

# Avian Community Response to Seasonal and Successional Changes

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## INTRODUCTION

- The composition of an animal community depends on a variety of factors, and may be predicted to change on seasonal and successional stage time scales.
- Seasonal changes can be extreme in their effects on biological and physical parameters, affecting phenological patterns of plants, and consequently, the faunal abundance<sup>1</sup>.
- Although vegetation and the avian community are key components of many biological communities, few studies have examined the changes in bird communities across seasons and stages of ecological succession.
- We studied seasonal changes in the abundance, diversity, and similarity of avian communities in abandoned rice fields representing a variety of successional stages on the Cooper River, Berkeley County, South Carolina.

## METHODS

### Map of Rice Fields

Large Bonneau Ferry  
Small Bonneau Ferry  
Durham Creek

● = Census Point

### Successional Stages

Stage 1 = Subtidal Submerged Aquatic Vegetation (SAV)

Stage 2 = Subtidal Floating Leaf Vegetation (FLV)

Stage 3 = Intertidal Emergent Marsh (ITEM)

Stage 4 = Intertidal Developing Swamp Forest (DSF)

### Seasons

- Breeding = March - June
- Molt = July - October
- Winter/Migration = November - February

### Field Technique

Photos allowed later confirmation of bird ID

Playback used to detect cryptic species

Recorded all species & individuals observed per 5-minute census point

Census & Data Collecting

### Statistical Analysis

- Shannon Weaver Index (SWI), based on avian abundance & evenness data, was used to examine diversity in every season and stage
- ANOVAS were used to test for significant differences in diversity
- Similar SWI values may mask differences in community composition therefore we calculated similarity indices using a modified Renkonen's Index
- Renkonen Similarity Index: 0 = no overlap between samples; 100 = complete similarity

$$P = \sum_{i=1}^{i=S} \text{minimum}(p_i^A, p_i^B, p_i^C, p_i^D)$$

Modified Renkonen's Index

## RESULTS

- Successional stage significantly influenced diversity but season did not (Figure 1;  $F_{3,306}=141.30, p < 0.001$  &  $F_{2,207}= 0.50, p = 0.61$ , respectively).
- We observed 5,302 individuals representing 106 avian species (Figures 2 & 3).
- Although similar in species richness, the communities are comprised of completely different species in each season and especially each stage (Figures 2 & 3; Renkonen indices = 36 and 2, respectively).

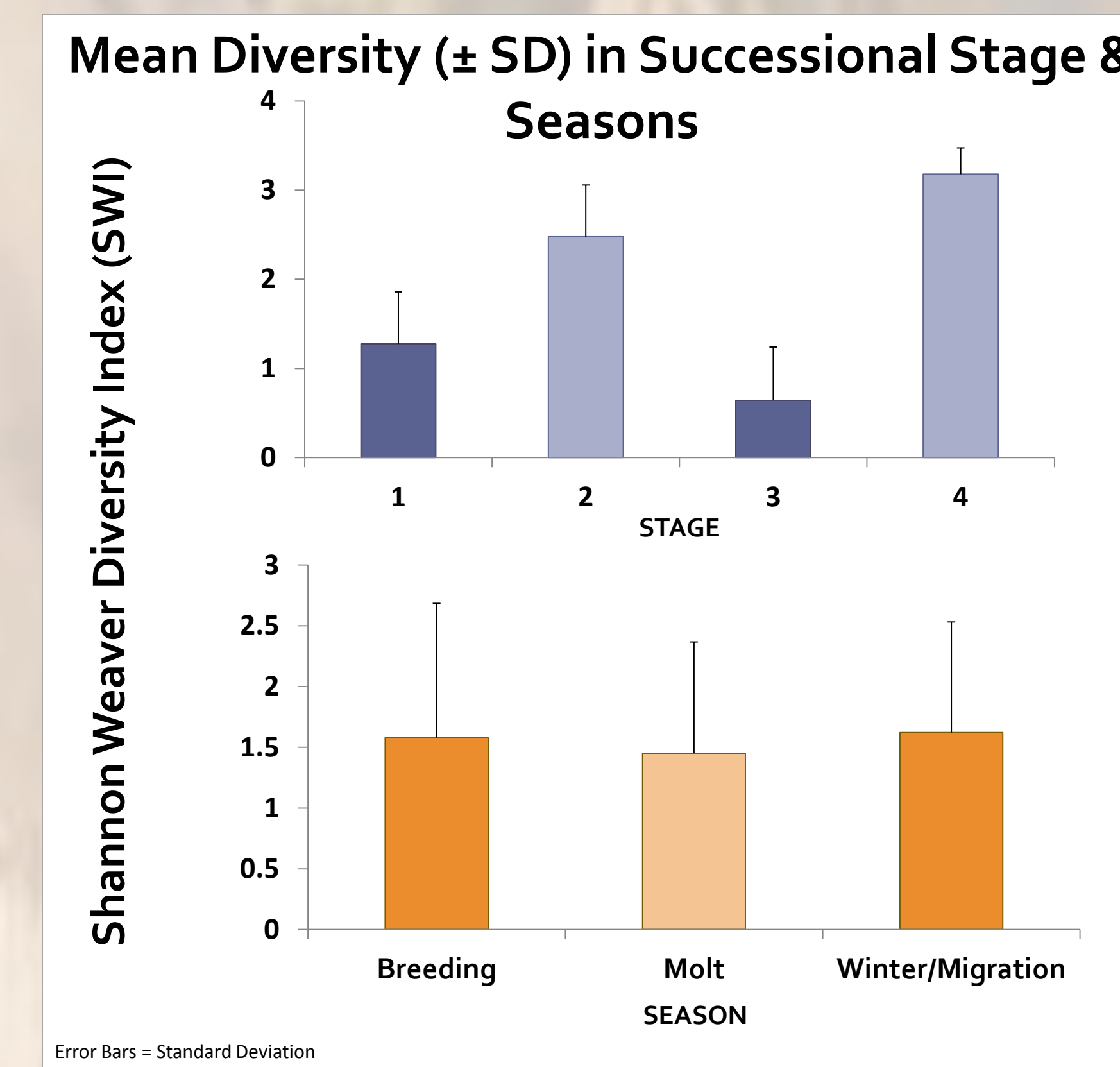


Figure 1. SWI is significantly influenced by successional stage but not by season.

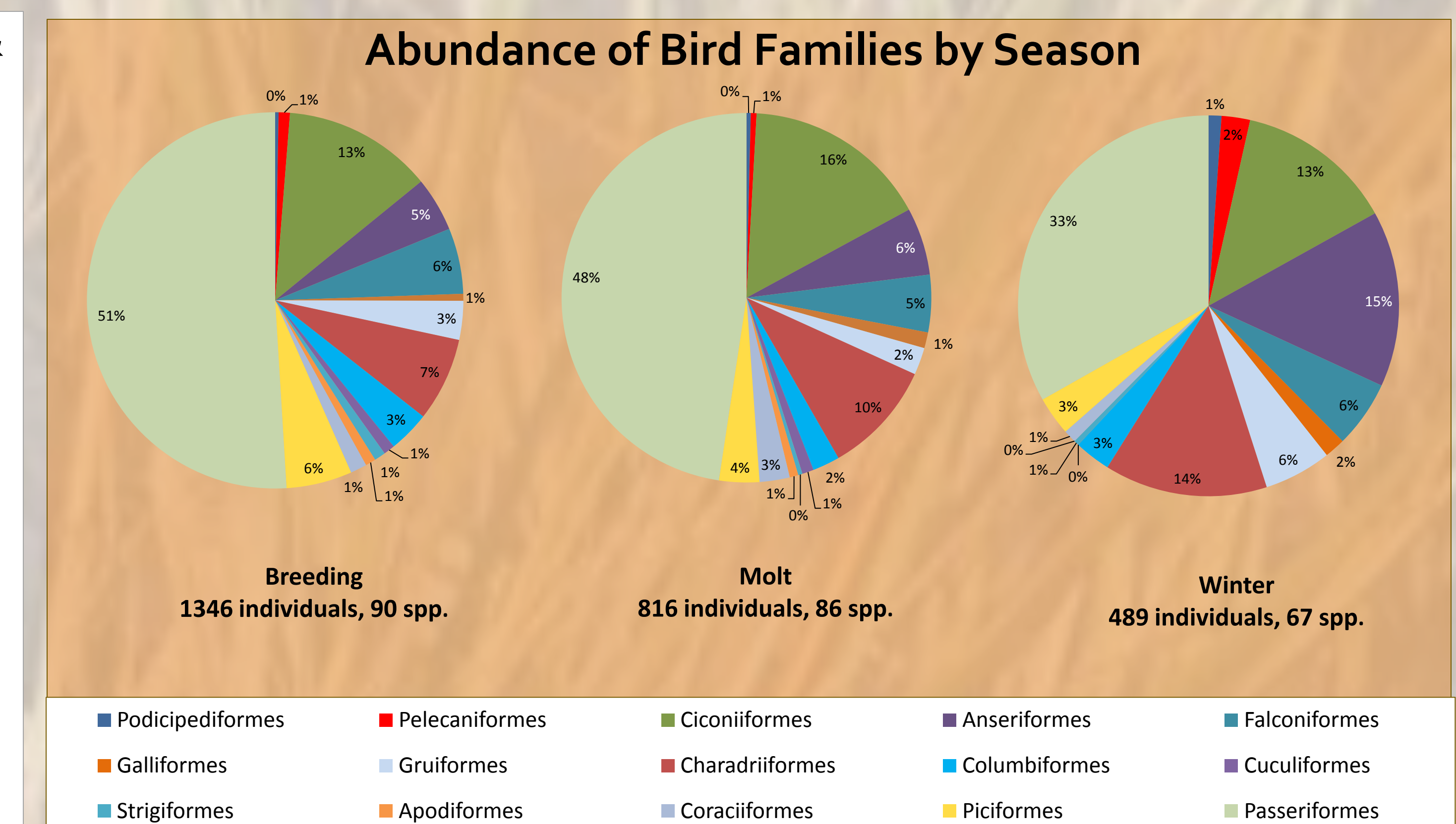


Figure 2. The differences in avian family abundances in each season.

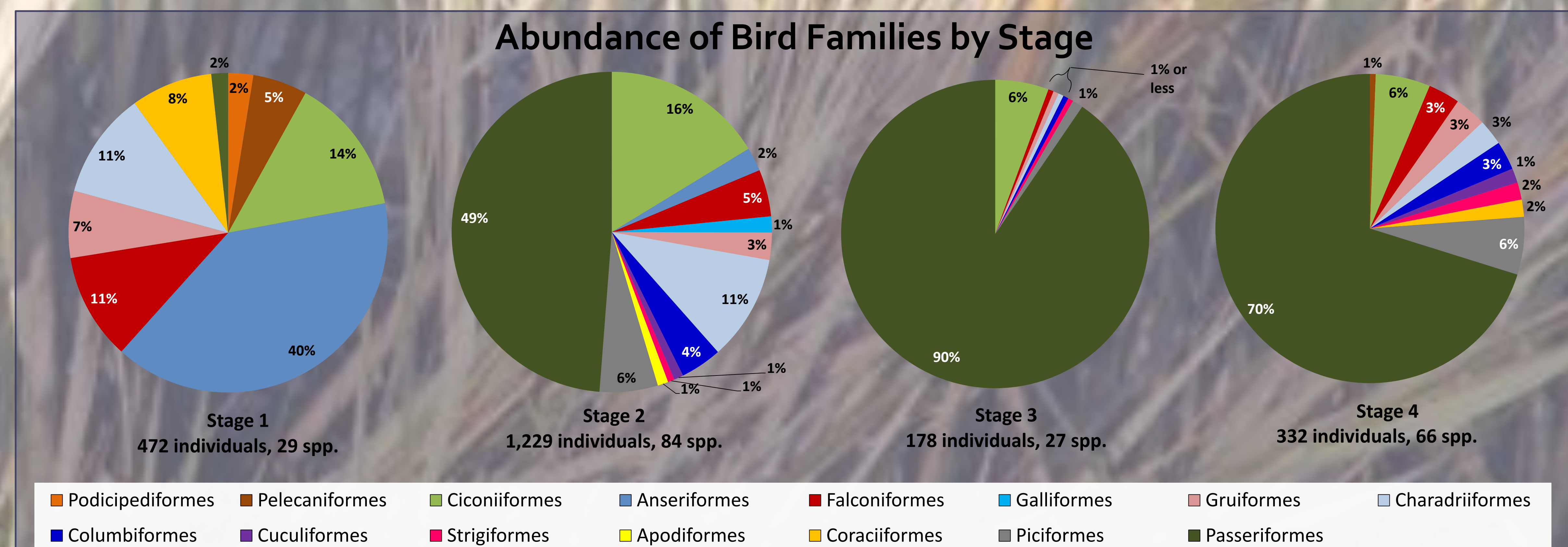


Figure 3. The differences in avian family abundances in each of the successional stages.

## DISCUSSION

- Understanding how the avian community responds to seasonal and successional changes is important for conservation biologists and land managers:
  - Seasonal water drawdowns can manage for peak shorebird migrations
  - Management must be dynamic due to the variety of stages in a given area
  - Similar diversity values may hide large differences in community composition
- Rice fields play a vital role in avian diversity and conservation:
  - For many species, abandoned rice fields have replaced the original wetland habitats lost to reclamation and development
  - Data for current populations of threatened/endangered species
  - Variety of stages provided habitat for multifarious species
  - Managing for maximum diversity requires multiple successional stages