

Snipe (*Gallinago gallinago
delicata*), Killdeer (*Charadrius
vociferus*), and American
Woodcock (*Scolopax minor*)
As Indicator Species On
Climate Change Based On
Migrational Patterns in Ohio

Justin Rumel
Mr. Frantz, Teacher
Roswell Kent Middle School
1445 Hammel Street
Akron, OH 44306

ABSTRACT

The motivation for this project was a study on climate change. The whole point of doing this project was to use the selected birds as a reference to climate change to see if it was actually happening. This project clearly shows that climate change has already begun to affect certain animals and it should affect more in the next thirty years.

To get the results taken, the website Ebird was visited. The website shows migration data from 1880 to now. Other than migration data, air and soil temperature was taken. To gather the soil temperature, a soil thermometer was inserted into the ground and was left for two minutes and then the temperature reading was recorded. Air temperature was taken by taking an air thermometer and holding the thermometer out and waiting for minutes and then the temperature reading was recorded.

As a result, the selected birds have shown that climate change has affected their migration patterns. The birds have shown to arrive earlier and depart later than in past migrations. The results taken have supported the hypothesis made about the project. In conclusion, climate change is beginning to affect the environment around the world and should begin to affect more in the future if the present trend continues.

PROBLEM

The reason I decided to do this project is because we are learning about climate. I wanted to see how this would affect the migration patterns among certain types of birds. I chose the birds I am researching because the Common Snipe (*Gallinago gallinago delicata*) is a bird I had heard about through camping and we would go mythical snipe hunting with the younger kids and scare them with stories and such. I chose the American Woodcock (*Scolopax minor*) because it had similar migration patterns and habitat areas. I also chose the Killdeer (*Charadrius vociferous*) because of its similar habitat regions and migration patterns to the American Woodcock and Common Snipe. All birds can be found in Ohio.

HYPOTHESIS

My hypothesis is climate change has affected the migration patterns of selected birds by making the birds depart from Ohio later in the fall and having them return earlier in the spring.

MATERIALS

Air Temperature:

1. String, rubber band, and calibration thermometer
2. Watch
3. Pen or pencil
4. Data Sheet

Soil Temperature:

1. Soil Temperature Data Sheet
2. Watch
3. Soil Thermometer
4. Science Log
5. Pen or pencil
6. 12 cm or longer nail marked at 5 cm and 10 cm from its point (if soil is firm or extra firm)

PROCEDURE

Soil Temperature-

1. Insert Nail into ground 5cm.
2. Insert Soil Thermometer.
3. Wait 2-3 Minutes and check temperature recording.
4. Remove Soil Thermometer.
5. Insert nail 10cm.
6. Insert Soil thermometer.
7. Wait 2-3 Minutes and check temperature recording.

Air Temperature-

1. Take Air Thermometer in hand.
2. Hold it out in front of you.
3. Wait 2-3 Minutes and check temperature recording.

Air Temperature Protocol

- “1. Tie one end of a piece of string securely to the end of the calibration thermometer and the other end to a rubber band.
2. Slip the rubber band around the wrist so that the thermometer is not broken if it is accidentally dropped on the ground.
3. Hold the thermometer at chest height, in the shade, and away from your body for three minutes.
4. At the end of three minutes, record the temperature reading in your science log
5. Hold the thermometer the same way for another minute.
6. At the end of the minute, record the temperature once again. If the temperature is within 0.5° C of the previous reading, record the reading on your *Data Sheet*.
7. If the two temperature readings differ by more than 0.5° C, repeat steps 5 and 6 again.
8. If two consecutive temperature readings are not within 0.5° C of one another after 7 minute record the last measurement on the *Data Sheet* and report your other four measurements in the comments section along with a note that your reading wasn't stable after 7 minutes” Globe Program.

Soil Temperature Protocol

1. Fill in the top portion of the *Soil Temperature Data Sheet*.
2. Locate your sampling point (If soil is soft, skip step 3).
3. Use the nail to make a 5 cm deep pilot hole for the thermometer.
4. Gently push the thermometer into the soil.
5. Wait 2 minutes. Record the temperature and time in your Science Log.
6. Wait 1 minute. Record the temperature and time in your Science Log.
7. If the 2 readings are within 1.0° C of each other, record this value and the time on the *Soil Temperature Data Sheet* as Sample 1, 5 cm reading. If the 2 temperatures are not within 1.0° C, continue taking temperature readings at 1-minute intervals until 2 consecutive readings are within 1.0° C.
8. Remove the thermometer from the hole. (If the soil is soft, skip step 10.)
9. Use the nail to deepen the hole to 10 cm.
10. Wait 2 minutes. Record the temperature and time in your Science Log.
11. Wait 1 minute. Record the temperature and time in your Science Log.
12. If the 2 readings are within 1.0° C of each other, record this value and time on the Soil Temperature Data Sheet as Sample 1, 10 cm reading. If the 2 temperatures are not within 1.0°C, continue taking temperature readings at 1-minute intervals until 2 consecutive readings are within 1.0° C.
13. Repeat steps 2 – 14 for 2 other holes 25 cm away from the first hole. Record these data on the Soil Temperature Data Sheet as Sample 2, 5 and 10 cm and Sample 3, 5 and 10 cm. Note: These three sets of measurements must all be made within 20 minutes.
14. If possible, read and record the current air temperature from the thermometer in the instrument shelter or by following the Current Temperature Protocol in the Atmosphere Investigation.
15. Wipe clean all the equipment.” Globe Program

RESULTS

All results were taken on short-grass. All Air and Soil temperature data was taken in pairs of two at a difference of a half degree. All data shown are the averages of each set of data.

Day One: 5cm: 6°C, 10cm: 5°C, Air Temperature: 5°C

Day Two: 5cm: 5°C, 10cm: 4°C, Air Temperature: 1.5°C

Day Three: 5cm: 4°C, 10cm: 5°C, Air Temperature: 1°C

Day Four: 5cm: 5°C, 10cm: 6°C, Air Temperature: -1°C

Day Five: 5cm: 0°C, 10cm: 1°C, Air Temperature: -3°C

Day Six: 5cm: 0°C, 10cm: 1°C, Air Temperature: 0.5°C

Day Seven: 5cm: 0°C, 10cm: -1°C, Air Temperature: -1.5°C

Day Eight: 5cm: -1°C, 10cm: -2°C, Air Temperature: -4°C

Day Nine: 5cm: 0°C, 10cm: -1°C, Air Temperature: 2°C

Migration Data

1952

Killdeer: First Seen: June 14, Last seen: March 22

Common Snipe (Wilson's Snipe): First Seen: March 29, Last Seen: March 29

American Woodcock: First Seen: April 19, Last Seen: April 29

1953

No records available for these birds during this moment in time.

1954

Killdeer: First Seen: November 13, Last Seen: November 13

Common Snipe (Wilson's Snipe): No recorded data available for this bird during this moment in time.

American Woodcock: First Seen: November 13, Last Seen: November 13

1955

Killdeer: First Seen: April 3, Last Seen: April 3

Common Snipe (Wilson's Snipe): No recorded data available for this bird in this moment in time.

American Woodcock: No recorded data available for this bird in this moment in time.

1956

Killdeer: First Seen: April 15, Last Seen: May 20

Common Snipe (Wilson's Snipe): First Seen: April 15, Last Seen: May 6

American Woodcock: No recorded data available for this bird in this moment in time.

1957

Killdeer: First Seen: April 14, Last Seen: April 28

Common Snipe (Wilson's Snipe): First Seen: April 14, Last Seen: May 19

American Woodcock: No recorded data available for this bird in this moment in time.

1958

Killdeer: First Seen: April 13, Last Seen: April 13

Common Snipe (Wilson's Snipe): First Seen: April 13, Last Seen: April 13

American Woodcock: No recorded data available for this bird in this moment in time.

1959

Killdeer: First Seen: April 12, Last Seen: June 7

Common Snipe (Wilson's Snipe): First Seen: April 26, Last Seen: May 17

American Woodcock: First Seen: May 17, Last Seen: May 26

1960

Killdeer: First Seen: April 10, Last Seen: May 22

Common Snipe (Wilson's Snipe): First Seen: April 24, Last Seen: April 24

American Woodcock: First Seen: May 22, Last Seen: May 22

1961

Killdeer: First Seen: April 16, Last Seen: May 21

Common Snipe (Wilson's Snipe): First Seen: April 16, Last Seen: May 7

American Woodcock: No recorded data available for this bird in this moment in time.

1962

Killdeer: First Seen: April 29, Last Seen: April 29

Common Snipe (Wilson's Snipe): No recorded data available for this bird in this moment in time.

American Woodcock: May 13, Last Seen: May 13

1963

Killdeer: First Seen: May 3, Last Seen: May 3

Common Snipe (Wilson's Snipe): No recorded data available for this bird in this moment in time.

American Woodcock: No recorded data available for this bird in this moment in time.

1964

Killdeer: First Seen: April 12, Last Seen: December 27

Common Snipe (Wilson's Snipe): First Seen: April 19, Last Seen: December 27

American Woodcock: First Seen: April 19, Last Seen: May 17

1965

Killdeer: First Seen: April 15, Last Seen: May 16

Common Snipe (Wilson's Snipe): First Seen: May 16, Last Seen: May 23

American Woodcock: No recorded data available for this bird in this moment in time.

1966

Killdeer: First Seen: April 10, Last Seen: November 19

Common Snipe (Wilson's Snipe): First Seen: March 12, Last Seen: November 19

American Woodcock: First Seen: April 24, Last Seen: May 8

1967

Killdeer: First Seen: March 11, Last Seen: December 31

Common Snipe (Wilson's Snipe): First Seen: April 16, Last Seen: December 31

American Woodcock: First Seen: April 9, Last Seen: June 15

1968

Killdeer: First Seen: February 3, Last Seen: December 29

Common Snipe (Wilson's Snipe): First Seen: April 28, Last Seen: December 29

American Woodcock: First Seen: October 26, Last Seen: October 28

1969

Killdeer: First Seen: March 16, Last Seen: March 16

Common Snipe (Wilson's Snipe): First Seen: April 16, Last Seen: April 16

American Woodcock: First Seen: April 20, Last Seen: April 27

1970

Killdeer: First Seen: April 12, Last Seen: October 30

Common Snipe (Wilson's Snipe): First Seen: April 12, Last Seen: September 18

American Woodcock: First Seen: March 19, Last Seen: October 30

1971

Killdeer: First Seen: February 27, Last Seen: October 29

Common Snipe (Wilson's Snipe): First Seen: May 2, Last Seen: September 19

American Woodcock: First Seen: March 28, Last Seen: September 18

1972

Killdeer: First Seen: February 25, Last Seen: October 20

Common Snipe (Wilson's Snipe): First Seen: March 25, Last Seen: August 6

American Woodcock: First Seen: March 17, Last Seen: May 21

1973

Killdeer: First Seen: March 4, Last Seen: October 5

Common Snipe (Wilson's Snipe): First Seen: March 27, Last Seen: October 5

American Woodcock: No recorded data for this bird at this moment in time.

1974

Killdeer: First Seen: February 1, Last Seen: September 1

Common Snipe (Wilson's Snipe): First Seen: March 31, Last Seen: April 28

American Woodcock: First Seen: April 28, Last Seen: May 15

1975

Killdeer: First Seen: January 11, Last Seen: December 28

Common Snipe (Wilson's Snipe): First Seen: April 13, Last Seen: November 28

American Woodcock: First Seen: April 13, Last Seen: September 2

1976

Killdeer: First Seen: January 4, Last Seen: December 12

Common Snipe (Wilson's Snipe): First Seen: April 4, Last Seen: December 12

American Woodcock: First Seen: February 19, Last Seen: August 28

1977

Killdeer: First Seen: February 23, Last Seen: October 24

Common Snipe (Wilson's Snipe): First Seen: January 2, Last Seen: August 23

American Woodcock: First Seen: February 27, Last Seen: September 23

1978

Killdeer: First Seen: March 10, Last Seen: November 12

Common Snipe (Wilson's Snipe): First Seen: January 7, Last Seen: November 18

American Woodcock: First Seen: March 16, Last Seen: November 1

1979

Killdeer: First Seen: March 3, Last Seen: December 24

Common Snipe (Wilson's Snipe): First Seen: April 8, Last Seen: December 16

American Woodcock: First Seen: March 19, Last Seen: July 21

1980

Killdeer: First Seen: January 5, Last Seen: December 28

Common Snipe (Wilson's Snipe): First Seen: January 1, Last Seen: December 28

American Woodcock: First Seen: March 8, Last Seen: November 14

1981

Killdeer: First Seen: January 3, Last Seen: December 26

Common Snipe (Wilson's Snipe): First Seen: January 11, Last Seen: December 6

American Woodcock: First Seen: February 16, Last Seen: October 17

1982

Killdeer: First Seen: February 7, Last Seen: December 31

Common Snipe (Wilson's Snipe): First Seen: April 8, Last Seen: November 28

American Woodcock: First Seen: March 13, Last Seen: November 14

1983

Killdeer: First Seen: January 2, Last Seen: December 18

Common Snipe (Wilson's Snipe): First Seen: January 23, Last Seen: December 10

American Woodcock: First Seen: February 20, Last Seen: June 4

1984

Killdeer: First Seen: January 7, Last Seen: December 29

Common Snipe (Wilson's Snipe): First Seen: April 5, Last Seen: December 3

American Woodcock: First Seen: March 16, Last Seen: October 19

1985

Killdeer: First Seen: January 5, Last Seen: December 8

Common Snipe (Wilson's Snipe): First Seen: January 27, Last Seen: November 29

American Woodcock: First Seen: March 9, Last Seen: July 20

1986

Killdeer: First Seen: February 16, Last Seen: December 28

Common Snipe (Wilson's Snipe): First Seen: March 9, Last Seen: December 20

American Woodcock: First Seen: February 19, Last Seen: July 20

1987

Killdeer: First Seen: January 1, Last Seen: December 19

Common Snipe (Wilson's Snipe): First Seen: February 7, Last Seen: December 19

American Woodcock: First Seen: March 21, Last Seen: August 2

1988

Killdeer: First Seen: January 1, Last Seen: December 17

Common Snipe (Wilson's Snipe): First Seen: January 10, Last Seen: December 26

American Woodcock: First Seen: March 8, Last Seen: July 16

1989

Killdeer: First Seen: January 1, Last Seen: December 16

Common Snipe (Wilson's Snipe): First Seen: March 17, Last Seen: November 12

American Woodcock: First Seen: March 11, Last Seen: September 12

1990

Killdeer: First Seen: February 6, Last Seen: December 8

Common Snipe (Wilson's Snipe): First Seen: March 11, Last Seen: December 8

American Woodcock: First Seen: March 12, Last Seen: June 19

1991

Killdeer: First Seen: January 1, Last Seen: December 1

Common Snipe (Wilson's Snipe): First Seen: January 13, Last Seen: December 1

American Woodcock: First Seen: March 2, Last Seen: October 29

1992

Killdeer: First Seen: January 21, Last Seen: December 17

Common Snipe (Wilson's Snipe): First Seen: March 7, Last Seen: November 8

American Woodcock: First Seen: February 18, Last Seen: May 31

1993

Killdeer: First Seen: January 1, Last Seen: December 5

Common Snipe (Wilson's Snipe): First Seen: March 7, Last Seen: December 18

American Woodcock: First Seen: March 14, Last Seen: September 6

1994

Killdeer: First Seen: February 16, Last Seen: December 11

Common Snipe (Wilson's Snipe): First Seen: January 29, Last Seen: December 11

American Woodcock: First Seen: March 8, Last Seen: October 1

1995

Killdeer: First Seen: January 8, Last Seen: December 8

Common Snipe (Wilson's Snipe): First Seen: March 25, Last Seen: December 3

American Woodcock: First Seen: March 26, Last Seen: May 21

1996

Killdeer: First Seen: January 12, Last Seen: December 8

Common Snipe (Wilson's Snipe): First Seen: March 12, Last Seen: November 17

American Woodcock: First Seen: February 26, Last Seen: December 10

1997

Killdeer: First Seen: February 19, Last Seen: December 20

Common Snipe (Wilson's Snipe): First Seen: January 6, Last Seen: November 23

American Woodcock: First Seen: February 27, Last Seen: November 8

1998

Killdeer: First Seen: January 2, Last Seen: December 27

Common Snipe (Wilson's Snipe): First Seen: February 26, Last Seen: December 19

American Woodcock: First Seen: April 19, Last Seen: September 26

1999

Killdeer: First Seen: January 24, Last Seen: December 23

Common Snipe (Wilson's Snipe): First Seen: January 10, Last Seen: December 18

American Woodcock: First Seen: March 1, Last Seen: October 17

2000

Killdeer: First Seen: February 13, Last Seen: December 15

Common Snipe (Wilson's Snipe): First Seen: February 26, Last Seen: December 2

American Woodcock: First Seen: March 1, Last Seen: November 1

2001

Killdeer: First Seen: February 9, Last Seen: December 23

Common Snipe (Wilson's Snipe): First Seen: March 7, Last Seen: December 15

American Woodcock: First Seen: March 10, Last Seen: September 12

2002

Killdeer: First Seen: January 26, Last Seen: December 22

Common Snipe (Wilson's Snipe): First Seen: January 27, Last Seen: December 28

American Woodcock: First Seen: January 29, Last Seen: August 29

2003

Killdeer: First Seen: January 16, Last Seen: December 31

Common Snipe (Wilson's Snipe): First Seen: March 14, Last Seen: November 23

American Woodcock: First Seen: March 5, Last Seen: November 16

2004

Killdeer: First Seen: January 1, Last Seen: December 21

Common Snipe (Wilson's Snipe): First Seen: March 16, Last Seen: November 8

American Woodcock: First Seen: February 22, Last Seen: October 10

2005

Killdeer: First Seen: January 4, Last Seen: December 18

Common Snipe (Wilson's Snipe): First Seen: January 15, Last Seen: November 14

American Woodcock: First Seen: February 27, Last Seen: November 9

2006

Killdeer: First Seen: January 26, Last Seen: December 29

Common Snipe (Wilson's Snipe): First Seen: January 2, Last Seen: December 17

American Woodcock: First Seen: February 25, Last Seen: December 11

2007

Killdeer: First Seen: January 2, Last Seen: December 28

Common Snipe (Wilson's Snipe): First Seen: January 31, Last Seen: December 9

American Woodcock: First Seen: February 25, Last Seen: December 15

2008

Killdeer: First Seen: January 5, Last Seen: December 20

Common Snipe (Wilson's Snipe): First Seen: January 10, Last Seen: December 27

American Woodcock: First Seen: February 18, Last Seen: November 9

2009

Killdeer: First Seen: January 1, Last Seen: December 29

Common Snipe (Wilson's Snipe): First Seen: January 2, Last Seen: December 29

American Woodcock: First Seen: February 15, Last Seen: October 29

2010

Killdeer: First Seen: January 1, Last Seen: December 26

Common Snipe (Wilson's Snipe): First Seen: January 2, Last Seen: December 23

American Woodcock: First Seen: March 7, Last Seen: November 20

2011

Killdeer: First Seen: January 2, Last Seen: December 31

Common Snipe (Wilson's Snipe): First Seen: January 16, Last Seen: December 31

American Woodcock: First Seen: February 15, Last Seen: November 23

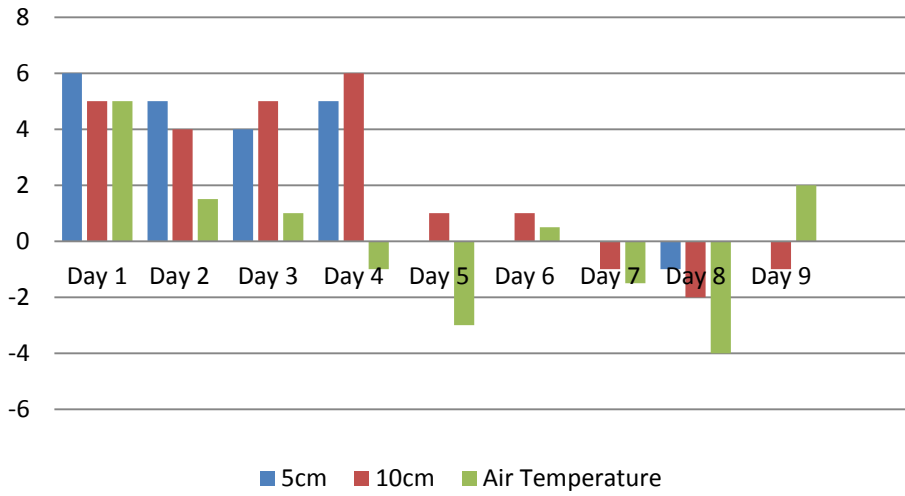
2012

Killdeer: First Seen: January 1, Last Seen: December 31

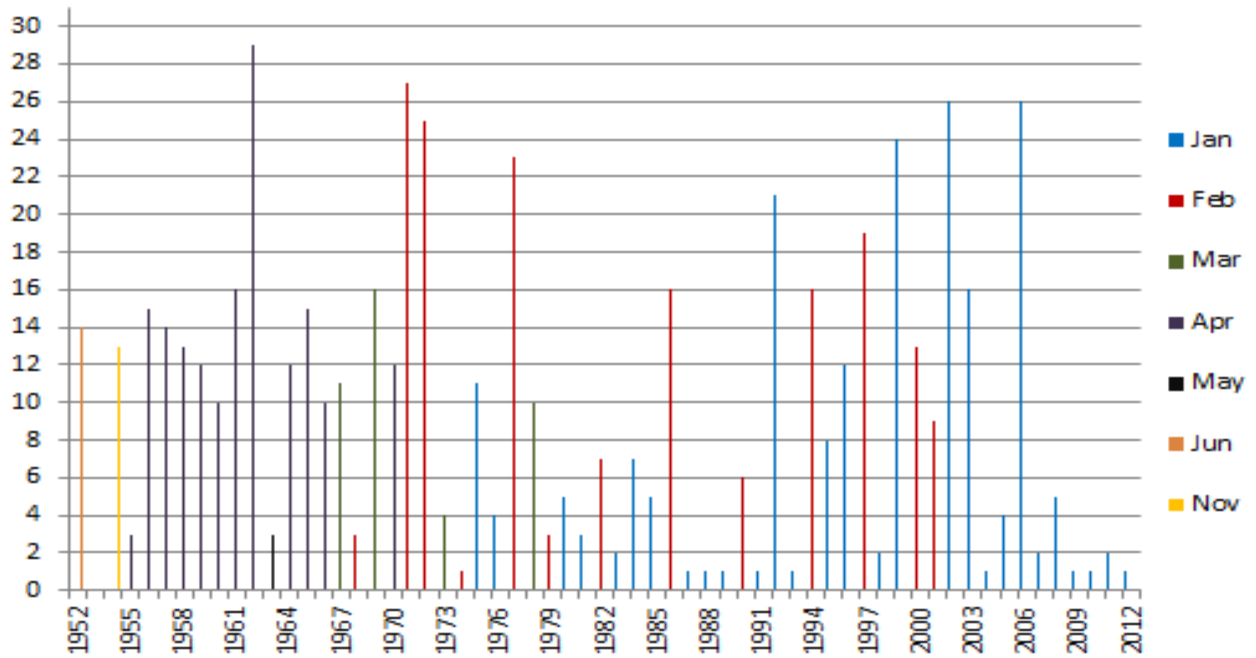
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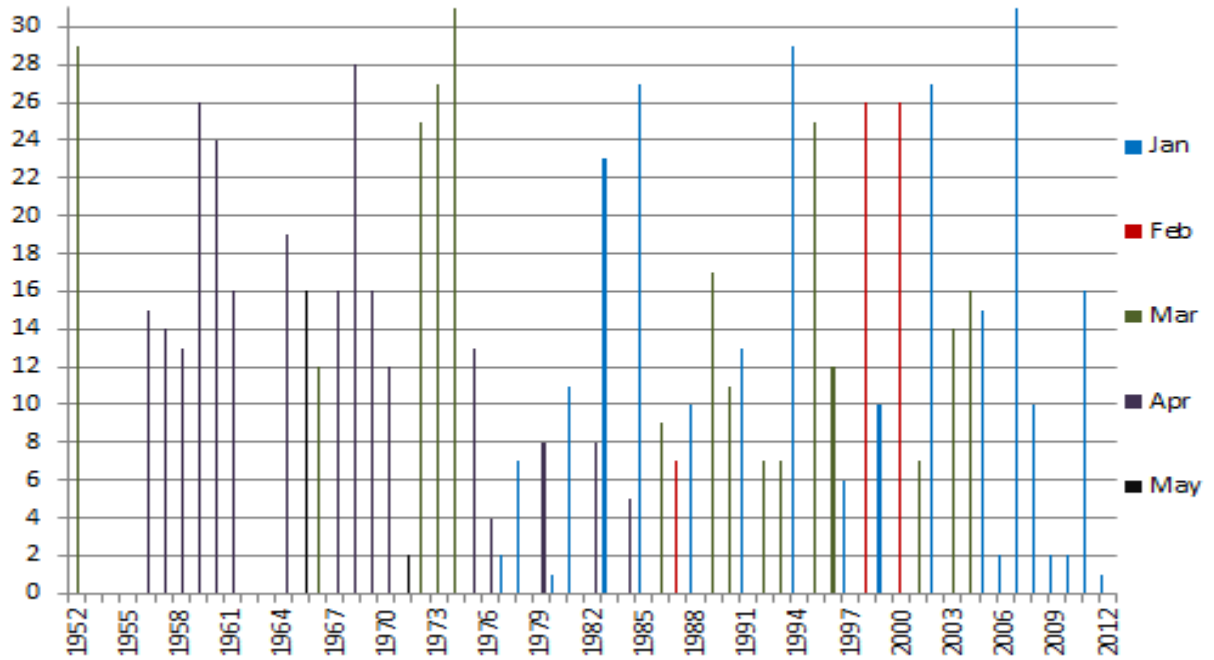
Soil and Air Temperature Data



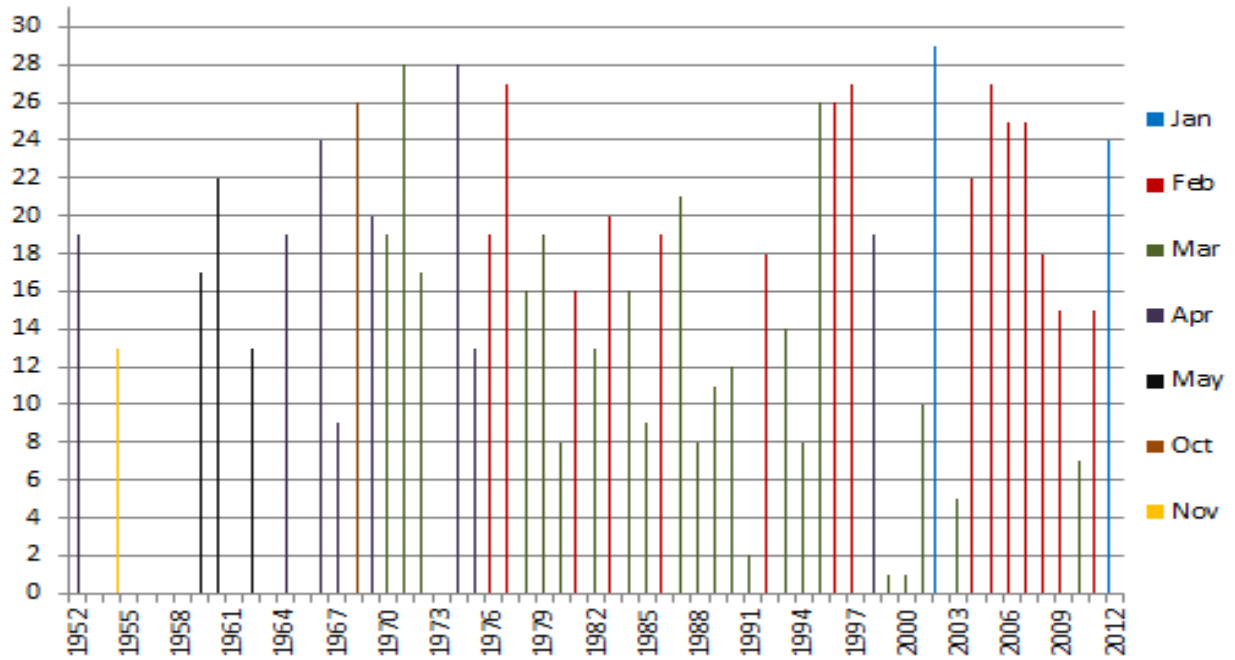
Migration Arrival Data Killdeer



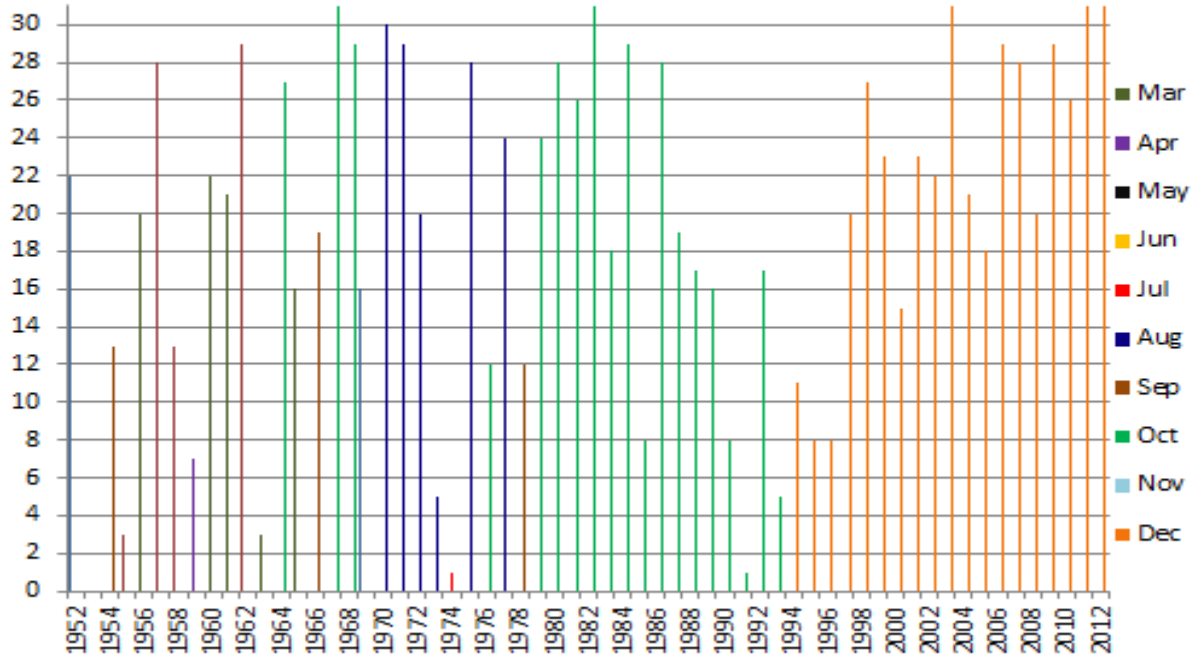
Migration Arrival Data Common Snipe



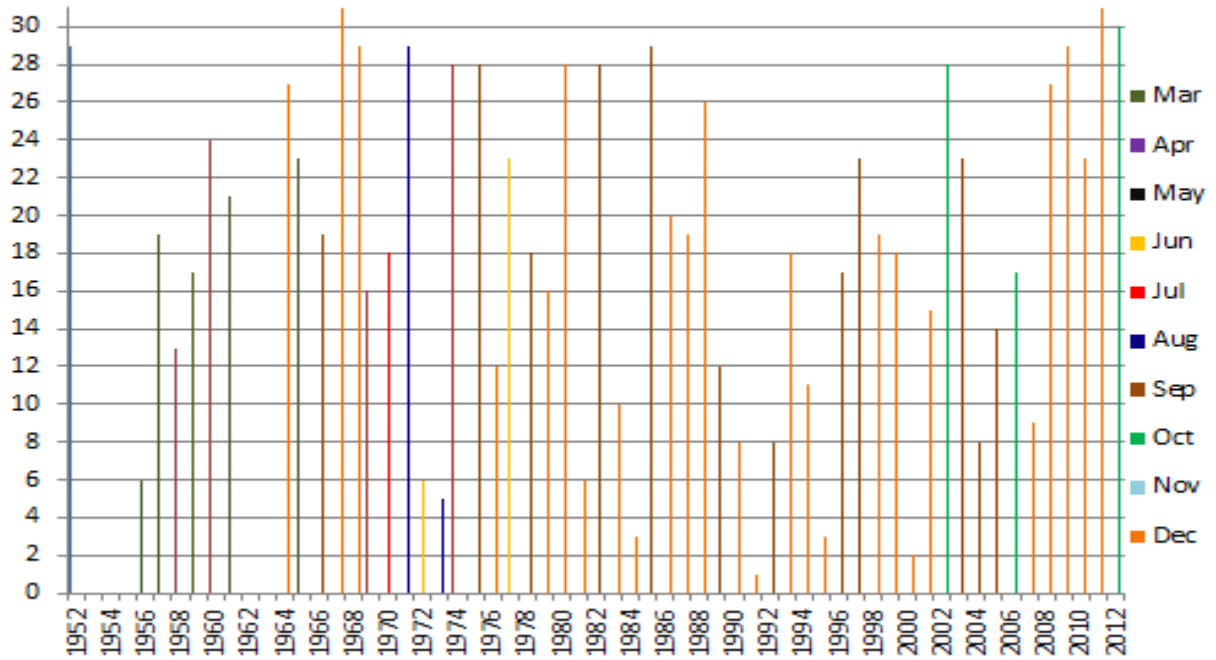
Migration Arrival Data American Woodcock



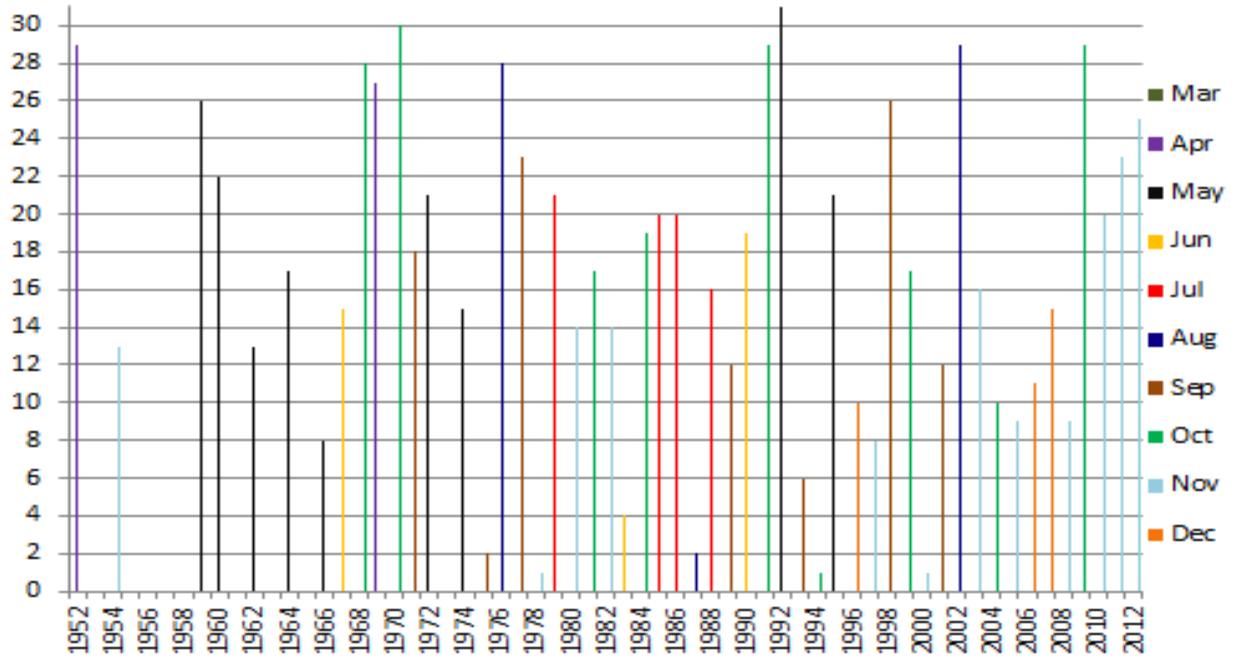
Migration Departure Data Killdeer



Migration Departure Data Common Snipe



Migration Departure Data American Woodcock



CONCLUSION

In conclusion, the data supported my hypothesis. Throughout the course of sixty years the selected birds began to arrive two months earlier than they used to, also the selected birds begun to depart one month later. When they leave, they only stay for two weeks and then the selected birds return. Out of the three selected birds, the American Woodcock had the most different migration pattern.

There were many problems I had to overcome in the duration of this project. One problem I had to overcome was in the beginning I only planned on working with the Common Snipe but there was very little data on this bird, so I decided to add the Killdeer and the American Woodcock so I could compensate for the lack of data. Another problem was some of my personal contacts had no idea who I should contact to find out information on my project. Another problem for me was I had limited amount of time to work on this project.

I feel this information could be used as a reference for climate change. Scientists have been on the subject of climate change and my project has shown that it has already affected the selected birds. If I was to continue with this I would study more birds to see how it affects them. If I had more time I would be able to do more with this this project than I already have.

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