



Everything You Wanted to Know About Bicyclist and Pedestrian Count Data

Module 2: SUMMARIZE

Online Training Presented by:

TxDOT Bicycle and Pedestrian Program &
Texas A&M Transportation Institute (TTI)



July 29, 2020



- Moderator: Shawn Turner, TTI
- TxDOT Program: Bonnie Sherman, TxDOT



Shawn Turner



Bonnie Sherman

- MODULE 2, SUMMARIZING AND VISUALIZING THE DATA
 - Introduction & Overview
 - Texas Bike and Pedestrian Count Exchange
 - Visualization tools in Count Exchange
 - Uploading count data to Count Exchange
 - Reviewing count data
 - Seasonal adjustment



Phil Lasley



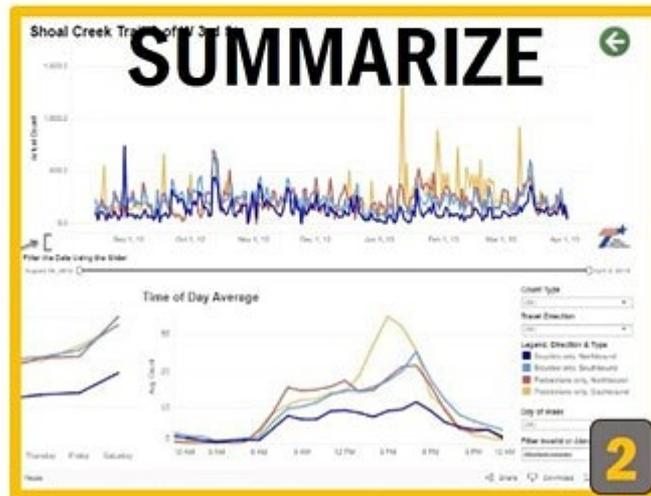
Everything You Wanted To Know About Bicyclist And Pedestrian Count Data

COLLECT



July 23
Recording

SUMMARIZE



TODAY

USE



August 4
Registration



- Please stay muted unless you are speaking

- Remove all other distractions (work email, instant messenger, etc.)

- Actively participate in training
 - Take notes on slide handouts
 - Use Q&A panel for questions or comments (not chat)
 - Respond to polls

- Webcam not necessary
 - Turn off outgoing video to conserve WiFi bandwidth



The screenshot displays the Cisco Webex Events interface with several features highlighted by callouts and red boxes:

- Participants Panel:** Located on the right side, it includes a search bar and lists participants under categories like Panelist (1) and Attendee. Callouts include "Feedback Options" and "Raise Hand".
- Q&A Panel:** A panel titled "Q&A" is shown, with a callout "Ask Question Here" pointing to the input area.
- Bottom Toolbar:** Contains icons for Polling and Q&A. Callouts "View Polling (when enabled)" and "View Q&A" point to these icons.
- Audio Settings:** A dropdown menu is open, showing options like "Copy Event Link", "Audio Connection", and "Speaker and Microphone". A callout "Adjust Audio Settings" points to this menu.
- Polling Panel:** A panel titled "Polling" is shown, containing a question: "1. What is your favorite color? Type your answer here". A callout "Answer Poll Here" points to the input area. Below the question, it shows "Time elapsed: 00:47" and "Time limit: 05:00", along with a "Submit" button.
- More Options:** A callout "More Options" points to the three-dot menu icon in the bottom toolbar.



- Please respond to poll at this time
- Any questions before we get started?
 - Feel free to test question box now

TxDOT Bicycle and Pedestrian Count Program

Bonnie Sherman, TxDOT



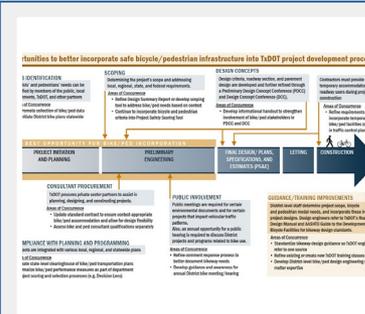


Texas Transportation Plan 2050

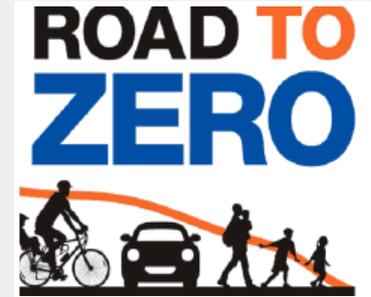


www.pedbikeimages.org /foote Design Group

Bikeway Design Effort



Project Development Enhancements



Road to Zero



Economic Impact of Bicycling in Texas



Antoniu [CC BY-SA 3.0] (<https://creativecommons.org/licenses/by-sa/3.0/>)

ADA Transition Plan Update



Pedestrian/Bicycle Facility Inventory



Bicycle Tourism Trails Study



Safety

- Exposure for crash rates
- Behavior (contra-flow riding)

Planning

- Demand estimation
- Travel patterns

Design

- Facility type and design
- Barriers
- High activity areas

Performance Measurement

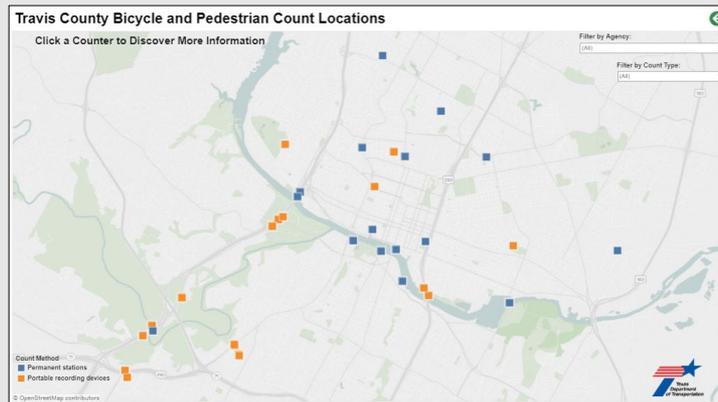
- Before and after studies
- Long-term trends from areawide improvements
- Mode shift



We need to know about bicycle and pedestrian usage on our roadways.



- Texas Bicycle and Pedestrian Count Exchange
- Crowdsourced bicycle data (StravaMetro)
- Counter equipment loan program
- Upcoming procurement of bike/ped counts
- Data collection and analysis guidance
- Virtual training in Summer 2020





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<https://www.txdot.gov/inside-txdot/modes-of-travel/bicycle.html>

Questions?

Why Am I Doing Bicyclist and Pedestrian Counts?

Shawn Turner, TTI





- “...that’s what our program plan lists...”
- “...that’s what my boss said to do...”
- “...that’s what others are doing...”
- Unless your job is ONLY data collection...
- ...THESE ARE NOT VERY GOOD REASONS.

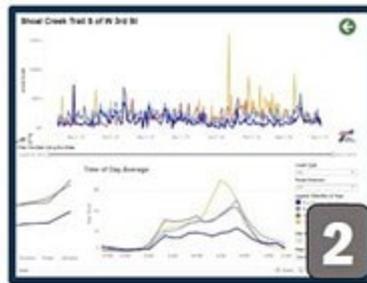


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SUMMARIZE

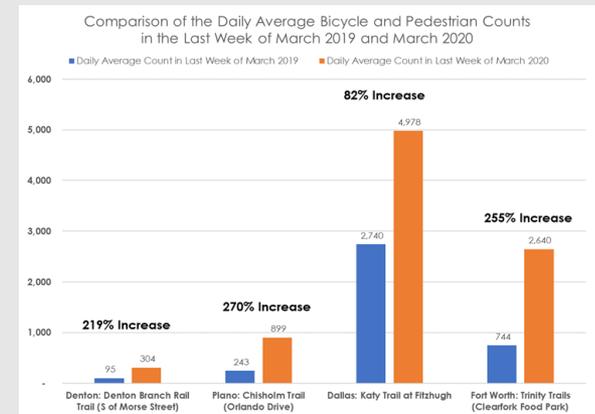


The uses (Module 3) inform many decisions made in these first 2 modules

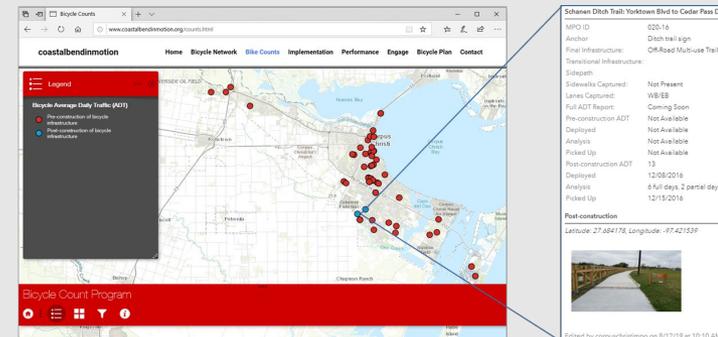
How will you (and others) use count data?



- Most likely will have multiple uses
- Will be used for more things than what you planned
- Count Exchange designed for flexibility
 - Summary and detail
 - Weekday vs. weekend
 - Other visuals
- Most common uses:
 1. Trend monitoring
 2. Before/after study or funding justification
 3. Identifying/prioritizing/selecting projects
 4. Safety analysis



Source: NCTCOG



Source: Corpus Christi MPO

Summarizing, Reporting, Visualizing Your Data

Phil Lasley, TTI





- How counts are used directly impacts how we Summarize and Display them

- Counts are ultimately used for:
 - Planning
 - Policy
 - Research
 - Design

- Universal Common Assumption:
Counts are High Quality and Widely Available for Use.



- Collected data often go unused.
 - No organization of the data.
 - No validation or quality control.
 - No aggregation or analysis into usable statistics.
 - *[Difficulty learning how to do this.]*
 - No general reporting mechanism.
 - No means to easily collect and share data with others.

- All these hurt the effort to make meaningful changes.

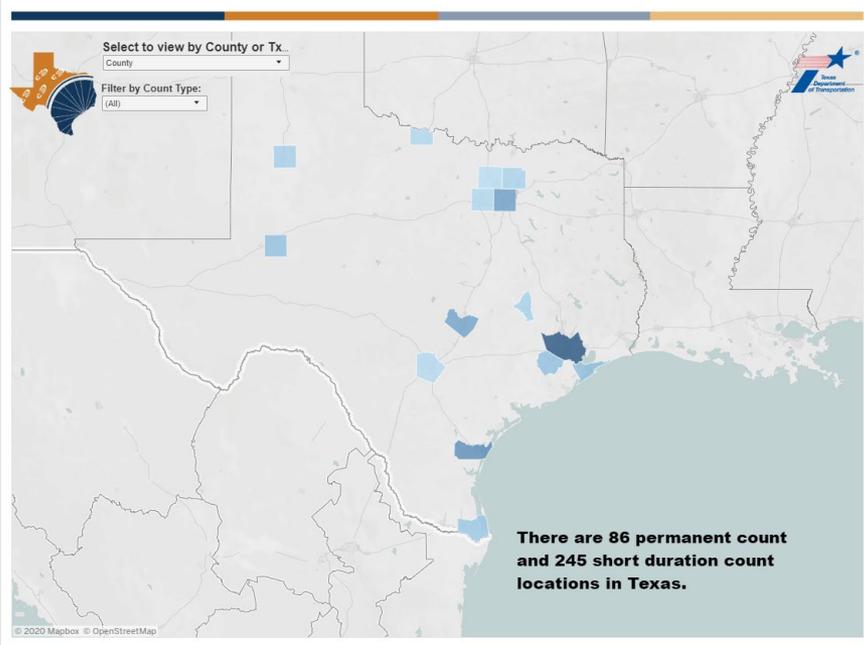
- ***Question: How has your organization struggled to use data?***



- Collaborative tool maintained by TxDOT with data contributed by multiple local partners.
- Provides a publicly-viewable platform that consolidates and standardizes biking and walking count data.
- Tracks active transportation growth in Texas to justify greater infrastructure investment.
- Integrates with other TxDOT planning maps and tools (future).
- Build a robust dataset to support research and analysis, such as exposure estimates, crowd-sourced data validation, and performance measures.



Public Visualization



BP|CX Data Manager

BP|CX

Phil Lasley | City of Austin Transportation Department | Change

- Dashboard
- Import
- Quality Control
- Exports
- TMAS Exports
- Authorized Users
- Agencies

Quality Control Your Data

Help: Below is a list of counters that need Quality Control assessment. Click QC on a Station to begin the process.

Needing Quality Control Review

Station ID	Station Name	City Area	Days of Data	Actions
AU0001	Exposition Blvd at O. Henry Track	Austin	0	QC
AU0002	Webberville Rd at Boggy Creek bridge	Austin	0	QC
AU0003	Rio Grande St: W 22nd St in West Campus	Austin	0	QC
AU0004	Walnut Creek Trail N of Jain Ln	Austin	0	QC
AU0005	Shoal Creek Trail S of W 3rd St	Austin	0	QC
AU0006	Lance Armstrong Bikeway at Waller Creek	Austin	0	QC
AU0007	Ann and Roy Butler Trail at E Bouldin Creek	Austin	0	QC
AU0008	Ann and Roy Butler Trail at MoPac/Crenshaw Bridge	Austin	0	QC



- All BP|CX data owners (agencies) must be registered.
 - Provides data security.
 - Limits access to authorized users.
- To register: <https://txbpcx.org> → “Register”
 - Read the Terms and Conditions
 - Fill out form.



BP|CX
Howdy! Please login to your account.

Email
p-lasley@tti.tamu.edu

Password

Login

Register | Forgot Password?

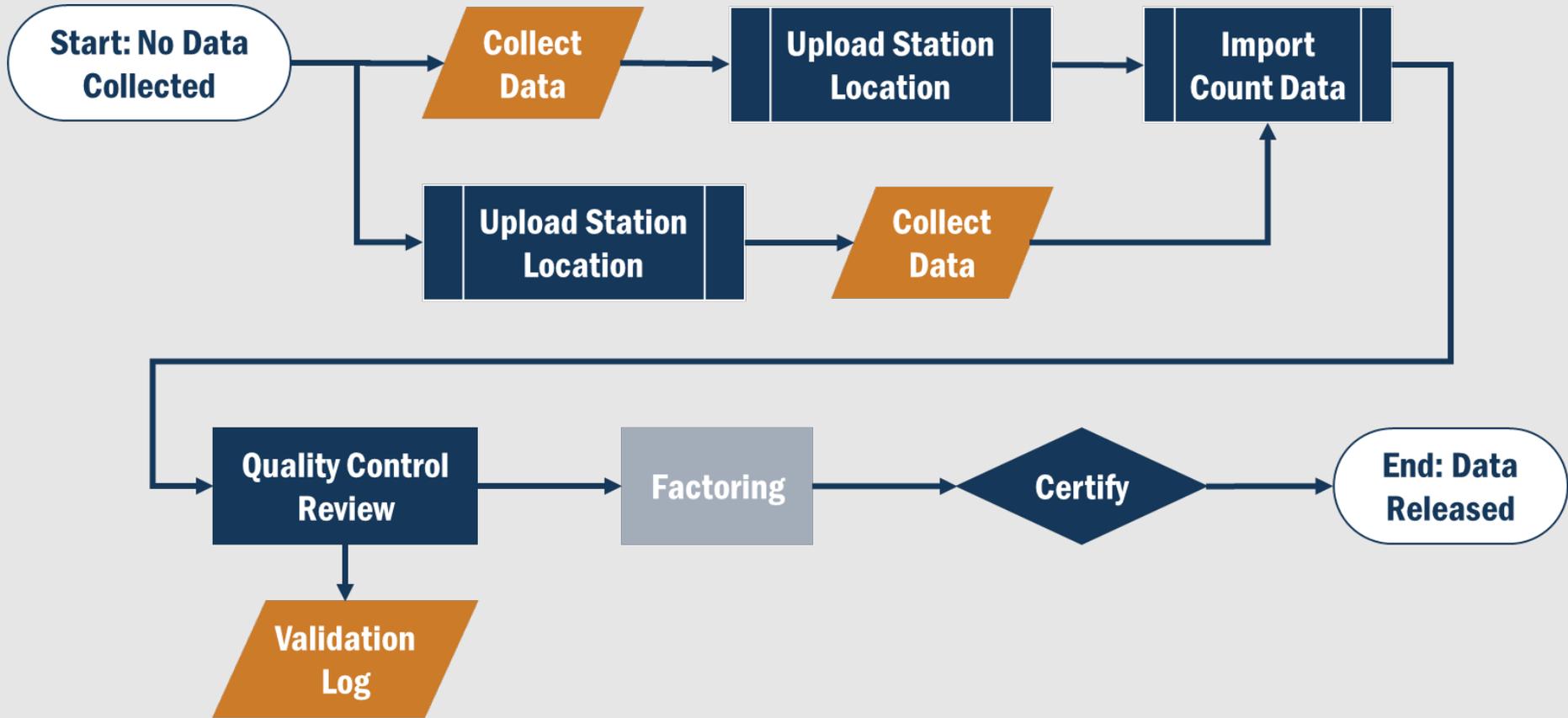
Terms & Conditions



- Two User Types
 - Authorized Agency User
 - Agency Administrator

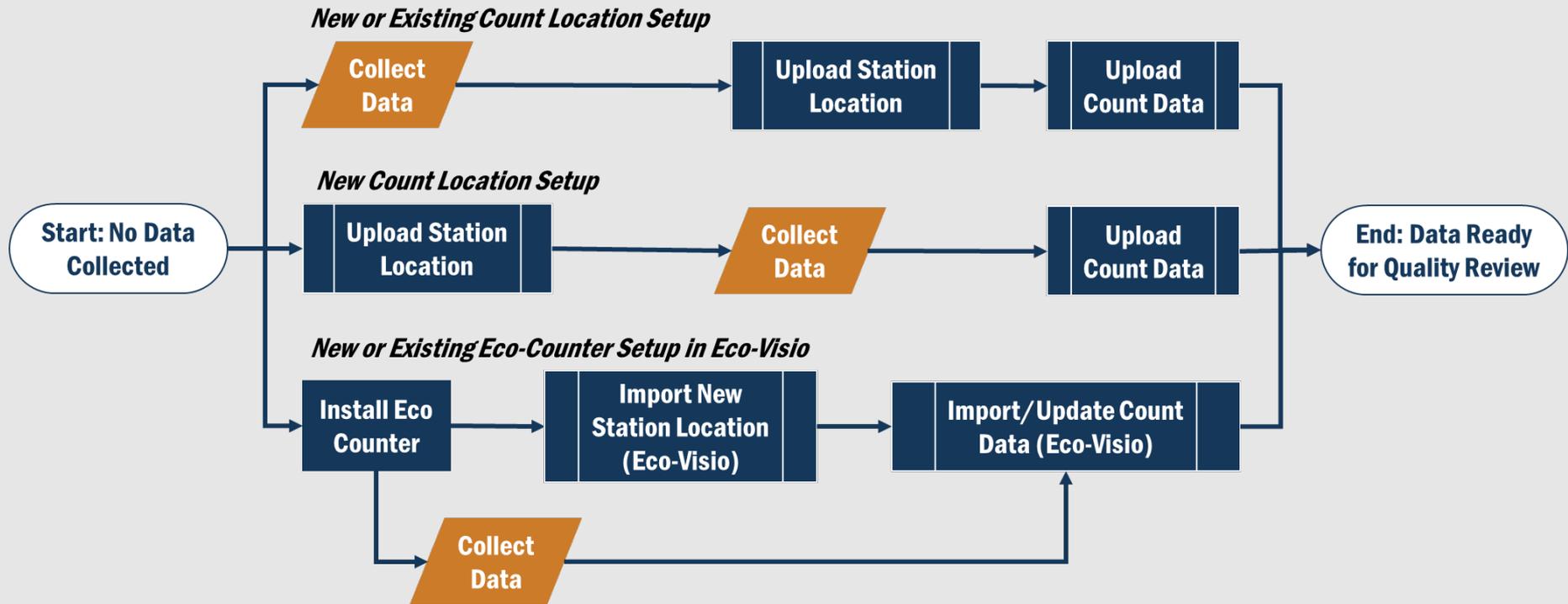
- *Agency users can be within your agency or outside of your agency (e.g., consultants)

- *Administrators can view/edit all users for their agency in the “Authorized Users” link in the navigation pane.



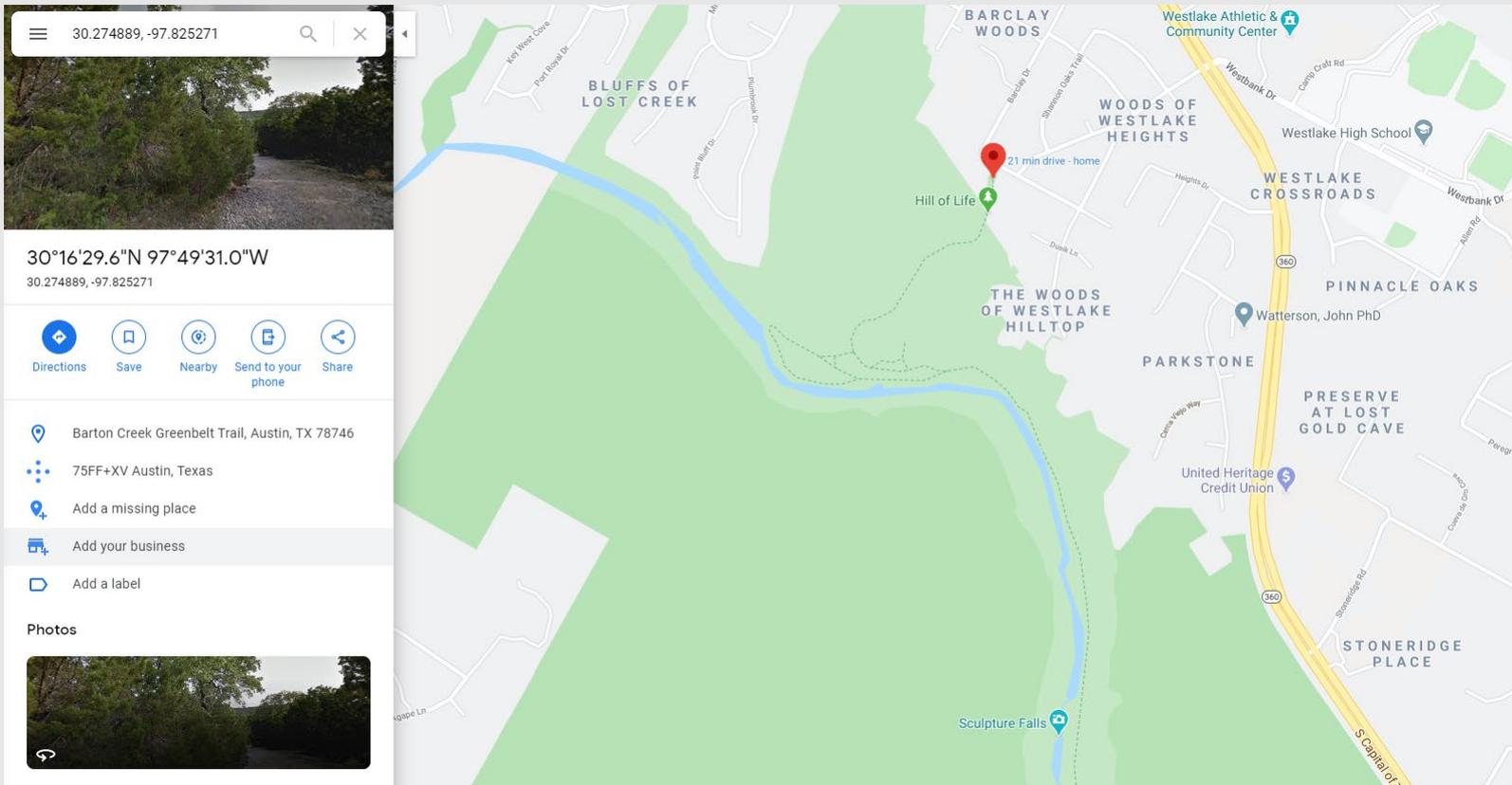
Live Demo of the BP | CX







- Hill of Life Trail Head (30.274889, -97.825271)
 - Eco-Counter (but not set up in Visio).
 - Can detect bicycles and pedestrians by direction.



Quality Review Concepts



- **Metadata Review**
 - Naming and matching
 - Location
 - Direction
 - Other information
- **Count Data Review**
 - Nulls
 - Extreme values
 - Abnormal but valid values
- **Count Data Validation***



■ Data Mislabeling

<i>channel_ind</i>	<i>usertype</i>	<i>direction</i>	<i>label</i>
0	bike + ped	both	Santa Fe at Beacon
1	ped	in	Pedestrians OUT
2	ped	out	Pedestrians IN
3	bike	in	Cyclists OUT
4	bike	out	Cyclists IN

<i>channel_ind</i>	<i>usertype</i>	<i>direction</i>	<i>label</i>
0	bike + ped	both	WRT Fisher
1	ped	in	Pedestrians Counter Clockwise
2	ped	out	Pedestrians Clockwise
3	bike	in	Pedestrians Counter Clockwise
4	bike	out	Pedestrians Clockwise

<i>channel_ind</i>	<i>usertype</i>	<i>direction</i>	<i>label</i>
0	bike + ped	both	Santa Fe at Glasgow
0	n/a	both	Santa Fe at Glasgow Bike Only
1	bike	n/a	Santa Fe at Glasgow Bike Only Cyclists
2	car	n/a	Santa Fe at Glasgow Bike Only Cars



- **Valid:** Count appears to be normal.
- **Invalid:** Count appears to be in error and not representative of reality.
- **Abnormal but Valid (ABV):** Count appears to be in error but is actually a valid count.

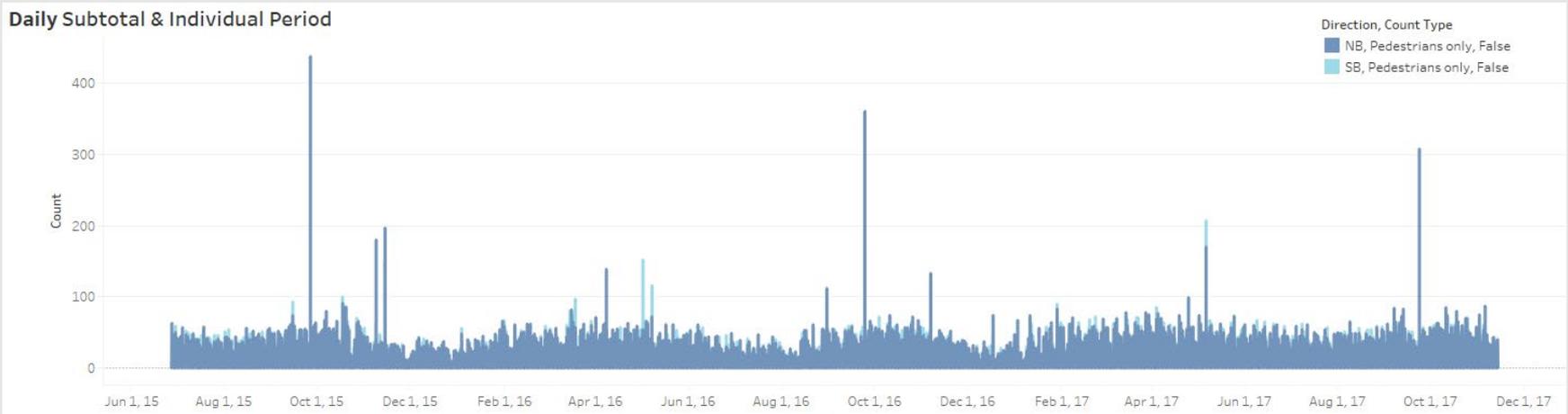
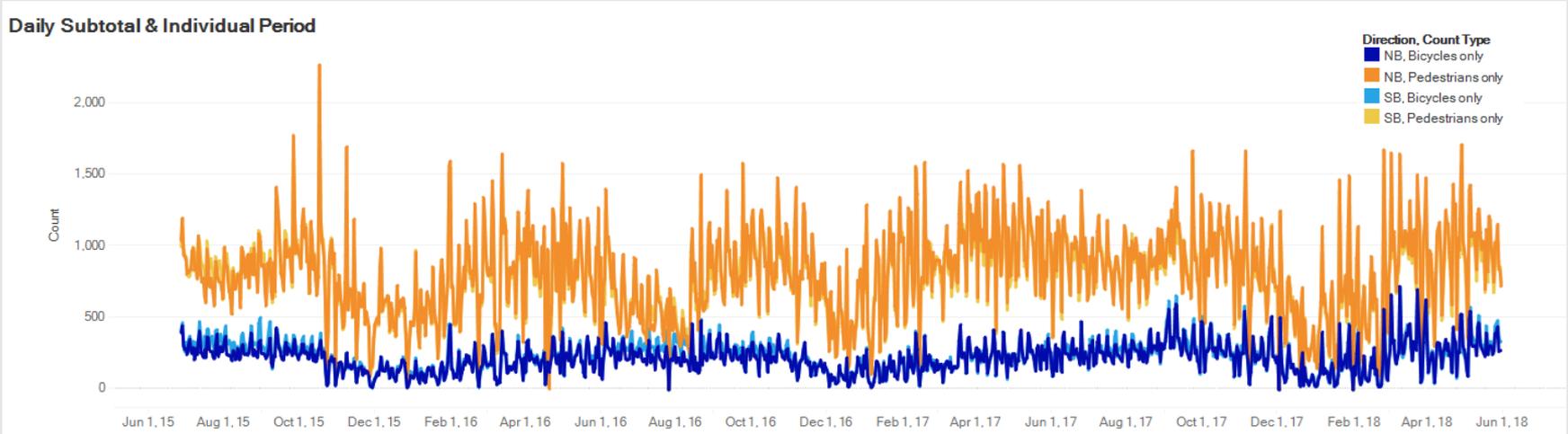
It is up to the reporting agency to determine if an error actually occurred.

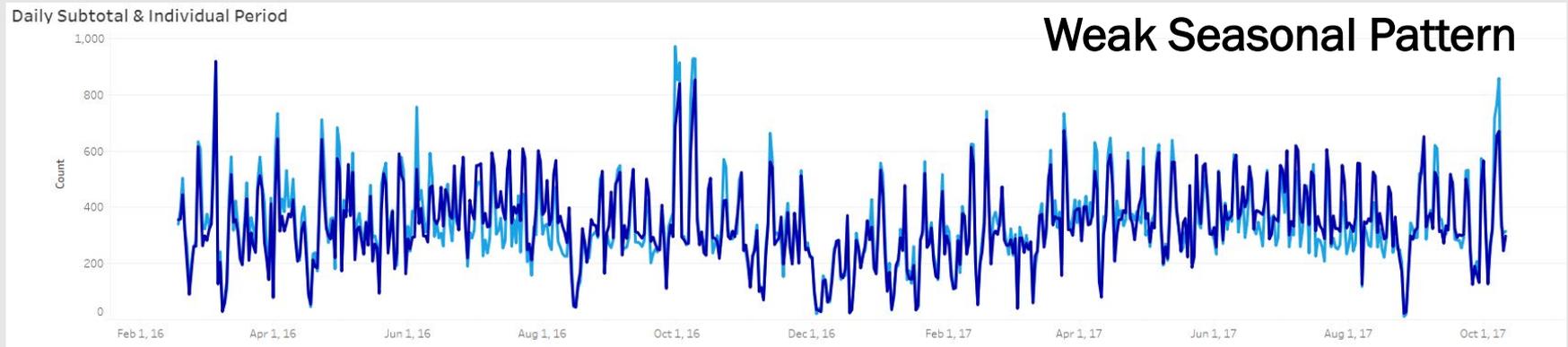
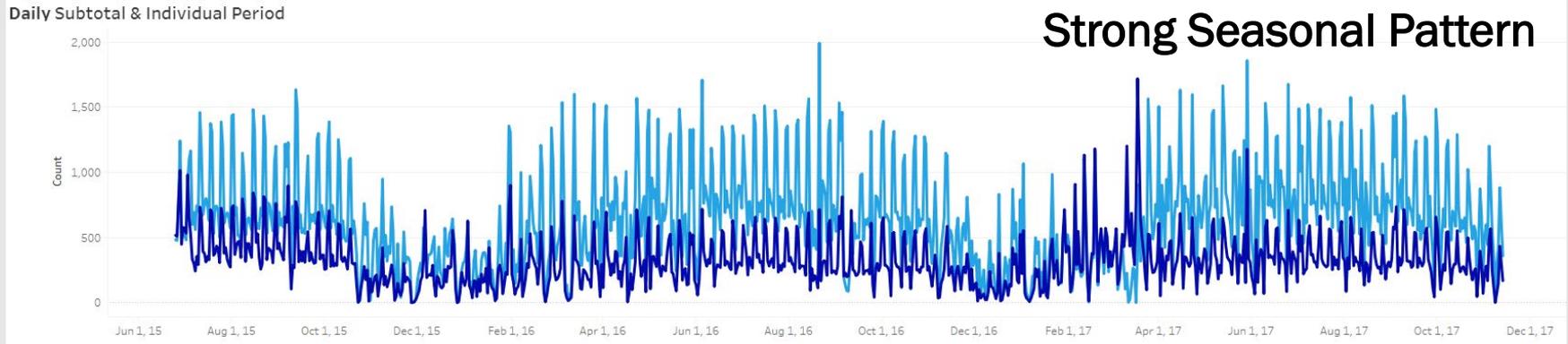


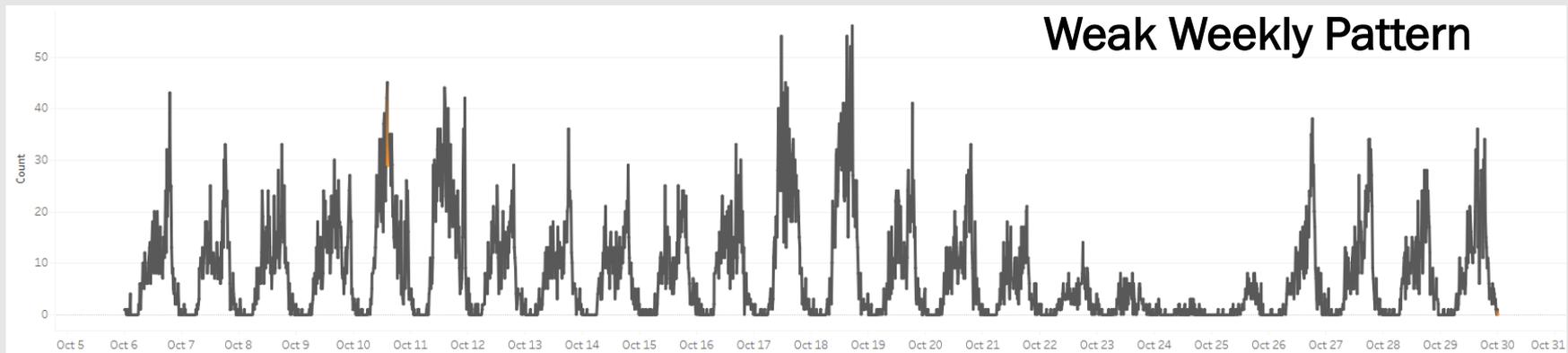
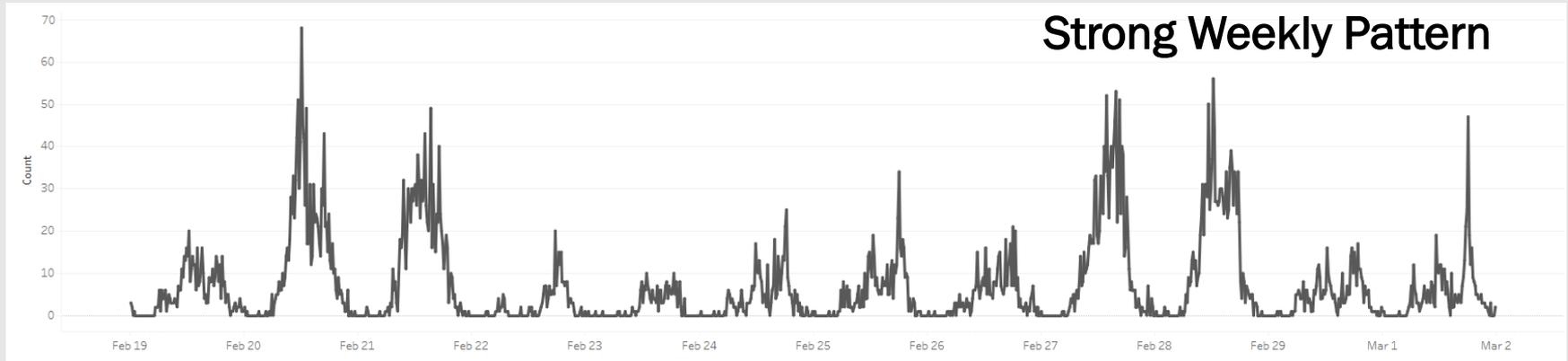
- **Data Gaps**
 - Any null values in the data.
- **Consecutive Zeros**
 - Too many zero values in a row.
 - FHWA recommends 7 periods; we recommend 15 hours of zeros.
- **Consecutive Non-Zeros**
 - Too many of the same value in a row.
 - Usually 3; counts above 15.
- **Maximum Count Exceeded**
 - Too high of a number for a single day or period
 - Usually 5,000/day and 1,500/period.
 - FHWA: 4000/hour.



- **Interquartile Range Violation**
 - Outliers based on the 25th/75th percentiles over a +/- 2 month rolling average of counts.
- **Adjacent Interval**
 - Counts jump from 0 to 50 or higher (or the reverse).
 - *+/-100% difference (depending on count average).
- **Inverted AM/PM**
 - Counts at 3:00 AM are > 3:00 PM
- **Invalid for Multiple Inconsistencies (General Error)**
 - Used for mass counter failures or multiple errors.
- ***Minimum Daily Total***
 - Counts for a day are less than 100





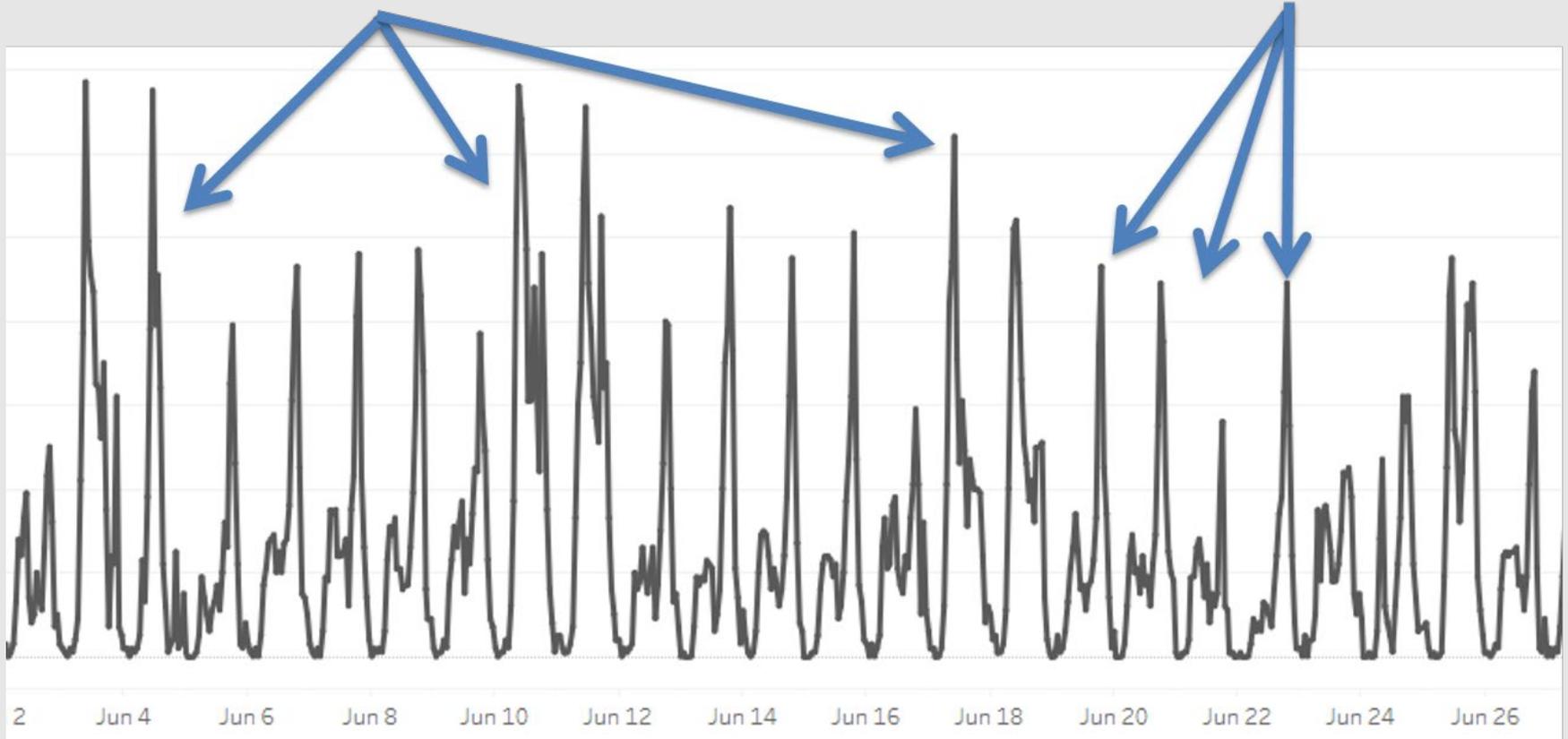


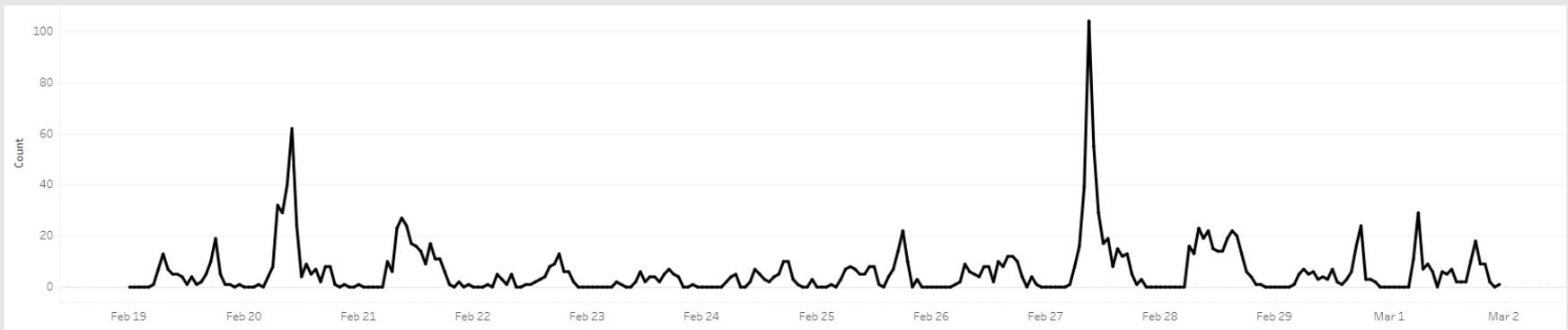
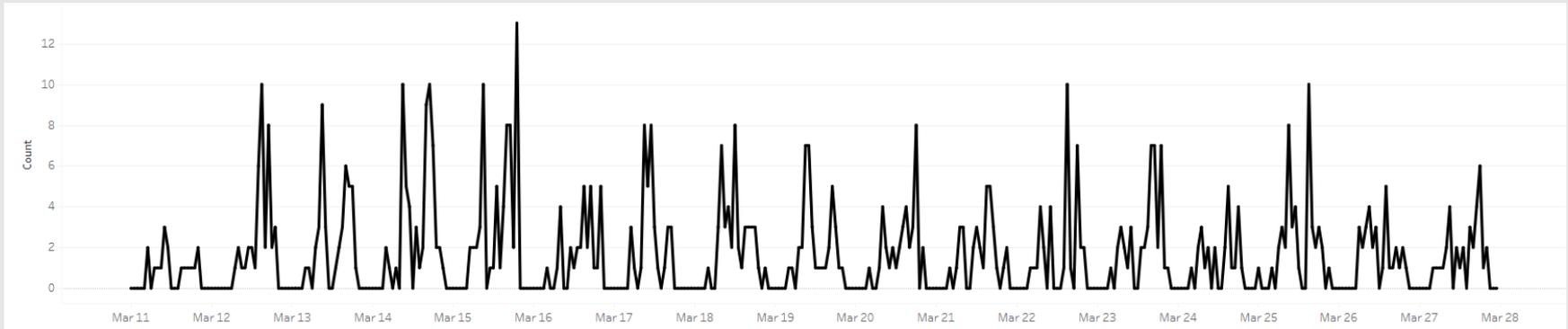
What did I just look at?



Strong weekend pattern

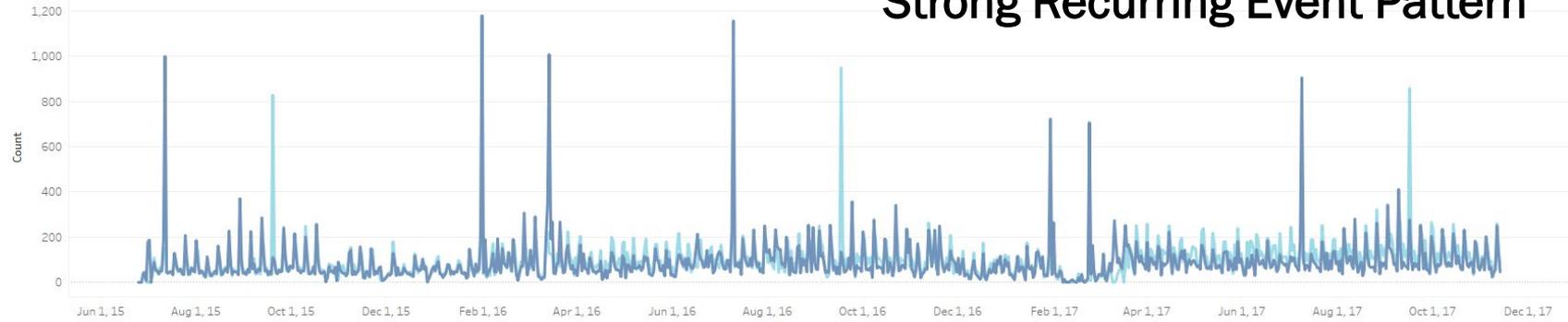
Consistent nightly use



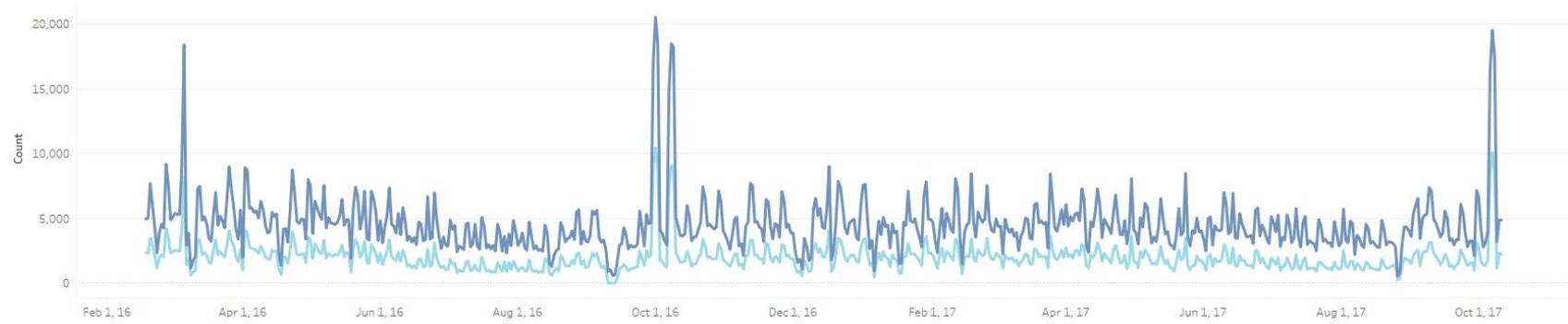


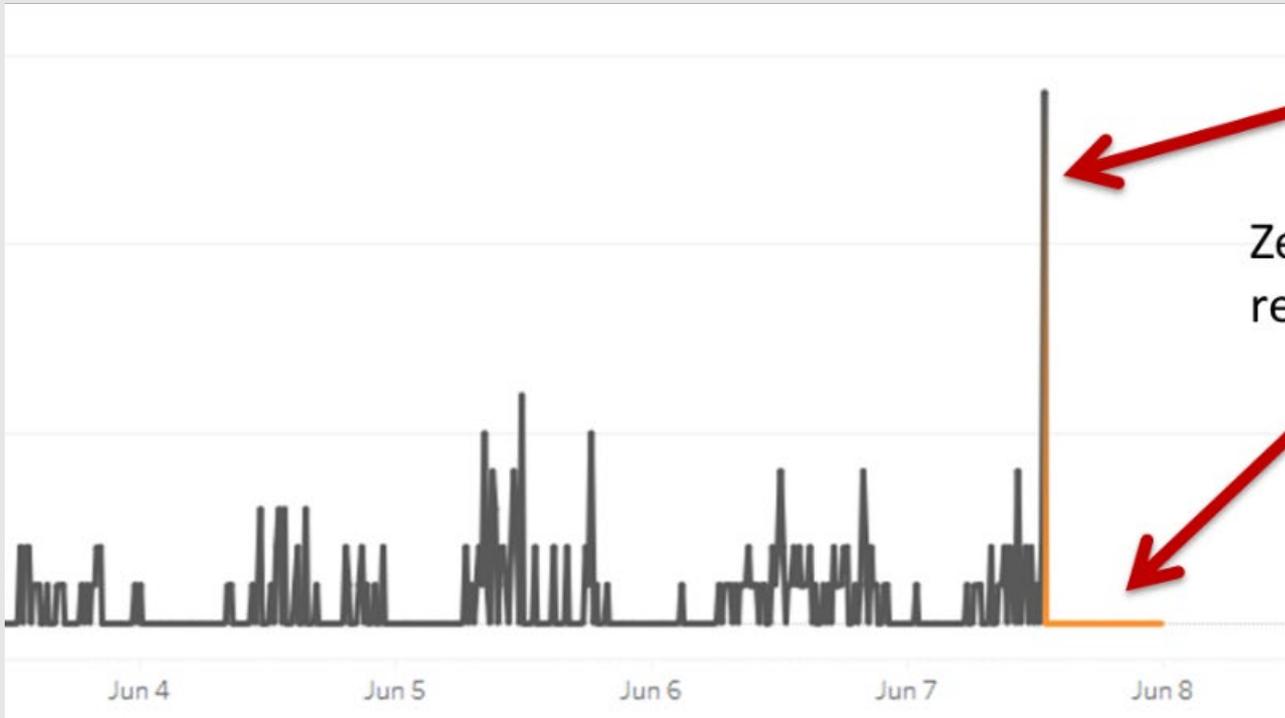


Daily Subtotal & Individual Period



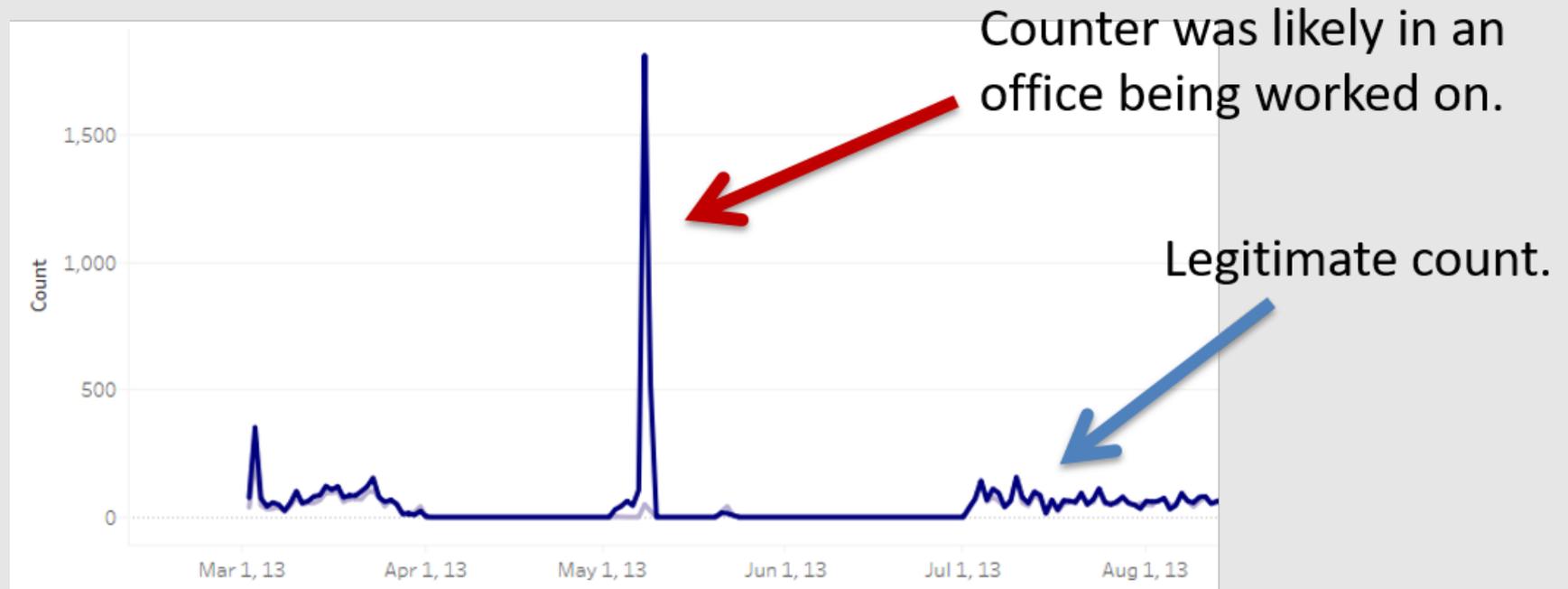
Daily Subtotal & Individual Period





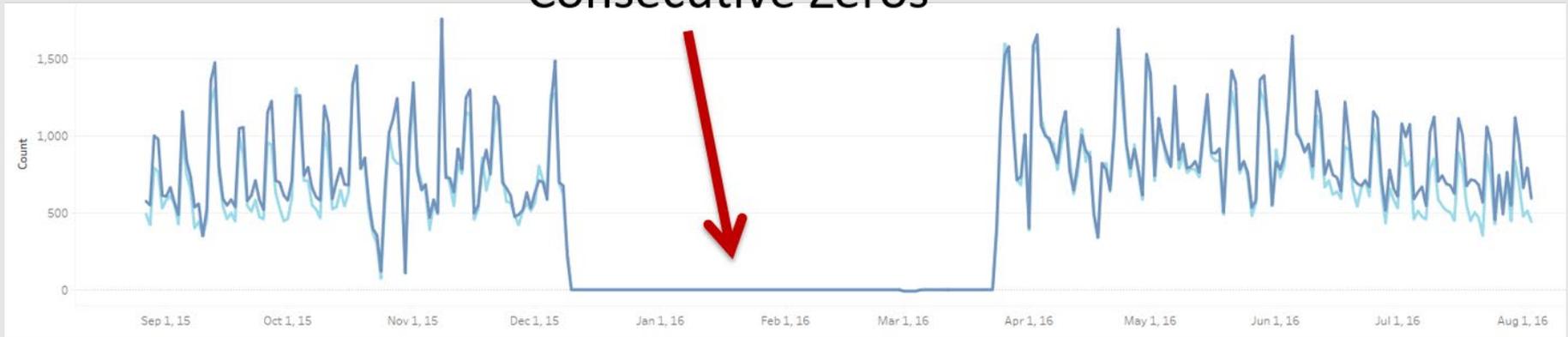
The day the counter was picked up.

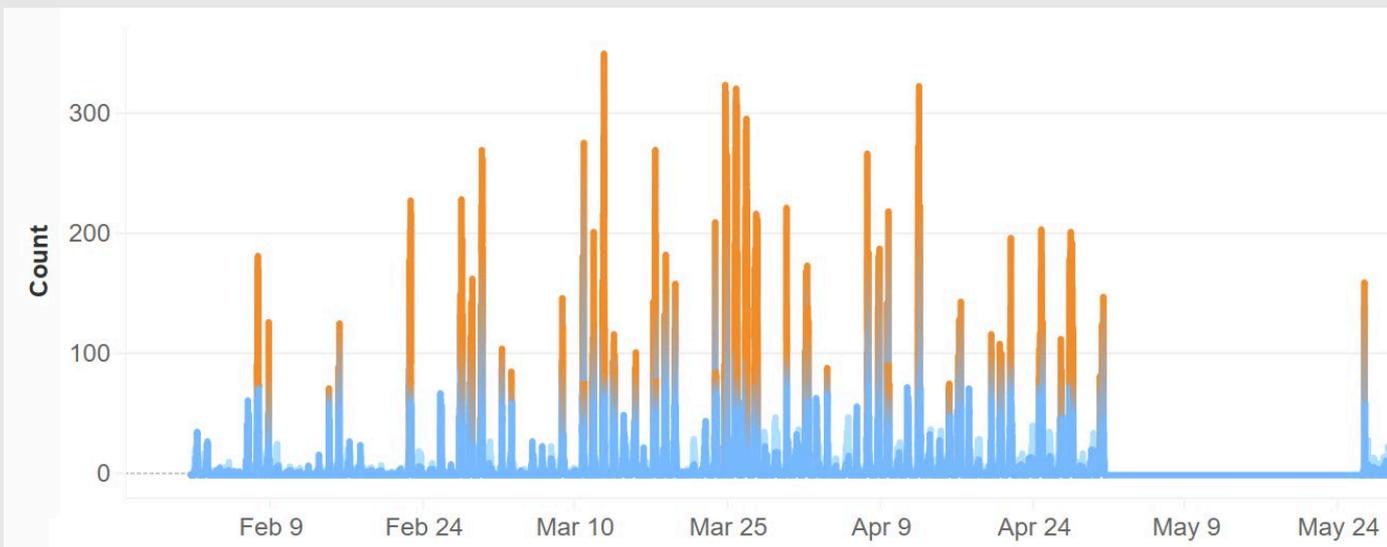
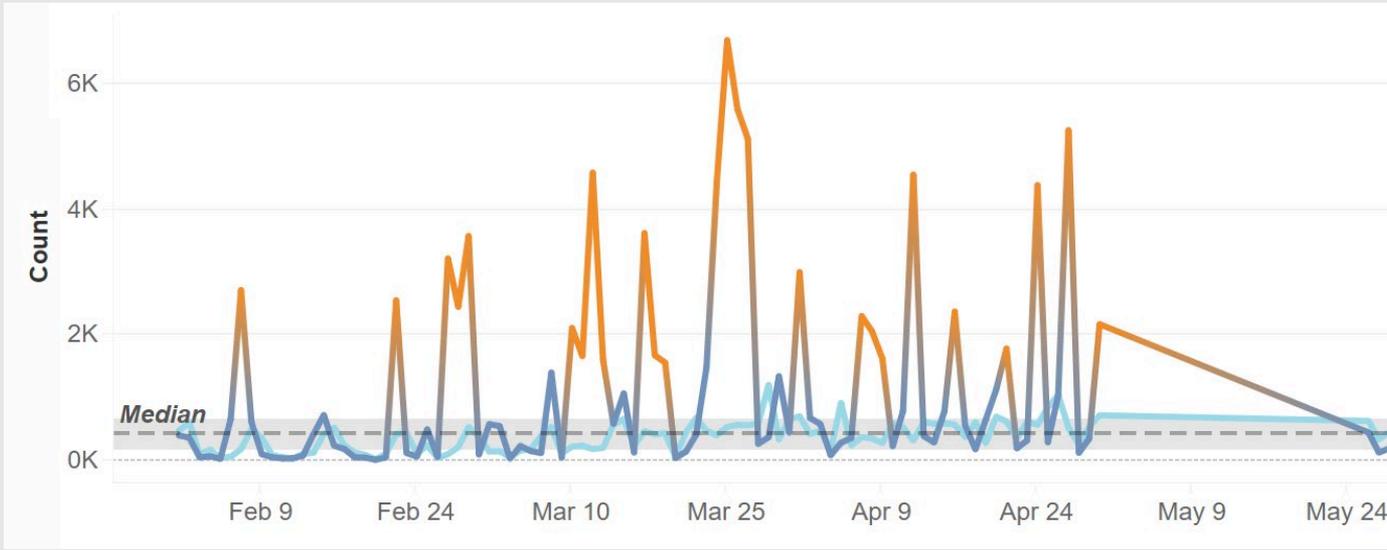
Zero values for the rest of the day.

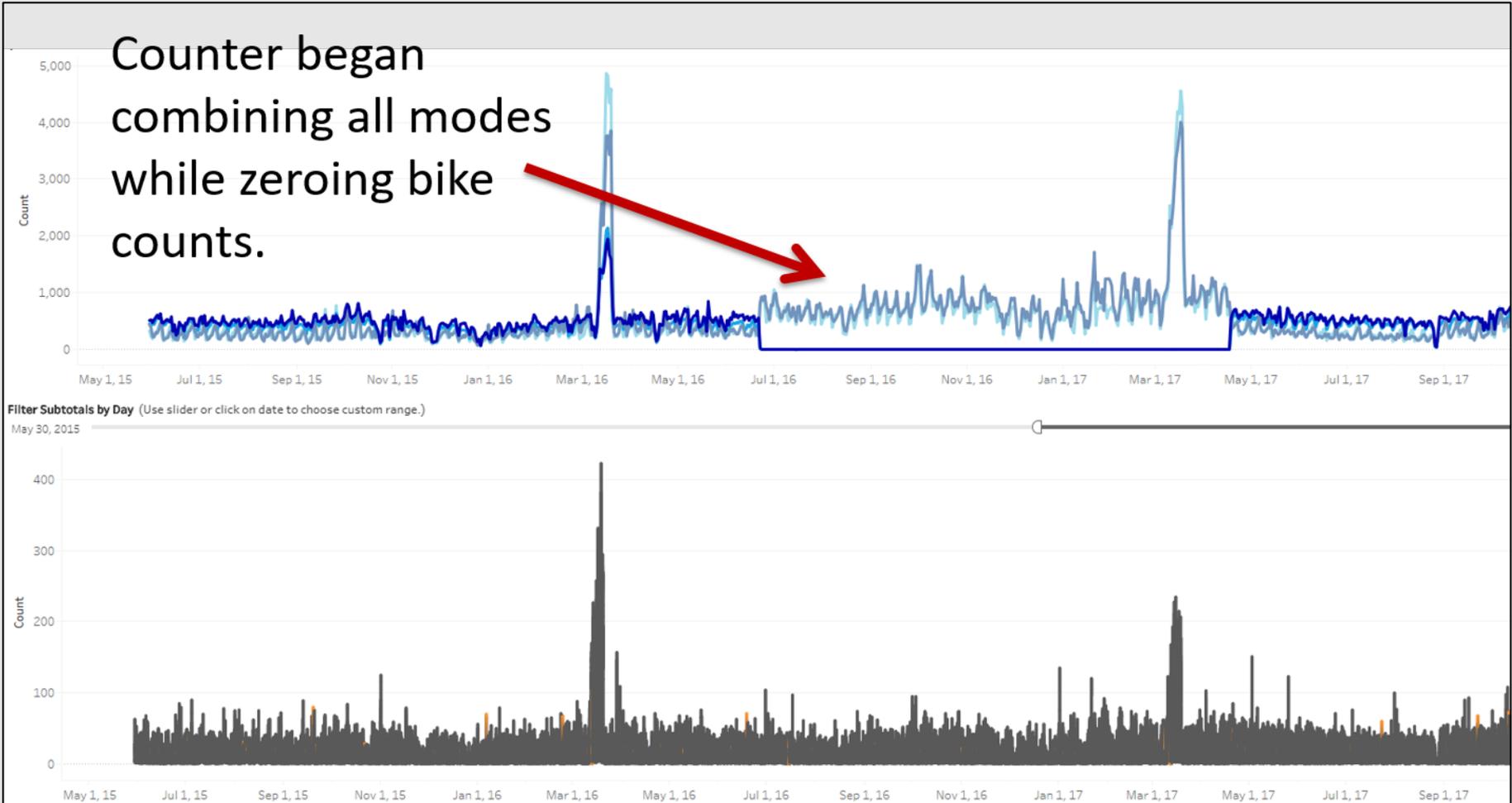


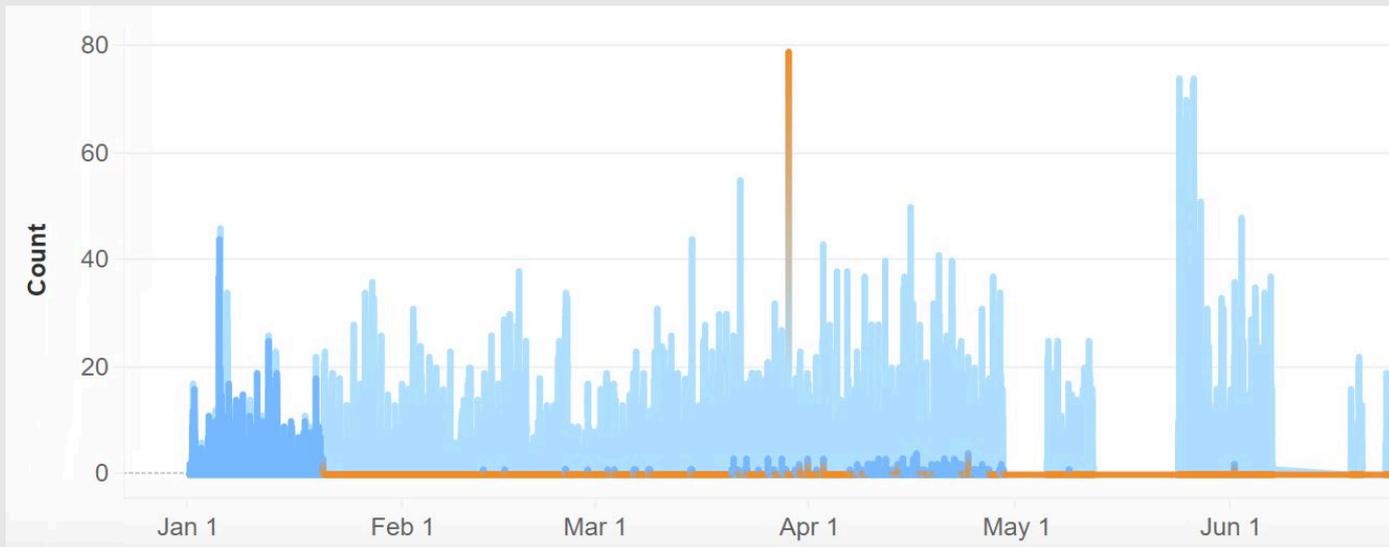
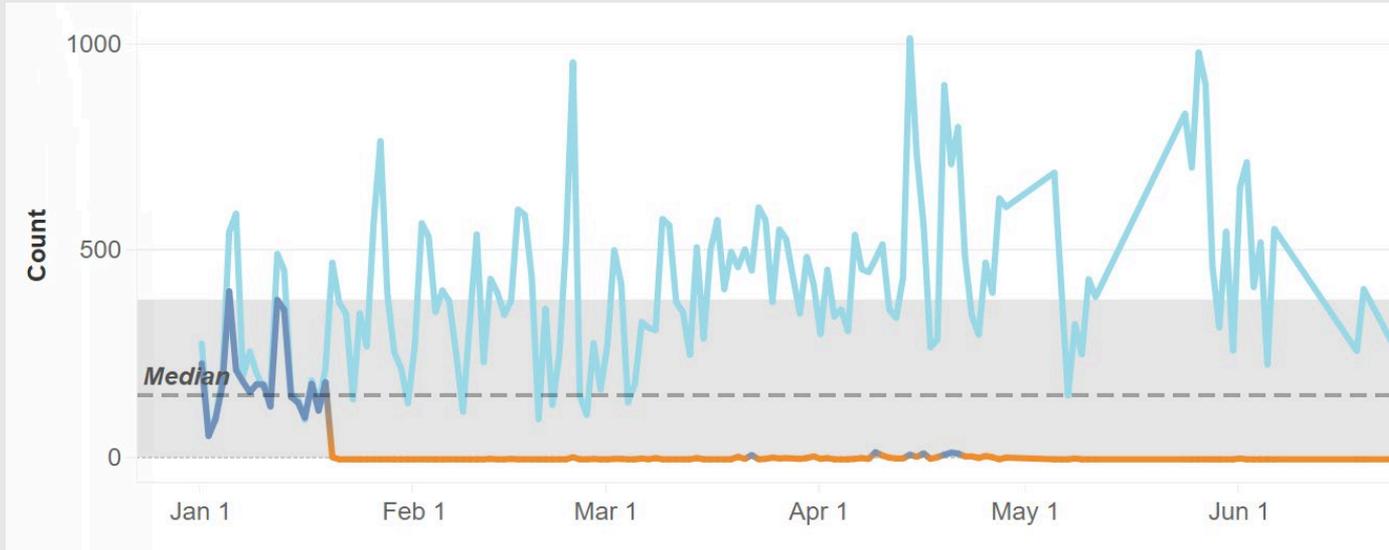


Consecutive Zeros







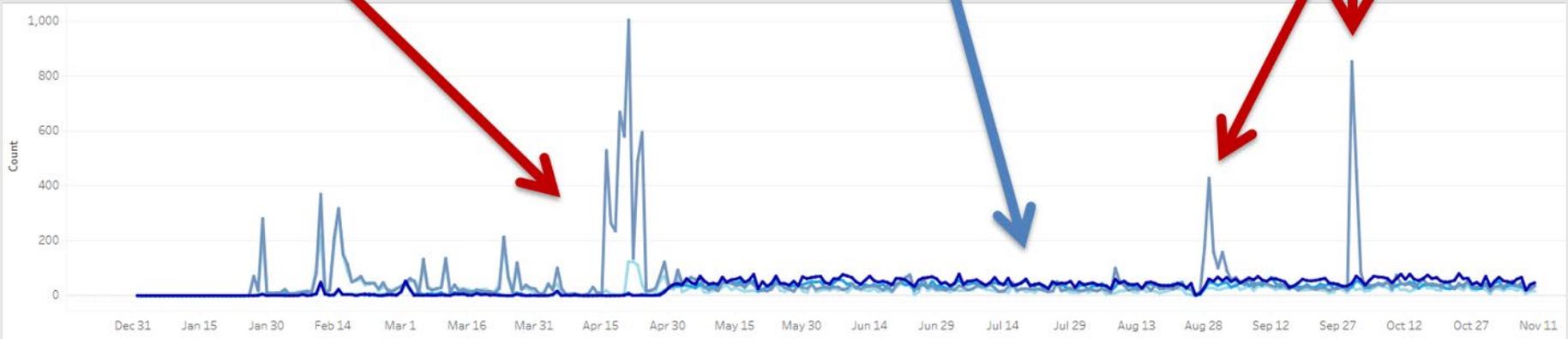


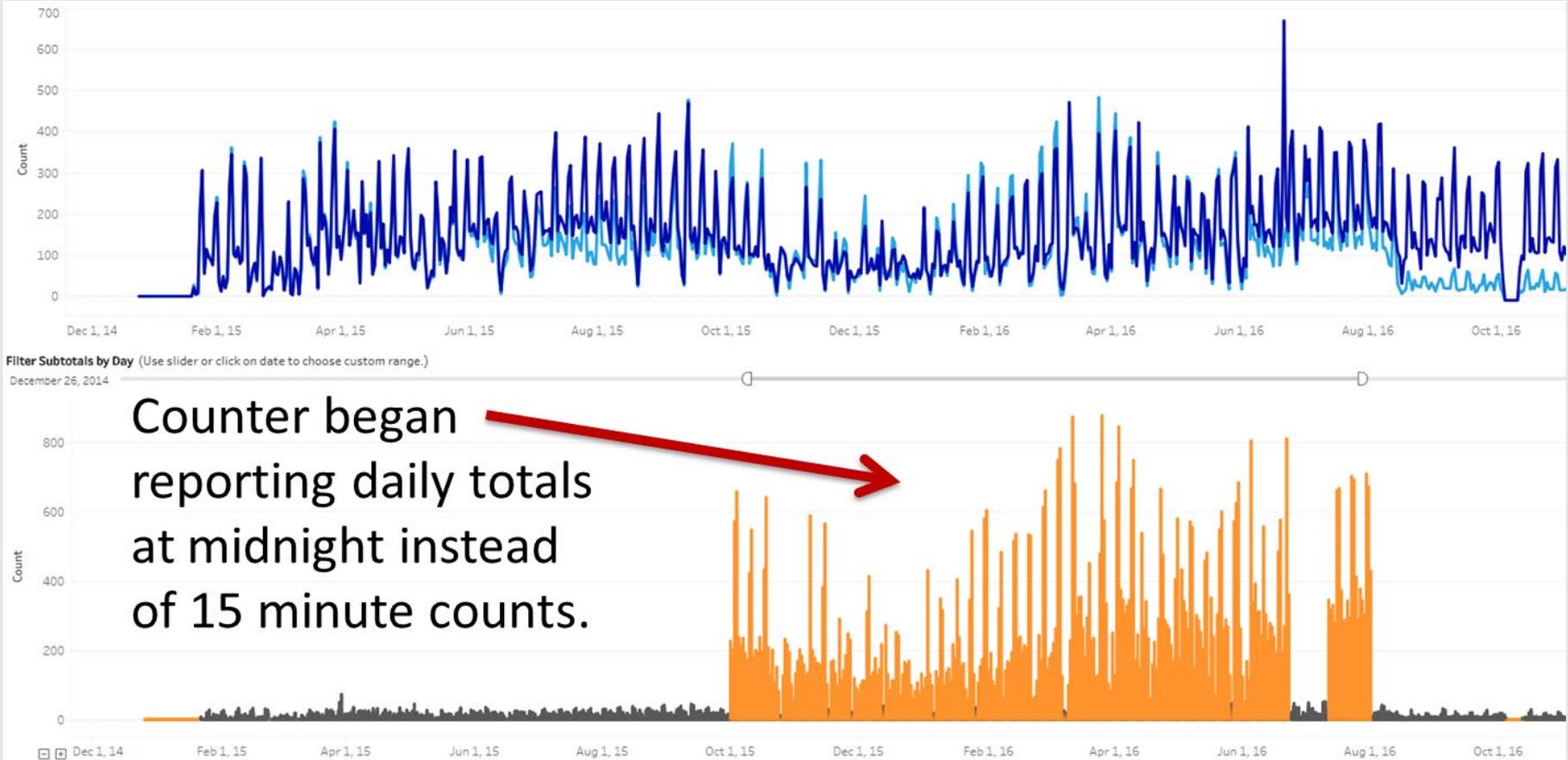


No apparent reason for spike/erratic pattern

Stable pattern

Questionable?

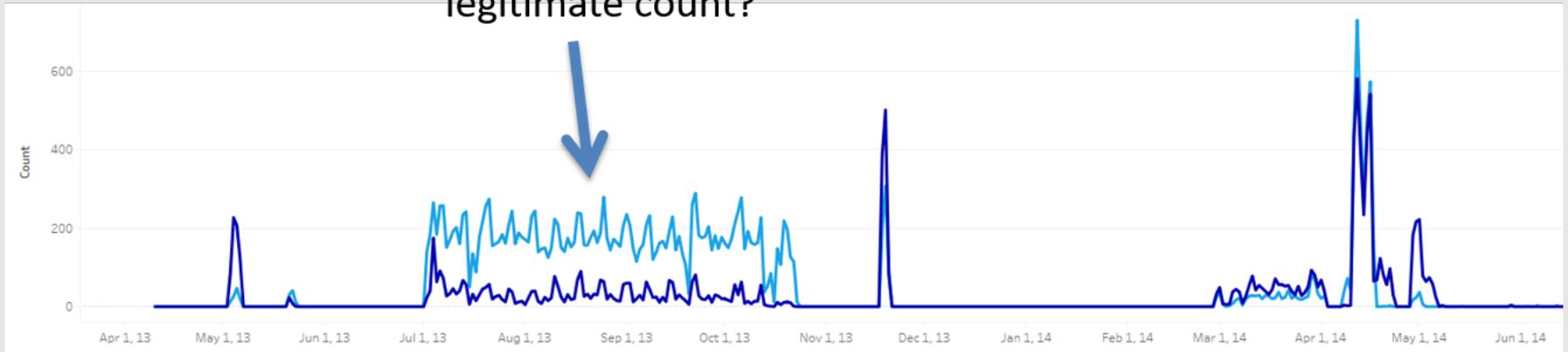






Count Location:
Local DOT Office
(Not a real count location)

Possible
legitimate count?

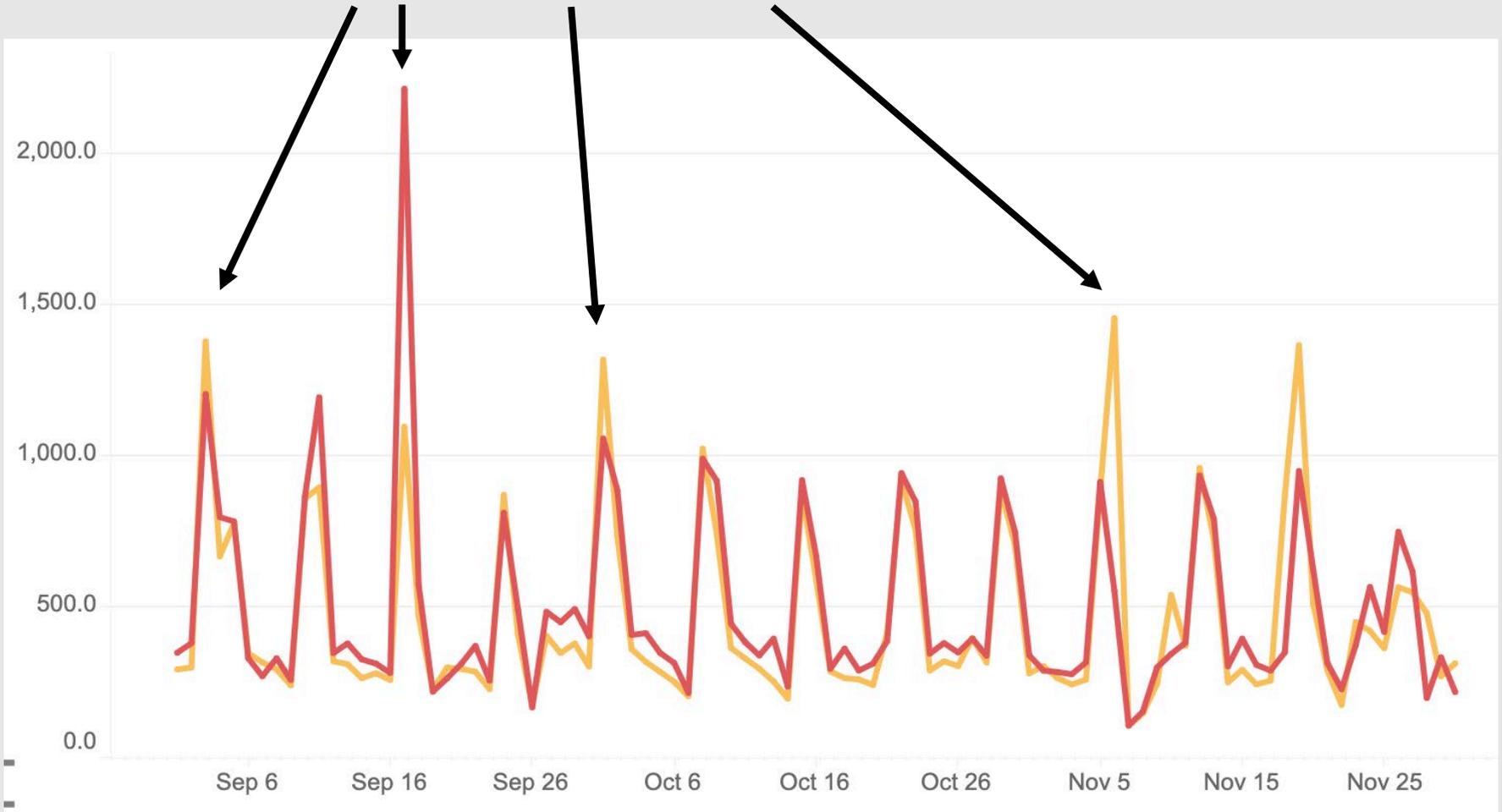




- What is Abnormal but Valid?
 - Events
 - Unusual Occurrences
 - **Counts outside the norm for the trail, but cannot be ruled an error.*
- How to spot ABV data?



Foot Races, Coded ABV





Abnormal one-way spike with ridiculously high count.



SB	Bicycles only	4/19/2015 11:00	4
SB	Bicycles only	4/19/2015 11:15	9
SB	Bicycles only	4/19/2015 11:30	2
SB	Bicycles only	4/19/2015 11:45	5
SB	Bicycles only	4/19/2015 12:00	7
SB	Bicycles only	4/19/2015 12:15	10
SB	Bicycles only	4/19/2015 12:30	13
SB	Bicycles only	4/19/2015 12:45	7
SB	Bicycles only	4/19/2015 13:00	10
SB	Bicycles only	4/19/2015 13:15	4
SB	Bicycles only	4/19/2015 13:30	9
SB	Bicycles only	4/19/2015 13:45	3
SB	Bicycles only	4/19/2015 14:00	6
SB	Bicycles only	4/19/2015 14:15	6
SB	Bicycles only	4/19/2015 14:30	7
SB	Bicycles only	4/19/2015 14:45	2
SB	Bicycles only	4/19/2015 15:00	4
SB	Bicycles only	4/19/2015 15:15	6
SB	Bicycles only	4/19/2015 15:30	7
SB	Bicycles only	4/19/2015 15:45	6
SB	Bicycles only	4/19/2015 16:00	1
SB	Bicycles only	4/19/2015 16:15	5
SB	Bicycles only	4/19/2015 16:30	6
SB	Bicycles only	4/19/2015 16:45	4
SB	Bicycles only	4/19/2015 17:00	3
SB	Bicycles only	4/19/2015 17:15	4
SB	Bicycles only	4/19/2015 17:30	5
SB	Bicycles only	4/19/2015 17:45	6
SB	Bicycles only	4/19/2015 18:00	2
SB	Bicycles only	4/19/2015 18:15	5
SB	Bicycles only	4/19/2015 18:30	3
SB	Bicycles only	4/19/2015 18:45	6
SB	Bicycles only	4/19/2015 19:00	9

NB	Bicycles only	4/19/2015 9:30	2
NB	Bicycles only	4/19/2015 9:45	6
NB	Bicycles only	4/19/2015 10:00	4
NB	Bicycles only	4/19/2015 10:15	21
NB	Bicycles only	4/19/2015 10:30	31
NB	Bicycles only	4/19/2015 10:45	49
NB	Bicycles only	4/19/2015 11:00	87
NB	Bicycles only	4/19/2015 11:15	119
NB	Bicycles only	4/19/2015 11:30	168
NB	Bicycles only	4/19/2015 11:45	198
NB	Bicycles only	4/19/2015 12:00	258
NB	Bicycles only	4/19/2015 12:15	229
NB	Bicycles only	4/19/2015 12:30	258
NB	Bicycles only	4/19/2015 12:45	269
NB	Bicycles only	4/19/2015 13:00	239
NB	Bicycles only	4/19/2015 13:15	253
NB	Bicycles only	4/19/2015 13:30	255
NB	Bicycles only	4/19/2015 13:45	309
NB	Bicycles only	4/19/2015 14:00	298
NB	Bicycles only	4/19/2015 14:15	311
NB	Bicycles only	4/19/2015 14:30	275
NB	Bicycles only	4/19/2015 14:45	280
NB	Bicycles only	4/19/2015 15:00	271
NB	Bicycles only	4/19/2015 15:15	279
NB	Bicycles only	4/19/2015 15:30	251
NB	Bicycles only	4/19/2015 15:45	216
NB	Bicycles only	4/19/2015 16:00	226
NB	Bicycles only	4/19/2015 16:15	205
NB	Bicycles only	4/19/2015 16:30	232
NB	Bicycles only	4/19/2015 16:45	188
NB	Bicycles only	4/19/2015 17:00	173
NB	Bicycles only	4/19/2015 17:15	190
NB	Bicycles only	4/19/2015 17:30	145
NB	Bicycles only	4/19/2015 17:45	138
NB	Bicycles only	4/19/2015 18:00	96
NB	Bicycles only	4/19/2015 18:15	44
NB	Bicycles only	4/19/2015 18:30	24
NB	Bicycles only	4/19/2015 18:45	2
NB	Bicycles only	4/19/2015 19:00	1

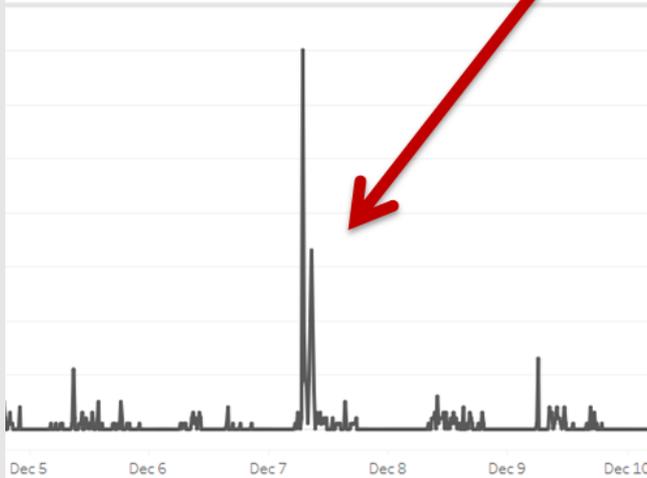
MS 150 Bike Race



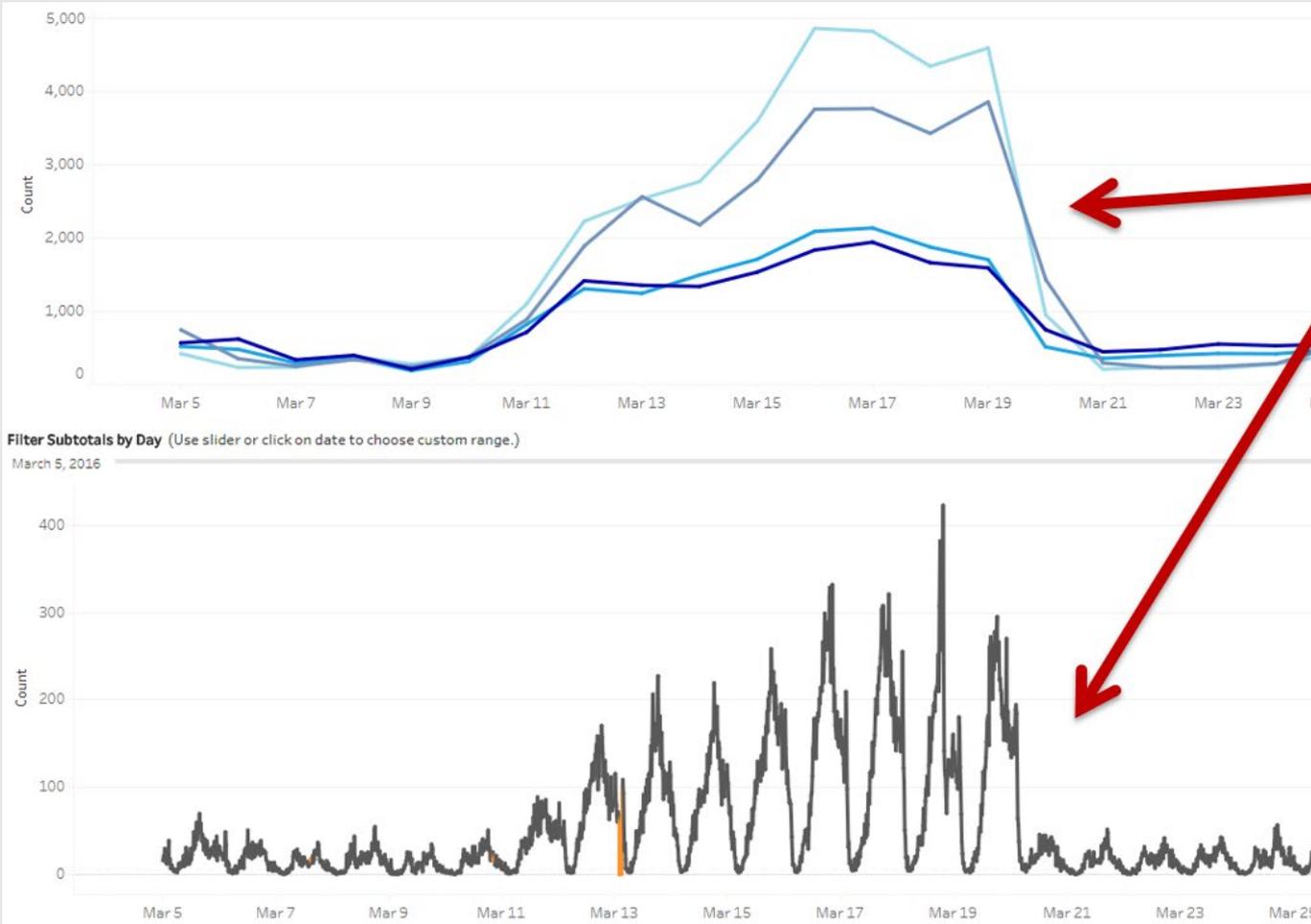
Abnormal two-way spike usually on a weekend morning around 6:30 a.m. to 10:00 a.m.

NB	Pedestrians only	12/7/2013 6:30	1
NB	Pedestrians only	12/7/2013 6:45	70
NB	Pedestrians only	12/7/2013 7:00	16
NB	Pedestrians only	12/7/2013 7:15	5
NB	Pedestrians only	12/7/2013 7:30	0
NB	Pedestrians only	12/7/2013 7:45	0
NB	Pedestrians only	12/7/2013 8:00	1
NB	Pedestrians only	12/7/2013 8:15	0
NB	Pedestrians only	12/7/2013 8:30	1
NB	Pedestrians only	12/7/2013 8:45	1
NB	Pedestrians only	12/7/2013 9:00	0

SB	Pedestrians only	12/7/2013 6:30	1
SB	Pedestrians only	12/7/2013 6:45	0
SB	Pedestrians only	12/7/2013 7:00	1
SB	Pedestrians only	12/7/2013 7:15	4
SB	Pedestrians only	12/7/2013 7:30	8
SB	Pedestrians only	12/7/2013 7:45	1
SB	Pedestrians only	12/7/2013 8:00	8
SB	Pedestrians only	12/7/2013 8:15	20
SB	Pedestrians only	12/7/2013 8:30	32
SB	Pedestrians only	12/7/2013 8:45	18
SB	Pedestrians only	12/7/2013 9:00	7

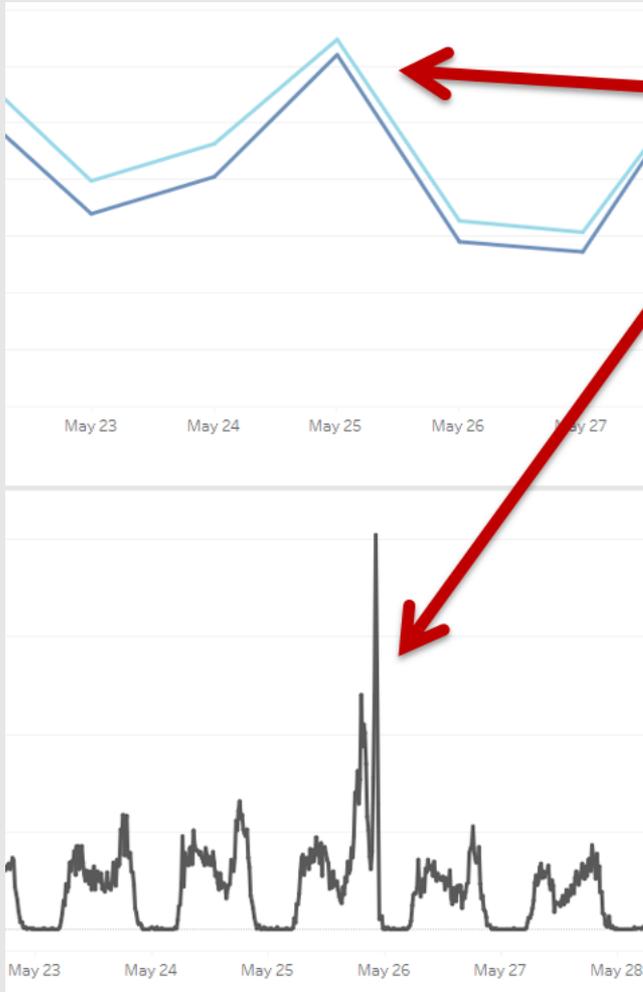


This is usually characterized by a concentration of counts within a 15-minute interval followed by high counts spread out.



Abnormal long **recurring** period in one or all directions

SXSW



Abnormal spikes: Both directions close to equal, but at different times.

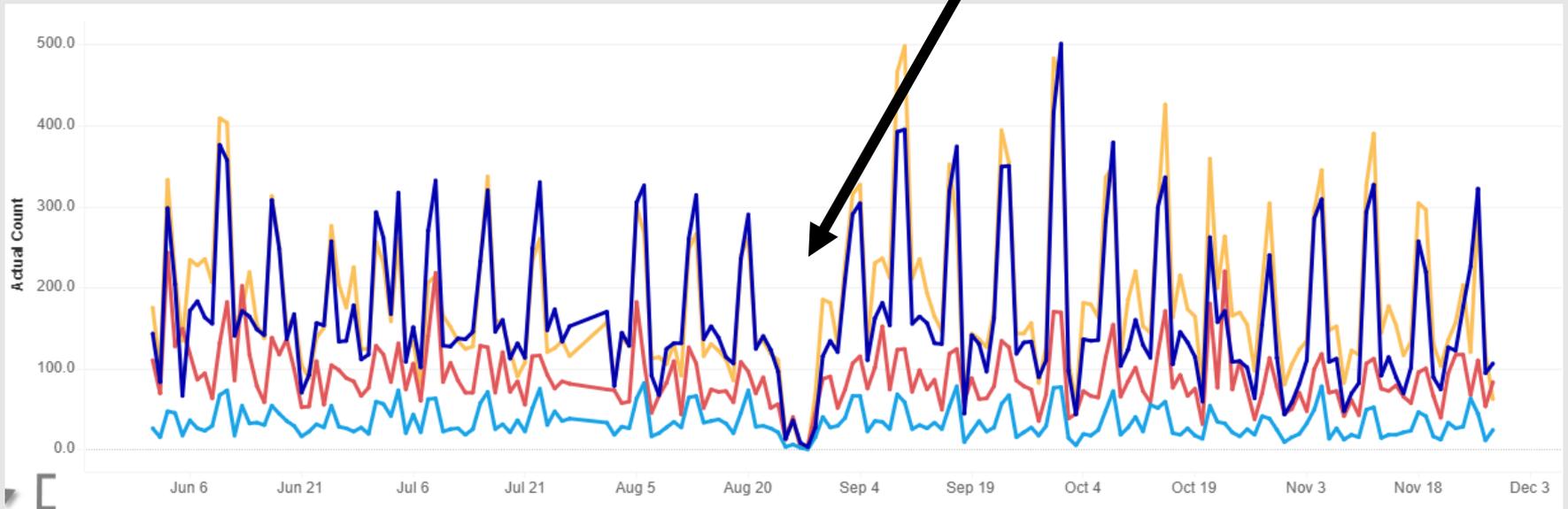
SB	Pedestrians only	5/25/2016 16:00	21
SB	Pedestrians only	5/25/2016 16:15	48
SB	Pedestrians only	5/25/2016 16:30	37
SB	Pedestrians only	5/25/2016 16:45	37
SB	Pedestrians only	5/25/2016 17:00	50
SB	Pedestrians only	5/25/2016 17:15	45
SB	Pedestrians only	5/25/2016 17:30	59
SB	Pedestrians only	5/25/2016 17:45	82
SB	Pedestrians only	5/25/2016 18:00	78
SB	Pedestrians only	5/25/2016 18:15	95
SB	Pedestrians only	5/25/2016 18:30	83
SB	Pedestrians only	5/25/2016 18:45	103
SB	Pedestrians only	5/25/2016 19:00	180
SB	Pedestrians only	5/25/2016 19:15	151
SB	Pedestrians only	5/25/2016 19:30	175
SB	Pedestrians only	5/25/2016 19:45	164
SB	Pedestrians only	5/25/2016 20:00	148
SB	Pedestrians only	5/25/2016 20:15	98
SB	Pedestrians only	5/25/2016 20:30	83
SB	Pedestrians only	5/25/2016 20:45	50
SB	Pedestrians only	5/25/2016 21:00	25
SB	Pedestrians only	5/25/2016 21:15	33
SB	Pedestrians only	5/25/2016 21:30	19
SB	Pedestrians only	5/25/2016 21:45	11
SB	Pedestrians only	5/25/2016 22:00	9
SB	Pedestrians only	5/25/2016 22:15	6
SB	Pedestrians only	5/25/2016 22:30	2
SB	Pedestrians only	5/25/2016 22:45	1
SB	Pedestrians only	5/25/2016 23:00	2

NB	Pedestrians only	5/25/2016 16:00	27
NB	Pedestrians only	5/25/2016 16:15	21
NB	Pedestrians only	5/25/2016 16:30	20
NB	Pedestrians only	5/25/2016 16:45	24
NB	Pedestrians only	5/25/2016 17:00	33
NB	Pedestrians only	5/25/2016 17:15	28
NB	Pedestrians only	5/25/2016 17:30	36
NB	Pedestrians only	5/25/2016 17:45	58
NB	Pedestrians only	5/25/2016 18:00	54
NB	Pedestrians only	5/25/2016 18:15	67
NB	Pedestrians only	5/25/2016 18:30	45
NB	Pedestrians only	5/25/2016 18:45	50
NB	Pedestrians only	5/25/2016 19:00	60
NB	Pedestrians only	5/25/2016 19:15	36
NB	Pedestrians only	5/25/2016 19:30	35
NB	Pedestrians only	5/25/2016 19:45	37
NB	Pedestrians only	5/25/2016 20:00	21
NB	Pedestrians only	5/25/2016 20:15	17
NB	Pedestrians only	5/25/2016 20:30	18
NB	Pedestrians only	5/25/2016 20:45	24
NB	Pedestrians only	5/25/2016 21:00	36
NB	Pedestrians only	5/25/2016 21:15	46
NB	Pedestrians only	5/25/2016 21:30	136
NB	Pedestrians only	5/25/2016 21:45	228
NB	Pedestrians only	5/25/2016 22:00	395
NB	Pedestrians only	5/25/2016 22:15	265
NB	Pedestrians only	5/25/2016 22:30	126
NB	Pedestrians only	5/25/2016 22:45	9
NB	Pedestrians only	5/25/2016 23:00	10

Movie in the Park

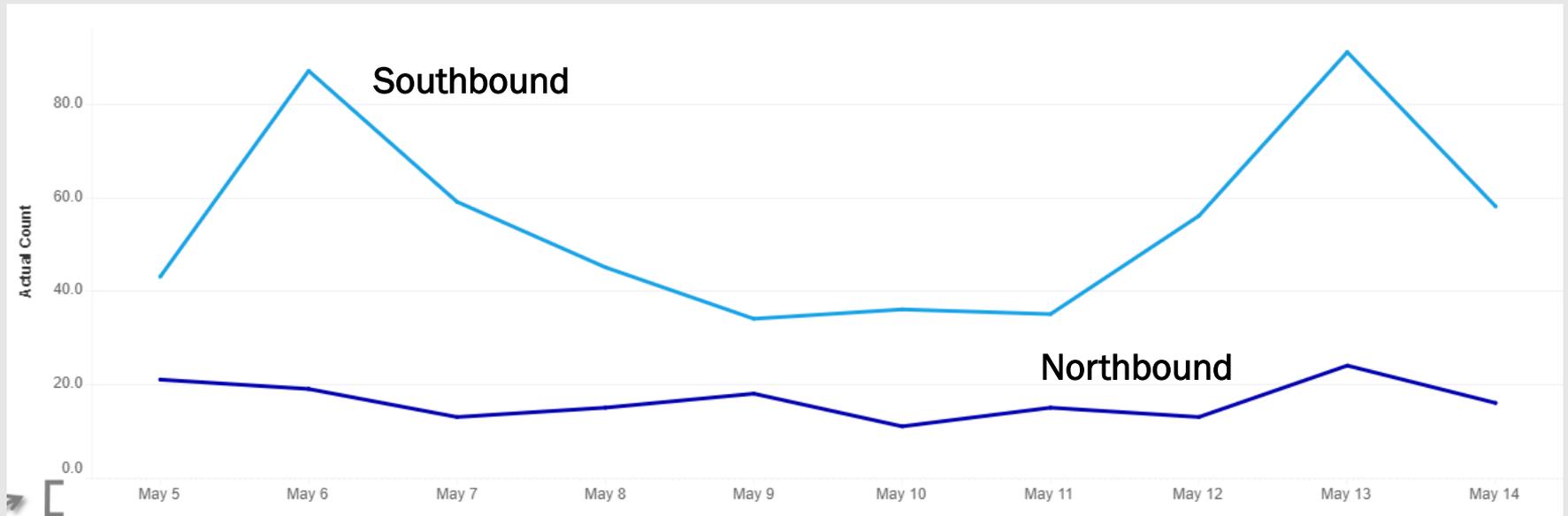


Hurricane Harvey, Houston





Wrong-Way Riders



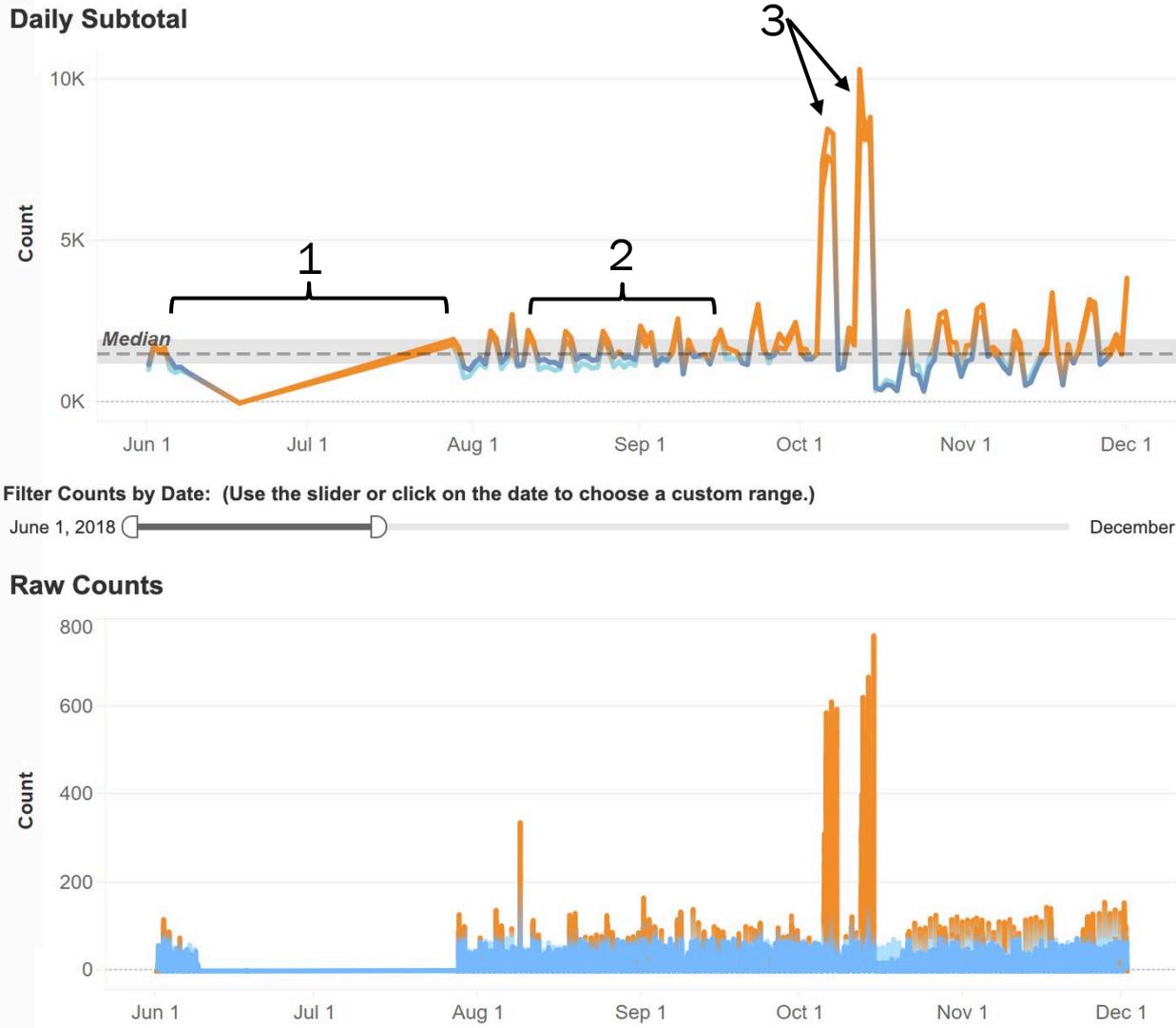


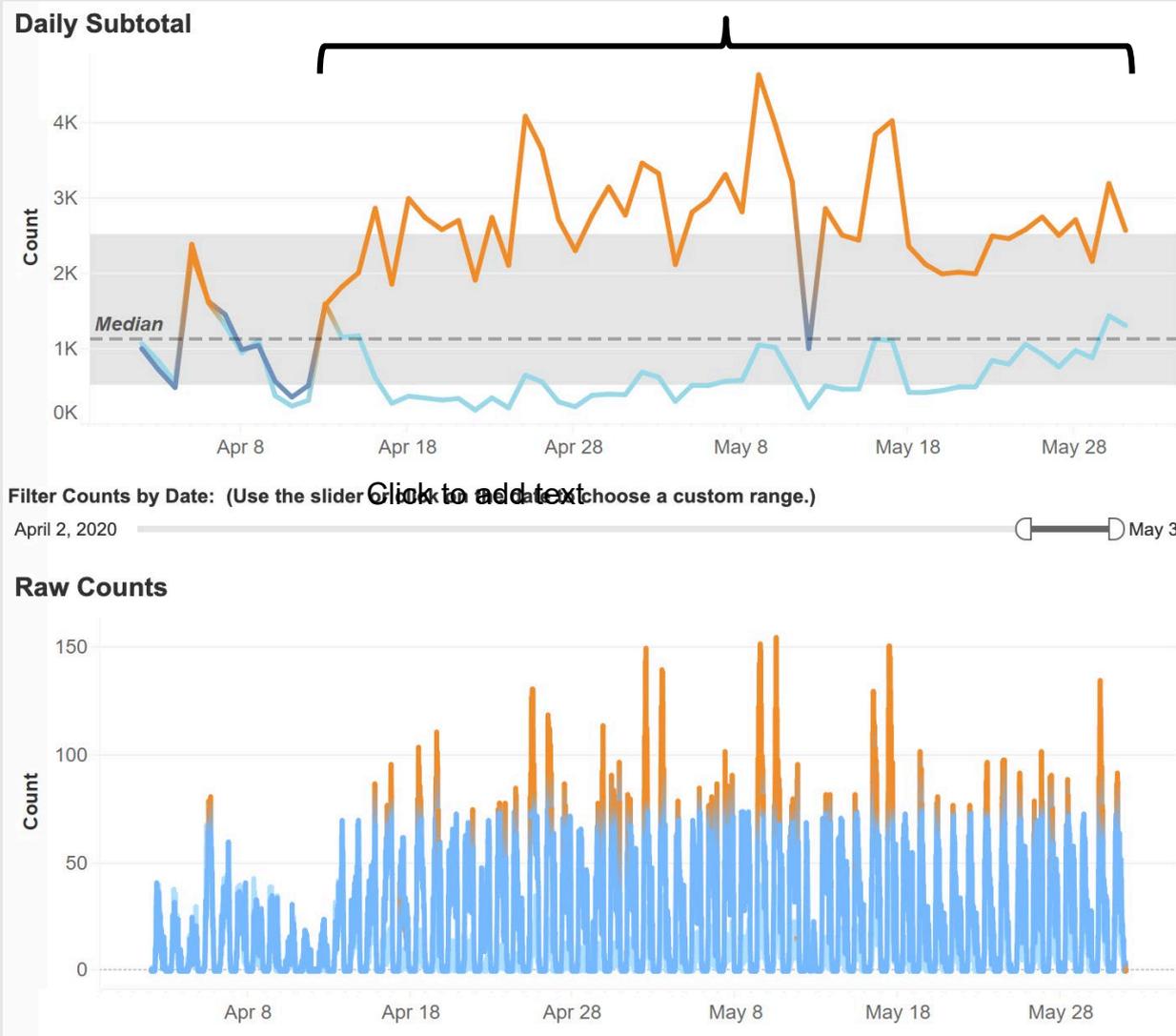
- Rainy or Snowy Days
- Wrong-Way Riders
- Unequal Directional Splits
- Count Spikes Overnight
- Count Spikes Before/After Counter Error

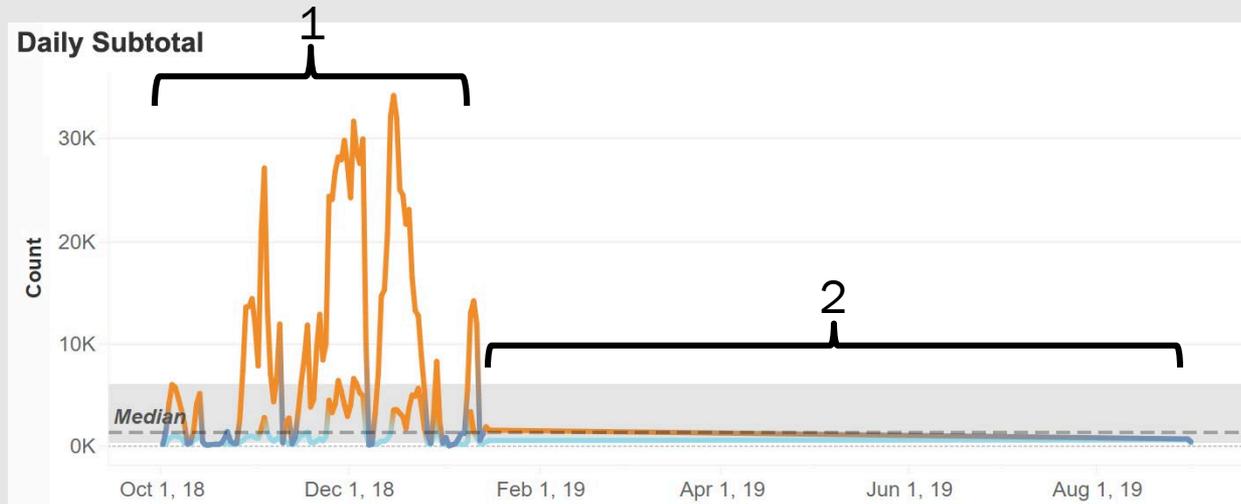
Try to connect the Behavior with the Count.

Quiz Time!





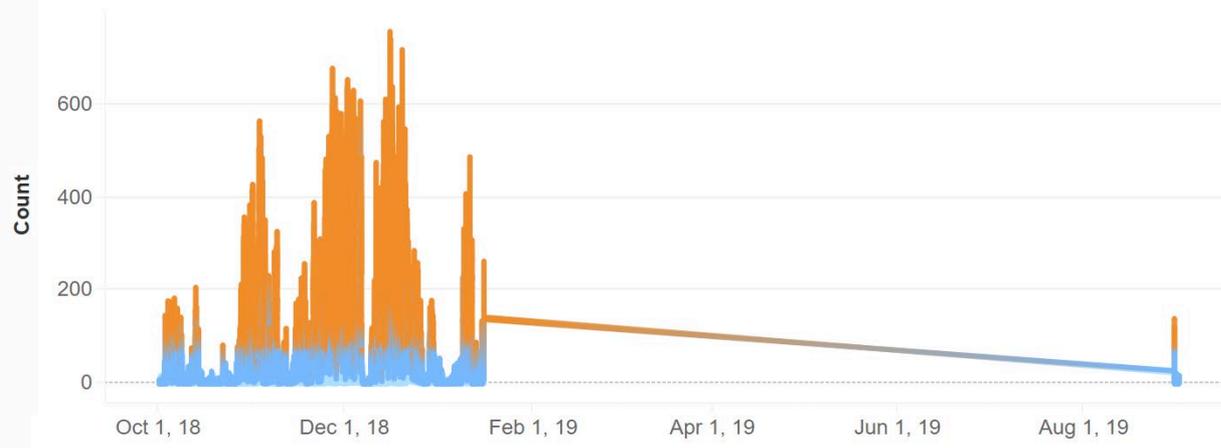


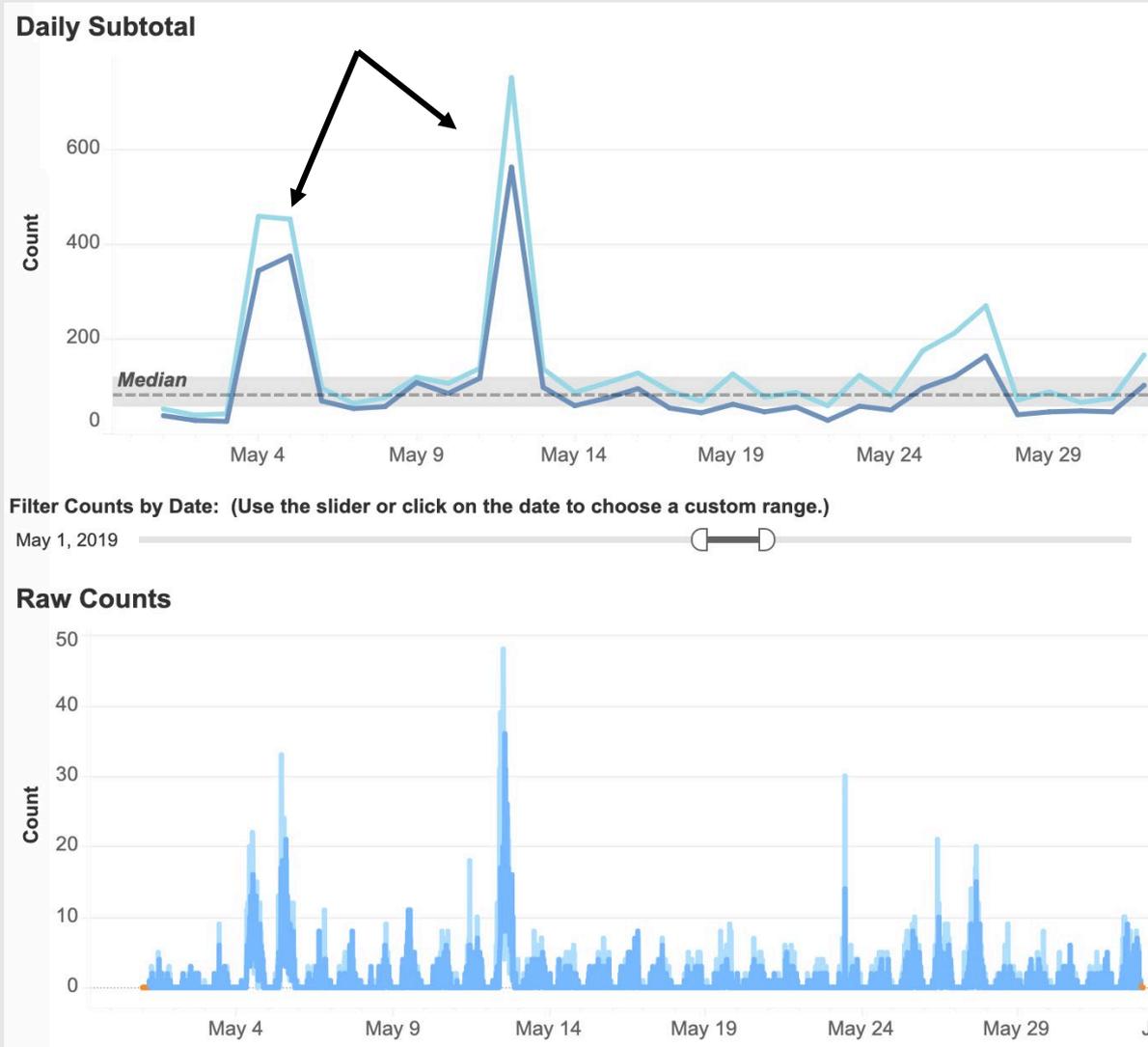


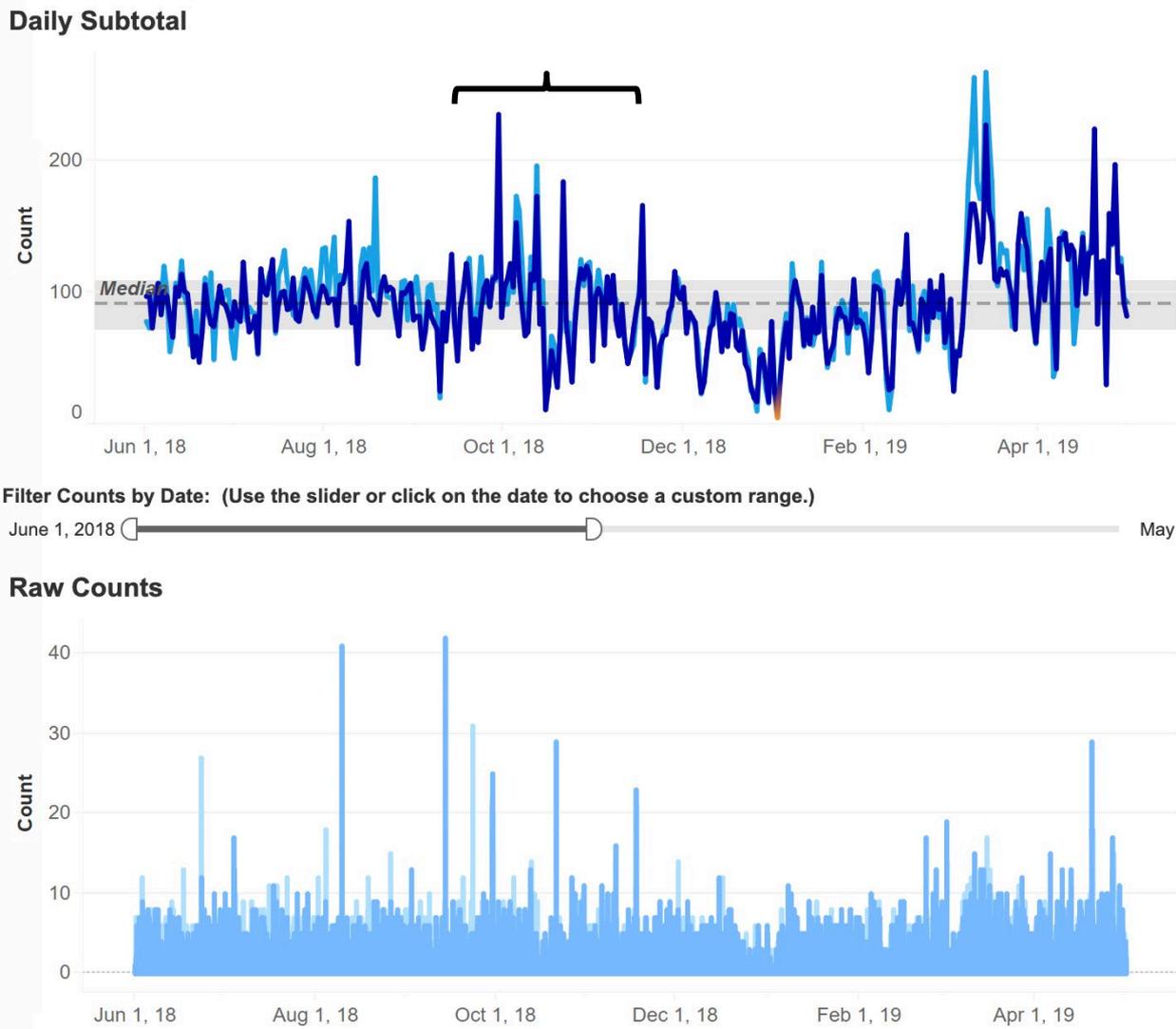
Filter Counts by Date: (Use the slider or click on the date to choose a custom range.)

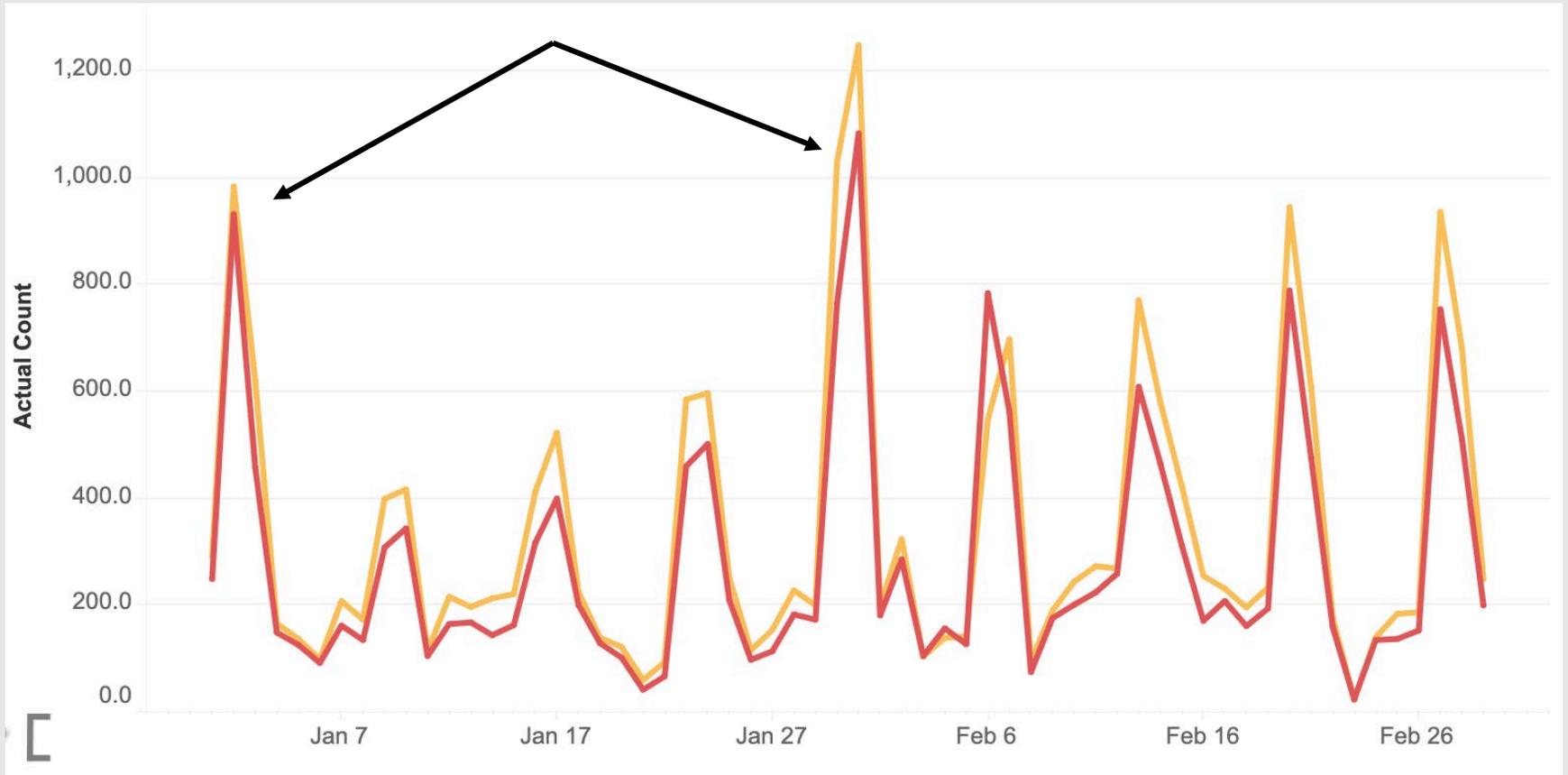


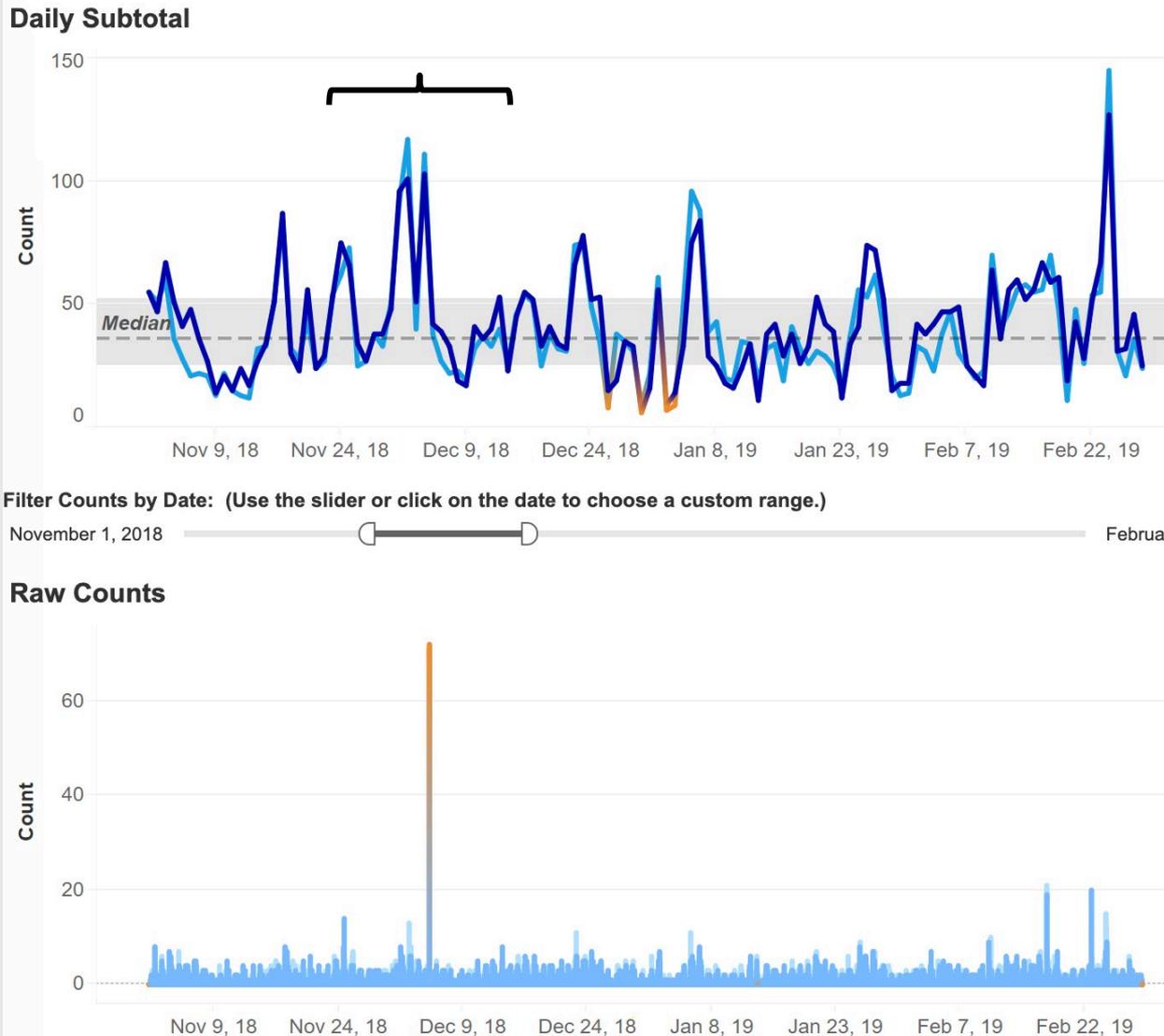
Raw Counts

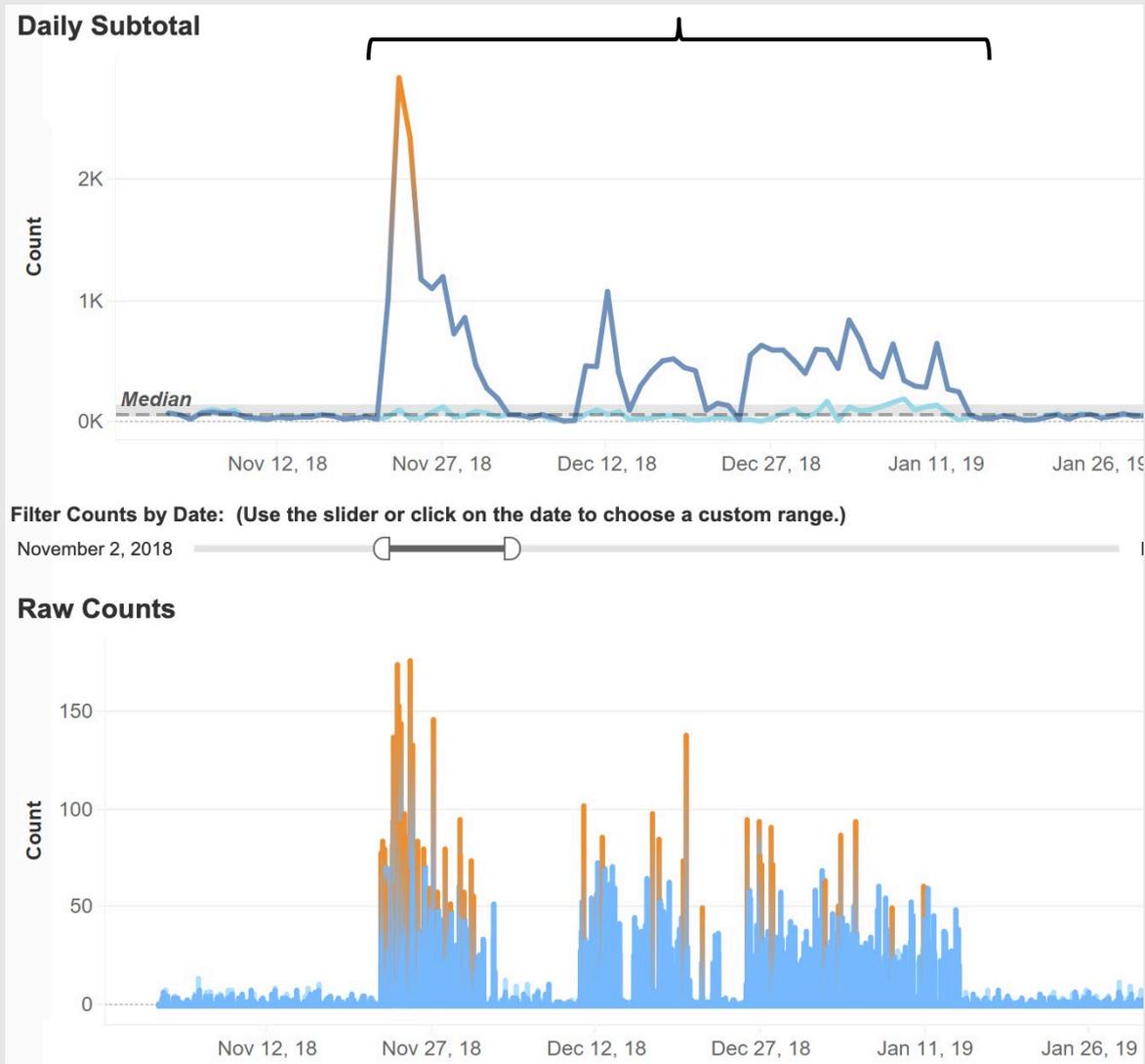


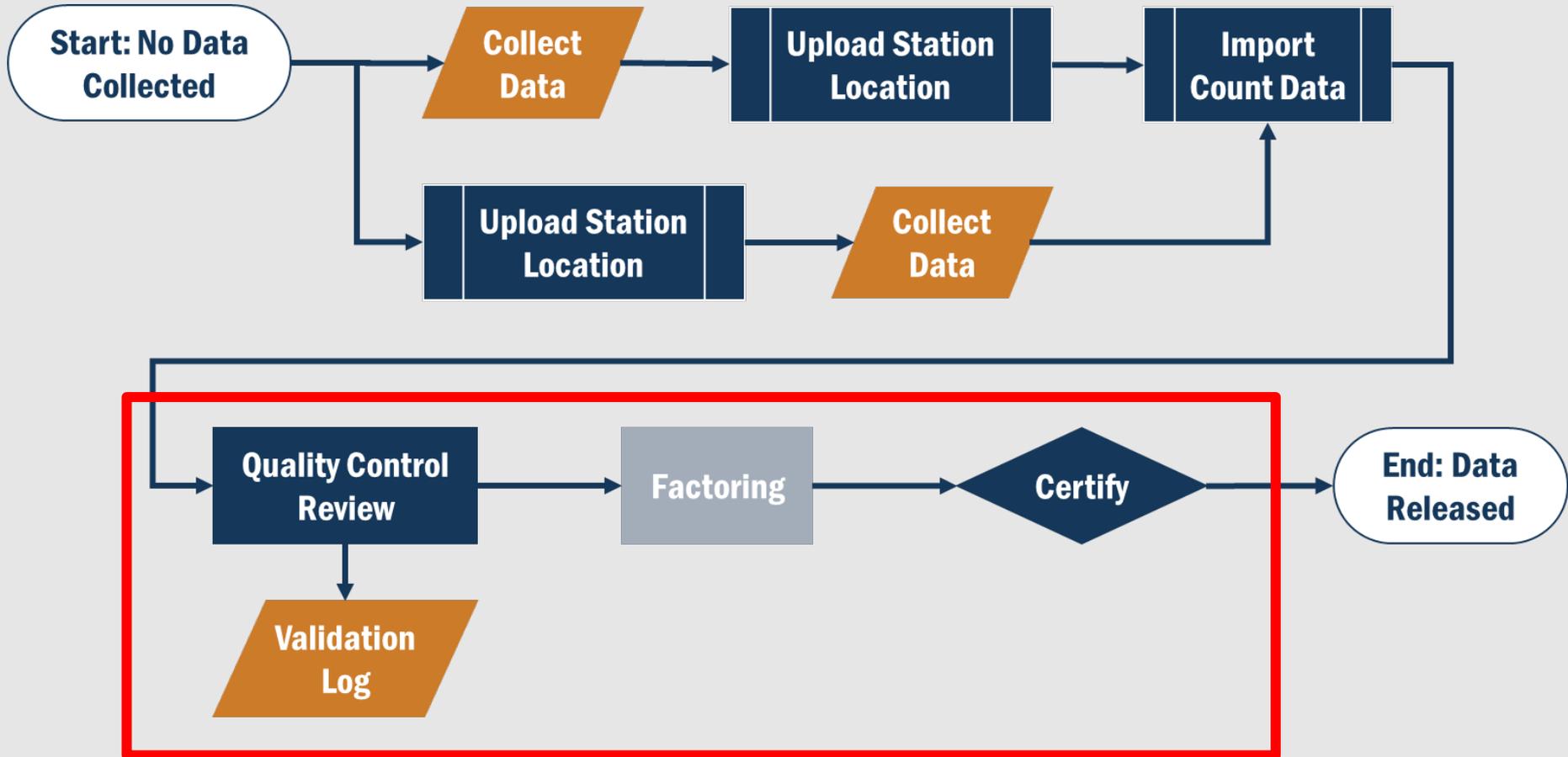














- **Review the Metadata.**
 - Correct errors before reviewing counts.
- **Review the Counts.**
 - Visually inspect the broad pattern.
 - What's the context?
 - Do the new data match previous counts?
 - Do they seem reasonable?
 - What is happening at this location?
 - Identify potential problem areas.
- **Visually Inspect Problem Areas.**
- **Flag Suspect Counts.**
- **Log Flagged Data for Potential Reasons.**
- **Certify the Review.**

Live Demo of the BP | CX





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 - 512-407-1113

For 3 hours of AICP CM Credit:

[Link included after webinar.]





- In the works this year:
 - Apply and annotate factors to your data.
 - View AADNMT counts in the public view.
 - Create custom reports (we need your input!)
 - Improve system performance to speed load times.
- In the future:
 - Use AI to automate most of the QC process.
 - Improve data management tools.
 - Implement user-suggested improvements.



- Access to data quality review tools.
- Access to data summary and visualization tools.
- Access to seasonal adjustment factors and tools (in future).
- Ability to coordinate with other local agencies for count locations.
- Ability to download datasets from peer cities to establish benchmarks.
- Ability to easily share your data with decision-makers, colleagues, and the public.
- Demonstrate increased bicycling and walking in your community to support active transportation investments.
- If desired, contributing to a statewide submission of bicycle and pedestrian count data to FHWA's Travel Monitoring System (TMAS).