Team 17: Need Identification and Problem Statement

Introduction

Tiree FS Inc has recruited our design group to foster healthy ecosystems through the promotion of bat populations. Bat boxes provide safe, warm, and dry roosting sites during the summer. Our design task will center around creating a sensor that will be able to track the usage of these bat boxes. We will also create a prototype box that will demonstrate the connection between box and sensor. This document contains the interpreted needs that we formulated from our interview with a representative of Tiree FS Inc.

Need Organization

	needs	Priority rating (5-highest)	Justifications
Sensor functions	Track number of visits accurately	5	Tracking visits is the core function of the sensor system.
	Battery life needs last one month	5	Makes the sensor more reliable and limits maintenance
	Temperature tracking	2	it is an advantage but not necessary for now
Sensor features	Must last a season	4	Durability and minimal maintenance are essential to ensuring the system functions effectively without burdening maintenance teams
	Requires minimal maintenance		
	Weatherproof	4	ensures the system remains functional despite the environment
	Low cost (50-100$)	3	keeping costs low is desirable, functionality and reliability are more important
	Doesn't interfere with bat movement	4	Any interference with bat movement could discourage roosting or cause harm
Box features	Must last a season	5	for bat usage
	Dimensions shouldallow multioccupancy	4	improper sizing could reduce occupancy and make the design ineffective
	Elevated from the ground	4	key for bat safety and natural behavior. A poorly elevated box could lead to predation risks
	Must have a landing pad (at least 1.5ft)	5	aids in bat entry and exit, contributing to the box's usability

Problem definition: A need exists for a **sensor system** that reliably **tracks bat activity** within **bat boxes** while being **weatherproof**, **low cost**, and **non-intrusive** to bat movement, to address **Tiree**'s goal of promoting healthy **bat** populations. The sensor and accompanying bat box design must be **durable**, require minimal **maintenance**, and be **practical** for widespread use.

Benchmark

Company	Cost	Weight	Size	Material
OBC Bat Box	CAD 70-100	3-4 kg	30 cm x 30 cm x 60 cm	Cedar wood with insulation
BestNest Triple-Celled Bat House	CAD 100-130	4.5-5 kg	38 cm x 38 cm x 100 cm	Solid wood
Woodlink Bat Shelter	CAD 40-70	1.5-2 kg	30 cm x 25 cm x 30 cm	Plywood
Bat Logger Q	CAD 300-400	0.5 kg	15 cm x 10 cm x 5 cm	Plastic casing
Wildlife Acoustics SM4BAT	CAD 1,200-1,500	1-2 kg	20 cm x 20 cm x 10 cm	Weatherproof plastic

Company	Cost	Weight	Size	Material
Importance	5	2	3	1
OBC Bat Box	3	2	2	3
BestNest Triple-Celled Bat House	3	2	3	3
Woodlink Bat Shelter	3	3	2	3
Bat Logger Q	1	2	3	2
Wildlife Acoustics SM4BAT	1	2	3	2

Other needs/ issues

Clarification of Bat Species Behavior, Data Transmission for Sensors, Power Source and Battery Life, Box Durability in Extreme Conditions, Scaling and Mass Production,Long-Term Impact on Bat Populations, Additional Stakeholder Feedback