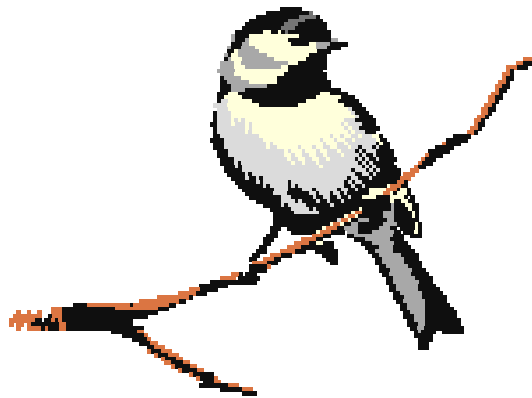


Recapture Analysis of Birds in Mist Nets at  
Reedy Creek Preserve,  
Mecklenburg County, North Carolina



Katherine Harper

Field Biology and Ecology

Dr. Michael J. Baranski, Instructor

Shelby Harrison, Assistant

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## **Abstract**

This study was conducted to see if there were any common or interesting factors associated with birds recaptured in the mist net stations at Reedy Creek Preserve, Mecklenburg County, North Carolina. The data were collected from the Reedy Creek Preserve bird banding facility for the period from October 18, 2002 through April 14, 2004. The four species that reoccurred most often in the database were separated and studied. They are the Northern Cardinal, Carolina Chickadee, Indigo Bunting, and Carolina Wren. The project was designed by comparing total captured birds to total recaptured birds, and was further broken down into categories. The categories included recaptured adult birds in the fall versus the spring, recapture rates regardless of age, differences in recaptured juveniles in the fall between species, and adult recapture rates versus juvenile recapture rates for each species. The results of chi-square tests performed on this data showed that there was always a large difference in the expected number and the observed number, especially in the case of the Carolina Wren.

## **Introduction**

The idea of bird banding first originated in the late 1500s with Henry IV's Peregrine Falcons. It has gained popularity since then, and was introduced to North America by John James Audubon in 1803. The main goal of early bird banding was to become more informed on the migratory patterns of bird species. It is still used for this information today, but has also expanded to study populations and behavior, and even restoration of endangered species.

The past hundred years have shown rapid expansion in the practice, with about 1,200,000 birds being banded and 85,000 recaptured each year (Tautin, 2002.) About 6,100 private bird

banding facilities are in use in the United States, including the Reedy Creek Preserve, where the data for this project were collected.

The idea behind this study is that there is a common factor among the birds most often captured in the mist nets at Reedy Creek Preserve. For instance, does it seem that there are more juvenile birds recaptured than adult birds? Or is the Carolina Wren captured more often than the Northern Cardinal? This study was performed on the belief that there are indeed factors that alter the probability of being captured or recaptured in the mist nets at the Reedy Creek Preserve.

## **Methods**

### **Field site description**

The study was conducted at the Reedy Creek Nature Preserve bird banding center, outside of Charlotte, North Carolina. Thirteen different mist net sites were maintained at this area, each equipped with two 10-foot poles to hold an 8x20 foot mist net. The mist nets, which could be horizontally adjusted if needed, were woven with a fine thread that made them barely visible to birds. Each was put out only in the mornings, before the temperature became too high, and never put out in extreme temperatures or precipitation of any kind. They were carefully monitored while out, so any captured bird would not be stuck in the net for too long.

Four of the net sites were located at forest edges, where the most common trees were Virginia Pine (*Pinus virginiana*), Tulip Poplar (*Liriodendron tulipifera*), and Sweet Gum (*Liquidambar styraciflua*), and the average height ranged from 15-30 feet. The most common shrub in this area was Blackberry (*Rubus argutus*.) Eight of the sites were found in young forest areas, in which both deciduous hardwood trees and evergreen trees were seen, especially Virginia Pine and Sweet Gum. The last site was in a scrub/shrub area dominated by Blackberry.

## Data collection

The data were collected from the Reedy Creek Preserve bird banding database starting from October 18, 2002, and ending April 14, 2004. Though the data entries include both newly captured and recaptured birds, recaptured bird data were the focus of this study. Each entry included the species, age, and sex of the bird, the season in which it was captured (either fall or spring), and whether the bird was juvenile or adult. A total of twenty species were captured during this time period, but only the ones that occurred more than eight times or more were used, leaving four. They were the Northern Cardinal (*Cardinalis cardinalis*), Carolina Wren (*Thyrothorus ludovicianus*), Indigo Bunting (*Passerina cyanea*), and Carolina Chickadee (*Poecile carolinensis*.)

## Data Analysis

The data were analyzed with recaptured birds as percentages in terms of total birds captured using four chi-square ( $X^2$ ) tests. The first chi-square contingency test compared each species for fall and spring, to see which season had a higher percentage of adult recaptured birds. This test was only used for one comparison; the remaining comparisons used the chi-square test for goodness of fit. The second comparison looked at the number of juveniles recaptured, but since no juveniles were captured in spring, it compared recapture rates of the different species in the fall. Similarly, the third comparison compared recaptures made in fall as a percentage of the total captures made in fall regardless of age. It included adults, juveniles, and birds of unknown age in the data. The final comparison separated the data further, by making an individual chi-square test for each species. The data included in the tests were the same data from the first and second

comparison, but these directly compared the adult data to the juvenile data to see which was more often recaptured in the fall.

## Results

The results of this study are shown in Table 1. An inspection of the table reveals that the results of the chi-square contingency tests for the first comparison show a great difference in the number of adults recaptured in the fall compared to the number recaptured in the spring, as percentages of all captured in each season ( $X^2 = 36.00$ ,  $DF = 3$ ,  $p = 0.01$ ). This was especially true for the Northern Cardinal, Carolina Chickadee, and Indigo Bunting, but only somewhat true for the Carolina Wren because the number difference was not that large. The Cardinal, Wren, and Chickadee were most often recaptured in the fall, but the Indigo Bunting was strikingly different by only being recaptured in the spring.

**Table 1. Collected data for all years from 2002-2004. Values are percentage recaptures of total captured, and total number of birds.**

	<u>Spring (%)</u>		<u>Fall (%)</u>		<u>All Birds</u>	<u>Total (no.)</u>
	<u>Adults</u>	<u>Juveniles</u>	<u>Adults</u>	<u>Juveniles</u>		
Northern Cardinal	29.3	0	42.9	5	19.5	82
Carolina Chickadee	14.3	0	25	10	18.4	38
Indigo Bunting	30.4	0	0	0	0	28
Carolina Wren	20	0	20	36.7	48.4	61

The results of the second chi-square test also show that there is a great difference in the expected recaptured juveniles in the fall, and the observed juveniles captured ( $X^2 = 62.18$ ,  $DF =$

3,  $p = 0.01$ ). The observed percentages of Cardinals, Chickadees, and Buntings were lower than the expected number, but the number of Wrens recaptured in the fall is considerably higher than the expected number.

The chi-square test results for the third comparison again show that there is a large variance in the number of expected total recaptures in the fall as a percentage of all captures, compared to the observed total recaptures ( $X^2 = 55.60$ ,  $DF = 3$ ,  $p = 0.01$ ). The number of Indigo Bunting recaptures in the fall was none, making it quite a bit lower than the expected. Both the Cardinal and the Chickadee were only slightly below the expected number, but once again the Wrens were the most often recaptured species in general.

The final chi-square test results also show great differences in the number of adult birds recaptured in the fall as a percentage of the total captured compared to the number of juveniles recaptured in the fall. For the Cardinal and the Chickadee, the number of adults recaptured was larger than the expected number, while the number of juveniles recaptured for both was lower (for Cardinal and Chickadee respectively,  $X^2 = 28.43$ ,  $5.6$ ,  $DF = 1$ ,  $1$ ,  $p = 0.01$ ,  $0.05$ ). Since no Indigo Buntings were recaptured in the fall, there were no data to report. The Carolina Wren, as usual, had the largest overall result, with the number of adults recaptured being a little lower than the expected number, and the number of juveniles being a little higher ( $X^2 = 4.35$ ,  $DF = 1$ ,  $p = 0.05$ ).

## **Discussion**

All the results of the first comparison are fairly simple, showing that adults are the birds most often recaptured in the fall. The one exception to this statement, though, is the Indigo Bunting. Because it was never recaptured in the fall, it clearly throws off the pattern. This fact is probably

because the total number of Indigo Buntings captured to begin with was very low, also making the recapture rate very low, even in the spring. A closer look at the data from the second comparison shows that Carolina Wren juveniles recaptured in the fall is considerably higher than any other juvenile bird recaptured in the fall. Because the Wren was the most often captured juvenile bird anyway, it is not too unexpected that they also have the highest number of recaptures. The third comparison showed that the percentages of Cardinals and Chickadees recaptured were very close to the expected number, but that the Indigo Bunting and Carolina Wren were far off. There was not a single Indigo Bunting recapture, but because there were not many Indigo Buntings captured overall, it was not surprising to find this pattern. The Carolina Wren results were not very unusual either, chiefly because of their usual habits. They live mainly in brushy places, woodland tangles, and hedges, and tend to do most of their foraging near the ground (Potter et al., 2006). This makes them more susceptible to being captured than the other birds simply because they spend more of their time near the ground where the nets are more prevalent. So while other birds may occasionally visit the lower strata of the forest and are captured, the Wren lives closest to the net, making it the most often captured and recaptured bird in this study. The final comparison made showed that the Cardinal and Chickadee adults were recaptured more often than their juvenile counterparts. The Indigo Bunting data was of no use, since there were not any recaptures for adult or juvenile made in fall. The Carolina Wren, however, had the greatest difference between adult and juvenile recaptures. This is probably because of the sheer multitude and naivety of the juveniles. Female Carolina Wrens can produce two to three broods per year, each with about six eggs total. The short length of the gestation and incubation period for the eggs makes sure that the population of the Wren stays stable (Ehrlich et

al., 1988). This also seems to keep a steady flow of juvenile wrens in the mist nets at Reedy Creek Preserve.

## **Conclusion**

The results of the chi-square tests performed on this data showed that there was nearly always a significant difference in the expected number and the observed number, especially in the case of the Carolina Wren. The null hypothesis was rejected, because of the data overwhelmingly showing otherwise. Thus, certain factors such as age and species play into the probability of being captured or recaptured.

## **References**

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