Winter Birds Curricular Connections - Grade 9

Subject Area	Curriculum Connections	Notes
Mathematics	By the end of this course, students will: – interpret the meanings of points on scatter plots or graphs that represent linear relations, including scatter plots or graphs in more than one quadrant [e.g., on a scatter plot of height versus age, interpret the point (13, 150) as representing a student who is 13 years old and 150 cm tall; identify points on the graph that represent students who are taller and younger than this student] (Sample problem: Given a graph that represents the relationship of the Celsius scale and the Fahrenheit scale, determine the Celsius equivalent of –5°F.); – pose problems, identify variables, and formulate hypotheses associated with relationships between two variables (Sample problem: Does the rebound height of a ball depend on the height from which it was dropped?); – design and carry out an investigation or experiment involving relationships between two variables, including the collection and organization of data, using appropriate methods, equipment, and/or technology (e.g., surveying; using measuring tools, scientific probes, the Internet) and techniques (e.g., making tables, drawing graphs) (Sample problem: Design and perform an experiment to measure and record the temperature of ice water in a plastic cup and ice water in a thermal mug over a 30 min period, for the purpose of comparison. What factors might affect the outcome of this experiment? How could you design the experiment to account for them?); – describe trends and relationships observed in data, make inferences from data, compare the inferences with hypotheses about the data, and explain any differences between the inferences and the hypotheses (e.g., describe the trend observed in the data. Does a relationship seem to exist? Of what sort? Is the outcome consistent with your hypothesis? Identify and explain any	For the winter bird count, students will be submitting data regarding how many birds of different species were seen, how long they were searching for birds, and where they saw the birds. Lots of data analysis and graphing possibilities. Some data will be presented in graphs by the outdoor education staff, but students can also determine which graphs would work best to present the data. Students could attempt to find dependent variables in the data. Why were bird counts higher or lower on different days. Can temperature be correlated with bird sightings? If there is a correlation, is it due to bird behaviour or human behaviour?

	outlying pieces of data. Suggest a formula that relates the variables. How might you vary this experiment to examine other relationships?) (Sample problem: Hypothesize the effect of the length of a pendulum on the time required for the pendulum to make five full swings. Use data to make an inference. Compare the inference with the hypothesis. Are there other relationships you might investigate involving pendulums?). – construct tables of values, graphs, and equations, using a variety of tools (e.g., graphing calculators, spreadsheets, graphing software, paper and pencil), to represent linear relations derived from descriptions of realistic situations (Sample problem: Construct a table of values, a graph, and Linear Relations	
Language		
Social Studies		There are lots of investigative projects that could be formulated around birds and issues related to them.
Science	B1.1 assess, on the basis of research, the impact of a factor related to human activity (e.g., urban sprawl, introduction of invasive species, overhunting/overfishing) that threatens the sustainability of a terrestrial or aquatic ecosystem B1.2 evaluate the effectiveness of government initiatives in Canada (federal, provincial, municipal), and/or the efforts of societal groups or non-governmental organizations, such as Aboriginal communities, environmental groups, or student organizations, with respect to an environmental issue that affects the sustainability of terrestrial or aquatic ecosystems (e.g., wetland restoration, recycling programs, Canada–Ontario Environmental Farm Plans, stewardship of	Relating to expectations B1.1, B2.2 and B2.5, it would be an interesting project to compare what birds we find now in Waterloo Region to what birds would have been found here in pre-settlement times. How has the reengineering of our landscape affected the birds that live here. What birds have been harmed? Which birds find the new landscape more amenable to their needs? There is a lot of legislation that affects birds and their breeding gounds, wintering grounds. Students could explore the Migratory Bird Convention Act, the Ontario Environmental Bill of Rights, and Species at Risk Act to evaluate their effectiveness in protecting bird populations.

	national and provincial parks)	
	B2.1 use appropriate terminology related to sustainable ecosystems, including, but not limited to: bioaccumulation, biosphere, diversity, ecosystem, equilibrium, sustainability, sustainable use, protection, and watershed [C]	
	B2.2 interpret qualitative and quantitative data from undisturbed and disturbed ecosystems (terrestrial and/or aquatic), communicate the results graphically, and, extrapolating from the data, explain the importance of biodiversity for all sustainable ecosystems [PR, AI, C]	
	B2.5 analyse the effect of human activity on the populations of terrestrial and aquatic ecosystems by interpreting data and generating graphs (e.g., data from Statistics Canada, Parks Canada, and other websites on: the concentration in water of chemicals from fertilizer run-off and their effect on the growth of algae; stressors associated with human use of natural areas, such as trampled vegetation, wildlife mortality from motor vehicles, and the removal of plants, animals, and/or natural objects; suburban developments and their impact on the food supply for animals such as foxes and racoons) [PR, AI, C]	This is where ebird could be a useful tool. Ebird is a website that tracks where birds have been seen, and reveals migration patterns. If teachers are looking to combine data analysis with map reading, it's worth checking out.
	B3.3 describe the limiting factors of ecosystems (e.g., nutrients, space, water, energy, predators), and explain how these factors affect the carrying capacity of an ecosystem (e.g., the effect of an increase in the moose population on the wolf population in the same ecosystem)	The reasons for bird migration revolve around limiting factors in ecosystems. Birds that remain in winter can meet their needs. Birds that fly south cannot.
	B3.5 identify various factors related to human activity that have an impact on ecosystems (e.g., the introduction of invasive species; shoreline development; industrial emissions that result in acid rain), and explain how these factors affect	

	the equilibrium and survival of ecosystems (e.g., invasive species push out native species and upset the equilibrium in an ecosystem; shoreline development affects the types of terrestrial and aquatic life that can live near lake shores or river banks; acid rain changes the pH of water, which affects the type of aquatic life that can survive in a lake)	