

DATA *Nugget*

The birds of Hubbard Brook, Part I

Featured scientist: Richard Holmes from the Hubbard Brook Experimental Forest

Research Background:

The Hubbard Brook Experimental Forest is an area where scientists have collected ecological data for many years. It is located in the White Mountains of New Hampshire. Data collected in this forest helps uncover environmental trends over long periods of time, such as changes in air temperature, precipitation, forest growth, and animal populations. It is important to collect data on ecosystems over time because these patterns could be missed with shorter observation periods or short-term experiments.

Each spring, Hubbard Brook comes alive with the arrival of migratory birds. Many come from the tropics to take advantage of abundant insects and the long summer days of northern areas. In the spring, **avian ecologists**, or scientists who study the ecology of birds, also become active in the forest at Hubbard Brook. They have been keeping records on the birds that live in the experimental forest for over 50 years. These data are important because they represent one of the longest bird studies ever conducted!

Richard is an avian ecologist who began this study early in his career as a scientist. He was interested in how bird populations respond to long-term environmental changes at Hubbard Brook. Every summer since 1969, Richard takes his team of trained scientists,



Male Black-throated Blue Warbler feeding nestlings. Nests of this species are built typically less than one meter above ground in a shrub such as hobblebush. Photo by N. Rodenhouse.

students, and technicians into the field to identify which species are present. Richard's team monitors populations of over 30 different bird species. They count the number of birds that are in the forest each year and study their activities during the breeding season. The researchers wake up every morning before the sun rises and travel to the far reaches of the forest. They listen for, look for, identify, and count all the birds they find. The team has been trained to be able to identify the birds by sight, but also by their calls. Team members are even able to identify how far away a bird is by hearing its call!

The study area is located away from any roads or other disturbed areas. To measure the **abundance**, or number of birds found in the 10 hectare study area, the researchers used what is called the spot-mapping method. They use plastic flags on trees 50 meters apart throughout the study area to create a 50x50 meter grid. The grid allows them to map where birds are found in this area, and when possible, where they locate their nests. Using the grid the researchers systematically walk through the plot several days each week from early May until July, recording the presence and activities of every bird they find. They also note the locations of nearby birds singing at the same time. These records are combined on a map to figure out a bird's territory, or activity center. At the end of the breeding season they count up the number of territories to get an estimate of the number of birds on the study area. This information, when paired with observations on the presence and activities of mates, locations of nests, and other evidence of breeding activity provide an accurate estimate for bird abundance. Finally, some species under close study, like American Redstart and Black-throated Blue Warbler, were captured and given unique combinations of colored bands, which makes it easier to track individuals.

By looking at bird abundance data across many years, Richard and his colleagues can identify trends that reveal how avian populations change over time.

Scientific Question: How has the total number of birds at the Hubbard Brook Experimental Forest changed over time?

Scientific Data:

Use the data below to answer the scientific question

Year	Total number of birds counted / study area
1969	158
1970	163
1971	212
1972	214
1973	192
1974	161
1975	201
1976	194
1977	187
1978	149
1979	147
1980	131
1981	117
1982	124
1983	118
1984	89
1985	116
1986	91
1987	85
1988	113
1989	101
1990	133
1991	120
1992	130

Year	Total number of birds counted / study area
1993	94
1994	84
1995	72
1996	93
1997	87
1998	72
1999	85
2000	89
2001	91
2002	71
2003	89
2004	76
2005	96
2006	108
2007	100
2008	92
2009	106
2010	108
2011	95
2012	105
2013	120
2014	113
2015	114

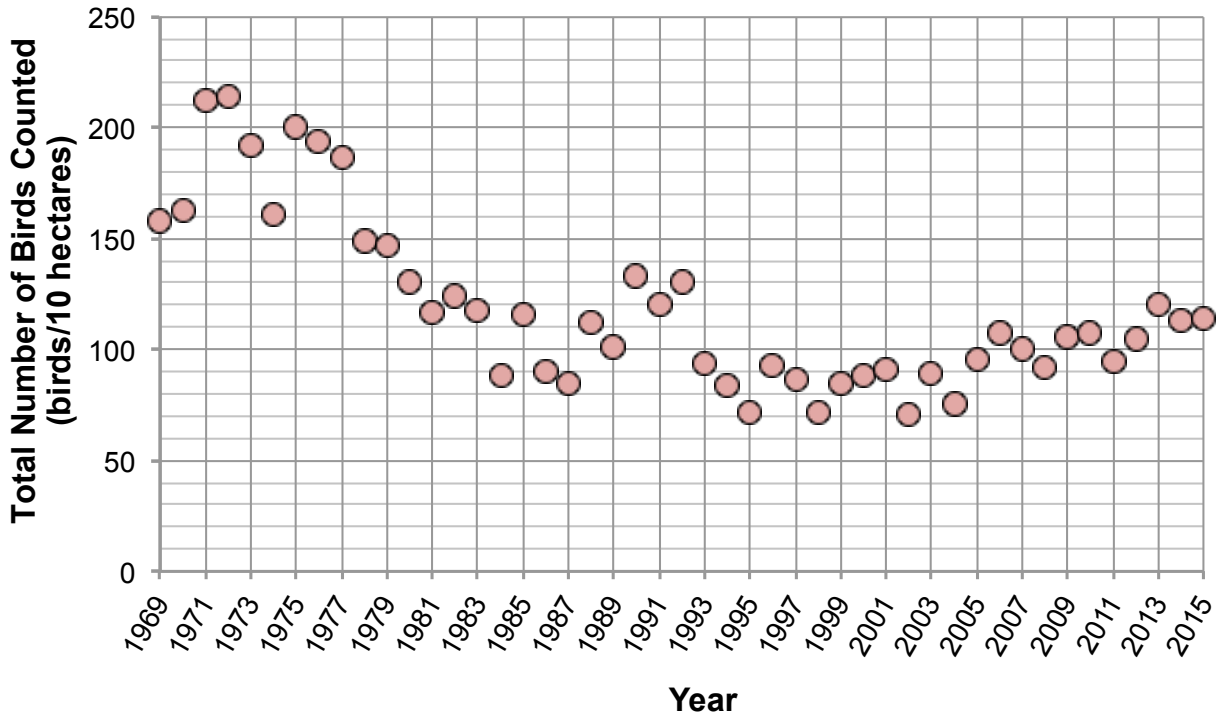
**The long-term data on bird abundances above were collected from a 10-ha study area.*

What data will you graph to answer the question?

Independent variable: _____

Dependent variable: _____

Below is a graph of the data: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.



Interpret the data:

Make a claim that answers the scientific question.

What evidence was used to write your claim? Reference specific parts of the table or graph.

Name _____

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about the importance of long-term datasets.

Please continue to Part II