

# A Comparison of Bird Abundance Among Pine and Hardwood Stands of Centennial Campus and Schenck Forest



Webshots.com

- Kim Jervis
- Greg Queen
- James Stephens
- Matt Wood
- Jimmy Dodson

# Introduction



- Forested areas in the Triangle region of NC are quickly being developed.
  - Dr. Thomas Quay examined the winter avian communities in the Raleigh, NC area during the winter of 1938.
  - Centennial Campus Development will change the forest cover type.
  - The NCSU CNR Schenck forest represents a similar forest type and area to that found currently and historically on Centennial Campus.

# Objectives

- Compare the forest avian community in 2005 for Centennial Campus with that found by Dr. Thomas Quay in 1938.
- Examine the winter forest avian community in 2005 @ the NCSU CNR Schenck Forest.
- Compare the Centennial and Schenck forest avian communities present in 2005.

# Study Areas

- Centennial Campus
  - Deciduous forest (Quay, 1938-39, site #8.1, ~87 acres)
  - Pine forest (Quay, 1938-39, site #7.3, ~16.4 acres)
- Schenck Forest
  - Deciduous forest (Stand 19, ~ 35 acres)
  - Pine forest (Stand 2, ~ 19 acres)



# Centennial Color Ortho-photo



# Centennial Planning Map



# Schenck Forest Color Ortho-photo



Wake Co GIS database

# Stands @ Lake Raleigh Woods



Kim Jervis

**Centennial Hardwoods**



Kim Jervis

**Centennial Pines**

# Hardwood and Pine Stands in Schenck



Kim Jervis

Schenck Forest hardwoods



Kim Jervis

Schenck Forest pine

# Data Collected



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- Study Area photography & Centennial Plan Maps
- Avian Surveys
- Vegetation Surveys

# Avian Surveys

- Hybrid count (point count and line-transect)
  - Deciduous forest
    - Line transects ~750m total, with a point count every 250m
  - Pine forest
    - Line transects ~500m total, with a point count every 250m

# Data Recorded for Avian Survey

- Weather, start time, noise level and all birds seen and heard during survey.
- 5 minute Point Counts separated into 2 periods
  - 1-3 minutes (Period 1)
  - 3-5 minutes (Period 2)
- Distances of recorded birds were related to transect line and center of point count
  - Stand/Habitat association considerations with flyovers, etc.

# Data recorded for Vegetation Sampling

- Three BAF 10 point counts for midstory and overstory at least 4.5' in height
- Three 1/50 acre sample plots for any vegetation material less than 4.5' in height
  - Grasses, woody, and herbaceous plants
- Canopy closure estimation

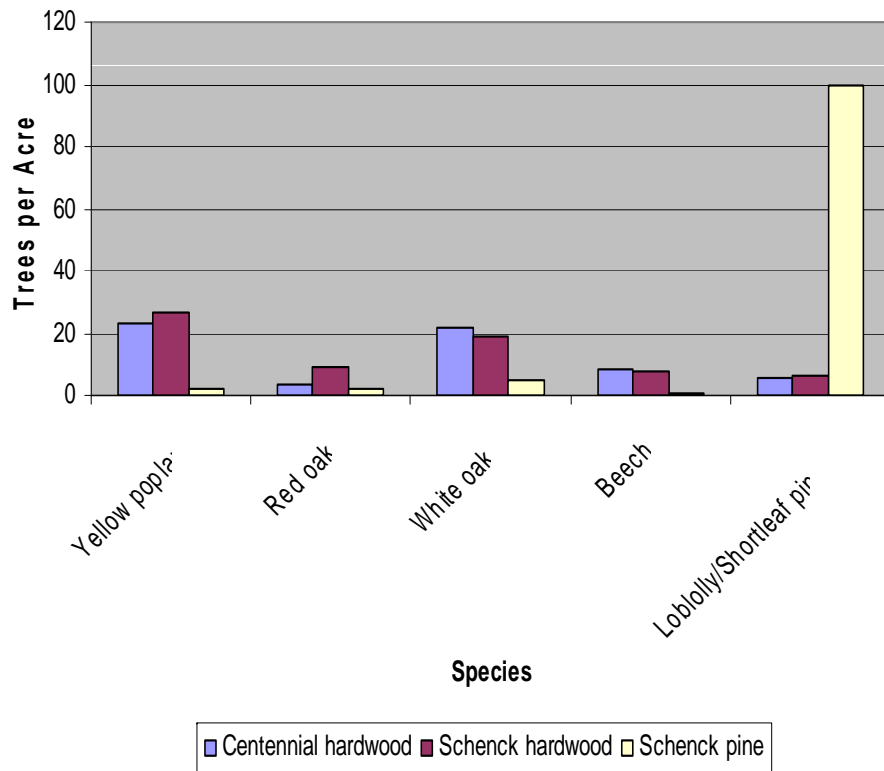


# Data: Vegetation Characteristics

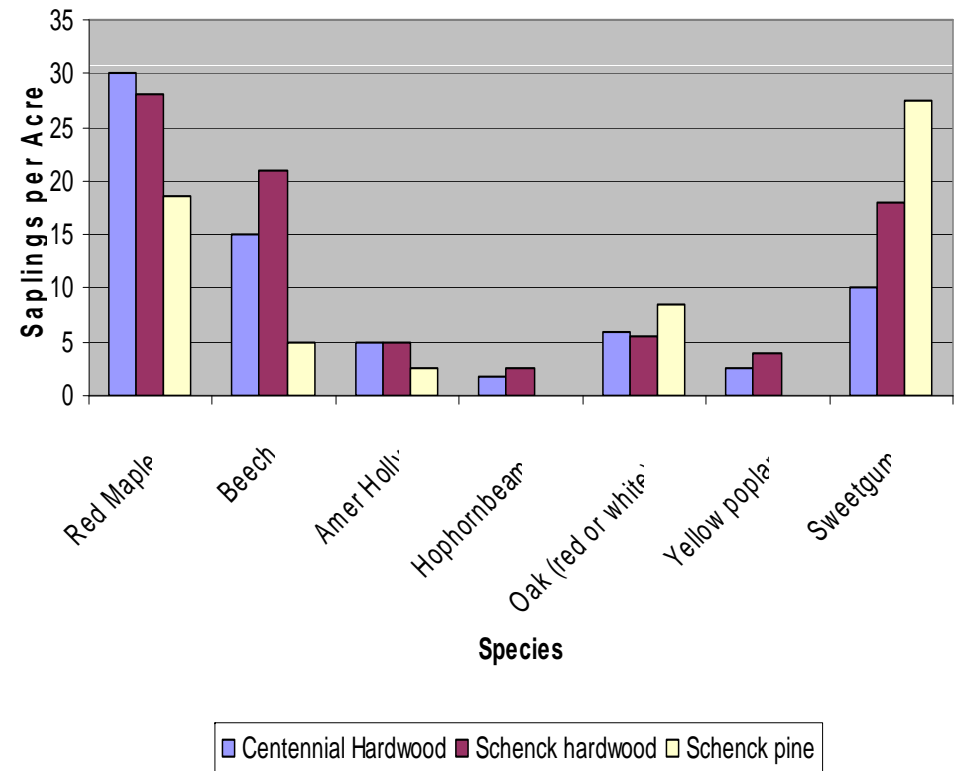
<b>2005 Group #4 Vegetation Characteristics</b>			
<i>Overstory Components</i>			
		<b>Centennial hardwood</b>	<b>Schenck hardwood</b>
<b>Age</b>		~99 (1906)	~91 (1914)
<b>Trees per acre</b>		71	117
<b>Species TPA</b>	<b>Yellow poplar</b>	23.4	2.4
	<b>Red oak</b>	3.2	1.76
	<b>White oak</b>	22.1	4.9
	<b>Beech</b>	8.4	0.85
	<b>Loblolly/Shortleaf pine</b>	5.8	99.4
<b>Avg DBH</b>		14.1"	13.7"
<b>Basal Area</b>		101	116
<b>Canopy Closure</b>		~84%	~98%
<i>Understory Components</i>			
		<b>Centennial hardwood</b>	<b>Schenck hardwood</b>
<b>Saplings per acre</b>		80	65
<b>Sapling SPA</b>	<b>Red Maple</b>	30	18.5
	<b>Beech</b>	15	5
	<b>Amer Holly</b>	5	2.5
	<b>Hophornbeam</b>	1.75	0
	<b>Oak (red or white)</b>	6	8.5
	<b>Yellow poplar</b>	2.5	0
	<b>Sweetgum</b>	10	27.5
<b>Other ground cover</b>		Vaccinium sp.	Red Maple
		Microstegium sp.	Sweetgum
		Red maple	Plume grass
		Christmas fern	Vaccinium sp.
		Amer beech	Amer Holly
		Rattlesnake plantain	Muscadine grape
		Muscadine grape	Greenbriar

# Vegetation Components

Overstory Trees per Acre by Site

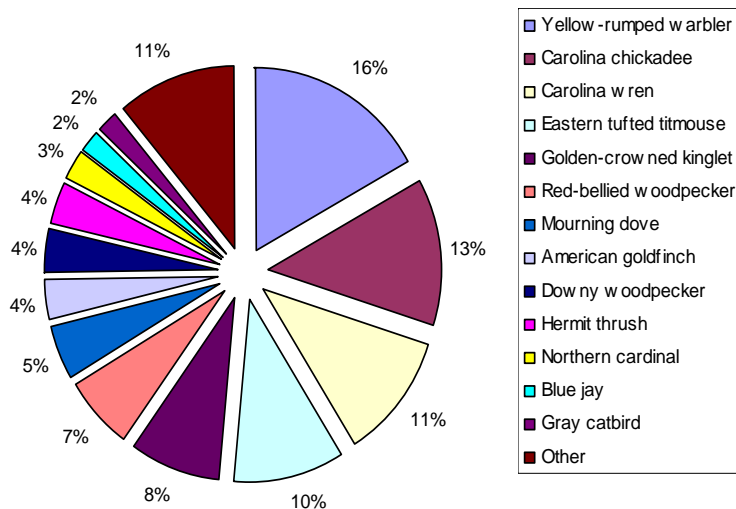


Understory Species per Acre for Sites



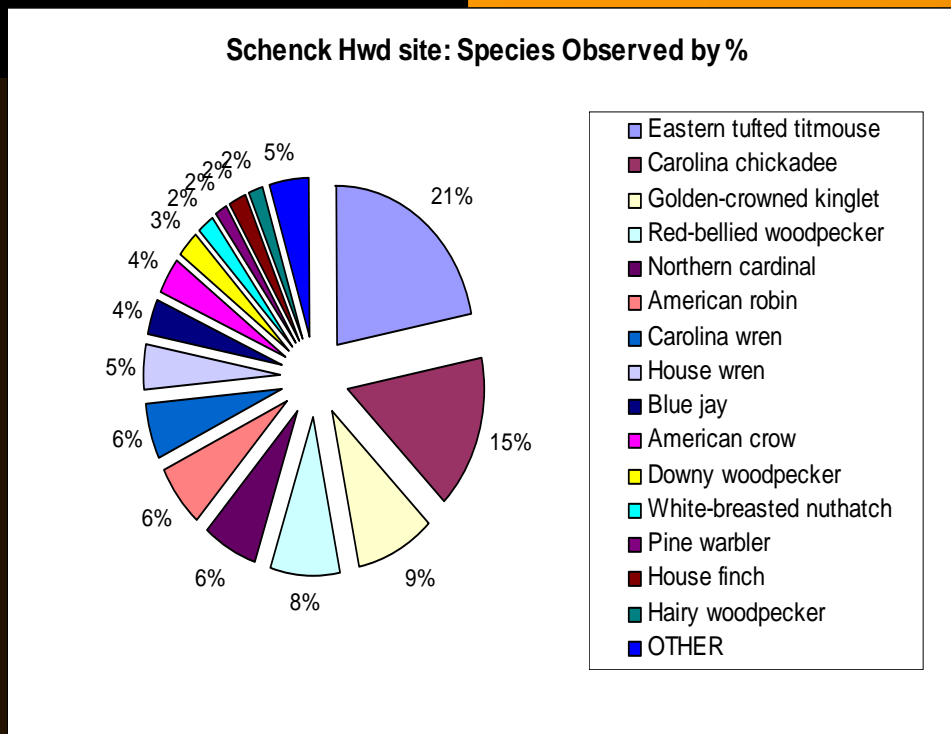
# Data: Relative Abundance for Centennial Campus Hardwood

Centennial Hwd site: Species Observed by %



- 108 individuals of 25 species
- Most Prevalent:
  - YRWA (16%)
  - CACH (13%)
  - CAWR (11%)
  - ETTI (10%)
  - GCKI (8%)
- “OTHER” included:
  - EAPH, AMCR, AMRO, NOFL, NOMO, HAWO, RTHA, PIWA, PIWO, WBNU, YBSA, and an Unknown (U1)

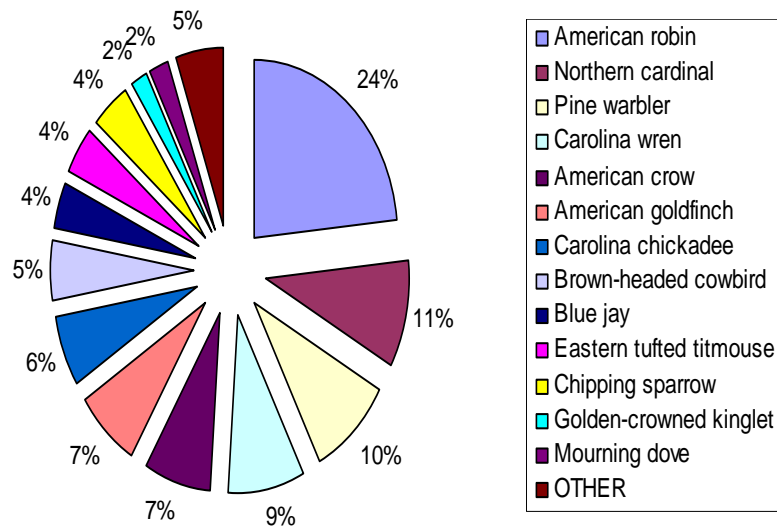
# Data: Relative Abundance for Schenck Forest Hardwood



- 109 individuals of 20 species
- Most prevalent species:
  - ETTI (21%)
  - CACH (15%)
  - GCKI (9%)
  - RBWO (8%)
- “OTHER” included:
  - AMGO, MODO, and three Unknown species (U2, U3, U4)

# Data: Relative Abundance for Schenck Forest Pine

Schenck Pine site: Species Observed by %



- 94 individuals of 18 species
- Most prevalent:
  - AMRO (24%)\*\*\*\*\*
  - NOCA (11%)
  - PIWA (10%)
  - CAWR (9%)
  - AMGO/AMCR (7% ea)
- “OTHER” includes:
  - RBWO, WBNU, PIWO, NOFL, and one Unknown (U5)

# Comparisons Between 1938 and 2005 Avian Surveys

- Simple look @ data
- Utilized Dr. Quay's records of observations to generate relative abundance values for 1938 surveys of Centennial Hardwood (Plot 8.1) and Pine (7.3)
- Generated relative abundance values for 2005 data
- Compared data sets using a simple statistical Paired Differences test
- $H_0 \Rightarrow \mu_1 - \mu_2 = 0$   
 $\alpha = .05,$   
if  $p\text{-val} < \alpha$ , reject  $H_0$
- Example: 2005 data ( $\mu_1$ ) vs. 1938 data ( $\mu_2$ )

# Basic Comparison of Data

Site/Location	# of Individuals	# of Species
Centennial Hwd 2005	107	25
Schenck Hwd 2005	109	20
Schenck Pine 2005	94	18
Centennial Hwd 1938	160	21
Centennial Pine 1938	293	15

# Comparisons Between 1938 and 2005 Avian Surveys

## Stat Results for Paired Differences test of Relative Abundance data

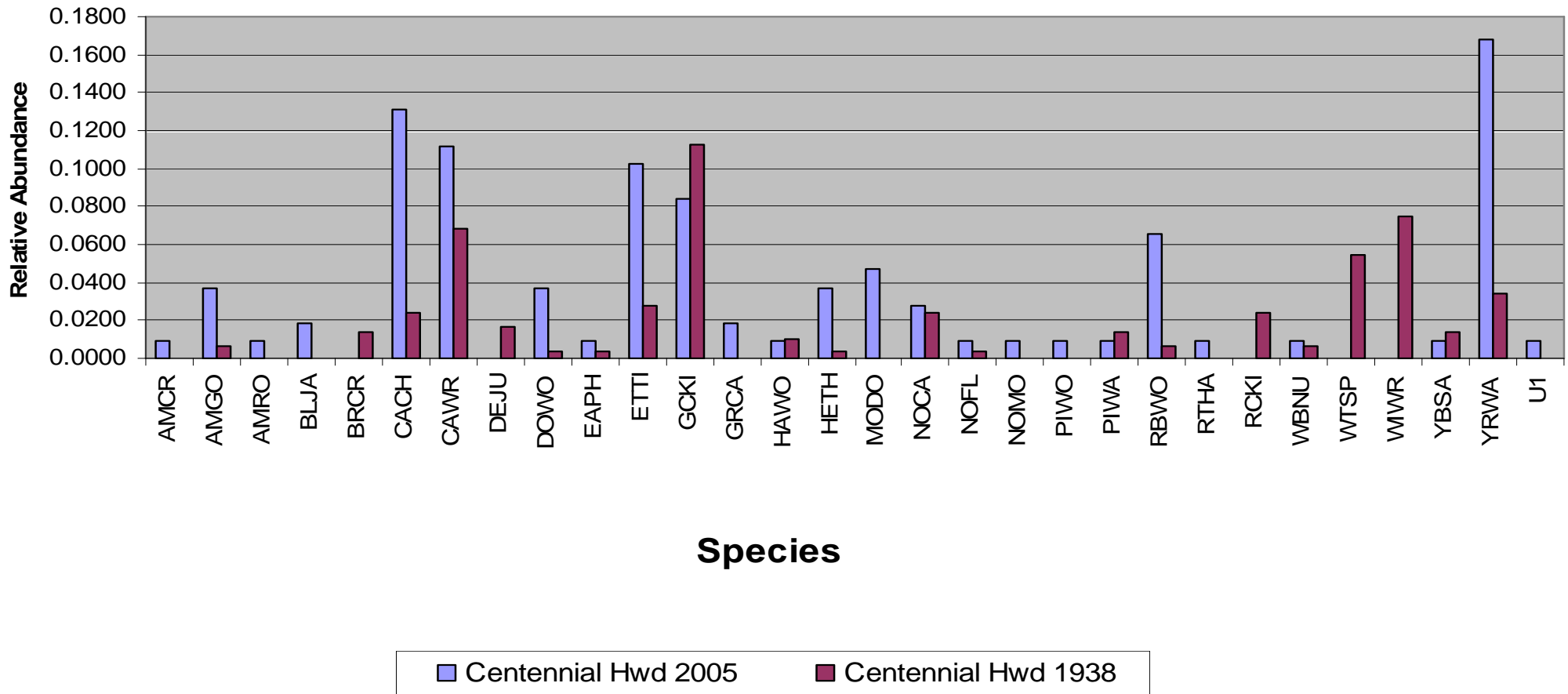
<i>Site &amp; Data Comparison</i>	<i>Mean</i>	<i>Std Dev</i>	<i>t-stat</i>	<i><math>\alpha</math></i>	<i>p-value</i>
<b>Centennial Hwd 2005 vs. 1938</b>	0.0151	0.0419	1.9787	0.05	<b>0.10 &gt; p &gt; .05***</b>
<b>Schenck Hwd 2005 vs. Centennial Hwd 1938</b>	0.0168	0.0637	1.4451	0.05	<b>.2 &gt; p &gt; .1</b>
<b>Centennial Hwd 2005 vs. Schenck Hwd 2005</b>	0.0000	0.0452	0.0000	0.05	<b>p &gt; .50</b>
<b>Schenck Pine 2005 vs. Centennial Pine 1938</b>	0.0000	0.0944	0.0000	0.05	<b>p &gt; .50</b>

•\*\*\*-- t-stat value for  $\alpha = .05$  is 2.045

•\*\*\*-- t-stat value for  $\alpha = .10$  is 1.699

# Comparisons Between 1938 and 2005 Avian Surveys

## Relative Abundance by Species



# Comparisons Between 1938 and 2005 Avian Surveys

## *Point Count Observations per Minute by Group*

	Centennial Hwd 2005			Schenck Hwd 2005			Schenck Pine 2005		
Group	Period 1	Period 2	Average	Period 1	Period 2	Average	Period 1	Period 2	Average
A	0.1204	0.0417	<b>0.0889</b>	0.1759	0.1389	<b>0.1611</b>	0.1111	0.4074	<b>0.2296</b>
B	0.2444	0.3333	<b>0.2800</b>	0.1481	0.1667	<b>0.1556</b>	0.1515	0.2273	<b>0.1818</b>

Group A – Kim Jervis, Greg Queen, Jim Stephens

Group B – Matt Wood and Jimmy Dodson

# Sources of Error or Bias

- Observer experience level
- Seasonal Migration
- Noise levels
- Incorrect Identification of species
- Statistical Methodology
- Small sample size
- Double-counting
- Movement of individuals
- Violation of site association by individual

# Conclusions

- The avian community at Centennial Campus is not that different at the community level in 2005 versus that found by Dr. Quay in 1938 utilizing relative abundance data. There is variation in the presence/absence and abundance of individual species.
- The 2005 avian communities at Centennial Campus and Schenck Forest are similar at the community level using relative abundance. There is variation in the presence/absence and abundance of the individual species.
- Density figures may produce different results.
- Observability, statistical, and methodology issues are major considerations when dealing with avian community surveys.