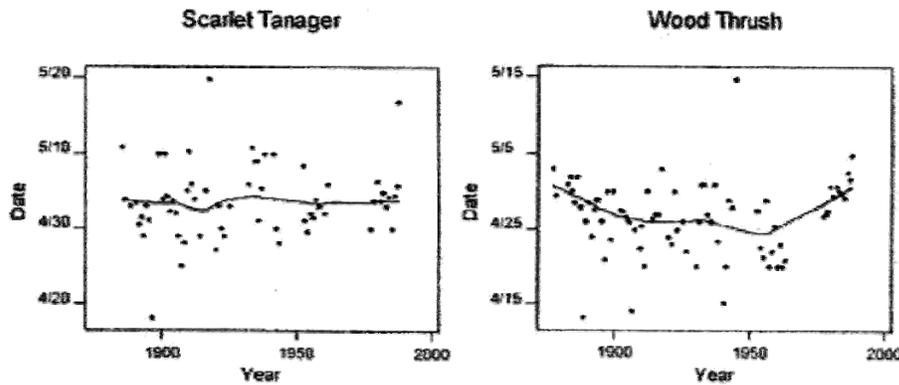
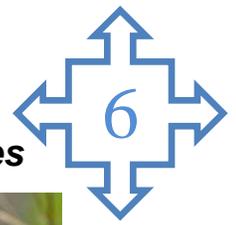


# Thinking About Climate Change

## Phenology of Two North American Neotropical Bird Species



Scarlet Tanager  
Source: R. Quinn, U.S. National Park Service



Wood Thrush  
Source: U.S. Fish and Wildlife Service

Phenology is the science that measures the timing of life cycle events in living organisms and investigates how the environment influences the timing of those events. In the figure above, the two graphs show plots of change over time in the spring arrival date for two bird species over more than 100 years. These birds migrate to southern areas to live during the winter and then return to the north, in this case, the Maryland and Washington, D.C. areas, to build their spring nests and raise their young. In the graphs above, each dot represents individual observers' earliest detection of the species within a given year.

### Let's look at the first arrival dates for the two species of Neotropical migratory birds.

- Looking at the Scarlet Tanager data... What is the interval on vertical axis? \_\_\_\_\_  
How many years of data on the Scarlet Tanager are presented in this graph? \_\_\_\_\_  
What does the black line represent on the Scarlet Tanager graph? \_\_\_\_\_  
\_\_\_\_\_  
What is the approximate arrival date in Maryland for the Scarlet Tanager  
In 1900? \_\_\_\_\_ In 1950? \_\_\_\_\_ In 1975? \_\_\_\_\_ In 1990? \_\_\_\_\_  
Describe the trend in arrival dates of the Scarlet Tanager in the Maryland and Washington, DC area over the 100 year period depicted in the graph. \_\_\_\_\_  
\_\_\_\_\_
- Looking at the Wood Thrush data... What is the interval on vertical axis? \_\_\_\_\_  
How many years of data are presented in this graph? \_\_\_\_\_  
What does the black line represent on the Wood Thrush graph? \_\_\_\_\_  
\_\_\_\_\_  
What is the approximate arrival date in Maryland for the Wood Thrush  
In 1900? \_\_\_\_\_ In 1950? \_\_\_\_\_ In 1975? \_\_\_\_\_ In 1990? \_\_\_\_\_  
Does the Wood Thrush arrive earlier or later than the Scarlet Tanager to the Maryland and Washington, D.C. area? \_\_\_\_\_  
Describe the trend in arrival dates of the Wood Thrush in the Maryland and Washington, DC area over the 100 year period depicted in the graph. \_\_\_\_\_  
\_\_\_\_\_

### Thinking about data.

- What might explain the shift in arrival dates for the Wood Thrush? \_\_\_\_\_  
\_\_\_\_\_  
What might this shift in arrival dates have to do with climate change? \_\_\_\_\_  
\_\_\_\_\_
- Which bird had the most consistent arrival time over the last 100 years. Why would one bird change patterns and the other not? \_\_\_\_\_  
\_\_\_\_\_

Image source: Droesge, S., van den Berg, A., and Keller, E. (2003). Spring Arrivals of Maryland and Washington, D.C. Birds. *Maryland Birdlife*, 59(1-2), 4-11.

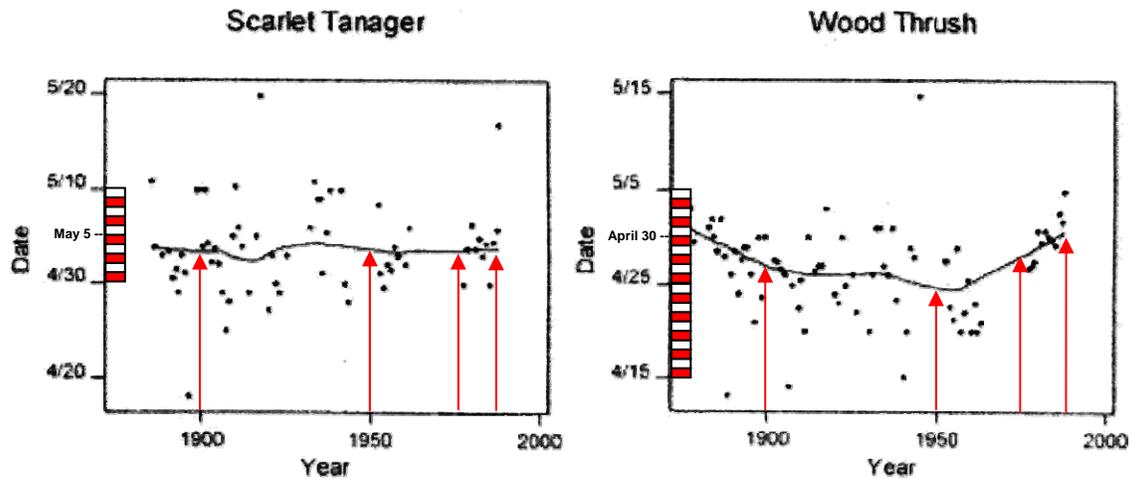
U.S. Fish and Wildlife Service. (no date). That's for the Birds! (Wood Thrush image). Accessed July 18, 2010, at <http://www.fws.gov/chesapeakebay/newsletter/Spring05/Forthebirds.htm>.

Quinn, Rob. U.S. National Park Service (no date). Indiana Dunes National Seashore (Scarlet Tanager image). Accessed July 18, 2010, at <http://www.nps.gov/indu/planyourvisit/birdwatching.htm>.

Louisiana Sea Grant College Program  
<http://www.lamer.lsu.edu>

# Thinking About Climate Change

## Phenology of Two North American Neotropical Bird Species



Phenology is the science that measures the timing of life cycle events in living organisms and investigates how the environment influences the timing of those events. In the figure above, the two graphs show plots of change over time in the spring arrival date for two bird species over more than 100 years. These birds migrate to southern areas to live during the winter and then return to the north, in this case, the Maryland and Washington, D.C. areas, to build their spring nests and raise their young.

### Let's look at the first arrival dates for the two species of Neotropical migratory birds.

- Looking at the Scarlet Tanager data...
  - What is the interval on vertical axis? **10 day interval**
  - How many years of data on the Scarlet Tanager are presented in this graph? **~110 years**
  - What does the black line represent on the Scarlet Tanager graph? **The average arrival date for Scarlet Tanagers.**
  - What is the approximate arrival date in Maryland for the Scarlet Tanager
    - In 1900? **May 3**
    - In 1950? **May 3 or 4**
    - In 1975? **May 3**
    - In 1990? **May 3**
  - Describe the trend in arrival dates of the Scarlet Tanager in the Maryland and Washington, DC area over the 100 year period depicted in the graph. **The Scarlet Tanager has a consistent arrival time of May 3<sup>rd</sup> or 4<sup>th</sup> throughout the 100 year data record. This arrival time may vary by only one or two days.**
- Looking at the Wood Thrush data...
  - What is the interval on vertical axis? **10 days**
  - How many years of data on the Wood Thrush are presented in this graph? **~110 years**
  - What does the black line represent on the Wood Thrush graph? **The average arrival date for Wood Thrushes.**
  - What is the approximate arrival date in Maryland for the Wood Thrush...
    - In 1900? **April 27**
    - In 1950? **April 24**
    - In 1975? **April 28**
    - In 1990? **April 30**
  - Does the Wood Thrush arrive earlier or later than the Scarlet Tanager to the Maryland and Washington, D.C. area? **Earlier**
  - Describe the trend in arrival dates of the Wood Thrush in the Maryland and Washington, DC area over the 100 year period depicted in the graph. **The spring arrival of the Wood Thrushes began arriving earlier in the spring (1880 – May 1, to 1950 – April 25). This trend changed around 1950 and since that time, the Wood Thrushes have arrived (on average) later in the spring each year (1950 – April 25, 1990 – April 30).**

### Thinking about data.

- What might explain the shift in arrival dates for the Wood Thrush?

## Thinking About Climate Change

**The availability of food and habitat resources, as well as climate change can all have a hand in the shifting spring arrival time of the Wood Thrush.**

2. Which bird had the most consistent arrival time over the last 100 years? Why would one bird change patterns and the other not? **Scientists study habits of birds and other animals because reproductive cycles are closely related to photo period and temperature. A change in temperature could delay or accelerate the migration of a species.**

Image source: Droesge, S., van den Berg, A., and Keller, E. (2003). Spring Arrivals of Maryland and Washington, D.C. Birds. *Maryland Birdlife*, 59(1-2), 4-11.

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