Monitoring Akrotiri visitation with Automatic Visitor Counters

DPLUS141:
Habitat restoration and wise use for Akrotiri and Cape Pyla

July 2024

Contents

1. Project Background Information and Aim of Visitor Monitoring

Darwin Plus Project: DPLUS141 "Habitat Restoration & Wise Use for Akrotiri & Cape Pyla" is a 3-year project (July 2021 – June 2024), which aims to restore important wildlife habitats within the Cyprus SBAs, focusing on Akrotiri wetlands and native scrub on Cape Pyla (Dhekelia), to promote wise use of the area and at the same time to develop eco-tourism opportunities to support the local economy. The Project is funded by Darwin Plus (also known as The Overseas Territories Environment and Climate Fund), which provides funding for environmental projects in UK Overseas Territories. The project partners are BirdLife Cyprus (leading role), Terra Cypria, Cyprus Sovereign Base Areas Administration – Environment Department (SBAA ED) and the Royal Society for the Protection of Birds (RSPB). The project through various actions promotes Akrotiri Peninsula as an eco-friendly tourism destination. Examples of such actions include creating a dedicated Akrotiri eco-tourism website with information for visitors, organising Spring festivals, designating walking routes, information signs and structures and installing automatic visitor counters.

To monitor visitor numbers, three counters were installed at the entrances of the three bird hides in Akrotiri. The objective was to track visitation, assess possible patterns and establish a visitor baseline to compare possible future increases in visitor numbers through the project actions.

Three automatic visitor counters (Tinytag Explorer) were installed in July 2022 at bird hides in Akrotiri Peninsula. The bird hides which were equipped with visitor counters and their location are as follows (see Map 1):

1. Akrotiri Marsh Tower Hide (https://maps.app.goo.gl/JxebkDoC4RbLhtsG9)
2. Akrotiri Marsh Ground Hide (https://maps.app.goo.gl/sTq6kTASYUDAHLKw7)
3. Zakaki Marsh Hide (https://maps.app.goo.gl/tzDajBYDU9CdGghd9)

Map 1: Location of bird hides in Akrotiri Peninsula which were equipped with visitor counters

2. Establishment of Baseline Visitation- Data analysis and interpretation

One of the objectives of installing the visitor counters was to monitor visitation in Akrotiri and establish daily, monthly, and seasonal baselines. The data that was used for this analysis are from October 2022 to September 2023 (1 year).

The following data serve as a valuable indicator for Akrotiri hide visitation, providing insights on a daily, monthly, seasonal, and bird hide basis. However, the period from October 2022 to September 2023 being the first year of visitation monitoring, we cannot determine with certainty whether visitation increased over the life of the Darwin project, as the project ends in June 2024, but we can have some indications. As the baseline has just been established, future visitation monitoring is essential for meaningful comparisons.

For the analysis of the data collected, we utilised the statistical analysis software RStudio. The data were initially combined (for all three bird hides) and then plotted against Weekdays, Months, Seasons, as well as the three different Bird hides compared, using box plots.

The visitor counters tracked both incoming and outgoing visitors. To reflect only the presence of visitors in the bird hide, the data were transformed by being divided by 2.

2.1 Days of the week

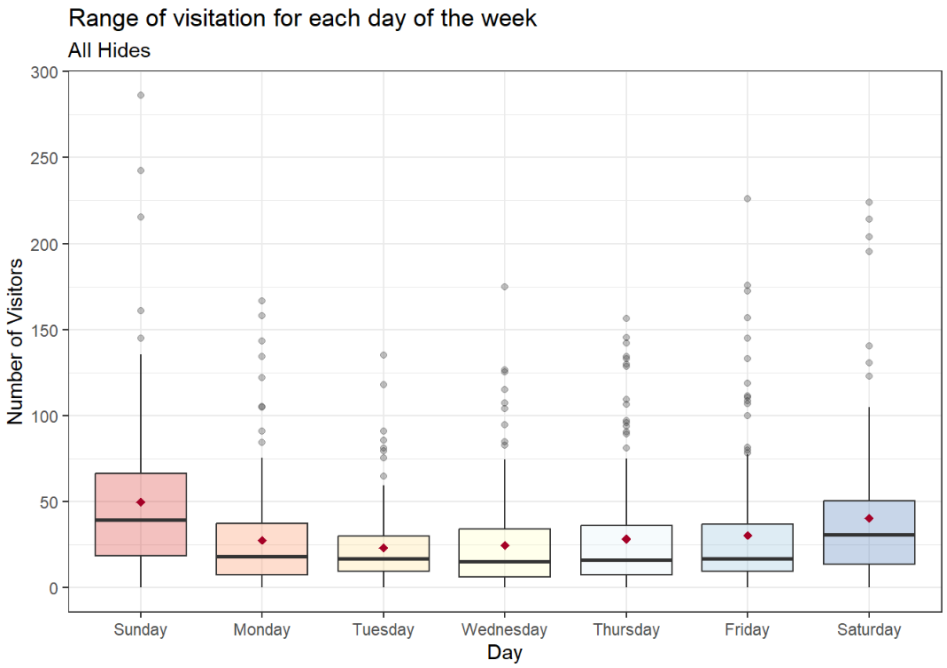

Figure 1: The Boxplot presents the visitation data categorised by the day of the week for all three bird hides. The Red dot inside the boxplot represents the mean value of the data.

Table 1:Summary of the data collected, categorised by each Day of the week. The data presented are collected from all three Bird Hides.

Day	Min	1st Quartile	Median	Mean	3rd Quartile	Max
Monday	0	7.6	18	27.6	37.4	166.5
Tuesday	0	9.5	17	23.3	29.9	135.0
Wednesday	0	6.5	15.3	24.8	34.0	175.0
Thursday	0	7.5	16	28.4	36.0	156.5
Friday	0	9.5	17	30.6	37.0	226.0
Saturday	0	13.6	31	40.4	50.4	224.0
Sunday	0	18.5	39.5	49.8	66.4	286.0

The graph depicting the visitation range for each day of the week illustrates the distribution of visitors throughout the week across all three bird hides. The data revealed that Sunday had the highest mean of 49.82, followed by Saturday with a mean of 40.42. Tuesday recorded the lowest mean at 23.28, followed closely by Wednesday at 24.78.

Sunday exhibited the highest 1st quartile value of 18.5, followed by Saturday with a value of 13.62. Wednesday had the lowest 1st quartile value of 6.5, followed by Thursday at 7.5. In terms of the 3rd quartile, Sunday again has the highest with the highest value of 66.38, followed by Saturday at 50.38. On the other hand, Wednesday showed the lowest 3rd quartile value of 34, followed by Thursday at 36.

The day with the highest median was Sunday at 39.5, while the lowest median was observed on Wednesday at 15.25. Sunday also recorded the highest maximum value at 286, with Tuesday having the lowest at 135.

Main observations:

- Weekend days have the highest overall visitation. Sunday consistently showed the highest values across mean, quartiles, median, and maximum, indicating the highest overall daily visitation, followed by Saturday.
- Tuesday and Wednesday displayed the lowest mean and maximum values, suggesting the lowest overall daily visitation across the three bird hides.

2.2 Months

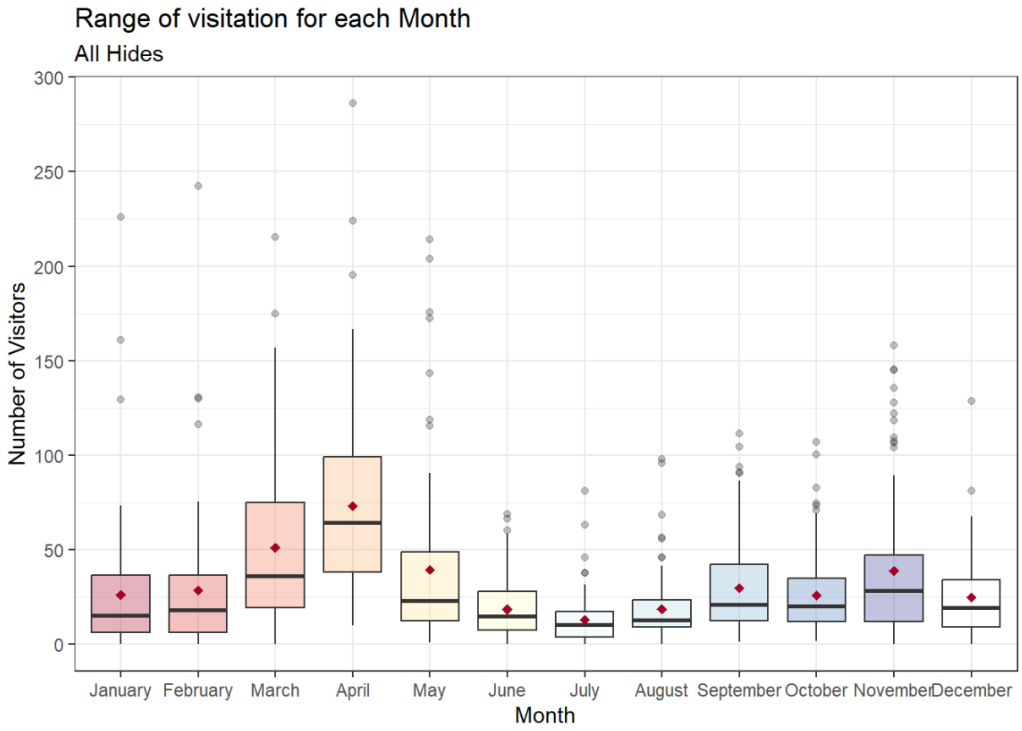

Figure 2: The Boxplot presents the visitation data categorised by month of the year for all three bird hides. The Red dot inside the boxplot represents the mean value of the data.

Table 2: Summary of the data collected, categorised by month of the year. The data presented are collected from all three Bird Hides.

Month	Min	1st Quartile	Median	Mean	3rd Quartile	Max
January	0	6.5	15.5	26.3	36.5	226.0
February	0	6.4	18.0	28.7	36.8	242.5
March	0	19.5	36.0	51.2	75.0	215.5
April	10	38.1	64.5	73.3	99.3	286.0
May	1	12.5	23.0	39.6	49.0	214.0
June	0	7.5	14.8	18.6	28.0	69.0
July	0	4.0	10.5	13.1	17.5	81.0
August	0	9.0	13.0	18.7	23.5	98.0
September	1.5	12.4	21.0	30.0	42.5	111.5
October	2	12.0	20.3	25.9	35.1	107.0
November	0	12.3	28.3	38.9	47.3	158.0
December	0	9.0	19.5	25.0	34.0	128.5

The Graph depicting the range of visitation for each Month, illustrates the distribution of visitors throughout the months across all three bird hides. The data revealed that the month with the highest mean value was April with 73.28 followed by March 51.15. The month with the lowest mean value was July with 13.06, followed by June with 18.64 and August with 18.71.

April was the month with the highest median of 64.5, followed by March with 36. The month with the lowest median was July with a value of 10.5, followed by August with 13. April was again highest in max value with 286 and July lowest with a value of 81.

Main observations:

- April stands out as the month with the highest median, mean, 3rd quartile and maximum values, indicating the highest overall monthly visitation.
- July consistently has the lowest values, suggesting the lowest overall monthly visitation.

2.3 Seasons

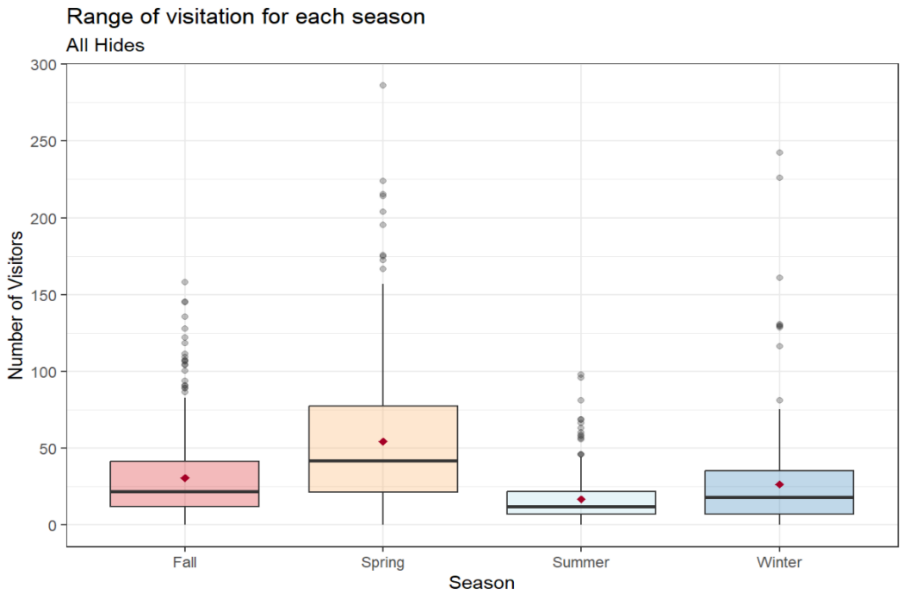

Figure 3: The Boxplot presents the visitation data categorised by Season for all three bird hides. The Red dot inside the boxplot represents the mean value of the data.

Table 3: Summary of the data collected, categorised by Season. The data presented are collected from all three Bird Hides.

Season	Min	1st Quartile	Median	Mean	3rd Quartile	Max
Fall	0	12	22	30.81	41.5	158
Spring	0	21.38	42	54.46	77.62	286
Summer	0	7	12	16.78	22	98
Winter	0	7	18	26.58	35.5	242.5

The Range of visitation for each Season graph illustrates the distribution of visitors throughout the seasons across all the three bird hides. Data showed that the season with the highest mean value was Spring with 54,46 followed by Fall with 30,81. The season with the lowest mean value was Summer with 16,78, followed by Winter with 26,58.

Spring showed the highest 1st quartile value of 21,38, followed by Fall with a value of 12. Summer and Winter shared the lowest 1st quartile value, both recording 7. Spring again showed the highest 3rd quartile value of 77.62, followed by Fall with a value of 41.5. Summer had the lowest 3rd quartile value of 22.

Spring was the season with the highest median value of 42, followed by Fall with 22. The season with the lowest median value was Summer with a value of 12. Spring had the highest max value of 286, followed by Winter with a value of 242,5. Summer with the season with the lowest max value of 98.

Main observations:

- Spring was the season with the highest quartile, mean, max and mean values, followed by Fall, indicating the highest overall seasonal visitation. This is explained by the higher interest for birdwatching in these two seasons, where bird migration, as well as breeding (spring) takes place.
- Summer and Winter were the months with the lowest values

2.4 Comparison amongst the three bird hides

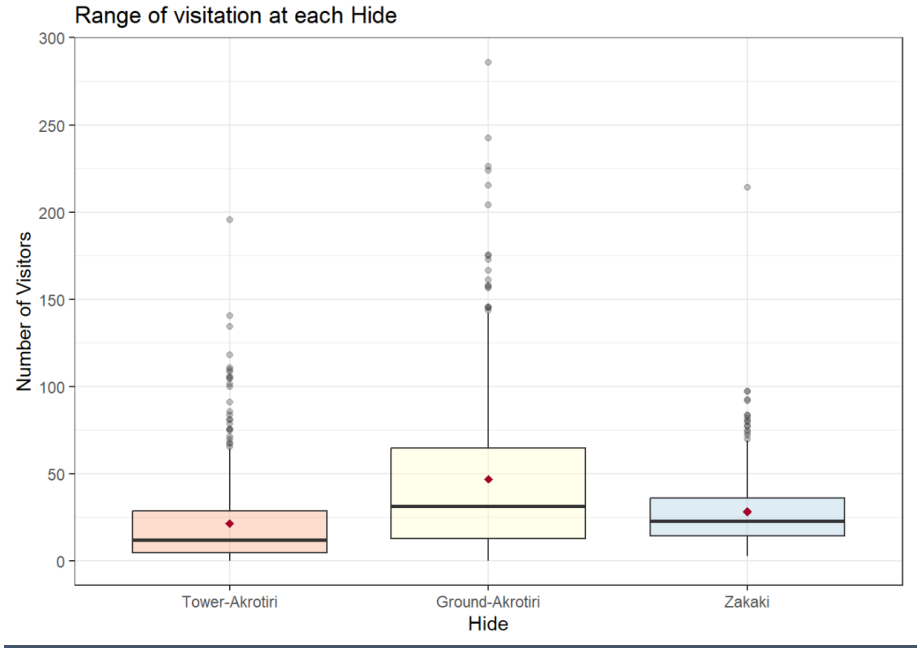

Figure 4: The Boxplot presents the visitation data categorised by Hide. The Red dot inside the boxplot represents the mean value of the data.

Table 4: Visitation values for the three bird hides

Bird Hide	Min	1st Quartile	Median	Mean	3rd Quartile	Max
Akrotiri Marsh - Tower	0	4.5	11.75	21.47	28.62	195.5
Akrotiri Marsh - Ground	0	12.5	31.25	46.85	64.62	286
Zakaki Marsh	2.5	14	22.5	28.09	36	214

The graph depicting the range of visitation at each Hide illustrates the distribution of visitors for all three bird hides between October 2022 to September 2023. Data showed that the hide with the highest mean value was Akrotiri Marsh - Ground with 64,62. The hide with the lowest mean value was Akrotiri Marsh - Tower with a value of 21,47.

Zakaki Marsh hide showed the highest 1st quartile value of 14, followed by Akrotiri Marsh - Ground with a value of 12,5. Akrotiri Marsh - Tower showed the lowest 1st quartile value of 4,5. Akrotiri Marsh - Ground showed the highest 3rd quartile value of 64,62, followed by Zakaki Marsh with a value of 36. Akrotiri Marsh - Tower had the lowest 3rd quartile value of 28,62.

Akrotiri Marsh - Ground was the hide with the highest median value of 31,25, followed by Zakaki Marsh with a value of 22,5. The hide with the lowest median value was Akrotiri Marsh - Tower. Akrotiri Marsh - Ground showed the highest max value of 286 followed by Zakaki Marsh with a value of 214. Akrotiri Marsh - Ground had the lowest max value of 195,5.

Main observations:

- Akrotiri Marsh - Ground hide showed the highest values, indicating the highest visitation count between the three hides.
- Zakaki Marsh showed the second highest visitation count.
- Akrotiri Marsh - Tower indicated that is the hide with the lowest visitation.

3. Comparison of 1st year's Baseline with following months

During the project, multiple actions were focused on increasing sustainable tourism in the area. Some of them include the designation of hiking trails, the organisation of Akrotiri spring festivals, the design of a website for visitors, as well as a short video spot promoting the environmental and cultural value of the area, as well as the activities that visitors could do in all the seasons of the year. In order to evaluate if the project actions influenced the visitation of the area, data were collected from the existing Birdwatching hides during the project and were compared with the baseline established in section 2 of this report. The visitation data were collected from the three hides for the remaining months of the project (i.e October 2023 to June 2024).

3.1 Days of the week

The graph depicting the visitation range for each day of the week illustrates the distribution of visitors throughout the week across all three bird hides. The graph displays the baseline data along with the new set of data to better determine any potential changes.

Similarly to the baseline data, Sunday had the highest mean of 65.4, followed by Saturday with a mean of 57.7. The patterns remained the same since Tuesday recorded the lowest mean at 26.3, followed by Wednesday at 30.1.

The overall visitation has increased for each day of the week. The maximum percentage increase was observed for Friday where visitation has increased by 31.1%, while the lowest percentage increase was on Wednesday by 15,3% increase.

Table 5: Summary of Visitation data, categorised by each day of the week.

Day	Min	1st Quartile	Median	Mean	3rd Quartile	Max
Monday	0	10.6	19.0	35.5	51.9	296.0
Tuesday	0	11.8	18.3	26.3	30.0	147.0
Wednesday	0	11	19.0	30.1	30.5	306.0
Thursday	0	10.3	18.0	32.2	37.3	168.5
Friday	1.5	11.1	22.8	37.4	43.5	233.0
Saturday	2.5	23.5	39.5	57.7	73.3	252.0
Sunday	1	24.4	43.3	65.4	81.8	441.0

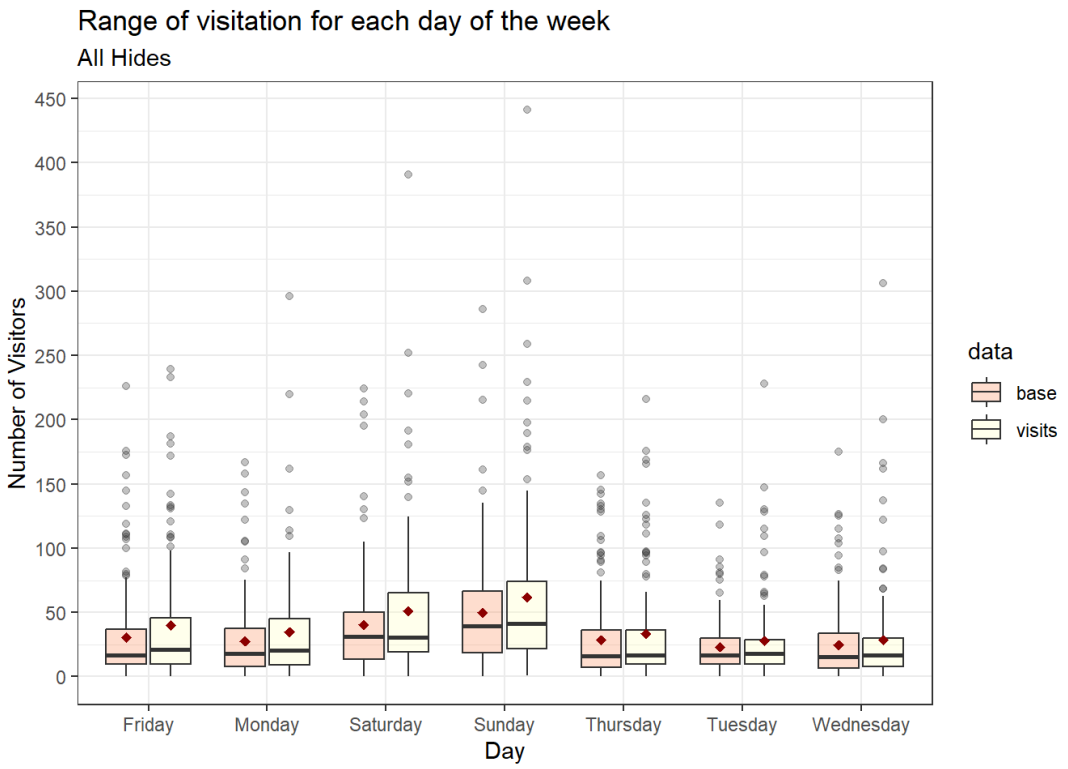

Figure 5: Boxplot of the range of visitation categorised by each day of the week. The figure displays the boxplot of the baseline data filled with a light red colour, and the visitation data boxplot is filled with a light yellow. The red dot represents the mean.

Table 6: Comparison of the mean value from the visitation data, with the baseline mean visitation value each day of the week. The table shows the percentage difference between the two values.

Day	Baseline Mean	Mean	Percentage Difference
Monday	27.7	34.8	26.1%
Tuesday	23.3	27.8	19.3%
Wednesday	24.8	28.6	15.3%
Thursday	28.4	33.4	17.6%
Friday	30.6	40.1	31.1%
Saturday	40.4	51.3	27%
Sunday	49.8	61.9	24.3%

Main observations:

- Similarly to the baseline data, weekends have highest overall visitation, while Tuesday and Wednesday had the lowest mean visitation.
- There was an increase in visitation in all days of the week compared to the baseline data from 17,6% to 31,1%.
- Friday had the highest percentage increase in visitation compared to the baseline data, while Tuesday and Thursday had the lowest percentage increase.

3.2 Months

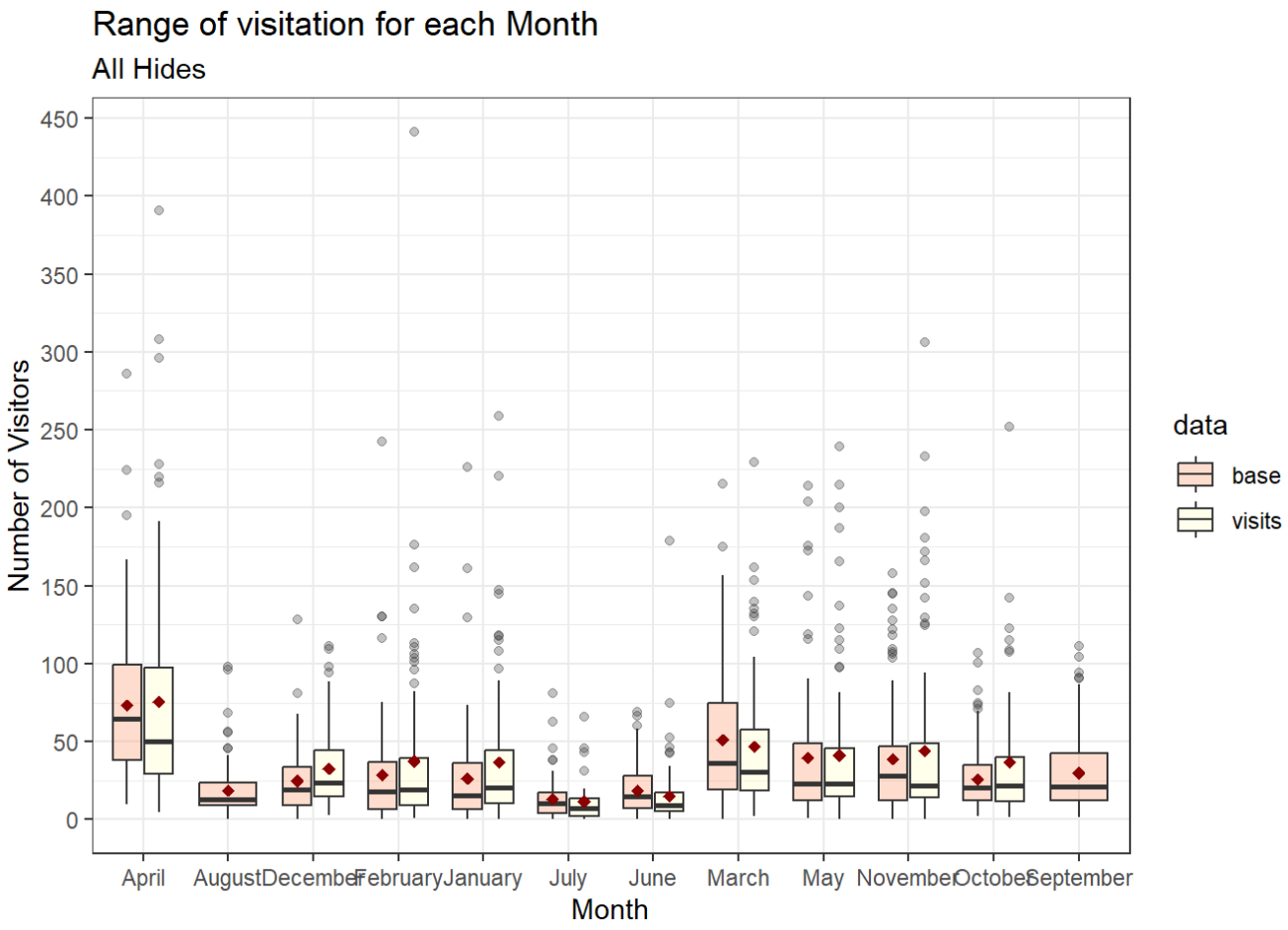

Figure 6: Boxplot of the range of visitation categorised by each month. The figure displays the boxplot of the baseline data filled with a light red colour, and the visitation data boxplot is filled with a light yellow. The red dot represents the mean.

The Graph depicting the range of visitation for each Month illustrates the distribution of visitors throughout the months across all three bird hides. The graph displays the baseline data along with the new set of data to better determine any changes in the pattern.

The presented data have some limitations due to the constrictive timeframe of the project. The data were collected up until 11th of July, therefore the visitation values for the month of July are not representative. There are no values for the months of August and September.

The data revealed that the month with the highest mean value was April with 75.6 followed by March with 46.7. The highest percentage increase was reported in October, with a 41.7% increase in visitation. Surprisingly March, June and July have recorded a decrease in visitation of 8.9%, 18.8% and 10.7% respectively. One of the possible reasons for this could be the extreme weather conditions that were recorded during these months with extremely high temperatures for the season.

Table 7: Summary of Visitation data, categorised by each month.

Month	Min	1st Quartile	Median	Mean	3rd Quartile	Max
January-24	0	10.5	20.5	36.6	44.5	259.0
February-24	1	9.0	19.5	37.5	39.5	441.0
March-24	2.5	18.5	30.5	46.7	57.5	229.5
April-24	4.5	29.6	50.3	75.6	97.4	391
May-24	0.5	14.5	23	41.4	45.5	239.5
June-24	0	5.3	9.3	15.1	17.5	179
July-24	0	2	7	11.7	13.5	66
October-23	1.5	11.5	21.5	36.7	40	252.0
November-23	0	14.0	21.8	44.2	48.8	306.0
December-23	3	15.0	23.5	32.6	44.5	111.0

Table 8: Comparison of the mean value from the visitation data, with the baseline mean visitation value each month. The table shows the percentage difference between the two values.

Month	Baseline Mean	Mean	Percentage Difference
January	26.3	36.6	39.2%
February	28.7	37.5	30.7%
March	51.2	46.7	-8.8%
April	73.3	75.6	3.14%
May	39.6	41.4	4.55%
Jun	18.6	15.1	-18.8%
July	13.1	11.7	-10.7%
October	25.9	36.7	41.7%
November	38.9	44.2	13.6%
December	25.0	32.6	30.4%

Main observations:

- The highest visitation was recorded in April, despite the low increase in percentage difference from the baseline.
- March, June and July recorded a decrease in percentage visitation compared to the baseline, probably due to the extreme weather conditions that were recorded during these months with extremely high temperatures for the season.
- October had the highest increase in percentage difference by 41,7%.
- The data are limited for safe conclusions, but they can provide some indications.

3.3 Seasons

The presented data have some limitations due to the timeframe of the project. The data were collected up until 11th of July 2024 (end of project) and therefore are no values for July and August, therefore the visitation values for summer season are not representative. Similarly, there are no values recorded for September thus the data recorded for Fall are also not representative. So, meaningful comparisons are made for Spring, Winter and Fall (without September).

The Range of visitation for each Season graph illustrates the distribution of visitors throughout the seasons across all three bird hides. The graph displays the baseline data along with the new set of data to better determine any changes in the pattern.

Data showed that the season with the highest mean value was Spring with 54.3 followed by Fall with 41.3. Spring recorded a percentage decrease compared to the baseline of 0.4%. The highest percentage difference was recorded in Fall with an increase of 34.1%. Although there is an increase the comparison is not accurate due to the lack of data for September.

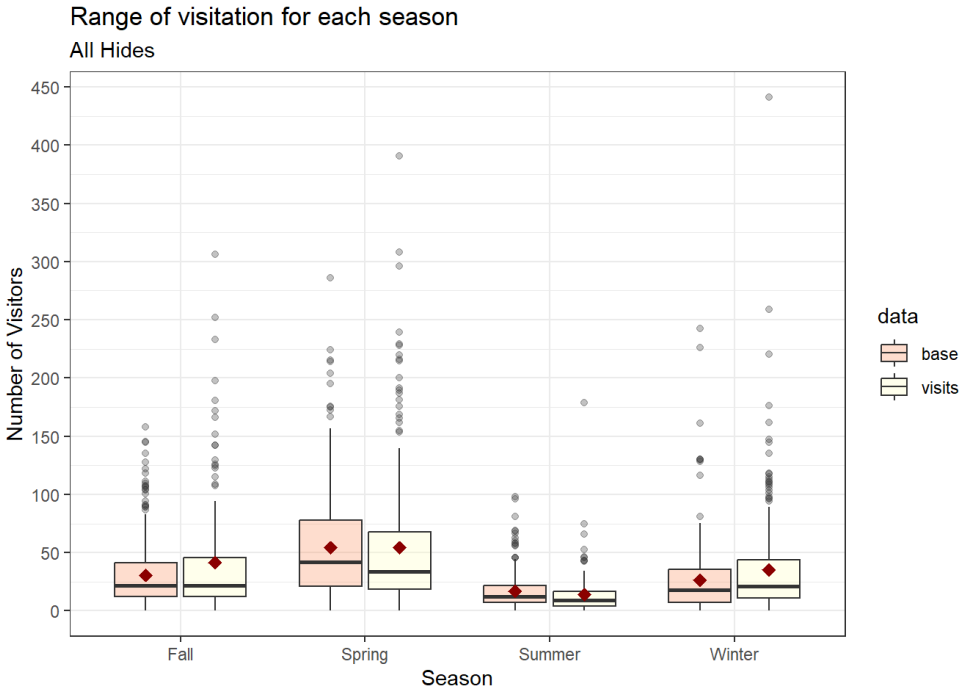

Figure 7: Boxplot of the range of visitation categorised by season. The figure displays the boxplot of the baseline data filled with a light red colour, and the visitation data boxplot is filled with a light yellow. The red dot represents the mean.

Table 9: Summary of Visitation data, categorised by each season.

Season	Min	1st Quartile	Median	Mean	3rd Quartile	Max
Fall	0	12.5	21.5	41.3	46.0	306.0
Spring	0.5	18.5	33.8	54.3	67.8	391
Summer	0	4.3	9	14.2	17	179
Winter	0	11.0	21.0	35.5	44.0	441.0

Table 10: Comparison of the mean value from the visitation data, with the baseline mean visitation value each season. The table shows the percentage difference between the two values.

Season	Baseline Mean	Mean	Percentage Difference
Fall	30.8	41.3	34.1%
Spring	54.5	54.3	-0.4%
Winter	26.6	35.5	33.5%

Main observations:

- Overall, spring has the highest visitation, followed by fall.
- The mean visitation of Fall and Winter increased compared to the baseline, by >30%.
- The data are limited for safe conclusions, but they can provide some indications.

3.4 Comparison amongst the three bird hides

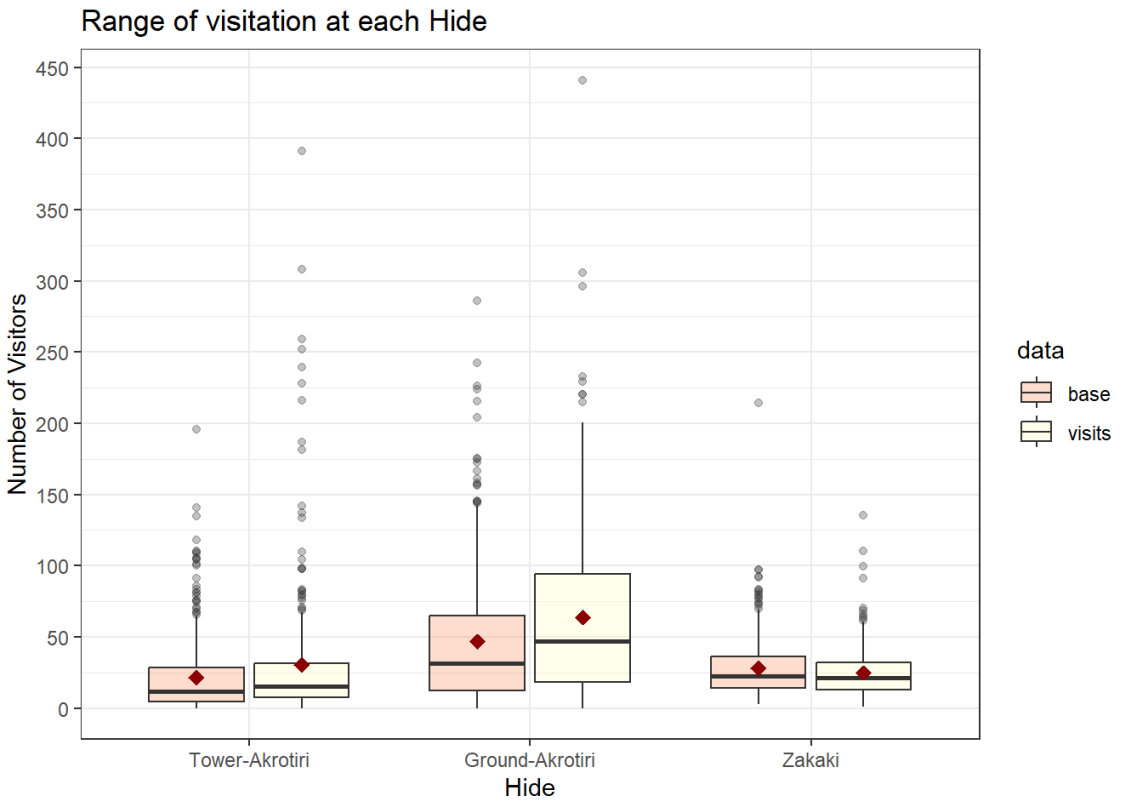

Figure 8: Boxplot of the range of visitation categorised by each hide. The figure displays the boxplot of the baseline data filled with a light red colour, and the visitation data boxplot is filled with a light yellow. The red dot represents the mean

Table 11: Summary of Visitation data, categorised by each Hide.

Bird Hide	Min	1st Quartile	Median	Mean	3rd Quartile	Max
Akrotiri Marsh - Tower	0	7.5	15.0	30.3	31.5	391
Akrotiri Marsh - Ground	0	18	47	64	94	441.0
Zakaki Marsh	1	13	21	24.8	32	135.5

Table 12: Comparison of the mean value from the visitation data, with the baseline mean visitation value for each Hide. The table shows the percentage difference between the two values.

Bird Hide	Baseline Mean	Mean	Percentage Difference
Akrotiri Marsh - Tower	21.5	30.3	40.9%
Akrotiri Marsh - Ground	46.9	64	36.5%
Zakaki Marsh	28.1	24.8	-11.7%

The graph depicting the range of visitation at each Hide illustrates the distribution of visitors for all three bird hides. The graph displays the baseline data along with the new set of data to better determine any changes in the pattern.

Similarly to the baseline data, the most visited bird hide is the Ground Hide at the Akrotiri Marsh. In addition, the visitation increased by 36.5% compared to the baseline data. The Ground Akrotiri Marsh hide is the one more accessible compared to the other two hides, which might play a role in attracting more visitors, as well as schools. The visitation to the Akrotiri Marsh Tower Hide also showed an increase of 40.9%.

In contrast with the other two hides the visitation to the Zakaki Marsh Hide has decreased by 11.7%. The Zakaki Marsh Hide has a view of the Lake Makria, which is currently facing a problem with overgrowing reeds. The limited view from the hide might be the reason for the decrease in visitation.

Main observations:

- The Akrotiri Marsh Ground Hide had the highest overall visitation and the greatest percentage increase compared to the baseline data by 40,9%.
- The visitation to the Zakaki Marsh Hide was the only one that decreased by 11,7% compared to the baseline data, probably due to the fact that overgrowing reeds limit the view from the hide.

4. Cumulative Visitation in all bird hides

In the following table 13, we can see the cumulative numbers of visitors in all three bird hides from the start to the end of visitors' numbers recording period through the DPLUS141 project duration.

Table 13: Cumulative numbers of visitors in all three bird hides from October 2022 to June 2024

Month and Year	Akrotiri Marsh - Tower	Akrotiri Marsh - Ground	Zakaki Marsh
Oct-22	573	1137	640
Nov-22	487	2010	1001
Dec-22	512	925	886
Jan-23	335	1189	919
Feb-23	375	1230	807
Mar-23	854	2463	1440
Apr-23	2033	3015	1548
May-23	660	1918	1101
Jun-23	424	629	626
Jul-23	157	573	485
Aug-23	342	928	471
Sep-23	980	1263	470
Oct-23	1122	1463	581
Nov-23	474	2807	698
Dec-23	549	1547	924
Jan-24	627	1943	835
Feb-24	381	1941	939
Mar-24	1015	2426	903
Apr-24	2703	3125	977
May-24	1334	1840	672
Jun-24	360	617	379
Total	**16293**	**34985**	**17296**

For the duration of the recording period (Oct. 22 to Jun. 24), the **number of visitors** was **68 573 in total**, out of which 34 985 in Akrotiri Marsh – Ground, 16 293 in Akrotiri Marsh – Tower and 17 296 in Zakaki Marsh.

An annual total (Oct. 22 to Sep. 23) reached to **35 398 visitors**, out of which 17 278 in Akrotiri Marsh – Ground, 7 729 in Akrotiri Marsh – Tower and 10 391 in Zakaki Marsh.