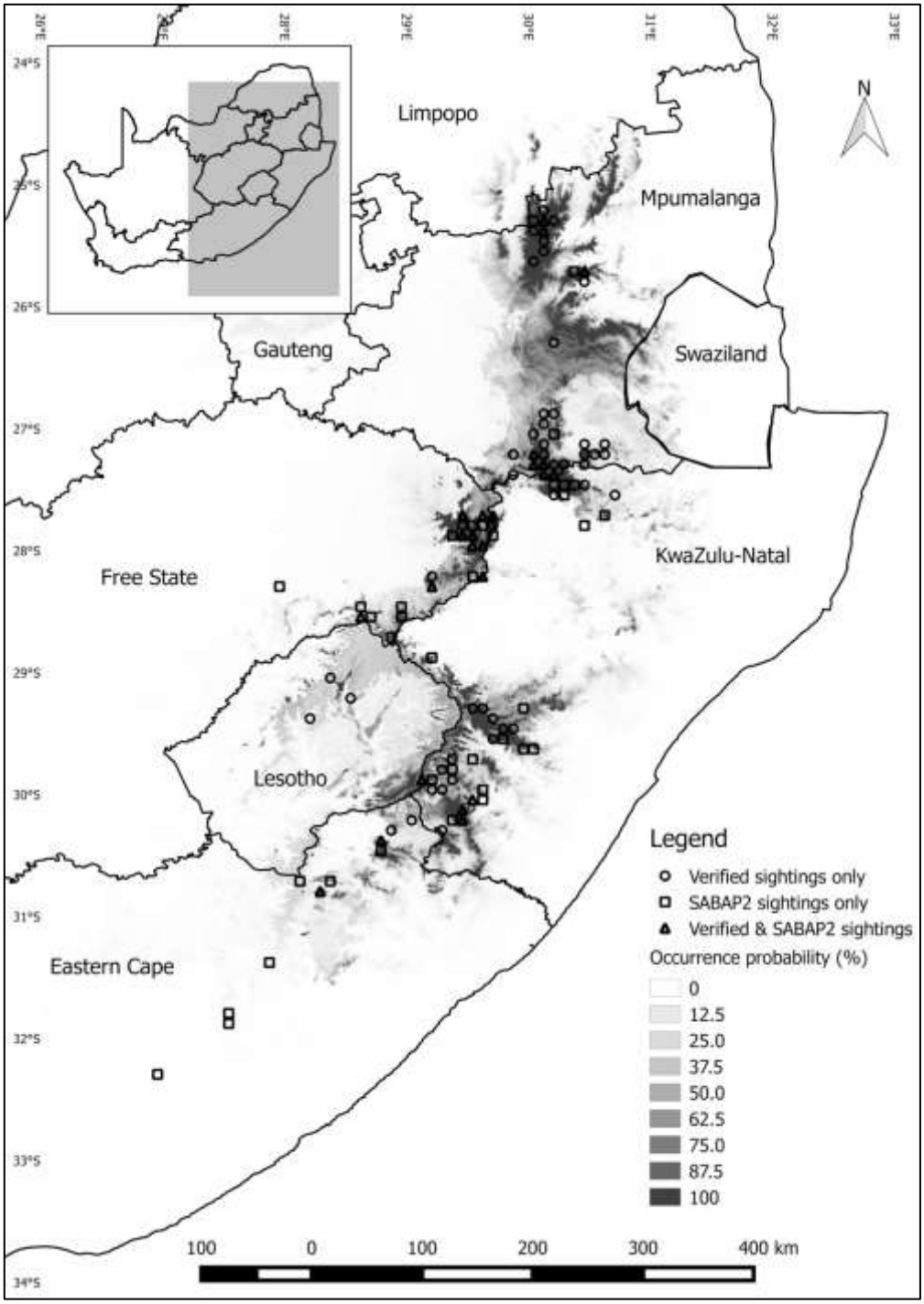


Figure S7. Partial dependence plots showing the mean (red) and standard deviation (blue) marginal response of the Yellow-breasted Pipit (*Anthus chloris*) to each of the four environmental variables used to model its distribution, using a regularization factor of three. Bars in the vegetation partial dependence plot represent each vegetation type, with absent vegetation types having been regularized out of the model. The y-axis indicates logistic output, and the variable importance is indicated below each graph.

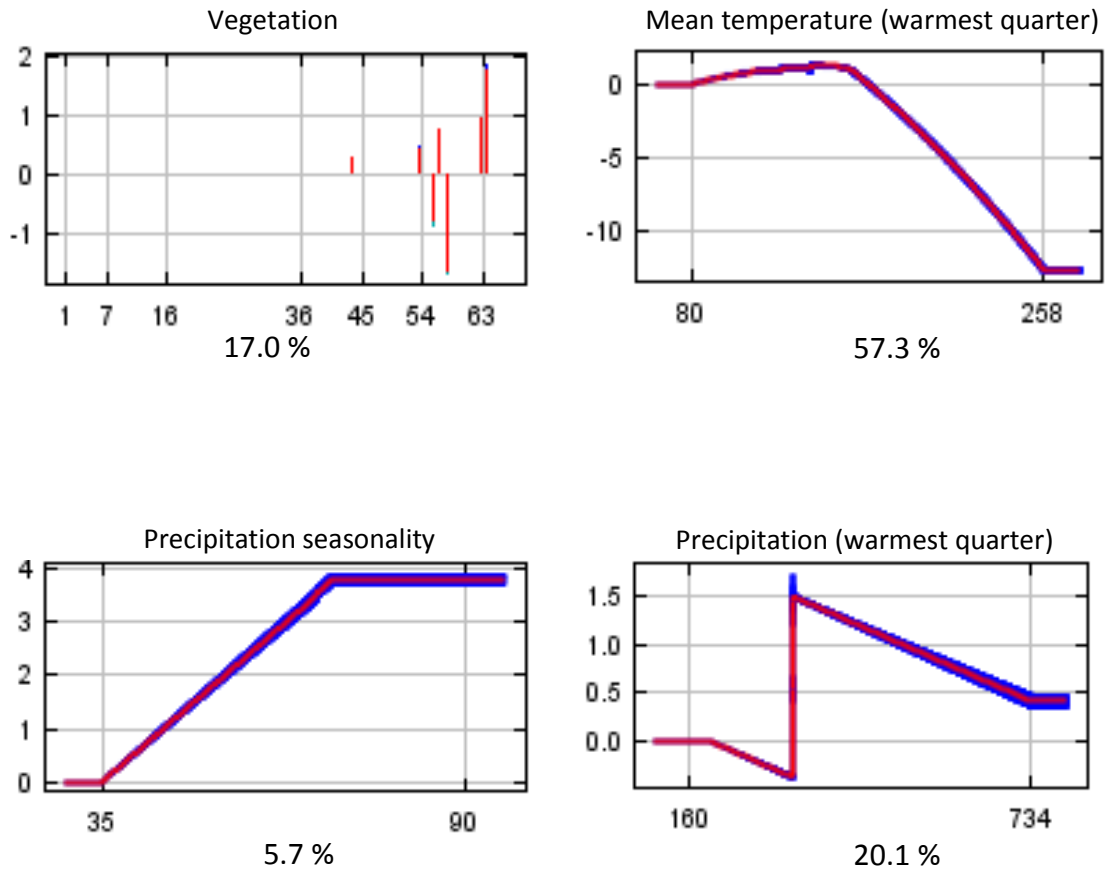


Figure S8. Relative probability of occurrence of the Yellow-breasted Pipit (*Anthus chloris*) in southern Africa as inferred in MaxEnt using 250 verified observations, three climatic variables, vegetation type (Mucina & Rutherford 2006) and a regularization factor of four. Data from the Second Southern African Bird Atlas Project (SABAP2) includes only observations made between the austral spring and autumn (August to April), and were not used to predict the distribution of the species. Inset: Map of southern Africa, indicating the magnified region.

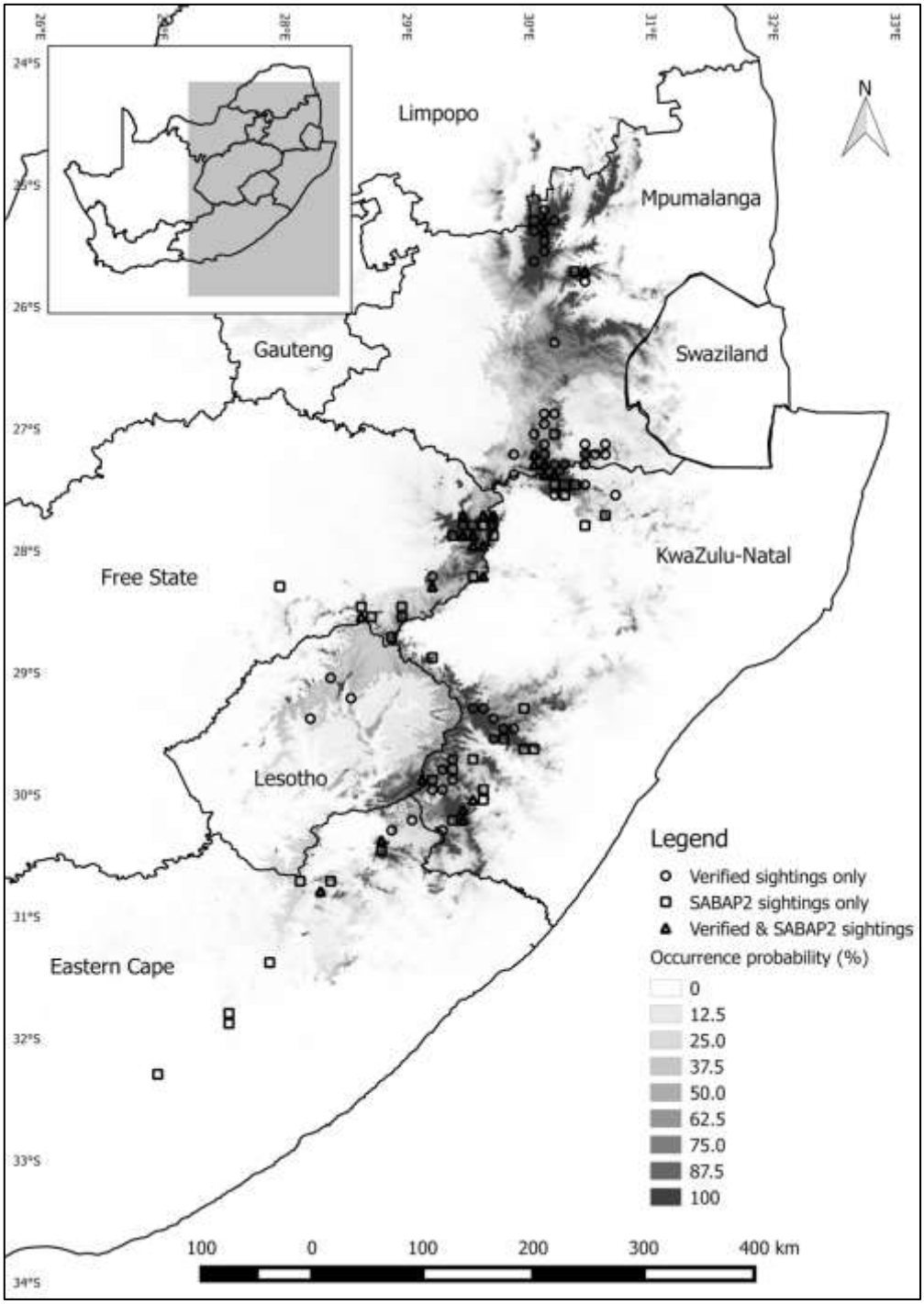


Figure S9. Partial dependence plots showing the mean (red) and standard deviation (blue) marginal response of the Yellow-breasted Pipit (*Anthus chloris*) to each of the four environmental variables used to model its distribution, using a regularization factor of four. Bars in the vegetation partial dependence plot represent each vegetation type, with absent vegetation types having been regularized out of the model. The y-axis indicates logistic output, and the variable importance is indicated below each graph.