

**Screws Loose**

Project Deliverable B - Needs Identification and Problem Statement

**Group 9**

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**1. Introduction**

Bats play a critical role in maintaining ecosystems by controlling pest populations, pollinating plants, and dispersing seeds. However, due to habitat loss, climate change, and other environmental factors, some bat species, particularly those in Ontario, are endangered. To aid in conservation efforts, bat boxes, which are artificially designed roosting structures for bats, are being installed to provide a safe habitat for bats. However, in order to assess the effectiveness of these boxes, there is a need for accurate monitoring of bat activity. Without reliable data on how frequently bats use these structures, it is difficult to determine whether bat boxes are successful in preventing the decline in bat populations or whether they require further design improvements.

**2. Purpose**

Tiree has assigned us the task of building a device (to be attached on bat boxes) that can track the number of visits that a bat box will receive over a summer season. The goal is to collect data on bats so that Tiree can do analysis and further study the ecology of wild bats across Canada.

**3. Problem Analysis**

| **Needs** | **Priority (1-3)** |
| --- | --- |
| The device will count the number of bats entering/leaving a bat house | **3** |
| The device will be easy to install by anyone | **3** |
| The data needs to be stored on site | **3** |
| The data needs to be stored offsite | **2** |
| The device will require minimal maintenance (1/month) | **3** |
| The device must have a battery life of at least 1 month | **3** |
| The data will be accessible in real time | **1** |
| The device must monitor the internal conditions of the bat box | **1** |
| The sensors must not obstruct the bats’ path into the box | **3** |
| The device needs to be made from environmentally friendly materials | **1** |

**4. Numerical Classification**

3 - Satisfying the need is critical.

2 - Satisfying the need is desirable, but not necessary.

1 - Satisfying the need is not important.

**5. Benchmarking**

Currently, there are no digital methods that can accurately monitor and track bats that use a bat box. There are manual methods, like counting the amount of guano produced, but these methods are inefficient, costly and inconvenient as they involve someone going out and counting each bat and their relative amount of guano droppings. We believe that we can develop a digital method that is both efficient and convenient for the average user.

**6. Problem Statement**

The effectiveness of bat boxes in Ontario has not been accurately measured, and it is unclear how frequently they are being used by bats. To support conservation efforts for endangered bat species, it is necessary to develop a device that can monitor and track bat activity accurately while requiring minimal maintenance and minimal impact on the habitat.