

Fresh Pond Reservation Census Program

2021 Data Collection Summary



Program Outline

- Purpose
- Methods
 - Data collection
 - Quality control
 - Data exclusions
 - Data analysis
- Results
 - Annual overview
 - EcoCounter sensor data by site
 - Visual survey results
- Future Goals

Purpose

- To *quantify* and *qualify* users at Fresh Pond Reservation in order to inform management
 - Sensors at reservation entrances, the bike path, and perimeter road give an idea of user distribution throughout the day
 - Multi-sensors differentiate between bike and pedestrian users

Methods

Methods *Data Collection*

- Strategically-placed EcoCounter sensors at entrances and along perimeter road quantify Fresh Pond users
 - EcoCounter Pyro sensors count any heat producing body over 3ft tall
 - EcoCounter Multi sensors differentiate between pedestrians and cyclists
 - Sensors collect data in 15-minute intervals which is saved to an online database
- Visual surveys were conducted at sensor locations to further categorize users at Fresh Pond

EcoCounter Sensors



A multi sensor



A pyro sensor

Visual Surveys

- Employee or volunteer conducted surveys next to sensor
- Recorded direction of travel and type of users
- Types of users included:
 - Pedestrians
 - Dogs (on/off leash)
 - Cyclists
 - Runners
 - Children and baby carriages
- Real-time feedback with the EcoCounter Android app helped verify multiple people passing the sensor at once

Fresh Pond Census Sheet page 1 of 3

Date: 1/21/2011
 Start Time: 7am
 End Time: 8am
 Location: LFP
 Observer: JU

Instructions: Each row is a unique observed event. Record count for observed user(s) in each cell. If multiple users pass at *some time*, record the number in one cell. For example, 3 runners passing together would be "3", whereas people passing one after another would be "1" for three rows. Please start exactly on the hour and count for one full hour or 1/2 hour during high use periods. Count user as 'child' if below sensor height.

Weather: Partly Sun

Direction of travel	Walker	Dog Walker	Dog Runner	Unleashed Dog	Leashed Dog	Runner	Child	Bike	Baby Carriage	Other	EcoCounter Count
R	1										
R						11					
R	1										
R						1					
R		1		1							
R	1										
R			1	1							
R	1										
R						1					
R	1										
R		1		11							
R	1										
R	1										
R	1										
R	1										
R	1										
R	1										
R	1										
R	1										
R	1										
R						11					
R						1					
PAGE TOTAL											

-7:15

Example Survey Datasheet

EcoCounter Sensor Locations

Entrances:

Black's Nook, Community Garden,
Lusitania, and Pro Shop

Perimeter Road:

LFP and WTP

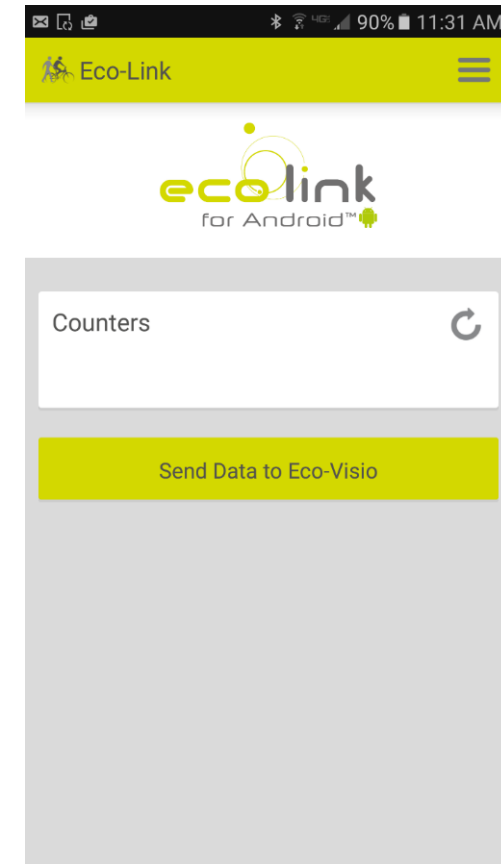
Multi Sensors:

WTP multi and BP Multi



Methods *Quality Control*

- Sensors were visited weekly and checked for physical damage or environmental changes
- Data were downloaded and screened for anomalies weekly
- Sensor data were compared against visual survey data to identify any incongruities



EcoCounter Data Collection App

Methods 2021 Data Exclusions

Site	Exclusion dates	Explanation
Black's Nook	2/1, 4/22 - 5/6, 5/8 - 5/19, 5/23 - 6/7, 9/20, 9/21, 9/26, 11/23, 11/24	Unexplained spikes, periods of directional differentiation not working (fixed 6/7)
BP Multi	3/15 - 3/17, 7/8, 10/27 - 11/2	Dead batteries, unexplained spike
Community Garden	2/11, 8/8, 11/17, 11/23, 11/25, 11/29, 11/30, 12/1, 12/2, 12/5, 12/8, 12/15, 12/17, 12/19, 12/22, 12/23, 12/26, 12/29, 12/30	Unexplained spikes
LFP	n/a	n/a
Lusitania	1/21, 1/29, 1/31, 2/8 - 2/9, 2/10 - 2/12, 2/18, 2/19, 2/21, 2/22, 3/15-3/22, 12/14	Unexplained spikes, period of sensor disabled
Pro Shop	2/1	Testing sensor
WTP multi	1/1 - 5/7, 5/7 - 8/2, 6/7 - 6/10	No data, period of no bike/ped differentiation

**Anomalous data were removed in hour increments.*

Methods

Data Analysis

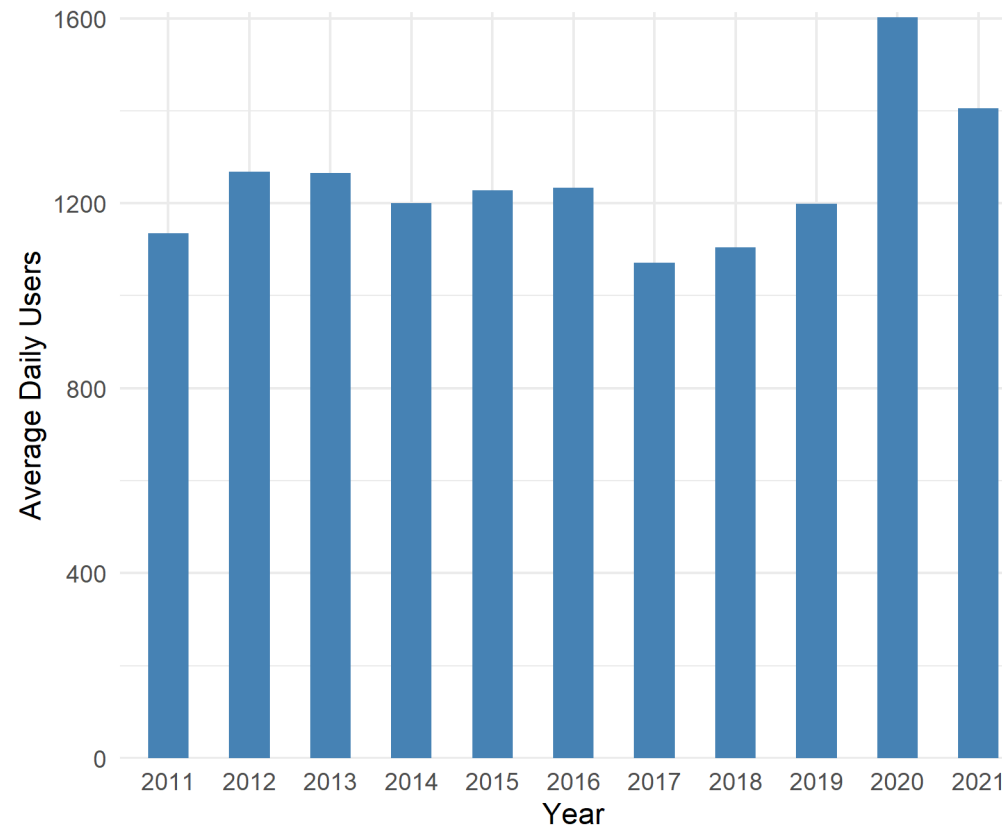
- Sensor results were grouped by location as being representative of the Entrances or the Perimeter Road
- Multi sensors were used to quantify cyclists separately from pedestrians
- Data were analyzed on yearly, monthly, daily, and hourly time scales to understand trends
- Data were presented as total counts (total of both directions: *in* and *out*)
 - Counts may include users who pass sensors multiple times
- Visual surveys were compared to EcoCounter data to estimate sensor error and to characterize types of users

Results

Annual Overview

Results Daily Overview 2021

Year	Average Daily Users*
2011	1,135
2012	1,268
2013	1,265
2014	1,200
2015	1,228
2016	1,234
2017	1,072
2018	1,105
2019	1,199
2020	1,603
2021	1,405

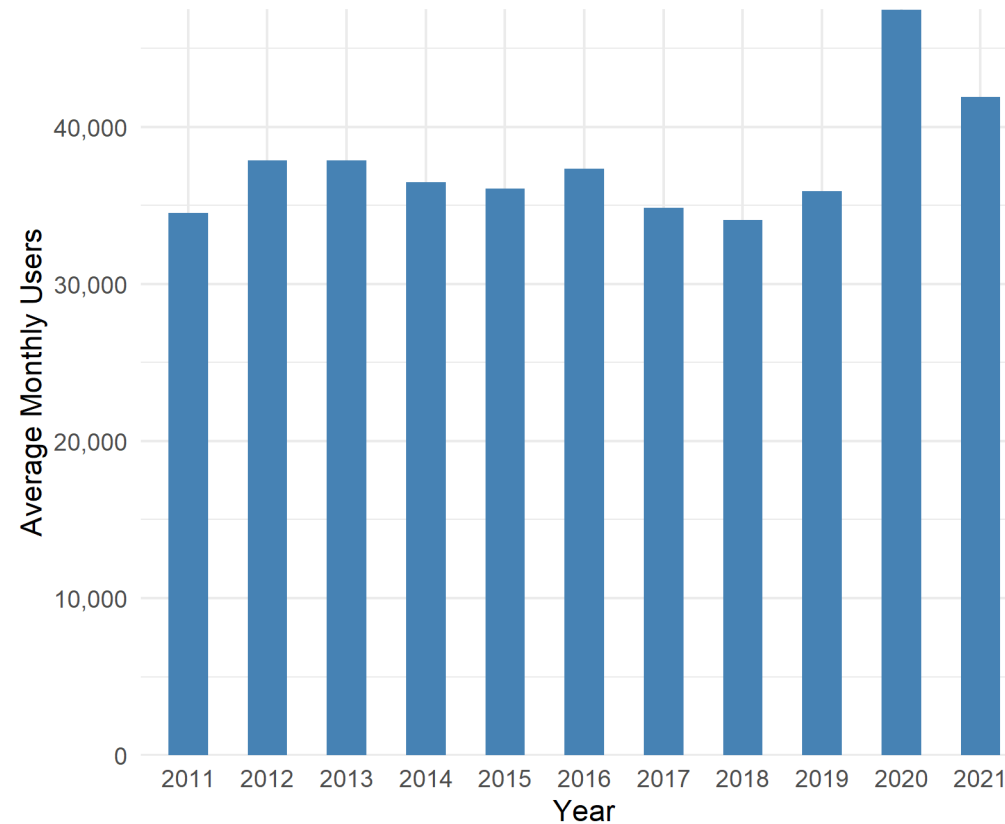


- Prior to 2020, average daily usership was generally between 1,070-1,270 people.
- However, there was a sizable increase in users in 2020 due to the COVID-19 pandemic.
 - There were slightly fewer visitors during the second year of the pandemic.
- The average daily usership calculation was likely lower in 2017 and 2018 due to construction project detours around the WTP sensor.

*Average of the daily (Sunday-Saturday) averages of WTP Multi (pedestrians and cyclists) and LFP. Days with missing data were excluded from the average calculations

Results Monthly Overview 2021

Year	Average Monthly Users*
2011	34,512
2012	37,880
2013	37,858
2014	36,495
2015	36,070
2016	37,347
2017	34,874
2018	34,077
2019	35,924
2020	47,482
2021	41,897

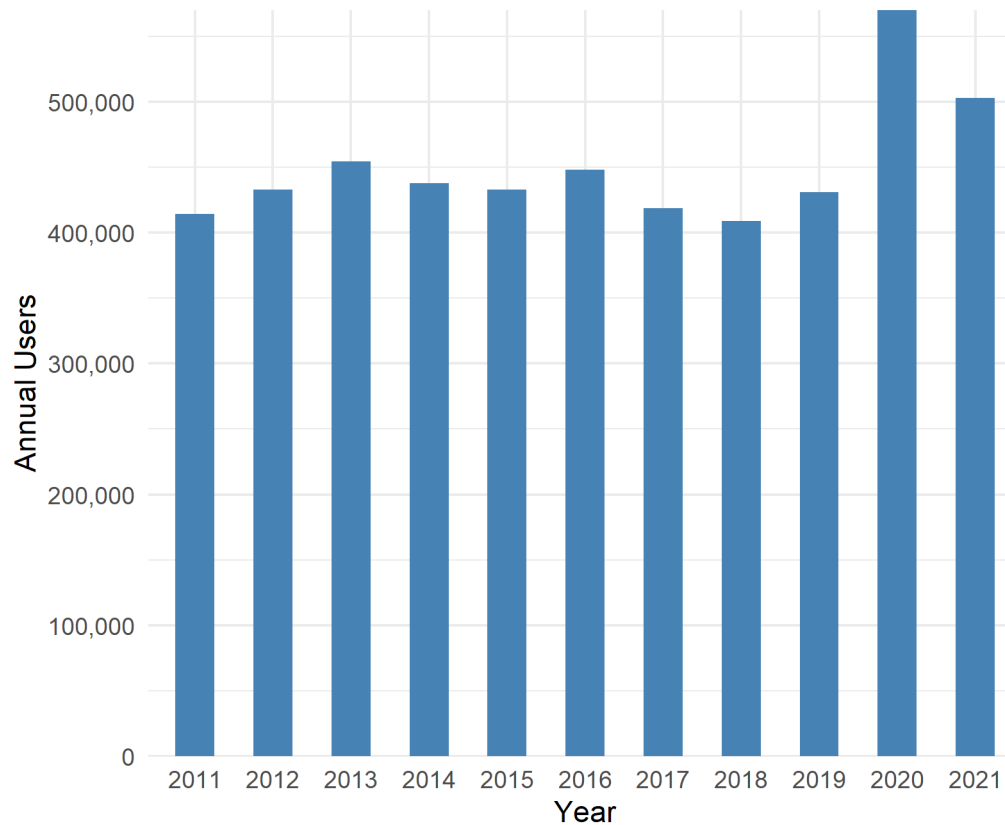


- Between 2011 and 2019, annual average monthly usership ranged from ~ 34,000 – 38,000
- During the 2020 COVID-19 pandemic shutdown, average monthly usership increased by over 9,000 users compared to the next highest year (2012)
 - Usership stayed high during the second year of the pandemic

*Average of the monthly averages of WTP Multi (pedestrians and cyclists) and LFP. During months with significant data loss at WTP, monthly total counts at LFP were used instead of the LFP and WTP Multi monthly averages to calculate the annual monthly average. The opposite was true if significant amounts of data were missing at LFP but not WTP.

Results Annual Overview 2021

Year	Annual Users*
2011	414,140
2012	432,646
2013	454,294
2014	437,944
2015	432,838
2016	448,164
2017	418,492
2018	408,926
2019	431,086
2020	569,788
2021	502,760



- Measured usership on an annual basis is typically ~410,000-455,000 people per year.
- 2020 and 2021 showed a major increase in annual usership, corresponding with the COVID-19 pandemic:
 - Usership increased 32% from 2019 to 2020.
 - In 2021, there were still 17% more users than in 2019.

*Sum of the monthly averages of WTP Multi (pedestrians and cyclists) and LFP. During months with significant data loss at WTP, monthly total counts at LFP were used instead of the LFP and WTP Multi monthly averages to calculate the annual monthly average. The opposite was true if significant amounts of data were missing at LFP but not WTP.

2021 Annual Overview Summary

- The 2020 COVID-19 pandemic corresponded with a large increase in the number of users at Fresh Pond Reservation. This trend continued in 2021, the second year of the pandemic.
- Total usership increased by 32% in 2020 from 2019. Usership in 2021 was lower but still 17% higher than 2019.
- Total annual usership in 2021 was 502,760.
- In 2021, an average of 41,897 people visited Fresh Pond Reservation each month. Monthly average usership decreased by 5,586 users compared to 2020 but was still 5,973 users higher than 2019.
- In a typical year, an average of roughly 1,070 – 1,270 people visit Fresh Pond Reservation daily. In 2021, there were an average of ~1,400 users/day.

Results

Perimeter Road Sensors

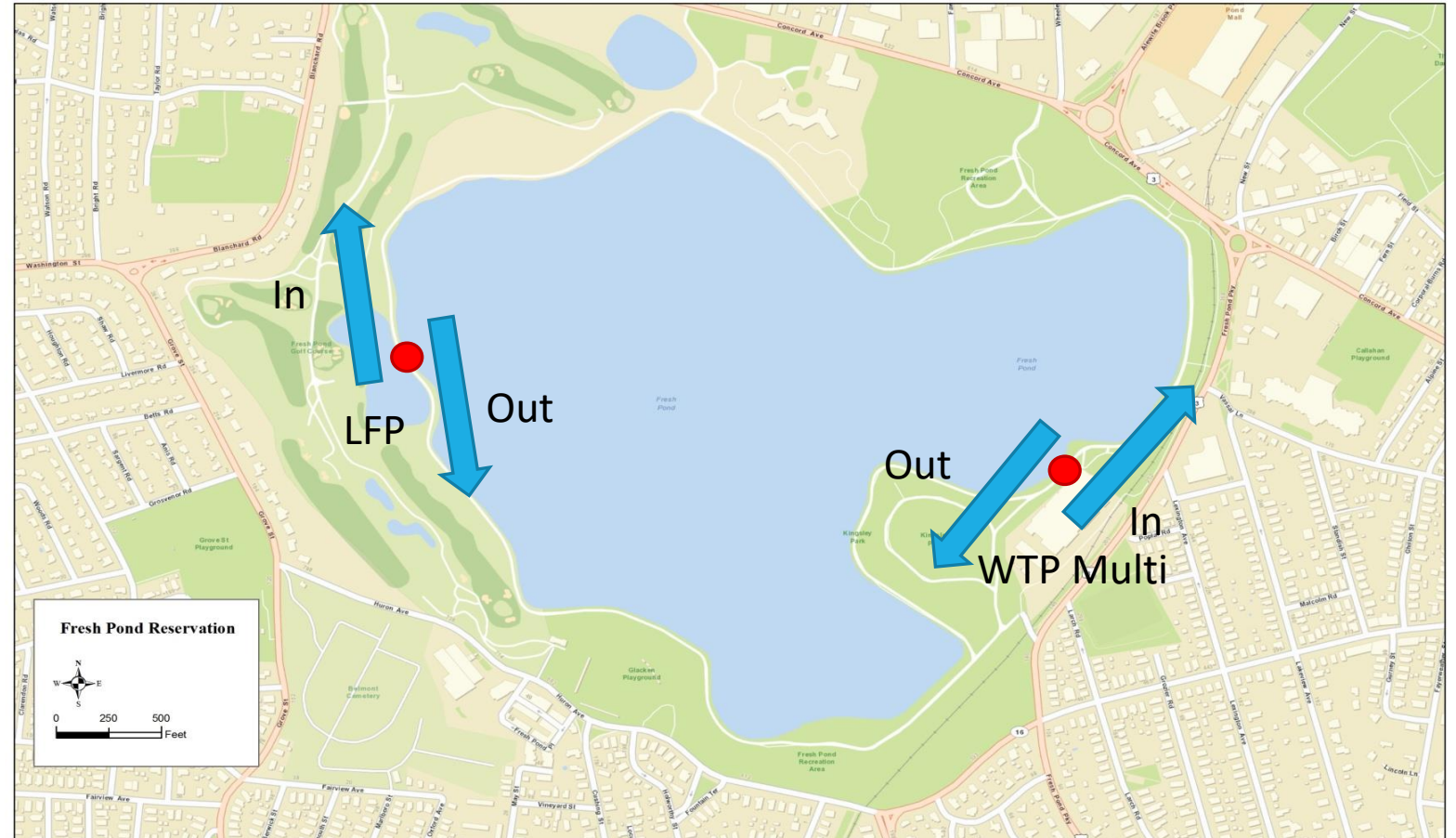
Perimeter Road EcoCounter Sensors

Little Fresh Pond (LFP)

- Directional

Water Treatment Plant Multi (WTP)

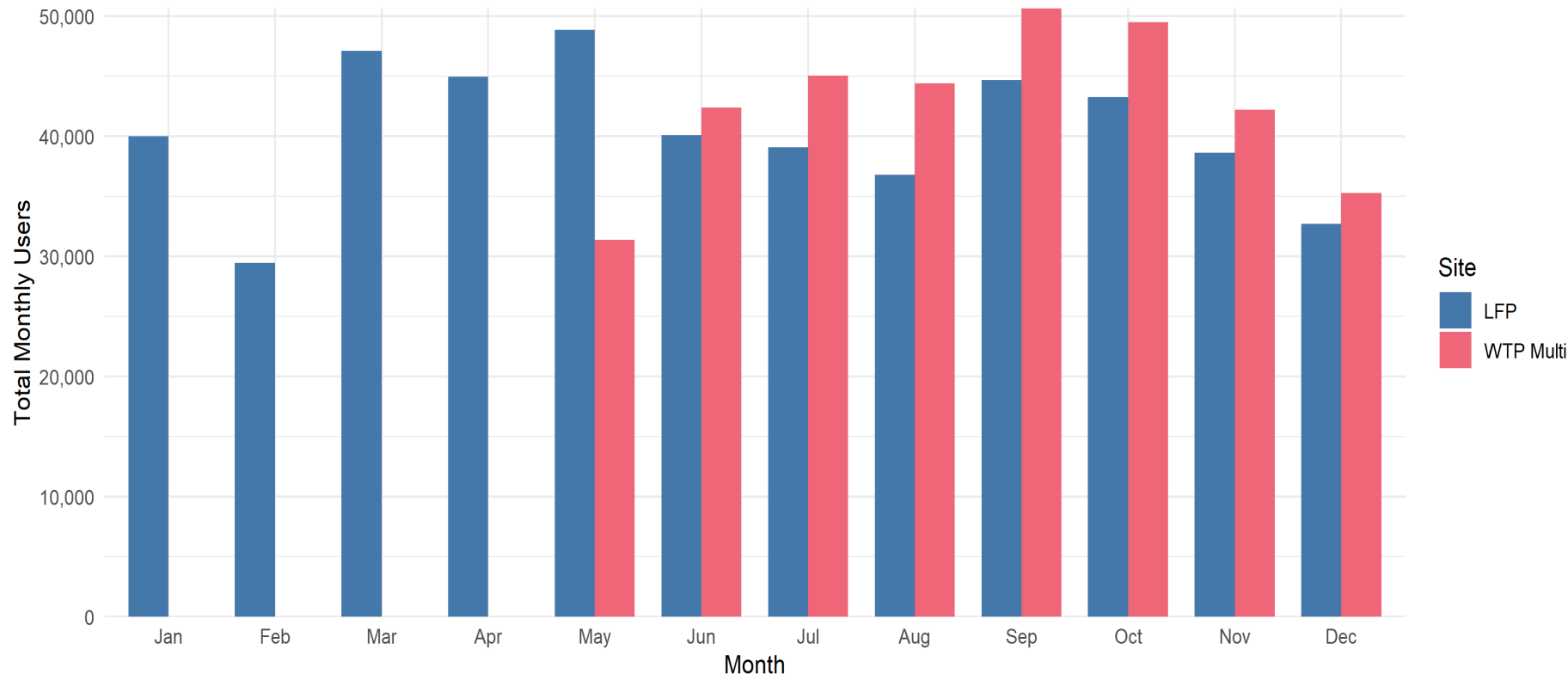
- Directional
- Differentiates between pedestrians and cyclists



2021 Perimeter Road Summary

- In the second year of the pandemic, usage has remained high at both LFP and WTP.
- Weekend days show higher usage than weekdays at both sites, and WTP had slightly higher usership each day than LFP.
- Weekend use has dropped to near pre-COVID-19 pandemic levels. However, weekday usership remains elevated.
- Both sites had two distinct peaks of usage throughout the day, late morning and late afternoon. Prior to 2020, the LFP morning peak was larger than the afternoon. In 2020 and 2021, the afternoon peak was larger than the morning one. The same pattern was observed at WTP in 2020 but the morning peak returned to being larger than the afternoon peak in 2021.

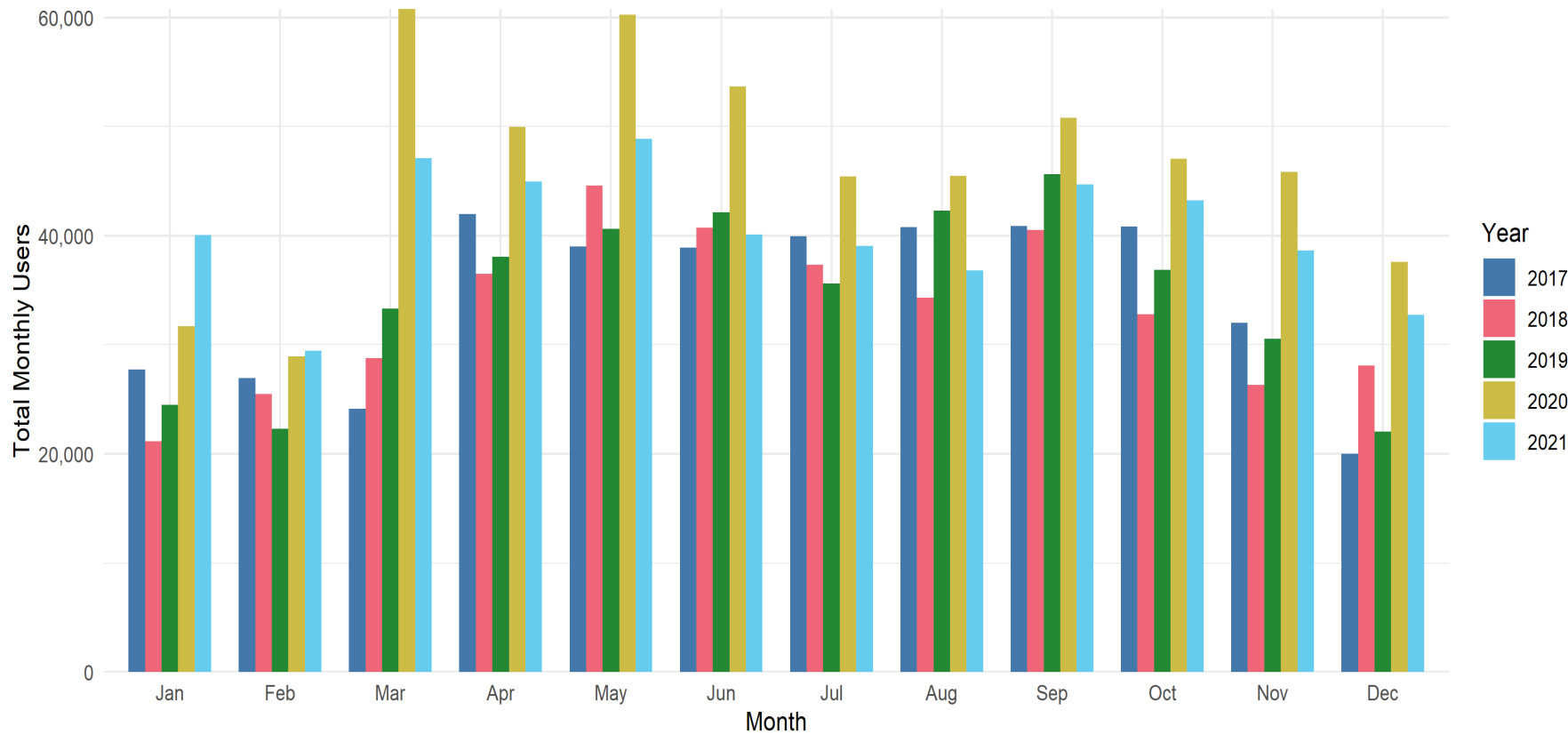
Results Perimeter Road Total Monthly Users 2021



There is no WTP Multi data Jan-Apr. The sensor was replaced on May 7th, and additional sensor errors caused May data to be artificially low.

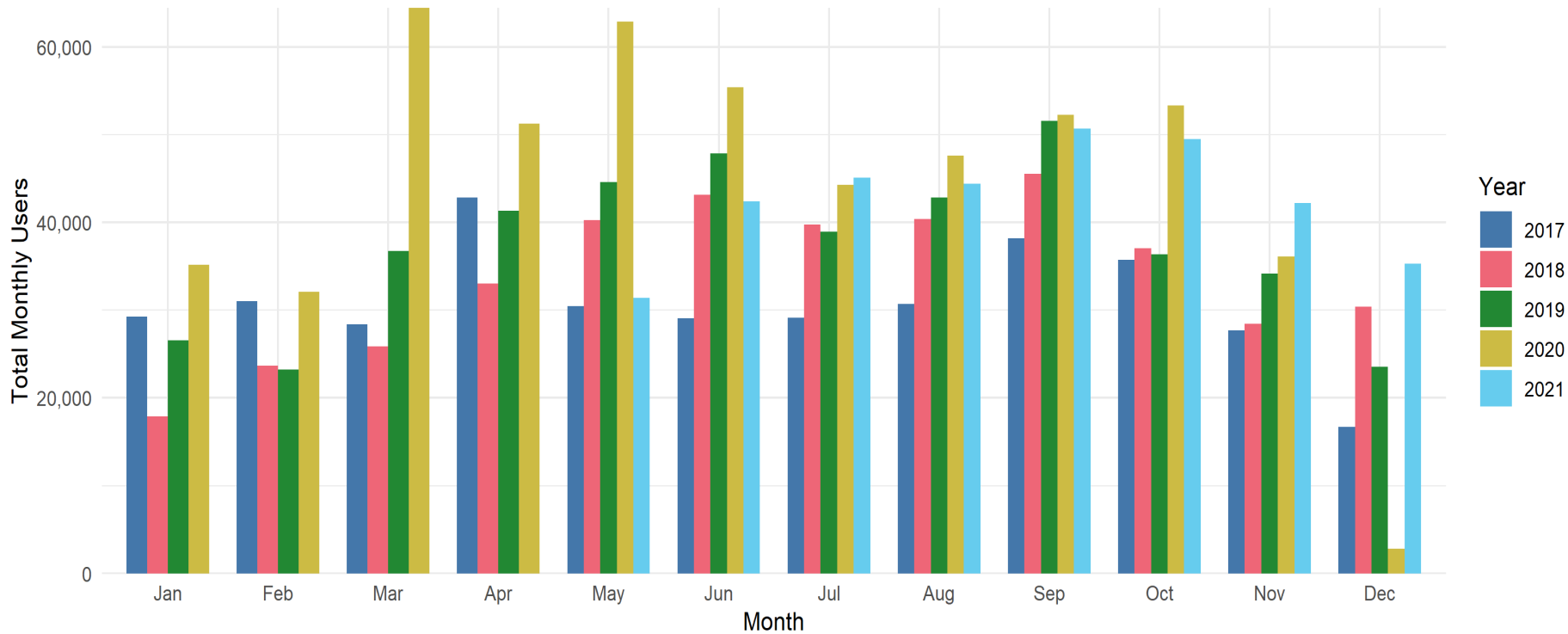
- Usership increased from June through September at both sites.
 - At LFP, usership spiked in the spring (March – May) and again in September.

Results LFP Total Monthly Users



- Usership at LFP generally increases through the spring and into the summer, with a slight decrease during July and August. Usership typically rebounds again in September and then tapers off as the weather gets colder in the fall.
- Usership can reach 40,000 people a month during peak seasons in a typical year
 - Monthly usership spiked at the start of the COVID-19 pandemic (March 2020) to over 60,000 people.
- Monthly usership in 2021 is slightly higher than in previous years (excluding 2020) except during the summer (June – August).

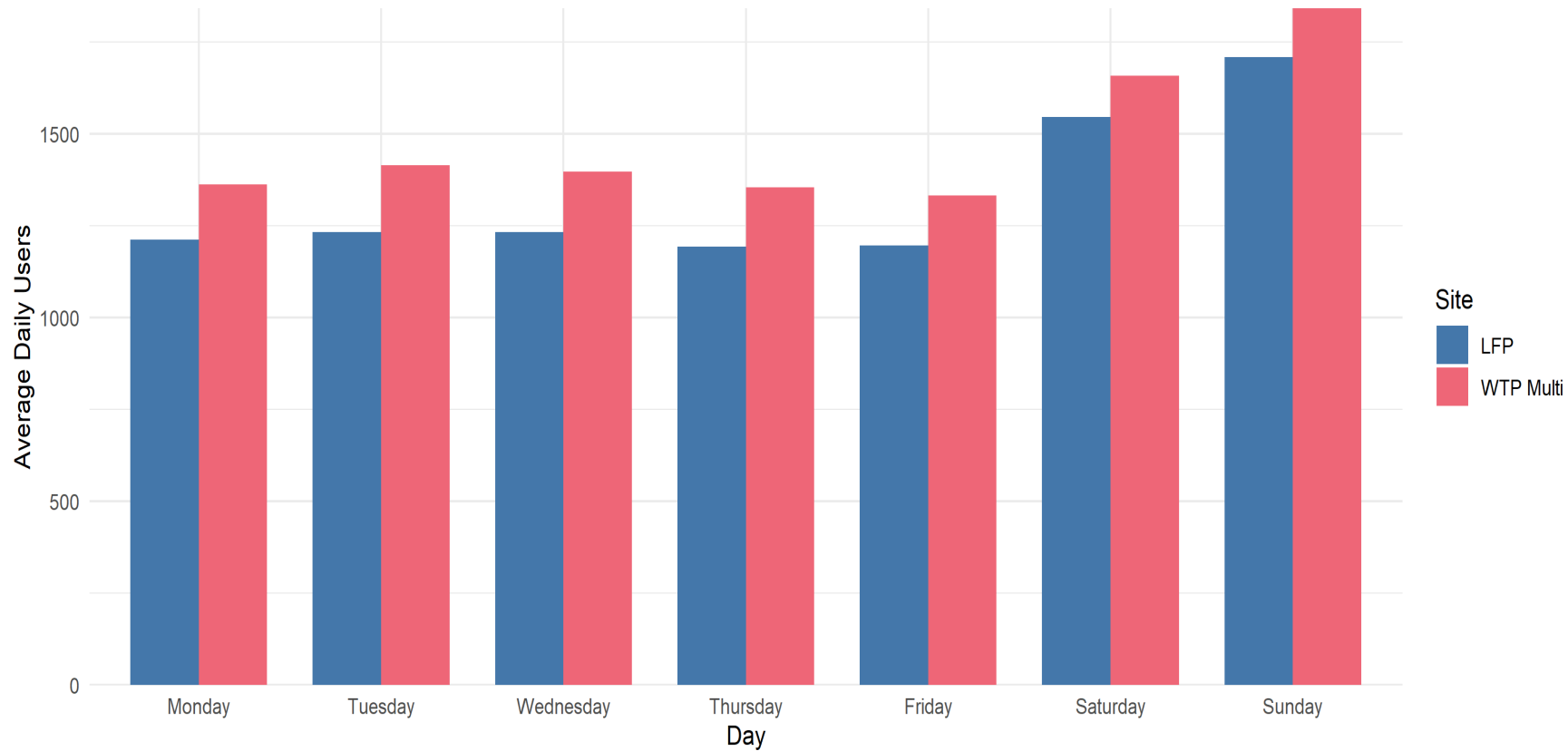
Results WTP Total Monthly Users



- Usage in 2020 and 2021 is higher than previous years.
- Other than in 2020, the month with the highest usage is consistently September.

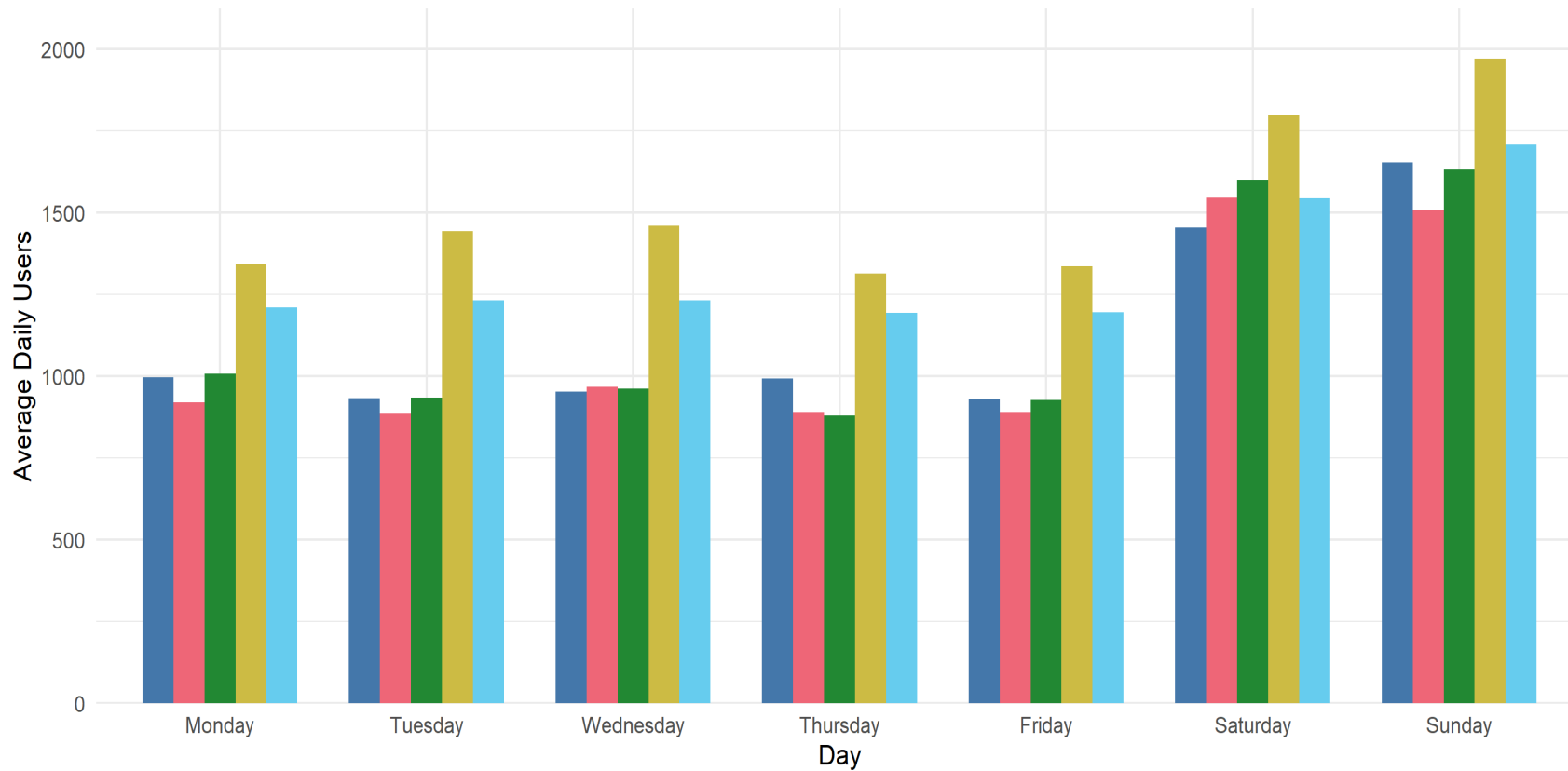
Low counts from May 2017 - May 2018 may be due to a construction detour routing users away from the sensor.
 Nov and Dec 2020 counts are artificially low due to sensor error.
 There was no data Jan-Apr 2021; the sensor was replaced on May 7th, and additional sensor errors caused May data to be artificially low.

Results Perimeter Road Day of Week Averages 2021



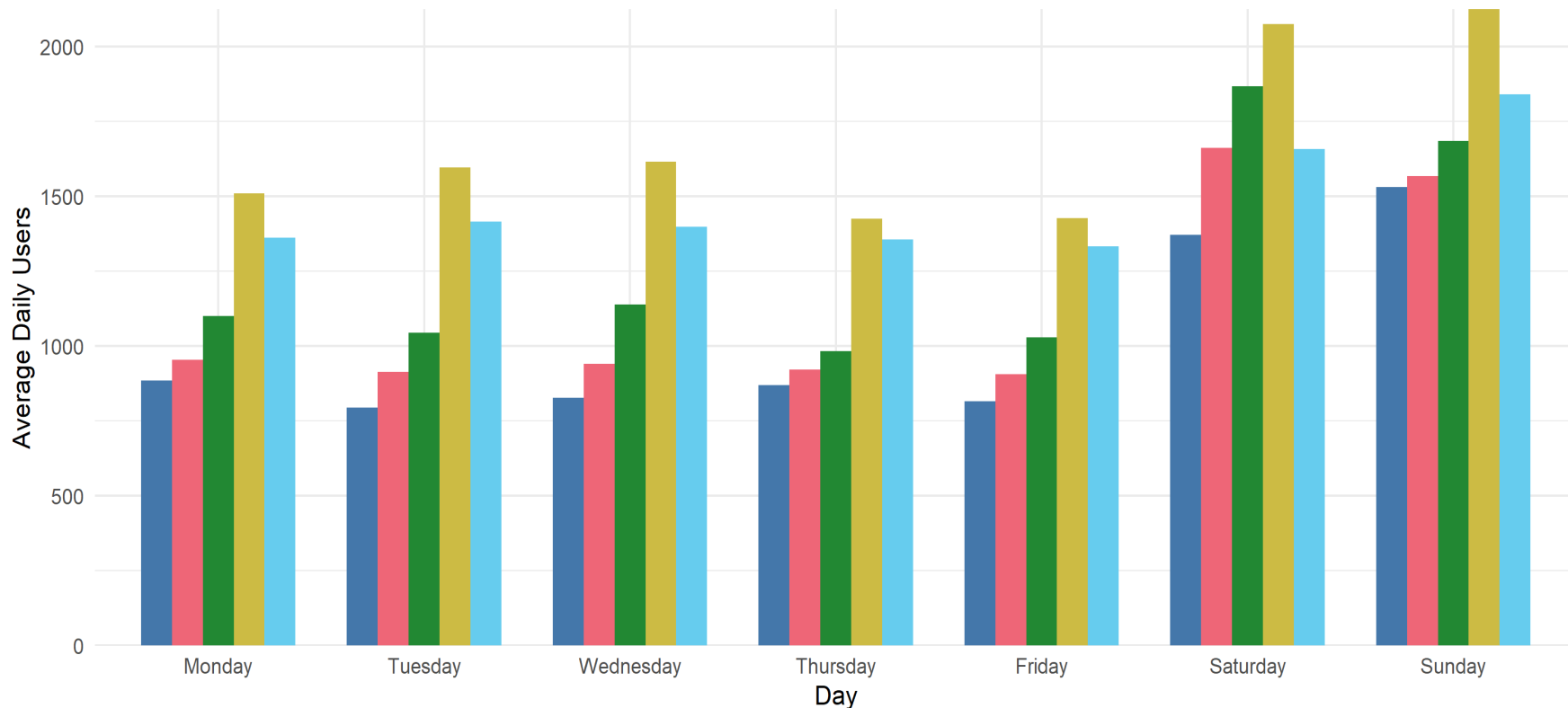
- Weekends were busier than weekdays at both LFP and WTP.
 - Weekdays experienced ~1,200 – 1,400 average daily users.
 - Weekends hovered around 1,600 – 1,800 users.
- WTP saw slightly more visitors than LFP.

Results LFP Day of Week Averages



- LFP has seen consistent usership just under or over 1,000 people/day during weekdays since 2017. However, ~1,400 users/weekday passed the LFP sensor in 2020 and 1,200 in 2021.
- Prior to 2020, weekends hovered around 1,500-1,600 people each day.
 - Weekends showed less of an increase in users due to the pandemic (1,800-2,000 users/day in 2020) compared to the weekday increase.
- Weekend daily usage in 2021 dropped to levels similar to before the COVID-19 pandemic

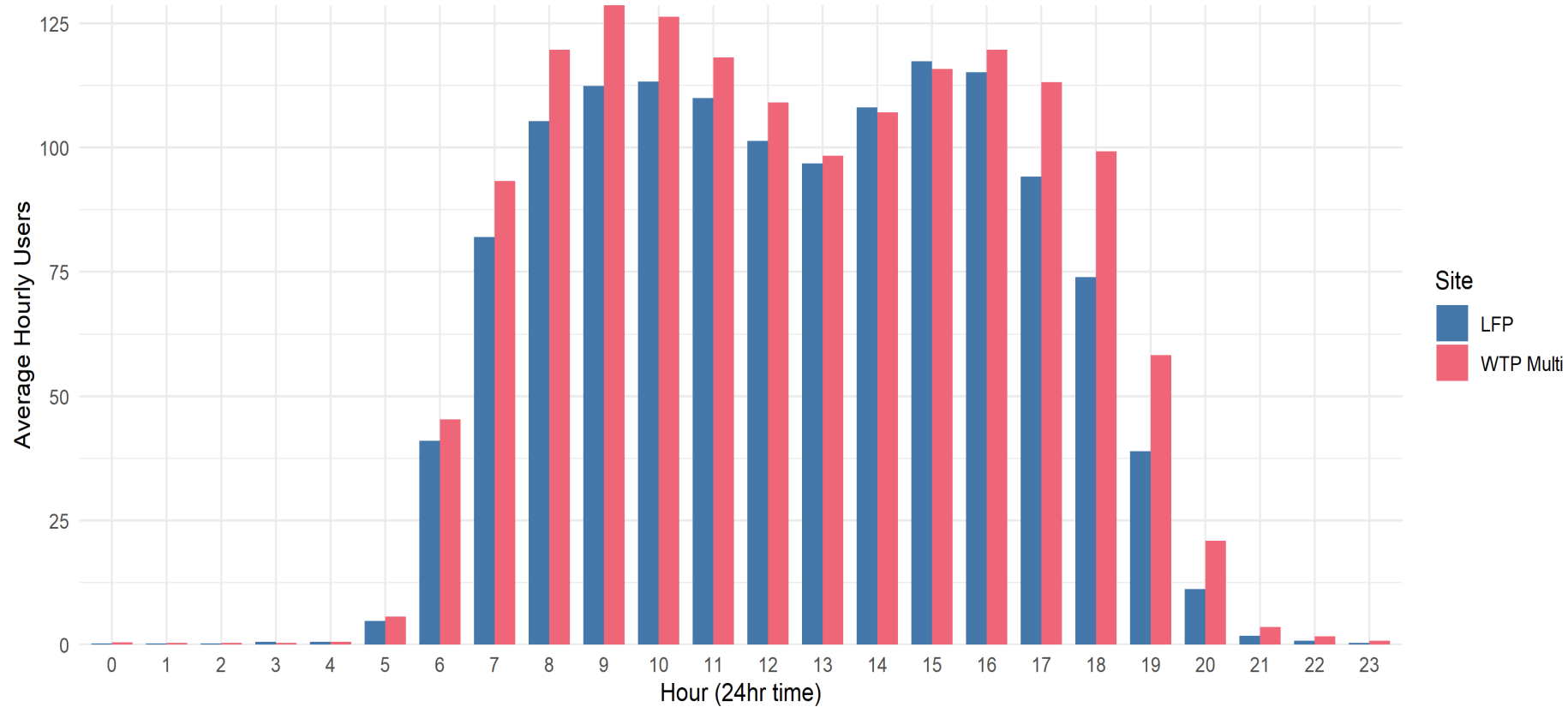
Results WTP Day of Week Averages



Counts may be lower in 2017 and 2018 due to a construction detour that routed users away from the sensor.

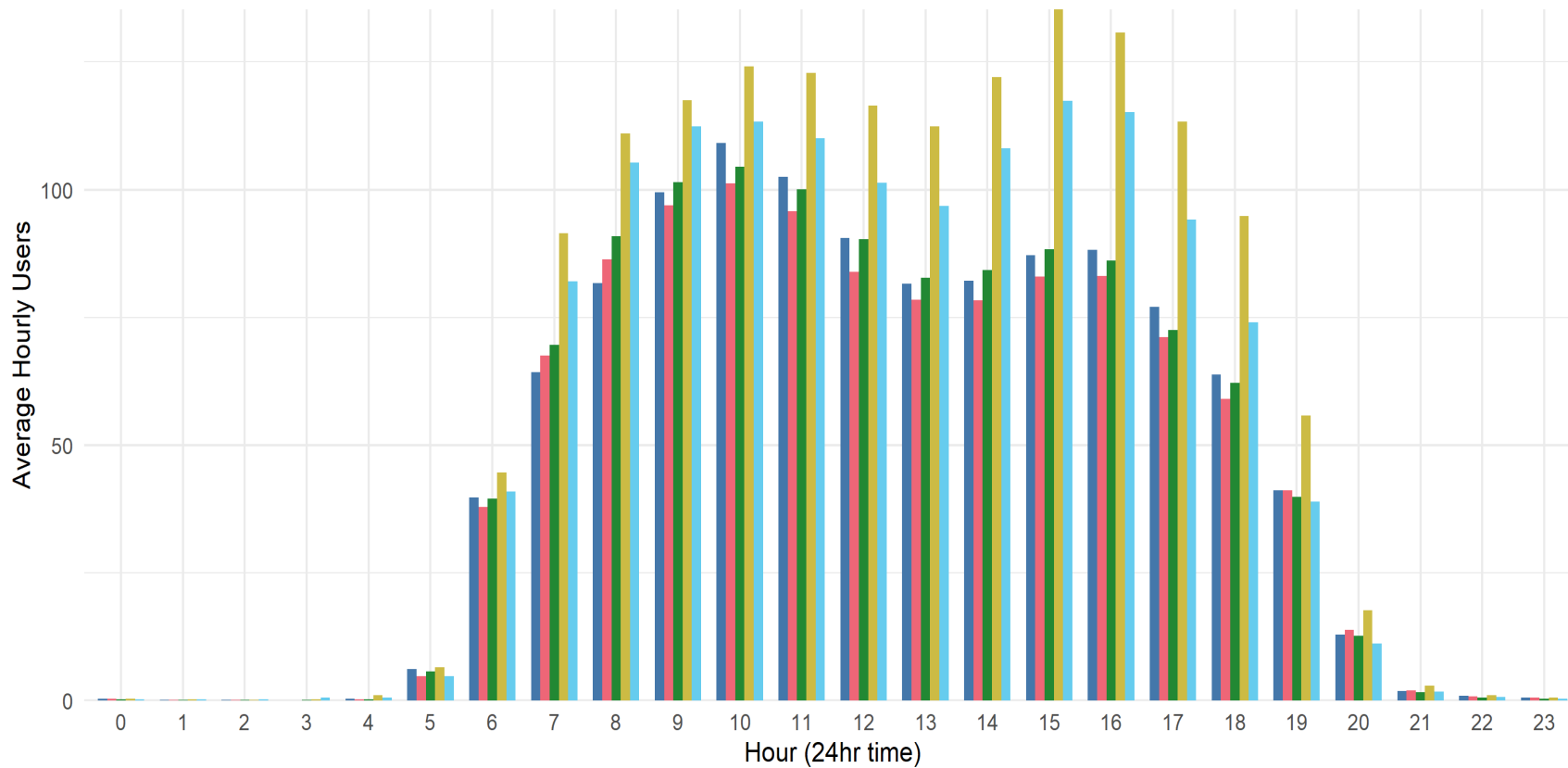
- Weekday usage at WTP was lowest from 2017-2019, in part from a construction detour, but increasing each year after. As with LFP, daily weekday usership increased in 2020 and 2021 compared to 2017-2019.
- Weekends see approximately 1,500-1,800 people a day, except during 2020 (~2,100 users/day)
- Weekend daily usership levels are also dropping to pre-pandemic levels

Results Perimeter Road Hourly Averages 2021



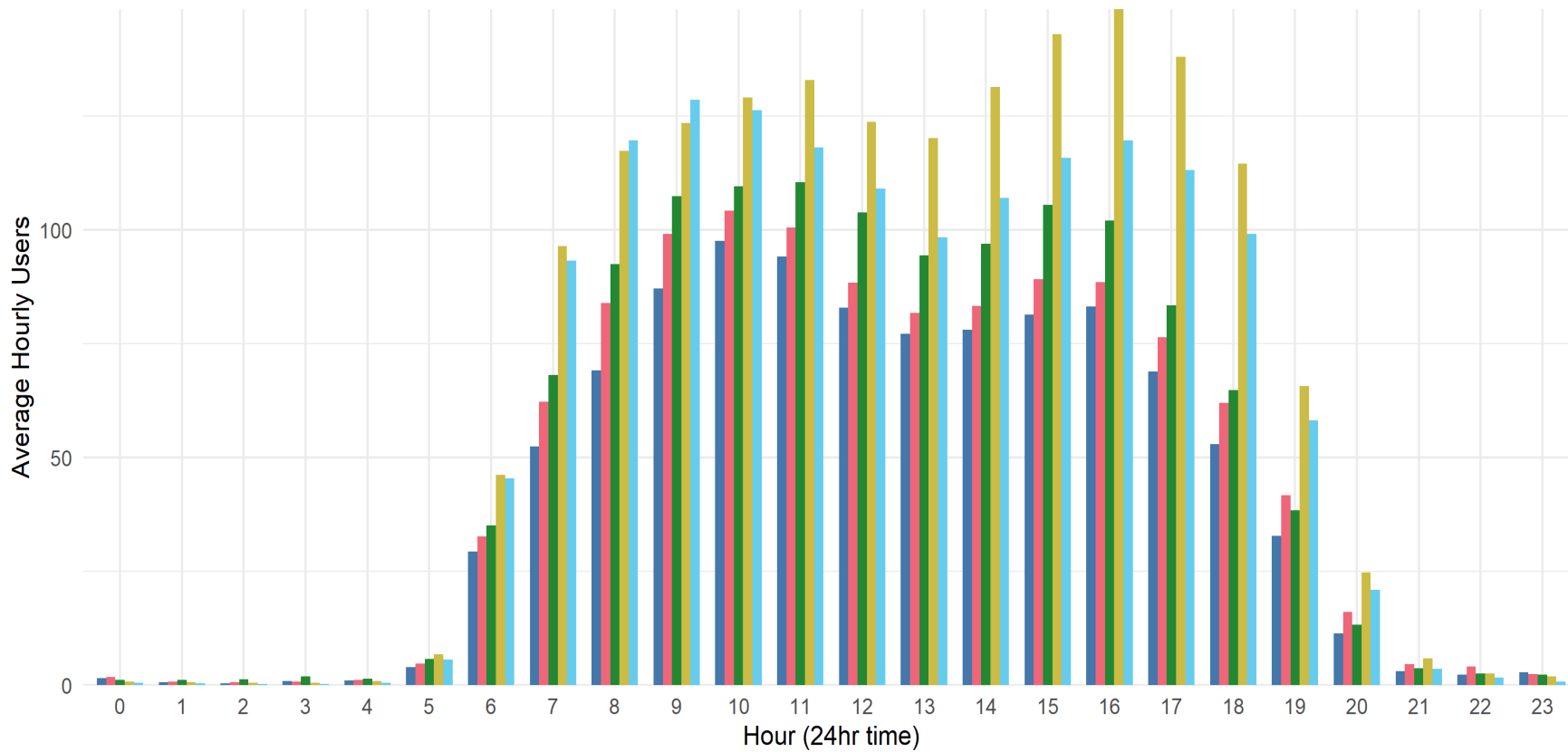
- There were two peaks of usage for each site, midmorning and late afternoon.
- There was a bigger difference in use between WTP and LFP in the evenings (5-7pm) than the mornings.
 - This may indicate users are finishing up their walks around Fresh Pond as sunlight wanes

Results LFP Hourly Averages



- In the past, LFP had more visitors in the morning than the afternoon, peaking around 10:00 AM.
- However, in 2020 and 2021 it was the opposite, with more use in the late afternoon.

Results WTP Hourly Averages



- There were two peaks in usage at WTP during the day, one at midmorning and the other in the late afternoon.
- Prior to 2020 and in 2021, the midmorning peak was larger than in the afternoon. However, the opposite was true in 2020.

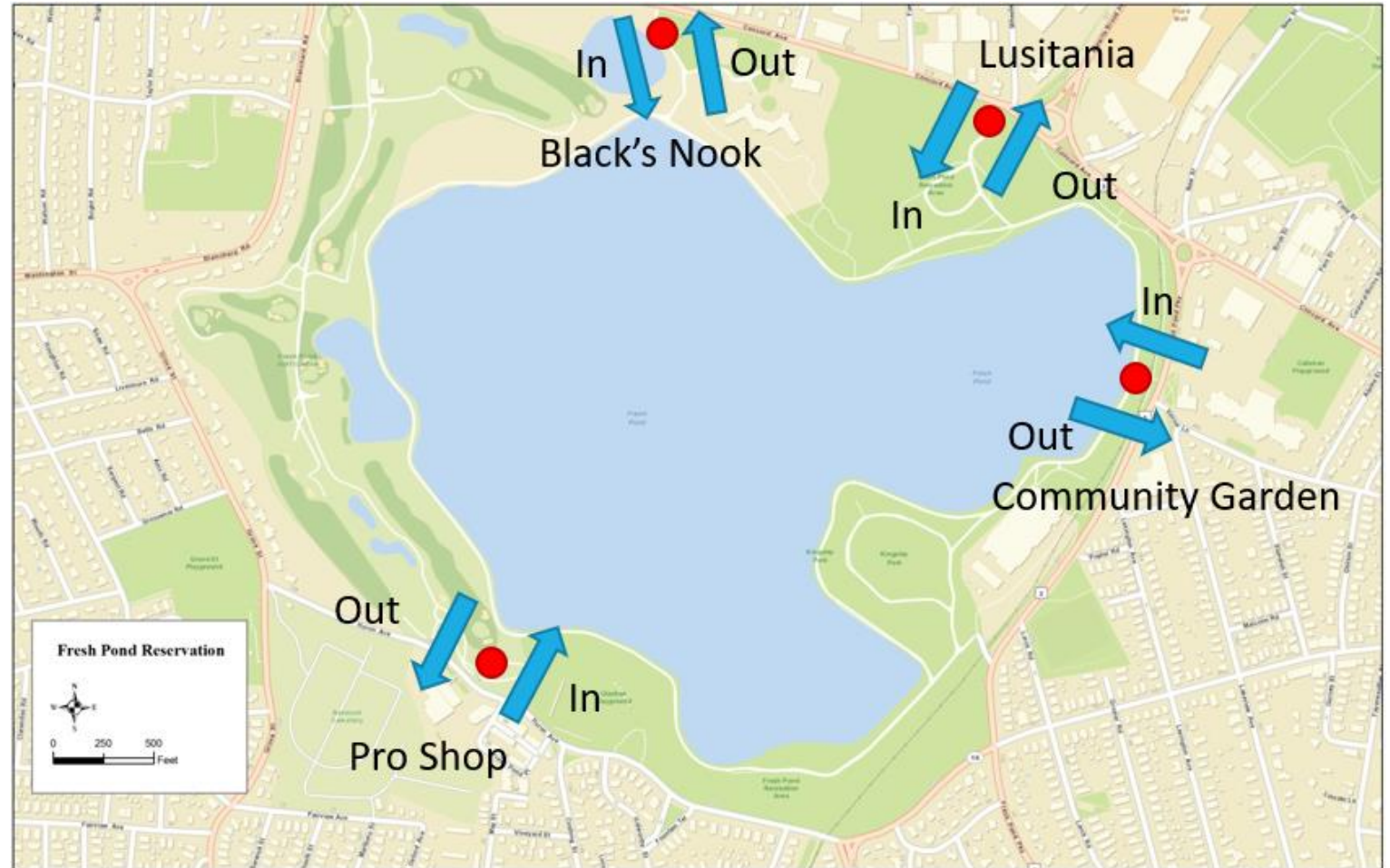
Results

Entrance Sensors

Reservation Entrance EcoCounter Sensors

Black's Nook, Community Garden,
Lusitania, and Pro Shop

- Directional

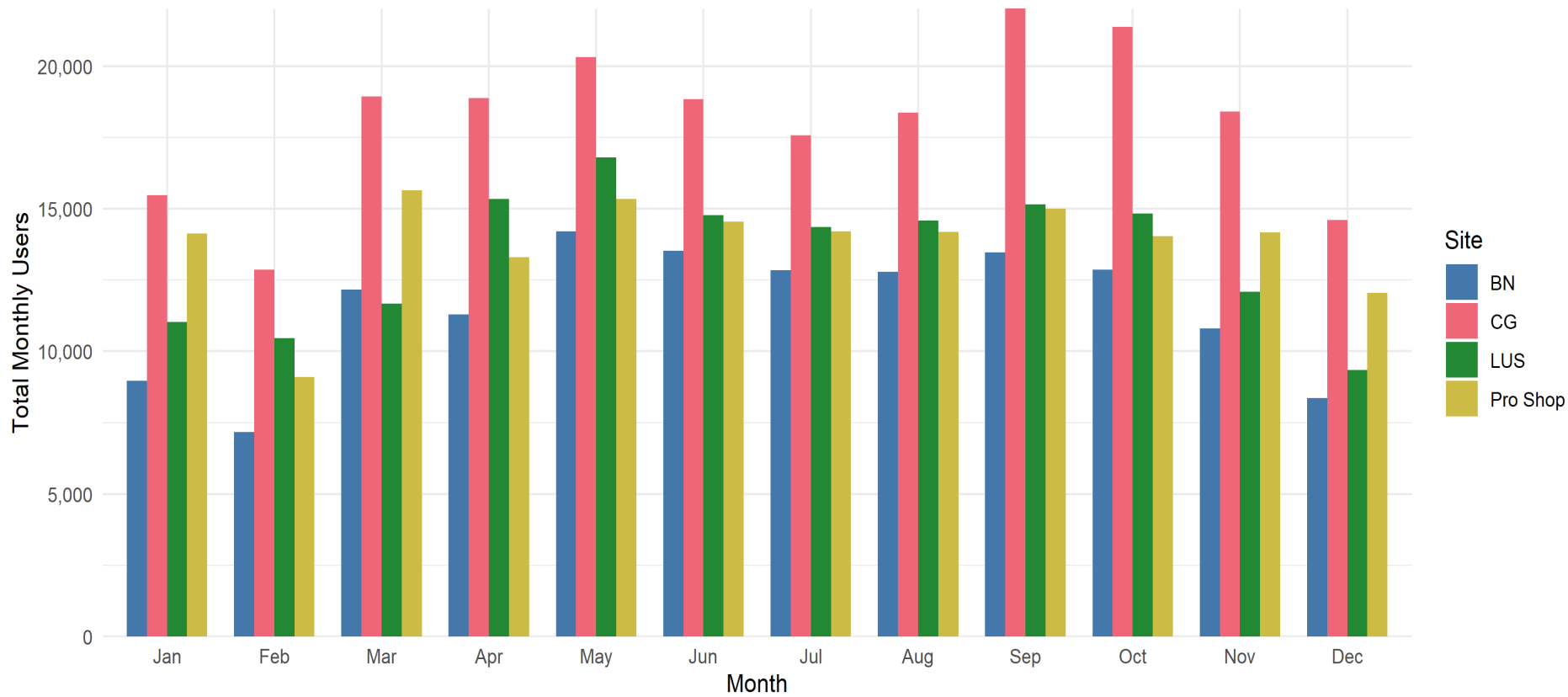


2021 Entrance Summary

- The Community Garden sensor shows higher usage than the other entrance sensors.
- Usership at Black's Nook and Lusitania increases leading up to the warmer months. Usership at the Pro Shop entrance is more consistent throughout the year. The Community Garden entrance showed the strongest fall peak of the four sites.
- Weekends are busier than weekdays at all sites. However, there appears to be a pandemic-related increase in weekday usage.
- In a typical year, usership at Black's Nook and Lusitania peaks at noon with a smaller, second peak in the late afternoon. The Pro Shop entrance typically has two peaks that are similar in scale in the midmorning and late afternoon. The pandemic years of 2020 and 2021 showed a shift towards increased afternoon usage.
- Community Garden sensor shows two distinct peaks through the day, early morning and late afternoon. *Note: there are no trends over the last five years for CG because it was installed in Dec 2019.*

Results 2021

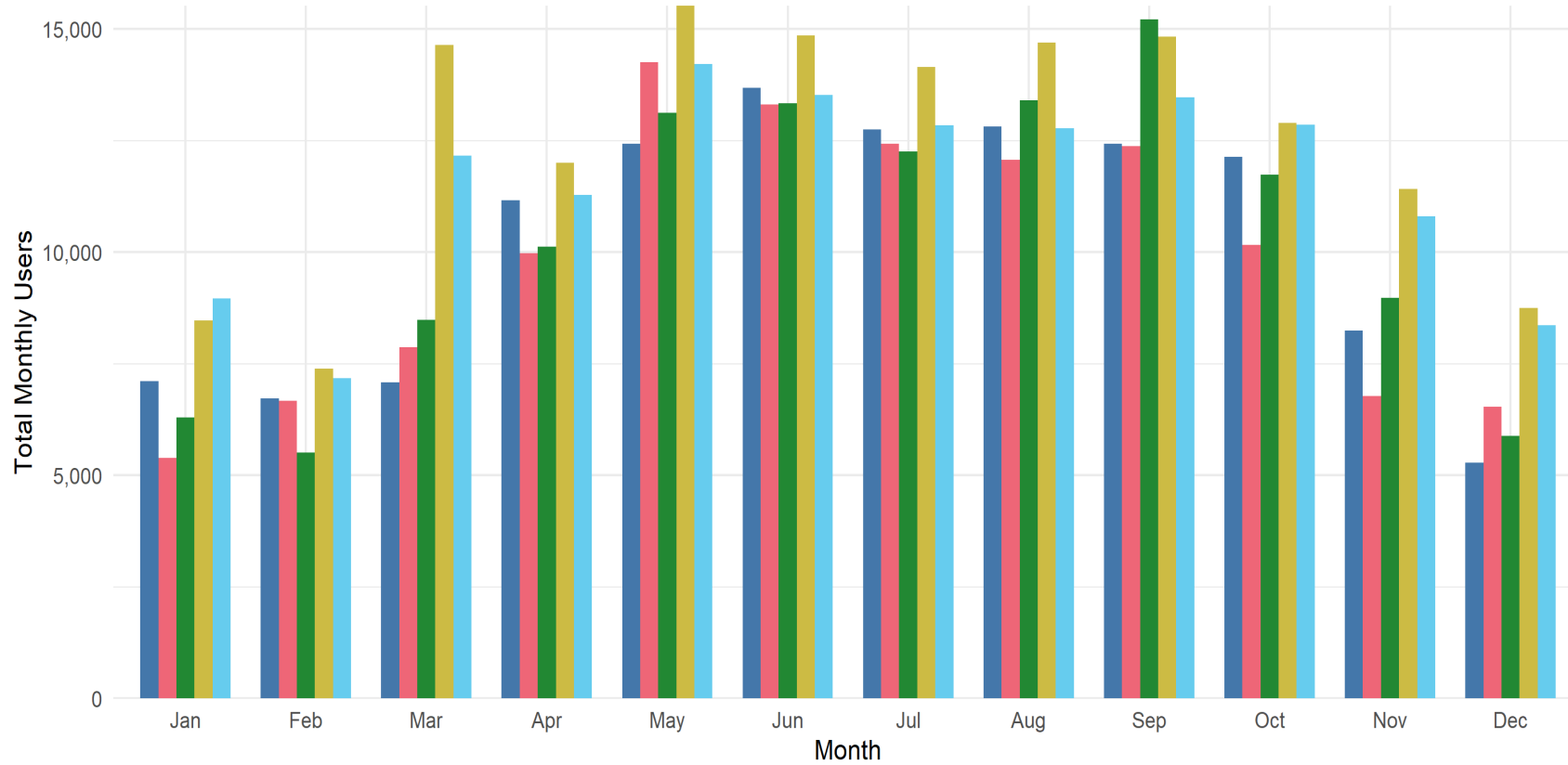
Entrances Total Monthly Users



- The Community Garden (CG) entrance is the busiest of the four. Black's Nook (BN) is the least busy.
- Similar to the perimeter road sensors, usership at the entrances was slightly lower in July and August before increasing again in September and slowly tapering off through the end of the year.

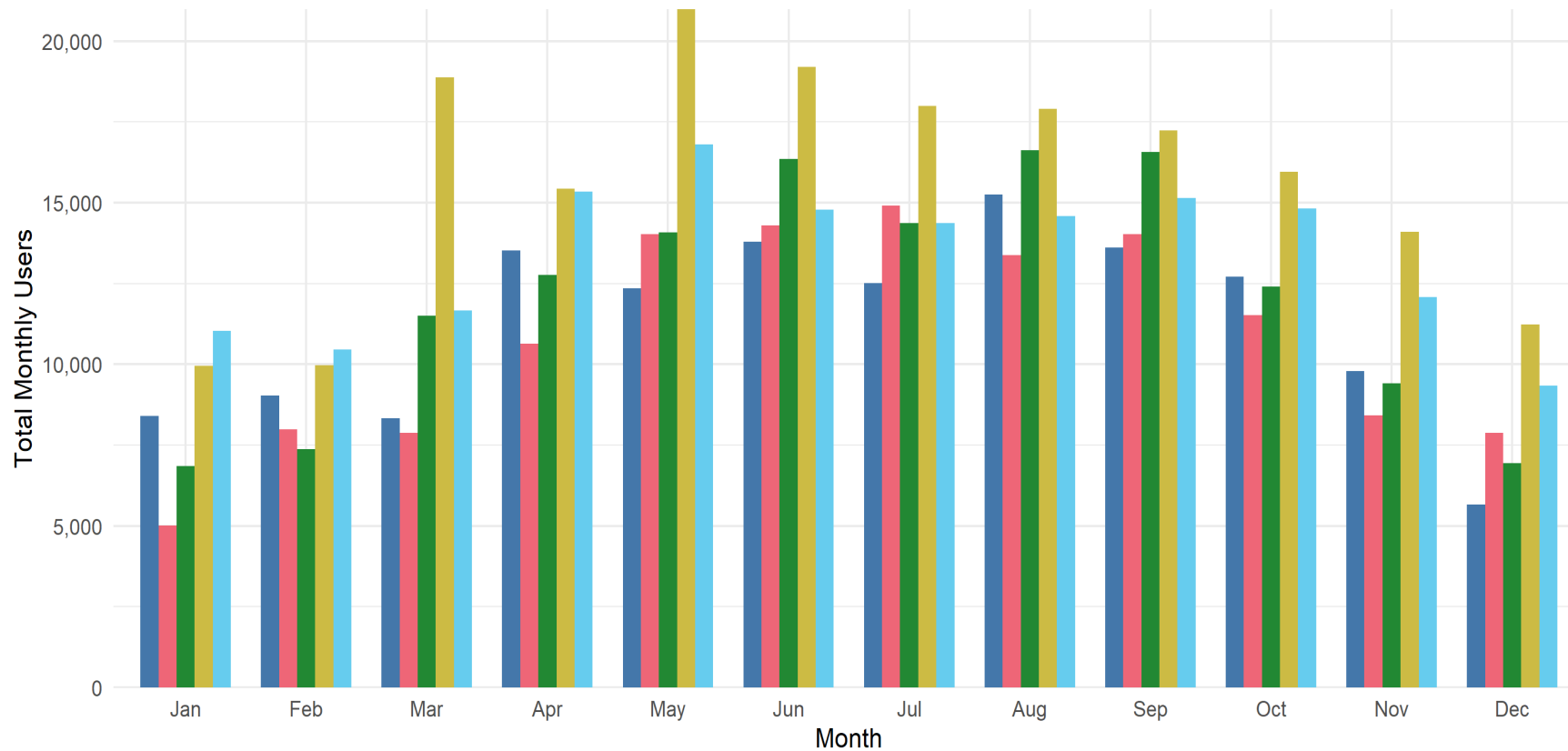
Results Users

Black's Nook Total Monthly



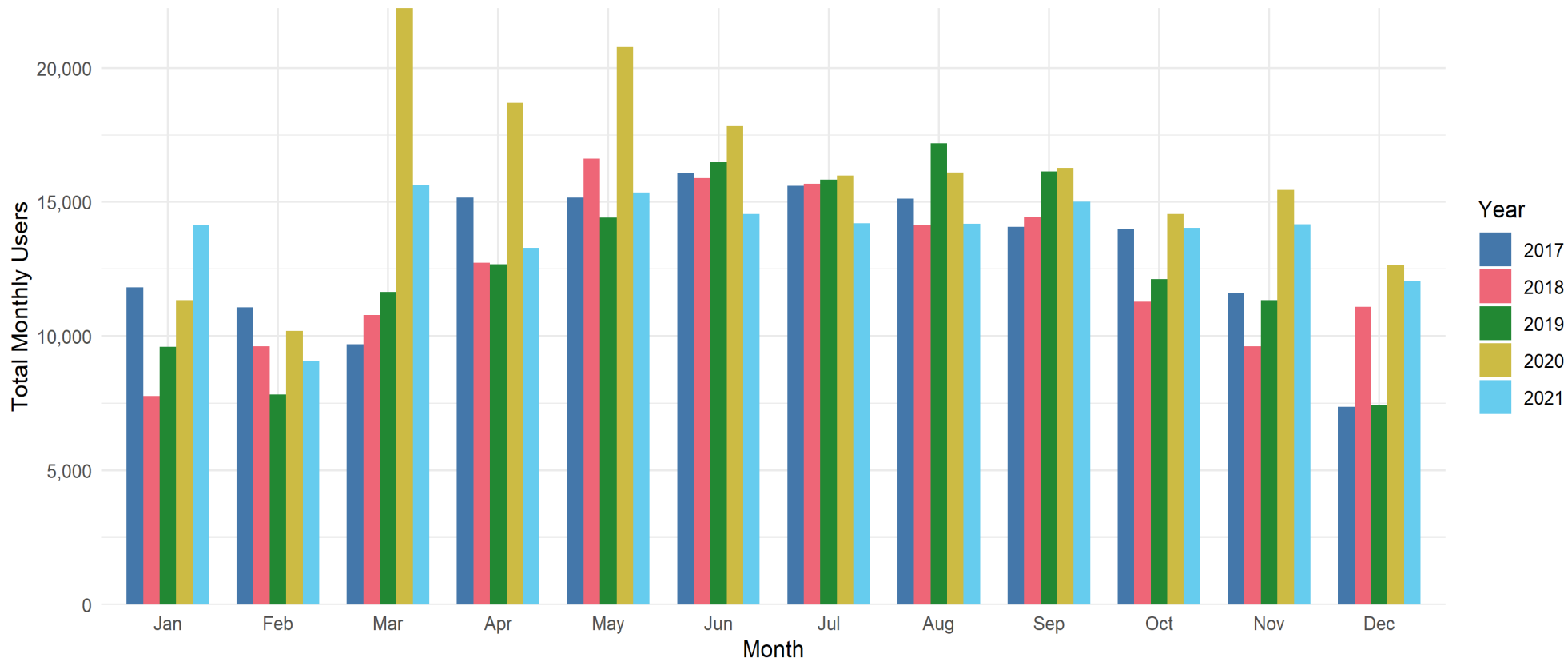
- Usage at Black's Nook increases steadily into the summer and decreases steadily in the fall.
- As with all sites, monthly usership increased in 2020 due to the COVID-19 pandemic.
- In 2021, usership appeared to return to pre-pandemic levels during the warmer months.
- However, user numbers were similar to 2020 during the colder months. This suggests a pandemic-related increase in cold weather walkers.

Results Lusitania Total Monthly Users



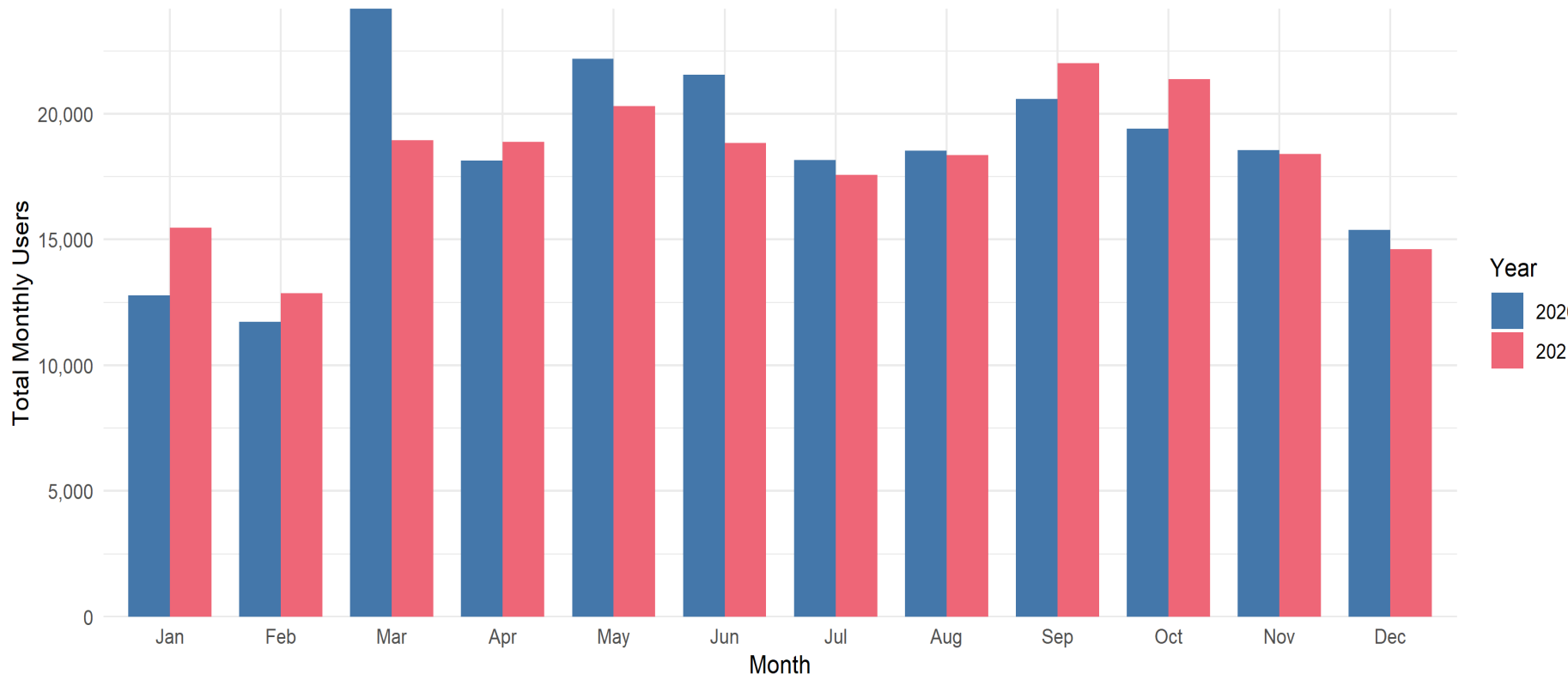
- Monthly usership typically steadily increases until the beginning of summer, dips slightly in July, rebounds slightly in August or September, then decreases throughout the rest of the year.
- Usership at LUS increased almost 100% between February and March of 2020, although 2021 levels were back to normal for most of the year.
- A pandemic-related increase in cold weather users appeared to remain October – December of 2021.

Results Pro Shop Total Monthly Users



- 2020 usage at the Pro Shop entrance was only noticeably higher than in past years in the early spring and late fall.
- In 2021, usage was higher than pre-pandemic years in January, March, and October through December, although not during the warmer months.

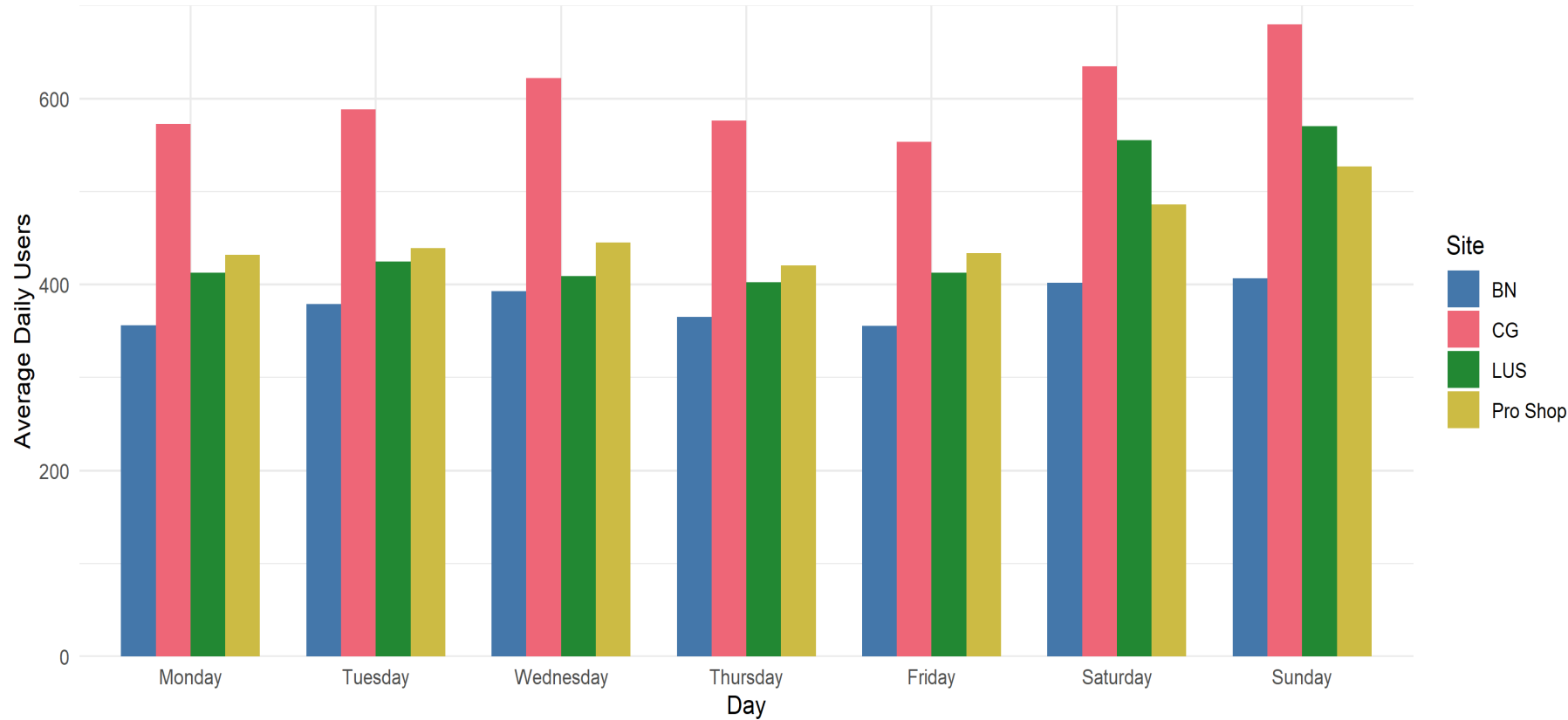
Results Community Garden Total Monthly Users



2020 was the first full year of data after sensor installation.

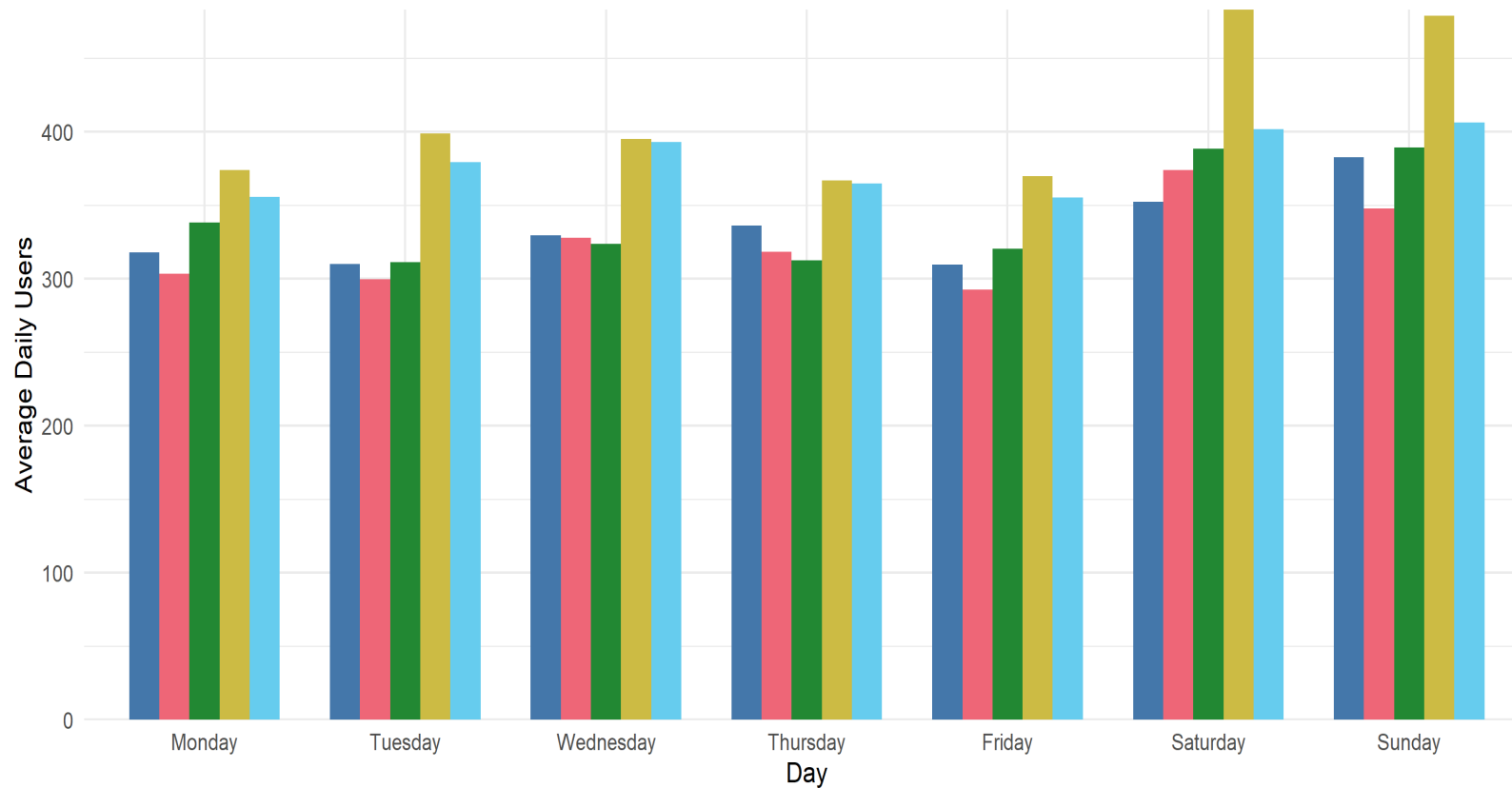
- Usership at CG increases steeply in March from February, then stays high through the rest of the year with a slight dip in July and August.
- Usership was higher in 2021 than 2020 in the fall, although the opposite is true of the spring.

Results Entrances Day of Week Averages 2021



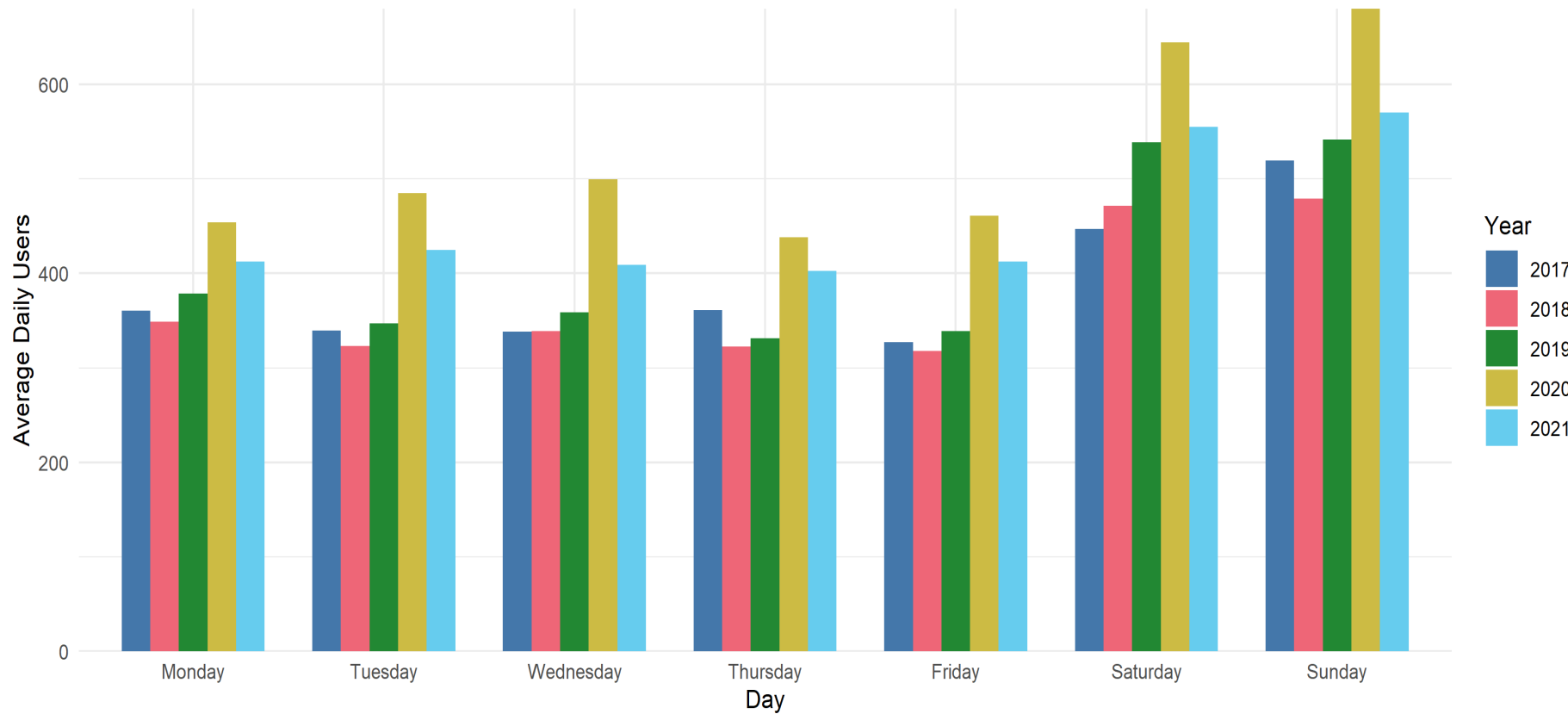
- Each entrance had more users on the weekends than the weekdays.
- The Community Garden entrance consistently had the highest number of daily users (~550-780).
- Average weekday usership at Black's Nook, Lusitania, and Pro Shop was ~400.
 - Usership at Lusitania and Pro Shop increased to ~500 on the weekends whereas Black's Nook weekend use increase only slightly over weekday use.

Results Black's Nook Day of Week Averages



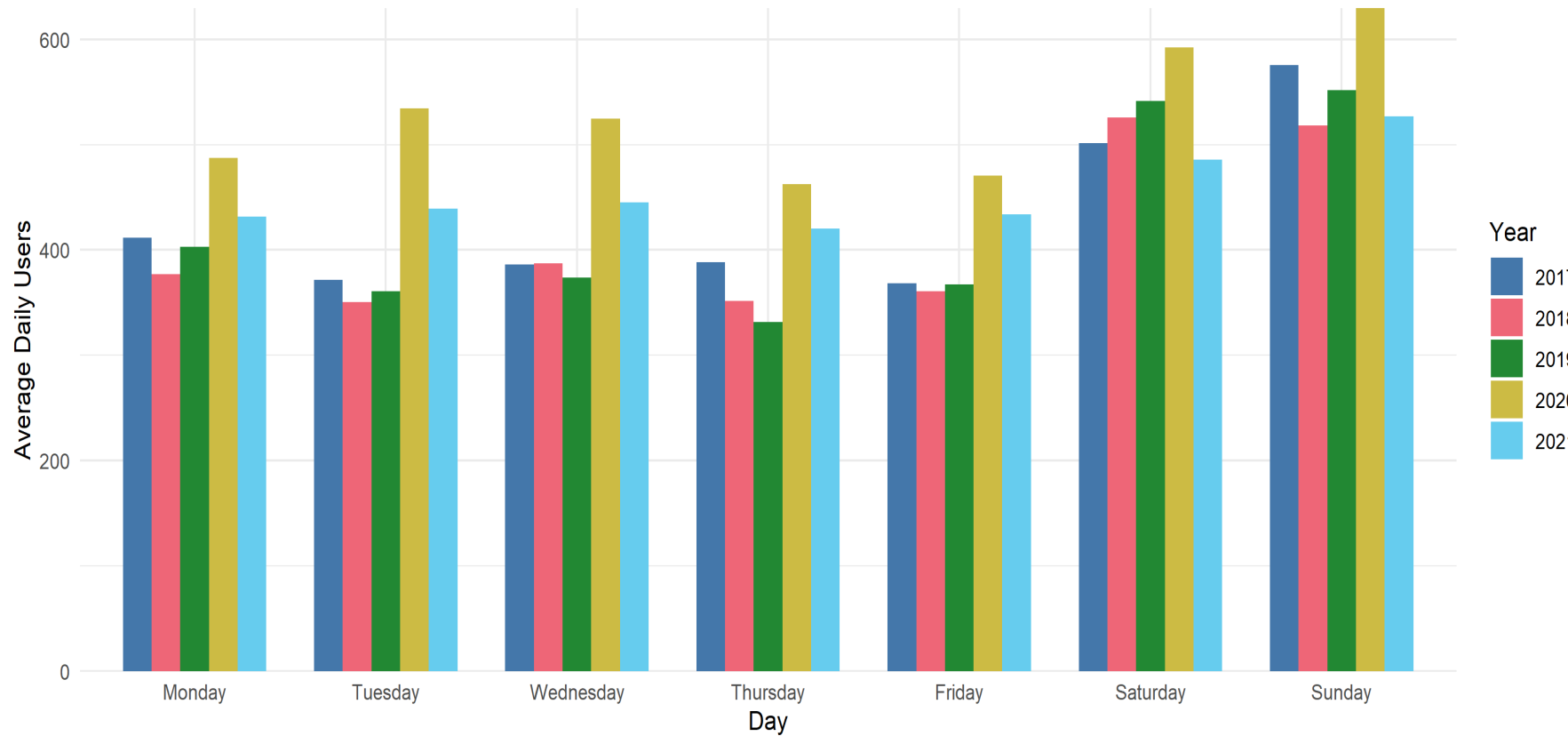
- Usership over the last five years has been consistent at Black's Nook, other than 2020 and 2021.
- Weekend usership has increased slightly since 2017.
- Average weekend usage typically increases by less than 100 users compared to weekdays.
- 2021 usership appears to have returned to pre-pandemic levels on the weekend but remains elevated on the weekdays.

Results Lusitania Day of Week Averages



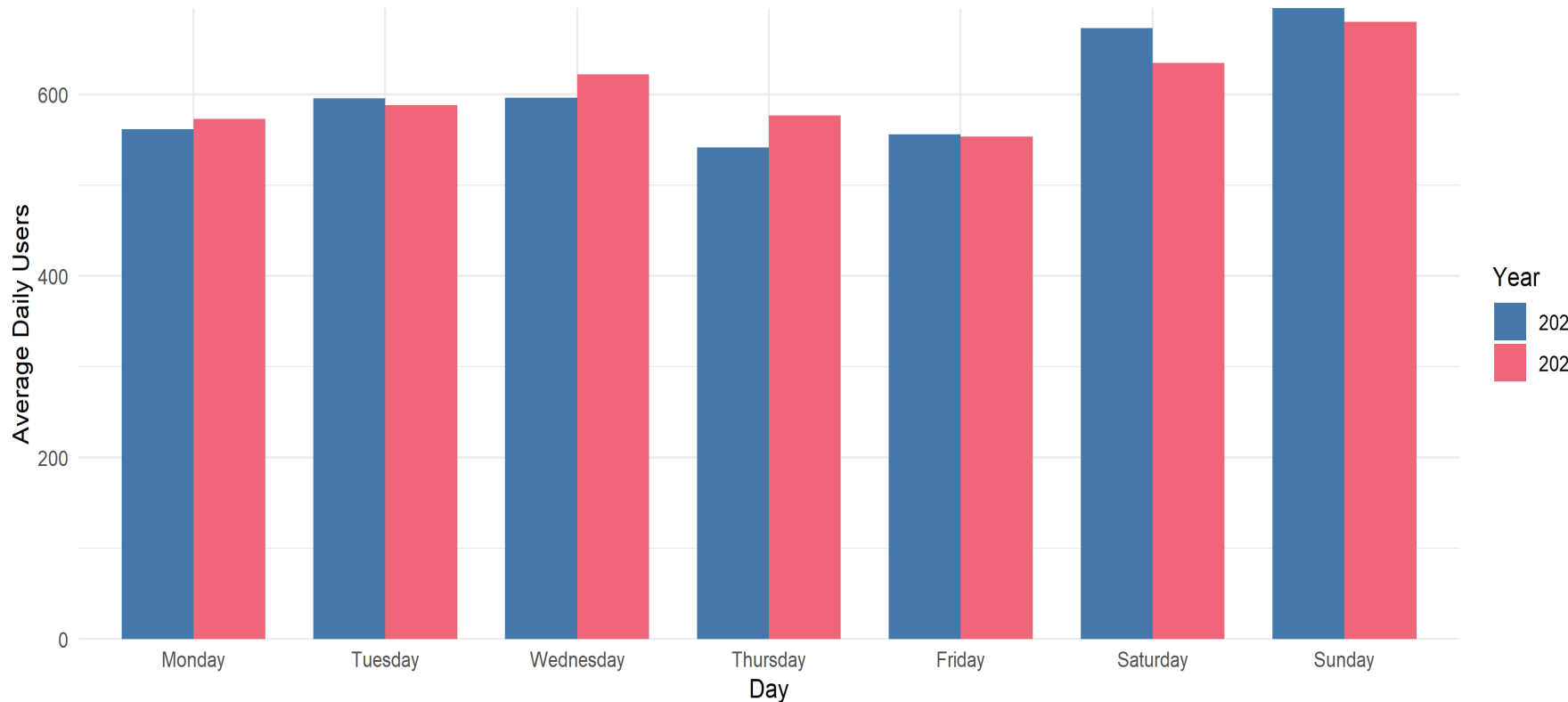
- Prior to 2020, there were approximately 350 visitors a day at LUS, increasing to approximately 500 on the weekends.
- Usership increased in 2020, but only stayed noticeably higher on weekdays in 2021.
- Sunday usership has historically been higher than Saturday, although Saturday visitor counts have been increasing since 2017.

Results Pro Shop Day of Week Averages



- There are typically ~350-400 visitors a day at the Pro Shop entrance, which increases to over 500 on the weekends.
- An increase in usership starting in 2020 is still present midweek, although usership has declined on the weekends.

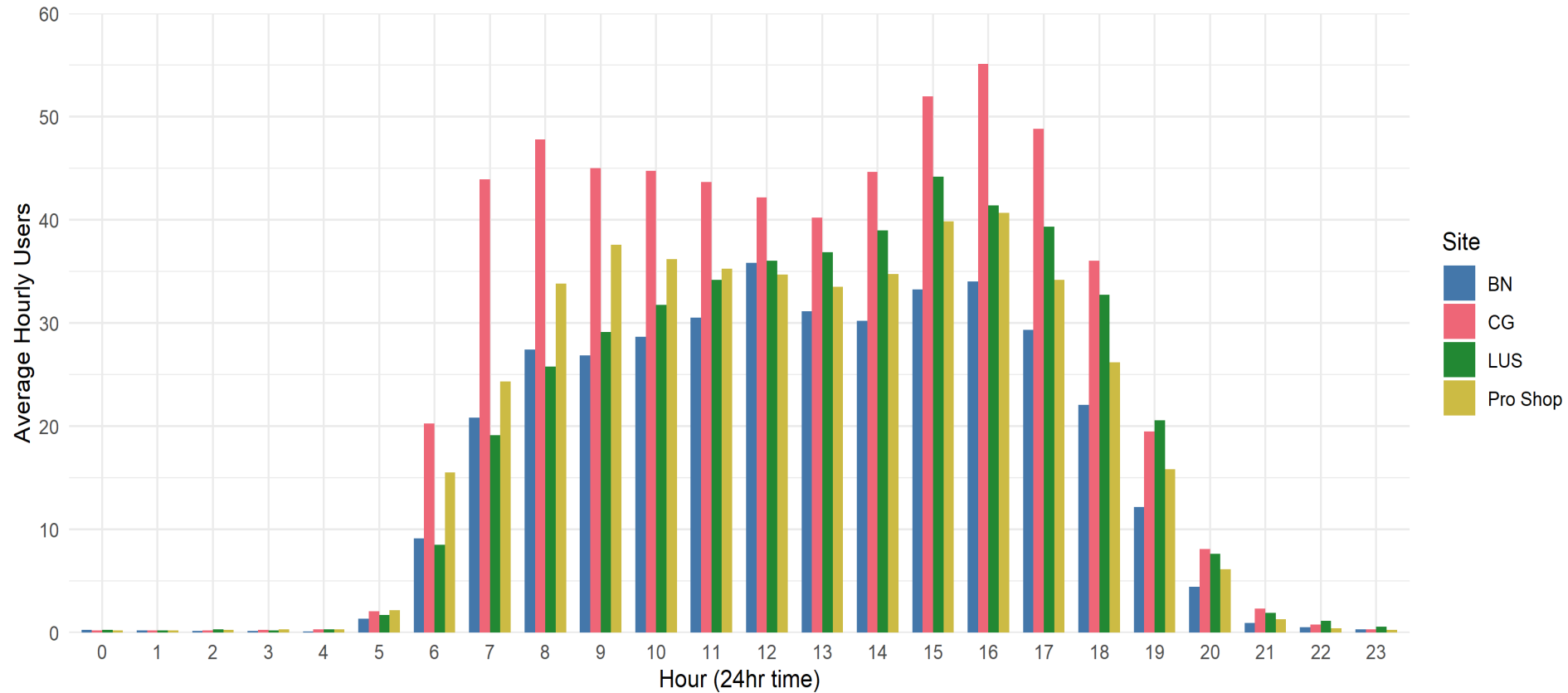
Results Community Garden Day of Week Averages



- Usership is slightly higher on the weekends than weekdays at CG.
- There are between 540 and 600 users daily on weekdays, and almost 700 on weekends.

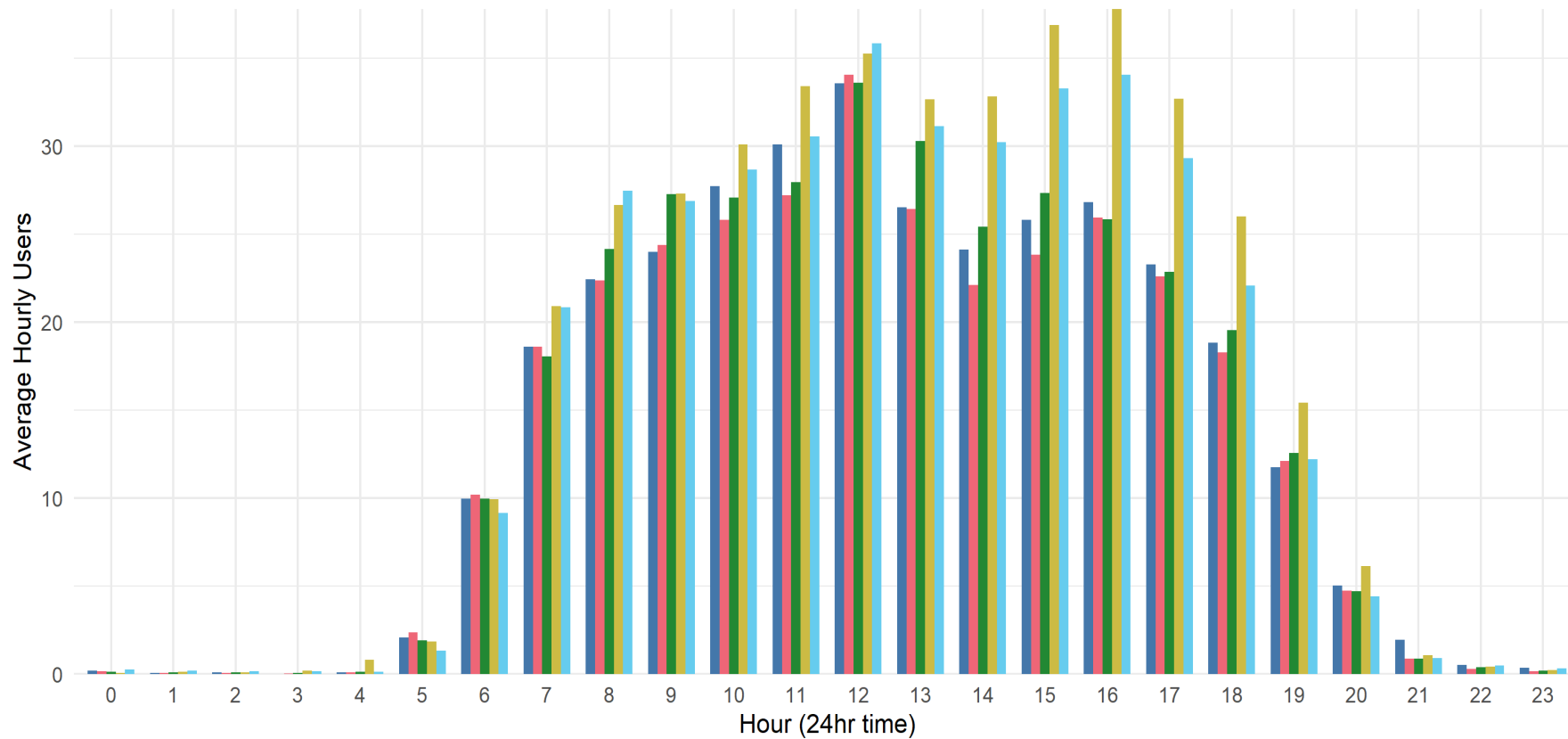
2020 was the first full year of data after sensor installation.

Results Entrances Hourly Averages 2021



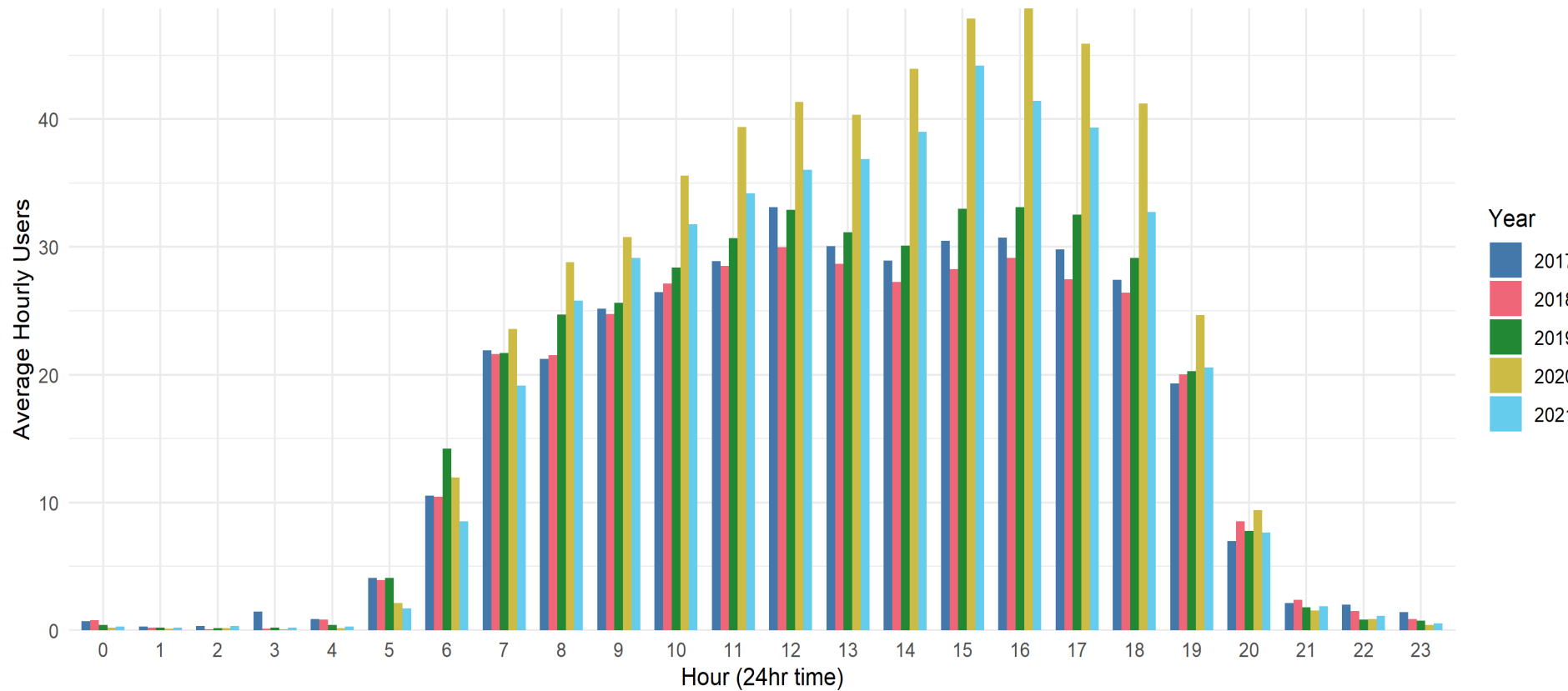
- Black's Nook, Community Garden, and Pro Shop had two peaks of high use during the day
 - Noon and late afternoon (BN)
 - Morning and late afternoon (CG, ProShop)
- Lusitania had more of a gradual increase in use through the day, peaking in the late afternoon.

Results Black's Nook Hourly Averages



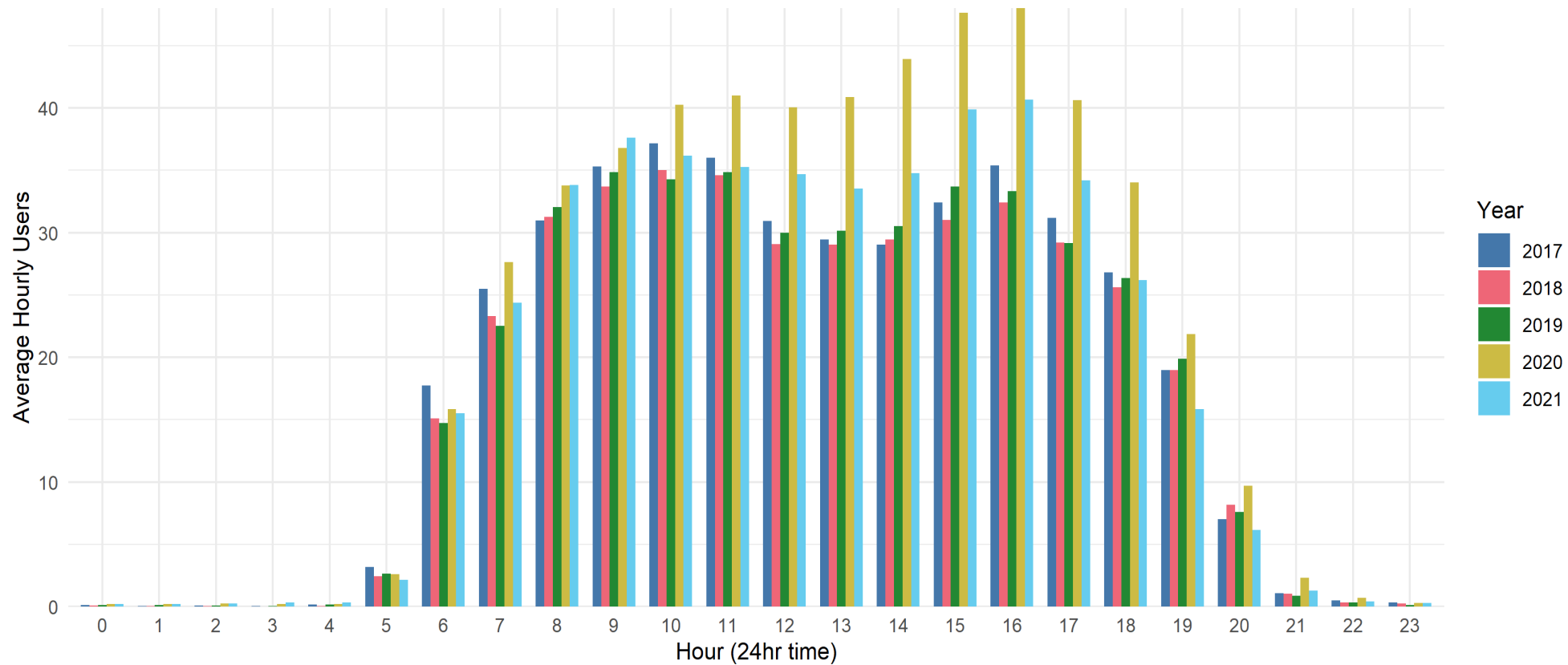
- In the past, visitor counts at Black's Nook have been highest at midday with a second smaller peak in the late afternoon.
- In 2020 and 2021, usage increased the most in the afternoon.
 - There was a second peak of use at 4:00 PM.

Results Lusitania Hourly Averages



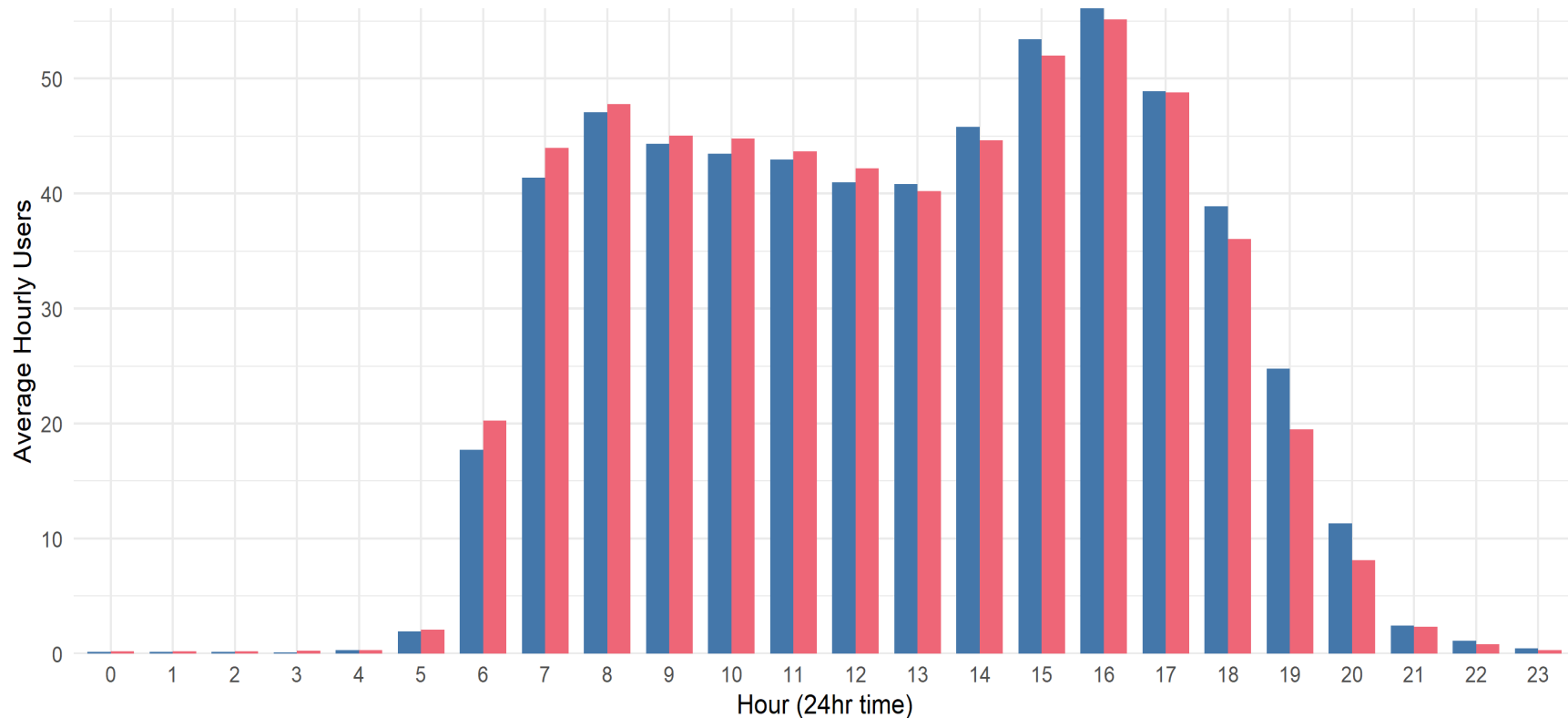
- Visitors at Lusitania have historically been spread out throughout the day, with a small peak in usage around midday and a second small peak in the afternoon.
- In 2020 and 2021, visitor counts increased the most in the afternoon.
 - Peak usage occurred in the late afternoon (4pm), before usage dropped steeply.

Results Pro Shop Hourly Averages



- Users at the Pro Shop entrance had two peaks of high usage during the day, midmorning and late afternoon.
- In 2020 and 2021, the afternoon peak was much higher relative to the morning peak. In past years, the morning peak was slightly higher than the afternoon peak.

Results Community Garden Hourly Averages



2020 was the first full year of data after sensor installation.

- While there were two peak usage time at CG, early morning and late afternoon, the afternoon one was larger.
- The number of visitors was higher in the mornings but lower in the afternoons in 2021 compared to 2020.

Results

Multi Sensors

Multi Sensor EcoCounter Sensors

Water Treatment Plant Multi (WTP Multi) and Bike Path Multi (BP Multi)

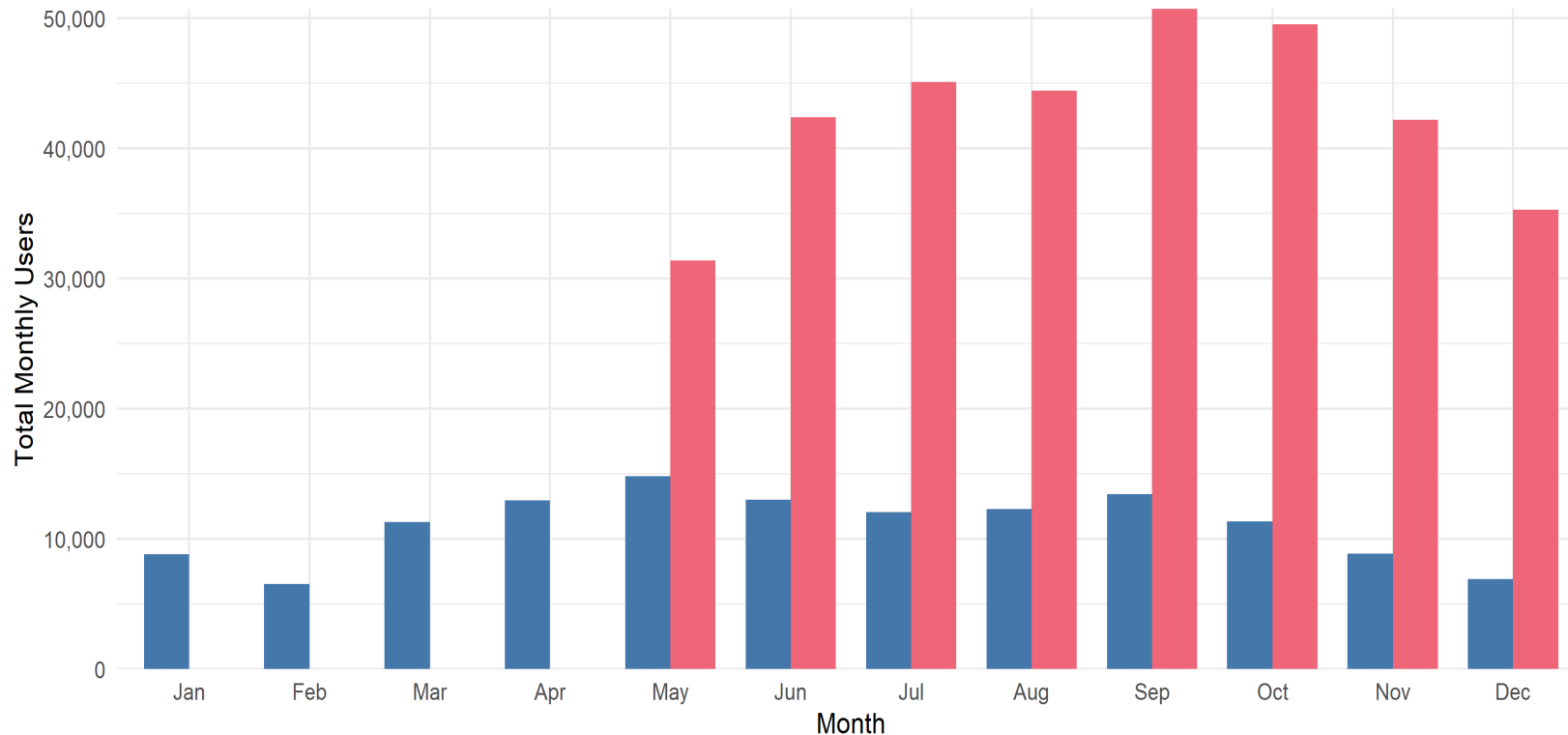
- Directional
- Differentiates between pedestrians and cyclists



2021 Multi Sensor Summary

- Total usership at WTP Multi is significantly higher throughout the year than at BP Multi, although there are more cyclists at BP Multi.
- Pedestrian usage at BP Multi was higher than bike usage during 2021 in the winter and early spring. Bike users exceeded pedestrians during the summer and fall months of 2021. Pre-pandemic in 2019, there were consistently more bikes than pedestrians. In all years, pedestrian usership was more consistent month to month, while bike usage changed more with the season.
 - Weekday bike usage at BP was consistent with past years. However, there was an increase in bike usage on the weekends in 2020 and 2021, indicating an increase in recreational users rather than commuters.
 - The pandemic-related increase in users at BP Multi appear to be more driven by pedestrians than cyclists
- WTP Multi has significantly higher pedestrian usage than bike usage throughout the year. While 2020 average daily bike usage increased for every day of the week compared to past years, daily bike averages appeared to have returned to pre-pandemic levels in 2021. This could be partially due missing bicycle data from January 1st through August 2nd of 2021.
- BP had peaks of high usage during morning and evening commuting hours. In 2020, likely due to pandemic-driven changes in commuting patterns, bike usership increased heavily in the late afternoon/evening peak. This continued in 2021.
 - Usage at BP Multi was especially high in 2017 and 2018 due to construction.
- WTP had two peaks of usage during mid-morning and mid-afternoon.

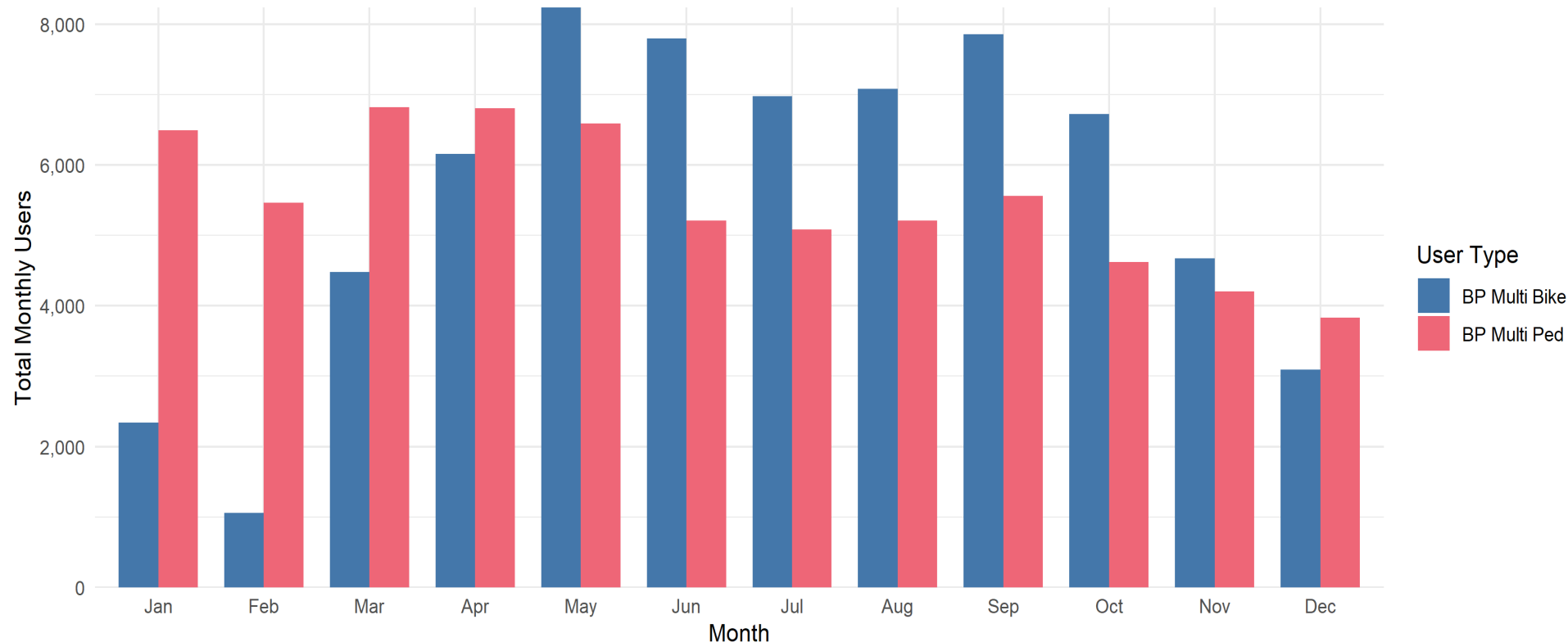
Results Multi Sensors Total Monthly Users 2021



- There were significantly more users at WTP than BP throughout the year.
 - Monthly usership peaked for the year in September with over 50,000 visitors at WTP Multi.
- BP multi peaks occurred in May and September.

There was no data at BP Multi Mar 15 - 17 and Oct 27 - Nov 2 due to a dead battery.
There was no data at WTP Multi Jan-Apr 2021; the sensor was replaced on May 7th, and additional sensor errors caused May data to be artificially low.

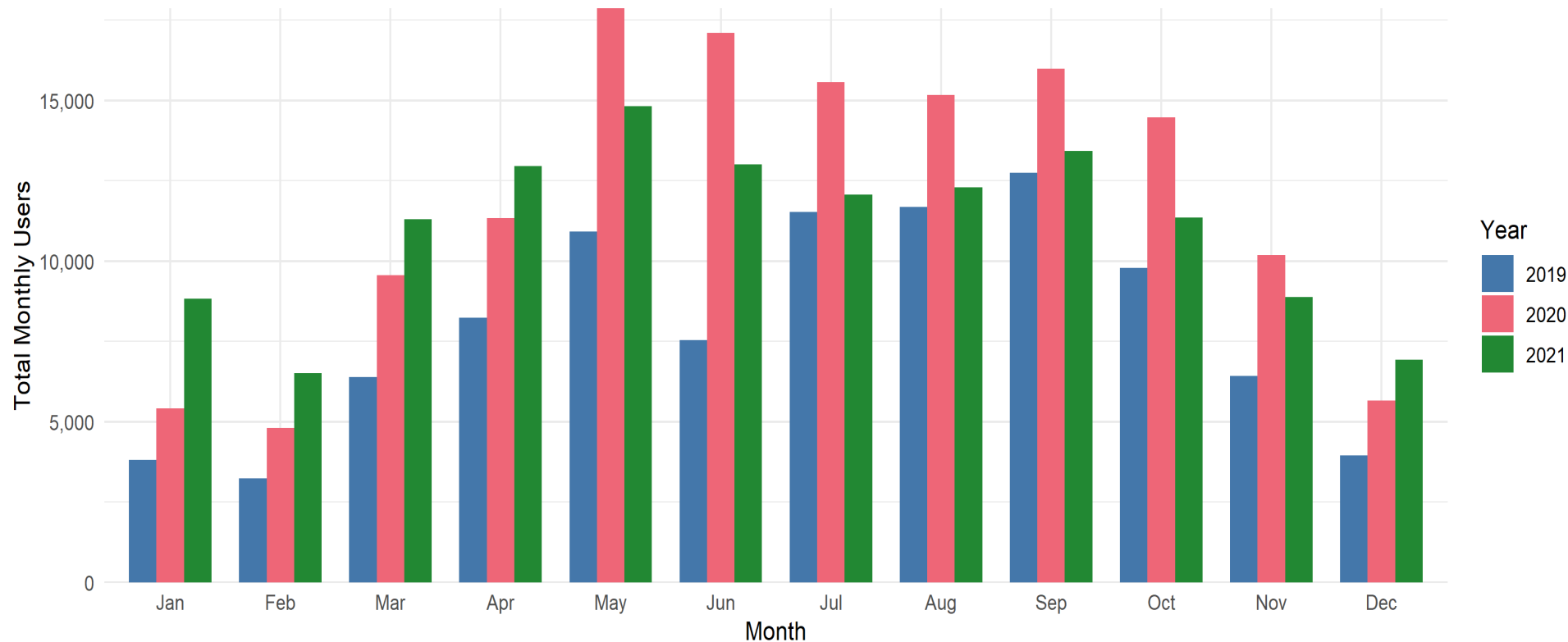
Results Bike Path Monthly Users by Type 2021



There was no data Mar 15 - 17 and Oct 27 - Nov 2 due to a dead battery.

- Pedestrian counts were highest in the late winter and spring, exceeding bike counts until May.
- Bike counts were lowest in February but increased to over 8,000 users in May.
 - Bike counts peaked a second time in September.

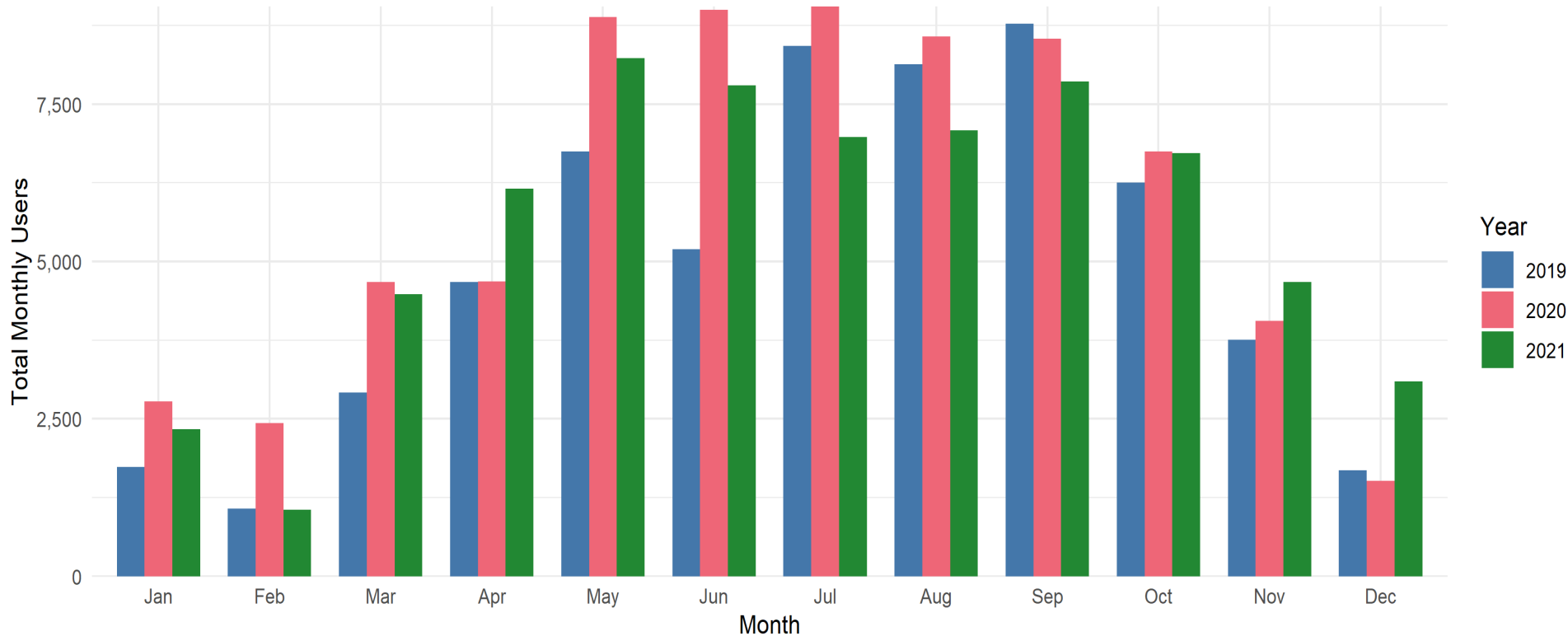
Results Bike Path Total Monthly Users 2019 - 2021



- 2021 usership from January through April exceeded 2020 usership, before decreasing to around 2,000 fewer monthly users from May – October than those months in 2020.
- 2021 monthly usership still exceeded all pre-pandemic months in 2019 and early 2020

February and June 2019 counts were lower due to missing data.
 There was no data Nov 30 - Dec 10, 2020 due to sensor battery issue.
 There was no data Mar 15 - 17 and Oct 27 - Nov 2, 2021 due to a dead battery.

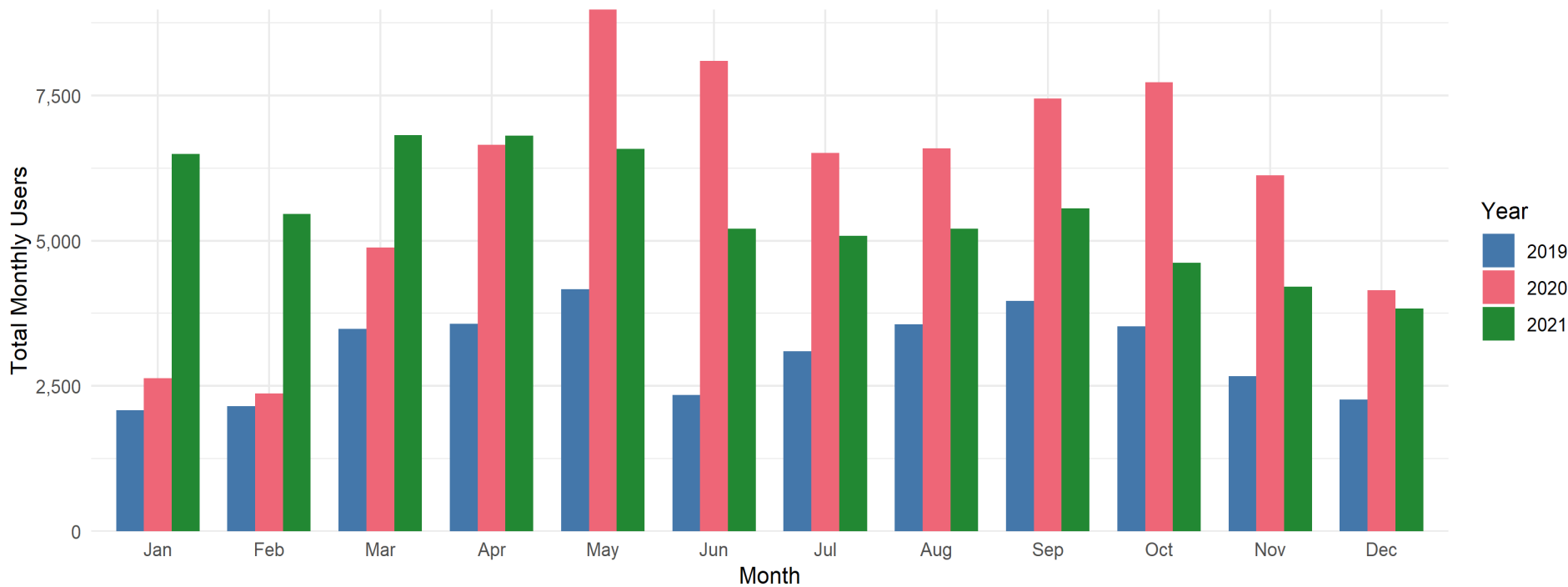
Results Bike Path Total Monthly Cyclists 2019 - 2021



February and June 2019 counts were lower due to missing data.
 There was no data Nov 30 - Dec 10, 2020 due to sensor battery issue.
 There was no data Mar 15 - 17 and Oct 27 - Nov 2, 2021 due to a dead battery.

- Although overall monthly usership was higher during the COVID-19 pandemic months in 2020 and in 2021, the number of cyclists using the bike path each month was relatively consistent between 2019 and 2021.
- Bike usership decreased between 2020 and 2021 for most months.
- Cyclist numbers followed a seasonal pattern, rising as the months warmed and falling as they cooled.

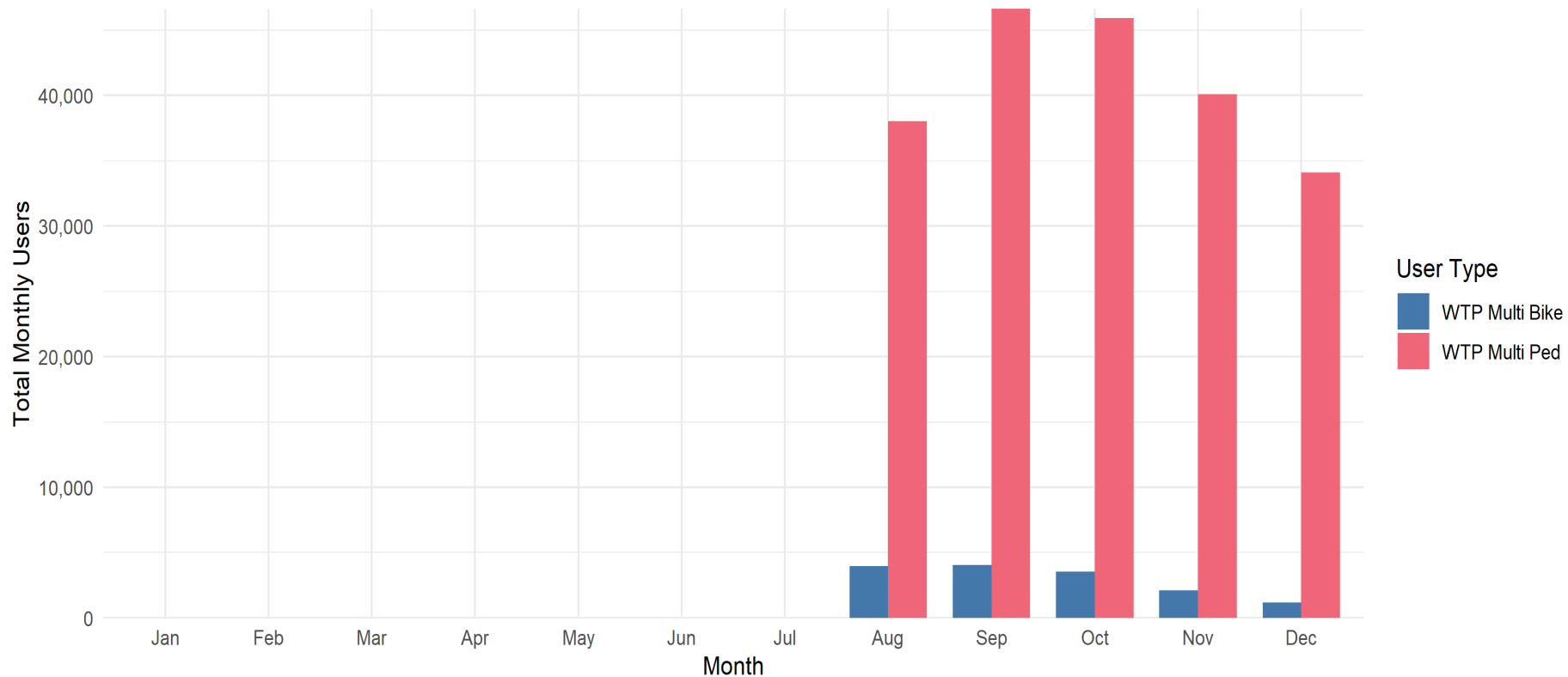
Results Bike Path Total Monthly Pedestrians 2019 - 2021



February and June 2019 counts were lower due to missing data.
 There was no data Nov 30 - Dec 10, 2020 due to sensor battery issue.
 There was no data Mar 15 - 17 and Oct 27 - Nov 2, 2021 due to a dead battery.

- Unlike cyclists, there was a large increase in the number of pedestrians using the bike path after the COVID-19 pandemic began in March/April of 2020.
- Although the number of pedestrians using the bike path has decreased since 2020 during pandemic months, 2021 monthly pedestrian usership along the bike path remained higher than 2019.
- The highest pedestrian usage occurred during the first 5 months of 2021, perhaps indicating a trending towards pre-pandemic pedestrian levels.

Results WTP Total Monthly Users 2021

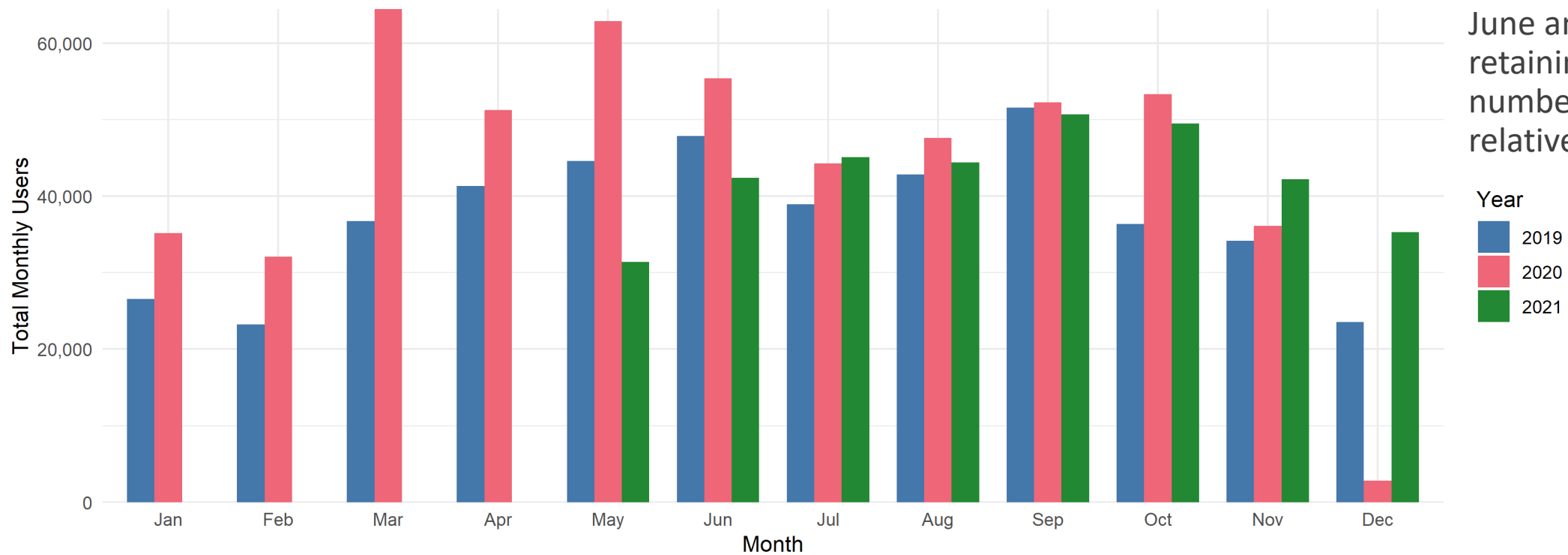


There was no data at WTP Multi Jan-Apr 2021; the sensor was replaced on May 7th, but bike and pedestrian data was not differentiated until Aug 2nd.

- There were significantly more pedestrians at WTP than cyclists.
- Although data is missing, the September peak of users is consistent with other sensors around the pond.
- Bike usage is generally low, and fewer users go by the sensor as it gets colder out.

Results - 2021

WTP Total Monthly Users 2019

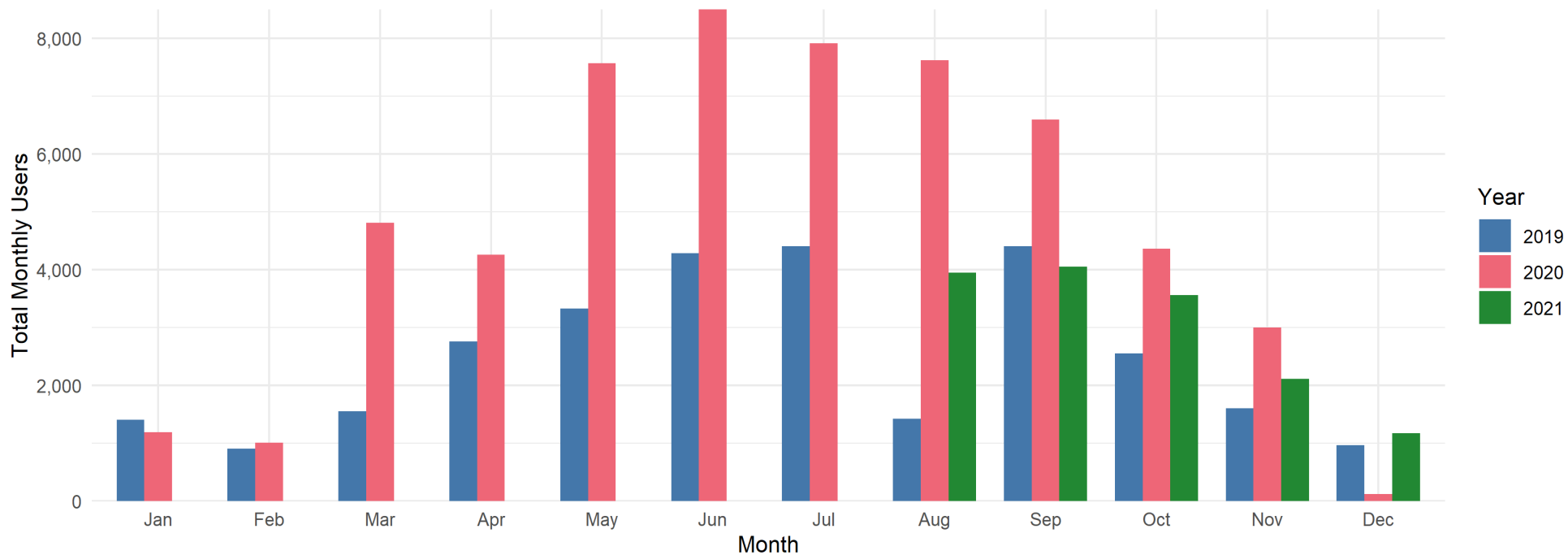


- 2021 total usership was similar to 2020 between June and November, retaining high usership numbers in the late fall relative to 2019.

Year
2019
2020
2021

Sporadic erroneous bike counts were removed throughout 2019 and 2020.
Nov and Dec 2020 counts are artificially low due to sensor error.
There was no data at WTP Multi Jan-Apr 2021; the sensor was replaced on May 7th, and additional sensor errors caused May data to be artificially low.

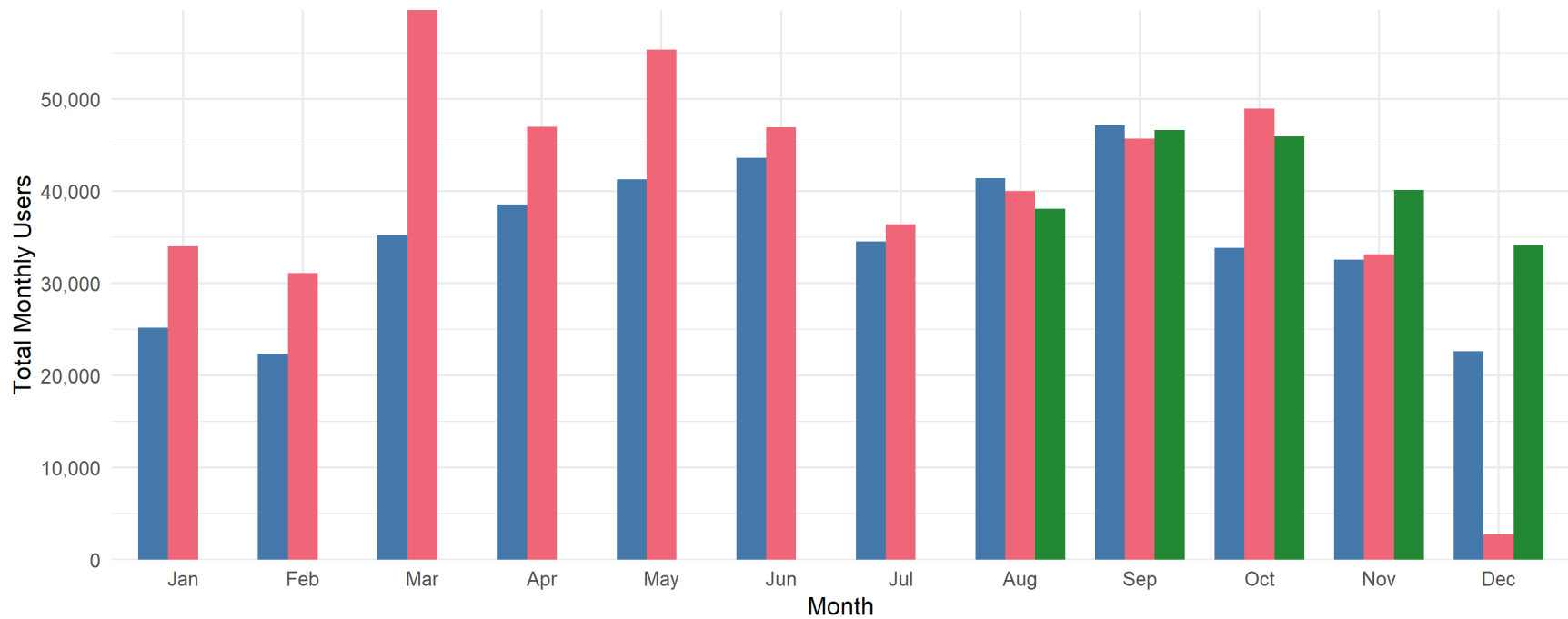
Results WTP Total Monthly Cyclists 2019 - 2021



- For months with available data, 2021 bicycle use around Fresh Pond was lower than in 2020.
- Bicyclists along the perimeter road returned to pre-pandemic levels in September, but remained higher than pre-pandemic 2019 counts in October and November.

Erroneous bike counts removed during most of August 2019. Nov and Dec 2020 counts are artificially low due to sensor error. There was no data at WTP Multi Jan-Apr 2021; the sensor was replaced on May 7th, but all users were counted as pedestrians until August 2nd. Therefore, May - July 2022 data are also excluded from this plot.

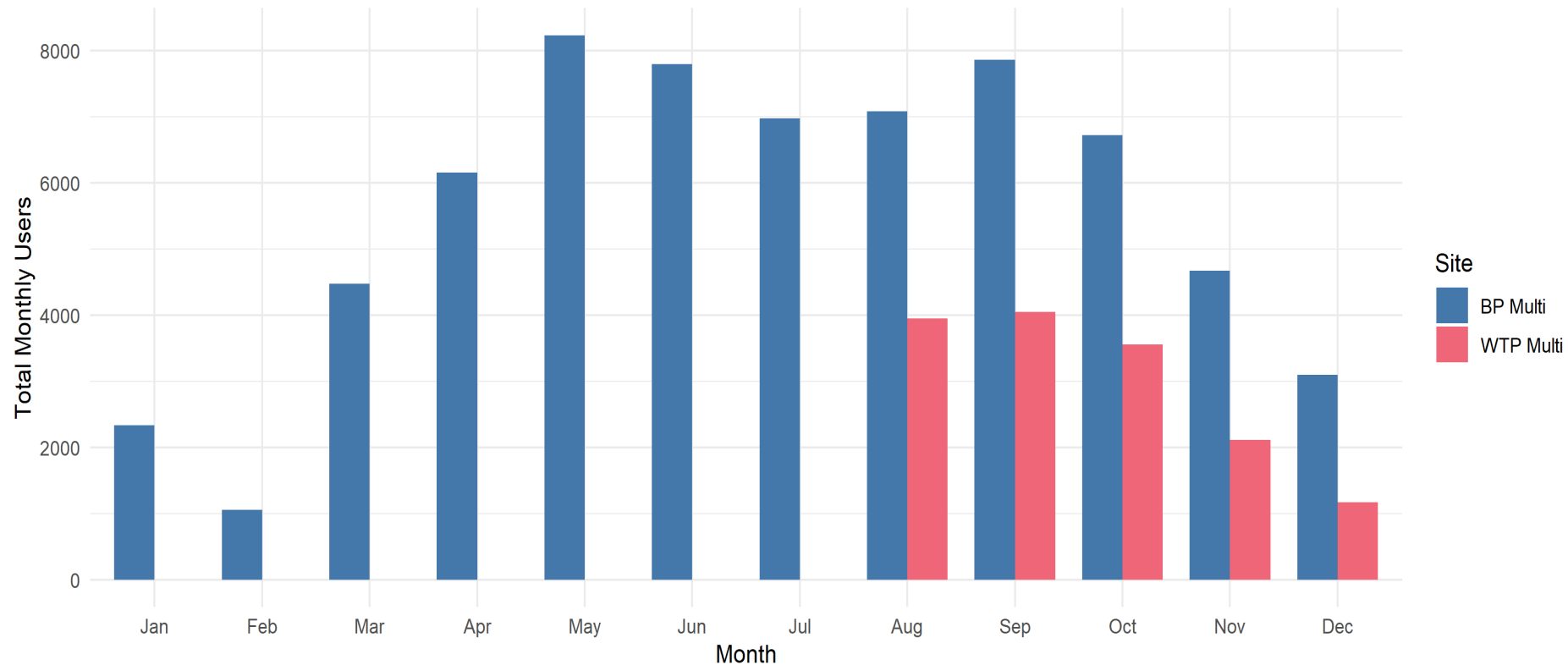
Results WTP Total Monthly Pedestrians 2019 - 2021



Nov and Dec 2020 counts are artificially low due to sensor error. There was no data at WTP Multi Jan-Apr 2021; the sensor was replaced on May 7th, but all users were counted as pedestrians until August 2nd. Therefore, May - July 2022 data are also excluded from this plot.

- Pedestrian use increased dramatically in March of 2020 and remained high throughout the spring.
- Summer and early fall pedestrian use remained similar throughout 2019, 2021, and 2022.
- There were also more pedestrians in the late fall in 2021 than pre-pandemic in 2019.

Results Multi Sensors Total Monthly Cyclists 2021

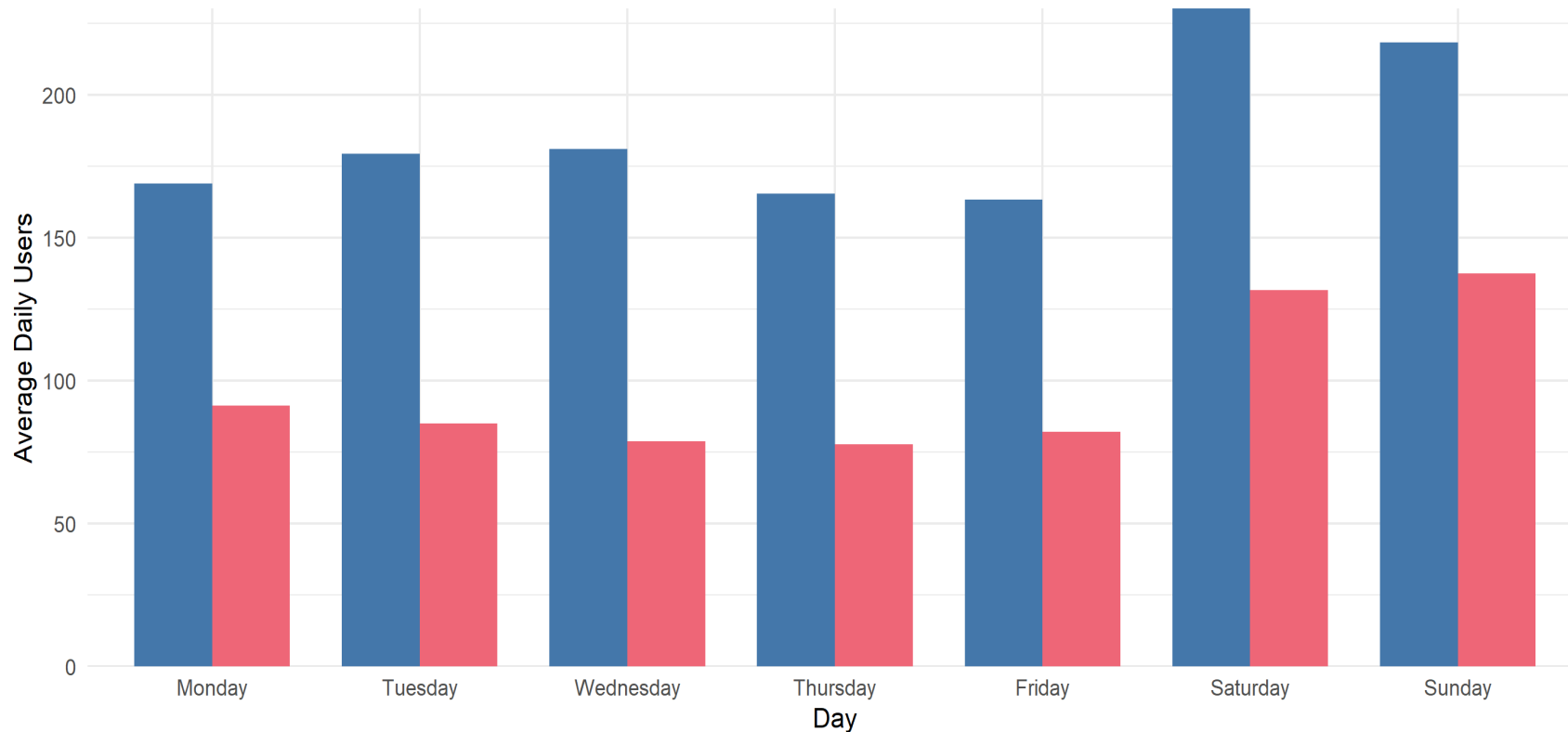


- For months with available data, BP Multi had more cyclists than WTP multi in 2021.

There was no data at WTP Multi Jan-Apr 2021; the sensor was replaced on May 7th, but bike data was not available until Aug 2nd.

Results 2021

Cyclists Day of Week Averages

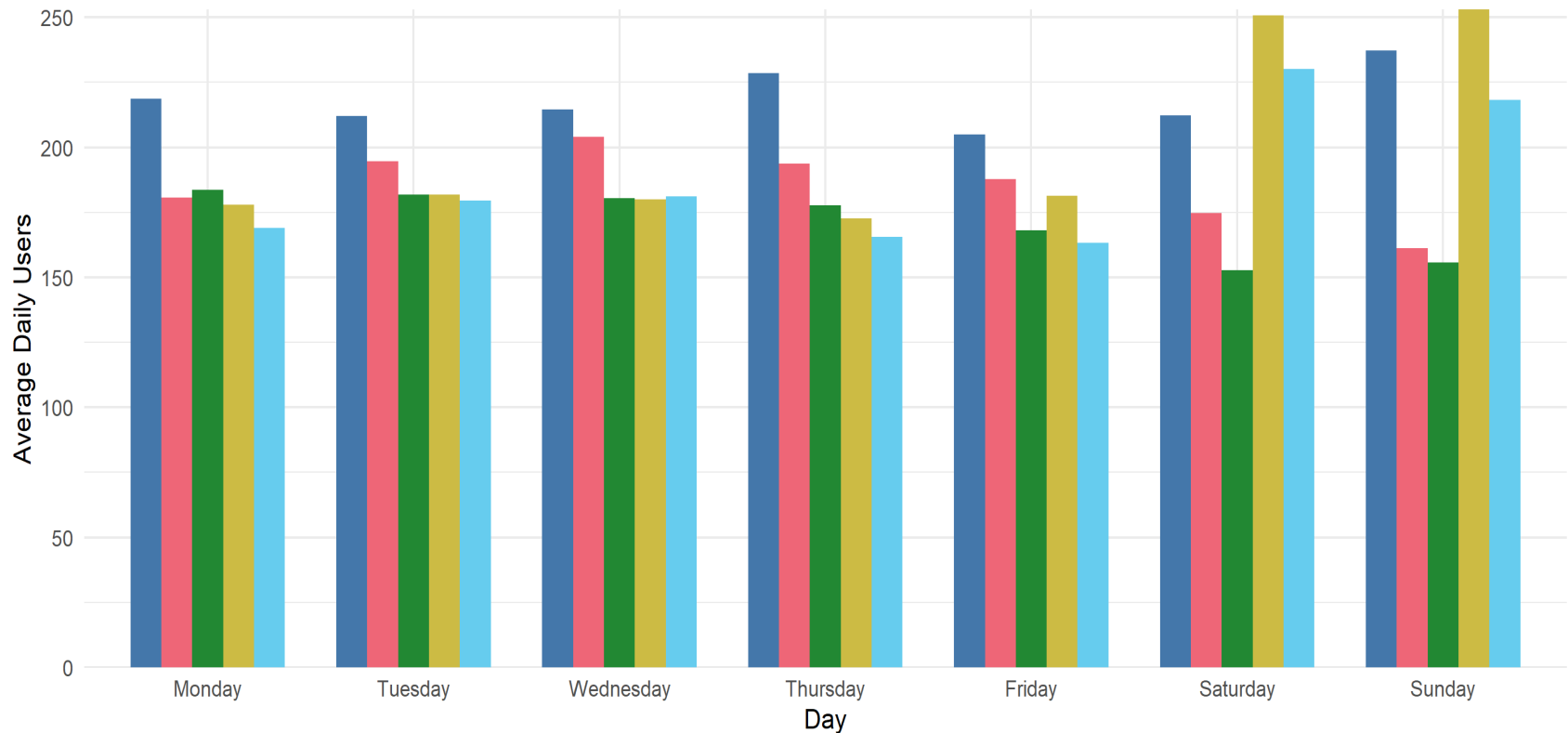


WTP Multi bike data was only available from Aug-Dec.

Site
BP Multi
WTP Multi

- Throughout the week, there were more cyclists at BP than at WTP.
- The number of cyclists at each site was higher on the weekends than during the weekdays.
- During the week there were approximately 175 cyclists/day at BP Multi and 75 cyclists/day at WTP Multi.
- On the weekends, these numbers increased to ~225 cyclists/day at BP Multi and over 125 cyclists/day at WTP Multi.

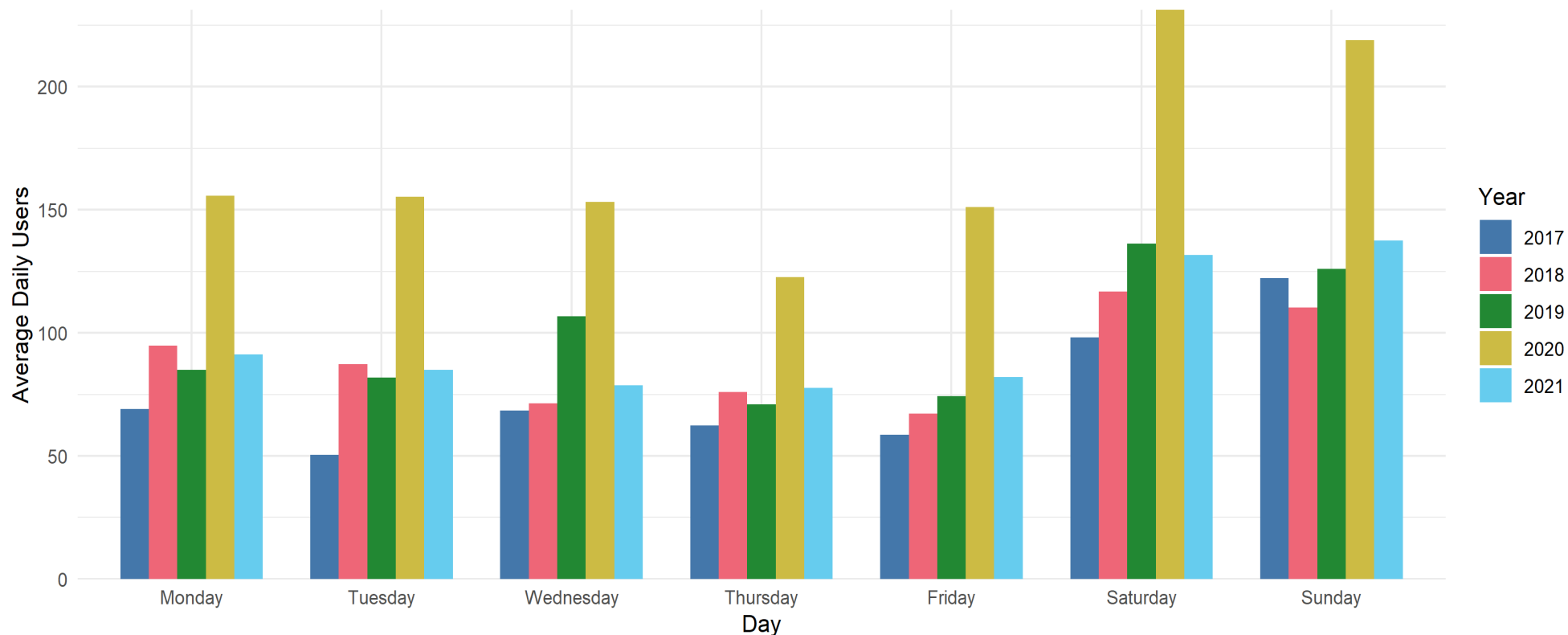
Results BP Cyclists Day of Week Averages



Higher bike counts from 2017-2018 may have been from a construction detour from May 25, 2017 - Jun 7, 2018 that routed users onto the Bike Path.

- Other than in 2017 (construction detour) and 2020 and 2021 (pandemic), cyclist usage at BP Multi is lower on the weekends.
 - The bike path is likely used by commuters more than recreators in a typical year.
- 2021 visitor numbers were not different than in past years during the weekdays but were much higher on the weekends.
- High usage in 2017 and 2018 is likely due to construction diversions.

Results WTP Cyclists Day of Week Averages



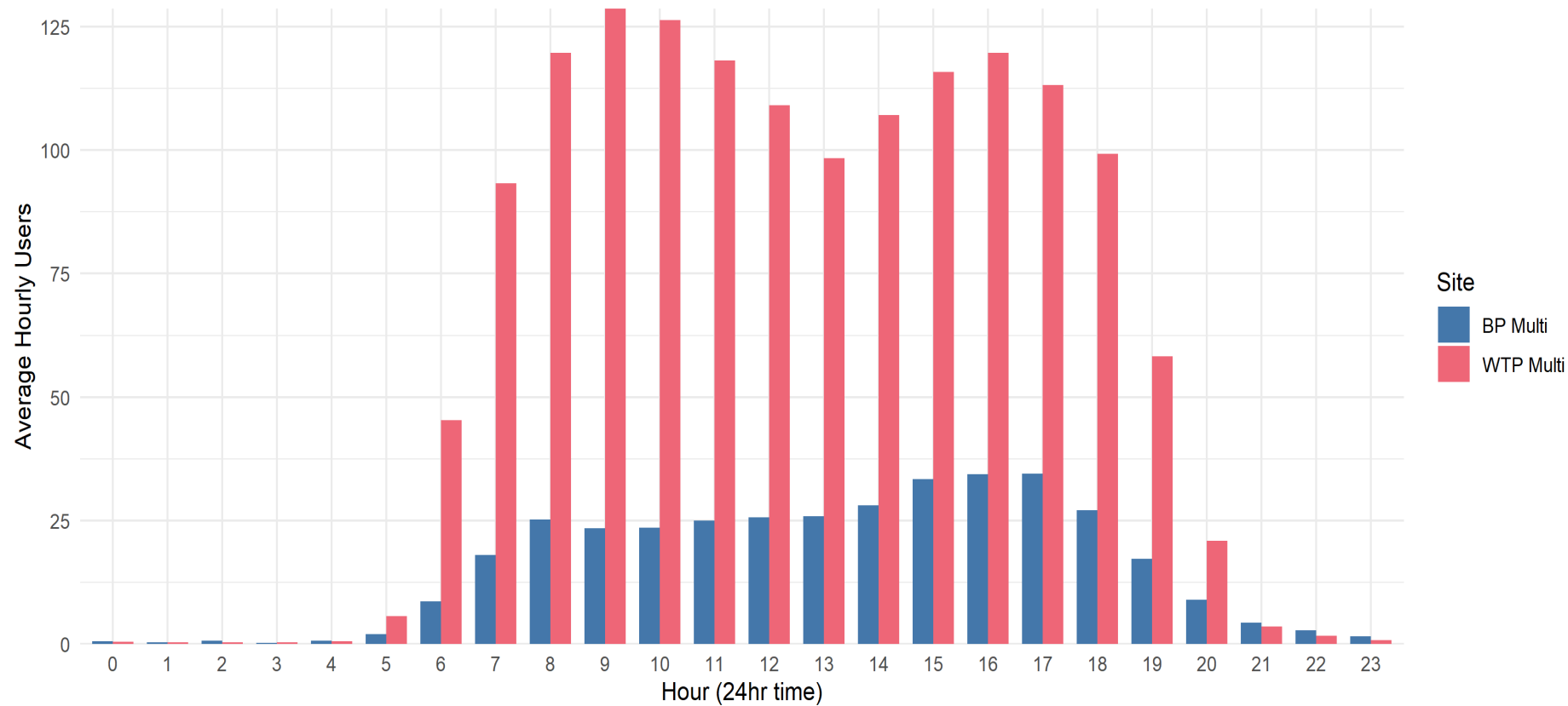
- In the past, usage has been steady around 70-100 people per day on the weekdays and 100-130 people on the weekends.

- Cyclist usage at WTP roughly doubled in 2020.
 - 2021 usage is back to previous numbers.
 - However, the average number of cyclists may be artificially low due to data missing during peak cycling months. The average daily number of cyclists in 2021 is based on August through December data.

Low counts from May 2017 - May 2018 may be due to a construction detour routing users away from the sensor.

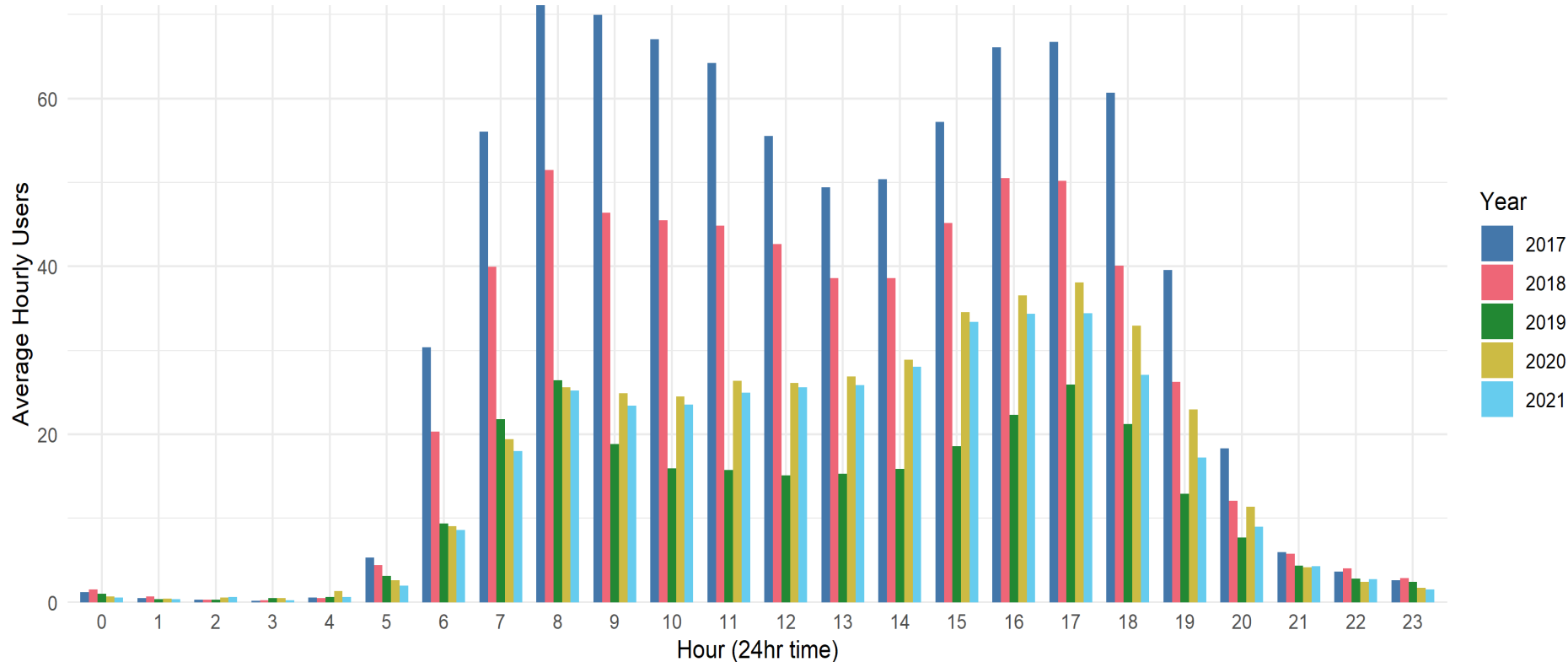
Results 2021

Multi Sensor Hourly Averages



- There were significantly more users at WTP than BP during the day.
 - WTP had around 125 overall users/hour during peak usage.
 - BP saw less than 40 users/hour all day.
- Both sites saw two daily peaks in usership, with the larger peak in the afternoon for BP Multi and in the morning for WTP Multi.
- The morning peak occurred during commuting hours (8 am) at BP Multi and an hour later (9 am) at WTP Multi. The afternoon peaks occurred at 4-5 pm at both sites.

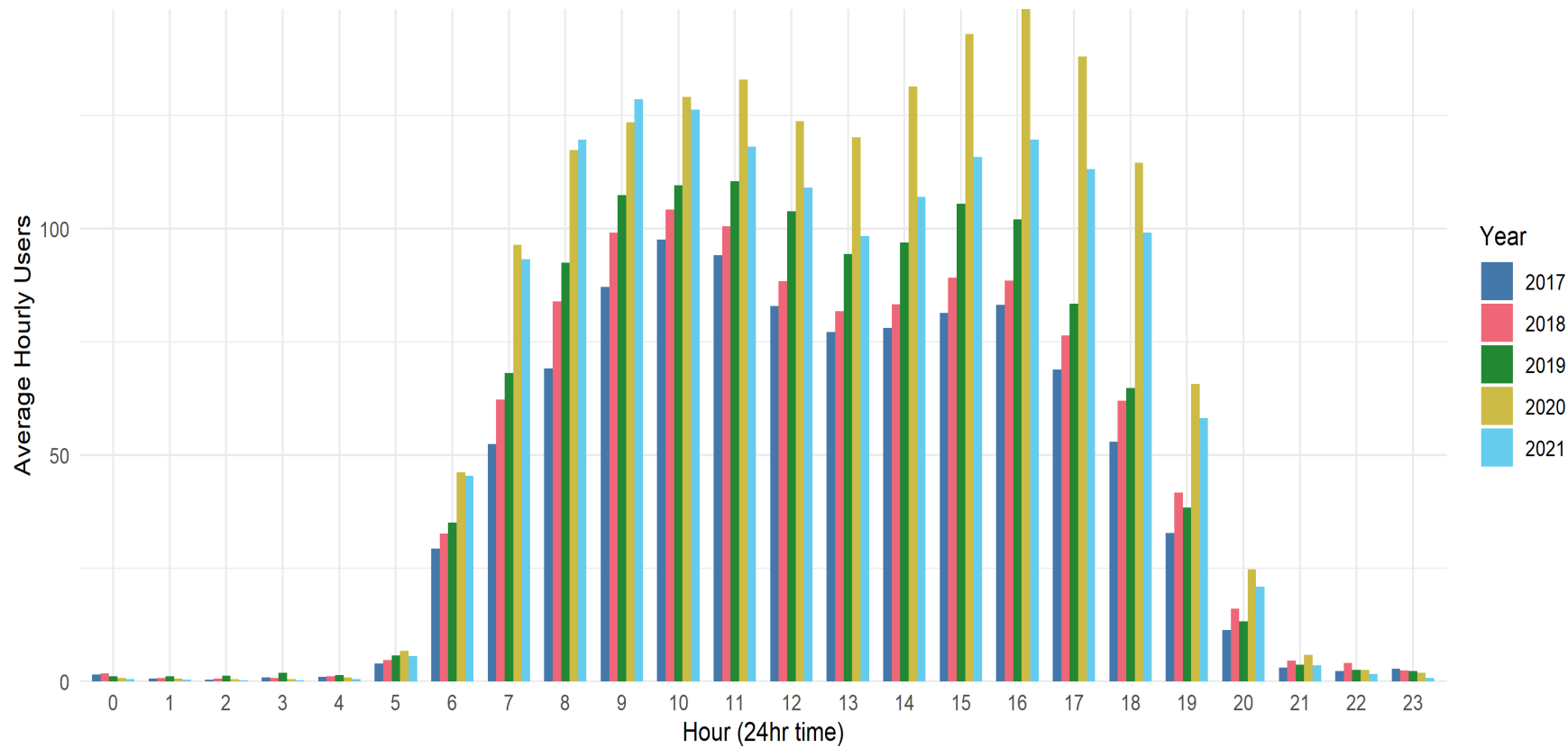
Results Bike Path Hourly Averages



Higher counts from 2017-2018 may have been from a construction detour from May 25, 2017 - Jun 7, 2018 that routed users onto the Bike Path.

- Like other sites, BP has two clear peaks of higher usage during the day.
 - However, they occur in the early morning and late afternoon (typical commuting times).
 - In 2020 and 2021, usage was higher in the afternoons than the morning, whereas in previous year the peaks were similar. This suggests that commuting patterns changed during the COVID-19 pandemic.
- Use was the highest in 2017 and 2018 due to construction routing users past the site.

Results WTP Hourly Averages



- WTP Multi has two clear peaks of high usage throughout the day, midmorning and late afternoon.
- Peak afternoon use has extended later into the day since 2020.

Methods *Visual Survey Data*

2021 Visual Survey Methods

- The goal of visual surveys was to quantify any error between EcoCounter sensor readings and the number of users.
 - CWD also quantified different types of users at Fresh Pond (for example, runners, walkers, dogs, children, bikes) observed during the surveys.
 - CWD counted all user types, even if the user did not trigger the counter (for example, dogs, children < 3 feet tall)
 - Survey times were not selected through a formal sample design process. Therefore, the percentages of user types may not be representative of the entire year.
- CWD staff performed 21 hours of visual surveys between February 8th and June 6th at the LFP and BP Multi sensors.

2021 Visual Survey Methods

- Surveyors stood at sensors and counted the number and type of users that crossed the sensors in both directions

Fresh Pond Census Sheet

page ___ of ___

Date: 12/18/2017
 Start Time: 4:00 PM
 End Time: 5:00 PM
 Location: BN
 Observer: MO

Instructions: Each row is a unique observed event. Record count for observed user(s) in each cell. If multiple users pass *at same time*, record the number in one cell. For example, 3 runners passing together would be "3", whereas people passing one after another would be "1" for three rows. Please start exactly on the hour and count for one full hour or 1/2 hour during high use periods. Count user as 'child' if below sensor height. Tally each user type when finished at the bottom of the sheet. THANKS FOR YOUR HELP!

Weather: cloudy, 32F

Direction of travel	Walker	Unleashed Dog	Leashed Dog	Runner	Child	Bike	Baby Carriage	Other	Ecocounter Count	Notes
L	1									
L	1	1								
L	1									
L	1									
R	1	1								
R	1									
R	1									
L	1									
L				1						
R	2									
R	1									
R	2									

Example survey data collection form

EcoCounter Census Survey Locations 2021

Perimeter Road:

LFP

Multi Sensor:

Bike Path (BP)

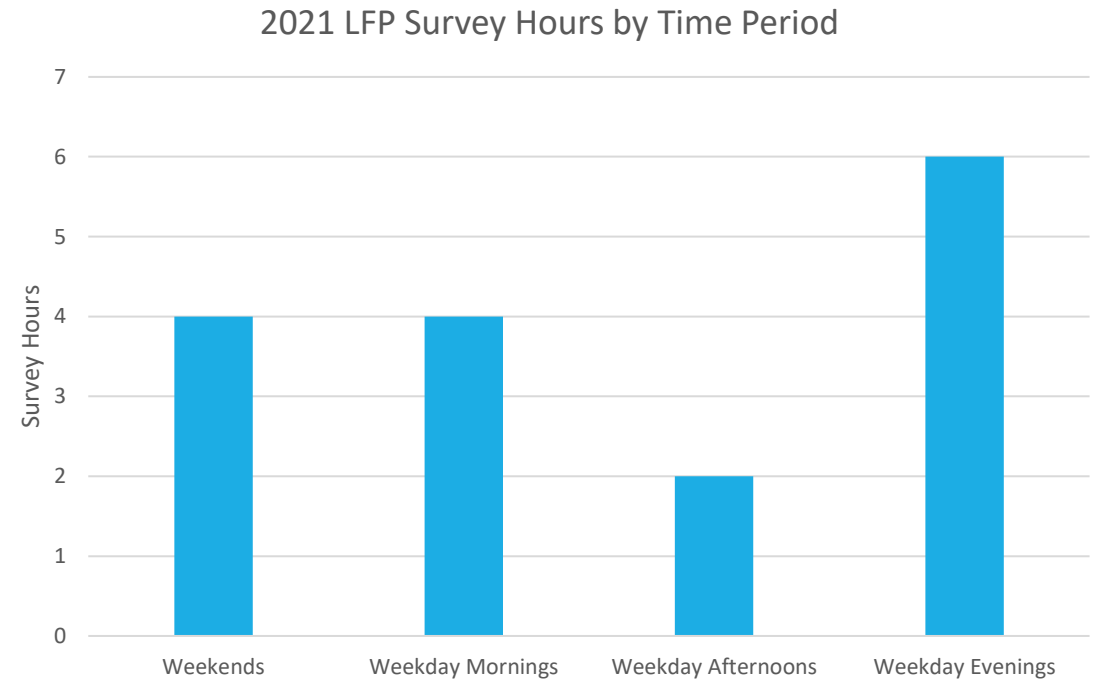
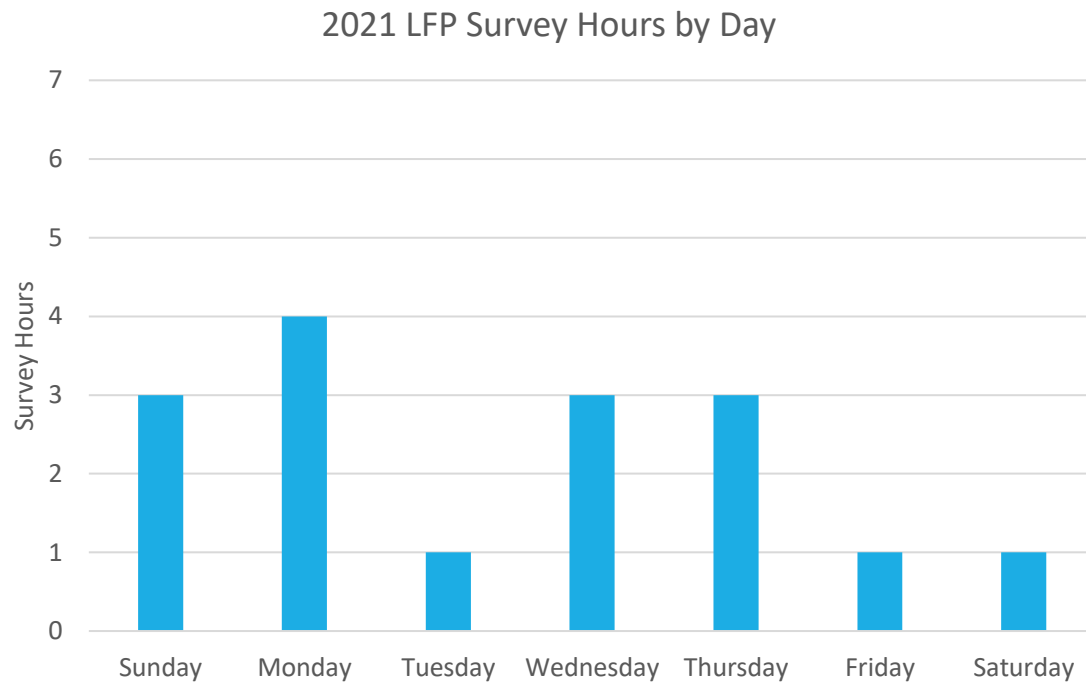


Results

Visual Survey Data

Results

Survey Hours at LFP

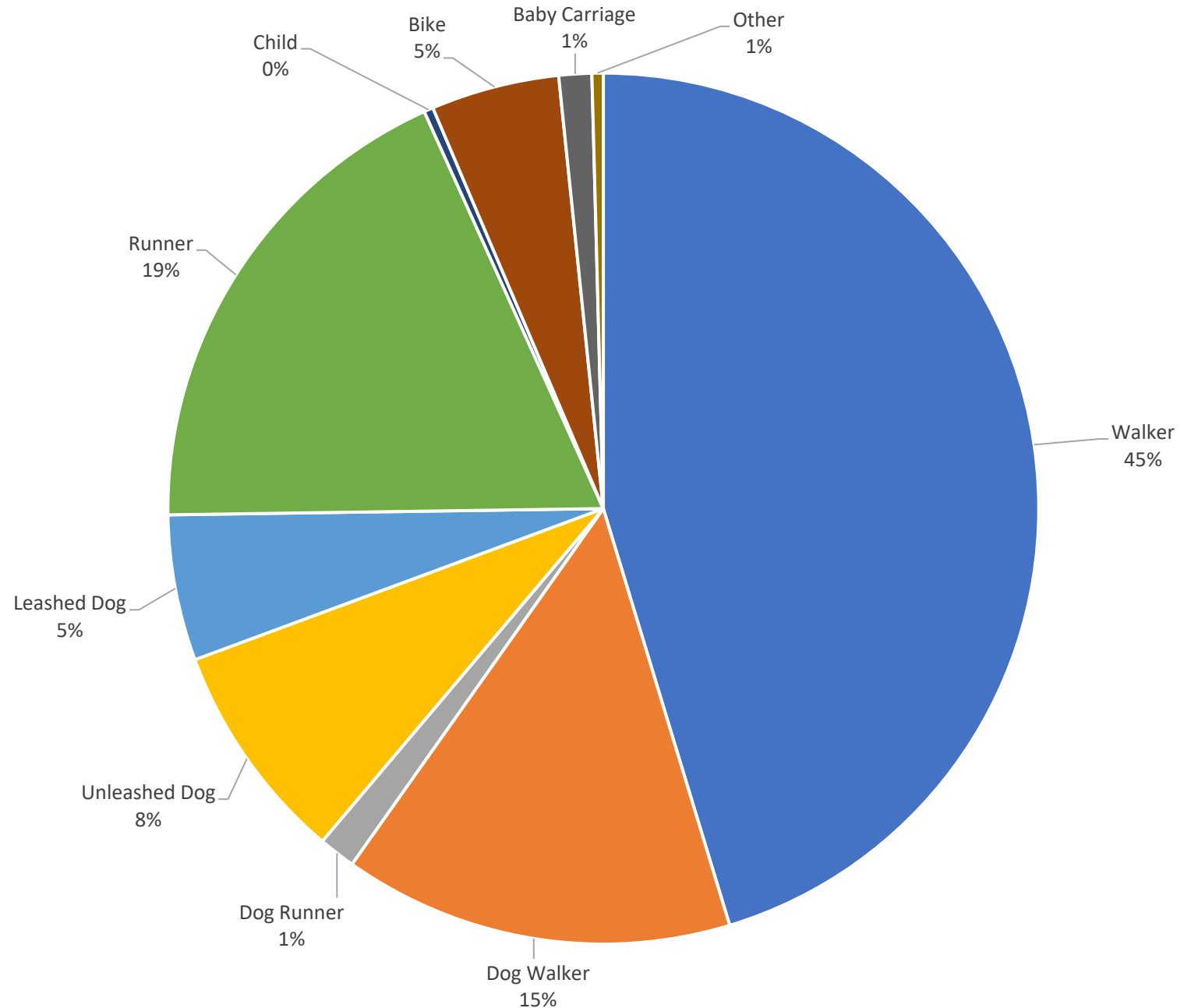


CWD conducted 16 hours of surveys at LFP in 2021.

Weekday mornings = 7:00 AM – 10:00 AM, Weekday mid-days = 11:00 AM – 2:00 PM, Weekday afternoons = 3:00 PM – 6:00 PM or 7:00 PM (end time varied by seasonal changes in daylight)

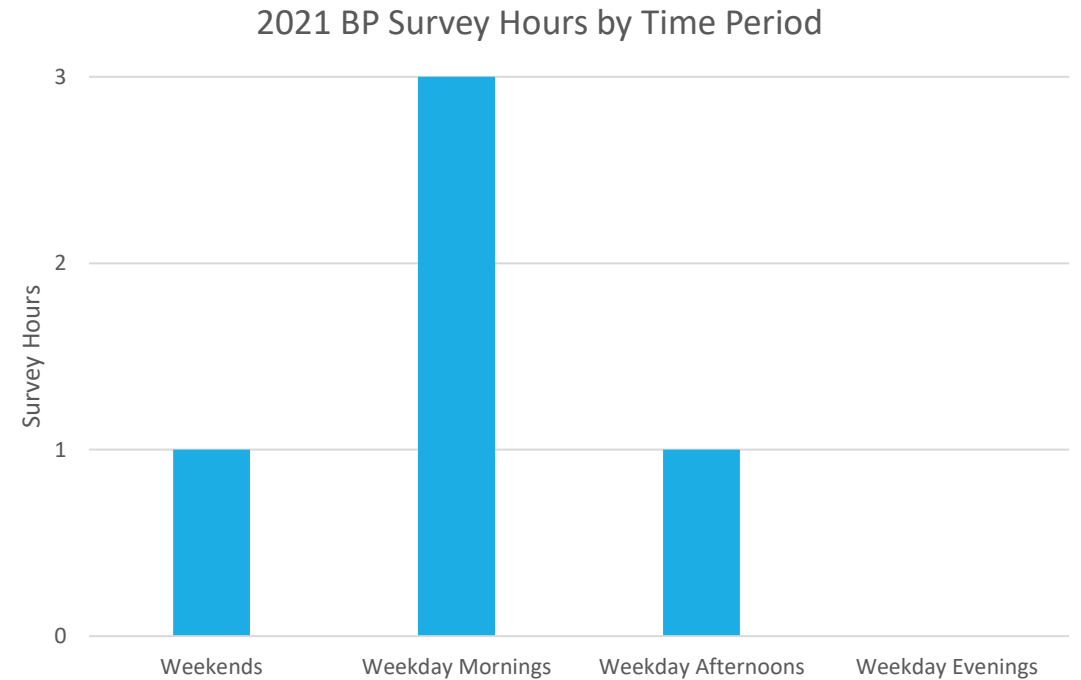
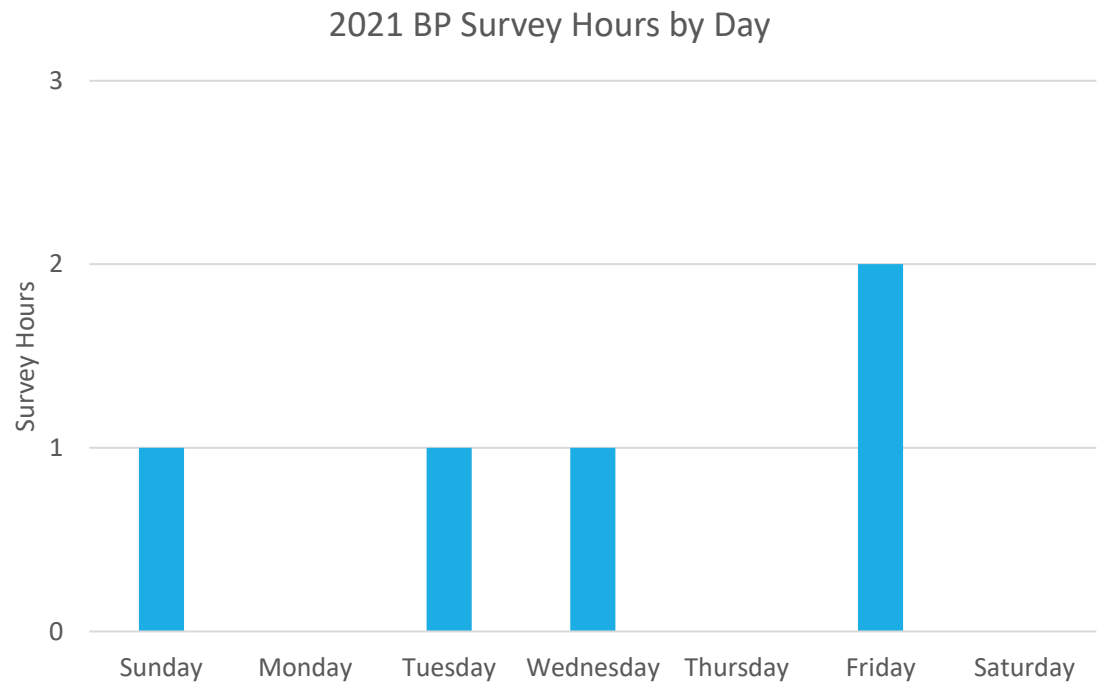
Results: 2021 LFP Surveys

- At LFP, 60% of users were walkers; 15% of users were walkers with dogs.
- There was a higher proportion of unleashed dogs than leashed dogs, with a difference of 3%. [See Fresh Pond Dog Regulations](#)
- 19% of users were runners, and only 1% were runners with dogs.
- 5% of users were on bikes.
- There was an overall error of 16% between survey counts and sensor counts.
 - Surveyors counted 365 MORE human users (>3ft tall) than the sensor during the hours surveyed
 - This discrepancy is primarily due to groups of users passing the sensor at the same time, resulting in a single count for multiple users



Results

Survey Hours at Bike Path (BP)

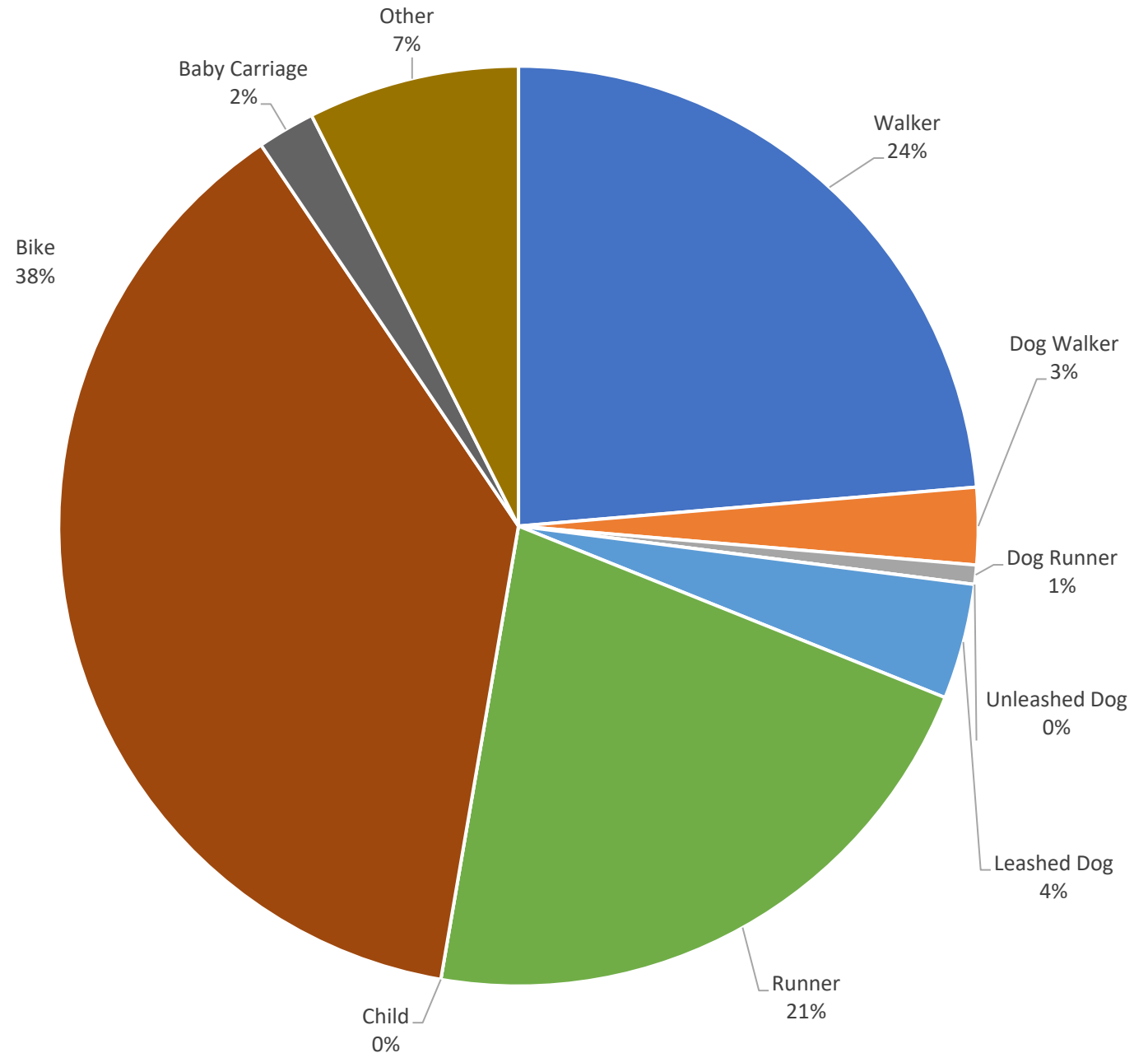


CWD conducted five hours of surveys at BP in 2021.

Weekday mornings = 7:00 AM – 10:00 AM, Weekday mid-days = 11:00 AM – 2:00 PM, Weekday afternoons = 3:00 PM – 6:00 PM or 7:00 PM (end time varied by seasonal changes in daylight)

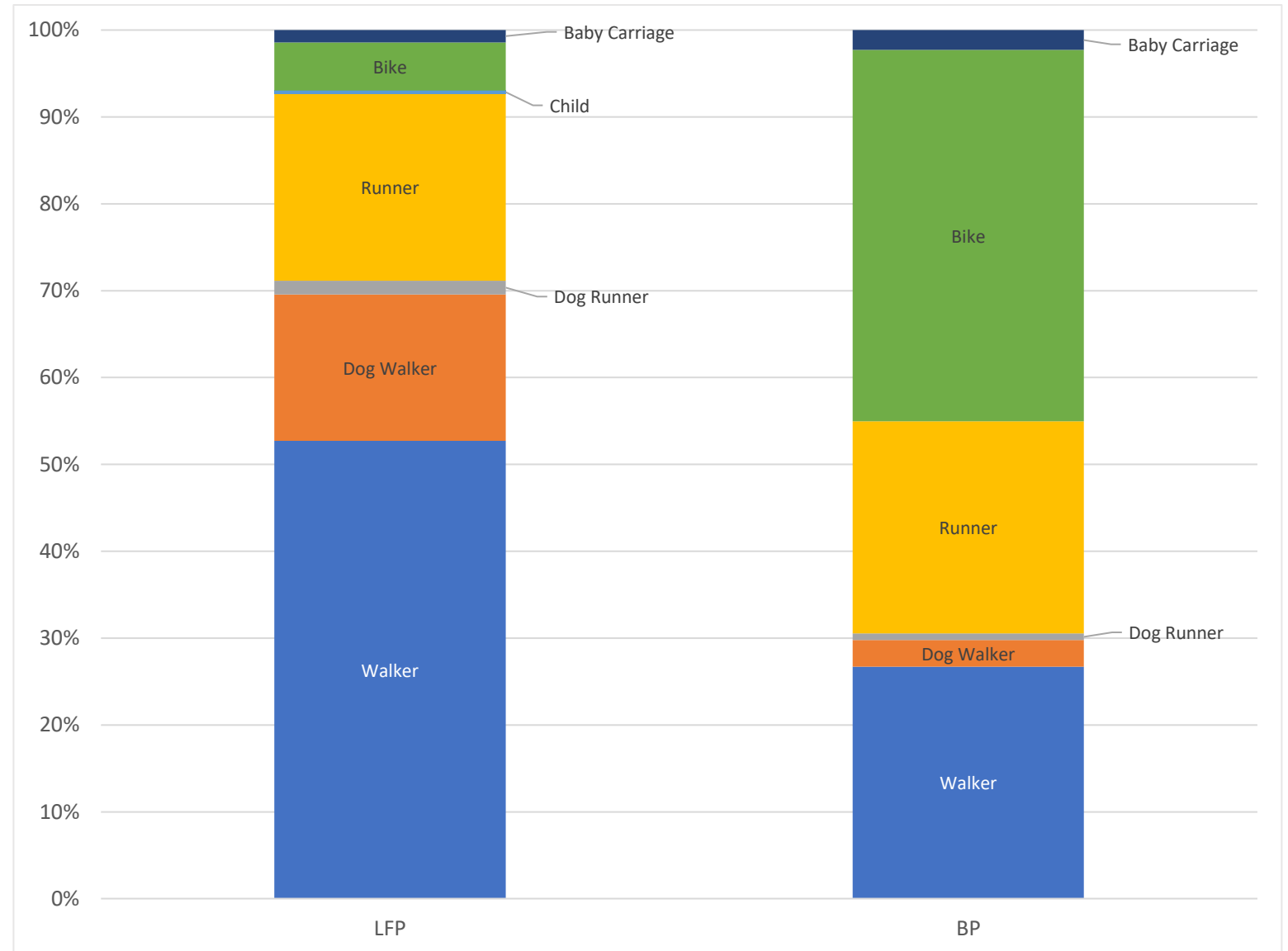
Results: 2021 Survey Results at Bike Path

- Bikers made up a majority of users (38%).
- All dog walkers and runners at the site had their dogs leashed.
- Walkers (27%) and runners (22%) comprised similar proportions of users.
- Baby carriages, children (<3ft tall), and “other” accounted for 9% of users.
- There was 0% error between survey counts and sensor counts during surveys.
 - This does not account for error that may occur outside of survey hours.
 - Because there are generally fewer users at BP than other sites, error is partially minimized by not having multiple users pass the sensor at once.



Results: *Human Users by Survey Site 2021*

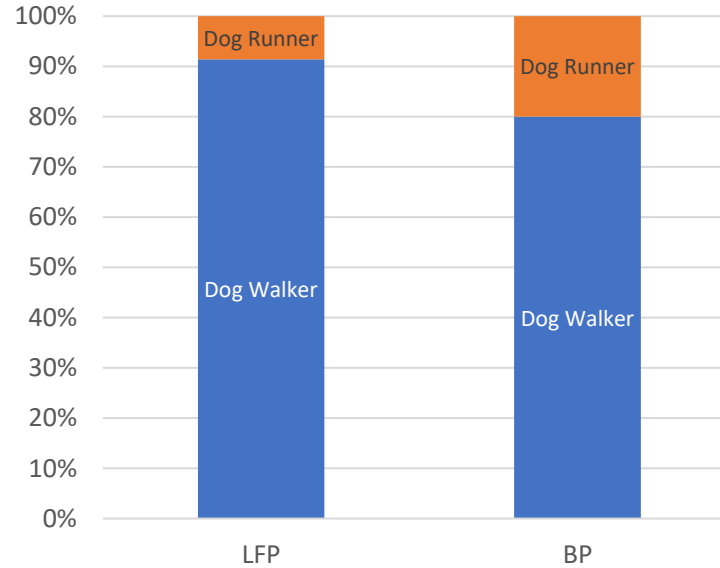
- Walkers and runners made up a majority of the users at both LFP and BP.
- However, there was a higher proportion of bikers at BP than LFP.
 - The bike path is convenient for commuters, while LFP is generally passed by for leisure.
- There were about equal proportions of runners at each site.



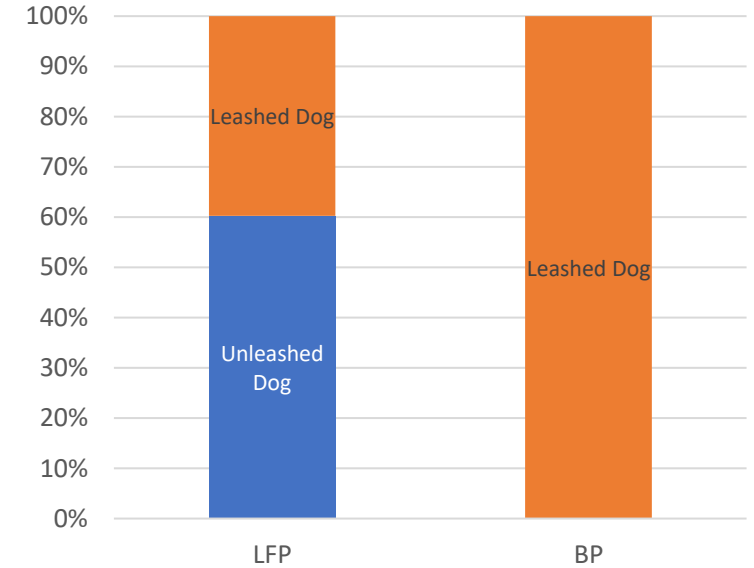
Results: *Dog Owners and Dogs 2021*

- Dog walkers were much more common than runners with dogs at both sites.
- There was a big discrepancy between leashed and unleashed dogs at the two sites.
 - LFP is relatively far from entrances and roads and 60% of dogs were unleashed.
 - BP is near Fresh Pond Parkway. All dogs were leashed at this site.
- At both sites, there was a roughly equal proportion of dog owners to dogs, indicating that most dog owners visited with just one canine.

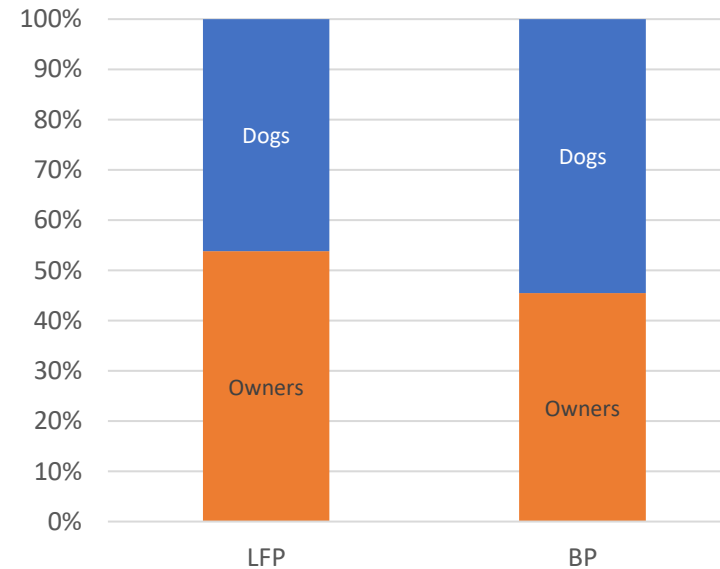
Proportion of Dog Owners



Proportion of Dogs



Proportion of Dog Owners to Dogs



Future Goals

Future Goals

- Continue to track long term trends
- Inform Shared Use plan
- Continue monitoring changes in usership during the COVID-19 pandemic
- Use sensor and survey data to better understand impacts on Fresh Pond Reservation from neighborhood development projects
- Add sensor for new Watertown Cambridge Greenway bike path

If you would like to volunteer to collect surveys at Fresh Pond, contact Anna Van Dreser at avandreser@cambridgma.gov!

