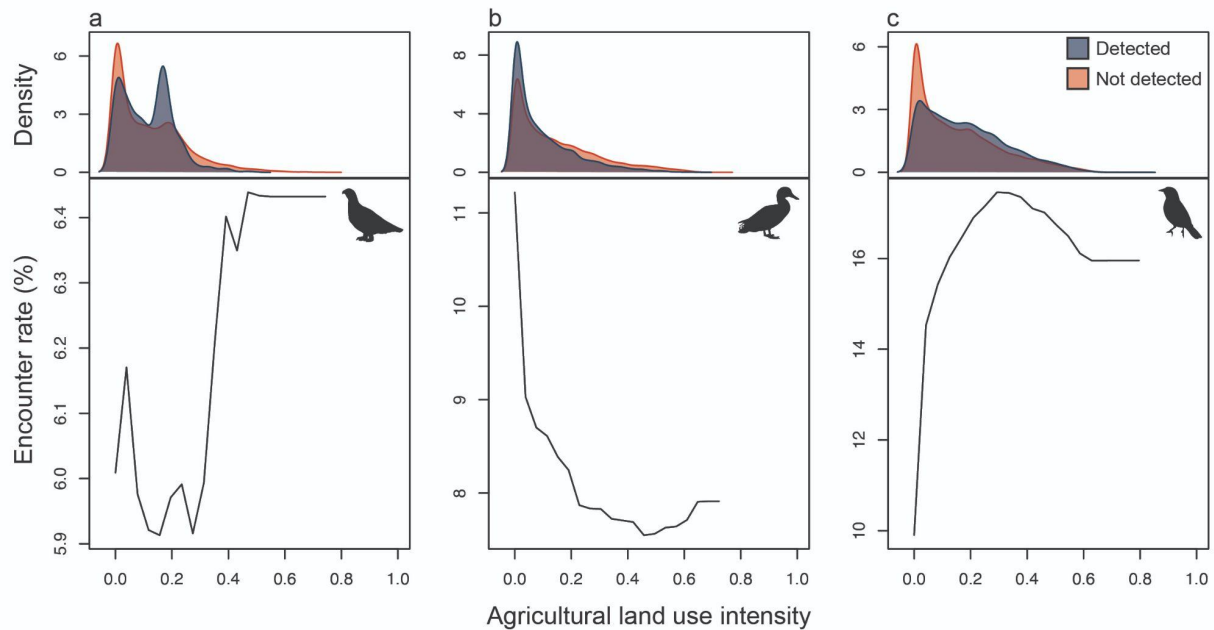
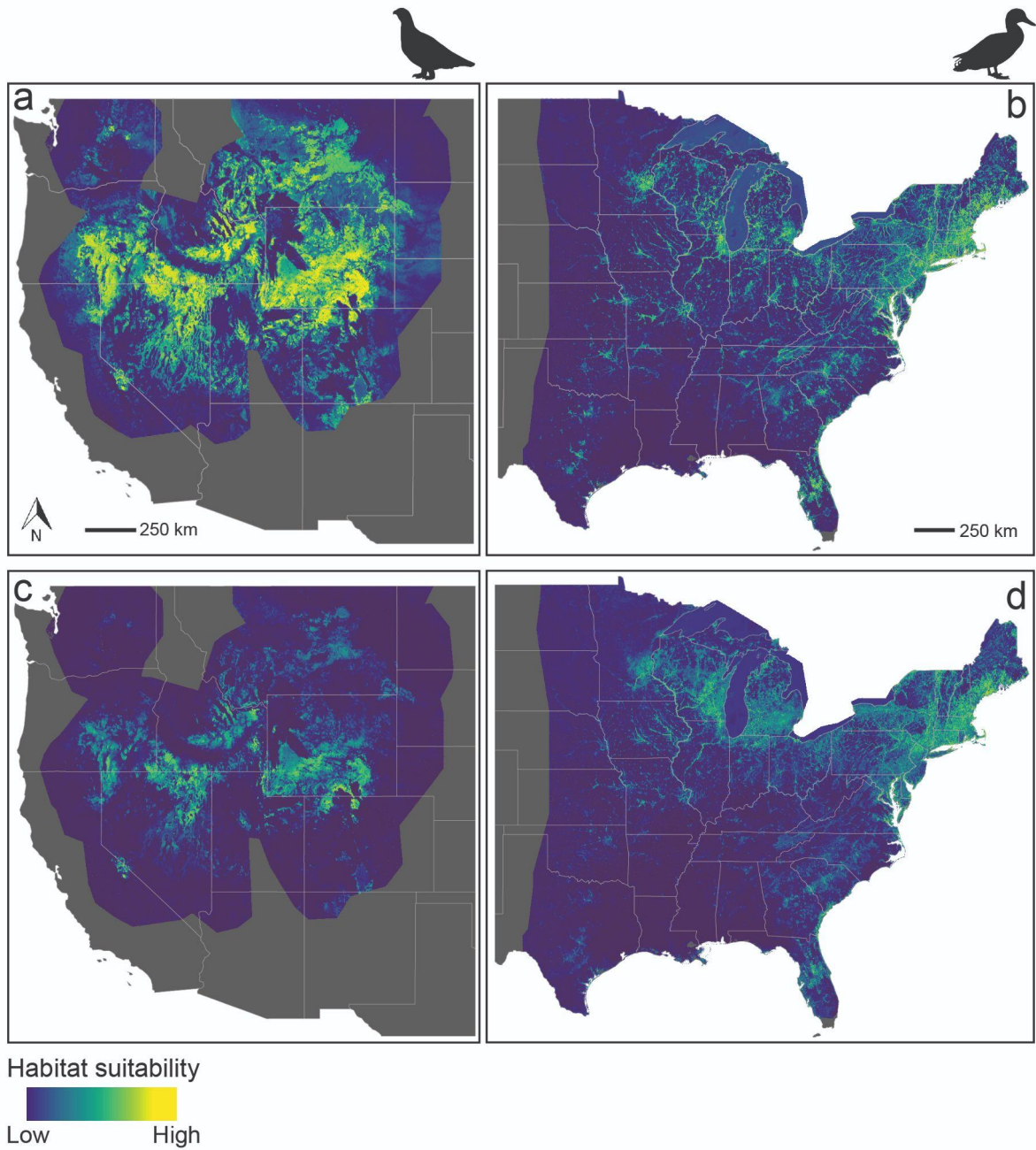


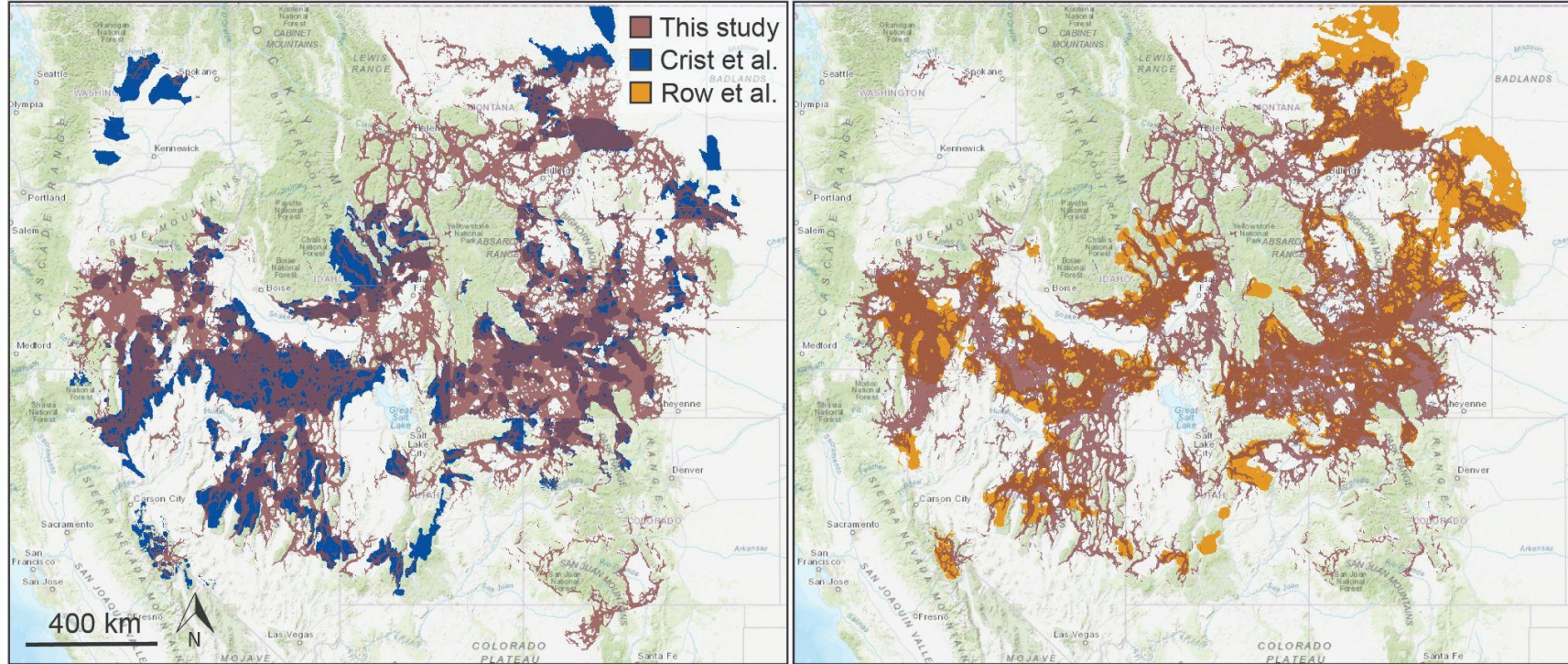
## Supplementary Materials



**Figure S1.** Effect of agricultural land use intensity ( $L$ ) on avian species habitat suitability as estimated from random forest model Partial Dependence (PD). Top panels show kernel density plots of species detections (gray) and non-detections (orange) from eBird data across a gradient of agricultural  $L$ , and bottom panels show partial dependence plots of the marginal effect of agricultural  $L$  on encounter rate (a proxy for habitat suitability) for (a) Greater Sage-Grouse, (b) American Black Duck, and (c) Bobolink, as estimated by the random forest model for each species. Note that y-axes differ between plots. PD plots incorporate complex interactions with other environmental and detection-related covariates in the random forest model, which is why relationships do not take the form of smooth curves.



**Figure S2.** Habitat suitability (as predicted from random forest models) for (a,c) Greater Sage-Grouse and (b,d) American Black Duck when model predictions are based on (a,b) the Julian date with the single highest detection probability across all dates included in the study for a given species (sage-grouse: 18 March [lekking season]; black duck: 17 December [fall migration]), as compared to other seasons included in the analysis (sage-grouse: 15 July [post-breeding season]; black duck: 19 March [spring migration]).



**Figure S3.** High connectivity areas (HCAs, i.e., pixels with current flow values in the top quartile for a given model) for Greater Sage-Grouse predicted by the connectivity model developed for this study (purple) compared HCAs predicted by the models developed by Crist et al. 2017<sup>1</sup> (blue) and Row et al. 2018<sup>2</sup> (orange).

<sup>1</sup> Crist, M.R.; Knick, S.T.; Hanser, S.E. Range-Wide Connectivity of Priority Areas for Greater Sage-Grouse: Implications for Long-Term Conservation from Graph Theory. *The Condor* 2017, 119, 44–57, doi:10.1650/CONDOR-16-60.1.

<sup>2</sup> Row, J.R.; Doherty, K.E.; Cross, T.B.; Schwartz, M.K.; Oyler-McCance, S.J.; Naugle, D.E.; Knick, S.T.; Fedy, B.C. Quantifying Functional Connectivity: The Role of Breeding Habitat, Abundance, and Landscape Features on Range-Wide Gene Flow in Sage-Grouse. *Evolutionary Applications* 2018, 11, 1305–1321, doi:10.1111/eva.12627.