Hunter & Central Coast
Regional Environmental
Management Strategy

TECHNICAL REPORT 3 • JULY 2015

EXCERPT FROM A REPORT ON BIODIVERSITY PRIORITISATION ANALYSIS:

Modelling Species and Threatened Ecological Plant Communities in the Hunter, Central & Lower North Coast Region of New South Wales

Hunter & Central Coast
Regional Environmental
Management Strategy

This report was prepared for the Hunter and Central Coast Regional Environmental Management Strategy

This report has been funded through the Australian Government's Biodiversity Fund

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The NERP Environmental Decisions Hub is supported through funding from the Australian Government's National Environmental Research Program www.environment.gov.au/nerp
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Suggested bibliographic citation:
Whitehead A, Kujala H & Wintle B (2015) Modelling Species and Threatened Ecological Plant Communities in the Hunter, Central & Lower North Coast Region of New South Wales, University of Melbourne VIC

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Glossary of terms

Biodiversity features	Species, threatened ecological communities and other key elements selected for inclusion in spatial conservation planning.
Ecological community	Naturally occurring biological assemblage that occurs in a particular type of habitat.
Endangered ecological communities	Ecological communities listed under the NSW Threatened Species Conservation Act 1995 (TSC Act) as critically endangered, endangered or vulnerable, depending on their risk of extinction, distribution pattern and other biodiversity value metrics. Only some of these communities align with the listed federally Threatened Ecological Communities under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
Grid cell	One rectangular cell within a raster grid data layer.
Raster (data) layer	Rasters are uniform grids of rectangular shape and commonly used in GIS based analyses. They typically describe characters of an area or distribution of features, each grid cell having one value within one raster layer.
Threatened species (flora and fauna)	Species listed under the NSW Threatened Species Conservation Act 1995 (TSC Act) as critically endangered, endangered or vulnerable depending on their risk of extinction, distribution pattern and other biodiversity value metrics. Only some of these species are listed federally under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Frequently used abbreviations

ALA	Atlas of Living Australia
EEC	Endangered Ecological Community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GIS	Geographic Information System
HCCREMS	Hunter & Central Coast Regional Environmental Management Strategy
IBRA	Interim Biogeographic Regionalisation of Australia
MNES	Matters of National Environmental Significance
OEH	NSW Office of Environmental and Heritage
TSC Act	NSW Threatened Species Conservation Act 1995

1. Introduction

The National Environmental Research Program (NERP) Environmental Decisions Hub, based at the University of Melbourne, undertook an analysis of biodiversity priorities within the Hunter, Central & Lower North Coast region of NSW for the HCCREMS program in 2014–2015. Over 600 spatial layers representing biodiversity features were created to be included in this analysis. This document is an excerpt from the main report (Whitehead A, Kujala H, & Wintle B (2015) Modelling Species and Threatened Ecological Plant Communities in the Hunter, Central & Lower North Coast Region of NSW, University of Melbourne, VIC) and provides information relevant to the HCCREMS Regional Biodiversity Program. This excerpt describes the sources of these data, how they were processed, and how they were used to model the feature's distributions.

1.1. Flora and fauna species

1.1.1. SPECIES DATA: POINT OCCURRENCES AND MODELLED DISTRIBUTIONS

Point occurrence data for all listed species within the Greater Hunter (Hunter, Central and Lower North Coast region of NSW) were downloaded from the ALA and BioNet. All species listed under Commonwealth (EPBC Act 1999) or NSW legislation (Threatened Species Conservation Act 1995, National Parks and Wildlife Service Act 1974) were identified as potential biodiversity features to include in the analyses. Additional point data for 101 species were provided by OEH and participants of the flora workshop, a technical expert review workshop.

To reduce biases due to potentially outdated and/or inaccurate spatial data, we undertook a process of filtering point occurrence records whereby species records were excluded if they were observed prior to 1 January 1990 to reduce uncertainties associated with spatial accuracy and subsequent changes in environmental data, particularly vegetation cover. We also excluded those records that had a spatial accuracy of greater than 100 m. The remaining data points for each species were then compared to a raster grid of the Greater Hunter with a 100 m grid resolution and all duplicate records within a given grid cell removed. Thus, the final data for each species represents the distribution of occurrence records across the Greater Hunter region since 1 January 1990 where duplicate records have been removed.

For 653 species with more than 20 occurrence points within the Greater Hunter we produced continuous distribution maps showing the likelihood of observing the species in any of the 100 m grid cells (see section 2).

1.2. Ecological communities

1.2.1. STATE-LISTED ENDANGERED ECOLOGICAL COMMUNITIES (EECs)

Occurrence points for state-listed EECs within the Greater Hunter were extracted from the survey records and used as input data for constructing the GHVMv4 (Sivertsen et al., 2011) based on the Map Unit codes. Because EECs are mutually exclusive (i.e. two EECs cannot, by definition, occur in the same place), we treated these occurrences records as presence-absence data where the presence of one EEC indicated that all other EECs were absent.

In addition, because these records were undertaken as part of a systematic survey, we considered them to be spatially accurate and no data filtering was undertaken.

For 21 EECs with more than 20 occurrence points within the Greater Hunter we produced continuous distribution maps showing the likelihood of observing the species in any of the 100 m grid cells (section 2.). For five EECs with less than 20 occurrences we used the occurrence records to indicate their known locations within the LHSA region. The full list of state-listed EECs included in the analyses can be found in Table 9 in the Appendix.

2. Modelling species potential distribution patterns

2.1. Modelling the distribution of threatened species

To identify areas important for conservation, it is necessary to understand how threatened species and other important biodiversity features are distributed across the landscape. Distribution data is typically available as occurrence records, where an observer has noted the location of an organism at a given point in time. However, incomplete sampling and difficulties in detecting species mean that these records often do not represent the entire habitat for a species. Therefore, prioritising sites for conservation based solely on known occurrence data is likely to bias areas towards those sites that are well sampled or where common and easy to survey species are located, with the very real risk of missing important habitats (Rondinini et al., 2006).

Species distribution modelling provides a tool that can predict the likely distribution of a species based on known occurrence data and environmental conditions at these localities (Figure 1). The technique is well established within the ecological literature and provides a robust and transparent method for predicting the distribution of species from available data. Here we predict the distribution of 653 species and 21 EECs using two species distribution modelling tools, MaxEnt (Phillips et al., 2006) and Boosted Regression Trees (BRTs; Elith et al., 2006). The outputs from this modelling are then used as input data for a spatial conservation prioritisation to identify high priority conservation areas for the region).

2.2. Environmental variables for species distribution modelling

We used publically available species occurrence data in a species distribution modelling framework to characterise spatial patterns of threatened biodiversity within the Greater Hunter region. The collection and pre-processing of these data are described fully in section 1.

2.2.1. SAMPLING BIAS LAYERS

Species distribution modelling techniques based on presence-only data assume that the landscape has been systematically or randomly sampled (Phillips et al., 2009) and failure to correct for geographic biases in the data can produce outputs that reflect the sampling effort rather than the true species distribution (Reddy and Dávalos, 2003). One option for reducing biases is to manipulate the background data used in the modelling process by introducing a sampling bias layer that mimics the biases in the occurrence data (Kramer-Schadt et al., 2013; Phillips et al., 2009).

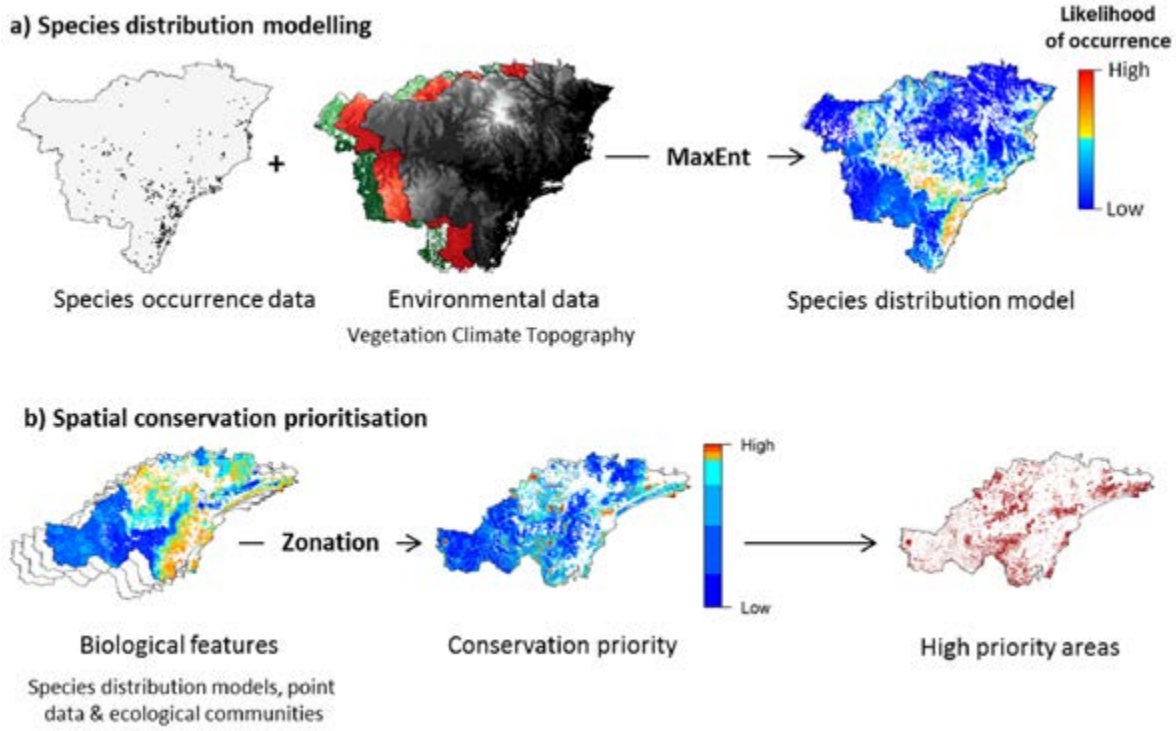

Figure 1. Schematic diagram representing the two-step modelling process used to generate the conservation prioritisation. A) Occurrence data for species and endangered ecological communities (EECs) were obtained from online databases and combined with environmental data to produce species distribution models using MaxEnt (species) or boosted regression trees (EECs). B) These models were clipped to LHSA region and combined with additional biological features in the spatial conservation prioritisation software, Zonation, to identify high priority areas for conservation. We identified the high priority conservation areas (the best 30% the landscape) based on the spatial prioritisation.

The spatial distribution of species observations within the Greater Hunter region is highly biased towards populated areas. Therefore, to reduce the influence of these observed biases in the species occurrence data, we generated sampling bias grids for five broad taxonomic groups (amphibians, birds, mammals, plants, reptiles). These bias grids were based on point data downloaded from the ALA and BioNet for all species observed within the Greater Hunter region. For each taxonomic group, we calculated a normalised kernel density layer from the available point data using a 10 km radius. We chose to use all species within a taxonomic group rather than just the listed species as it is likely that an observational technique that locates common species of a given taxa would also locate threatened species if they were present.

Because the sampling for EECs was conducted as part of a systematic survey, no bias layer was used in these models.

2.2.2. ENVIRONMENTAL VARIABLES

A set of 18 ecologically-relevant environmental variables were selected as potential predictors of the distribution of threatened species and EECs within the Greater Hunter region (Table 1). These included variables describing the climate, vegetation, topography and soils that were available across the entire modelling region at 100 m resolution.

Several vegetation spatial datasets were available across the Greater Hunter region, with varying levels of accuracy. We took the best available datasets and merged these to provide a single layer that represented the best available data at the level of Keith Formations (Keith, 2004) across the entire region. At the scale of the Lower Hunter region, we used Keith Formation data from an updated version of the Lower Hunter vegetation mapping produced by Parsons Brinkerhoff (Cockerill et al., 2013; updated by Mark Cameron, OEH, June 2014), while vegetation data outside the Lower Hunter region was obtained from the Greater Hunter Vegetation Mapping spatial database (v4.0; Sivertsen et al., 2011). In addition to the categorical Keith Formation layer (final_vegetation), we also generated a layer for three Keith Formations (dry sclerophyll forest, wet sclerophyll forest, rainforest) that represented the percentage cover of that vegetation community within a 2 km radius of each pixel in the landscape (Table 1). The percentage cover estimates were restricted to these three Keith Formations as they have been assessed as having a high degree of accuracy (John Hunter, pers. comm.)

Table 1. Abbreviated names and definitions of mapped environmental data used as candidate predictor variables for inclusion in species distribution models. All environmental data were available in raster format with a resolution of 100 m.

CANDIDATE VARIABLE	DEFINITION	UNITS
mean_temp	Mean annual temperature derived from ANUCLIM	degrees C
cold_temp	Mean temperature of the coldest period derived from ANUCLIM	degrees C
hot_temp	Mean temperature of the hottest period derived from ANUCLIM	degrees C
mean_rain	Mean annual rainfall derived from ANUCLIM	mm
seasonal_rain	Mean seasonal rainfall derived from ANUCLIM	mm
mean_solar	Mean annual solar radiation derived from ANUCLIM	$W/m^2/day$
altitude	The altitude of a cell (in metres) above sea level	metres
slope	The slope of a cell (in degrees)	degrees
eastness	The degree to which the aspect of a cell is east (east = 1, west = -1)	index
northness	The degree to which the aspect of a cell is north (north = 1, south = -1)	index
rugg1000	Topographic ruggedness (standard deviation in elevation) in a 1000 m radius	metres
terr1000	Relative terrain position in a 1000 m radius	dimensionless
wetness	Compound topographic index	dimensionless
final_vegetation	Keith formation vegetation categories derived from the Parsons Brinkerhoff and Greater Hunter vegetation mapping (Cockerill et al., 2013; Sivertsen et al., 2011)	categorical
Dry_sclerophyll_forests	The percentage of cells within a 2000 m radius dominated by dry sclerophyll forest	%
rainforests	The percentage of cells within a 2000 m radius containing rainforest	%
Wet_sclerophyll_forests	The percentage of cells within a 2000 m radius dominated by wet sclerophyll forest	%
soils	Digital Atlas of Australian Soils (CSIRO, 2014)	categorical

2.3. Species distribution modelling

2.3.1. MODELLING SPECIES DISTRIBUTIONS USING MAXENT

All species distribution models were constructed using MaxEnt (Phillips et al., 2006, version 3.3.3k), a freely available software. MaxEnt uses presence-only occurrence data to predict the likelihood of observing a species in each pixel of the landscape, given the environmental conditions that exist there relative to the environmental conditions in pixels where the species is known to occur (Phillips and Dudík, 2008).

Models were built for 621 species including 151 threatened species, and a further 21 EECs with a minimum of 20 records within the Greater Hunter region using taxa-specific sampling bias grids to account for potential biases in the point data (Kramer-Schadt et al., 2013). All modelling was undertaken at the scale of the Greater Hunter region, using raster grids with a grid cell resolution of 100 m.

Prior to building the final model, we undertook a process of variable selection by including all 18 environmental variables in preliminary MaxEnt models for each species and then examining the outputs to identify the most important variables across broad taxonomic groups (amphibians, birds, mammals, plants, reptiles). Where variables were known to be spatially correlated (collinearity > 0.8), we retained the variable that had the highest mean training gain (a measure of how well a variable describes the presence data) for all species within a taxonomic group. We then reran the models and iteratively removed those variables that contributed little information based on their permutation importance (less than 1% on average across all species within a taxonomic group based on jack-knife tests) (Williams et al., 2012).

Once the parameter set was finalised, we ran the models using a five-fold cross-validation procedure (Hastie et al., 2001). With this process, the dataset was randomly divided into five exclusive subsets and model performance calculated by successively removing each subset, refitting the model with the remaining data and predicting the omitted data. We assessed the mean Area Under the receiver operator Curve (AUC) value of each modelled species to determine the model fit, that is, how well the models are able to predict species known occurrences. We retained those species for which the AUC value was greater than 0.7, which is generally considered to be a threshold of an informative model (Swets, 1988a). For these species, we then reran the models using the full dataset and predicted the likelihood of occurrence of each species across the Greater Hunter at a spatial resolution of 100 m.

To explore the spatial uncertainties in our species' SDMs, we used the individual predictions from the models generated using five-fold cross-validation for each species to calculate the coefficient of variation (CV) within each grid cell: that is, for each species we calculated the mean and standard deviation of the predicted value in each grid cell across the five individual predictions, and divided the standard deviation by the mean in each cell (producing the CV for each cell). When estimated for a single species, a CV value greater than one represents a cell where the standard deviation across the five predictions is greater than the mean of those predictions, indicating notable variation and therefore potentially high uncertainty in the predicted value in the particular grid cell. To summarise the spatial patterns in SDM uncertainty, the CV values in each cell were then averaged across all species to identify how the variation in predictive ability of the SDMs changes across the landscape.

2.3.2 MODELLING EEC DISTRIBUTIONS USING BOOSTED REGRESSION TREES

We used Boosted Regression Trees (BRT) to model the potential distributions of 21 EECs within the Greater Hunter region. This allowed us to utilise the absence points associated with the GHVM survey data, where the presence of a given EEC at a location necessarily indicates the absence of all other EECs. BRT models are an advanced regression technique based on machine learning (Friedman, 2002) and are being used

increasingly to model the distributions of species (Elith et al., 2006). BRT models are capable of dealing with non-linear relationships between variables and can assess high-order interactions, making them particularly suited for ecological data (Elith et al., 2008b). BRT models are also robust to the effects of outliers and irrelevant predictors (Leathwick et al., 2006).

We used BRT to analyse the relationship between the occurrence of each EEC and the environment. All analyses were carried out in R (version 3.1.1) using the 'dismo' library (Hijmans et al., 2013). The models were allowed to fit interactions, using a tree complexity of three and a learning rate of 0.003. We used ten-fold cross validation to determine the optimal number of trees for each model, giving the maximum predictive performance. BRT models have a tendency to over-fit the training data, so the performance of the model was assessed by making predictions at sites that were not used during model development. The probability of occurrence of each EEC was predicted across the Greater Hunter region at a spatial resolution of 100 m. Because EECs have legal definitions that restrict them to specific bioregions, we clipped all EEC model outputs to their listed bioregions.

2.3.3. MODEL SELECTION

The predictive power of each model was evaluated using the area under the receiver operator characteristic curve (Hanley and McNeil, 1982), where models with an AUC value of 0.7 or greater were considered to be informative (Swets, 1988b). Models for species or EECs with an AUC less than 0.7 were either excluded from subsequent analyses or replaced with their original point data if they were represented by less than 100 records.

2.4. Results

2.4.1. MODEL PERFORMANCE

In general, model performance for each of the 642 modelled features was high, with mean AUC values greater than 0.83 for all taxonomic groups (Figure 2; Table 2). Seasonal rainfall, slope and local vegetation type were important drivers for all taxonomic groups. In addition, the percentage cover of dry and wet sclerophyll forest and rainforest within a 2km radius were important for all taxonomic groups. Using the iterative variable selection led to small changes in AUC values for all species, with no consistent trend.

26 species were identified as being poorly modelled by MaxEnt based on a mean AUC value of less than 0.7 (Table 3). The majority were common bird species, such as the Australian magpie (Cracticus tibicen) and laughing kookaburra (Dacelo novaeguineae), with a high number of records across the Greater Hunter region. These species typically occupy a broad range of habitat types and are, therefore, difficult to model accurately. Those poorly modelled species with greater than 100 records (20 out of 26) were excluded from subsequent analyses. For the remaining six species with less than 100 records (Table 3), we reverted to using the original point data in the spatial prioritisation.

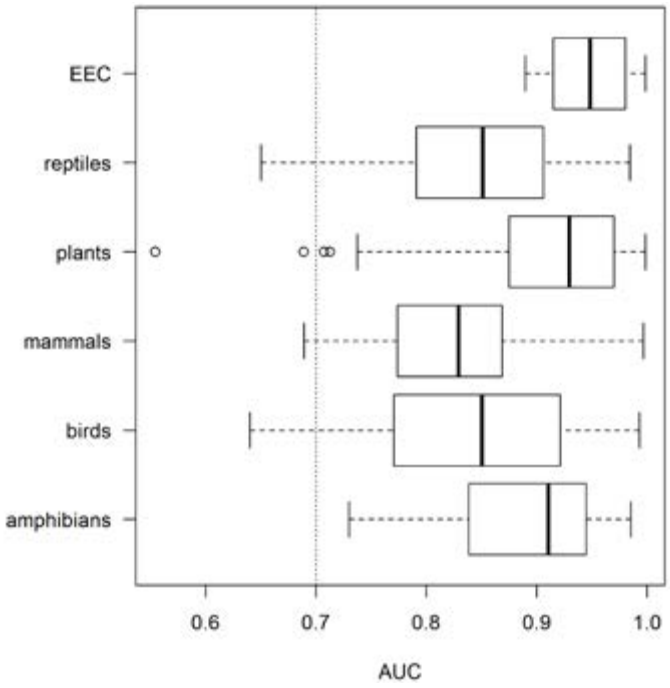

Figure 2. Boxplot of AUC values for 642 feature distributions modelled using MaxEnt (species) or boosted regression trees (EECs) summarised across the six broad taxonomic groups. AUC values greater than 0.7 are considered to be informative (Swets, 1988a).

Table 2. AUC values and the relative importance of each environmental variable for 674 species distribution models summarised across taxonomic groups (mean ± standard error), along with the number of species per group. Variables with no data for a given taxa were not included in the model for that group. Variable descriptions are given in Table 1. Results are based on MaxEnt models for species, while EECs were modelled using boosted regression trees.

	AMPHIBIANS	BIRDS	MAMMALS	PLANTS	REPTILES	EECs
N	39	305	65	177	67	21
AUC	0.89 (0.01)	0.84 (0.01)	0.83 (0.01)	0.91 (0.01)	0.85 (0.01)	0.95 (0.01)
cold_temp	26.18 (3.46)	30.75 (1.34)	16.88 (1.94)	10.14 (1.07)	16.87 (2.13)	–
hot_temp	6.9 (1.28)	6.75 (0.54)	9.82 (1.72)	7.33 (0.98)	5.74 (0.93)	–
mean_rain	11.38 (2.17)	11.83 (0.91)	16.21 (2.41)	–	–	19.6 (2.9)
seasonal_rain	14.95 (1.67)	10.2 (0.57)	13.54 (1.38)	10.24 (1)	10.31 (1.14)	14.16 (3.46)
mean_solar	–	–	–	23.37 (1.7)	17.38 (2.15)	–
slope	13.21 (1.76)	10.02 (0.56)	12.09 (0.99)	3.94 (0.47)	10.18 (1.06)	5.64 (1.02)
rugg1000	3.5 (1.11)	–	–	–	–	5.74 (1.02)
terr1000	–	3.29 (0.26)	2.97 (0.54)	–	2.89 (0.31)	–
wetness	–	–	–	–	–	3.32 (0.73)
final_vegetation	4.55 (0.63)	3.96 (0.26)	8.02 (0.87)	6.62 (0.58)	10.52 (1.28)	7.02 (1.85)
Dry_sclerophyll_forests	4.97 (1.14)	9.01 (0.57)	6.11 (0.76)	6.64 (0.75)	9.25 (1.2)	8.44 (1.67)
rainforests	3.96 (0.84)	3.77 (0.36)	3.57 (0.75)	3.56 (0.45)	5.49 (1.59)	5.34 (1.72)
Wet_sclerophyll_forests	8.45 (2.07)	10.41 (0.62)	8.3 (1.62)	6.16 (0.69)	8.74 (1.41)	4.04 (1.24)
soil	–	–	–	18.88 (1.19)	–	9.48 (1.41)

Table 3. List of poorly modelled species with mean AUC values less than 0.7. These species were either excluded from subsequent analyses or included as point data if they had less than 100 records. Number of records refers to observations within the Greater Hunter region.

SPECIES	COMMON NAME	STATUS	NUMBER OF RECORDS	MEAN AUC (± SE)	DECISION
Birds					
Acanthiza pusilla	Brown Thornbill		4626	0.68 (0.01)	exclude
Alisterus scapularis	Australian King-Parrot		2244	0.68 (0.02)	exclude
Aquila audax	Wedge-tailed Eagle		1206	0.65 (0.02)	exclude
Artamus personatus	Masked Woodswallow		34	0.66 (0.09)	points
Cacatua galerita	Sulphur-crested Cockatoo		2256	0.69 (0.01)	exclude
Colluricincla harmonica	Grey Shrike-thrush		4255	0.67 (0.01)	exclude
Cormobates leucophaea	White-throated Treecreeper		4116	0.69 (0.01)	exclude
Corvus coronoides	Australian Raven		4501	0.7 (0.01)	exclude
Cracticus tibicen	Australian Magpie		5273	0.67 (0.01)	exclude
Dacelo novaeguineae	Laughing Kookaburra		5132	0.67 (0.01)	exclude
Eopsaltria australis	Eastern Yellow Robin		4385	0.69 (0.01)	exclude
Lichenostomus chrysops	Yellow-faced Honeyeater		5185	0.66 (0.01)	exclude
Malurus cyaneus	Superb Fairy-wren		4508	0.69 (0.01)	exclude
Ninox connivens	Barking Owl	V,3	22	0.64 (0.12)	points
Pachycephala pectoralis	Golden Whistler		4186	0.7 (0.01)	exclude
Pachycephala rufiventris	Rufous Whistler		2672	0.69 (0.01)	exclude
Pardalotus punctatus	Spotted Pardalote		4030	0.68 (0.01)	exclude
Philemon corniculatus	Noisy Friarbird		3678	0.67 (0.01)	exclude
Rhipidura albiscapa	Grey Fantail		6063	0.66 (0.01)	exclude
Strepera graculina	Pied Currawong		4849	0.64 (0.01)	exclude
Zosterops lateralis	Silvereye		3191	0.69 (0.01)	exclude
Mammals					
Tachyglossus aculeatus	Short-beaked Echidna	P	2350	0.69 (0.01)	exclude
Plants					
Diuris sulphurea	Tiger Orchid	P	40	0.69 (0.10)	points
Pterostylis obtusa	Blue-tongue Greenhood	P	29	0.55 (0.12)	points
Reptiles					
Lialis burtonis	Burton's Snake-lizard	P	63	0.66 (0.08)	points
Vermicella annulata	Bandy-bandy	P	62	0.65 (0.06)	points

2.4.2. REGIONAL DISTRIBUTION PATTERNS AND UNCERTAINTY

We summed the predicted relative likelihood values in each grid cell across all species to give an estimate of the overall regional biodiversity patterns based on the species included in this analysis (Figure 3a). In general, species were distributed unevenly across the region, with more species predicted to be present closer to the coast. Maps of the predicted distributions for each of the modelled species are available upon request.

The mean predictive uncertainty in the model predictions across the Greater Hunter region ranged from 0.15–0.54 (median: 0.26), with the highest values occurring along the north-western boundary of the modelling region and around Barrington Tops National Park (Figure 3b).

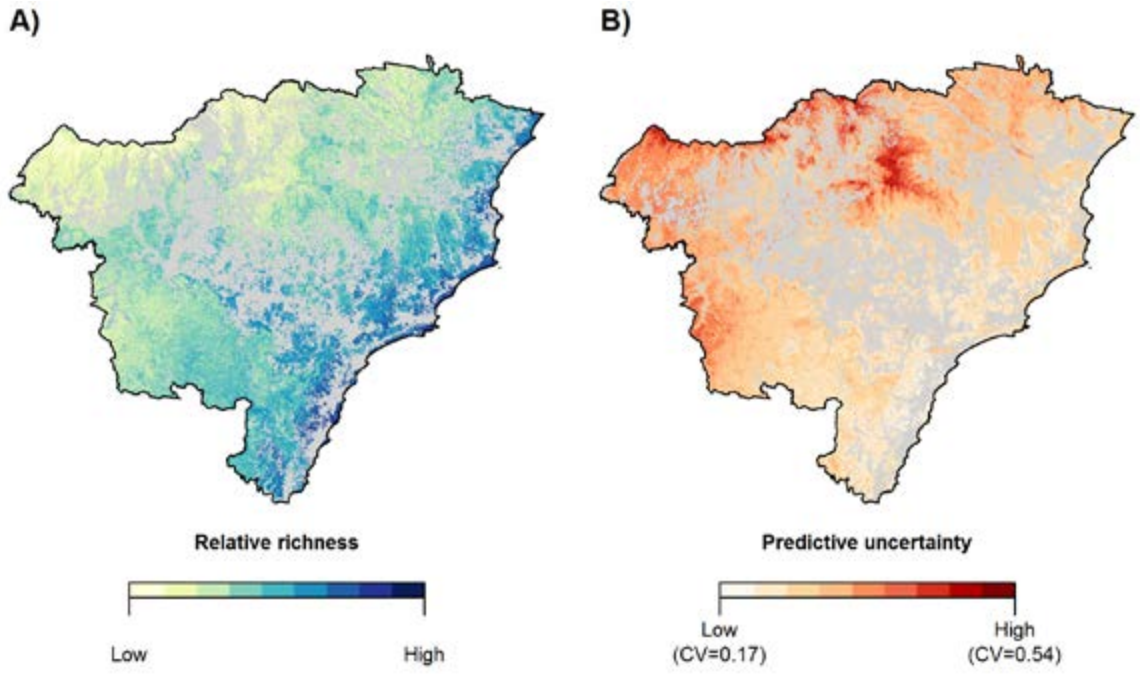

Figure 3. Spatial distribution patterns for species and EECs within the Greater Hunter region. A) Relative richness of species and EECs included in the analysis, calculated by summing the outputs of the 674 distribution models retained for inclusion in the spatial prioritisation. B) Mean predictive uncertainty across 653 modelled species distributions. These data were calculated by quantifying the coefficient of variation for each species' MaxEnt predictions based on five-fold cross validation and then averaging across all species (see section 2.3.1).

2.5. Discussion

2.5.1. OVERVIEW

The modelling framework described in this report to predict the distribution of threatened species within the Greater Hunter region is well established amongst the conservation literature (e.g. Guisan and Zimmermann, 2000; Phillips and Dudík, 2008; Phillips et al., 2006; Williams et al., 2012). It provides a robust, transparent and repeatable method for identifying the relatively likelihood of species' occurrences across the landscape.

2.5.2. LIMITATIONS AND SOURCES OF UNCERTAINTY

When using SDMs to inform decisions, it is necessary to consider the potential limitations and sources of uncertainty associated with the predictions (Guillera-Arroita et al., 2015). Uncertainty in species distribution modelling can arise from two major sources: poor quality input data or inappropriate model structures (Barry and Elith, 2006). For example, inaccurate occurrence data may result from spatial biases in sampling, imperfect detection and/or misidentification of species, while appropriate environmental variables may not be available or mapped at a sufficiently-high resolution to be ecologically relevant. Both issues can lead to models that may not reflect the true distribution of the species, with potential ramifications for the decision-making process. Also, the choice of modelling technique may influence model predictions. Here we chose to use two well-established methods (MaxEnt, BRT) to fully utilise the presence-only and presence-absence data available for species and EECs, respectively, and reduce any potential biases from model structure.

The occurrence data used in this analysis were obtained from two online databases that combine data from a range of sources, including systematic surveys, museum records, and observations by the general public. While the records were cleaned for spatial accuracy to the best of our ability, we were unable to compensate for inaccuracies due to species misidentifications or taxonomic changes. Therefore, it is possible that some inaccurate records were included in the model construction.

Initial analyses identified a strong spatial bias in the occurrence data, with records concentrated close to the coast. For this reason, we included a bias layer in the modelling approach to try and reduce the impact of this sampling bias when making predictions. Using a bias grid technique has previously been shown to help address issues related to sampling bias (Kramer-Schadt et al., 2013).

Species distribution models are reliant on the appropriate use of ecologically-relevant environmental data to make sensible predictions across the landscape and the availability of accurate data at an appropriate resolution can be problematic. We were able to include a range of environmental data describing characteristics of the climate, topography, soils and vegetation across the Greater Hunter region. Our modelling framework used a process whereby all species within a given taxonomic group were modelled using the same suite of environmental variables. While it would have ideally been better to have fine-tuned the models for each species individually, this was not possible due to time constraints and the large suite of species modelled. The high AUC values (Figure 2; Table 2) of most of our models indicate that, despite the somewhat generic variable selection process across taxonomic groups instead of individual species, our approach was successful in building distribution models that captured the known occurrences of species and notably increase our understanding of their distribution patterns within unsurveyed areas.

It is important to understand that there may be some mismatches between species' observed distribution and their predicted distribution when a species is absent from a site identified as suitable habitat. This common observation of environmentally suitable but unoccupied sites often results from competitive exclusion by other species, a low dispersal ability that may prevent colonisation of otherwise suitable site or historic factors that may have excluded species from a previously occupied site (Guisan and Zimmermann, 2000). While these areas may not currently be occupied, they represent potentially suitable habitat for the species concerned and may still be important for conservation purposes.

Our analysis of spatial uncertainty in the predictions indicated some areas of higher uncertainty within the Greater Hunter modelling region, located predominantly in the north-western areas of the region (Figure 3). However, these uncertainty values are relatively low. Ideally, the predictions from SDMs should be validated to ensure that they accurately reflect the true distribution. There

is a tradeoff between using unvalidated SDM models and the time required to generate potentially hundreds of highly accurate SDMs. While it is important to recognise the potential uncertainties associated with the model predictions, SDMs contain more information than the original point data (Rondinini et al., 2006). The models retained for use in the spatial prioritisation all had a high predictive value and low spatial uncertainty in the predictions. Therefore, we feel confident that they represent the best available distribution data for inclusion in the spatial conservation prioritisation (Hermoso et al., 2015). However, we recommend that sites highlighted by subsequent analyses as high priority for conservation or at risk from development be surveyed as part of the decision-making process.

3. References

Details of all References included in this excerpt can be found in the main Report

Kujala H, Whitehead AL & Wintle BA (2015) *Identifying conservation priorities and assessing impacts and trade-offs of potential future development in the Lower Hunter Valley in New South Wales.* The University of Melbourne, Melbourne, VIC.

4. Appendix: Individual results for species distributions modelled using Maxent

Table 4. Mean results from MaxEnt models for amphibians within the Greater Hunter region. Results show the number of records used to construct each model and the mean (± standard deviation) test AUC value across five-fold cross-validated models. The data shown for the environmental variables represent the permutation importance for each variable used to construct the full model. more details.

AMPHIBIANS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	RUGG1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Adelotus brevis	452	0.913 (0.012)	7.02	0.04	34.72	5.28	16.29	0.04	7.11	1.06	3.91	21.10
Crinia signifera	2249	0.744 (0.01)	15.32	0.00	10.72	12.37	26.41	0.97	11.26	5.77	6.93	2.41
Crinia tinnula	365	0.964 (0.004)	21.94	10.20	19.38	11.04	17.82	1.08	1.58	7.69	1.46	7.39
Heleioporus australiacus	158	0.973 (0.011)	17.75	6.79	1.71	29.64	1.12	0.09	0.23	39.34	0.66	2.33
Lechriodus fletcheri	179	0.93 (0.019)	8.96	10.01	37.05	1.65	5.09	2.23	7.10	0.00	18.83	8.45
Limnodynastes dumerilii	299	0.838 (0.023)	20.81	9.84	1.66	21.97	14.84	0.94	5.11	18.36	0.71	2.71
Limnodynastes ornatus	162	0.843 (0.027)	37.59	5.33	0.15	30.06	10.51	2.10	0.70	6.13	4.01	0.38
Limnodynastes peronii	1256	0.851 (0.009)	59.59	14.59	1.83	7.12	10.25	0.22	2.76	0.59	1.23	0.86
Limnodynastes tasmaniensis	386	0.839 (0.019)	46.08	11.93	2.57	13.95	15.34	0.51	1.69	0.32	0.77	6.75
Litoria aurea	224	0.951 (0.012)	41.14	2.33	5.46	23.19	0.17	0.62	0.23	9.43	12.71	4.50
Litoria brevipalmata	64	0.931 (0.027)	39.30	1.91	8.83	23.62	1.22	0.05	5.66	6.77	1.25	11.15
Litoria caerulea	264	0.742 (0.032)	47.98	0.00	7.04	12.00	13.17	2.67	3.17	1.37	6.59	4.88
Litoria chloris	228	0.915 (0.017)	3.22	10.42	0.01	2.66	9.70	1.94	1.26	1.43	4.81	62.72
Litoria citropa	30	0.938 (0.039)	0.14	31.50	0.00	30.98	1.98	15.16	2.14	0.00	16.18	1.87
Litoria daviesae	67	0.985 (0.006)	57.12	0.00	35.96	0.30	2.89	2.53	0.85	0.00	0.11	0.15
Litoria dentata	330	0.82 (0.024)	12.11	20.23	1.82	14.81	38.36	2.68	6.47	0.54	1.28	1.28
Litoria fallax	1310	0.813 (0.01)	32.08	0.00	4.11	18.79	32.69	0.46	5.51	2.53	0.75	1.41
Litoria freycineti	112	0.922 (0.019)	11.54	9.99	43.90	12.90	15.57	0.17	1.50	2.91	0.89	0.48
Litoria gracilenta	39	0.954 (0.015)	66.41	1.19	8.46	2.22	3.09	1.37	2.43	0.52	0.32	3.91
Litoria jervisiensis	57	0.929 (0.023)	3.33	1.53	30.58	39.96	6.24	0.00	6.64	7.51	0.33	3.72
Litoria latopalmata	499	0.82 (0.017)	25.72	0.00	5.02	25.05	27.77	0.75	8.96	6.47	0.21	0.00
Litoria lesueuri	630	0.858 (0.016)	5.69	4.96	1.94	16.31	11.17	3.78	2.63	6.51	12.88	33.69

TABLE 4 CONTINUED

AMPHIBIANS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	RUGG1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Litoria nasuta	46	0.938 (0.027)	74.90	0.00	1.56	10.94	0.98	2.33	0.04	2.87	5.17	0.22
Litoria pearsoniana	176	0.97 (0.007)	1.94	2.58	4.90	4.63	7.72	21.64	7.10	1.77	13.47	31.21
Litoria peronii	981	0.77 (0.015)	16.41	1.18	5.85	22.91	35.68	1.45	11.60	0.93	0.85	2.41
Litoria phyllochroa	579	0.896 (0.014)	5.27	6.45	12.33	0.00	10.57	23.99	13.86	0.89	1.15	20.23
Litoria revelata	66	0.91 (0.03)	23.65	17.06	4.26	15.64	2.07	0.00	10.25	3.94	4.72	15.32
Litoria subglandulosa	50	0.985 (0.009)	65.74	0.00	11.03	3.40	3.61	10.26	0.05	0.23	1.17	4.43
Litoria tyleri	366	0.866 (0.016)	49.80	8.88	2.21	8.52	21.66	0.79	1.82	1.64	0.86	3.83
Litoria verreauxii	381	0.819 (0.02)	5.81	16.11	16.87	17.96	34.47	0.71	1.76	0.24	0.63	5.06
Litoria wilcoxii	23	0.73 (0.109)	30.61	0.00	4.69	0.47	11.86	28.98	0.00	13.45	5.76	1.28
Mixophyes fasciolatus	425	0.945 (0.01)	18.75	7.50	6.60	11.23	7.83	0.55	4.88	2.01	2.68	34.56
Paracrinia haswelli	71	0.944 (0.015)	66.50	0.45	5.02	6.83	9.73	0.55	2.57	3.44	1.00	1.76
Philoria sphagnicolus	91	0.985 (0.006)	0.10	5.02	54.79	12.84	0.72	0.13	5.43	0.14	16.72	1.53
Pseudophryne australis	261	0.95 (0.012)	16.36	31.27	6.36	29.60	2.43	0.05	0.54	13.04	0.00	0.00
Pseudophryne bibronii	187	0.845 (0.026)	14.71	5.18	10.47	32.79	12.03	2.46	7.77	9.95	0.31	0.05
Pseudophryne coriacea	828	0.891 (0.011)	7.74	0.35	23.14	7.79	15.24	0.56	14.52	5.27	1.50	17.68
Uperoleia fusca	231	0.865 (0.021)	27.63	11.69	2.69	14.37	30.75	0.57	4.88	5.35	0.39	0.75
Uperoleia laevigata	395	0.829 (0.019)	14.12	2.75	8.30	27.27	26.13	1.16	5.44	3.53	1.23	7.28

Table 5. Mean results from MaxEnt models for birds within the Greater Hunter region. Results show the number of records used to construct each model and the mean (± standard deviation) test AUC value across five-fold cross-validated models. The data shown for the environmental variables represent the permutation importance for each variable used to construct the full model.

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Acanthagenys rufogularis	53	0.83 (0.071)	3.45	12.07	11.91	17.82	5.04	33.98	0.00	10.77	0.37	4.59
Acanthiza chrysorrhoa	1054	0.752 (0.018)	23.15	4.38	3.35	1.09	23.25	10.56	7.00	2.43	2.42	22.36
Acanthiza lineata	2258	0.736 (0.013)	24.33	19.74	0.00	7.50	19.40	1.34	6.19	14.54	0.00	6.97
Acanthiza nana	2270	0.722 (0.011)	55.31	4.03	0.00	0.00	23.54	7.26	4.37	3.55	1.06	0.89
Acanthiza pusilla	4626	0.681 (0.01)	38.30	14.13	0.00	4.32	15.72	2.10	5.31	11.84	0.39	7.90
Acanthiza reguloides	766	0.772 (0.021)	0.57	1.60	9.73	0.46	25.41	0.35	17.45	38.54	3.09	2.80
Acanthorhynchus tenuirostris	3890	0.722 (0.01)	32.10	15.85	0.00	8.35	16.35	2.39	1.91	15.94	0.00	7.11
Accipiter cirrocephalus	334	0.77 (0.029)	42.77	16.49	0.69	2.41	30.04	0.61	2.03	0.71	0.99	3.25
Accipiter fasciatus	634	0.741 (0.022)	44.21	6.77	3.42	10.36	19.63	4.42	2.70	2.93	0.98	4.58
Accipiter novaehollandiae	466	0.805 (0.022)	41.93	9.88	14.35	15.27	8.31	4.07	0.69	4.69	0.82	0.00
Acrocephalus australis	473	0.865 (0.015)	21.23	8.79	0.00	8.06	9.75	4.89	1.44	8.89	13.91	23.03
Actitis hypoleucos	59	0.962 (0.019)	16.41	2.98	7.18	20.27	1.60	6.98	3.70	2.23	0.44	38.22
Aegotheles cristatus	1442	0.802 (0.013)	10.59	1.60	5.76	6.36	12.73	0.64	9.55	23.33	4.51	24.93
Ailuroedus crassirostris	731	0.87 (0.011)	16.33	13.40	29.43	4.48	9.04	3.38	1.99	2.95	12.81	6.19
Alectura lathami	812	0.827 (0.016)	23.83	24.37	8.38	9.99	3.63	8.58	0.50	1.47	3.54	15.72
Alisterus scapularis	2244	0.675 (0.015)	21.72	8.50	3.91	8.46	21.51	9.16	9.57	7.16	2.52	7.48
Anas castanea	1335	0.888 (0.007)	75.47	6.04	3.92	2.82	1.09	1.09	0.45	1.90	0.73	6.49
Anas gracilis	995	0.82 (0.013)	36.18	0.00	0.00	6.64	22.42	4.81	0.71	11.61	2.56	15.08
Anas rhynchotis	231	0.923 (0.019)	29.64	8.72	13.19	18.39	4.72	0.65	2.12	17.28	1.94	3.35
Anas superciliosa	2440	0.78 (0.01)	63.59	1.85	0.00	0.82	15.85	2.50	0.14	4.76	3.69	6.80
Anhinga novaehollandiae	701	0.905 (0.01)	63.57	0.25	1.22	5.55	3.76	1.69	3.29	7.51	6.00	7.18
Anseranas semipalmata	86	0.971 (0.019)	0.81	5.27	4.48	52.74	1.20	0.00	0.82	14.06	0.66	19.96
Anthochaera carunculata	2037	0.789 (0.013)	1.98	0.08	46.27	30.33	17.25	0.00	1.29	0.61	0.81	1.39
Anthochaera chrysoptera	1915	0.907 (0.007)	67.35	17.75	2.49	8.72	0.51	0.11	0.03	0.00	0.49	2.55

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_RAIN	SLOPE	TERR1000	FINAL_VEGETATION	DRY_SCLEROPHYLL_FORESTS	RAINFORESTS	WET_SCLEROPHYLL_FORESTS
Anthochaera phrygia	26	0.718 (0.088)	31.35	2.73	8.18	2.41	0.05	0.74	5.28	21.27	15.69	12.28
Anthus novaeseelandiae	654	0.797 (0.022)	42.38	0.29	6.75	3.03	8.02	3.30	3.40	4.50	0.48	27.84
Apus pacificus	83	0.877 (0.036)	60.04	4.71	13.52	8.64	1.05	2.57	0.00	3.68	0.74	5.04
Aquila audax	1206	0.654 (0.022)	0.39	25.81	3.45	2.85	27.60	10.36	4.89	10.78	0.39	13.48
Ardea ibis	865	0.866 (0.01)	61.97	3.88	3.39	7.03	6.65	1.08	1.52	4.95	2.13	7.41
Ardea intermedia	439	0.928 (0.01)	68.70	4.83	4.63	5.21	1.25	0.67	3.92	2.38	0.65	7.76
Ardea modesta	1043	0.885 (0.008)	70.58	2.44	4.69	4.26	0.37	1.64	1.34	4.77	0.68	9.23
Ardea pacifica	479	0.826 (0.019)	30.89	4.85	0.00	22.25	9.26	6.25	0.85	16.40	3.71	5.55
Arenaria interpres	63	0.967 (0.017)	8.58	0.51	23.95	4.94	0.32	0.13	2.32	13.22	0.88	45.16
Artamus cyanopterus	527	0.791 (0.025)	36.75	5.30	8.15	0.00	13.28	3.78	10.76	14.95	1.38	5.66
Artamus leucorynchus	549	0.928 (0.009)	70.03	7.96	4.86	4.86	1.14	0.59	1.01	1.57	0.78	7.19
Artamus personatus	34	0.664 (0.089)	15.77	10.36	14.58	15.80	9.98	3.68	8.24	0.00	20.56	1.03
Artamus superciliosus	86	0.738 (0.053)	11.14	4.91	0.00	3.69	17.62	11.92	7.66	20.64	4.34	18.08
Atrichornis rufescens	94	0.993 (0.003)	60.49	0.01	37.97	1.04	0.12	0.08	0.00	0.06	0.15	0.08
Aviceda subcristata	331	0.825 (0.026)	56.16	16.59	0.92	18.29	3.37	0.88	1.31	1.30	0.26	0.91
Aythya australis	525	0.843 (0.015)	48.53	2.26	8.32	4.35	11.33	0.93	1.25	15.60	1.50	5.95
Biziura lobata	150	0.928 (0.014)	62.17	1.92	0.35	8.98	3.47	3.32	2.59	5.72	3.40	8.10
Burhinus grallarius	237	0.95 (0.018)	10.43	0.18	58.68	24.68	0.78	0.36	1.25	0.11	0.37	3.17
Butorides striatus	88	0.966 (0.012)	9.82	3.32	39.13	13.12	0.84	4.61	2.29	4.30	0.00	22.57
Cacatua galerita	2256	0.693 (0.013)	28.16	5.59	3.38	29.05	8.10	11.52	4.23	5.14	4.84	0.00
Cacatua sanguinea	438	0.882 (0.017)	16.34	0.05	8.26	23.81	13.50	0.76	0.00	16.58	3.16	17.53
Cacatua tenuirostris	389	0.938 (0.011)	56.34	13.84	1.84	10.73	3.54	0.18	0.36	7.58	0.44	5.14
Cacomantis flabelliformis	2439	0.716 (0.013)	22.81	5.15	1.82	10.85	19.61	5.12	3.66	16.94	0.79	13.26
Cacomantis pallidus	365	0.798 (0.022)	27.91	2.36	4.00	20.81	15.28	4.59	3.93	11.66	2.07	7.40
Cacomantis variolosus	519	0.723 (0.023)	27.04	4.29	5.04	18.06	15.33	10.24	9.31	9.26	0.00	1.43
Calidris acuminata	235	0.967 (0.009)	26.90	2.71	2.32	48.91	0.98	0.22	1.20	3.14	3.63	9.99

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Calidris canutus	105	0.974 (0.014)	1.19	0.31	56.25	1.10	0.06	0.38	0.38	6.46	0.02	33.87
Calidris ferruginea	134	0.982 (0.006)	49.92	0.65	1.21	12.10	4.58	0.19	2.43	14.98	0.22	13.73
Calidris melanotos	23	0.925 (0.051)	52.06	0.00	2.42	17.74	5.05	1.76	1.99	10.93	0.00	8.05
Calidris ruficollis	186	0.978 (0.008)	55.86	0.12	0.00	12.49	1.40	0.01	1.27	6.95	0.96	20.93
Calidris tenuirostris	53	0.991 (0.002)	4.67	0.08	22.98	0.90	0.09	0.28	0.67	16.61	0.31	53.39
Calyptorhynchus funereus	1784	0.762 (0.013)	33.90	17.01	0.89	7.80	24.00	0.74	4.81	6.01	1.07	3.77
Calyptorhynchus lathami	27	0.958 (0.017)	3.33	1.17	3.92	17.77	0.00	1.59	35.94	31.29	1.21	3.78
Centropus phasianinus	683	0.841 (0.015)	42.49	2.21	38.54	0.87	6.40	0.36	0.94	0.39	0.12	7.69
Ceyx azureus	435	0.805 (0.022)	72.19	0.00	0.59	0.74	3.74	18.40	1.78	0.54	0.28	1.74
Chalcites basalis	355	0.782 (0.026)	9.72	0.44	0.88	3.93	51.30	3.82	5.28	8.43	4.12	12.08
Chalcites lucidus	967	0.736 (0.018)	19.21	2.35	7.42	9.23	24.46	4.37	7.66	13.52	5.83	5.94
Chalcites osculans	25	0.873 (0.06)	9.97	27.35	0.66	0.00	15.00	0.51	12.21	26.29	8.00	0.00
Chalcophaps indica	164	0.82 (0.03)	17.23	4.79	32.34	2.18	12.16	3.76	4.48	1.08	15.68	6.30
Charadrius bicinctus	95	0.977 (0.009)	5.01	0.00	47.84	5.58	0.14	0.11	2.85	3.54	0.00	34.93
Charadrius mongolus	66	0.982 (0.006)	21.95	3.50	33.28	6.66	2.85	0.40	0.85	3.47	0.37	26.66
Charadrius ruficapillus	202	0.974 (0.006)	56.50	0.45	0.08	18.98	0.73	0.40	0.11	5.04	0.32	17.38
Chenonetta jubata	2325	0.738 (0.011)	58.17	3.23	0.00	0.55	22.63	5.15	0.00	4.97	1.97	3.34
Cheramoeca leucosterna	55	0.785 (0.069)	0.00	11.05	35.01	8.25	18.91	15.76	5.01	4.50	1.51	0.00
Chlidonias hybrida	65	0.945 (0.026)	42.01	0.64	0.44	22.12	1.11	1.47	2.52	10.95	3.51	15.24
Chlidonias leucopterus	23	0.982 (0.011)	14.14	0.14	4.80	0.43	0.56	1.61	4.41	15.79	0.16	57.94
Chroicocephalus novaehollandiae	1403	0.94 (0.006)	71.39	3.94	1.90	12.75	0.29	0.25	0.45	1.03	0.18	7.82
Chthonicola sagittata	527	0.891 (0.015)	22.23	49.18	1.66	9.23	3.34	0.28	8.45	4.94	0.69	0.00
Cincloramphus cruralis	55	0.894 (0.037)	1.78	0.00	18.33	15.06	10.02	35.15	4.35	4.44	0.50	10.36
Cincloramphus mathewsi	171	0.838 (0.03)	8.43	58.13	0.00	2.25	6.03	7.28	2.01	3.80	7.10	4.96
Cinclosoma punctatum	329	0.817 (0.026)	2.27	11.79	11.80	2.65	11.50	4.26	3.22	35.34	0.43	16.73

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Circus approximans	438	0.921 (0.015)	61.57	0.00	4.08	9.55	2.69	0.54	1.30	3.62	1.48	15.17
Circus assimilis	94	0.868 (0.031)	13.22	6.54	10.50	27.59	5.03	0.39	0.26	11.71	22.25	2.50
Cisticola exilis	486	0.893 (0.013)	28.71	0.48	4.36	36.78	5.70	0.94	0.35	10.15	2.71	9.82
Climacteris erythrops	299	0.843 (0.026)	1.28	38.06	1.56	1.27	13.76	5.64	26.97	4.12	5.41	1.94
Climacteris picumnus victoriae	217	0.903 (0.028)	15.87	1.68	58.70	6.53	3.70	0.19	9.21	3.88	0.00	0.24
Colluricincla harmonica	4255	0.671 (0.01)	21.53	5.38	0.00	8.26	19.28	3.73	7.58	16.33	3.26	14.66
Columba leucomela	701	0.841 (0.013)	20.89	5.55	51.00	3.60	10.27	0.17	0.00	3.17	4.59	0.76
Coracina novaehollandiae	3753	0.707 (0.011)	62.79	4.12	0.00	0.54	27.80	2.06	0.92	0.41	0.00	1.37
Coracina papuensis	300	0.789 (0.03)	15.30	3.81	10.84	13.09	31.61	3.23	6.51	13.01	2.40	0.20
Coracina tenuirostris	790	0.742 (0.017)	21.13	0.07	2.74	20.56	9.53	4.77	12.44	20.79	4.63	3.35
Corcorax melanorhamphos	906	0.8 (0.017)	26.03	12.14	26.53	2.70	15.11	0.92	7.27	6.88	1.84	0.58
Cormobates leucophaea	4116	0.69 (0.01)	10.38	3.55	0.00	6.01	19.93	3.40	12.96	17.80	4.90	21.06
Corvus coronoides	4501	0.699 (0.01)	57.47	3.91	0.00	8.04	21.67	2.26	0.00	4.52	1.10	1.03
Corvus mellori	110	0.797 (0.048)	16.01	11.17	23.75	16.60	17.55	2.81	2.74	0.96	4.48	3.91
Corvus orru	771	0.897 (0.014)	32.75	0.57	11.51	13.53	8.44	0.45	0.34	16.99	2.02	13.40
Corvus tasmanicus	181	0.887 (0.025)	28.99	7.58	32.57	5.05	15.79	0.13	0.00	3.78	5.80	0.30
Coturnix pectoralis	89	0.77 (0.049)	39.95	3.01	21.20	4.03	13.36	1.86	3.37	4.99	8.22	0.00
Coturnix ypsilophora	462	0.801 (0.026)	55.68	0.00	3.09	4.05	8.62	1.73	12.63	3.52	10.11	0.58
Cracticus nigrogularis	2225	0.736 (0.012)	44.37	0.00	2.15	2.43	41.28	2.38	1.24	1.93	1.14	3.09
Cracticus tibicen	5273	0.675 (0.009)	60.97	0.48	0.00	0.00	29.93	3.87	0.00	0.00	0.00	4.74
Cracticus torquatus	3532	0.718 (0.011)	53.86	6.05	0.00	10.62	22.69	2.14	1.62	2.14	0.69	0.20
Cygnus atratus	1117	0.88 (0.007)	61.97	8.48	6.21	6.53	4.43	1.27	0.50	4.65	2.11	3.86
Dacelo novaeguineae	5132	0.669 (0.009)	58.21	7.69	0.00	2.03	26.72	2.07	0.05	3.23	0.00	0.00
Daphoenositta chrysoptera	823	0.74 (0.019)	22.20	7.28	4.95	5.74	24.66	3.26	10.09	19.16	0.05	2.61
Dendrocygna arcuata	89	0.954 (0.02)	32.63	4.23	4.31	36.99	7.47	0.23	1.05	2.17	2.71	8.22
Dendrocygna eytoni	54	0.921 (0.026)	38.96	0.38	10.25	17.95	0.85	2.62	2.05	4.94	9.10	12.89

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_RAIN	SLOPE	TERR1000	FINAL_VEGETATION	DRY_SCLEROPHYLL_FORESTS	RAINFORESTS	WET_SCLEROPHYLL_FORESTS
Dicaeum hirundinaceum	1818	0.701 (0.015)	37.17	2.39	4.97	7.89	17.60	2.35	7.38	15.26	0.29	4.69
Dicrurus bracteatus	545	0.926 (0.013)	74.10	2.73	0.35	4.72	0.24	0.09	0.17	8.49	0.41	8.71
Dromaius novaehollandiae	44	0.879 (0.061)	0.00	38.72	6.44	30.26	4.84	0.00	7.14	11.89	0.71	0.00
Egretta garzetta	568	0.937 (0.009)	70.82	4.97	2.30	5.63	0.59	0.87	1.80	1.28	0.29	11.46
Egretta novaehollandiae	2347	0.808 (0.011)	62.57	0.00	0.00	1.24	4.87	6.08	1.13	5.73	0.00	18.39
Egretta sacra	81	0.95 (0.028)	51.91	1.97	12.27	8.40	2.33	1.42	1.09	3.51	0.79	16.32
Elanus axillaris	787	0.821 (0.017)	54.76	1.76	4.65	2.49	6.98	1.23	2.04	8.24	1.27	16.59
Elseyornis melanops	322	0.899 (0.016)	30.26	5.10	2.61	21.21	17.33	4.02	3.30	3.59	8.05	4.52
Entomyzon cyanotis	340	0.852 (0.018)	34.14	7.53	10.90	21.43	12.43	1.13	2.00	6.55	1.37	2.54
Eolophus roseicapillus	2575	0.749 (0.01)	59.09	0.00	0.00	1.56	13.01	3.28	0.86	2.65	4.40	15.16
Eopsaltria australis	4385	0.686 (0.01)	34.08	7.85	0.67	6.12	15.87	4.09	4.50	11.75	3.94	11.12
Ephippiorhynchus asiaticus	447	0.921 (0.009)	73.86	1.37	0.61	5.71	4.52	1.35	1.35	8.74	1.74	0.76
Epthianura albifrons	147	0.974 (0.011)	9.45	1.10	34.39	6.40	4.45	3.58	8.68	0.16	0.14	31.64
Erythrogonys cinctus	100	0.96 (0.018)	34.48	7.52	1.78	19.82	0.37	1.25	18.55	2.97	8.18	5.09
Esacus magnirostris	28	0.983 (0.012)	9.19	0.00	0.52	2.40	0.24	0.03	2.83	5.29	1.31	78.19
Eudynamys orientalis	1142	0.822 (0.013)	75.42	0.46	7.18	4.89	1.86	0.59	0.85	0.84	2.34	5.57
Eudyptula minor	52	0.98 (0.007)	3.13	0.29	48.79	37.06	0.00	0.40	0.36	1.53	1.35	7.09
Eurostopodus mystacalis	501	0.809 (0.02)	29.07	3.21	3.60	2.12	11.59	0.62	5.33	19.41	3.32	21.73
Eurystomus orientalis	1464	0.791 (0.015)	70.24	0.20	1.05	6.94	4.81	1.70	1.96	0.99	2.13	9.98
Falco berigora	537	0.743 (0.023)	31.86	0.44	0.00	0.91	17.36	5.38	3.55	1.77	5.18	33.55
Falco cenchroides	981	0.767 (0.017)	26.64	1.74	0.00	0.00	11.17	4.76	1.95	9.85	1.67	42.22
Falco longipennis	403	0.815 (0.021)	50.06	1.38	2.78	3.26	7.47	0.57	1.02	10.33	2.60	20.53
Falco peregrinus	382	0.815 (0.026)	44.61	8.90	3.75	3.68	3.13	2.75	6.17	0.70	6.34	19.97
Falco subniger	32	0.774 (0.071)	6.33	13.65	1.00	1.42	7.16	2.22	16.50	17.44	30.24	4.03
Falcunculus frontatus frontatus	344	0.778 (0.027)	14.33	7.91	5.49	3.96	12.74	5.26	26.99	13.91	4.25	5.15
Fulica atra	591	0.855 (0.017)	60.13	3.31	7.47	7.16	6.66	1.51	1.67	6.88	2.71	2.51

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Gallinago hardwickii	264	0.911 (0.018)	52.05	4.74	5.08	14.87	8.67	1.14	2.15	3.17	1.41	6.73
Gallinula tenebrosa	1042	0.825 (0.014)	62.10	1.75	2.89	5.56	8.88	3.96	0.96	5.59	4.02	4.29
Gallirallus philippensis	231	0.915 (0.018)	36.13	4.79	32.36	5.52	2.47	0.90	3.31	8.08	3.29	3.14
Gelochelidon nilotica	115	0.981 (0.007)	61.51	0.29	0.08	12.24	0.20	0.08	0.74	5.91	0.24	18.72
Geopelia humeralis	1149	0.834 (0.014)	59.36	7.24	3.41	5.28	10.44	0.93	1.66	3.19	0.56	7.92
Geopelia striata	509	0.816 (0.02)	37.32	0.45	15.57	6.90	8.35	2.46	2.35	12.50	5.55	8.56
Gerygone albogularis	1155	0.759 (0.015)	11.22	11.60	5.75	2.65	39.37	1.62	7.03	13.75	1.23	5.78
Gerygone fusca	96	0.904 (0.037)	18.11	22.07	15.60	1.30	20.29	0.00	6.23	13.89	0.00	2.52
Gerygone levigaster	167	0.972 (0.008)	5.06	6.36	60.08	8.87	2.05	0.70	2.90	1.96	1.51	10.51
Gerygone mouki	2219	0.774 (0.012)	19.87	12.18	9.32	10.49	12.35	5.58	5.22	1.89	14.02	9.08
Gliciphila melanops	48	0.975 (0.012)	59.32	10.34	5.01	8.19	0.00	0.96	2.26	0.00	0.01	13.90
Glossopsitta concinna	549	0.8 (0.022)	20.78	6.22	5.33	24.94	31.12	2.84	3.31	1.99	0.29	3.17
Glossopsitta pusilla	936	0.779 (0.018)	34.53	2.46	5.43	8.04	16.69	0.04	3.95	26.90	0.15	1.81
Grallina cyanoleuca	3473	0.744 (0.009)	73.99	1.65	0.00	0.00	15.22	1.87	0.01	0.30	1.69	5.27
Grantiella picta	33	0.867 (0.061)	0.00	0.00	22.92	4.81	4.14	5.50	10.71	47.17	1.61	3.14
Haematopus fuliginosus	167	0.977 (0.008)	49.72	2.69	12.95	0.32	2.22	1.47	0.46	6.87	0.05	23.25
Haematopus longirostris	452	0.967 (0.006)	2.52	1.59	59.55	8.19	1.13	0.22	0.63	6.29	0.57	19.30
Haliaeetus leucogaster	1621	0.891 (0.008)	71.80	0.41	3.95	11.58	0.04	0.57	1.34	1.62	0.35	8.34
Haliastur indus	225	0.967 (0.011)	25.32	2.19	20.15	19.04	0.57	0.12	0.30	4.78	1.55	25.98
Haliastur sphenurus	1271	0.891 (0.009)	74.15	1.59	1.15	8.52	0.03	0.22	0.60	0.60	0.29	12.84
Hieraaetus morphnoides	238	0.768 (0.033)	43.52	4.08	9.21	8.57	11.33	0.39	5.91	11.53	1.05	4.41
Himantopus himantopus	463	0.94 (0.008)	31.15	5.98	3.64	18.33	10.32	3.30	2.50	5.42	14.45	4.90
Hirundapus caudacutus	709	0.808 (0.02)	42.10	10.32	0.76	19.99	20.53	0.80	0.91	1.97	1.73	0.89
Hirundo neoxena	3476	0.736 (0.011)	66.35	7.52	0.00	0.46	8.73	8.02	0.78	0.00	0.00	8.13
Hydroprogne caspia	354	0.97 (0.009)	4.49	0.00	43.71	10.17	1.57	0.16	0.33	23.13	0.00	16.44
Hylacola pyrrhopygia	105	0.888 (0.029)	22.31	9.64	5.42	15.59	1.48	2.96	8.31	33.54	0.42	0.33

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Irediparra gallinacea	68	0.933 (0.022)	16.75	13.77	2.57	25.81	25.35	0.33	4.13	2.73	4.31	4.25
Ixobrychus flavicollis	75	0.898 (0.038)	60.44	6.13	0.05	15.38	4.24	5.66	0.64	3.22	4.13	0.10
Lalage leucomela	56	0.873 (0.061)	8.27	0.00	3.87	47.28	2.14	0.46	1.39	8.63	20.40	7.55
Lalage sueurii	211	0.782 (0.034)	4.29	39.95	3.73	1.30	12.31	0.41	9.46	3.41	5.42	19.71
Lathamus discolor	56	0.939 (0.022)	0.79	11.13	54.86	6.72	6.86	5.65	2.25	0.62	2.06	9.07
Leucosarcia picata	1418	0.756 (0.014)	13.77	6.24	3.29	7.49	15.56	6.41	7.99	12.28	6.73	20.24
Lewinia pectoralis	79	0.888 (0.036)	20.73	4.14	24.78	22.66	0.19	0.00	4.61	0.63	3.25	19.02
Lichenostomus chrysops	5185	0.665 (0.01)	25.52	0.49	0.00	5.40	22.11	4.30	6.62	20.72	0.00	14.85
Lichenostomus fuscus	351	0.845 (0.025)	34.54	2.54	5.35	13.94	9.58	1.66	5.92	19.88	2.59	4.01
Lichenostomus leucotis	768	0.82 (0.018)	3.93	4.37	2.36	10.42	8.61	3.75	7.93	54.67	2.30	1.66
Lichenostomus melanops	584	0.895 (0.013)	5.62	0.77	16.42	7.08	3.82	0.76	3.06	61.40	0.16	0.92
Lichenostomus penicillatus	503	0.843 (0.022)	2.33	27.40	3.13	23.18	14.91	4.14	5.78	8.45	6.34	4.33
Lichmera indistincta	398	0.923 (0.02)	33.74	5.55	17.83	7.60	12.65	0.10	1.16	3.32	1.03	17.03
Limosa lapponica	433	0.96 (0.007)	3.02	8.40	46.44	11.68	1.95	0.51	0.55	7.39	0.13	19.93
Limosa limosa	72	0.984 (0.009)	38.70	5.55	1.59	2.53	2.52	1.83	11.57	8.58	0.49	26.64
Lonchura castaneothorax	119	0.914 (0.027)	19.01	0.35	18.39	27.91	1.17	1.89	0.63	8.11	20.77	1.76
Lophoictinia isura	79	0.97 (0.009)	35.60	0.00	38.61	13.62	2.68	2.76	0.48	0.00	0.21	6.03
Lopholaimus antarcticus	508	0.821 (0.017)	22.27	13.13	21.45	6.20	8.45	5.53	0.13	10.54	11.06	1.23
Macropygia amboinensis	1304	0.808 (0.012)	13.71	6.51	18.36	14.79	11.26	4.27	2.90	0.17	2.07	25.97
Malacorhynchus membranaceus	92	0.931 (0.03)	7.42	5.61	1.36	52.94	2.02	1.62	2.77	23.76	0.23	2.26
Malurus cyaneus	4508	0.687 (0.011)	61.06	0.00	0.00	0.69	24.84	8.77	1.80	0.27	0.48	2.09
Malurus lamberti	2041	0.784 (0.012)	64.79	6.42	1.81	4.48	9.27	0.43	2.43	9.41	0.00	0.96
Malurus melanocephalus	93	0.92 (0.021)	7.63	0.79	6.40	58.95	1.95	4.06	2.56	2.35	0.02	15.30
Manorina melanocephala	3582	0.725 (0.01)	72.50	0.38	0.00	1.40	13.64	1.80	0.00	0.00	2.09	8.20
Manorina melanophrys	1701	0.748 (0.013)	30.00	21.69	7.88	4.22	5.46	7.89	2.11	10.94	5.64	4.16
Megalurus gramineus	255	0.94 (0.014)	32.16	3.15	7.40	25.30	2.44	1.05	1.28	7.69	12.16	7.37

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_RAIN	SLOPE	TERR1000	FINAL_VEGETATION	DRY_SCLEROPHYLL_FORESTS	RAINFORESTS	WET_SCLEROPHYLL_FORESTS
Megalurus timoriensis	262	0.932 (0.017)	4.03	1.66	25.99	21.82	6.43	1.16	1.74	3.10	13.58	20.48
Melanodryas cucullata cucullata	60	0.94 (0.025)	3.52	48.56	6.83	30.40	0.31	0.69	6.44	0.07	0.85	2.32
Meliphaga lewinii	4630	0.721 (0.009)	45.86	10.97	4.03	8.80	12.02	6.13	0.32	2.76	1.54	7.57
Melithreptus brevirostris	638	0.813 (0.019)	14.04	5.86	7.47	9.85	14.40	0.93	8.21	35.85	0.19	3.21
Melithreptus gularis gularis	152	0.945 (0.021)	36.06	0.88	34.29	6.11	0.67	0.01	0.45	21.26	0.25	0.02
Melithreptus lunatus	1564	0.738 (0.015)	6.82	4.24	0.00	4.21	19.11	4.66	13.32	30.87	0.00	16.77
Menura novaehollandiae	1892	0.82 (0.009)	4.38	16.59	2.79	3.12	3.17	6.27	6.89	16.80	9.67	30.32
Merops ornatus	567	0.797 (0.021)	11.40	7.31	30.31	12.19	7.92	1.70	4.37	5.34	2.32	17.13
Microcarbo melanoleucos	1669	0.867 (0.012)	56.53	0.95	4.27	2.80	1.98	4.03	0.69	10.07	2.88	15.80
Microeca fascinans	1027	0.763 (0.017)	22.98	3.33	9.42	9.67	21.98	6.40	4.29	20.27	1.20	0.45
Milvus migrans	36	0.792 (0.066)	38.20	0.00	6.26	3.66	4.56	3.06	10.35	0.00	0.75	33.15
Monarcha melanopsis	1323	0.781 (0.013)	4.58	2.69	29.70	6.62	14.90	3.46	11.66	2.59	14.70	9.09
Morus serrator	224	0.982 (0.004)	41.78	2.66	19.25	6.30	0.58	0.32	0.38	7.16	1.48	20.10
Myiagra cyanoleuca	122	0.744 (0.047)	1.19	8.50	16.74	9.75	47.87	1.34	6.57	4.00	0.87	3.17
Myiagra inquieta	283	0.734 (0.037)	0.00	26.35	12.41	3.87	8.80	30.02	3.80	5.10	3.27	6.38
Myiagra rubecula	950	0.744 (0.018)	28.54	3.70	4.70	8.31	20.25	2.02	13.29	14.61	4.57	0.00
Myzomela sanguinolenta	1787	0.759 (0.012)	45.95	1.87	1.90	6.38	18.69	3.34	2.97	13.77	1.54	3.59
Neochmia modesta	22	0.765 (0.107)	0.00	62.11	0.79	11.13	0.00	4.34	9.67	6.53	0.00	5.43
Neochmia temporalis	3279	0.705 (0.011)	53.98	3.93	1.77	3.97	18.35	6.11	4.55	5.65	0.00	1.69
Ninox connivens	22	0.642 (0.119)	47.87	0.00	0.57	1.17	0.59	21.71	5.60	11.92	8.19	2.37
Ninox novaeseelandiae	1667	0.754 (0.014)	14.60	31.57	2.69	8.21	6.90	2.58	2.88	10.02	0.67	19.88
Ninox strenua	291	0.849 (0.02)	5.40	5.38	46.35	2.31	14.92	0.34	14.05	5.79	0.00	5.46
Numenius madagascariensis	404	0.962 (0.006)	3.26	1.71	56.19	8.96	2.96	0.51	1.19	9.58	0.15	15.47
Numenius phaeopus	222	0.975 (0.005)	0.96	3.65	55.13	14.05	3.19	1.86	0.95	5.18	1.32	13.71
Nycticorax caledonicus	257	0.869 (0.024)	44.21	1.43	16.31	12.31	10.33	2.74	2.31	3.16	2.57	4.63
Ocyphaps lophotes	2381	0.791 (0.01)	69.08	0.00	0.00	1.04	5.70	0.72	0.00	3.13	2.75	17.59

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Origma solitaria	331	0.893 (0.012)	5.49	5.12	9.04	20.64	5.39	3.77	6.45	42.78	0.40	0.94
Oriolus sagittatus	2020	0.724 (0.013)	51.93	5.03	3.84	3.68	21.09	2.50	3.61	6.47	0.77	1.08
Orthonyx temminckii	225	0.901 (0.019)	0.60	6.24	21.74	19.03	10.64	4.29	7.58	0.97	18.95	9.95
Oxyura australis	28	0.875 (0.062)	44.30	3.23	3.62	12.74	0.00	0.00	1.50	14.84	1.96	17.81
Pachycephala olivacea	129	0.952 (0.028)	34.49	5.76	45.48	0.08	0.92	2.84	1.01	0.53	8.71	0.18
Pachycephala pectoralis	4186	0.697 (0.01)	29.57	12.99	2.85	7.40	14.78	4.35	1.87	10.60	4.05	11.54
Pachycephala rufiventris	2672	0.695 (0.012)	21.67	3.17	0.62	8.92	28.97	2.35	10.53	21.02	0.33	2.42
Pandion cristatus	427	0.956 (0.01)	48.29	4.50	14.01	15.40	0.92	0.28	0.13	1.61	1.12	13.74
Pardalotus punctatus	4030	0.679 (0.011)	9.13	1.79	0.00	8.19	18.36	3.74	10.54	32.67	1.15	14.43
Pardalotus striatus	1549	0.726 (0.016)	0.45	11.45	8.86	9.88	37.99	6.65	6.50	5.63	2.12	10.47
Pelecanus conspicillatus	1771	0.904 (0.008)	69.59	0.27	1.01	8.70	0.35	0.74	0.94	3.68	1.16	13.55
Petrochelidon ariel	419	0.828 (0.02)	3.56	5.26	0.00	17.59	39.23	3.97	2.95	5.75	5.79	15.89
Petrochelidon nigricans	552	0.75 (0.024)	0.00	16.90	7.29	2.79	33.88	11.73	9.58	1.95	4.11	11.77
Petroica boodang	226	0.72 (0.043)	2.25	19.74	2.21	3.84	19.80	4.62	4.72	33.01	2.04	7.78
Petroica goodenovii	116	0.92 (0.029)	11.54	4.27	23.24	9.49	9.32	1.44	11.70	17.36	1.21	10.43
Petroica phoenicea	130	0.876 (0.041)	20.77	22.75	8.44	0.00	11.36	10.56	2.52	2.15	13.73	7.71
Petroica rosea	984	0.751 (0.019)	0.80	7.78	7.12	8.47	17.37	8.12	12.71	14.03	8.06	15.54
Phalacrocorax carbo	982	0.911 (0.012)	69.82	0.00	2.65	3.71	0.50	1.39	0.26	10.31	0.99	10.36
Phalacrocorax sulcirostris	1383	0.879 (0.011)	56.04	0.27	5.09	3.87	5.76	1.98	1.73	11.54	1.59	12.13
Phalacrocorax varius	793	0.933 (0.011)	74.91	1.19	1.89	5.66	0.23	1.27	0.75	2.00	0.19	11.92
Phaps chalcoptera	514	0.794 (0.023)	4.42	1.88	38.00	3.94	9.60	3.75	10.93	22.89	0.72	3.87
Phaps elegans	126	0.823 (0.047)	54.54	8.32	0.86	4.59	4.61	0.32	16.32	2.24	0.24	7.95
Philemon citreogularis	123	0.758 (0.043)	11.65	16.00	9.91	31.84	5.40	1.20	0.18	7.77	7.44	8.62
Philemon corniculatus	3678	0.671 (0.011)	31.57	0.82	0.00	5.24	23.97	3.35	7.58	19.13	1.37	6.97
Phylidonyris niger	1365	0.902 (0.01)	59.61	19.14	1.20	11.88	3.46	0.00	0.29	2.23	0.09	2.09
Phylidonyris novaehollandiae	579	0.884 (0.02)	17.88	35.63	10.98	12.91	3.74	0.18	2.18	1.16	1.29	14.05

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_RAIN	SLOPE	TERR1000	FINAL_VEGETATION	DRY_SCLEROPHYLL_FORESTS	RAINFORESTS	WET_SCLEROPHYLL_FORESTS
Phylidonyris pyrrhoptera	76	0.967 (0.019)	1.08	52.60	0.00	17.01	0.15	5.75	2.45	14.85	5.16	0.95
Pitta versicolor	198	0.876 (0.024)	8.52	2.32	3.33	26.74	9.01	6.32	4.27	2.87	26.77	9.85
Platalea flavipes	233	0.902 (0.015)	44.57	3.37	11.03	8.15	2.42	3.65	0.29	7.84	16.99	1.69
Platalea regia	782	0.909 (0.008)	57.75	5.10	4.13	5.46	4.29	1.97	2.87	8.41	1.88	8.15
Platycercus elegans	2230	0.709 (0.014)	6.32	13.17	10.37	4.80	18.01	14.65	7.77	2.74	3.71	18.46
Platycercus eximius	3845	0.706 (0.009)	67.10	1.09	0.00	0.00	23.12	1.72	0.00	0.00	1.21	5.76
Plectorhyncha lanceolata	756	0.87 (0.012)	16.53	5.69	18.32	12.94	6.13	2.17	1.17	2.32	2.02	32.70
Plegadis falcinellus	84	0.946 (0.024)	7.80	2.13	4.61	43.61	4.84	0.06	10.58	0.29	10.57	15.51
Pluvialis fulva	174	0.973 (0.013)	7.48	0.35	38.36	0.34	0.04	0.16	1.18	7.22	0.58	44.29
Pluvialis squatarola	29	0.971 (0.014)	67.57	1.43	0.00	0.28	0.00	0.32	5.18	9.52	0.00	15.69
Podargus strigoides	1423	0.723 (0.013)	42.97	13.48	2.47	7.36	19.96	0.69	0.00	5.51	0.96	6.60
Podiceps cristatus	81	0.913 (0.033)	64.29	2.29	2.38	13.05	0.00	0.75	0.68	7.61	4.67	4.29
Poliocephalus poliocephalus	137	0.913 (0.018)	41.93	0.00	2.25	18.19	10.26	2.34	7.44	13.95	1.62	2.02
Pomatostomus superciliosus	46	0.951 (0.024)	0.00	0.00	62.47	0.00	1.24	0.05	1.96	28.70	0.22	5.35
Pomatostomus temporalis temporalis	813	0.916 (0.008)	33.58	4.11	22.92	17.60	14.25	1.27	2.47	1.72	0.13	1.95
Porphyrio porphyrio	1101	0.847 (0.012)	43.56	7.71	2.54	12.38	14.69	0.50	0.38	11.11	2.71	4.43
Porzana fluminea	30	0.904 (0.044)	3.66	1.36	16.18	20.33	46.86	0.12	4.63	4.63	0.00	2.24
Porzana pusilla	46	0.933 (0.033)	5.22	0.83	3.87	41.01	20.21	1.04	4.56	8.53	1.15	13.58
Porzana tabuensis	42	0.941 (0.023)	56.60	0.00	5.83	15.63	2.27	0.34	1.85	17.02	0.09	0.38
Psephotus haematonotus	556	0.835 (0.015)	7.83	3.71	33.03	4.16	13.51	9.69	2.74	8.46	0.59	16.28
Psophodes olivaceus	4323	0.721 (0.009)	44.13	20.22	0.44	5.90	9.55	4.04	1.84	7.84	2.22	3.82
Ptilinopus magnificus	164	0.873 (0.028)	6.45	1.26	20.74	18.27	5.84	2.65	4.28	0.18	38.52	1.81
Ptilinopus regina	37	0.874 (0.064)	31.98	7.88	8.67	3.66	2.29	0.83	0.00	2.67	0.00	42.04
Ptilinopus superbus	27	0.853 (0.072)	27.14	8.48	27.88	4.67	1.57	0.10	11.16	14.67	3.74	0.60
Ptilonorhynchus violaceus	2186	0.707 (0.013)	22.58	14.02	13.51	11.23	17.58	9.51	0.00	0.63	3.23	7.71

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Ptiloris paradiseus	126	0.951 (0.014)	10.98	4.11	37.67	2.75	4.42	0.74	2.33	1.57	32.08	3.36
Pycnoptilus floccosus	67	0.976 (0.013)	0.59	20.88	12.24	17.41	1.57	3.22	2.36	38.31	2.96	0.45
Recurvirostra novaehollandiae	96	0.971 (0.014)	66.09	0.33	6.62	1.64	0.98	0.22	3.35	0.80	0.41	19.55
Rhipidura albiscapa	6063	0.661 (0.01)	36.87	5.96	0.00	5.11	23.66	2.78	2.14	9.07	2.21	12.20
Rhipidura leucophrys	3364	0.723 (0.011)	58.17	0.00	0.00	0.00	25.55	8.34	0.24	0.00	1.13	6.57
Rhipidura rufifrons	1346	0.775 (0.014)	20.14	8.33	21.07	3.74	17.65	3.92	12.83	0.00	12.31	0.00
Scythrops novaehollandiae	989	0.765 (0.016)	71.95	0.00	0.04	6.72	7.45	3.31	2.65	3.63	2.43	1.81
Sericornis citreogularis	855	0.834 (0.015)	6.59	24.45	3.70	3.75	6.90	10.31	11.22	1.65	25.17	6.26
Sericornis frontalis	3780	0.707 (0.011)	35.69	11.16	1.13	9.27	17.79	5.80	4.24	5.32	1.32	8.28
Sericornis magnirostra	614	0.824 (0.017)	21.91	23.75	5.09	7.20	5.28	10.18	6.92	0.00	16.31	3.36
Sericulus chrysocephalus	484	0.874 (0.016)	23.14	2.84	41.73	7.56	6.12	0.98	0.48	8.63	5.70	2.83
Smicrornis brevirostris	697	0.829 (0.02)	2.65	8.40	49.63	1.88	12.65	2.57	6.49	14.92	0.00	0.80
Sphecotheres vieilloti	794	0.913 (0.013)	77.51	3.11	0.24	0.20	1.32	0.04	0.30	4.58	0.92	11.79
Stagonopleura guttata	198	0.9 (0.023)	3.77	14.80	21.84	21.27	9.84	5.44	6.57	10.76	1.31	4.41
Sterna hirundo	139	0.981 (0.005)	11.30	0.60	34.11	17.39	0.33	0.09	1.48	7.55	0.72	26.42
Sterna striata	34	0.967 (0.017)	9.97	0.09	39.08	5.18	1.04	0.96	0.74	6.21	0.00	36.70
Sternula albifrons	158	0.975 (0.011)	22.28	10.98	14.77	6.56	0.60	0.12	0.78	12.67	3.35	27.89
Stictonetta naevosa	24	0.907 (0.046)	28.74	0.00	0.57	6.18	1.90	5.91	3.18	13.36	0.73	39.43
Stipiturus malachurus	324	0.916 (0.015)	4.33	2.83	66.89	11.55	4.01	0.27	2.75	0.92	0.62	5.83
Strepera graculina	4849	0.64 (0.011)	25.60	5.30	0.00	5.79	19.85	5.38	3.78	12.13	5.68	16.49
Strepera versicolor	28	0.708 (0.114)	2.72	1.74	1.22	0.00	9.59	24.38	3.88	34.05	2.36	20.06
Symposiachrus trivirgatus	105	0.856 (0.032)	8.60	3.06	21.00	23.57	19.89	5.42	6.68	4.01	4.26	3.50
Tachybaptus novaehollandiae	845	0.802 (0.013)	45.93	5.09	6.64	2.54	23.82	1.56	2.17	3.98	5.19	3.08
Tadorna tadornoides	20	0.892 (0.063)	10.16	0.00	0.00	3.49	9.88	2.99	4.57	62.58	0.00	6.32
Taeniopygia bichenovii	687	0.836 (0.019)	23.97	8.78	30.42	6.56	9.07	3.82	2.41	5.22	2.36	7.41
Taeniopygia guttata	111	0.887 (0.031)	12.01	4.81	53.88	9.44	3.89	7.88	4.56	0.78	0.25	2.50

TABLE 5 CONTINUED

BIRDS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL_ VEGETATION	DRY_ SCLEROPHYLL_ FORESTS	RAINFORESTS	WET_ SCLEROPHYLL_ FORESTS
Thalasseus bergii	775	0.959 (0.007)	30.36	1.11	36.40	8.39	0.29	0.47	0.29	4.53	0.32	17.84
Threskiornis molucca	1325	0.894 (0.009)	80.10	1.15	1.93	1.82	1.17	0.37	1.21	2.39	0.11	9.75
Threskiornis spinicollis	1034	0.823 (0.013)	23.02	0.74	2.02	8.28	38.87	0.47	1.52	9.05	0.83	15.21
Todiramphus macleayii	144	0.899 (0.027)	56.94	0.00	16.59	9.76	9.37	0.73	0.92	0.76	2.79	2.14
Todiramphus sanctus	1724	0.78 (0.013)	61.00	3.46	1.81	9.25	13.99	2.72	1.90	5.05	0.10	0.72
Tregellasia capito	93	0.882 (0.029)	11.12	6.19	16.21	10.14	2.19	1.91	1.34	10.40	28.06	12.43
Tribonyx ventralis	26	0.85 (0.081)	4.62	5.17	0.56	41.94	0.33	6.97	7.57	2.19	28.21	2.44
Trichoglossus chlorolepidotus	998	0.917 (0.01)	81.24	8.66	0.84	3.55	1.28	0.08	0.06	1.54	0.60	2.13
Trichoglossus haematodus	2774	0.86 (0.007)	76.71	15.69	2.31	0.26	3.69	0.18	0.00	0.56	0.08	0.51
Tringa brevipes	132	0.976 (0.007)	7.08	1.10	63.87	9.70	0.03	0.44	1.63	1.87	0.15	14.13
Tringa nebularia	220	0.978 (0.004)	38.46	0.11	2.87	25.40	4.03	0.44	5.09	7.86	1.43	14.31
Tringa stagnatilis	101	0.981 (0.009)	30.93	0.64	7.30	23.20	1.11	1.61	0.88	16.90	5.06	12.38
Turnix varius	190	0.799 (0.034)	17.07	1.45	3.25	2.89	21.65	2.30	4.38	43.38	1.01	2.63
Tyto javanica	203	0.726 (0.038)	32.36	0.00	25.85	24.07	0.06	4.51	2.66	6.34	1.22	2.92
Tyto longimembris	36	0.921 (0.03)	1.09	4.39	81.56	7.69	1.05	0.12	0.00	0.70	0.19	3.21
Tyto novaehollandiae	256	0.828 (0.023)	9.82	3.61	12.97	9.90	16.79	1.91	4.18	17.52	5.44	17.87
Tyto tenebricosa	357	0.923 (0.011)	5.54	10.58	2.78	5.02	9.63	0.56	3.98	3.08	18.81	40.03
Vanellus miles	2769	0.794 (0.01)	78.68	1.38	0.14	2.25	10.70	1.95	0.15	0.00	0.56	4.21
Vanellus tricolor	44	0.811 (0.08)	4.74	2.11	15.48	5.88	17.28	4.68	8.22	5.55	14.67	21.38
Xenus cinereus	63	0.986 (0.004)	9.53	1.97	12.80	9.04	0.38	2.55	1.05	19.84	0.01	42.83
Zoothera heinei	71	0.87 (0.04)	3.11	6.66	2.46	10.09	1.20	11.62	1.69	14.97	42.47	5.71
Zoothera lunulata	329	0.811 (0.027)	4.11	24.08	15.56	6.12	6.64	18.42	11.05	1.02	12.23	0.77
Zosterops lateralis	3191	0.688 (0.012)	46.94	0.00	0.40	12.81	14.98	7.53	1.77	8.84	3.93	2.79

Table 6. Mean results from MaxEnt models for mammals within the Greater Hunter region. Results show the number of records used to construct each model and the mean (± standard deviation) test AUC value across five-fold cross-validated models. The data shown for the environmental variables represent the permutation importance for each variable used to construct the full model.

MAMMALS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLL FORESTS
Acrobates pygmaeus	268	0.777 (0.028)	23.05	3.46	8.00	23.90	7.67	4.10	12.12	3.85	5.58	4.98
Aepyprymnus rufescens	29	0.843 (0.094)	0.00	0.00	6.22	10.44	12.83	0.00	5.78	16.06	28.52	19.93
Antechinus flavipes	197	0.824 (0.036)	12.89	17.22	7.27	10.77	6.89	9.53	23.80	1.38	1.67	7.36
Antechinus stuartii	1390	0.83 (0.011)	12.43	9.20	44.15	7.84	17.85	1.81	3.34	1.74	0.11	0.55
Antechinus swainsonii	129	0.844 (0.037)	0.03	12.71	63.85	11.46	4.51	1.86	3.42	0.40	0.36	0.85
Cercartetus nanus	60	0.862 (0.057)	4.51	53.35	12.48	3.52	18.78	0.05	2.27	1.76	0.66	2.44
Chalinolobus dwyeri	188	0.847 (0.027)	1.56	1.19	19.66	27.70	2.25	4.40	15.95	24.39	0.71	0.88
Chalinolobus gouldii	1077	0.78 (0.015)	24.67	3.07	1.17	42.14	14.20	1.42	3.84	2.24	1.77	5.15
Chalinolobus morio	838	0.707 (0.022)	16.20	6.16	0.00	12.04	18.24	2.97	25.08	10.62	2.07	2.36
Dasyurus maculatus	1379	0.723 (0.014)	6.69	17.18	53.74	6.41	8.96	2.57	2.53	1.51	0.00	0.16
Falsistrellus tasmaniensis	197	0.747 (0.042)	2.33	12.69	7.08	31.25	15.04	3.77	7.53	3.91	2.79	2.78
Hydromys chrysogaster	70	0.774 (0.057)	0.86	2.18	10.10	8.91	32.61	14.89	9.95	1.71	4.60	13.34
Isoodon macrourus	396	0.849 (0.017)	10.48	2.85	62.90	10.14	8.73	1.20	0.25	0.95	1.45	0.61
Kerivoula papuensis	188	0.951 (0.011)	0.01	2.36	0.74	2.18	2.51	1.50	4.74	4.57	1.49	70.61
Macropus giganteus	1106	0.811 (0.015)	24.18	0.05	23.66	22.77	18.02	1.07	3.38	6.64	0.20	0.03
Macropus parma	227	0.943 (0.014)	1.08	13.92	2.97	11.02	3.75	2.83	8.77	0.00	2.88	51.31
Macropus robustus	264	0.802 (0.027)	15.27	8.88	15.33	11.53	6.46	5.78	2.41	23.36	2.13	5.25
Macropus rufogriseus	1008	0.764 (0.017)	16.70	16.60	4.63	8.02	13.02	0.07	7.81	7.04	1.86	23.96
Mastacomys fuscus	40	0.997 (0.001)	0.06	81.64	5.92	0.06	0.40	0.46	0.52	8.80	1.50	0.61
Melomys cervinipes	53	0.878 (0.035)	0.00	9.88	46.47	5.43	0.18	2.98	19.13	1.63	1.54	4.29
Miniopterus australis	730	0.883 (0.009)	74.00	1.48	5.70	6.44	4.03	2.25	3.24	0.74	0.97	0.29
Miniopterus schreibersii oceanensis	857	0.769 (0.017)	35.95	0.00	4.89	20.22	10.41	2.16	15.52	0.36	1.15	2.14
Mormopterus norfolkensis	519	0.832 (0.018)	11.85	0.00	1.13	47.72	12.46	2.24	7.46	5.44	4.95	6.75
Mormopterus planiceps	85	0.725 (0.062)	9.70	0.00	3.39	23.86	5.40	4.99	5.52	2.59	0.58	39.19

TABLE 6 CONTINUED

MAMMALS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLL FORESTS
Myotis macropus	345	0.834 (0.019)	42.48	0.44	1.13	12.00	7.61	1.45	10.31	7.06	4.13	6.60
Nyctophilus geoffroyi	357	0.745 (0.027)	22.82	1.32	10.31	16.58	20.82	2.08	18.05	6.16	0.21	0.31
Nyctophilus gouldi	687	0.804 (0.022)	11.32	8.77	0.41	4.46	17.97	0.44	33.78	4.84	2.65	2.99
Ornithorhynchus anatinus	655	0.783 (0.02)	12.05	12.29	26.20	4.86	1.28	31.17	0.11	7.01	4.56	0.00
Perameles nasuta	785	0.854 (0.013)	0.35	0.45	43.20	7.79	19.82	0.90	6.95	4.19	1.67	12.36
Petauroides volans	2049	0.875 (0.007)	3.86	47.51	0.38	0.94	9.70	0.60	7.19	1.91	3.29	24.07
Petaurus australis	1626	0.857 (0.009)	18.53	18.82	3.03	2.67	9.52	1.24	8.78	15.10	1.91	20.05
Petaurus breviceps	2092	0.8 (0.01)	21.64	13.68	0.56	5.26	18.67	1.11	7.71	10.49	1.17	19.28
Petaurus norfolcensis	826	0.868 (0.014)	33.01	3.11	0.35	27.33	12.45	2.02	6.07	1.76	2.46	11.35
Petrogale penicillata	180	0.896 (0.023)	30.91	1.21	9.90	10.14	13.97	8.81	7.15	11.35	4.14	0.87
Phascogale tapoatafa	271	0.839 (0.023)	2.95	31.36	37.76	3.07	2.86	5.30	1.36	9.76	2.23	3.30
Phascolarctos cinereus	6867	0.716 (0.006)	28.18	6.11	44.30	0.00	17.06	3.98	0.38	0.00	0.00	0.00
Potorous tridactylus	63	0.859 (0.037)	12.08	8.60	53.20	10.80	8.41	2.25	2.34	0.00	1.27	0.69
Pseudocheirus peregrinus	1166	0.818 (0.014)	17.12	24.66	12.71	16.42	15.92	1.55	4.82	1.13	2.62	1.42
Pseudomys gracilicaudatus	45	0.969 (0.012)	7.41	3.42	75.91	9.16	0.00	0.21	1.62	0.00	0.50	1.76
Pseudomys novaehollandiae	164	0.857 (0.034)	31.28	2.36	3.49	26.36	8.34	1.83	5.60	8.21	3.95	7.53
Pseudomys oralis	25	0.957 (0.037)	34.47	0.00	28.70	7.38	4.89	0.19	0.29	0.15	23.48	0.45
Pteropus poliocephalus	928	0.85 (0.012)	54.76	4.88	4.29	18.85	10.23	2.07	2.40	0.80	0.23	0.39
Pteropus scapulatus	68	0.877 (0.042)	35.51	4.38	12.95	4.05	31.76	4.76	0.78	2.91	1.52	1.34
Rattus fuscipes	1115	0.829 (0.013)	7.11	9.73	54.78	9.25	7.23	0.89	4.19	3.94	0.00	0.42
Rattus lutreolus	474	0.886 (0.014)	1.75	6.53	44.69	10.39	27.65	0.97	1.55	0.14	0.96	2.03
Rhinolophus megaphyllus	536	0.818 (0.02)	7.40	8.03	10.55	6.58	6.39	1.35	13.29	10.25	0.00	18.67
Saccolaimus flaviventris	75	0.782 (0.058)	21.73	0.00	3.53	33.77	10.48	5.63	10.97	11.11	0.00	0.00
Scoteanax rueppellii	379	0.82 (0.023)	8.42	10.07	1.21	35.85	17.13	1.84	8.95	4.67	4.49	3.64
Scotorepens balstoni	68	0.916 (0.034)	4.51	0.16	29.04	4.52	7.21	1.33	2.60	11.89	0.00	36.34
Scotorepens orion	410	0.807 (0.025)	22.42	8.19	1.90	22.14	14.51	2.39	12.63	8.24	1.08	0.44

TABLE 6 CONTINUED

MAMMALS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	TERR1000	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLL FORESTS
Sminthopsis murina	150	0.789 (0.053)	27.25	2.00	3.11	8.19	28.56	4.15	8.20	8.21	1.09	8.15
Syconycteris australis	22	0.955 (0.032)	52.55	3.45	0.00	4.31	0.26	0.00	3.25	0.47	7.31	28.09
Tachyglossus aculeatus	2350	0.689 (0.011)	62.08	2.84	0.00	5.48	12.48	1.05	1.41	3.36	3.28	7.09
Tadarida australis	966	0.762 (0.016)	14.95	0.54	1.24	30.18	21.18	2.97	14.21	12.17	0.00	1.35
Thylogale stigmatica	42	0.927 (0.034)	9.30	3.16	15.48	0.00	7.96	1.85	5.13	19.56	29.03	6.90
Thylogale thetis	365	0.917 (0.012)	7.22	6.44	24.41	3.07	6.14	1.66	10.43	3.61	20.28	15.72
Trichosurus caninus	304	0.893 (0.02)	6.13	11.45	10.86	3.54	24.21	4.35	18.29	0.01	9.72	8.84
Trichosurus vulpecula	2018	0.716 (0.012)	17.67	0.43	4.65	23.16	17.39	2.83	15.41	9.15	5.27	2.56
Vespadelus darlingtoni	387	0.773 (0.035)	13.16	34.60	5.29	7.39	19.64	1.84	4.03	2.31	3.69	1.80
Vespadelus pumilus	798	0.847 (0.013)	18.42	17.43	2.38	26.13	17.34	0.52	6.54	2.70	0.00	1.06
Vespadelus regulus	247	0.758 (0.037)	2.53	11.38	7.05	14.08	29.07	0.23	23.47	4.47	5.62	1.22
Vespadelus troughtoni	126	0.829 (0.04)	18.10	1.24	34.71	13.73	6.67	0.20	5.75	6.40	4.88	7.04
Vespadelus vulturnus	1310	0.752 (0.015)	24.17	6.04	0.48	15.43	12.32	3.12	19.34	10.92	1.90	0.03
Vombatus ursinus	2009	0.744 (0.012)	10.05	9.80	14.97	39.32	2.50	4.85	3.75	14.18	0.38	0.00
Wallabia bicolor	1591	0.76 (0.012)	14.74	15.62	3.28	9.55	13.35	1.99	8.12	24.59	1.25	7.40

Table 7. Mean results from MaxEnt models for plants within the Greater Hunter region. Results show the number of records used to construct each model and the mean (± standard deviation) test AUC value across five-fold cross-validated models. The data shown for the environmental variables represent the permutation importance for each variable used to construct the full model.

PLANTS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS	SOIL
Acacia bynoeana	126	0.987 (0.003)	1.90	1.88	4.43	20.92	23.35	1.91	26.04	8.61	4.71	4.93
Acacia courtii	35	0.994 (0.003)	0.54	46.17	40.52	0.15	0.06	0.57	4.67	1.91	1.52	1.20
Acacia pendula	132	0.984 (0.004)	26.05	25.41	22.19	12.28	1.87	0.16	3.02	1.44	1.66	4.99
Acianthus collinus	20	0.953 (0.03)	2.59	2.38	0.41	5.23	0.90	1.14	59.42	0.10	3.15	23.04
Acianthus fornicatus	195	0.832 (0.031)	5.95	3.60	14.28	23.52	10.11	8.73	2.02	0.43	4.73	17.81
Actinotus helianthi	283	0.918 (0.013)	2.45	9.85	29.60	5.63	0.31	1.98	5.21	0.03	18.63	20.83
Adiantum aethiopicum	1051	0.741 (0.015)	0.00	18.16	15.02	28.75	0.47	19.03	0.10	4.84	0.56	7.76
Adiantum atroviride	21	0.795 (0.109)	0.00	2.23	12.10	0.97	14.92	6.03	1.04	5.28	12.42	44.15
Adiantum diaphanum	26	0.898 (0.066)	3.02	0.00	29.96	0.00	7.37	9.11	5.82	0.51	10.30	30.44
Adiantum formosum	488	0.822 (0.018)	9.78	2.10	5.68	36.07	5.55	26.43	0.00	1.58	1.94	6.68
Adiantum hispidulum	567	0.799 (0.018)	26.45	0.54	11.65	14.08	4.28	25.94	0.78	2.63	1.38	9.11
Adiantum silvaticum	131	0.927 (0.02)	0.00	1.14	6.28	47.32	7.23	13.82	1.34	0.52	1.07	14.89
Allocasuarina defungens	64	0.974 (0.018)	5.80	25.12	26.42	0.00	0.69	9.76	2.23	0.56	4.31	25.12
Allocasuarina simulans	47	0.975 (0.022)	37.85	0.00	0.00	0.00	0.01	7.15	0.08	0.66	0.99	53.25
Angophora inopina	308	0.972 (0.003)	0.74	0.00	38.48	41.75	3.43	0.53	7.45	4.00	0.57	2.02
Archontophoenix cunninghamiana	316	0.941 (0.009)	34.74	1.78	0.76	49.74	1.07	0.00	3.29	0.96	2.01	4.87
Arthrochilus prolixus	28	0.836 (0.058)	2.25	0.00	5.39	17.50	6.29	1.24	4.64	0.00	0.33	57.45
Asperula asthenes	52	0.874 (0.049)	2.87	0.80	0.00	5.91	0.94	7.05	2.84	8.21	1.89	64.19
Asplenium australasicum	348	0.865 (0.02)	3.95	0.38	1.36	54.03	2.23	17.46	1.45	1.45	1.08	14.57
Banksia spinulosa	745	0.906 (0.008)	9.34	4.60	13.04	48.09	7.26	5.31	2.90	3.12	0.02	3.37
Blandfordia grandiflora	68	0.942 (0.022)	8.26	8.32	2.03	53.74	5.19	9.23	0.27	3.64	1.95	7.31
Boronia anethifolia	68	0.906 (0.048)	14.91	2.21	5.02	18.03	0.78	7.32	0.80	16.62	0.00	29.19
Boronia falcifolia	31	0.975 (0.013)	35.82	8.01	1.18	0.79	0.00	22.33	3.53	2.42	4.94	20.76
Boronia floribunda	25	0.97 (0.011)	0.00	11.37	5.98	33.49	0.83	3.42	1.19	2.66	4.56	26.81

TABLE 7 CONTINUED

PLANTS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS	SOIL
Boronia ledifolia	153	0.963 (0.011)	10.47	2.00	0.95	2.43	0.48	1.75	2.19	0.18	6.89	70.16
Boronia parviflora	46	0.909 (0.041)	4.93	3.82	1.91	22.45	33.83	6.92	1.15	0.05	0.10	19.35
Boronia pinnata	154	0.933 (0.018)	21.68	11.90	7.59	40.40	1.37	3.67	0.88	2.35	0.24	8.67
Boronia polygalifolia	106	0.929 (0.018)	6.23	13.08	34.85	4.92	3.19	5.88	6.84	2.04	2.96	19.50
Boronia rubiginosa	45	0.963 (0.018)	4.73	0.85	0.00	56.43	6.39	0.51	1.53	10.26	0.00	15.59
Boronia serrulata	33	0.998 (0.001)	0.19	0.00	0.00	86.27	0.01	5.90	3.17	0.25	0.00	3.65
Bothriochloa biloba	284	0.958 (0.007)	50.46	17.77	4.04	0.98	2.80	0.80	11.99	1.80	5.49	2.71
Bulbophyllum exiguum	51	0.936 (0.027)	14.91	7.91	1.96	14.99	2.95	10.04	6.78	2.89	5.91	17.68
Bulbophyllum shepherdii	43	0.882 (0.045)	14.62	6.15	0.12	17.38	2.50	30.26	3.40	4.57	0.00	14.77
Caladenia carnea	78	0.77 (0.055)	15.66	1.89	4.19	26.17	1.03	26.51	0.25	3.06	4.24	16.66
Caladenia catenata	156	0.886 (0.031)	11.03	2.27	25.80	4.00	0.58	9.72	0.21	0.97	5.94	33.31
Calanthe triplicata	53	0.923 (0.034)	26.14	0.00	0.00	25.47	5.96	10.45	4.18	9.75	2.06	12.91
Caleana major	34	0.896 (0.034)	26.62	1.02	5.90	14.92	4.60	16.35	0.40	0.33	5.18	22.53
Callistemon linearifolius	290	0.977 (0.003)	38.93	5.31	5.10	13.48	0.18	2.46	13.40	2.22	14.41	3.81
Calochilus paludosus	39	0.78 (0.082)	18.56	3.62	7.39	1.81	0.95	0.00	27.20	0.00	0.10	38.12
Calochilus robertsonii	34	0.896 (0.042)	0.20	0.00	0.21	33.52	0.99	5.26	10.00	0.00	8.41	41.29
Casuarina cunninghamiana subsp. cunninghamiana	308	0.863 (0.025)	11.06	23.10	2.20	2.91	2.94	4.93	0.61	0.00	0.51	8.70
Caustis flexuosa	153	0.91 (0.023)	0.42	9.82	3.08	28.28	1.38	6.30	0.12	0.15	6.87	38.46
Caustis pentandra	57	0.925 (0.037)	0.53	1.76	9.59	53.03	0.00	10.14	3.98	3.86	3.78	9.76
Caustis recurvata	78	0.951 (0.022)	0.42	10.77	6.17	14.40	44.38	5.70	3.45	0.00	2.25	5.77
Ceratopetalum gummiferum	162	0.924 (0.018)	0.16	3.40	16.17	63.53	0.00	0.00	1.55	2.78	3.01	7.28
Cestichis reflexa	27	0.845 (0.065)	1.46	5.04	0.75	0.62	33.56	21.39	1.39	5.77	0.23	29.26
Chiloglottis diphylla	26	0.904 (0.046)	2.69	21.87	1.55	1.85	4.46	13.30	13.96	10.46	7.51	21.97
Chiloglottis pluricallata	24	0.996 (0.002)	0.00	89.02	0.00	0.38	0.00	0.53	0.05	0.00	6.48	2.68
Chiloglottis sylvestris	20	0.708 (0.084)	0.00	0.00	6.75	28.05	5.19	5.53	13.35	0.59	4.46	36.07

TABLE 7 CONTINUED

PLANTS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS	SOIL
Chiloglottis trilabra	41	0.941 (0.045)	60.87	0.48	0.11	4.90	0.00	0.00	0.00	0.03	3.80	29.81
Cordyline stricta	308	0.923 (0.01)	57.36	24.69	2.08	2.60	0.37	0.63	0.92	0.00	8.09	2.27
Corybas fimbriatus	24	0.826 (0.067)	2.91	0.00	0.28	46.26	8.03	7.02	0.15	10.60	2.77	21.95
Crowea saligna	20	0.968 (0.026)	6.35	0.00	0.00	70.58	0.00	0.00	0.00	9.23	10.76	2.45
Cryptostylis erecta	108	0.934 (0.016)	3.33	3.49	1.36	64.29	5.11	0.84	4.38	6.78	3.08	4.12
Cryptostylis subulata	152	0.955 (0.011)	34.27	11.71	0.96	28.75	2.10	2.51	1.24	1.05	1.03	9.64
Cyanicula caerulea	26	0.789 (0.099)	0.00	4.26	2.24	0.00	4.19	11.37	5.67	3.79	19.99	44.32
Cyathea australis	256	0.893 (0.019)	7.28	46.58	1.19	25.02	3.16	0.34	2.37	0.00	0.01	13.01
Cyathea leichhardtiana	162	0.944 (0.016)	1.03	15.66	1.18	67.54	3.19	3.09	0.91	0.00	0.19	4.72
Cymbidium canaliculatum	56	0.968 (0.016)	13.32	8.40	0.12	1.69	0.53	4.94	0.44	25.16	22.98	19.10
Cymbidium suave	287	0.833 (0.018)	3.73	19.70	9.48	28.72	1.37	5.05	2.78	0.00	3.87	18.22
Cynanchum elegans	93	0.884 (0.046)	25.65	5.06	7.27	11.83	1.81	5.80	2.02	23.31	1.51	13.46
Darwinia glaucophylla	127	0.994 (0.001)	1.46	1.24	2.20	89.49	0.65	0.00	2.20	0.13	0.10	1.85
Dendrobium aemulum	63	0.855 (0.043)	7.45	0.08	0.53	32.60	13.14	3.61	3.81	7.27	1.19	27.84
Dendrobium fairfaxii	34	0.916 (0.044)	28.04	0.44	20.11	2.14	0.00	2.11	0.42	19.82	9.59	16.17
Dendrobium gracilicaule	86	0.911 (0.033)	1.97	2.04	14.27	0.00	3.14	22.19	4.50	38.92	1.92	10.66
Dendrobium linguiforme	51	0.823 (0.063)	47.41	2.57	0.41	0.73	2.91	4.53	3.82	7.03	0.00	30.17
Dendrobium mortii	20	0.857 (0.102)	0.00	2.16	2.13	1.27	1.56	6.56	0.41	13.54	9.31	61.76
Dendrobium pugioniforme	126	0.949 (0.018)	43.02	1.25	2.73	14.20	2.20	7.35	4.90	17.98	0.46	5.16
Dendrobium schoeninum	54	0.936 (0.027)	11.38	1.89	34.78	2.22	4.88	16.40	0.08	15.43	1.78	11.17
Dendrobium teretifolium	50	0.847 (0.058)	5.98	2.46	1.70	10.68	0.32	15.05	1.96	6.63	0.53	47.37
Dendrobium tetragonum	26	0.912 (0.034)	13.90	0.00	14.83	12.78	0.00	6.04	1.83	1.10	21.31	27.54
Dicksonia antarctica	118	0.954 (0.02)	32.22	0.00	1.36	42.94	1.29	1.09	4.14	6.84	0.18	8.11
Dipodium punctatum	67	0.768 (0.053)	4.18	7.98	0.00	34.28	0.91	3.15	7.67	0.00	1.55	40.28
Diuris sulphurea	40	0.689 (0.102)	0.32	19.67	0.00	13.08	8.74	11.88	4.69	5.61	0.00	36.01
Diuris tricolor	57	0.994 (0.002)	0.49	0.11	12.63	35.14	1.74	1.32	0.48	0.00	0.00	40.73

TABLE 7 CONTINUED

PLANTS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS	SOIL
Doryanthes excelsa	189	0.963 (0.008)	7.76	0.00	24.40	56.38	0.03	0.65	1.91	5.22	0.31	2.64
Dracophyllum macranthum	22	0.998 (0.001)	0.00	8.57	0.00	1.27	0.00	0.74	3.34	0.00	0.00	86.06
Eriostemon australasius	192	0.974 (0.006)	25.95	3.51	27.11	23.03	0.00	5.86	1.47	0.93	6.93	2.95
Eucalyptus camaldulensis	203	0.98 (0.007)	4.16	77.24	1.04	8.38	0.17	2.44	1.33	0.76	0.94	2.98
Eucalyptus camfieldii	50	0.984 (0.008)	0.00	12.26	1.31	38.65	9.88	0.17	11.95	0.01	16.02	1.24
Eucalyptus fracta	24	0.998 (0.001)	0.00	2.26	57.41	0.00	2.71	0.00	34.03	1.02	1.58	0.74
Eucalyptus glaucina	173	0.968 (0.009)	7.68	18.78	20.74	10.23	1.30	2.19	11.95	0.51	4.65	17.57
Eucalyptus largeana	63	0.938 (0.021)	31.24	19.59	2.03	19.56	2.47	2.57	11.10	1.86	0.57	8.50
Eucalyptus oblonga	27	0.988 (0.006)	0.00	55.14	0.00	24.73	3.81	0.92	2.52	3.68	0.09	8.46
Eucalyptus parramattensis subsp. decadens	343	0.981 (0.002)	0.00	2.73	0.42	40.98	7.04	2.05	22.80	10.57	9.22	2.61
Eucalyptus parramattensis subsp. parramattensis	26	0.978 (0.013)	0.00	32.44	1.34	0.14	1.62	0.00	47.34	15.69	0.00	0.00
Eucalyptus seeana	46	0.97 (0.019)	0.91	0.00	29.11	13.91	3.08	4.69	15.29	0.00	13.04	19.41
Euphrasia ciliolata	33	0.981 (0.016)	19.64	61.62	0.64	1.16	8.20	0.31	1.81	0.42	0.28	4.29
Gahnia sieberiana	306	0.915 (0.013)	2.94	6.15	12.90	54.40	8.45	1.74	1.24	0.00	0.92	7.32
Glossodia major	33	0.8 (0.06)	2.74	0.67	2.47	4.76	5.16	1.74	44.04	3.31	0.00	14.65
Glossodia minor	25	0.902 (0.054)	0.54	2.98	0.00	4.92	12.46	0.07	28.05	1.53	2.76	37.61
Grevillea parviflora subsp. parviflora	556	0.968 (0.003)	3.00	1.70	33.96	17.80	3.96	1.91	11.14	5.79	0.42	19.30
Hakea archaeoides	21	0.994 (0.003)	9.68	1.07	19.21	0.68	0.12	0.00	0.00	9.55	55.92	3.76
Hibbertia procumbens	344	0.983 (0.003)	0.47	0.00	0.00	80.59	5.00	0.14	2.07	0.11	0.74	10.28
Isopogon anemonifolius	476	0.939 (0.009)	1.99	0.89	9.70	47.37	7.07	8.42	2.31	0.66	11.59	7.44
Isopogon anethifolius	34	0.985 (0.006)	0.00	3.33	4.92	67.51	0.38	0.99	0.74	0.09	18.01	2.97
Isopogon dawsonii	86	0.971 (0.014)	0.00	14.36	22.55	11.30	0.46	11.47	5.60	20.34	4.89	7.36
Kunzea ambigua	156	0.969 (0.011)	0.34	3.82	21.39	57.98	1.40	0.11	8.81	0.27	1.77	3.62
Kunzea capitata	68	0.985 (0.004)	0.51	11.83	0.02	68.94	2.75	2.96	2.21	0.00	9.25	1.05

TABLE 7 CONTINUED

PLANTS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS	SOIL
Lepidozamia peroffskyana	35	0.977 (0.011)	12.64	0.22	9.96	0.00	0.00	32.85	6.71	3.90	10.22	21.89
Linospadix monostachya	51	0.93 (0.028)	4.74	5.90	24.86	3.04	6.14	21.25	11.87	0.00	1.05	18.71
Livistona australis	662	0.937 (0.006)	44.81	5.68	29.60	16.02	0.96	1.12	0.09	0.73	0.24	0.42
Lomatia silaifolia	448	0.883 (0.013)	2.23	7.02	1.18	54.54	8.30	3.27	1.05	4.39	0.49	12.36
Lycopodium deuterodensum	21	0.908 (0.07)	0.00	5.69	7.87	23.78	18.94	10.71	0.51	0.00	11.90	17.42
Lyperanthus suaveolens	36	0.913 (0.031)	27.27	0.00	12.95	4.60	2.47	0.47	32.07	0.00	0.00	12.64
Macrozamia communis	432	0.918 (0.011)	19.57	0.00	25.24	16.04	0.00	0.84	3.98	0.43	11.51	20.42
Macrozamia concinna	27	0.9 (0.042)	0.00	0.36	23.91	21.01	3.33	29.92	3.62	0.01	1.16	15.30
Macrozamia flexuosa	246	0.969 (0.008)	3.15	6.91	15.41	29.11	0.28	2.08	20.41	0.00	1.68	19.56
Macrozamia reducta	136	0.926 (0.016)	10.34	0.01	18.23	0.96	0.27	22.72	22.79	4.74	3.29	13.48
Maundia triglochinoides	30	0.959 (0.019)	2.89	0.00	0.04	9.00	4.14	6.36	3.90	16.74	2.77	30.99
Melaleuca biconvexa	510	0.972 (0.002)	40.10	15.80	26.37	10.07	0.68	0.19	0.59	0.65	4.65	0.53
Melaleuca groveana	95	0.939 (0.027)	21.87	11.84	19.62	20.64	2.60	0.28	6.24	0.18	4.74	10.23
Microtis parviflora	65	0.862 (0.043)	12.02	0.83	0.44	9.76	15.79	5.97	9.73	0.22	4.45	33.86
Microtis unifolia	71	0.85 (0.051)	0.00	11.88	45.17	1.37	3.59	0.06	15.72	0.59	0.05	19.04
Papillilabium beckleri	31	0.868 (0.072)	0.00	0.51	1.82	16.80	1.09	1.65	4.70	0.84	38.46	27.62
Persoonia conjuncta	48	0.93 (0.023)	9.83	23.52	43.52	0.00	3.32	3.41	0.95	1.11	9.59	4.77
Persoonia isophylla	113	0.984 (0.007)	0.57	0.25	0.00	64.69	1.41	0.22	0.67	0.19	0.25	30.96
Persoonia lanceolata	278	0.965 (0.008)	9.28	15.50	20.05	20.79	1.28	2.14	2.79	0.00	22.06	3.53
Persoonia laurina	31	0.929 (0.047)	0.00	0.00	7.56	42.54	0.00	20.24	4.26	0.00	3.73	21.19
Persoonia levis	913	0.908 (0.007)	1.65	1.88	5.80	72.68	2.01	3.25	0.97	1.43	0.68	6.60
Persoonia linearis	2145	0.737 (0.01)	0.00	0.20	13.41	2.36	3.66	17.96	31.45	0.00	6.60	20.40
Persoonia media	121	0.962 (0.013)	4.18	1.14	79.04	4.51	0.51	3.02	0.30	0.27	3.75	2.43
Persoonia oleoides	24	0.983 (0.009)	66.94	0.00	2.39	0.00	0.02	0.03	0.60	2.80	23.32	3.31
Persoonia pauciflora	48	0.998 (0.001)	0.26	2.87	0.00	9.30	0.51	3.59	44.00	0.00	10.51	28.97
Persoonia pinifolia	26	0.953 (0.029)	11.21	0.00	0.00	24.74	4.75	0.97	24.08	7.14	0.00	27.10

TABLE 7 CONTINUED

PLANTS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS	SOIL
Persoonia stradbrokensis	35	0.988 (0.005)	40.83	0.93	42.85	0.00	0.29	0.27	6.18	0.19	2.08	5.97
Petrophile pulchella	330	0.958 (0.006)	0.21	8.31	11.97	56.11	4.89	7.10	0.21	0.90	4.16	2.34
Phebalium squamulosum	125	0.887 (0.032)	4.02	5.97	25.36	8.92	0.91	10.15	13.83	0.32	1.49	28.20
Philotheca buxifolia	47	0.991 (0.005)	0.37	0.00	0.00	54.74	2.49	0.20	3.18	0.00	1.48	36.30
Philotheca myoporoides	23	0.859 (0.068)	1.29	0.00	3.19	6.55	0.00	12.75	8.67	11.01	4.40	40.03
Philotheca salsolifolia	80	0.915 (0.025)	0.97	1.90	6.27	19.00	3.46	5.64	0.23	0.00	40.86	20.81
Platycerium bifurcatum	412	0.827 (0.019)	13.04	0.65	0.72	53.25	3.25	14.61	0.89	4.16	2.61	5.80
Platycerium superbum	62	0.908 (0.038)	1.49	8.26	14.13	0.07	0.22	19.22	5.27	26.90	6.96	16.95
Plectorrhiza tridentata	127	0.821 (0.035)	0.00	0.29	8.85	23.41	6.02	29.51	4.46	0.43	5.44	16.26
Pomaderris queenslandica	43	0.887 (0.067)	0.00	3.24	0.05	54.85	1.75	24.33	2.14	0.04	0.00	13.60
Pomaderris reperta	26	0.987 (0.011)	0.00	9.52	0.00	17.92	0.06	1.57	47.14	0.00	0.00	23.59
Prasophyllum brevilabre	20	0.875 (0.057)	0.16	13.75	19.71	5.75	0.14	17.15	13.13	0.00	11.61	17.69
Prasophyllum odoratum	25	0.843 (0.117)	0.00	0.22	0.00	23.80	0.00	24.48	2.04	0.00	24.97	24.50
Prostanthera askania	49	0.993 (0.003)	3.07	0.00	0.00	63.06	0.32	0.03	5.00	0.19	2.80	25.08
Prostanthera junonis	122	0.994 (0.001)	0.13	3.68	0.00	39.53	0.76	0.28	11.09	0.00	8.49	36.02
Pterostylis acuminata	36	0.867 (0.054)	2.91	0.00	0.02	16.96	1.91	3.93	3.52	0.00	5.99	59.12
Pterostylis baptistii	32	0.899 (0.034)	6.25	0.02	13.69	1.70	3.80	2.71	0.11	0.00	5.75	54.97
Pterostylis coccina	30	0.899 (0.071)	35.41	14.00	0.42	0.37	1.19	6.72	0.00	0.00	22.43	19.13
Pterostylis concinna	47	0.82 (0.057)	2.23	13.51	5.02	3.74	2.60	10.62	4.32	0.00	24.18	27.38
Pterostylis curta	78	0.713 (0.065)	30.89	2.87	10.26	2.81	6.06	14.84	2.24	2.87	0.54	26.63
Pterostylis longifolia	83	0.821 (0.046)	5.00	0.00	10.49	37.54	4.30	10.41	0.36	0.10	5.43	25.78
Pterostylis nutans	132	0.774 (0.035)	1.53	2.12	32.09	18.02	4.60	6.12	4.45	0.26	4.21	26.40
Pterostylis obtusa	29	0.555 (0.117)	0.00	2.20	12.58	9.92	0.00	29.91	0.00	1.82	0.00	41.42
Pterostylis parviflora	22	0.775 (0.067)	12.05	2.00	6.87	1.00	7.01	5.71	4.95	0.20	2.40	20.50
Pterostylis pedunculata	25	0.758 (0.08)	0.67	5.06	5.04	0.57	0.00	0.45	18.52	0.71	19.62	44.85
Rutidosis heterogama	439	0.974 (0.004)	1.10	3.49	51.63	2.40	0.27	1.86	5.31	13.57	1.54	18.84

TABLE 7 CONTINUED

PLANTS	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS	SOIL
Sarcochilus falcatus	161	0.933 (0.017)	14.31	1.28	2.10	9.00	0.03	13.19	11.14	26.77	16.25	5.50
Sarcochilus hillii	29	0.805 (0.07)	18.24	0.00	46.85	6.47	2.27	3.08	0.00	1.42	1.51	19.39
Sarcochilus olivaceus	30	0.876 (0.06)	7.99	0.11	4.88	4.78	0.76	22.73	12.01	0.38	11.72	19.28
Senna acclinis	36	0.918 (0.04)	10.39	0.00	18.46	0.00	3.12	0.00	0.00	4.95	46.19	15.63
Spiranthes australis	33	0.846 (0.061)	0.95	1.74	0.90	43.03	16.37	0.61	2.67	1.86	6.75	19.47
Sprengelia incarnata	52	0.97 (0.012)	0.00	0.56	0.00	77.36	0.27	3.60	5.41	0.55	4.72	6.32
Sticherus flabellatus var. flabellatus	67	0.941 (0.029)	0.48	0.60	0.26	45.09	3.71	2.04	4.37	0.65	4.15	35.83
Syzygium paniculatum	127	0.943 (0.02)	12.18	9.90	6.43	23.59	1.04	3.15	17.74	1.72	4.42	18.02
Tasmannia glaucifolia	26	0.995 (0.002)	12.74	0.61	0.00	3.47	4.91	2.89	5.66	0.46	54.46	3.87
Tasmannia purpurascens	133	0.987 (0.004)	38.90	19.44	23.65	6.03	0.09	0.06	1.51	0.02	3.83	5.49
Telopea speciosissima	38	0.971 (0.016)	0.00	3.15	0.00	35.68	14.73	2.12	7.12	0.48	2.18	34.54
Tetratheca glandulosa	119	0.985 (0.008)	5.76	1.42	0.07	73.65	0.34	0.02	0.13	0.83	1.96	15.51
Tetratheca juncea	1126	0.946 (0.003)	34.22	2.30	35.31	12.15	0.10	1.60	6.66	1.31	0.29	5.21
Todea barbara	75	0.922 (0.031)	0.00	7.76	3.53	47.85	8.87	3.56	2.88	1.09	5.82	14.86
Xanthorrhoea arborea	54	0.974 (0.014)	0.75	0.37	12.87	68.85	0.68	0.61	1.05	0.80	4.53	9.49
Xanthorrhoea fulva	136	0.942 (0.02)	1.63	9.89	6.49	26.92	28.26	8.26	6.87	1.45	0.61	5.15
Xanthorrhoea glauca	130	0.888 (0.036)	3.34	6.11	2.46	2.02	2.41	9.95	0.50	2.24	4.16	66.60
Xanthorrhoea johnsonii	82	0.868 (0.047)	0.00	3.34	4.66	26.51	1.36	12.98	24.06	1.42	5.61	20.06
Xanthorrhoea latifolia	334	0.954 (0.007)	5.23	0.43	19.58	53.85	1.08	2.47	5.19	8.73	0.19	1.20
Xanthorrhoea macronema	179	0.932 (0.013)	45.13	0.48	0.68	40.38	1.15	1.07	1.70	0.74	0.23	6.08
Xanthorrhoea malacophylla	35	0.864 (0.051)	10.34	0.49	3.13	1.41	14.83	11.18	17.77	2.92	23.07	12.94
Xanthorrhoea media	163	0.948 (0.015)	0.00	12.28	9.83	23.89	10.45	0.56	0.82	2.07	0.68	38.21
Xanthorrhoea resinosa	102	0.976 (0.007)	4.46	47.05	2.01	23.77	1.45	1.92	1.39	8.14	5.41	4.31
Xylomelum pyriforme	168	0.927 (0.015)	0.00	6.14	13.82	34.86	3.68	3.52	1.04	5.84	8.50	21.80
Zannichellia palustris	23	0.962 (0.026)	2.45	0.00	0.60	57.27	3.31	0.21	9.54	0.00	16.96	8.08
Zieria smithii	200	0.815 (0.03)	45.50	0.00	13.73	13.17	6.11	0.38	0.61	3.51	2.56	10.61

Table 8. Mean results from MaxEnt models for reptiles within the Greater Hunter region. Results show the number of records used to construct each model and the mean (± standard deviation) test AUC value across five-fold cross-validated models. The data shown for the environmental variables represent the permutation importance for each variable used to construct the full model.

REPTILES	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	TERR1000	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS
Acanthophis antarcticus	34	0.847 (0.077)	2.14	2.58	0.00	27.57	2.22	5.18	30.06	27.01	2.35	0.76
Acritoscincus platynota	95	0.876 (0.037)	31.67	3.17	16.49	3.15	10.77	0.55	23.16	4.50	0.20	3.84
Amphibolurus muricatus	421	0.819 (0.021)	4.20	0.00	12.81	27.27	29.70	3.82	12.26	2.76	4.62	1.75
Amphibolurus nobbi	24	0.887 (0.087)	0.16	6.29	0.80	66.02	2.90	5.64	8.09	0.83	2.94	5.68
Anomalopus leuckartii	28	0.94 (0.029)	11.04	22.33	20.27	4.10	3.67	7.70	4.73	3.15	0.00	23.01
Anomalopus swansoni	71	0.844 (0.043)	17.71	0.00	31.72	2.29	0.77	1.05	2.05	28.78	3.66	9.94
Bellatorias major	188	0.883 (0.019)	7.67	1.57	6.20	66.62	5.09	0.81	5.48	5.33	0.00	1.10
Cacophis krefftii	52	0.913 (0.031)	33.71	1.20	3.33	27.12	9.66	1.23	0.43	15.69	4.12	0.97
Cacophis squamulosus	99	0.842 (0.041)	17.07	4.05	6.66	56.55	6.50	4.87	1.47	1.27	0.00	1.54
Calyptotis ruficauda	104	0.891 (0.027)	27.44	7.12	13.36	0.42	5.52	1.30	5.78	2.85	20.78	14.42
Carlia tetradactyla	138	0.88 (0.024)	35.27	0.01	8.22	28.52	1.71	1.20	4.16	4.74	0.00	15.33
Chelodina longicollis	231	0.783 (0.03)	18.86	10.35	19.89	3.15	17.35	1.87	8.36	0.74	0.00	18.96
Cryptoblepharus virgatus	160	0.774 (0.038)	13.76	2.25	11.75	2.05	15.02	5.49	14.45	24.16	6.26	0.24
Cryptophis nigrescens	141	0.851 (0.034)	14.52	26.01	0.32	4.19	30.68	0.73	1.39	6.24	0.14	9.44
Ctenotus robustus	314	0.771 (0.033)	34.00	1.68	2.90	4.28	4.81	2.60	9.43	0.84	0.86	37.00
Ctenotus taeniolatus	441	0.856 (0.016)	0.82	1.04	27.15	1.85	11.57	2.57	21.56	24.17	0.89	1.66
Cyclodomorphus gerrardii	23	0.823 (0.064)	5.54	0.43	0.00	1.00	8.49	4.68	39.13	3.14	0.00	32.88
Cyclodomorphus michaeli	42	0.86 (0.05)	8.99	15.02	30.21	22.34	3.90	0.34	0.00	10.64	4.13	4.08
Demansia psammophis	129	0.75 (0.05)	49.15	1.71	7.27	4.56	16.58	5.01	9.34	1.89	2.11	2.06
Dendrelaphis punctulatus	102	0.862 (0.031)	48.34	2.93	17.80	2.32	10.26	1.59	5.45	1.90	0.00	9.20
Diplodactylus vittatus	106	0.862 (0.036)	14.88	7.85	12.66	9.20	17.12	11.89	5.41	17.03	0.00	0.31
Egernia cunninghami	59	0.827 (0.049)	6.58	4.16	13.61	7.58	27.11	1.13	19.21	10.48	1.08	2.11
Egernia mcpheei	31	0.814 (0.055)	2.11	0.00	3.46	0.00	12.86	1.90	7.34	3.70	11.06	57.49
Egernia striolata	193	0.87 (0.027)	9.07	1.85	4.39	37.12	0.68	1.91	15.37	2.31	2.14	24.98

TABLE 8 CONTINUED

REPTILES	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	TERR1000	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS
Egernia whitii	235	0.9 (0.02)	20.02	3.53	6.51	4.07	7.75	3.69	25.20	16.47	0.23	3.95
Eulamprus heatwolei	101	0.935 (0.029)	57.73	0.42	1.18	16.40	4.77	2.03	7.95	5.84	3.45	0.22
Eulamprus kosciuskoi	29	0.955 (0.035)	13.88	2.02	0.03	36.45	22.33	0.00	10.73	5.82	8.72	0.00
Eulamprus murrayi	104	0.946 (0.014)	1.30	2.06	15.61	0.55	7.71	1.32	6.39	0.29	57.19	6.64
Eulamprus quoyii	526	0.795 (0.021)	0.85	2.88	5.44	35.77	16.15	4.72	12.51	5.38	2.19	1.52
Eulamprus tenuis	130	0.797 (0.04)	0.59	10.24	19.70	3.82	0.88	2.22	37.75	21.03	0.00	3.21
Furina diadema	59	0.746 (0.064)	5.41	25.67	16.35	22.51	1.85	4.42	1.99	17.53	2.42	1.43
Hemiaspis signata	133	0.834 (0.033)	4.72	2.79	3.30	42.27	21.05	1.96	2.62	12.84	0.56	4.44
Hemiergis decresiensis	40	0.793 (0.077)	0.72	0.78	5.17	22.34	14.28	2.33	16.66	11.65	24.34	0.45
Hoplocephalus stephensii	80	0.856 (0.048)	15.36	0.87	4.25	35.01	3.96	2.80	2.56	8.48	2.48	22.22
Hypsilurus spinipes	87	0.906 (0.024)	5.22	5.92	7.43	34.20	14.03	3.12	5.93	1.55	11.51	10.10
Lamprophollis amicula	21	0.818 (0.07)	56.62	0.38	2.63	1.38	0.87	4.18	20.97	7.06	2.19	3.72
Lamprophollis caligula	38	0.983 (0.006)	77.64	0.01	0.00	0.05	1.14	0.08	0.44	0.16	0.07	20.42
Lamprophollis delicata	1289	0.778 (0.014)	29.01	5.96	4.49	23.25	19.65	3.20	5.75	4.73	2.72	1.09
Lamprophollis guichenoti	454	0.843 (0.019)	10.52	12.70	14.46	29.70	22.42	0.96	4.68	0.86	0.47	2.45
Lerista bougainvillii	45	0.938 (0.021)	2.37	0.21	1.50	39.63	0.61	6.45	29.24	10.03	2.81	5.56
Lialis burtonis	63	0.662 (0.078)	24.94	1.03	13.38	6.97	18.41	4.31	6.91	3.73	2.32	11.13
Liopholis modesta	45	0.968 (0.016)	14.64	0.33	28.57	16.41	0.48	0.36	9.07	22.72	2.69	4.72
Lygisaurus foliorum	182	0.882 (0.027)	11.93	25.01	3.76	2.34	2.96	1.53	7.11	38.68	2.25	2.07
Morelia spilota	226	0.811 (0.028)	28.78	3.93	13.44	10.26	14.23	7.25	6.64	0.15	7.32	7.78
Morethia boulengeri	59	0.906 (0.029)	1.39	5.29	0.29	34.93	3.64	0.00	10.68	12.60	0.82	30.32
Notechis scutatus	63	0.721 (0.077)	0.00	39.29	12.10	0.00	15.66	2.87	0.30	16.14	12.85	0.00
Oedura lesueurii	259	0.91 (0.014)	5.88	0.30	26.14	1.05	5.67	1.58	19.04	37.51	0.00	0.51
Oedura robusta	26	0.768 (0.105)	0.55	1.62	18.01	49.31	8.69	3.26	0.51	16.37	0.14	0.04
Phyllurus platurus	260	0.912 (0.014)	1.76	2.85	32.46	3.19	14.59	1.15	5.65	28.77	0.31	7.15

TABLE 8 CONTINUED

REPTILES	N.RECORDS	TEST AUC	COLD_TEMP	HOT_TEMP	SEASONAL_RAIN	MEAN_SOLAR	SLOPE	TERR1000	FINAL VEGETATION	DRY SCLEROPHYLL FORESTS	RAINFORESTS	WET SCLEROPHYLLS FORESTS
Physignathus lesueurii	495	0.789 (0.022)	3.05	4.30	1.83	33.74	4.68	3.29	6.86	2.66	0.05	6.37
Pogona barbata	254	0.772 (0.03)	21.90	11.75	21.28	6.46	13.94	4.16	13.02	0.94	0.16	6.27
Pseudechis porphyriacus	569	0.75 (0.021)	3.02	1.31	12.37	26.70	42.28	1.83	8.18	0.99	0.19	1.82
Pseudemoia pagenstecheri	34	0.984 (0.008)	12.63	2.01	2.54	0.00	6.07	0.08	56.41	9.34	4.32	5.37
Pseudonaja textilis	155	0.7 (0.045)	30.38	5.73	13.51	13.18	0.00	7.26	2.01	1.25	0.00	26.36
Pygopus lepidopodus	49	0.774 (0.067)	3.90	6.04	0.50	31.23	17.30	0.72	11.71	12.04	9.98	6.23
Ramphotyphlops nigrescens	80	0.802 (0.052)	11.37	11.78	30.70	28.14	9.08	0.25	6.20	1.00	0.00	0.00
Rankinia diemensis	146	0.926 (0.022)	6.90	4.51	6.82	26.88	11.98	0.12	15.38	19.75	0.84	0.45
Saiphos equalis	247	0.789 (0.034)	0.05	12.11	18.27	23.02	12.34	2.59	16.86	8.34	0.96	0.06
Saltuarius swaini	65	0.903 (0.039)	24.70	7.25	0.46	10.16	0.38	2.17	1.98	1.52	0.96	44.38
Saproscincus challengeri	37	0.968 (0.013)	8.75	0.01	0.43	0.37	2.90	1.75	0.82	0.00	73.19	11.39
Saproscincus mustelinus	142	0.856 (0.035)	0.40	14.30	26.81	29.23	10.06	2.05	13.12	0.73	0.18	0.01
Saproscincus rosei	29	0.963 (0.016)	7.96	0.00	2.09	0.35	14.87	1.41	9.95	1.28	51.00	9.30
Tiliqua scincoides	264	0.819 (0.031)	58.66	7.30	10.50	0.39	2.61	1.52	1.01	1.57	0.17	15.36
Underwoodisaurus milii	123	0.909 (0.017)	27.36	11.48	8.37	4.06	1.40	1.44	2.18	28.95	0.99	11.12
Varanus rosenbergi	34	0.939 (0.041)	22.13	0.00	0.04	48.36	1.84	11.15	2.50	0.00	7.53	0.90
Varanus varius	984	0.771 (0.015)	28.92	0.63	2.22	0.49	18.44	3.25	20.92	17.13	0.00	7.37
Vermicella annulata	62	0.65 (0.056)	51.37	4.68	4.63	0.87	12.85	7.75	4.61	1.97	0.08	3.04

Table 9. Mean results from Boosted Regression Tree models for EECs within the Greater Hunter region. Results show the number of training samples used to construct each model and the mean (± standard deviation) test AUC value across ten-fold cross-validated models. The data shown for the environmental variables represent the percent contribution of each variable used to construct full model..

EECS	N.RECORDS	TEST AUC	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	RUGG1000	WETNESS	FINAL VEGETATION	DRY SCLEROPHYL LFORESTS	RAINFORESTS	WET SCLEROPHYLL FORESTS	SOIL
Central Hunter grey box ironbark woodland in the NSW North Coast and Sydney Basin bioregion	148	0.915 (0.009)	46.06	5.99	3.66	0.81	0.67	2.22	13.27	2.24	0.31	14.05
Central Hunter ironbark spotted gum grey box forest in the NSW North Coast and Sydney Basin bioregion	147	0.953 (0.005)	28.95	19.20	3.64	2.53	3.32	0.65	3.39	0.24	2.05	12.66
Freshwater wetlands on coastal floodplains of the NSW North Coast Sydney Basin and South East Corner bioregion	23	0.89 (0.031)	1.69	2.02	17.45	5.35	12.98	11.13	5.39	0.63	2.94	4.18
Grassy white box woodlands	59	0.995 (0.001)	20.64	1.19	2.58	3.19	2.29	1.61	25.20	0.50	0.00	21.33
Hunter lowland redgum forest in the Sydney Basin and NSW North Coast bioregion	171	0.891 (0.008)	45.62	3.59	3.96	0.85	1.08	1.94	12.83	1.62	0.80	14.90
Hunter valley footslopes slaty gum woodland in the Sydney Basin bioregion	28	0.944 (0.027)	8.77	13.19	9.35	12.96	3.67	0.29	0.86	4.11	25.19	14.39
Kincumber scribbly gum forest in the Sydney Basin bioregion	39	0.99 (0.004)	17.66	5.55	1.37	2.27	1.45	0.30	24.69	0.63	3.54	0.85
Kurri sand swamp woodland in the Sydney Basin bioregion	71	0.992 (0.002)	12.60	27.79	5.48	14.35	1.51	1.40	11.05	0.00	0.47	18.54
Littoral rainforest in the NSW North Coast Sydney Basin and South East Corner bioregion	51	0.992 (0.003)	12.03	0.89	0.31	6.96	0.72	32.82	0.55	17.46	11.10	8.50
Lower Hunter spotted gum ironbark forest in the Sydney Basin bioregion	359	0.948 (0.004)	7.96	26.96	2.22	8.02	1.15	2.91	16.58	2.92	0.76	20.86
Lower Hunter valley dry rainforest in the Sydney Basin and NSW North Coast bioregion	55	0.921 (0.021)	24.05	3.78	5.90	13.25	6.64	14.01	5.63	5.60	8.09	4.34
Lowland rainforest in NSW North Coast and Sydney Basin bioregion	130	0.942 (0.007)	7.20	6.09	6.63	14.54	4.54	11.09	1.72	24.74	4.75	2.34
Lowland rainforest on floodplain in the NSW North Coast bioregion	121	0.977 (0.006)	23.00	10.55	15.91	3.71	2.35	7.56	2.01	13.68	2.16	2.36

TABLE 9 CONTINUED

EECS	N.RECORDS	TEST AUC	MEAN_RAIN	SEASONAL_ RAIN	SLOPE	RUGG1000	WETNESS	FINAL VEGETATION	DRY SCLEROPHYL LFORESTS	RAINFORESTS	WET SCLEROPHYLL FORESTS	SOIL
Pittwater and Wagstaffe spotted gum forest in the Sydney Basin bioregion	22	0.952 (0.038)	21.24	14.34	9.93	6.56	4.07	2.93	4.50	3.88	4.58	10.45
Ribbon gum mountain gum snow gum grassy forest woodland of the New England tableland bioregion	23	0.98 (0.01)	3.88	37.05	1.38	1.48	1.86	0.44	0.01	25.09	8.31	0.14
River flat eucalypt forest on coastal floodplains of the NSW North Coast Sydney Basin and South East Corner bioregion	148	0.912 (0.017)	11.22	7.67	3.30	5.72	1.88	19.78	10.72	1.37	3.04	14.54
Subtropical coastal floodplain forest of the NSW North Coast bioregion	43	0.911 (0.032)	37.07	19.15	2.19	1.85	1.35	6.34	6.57	4.09	0.74	7.51
Swamp oak floodplain forest of the NSW North Coast Sydney Basin and South East Corner bioregion	62	0.909 (0.021)	11.01	7.66	9.68	8.89	10.82	6.76	11.73	2.29	3.50	8.00
Swamp sclerophyll forest on coastal floodplains of the NSW North Coast Sydney Basin and South East Corner bioregion	374	0.96 (0.004)	17.83	3.99	8.36	4.35	5.84	19.22	3.81	0.44	1.12	6.28
Warkworth sands woodland in the Sydney Basin bioregion	24	0.998 (0.001)	12.32	68.68	1.43	0.37	0.05	0.00	0.40	0.00	0.00	3.55
White box yellow box blakely's red gum woodland	176	0.937 (0.005)	40.80	11.97	3.78	2.41	1.44	4.00	16.41	0.54	1.30	9.22

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