

# Fresh Pond Reservation Census Program

## 2020 Data Collection Summary



# Program Outline

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

# Purpose

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- 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

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# Methods

## *Data Collection*

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- 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

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*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

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**Fresh Pond Census Sheet**

Date: 1/21/2014  
 Start Time: 7 am  
 End Time: 8 am  
 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 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.

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										
R			1	1							
R						1					
R	1										
R						1					
R			1	11							
R	1										
R	1										
R											
R	1										
R											
R	1										
R											
R	1										
R						11					
R						1					
PAGE TOTAL											

-7:15

Example Survey Datasheet

# EcoCounter Sensor Locations

## Entrances:

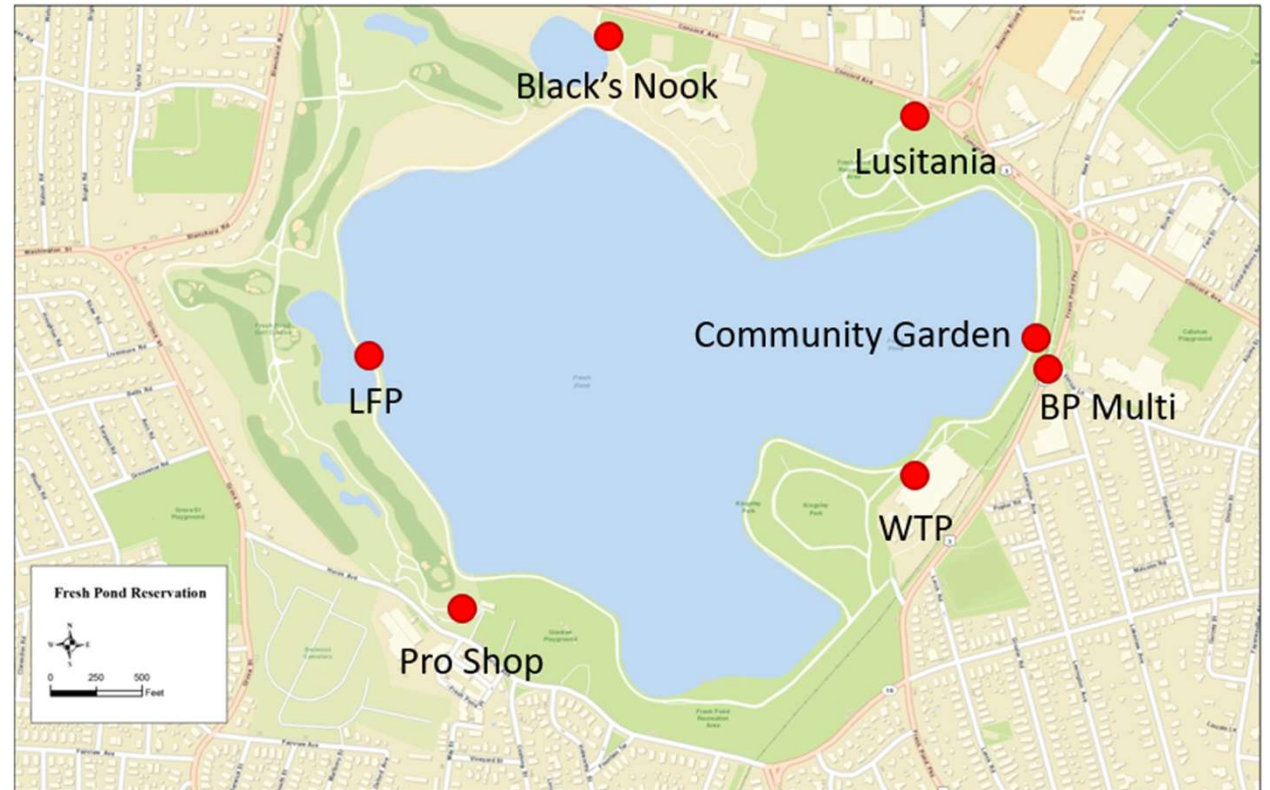
Black's Nook, Community Garden,  
Lusitania, and Pro Shop

## Perimeter Road:

LFP and WTP

## Multi Sensors:

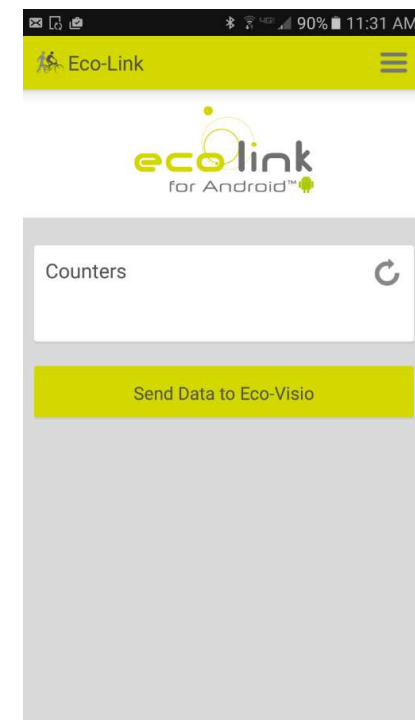
WTP multi and BP Multi





# 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 2020 Data Exclusions

Site	Exclusion dates	Explanation
Black's Nook	1/6, 5/11	Unexplained spikes
BP Multi	4/22, 6/3, 11/30 - 12/10	Unexplained spikes; dead battery
Community Garden	6/4	Unexplained spike
LFP	n/a	n/a
Lusitania	1/20 - 1/22, 10/12, 10/17, 12/8, 12/16, 12/18 - 12/19, 12/19 - 12/20, 12/29 - 12/30	Unexplained spikes, often only in the 'in' direction
Pro Shop	7/12, 7/20, 7/26, 7/27, 8/14	Unusually high numbers
WTP multi	1/4, 6/24 - 6/25, 7/1 - 7/3, 7/5-7/6, 7/13 - 7/14, 7/22-7/23, 7/27-7/30, 8/3, 8/4, 8/18, 8/20, 8/23, 8/25, 8/29, 9/7-9/11, 9/13, 9/16 - 9/18, 10/23 - 10/24, 11/16 - 11/18, 11/23 - 12/31	Unexplained spikes, especially with the bike sensor; multiple attempts to relocate but eventually disabled

*\*Anomalous data were removed in hour increments.*

# Methods

## *Data Analysis*

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- 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*

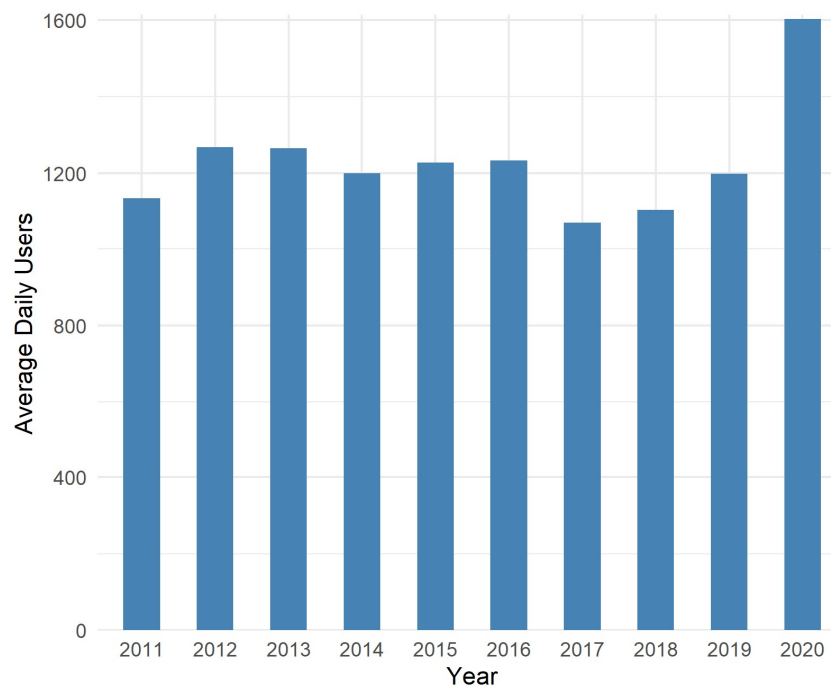
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# Results

## Daily Overview 2020

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

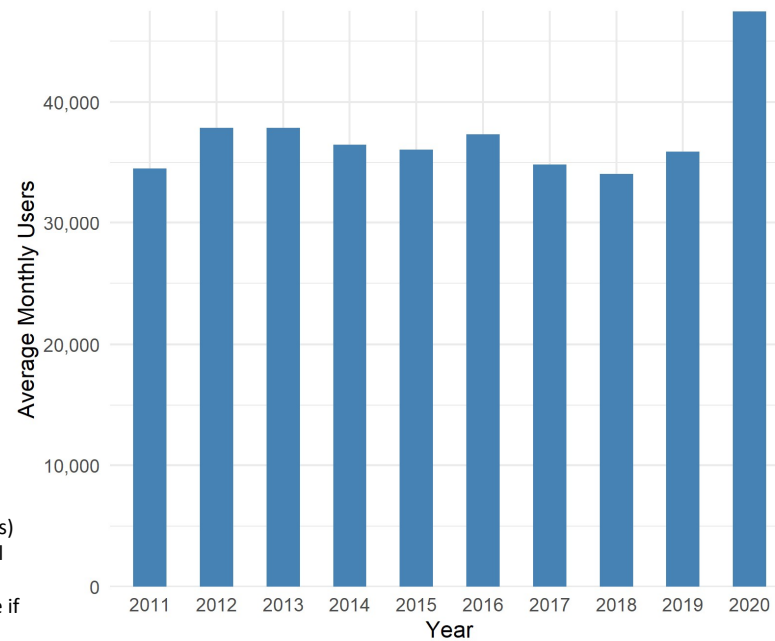


- Prior to 2020, average daily usership was generally between 1,000-1,300 people.
- However, there was a sizable increase in users in 2020 due to the COVID-19 pandemic.
  - 2020 Average daily usership was ~300-600 people/day higher than in past years.
- The average daily usership calculation was likely 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

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

# Results Monthly Overview 2020



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

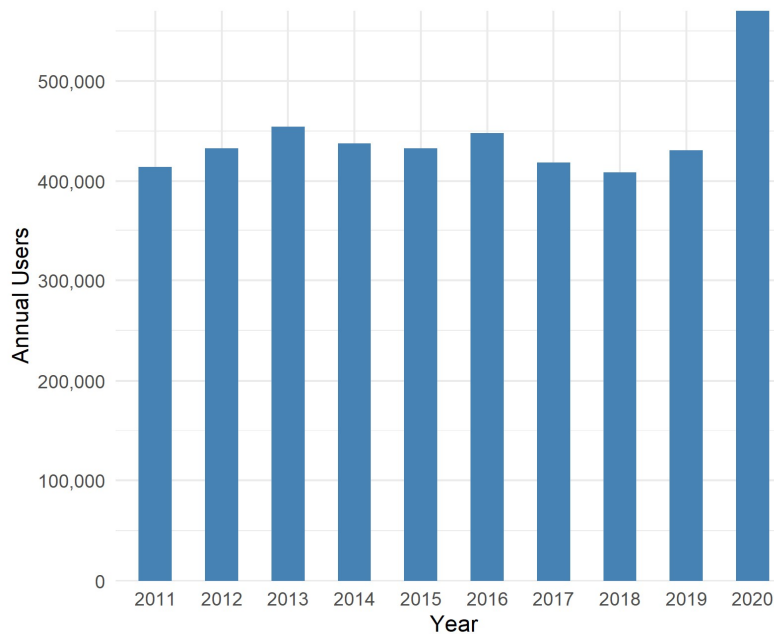
\*Average of the monthly averages of WTP Multi (pedestrians and cyclists) and LFP. During months with significant data loss at WTP, monthly total counts at LFP were used instead of the LFP and WTP Multi monthly averages to calculate the annual monthly average. The opposite was true if significant amounts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

\*\*WTP and LFP monthly averages were not calculated May 2017 – June 2018 due to a construction detour which reduced the number of users at WTP. During these months, total counts at LFP were used in the calculation of the annual monthly average.



# Results Annual Overview 2020

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



- Measured usership on an annual basis is typically ~410,000-455,000 people per year.
- 2020 resulted in a significant increase in annual usership, corresponding with the COVID-19 pandemic:
  - There were over 115,000 more users than 2013, the previously most populous year at Fresh Pond.
  - Usership increased by 32% compared to 2019.

\*Sum of the monthly averaged total counts of WTP Multi (pedestrians and cyclists) and LFP. If significant amounts of data were missing from WTP, then the monthly total from LFP (rather than the WTP, LFP average) was used to calculate the annual total. The opposite was true if significant amounts of data were missing at LFP but not WTP.

\*\*Monthly totals from LFP were used in place of the LFP and WTP monthly averages during the Bike path construction detour May 2017-May 2018

# 2020 Annual Overview Summary

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- The COVID-19 pandemic corresponded with a large increase in the number of users at Fresh Pond Reservation
- Total usership increased by 32% in 2020 from 2019.
- Total annual usership in 2020 was 569,788: more than 115,000 additional users than the next most populous year at Fresh Pond Reservation
- In 2020, an average of 47,482 people visited Fresh Pond Reservation each month. Monthly average usership increased by over 11,000 users compared to 2019.
- In a typical year, an average of roughly 1,000 – 1,300 people visit Fresh Pond Reservation daily. In 2020, there were an average of ~1,600 users/day.



# Results

## *Perimeter Road Sensors*

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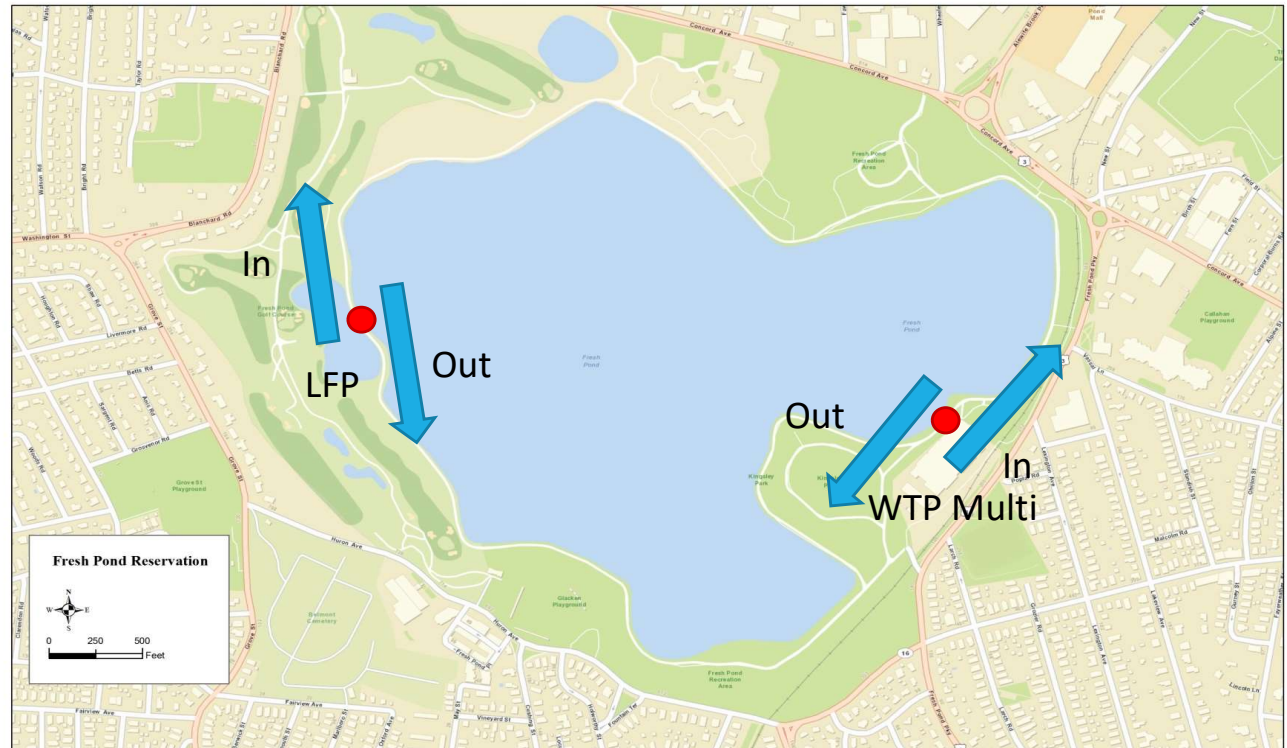
# Perimeter Road EcoCounter Sensors

## Little Fresh Pond (LFP)

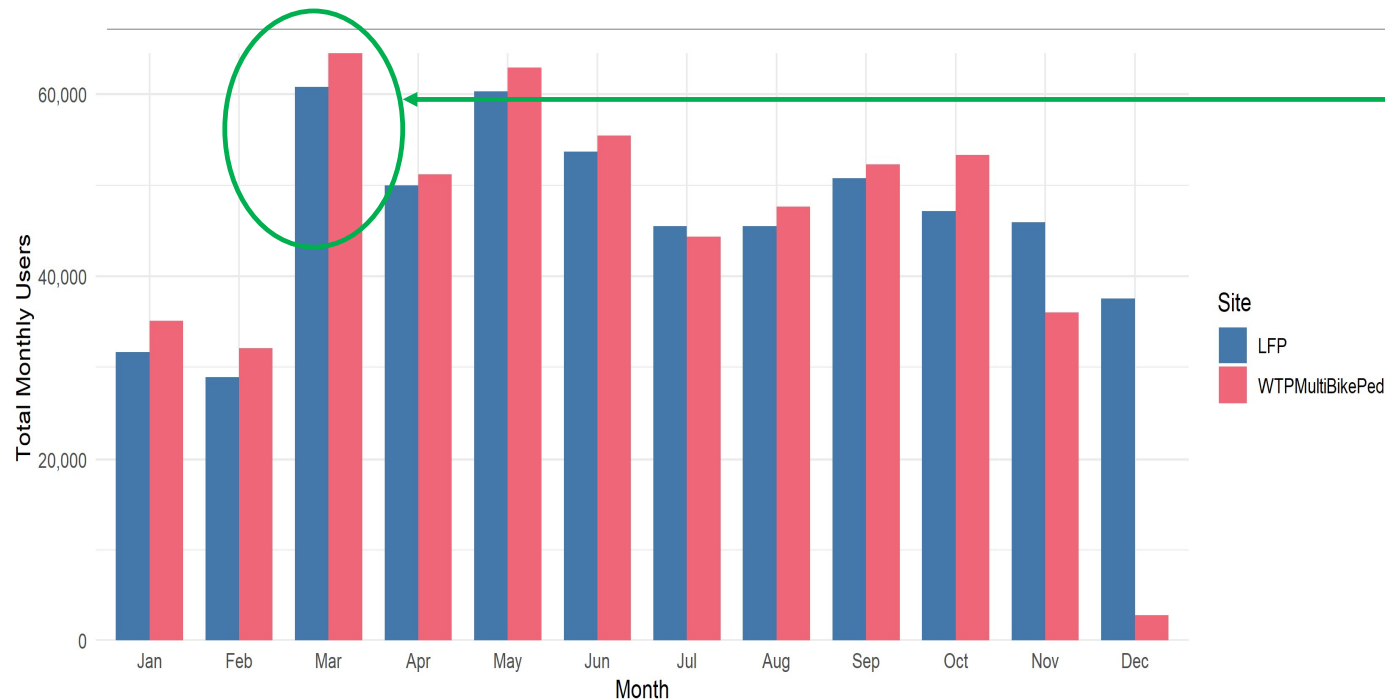
- Directional

## Water Treatment Plant Multi (WTP)

- Directional
- Differentiates between pedestrians and cyclists



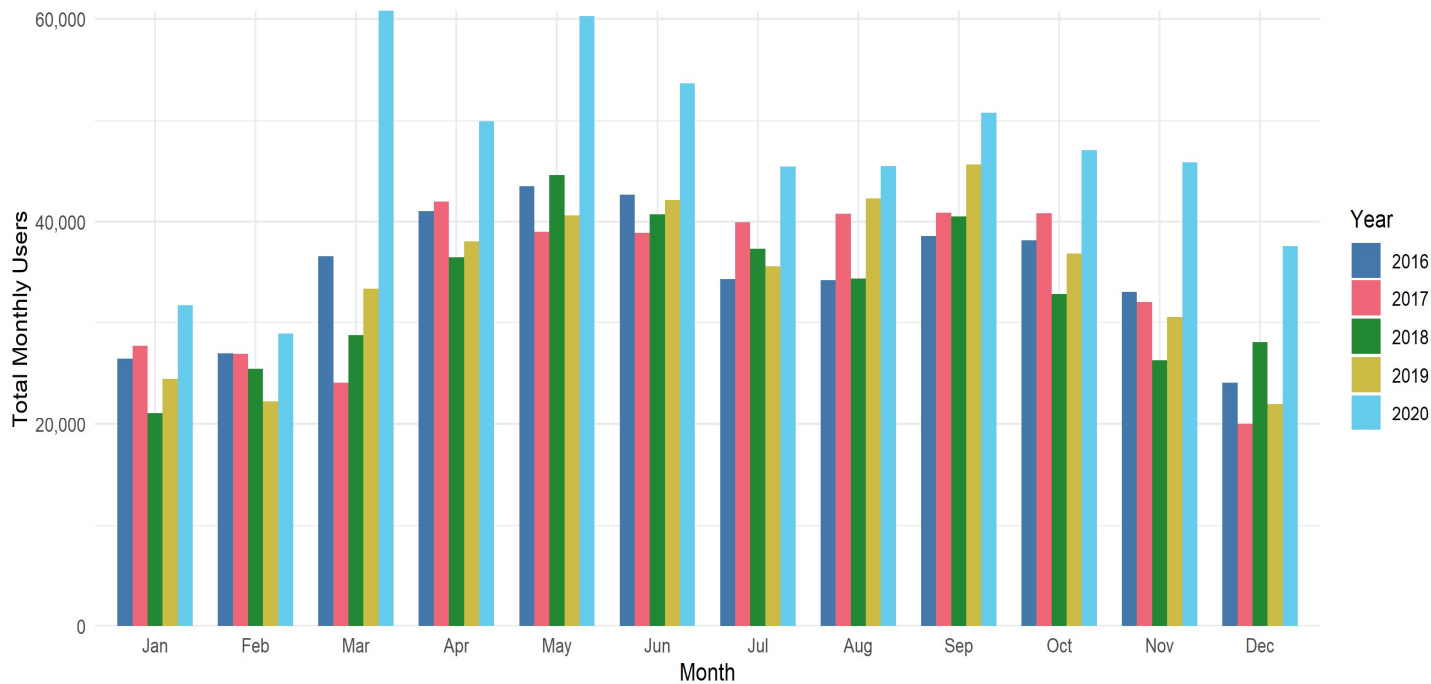
# Results Perimeter Road Total Monthly Users 2020



WTP November and December values are low due to a sensor error from Nov 16-18, Nov 23-30, and Dec 4-31.

- There was a rapid spike in usership starting in March of 2020 due to the pandemic.
- Usership decreased in April, perhaps due to the severity of the of the pandemic and new COVID restrictions, before rebounding in May.
- While usership dipped again during July and August and November and December, it stayed higher than both January or February values at LFP.
- There are slightly more users at WTP than LFP, likely due to the proximity to the parking lots and Kingsley park.

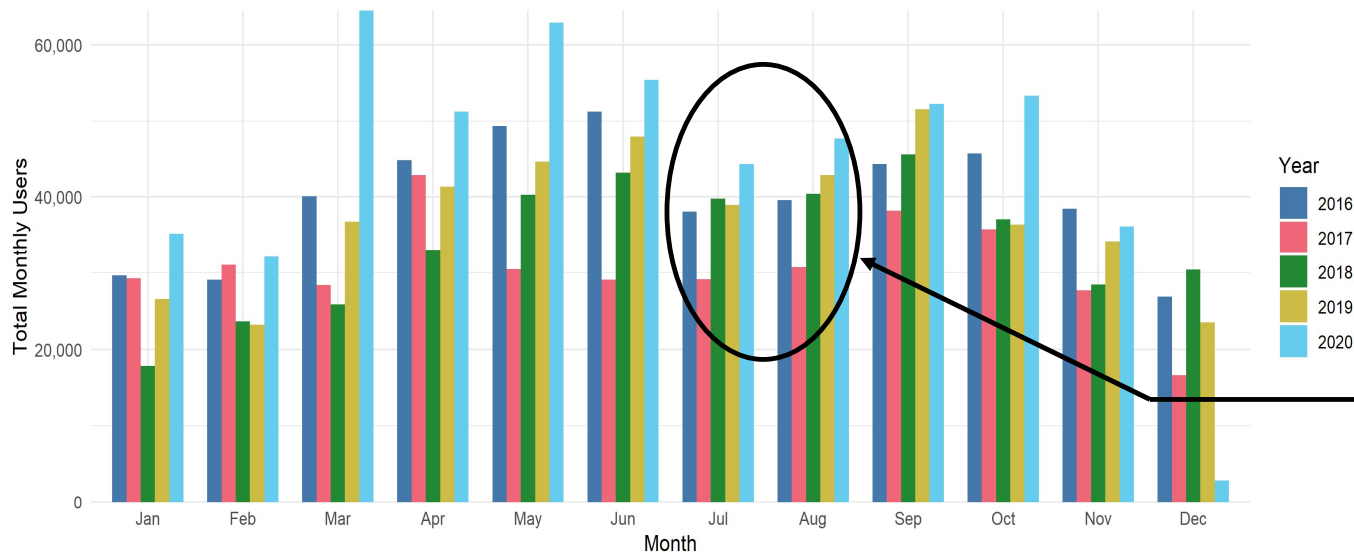
# Results LFP Total Monthly Users



- 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.
- 2020 usership showed a big spike in users in March, then followed a similar trend of peak usage to past years, but at a greater magnitude.



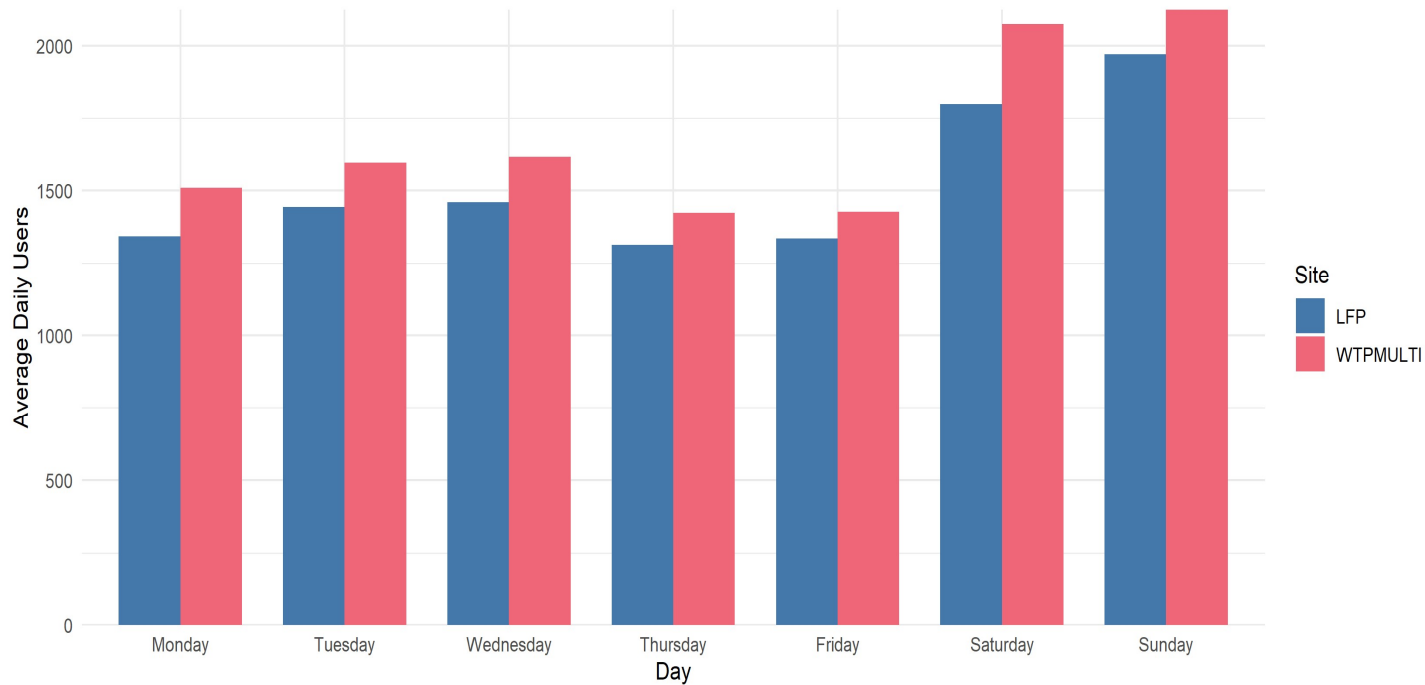
# Results WTP Total Monthly Users



*Low counts from May 2017 - May 2018 are due to a construction detour routing users away from the sensor.  
 November and December 2020 counts are artificially low due to sensor error.  
 Sporadic erroneous spikes in bike counts removed throughout 2016, 2018, 2019, and 2020.*

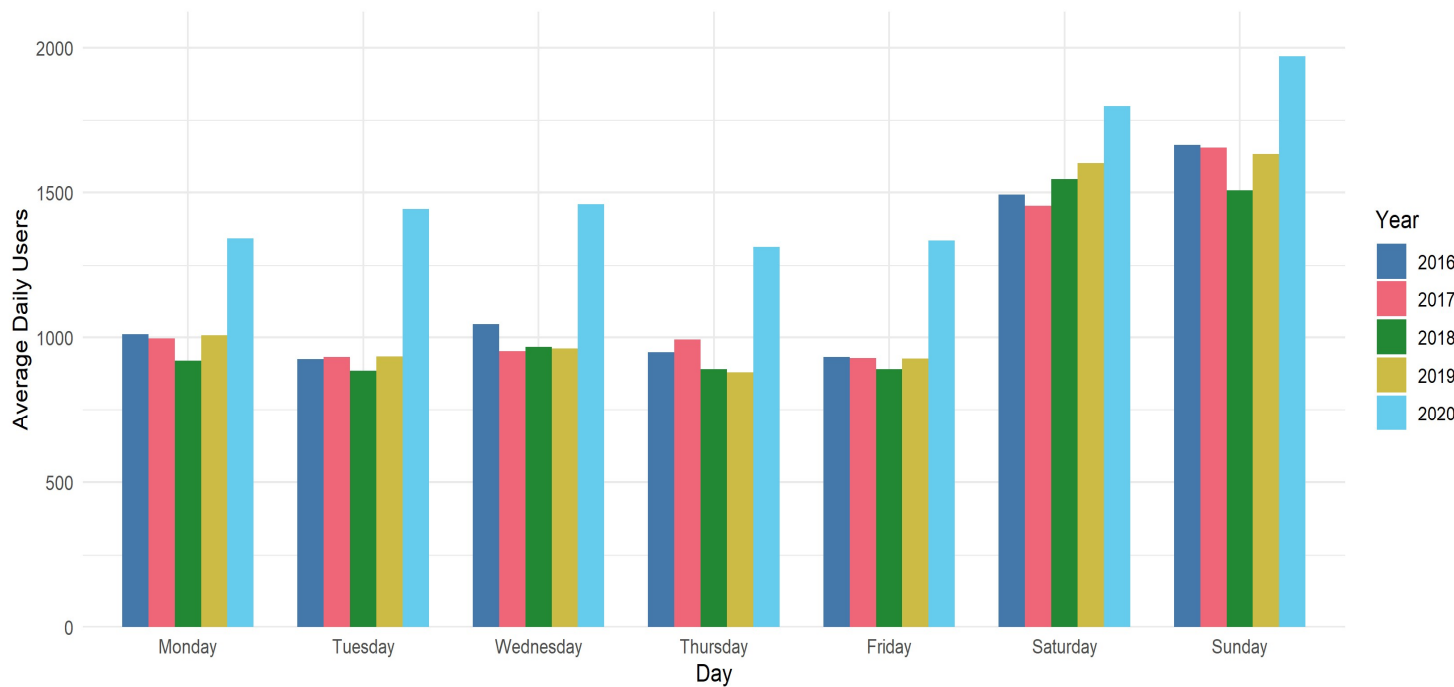
- Usage at WTP was highest in 2016 and 2020. Low usage was due to both construction detours along the bike path near the sensor and sensor error.
- There is a clear dip in usage in July and August, typically hotter months when users may also be away on vacation.

# Results Perimeter Road Day of Week Averages 2020



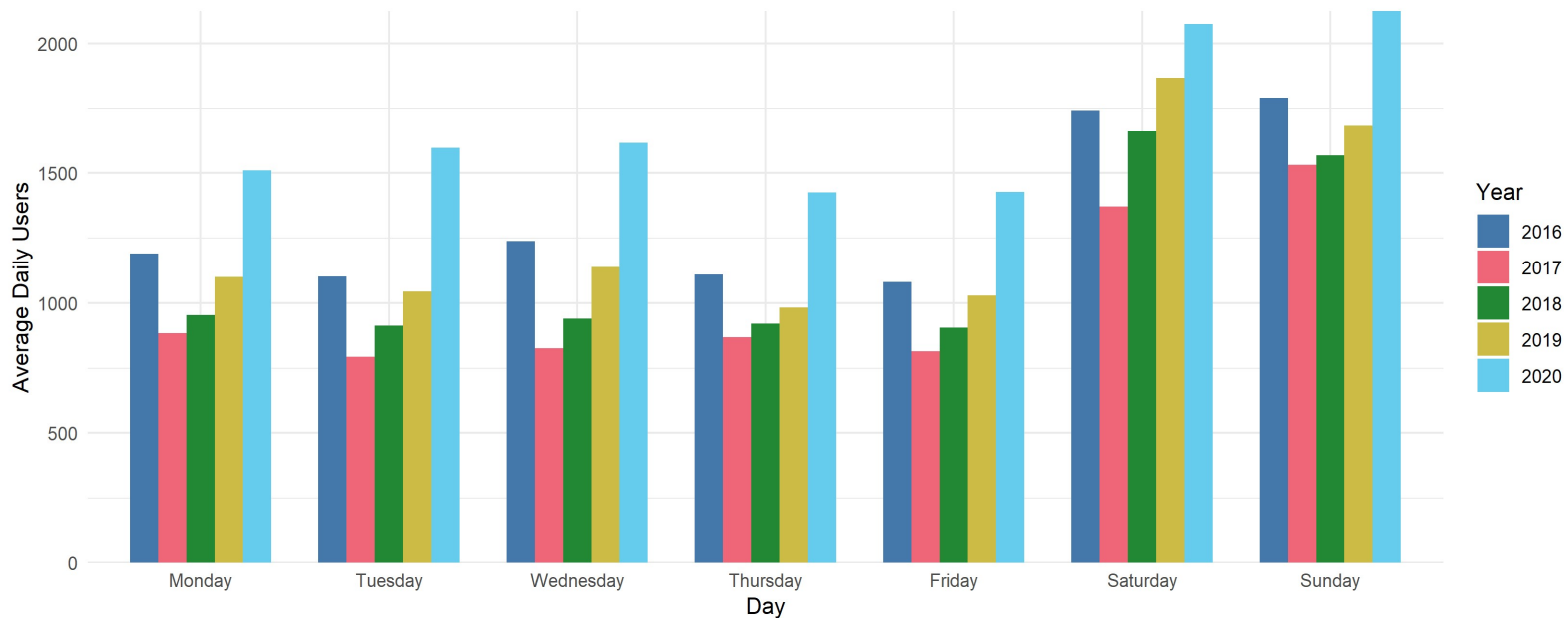
- Weekends were busier than weekdays at both LFP and WTP.
  - Weekdays hovered around 1,300-1,600 average users.
  - Weekends hovered around 1,800-2,100 users.
- WTP saw slightly more visitors than LFP.

# Results LFP Day of Week Averages



- LFP has seen consistent usership just under or over 1,000 people/day during weekdays since 2016. However, ~1,400 users/weekday passed the LFP sensor in 2020.
- 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) compared to the weekday increase.

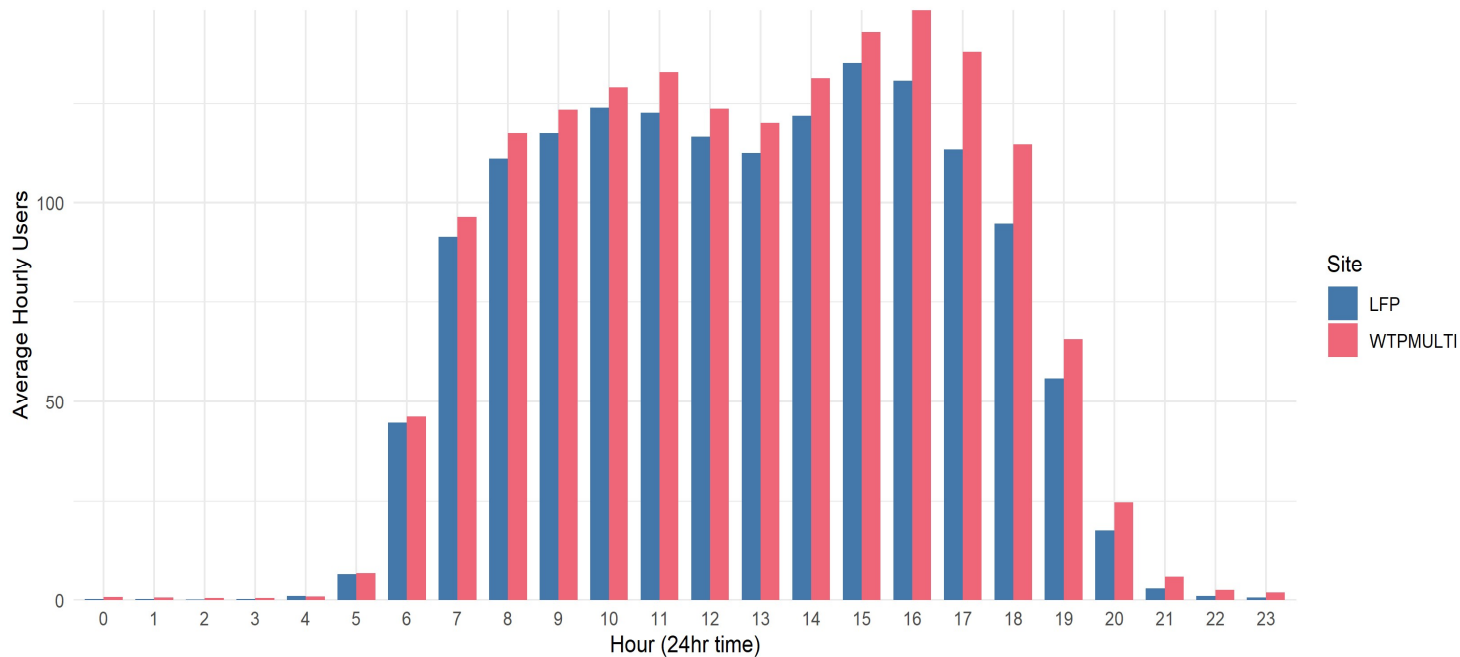
# Results WTP Day of Week Averages



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

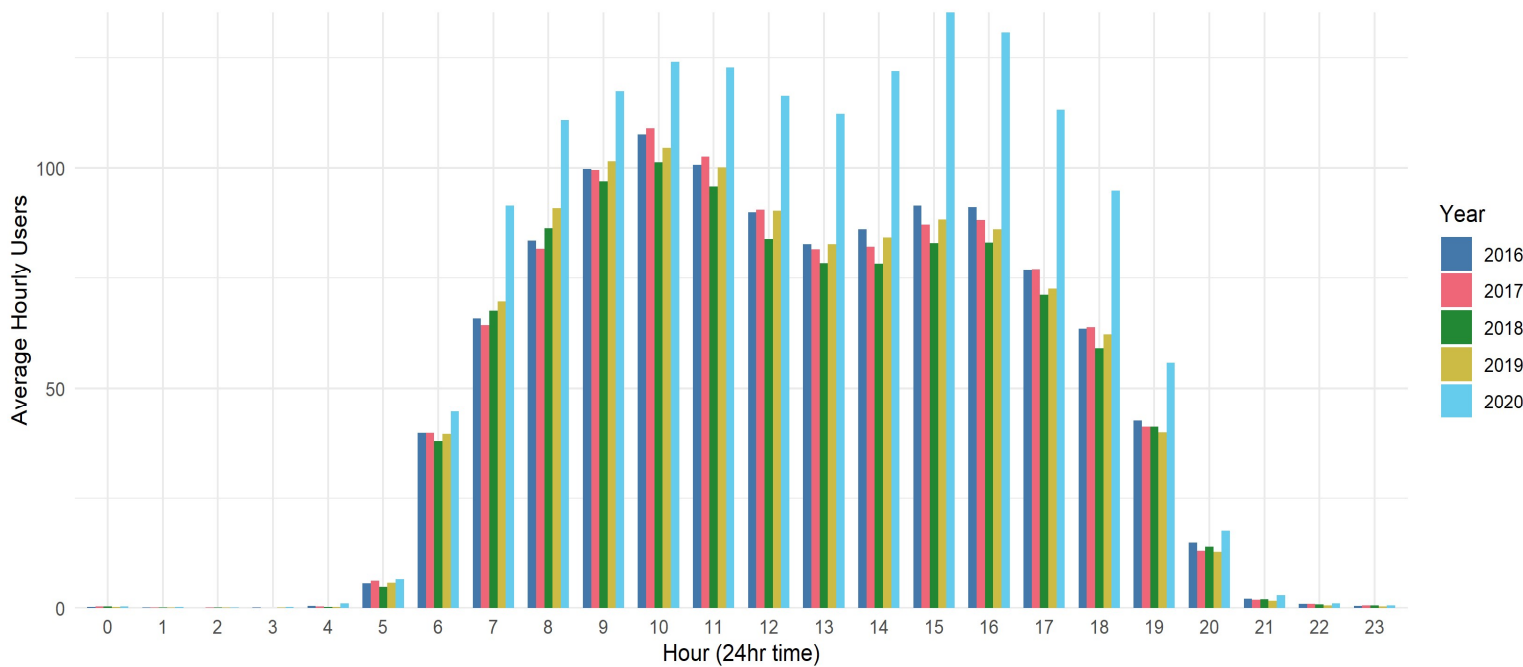
- Weekday usage at WTP was lowest from 2017-2019, in part from a construction detour, but increasing each year after. As with LFP, daily usership increased in 2020.
- Weekends see approximately 1,500-1,800 people a day, although that number is significantly higher in 2020, similar to LFP.

# Results Perimeter Road Hourly Averages 2020



- 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 afternoons than the morning.

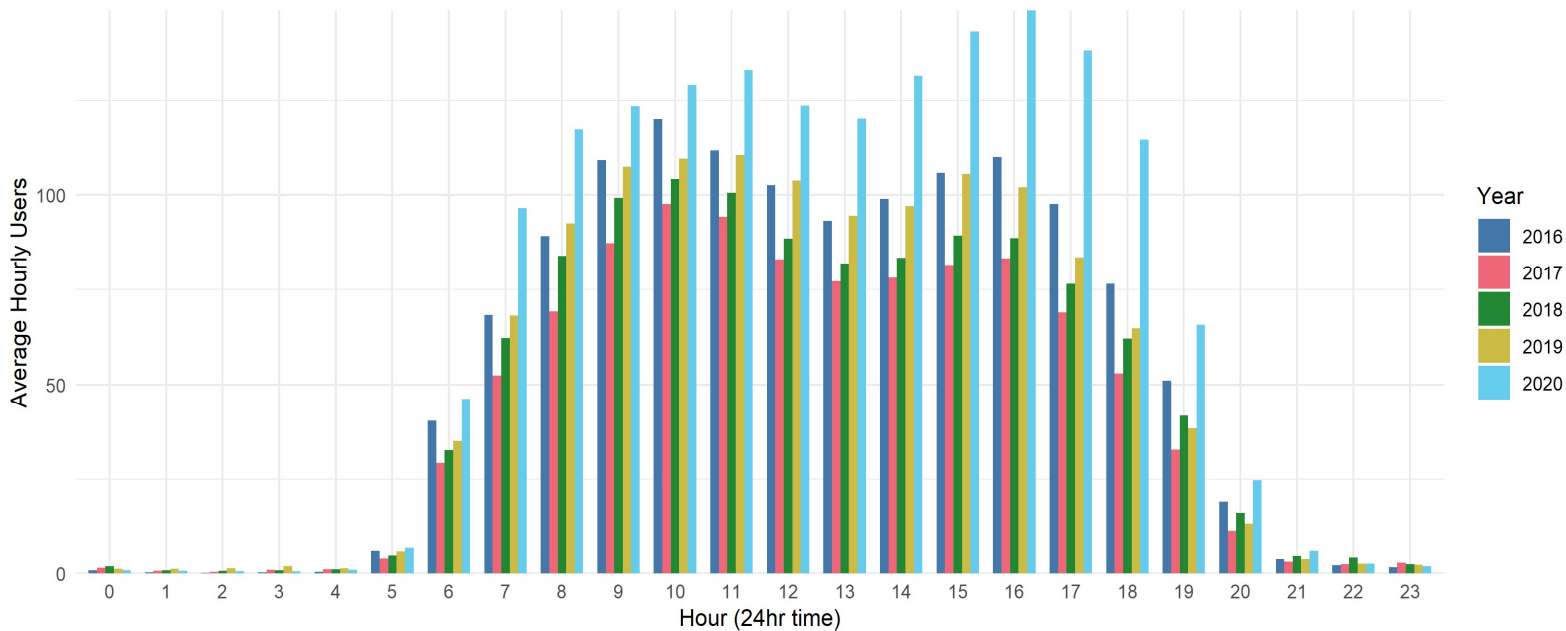
# Results LFP Hourly Averages



- In the past, LFP had more visitors in the morning than the afternoon, peaking around 9:00 AM.
- However, in 2020 it was the opposite, with more use in the late afternoon.



# Results WTP Hourly Averages



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

- There were two peaks in usage at WTP during the day, one at midmorning and the other in the late afternoon.
- In the past, the midmorning peak was higher than in the afternoon. However, this flipped in 2020.

# 2020 Perimeter Road Summary

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- Monthly usership at both perimeter road sites increased in March 2020 at the start of the COVID-19 pandemic, decreased in April as more significant COVID-19 restrictions were implemented, then increased again in May. Counts remained elevated compared to a normal year, though expected seasonal fluctuations were still apparent (lower counts in July and August and a fall peak in Sept-October).
- Weekend days show higher usage than weekdays at both sites, and WTP had slightly higher usership each day than LFP.
- Both sites had two distinct peaks of usage throughout the day, late morning and late afternoon, although the morning peak was larger than the afternoon one prior to 2020. In 2020, the afternoon peak was larger than the morning one at both sites.

# Results

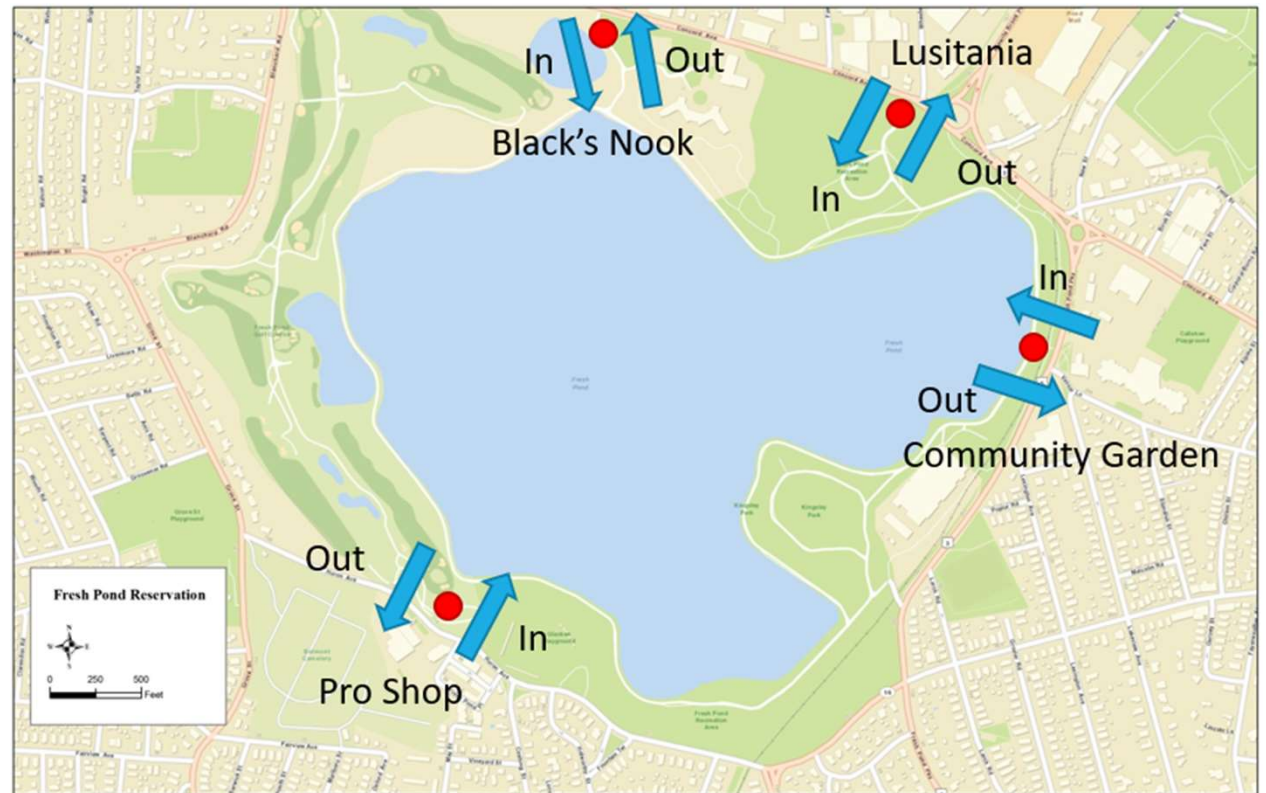
*Entrance Sensors*

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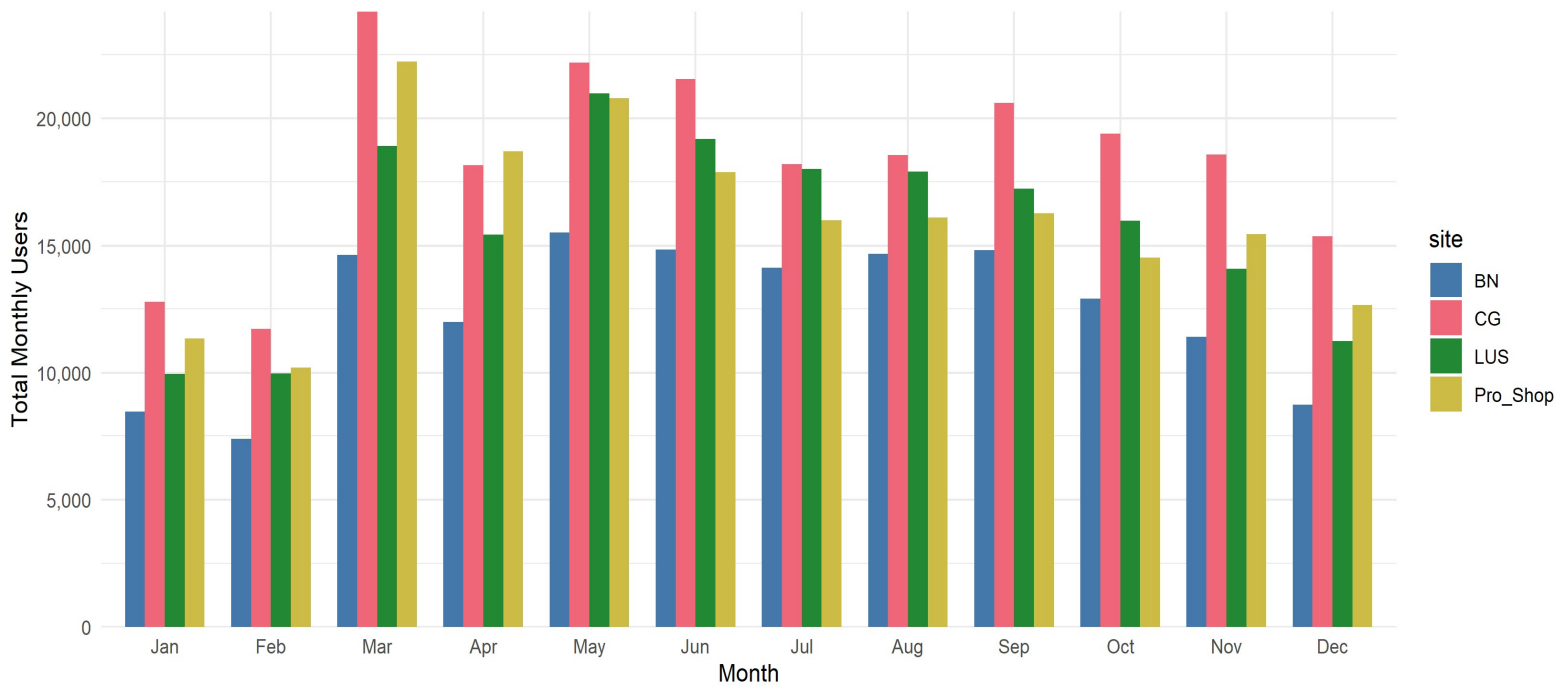
# Reservation Entrance EcoCounter Sensors

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

- Directional



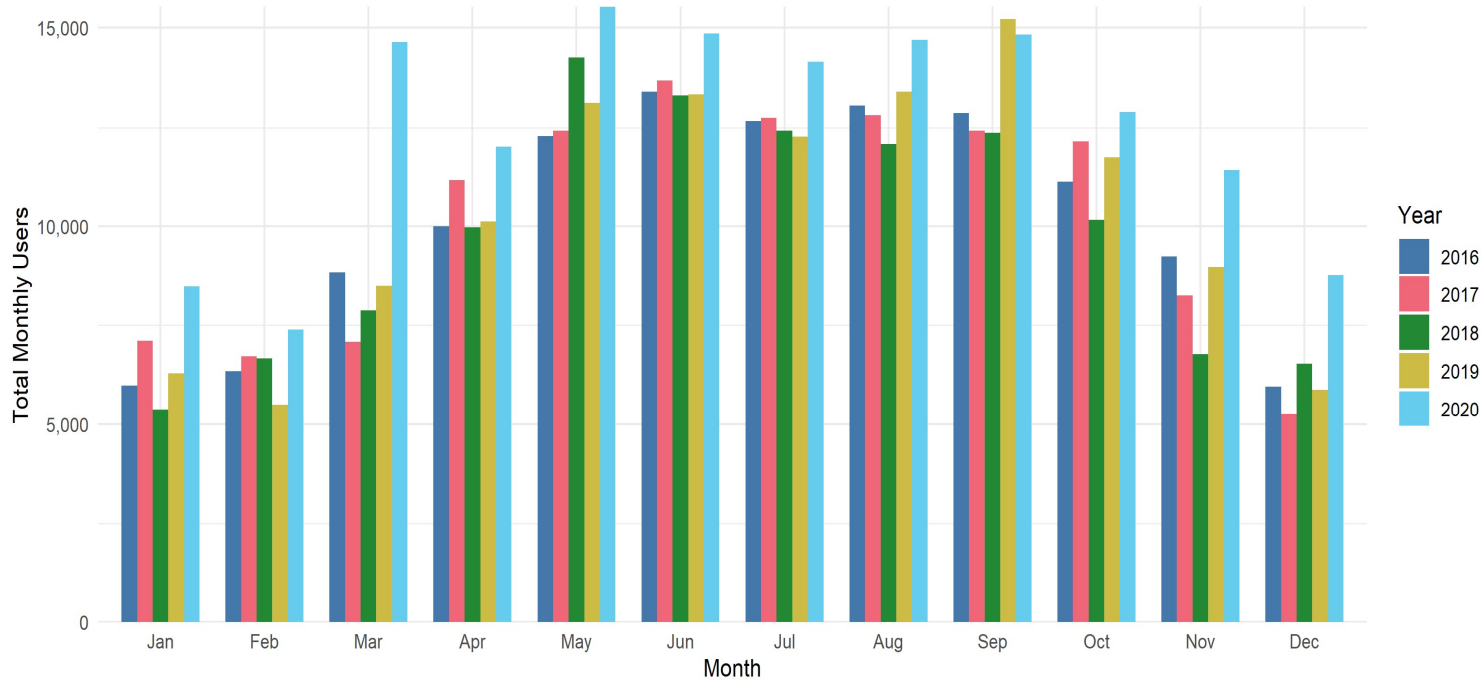
# Results Entrances Total Monthly Users 2020



- The Community Garden (CG) entrance is the busiest of the four. Black’s Nook (BN) is the least busy.
- All entrances showed an increase in usership in March at the start of the pandemic, followed by a dip in April and another spike in May.
- Monthly usership at Black’s Nook remained the most consistent of the sites throughout the year.
- 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.
- However, counts remained higher than January and February throughout the year.
- All sites nearly doubled in usership between February and March. The CG entrance more than doubled the number users between February and March.

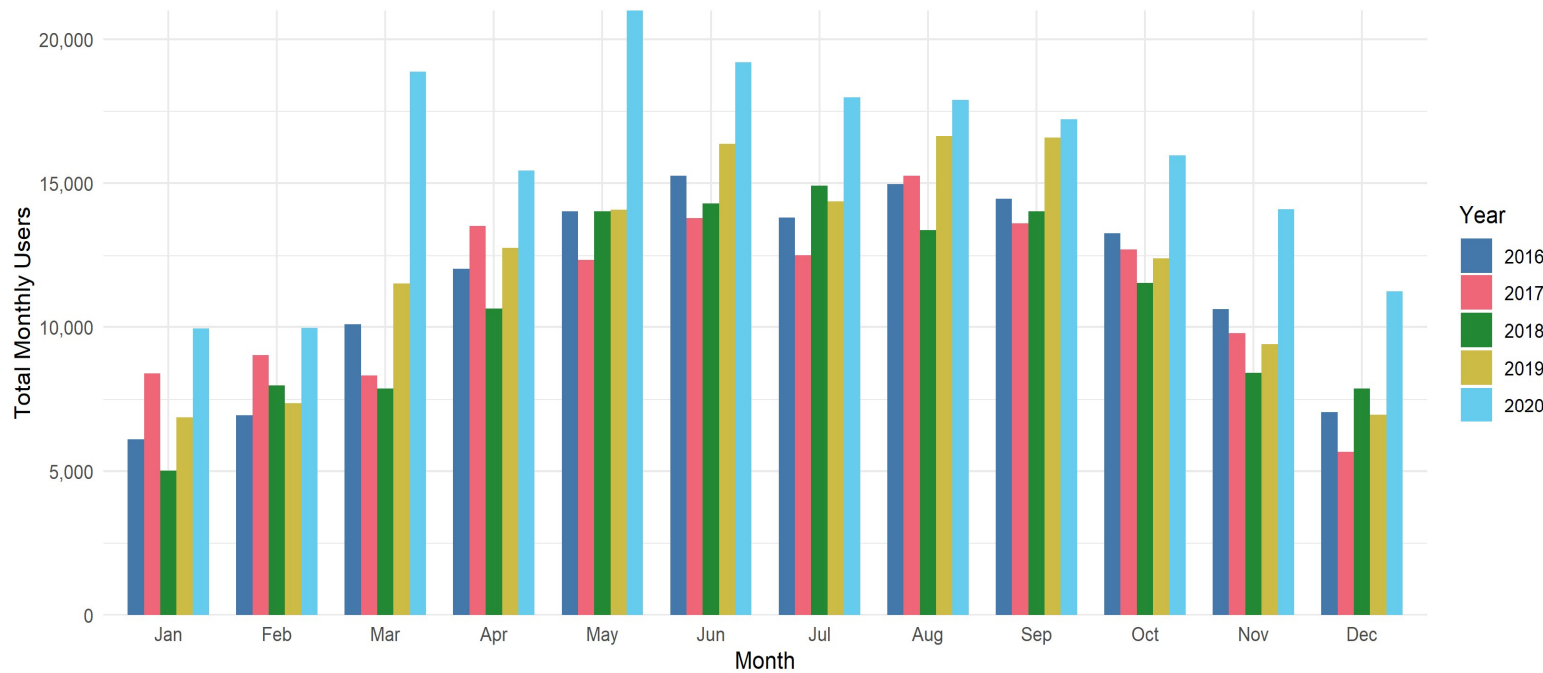
# Results Users

# Black's Nook Total Monthly



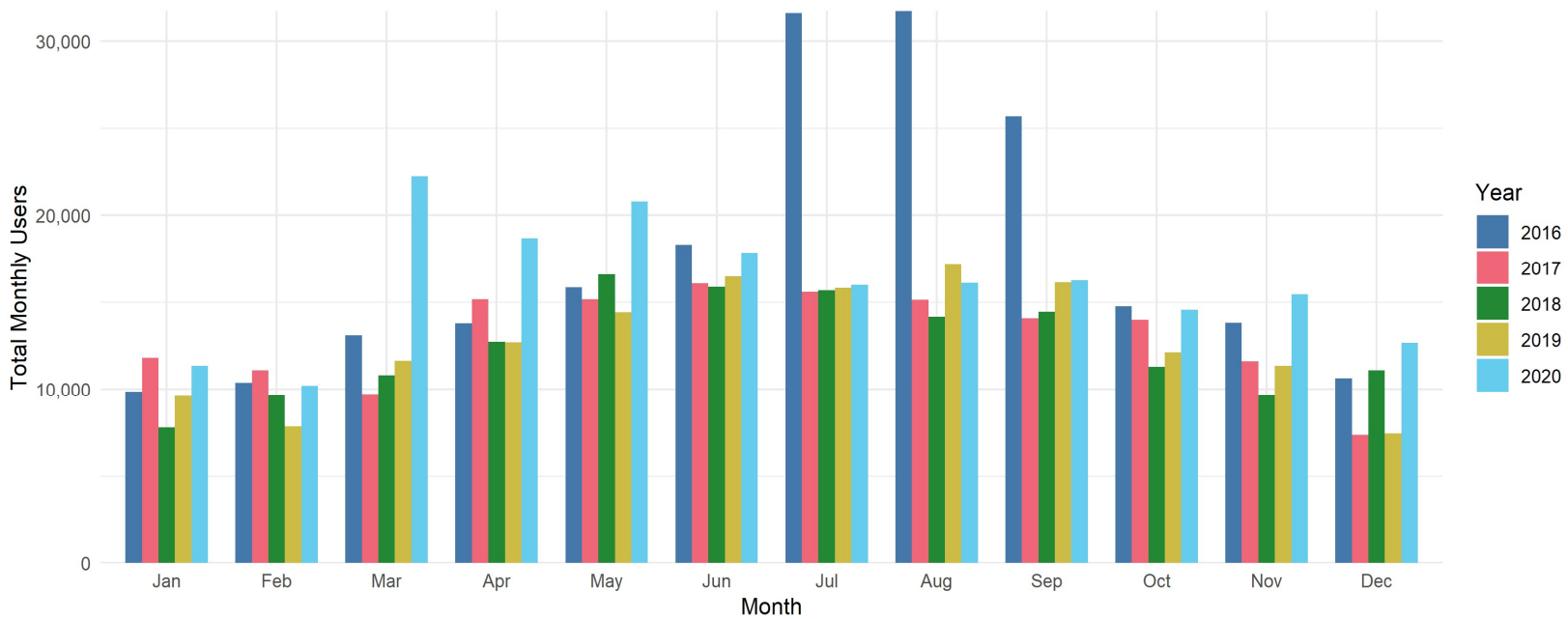
- Usage at Black's Nook increases steadily into the summer and decreases steadily in the fall.
- In 2020, the March spike in usage was much larger than the increased use through the rest of the year, when compared to past years.
- There were between 5,800 – 7,500 more visitors than the past four Marches.

# Results Lusitania (LUS) 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.
- May 2020 had the highest use recorded in the last 5 years, with over 20,000 visitors

# Results Pro Shop Total Monthly Users

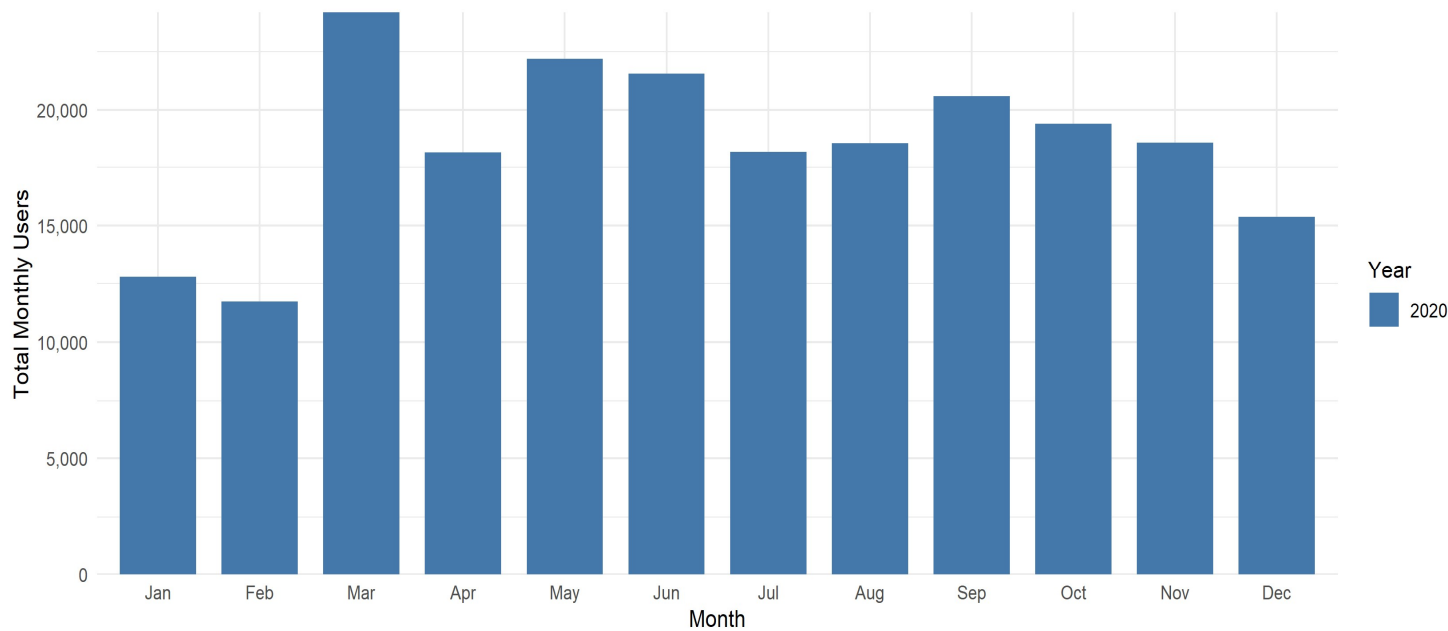


High counts July - Sept 2016 are due to a construction detour routing users past the sensor

- 2020 usage at the Pro Shop entrance was only noticeably higher than in past years in the early spring and late fall.



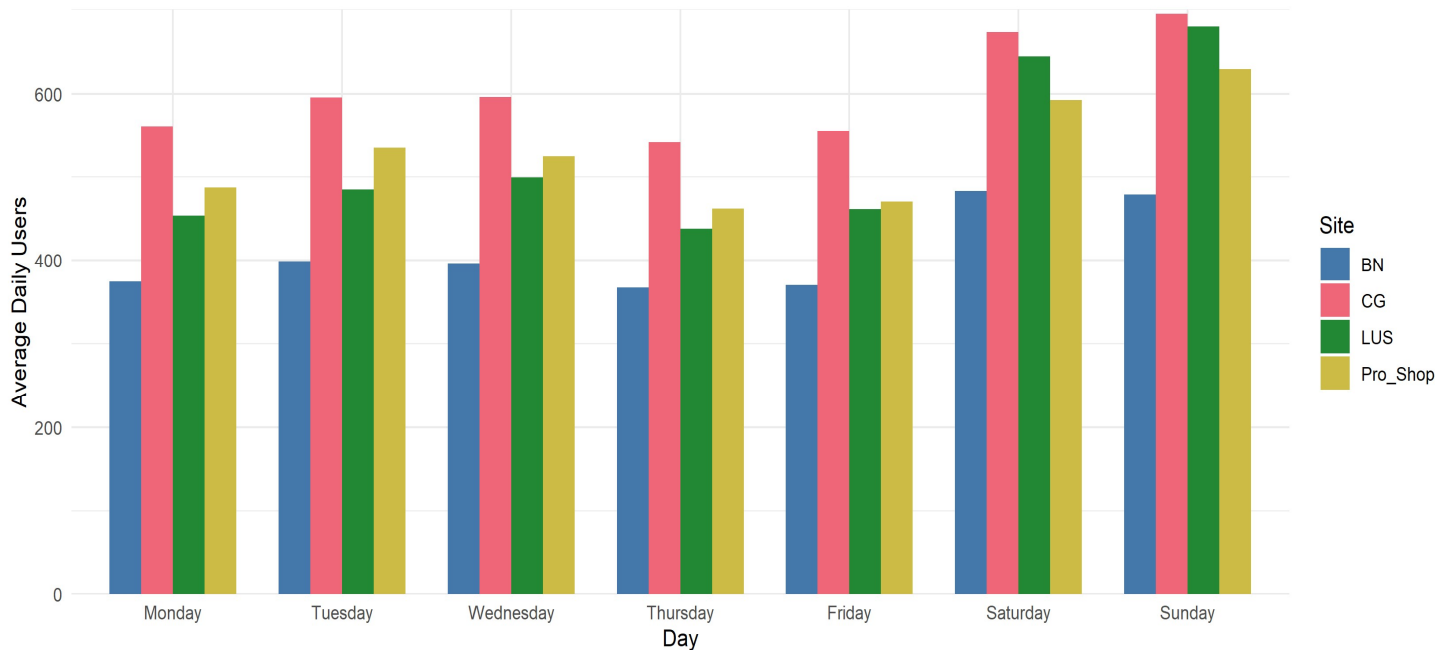
# Results Community Garden (CG) Total Monthly Users



- Usership at CG increased over 100% in March from February. It stayed high through the rest of the year.

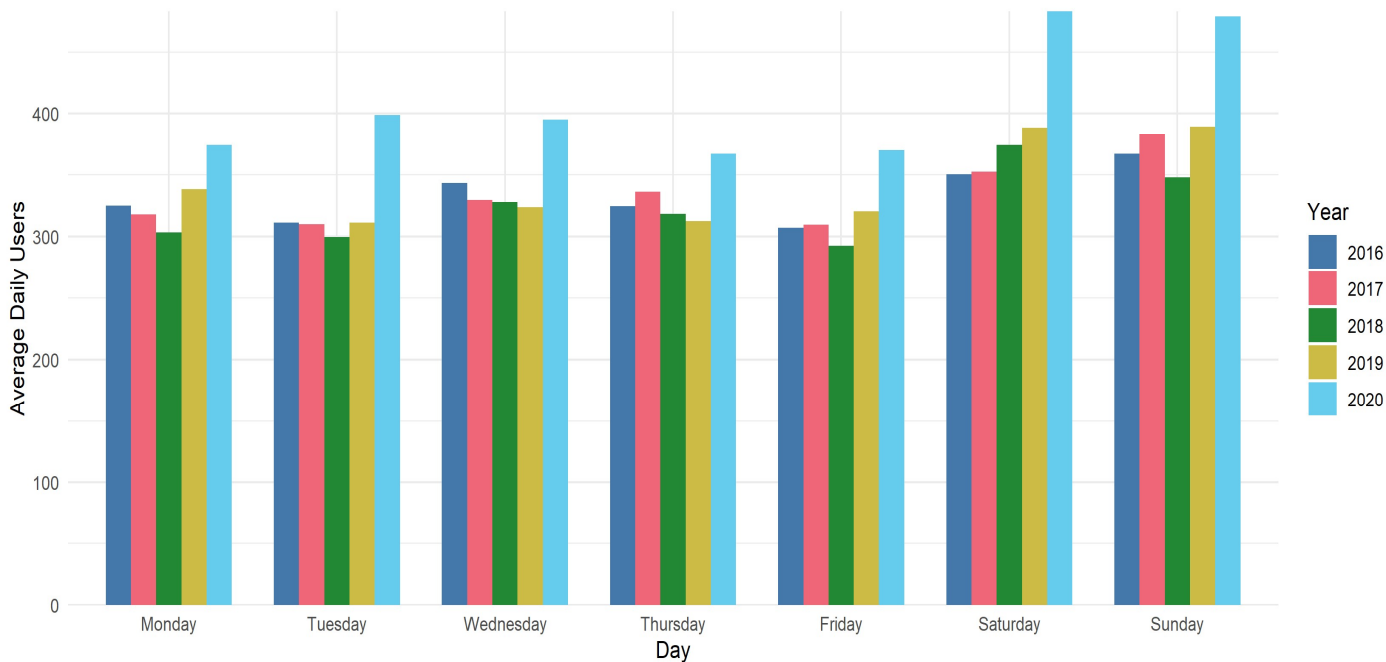
2020 was the first full year of data after sensor installation.

# Results Entrances Day of Week Averages 2020



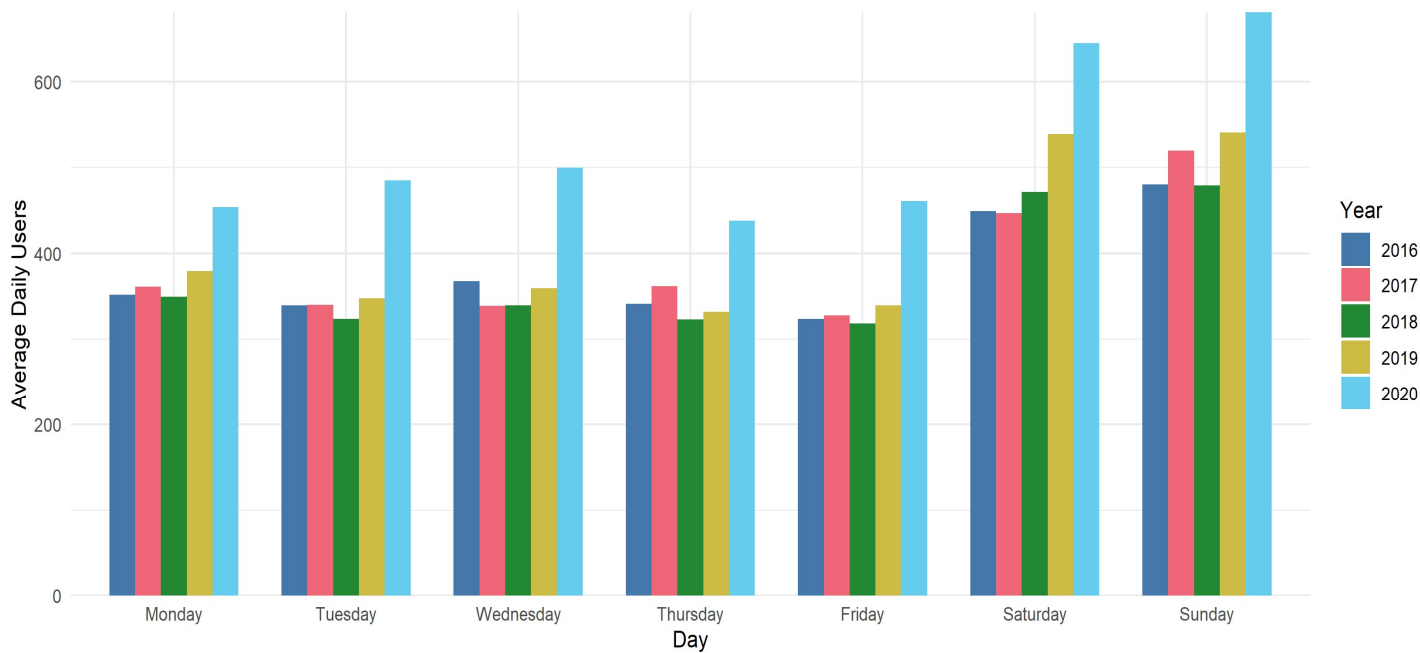
- Each entrance has more users on the weekends than the weekdays.
- The Community Garden entrance has more users during the weekdays than Black's Nook does on the weekends.
- Lusitania and Pro Shop have a similar number of users during the weekdays as Black's Nook does during the weekend.

# Results Black's Nook Day of Week Averages



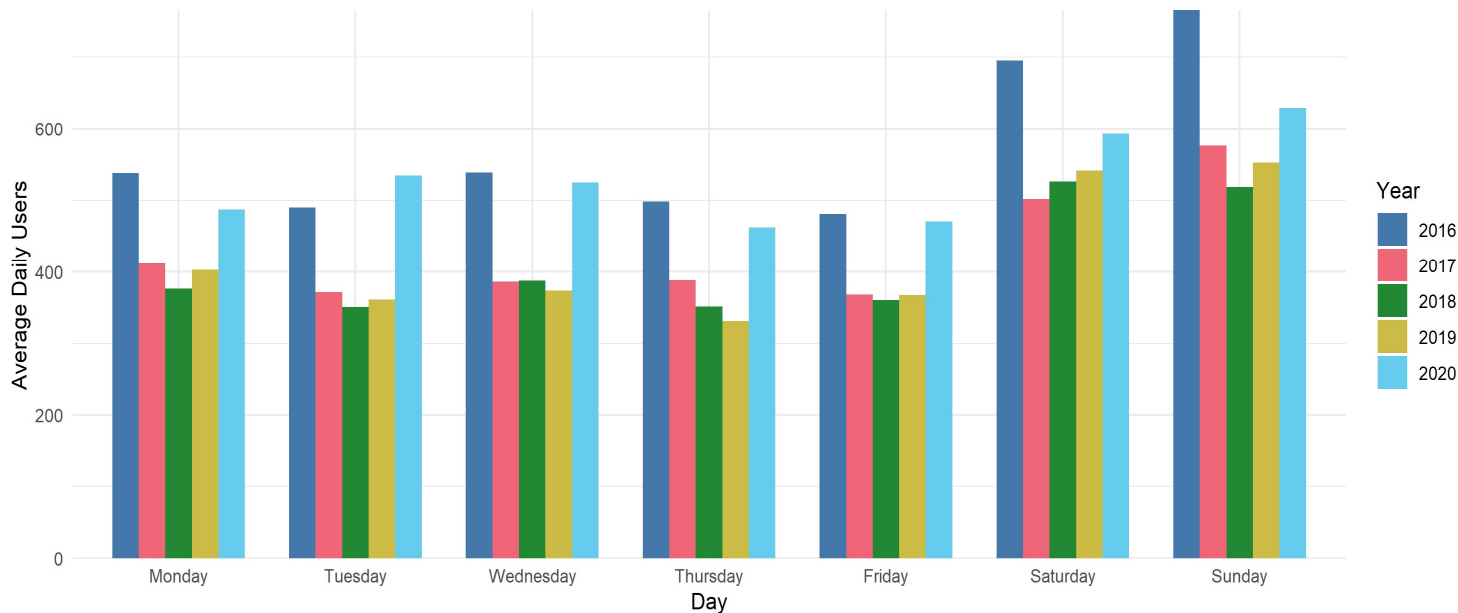
- Usership over the last five years has been consistent at Black's Nook, other than 2020.
- Weekend usership has increased slightly since 2016.
- Average weekend usage typically increases by less than 100 users compared to weekdays.

# 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.
- In 2020, measured weekday usership was closer to weekend usership in past years.
- Sunday usership has historically been higher than Saturday, although Saturday visitors have been increasing since 2017.

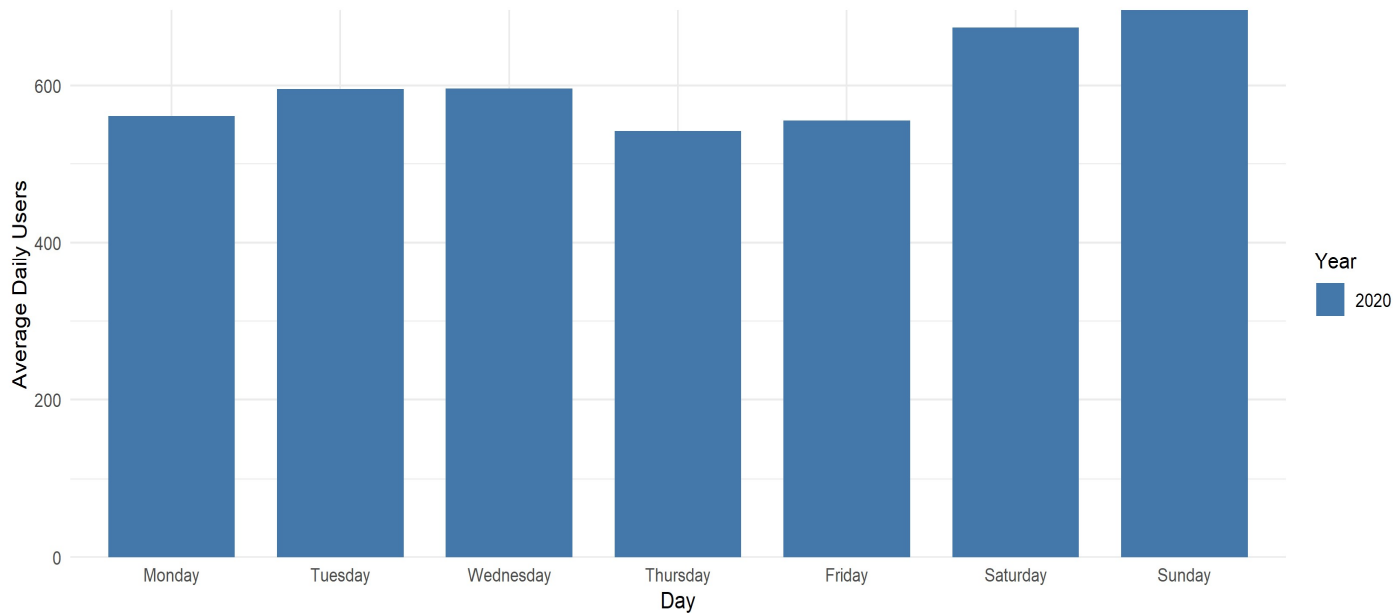
# Results Pro Shop Day of Week Averages



Counts were higher in 2016 due to a construction detour from July - September

- There typically ~400 visitors a day at the Pro Shop entrance, which increases to over 500 on the weekends.
- 2020 usership increased the most midweek relative to past years, and less so on the weekends.

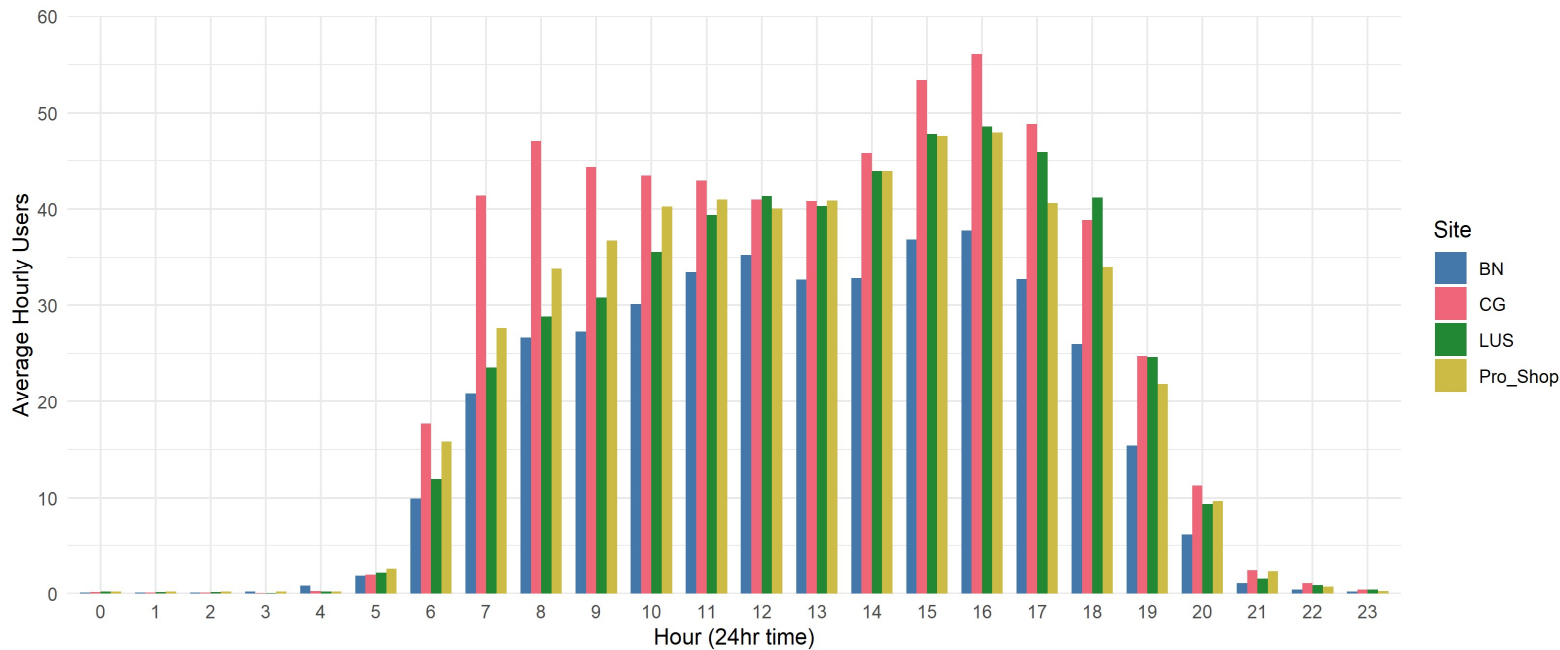
# Results Community Garden Day of Week Averages



First full year of sensor data was 2020

- In 2020, usership only increased slightly at CG on the weekends.
- There were between 540 and 600 users daily on weekdays, and almost 700 on weekends.

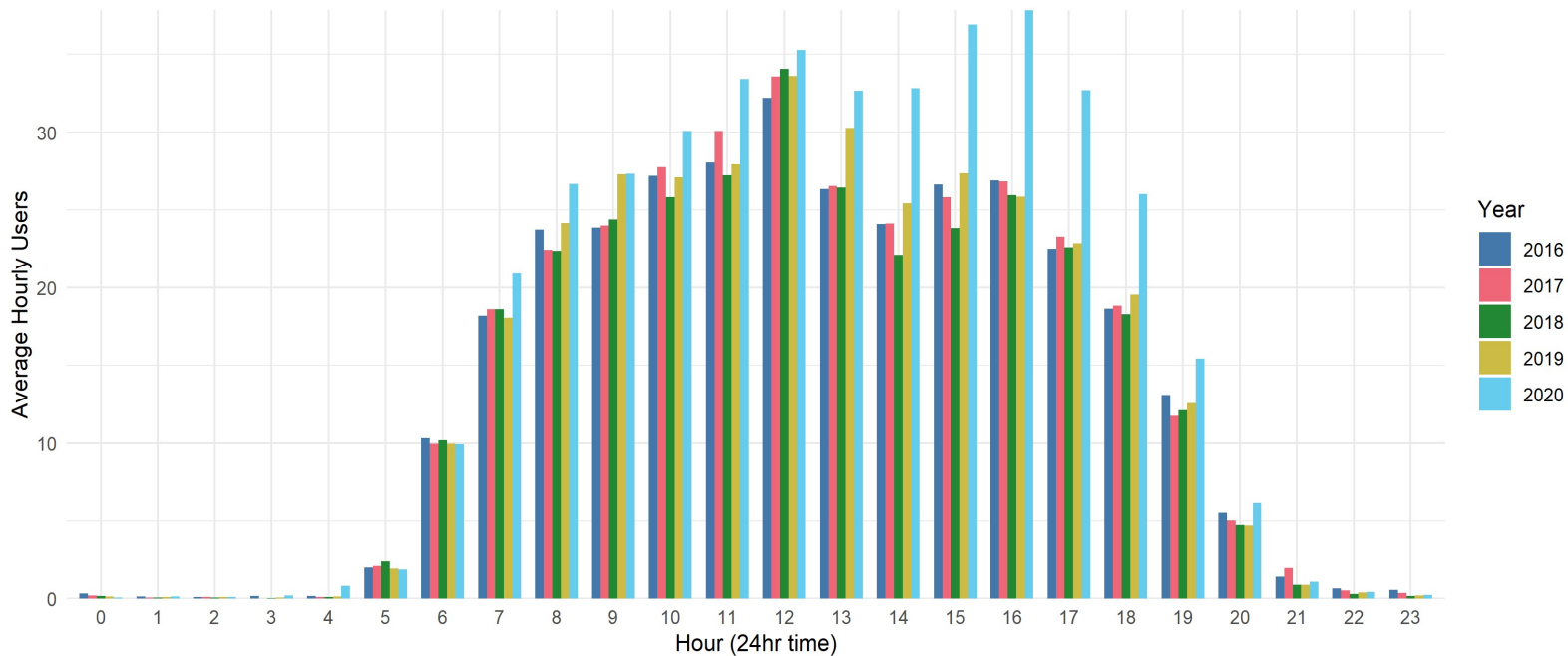
# Results Entrances Hourly Averages 2020



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

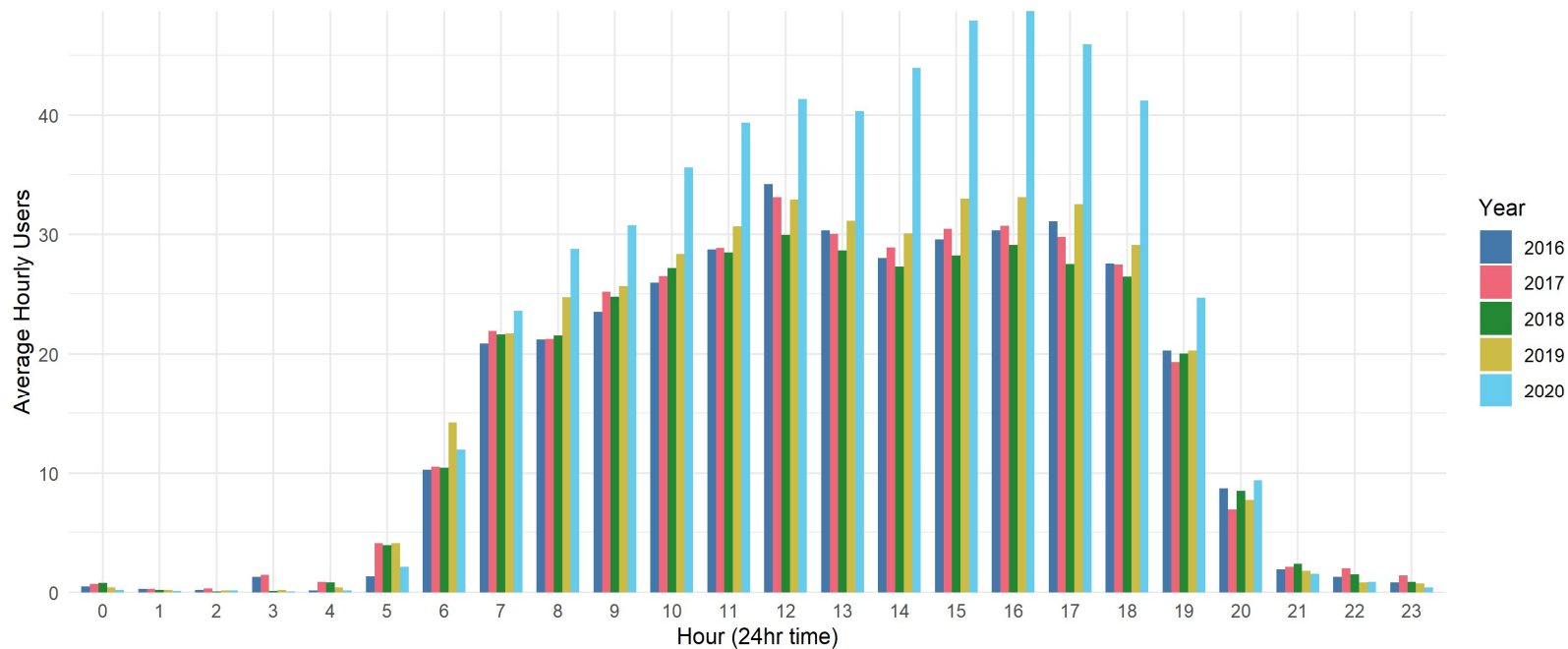


# Results Black's Nook Hourly Averages



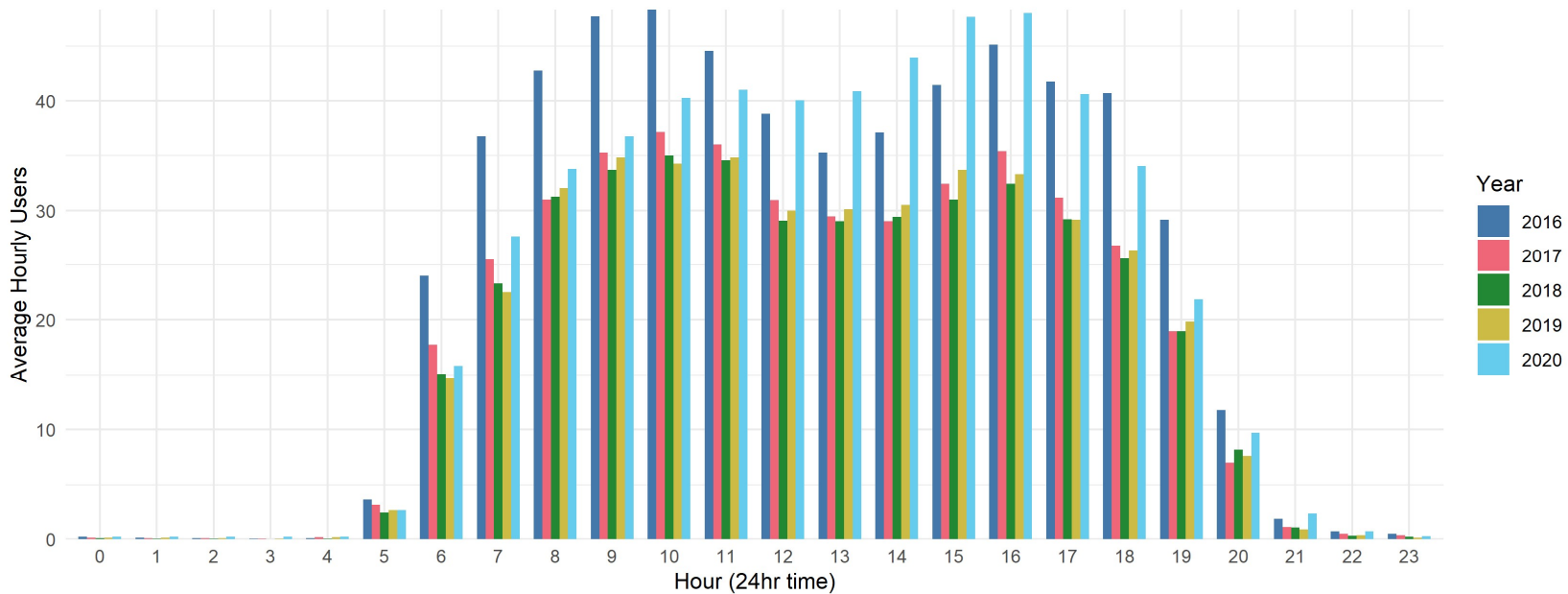
- In the past, visitors at Black's Nook have been highest at midday with a second smaller peak in the late afternoon.
- In 2020, usage was similar to the past up until midday. Usage was higher in the afternoon than in past years.
  - There was a second peak of use at 4:00 PM.

# 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, there was higher usage throughout the day than in the past, especially in the afternoon.
  - Peak usage occurred in the late afternoon (4pm), before usage dropped steeply.

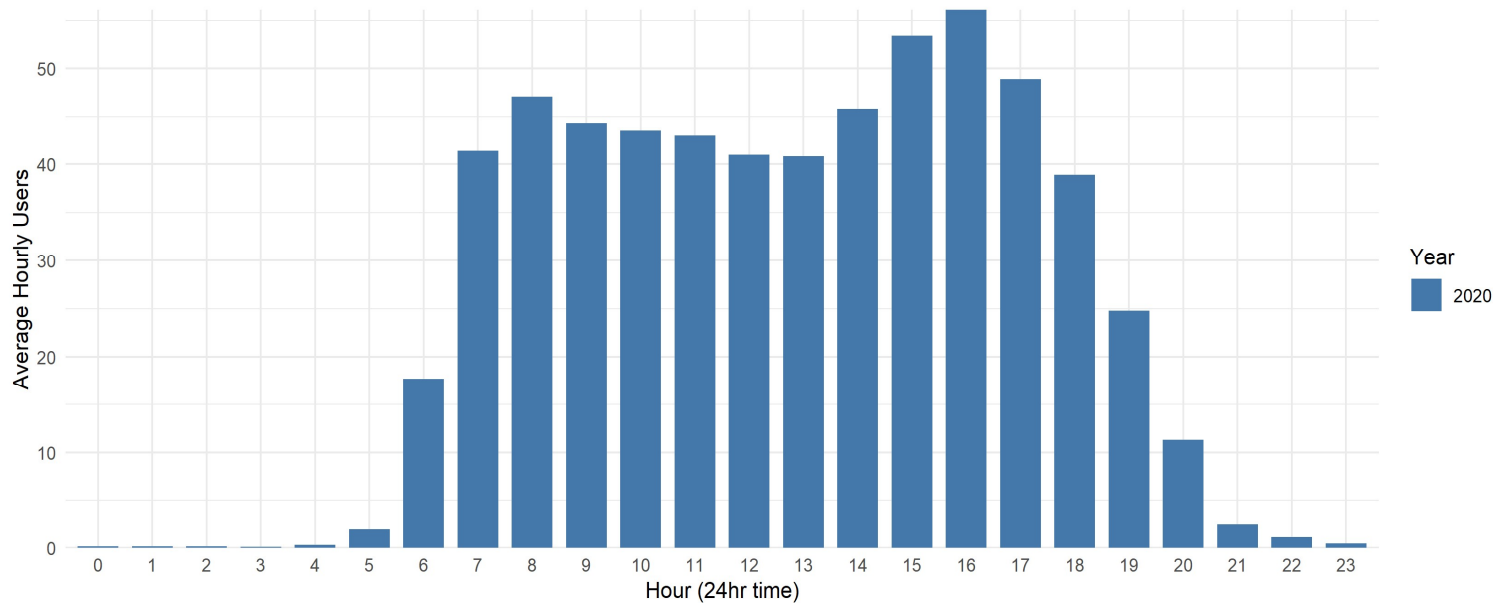
# Results Pro Shop Hourly Averages



2016 hourly averages are high due to a construction detour from July-Sep routing users by the sensor

- Users at the Pro Shop entrance had two peaks of high usage during the day, midmorning and late afternoon.
- In 2020, 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 sensor data

- While there were two peak usage time at CG, early morning and late afternoon, the afternoon one was larger.
- Usage decreased around lunch hours.

# 2020 Entrance Summary

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- The start of the COVID-19 pandemic was evident in a spike in usership in March 2020 at all entrances. Entrance usership dropped slightly in April, then rebounded again in May. All entrance monthly totals for the rest of the year remained higher than January and February 2020.
- The new 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.
- 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.
- In 2020, the pandemic appeared to lead to increased visits to Fresh Pond in the afternoons. All three entrance sensors had larger than usual or new spikes in use in the mid to late afternoon.
- 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

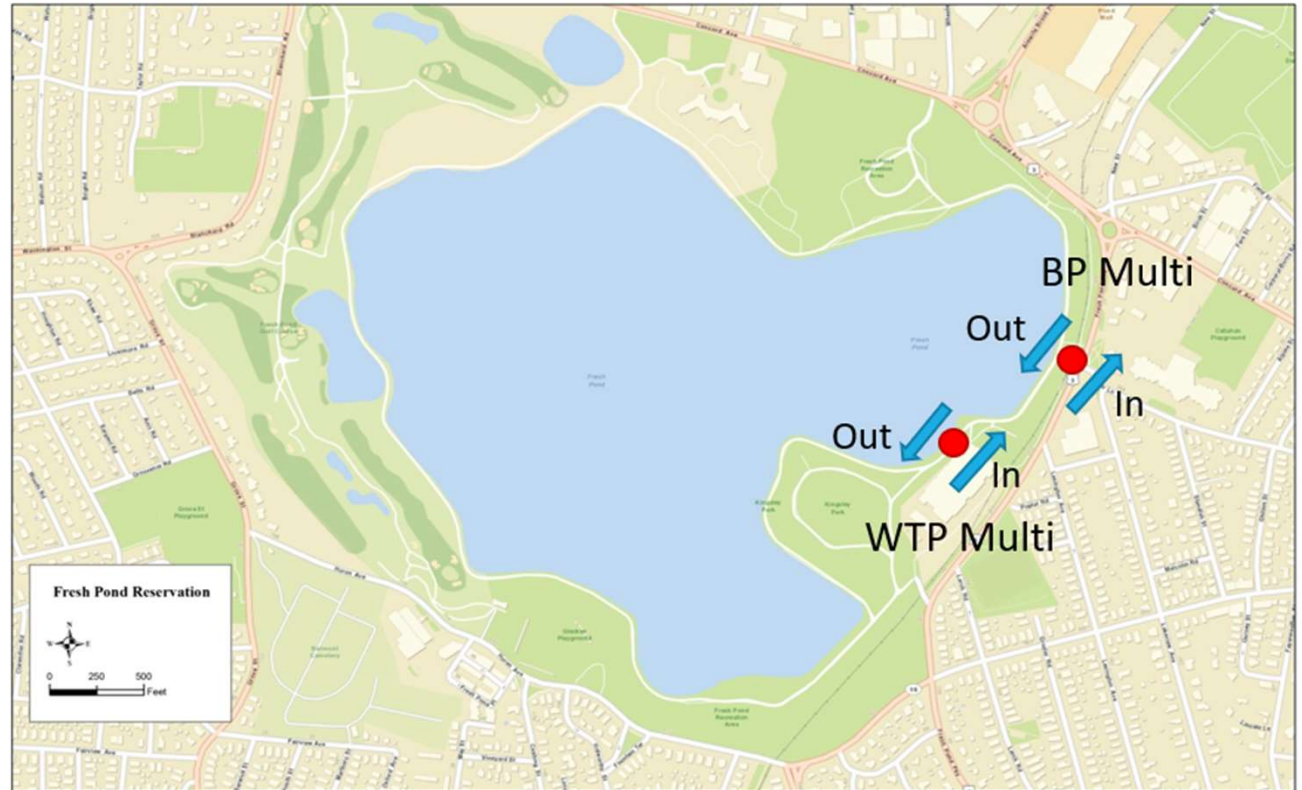
*Multi Sensors*

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# Multi Sensor EcoCounter Sensors

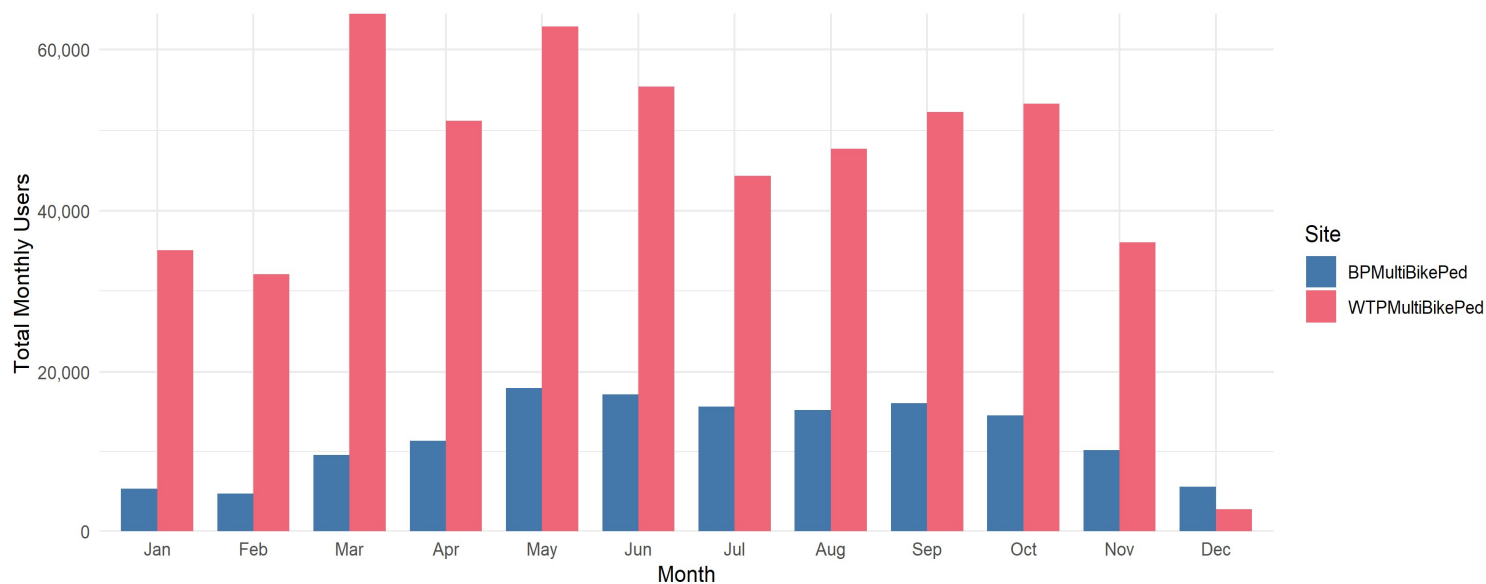
Water Treatment Plant Multi (WTP  
Multi) and Bike Path Multi (BP  
Multi)

- Directional
- Differentiates between pedestrians and cyclists





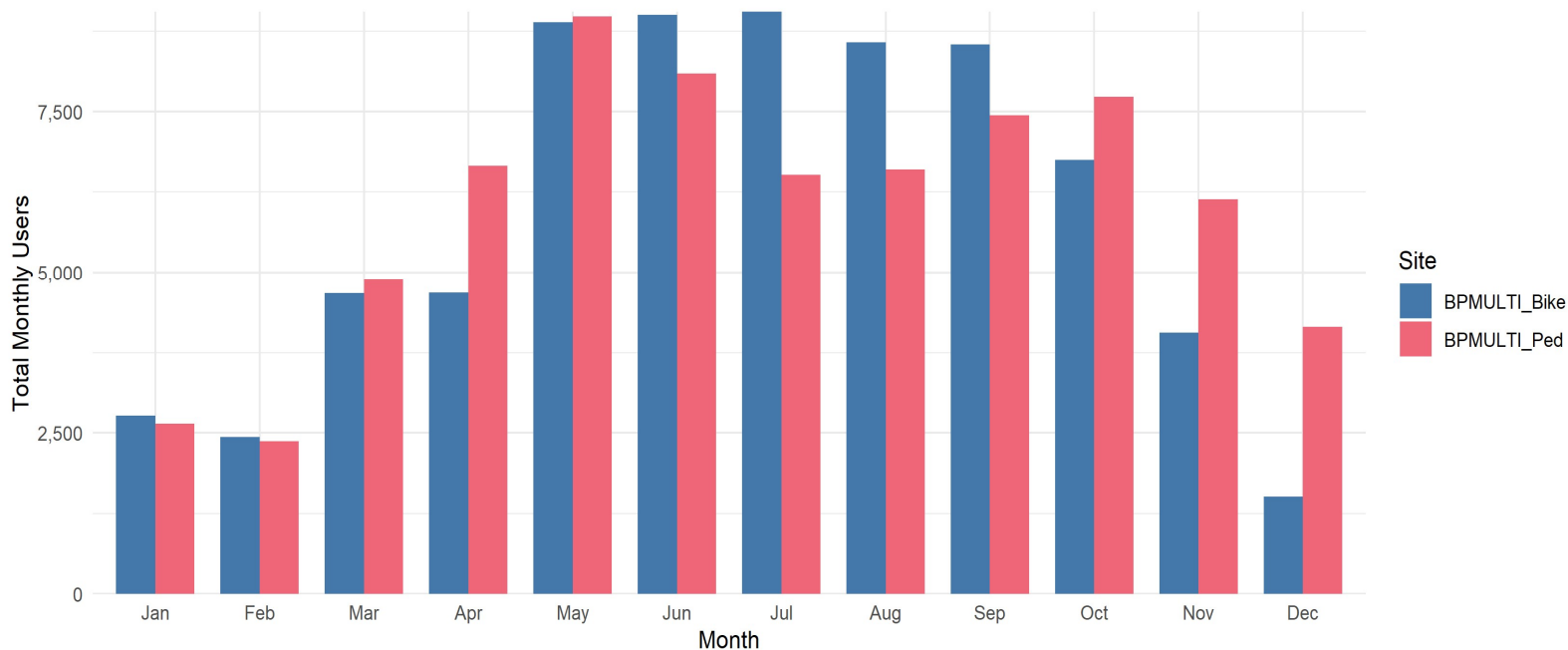
# Results Multi Sensors Total Monthly Users 2020



WTP data were missing during hours on November 16-18 and November 23-December 31 due to sensor failure.  
BP Multi data were missing from November 30 - December 10 due to sensor error.

- There were significantly more users at WTP than BP throughout the year.
- WTP users shot up in March at the start of the pandemic, decreased in April, then increased again in May. WTP also showed lower usage during July and August before rebounding in the fall.
- BP multi shows a clear rise and fall of users as the weather warms and cools.

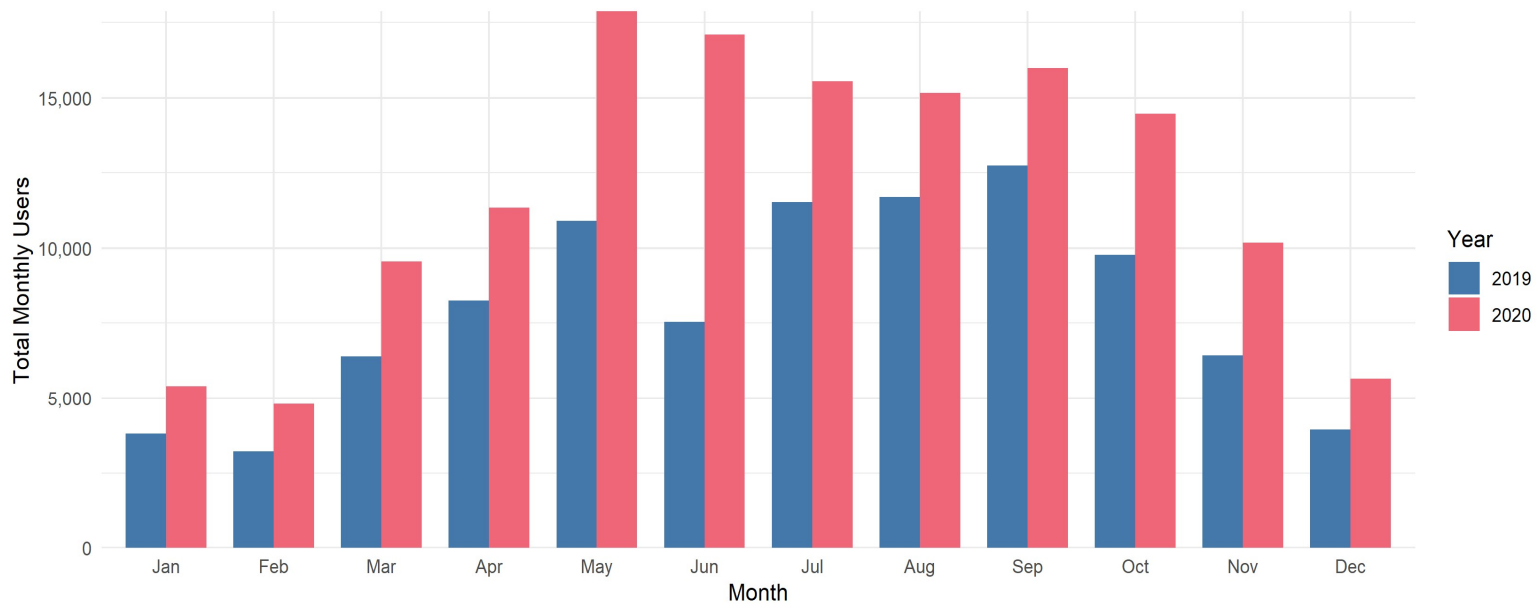
# Results Bike Path Monthly Users by Type 2020



Counts missing November 30-December 10 due to sensor battery issue

- In the winter prior to the COVID-19 pandemic and during the summer months, there were more cyclists than pedestrians.
- In the spring (Mar – May) and fall (Oct – Dec), pedestrians exceeded cyclists.

# Results Bike Path Total Monthly Users 2019 - 2020

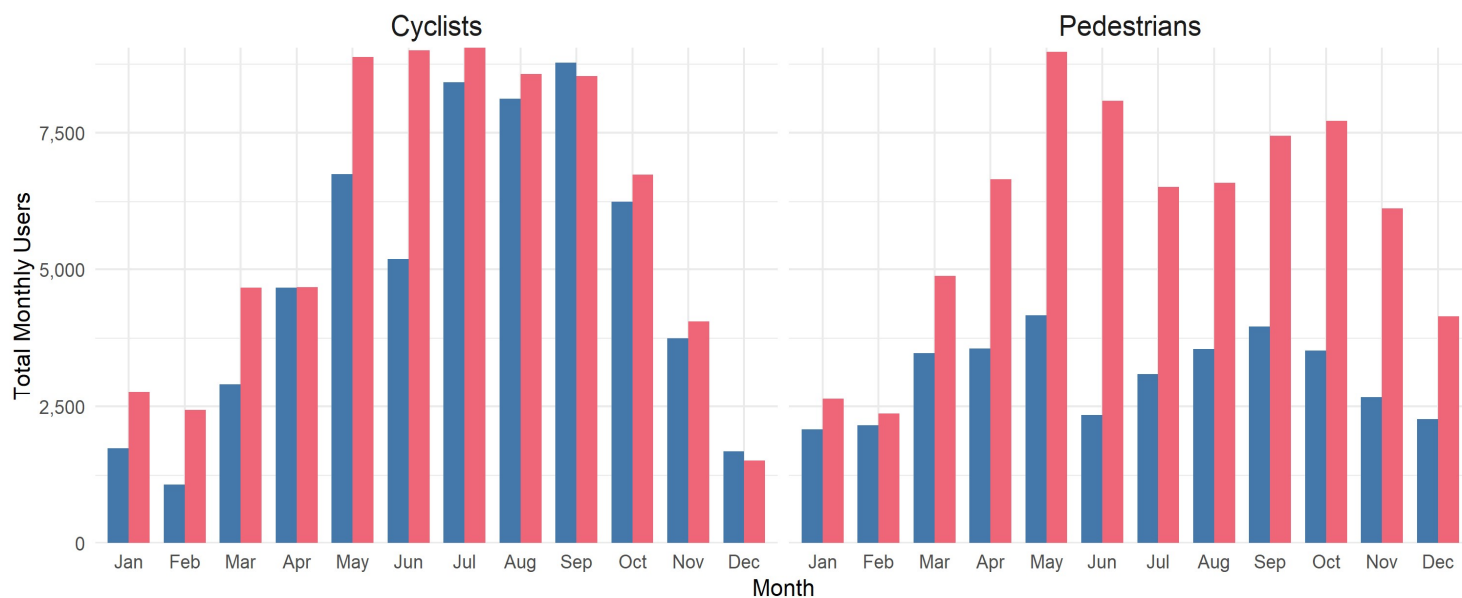


- The largest jump in users between 2019 and 2020 occurred in May\*, a delayed response compared to other sites that experienced large increases in March at the start of the pandemic.

\*Excluding June, when data were missing in 2019

February and June 2019 counts low due to missing data.  
Counts missing November 30-December 10 2020 due to sensor battery issue

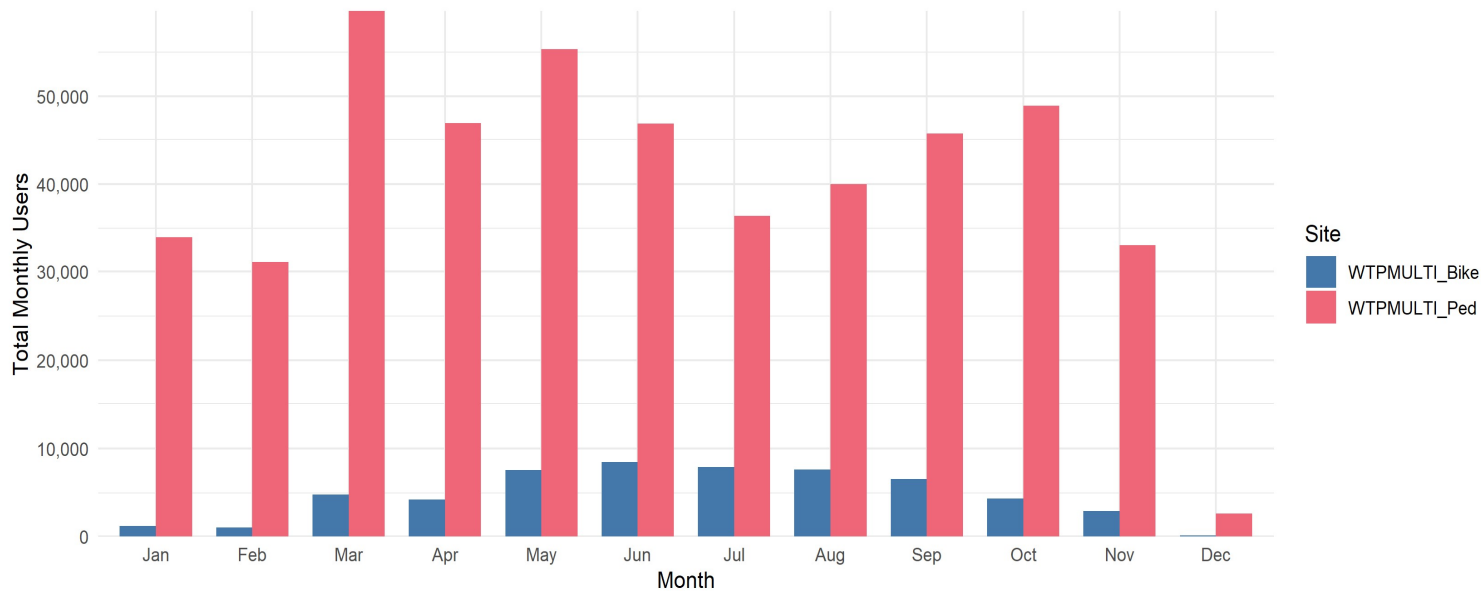
# Results Bike Path Monthly Users by Type 2019 - 2020



February and June 2019 counts low due to missing data.  
 Counts missing November 30-December 10 2020 due to sensor battery issue

- The increase in total monthly BP Multi users starting in May 2020 was largely due pedestrians walking or running along the Bike Path.
- After the May boost, the number of cyclists remained similar to 2019 whereas the number of pedestrians was near double.
- Pedestrians followed a monthly pattern of use similar to other sensors where there is a peak of users in the spring and a second peak in the fall.
- Cyclists followed a seasonal pattern, rising as the months warm and falling as they cool.
- In 2019, cyclists were the dominant user type on the bike path in all but the coldest months of the year. In 2020, pedestrians used the bike path in more similar numbers as cyclists, even exceeding cyclist use in the late fall.

# Results WTP Total Monthly Users 2020

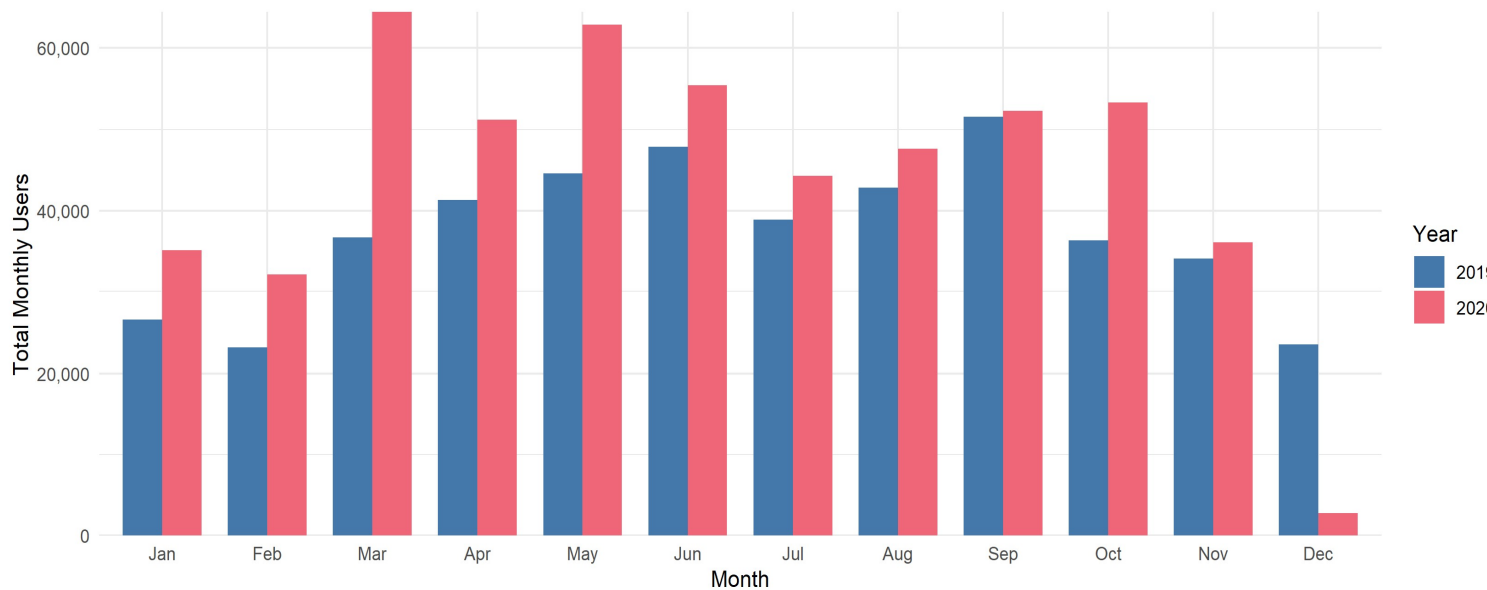


November and December 2020 counts are artificially low due to sensor error.  
Sporadic erroneous spikes in bike counts removed throughout 2020.

- There were significantly more pedestrians at WTP than cyclists.
- Because of this, monthly pedestrian use followed the pattern of the overall monthly sensor totals
- Bike users followed a different pattern where use rises and falls as weather warms up and cools back down

# Results

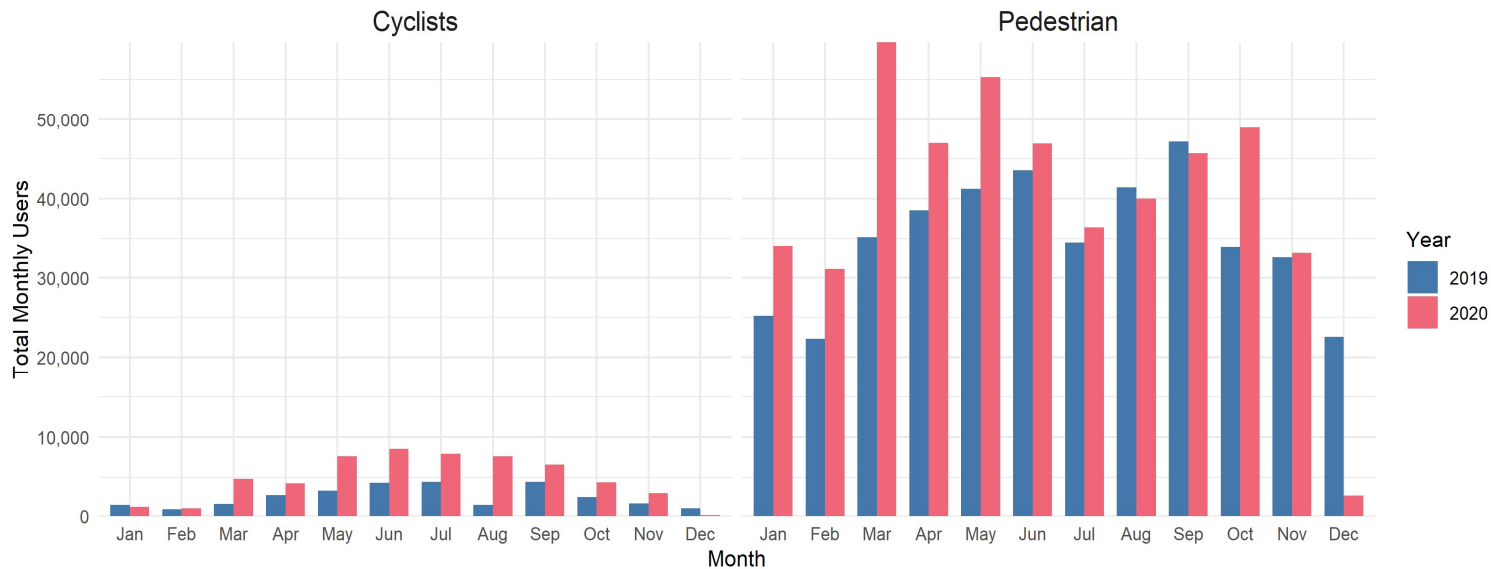
# WTP Total Monthly Users 2019 - 2020



- Comparing total usership at WTP Multi to 2019, the biggest jump occurred in March, aligning with all other sites except for BP Multi.

November and December 2020 counts are artificially low due to sensor error. Sporadic erroneous spikes in bike counts removed throughout 2019 and 2020.

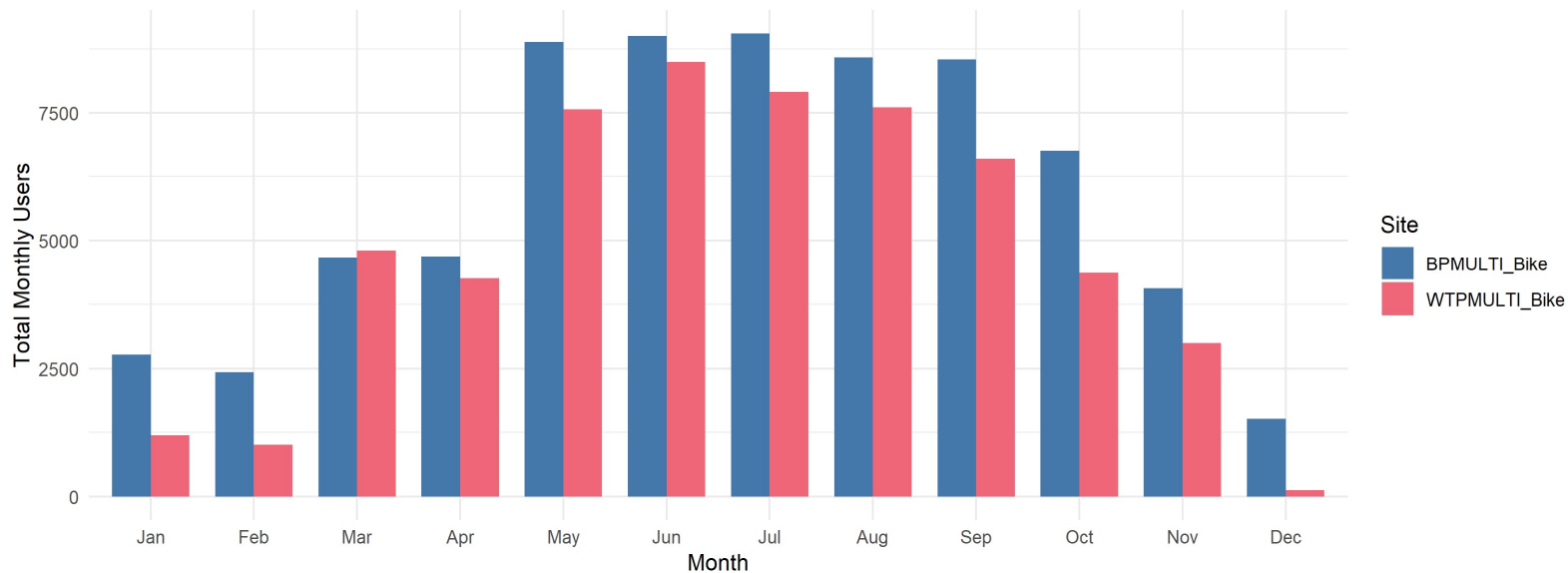
# Results WTP Monthly Users by Type 2019 - 2020



November and December 2020 counts are artificially low due to sensor error. Sporadic erroneous spikes in bike counts removed throughout 2019 and 2020.

- Bike use increased throughout the 2020 COVID-19 pandemic relative to 2019, starting in March. However, bike use overall was low compared to pedestrians in both 2019 and 2020.
- Pedestrian use shot up in March of 2020 compared to 2019 and remained high throughout the spring.
- Summer pedestrian use in 2020 was more similar to 2019, though it spiked again in October.
- Comparisons with November and December 2019 are difficult due to missing data in 2020.

# Results Multi Sensors Total Monthly Cyclists 2020



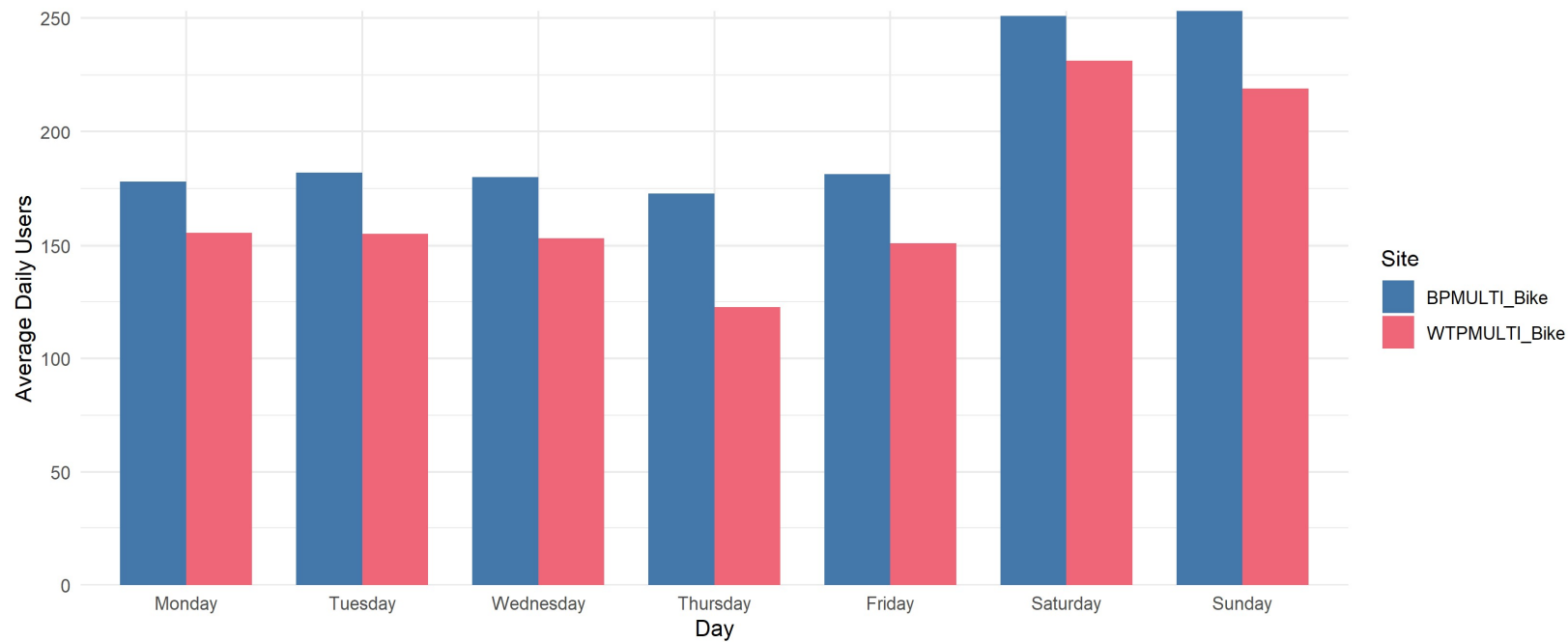
- Bike usage was higher along the Bike Path than the Perimeter Road every month in 2020 except for March.

*WTP data were missing during hours on November 16-18 and November 23-December 31 due to sensor failure.  
Sporadic erroneous spikes in bike data removed throughout 2020 at WTP.  
BPMulti data were missing from November 30 - December 10 due to sensor error.*



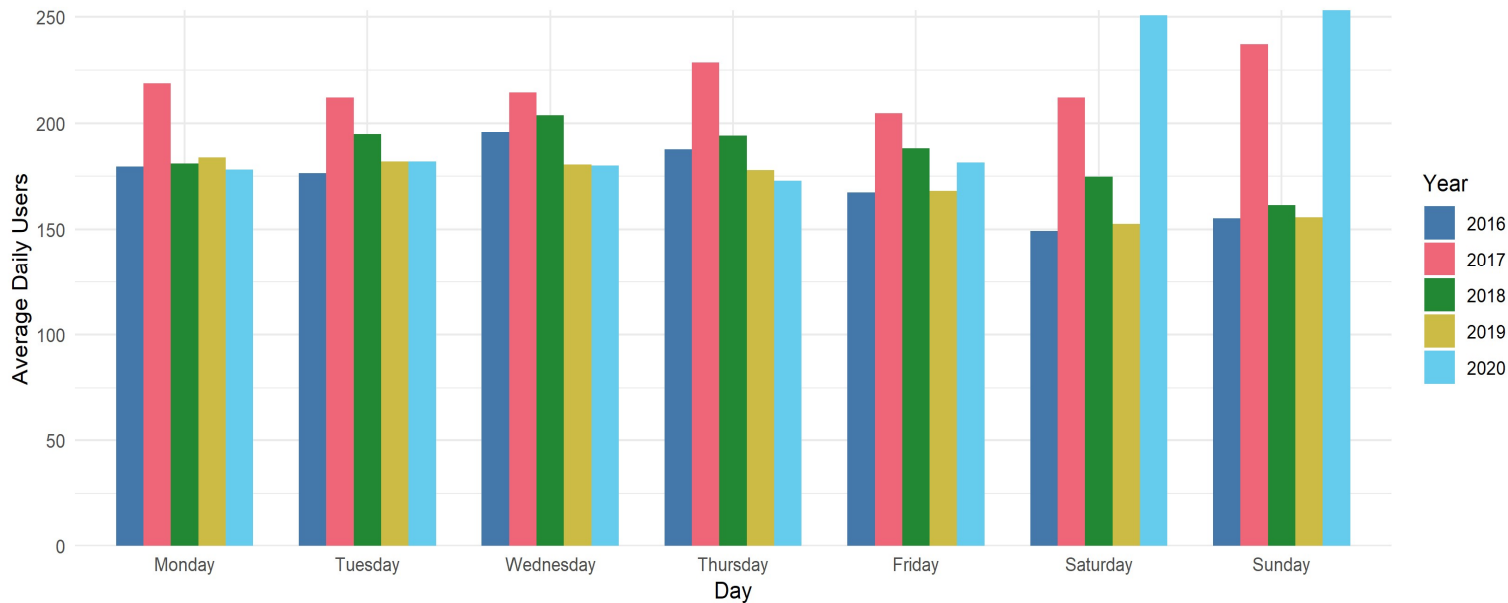
# Results 2020

## Cyclists Day of Week Averages



- Throughout the week, there were slightly 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 150 cyclists/day at WTP MULTI.
- On the weekends, these numbers increased to ~250 cyclists/day at BP Multi and 225 cyclists/day at WTP Multi.

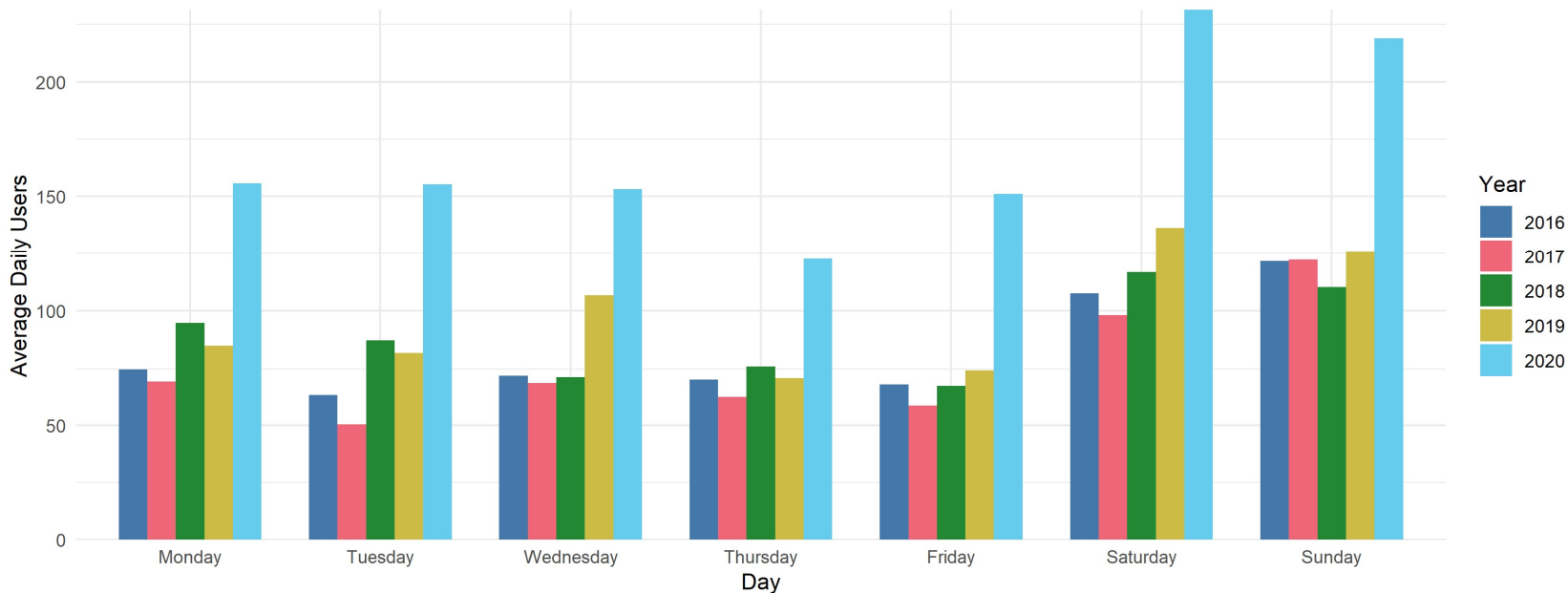
# Results BP Cyclists Day of Week Averages



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

- Other than in 2017 (construction detour) and 2020 (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.
- 2020 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

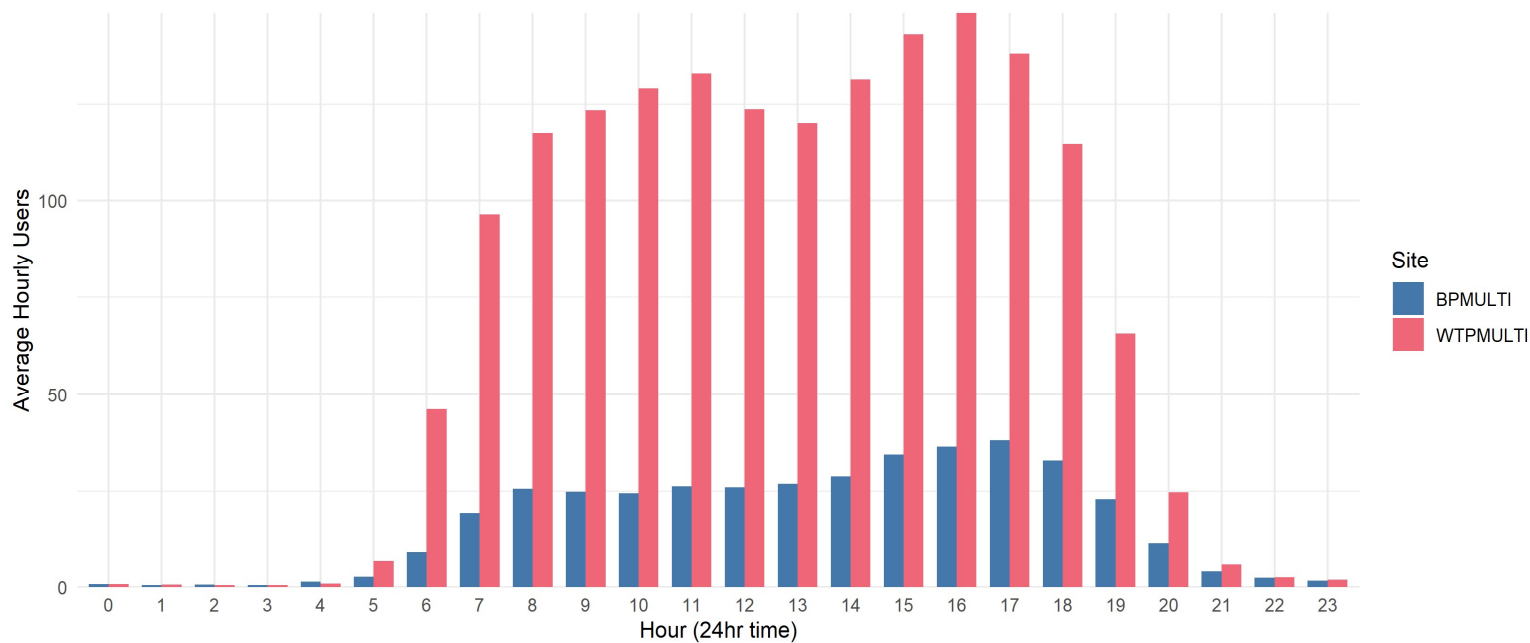


Low counts from May 2017 - May 2018 are due to a construction detour routing users away from the sensor.

- 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, especially on the weekends.

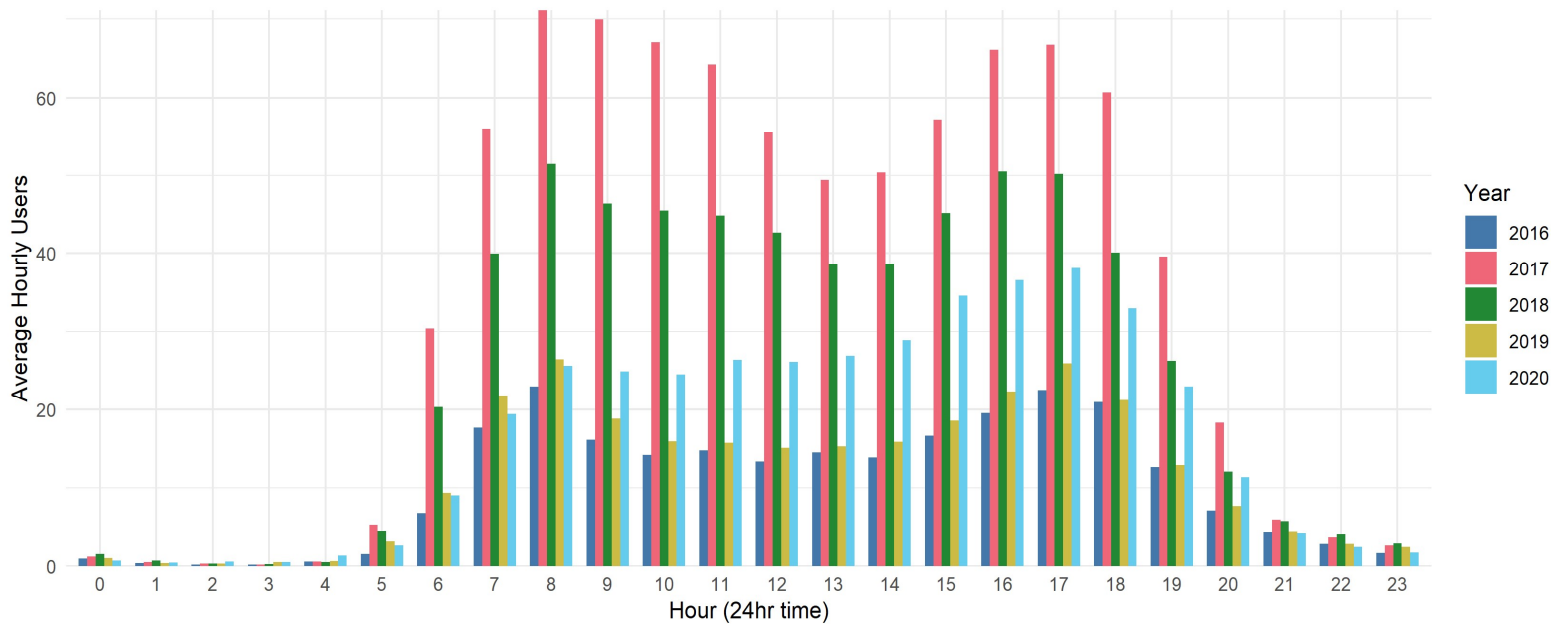
# Results 2020

## Multi Sensor Hourly Averages



- There were significantly more users at WTP than BP during the day.
  - WTP had around 150 overall users/hour during peak usage.
  - BP saw less than 50 users/ hour all day.
- Both sites saw two daily peaks in usership, with the larger peak in the afternoon
- The morning peak occurred during commuting hours (8 am) at BP Multi and late morning (11:00 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 were from a construction detour 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, 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.

# 2020 Multi Sensor Summary

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- Total usership at WTP Multi is significantly higher throughout the year than at BP Multi, although there are more cyclists at BP Multi.
- WTP Multi shows an increase in usership from March onwards, likely due to the COVID-19 pandemic, while BP Multi does not show an increase until May 2020. The BP Multi 2020 increase appears to be driven by more pedestrians using the path while increased use at WTP Multi in 2020 is due to both bikes and pedestrians.
- BP Multi had an overall similar number of pedestrians and bikes in 2020, although during the summer bike usage stayed high while pedestrians decreased in July and August. In a typical year, the number of cyclists far exceeds the number of pedestrians.
  - Weekday bike usage at BP was consistent with past years. However, there was an increase in bike usage on the weekends in 2020, indicating an increase in recreational users rather than commuters.
- WTP Multi has significantly higher pedestrian usage than bike usage throughout the year. However, average daily bike usage increased for every day of the week compared to past years.
- 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. Usage was especially high in 2017 and 2018 due to construction.
- WTP had two peaks of usage during mid-morning and mid-afternoon.

# Methods

*Visual Survey Data*

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# 2020 Visual Survey Methods

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- The goal of visual surveys was to quantify different types of users at Fresh Pond (for example, runners, walkers, dogs, children, bikes).
- Surveys were conducted for 1-hr increments at LFP and CG sites according to a stratified simple random sampling design. For each sensor, 6 – 8 hours were randomly selected from four strata (S1-S4) to survey:
  - S1 - Weekends
  - S2 - Weekday mornings 7:00 AM – 10:00 AM
  - S3 - Weekday mid-days 11:00 AM – 2:00 PM
  - S4 - Weekday afternoons 3:00 PM – 6:00 PM or 7:00 PM (end time varied by seasonal changes in daylight)
- 2020 was the fourth year a formalized sampling design was used to select survey dates and times. *However, disruptions from the COVID-19 pandemic interrupted sampling. Estimation of total annual users by user type and associated statistics were not calculated in 2020. The proportion of users by type in 2020 were estimated using the results of the limited number of surveys.*
- The 2020 surveys were not performed on a calendar year basis. The 2020 survey year spanned February 1, 2020 – January 31, 2021.



# 2020 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: MD

**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 2020

## Entrance:

Community Garden

## Perimeter Road:

LFP



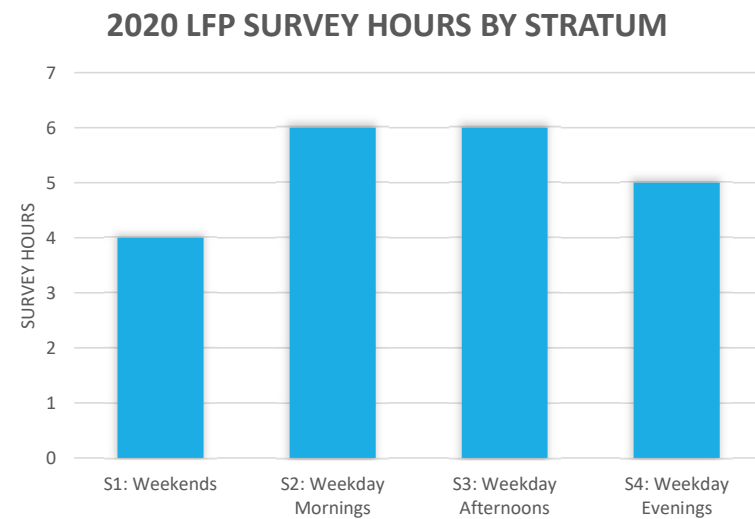
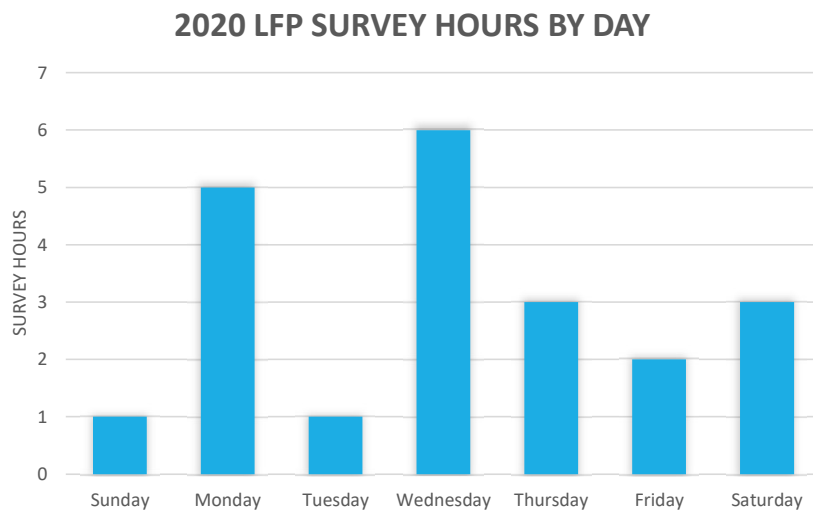
# Results

*Visual Survey Data*

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# Results

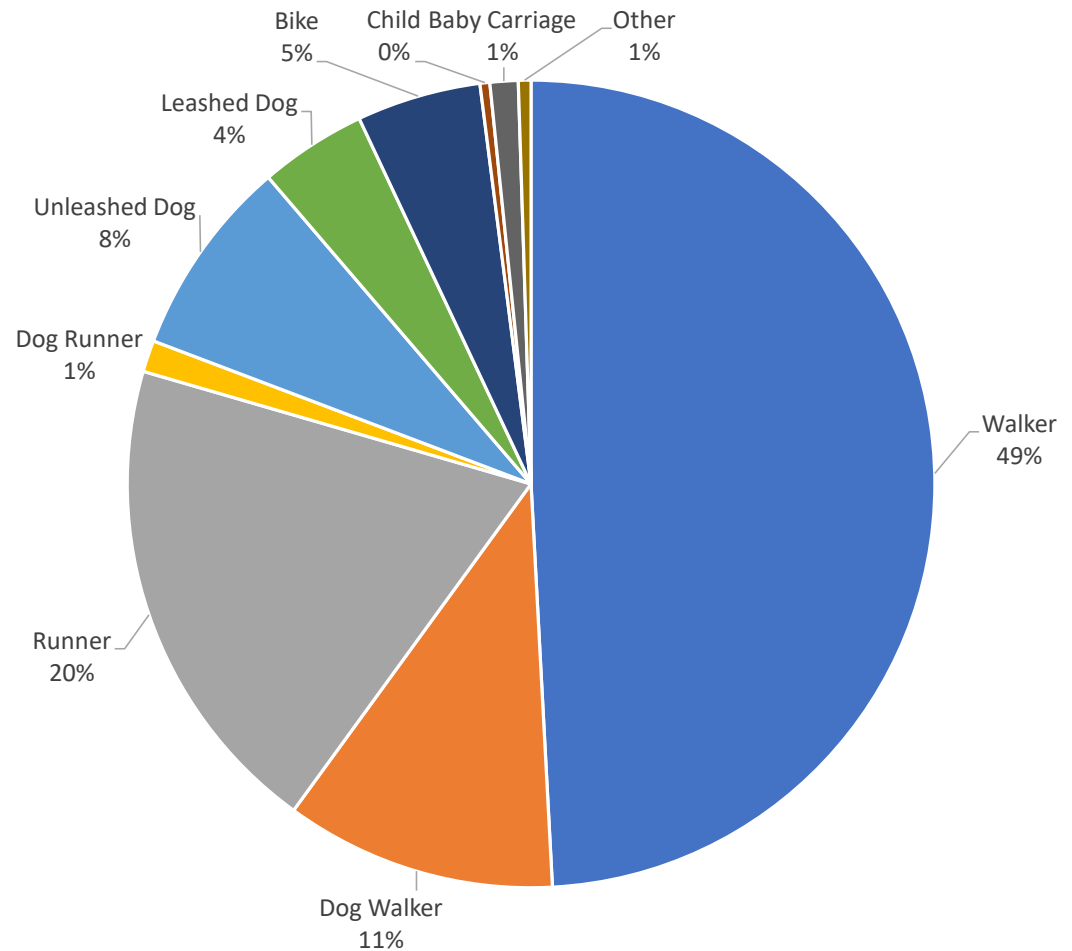
## *Survey Hours at LFP*



Conducted 21 hours of surveys at LFP in 2020

# Results 2020 LFP Surveys

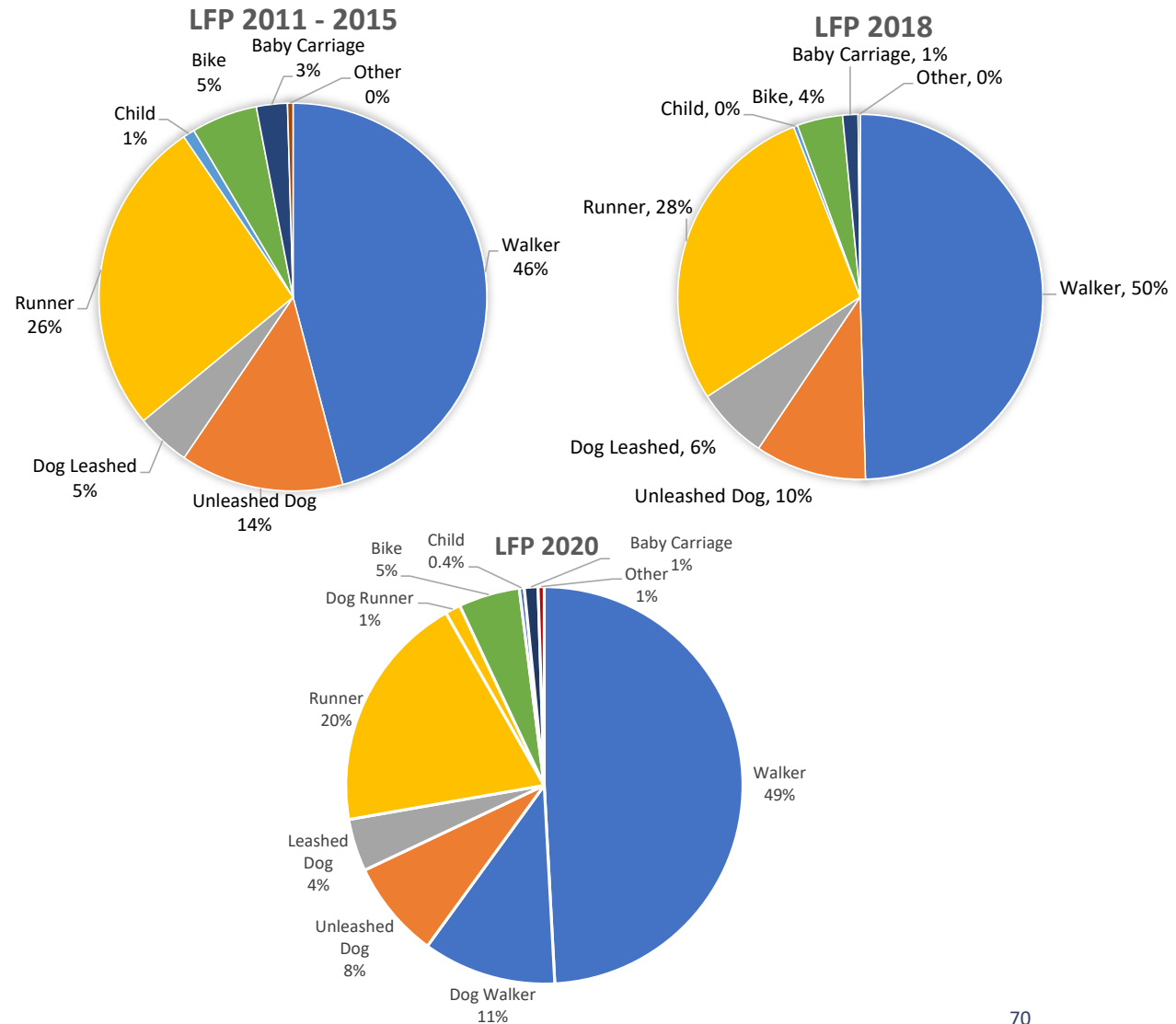
- At LFP, 60% of users were walkers, with 11% having dogs.
- There was a higher proportion of unleashed dogs than leashed dogs, with a difference of 4%.
- 21% of users were runners, and only 1% had dogs.
- 5% of users were on bikes.
- There was an overall error of 15% between survey counts and sensor counts.
  - Surveyors counted 434 MORE human users (>3ft tall) than the sensor during the hours surveyed. This likely due to groups of users crossing the sensor simultaneously, resulting in one count for multiple users.



# Results

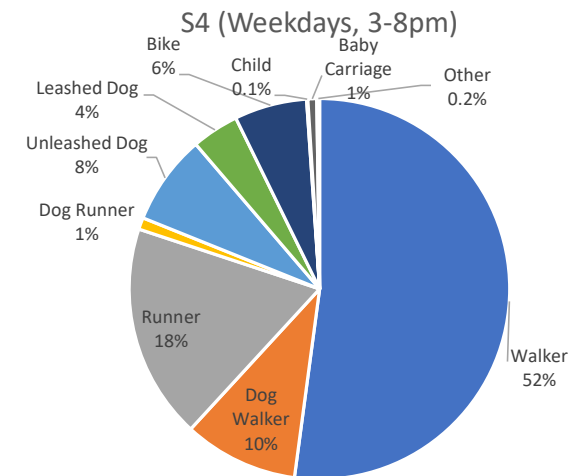
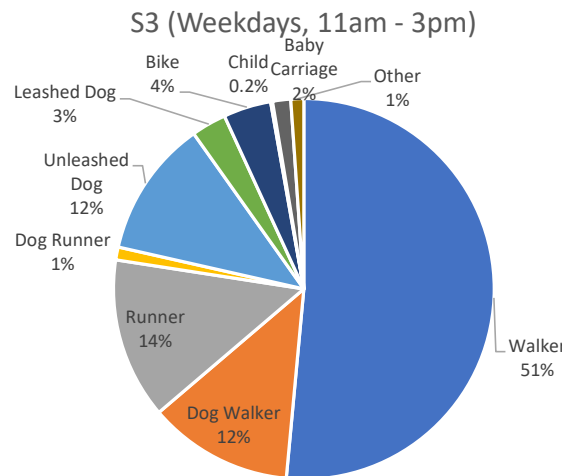
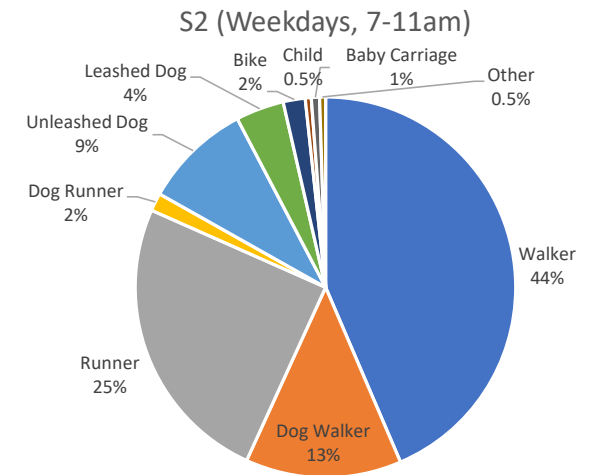
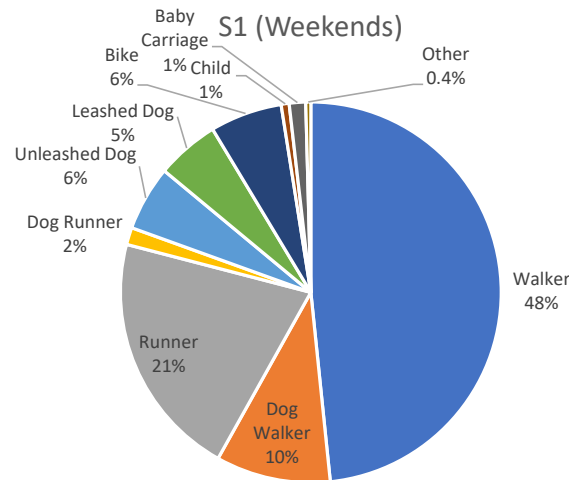
## LFP Survey Comparisons

- Surveys from 2011-2016 (62.4 hours) were not collected under a formal sampling methodology.
- 2018 and 2020 survey years spanned from Feb1-Jan31 and were performed under a stratified random sampling design (30 hours and 21 hours, respectively).
  - COVID – 19 interrupted sampling in 2020. The percentages of user types were based on results from available surveys
  - Dog walkers and runners were not categorized separately until 2019
- Walkers and runners are the largest groups of users. The proportion of walkers appeared to be increase relative to dogs and runners in 2020.
- The proportion of bikes has remained consistent.



# Results 2020 LFP Survey Users By Stratum

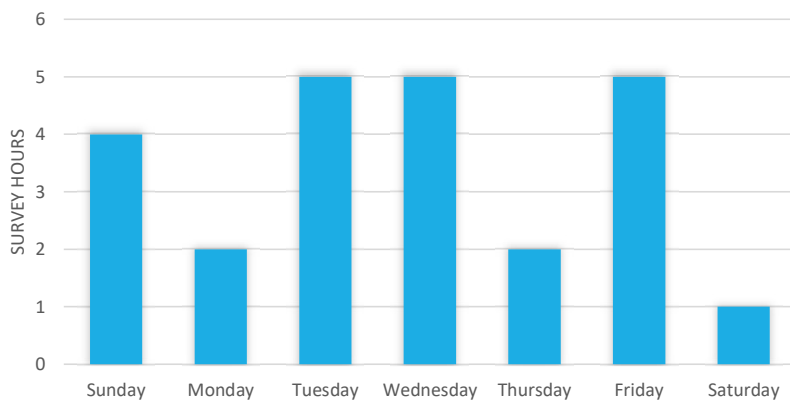
- S1 and S4 had similar usership, with a high percentage of users being walkers and runners. 11%-12% of users walked or ran with dogs.
- S2 had a lower proportion of walkers and a higher proportion of runners and dog walkers than the other strata.
- Bikers were 4-6% of users across all strata excluding S3, where there were fewer (2%).
- The proportion of unleashed dogs was highest during S3.



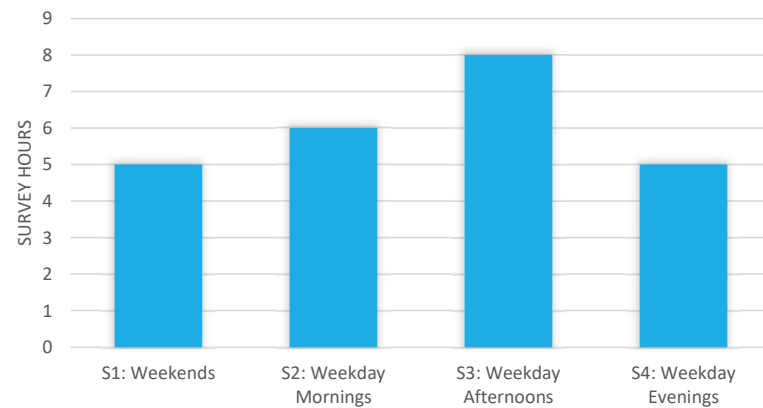
# Results

## *Survey Hours at Community Gardens (CG)*

**2020 CG SHOP SURVEY HOURS BY DAY**



**2020 CG SURVEY HOURS BY STRATUM**

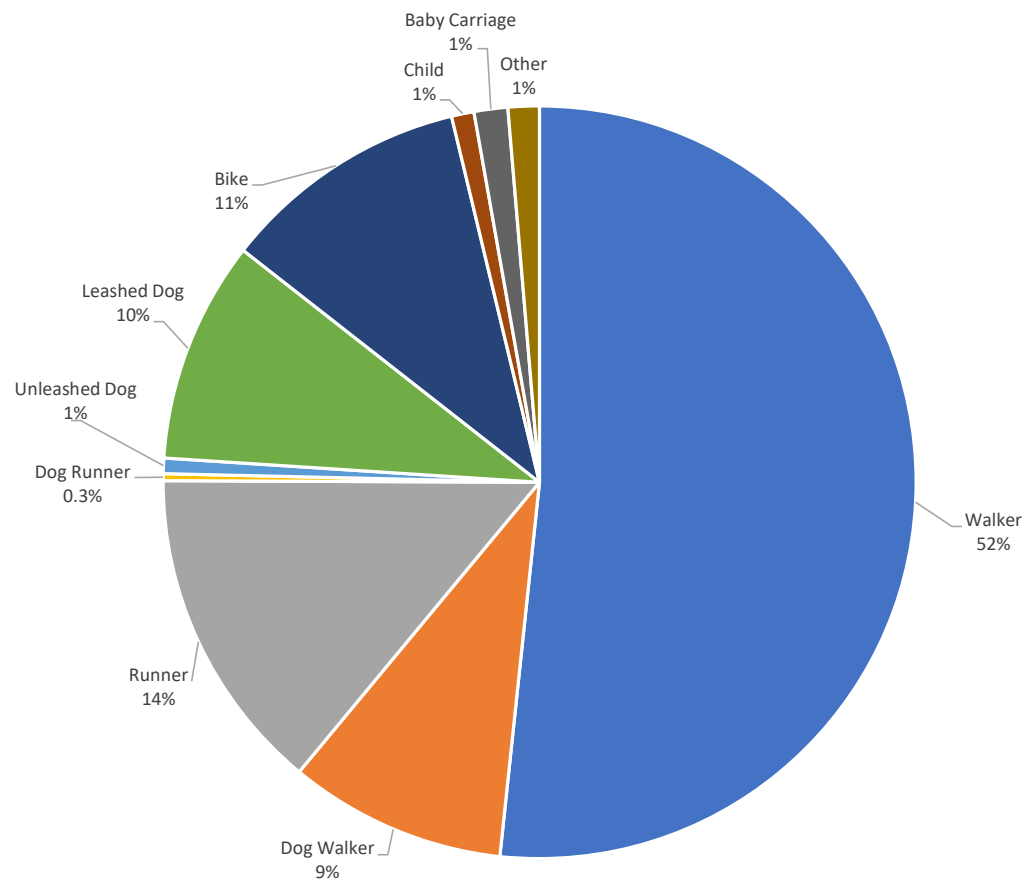


Conducted 24 hours of surveys at CG in 2020



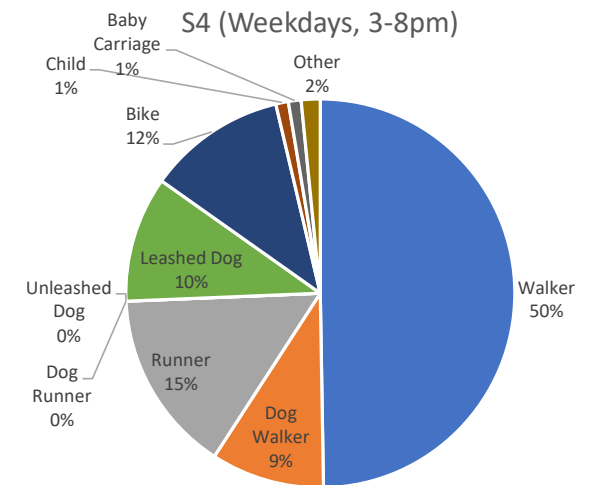
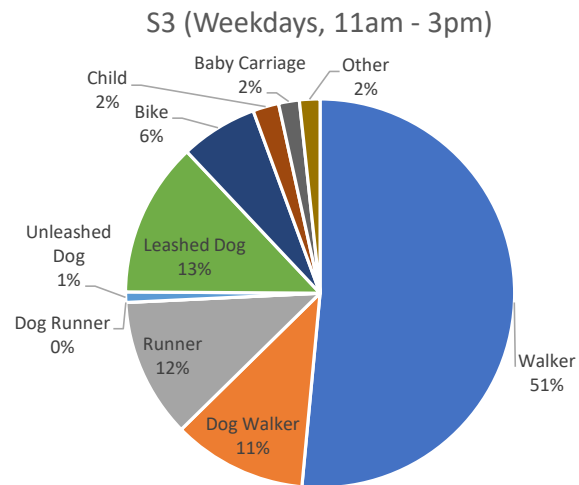
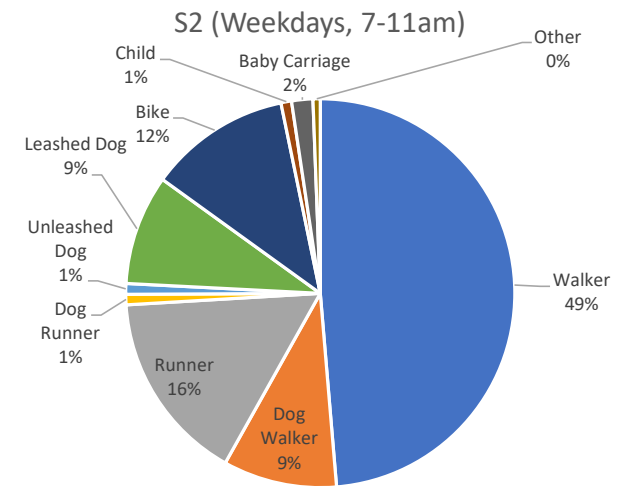
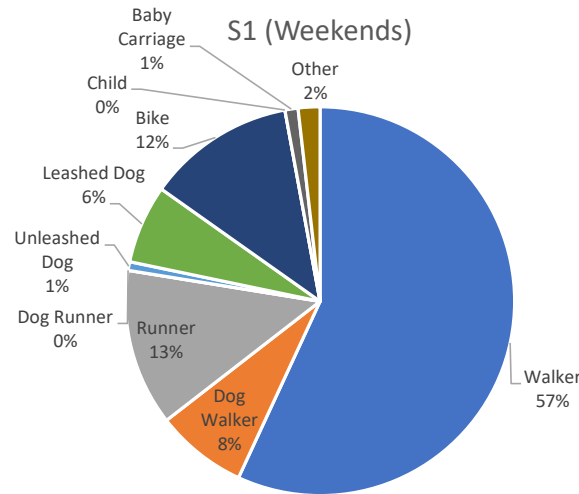
# Results 2020 Survey Results at Community Gardens

- Walkers made up a majority of users (61%), with 9% having dogs.
- Most users entered at CG with leashed dogs
- Runners (14%) and bikers (11%) comprised of similar proportions of users.
- Baby carriages, children (<3ft tall), and “other” only accounted for 3% of users.
- There was an error of 7% between survey counts and sensor counts.
  - Surveyors counted 64 FEWER human users (>3ft tall) than the sensors during the hours surveyed



# Results 2020 CG Survey Users By Stratum

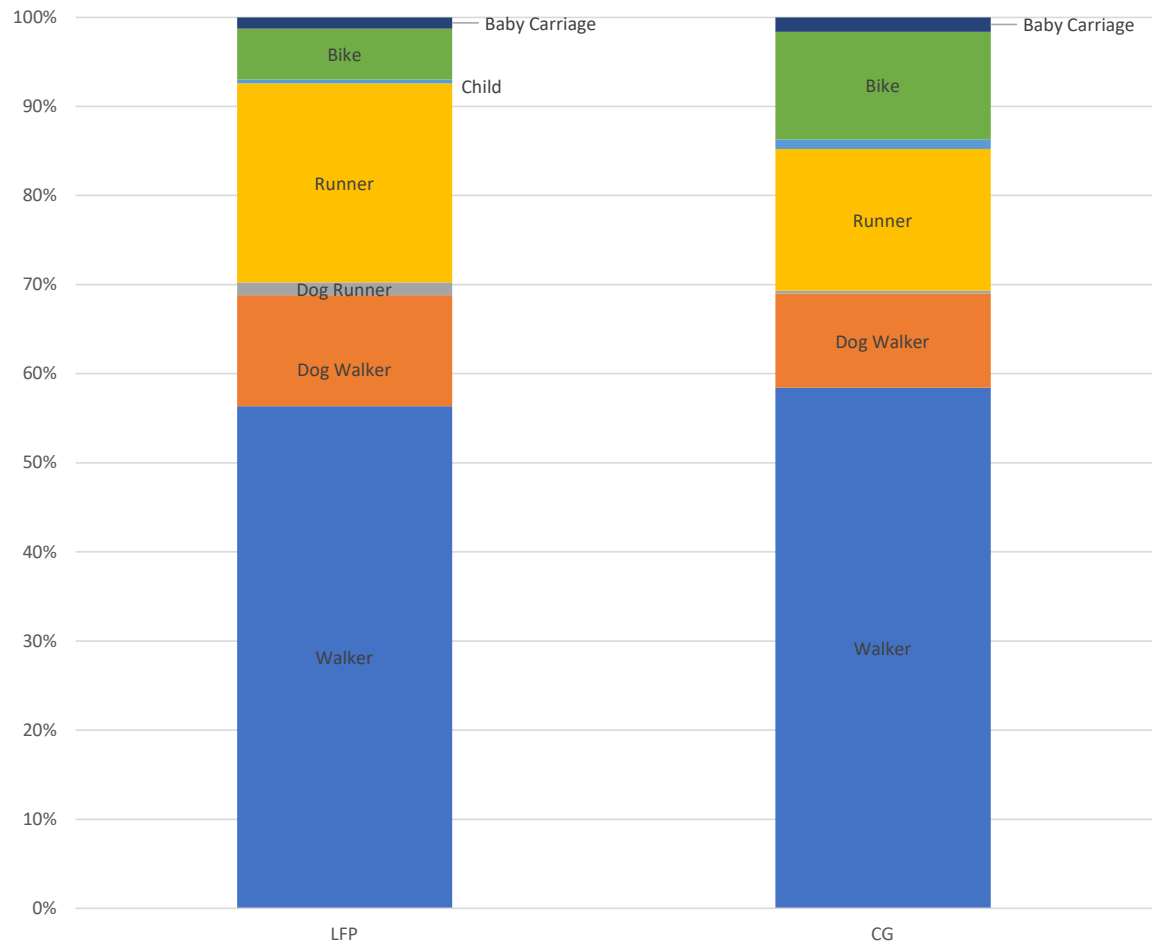
- S2 and S4 had similar usership, with a high percentage of users being walkers and runners. 9%-10% of users walked or ran with dogs.
- S3 (middle of the day) had a lower proportion of bikers and a higher proportion of dog walkers and dogs than the other strata.
- Bikers were 12% of users across all strata excluding S3, where there were only 6% of users.
- Nearly all dogs at this entrance are leashed.



# Results

## *Human Users by Survey Site 2020*

- Walkers and runners made up a majority of the users at both LFP and CG.
- However, there was a higher proportion of runners and dog walkers at LFP than CG and a higher proportion of walkers at CG compared to LFP.
- Bikers represented a higher proportion of users CG than LFP. This makes sense given the proximity of CG to the bike path.



# Results

## *Dog Owners and Dogs 2020*

Dog walkers were much more common than runners with dogs at both sites, though 10% of dog owners were comprised of runners at LFP.

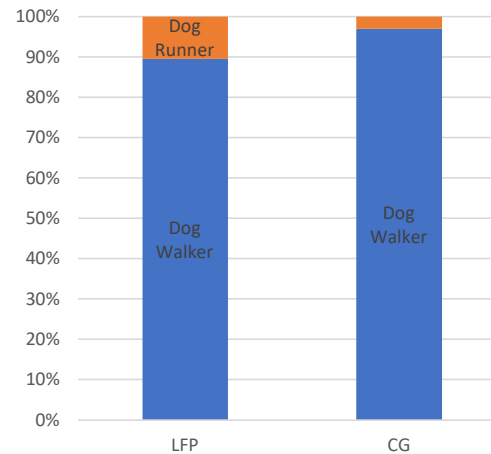
There was a big discrepancy between leashed and unleashed dogs at the two sites.

LFP is relatively far from entrances and roads and over 60% of dogs were unleashed.

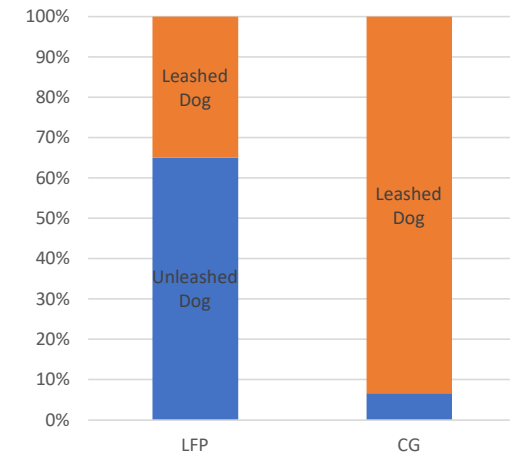
The CG entrance is near the bike path and Fresh Pond Parkway. Nearly all dogs were leashed at this entrance.

At both sites, there was a roughly equal proportion of dog owners to dogs, indicating that most dog owners visited with just one canine.

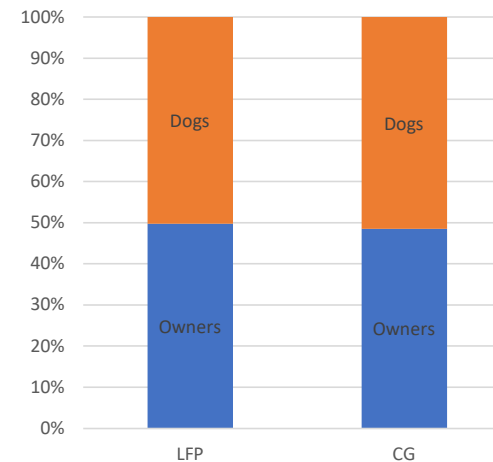
Proportion of Dog Owners



Proportion of Dogs



Proportion of Dog Owners to Dogs



# Future Goals

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# Future Goals

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- Continue to track long term trends
- Inform Shared Use plan
- Use sensor and survey data to better understand impacts on Fresh Pond Reservation from neighborhood development projects
- Add sensor for new bike path when it is completed
- Investigate and implement robust survey methods requiring less staff time

*If you would like to volunteer to collect surveys at Fresh Pond, contact Anna Van Dreser at [avandreser@cambridgma.gov](mailto:avandreser@cambridgma.gov)!*

