RUNWAYS 12L AND 12R NIGHTTIME ARRIVALS OPERATIONS REPORT

September 2020

Community Relations Office

RUNWAYS 12L AND 12R NIGHTTIME ARRIVALS OPERATIONS REPORT

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EXECUTIVE SUMMARY

During a Minneapolis-St. Paul International Airport (MSP) Listening Session held in Edina in July 2019, community members discussed concerns related to nighttime arrivals to Runways 12L and 12R. At the MSP Noise Oversight Committee (NOC) meeting in September 2019, some NOC members echoed these concerns and, in response, included an item to conduct a Runways 12L and 12R Nighttime Arrivals Operations Report on the 2020 Work Plan.

This study provides trend information on the use of Runways 12L and 12R for arrivals between 10:30 PM and 6:00 AM in 2019 and compares that to aircraft activity from 2016 through 2018. Differences in the use of runways is noted as applicable. Data from 2020 was intentionally precluded from this study, due to changes in airport operations from COVID-19. The study examines runway use, arrival flight frequency, aircraft origin combined with airport parking destinations, and aircraft noise complaint data trends.

The use of Runways 12L and 12R for nighttime arrivals has varied since 2005. In 2019, Runway 12L was used for 13 percent of MSP nighttime arrivals and Runway 12R was used for 26 percent of nighttime arrivals.

Weather, special events and runway closures all impact the operational flow of air traffic daily. These activities often necessitate closure of airport surfaces to ensure the safety of aircraft and ground support personnel. Between 2016 and 2019, routine runway maintenance and snow removal activities accounted for 75 percent of all nighttime closures of Runways 12L and 12R. The remaining 25 percent was categorized as either construction or routine inspections.

Airline schedules and changing fleet characteristics affect runway use monthly and annually. On both runways, the frequency of arrivals drops off after midnight and picks up again in the 5:00 AM hour.

Aircraft origin and airport parking destination are important determinants to the runway assigned. Standard Terminal Arrival Routes (STARs) are arrival flight procedures where aircraft transition from enroute to the approach phase of the flight. This report examines the strong correlation between an aircraft's arrival runway and a combination of the STAR and parking location on the airport. There is a strong correlation between an aircraft's arrival runway and a combination of the STAR and parking location on the airport. Due to the strong correlations identified in the report, there is evidence that FAA Air Traffic Control practices a standardized way in which arrival runways are assigned, leading to consistency and predictability between controllers and pilots. This standardization contributes to the imbalanced use of these runways at night.

Although Runway 12R is used more often at night, aircraft noise complaints are registered from aircraft arriving to both Runways 12L and 12R at night. This is an indication that aircraft arrival activity, regardless of runway, is intrusive to airport neighbors during the nighttime period.

1. Introduction

The Metropolitan Airports Commission (MAC) is a public corporation governed by a board of commissioners that reports to the Governor of Minnesota and the Minnesota State Legislature. The MAC is charged with managing a system of seven airports within the Minneapolis-St. Paul metropolitan area, including Minneapolis-St. Paul International Airport (MSP). In addition to the MAC, other air transportation entities play critical roles in the successful operation of an airport. The Federal Aviation Administration (FAA) regulates all aircraft activity. At MSP, the FAA's Air Traffic Control (ATC) is solely responsible for directing aircraft on the ground and in the air. ATC's highest priority is the safe and efficient movement of air traffic. Air transportation companies, such as airlines, provide transportation services for people and products. **Figure 1 - Air Transportation Entities** below outlines the primary air transportation units responsible for the successful operation of MSP.

Figure 1 - Air Transportation Entities

The MAC has designated the Noise Oversight Committee (NOC) as its primary advisory body regarding aircraft noise issues associated with flight operations at MSP. The NOC directed MAC staff to conduct an analysis of MSP Runways 12L and 12R nighttime arrival activity. A graphic of the MSP runway layout is provided in **Figure 2 - MSP Runway Layout**.

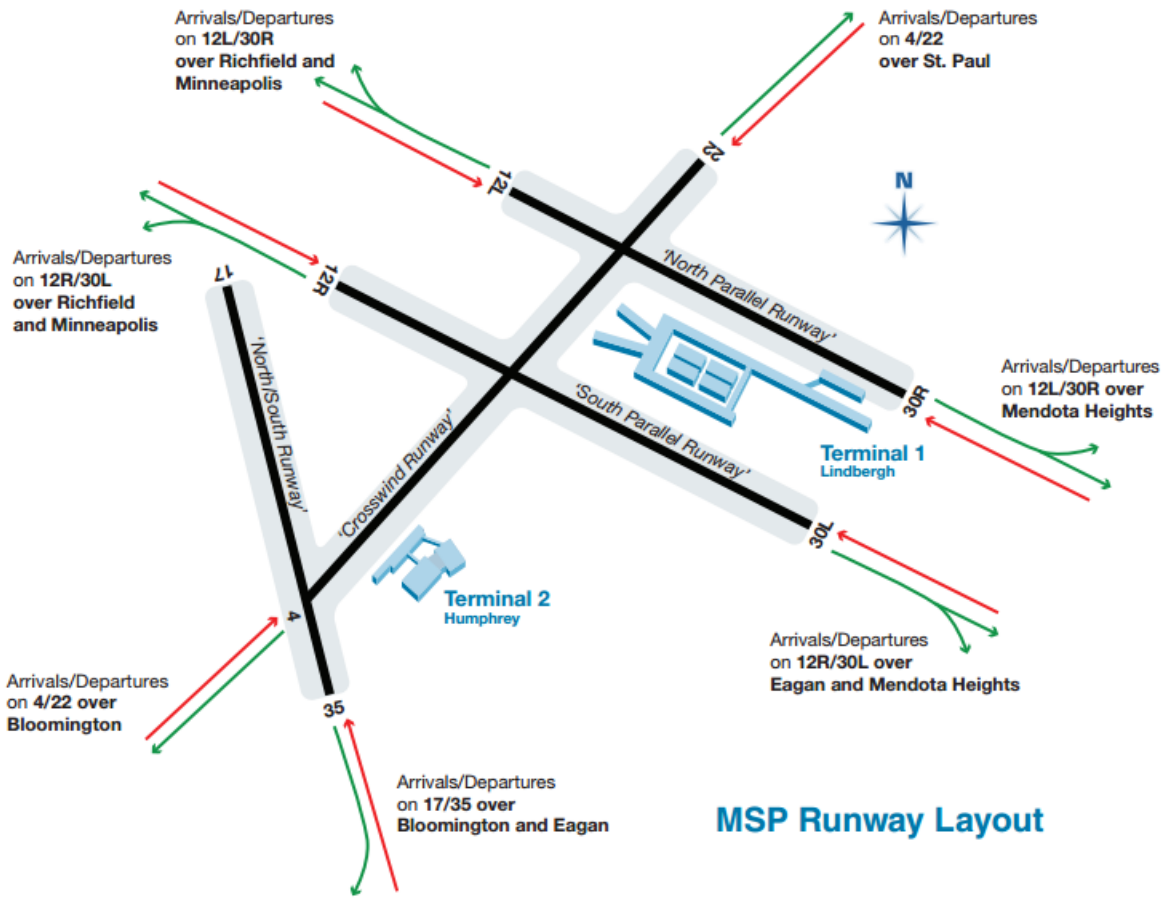


Figure 2 - MSP Runway Layout

2. BACKGROUND

As shown in **Figure 3 - MSP Runway Configurations**, Runways 12L and 12R are used for arrivals during a South Flow or Straight South Flow airport configuration. These configurations are typically used when prevailing winds are out of the south or east.

The MSP Runway Use System (RUS) prioritizes arrival and departure runways to promote flight activity over less-populated residential areas as much as possible. During a South Flow, the Priority 4 arrival runways (12L and 12R) are used for aircraft arriving to MSP.

As shown in **Figure 4 - MSP Arrivals by Year,** the use of Runways 12L and 12R for nighttime arrivals has varied since 2005. In 2019, Runway 12L was used for 13 percent of all MSP nighttime arrivals and Runway 12R was used for 26 percent of all nighttime arrivals. As discussed later in this report, the higher use of Runway 12R is correlated to flight origin and on airport parking destination.

In 2019, there were a total of 2,520 nighttime arrivals to 12L and 4,904 nighttime arrivals to 12R. The use of Runway 12L, as a percentage of total nighttime arrivals, was highest in 2007 and 2015. The use of Runway 12R, as a percentage of total nighttime arrivals, was highest in 2012.

Runway 12R is 10,000 feet long, which is 1,800 feet longer than 12L. The added length may be necessary for wide-body or heavy aircraft to land safely.

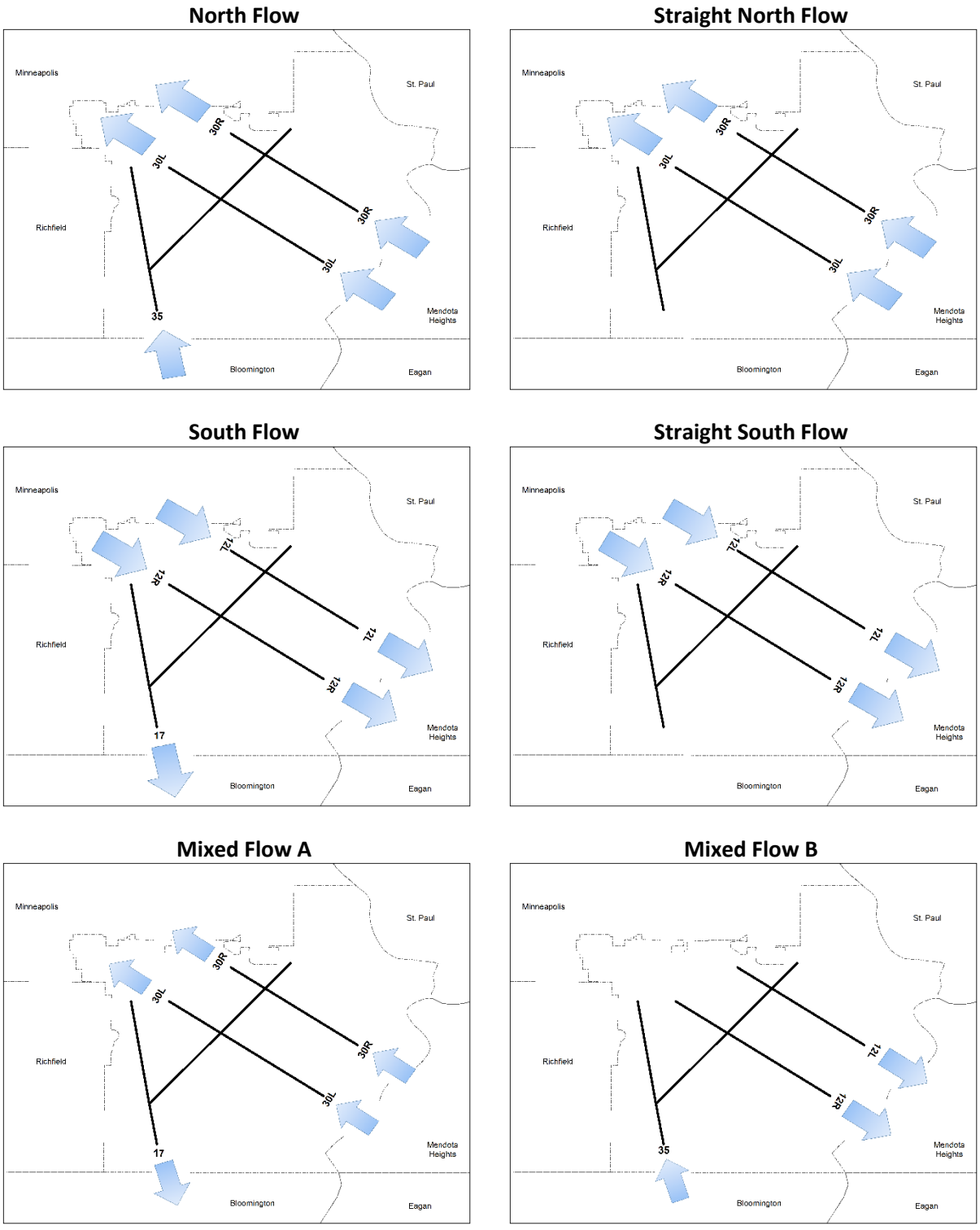


Figure 3 - MSP Runway Configurations

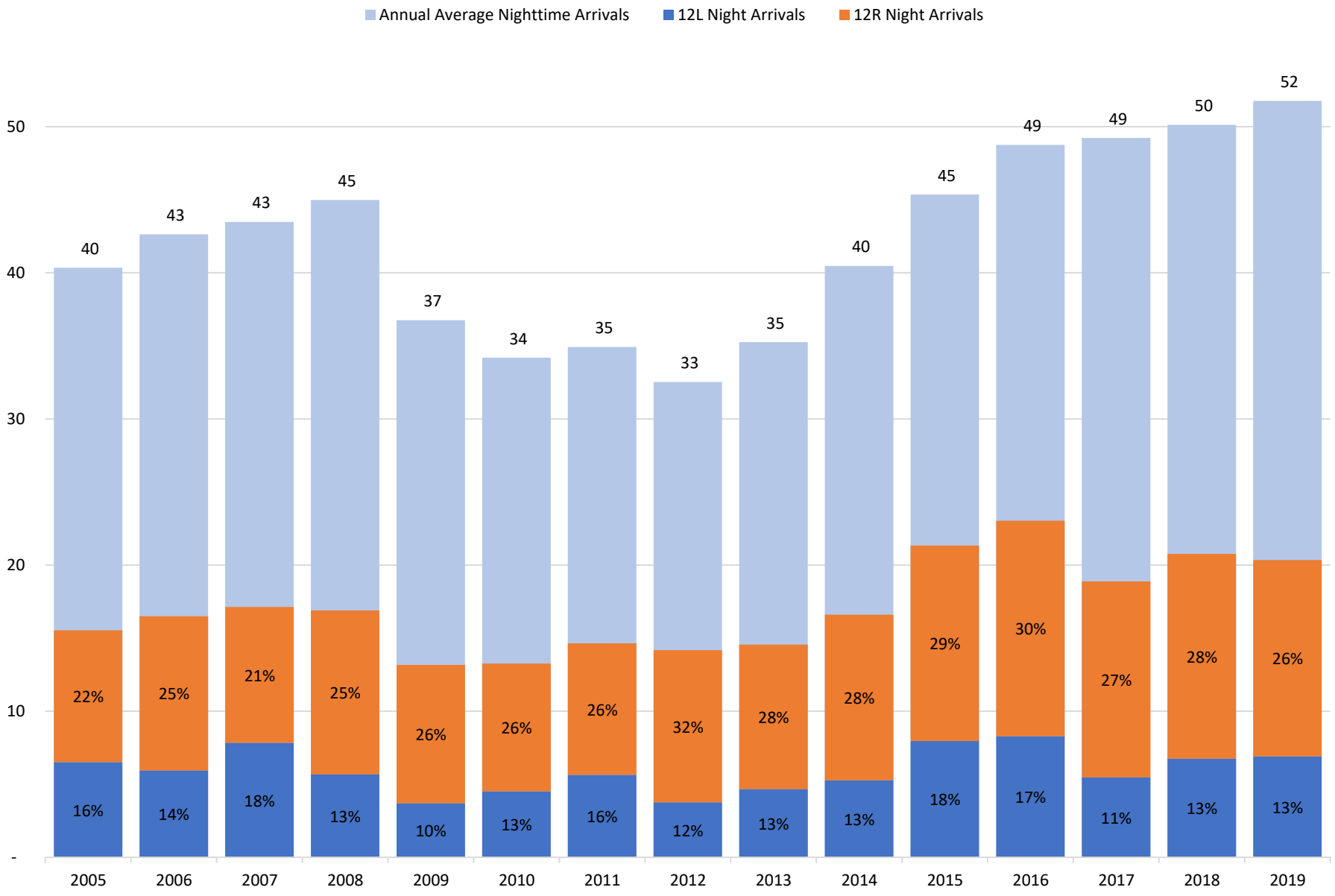


Figure 4 - MSP Arrivals by Year

3. Runway Use

Weather, special events and runway closures all impact the operational flow of air traffic daily. Airline schedules and changing fleet characteristics affect runway use monthly and annually.

Figure 5 - Nighttime Runway Closures shows the type of closures on Runways 12L or 12R between 10:30 PM and 6:00 AM from 2016 through 2019. As much as possible, runways are closed at night to perform regular maintenance activities as to not impact aircraft operations during the day. As shown, routine maintenance and snow removal activities account for 75 percent of all nighttime closures of Runways 12L and 12R during this period with construction and inspection activities accounting for the remaining 25 percent. Runway 12L was closed an average of about 130 hours at night each year in the study period and Runway 12R was closed an average of about 172 hours at night. It is not common that both parallel runways are closed at the same time. Aircraft arrivals and departures are routed to another runway while one is closed.

Figure 6 - Runway 12L Average Annual Night and **Figure 7 - Runway 12R Average Annual Night** show the average number of arrivals during each nighttime hour when the airport was in either a South Flow or Straight South Flow in 2019 compared to an average of the previous three years. On both runways, arrivals drop off after midnight and pick up again in the 5:00 AM hour.

Figure 8 - Nighttime Arrival Runway Distribution illustrates the distribution of runways used for nighttime arrivals in 2016-2018 (average) and 2019 when the airport was operating in a South Flow or Straight South Flow. When MSP was configured in a South Flow or Straight South Flow in 2016-2018 (average), 33 percent of nighttime arrivals used Runway 12L and 67 percent of nighttime arrivals used Runway 12R. That percentage changed slightly to 34 percent and 66 percent in 2019.

MSP NIGHTTIME RUNWAY CLOSURES
(2016 - 2019)

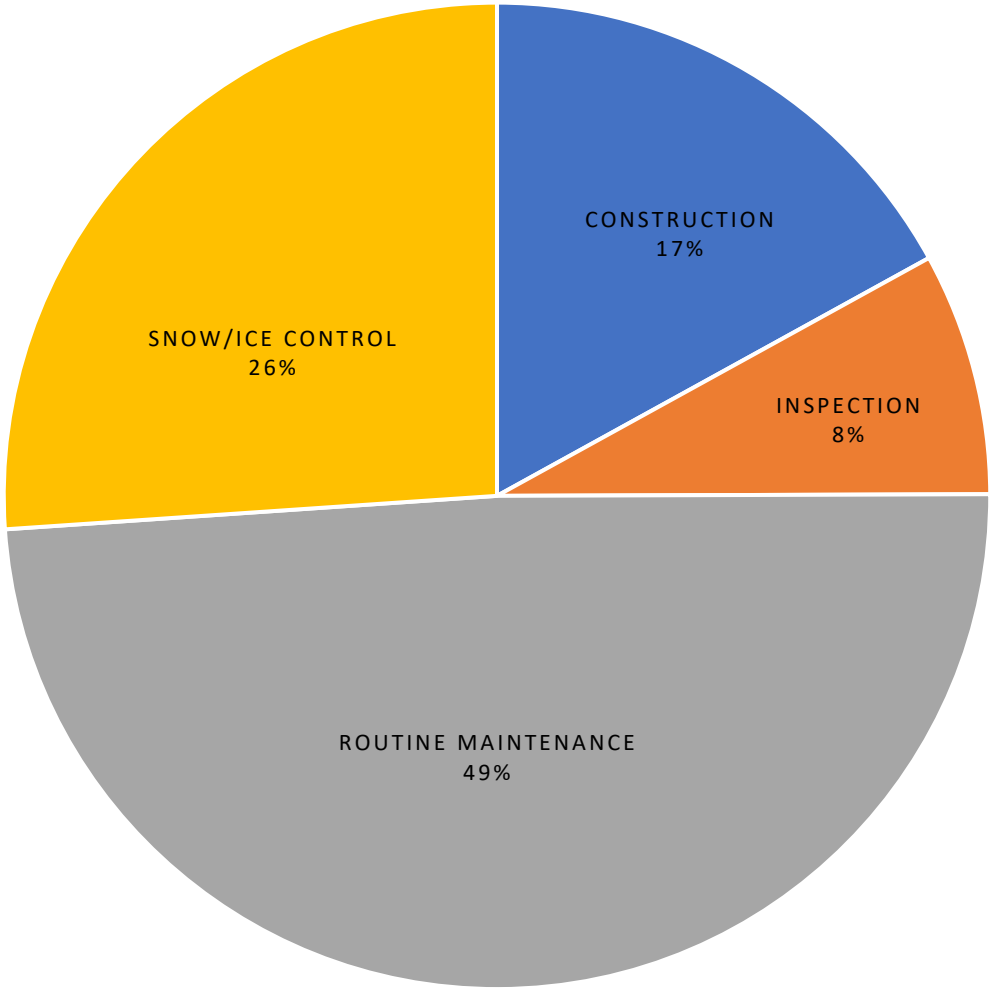
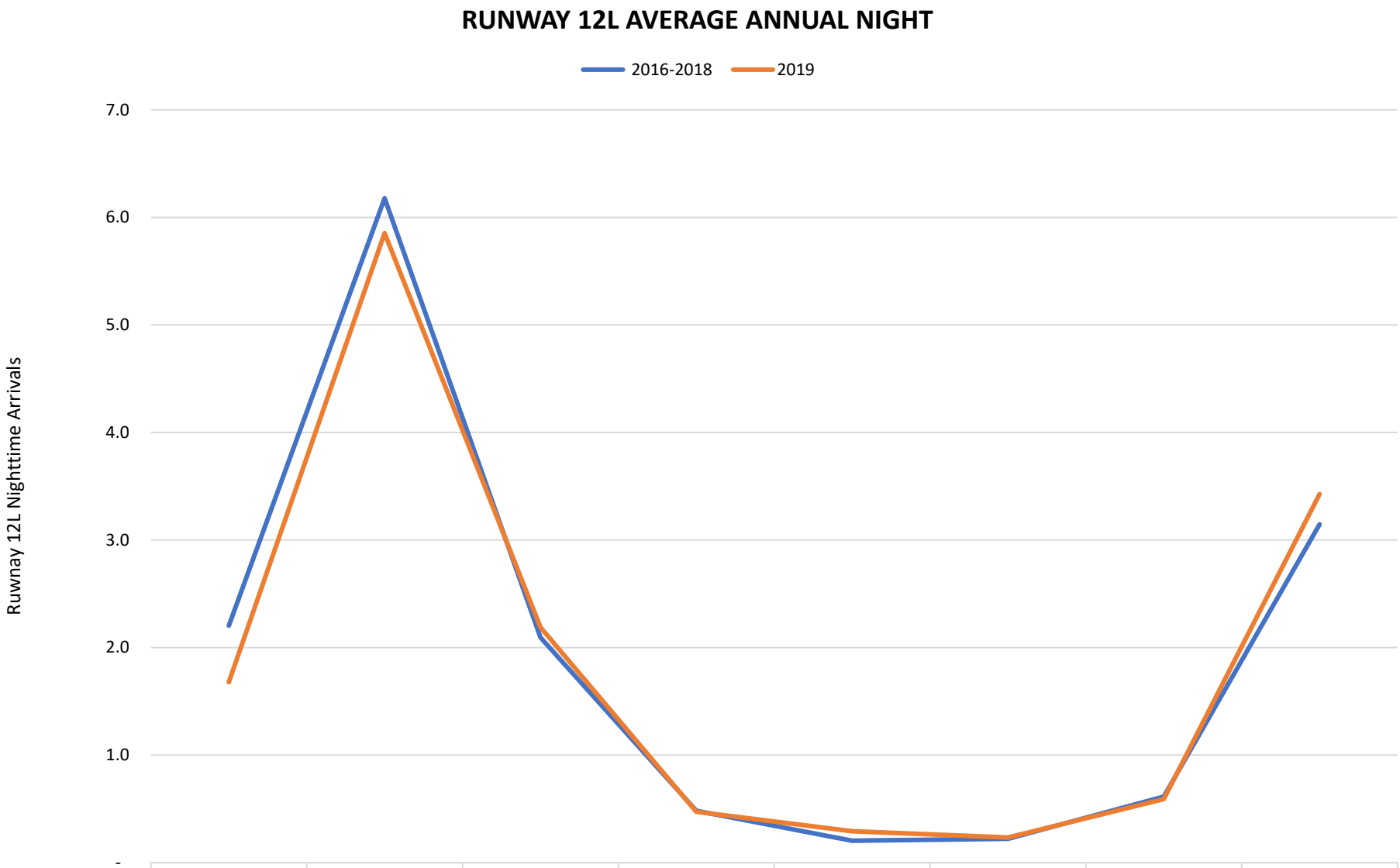
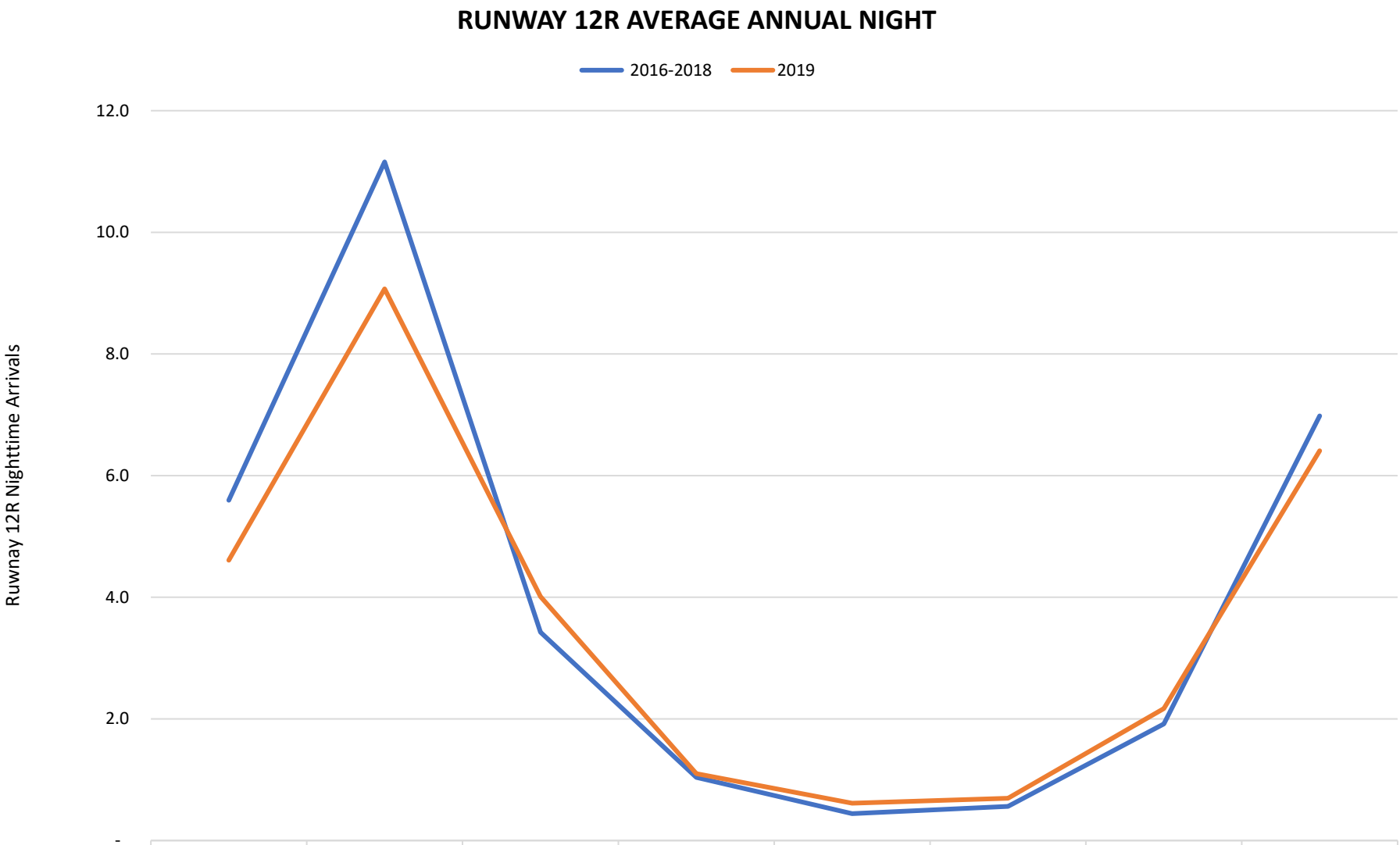


Figure 5 - Nighttime Runway Closures



	22:30	23:00	0:00	1:00	2:00	3:00	4:00	5:00
2016-2018	2.2	6.2	2.1	0.5	0.2	0.2	0.6	3.1
2019	1.7	5.9	2.2	0.5	0.3	0.2	0.6	3.4

Figure 6 - Runway 12L Average Annual Night



	22:30	23:00	0:00	1:00	2:00	3:00	4:00	5:00
2016-2018	5.6	11.2	3.4	1.0	0.4	0.6	1.9	7.0
2019	4.6	9.1	4.0	1.1	0.6	0.7	2.2	6.4

Figure 7 - Runway 12R Average Annual Night

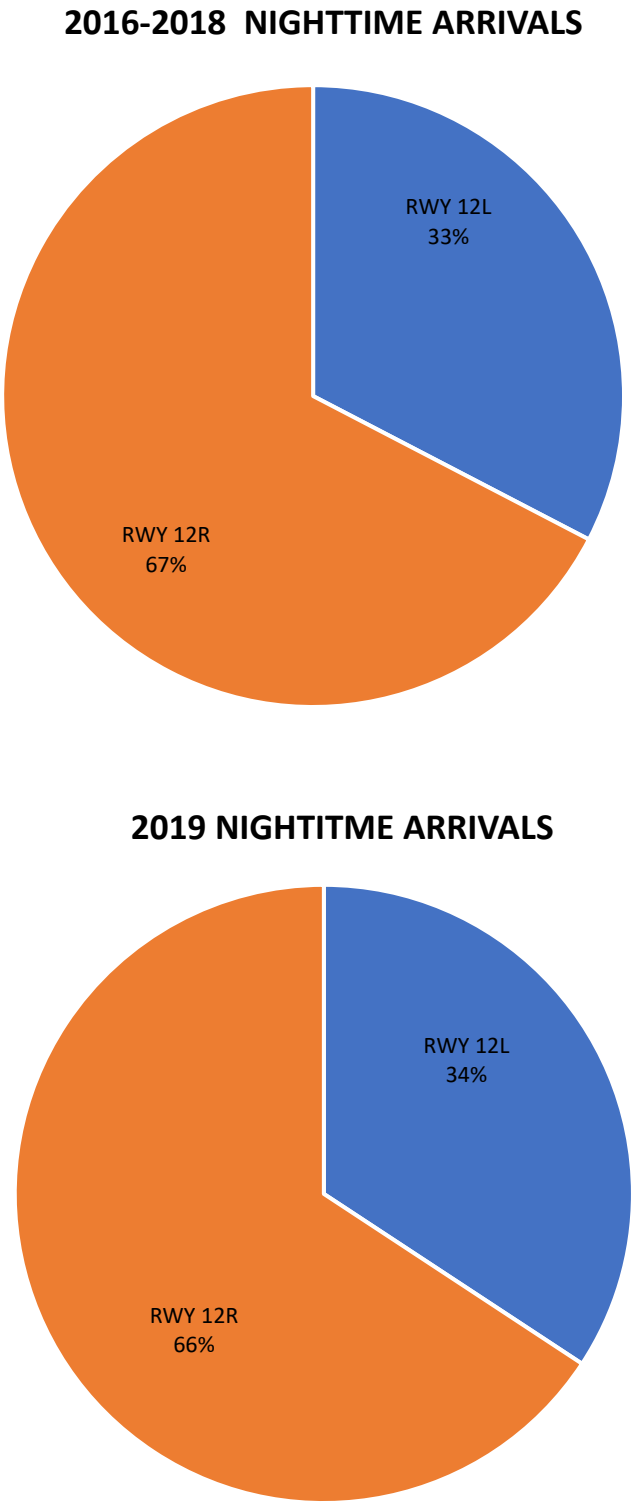


Figure 8 - Nighttime Arrival Runway Distribution

4. Flight Frequency

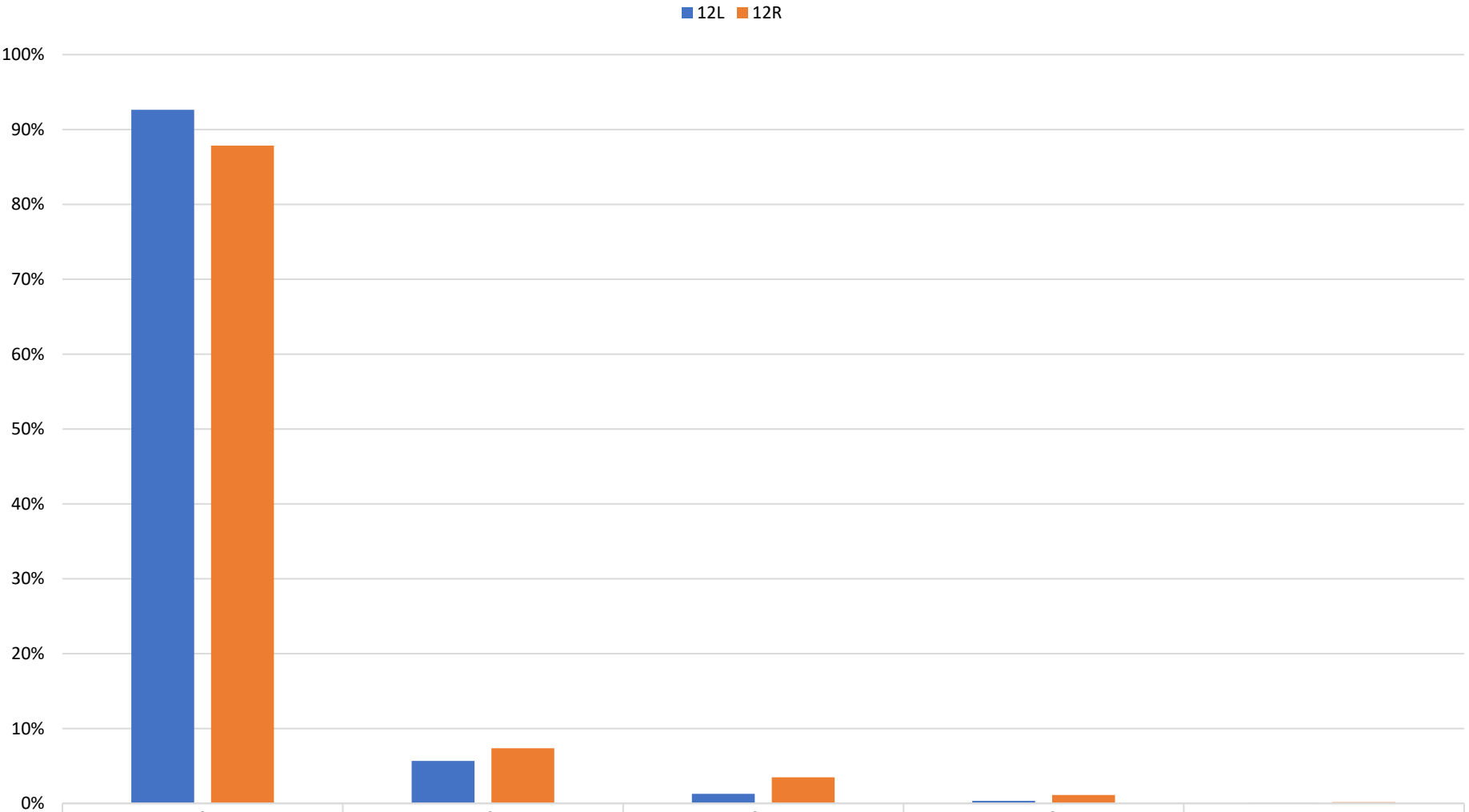
The frequency of aircraft arrivals is oftentimes a concern raised by airport neighbors. To ensure a safe and stable landing, aircraft arriving to a runway will line up on the extended centerline of that runway, overflying the same areas upon arrival. Therefore, frequent arrivals at night are often intrusive to those living under an arrival path to a runway.

To investigate whether the flight frequency within the 15-minute segments has changed, this analysis counts the number of Runway 12L and 12R nighttime arrivals during 15-minute segments in 2019 and compares to 2016-2018 (average). **Figure 9 - 2016-2018 (Average) 15-Minute Nighttime Arrival Use** and **Figure 10 - 2019 15-Minute Nighttime Arrival Use** displays the percent of time runway arrivals occurred at various levels of frequency (i.e. the number of Runway 12L arrivals per 15-minutes was 0, 1-2, 3-4, 5-6, etc.).

It is important to note that although the runways may be available for arrivals, they may not necessarily be used. Overnight hours are the most frequent occurrence of this situation. While there are many instances when the runways are available for use, Runway 12L was not used 93 percent and Runway 12R was not used 88 percent of the time they were available for use in 2019 as well as the previous three-year average.

The charts show the frequency of arrivals to Runways 12L and 12R have not substantially changed between the three-year average of 2016-2018 and 2019. Also shown is the higher frequency of arrivals on 12R compared to 12L, due to the increased overall use of Runway 12R at night.

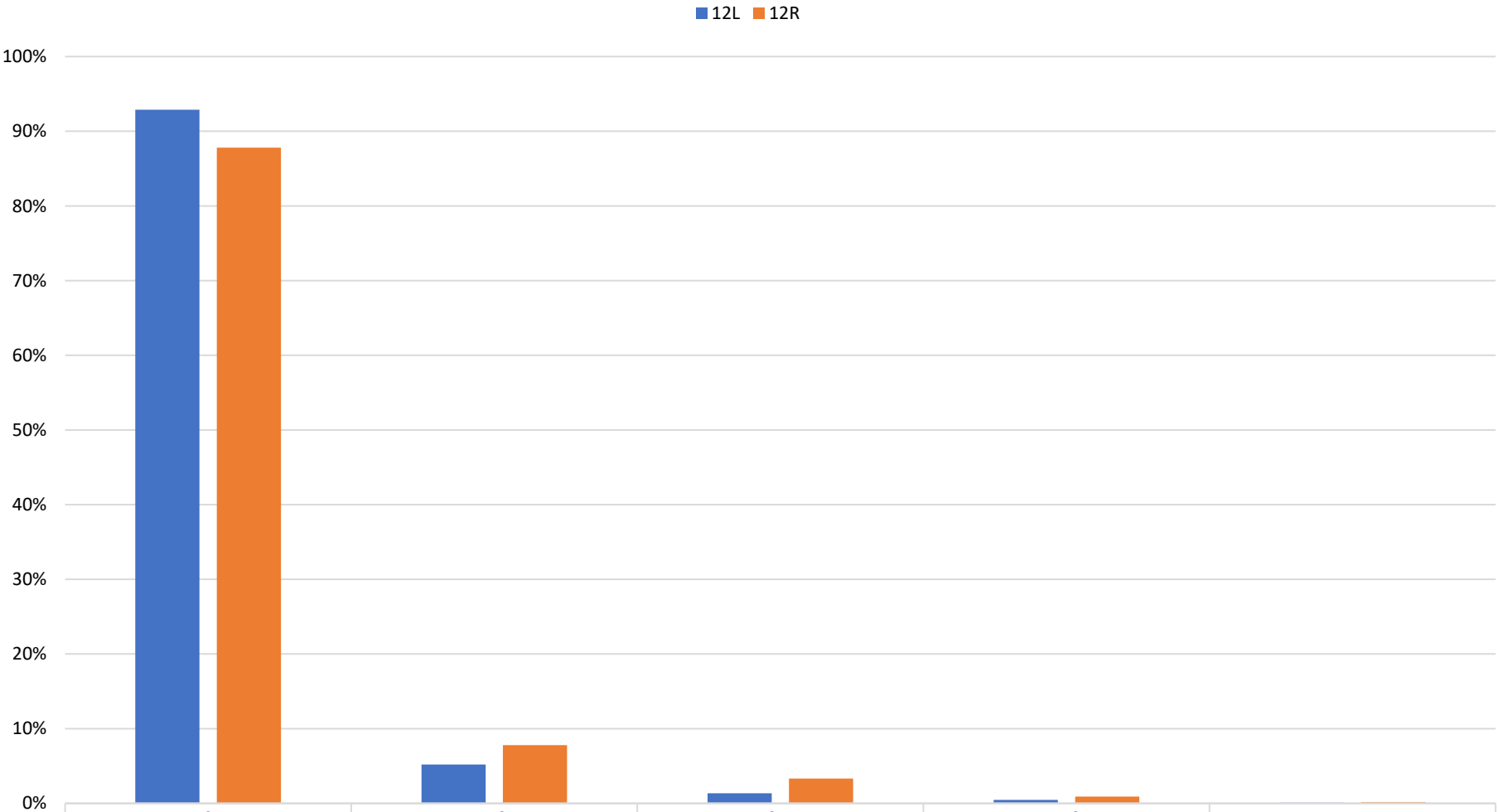
2016-2018 AVERAGE 15-MINUTE NIGHTTIME ARRIVAL USE
DURING SOUTH FLOW



	0	1-2	3-4	5-6	>7
12L	93%	6%	1%	0%	0.1%
12R	88%	7%	3%	1%	0.2%

Figure 9 - 2016-2018 (Average) 15-Minute Nighttime Arrival Use

2019 15-MINUTE NIGHTTIME ARRIVAL USE
DURING SOUTH FLOW



	0	1-2	3-4	5-6	>7
12L	93%	5%	1%	0%	0.1%
12R	88%	8%	3%	1%	0.2%

Figure 10 - 2019 15-Minute Nighttime Arrival Use

5. Origin and Airport Parking Destination

During nighttime hours, particularly between midnight and 6:00 AM, ATC staffing typically consists of one controller directing arrivals for all of MSP. ATC will direct arriving aircraft to utilize a runway based on numerous factors including origin of the aircraft, airport parking location, aircraft type, weather conditions, and runway closures.

Aircraft origin and airport parking destination are important determinants to the runway assigned. Standard Terminal Arrival Routes (STARs) are arrival route flight procedures where aircraft transition from enroute to the approach phase of flight. **Figure 11 - Standard Terminal Arrival Routes (STARs)** illustrates the general location of the named airspace fixes for MSP STARs. These are the locations where aircraft begin this transition. The STARs are assigned based on the filed route of the flight. Aircraft utilizing BAINY, MUSCL, or KKLIR typically originate from airports to the north, northeast, east, or southeast. Aircraft utilizing TORGY, NITZR, or BLUEM typically originate from airports to the west, southwest or south. While the aircraft origin largely determines which STAR is assigned, weather, airspace restrictions, or other traffic may affect the assignment.

Figure 12 - 2019 Nighttime STARs Distribution illustrates the distribution of all nighttime arrivals to Runways 12L and 12R. As shown, 72 percent of Runway 12L and Runway 12R arrivals at nighttime utilize the TORGY, NITZR or BLUEM arrival routes to the west, southwest, and south of the airport. This concludes that close to three-quarters of nighttime arrivals to MSP are originating at airports to the west, southwest and south. Aircraft entering the airspace from this direction are closest to Runway 12R and more likely to be assigned that runway, particularly if the aircraft parking location is on the west or south side of the airport.

Figure 13 - MSP Airport Parking Locations illustrate the options for parking destinations of aircraft arriving to MSP. **Figure 14 - 2019 Nighttime Parking Locations** identifies the parking location for nighttime arrivals to Runways 12L and 12R in 2019. As shown, 62 percent of arriving aircraft had on-airport parking destinations on the west or south side of the airport (Terminal 2/Concourse H, Concourse G, Concourse F, cargo or general aviation). Since Runway 12R is closer to these parking locations than 12L, ATC is more likely to direct the aircraft to land on Runway 12R, especially if the aircraft is coming inbound from the west, southwest or south.

Figure 15 - 2019 Nighttime Runway Use by Arrival Gate and Parking Location combines arrival route with parking destination and compares runway usage. As shown, 67 percent of operations on the BAINY, MUSCL, or KKILR arrival routes utilized Runway 12L and 71 percent of operations on the TORGY, NITZR or BLUEM arrival routes utilized Runway 12R.

There is a strong correlation between an aircraft's arrival runway and a combination of the STAR and parking location on the airport. Due to the strong correlations identified in the report, there is evidence that FAA Air Traffic Control practices a standardized way in which arrival runways are assigned, leading to consistency and predictability between controllers and pilots. This standardization contributes to the imbalanced use of these runways at night.

Flight schedules, specifically airport origin, is determined by the aircraft operator. At MSP, airlines determine the schedule of aircraft operations, the frequency of flights to their chosen destinations and the time of day those flights operate. How quickly the airlines change the schedule would be contingent on their responsiveness to passenger demand. Because airline scheduling decisions vary throughout the day, origins that favor certain regions of the country may be more prevalent during certain hours of the day.

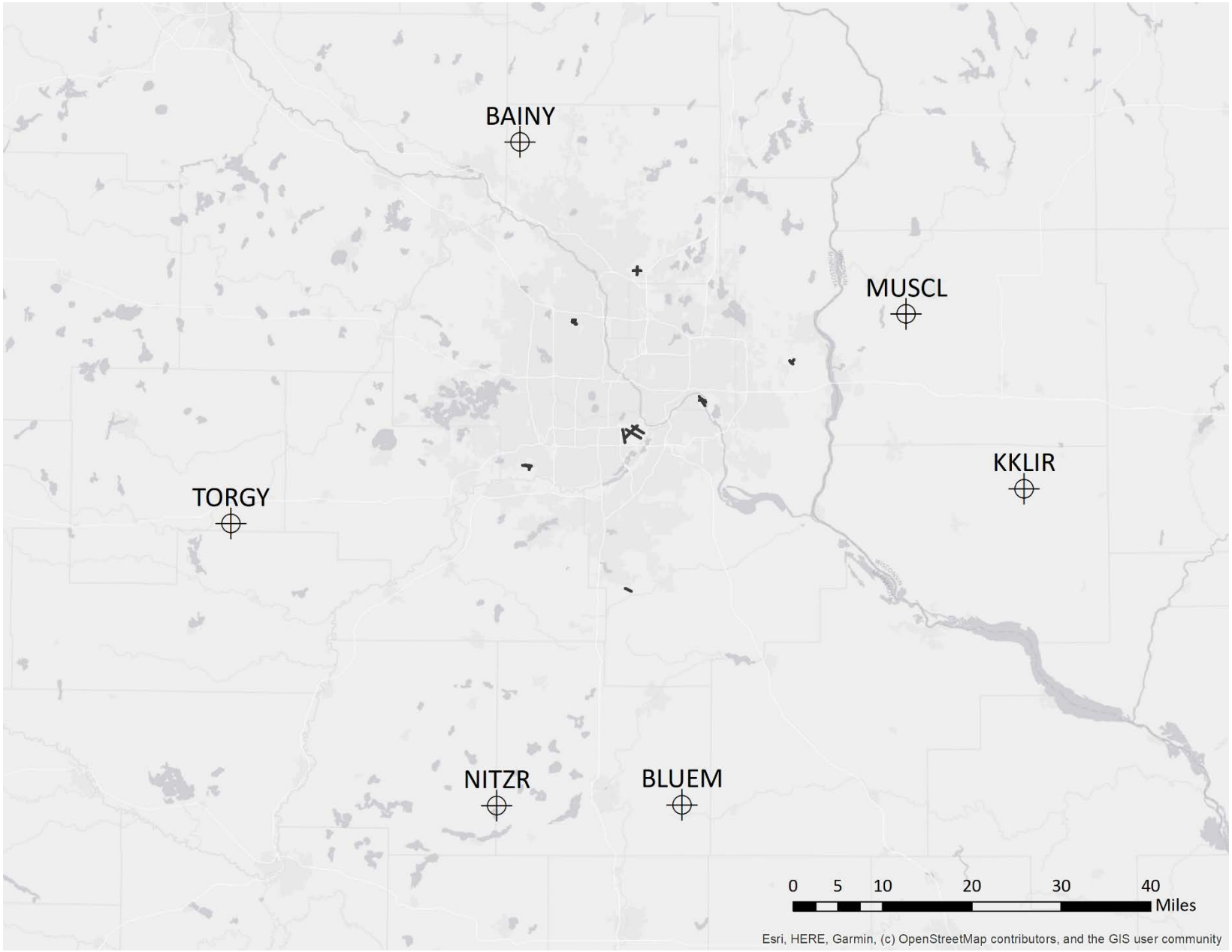


Figure 11 - Standard Terminal Arrival Routes (STARs)

2019 NIGHTTIME STARS DISTRIBUTION
RUNWAY 12L AND 12R ARRIVALS

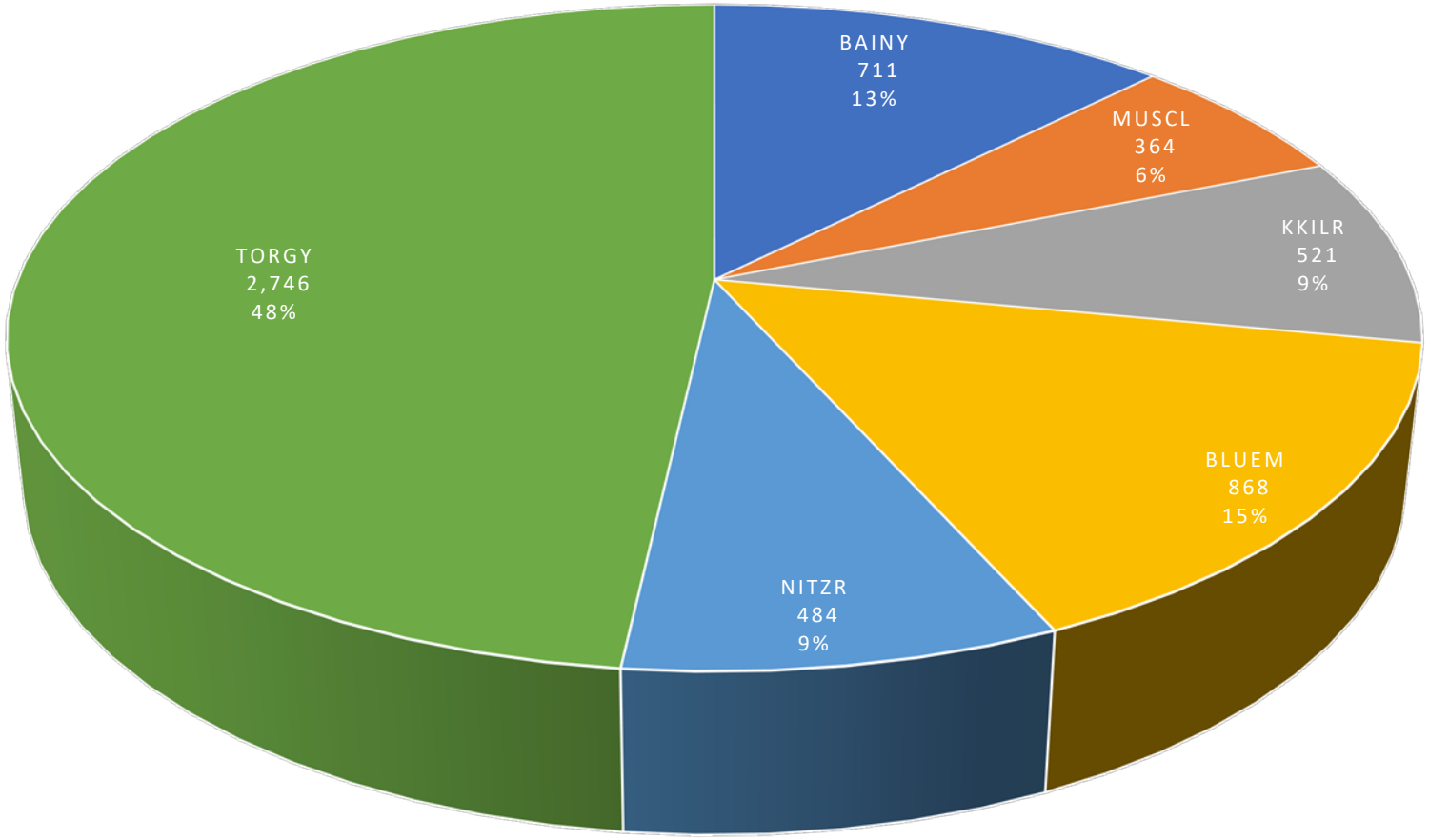


Figure 12 - 2019 Nighttime STARs Distribution

Figure 13 - MSP Airport Parking Locations

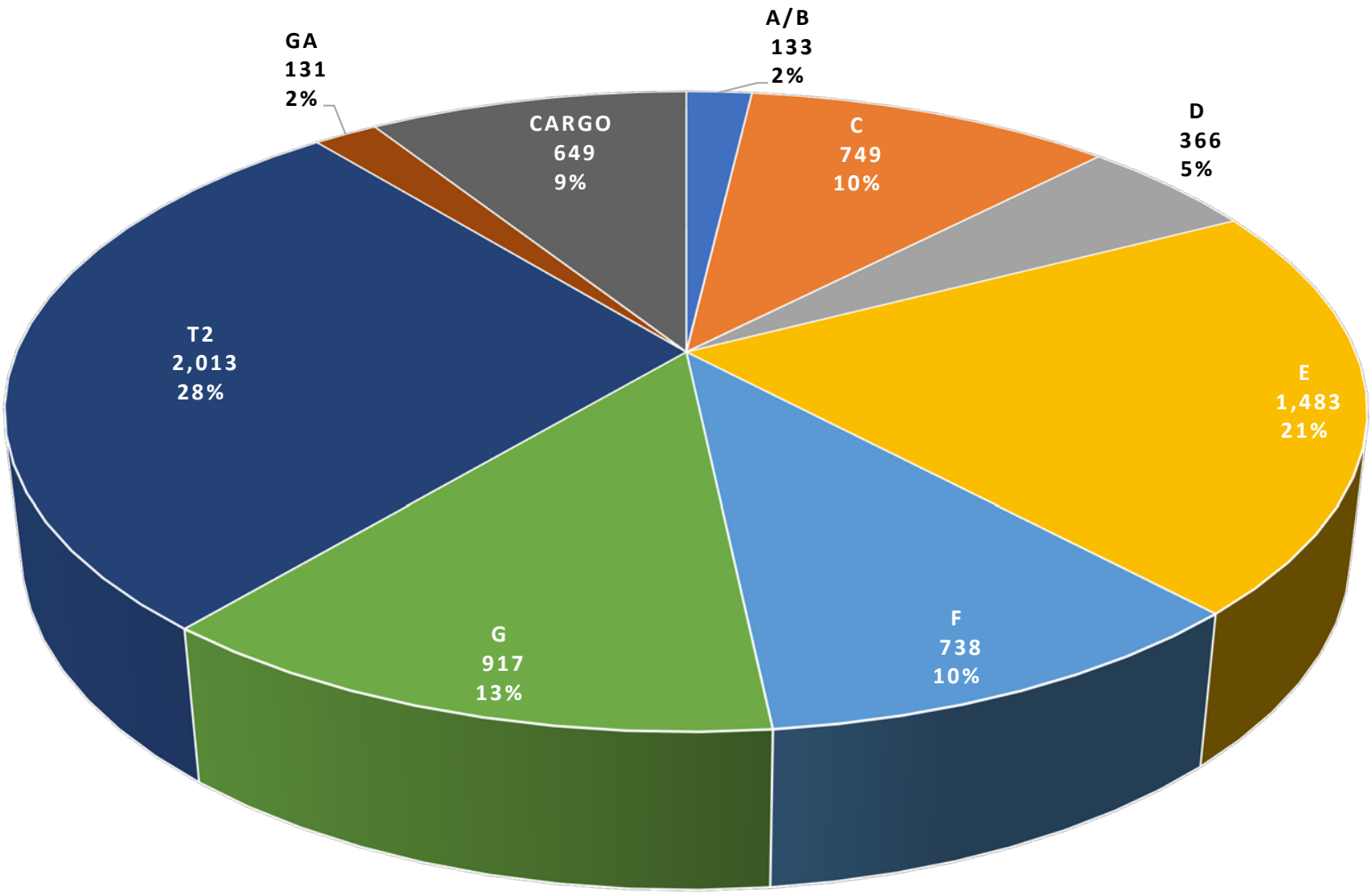


Figure 14 - 2019 Nighttime Parking Locations

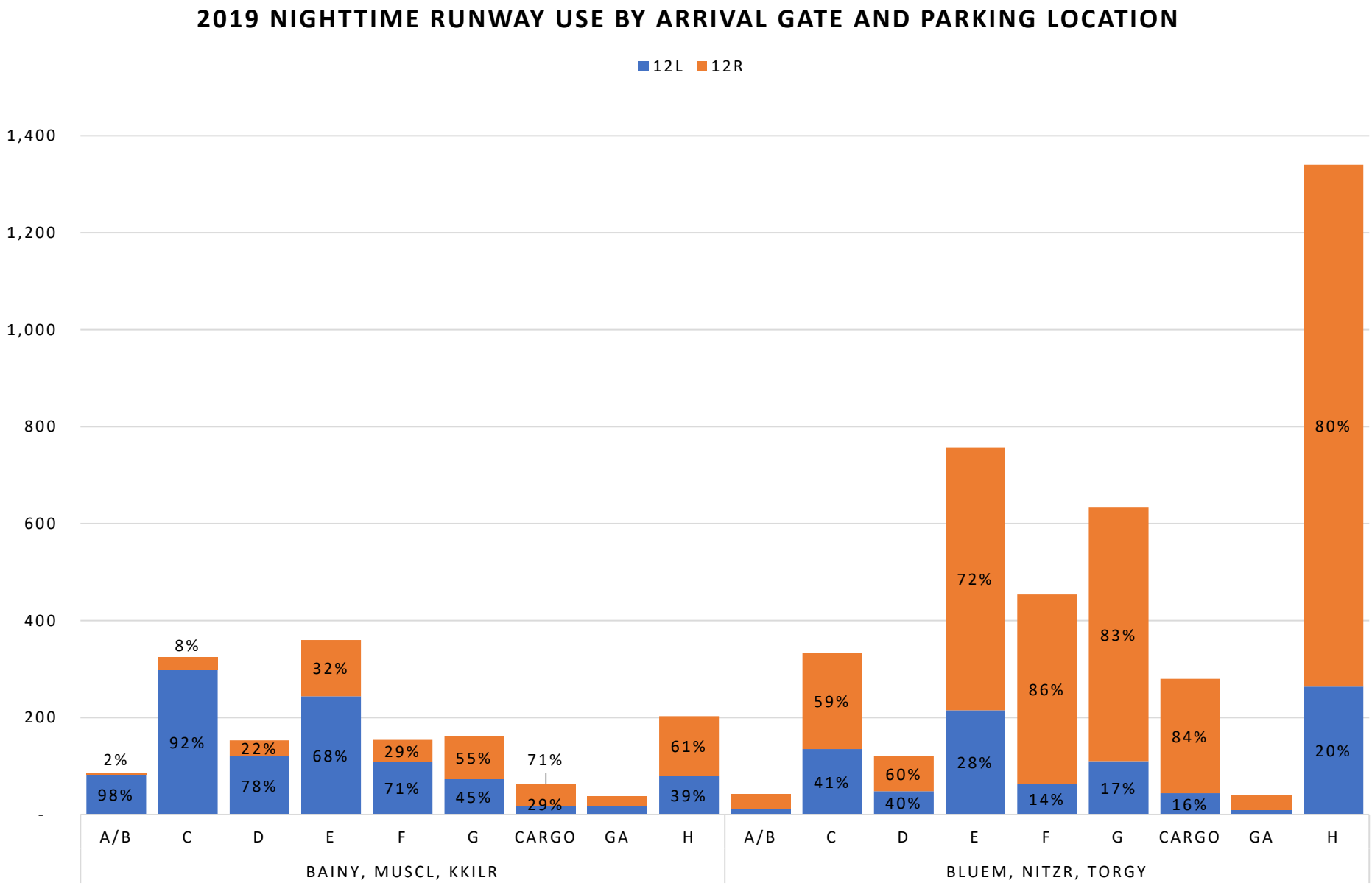


Figure 15 - 2019 Nighttime Runway Use by Arrival Gate and Parking Location

6. Complaint Data

This section evaluates the aircraft noise complaint data collected by the MAC. **Figure 16 – 2019 Complaints Correlated to MSP Nighttime Arrivals** displays households that filed complaints in 2019 that were correlated to an aircraft arriving between 10:30 PM and 6:00 AM on Runway 12L or Runway 12R. Households that filed more than one complaint are represented by a white dot. Households filing complaints are concentrated in Minneapolis under the final approach for Runways 12L and 12R. Many of the other households filing complaints are located under arrival routes as aircraft transition to final approach.

Although Runway 12R is used more often at night, aircraft noise complaints are registered from aircraft arriving to both Runways 12L and 12R at night. This is an indication that aircraft arrival activity, regardless of runway, is intrusive to airport neighbors during the nighttime period.

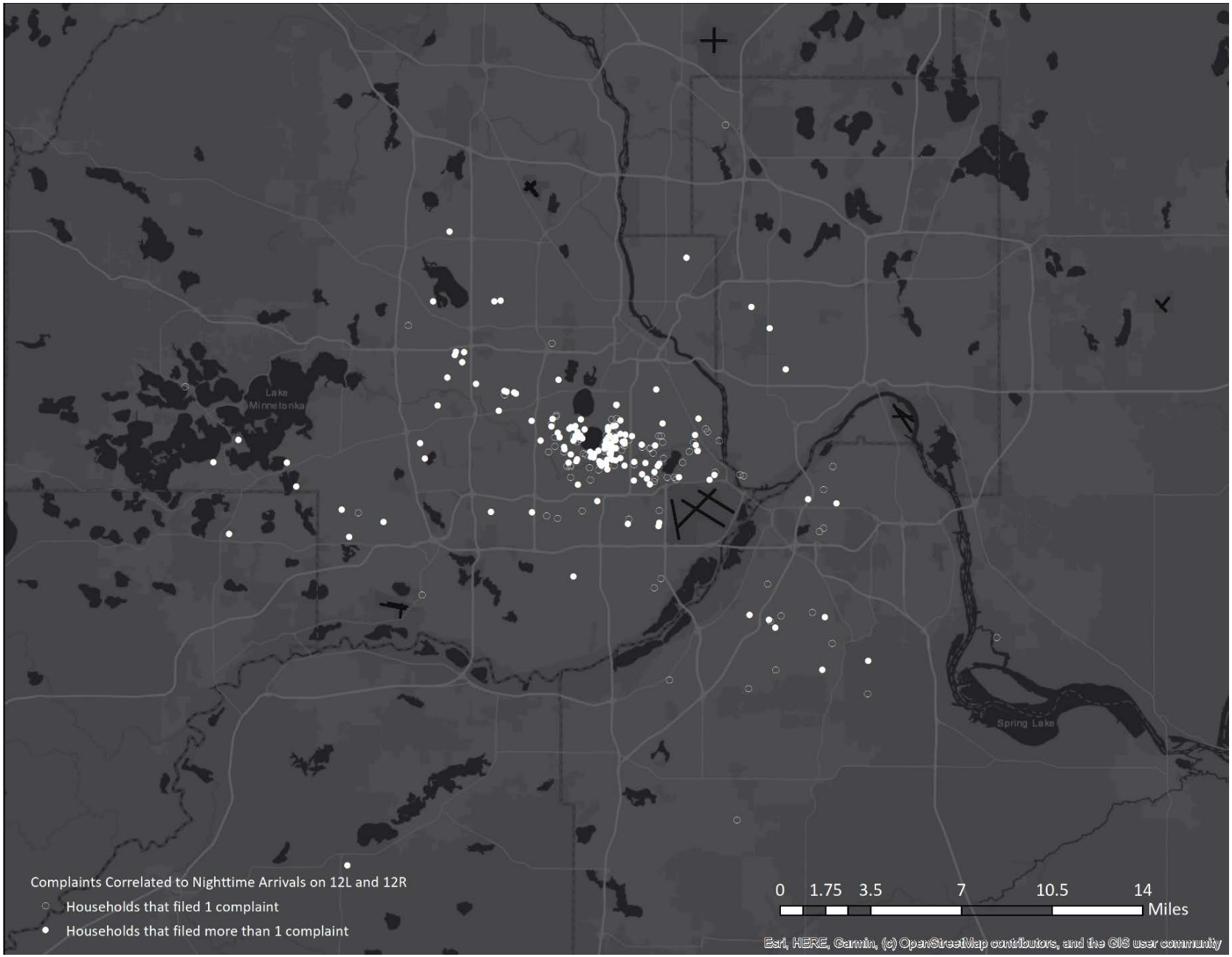


Figure 16 – 2019 Complaints Correlated to MSP Nighttime Arrivals

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metroairports.org