

**Faculty of Engineering  
University of Ottawa**

**GNG 1103 C04 – Engineering Design  
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**Project Deliverable B: Needs Identification and Problem Statement**

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Course Coordinator: Dr. Muslim Majeed

Group Members: Adam Sirota, Brayden Fitzgerald, Hala Aldahoun, Rami Mosleh, Jordan Draper

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## **Introduction:**

To have a bright future, biodiversity should be considered because it is essential for our planet's health. It surrounds the variety of genes, species, and ecosystems that maintain ecological balance. Thus, any flaw in our biodiversity may doom our world—for example, bats. People, from their perspectives, don't know that these creatures provide important control of agricultural and forest insect pests. If we don't act to maintain the bats' existence, habitat loss and degradation from climate change and pollution will endanger them, especially those species in Canada.

So, as a solution, bat boxes<sup>1</sup> will be installed where those bats used to live, to ensure their survival. It provides safe and warm roosting sites that not only promote backyard biodiversity but also serve as an offsetting measure for habitat loss due to infrastructure projects.

As in the tables below, we gathered raw data from our meeting with our client, interpreted it, organized those needs, and established the relative importance of needs, starting with the crucial need which is tracking the efficacy of bat boxes. Thus, this will help our team define the problem to be solved and consider the design of a bat box with a tracking device.

**Table 1:** Client Needs' Statements and their Interpretations

Questions	Client's Statement	Interpreted Needs
Typical Uses	The spacing between the panels should discourage other species from entering while allowing bats to enter	The enclosure's size and dimensions are such that only bats will enter and use it.
	The entrance should be about 4-5 inches into the box before the bats start roosting	The enclosure's size and dimensions are such that only bats will enter and use it.
	The bat box should be designed to withstand weather conditions, such as temperature and humidity, with some moisture but not direct water exposure	The enclosure can withstand varying weather conditions reliably
	Bats will only use one entrance to enter and exit the box	The enclosure has only one opening for entry and exit
	A rough or notched surface is necessary for the bats to grip and hang on	The landing surface is notched and rough
	Must be easy to use and install by a non-engineer	The enclosure is easy to install and use
	I need a bat box that tracks and stores the number of visits of bats over a summer season	The enclosure has a built-in device that tracks and stores the number of bats that visit it over the summer season

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<sup>1</sup> Frederick Conn. (2024, September 20). Bat Box Representation at Brightspace.

	I need a tracking system that does not interfere with the bats' natural movement	The tracking device does not interfere with the bats' natural movement
Likes – Current Tools	I like it when it is cheap	The enclosure and device are low-cost
Dislikes – Current Tools	The bat box should be designed for low maintenance, with minimal disturbance to the bat population	The enclosure and tracking device are easy to install and use
	The box should be easy to clean, with removable parts if necessary	The enclosure and device are easy to clean

**Table 2:** Interpreted Needs and Their Importance to Client

Interpreted Needs	Importance
The enclosure's size and dimensions are such that only bats will enter and use it.	5
The enclosure can withstand varying weather conditions reliably	4
The enclosure has only one opening for entry and exit	2
The landing surface is notched and rough	4
The enclosure has a built-in device that tracks and stores the number of bats that visit it over the summer season	5
The enclosure is easy to install and use	3
The tracking device does not interfere with the bats' natural movement	4
The enclosure and device are low-cost	4
The enclosure and device are easy to clean	3

### **Problem Statement:**

A need exists for bat conservationists in Canada to track bat visits to bat boxes with a low-cost, weatherproof device that is easy to install, requires minimal maintenance, and does not interfere with bat movement, providing essential data for monitoring populations.

### **Conclusion:**

Bat boxes, while beneficial for providing a home and roosting sites for bats, come with some challenges. Poorly designed boxes can lead to overheating, especially in a warm climate, which poses risks to the bats. The implications of these issues highlight the need for care and effort in making the design. Despite the challenges, bat boxes play a crucial role in supporting the bat population, which is vital for pest control and biodiversity. Therefore, understanding these issues and having follow-up meetings with our client are essential for maximizing the positive impact of bat boxes on the environment.