



Description: Students graph long-term data of birds banded by Rio Grande Bird Research to see if there have been changes in birds encountered.

Objective: Students look at data, and decide how to present it in graphic form, then write an analysis of the data.

Materials: Graph paper, pencils, worksheets

Background: Look at the main migration background information for Wilson's Warblers, Chipping Sparrows and White-crowned Sparrows.

Procedure: This activity provides total numbers of individuals for three species of birds banded during fall migration by Rio Grande Bird Research at the Rio Grande Nature Center; these are divided into three decades for students to graph.

There is one template that you could use for drawing the graph, or students can start with graph paper and decide on the scale themselves. The vertical axis should be the average number of birds per decade, and both the species of birds and the years (decades) represented should be along the horizontal axis.

◆ Hand out the raw data and have students calculate averages for three 10 year periods: 1985-1994, 1996-2005, 2006-2015. Note that data for 1995 are missing. Students then make bar graphs for these averages.

◆ Students should then write a claim-evidence-reasoning statement.

Claim: Answers a question

Evidence: Data that supports the claim. This can be quantitative--numbers you can count; or qualitative--something descriptive such as color.

Reasoning: Explains and justifies why the evidence supports the claim. These should be written in complete sentences.

48. Changes in Bird Populations

Grades: 4-8

Time: one class period

Subjects: area science, math

Standards: see end of activity

Terms: *data, average, bar graph, claim, evidence, reasoning, population*





Rio Grande Bird Research observed that Chipping Sparrows (*Spizella passerina*) were the most commonly banded bird during their first few years of banding. Now, RGBR catches them only rarely. Why? Well, we know that Chipping Sparrows prefer a forest with a closed canopy and we know that many forests have become fragmented. One hypothesis, or possible explanation based on these two statements, is that the Chipping Sparrows numbers have declined because they don't have enough closed canopy any more due to habitat loss. Even though we know that both the earlier statements are true, we don't actually have data to support that one causes the other. Other elements can come into play, such as: drought, fire, flooding, nest success, predation by cats, window strikes, etc.



Chipping Sparrow gathering nesting material in the Sandias

Photograph by Laurel Ladwig

Similarly, it has been observed that Wilson's Warbler (*Cardellinapusilla*) numbers are increasing. They are birds that like "edges" such as the line between where a fire burned and where it didn't, a riverbank, and a fence line. Due to habitat loss, there has been fragmentation and so more edges. Again, it is tempting to say that the increase in Wilson's Warblers numbers is due to the increase in edges. And, again, we don't have enough data to fully support that claim because there are other factors that could be partially or completely responsible.

In the lessons using RGBR data, we have listed possible claims and noted the evidence or data that supports the claims. These claims note what is happening, but do not explain why, because we cannot say "why" based on the data we have so far.

For this activity, here is a possible claim-evidence-reasoning statement.

Claim: Wintering bird populations vary over years

Evidence: From 1985 to 1994 there were an average of 422 Chipping Sparrows banded each year, but an average of 81 were banded each year in 1996 to 2005, and 38 per year from 2006 to 2015. Wilson's Warblers numbers for the same years are, 95, 132 and 145. White-crowned Sparrow numbers were 106, 124, 98.

Reasoning: The Chipping Sparrow numbers dropped dramatically over the decades. The Wilson's Warblers were lower initially, and then almost doubled the following decade, and then dropped somewhat recently. The White-crowned Sparrows (*Zonotrichia leucophrys*) were relatively stable over those years, but still the numbers vary from year to year.



Alternate Claim

Claim: Chipping Sparrow numbers have declined since the 1980s.

Evidence: An average of 422 birds were banded from 1985 to 1994, declined to 81 birds in 1996 to 2005, and 38 birds banded between 2006 and 2015.

Reasoning: Clearly, there are fewer birds being banded in recent years compared to the 1985 to 1994 decade. In fact, the highest number of Chipping Sparrows banded during any year was 1159 birds in 1990, much higher than the average.

Teacher Key:

The average number of birds banded in the years 1985 to 1994:

Chipping Sparrow	422
Wilson's Warbler	95
White-crowned Sparrow	106

The average number of birds banded in the years 1996 to 2005:

Chipping Sparrow	81
Wilson's Warbler	132
White-crowned Sparrow	124

The average number of birds banded in the years 2006 to 2015:

Chipping Sparrow	38
Wilson's Warbler	145
White-crowned Sparrow	98

Assessment:

- Are graphs complete and labeled?
- Does the claim, evidence, reasoning statement make sense, and is written in full sentences that build from one section to the next.

Extensions:

- Students can also graph the following; they should then describe what the graph shows.

The highest number of Chipping Sparrows banded was 1159 birds in 1990.

The highest number of White-crowned Sparrows banded was 255 in 1992.

The highest number of Wilson's Warblers banded was 262 in 2009.

- For more advanced math exercises, calculate error estimates for averages in each of the three decades. How accurately do averages represent actual numbers each year? How much annual variation is present?



Birds Banded at Rio Grande Nature Center 1984-2015

Total numbers of birds captured (banded) during fall migration at Rio Grande Nature Center between 1985 and 2015. Data are included for Chipping Sparrows (CHSP), Wilson's Warblers (WIWA) and White-crowned Sparrows (WCSP).

	CHSP	WIWA	WCSP
1985	304	57	61
1986	159	59	19
1987	114	51	49
1988	88	59	60
1989	244	148	131
1990	1159	139	191
1991	235	124	83
1992	1134	79	255
1993	386	111	114
1994	394	123	101
1995	data unavailable		
1996	272	208	174
1997	78	65	92
1998	21	54	168
1999	46	40	92
2000	12	88	76
2001	185	135	231
2002	27	217	155
2003	118	185	108
2004	2	115	93
2005	47	208	51
2006	61	117	89
2007	168	130	164
2008	17	63	45
2009	73	262	96
2010	8	215	60
2011	14	144	122
2012	8	190	166
2013	12	92	78
2014	13	95	66
2015	6	141	95

Changes in Bird Populations Over Time

