



Assignment 5.4: An Environmental Issue in Manitoba (Research Paper) (35 marks)



Remember that you will submit this assignment to your tutor/marker for assessment at the end of this module, along with the other assignments from Module 5.

In the learning activity for this lesson, you read about 10 environmental issues affecting Manitoba, and then chose one issue about which you would like to find out more. This assignment consists of writing a research paper on the particular environmental issue that you chose.

Keep in mind that this research paper is to be your original work. Do not copy text directly from any source unless you cite it in your paper. Do not plagiarize someone else's work.

Research Paper Guidelines and Assessment Criteria

The guidelines for writing your research paper are outlined below, followed by a chart identifying the criteria that will be used to assess your paper.

Length

Your paper should be at least three double-spaced, typewritten pages, in a font no larger than 12 point. If you choose to handwrite your paper, it should be of a similar length and following a similar format.

Components

Include the following sections in your paper:

- **Cover sheet:** This sheet should include the title of your paper, your name, and the date.
- **Topic:** Write a clear statement that names the environmental issue in Manitoba that you have chosen. The issue must be chosen from the list given in Learning Activity 5.4, which preceded this assignment.
- **Content:** Explain why the environmental issue you have chosen is a concern in Manitoba. Consider events and perspectives in the past that have led to the current issue you are investigating. Also consider various viewpoints on this issue, including arguments (positions) that oppose (differ from) yours.
- **Personal stand:** Having investigated the issue and having considered different points of view regarding it, state your personal viewpoint and explain your rationale for having it.

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- **Future implications:** Conclude your paper with a statement of what you think the future will hold with respect to the issue you have chosen. Explain your reasons for making the predictions that you've made.

References

Include a list of references at the end of your paper. You should use at least three different sources, of which at least two must be sources other than encyclopedias (online or otherwise). Cite your sources using the style illustrated in the following **sample** citations (these samples are provided only as a style guide):

- **Books**

Thames, Robert Patrick. *Biodiversity in the Tropics*. Louisville, ON: Macmillan, 1997.

- **Periodical Articles**

Berridge, Mary. "The Molecular Basis of Life in the Cell." *Scientific American* (Nov. 2001): 57-75.

- **Websites**

Kuyt, E. "Whooping Crane." Rev. 1993. *Hinterland Who's Who*. Canadian Wildlife Service and Canadian Wildlife Federation. 2003.
<<http://www.hww.ca/hww2p.asp?id=79&cid=7>> (7 July 2011).

The Manitoba Museum. "Earth History Gallery." *Museum*.
<<http://www.manitobamuseum.ca/main/museum/earth-history-gallery/>> (7 July 2011).

Note: For websites, provide as much detail as you can find. Make sure you cite the full website address and the date you accessed it.

Assessment

The criteria that your tutor/marker will use to assess your research paper are identified in the following chart.

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Assessment Criteria		
Criteria		Marks
Length	Paper may be typed or handwritten. ■ Typed: At least three double-spaced typewritten pages, in a font no larger than 12 point. ■ Handwritten: Of a similar length and format.	5 marks
Cover sheet	■ Includes the title of the paper, the student's name, and the date.	1 mark
Topic	■ Gives a clear statement of the environmental issue selected (must be one of the issues identified in Learning Activity 5.4).	2 marks
Content	■ Provides a clear explanation of why the issue is important in Manitoba. ■ Considers events and perspectives from the past that contributed to the current importance of the issue. ■ Explains different viewpoints on the issue.	12 marks
Personal stand	■ States personal viewpoint on the issue. ■ Includes a rationale for the viewpoint taken.	5 marks
Future implications	■ States what the future may hold with respect to the issue. ■ Gives reasons for the prediction.	5 marks
References	■ Includes at least three different sources, at least two of which are sources other than encyclopedias. ■ Follows the specified reference style.	5 marks
Total		35 marks





Notification



Assignment 5.3: Mark and Recapture Sampling (20 marks)



Remember that you will submit this assignment to your tutor/marker for assessment at the end of this module, along with the other assignments from Module 5.

It can be difficult to determine the exact size of wild animal populations. This is why biologists use a variety of sampling strategies to estimate the size of populations in an area. Mobile animal populations can be estimated by using the mark and recapture method. This method involves tagging, marking, or banding the animals being studied.

Like the transect and quadrat methods of sampling, the mark and recapture method uses random sampling procedures. Care must be taken to ensure that randomness occurs when the sampling is performed; otherwise, erroneous population estimates will result. Biologists can then determine, by repeating sampling procedures over time, whether a population is growing or declining.

Materials

You will need an opaque jar or coffee can with a lid, about $\frac{1}{4}$ cup of uncooked white rice grains, a felt-tipped marker, and a calculator.

Procedure

1. In this exercise, the $\frac{1}{4}$ cup (50 mL or 55 grams) of white rice represents an animal population. You do not know how many grains of rice are in this measured amount of rice, just as you would not know the size of the wild population of animals that was being studied in a particular habitat. Place all the rice in a jar or can, and then take out 100 grains and colour each grain with a marker. Allow the marked rice to dry well, and then place all the rice, marked and unmarked grains together, back into the jar or can.
2. Shake the container well. Without looking into the container, reach in and remove 50 individual rice grains. Count how many of the 50 grains are marked and how many are unmarked. Record those numbers in a data table. Return the 50 grains to the rice container and shake it well.
3. Repeat Step 2 four more times. Record your results in your data table. You have "recaptured" a total of five times from the wild population.
4. Calculate the average number of marked grains (out of 50 possible grains) for the five trials that you conducted.

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Assignment 5.3: Mark and Recapture Sampling (continued)

5. Count all the rice grains in the container, both marked and unmarked grains together. Record this number in your data table. (6 marks)

Data Table		
Step	Number	
Number of rice grains initially marked	100	--
Trial 1 (total of 50)	# marked:	# unmarked:
Trial 2 (total of 50)	# marked:	# unmarked:
Trial 3 (total of 50)	# marked:	# unmarked:
Trial 4 (total of 50)	# marked:	# unmarked:
Trial 5 (total of 50)	# marked:	# unmarked:
Average of 5 trials	# marked: A =	--
Actual total number of grains	B =	--

Analysis

1. Calculate the estimated size of the rice population, using the following formula: (2 marks)

$$\frac{100}{\text{Estimated Population Size}} = \frac{A}{50}$$

OR

$$\text{Estimated Population Size} = \frac{100 \times 50}{A}$$

(continued)



**Assignment 5.3: Mark and Recapture Sampling (continued)**

2. Compare your experimental estimated population size to the actual number of grains in the $\frac{1}{4}$ cup of rice (which was the original "population"). (2 marks)

3. Calculate the percent error in your estimate, using the following formula: (2 marks)

$$\text{Percent Error} = \frac{\text{Estimate} - \text{Actual}}{\text{Actual}} \times 100$$

4. How do you explain the experimental error in your estimate of the population size in this exercise? Name at least two sources of experimental error that you believe could have affected your results. (2 marks)

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**Assignment 5.3: Mark and Recapture Sampling (continued)**

5. Name at least **two** changes that you could make to the procedure used in this exercise that you believe would result in a smaller percent error in the results. Briefly explain why you would make each of the changes that you suggest. (4 marks)

6. Name **two** ways in which the steps in this experimental procedure differ significantly from an actual mark and recapture done with a real wild population. (2 marks)

