# Emergence Theory: A Search for Clarity

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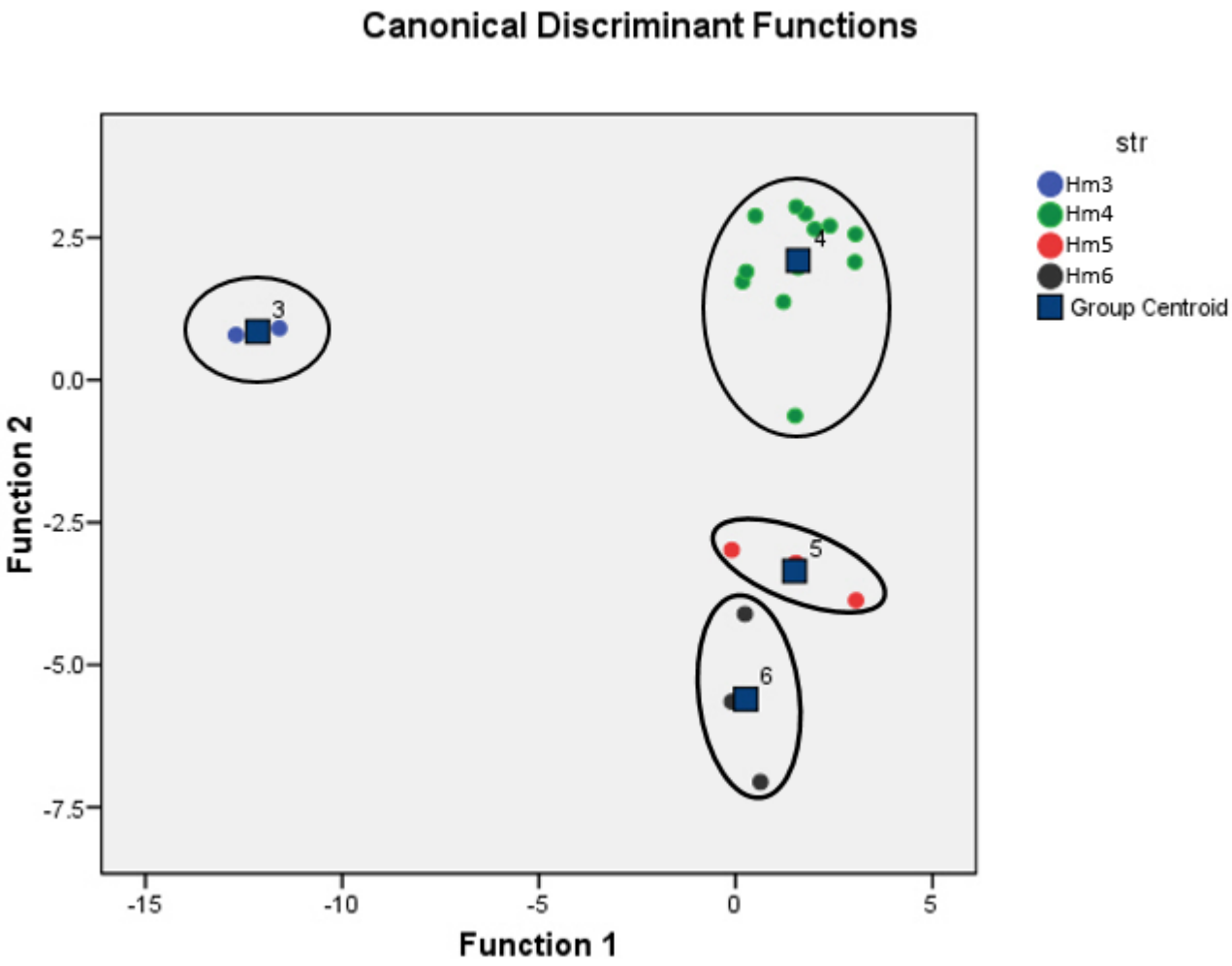
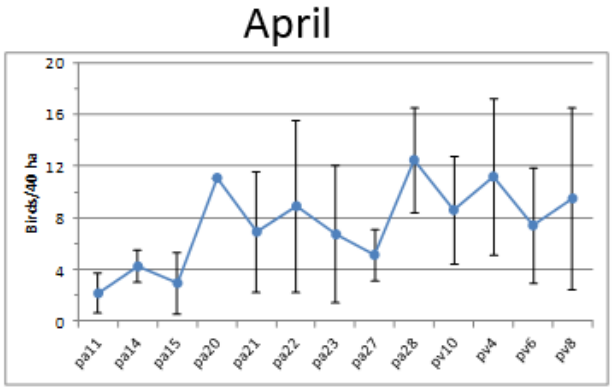
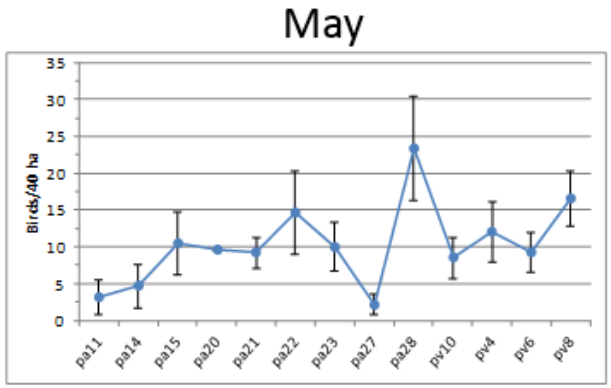
RANCE AGENTS

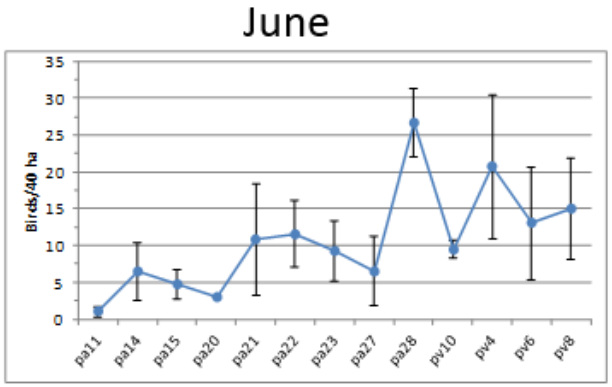
*Results of discriminant function analysis of 20 areas. High scores on Function 1 indicate presence of shrubs; function 2, greater number of honey mesquite, foliage volume and patchiness greater than 1 m.*

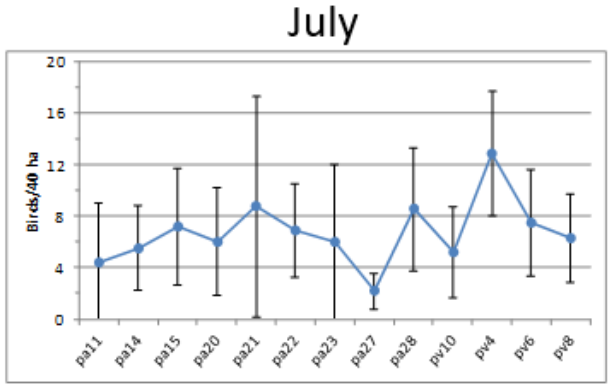


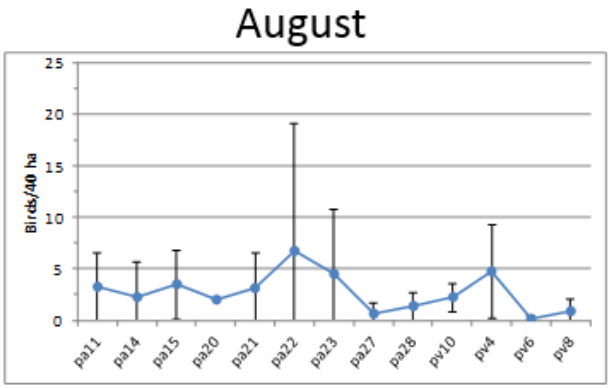
*Bullock's oriole densities for April, May, June, July and August*



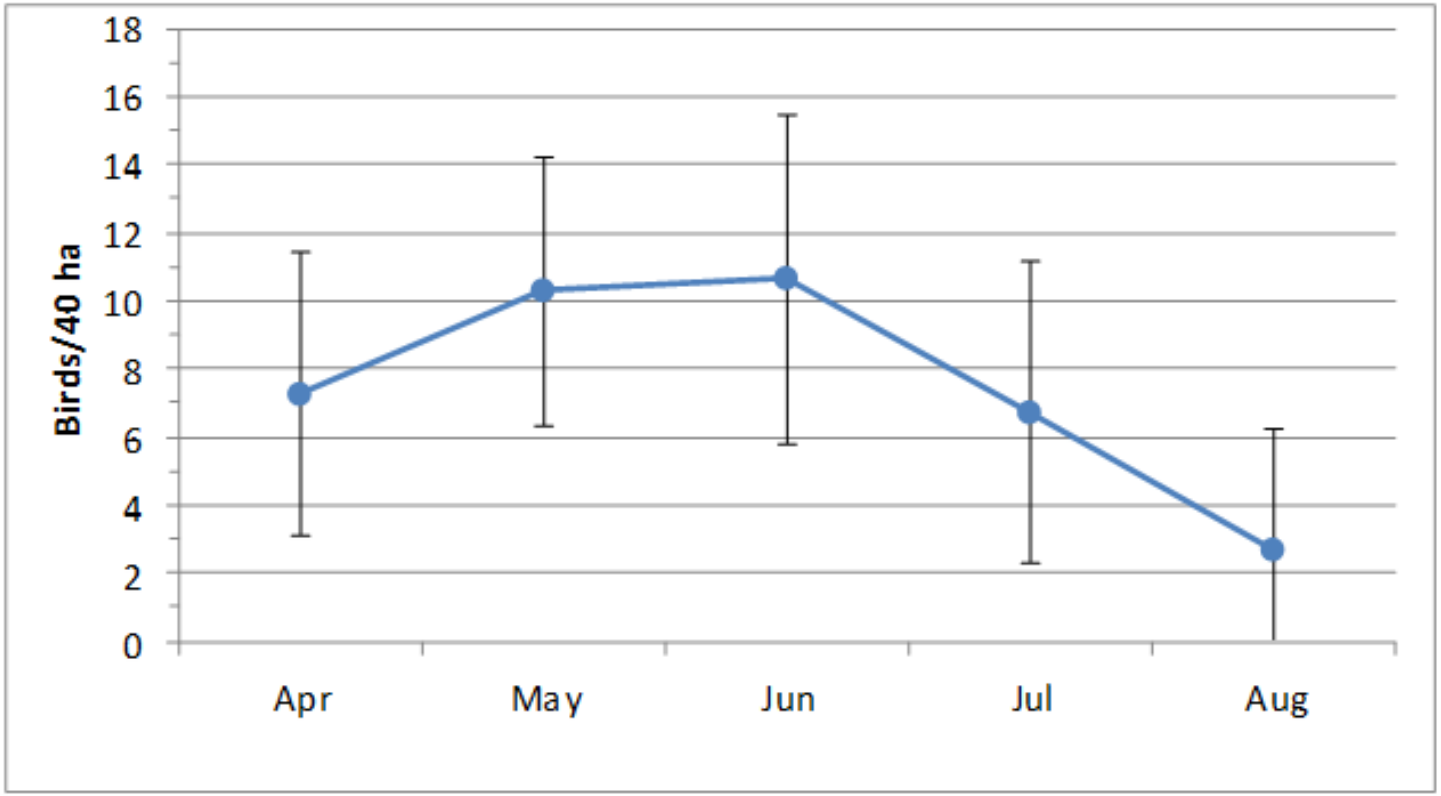



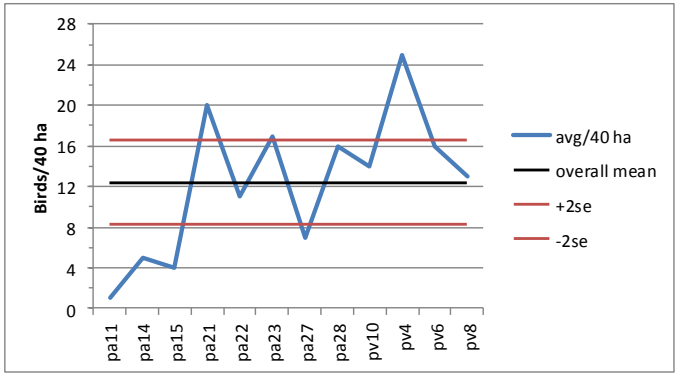



*Densities of Bullock's oriole combined across 12 areas determined to be honey mesquite of structural type 4 for 6 years across months. Vertical lines represent 2 standard errors of the mean value (blue dots). For any pair of months, if the mean of one lies outside of 2 se of the mean of the other and if the reverse is also true, the means are statistically significantly different.*

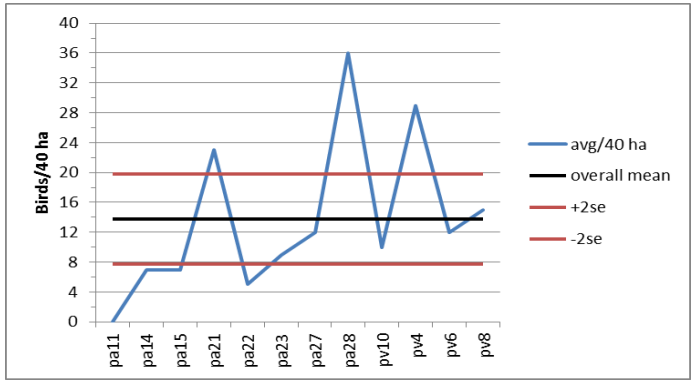


*Variation the number of Bullock's oriole in April, June and July 1978. The red bars represent plus and minus 2 standard errors of the overall mean for all 13 areas.*

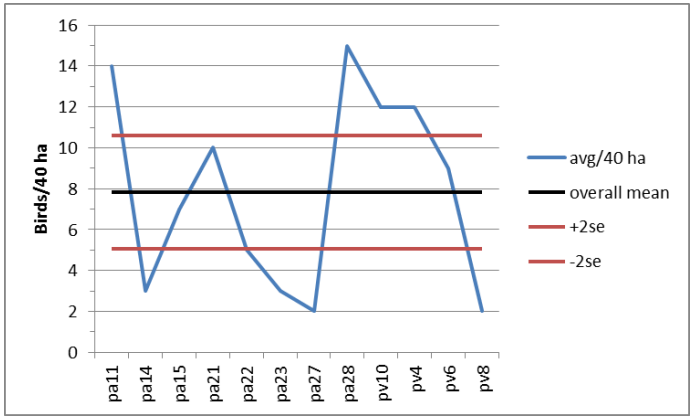
April



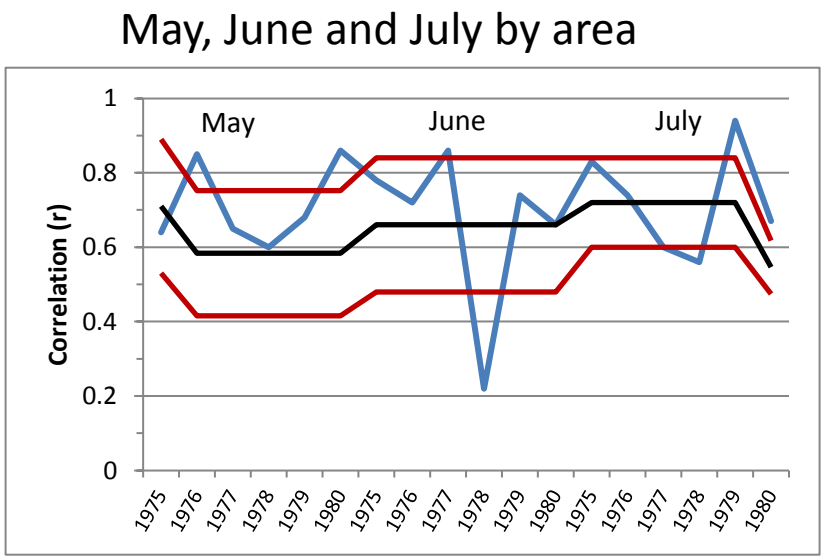

June

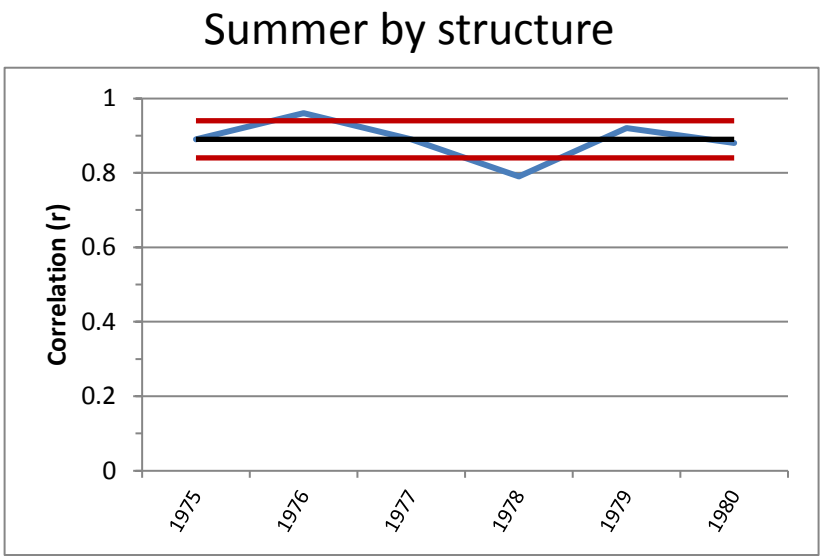



July

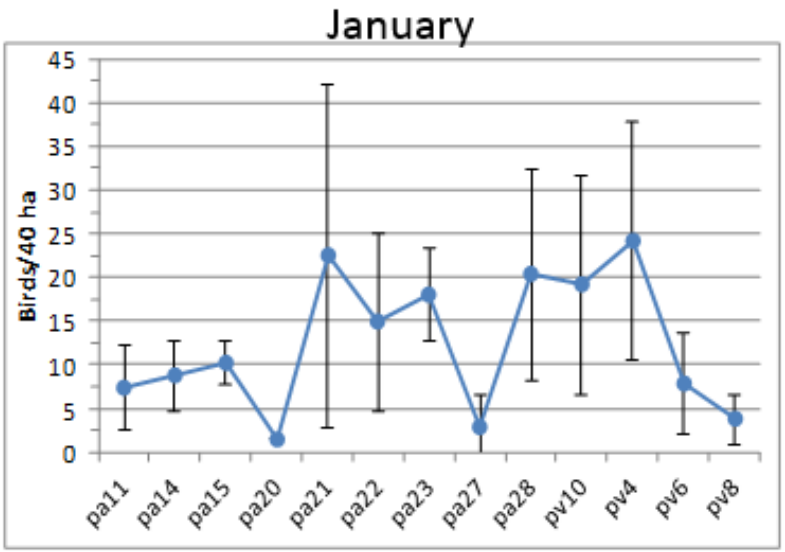


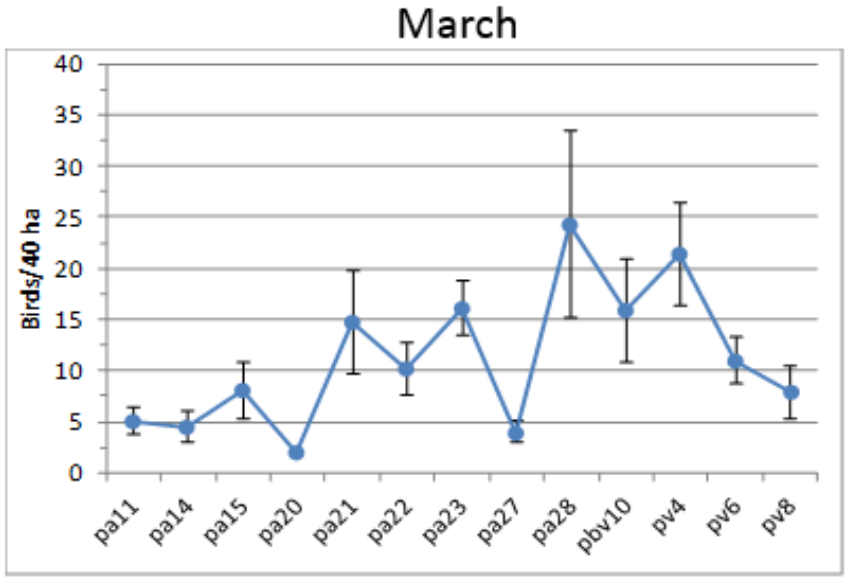
*Correlation between the number of Bullock's orioles per 40 ha and the foliage volume greater than 5 m considered area by area for 20 areas for each of 3 summer (May, June and July) for each of 6 years. The graph on the right shows the correlation across the 3 months combined with the areas combined by each of the 4 structural types of honey mesquite habitat in the lower Colorado River valley. On both graphs the solid black line represents the mean value; red lines, 2 standard errors of the mean; blue line, the correlation for a given year.*

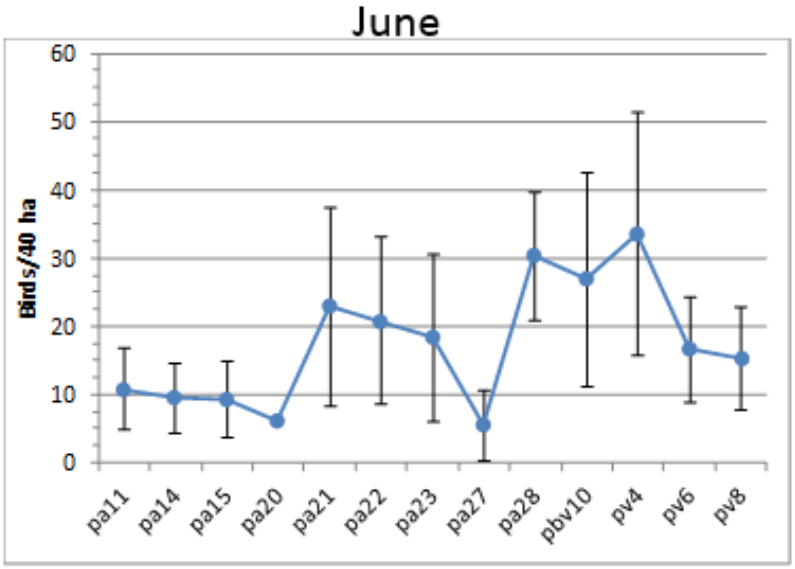


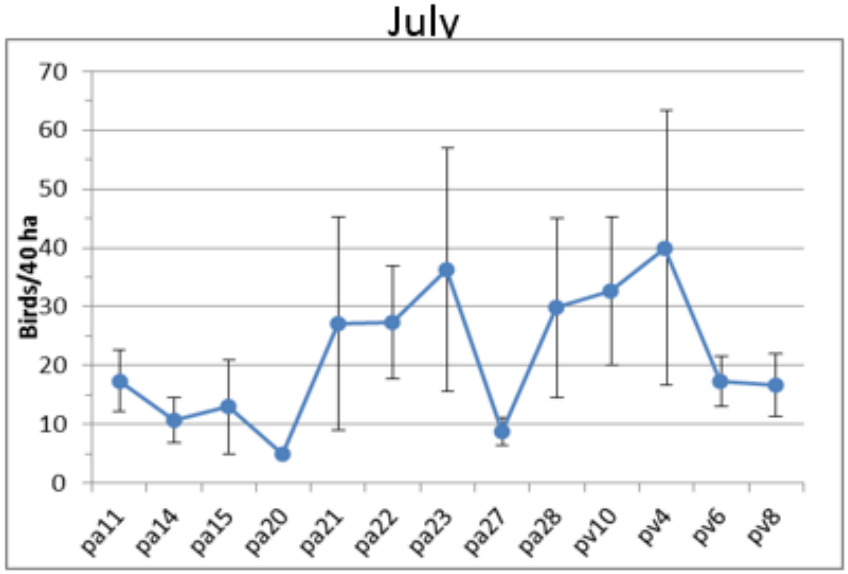



*Abert's towhee densities for January, March, June and July, August, September, October, November and December. Data for 9 of the 12 months reveal the relevant features concerning the variation in towhee numbers for the whole year. The blue dots represent the mean numbers per 40 ha for each of the areas listed on the x-axis. The vertical lines above and below the mean indicate 2 standard errors of the mean. For any pair of areas, if the mean of one lies outside of 2 se of the mean of the other and if the reverse is also true, the means are statistically significantly different.*

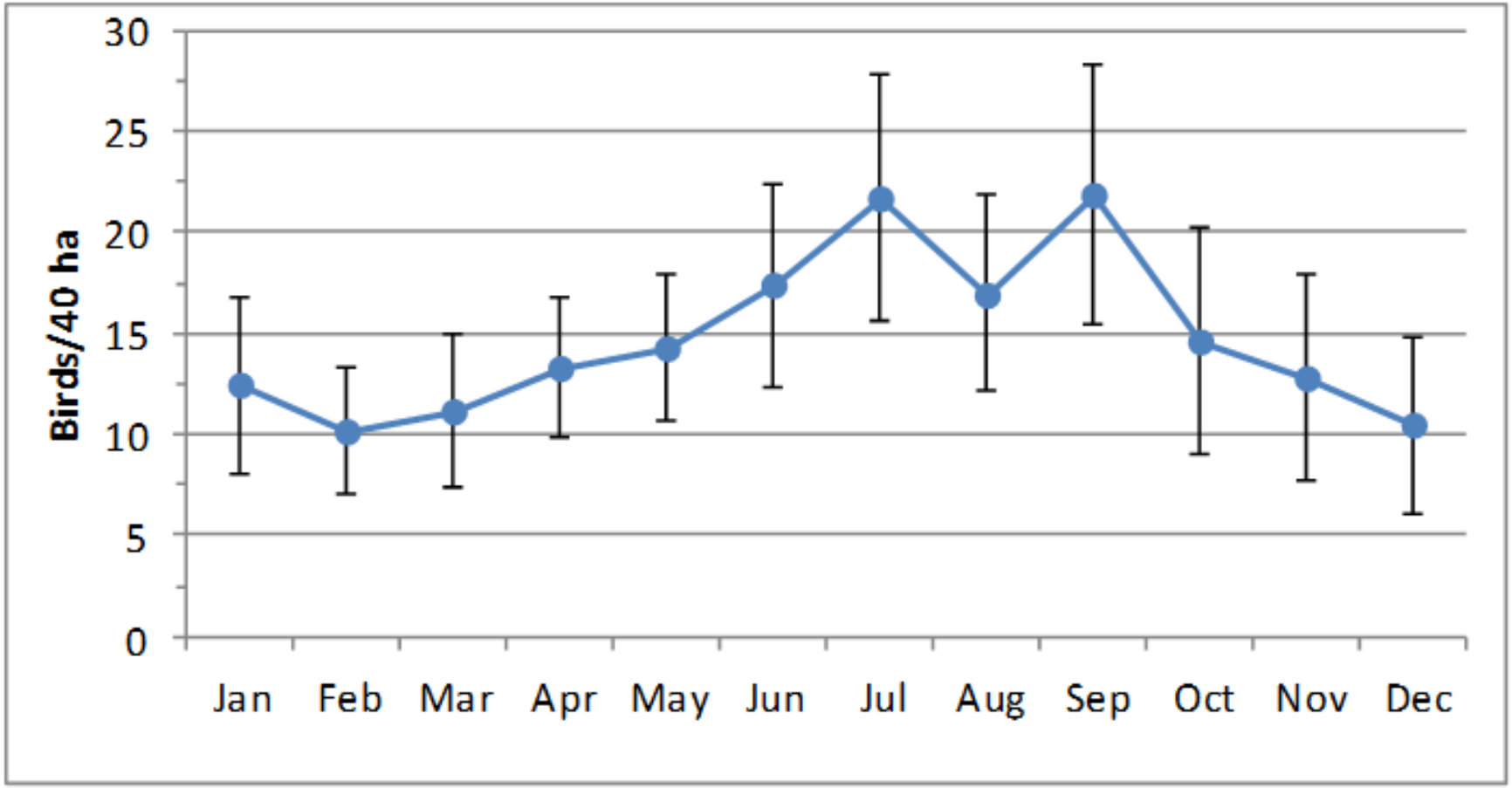


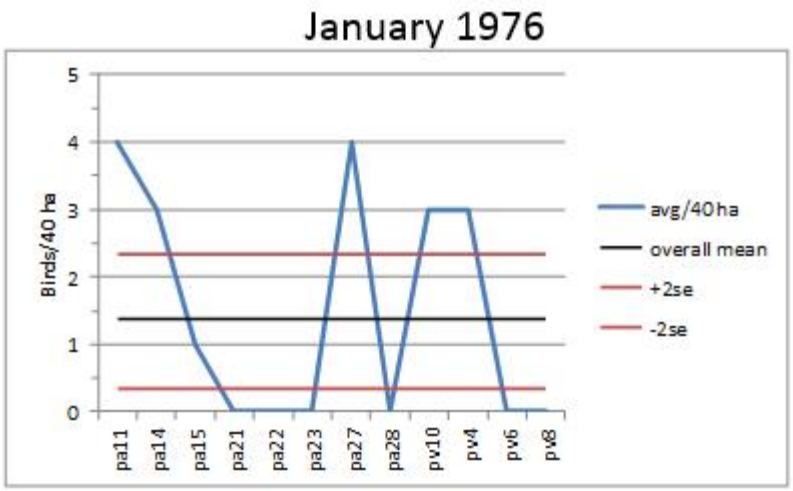



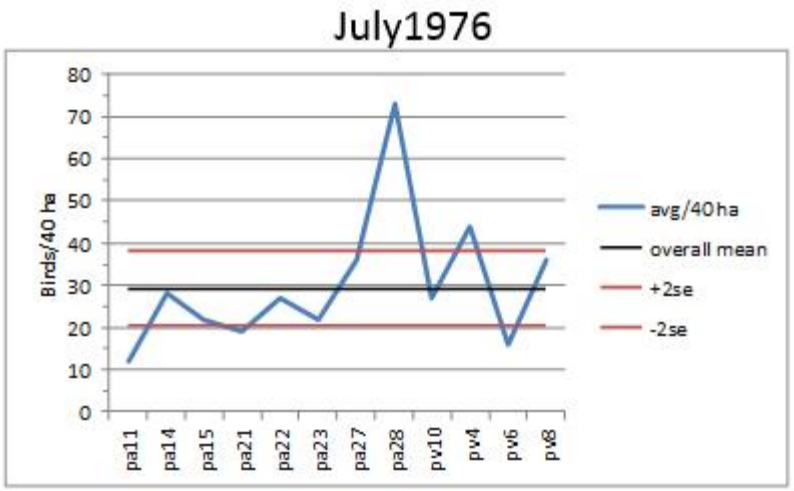



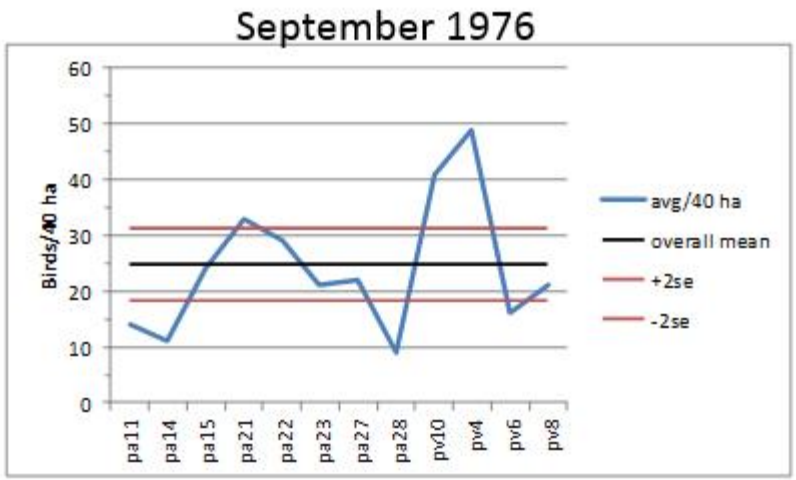
*Densities of Abert's towhee for 12 areas determined to be honey mesquite of structural type 4 for 7 years across months. The vertical line represents 2 standard errors of the mean value (blue dots). For any pair of months, if the mean of one lies outside of 2 se of the mean of the other and if the reverse is also true, the means are statistically significantly different.*



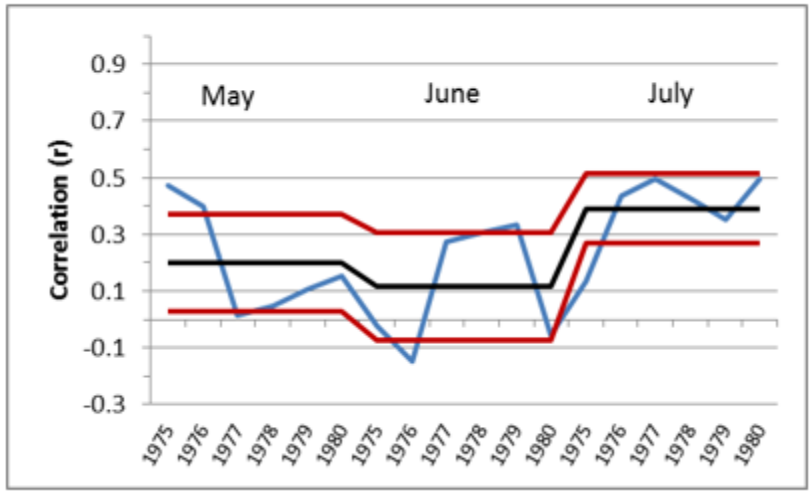
*Variation the number of verdins in January, July and September 1976. The red bars represent plus and minus 2 standard errors of the overall mean for all 12 areas. For any pair of areas, if the mean of one lies outside of 2 se of the mean of the other and if the reverse is also true, the means are statistically significantly different.*

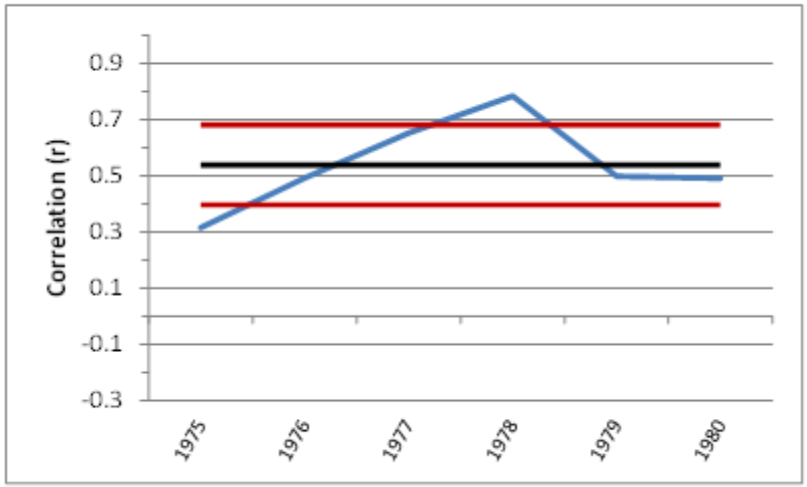


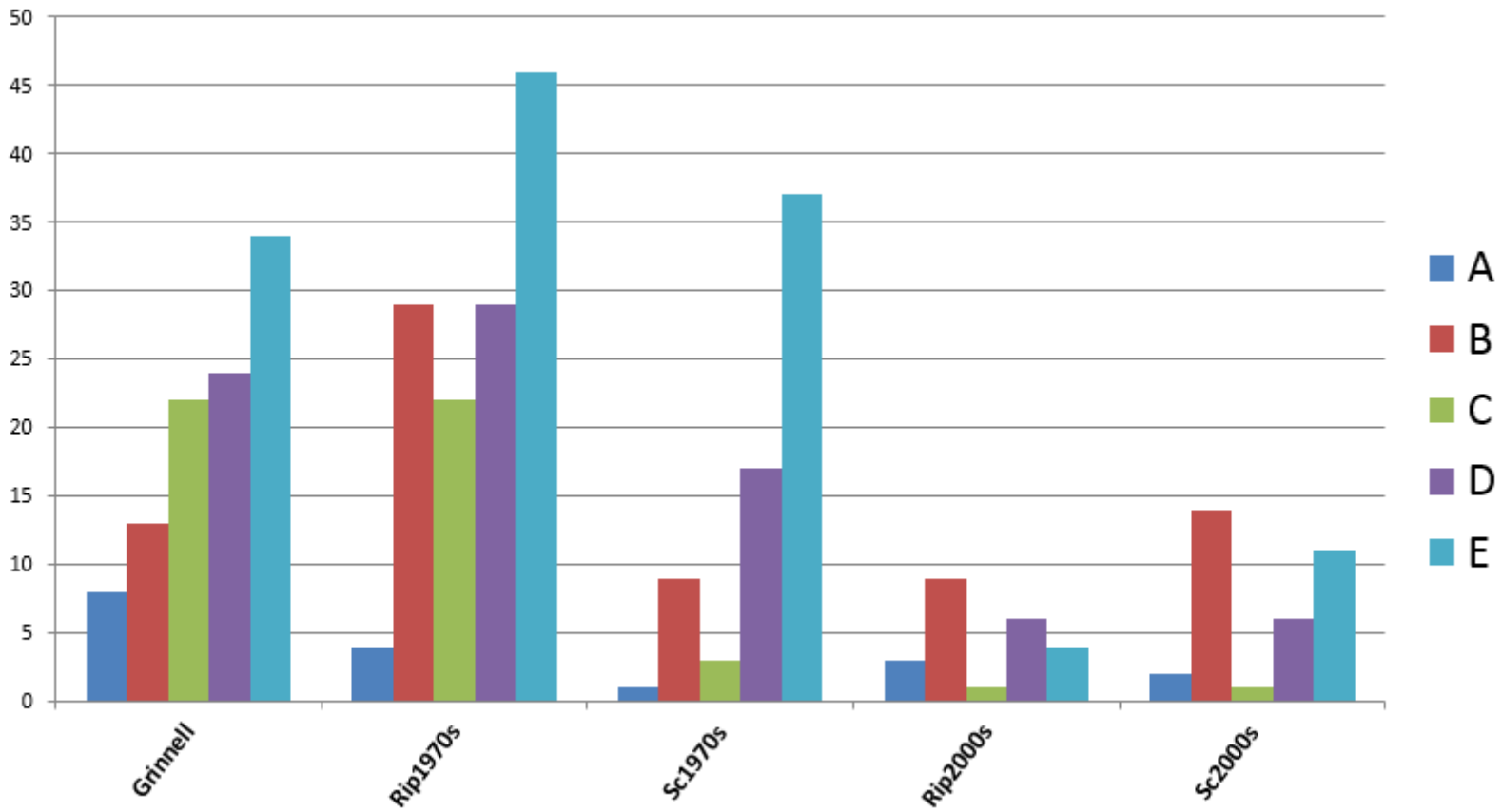



*Correlation between the number of Abert's towhees per 40 ha and foliage height diversity considered area by area for 20 areas for each of 3 months (May, June and July) for each of 6 years. The graph on the right shows correlations across the 3 months combined with the areas combined by each of the 4 structural types of honey mesquite habitats in the lower Colorado River valley. On both graphs the solid black line represents the mean value, red lines, 2 standard errors of the mean; blue line, correlations for each year. The graph on the left has 3 different sets of means, one for May for each year then June and July for each of the 6 years.*



# Factors causing variation

- Statistical—regression to the mean
- Variation in an important food item from month to month
- Proximity of agriculture
- Variation in species of shrubs
- Proximity of water
- Edaphic features within area
- Censusing technique
- Variable results of different censuses
- Weather factors

# WHAT ARE THE 5 SPECIES ON THE RIGHT OF THE GRAPH? WHAT DO MOST OF THEM HAVE IN COMMON?