# Bird Species Observation Dashboard - Analysis Report

## *1. Introduction*

This report summarizes the approach, key findings, and actionable insights from the Bird Species Observation Dashboard project. The dashboard was designed to analyze bird species trends across habitats, years, observers, and locations using interactive visualizations.

## *2. Approach*

1. Data Loading and Cleaning:  
 - Combined two datasets: Bird\_Monitoring\_Data\_GRASSLAND and Bird\_Monitoring\_Data\_FOREST.  
 - Added a 'Habitat' column to differentiate between grassland and forest observations.  
 - Converted Date columns to datetime format and extracted Year and Month.  
 - Filled missing values for Temperature and Humidity with their mean values.  
 - Standardized categorical columns like Location\_Type.  
  
2. Dashboard Development:  
 - Built using Streamlit and Plotly for interactive filtering and visualizations.  
 - Sidebar filters for Habitat, Year, Location Type, and Observer.  
 - Tabs to separate different types of insights: Trends, Habitat Insights, Environmental Impact, Top Species, and Data Table.  
 - Added metrics cards for quick overview.  
 - Download button for exporting filtered data.

## *3. Visualizations and Analyses*

A. Trends Tab:  
 - Monthly Trend Line Chart: Shows observation counts for the selected species over months and years, helping identify seasonal peaks.  
 - Seasonal Trend Chart: Groups observations by Winter, Spring, Summer, and Autumn to reveal overall seasonal preferences.  
 - Animated Species Trend: Displays how the count of each species changes over the years.

B. Habitat Insights Tab:  
 - Bar Chart of Observations by Habitat: Compares the number of observations recorded in each habitat type.

C. Environmental Impact Tab:  
 - Scatter Plot (Temperature vs. Humidity): Helps identify environmental conditions that might influence bird sightings.  
 - Temporal Heatmap: Highlights month-year combinations with the highest observation activity.

D. Top Species Tab:  
 - Horizontal Bar Chart: Displays the top 10 most frequently observed species in the filtered dataset.

E. Data Table Tab:  
 - Interactive table showing filtered dataset entries.  
 - Option to download the filtered dataset as a CSV.

## *4. Key Findings*

- Distinct seasonal trends observed for several species, with certain months showing significantly higher counts.  
- Grasslands and forests both support a diverse range of species, but some species are exclusive to one habitat type.  
- Environmental factors such as temperature and humidity correlate with observation frequency for some species.  
- A small number of species account for a large portion of total observations, as seen in the Top Species chart.

## *5. Actionable Insights*

- Conservation efforts should be seasonally targeted, focusing on periods of high bird activity.  
- Protect biodiversity hotspots identified in the habitat insights section.  
- Monitor environmental factors to predict and enhance bird sighting opportunities.  
- Special attention should be given to the most frequently observed species to ensure sustainable population levels.