

# Summary Results of 2016 Acoustic Monitoring

## Great Lakes Inventory and Monitoring Network

### Prepared for

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# 1 Introduction

Normandeau Associates Inc. (Normandeau) was tasked with creating a streamlined automated Microsoft Access-based data management system for importing and summarizing the results of automatic identification of bat species and audio files for nine parks within the Great Lakes Inventory and Monitoring Network (GLKN). The management system involved quality checking (QC) the audio files, organizing them by park, sampling site and date, performing automatic identification (AutoID) of the audio files, importing the results of the AutoID, performing a manual identification of a subset of audio files, and importing the results of the manual ID. Finally, Normandeau was tasked with summarizing the AutoID results and performing some basic statistics.

This report summarizes the results of 2016 data collection and analysis of the AutoID and manual ID along with some additional supporting statistics about the number of audio files collected.

This report is organized into the following sections:

- Audio File Inventory Summary: lists the number of audio files for each park and the results of initial processing and organizing (before automatic identification)
- Deployment Summary: summarizes the number of deployments and deployment-nights per park
- AutoID Summary: summarizes the results of the automatic identification
- Manual Vetting Summary: summarizes the comparison of manual identifications to the automatic identifications
- Appendix: lists some tables too long for the report main body
- Supplementary Documents: lists the documents that have more detailed information about some aspects of the data processing and documents with tables too large for this report

The results in this summary report are presented, in general, by park. Presenting the results by each site/deployment within a park is generally not very informative due to the large number of sites/deployments within each park. Tables of summary statistics for individual sites/deployments will be provided in supplementary documents.

Table 1 lists the parks where the data were collected for the 2016 season along with the abbreviations used through this report for those parks.

Table 1-1. Parks where acoustic monitoring was performed during the 2016 monitoring season

| Abbreviation | Name                                           | State |
|--------------|------------------------------------------------|-------|
| <b>INDU</b>  | Indiana Dunes National Lakeshore               | IN    |
| <b>MISS</b>  | Mississippi National River and Recreation Area | MN    |
| <b>SACN</b>  | Saint Croix National Scenic Riverway           | WI/MN |
| <b>SLBE</b>  | Sleeping Bear Dunes National Lakeshore         | MI    |
| <b>PIRO</b>  | Pictured Rocks National Lakeshore              | MI    |
| <b>APIS</b>  | Apostle Islands National Lakeshore             | WI    |
| <b>ISRO</b>  | Isle Royale National Park                      | MI    |
| <b>GRPO</b>  | Grand Portage National Monument                | MN    |
| <b>VOYA</b>  | Voyageurs National Park                        | MN    |

NOTE: for all tables and graphs in this report, the parks are ordered from southern-most to northern-most.

## **NPS GLKN Report 2016 (updated)**

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The report is not intended to be high-level analysis of the resulting data. Instead, it is intended to be a very basic summary of the numbers and species of bat calls at various parks, as determined by the AutoID. In addition it provides a basic analysis of the validity of automatic identification as compared to manual identification. A more advanced statistical comparison and detailed analysis is outside of the scope of this report.

### **Raw Data Provided:**

The raw data provided by the National Park Service (NPS) for this analysis are audio files (sound recording in WAV file format). These audio files were organized into folders by location (park, site within park). In addition, the name of the audio file contained the date and time of its recording, allowing for the files to be further organized by date.

The National Park Service also supplied an initial Access database (Microsoft Access 2010) which was expanded upon to include the information extracted from the supplied audio files.

**NOTE: This is a revision of a previous report of the 2016 data collection season (published May 31, 2018).** The following data have been added or revised as compared to the previous report:

- PIRO park data and automatic identification analysis (both Baseline and Expanded) have been added
- For the original 8 parks (not PIRO), automatic identification analysis with the expanded species list (i.e the “Expanded Analysis”) has been added
- For the original 8 parks (not PIRO), a few hundred additional audio files were found and added to the data and all analyses. These additions alter the tables and graphs slightly but do not significantly change the results as compared to the previous report.

## 2 Audio File Inventory Summary

This section presents the results of the initial audio file processing, done before the files were run through the automatic species identification classifier.

A thorough, detailed account of the data processing methods and settings is given in a separate document: the “Data Management Plan.”

The audio files were organized into folders by location (park, site within park). The name of the audio file contained the date and time of its recording, allowing for the files to be further organized by date. **For these results the recording “date” extends from the evening (after 5:00PM) of the actual date through the following morning (before noon).** Any files recorded after 5:00PM have the same date as the recording date, while any files recorded before noon have the previous day’s date.

- File recorded at 7:00PM on 6/2 has “Date” value of 6/2
- File recorded at 7:00AM on 6/2 has “Date” value of 6/1

Also during this process every audio file was analyzed by the SoX program to determine that the file was in fact an audio file, was not corrupted, and to optionally extract file parameters such as duration and number of channels. The audio file inventory and the results of the initial audio file processing were not stored in the original NPS Access database, but were instead stored in a supplementary table created by Normandeau.

The numbers of audio files for the 2016 recording period are listed in Table 2-1. The same data in terms of percent are shown in Table 2-2. The column “Total” lists the total number of audio files collected for each park. The remaining columns show how the audio files were classified for analysis.

### Analyzed Files

- **Analyzed Summer:** If at least 4 days of the deployment occurred in the range 6/1-8/15, all files for that deployment were classified as summer season files and analyzed

### Excluded from analysis:

- **Spring & Fall:** If less than 4 days of the deployment occurred in the range 6/1-8/15, all the files for that deployment were classified as either spring or fall
- **Short Deployment (Summer):** If a summer season deployment was < 4 days total, no files were analyzed from that deployment
- **Extra Night (Summer):** If a summer season deployment had > 16 nights, the files in the nights beyond 16 were not analyzed. Generally, the nights not analyzed were taken from the end of the deployment, unless the deployment started before 6/1, then the nights not analyzed were taken from the beginning of the deployment.
- **Short Night (Summer):** Nights with recording time < 6 hours were not analyzed

Table 2-1. Audio file classification for analysis for 2016: Numbers of Files

| Park         | Total  | Summer | Spring | Fall  | Short Deploy <sup>1</sup> | Extra Night <sup>2</sup> | Short Night <sup>3</sup> | Bad File |
|--------------|--------|--------|--------|-------|---------------------------|--------------------------|--------------------------|----------|
| INDU         | 92233  | 84713  | 0      | 5990  | 1529                      | 0                        | 0                        | 1        |
| MISS         | 114334 | 107025 | 0      | 0     | 275                       | 6913                     | 116                      | 5        |
| SACN         | 71581  | 63719  | 2462   | 5399  | 0                         | 0                        | 1                        | 0        |
| SLBE         | 69356  | 69035  | 318    | 0     | 0                         | 0                        | 0                        | 3        |
| PIRO         | 335451 | 310896 | 17249  | 0     | 0                         | 0                        | 0                        | 7306     |
| APIS         | 46305  | 46290  | 0      | 0     | 0                         | 0                        | 14                       | 1        |
| ISRO         | 28518  | 28490  | 0      | 0     | 0                         | 0                        | 25                       | 3        |
| GRPO         | 31118  | 30160  | 0      | 0     | 903                       | 0                        | 52                       | 3        |
| VOYA         | 28662  | 28515  | 0      | 0     | 0                         | 0                        | 143                      | 4        |
| <b>Total</b> | 817558 | 768843 | 20029  | 11389 | 2707                      | 6913                     | 351                      | 7326     |

<sup>1</sup> Deployment < 4 days<sup>2</sup> Files in nights beyond 16 nights<sup>3</sup> Recording time < 6 hours

Table 2-2. Audio file classification for analysis for 2016: Percent of Files.

| Park         | Total | Summer | Spring | Fall | Short Deploy | Extra Night | Short Night | Bad File |
|--------------|-------|--------|--------|------|--------------|-------------|-------------|----------|
| INDU         | 100   | 92     | 0      | 6    | 2            | 0           | 0           | ~0       |
| MISS         | 100   | 94     | 0      | 0    | ~0           | 6           | ~0          | ~0       |
| SACN         | 100   | 89     | 3      | 8    | 0            | 0           | ~0          | 0        |
| SLBE         | 100   | ~100   | ~0     | 0    | 0            | 0           | 0           | ~0       |
| PIRO         | 100   | 93     | 5      | 0    | 0            | 0           | 0           | 2        |
| APIS         | 100   | ~100   | 0      | 0    | 0            | 0           | ~0          | 0        |
| ISRO         | 100   | ~100   | 0      | 0    | 0            | 0           | ~0          | ~0       |
| GRPO         | 100   | 97     | 0      | 0    | 3            | 0           | ~0          | ~0       |
| VOYA         | 100   | 99     | 0      | 0    | 0            | 0           | ~0          | ~0       |
| <b>Total</b> | 100   | 94     | 2      | 1    | ~0           | 1           | ~0          | 1        |

Note: In tables displaying percentages, values sometimes appear not sum to 100% due to the displayed precision.

### 3 Deployment Summary

#### 3.1.1 Deployments

Within each park, detectors were deployed at a given location (site) for a given length of time. A ‘deployment’ is defined as the site combined with time period the detector was deployed.

Table 3-1 lists the number of deployments per season as well the number of short deployments for each park. Figure 3-1 graphically depicts the number of deployments by season. Almost all deployments were in the summer season but SACN, SLBE, PIRO, and APIS had a number of deployments in the spring while INDU, SACN, PIRO, and VOYA had a number of deployments in the fall. There were a few short deployments (less than the four days required by protocol) at four of the parks, as shown in the table. The number of deployments in the summer season ranged from as few as 18 for GRPO to as many as 55 for PIRO.

Table 3-1. Deployments (Sites) By Park and Season

| Park | Total | Summer | Spring | Fall | Short Deploy | Date Range  |
|------|-------|--------|--------|------|--------------|-------------|
| INDU | 33    | 27     | 0      | 3    | 3            | 06/10-08/28 |
| MISS | 29    | 28     | 0      | 0    | 1            | 05/24-08/25 |
| SACN | 34    | 22     | 1      | 11   | 0            | 05/24-10/04 |
| SLBE | 39    | 36     | 3      | 0    | 0            | 05/09-08/12 |
| PIRO | 90    | 55     | 20     | 13   | 2            | 04/14-10/24 |
| APIS | 33    | 29     | 4      | 0    | 0            | 04/26-08/21 |
| ISRO | 27    | 27     | 0      | 0    | 0            | 06/06-08/23 |
| GRPO | 19    | 18     | 0      | 0    | 1            | 06/08-08/17 |
| VOYA | 24    | 19     | 0      | 5    | 0            | 06/07-09/17 |

<sup>1</sup> Short Deploy: summer deployments < 4 days, not analyzed

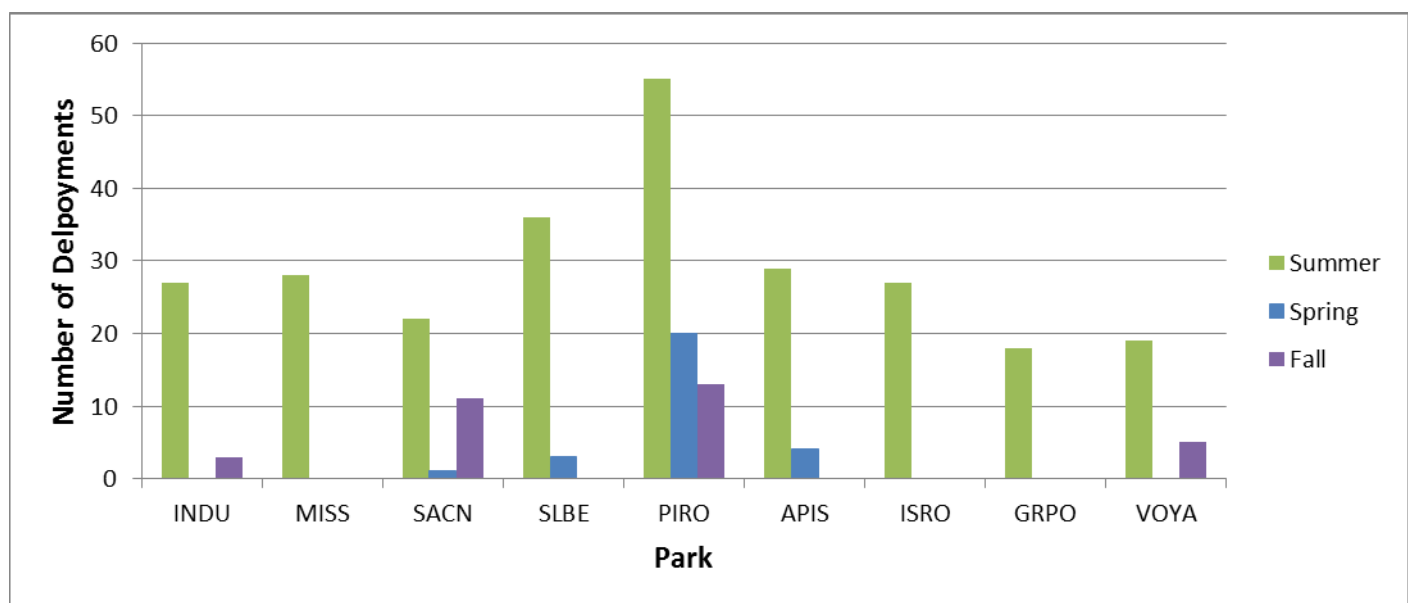


Figure 3-1. Deployments (Sites) By Park and Season

For the summer season (6/1-8/15), the number of deployments per day is shown in Figure 3-2. The table for this data is given in Appendix A because it is too big to show here. The dates shown in the figure that occur outside of the summer range belong to deployments that are considered ‘summer deployments’. If a deployment had at least 4 days in the summer date range, then all dates of the deployment were analyzed as summer dates.

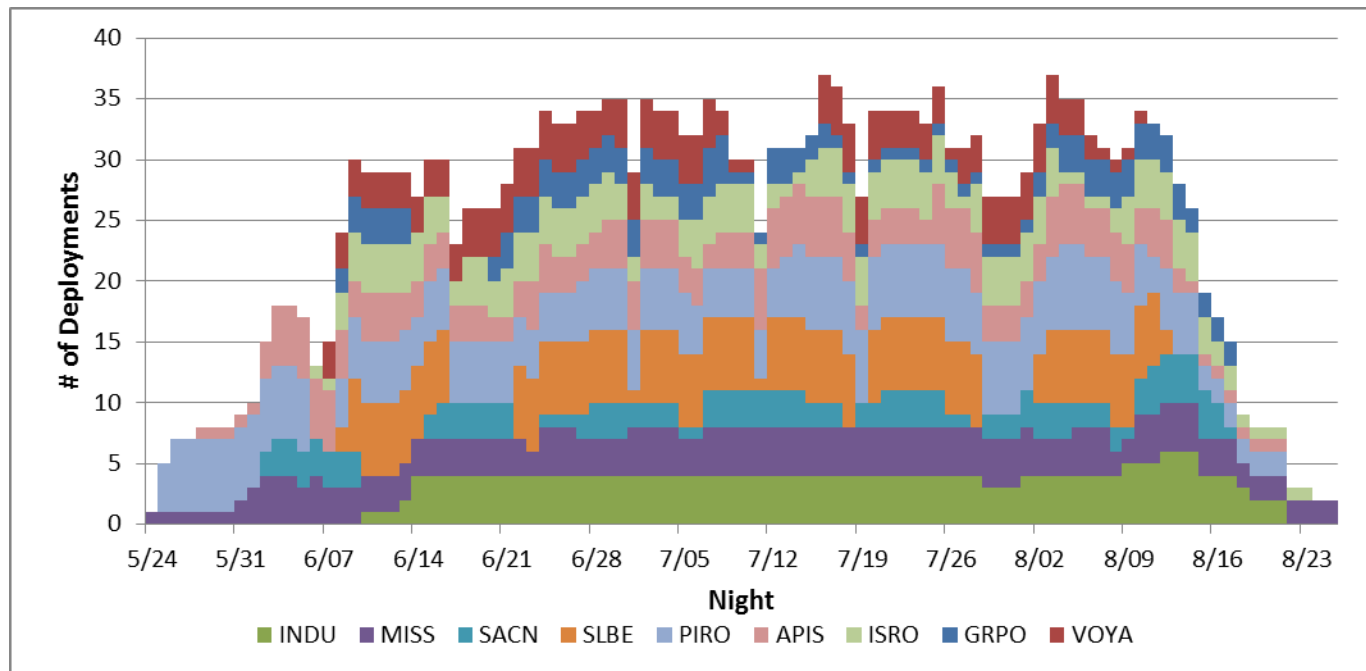


Figure 3-2. Number of Deployments by Date, during the Summer season

### 3.1.2 Deployment Nights

The number of ‘deployment-nights’ for a park is the sum of the number of nights for each deployment. For example if a park had 3 deployments of 11, 6 and 10 nights, the number of deployment-nights for that park is 27 (11+6+10). Even if the deployments overlap and occurred on many of the same nights, the number of deployment-nights is still 27. If a park has 3 deployments on the same night, that would be 3 deployment-nights not 1.

Table 3-2 lists and Figure 3-3 shows the deployment-nights for each park. A few notes about the night counts:

- Nights for deployments less than 4 days are NOT counted
- Nights beyond the 16<sup>th</sup> night for single deployment are NOT counted
- Nights at the beginning or end of a deployment with a recording time of < 6 hours, are not counted.

This shows that almost all deployment-nights occurred during the summer season. However SLBE, PIRO, and APIS had a notable number of deployment-nights in the spring, while INDU, SACN, PIRO, and VOYA had a notable number of deployment-nights in the fall.

Table 3-2. Deployment-Nights by Park and Season

| Park        | Summer | Spring | Fall |
|-------------|--------|--------|------|
| <b>INDU</b> | 280    | 0      | 31   |
| <b>MISS</b> | 301    | 0      | 0    |
| <b>SACN</b> | 172    | 9      | 74   |
| <b>SLBE</b> | 316    | 30     | 0    |
| <b>PIRO</b> | 435    | 139    | 149  |
| <b>APIS</b> | 283    | 60     | 0    |
| <b>ISRO</b> | 244    | 0      | 0    |
| <b>GRPO</b> | 148    | 0      | 0    |
| <b>VOYA</b> | 193    | 0      | 39   |

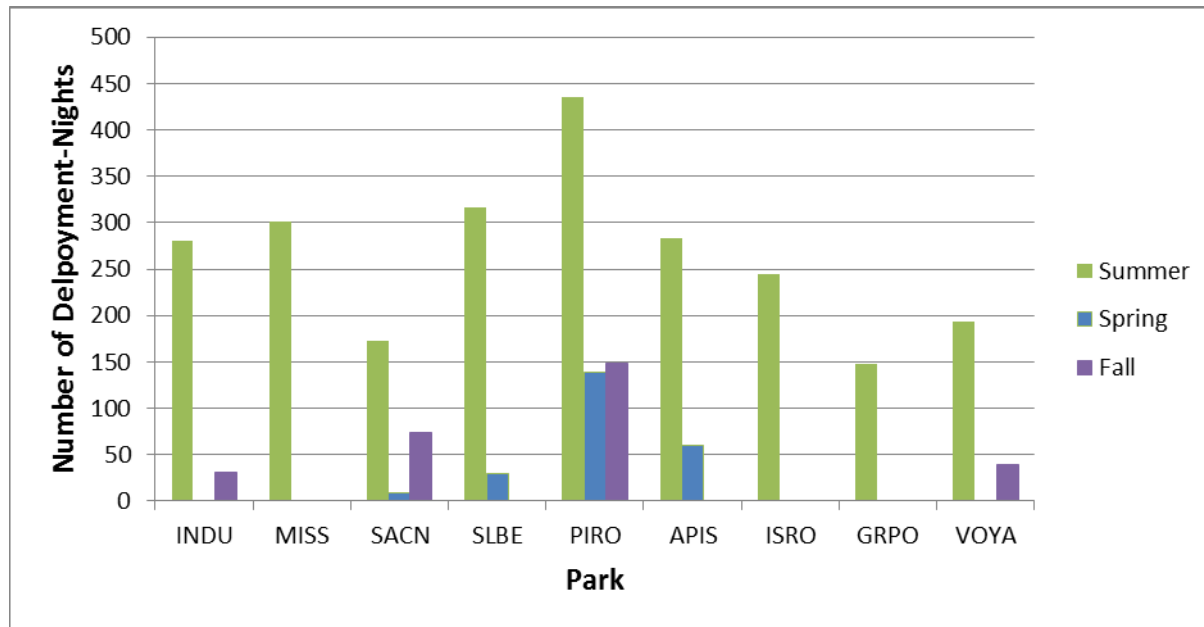


Figure 3-3. Deployment-Nights by Park and Season

## 4 Auto-ID Summary

The Wildlife Acoustics Kaleidoscope Pro software (KPro) version 4.0.0 was used to remove non-bat noise files and to identify all bats to species using a built in auto classifier. Guidelines for use of auto classifier programs defined in the USFWS 2016 Indiana bat summer survey protocol\* were followed. KPro has three options for setting the sensitivity of the classifier: -1 More Sensitive (Liberal); 0 Balanced (Neutral), and +1 More Accurate (Conservative). For this analysis the “-1 More Sensitive (Liberal)” setting was used, as suggested in the USFWS guidelines.

First, full spectrum audio files were converted to zero-cross files. In this process KPro classified some files as ‘Noise’ and did not create a zero-cross file. Also a very small number of files (10 or less per park) experienced other various errors and were not converted to zero-cross.

Second, KPro was run again to analyze the zero-cross files and produce an identification (ID): either ‘Noise’, ‘No Id’ (unknown bat call sequence), or a specific species ID.

The bat biologists assembled a list of possible bat species for each park, as shown in Table 4-1. Those were the only species, for that park, that KPro considered in the automatic identification. The baseline analysis includes only species that have been documented within each park’s boundaries. The expanded analysis includes species that have been documented within each park’s boundaries as well as species that have been reported in nearby areas.

From this point forward, the term “Auto ID”, refers to the automatic identification of the audio file via the KPro program.

### 4.1 Species to be considered for Auto ID

The following tables show the species that that KPro considered for each park. For the 2016 data, both a ‘baseline’ and an ‘expanded’ species analysis were done. Both analyses were done in the exact same manner, only changing the species KPro could consider in making an ID. Table 4-1 shows the species considered for Auto ID in the baseline (●) and the expanded (✱) analyses.

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\* U.S. Fish and Wildlife Service (USFWS). 2018. Range-wide Indiana Bat Summer Survey Guidelines. April 2018.  
<[www.fws.gov/midwest/Endangered/mammals/inba/surveys/pdf/2018IndianaBatSummerSurveyGuidelines11April2018.pdf](http://www.fws.gov/midwest/Endangered/mammals/inba/surveys/pdf/2018IndianaBatSummerSurveyGuidelines11April2018.pdf)>

Table 4-1. Bat Species considered by KPro analysis, for each Park

| Park | EPFU <sup>1</sup> | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU |
|------|-------------------|------|------|------|------|------|------|------|------|
| INDU | ●                 | ●    | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| MISS | ●                 | ●    | ●    | ●    | ●    | ●    |      | ✱    | ●    |
| SACN | ●                 | ●    | ●    | ●    | ●    | ●    |      | ✱    | ●    |
| SLBE | ●                 | ●    | ●    | ●    | ●    | ●    | ✱    |      | ✱    |
| PIRO | ●                 | ●    | ●    | ●    | ●    | ●    |      |      | ✱    |
| APIS | ●                 | ●    | ●    | ●    | ●    | ●    |      |      | ✱    |
| ISRO | ●                 | ●    | ●    | ●    | ●    | ●    |      |      | ✱    |
| GRPO | ●                 | ●    | ●    | ●    | ●    | ●    |      |      | ✱    |
| VOYA | ●                 | ●    | ●    | ●    | ●    | ●    |      |      | ✱    |

<sup>1</sup> See Table 4-2 for bat species abbreviations

● : baseline AutoID analysis

✱ : expanded AutoID analysis

Table 4-2. Bat species abbreviations used in this analysis

| Abbreviation | Scientific Name                  | Common Name             |
|--------------|----------------------------------|-------------------------|
| EPFU         | <i>Eptesicus fuscus</i>          | Big Brown Bat           |
| LABO         | <i>Lasiurus borealis</i>         | Eastern Red Bat         |
| LACI         | <i>Lasiurus cinereus</i>         | Hoary Bat               |
| LANO         | <i>Lasionycteris noctivagans</i> | Silver-haired Bat       |
| MYLU         | <i>Myotis lucifugus</i>          | Little Brown Bat        |
| MYSE         | <i>Myotis septentrionalis</i>    | Northern Long-eared Bat |
| MYSO         | <i>Myotis sodalis</i>            | Indiana Bat             |
| NYHU         | <i>Nycticeius humeralis</i>      | Evening Bat             |
| PESU         | <i>Perimyotis subflavus</i>      | Tri-colored Bat         |

#### 4.1.1 Calls vs. Noise

Table 4-3 shows the numbers of specific IDs compared to unknown bat calls and noise for the Summer season files analyzed using the baseline species analysis. The table columns show:

- Number of files analyzed (Audio Files)
- Number of files ID'd as a specific species (Species ID)
- Number of files ID'd as a bat but could not determine species (No Id)
- Number of files ID'd as Noise (includes files labeled as noise during the conversion from full spectrum to zero-cross)
- Files that KPro could not analyze (KPro fail)

Some files could not be processed by KPro (KPro fail) for “corrupted header” and other cryptic reasons. This is a tiny number of files as shown in Table 4-3.

**NPS GLKN Report 2016 (updated)**

The last four columns of the table show the percentages of files for each general result. For all but 2 parks, at least 80% of files were ID'd to species with almost all the rest of the files ID'd as Noise. Only a very small number of files were ID'd as unknown bat call sequences.

PIRO had a very high percentage (~96%) of noise files compared with the other parks. INDU had a relatively high percentage (~27%) of files classified as noise.

Figure 4-1 and Figure 4-2 are plots of the data shown in Table 4-3.

Table 4-3. Number and Percent of Files By Park: Call Sequences vs. Noise, Summer Only, Baseline Analysis

| Park  | #Audio File | #Species Id | #No Id | #Noise | #KPro Fail <sup>1</sup> | %Species Id | %No Id | %Noise | %KPro Fail |
|-------|-------------|-------------|--------|--------|-------------------------|-------------|--------|--------|------------|
| INDU  | 84713       | 61398       | 847    | 22468  | 0                       | 72.5        | 1.0    | 26.5   | 0          |
| MISS  | 107025      | 94065       | 709    | 12249  | 2                       | 87.9        | 0.7    | 11.4   | ~0         |
| SACN  | 63719       | 53009       | 687    | 10014  | 9                       | 83.2        | 1.1    | 15.7   | ~0         |
| SLBE  | 69035       | 60337       | 519    | 8179   | 0                       | 87.4        | 0.8    | 11.8   | 0          |
| PIRO  | 310896      | 10866       | 628    | 299402 | 0                       | 3.5         | 0.2    | 96.3   | 0          |
| APIS  | 46290       | 41125       | 213    | 4944   | 8                       | 88.8        | 0.5    | 10.7   | ~0         |
| ISRO  | 28490       | 23657       | 194    | 4635   | 4                       | 83.0        | 0.7    | 16.3   | ~0         |
| GRPO  | 30160       | 25149       | 570    | 4437   | 4                       | 83.4        | 1.9    | 14.7   | ~0         |
| VOYA  | 28515       | 25529       | 173    | 2809   | 4                       | 89.5        | 0.6    | 9.9    | ~0         |
| Total | 768843      | 395135      | 4540   | 369137 | 31                      | 51.4        | 0.6    | 48.0   | ~0         |

<sup>1</sup> Files that KPro could not process (sometimes bad header, sometimes for unknown reasons)

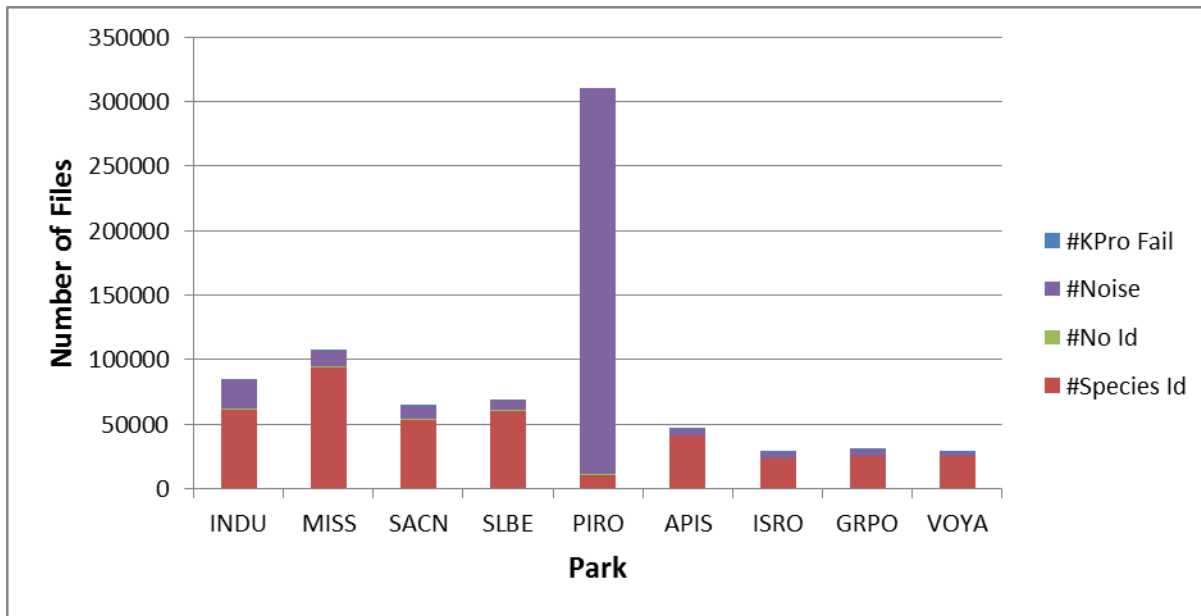


Figure 4-1. Number of Files By Park: Call Sequences vs. Noise, Summer Only, Baseline Analysis

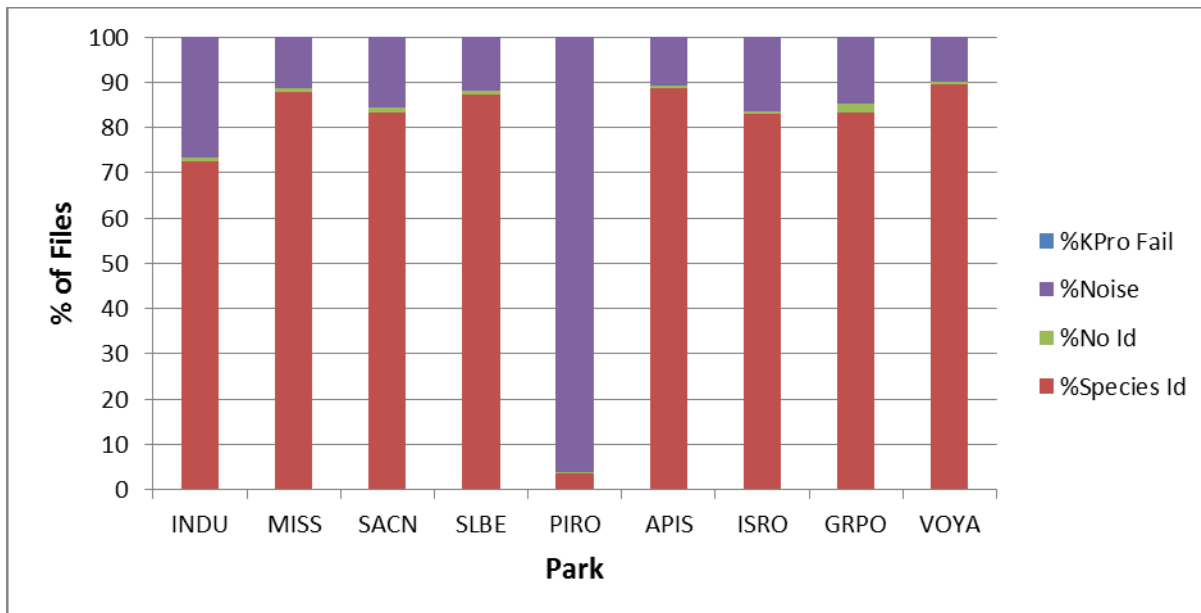


Figure 4-2. Percent of Files by Park: Call Sequences vs. Noise, Summer Only, Baseline Analysis

Table 4-4 shows the numbers of specific IDs compared to unknown bat call sequences and noise for the Summer season files analyzed using the expanded species analysis. Figure 4-3 and Figure 4-4 are plots of the data shown in Table 4-4. Compared to the baseline species analysis, a small number (506) of call sequences that had been identified to the species level were reclassified as No Id during the expanded analysis but the number of noise files and KPro fail files stayed the same. Table 4-5 shows the difference between the expanded (Table 4-4) and baseline (Table 4-3) analysis results.

Table 4-4. Number and Percent of Files By Park: Call Sequences vs. Noise, Summer Only, Expanded Analysis

| Park  | #Audio File | #Species Id | #No Id | #Noise | #KPro Fail | %Species Id | %No Id | %Noise | %KPro Fail |
|-------|-------------|-------------|--------|--------|------------|-------------|--------|--------|------------|
| INDU  | 84713       | 61398       | 847    | 22468  | 0          | 72.5        | 1.0    | 26.5   | 0          |
| MISS  | 107025      | 94009       | 765    | 12249  | 2          | 87.8        | 0.7    | 11.4   | ~0         |
| SACN  | 63719       | 52946       | 750    | 10014  | 9          | 83.1        | 1.2    | 15.7   | ~0         |
| SLBE  | 69035       | 60105       | 751    | 8179   | 0          | 87.1        | 1.1    | 11.8   | 0          |
| PIRO  | 310896      | 10862       | 632    | 299402 | 0          | 3.5         | 0.2    | 96.3   | 0          |
| APIS  | 46290       | 41032       | 306    | 4944   | 8          | 88.6        | 0.7    | 10.7   | ~0         |
| ISRO  | 28490       | 23619       | 232    | 4635   | 4          | 82.9        | 0.8    | 16.3   | ~0         |
| GRPO  | 30160       | 25140       | 579    | 4437   | 4          | 83.4        | 1.9    | 14.7   | ~0         |
| VOYA  | 28515       | 25518       | 184    | 2809   | 4          | 89.5        | 0.6    | 9.9    | ~0         |
| Total | 768843      | 394629      | 5046   | 369137 | 31         | 51.3        | 0.7    | 48.0   | ~0         |

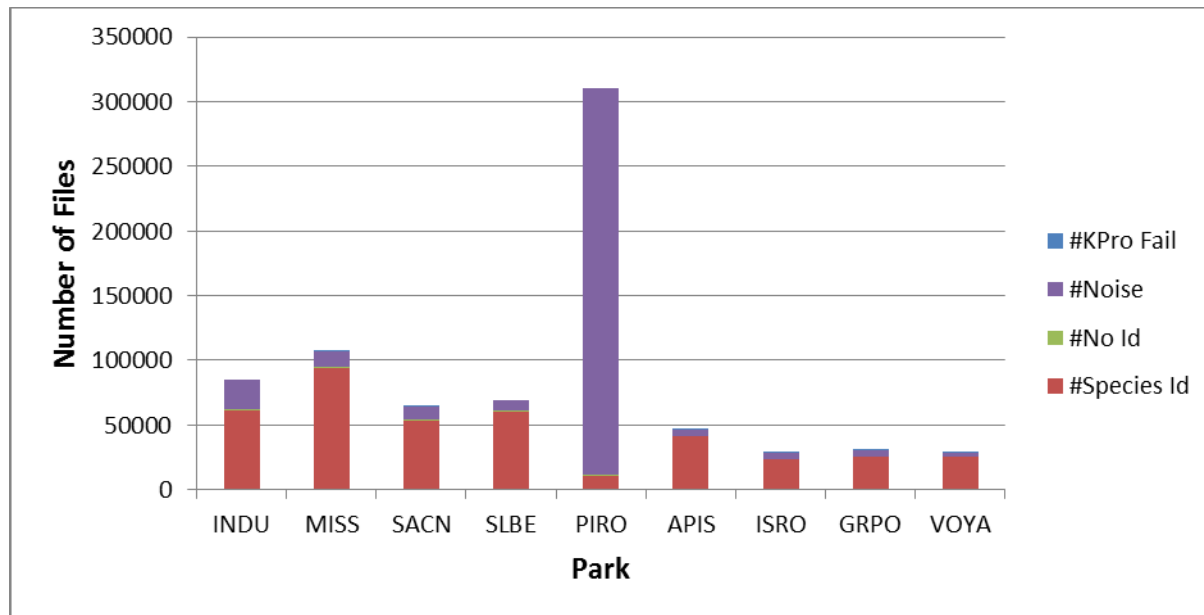


Figure 4-3. Number of Files By Park: Call Sequences vs. Noise, Summer Only, Expanded Analysis

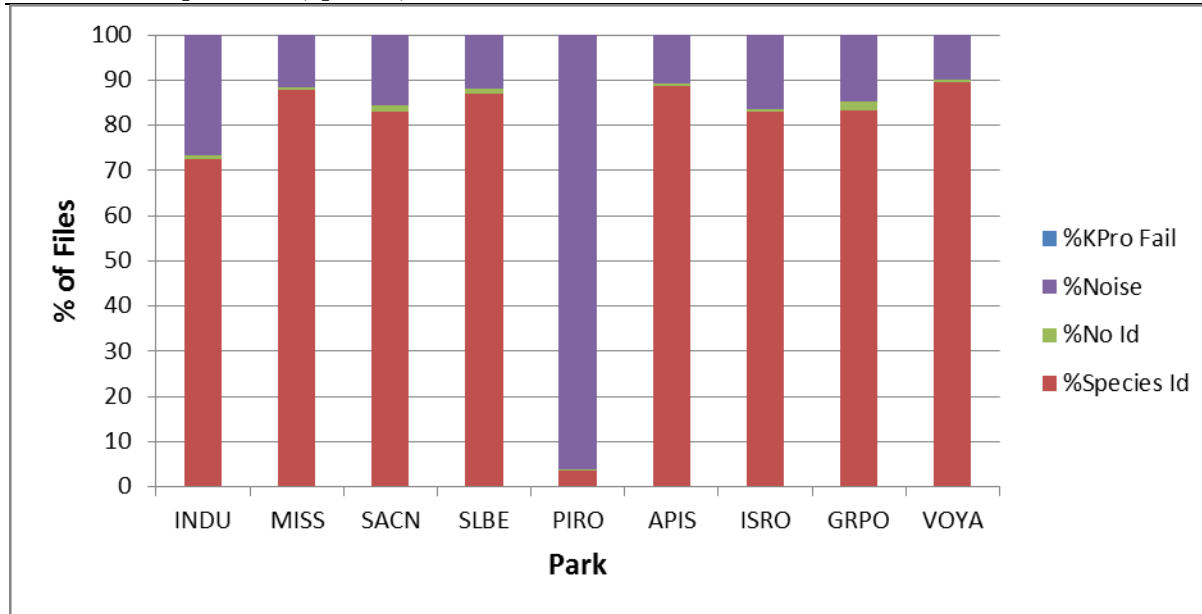


Figure 4-4. Percent of Files by Park: Call Sequences vs. Noise, Summer Only, Expanded Analysis

Table 4-5. Difference in Number and Percent of Files By Park: Call Sequences vs. Noise, Summer Only. Differences were calculated by subtracting Baseline Analysis values from Expanded Analysis values.

| Park  | #Audio File | #Species Id | #No Id | #Noise | #KPro Fail | %Species Id | %No Id | %Noise | %KPro Fail |
|-------|-------------|-------------|--------|--------|------------|-------------|--------|--------|------------|
| INDU  | 0           | 0           | 0      | 0      | 0          | 0           | 0      | 0      | 0          |
| MISS  | 0           | -56         | 56     | 0      | 0          | -0.1        | 0.1    | 0      | 0          |
| SACN  | 0           | -63         | 63     | 0      | 0          | -0.1        | 0.1    | 0      | 0          |
| SLBE  | 0           | -232        | 232    | 0      | 0          | -0.3        | 0.3    | 0      | 0          |
| PIRO  | 0           | -4          | 4      | 0      | 0          | 0           | 0      | 0      | 0          |
| APIS  | 0           | -93         | 93     | 0      | 0          | -0.2        | 0.2    | 0      | 0          |
| ISRO  | 0           | -38         | 38     | 0      | 0          | -0.1        | 0.1    | 0      | 0          |
| GRPO  | 0           | -9          | 9      | 0      | 0          | 0           | 0      | 0      | 0          |
| VOYA  | 0           | -11         | 11     | 0      | 0          | 0           | 0      | 0      | 0          |
| Total | 0           | -506        | 506    | 0      | 0          | -0.1        | 0.1    | 0      | 0          |

#### 4.1.2 Calls by Species

Of the files that were identified to the species level by KPro, we calculated how many were attributed to each species, for both the Baseline and Expanded species lists. We also examined the differences between the Baseline and Expanded analyses. The most notable difference was that the Baseline analysis had many more files identified as LABO and MYLU.

Table 4-6 shows the total number of files identified to each species by KPro (summer season only), using the baseline species analysis and Figure 4-5 graphs the table data.

Table 4-7 shows the total number of files identified to each species by KPro (summer season only), using the expanded species analysis and Figure 4-6 graphs the table data.

Table 4-8 shows the change in species ID's from the baseline to the expanded species analysis.

Table 4-6. Number of Files AutoID'd to each Species by Park, Summer only, Baseline Analysis

| Park      | EPFU  | LABO  | LACI  | LANO  | MYLU   | MYSE  | MYSO | NYHU | PESU | All Species |
|-----------|-------|-------|-------|-------|--------|-------|------|------|------|-------------|
| INDU      | 20089 | 21542 | 4723  | 8235  | 1799   | 24    | 89   | 4113 | 784  | 61398       |
| MISS      | 27185 | 7744  | 6705  | 9883  | 35167  | 2806  | na   | na   | 4575 | 94065       |
| SACN      | 7312  | 4860  | 8909  | 13068 | 17138  | 986   | na   | na   | 736  | 53009       |
| SLBE      | 9244  | 19735 | 5889  | 11888 | 13180  | 401   | na   | na   | na   | 60337       |
| PIRO      | 608   | 492   | 2755  | 4834  | 1935   | 242   | na   | na   | na   | 10866       |
| APIS      | 494   | 8182  | 6364  | 2242  | 22821  | 1022  | na   | na   | na   | 41125       |
| ISRO      | 624   | 1581  | 1075  | 1412  | 17619  | 1346  | na   | na   | na   | 23657       |
| GRPO      | 211   | 3447  | 970   | 1372  | 15296  | 3853  | na   | na   | na   | 25149       |
| VOYA      | 200   | 1284  | 1246  | 2057  | 19018  | 1724  | na   | na   | na   | 25529       |
| All Parks | 65967 | 68867 | 38636 | 54991 | 143973 | 12404 | 89   | 4113 | 6095 | 395135      |

na: species was not considered in the analysis

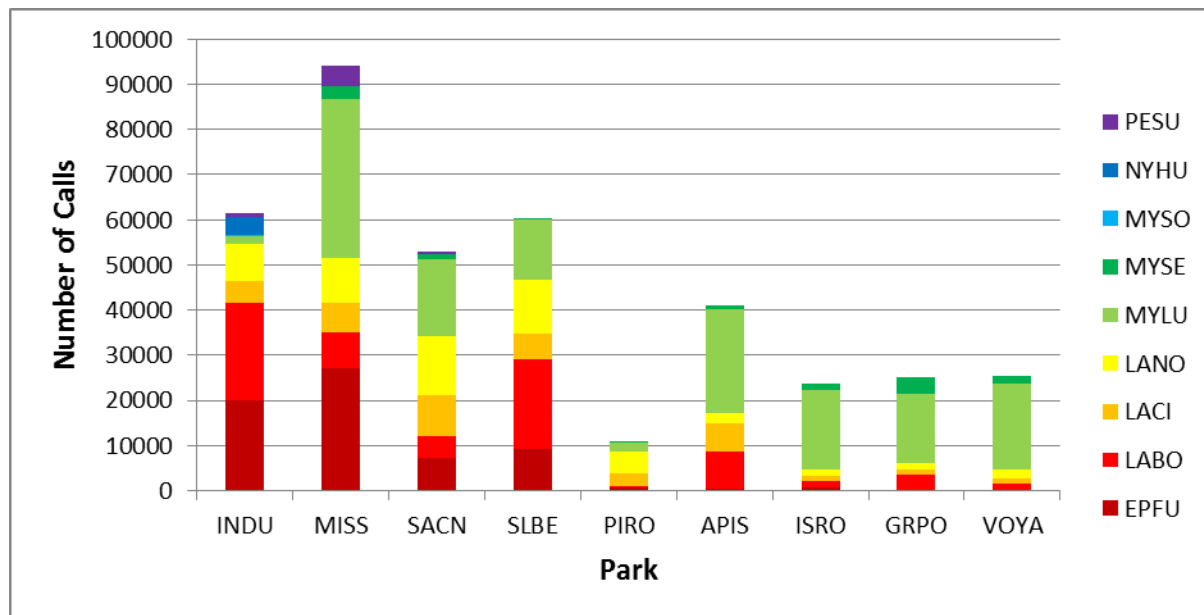


Figure 4-5. Number of Files AutoID'd to each Species by Park, Summer only, Baseline Analysis

Table 4-7. Number of Files AutoID'd to each Species by Park, Summer only, Expanded Analysis

| Park      | EPFU  | LABO  | LACI  | LANO  | MYLU   | MYSE  | MYSO | NYHU | PESU | All Species |
|-----------|-------|-------|-------|-------|--------|-------|------|------|------|-------------|
| INDU      | 20089 | 21542 | 4723  | 8235  | 1799   | 24    | 89   | 4113 | 784  | 61398       |
| MISS      | 27215 | 7064  | 6696  | 9876  | 35072  | 2786  | na   | 738  | 4562 | 94009       |
| SACN      | 7320  | 4460  | 8925  | 13081 | 17062  | 980   | na   | 375  | 743  | 52946       |
| SLBE      | 9268  | 18349 | 5903  | 11903 | 12039  | 340   | 1472 | na   | 831  | 60105       |
| PIRO      | 608   | 491   | 2755  | 4834  | 1932   | 239   | na   | na   | 3    | 10862       |
| APIS      | 495   | 7806  | 6368  | 2243  | 22822  | 1020  | na   | na   | 278  | 41032       |
| ISRO      | 627   | 1523  | 1075  | 1413  | 17561  | 1349  | na   | na   | 71   | 23619       |
| GRPO      | 214   | 3355  | 972   | 1371  | 15170  | 3991  | na   | na   | 67   | 25140       |
| VOYA      | 203   | 1254  | 1246  | 2059  | 18955  | 1745  | na   | na   | 56   | 25518       |
| All Parks | 66039 | 65844 | 38663 | 55015 | 142412 | 12474 | 1561 | 5226 | 7395 | 394629      |

na: species was not considered in the analysis

Highlighted cells are species and park combinations added in the expanded analysis

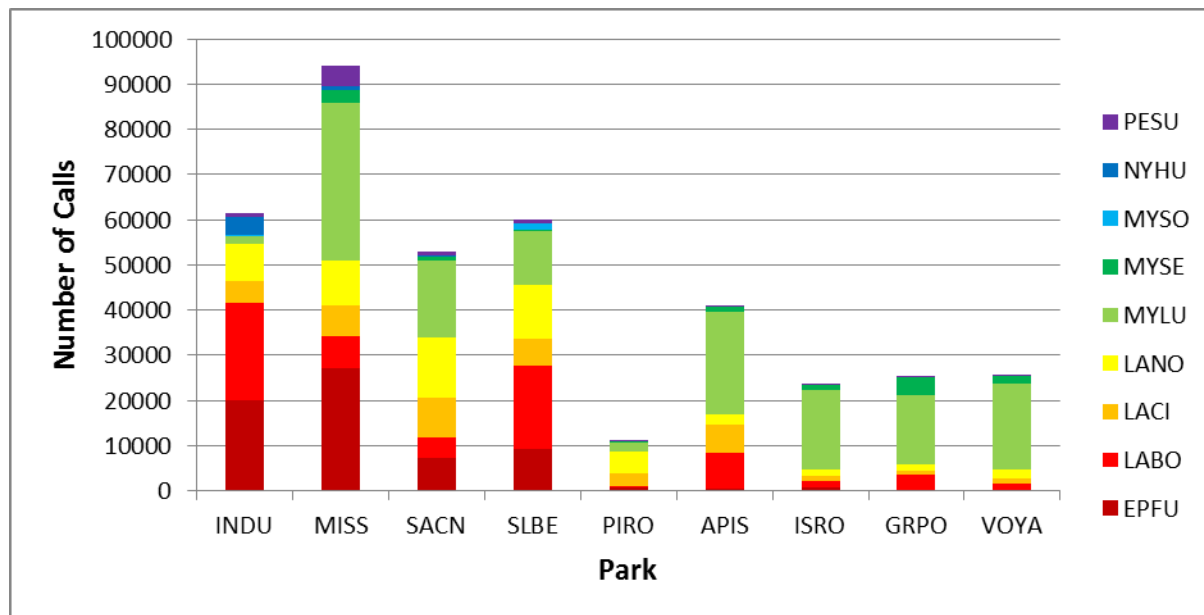


Figure 4-6. Number of Files AutoID'd to each Species by Park, Summer only, Expanded Analysis

Table 4-8. Difference in Number of Files AutoID'd to each Species by Park, Summer only. Differences were calculated by subtracting Baseline Analysis values from Expanded Analysis values.

| Park  | EPFU | LABO  | LACI | LANO | MYLU  | MYSE | MYSO | NYHU | PESU | All Species |
|-------|------|-------|------|------|-------|------|------|------|------|-------------|
| INDU  | 0    | 0     | 0    | 0    | 0     | 0    | 0    | 0    | 0    | 0           |
| MISS  | 30   | -680  | -9   | -7   | -95   | -20  | na   | 738  | -13  | -56         |
| SACN  | 8    | -400  | 16   | 13   | -76   | -6   | na   | 375  | 7    | -63         |
| SLBE  | 24   | -1386 | 14   | 15   | -1141 | -61  | 1472 | na   | 831  | -232        |
| PIRO  | 0    | -1    | 0    | 0    | -3    | -3   | na   | na   | 3    | -4          |
| APIS  | 1    | -376  | 4    | 1    | 1     | -2   | na   | na   | 278  | -93         |
| ISRO  | 3    | -58   | 0    | 1    | -58   | 3    | na   | na   | 71   | -38         |
| GRPO  | 3    | -92   | 2    | -1   | -126  | 138  | na   | na   | 67   | -9          |
| VOYA  | 3    | -30   | 0    | 2    | -63   | 21   | na   | na   | 56   | -11         |
| Total | 72   | -3023 | 27   | 24   | -1561 | 70   | 1472 | 1113 | 1300 | -506        |

na: species was not considered in the analysis

Highlighted cells are species and park combinations added in the expanded analysis

The above tables and figures show the total number of files identified to each species for each analysis. We also calculated the number of files *per deployment-night* for each species at each park and those results are shown below.

Table 4-9 shows the number of files per deployment-night identified to each species by KPro (summer season only), using the baseline species analysis and Figure 4-7 graphs the table data.

Table 4-10 shows the number of files per deployment-night identified to each species by KPro (summer season only), using the expanded species analysis and Figure 4-8 graphs the table data.

Table 4-11 shows the change in species ID per deployment-night from the baseline to the expanded species analysis.

Table 4-9. Number of Files per Deployment-Night AutoID'd to each Species by Park, Summer Only, Baseline Analysis

| Park      | EPFU | LABO | LACI | LANO | MYLU  | MYSE | MYSO | NYHU | PESU | All Species |
|-----------|------|------|------|------|-------|------|------|------|------|-------------|
| INDU      | 71.7 | 76.9 | 16.9 | 29.4 | 6.4   | 0.1  | 0.3  | 14.7 | 2.8  | 219.3       |
| MISS      | 90.3 | 25.7 | 22.3 | 32.8 | 116.8 | 9.3  | na   | na   | 15.2 | 312.5       |
| SACN      | 42.5 | 28.3 | 51.8 | 76.0 | 99.6  | 5.7  | na   | na   | 4.3  | 308.2       |
| SLBE      | 29.3 | 62.5 | 18.6 | 37.6 | 41.7  | 1.3  | na   | na   | na   | 190.9       |
| PIRO      | 1.4  | 1.1  | 6.3  | 11.1 | 4.4   | 0.6  | na   | na   | na   | 25.0        |
| APIS      | 1.7  | 28.9 | 22.5 | 7.9  | 80.6  | 3.6  | na   | na   | na   | 145.3       |
| ISRO      | 2.6  | 6.5  | 4.4  | 5.8  | 72.2  | 5.5  | na   | na   | na   | 97.0        |
| GRPO      | 1.4  | 23.3 | 6.6  | 9.3  | 103.4 | 26.0 | na   | na   | na   | 169.9       |
| VOYA      | 1.0  | 6.7  | 6.5  | 10.7 | 98.5  | 8.9  | na   | na   | na   | 132.3       |
| All Parks | 27.8 | 29.0 | 16.3 | 23.2 | 60.7  | 5.2  | 0.3  | 14.7 | 8.1  | 166.6       |

na: species was not considered in the analysis

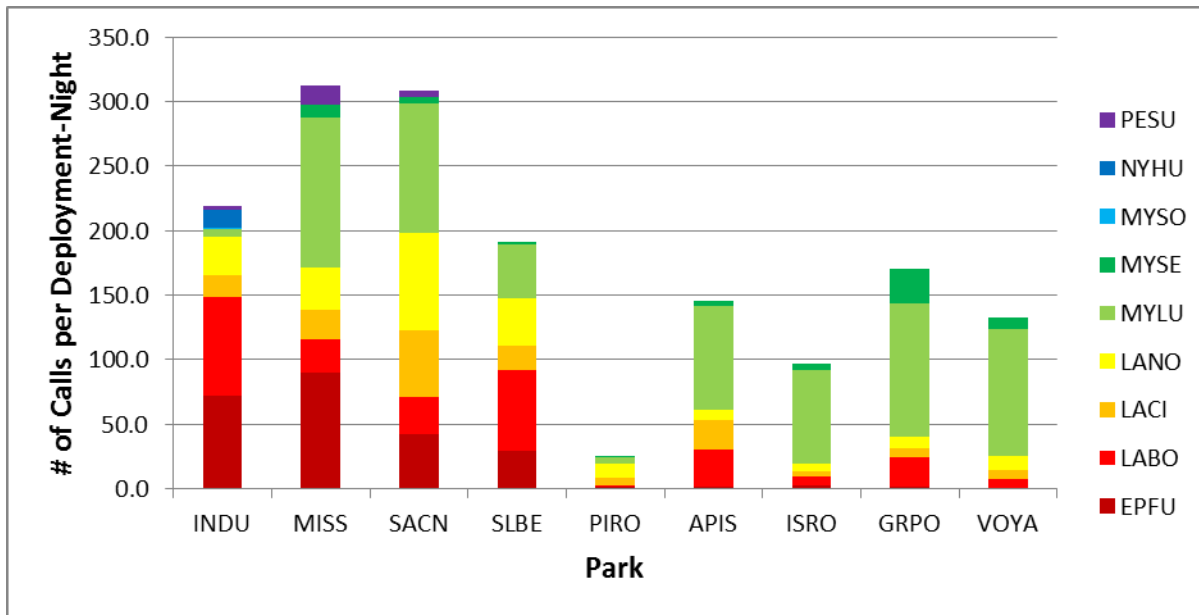


Figure 4-7. Number of Files per Deployment-Night AutoID'd to each Species by Park, Summer Only, Baseline Analysis

Table 4-10. Number of Files per Deployment-Night AutoID'd to each Species by Park, Summer Only, Expanded Analysis

| Park      | EPFU | LABO | LACI | LANO | MYLU  | MYSE | MYSO | NYHU | PESU | All Species |
|-----------|------|------|------|------|-------|------|------|------|------|-------------|
| INDU      | 71.7 | 76.9 | 16.9 | 29.4 | 6.4   | 0.1  | 0.3  | 14.7 | 2.8  | 219.3       |
| MISS      | 90.4 | 23.5 | 22.2 | 32.8 | 116.5 | 9.3  | na   | 2.5  | 15.2 | 312.3       |
| SACN      | 42.6 | 25.9 | 51.9 | 76.1 | 99.2  | 5.7  | na   | 2.2  | 4.3  | 307.8       |
| SLBE      | 29.3 | 58.1 | 18.7 | 37.7 | 38.1  | 1.1  | 4.7  | na   | 2.6  | 190.2       |
| PIRO      | 1.4  | 1.1  | 6.3  | 11.1 | 4.4   | 0.5  | na   | na   | 0.0  | 25.0        |
| APIS      | 1.7  | 27.6 | 22.5 | 7.9  | 80.6  | 3.6  | na   | na   | 1.0  | 145.0       |
| ISRO      | 2.6  | 6.2  | 4.4  | 5.8  | 72.0  | 5.5  | na   | na   | 0.3  | 96.8        |
| GRPO      | 1.4  | 22.7 | 6.6  | 9.3  | 102.5 | 27.0 | na   | na   | 0.5  | 169.9       |
| VOYA      | 1.1  | 6.5  | 6.5  | 10.7 | 98.2  | 9.0  | na   | na   | 0.3  | 132.2       |
| All Parks | 27.8 | 27.8 | 16.3 | 23.2 | 60.0  | 5.3  | 2.6  | 6.9  | 3.1  | 166.4       |

na: species was not considered in the analysis

Highlighted cells are species and park combinations added in the expanded analysis

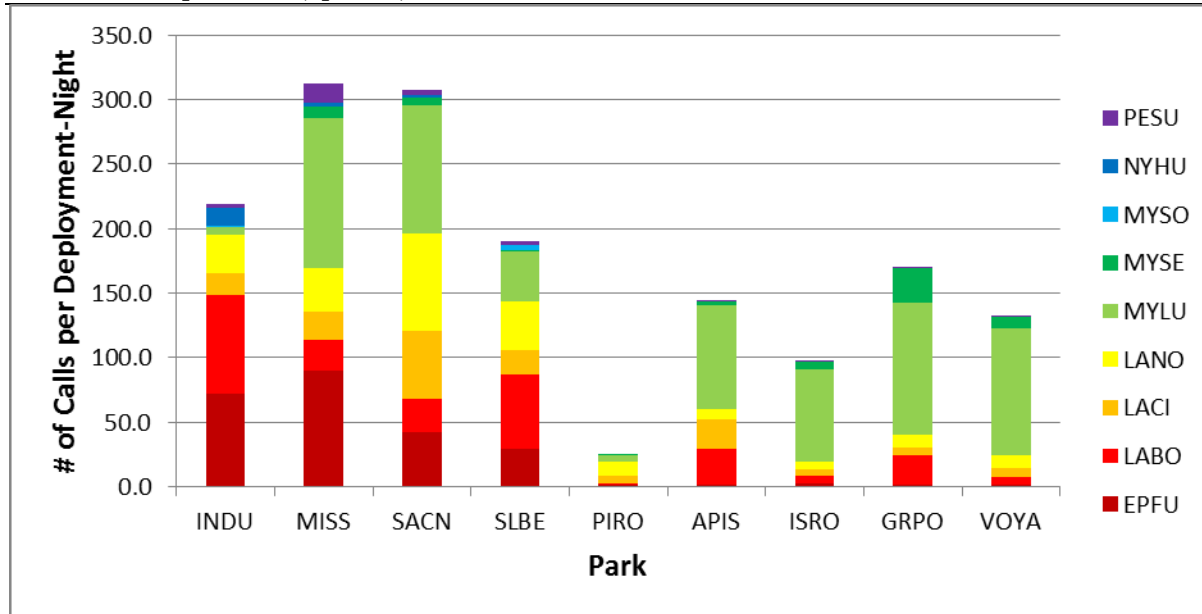


Figure 4-8. Number of Files per Deployment-Night AutoID'd to each Species by Park, Summer Only, Expanded Analysis

Table 4-11. Difference in Number of Files per Deployment-Night AutoID'd to each Species by Park, Summer Only. Differences were calculated by subtracting Baseline Analysis values from Expanded Analysis values.

| Park      | EPFU | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU | All Species |
|-----------|------|------|------|------|------|------|------|------|------|-------------|
| INDU      | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0         |
| MISS      | 0.1  | -2.2 | -0.1 | 0.0  | -0.3 | 0.0  | na   | 2.5  | 0    | -0.2        |
| SACN      | 0.1  | -2.4 | 0.1  | 0.1  | -0.4 | 0.0  | na   | 2.2  | 0    | -0.4        |
| SLBE      | 0.0  | -4.4 | 0.1  | 0.1  | -3.6 | -0.2 | 4.7  | na   | 2.6  | -0.7        |
| PIRO      | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -0.1 | na   | na   | 0    | 0.0         |
| APIS      | 0.0  | -1.3 | 0.0  | 0.0  | 0.0  | 0.0  | na   | na   | 1    | -0.3        |
| ISRO      | 0.0  | -0.3 | 0.0  | 0.0  | -0.2 | 0.0  | na   | na   | 0.3  | -0.2        |
| GRPO      | 0.0  | -0.6 | 0.0  | 0.0  | -0.9 | 1.0  | na   | na   | 0.5  | 0.0         |
| VOYA      | 0.1  | -0.2 | 0.0  | 0.0  | -0.3 | 0.1  | na   | na   | 0.3  | -0.1        |
| All Parks | 0.0  | -1.2 | 0.0  | 0.0  | -0.7 | 0.1  | 2.3  | -7.8 | -5.0 | -0.2        |

na: species was not considered in the analysis

Highlighted cells are species and park combinations added in the expanded analysis

### 4.1.3 Nightly Patterns of Activity

Figure 4-9 shows the total number of call sequences recorded for each date and species, for the baseline species analysis. This is the combined number of call sequences for all deployments in all parks on that date, during the summer season only.

Figure 4-10 shows the number of call sequences recorded per deployment-night for each date and species, for the baseline species analysis. Again this is for all parks combined and during the summer season only.

Figure 4-11 and Figure 4-12 show the total number of call sequences and call sequences per deployment-night, respectively, recorded for each date and species, for the expanded species analysis. This is for all parks combined.

Figure 4-13 and Figure 4-14 show the changes in species ID from the baseline to the expanded analysis for total number of call sequences and call sequences per deployment-night, respectively. This is for all parks combined.

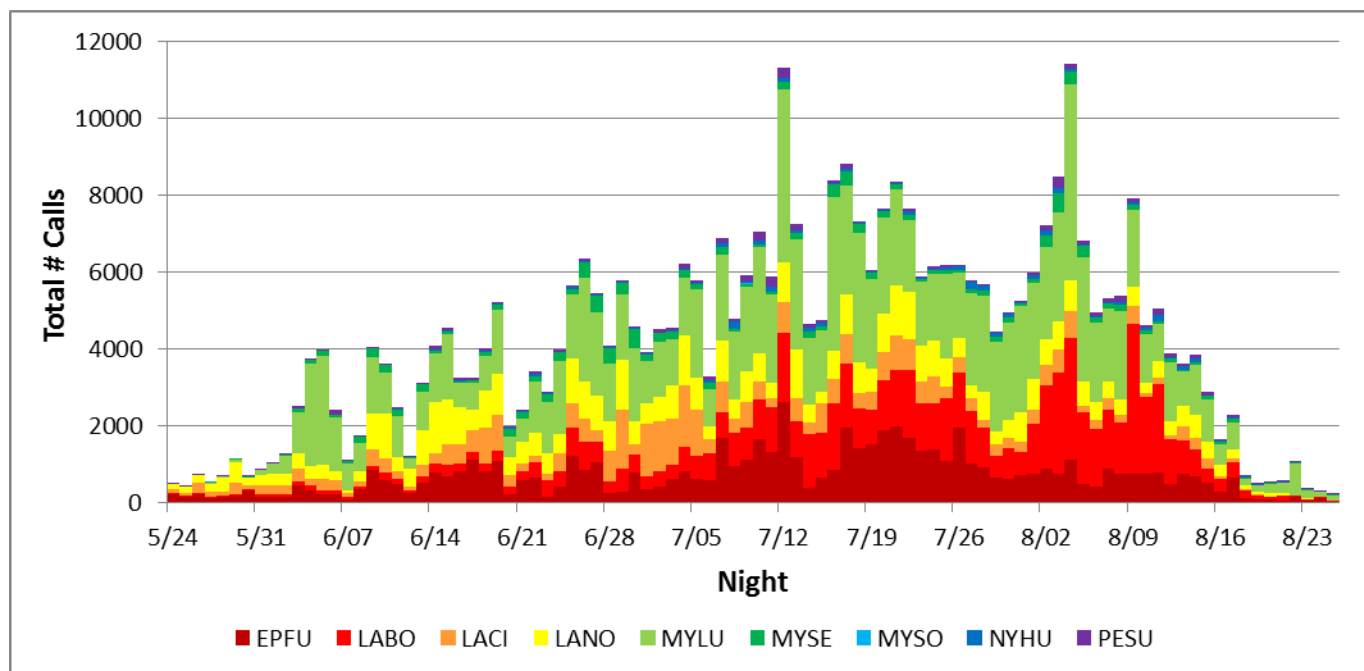


Figure 4-9. Total number of Call Sequences Recorded (All Parks Combined), for each Date and Species (Summer only), Baseline Analysis

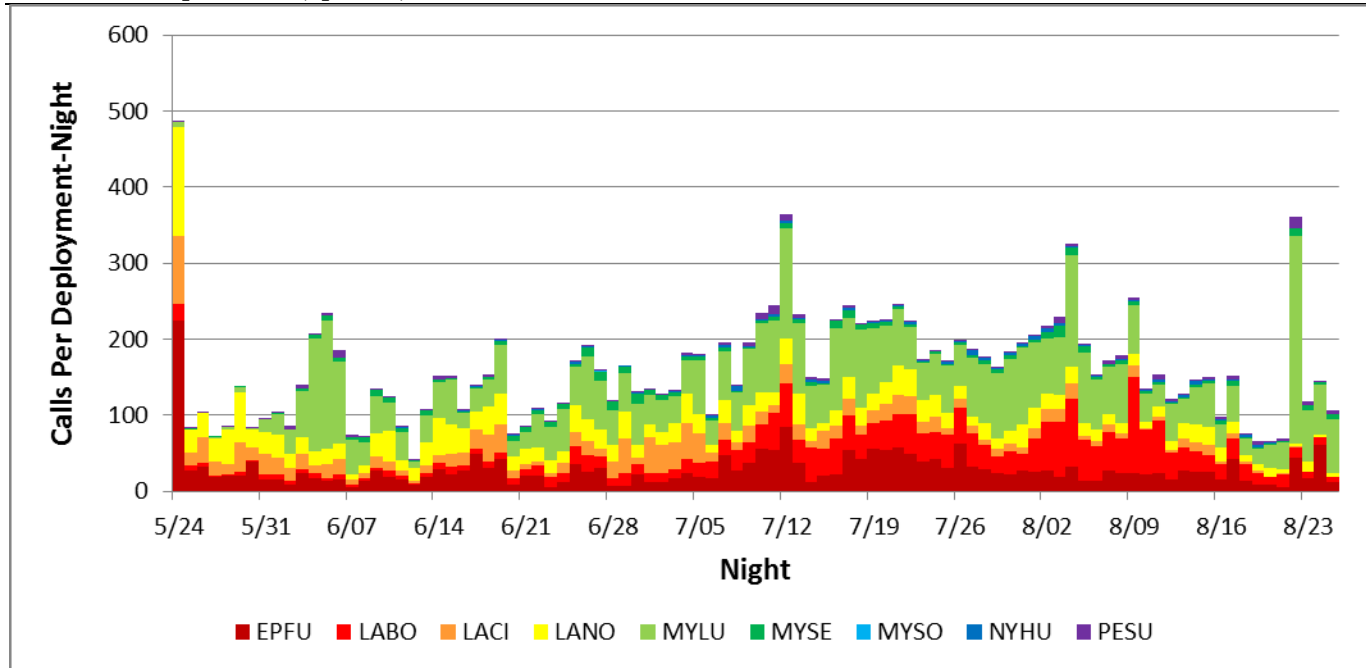


Figure 4-10. Number of Call Sequences Recorded per Deployment-Night (All Parks Combined), for each Date and Species (Summer only), Baseline Analysis

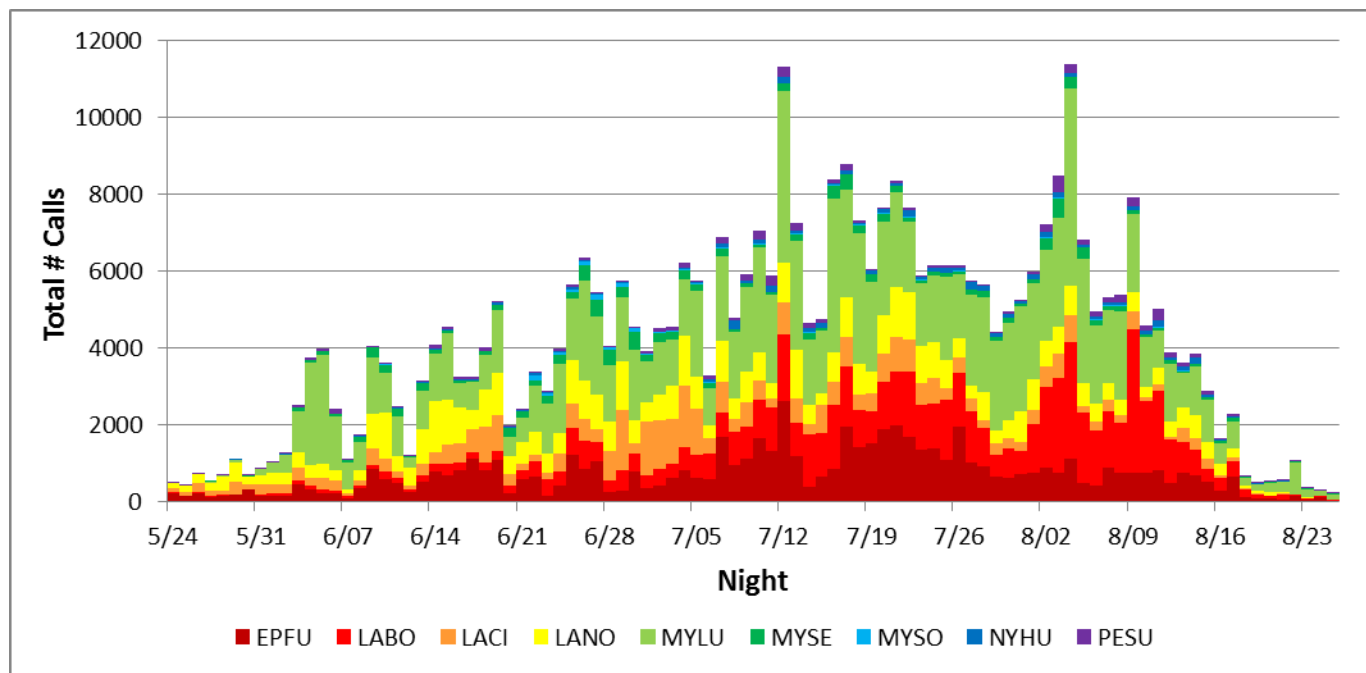


Figure 4-11. Total number of Call Sequences Recorded (All Parks Combined), for each Date and Species (Summer only), Expanded Analysis

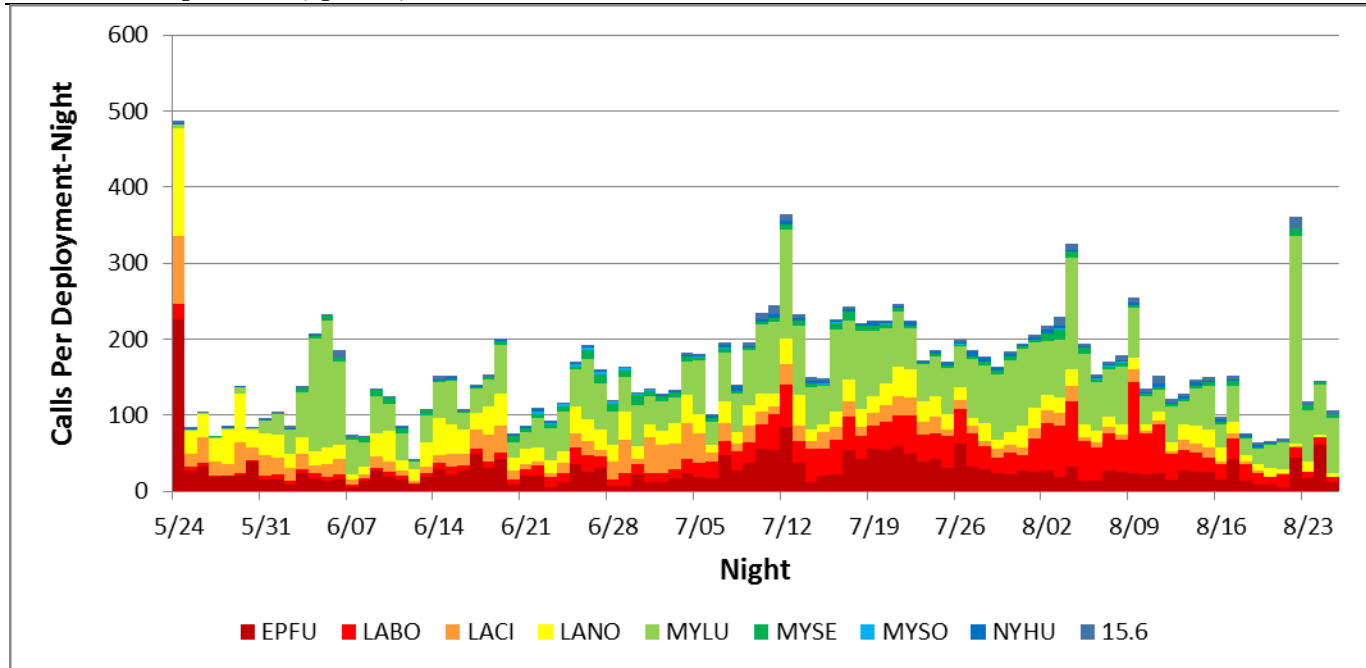


Figure 4-12 Number of Call Sequences Recorded per Deployment-Night (All Parks Combined), for each Date and Species (Summer only), Expanded Analysis

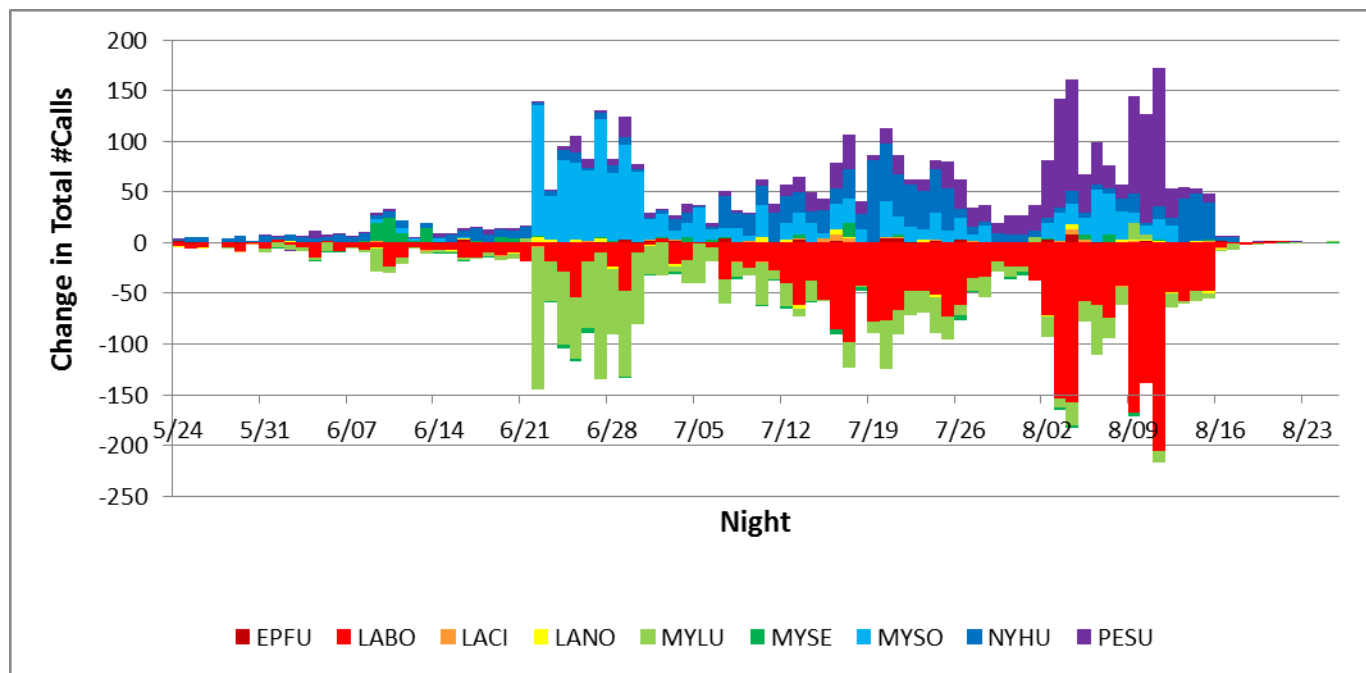


Figure 4-13. Difference in Total number of Call Sequences Recorded (All Parks Combined), for each Date and Species (Summer only. Differences were calculated by subtracting Baseline Analysis values from Expanded Analysis values.

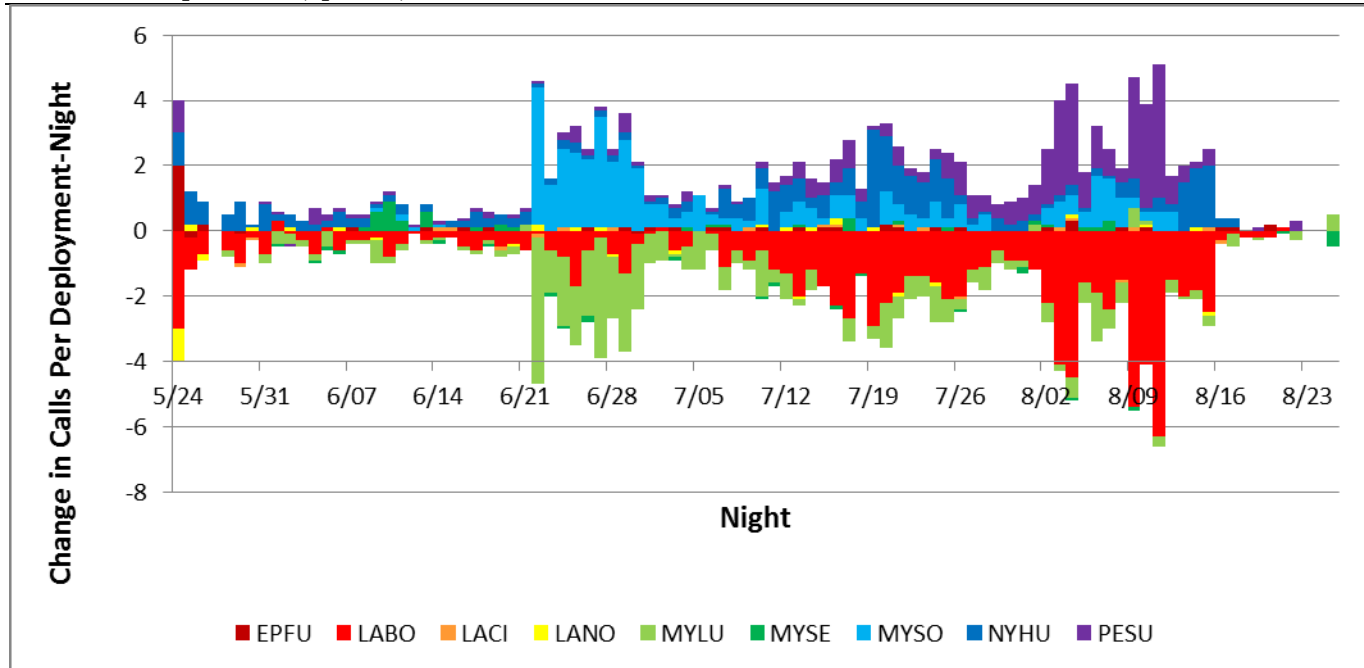


Figure 4-14. Difference in Number of Call Sequences Recorded per Deployment-Night (All Parks Combined), for each Date and Species (Summer only). Differences were calculated by subtracting Baseline Analysis values from Expanded Analysis values.

Figure 4-15 and Figure 4-16 show the total number of call sequences per night and the number of call sequences per deployment-night, respectively, for each date and park with all species combined. This helps illustrate the pattern of total bat activity.

Because the following graphs do not show individual species IDs, the graphs are essentially same for both the baseline and expanded analysis and therefore only one set of graphs is shown. (There would be very small differences due to the changes in ID from a particular species to No ID, but those differences are not apparent on the graphs due to scale).

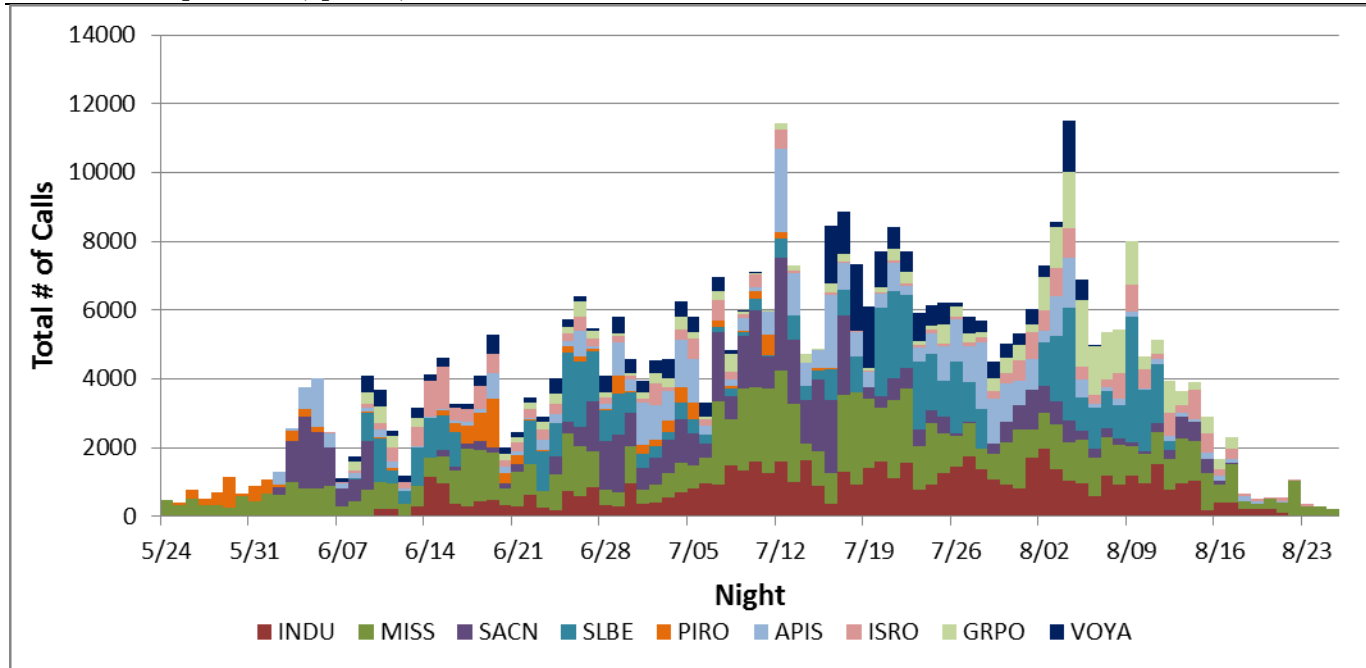


Figure 4-15. Total number of Call Sequences Recorded (All Species Combined), for each Date and Park (Summer only).

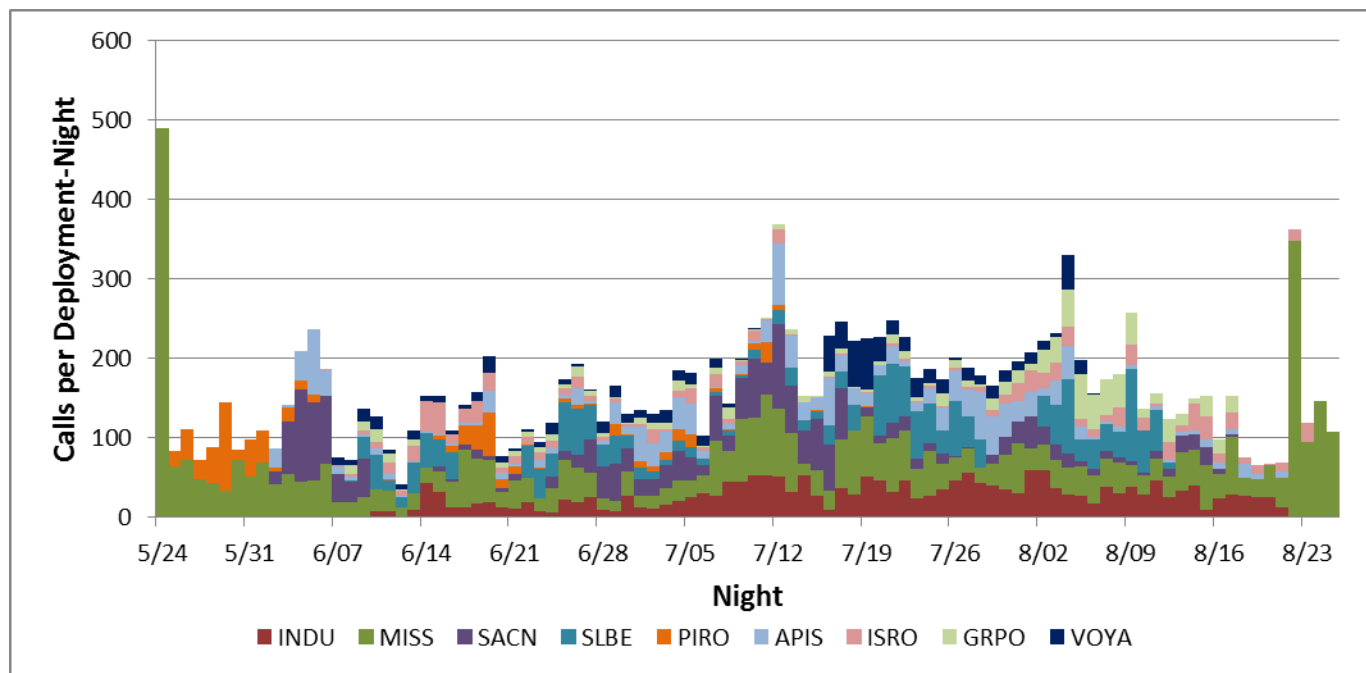


Figure 4-16. Number of Call Sequences Recorded Per Deployment-Night (All Species Combined), for each Date and Park (Summer only).

#### 4.1.4 Percent of Deployments & Deployment-Nights with Calls

Table 4-12 lists the percent of deployments while Table 4-13 lists the percent of deployment-nights where each species was present, for the baseline species analysis. This is for the summer season only. Figure 4-17 plots the data in Table 4-13.

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Similarly, Table 4-14 lists the percent of deployments while Table 4-15 lists the percent of deployment-nights where each species was present, for the expanded species analysis. This is for the summer season only. Figure 4-18 plots the data in Table 4-15.

To better highlight the differences in percentages, the table cells are highlighted using a continuous color scale based on the cell values as follows:



Table 4-12. Percent of Deployments each species was present, by Park (Summer Only), Baseline Analysis

| Park | Deploy-ments | EPFU | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU |
|------|--------------|------|------|------|------|------|------|------|------|------|
| INDU | 27           | 100  | 100  | 100  | 100  | 100  | 48   | 89   | 100  | 100  |
| MISS | 28           | 100  | 100  | 96   | 100  | 100  | 93   | na   | na   | 96   |
| SACN | 22           | 100  | 95   | 100  | 100  | 100  | 100  | na   | na   | 91   |
| SLBE | 36           | 94   | 94   | 94   | 94   | 94   | 56   | na   | na   | na   |
| PIRO | 55           | 35   | 24   | 38   | 45   | 29   | 24   | na   | na   | na   |
| APIS | 29           | 79   | 93   | 86   | 93   | 97   | 93   | na   | na   | na   |
| ISRO | 27           | 85   | 93   | 89   | 89   | 96   | 100  | na   | na   | na   |
| GRPO | 18           | 94   | 94   | 94   | 100  | 100  | 100  | na   | na   | na   |
| VOYA | 19           | 89   | 95   | 95   | 95   | 95   | 95   | na   | na   | na   |

na: species was not considered in the analysis

Table 4-13. Percent of Deployment-Nights each species was present, by Park (Summer Only), Baseline Analysis

| Park | Deploy-Nights | EPFU | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU |
|------|---------------|------|------|------|------|------|------|------|------|------|
| INDU | 280           | 100  | 100  | 89   | 100  | 88   | 8    | 19   | 91   | 71   |
| MISS | 301           | 96   | 93   | 80   | 91   | 96   | 66   | na   | na   | 83   |
| SACN | 172           | 87   | 92   | 94   | 99   | 99   | 77   | na   | na   | 53   |
| SLBE | 316           | 84   | 89   | 81   | 90   | 86   | 28   | na   | na   | na   |
| PIRO | 435           | 19   | 13   | 21   | 31   | 20   | 11   | na   | na   | na   |
| APIS | 283           | 35   | 64   | 47   | 63   | 89   | 62   | na   | na   | na   |
| ISRO | 244           | 35   | 75   | 50   | 64   | 92   | 82   | na   | na   | na   |
| GRPO | 148           | 51   | 64   | 66   | 79   | 91   | 82   | na   | na   | na   |
| VOYA | 193           | 44   | 68   | 76   | 76   | 90   | 71   | na   | na   | na   |

na: species was not considered in the analysis

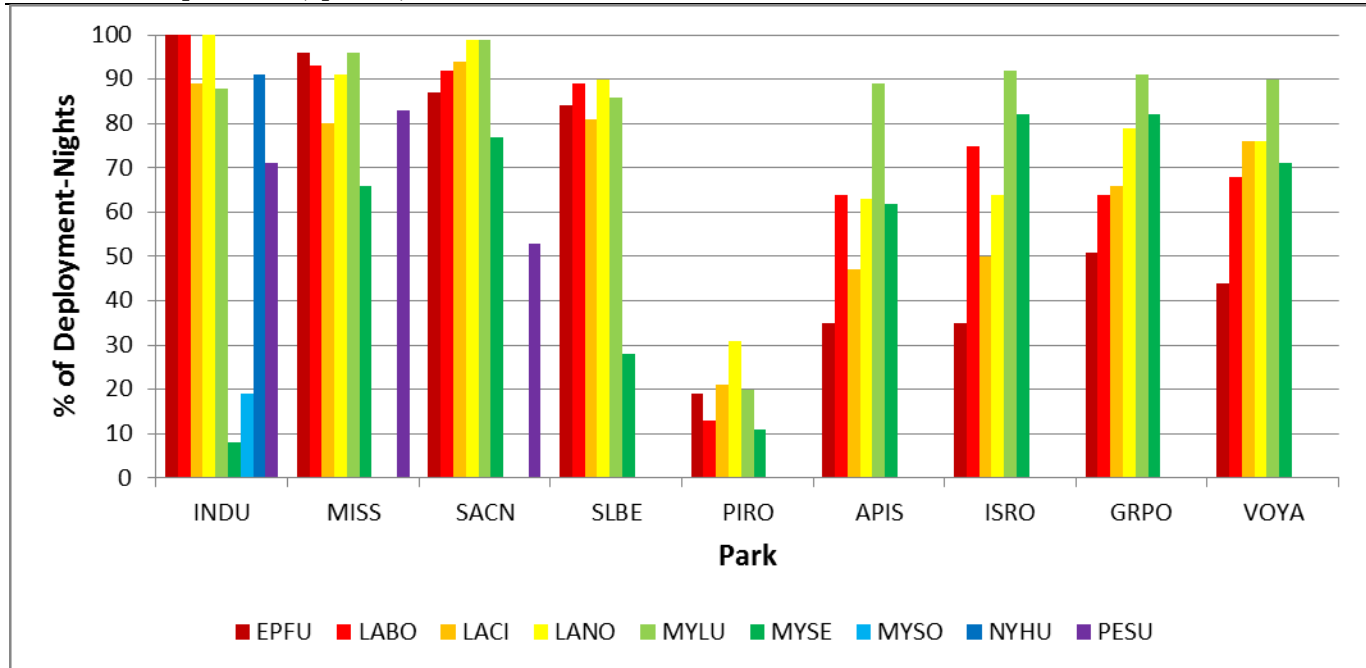


Figure 4-17. Percent of Deployment-Nights each species was present, by Park (Summer only), Baseline Analysis

Table 4-14. Percent of Deployments each species was present, by Park (Summer Only), Expanded Analysis

| Park | Deploy-ments | EPFU | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU |
|------|--------------|------|------|------|------|------|------|------|------|------|
| INDU | 27           | 100  | 100  | 100  | 100  | 100  | 48   | 89   | 100  | 100  |
| MISS | 28           | 100  | 100  | 96   | 100  | 100  | 93   | na   | 93   | 96   |
| SACN | 22           | 100  | 95   | 100  | 100  | 100  | 100  | na   | 95   | 91   |
| SLBE | 36           | 94   | 94   | 94   | 94   | 94   | 50   | 86   | na   | 83   |
| PIRO | 55           | 35   | 24   | 38   | 45   | 29   | 24   | na   | na   | 4    |
| APIS | 29           | 79   | 93   | 86   | 93   | 97   | 93   | na   | na   | 62   |
| ISRO | 27           | 85   | 89   | 89   | 89   | 96   | 100  | na   | na   | 52   |
| GRPO | 18           | 94   | 89   | 94   | 100  | 100  | 100  | na   | na   | 50   |
| VOYA | 19           | 89   | 95   | 95   | 95   | 95   | 95   | na   | na   | 58   |

na: species was not considered in the analysis

Table 4-15. Percent of Deployment-Nights each species was present, by Park (Summer Only), Expanded Analysis

| Park | Deploy-ments | EPFU | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU |
|------|--------------|------|------|------|------|------|------|------|------|------|
| INDU | 280          | 100  | 100  | 89   | 100  | 88   | 8    | 19   | 91   | 71   |
| MISS | 301          | 96   | 93   | 80   | 91   | 96   | 66   | na   | 54   | 82   |
| SACN | 172          | 88   | 91   | 94   | 99   | 99   | 77   | na   | 55   | 53   |
| SLBE | 316          | 84   | 88   | 81   | 90   | 86   | 25   | 49   | na   | 41   |
| PIRO | 435          | 19   | 13   | 21   | 31   | 20   | 10   | na   | na   | 1    |
| APIS | 283          | 35   | 62   | 47   | 63   | 89   | 61   | na   | na   | 31   |
| ISRO | 244          | 36   | 75   | 50   | 64   | 92   | 83   | na   | na   | 12   |
| GRPO | 148          | 52   | 60   | 66   | 79   | 91   | 82   | na   | na   | 14   |
| VOYA | 193          | 44   | 67   | 76   | 77   | 90   | 71   | na   | na   | 17   |

na: species was not considered in the analysis

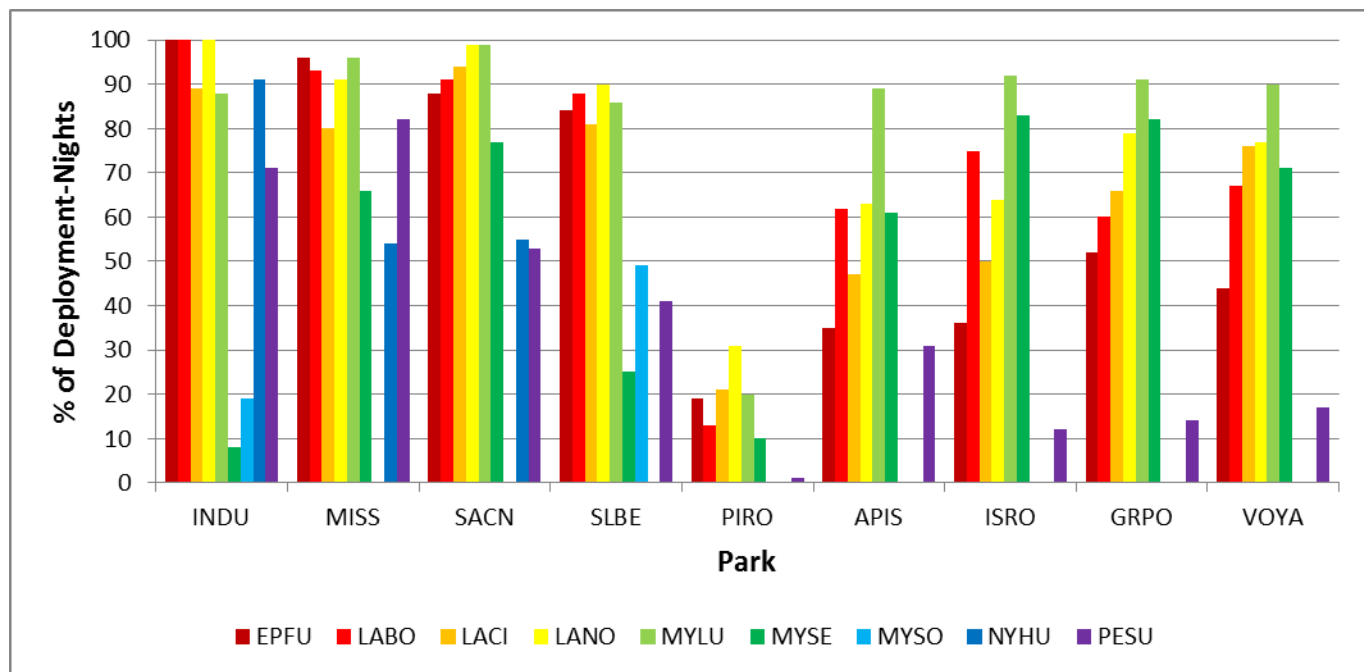


Figure 4-18. Percent of Deployment-Nights each species was present, by Park (Summer only), Expanded Analysis

## 5 Manual Vetting Summary

### 5.1.1 Manual Vetting/QC of KPro results

To manually vet the KPro IDs, at least 1% of identified (to species) files were chosen for manual vetting. To be sure that all parks and all species were proportionally represented in the manual vetting, files were NOT randomly selected at large, but instead 1% of files from within a given park and species group were randomly selected with a minimum of 10 files selected for each park and species group.

For example, if Park A had 5000 LABO and 6000 MYSO files, while Park B had 10000 LABO and 3000 MYSO files, the number of files selected for manual vetting would be 50 LABO files and 60 MYSO files from Park A and 100 LABO files and 30 MYSO files from Park B. In addition, if Park C had 500 LABO file, then 10 LABO files would be selected for manual vetting.

Table 5-1 shows the number of files selected for manual vetting, for each park and species, for the baseline analysis

Table 5-1. Number of files manually vetted for each species and park, Baseline analysis

| Park      | EPFU | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU | All Species |
|-----------|------|------|------|------|------|------|------|------|------|-------------|
| INDU      | 210  | 216  | 47   | 84   | 18   | 10   | 10   | 42   | 10   | 647         |
| MISS      | 277  | 79   | 64   | 98   | 351  | 28   | na   | na   | 46   | 943         |
| SACN      | 74   | 49   | 89   | 131  | 171  | 10   | na   | na   | 10   | 534         |
| SLBE      | 92   | 197  | 59   | 119  | 132  | 10   | na   | na   | na   | 609         |
| PIRO      | 10   | 10   | 28   | 48   | 19   | 10   | na   | na   | na   | 125         |
| APIS      | 10   | 82   | 64   | 22   | 228  | 10   | na   | na   | na   | 416         |
| ISRO      | 10   | 18   | 18   | 22   | 339  | 19   | na   | na   | na   | 426         |
| GRPO      | 10   | 34   | 10   | 14   | 153  | 39   | na   | na   | na   | 260         |
| VOYA      | 10   | 18   | 12   | 21   | 191  | 17   | na   | na   | na   | 269         |
| All Parks | 703  | 703  | 391  | 559  | 1602 | 153  | 10   | 42   | 66   | 4229        |

For the expanded analysis, an additional manual vetting was done on the additional park/species combinations added in the expanded analysis. The numbers of files manually vetted for the additional park/species combinations in the expanded analysis are show in Table 5-2.

Table 5-2. Number of additional files manually vetted for each species and park, Expanded Analysis

| Park | EPFU | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU |
|------|------|------|------|------|------|------|------|------|------|
| INDU | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| MISS | -    | -    | -    | -    | -    | -    | na   | 10   | -    |
| SACN | -    | -    | -    | -    | -    | -    | na   | 10   | -    |
| SLBE | -    | -    | -    | -    | -    | -    | 15   | na   | 10   |
| PIRO | -    | -    | -    | -    | -    | -    | na   | na   | 3    |
| APIS | -    | -    | -    | -    | -    | -    | na   | na   | 10   |
| ISRO | -    | -    | -    | -    | -    | -    | na   | na   | 10   |
| GRPO | -    | -    | -    | -    | -    | -    | na   | na   | 10   |
| VOYA | -    | -    | -    | -    | -    | -    | na   | na   | 10   |

The files were renamed to strip any information from the file names and the files were placed into folders that indicated the possible species that were supplied to KPro for that file. This ensured that the manual analysis performed by biologists was a blind test with no information about the sites or files besides resident species.

Manual analysis was then performed using several call viewing programs: SonoBat Viewer, Binary Acoustic Technologies SCANR, and Callviewer. Baseline call identification trees and prior knowledge or call shape, durations, and lengths were used to identify bats.

The auto classifier program, KPro, only identifies bats to singular species. Biologists were allowed to ID call sequences as species groups, such as EPFU/LANO or LABO/NYHU.

For the 2016 data, a single biologist performed all manual identifications.

### 5.1.2 Definition of 'Agreement'

The KPro species identifications were restricted to a single species with the possible species for a given park as listed in Table 4-1. Species groups and unknown species were not allowed in the KPro identifications. The manual species identifications were restricted to the same species as the KPro identifications; however in addition, the manual id allowed call sequences to be identified as species groups, unknown, unknown high frequency, unknown low frequency, unknown *Myotis* or no bat.

Table 5-3 shows the different manual identifications that were returned by the bat biologist in this study and the KPro identifications that would be considered to be in agreement.

Table 5-3. Manual ID and KPro ID conventions for agreement

| Manual ID<br>(species IDs by manual<br>vetter) | KPro ID in ‘agreement’ | KPro ID in ‘partial-<br>agreement’ |
|------------------------------------------------|------------------------|------------------------------------|
| EPFU                                           | EPFU                   |                                    |
| EPFU/LABO                                      |                        | EPFU or LABO                       |
| EPFU/LANO                                      |                        | EPFU or LANO                       |
| LABO                                           | LABO                   |                                    |
| LABO/MYLU                                      |                        | LABO or MYLU                       |
| LABO/NYHU                                      |                        | LABO or NYHU                       |
| LABO/PESU                                      |                        | LABO or PESU                       |
| LACI                                           | LACI                   |                                    |
| LACI/LANO                                      |                        | LACI or LANO                       |
| LANO                                           | LANO                   |                                    |
| MYLU                                           | MYLU                   | MYSE or MYSO                       |
| MYLU/MYSE                                      |                        | MYLU, MYSE or MYSO                 |
| MYLU/MYSO                                      |                        | MYLU, MYSE or MYSO                 |
| MYSE                                           | MYSE                   | MYLU or MYSO                       |
| MYsp (unknown Myotis)                          |                        | MYLU, MYSE or MYSO                 |
| NYHU                                           | NYHU                   |                                    |
| PESU                                           | PESU                   |                                    |
| UNKN (unknown bat)                             |                        |                                    |
| UNKN_HIFREQ                                    |                        | MYLU, MYSE or MYSO                 |
| UNKN_LOWFREQ                                   |                        |                                    |
| NOBAT (not a bat)                              |                        |                                    |

**5.1.3 Agreement: Number of Call Sequences**

Table 5-4 shows a matrix comparing the manual and KPro identifications. Cells that are highlighted in green are the agreements and cells that are highlighted in orange are the partial agreements. Cells highlighted in light red are the most common disagreements for a given KPro ID.

Table 5-5 shows the manual vetting results for species added in the expanded analysis.

Potential MYSO are always manually identified as MYLU/MYSO and not just MYSO, because MYSO call characteristics always overlap with those of MYLU.

Table 5-4. Manual Vetting Results – Number of Call Sequences, Baseline Analysis

| ManualID <sup>1</sup>        | EPFU | LABO | LACI | LANO | MYLU | MYSE | MYSO | NYHU | PESU | All Species |
|------------------------------|------|------|------|------|------|------|------|------|------|-------------|
| <b>EPFU</b>                  | 117  | 3    | 0    | 2    | 0    | 2    | 0    | 0    | 0    | 124         |
| <b>EPFU/LABO</b>             | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1           |
| <b>EPFU/LANO</b>             | 479  | 8    | 16   | 186  | 7    | 1    | 0    | 1    | 0    | 698         |
| <b>LABO</b>                  | 7    | 415  | 1    | 8    | 59   | 3    | 8    | 3    | 9    | 513         |
| <b>LABO/MYLU</b>             | 0    | 2    | 0    | 0    | 4    | 0    | 0    | 0    | 0    | 6           |
| <b>LABO/NYHU</b>             | 2    | 81   | 0    | 0    | 6    | 0    | 0    | 15   | 3    | 107         |
| <b>LABO/PESU</b>             | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 2           |
| <b>LACI</b>                  | 9    | 2    | 273  | 10   | 4    | 0    | 0    | 0    | 0    | 298         |
| <b>LACI/LANO</b>             | 1    | 0    | 2    | 1    | 0    | 0    | 0    | 0    | 0    | 4           |
| <b>LANO</b>                  | 50   | 8    | 35   | 312  | 3    | 0    | 0    | 0    | 0    | 408         |
| <b>MYLU</b>                  | 11   | 50   | 1    | 3    | 1310 | 64   | 0    | 0    | 0    | 1439        |
| <b>MYLU/MYSE</b>             | 0    | 0    | 0    | 0    | 2    | 0    | 0    | 0    | 0    | 2           |
| <b>MYLU/MYSO<sup>2</sup></b> | 0    | 0    | 0    | 0    | 0    | 2    | 0    | 0    | 0    | 2           |
| <b>MYSE</b>                  | 0    | 0    | 0    | 1    | 21   | 41   | 0    | 0    | 0    | 63          |
| <b>MYsp</b>                  | 0    | 0    | 1    | 0    | 30   | 23   | 0    | 0    | 0    | 54          |
| <b>NYHU</b>                  | 1    | 35   | 0    | 0    | 0    | 0    | 0    | 19   | 1    | 56          |
| <b>PESU</b>                  | 1    | 15   | 0    | 0    | 2    | 0    | 0    | 0    | 45   | 63          |
| <b>UNKN</b>                  | 1    | 1    | 13   | 0    | 1    | 0    | 0    | 0    | 0    | 16          |
| <b>UNKN_HIFREQ</b>           | 3    | 73   | 4    | 1    | 151  | 17   | 2    | 3    | 7    | 261         |
| <b>UNKN_LOWFREQ</b>          | 20   | 8    | 32   | 32   | 2    | 0    | 0    | 1    | 0    | 95          |
| <b>NOBAT</b>                 | 0    | 1    | 13   | 3    | 0    | 0    | 0    | 0    | 0    | 17          |
| <b>Total</b>                 | 703  | 703  | 391  | 559  | 1602 | 153  | 10   | 42   | 66   | 4229        |

<sup>1</sup>MYsp: unknown Myotis; UNKN: unknown bat call sequence; UNKN\_HIFREQ: unknown high frequency bat call sequence; UNKN\_LOWFREQ: unknown low frequency bat call sequence; NOBAT: not a bat

<sup>2</sup> For manual ID all potential MYSO are ID'd as MYLU/MYSO.

■: cells in light green are exact matches

■: cells in light orange are partial matches

■: cells in light red are most common disagreement

Table 5-5. Manual Vetting Results – Number of Call Sequences, Expanded Analysis Species

| ManualID <sup>1</sup>        | MYSO | NYHU | PESU |
|------------------------------|------|------|------|
| <b>LABO</b>                  | 1    | 5    | 28   |
| <b>LABO/MYLU</b>             | 0    | 0    | 3    |
| <b>LABO/NYHU</b>             | 0    | 2    | 0    |
| <b>LABO/PESU</b>             | 0    | 0    | 2    |
| <b>MYLU</b>                  | 1    | 2    | 15   |
| <b>MYLU/MYSO<sup>2</sup></b> | 12   | 0    | 1    |
| <b>NYHU</b>                  | 0    | 10   | 0    |
| <b>PESU</b>                  | 0    | 0    | 2    |
| <b>UNKN_HIFREQ</b>           | 1    | 0    | 1    |
| <b>UNKN_LOWFREQ</b>          | 0    | 1    | 0    |
| <b>Total</b>                 | 15   | 20   | 52   |

<sup>1</sup>UNKN\_HIFREQ: unknown high frequency bat call sequence; UNKN\_LOWFREQ: unknown low frequency bat call sequence

<sup>2</sup> For manual ID all potential MYSO are ID'd as MYLU/MYSO.

: cells in light green are exact matches

: cells in light orange are partial matches

: cells in light red are most common disagreement

**5.1.4 Agreement: Percent**

For the baseline analysis, Table 5-6 and Table 5-7 show the agreement between the manual and KPro identifications for non-*Myotis* species and *Myotis* species, respectively.

For the additional species considered in the expanded analysis, Table 5-8 and Table 5-9 show the agreement between the manual and KPro identifications for non-*Myotis* species and *Myotis* species, respectively.

Table 5-6. Manual Vetting of KPro ID: Percent Agreement for non-*Myotis* species, Baseline Analysis

| KPro ID     | Total Vetted | # Agree <sup>1</sup> | % Agree | Most Common Disagreements |
|-------------|--------------|----------------------|---------|---------------------------|
| <b>EPFU</b> | 703          | 597                  | 84.9    | LANO, UNKN_LOWFREQ        |
| <b>LABO</b> | 703          | 499                  | 71.0    | UNKN_HIFREQ, MYLU, NYHU   |
| <b>LACI</b> | 391          | 275                  | 70.3    | LANO, UNKN_LOWFREQ        |
| <b>LANO</b> | 559          | 499                  | 89.3    | UNKN_LOWFREQ, LACI, LABO  |
| <b>NYHU</b> | 42           | 34                   | 81.0    | LABO, UNKN_HIFREQ         |
| <b>PESU</b> | 66           | 46                   | 69.7    | LABO, UNKN_HIFREQ         |

<sup>1</sup>Includes both exact and partial agreements

Table 5-7. Manual Vetting of KPro ID: Percent Agreement for *Myotis* species, Baseline Analysis

| # of Files |              |               |                            |                          |               | % of Files                 |                          |                           |
|------------|--------------|---------------|----------------------------|--------------------------|---------------|----------------------------|--------------------------|---------------------------|
| KPro ID    | Total Vetted | Exact Species | Other Myotis or High Freq. | All Myotis or High Freq. | Exact Species | Other Myotis or High Freq. | All Myotis or High Freq. | Most Common Disagreements |
| MYLU       | 1602         | 1310          | 208                        | 1518                     | 82            | 13                         | 95                       | LABO                      |
| MYSE       | 153          | 41            | 106                        | 147                      | 27            | 69                         | 96                       | LABO                      |
| MYSO       | 10           | 0             | 2                          | 2                        | 0             | 20                         | 20                       | LABO                      |

Table 5-8. Manual Vetting of KPro ID: Percent Agreement for non-*Myotis* species, Expanded Analysis

| KPro ID     | Total Vetted | # Agree <sup>1</sup> | % Agree | Most Common Disagreements |
|-------------|--------------|----------------------|---------|---------------------------|
| <b>NYHU</b> | 20           | 12                   | 60.0    | LABO                      |
| <b>PESU</b> | 52           | 4                    | 7.7     | LABO                      |

<sup>1</sup>Includes both exact and partial agreements

Table 5-9. Manual Vetting of KPro ID: Percent Agreement for *Myotis* species, Expanded Analysis

| KPro ID | Total Vetted | # of Files    |                            |                          |               | % of Files                 |                          | Most Common Disagreements |
|---------|--------------|---------------|----------------------------|--------------------------|---------------|----------------------------|--------------------------|---------------------------|
|         |              | Exact Species | Other Myotis or High Freq. | All Myotis or High Freq. | Exact Species | Other Myotis or High Freq. | All Myotis or High Freq. |                           |
| MYSO    | 15           | 0             | 14                         | 14                       | 0             | 93                         | 93                       | LABO                      |

## 6 Conclusion and Observations

The purpose of this report was simply to summarize the results of 2016 GLKN acoustic monitoring effort and not to make conclusions about the ecological significance of the results.

For the 2016 Summer season (6/1/16-9/15/16), 768843 audio files were analyzed from 9 national parks. These were collected at 328 distinct locations during 2372 deployment-nights. Using the auto-classifier Kaleidoscope Pro (KPro), audio files were identified to species or classified as unknown bats or noise. Both a baseline analysis and an expanded analysis (additional possible species) were performed using the auto-classifier.

For the baseline analysis, overall ~51.4% of the audio files were identified to species, while ~48% were found to be noise. Less than 1% were found to be bat call sequences that could not be identified to species. The PIRO park had an unusually high number of noise files with 96% being classified as noise and only 4% of files identified to species. Excluding PIRO, the remaining parks had 73-90% of audio files identified to species with 10-27% classified as noise. It is not known why PIRO had such a high number of noise files, however the equipment and recording settings used there are different than at the remaining parks and this may be a contributing factor. In particular, a high-pass filter was not used at PIRO which may have permitted low frequency noises to be recorded. The expanded species analysis did not reclassify any noise files to species or vice versa; however, the expanded analysis did reclassify a small number files (~0.1%) from a specific species to an unidentifiable bat. It is not known why there was a slight increase in unidentifiable files with the expanded species analysis.

The expanded species analysis reclassified ~9% of LABO to NYHU at both MISS and SACN. LABO call characteristics vary a great deal and overlap with call characteristics for a great many species, thus misclassification of a species as LABO or vice versa tends to be the most common misclassification by KPro.

For call sequences identified by KPro as a *Myotis* species, in the baseline analysis 92% were identified as MYLU while ~8% were identified as MYSE and ~0.06% were identified as MYSO (which was only considered for the INDU park). For the expanded analysis, which allowed MYSO to be considered for both the SLBE and INDU parks, a number of call sequences originally identified as LABO or MYLU were re-identified as MYSO in the SLBE park. For the expanded analysis 91% were identified as MYLU while ~8% were identified as MYSE and ~1% were identified as MYSO. However, given the high degree of overlap in call characteristics among the three *Myotis* species, some of these identifications may not be correct.

For the baseline analysis KPro identification was QC'd by manually vetting about 1% of the files identified to species. Additionally, species/park combinations added in the expanded analysis were separately QC'd by manually vetting 1% of the files identified to the expanded species.

In the baseline analysis, for call sequences identified by KPro as non-*Myotis* species, the KPro and manual identifications had good agreement for some species and less for others. The agreement ranged from 70-89%, with LANO having the highest agreement at 89% and PESU, LACI and LABO having the lowest agreements at ~70% each. PESU calls are fairly distinctive but are often misclassified by KPro as LABO and vice versa.

For the expanded analysis, for call sequences identified by KPro as non-*Myotis* species, manual identification did not agree well with the KPro identification. For the files identified by KPro as NYHU, the manual ID agreed only 60% and for PESU only 8%, with a manual identification of LABO being the most common disagreement.

In the baseline analysis, for call sequences identified by KPro as *Myotis* species, the agreement between KPro and manual identification was mixed. For files identified by KPro as MYLU, the agreement was very good;

with 82% also manually identified as MYLU and 95% manually identified as a *Myotis* species call sequence. For files identified by KPro as MYSE, only 27% were also manually identified as MYSE but 96% were manually identified as a *Myotis* species. For files identified by KPro as MYSO, the agreement was not good, with only 30% manually identified as *Myotis* and with 70% being manually identified as LABO. However, there were so few MYSO files that results are difficult to interpret.

For the expanded analysis which added MYSO for SLBE, manual identification agreed fairly well with KPro identification. For the files identified by KPro as MYSO, the manual identification was MYLU/MYSO for 12 of 15 files, with the remaining 3 files identified as MYLU, LABO and unknown high frequency. The agreement was 93% with files manually identified as potential *Myotis*.

The auto classifier programs approved by the USFWS for MYSO and MYSE (including KPro), are tuned to be extra sensitive towards endangered species such as MYSO and MYSE. This can explain the number of audio files manually identified as LABO but identified by KPro as MYSE and MYSO. The manual vetting did agree that the files identified by KPro as MYLU or MYSE were some type of *Myotis* about 95% of the time, thus an identification by KPro of MYLU or MYSE could at least be a flag for call sequences that are potentially *Myotis* and should be given further review.

Based on the data tables presented in this report, there was nothing highly unusual about distribution of species (as determined by KPro identification) among the parks or the relative nightly activity throughout the season. A thorough analysis is, of course, needed to quantify this observation, correct for discrepancies between KPro and manual identification and compare these results with bat species prevalence reported in the general literature. This is an ongoing study with four years of data collection so far completed (2015-2018) and a fifth year planned for 2019.

## 7 Supplementary Documents

The following documents contain detailed information and data that are important to the 2016 reporting of results, but are too big to be included in this report and are better provided as supplementary documents:

- [\*Data Management Plan.docx\*](#)
  - Detailed information about the procedures for data management and processing as well as step-by-step instruction for automatic identification using KPro.
- [\*tables\\_2016\\_SpeciesCalls\\_byParkSiteNight\\_AutoID.xlsx\*](#)
  - Number of call sequences for each species (as ID'd by KPro for both baseline and expanded species lists) for each site and night combination
  - Total number of call sequences for each species (as ID'd by KPro for both baseline and expanded species lists) for each site with all nights combined
  - Number of call sequences per deployment-night for each site, for each species (as ID'd by KPro for both baseline and expanded species lists)
- [\*tables\\_2016\\_AudioFile\\_Classification\\_byParkSite.xlsx\*](#) Audio file classification (bad files, short deployment fields, etc.) for each Park and site.
- [\*tables\\_2016\\_CallsvsNoise\\_byParkSite.xlsx\*](#) Number and percent files ID'd as bats and noise files for each Park and site.

## 8 APPENDIX

Table 8-1. Number of Deployments By Date, during the Summer season (Figure 3-2)

| Night     | All Parks | INDU | MISS | SACN | SLBE | PIRO | APIS | ISRO | GRPO | VOYA |
|-----------|-----------|------|------|------|------|------|------|------|------|------|
| 5/24/2016 | 1         | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 5/25/2016 | 5         | 0    | 1    | 0    | 0    | 4    | 0    | 0    | 0    | 0    |
| 5/26/2016 | 7         | 0    | 1    | 0    | 0    | 6    | 0    | 0    | 0    | 0    |
| 5/27/2016 | 7         | 0    | 1    | 0    | 0    | 6    | 0    | 0    | 0    | 0    |
| 5/28/2016 | 8         | 0    | 1    | 0    | 0    | 6    | 1    | 0    | 0    | 0    |
| 5/29/2016 | 8         | 0    | 1    | 0    | 0    | 6    | 1    | 0    | 0    | 0    |
| 5/30/2016 | 8         | 0    | 1    | 0    | 0    | 6    | 1    | 0    | 0    | 0    |
| 5/31/2016 | 9         | 0    | 2    | 0    | 0    | 6    | 1    | 0    | 0    | 0    |
| 6/1/2016  | 10        | 0    | 3    | 0    | 0    | 6    | 1    | 0    | 0    | 0    |
| 6/2/2016  | 15        | 0    | 4    | 2    | 0    | 6    | 3    | 0    | 0    | 0    |
| 6/3/2016  | 18        | 0    | 4    | 3    | 0    | 6    | 5    | 0    | 0    | 0    |
| 6/4/2016  | 18        | 0    | 4    | 3    | 0    | 6    | 5    | 0    | 0    | 0    |
| 6/5/2016  | 17        | 0    | 3    | 3    | 0    | 6    | 5    | 0    | 0    | 0    |
| 6/6/2016  | 13        | 0    | 4    | 3    | 0    | 0    | 5    | 1    | 0    | 0    |
| 6/7/2016  | 15        | 0    | 3    | 3    | 0    | 0    | 5    | 1    | 0    | 3    |
| 6/8/2016  | 24        | 0    | 3    | 3    | 2    | 4    | 4    | 3    | 2    | 3    |
| 6/9/2016  | 30        | 0    | 3    | 3    | 6    | 5    | 3    | 4    | 3    | 3    |
| 6/10/2016 | 29        | 1    | 3    | 0    | 6    | 5    | 4    | 4    | 3    | 3    |
| 6/11/2016 | 29        | 1    | 3    | 0    | 6    | 5    | 4    | 4    | 3    | 3    |
| 6/12/2016 | 29        | 1    | 3    | 0    | 6    | 5    | 4    | 4    | 3    | 3    |
| 6/13/2016 | 29        | 2    | 3    | 0    | 6    | 5    | 3    | 4    | 3    | 3    |
| 6/14/2016 | 27        | 4    | 3    | 0    | 6    | 4    | 3    | 4    | 0    | 3    |
| 6/15/2016 | 30        | 4    | 3    | 2    | 6    | 5    | 3    | 4    | 0    | 3    |
| 6/16/2016 | 30        | 4    | 3    | 3    | 6    | 5    | 3    | 3    | 0    | 3    |
| 6/17/2016 | 23        | 4    | 3    | 3    | 0    | 5    | 3    | 2    | 0    | 3    |
| 6/18/2016 | 26        | 4    | 3    | 3    | 0    | 5    | 3    | 4    | 0    | 4    |
| 6/19/2016 | 26        | 4    | 3    | 3    | 0    | 5    | 3    | 4    | 0    | 4    |
| 6/20/2016 | 26        | 4    | 3    | 3    | 0    | 5    | 2    | 3    | 2    | 4    |
| 6/21/2016 | 28        | 4    | 3    | 3    | 0    | 5    | 2    | 4    | 3    | 4    |
| 6/22/2016 | 31        | 4    | 3    | 0    | 6    | 4    | 3    | 4    | 3    | 4    |
| 6/23/2016 | 31        | 4    | 2    | 0    | 6    | 4    | 4    | 4    | 3    | 4    |
| 6/24/2016 | 34        | 4    | 4    | 1    | 6    | 4    | 4    | 4    | 3    | 4    |
| 6/25/2016 | 33        | 4    | 4    | 1    | 6    | 4    | 3    | 4    | 3    | 4    |
| 6/26/2016 | 33        | 4    | 4    | 1    | 6    | 4    | 3    | 4    | 3    | 4    |
| 6/27/2016 | 34        | 4    | 3    | 2    | 6    | 5    | 3    | 4    | 3    | 4    |
| 6/28/2016 | 34        | 4    | 3    | 3    | 6    | 5    | 3    | 4    | 3    | 3    |
| 6/29/2016 | 35        | 4    | 3    | 3    | 6    | 5    | 4    | 4    | 3    | 3    |
| 6/30/2016 | 35        | 4    | 3    | 3    | 6    | 5    | 4    | 3    | 3    | 4    |
| 7/1/2016  | 29        | 4    | 4    | 2    | 1    | 5    | 4    | 2    | 3    | 4    |
| 7/2/2016  | 35        | 4    | 4    | 2    | 6    | 5    | 4    | 3    | 3    | 4    |

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|           |    |   |   |   |   |   |   |   |   |   |
|-----------|----|---|---|---|---|---|---|---|---|---|
| 7/3/2016  | 34 | 4 | 4 | 2 | 6 | 5 | 4 | 2 | 3 | 4 |
| 7/4/2016  | 34 | 4 | 4 | 2 | 6 | 5 | 4 | 2 | 3 | 4 |
| 7/5/2016  | 32 | 4 | 3 | 1 | 6 | 5 | 3 | 3 | 3 | 4 |
| 7/6/2016  | 32 | 4 | 3 | 1 | 6 | 4 | 3 | 4 | 3 | 4 |
| 7/7/2016  | 35 | 4 | 4 | 3 | 6 | 4 | 2 | 4 | 4 | 4 |
| 7/8/2016  | 34 | 4 | 4 | 3 | 6 | 4 | 3 | 4 | 4 | 2 |
| 7/9/2016  | 30 | 4 | 4 | 3 | 6 | 4 | 3 | 4 | 1 | 1 |
| 7/10/2016 | 30 | 4 | 4 | 3 | 6 | 4 | 3 | 4 | 1 | 1 |
| 7/11/2016 | 24 | 4 | 4 | 3 | 1 | 4 | 5 | 2 | 1 | 0 |
| 7/12/2016 | 31 | 4 | 4 | 3 | 6 | 4 | 5 | 2 | 3 | 0 |
| 7/13/2016 | 31 | 4 | 4 | 3 | 6 | 5 | 5 | 1 | 3 | 0 |
| 7/14/2016 | 31 | 4 | 4 | 3 | 6 | 6 | 5 | 1 | 2 | 0 |
| 7/15/2016 | 32 | 4 | 4 | 2 | 6 | 6 | 5 | 3 | 2 | 0 |
| 7/16/2016 | 37 | 4 | 4 | 2 | 6 | 6 | 5 | 4 | 2 | 4 |
| 7/17/2016 | 36 | 4 | 4 | 2 | 6 | 6 | 5 | 4 | 1 | 4 |
| 7/18/2016 | 33 | 4 | 4 | 0 | 6 | 6 | 4 | 4 | 1 | 4 |
| 7/19/2016 | 27 | 4 | 4 | 2 | 0 | 6 | 2 | 4 | 1 | 4 |
| 7/20/2016 | 34 | 4 | 4 | 2 | 6 | 6 | 3 | 4 | 1 | 4 |
| 7/21/2016 | 34 | 4 | 4 | 3 | 6 | 6 | 3 | 4 | 1 | 3 |
| 7/22/2016 | 34 | 4 | 4 | 3 | 6 | 6 | 3 | 4 | 1 | 3 |
| 7/23/2016 | 34 | 4 | 4 | 3 | 6 | 6 | 3 | 4 | 1 | 3 |
| 7/24/2016 | 33 | 4 | 4 | 3 | 6 | 6 | 2 | 4 | 1 | 3 |
| 7/25/2016 | 36 | 4 | 4 | 3 | 6 | 6 | 5 | 4 | 1 | 3 |
| 7/26/2016 | 31 | 4 | 4 | 1 | 6 | 6 | 5 | 3 | 1 | 1 |
| 7/27/2016 | 31 | 4 | 4 | 1 | 6 | 6 | 5 | 1 | 1 | 3 |
| 7/28/2016 | 32 | 4 | 4 | 0 | 6 | 5 | 5 | 4 | 1 | 3 |
| 7/29/2016 | 27 | 3 | 4 | 2 | 0 | 6 | 3 | 4 | 1 | 4 |
| 7/30/2016 | 27 | 3 | 4 | 2 | 0 | 6 | 3 | 4 | 1 | 4 |
| 7/31/2016 | 27 | 3 | 4 | 2 | 0 | 6 | 3 | 4 | 1 | 4 |
| 8/1/2016  | 29 | 4 | 4 | 3 | 0 | 6 | 3 | 4 | 1 | 4 |
| 8/2/2016  | 33 | 4 | 3 | 3 | 4 | 6 | 3 | 4 | 2 | 4 |
| 8/3/2016  | 37 | 4 | 3 | 3 | 6 | 6 | 5 | 4 | 2 | 4 |
| 8/4/2016  | 35 | 4 | 3 | 3 | 6 | 7 | 5 | 1 | 3 | 3 |
| 8/5/2016  | 35 | 4 | 4 | 2 | 6 | 7 | 5 | 1 | 3 | 3 |
| 8/6/2016  | 32 | 4 | 4 | 2 | 6 | 6 | 4 | 1 | 3 | 2 |
| 8/7/2016  | 31 | 4 | 4 | 2 | 6 | 6 | 4 | 1 | 3 | 1 |
| 8/8/2016  | 30 | 4 | 2 | 2 | 6 | 6 | 4 | 2 | 3 | 1 |
| 8/9/2016  | 31 | 5 | 2 | 1 | 6 | 5 | 4 | 4 | 3 | 1 |
| 8/10/2016 | 34 | 5 | 4 | 3 | 6 | 5 | 3 | 4 | 3 | 1 |
| 8/11/2016 | 33 | 5 | 4 | 4 | 6 | 3 | 4 | 4 | 3 | 0 |
| 8/12/2016 | 32 | 6 | 4 | 4 | 2 | 5 | 4 | 4 | 3 | 0 |
| 8/13/2016 | 28 | 6 | 4 | 4 | 0 | 5 | 2 | 4 | 3 | 0 |
| 8/14/2016 | 26 | 6 | 4 | 4 | 0 | 5 | 1 | 4 | 2 | 0 |
| 8/15/2016 | 19 | 4 | 3 | 4 | 0 | 2 | 1 | 3 | 2 | 0 |

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|           |    |   |   |   |   |   |   |   |   |   |
|-----------|----|---|---|---|---|---|---|---|---|---|
| 8/16/2016 | 17 | 4 | 3 | 3 | 0 | 2 | 1 | 2 | 2 | 0 |
| 8/17/2016 | 15 | 4 | 3 | 1 | 0 | 2 | 1 | 2 | 2 | 0 |
| 8/18/2016 | 9  | 3 | 2 | 0 | 0 | 2 | 1 | 1 | 0 | 0 |
| 8/19/2016 | 8  | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 0 | 0 |
| 8/20/2016 | 8  | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 0 | 0 |
| 8/21/2016 | 8  | 2 | 2 | 0 | 0 | 2 | 1 | 1 | 0 | 0 |
| 8/22/2016 | 3  | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 8/23/2016 | 3  | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 8/24/2016 | 2  | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/25/2016 | 2  | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 8-2. Number of Calls Per Deployment-Night (All Parks Combined), for each Species, Baseline Analysis (Figure 4-10)

| Night     | EPFU | LABO | LACI | LANO | MYLU  | MYSE | MYSO | NYHU | PESU |
|-----------|------|------|------|------|-------|------|------|------|------|
| 5/24/2016 | 224  | 23   | 89   | 143  | 6     | 0    | 0    | 0    | 3    |
| 5/25/2016 | 28   | 5.8  | 16.4 | 31.2 | 0.2   | 0.6  | 0    | 0    | 0.4  |
| 5/26/2016 | 32.4 | 5.1  | 33.7 | 31.3 | 1.4   | 0    | 0    | 0    | 0.4  |
| 5/27/2016 | 18.6 | 1.7  | 19.3 | 30   | 1.6   | 0.1  | 0    | 0    | 0    |
| 5/28/2016 | 19.9 | 1.8  | 14.5 | 45   | 3.4   | 0    | 0    | 0    | 0.1  |
| 5/29/2016 | 21   | 4    | 40.1 | 64.8 | 7.6   | 0.8  | 0    | 0    | 0    |
| 5/30/2016 | 38.8 | 2.8  | 16   | 24   | 1.4   | 0.4  | 0    | 0    | 0.1  |
| 5/31/2016 | 16.4 | 5.8  | 26.4 | 28.9 | 16.9  | 0.4  | 0    | 0    | 1.6  |
| 6/1/2016  | 15.6 | 6.6  | 22.2 | 30.5 | 27.2  | 0.5  | 0    | 0    | 1.6  |
| 6/2/2016  | 9.3  | 5.4  | 15.7 | 18.4 | 32.4  | 0.9  | 0    | 0    | 3.5  |
| 6/3/2016  | 24.8 | 5.1  | 19   | 22.2 | 60    | 4.9  | 0    | 0    | 3.6  |
| 6/4/2016  | 16.6 | 7.9  | 10.4 | 18.5 | 147.9 | 4.7  | 0    | 0    | 2.2  |
| 6/5/2016  | 13.2 | 4.9  | 17.1 | 21.7 | 168.3 | 6.1  | 0    | 0    | 2.6  |
| 6/6/2016  | 16.2 | 7    | 20.2 | 18.6 | 109   | 5.3  | 0    | 0    | 9.1  |
| 6/7/2016  | 5.3  | 4    | 6.3  | 6.5  | 46.5  | 2.9  | 0    | 0    | 2.8  |
| 6/8/2016  | 14.3 | 2.6  | 6.5  | 10.2 | 30.9  | 6.2  | 0    | 0    | 1    |
| 6/9/2016  | 28.2 | 3.4  | 14.7 | 30.4 | 48.9  | 7.9  | 0    | 0    | 1.5  |
| 6/10/2016 | 19.8 | 7.5  | 12.2 | 40.8 | 35.9  | 6.8  | 0    | 0.2  | 0.7  |
| 6/11/2016 | 16.1 | 5.4  | 6.2  | 13   | 36.6  | 6.4  | 0    | 0.4  | 0.3  |
| 6/12/2016 | 8.6  | 1.9  | 3.6  | 15.9 | 9.1   | 1.9  | 0    | 0    | 0.1  |
| 6/13/2016 | 18.2 | 5.3  | 10   | 31.8 | 34.4  | 6.1  | 0    | 0.6  | 1    |
| 6/14/2016 | 29   | 8.1  | 10.1 | 49.4 | 46.5  | 3.2  | 0    | 1.3  | 3.8  |
| 6/15/2016 | 23.1 | 10.1 | 16.7 | 38.9 | 57.4  | 1.7  | 0    | 1.6  | 2.1  |
| 6/16/2016 | 26.7 | 7.6  | 16.1 | 31.9 | 20.9  | 1.8  | 0    | 0.8  | 2.5  |
| 6/17/2016 | 48.7 | 8.2  | 25.2 | 22.5 | 31.1  | 2    | 0    | 0.5  | 2.4  |
| 6/18/2016 | 31.1 | 8.3  | 35.1 | 38   | 34.4  | 3.6  | 0    | 0.7  | 2.7  |
| 6/19/2016 | 42.1 | 9.1  | 36.3 | 41.2 | 64    | 4.8  | 0    | 1.4  | 2    |
| 6/20/2016 | 8.3  | 8.3  | 11.5 | 17.1 | 20.5  | 7.8  | 0    | 1.5  | 1.3  |
| 6/21/2016 | 20.2 | 9.1  | 6.4  | 20.8 | 21.9  | 5.5  | 0    | 0.9  | 1.2  |

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|           |      |      |      |      |       |      |     |     |      |
|-----------|------|------|------|------|-------|------|-----|-----|------|
| 6/22/2016 | 21.3 | 12.8 | 5    | 18.9 | 43.3  | 4.5  | 0   | 1.9 | 2    |
| 6/23/2016 | 5    | 14.2 | 5    | 16.8 | 43.2  | 6.7  | 0   | 0.8 | 1.6  |
| 6/24/2016 | 12.1 | 12   | 13.3 | 15.3 | 55.7  | 6.3  | 0.1 | 0.5 | 1.9  |
| 6/25/2016 | 36.5 | 23   | 19.1 | 34.9 | 50.1  | 4.5  | 0   | 1.8 | 0.9  |
| 6/26/2016 | 25.4 | 22.5 | 18.1 | 29.5 | 81.5  | 12   | 0.4 | 1.2 | 1.8  |
| 6/27/2016 | 31.1 | 15.1 | 9.1  | 26.1 | 63.9  | 12.5 | 0.2 | 1   | 0.3  |
| 6/28/2016 | 7.6  | 9    | 23.1 | 22.1 | 44.9  | 11.6 | 0.1 | 0.4 | 0.1  |
| 6/29/2016 | 7.9  | 17   | 44.1 | 36.5 | 49.3  | 8.4  | 0   | 0.5 | 0    |
| 6/30/2016 | 22.3 | 13.7 | 7.6  | 17   | 54.5  | 13.7 | 0.2 | 0.6 | 0.2  |
| 7/1/2016  | 12.4 | 11.1 | 47.6 | 17.8 | 37.6  | 6.4  | 0.1 | 0.1 | 1.4  |
| 7/2/2016  | 11.9 | 11.7 | 36.7 | 18.5 | 40.5  | 6.7  | 0   | 0.3 | 2.5  |
| 7/3/2016  | 17.9 | 11.1 | 35.1 | 25.5 | 35.1  | 6.1  | 0.1 | 0.5 | 2.3  |
| 7/4/2016  | 24.2 | 18.1 | 47.3 | 38.1 | 43.8  | 6.4  | 0   | 1.3 | 3.5  |
| 7/5/2016  | 19.6 | 18.6 | 37.6 | 25.9 | 71.1  | 4.4  | 0   | 1.6 | 1.3  |
| 7/6/2016  | 18   | 21.5 | 12.2 | 10.2 | 30.5  | 4.5  | 0.1 | 2.1 | 2.9  |
| 7/7/2016  | 47.6 | 19.9 | 22.6 | 30   | 64    | 5.7  | 0.1 | 2.3 | 4.2  |
| 7/8/2016  | 27.4 | 26.4 | 10.1 | 15.1 | 51.3  | 2.1  | 0.1 | 5.9 | 2.4  |
| 7/9/2016  | 37   | 28.3 | 21.6 | 26.5 | 73.9  | 2.5  | 0   | 1.5 | 5.3  |
| 7/10/2016 | 55.3 | 33.5 | 16.5 | 24.4 | 92    | 2.4  | 0   | 2.8 | 7.4  |
| 7/11/2016 | 55.2 | 47.5 | 9.9  | 17.2 | 95.2  | 3.8  | 0.1 | 4.6 | 11.7 |
| 7/12/2016 | 84.7 | 57.2 | 26   | 33.5 | 145.1 | 5.8  | 0.1 | 4.2 | 8.2  |
| 7/13/2016 | 38.2 | 30   | 19.9 | 40.8 | 91.8  | 5.5  | 0   | 1.6 | 6    |
| 7/14/2016 | 12.7 | 44.6 | 9.4  | 15.6 | 55.9  | 5.4  | 0   | 2.8 | 3.9  |
| 7/15/2016 | 20.7 | 36.2 | 23.3 | 9.5  | 50.4  | 2.5  | 0   | 3.2 | 2.4  |
| 7/16/2016 | 23.1 | 46.7 | 16.8 | 19.7 | 108.5 | 9.2  | 0   | 0.8 | 1.9  |
| 7/17/2016 | 53.9 | 46.5 | 20.9 | 28.9 | 78.3  | 10.3 | 0   | 2   | 3.4  |
| 7/18/2016 | 42.4 | 31.4 | 12   | 24.3 | 102.6 | 6.3  | 0   | 1.2 | 1.5  |
| 7/19/2016 | 55.8 | 33.6 | 17.3 | 21.7 | 86.4  | 6.7  | 0   | 1.5 | 1.3  |
| 7/20/2016 | 54.9 | 38.6 | 21.9 | 28.7 | 73.6  | 5.4  | 0   | 1.1 | 1    |
| 7/21/2016 | 58.5 | 43.1 | 25.9 | 38   | 73.9  | 4.3  | 0   | 0.8 | 1.2  |
| 7/22/2016 | 49.4 | 51.8 | 23.9 | 36   | 54.9  | 3.5  | 0.1 | 3.4 | 1.8  |
| 7/23/2016 | 39.5 | 36.1 | 16.5 | 28.2 | 48.4  | 2.3  | 0   | 0.8 | 1.3  |
| 7/24/2016 | 42.2 | 36.4 | 20.4 | 28.2 | 53.3  | 2.8  | 0   | 1   | 1.6  |
| 7/25/2016 | 30   | 45.4 | 8.3  | 20.3 | 60.9  | 2.8  | 0   | 2.2 | 1.4  |
| 7/26/2016 | 62.7 | 46.8 | 12.8 | 16.1 | 54.3  | 2.6  | 0.1 | 2.2 | 1.3  |
| 7/27/2016 | 32.6 | 44.4 | 10.1 | 10.7 | 77.4  | 3.9  | 0   | 5.9 | 0.8  |
| 7/28/2016 | 28.8 | 32.2 | 6.2  | 23.2 | 77.6  | 4.4  | 0.1 | 3.7 | 1    |
| 7/29/2016 | 23.8 | 21.5 | 11   | 12.7 | 86.3  | 4.4  | 0   | 3.1 | 1.4  |
| 7/30/2016 | 22.5 | 29.5 | 10.4 | 16.9 | 94.4  | 4.7  | 0.1 | 3.5 | 1.6  |
| 7/31/2016 | 26.6 | 22.6 | 9    | 29.1 | 101.4 | 2.9  | 0   | 1.9 | 0.9  |
| 8/1/2016  | 25.9 | 44.4 | 13.1 | 27.2 | 85.8  | 3.7  | 0   | 3.9 | 1.4  |
| 8/2/2016  | 26.8 | 65.1 | 16.6 | 19.8 | 72.7  | 9    | 0   | 4.5 | 4.1  |
| 8/3/2016  | 19.8 | 71.5 | 16.4 | 19.5 | 76.1  | 13.8 | 0   | 3.9 | 8.2  |
| 8/4/2016  | 31.9 | 90.7 | 19.5 | 22.6 | 146.3 | 8.8  | 0   | 1.8 | 4.2  |

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|           |      |       |      |      |      |      |     |     |     |
|-----------|------|-------|------|------|------|------|-----|-----|-----|
| 8/5/2016  | 13.4 | 53.9  | 4.9  | 17.5 | 92.6 | 8.2  | 0   | 1.6 | 2.7 |
| 8/6/2016  | 13.4 | 46.1  | 7.1  | 15   | 64.8 | 3.8  | 0   | 1.2 | 3.1 |
| 8/7/2016  | 28.2 | 49.9  | 9.6  | 13.7 | 61.7 | 3.6  | 0   | 1.3 | 3.6 |
| 8/8/2016  | 24.9 | 44.9  | 6    | 14.1 | 76.6 | 5.1  | 0   | 1.7 | 5.8 |
| 8/9/2016  | 24   | 125.6 | 15.5 | 15.7 | 64.6 | 3.8  | 0   | 2.7 | 3.5 |
| 8/10/2016 | 22.2 | 58.3  | 3    | 8.2  | 37.5 | 2.5  | 0   | 2.4 | 1.3 |
| 8/11/2016 | 24.2 | 69.5  | 5.1  | 13.2 | 28.9 | 2.2  | 0.1 | 4.6 | 5.2 |
| 8/12/2016 | 15.5 | 36    | 2.9  | 11.6 | 48.2 | 2.5  | 0   | 1.6 | 3.3 |
| 8/13/2016 | 26.8 | 30.4  | 13   | 19.2 | 31.8 | 2.1  | 0   | 2.9 | 2.3 |
| 8/14/2016 | 26.4 | 26.8  | 11.7 | 23.2 | 48.9 | 3.2  | 0.1 | 4.4 | 2.8 |
| 8/15/2016 | 26.4 | 20.7  | 13.5 | 23.4 | 57.5 | 4.3  | 0.1 | 0.5 | 4.8 |
| 8/16/2016 | 16.3 | 19.8  | 3.9  | 18.2 | 30.6 | 3.6  | 0.1 | 2.6 | 2.5 |
| 8/17/2016 | 42.9 | 26.6  | 6.4  | 16.2 | 47   | 5.9  | 0   | 2.2 | 4.3 |
| 8/18/2016 | 13.2 | 23.2  | 2.6  | 9.1  | 21.6 | 2.2  | 0   | 2.1 | 1.8 |
| 8/19/2016 | 8.9  | 15.4  | 2.9  | 9.4  | 19.2 | 1.8  | 0   | 3.1 | 4.8 |
| 8/20/2016 | 9.2  | 9.4   | 1.1  | 11.8 | 30.4 | 0.5  | 0   | 1.8 | 1.9 |
| 8/21/2016 | 6.1  | 16.9  | 1.8  | 5    | 34.2 | 1.9  | 0   | 0.8 | 2.6 |
| 8/22/2016 | 44.7 | 13.3  | 0.7  | 4.7  | 272  | 10.7 | 0   | 0   | 15  |
| 8/23/2016 | 17.7 | 7.7   | 0.3  | 14   | 67.7 | 5.7  | 0   | 0   | 5   |
| 8/24/2016 | 60.5 | 11    | 0    | 2.5  | 67   | 2    | 0   | 0   | 2.5 |
| 8/25/2016 | 12   | 7.5   | 0    | 4    | 72   | 6.5  | 0   | 0   | 5   |

Table 8-3. Number of Calls Per Deployment-Night (All Parks Combined), for each Species, Expanded Analysis (Figure 4-12)

| Night     | EPFU | LABO | LACI | LANO | MYLU  | MYSE | MYSO | NYHU | PESU |
|-----------|------|------|------|------|-------|------|------|------|------|
| 5/24/2016 | 226  | 20   | 89   | 142  | 6     | 0    | 0    | 1    | 4    |
| 5/25/2016 | 27.8 | 4.8  | 16.4 | 31.4 | 0.2   | 0.6  | 0    | 1    | 0.4  |
| 5/26/2016 | 32.6 | 4.4  | 33.7 | 31.1 | 1.4   | 0    | 0    | 0.7  | 0.4  |
| 5/27/2016 | 18.6 | 1.7  | 19.3 | 30   | 1.6   | 0.1  | 0    | 0    | 0    |
| 5/28/2016 | 19.9 | 1.2  | 14.5 | 45   | 3.2   | 0    | 0    | 0.5  | 0.1  |
| 5/29/2016 | 20.9 | 3.1  | 40   | 64.8 | 7.6   | 0.8  | 0    | 0.9  | 0    |
| 5/30/2016 | 38.8 | 2.6  | 15.9 | 24.1 | 1.4   | 0.4  | 0    | 0.1  | 0.1  |
| 5/31/2016 | 16.4 | 5.1  | 26.4 | 28.9 | 16.6  | 0.4  | 0    | 0.8  | 1.7  |
| 6/1/2016  | 15.6 | 6.9  | 22.2 | 30.5 | 26.8  | 0.4  | 0    | 0.2  | 1.7  |
| 6/2/2016  | 9.3  | 5.3  | 15.7 | 18.5 | 32.1  | 0.9  | 0    | 0.4  | 3.4  |
| 6/3/2016  | 24.8 | 4.8  | 19   | 22.2 | 59.8  | 4.9  | 0    | 0.3  | 3.6  |
| 6/4/2016  | 16.6 | 7.2  | 10.4 | 18.5 | 147.7 | 4.6  | 0    | 0.2  | 2.7  |
| 6/5/2016  | 13.2 | 5    | 17.1 | 21.7 | 167.8 | 6    | 0    | 0.2  | 2.8  |
| 6/6/2016  | 16.2 | 6.4  | 20.2 | 18.7 | 109   | 5.2  | 0    | 0.5  | 9.2  |
| 6/7/2016  | 5.4  | 3.7  | 6.3  | 6.5  | 46.4  | 2.9  | 0    | 0.3  | 2.9  |
| 6/8/2016  | 14.3 | 2.3  | 6.5  | 10.2 | 30.8  | 6.3  | 0    | 0.3  | 1.1  |
| 6/9/2016  | 28.2 | 3.2  | 14.7 | 30.3 | 48.2  | 8.5  | 0.1  | 0.1  | 1.6  |
| 6/10/2016 | 19.8 | 6.7  | 12.2 | 40.8 | 35.7  | 7.7  | 0    | 0.4  | 0.8  |
| 6/11/2016 | 16.1 | 5    | 6.2  | 13   | 36.4  | 6.7  | 0.2  | 0.7  | 0.3  |

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|           |      |      |      |      |       |      |     |     |     |
|-----------|------|------|------|------|-------|------|-----|-----|-----|
| 6/12/2016 | 8.6  | 1.8  | 3.6  | 15.9 | 9.1   | 1.9  | 0.1 | 0   | 0.2 |
| 6/13/2016 | 18.3 | 5    | 10   | 31.8 | 34.3  | 6.6  | 0   | 0.8 | 1   |
| 6/14/2016 | 29   | 7.9  | 10.2 | 49.4 | 46.4  | 3.1  | 0.1 | 1.3 | 3.9 |
| 6/15/2016 | 23.1 | 9.9  | 16.8 | 38.9 | 57.4  | 1.7  | 0   | 1.8 | 2.1 |
| 6/16/2016 | 26.8 | 7.1  | 16.1 | 31.9 | 20.8  | 1.8  | 0   | 1   | 2.6 |
| 6/17/2016 | 48.7 | 7.6  | 25.2 | 22.5 | 31    | 2.1  | 0   | 1   | 2.5 |
| 6/18/2016 | 31.2 | 8    | 35.1 | 38   | 34.3  | 3.5  | 0   | 1   | 2.9 |
| 6/19/2016 | 42.1 | 8.6  | 36.2 | 41.2 | 63.8  | 5    | 0   | 1.7 | 2   |
| 6/20/2016 | 8.3  | 7.9  | 11.5 | 17   | 20.3  | 7.9  | 0   | 1.8 | 1.4 |
| 6/21/2016 | 20.2 | 8.5  | 6.4  | 20.8 | 22.1  | 5.5  | 0   | 1.3 | 1.3 |
| 6/22/2016 | 21.3 | 12.7 | 4.9  | 19.1 | 38.8  | 4.5  | 4.2 | 2   | 2.1 |
| 6/23/2016 | 5    | 13.6 | 5    | 16.8 | 41.9  | 6.6  | 1.4 | 1   | 1.6 |
| 6/24/2016 | 12.1 | 11.2 | 13.4 | 15.3 | 53.6  | 6.2  | 2.5 | 0.8 | 2.1 |
| 6/25/2016 | 36.5 | 21.3 | 19.1 | 35   | 48.3  | 4.5  | 2.3 | 2.1 | 1.4 |
| 6/26/2016 | 25.5 | 21.9 | 18.1 | 29.5 | 79.5  | 11.8 | 2.5 | 1.3 | 2   |
| 6/27/2016 | 31.1 | 14.9 | 9.1  | 26.2 | 60.2  | 12.5 | 3.6 | 1.2 | 0.4 |
| 6/28/2016 | 7.6  | 8.3  | 23.2 | 22   | 43    | 11.6 | 2.1 | 0.6 | 0.3 |
| 6/29/2016 | 8    | 15.7 | 44.1 | 36.5 | 46.9  | 8.4  | 2.7 | 0.7 | 0.6 |
| 6/30/2016 | 22.2 | 13.4 | 7.6  | 17   | 52.5  | 13.7 | 2.1 | 0.7 | 0.3 |
| 7/1/2016  | 12.5 | 11   | 47.6 | 17.8 | 36.7  | 6.4  | 0.8 | 0.2 | 1.6 |
| 7/2/2016  | 11.9 | 11.8 | 36.7 | 18.5 | 39.6  | 6.7  | 0.7 | 0.5 | 2.6 |
| 7/3/2016  | 18   | 10.5 | 35.1 | 25.4 | 35    | 6    | 0.4 | 0.8 | 2.4 |
| 7/4/2016  | 24.2 | 17.6 | 47.3 | 38.1 | 43.1  | 6.5  | 0.5 | 1.6 | 3.8 |
| 7/5/2016  | 19.6 | 18.6 | 37.6 | 25.9 | 69.9  | 4.4  | 1.1 | 1.6 | 1.3 |
| 7/6/2016  | 18.1 | 21.4 | 12.2 | 10.2 | 30    | 4.6  | 0.4 | 2.2 | 3   |
| 7/7/2016  | 47.7 | 18.8 | 22.6 | 30   | 63.3  | 5.8  | 0.3 | 3.2 | 4.3 |
| 7/8/2016  | 27.4 | 25.8 | 10.1 | 15.1 | 50.9  | 2.1  | 0.5 | 6.3 | 2.5 |
| 7/9/2016  | 37   | 27.4 | 21.7 | 26.5 | 73.6  | 2.5  | 0.2 | 2.2 | 5.3 |
| 7/10/2016 | 55.4 | 32.9 | 16.5 | 24.5 | 90.6  | 2.3  | 1.1 | 3.4 | 7.6 |
| 7/11/2016 | 55.2 | 46.3 | 9.9  | 17.2 | 94.8  | 3.7  | 0.1 | 5.8 | 12  |
| 7/12/2016 | 84.7 | 55.9 | 26   | 33.6 | 144.3 | 5.8  | 0.6 | 5   | 8.5 |
| 7/13/2016 | 38.3 | 28   | 19.9 | 40.7 | 91.6  | 5.6  | 0.7 | 2.3 | 6.5 |
| 7/14/2016 | 12.7 | 43.4 | 9.4  | 15.7 | 55.3  | 5.4  | 0.6 | 3.1 | 4.5 |
| 7/15/2016 | 20.8 | 34.5 | 23.4 | 9.5  | 50.4  | 2.5  | 0.2 | 3.9 | 2.8 |
| 7/16/2016 | 23.2 | 44.4 | 16.9 | 19.9 | 108.5 | 9.1  | 0.7 | 1.2 | 2.6 |
| 7/17/2016 | 53.9 | 43.8 | 20.9 | 28.9 | 77.6  | 10.7 | 0.7 | 2.8 | 4.3 |
| 7/18/2016 | 42.4 | 30.1 | 12   | 24.3 | 102.6 | 6.2  | 0.4 | 1.7 | 1.9 |
| 7/19/2016 | 55.8 | 30.7 | 17.3 | 21.8 | 86    | 6.7  | 0   | 4.5 | 1.4 |
| 7/20/2016 | 55.1 | 36.4 | 21.9 | 28.7 | 72.2  | 5.4  | 1   | 2.8 | 1.4 |
| 7/21/2016 | 58.6 | 41.2 | 26   | 37.9 | 73.2  | 4.4  | 0.5 | 2   | 1.8 |
| 7/22/2016 | 49.4 | 50.4 | 23.9 | 36   | 54.2  | 3.5  | 0.6 | 4.6 | 2   |
| 7/23/2016 | 39.5 | 34.7 | 16.6 | 28.2 | 47.8  | 2.3  | 0.3 | 1.9 | 1.6 |
| 7/24/2016 | 42.3 | 34.8 | 20.4 | 28.1 | 52.2  | 2.8  | 0.8 | 2.3 | 1.9 |
| 7/25/2016 | 30   | 43.3 | 8.3  | 20.3 | 60.2  | 2.9  | 0.3 | 3.4 | 2.2 |

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|           |      |       |      |      |       |      |     |     |      |
|-----------|------|-------|------|------|-------|------|-----|-----|------|
| 7/26/2016 | 62.8 | 44.8  | 12.7 | 16.1 | 54    | 2.5  | 0.8 | 2.5 | 2.3  |
| 7/27/2016 | 32.6 | 43.2  | 10.1 | 10.7 | 77    | 3.9  | 0.2 | 6.1 | 1.5  |
| 7/28/2016 | 28.8 | 31.1  | 6.2  | 23.2 | 76.9  | 4.4  | 0.6 | 3.8 | 1.5  |
| 7/29/2016 | 23.8 | 20.9  | 11   | 12.7 | 85.9  | 4.4  | 0   | 3.5 | 1.8  |
| 7/30/2016 | 22.5 | 28.6  | 10.4 | 16.9 | 94.1  | 4.7  | 0.1 | 3.7 | 2.3  |
| 7/31/2016 | 26.6 | 21.7  | 9    | 29.1 | 101.2 | 2.7  | 0   | 2.2 | 1.6  |
| 8/1/2016  | 25.9 | 43.2  | 13.1 | 27.2 | 86    | 3.8  | 0   | 4.1 | 2.3  |
| 8/2/2016  | 26.9 | 62.9  | 16.6 | 19.8 | 72.1  | 9.1  | 0.5 | 4.6 | 5.8  |
| 8/3/2016  | 19.8 | 67.4  | 16.5 | 19.5 | 75.9  | 13.8 | 0.8 | 4.1 | 11.1 |
| 8/4/2016  | 32.2 | 86.2  | 19.6 | 22.7 | 145.7 | 8.7  | 0.6 | 2.1 | 7.3  |
| 8/5/2016  | 13.4 | 52.3  | 4.9  | 17.5 | 92    | 8.3  | 0.5 | 1.7 | 3.8  |
| 8/6/2016  | 13.4 | 44.2  | 7.1  | 15   | 63.3  | 3.9  | 1.6 | 1.4 | 4.4  |
| 8/7/2016  | 28.2 | 47.5  | 9.6  | 13.7 | 61.1  | 3.9  | 1.3 | 1.4 | 4.4  |
| 8/8/2016  | 25   | 43.4  | 5.9  | 14.1 | 76    | 5.1  | 0.9 | 2.2 | 6.2  |
| 8/9/2016  | 24   | 120.2 | 15.6 | 15.7 | 65.2  | 3.7  | 0.3 | 3.3 | 6.6  |
| 8/10/2016 | 22.3 | 54.2  | 3    | 8.3  | 37.6  | 2.5  | 0.3 | 2.5 | 4.5  |
| 8/11/2016 | 24.2 | 63.2  | 5.1  | 13.2 | 28.6  | 2.2  | 0.7 | 5   | 9.3  |
| 8/12/2016 | 15.5 | 34.5  | 2.9  | 11.6 | 47.8  | 2.5  | 0.6 | 1.8 | 4.2  |
| 8/13/2016 | 26.8 | 28.4  | 13   | 19.2 | 31.7  | 2.1  | 0   | 4.4 | 2.8  |
| 8/14/2016 | 26.4 | 25    | 11.7 | 23.3 | 48.6  | 3.2  | 0.1 | 6.2 | 3    |
| 8/15/2016 | 26.4 | 18.2  | 13.6 | 23.3 | 57.2  | 4.3  | 0.1 | 2.4 | 5.3  |
| 8/16/2016 | 16.4 | 19.5  | 3.8  | 18.2 | 30.6  | 3.6  | 0.1 | 2.9 | 2.5  |
| 8/17/2016 | 43   | 26.5  | 6.4  | 16.2 | 46.6  | 5.9  | 0   | 2.5 | 4.3  |
| 8/18/2016 | 13.2 | 23    | 2.6  | 9.1  | 21.6  | 2.2  | 0   | 2.1 | 1.8  |
| 8/19/2016 | 8.9  | 15.2  | 2.9  | 9.4  | 19.1  | 1.8  | 0   | 3.1 | 4.9  |
| 8/20/2016 | 9.4  | 9.2   | 1.1  | 11.8 | 30.4  | 0.5  | 0   | 1.8 | 1.9  |
| 8/21/2016 | 6.1  | 17    | 1.8  | 5    | 34.2  | 1.8  | 0   | 0.8 | 2.6  |
| 8/22/2016 | 44.7 | 13.3  | 0.7  | 4.7  | 271.7 | 10.7 | 0   | 0   | 15.3 |
| 8/23/2016 | 17.7 | 7.7   | 0.3  | 14   | 67.7  | 5.7  | 0   | 0   | 5    |
| 8/24/2016 | 60.5 | 11    | 0    | 2.5  | 67    | 2    | 0   | 0   | 2.5  |
| 8/25/2016 | 12   | 7.5   | 0    | 4    | 72.5  | 6    | 0   | 0   | 5    |

Table 8-4. Total number of Calls Recorded (All Species Combined), for each Date and Park (Summer only) (Figure 4-15)

| Night     | INDU | MISS | SACN | SLBE | PIRO | APIS | ISRO | GRPO | VOYA |
|-----------|------|------|------|------|------|------|------|------|------|
| 5/24/2016 | 0    | 489  | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 5/25/2016 | 0    | 322  | 0    | 0    | 94   | 0    | 0    | 0    | 0    |
| 5/26/2016 | 0    | 505  | 0    | 0    | 270  | 0    | 0    | 0    | 0    |
| 5/27/2016 | 0    | 337  | 0    | 0    | 172  | 0    | 0    | 0    | 0    |
| 5/28/2016 | 0    | 348  | 0    | 0    | 355  | 0    | 0    | 0    | 0    |
| 5/29/2016 | 0    | 273  | 0    | 0    | 889  | 0    | 0    | 0    | 0    |
| 5/30/2016 | 0    | 579  | 0    | 0    | 97   | 0    | 0    | 0    | 0    |
| 5/31/2016 | 0    | 457  | 0    | 0    | 426  | 0    | 0    | 0    | 0    |

**NPS GLKN Report 2016 (updated)**

|           |      |      |      |      |      |      |      |     |     |
|-----------|------|------|------|------|------|------|------|-----|-----|
| 6/1/2016  | 0    | 687  | 0    | 0    | 400  | 0    | 0    | 0   | 0   |
| 6/2/2016  | 0    | 622  | 237  | 0    | 84   | 360  | 0    | 0   | 0   |
| 6/3/2016  | 0    | 994  | 1187 | 0    | 316  | 56   | 0    | 0   | 0   |
| 6/4/2016  | 0    | 811  | 2087 | 0    | 215  | 666  | 0    | 0   | 0   |
| 6/5/2016  | 0    | 803  | 1652 | 0    | 159  | 1418 | 0    | 0   | 0   |
| 6/6/2016  | 0    | 882  | 1116 | 0    | 0    | 417  | 17   | 0   | 0   |
| 6/7/2016  | 0    | 298  | 527  | 0    | 0    | 149  | 18   | 0   | 130 |
| 6/8/2016  | 0    | 447  | 640  | 35   | 4    | 126  | 73   | 261 | 154 |
| 6/9/2016  | 0    | 792  | 1410 | 831  | 15   | 108  | 112  | 337 | 490 |
| 6/10/2016 | 218  | 804  | 0    | 1248 | 32   | 228  | 201  | 479 | 473 |
| 6/11/2016 | 212  | 760  | 0    | 375  | 52   | 202  | 399  | 338 | 141 |
| 6/12/2016 | 46   | 341  | 0    | 347  | 1    | 66   | 195  | 9   | 199 |
| 6/13/2016 | 282  | 598  | 0    | 1112 | 13   | 35   | 559  | 262 | 307 |
| 6/14/2016 | 1157 | 552  | 0    | 1163 | 8    | 38   | 1016 | 0   | 187 |
| 6/15/2016 | 951  | 791  | 190  | 999  | 173  | 24   | 1221 | 0   | 250 |
| 6/16/2016 | 374  | 957  | 109  | 1035 | 249  | 53   | 380  | 0   | 136 |
| 6/17/2016 | 294  | 1664 | 149  | 0    | 542  | 97   | 381  | 0   | 145 |
| 6/18/2016 | 458  | 1475 | 277  | 0    | 794  | 111  | 670  | 0   | 297 |
| 6/19/2016 | 501  | 1367 | 138  | 0    | 1403 | 749  | 567  | 0   | 557 |
| 6/20/2016 | 317  | 499  | 155  | 0    | 297  | 177  | 178  | 195 | 193 |
| 6/21/2016 | 291  | 1005 | 217  | 0    | 273  | 105  | 251  | 183 | 118 |
| 6/22/2016 | 620  | 909  | 0    | 1274 | 15   | 42   | 276  | 189 | 125 |
| 6/23/2016 | 262  | 499  | 0    | 1151 | 27   | 298  | 283  | 245 | 157 |
| 6/24/2016 | 189  | 1057 | 492  | 967  | 30   | 242  | 286  | 293 | 474 |
| 6/25/2016 | 736  | 1671 | 358  | 1999 | 189  | 133  | 253  | 190 | 213 |
| 6/26/2016 | 613  | 1439 | 553  | 1918 | 142  | 720  | 443  | 437 | 128 |
| 6/27/2016 | 862  | 1051 | 1428 | 1453 | 88   | 69   | 228  | 213 | 72  |
| 6/28/2016 | 334  | 461  | 1385 | 927  | 13   | 154  | 175  | 181 | 449 |
| 6/29/2016 | 299  | 416  | 1665 | 1201 | 507  | 974  | 182  | 76  | 485 |
| 6/30/2016 | 970  | 1078 | 972  | 609  | 17   | 340  | 122  | 74  | 401 |
| 7/1/2016  | 375  | 409  | 612  | 419  | 253  | 1245 | 115  | 191 | 326 |
| 7/2/2016  | 410  | 520  | 777  | 340  | 199  | 993  | 639  | 288 | 385 |
| 7/3/2016  | 553  | 697  | 980  | 239  | 322  | 856  | 98   | 286 | 567 |
| 7/4/2016  | 718  | 846  | 1252 | 486  | 465  | 1355 | 315  | 388 | 449 |
| 7/5/2016  | 836  | 634  | 933  | 431  | 496  | 1263 | 590  | 171 | 464 |
| 7/6/2016  | 972  | 746  | 403  | 244  | 17   | 271  | 173  | 81  | 395 |
| 7/7/2016  | 934  | 2429 | 1983 | 183  | 156  | 30   | 570  | 283 | 401 |
| 7/8/2016  | 1504 | 1327 | 672  | 239  | 49   | 194  | 217  | 509 | 146 |
| 7/9/2016  | 1351 | 2380 | 1512 | 124  | 34   | 356  | 136  | 56  | 26  |
| 7/10/2016 | 1606 | 2164 | 2214 | 362  | 197  | 123  | 364  | 62  | 23  |
| 7/11/2016 | 1281 | 2443 | 935  | 22   | 614  | 660  | 19   | 2   | 0   |
| 7/12/2016 | 1597 | 2640 | 3275 | 567  | 179  | 2429 | 546  | 205 | 0   |
| 7/13/2016 | 992  | 2299 | 1853 | 687  | 10   | 1237 | 69   | 171 | 0   |
| 7/14/2016 | 1656 | 454  | 1269 | 419  | 6    | 663  | 1    | 270 | 0   |

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|           |      |      |      |      |    |      |     |      |      |
|-----------|------|------|------|------|----|------|-----|------|------|
| 7/15/2016 | 875  | 1041 | 2058 | 280  | 72 | 508  | 18  | 31   | 0    |
| 7/16/2016 | 374  | 887  | 2117 | 917  | 15 | 2148 | 71  | 249  | 1690 |
| 7/17/2016 | 1311 | 2217 | 2310 | 750  | 9  | 779  | 54  | 202  | 1250 |
| 7/18/2016 | 935  | 2688 | 0    | 1047 | 1  | 695  | 18  | 13   | 1958 |
| 7/19/2016 | 1406 | 2019 | 323  | 0    | 19 | 442  | 47  | 81   | 1758 |
| 7/20/2016 | 1586 | 1573 | 332  | 2576 | 10 | 406  | 44  | 131  | 1062 |
| 7/21/2016 | 1106 | 2296 | 624  | 2525 | 1  | 804  | 109 | 336  | 606  |
| 7/22/2016 | 1570 | 2138 | 599  | 2133 | 2  | 244  | 91  | 322  | 594  |
| 7/23/2016 | 796  | 1269 | 452  | 2006 | 0  | 375  | 87  | 133  | 820  |
| 7/24/2016 | 913  | 1823 | 346  | 1633 | 2  | 616  | 105 | 112  | 613  |
| 7/25/2016 | 1267 | 1143 | 487  | 1044 | 1  | 1025 | 56  | 572  | 632  |
| 7/26/2016 | 1465 | 898  | 39   | 2114 | 3  | 1221 | 68  | 298  | 112  |
| 7/27/2016 | 1732 | 978  | 34   | 1180 | 1  | 1046 | 97  | 260  | 500  |
| 7/28/2016 | 1379 | 603  | 0    | 1151 | 0  | 1917 | 182 | 138  | 336  |
| 7/29/2016 | 1063 | 750  | 301  | 0    | 0  | 1307 | 217 | 384  | 471  |
| 7/30/2016 | 934  | 1210 | 601  | 0    | 0  | 1120 | 309 | 435  | 405  |
| 7/31/2016 | 805  | 1713 | 734  | 0    | 0  | 712  | 576 | 436  | 340  |
| 8/1/2016  | 1706 | 813  | 1178 | 0    | 0  | 873  | 799 | 213  | 450  |
| 8/2/2016  | 1960 | 1043 | 781  | 1282 | 0  | 316  | 627 | 969  | 322  |
| 8/3/2016  | 1376 | 1289 | 704  | 1898 | 0  | 1127 | 823 | 1194 | 163  |
| 8/4/2016  | 1025 | 1149 | 620  | 3290 | 0  | 1449 | 847 | 1624 | 1518 |
| 8/5/2016  | 961  | 1278 | 256  | 961  | 0  | 518  | 378 | 1942 | 601  |
| 8/6/2016  | 590  | 1123 | 247  | 1188 | 0  | 116  | 288 | 1413 | 38   |
| 8/7/2016  | 1184 | 1132 | 258  | 1089 | 0  | 103  | 225 | 1378 | 0    |
| 8/8/2016  | 919  | 1158 | 196  | 984  | 0  | 183  | 718 | 1265 | 0    |
| 8/9/2016  | 1181 | 860  | 133  | 3622 | 0  | 154  | 805 | 1247 | 0    |
| 8/10/2016 | 955  | 873  | 69   | 1797 | 0  | 44   | 541 | 378  | 0    |
| 8/11/2016 | 1531 | 909  | 293  | 1703 | 0  | 160  | 141 | 394  | 0    |
| 8/12/2016 | 799  | 865  | 268  | 280  | 0  | 126  | 679 | 927  | 0    |
| 8/13/2016 | 955  | 1334 | 603  | 0    | 0  | 131  | 201 | 420  | 0    |
| 8/14/2016 | 1057 | 1138 | 542  | 0    | 0  | 103  | 864 | 195  | 0    |
| 8/15/2016 | 180  | 1076 | 419  | 0    | 0  | 202  | 535 | 496  | 0    |
| 8/16/2016 | 404  | 526  | 113  | 0    | 0  | 131  | 202 | 301  | 0    |
| 8/17/2016 | 424  | 1091 | 45   | 0    | 0  | 114  | 315 | 305  | 0    |
| 8/18/2016 | 240  | 211  | 0    | 0    | 0  | 161  | 75  | 0    | 0    |
| 8/19/2016 | 208  | 177  | 0    | 0    | 0  | 58   | 89  | 0    | 0    |
| 8/20/2016 | 206  | 315  | 0    | 0    | 0  | 10   | 2   | 0    | 0    |
| 8/21/2016 | 96   | 303  | 0    | 0    | 0  | 62   | 96  | 0    | 0    |
| 8/22/2016 | 0    | 1045 | 0    | 0    | 0  | 0    | 41  | 0    | 0    |
| 8/23/2016 | 0    | 286  | 0    | 0    | 0  | 0    | 73  | 0    | 0    |
| 8/24/2016 | 0    | 292  | 0    | 0    | 0  | 0    | 0   | 0    | 0    |
| 8/25/2016 | 0    | 214  | 0    | 0    | 0  | 0    | 0   | 0    | 0    |

Table 8-5. Number of Calls Per Deployment-Night Per Night (All Species Combined), for each Park (Figure 4-16)

| Night     | INDU | MISS | SACN  | SLBE | PIRO  | APIS | ISRO | GRPO | VOYA |
|-----------|------|------|-------|------|-------|------|------|------|------|
| 5/24/2016 | 0    | 489  | 0     | 0    | 0     | 0    | 0    | 0    | 0    |
| 5/25/2016 | 0    | 64.4 | 0     | 0    | 18.8  | 0    | 0    | 0    | 0    |
| 5/26/2016 | 0    | 72.1 | 0     | 0    | 38.6  | 0    | 0    | 0    | 0    |
| 5/27/2016 | 0    | 48.1 | 0     | 0    | 24.6  | 0    | 0    | 0    | 0    |
| 5/28/2016 | 0    | 43.5 | 0     | 0    | 44.4  | 0    | 0    | 0    | 0    |
| 5/29/2016 | 0    | 34.1 | 0     | 0    | 111.1 | 0    | 0    | 0    | 0    |
| 5/30/2016 | 0    | 72.4 | 0     | 0    | 12.1  | 0    | 0    | 0    | 0    |
| 5/31/2016 | 0    | 50.8 | 0     | 0    | 47.3  | 0    | 0    | 0    | 0    |
| 6/1/2016  | 0    | 68.7 | 0     | 0    | 40    | 0    | 0    | 0    | 0    |
| 6/2/2016  | 0    | 41.5 | 15.8  | 0    | 5.6   | 24   | 0    | 0    | 0    |
| 6/3/2016  | 0    | 55.2 | 65.9  | 0    | 17.6  | 3.1  | 0    | 0    | 0    |
| 6/4/2016  | 0    | 45.1 | 115.9 | 0    | 11.9  | 37   | 0    | 0    | 0    |
| 6/5/2016  | 0    | 47.2 | 97.2  | 0    | 9.4   | 83.4 | 0    | 0    | 0    |
| 6/6/2016  | 0    | 67.8 | 85.8  | 0    | 0     | 32.1 | 1.3  | 0    | 0    |
| 6/7/2016  | 0    | 19.9 | 35.1  | 0    | 0     | 9.9  | 1.2  | 0    | 8.7  |
| 6/8/2016  | 0    | 18.6 | 26.7  | 1.5  | 0.2   | 5.2  | 3    | 10.9 | 6.4  |
| 6/9/2016  | 0    | 26.4 | 47    | 27.7 | 0.5   | 3.6  | 3.7  | 11.2 | 16.3 |
| 6/10/2016 | 7.5  | 27.7 | 0     | 43   | 1.1   | 7.9  | 6.9  | 16.5 | 16.3 |
| 6/11/2016 | 7.3  | 26.2 | 0     | 12.9 | 1.8   | 7    | 13.8 | 11.7 | 4.9  |
| 6/12/2016 | 1.6  | 11.8 | 0     | 12   | 0     | 2.3  | 6.7  | 0.3  | 6.9  |
| 6/13/2016 | 9.7  | 20.6 | 0     | 38.3 | 0.4   | 1.2  | 19.3 | 9    | 10.6 |
| 6/14/2016 | 42.9 | 20.4 | 0     | 43.1 | 0.3   | 1.4  | 37.6 | 0    | 6.9  |
| 6/15/2016 | 31.7 | 26.4 | 6.3   | 33.3 | 5.8   | 0.8  | 40.7 | 0    | 8.3  |
| 6/16/2016 | 12.5 | 31.9 | 3.6   | 34.5 | 8.3   | 1.8  | 12.7 | 0    | 4.5  |
| 6/17/2016 | 12.8 | 72.3 | 6.5   | 0    | 23.6  | 4.2  | 16.6 | 0    | 6.3  |
| 6/18/2016 | 17.6 | 56.7 | 10.7  | 0    | 30.5  | 4.3  | 25.8 | 0    | 11.4 |
| 6/19/2016 | 19.3 | 52.6 | 5.3   | 0    | 54    | 28.8 | 21.8 | 0    | 21.4 |
| 6/20/2016 | 12.2 | 19.2 | 6     | 0    | 11.4  | 6.8  | 6.8  | 7.5  | 7.4  |
| 6/21/2016 | 10.4 | 35.9 | 7.8   | 0    | 9.8   | 3.8  | 9    | 6.5  | 4.2  |
| 6/22/2016 | 20   | 29.3 | 0     | 41.1 | 0.5   | 1.4  | 8.9  | 6.1  | 4    |
| 6/23/2016 | 8.5  | 16.1 | 0     | 37.1 | 0.9   | 9.6  | 9.1  | 7.9  | 5.1  |
| 6/24/2016 | 5.6  | 31.1 | 14.5  | 28.4 | 0.9   | 7.1  | 8.4  | 8.6  | 13.9 |
| 6/25/2016 | 22.3 | 50.6 | 10.8  | 60.6 | 5.7   | 4    | 7.7  | 5.8  | 6.5  |
| 6/26/2016 | 18.6 | 43.6 | 16.8  | 58.1 | 4.3   | 21.8 | 13.4 | 13.2 | 3.9  |
| 6/27/2016 | 25.4 | 30.9 | 42    | 42.7 | 2.6   | 2    | 6.7  | 6.3  | 2.1  |
| 6/28/2016 | 9.8  | 13.6 | 40.7  | 27.3 | 0.4   | 4.5  | 5.1  | 5.3  | 13.2 |
| 6/29/2016 | 8.5  | 11.9 | 47.6  | 34.3 | 14.5  | 27.8 | 5.2  | 2.2  | 13.9 |
| 6/30/2016 | 27.7 | 30.8 | 27.8  | 17.4 | 0.5   | 9.7  | 3.5  | 2.1  | 11.5 |
| 7/1/2016  | 12.9 | 14.1 | 21.1  | 14.4 | 8.7   | 42.9 | 4    | 6.6  | 11.2 |
| 7/2/2016  | 11.7 | 14.9 | 22.2  | 9.7  | 5.7   | 28.4 | 18.3 | 8.2  | 11   |
| 7/3/2016  | 16.3 | 20.5 | 28.8  | 7    | 9.5   | 25.2 | 2.9  | 8.4  | 16.7 |

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|           |      |       |       |       |      |      |      |      |      |
|-----------|------|-------|-------|-------|------|------|------|------|------|
| 7/4/2016  | 21.1 | 24.9  | 36.8  | 14.3  | 13.7 | 39.9 | 9.3  | 11.4 | 13.2 |
| 7/5/2016  | 26.1 | 19.8  | 29.2  | 13.5  | 15.5 | 39.5 | 18.4 | 5.3  | 14.5 |
| 7/6/2016  | 30.4 | 23.3  | 12.6  | 7.6   | 0.5  | 8.5  | 5.4  | 2.5  | 12.3 |
| 7/7/2016  | 26.7 | 69.4  | 56.7  | 5.2   | 4.5  | 0.9  | 16.3 | 8.1  | 11.5 |
| 7/8/2016  | 44.2 | 39    | 19.8  | 7     | 1.4  | 5.7  | 6.4  | 15   | 4.3  |
| 7/9/2016  | 45   | 79.3  | 50.4  | 4.1   | 1.1  | 11.9 | 4.5  | 1.9  | 0.9  |
| 7/10/2016 | 53.5 | 72.1  | 73.8  | 12.1  | 6.6  | 4.1  | 12.1 | 2.1  | 0.8  |
| 7/11/2016 | 53.4 | 101.8 | 39    | 0.9   | 25.6 | 27.5 | 0.8  | 0.1  | 0    |
| 7/12/2016 | 51.5 | 85.2  | 105.6 | 18.3  | 5.8  | 78.4 | 17.6 | 6.6  | 0    |
| 7/13/2016 | 32   | 74.2  | 59.8  | 22.2  | 0.3  | 39.9 | 2.2  | 5.5  | 0    |
| 7/14/2016 | 53.4 | 14.6  | 40.9  | 13.5  | 0.2  | 21.4 | 0    | 8.7  | 0    |
| 7/15/2016 | 27.3 | 32.5  | 64.3  | 8.8   | 2.2  | 15.9 | 0.6  | 1    | 0    |
| 7/16/2016 | 10.1 | 24    | 57.2  | 24.8  | 0.4  | 58.1 | 1.9  | 6.7  | 45.7 |
| 7/17/2016 | 36.4 | 61.6  | 64.2  | 20.8  | 0.2  | 21.6 | 1.5  | 5.6  | 34.7 |
| 7/18/2016 | 28.3 | 81.5  | 0     | 31.7  | 0    | 21.1 | 0.5  | 0.4  | 59.3 |
| 7/19/2016 | 52.1 | 74.8  | 12    | 0     | 0.7  | 16.4 | 1.7  | 3    | 65.1 |
| 7/20/2016 | 46.6 | 46.3  | 9.8   | 75.8  | 0.3  | 11.9 | 1.3  | 3.9  | 31.2 |
| 7/21/2016 | 32.5 | 67.5  | 18.4  | 74.3  | 0    | 23.6 | 3.2  | 9.9  | 17.8 |
| 7/22/2016 | 46.2 | 62.9  | 17.6  | 62.7  | 0.1  | 7.2  | 2.7  | 9.5  | 17.5 |
| 7/23/2016 | 23.4 | 37.3  | 13.3  | 59    | 0    | 11   | 2.6  | 3.9  | 24.1 |
| 7/24/2016 | 27.7 | 55.2  | 10.5  | 49.5  | 0.1  | 18.7 | 3.2  | 3.4  | 18.6 |
| 7/25/2016 | 35.2 | 31.8  | 13.5  | 29    | 0    | 28.5 | 1.6  | 15.9 | 17.6 |
| 7/26/2016 | 47.3 | 29    | 1.3   | 68.2  | 0.1  | 39.4 | 2.2  | 9.6  | 3.6  |
| 7/27/2016 | 55.9 | 31.5  | 1.1   | 38.1  | 0    | 33.7 | 3.1  | 8.4  | 16.1 |
| 7/28/2016 | 43.1 | 18.8  | 0     | 36    | 0    | 59.9 | 5.7  | 4.3  | 10.5 |
| 7/29/2016 | 39.4 | 27.8  | 11.1  | 0     | 0    | 48.4 | 8    | 14.2 | 17.4 |
| 7/30/2016 | 34.6 | 44.8  | 22.3  | 0     | 0    | 41.5 | 11.4 | 16.1 | 15   |
| 7/31/2016 | 29.8 | 63.4  | 27.2  | 0     | 0    | 26.4 | 21.3 | 16.1 | 12.6 |
| 8/1/2016  | 58.8 | 28    | 40.6  | 0     | 0    | 30.1 | 27.6 | 7.3  | 15.5 |
| 8/2/2016  | 59.4 | 31.6  | 23.7  | 38.8  | 0    | 9.6  | 19   | 29.4 | 9.8  |
| 8/3/2016  | 37.2 | 34.8  | 19    | 51.3  | 0    | 30.5 | 22.2 | 32.3 | 4.4  |
| 8/4/2016  | 29.3 | 32.8  | 17.7  | 94    | 0    | 41.4 | 24.2 | 46.4 | 43.4 |
| 8/5/2016  | 27.5 | 36.5  | 7.3   | 27.5  | 0    | 14.8 | 10.8 | 55.5 | 17.2 |
| 8/6/2016  | 18.4 | 35.1  | 7.7   | 37.1  | 0    | 3.6  | 9    | 44.2 | 1.2  |
| 8/7/2016  | 38.2 | 36.5  | 8.3   | 35.1  | 0    | 3.3  | 7.3  | 44.5 | 0    |
| 8/8/2016  | 30.6 | 38.6  | 6.5   | 32.8  | 0    | 6.1  | 23.9 | 42.2 | 0    |
| 8/9/2016  | 38.1 | 27.7  | 4.3   | 116.8 | 0    | 5    | 26   | 40.2 | 0    |
| 8/10/2016 | 28.1 | 25.7  | 2     | 52.9  | 0    | 1.3  | 15.9 | 11.1 | 0    |
| 8/11/2016 | 46.4 | 27.5  | 8.9   | 51.6  | 0    | 4.8  | 4.3  | 11.9 | 0    |
| 8/12/2016 | 25   | 27    | 8.4   | 8.8   | 0    | 3.9  | 21.2 | 29   | 0    |
| 8/13/2016 | 34.1 | 47.6  | 21.5  | 0     | 0    | 4.7  | 7.2  | 15   | 0    |
| 8/14/2016 | 40.7 | 43.8  | 20.8  | 0     | 0    | 4    | 33.2 | 7.5  | 0    |
| 8/15/2016 | 9.5  | 56.6  | 22.1  | 0     | 0    | 10.6 | 28.2 | 26.1 | 0    |
| 8/16/2016 | 23.8 | 30.9  | 6.6   | 0     | 0    | 7.7  | 11.9 | 17.7 | 0    |

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|                  |      |       |   |   |   |      |      |      |   |
|------------------|------|-------|---|---|---|------|------|------|---|
| <b>8/17/2016</b> | 28.3 | 72.7  | 3 | 0 | 0 | 7.6  | 21   | 20.3 | 0 |
| <b>8/18/2016</b> | 26.7 | 23.4  | 0 | 0 | 0 | 17.9 | 8.3  | 0    | 0 |
| <b>8/19/2016</b> | 26   | 22.1  | 0 | 0 | 0 | 7.2  | 11.1 | 0    | 0 |
| <b>8/20/2016</b> | 25.8 | 39.4  | 0 | 0 | 0 | 1.2  | 0.2  | 0    | 0 |
| <b>8/21/2016</b> | 12   | 37.9  | 0 | 0 | 0 | 7.8  | 12   | 0    | 0 |
| <b>8/22/2016</b> | 0    | 348.3 | 0 | 0 | 0 | 0    | 13.7 | 0    | 0 |
| <b>8/23/2016</b> | 0    | 95.3  | 0 | 0 | 0 | 0    | 24.3 | 0    | 0 |
| <b>8/24/2016</b> | 0    | 146   | 0 | 0 | 0 | 0    | 0    | 0    | 0 |
| <b>8/25/2016</b> | 0    | 107   | 0 | 0 | 0 | 0    | 0    | 0    | 0 |