SUPPLEMENTAL INFORMATION

USING LIDAR TO ENHANCE DISTRIBUTION MODELS FOR THE DUNES SAGEBRUSH LIZARD (*SCELOPORUS ARENICOLUS*) IN TEXAS, USA

DANIELLE K. WALKUP, WADE A. RYBERG, T.J. HIBBITTS, K.L. SKOW, GARRETT POWERS, L.A. FITZGERALD, B.A. COLLIER, AND R.R. LOPEZ

The following material is provided by the authors and was not subjected to peer review or editing by *Herpetological Conservation and Biology*.

TABLE 1. Data sources for *Sceloporus arenicolus* (Dunes Sagebrush Lizard, DSL) localities available for potential use in the species distribution model. The abbreviations VES = visual encounter survey.

Data Source	Years	Data Collection Summary	DSL Points
Surveys typically following protocols in: Fitzgerald, L.A., Painter, C.W., Sias, D.A., Snell, H.L., 1997. The Range, Distribution, and Habitat of Sceloporus arenicolus *in New Mexico, Final Report to New Mexico Department of Game and Fish: Santa Fe, NM.*			
Laurencio, L., D. Laurencio, and L.A. Fitzgerald. 2007. Geographic distribution and habitat suitability of the Sand Dune Lizard (*Sceloporus arenicolus*) in Texas. Final report submitted to Texas Parks and Wildlife Department, Lubbock. 16 p. + appendix.	2006 – 2007	32 VES at 27 sites, 6 counties	3 DSL localities
Fitzgerald, L.A. 18 June 2010. Memo submitted to Texas Parks and Wildlife Department	2010	2 VES at 2 sites on Monahans State Park	2 DSL localities
Fitzgerald, L.A., C.W. Painter, T.J. Hibbitts, W.A. Ryberg, and N.L. Smolensky. 2011. The range and distribution of *Sceloporus arenicolus* in Texas: results of surveys conducted 8–15 June 2011. Submitted to the Texas Comptroller of Public Accounts. 19 pp. + appendix	2011	51 VES at 50 sites, 6 counties	17 DSL localities
Ryberg, W.A., D.K. Walkup, M. Young, L.A. Fitzgerald, and T.J. Hibbitts. 2016. Best practices for managing Dunes Sagebrush Lizards	2012 – 2013	30 VES, 26 sites	17 DSL localities, 8 sites

Data Source	Years	Data Collection Summary	DSL Points
in Texas. Final report submitted to Texas Comptroller of Public Accounts, Austin, Texas. iii–vii + 83 pp.			
Walkup et al. 2018[†]	2014 – 2016	339 area-constrained VES, 100 sites, 3 counties	23 DSL localities, 11 sites
Additional Data Sources:			
Hibbitts et al. 2013	2012	DSL located during microhabitat study, 3 VES at each of 6 (500 x 500 m) grids, surveyed for 180 min each survey	13 DSL localities
Young et al. 2018	2012	Initial captures from DSL in telemetry study, no survey information	19 DSL localities
Walkup et al. 2019	2012 – 2015	Pitfall arrays (324 and 291 traps)	DSL occurrence at pitfall traps
Additional localities (e.g., Biodiversity Research and Teaching Collections, personal observations)	1998 – 2017	N/A	15 DSL localities

[†]Some modifications to the survey methods

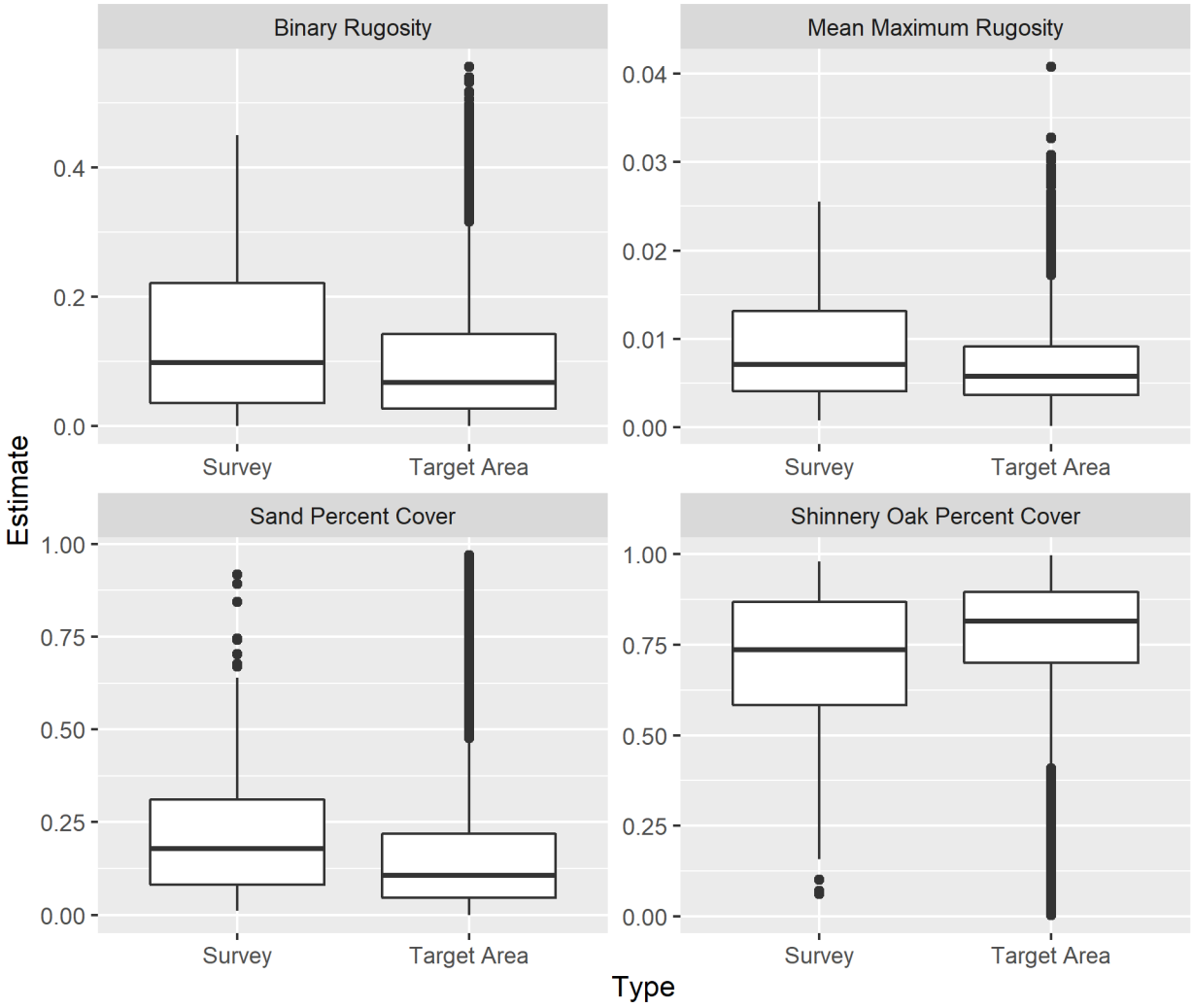

FIGURE S1. Box plots for the rugosity and percent cover covariates used in the generalized linear and additive models for the 152 unique 16-ha cells in which our survey points fell ("Survey") versus for all 9,459 16-ha cells available in the target area used for modeling ("Target Area").

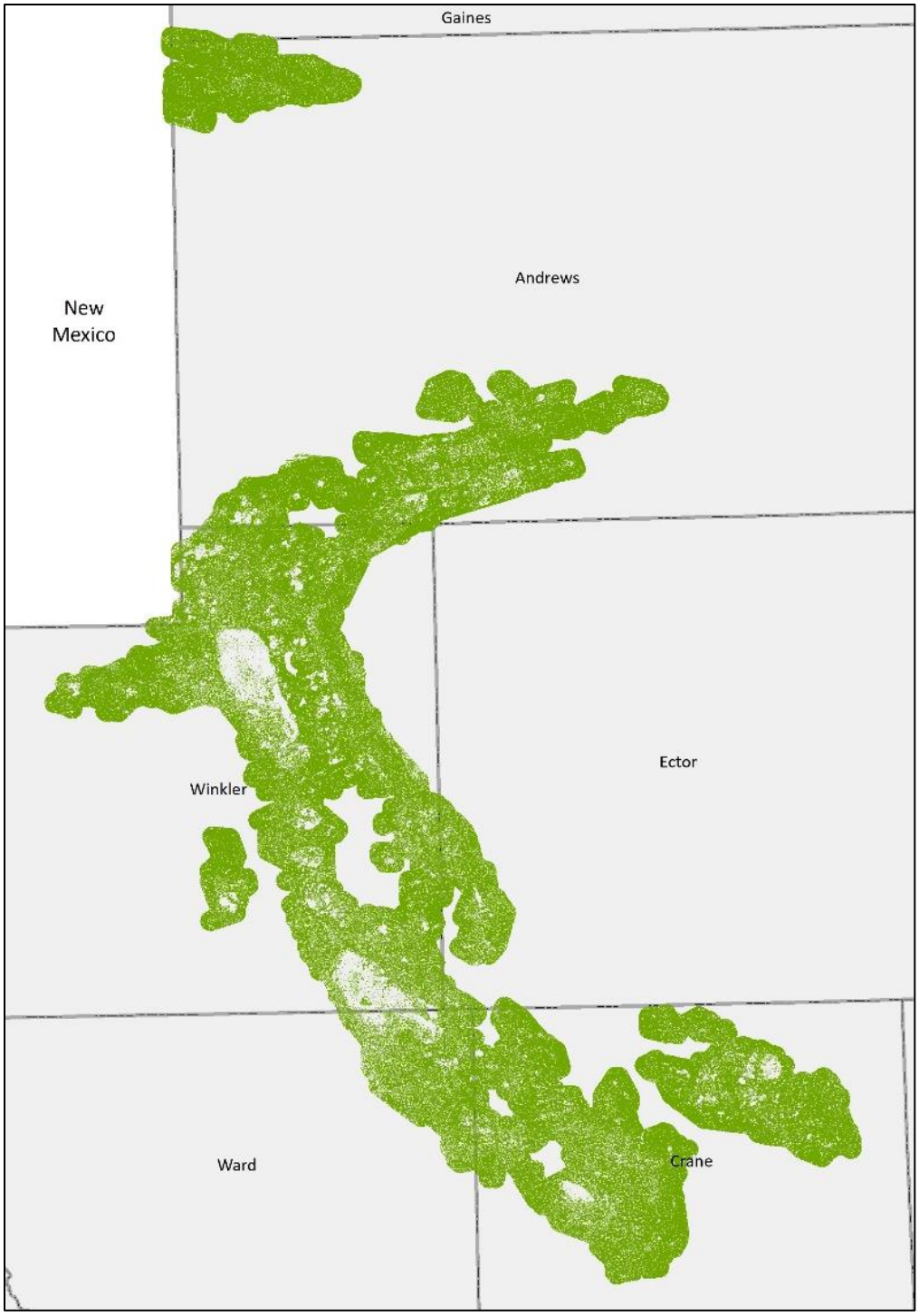

FIGURE S2. Map of percent cover of shinnery oak at a 5 x 5 m cell size for the target area, derived from an object based image classification of NAIP imagery.

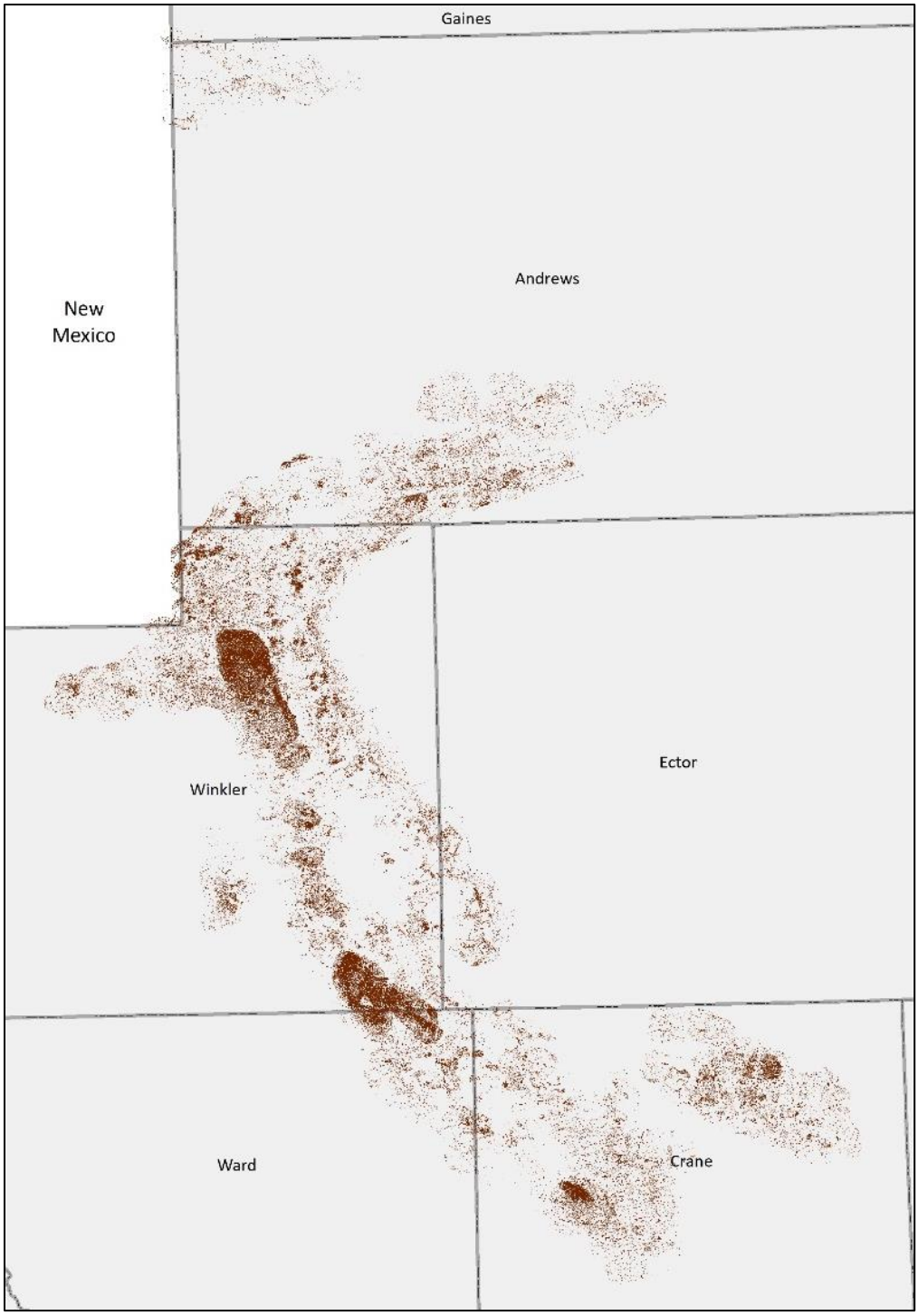

FIGURE S3. Map of percent cover of sand at a 5 x 5 m cell size for the target area, derived from an object based image classification of NAIP imagery.

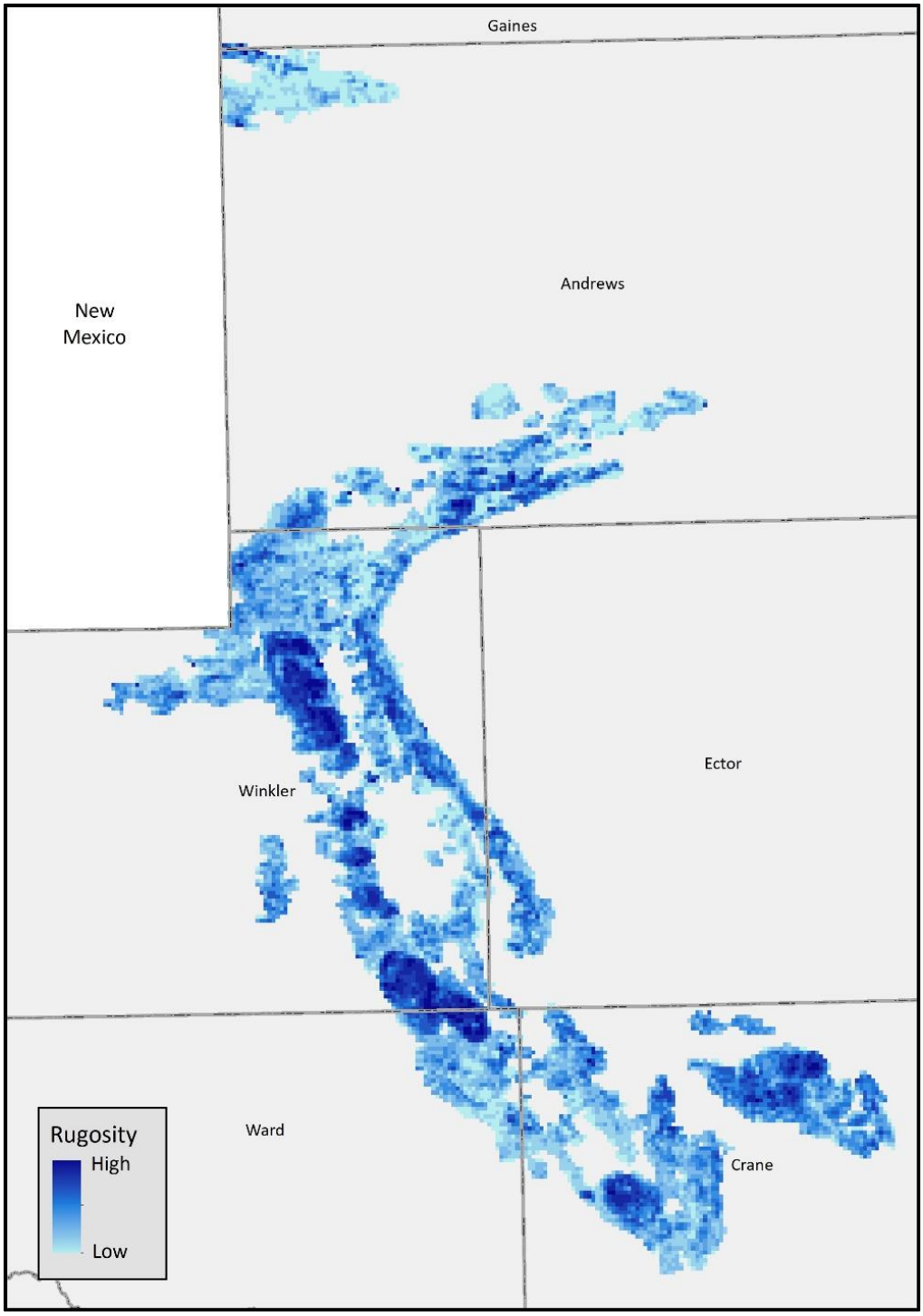

FIGURE S4. Mean maximum rugosity calculated from the maximum terrain ruggedness value for each 10 x 10 m cell averaged for the 16-ha cells for the target area.

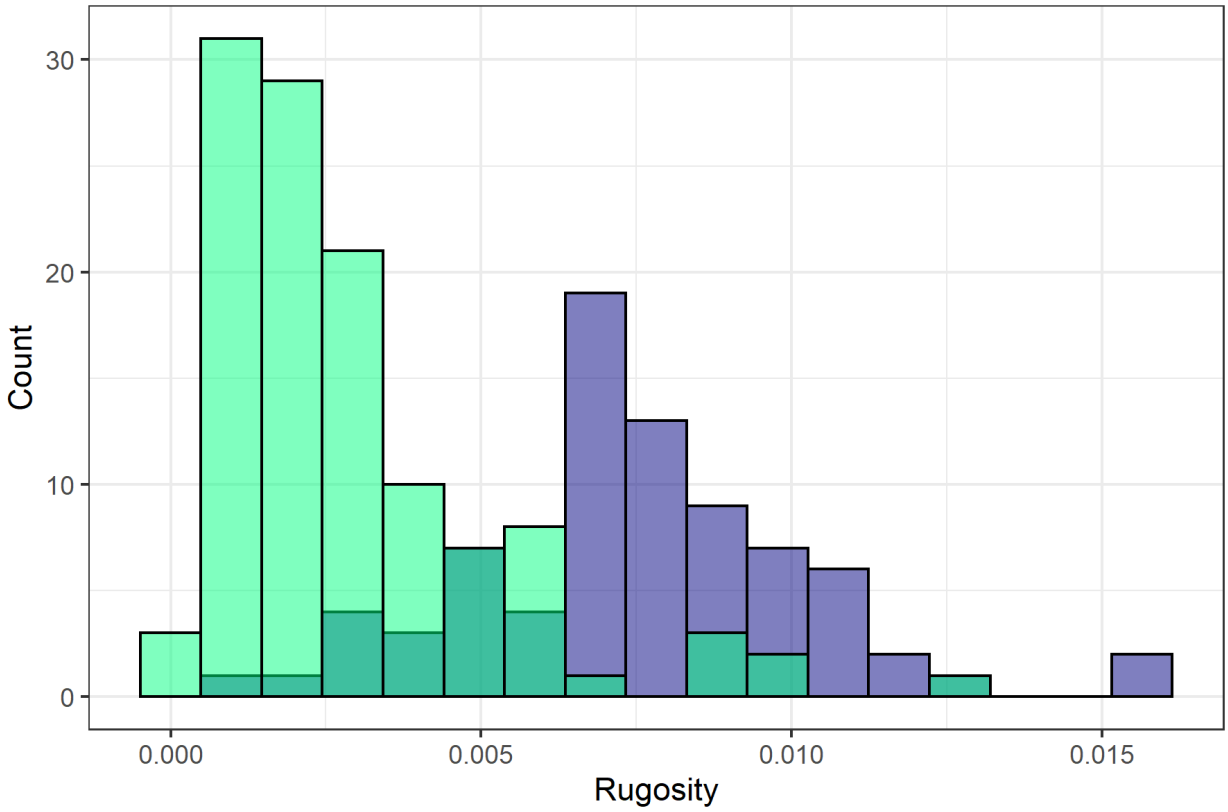

Figure S5. Histogram of rugosity values for 30 x 30 m cells, where *Sceloporus arenicolus* was present (blue; n = 79 cells) and at randomly selected cells (green, n = 116 cells). The darker green shows overlap between the two groups.

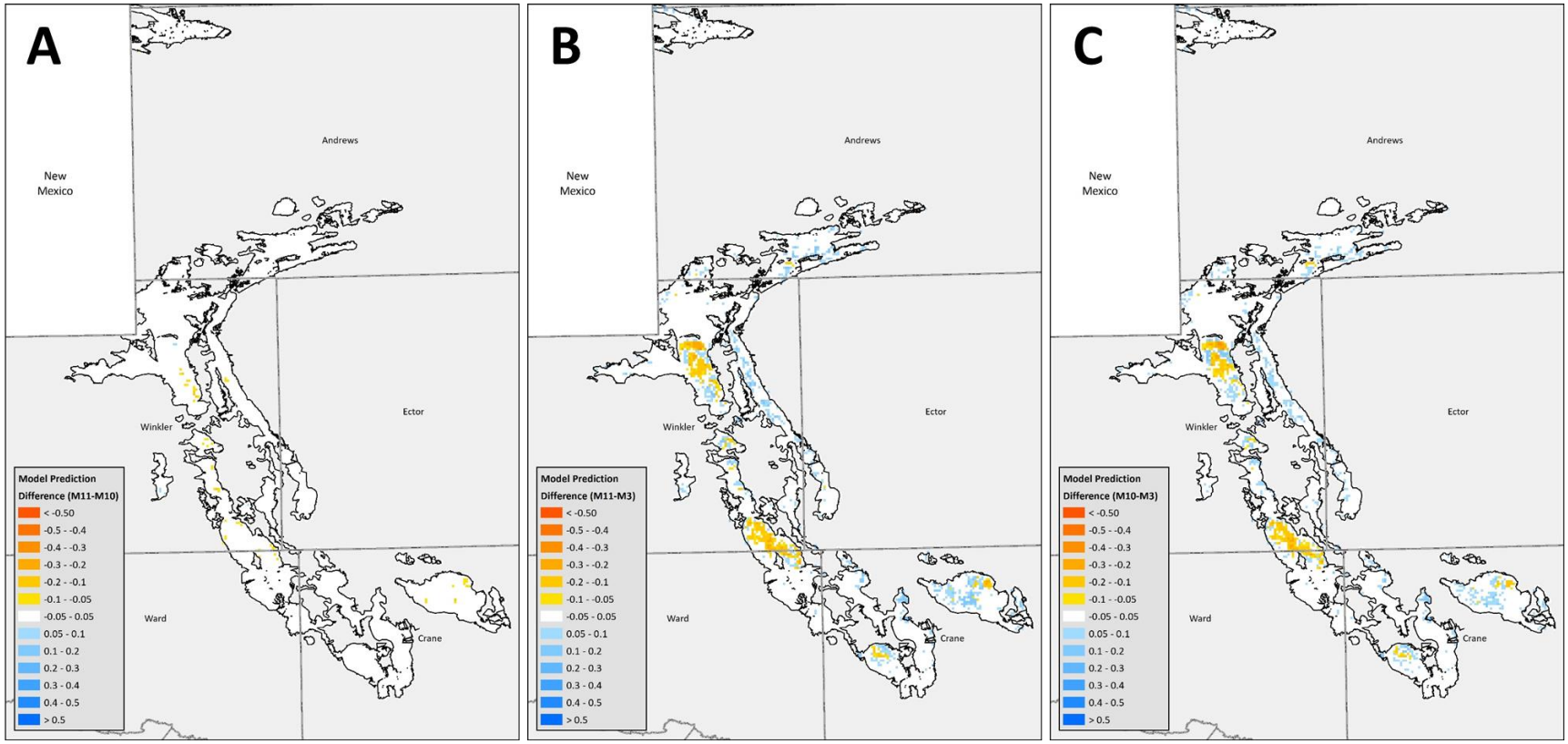

FIGURE S6. Differences between the top three generalized linear model predictions: (A) Difference between the mean maximum rugosity and percent cover shinnery oak interaction model (M11) mean predicted probability and the mean maximum rugosity and percent cover sand interaction model mean predicted probability (M10), where the negative values indicate areas that had higher predictive values in M11 and positive values indicate areas that had higher predictive values in M10. (B) Difference between the M11 mean predicted probability and the mean maximum rugosity model (M3) mean predicted probability, where the negative values indicate areas that had higher predictive values in M11 and positive values indicate areas that had higher predictive values in M3. (C) Difference between the M10 mean predicted probability and the M3 mean predicted probability, where the negative values indicate areas that had higher predictive values in M10 and positive values indicate areas that had higher predictive values in M3.

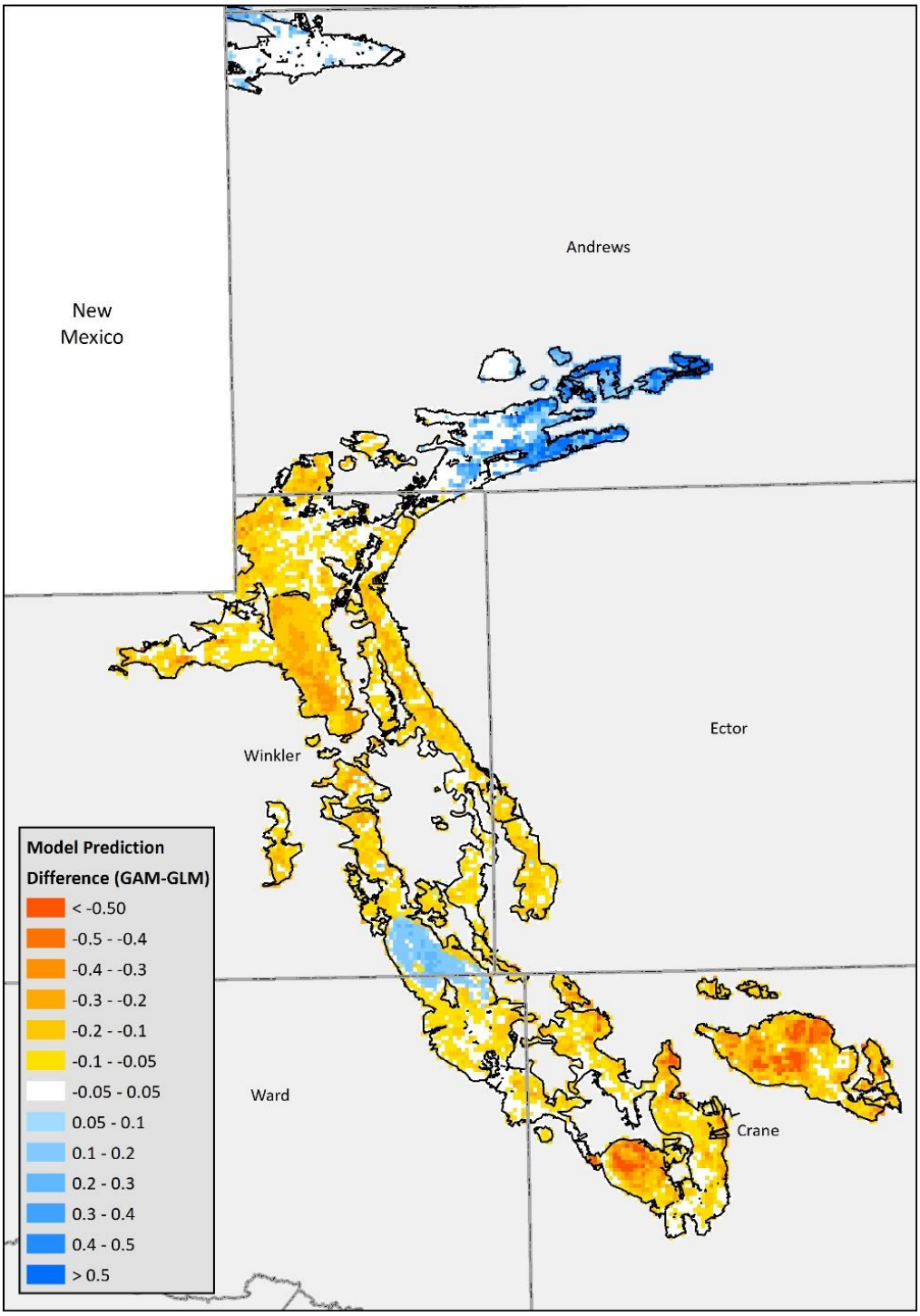

FIGURE S7. Differences in the mean maximum rugosity and percent cover shinnery oak interaction model predictions, where the negative values indicate areas that had higher predictive values in the non-spatial general linear model and positive values indicate areas that had higher predictive values in the spatial general additive model.