

Development of a probability map for occurrence of Sprague's Pipit along the Texas coast

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Data from the Christmas Bird Count and eBird indicate that the coast of Texas, here defined as the Western Gulf Coastal Plain¹, serves as an important region for wintering Sprague's Pipits. Therefore, we sought to create a map that would provide habitat-based occurrence probabilities for the species throughout this region. Previous analyses of land cover associations of this species throughout Texas revealed that the species associates with the following broad land cover types: grassland, pasture/hay, grassy wetland, and cropland². These cover types have the common feature of being relatively devoid of woody canopy cover. That is, the species seems to avoid areas with substantial canopy cover. Our probability map was developed in ArcGIS 10.2 at a resolution of 4 km (each pixel is 4 x 4 km). For each pixel within the focal region, we determined the proportion of the four cover types with data provided by the National Land Cover Database 2011 edition³. We then used the following equation to determine a probability of occurrence for each pixel: $P(\text{occurrence}) = p(\text{grassland}) + p(\text{pasture})/1.5 + p(\text{wetland})/1.5 + p(\text{cropland})/2$, where $p(x)$ = the proportion of the cover type in the 16 km² area. In this equation, grassland was given the greatest weight followed by pasture and wetland each of which was given a weight of 0.67 and cropland which was given a weight of 0.5 relative to grassland. Grassland was given the greatest weight in that it is the natural habitat of this species. The other cover types were given weights in accordance to their physical resemblance to grassland and/or their degree of "naturalness".

The map reveals areas of very low probability of occurrence to very high probability (Fig. 1). Areas immediately adjacent to the coastline are generally low probability due to urbanization/development and pixels sometimes being positioned such that they include substantial open water. There is a small strip of higher probability along the middle portion of the coast; this might represent the grassy dune areas of San Jose Island and Matagorda Island. As expected, areas of urbanization (e.g., Houston and surrounding area, Galveston, Beaumont/Port Arthur, Corpus Christi, and south Texas) have very low probability of occurrence. Areas of the highest probability of occurrence include Katy Prairie and Attwater Prairie Chicken National Wildlife Refuge both of which have numerous eBird records of Sprague's Pipits (Figs. 1 and 2). The agricultural and ranching area immediately west of Beaumont also has high probability as does a very broad area of extreme south Texas. This latter area encompasses the eastern half of Jim Hogg County and extends eastward into smaller portions of Brooks, Hidalgo, and Kenedy counties. Interestingly, both of these areas are relatively "under-surveyed" by eBird, particularly the high-probability area in south Texas (Fig. 2). This map could be used to guide future survey efforts for Sprague's Pipit and perhaps regional conservation planning. However, we stress that the map is only a guide. Further research efforts could modify and improve the map.

¹ US EPA (2004) revision of Omernik (1987) Level III ecoregions. Ecoregion also referred to as Gulf Coast Prairies and Marshes by TPWD.

² Muller, JA (2015), Landscape scale habitat associations of Sprague's Pipit (*Anthus spragueii*) overwintering in the southern United States. Unpublished M.S. thesis, Texas State University.

³ Based on satellite imagery, the NLCD classifies 30 x 30 m pixels to 15 broad cover types. Our mapping used a subset of these cover types relevant to Sprague's Pipit.

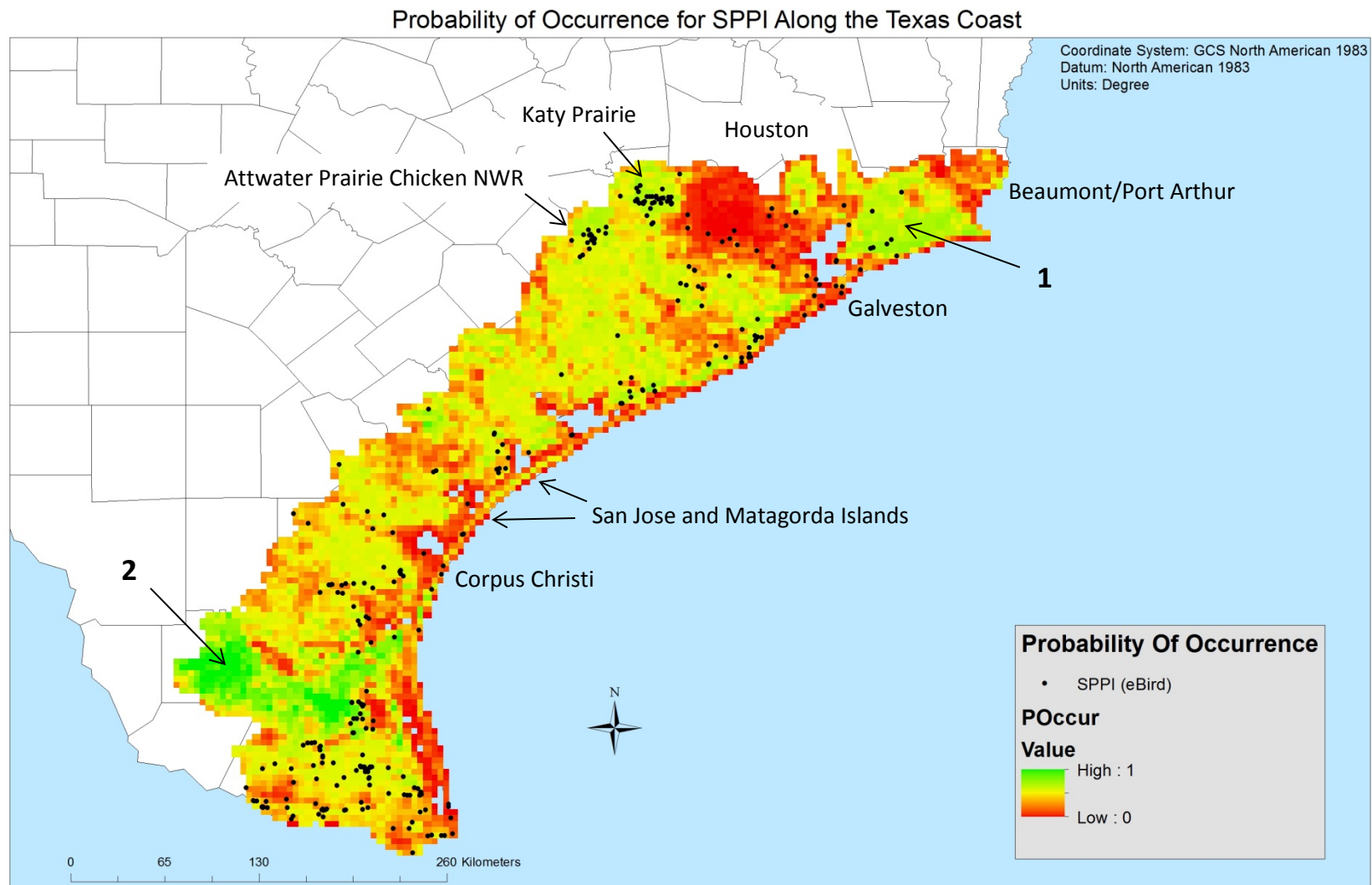


Figure 1. Probability map for occurrence of Sprague's Pipit in coastal Texas, including eBird locations of the species between 2002 – 2013. Map resolution is 4 x 4 km. Labels 1 and 2 indicate two areas of high probability that are relatively under-surveyed by eBird (also see Figure 2).

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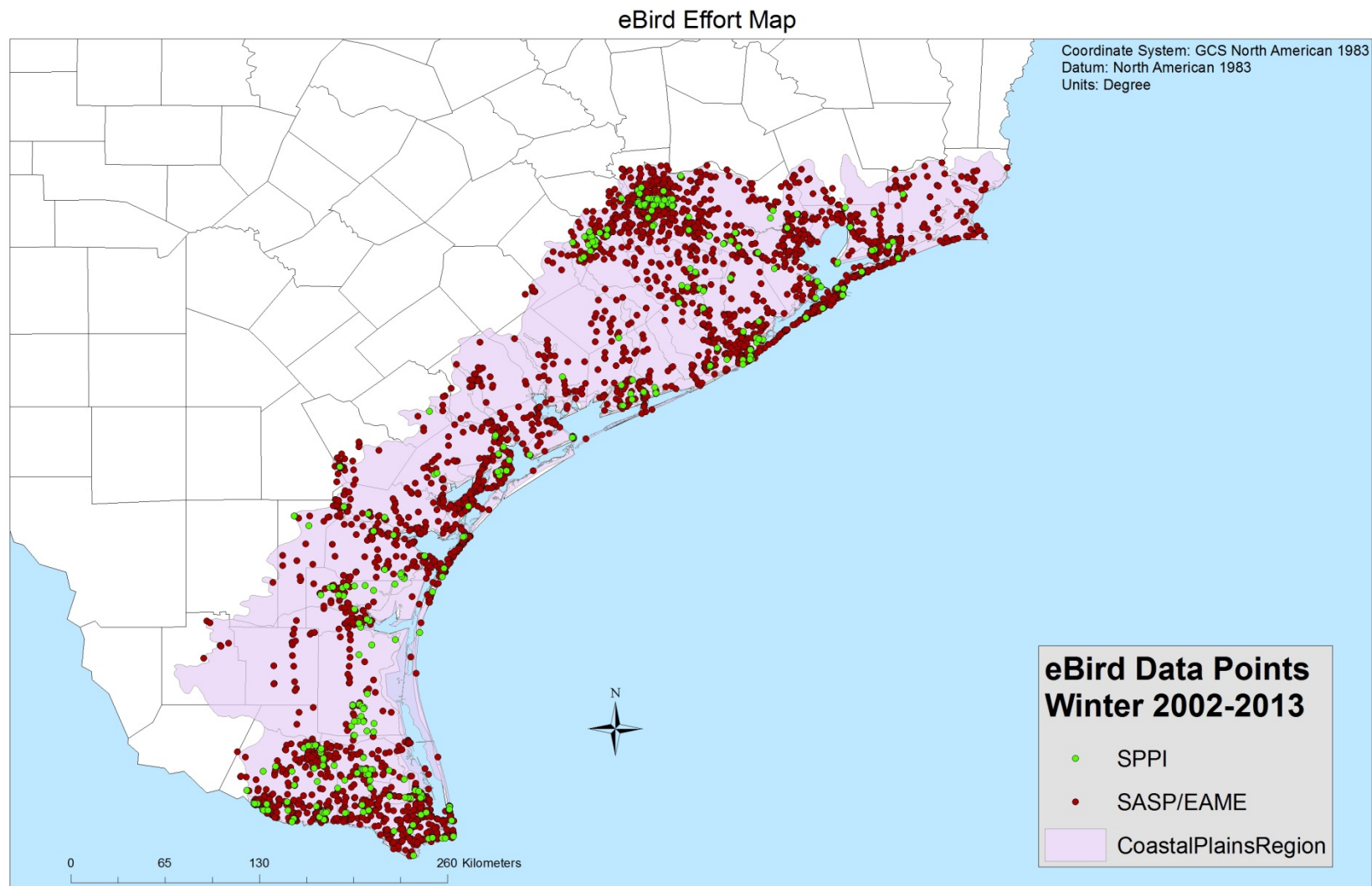


Figure 2. Map depicting eBird locations of Sprague's Pipit (SPPI) and survey effort. eBird checklists having either Savannah Sparrow or Eastern Meadowlark (SASP/EAME) were used as a proxy for survey effort. Both are relatively common grassland bird species that occupy habitat similar to that occupied by Sprague's Pipit.

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