Micrathene whitneyi

Elf Owl

California Department of Fish and Wildlife
Range and Distribution Mapping and Analysis Project (RADMAP)
Species Habitat Model (SHM) assessment metrics and metadata Star Rating: 3 out of 5

Date: 2025-12-03

This metadata describes the SHM results for this one taxon. Methods were developed by the RADMAP team and implemented with Maxent. Sara Moriarty-Graves was the primary modeler for this species.

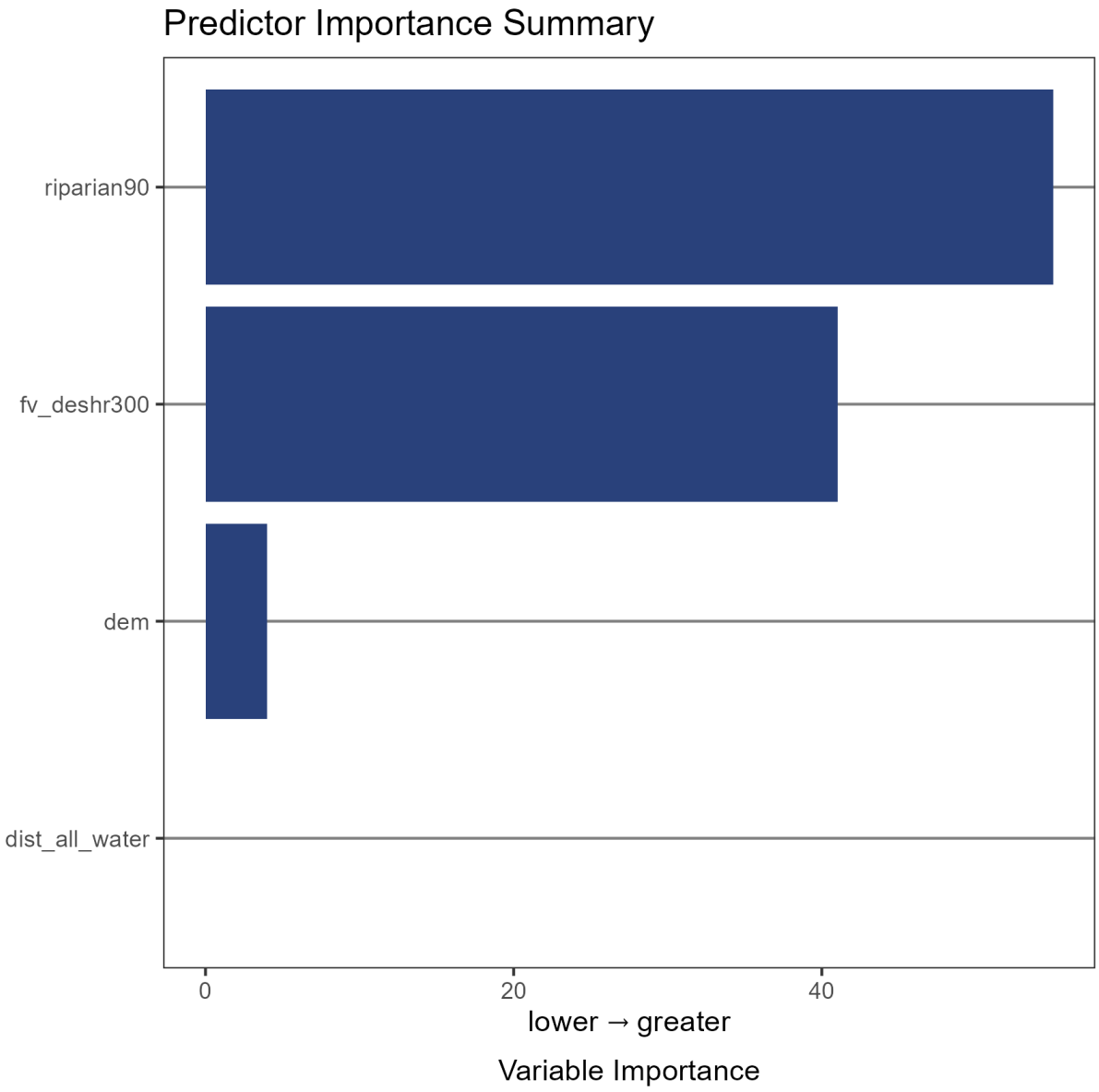
Model Results

Table 1. Maxent model testing results, including the number of filtered presence locations used (Presence), regularization multiplier (RM), feature class (FC), p0 test omission error rate (OER), test area under the curve (AUC), difference between AUC test and AUC training values (AUCdiff), p0 threshold (Threshold) distinguishing habitat from non-habitat, and max(se+sp) test True Skill Statistic (TSS).

Presence	RM	FC	AUC	AUCdiff	Threshold	TSS	OER
42	4	lqh	0.9361217	0.02168433	P0	0.90045	0

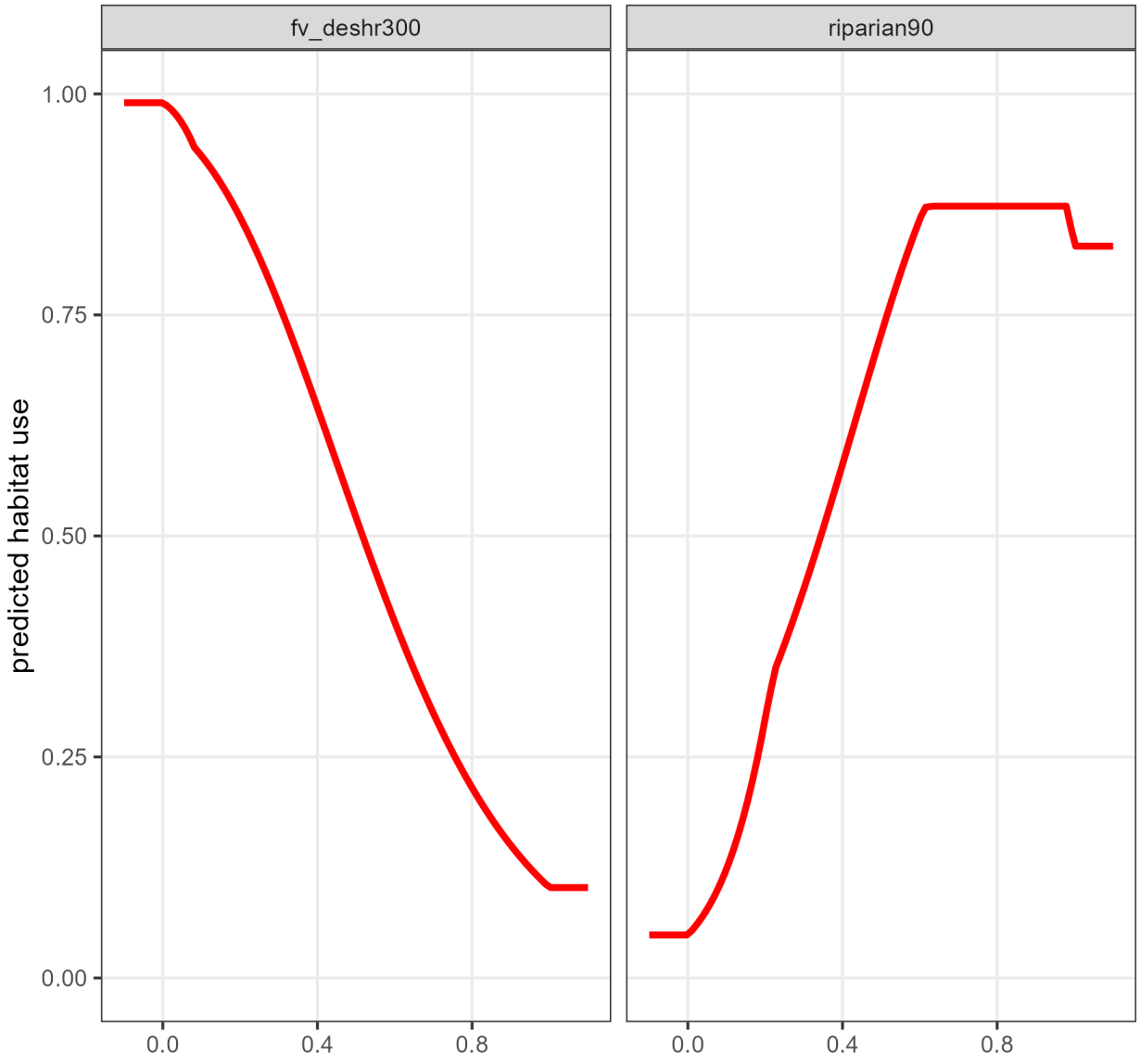
Percent Contribution of Covariates

Figure 1. Estimates of the relative percent of contributions (variable importance %) of covariate inputs to the top Maxent model. Covariates are defined in Table 4.



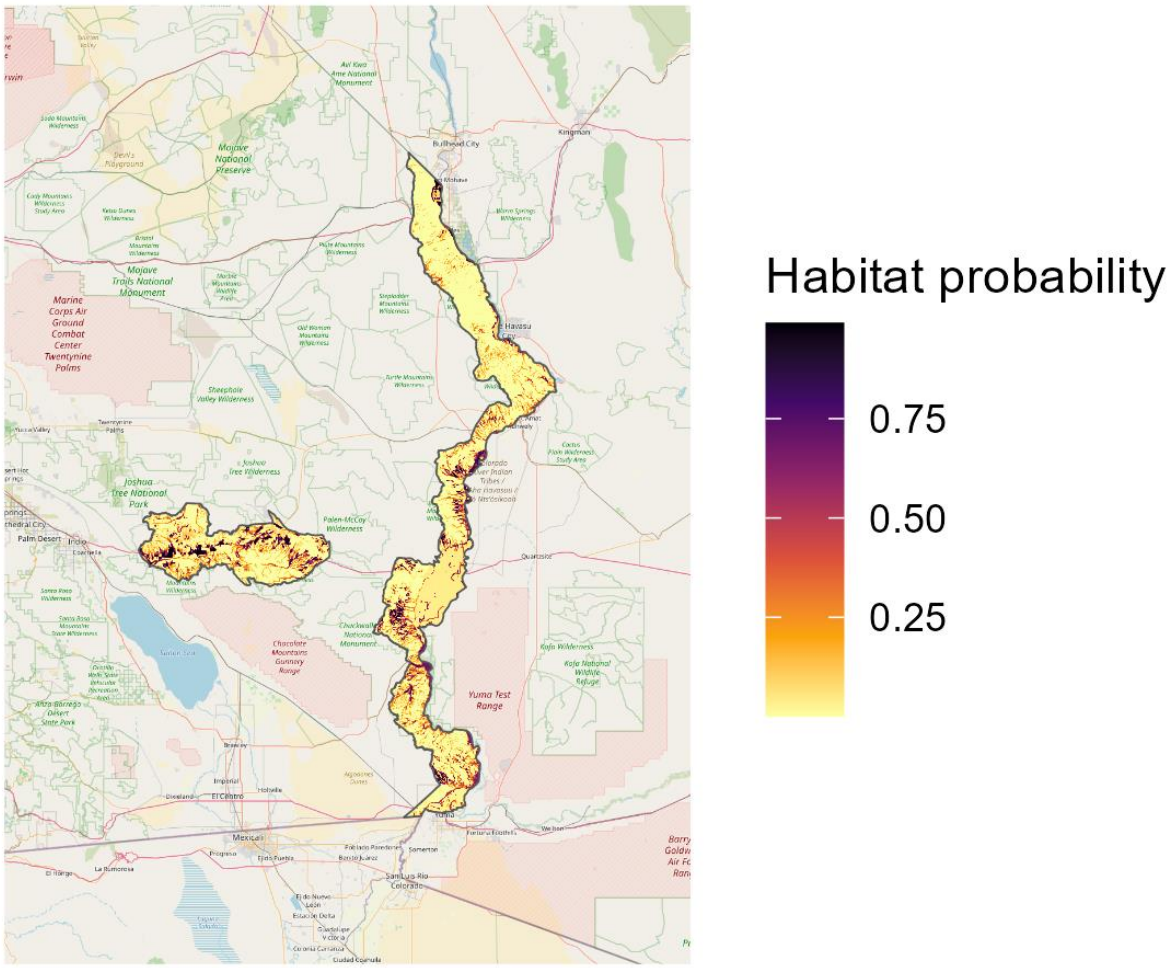
Response Curves

Figure 2. Response curves reveal how the predicted habitat use (0–1 on the y-axis) changes as each variable is altered while all other predictors remain constant. The x-axis represents the covariate's range of values while the y-axis represents the effect between the variable and the model response. Covariates are defined in Table 4.



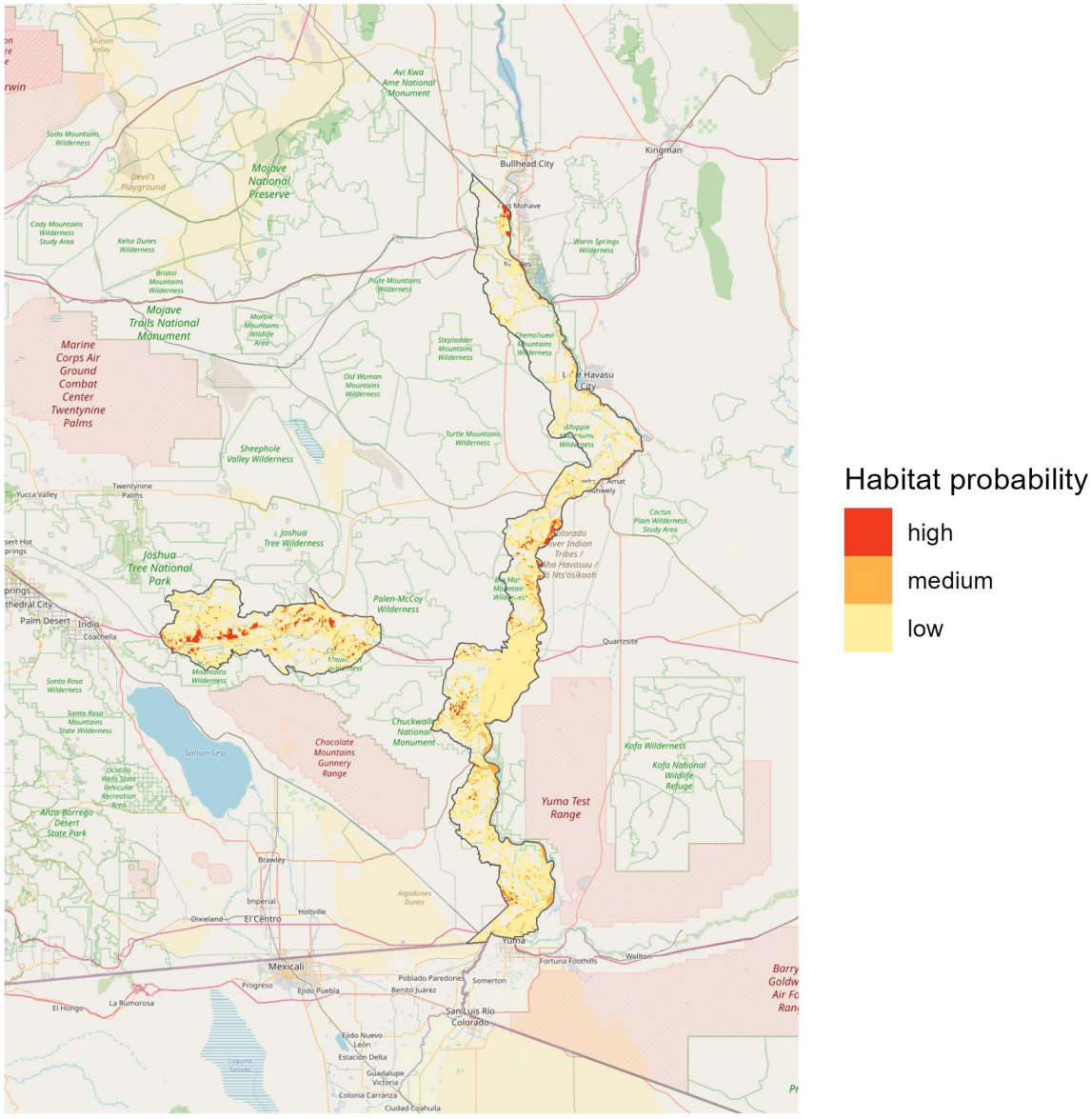
Model Output – Species Habitat Model (continuous)

Figure 3. SHMs depict a species' predicted habitat associations within each cell, represented as a continuous value between 0 and 1, and masked to the species' range. Values closer to 1 depict a higher relative probability of habitat use within that cell.



Model Output – Species Habitat Model (categorical)

Figure 4. The categorical SHM is based on the continuous SHM output. It splits the model output into predicted habitat and non-habitat based on a statistical threshold (p0). Within the area marked as predicted habitat in the output, this map displays the categories of high, medium, and low relative probability of habitat use. Medium and high relative probability of habitat use categories were distinguished based on expert chosen statistical thresholds.



Categorical SHM Thresholds

Table 2. Statistical thresholds chosen to represent the categorical SHM.

Category	Threshold Selected	Threshold Value
low	Minimum Training Presence	0.0034100
medium	Maximum Sensitivity Plus Specificity	0.3712500
high	Top 25% of habitat probability values above medium threshold	0.8168151

Model Evaluation

Table 3. The final model evaluation score, represented as a star rating (1-5) is presented at the top of this metadata. Star ratings are comprised of three distinct components, including an expert review, a modeler review, and an AUC score. Experts review models based on predictor relevance and the overall accuracy of the continuous and categorical SHM outputs. Modelers provide a review of presence data, predictor relevance, performance evaluation, spatio-temporal data alignment, model review status, and the overall accuracy of the continuous and categorical SHM outputs. Along with the AUC score, these three inputs are normalized and given an equal weight before being converted into a categorical star rating. The table below provides a basic descriptive meaning of the star rating provided for this model, taking into account the subjective expert and modeler review scores as well as the objective AUC evaluation.

Star Rating	Brief Description
1	Poor representation of habitat. Habitat for this species is unlikely to be successfully mapped using standard habitat modeling approaches given unique species traits.
2	Significant concerns. A large proportion of the map shows habitat in areas where the species is unlikely to occur or does not predict habitat where the species is known. Revisions are needed before the model is used for any formal application or decision, with the possible exception of guiding inventory.
3	Some concerns about model performance in specific areas. The model would benefit from additional refinement, but the general pattern of mapped habitat is consistent with expert expectations
4	Model generally good. Potential for further improvement through additional iteration but provides a good approximation of likely habitat.
5	Modeled habitat is a very good representation of likely habitat. Further iteration is unlikely to result in significant improvements.

Covariate Descriptions

Table 4. Descriptions of environmental variables included in model. Covariates were chosen for inclusion in the model based on a literature review, their potential for ecological relevance to the focal taxon, and advice from applicable experts. Focal statistics were calculated for certain habitat covariates at the 90, 300, 900, 3,000, and 6,000-m radii scales to assess species' scale dependency. Only one covariate per set of scales were included in the covariate candidate set. Other covariates were extracted at the raster cell's resolution (30-m) unless otherwise specified.

The entire covariate library including full citations is available here: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=232517

Covariate Name	Covariate Description	Source
dem	Digital elevation model	USGS Earth Explorer
fv_deshr300	FVEG desert shrub prevalence at a 300 m radius	Cal Fire FVEG 2022
dist_all_water	Distance to all water	USGS National Hydrography Dataset Plus Version 2, CDFW, Cal Fire FVEG 2022, USFWS National Wetlands Inventory 2024, CARI 2024, CropScape 2022, Cal Fire FRAP 2025
riparian90	Riparian habitat prevalence at a 90 m radius	Cal Fire FVEG 2022, USFWS National Wetlands Inventory 2024, CDFW, Cal Fire FRAP 2025