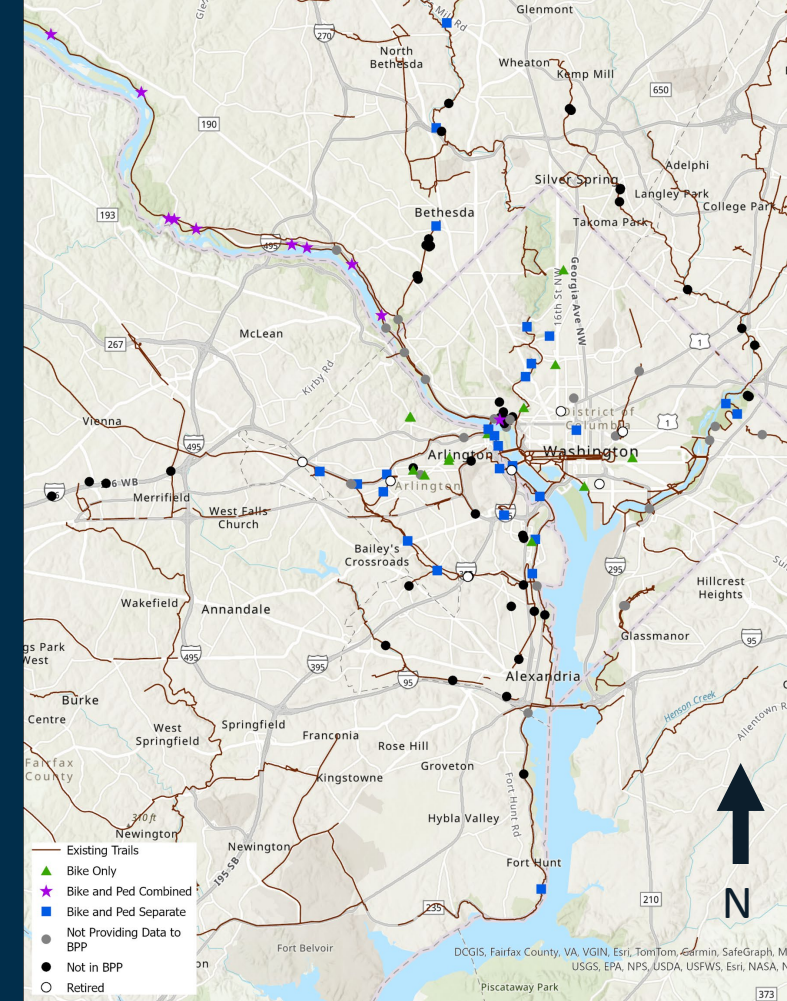


National Capital Region (NCR) Trail Monitoring and Analysis Program

Funded by the National Park Service

UNC HSRC: Krista Nordback, PI, Sarah O'Brien, Co-PI;
Sarah Baydon; Mike Vann

Virginia Tech: Ralph Buehler (Arlington) and
Steve Hankey (Blacksburg); Vahid Bakhshi; Md Shazalal Tushar
Portland State University: Tammy Lee
Basem Elazzabi



September 17, 2024

Agenda

- Scope
- Validation
- Troubleshooting
- New Counter Installation
- Big Data & Data Fusion
- Data Dashboard



Scope – 5-Year Project

- Task Area 1: Jurisdiction Coordination (UNC)
- Task Area 2: **Maintenance** of Automated Counters and Siting New Counters (VT and UNC and All)
- Task Area 3: Creation of Shared Regional Database and **Public Dashboard** and Data Monitoring (PSU and All)
- Task Area 4: Analysis and Reporting (UNC)
- Task Area 5: Explore Big Data Procurement and Analysis (VT)
- Task Area 6: Install Counters

National Capital Region Trail Count Program

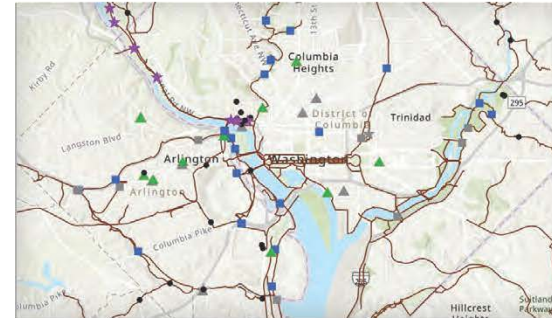
December 2023 Update



The Washington, DC region has **160** trail counters (with more on the way), one of the largest regional count programs in the country.



Photo by Dani Moore



Data from **90** counters uploaded and viewable in our Dashboard (<https://bikeped.trec.pdx.edu/>).

Uniting data from **4** agencies: **Arlington County, City of Alexandria, National Park Service, District Department of Transportation**



10 students assisted with the project, as well as an additional **8** students from a Computer Science capstone group at Portland State University



60 stakeholders from **24** different agencies and organizations attended **4** regional meetings.



Photo by Dani Moore

Made possible by a partnership between the National Park Service, District Department of Transportation, University of North Carolina, Virginia Tech, and Portland State University, the Trail Count Program is creating the most comprehensive portrait of trail use the Washington, DC region has ever had. This document highlights key project outcomes as of December 31, 2023.

Validation

Professors Ralph Buehler (Arlington) and Steve Hankey (Blacksburg); Vahid Bakhshi; **Md Shazal Tushar**



www.hsrc.unc.edu

September 17, 2024

Purpose of validation

- Ensure counters are counting accurately enough

If yes:

Use validation data to develop correction factor

If no:

Troubleshoot the counter



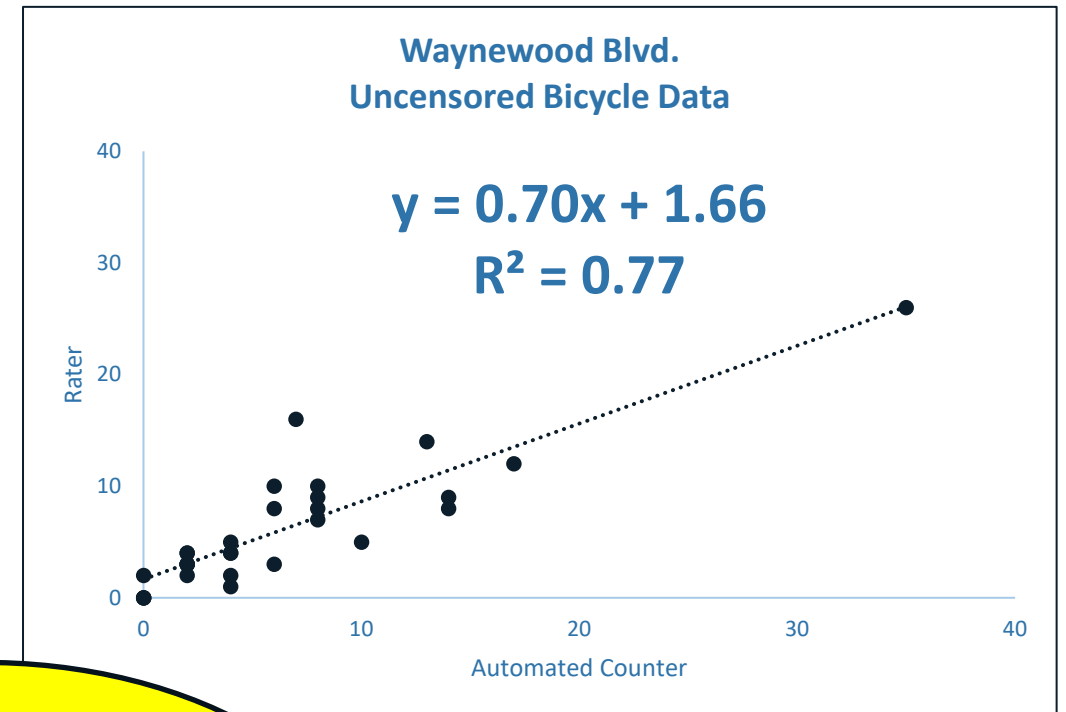
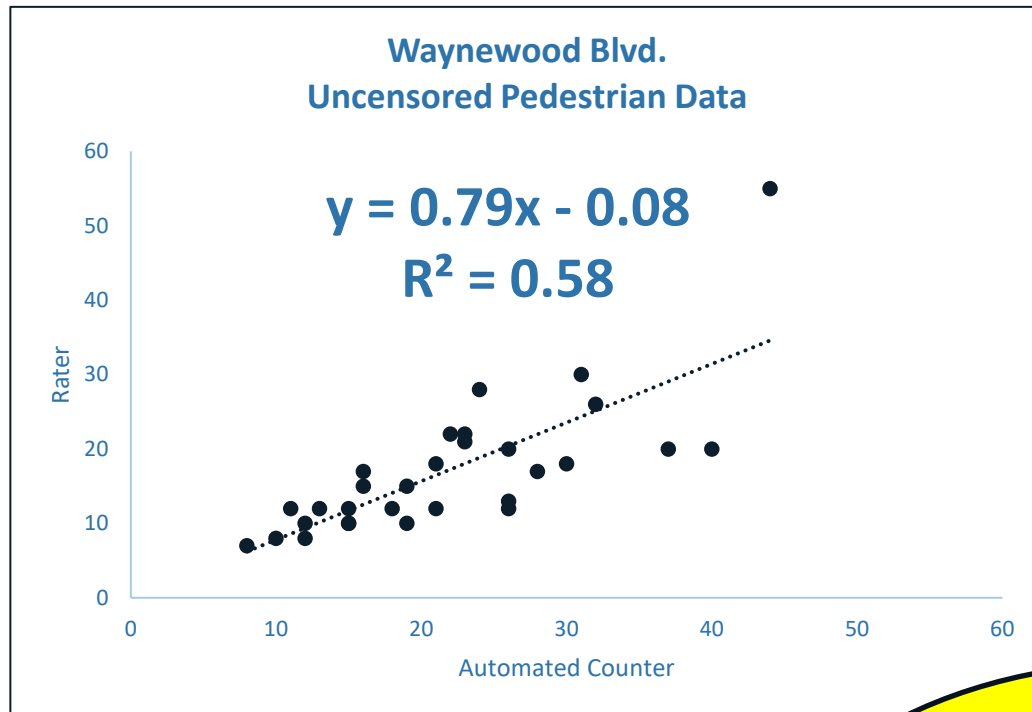
Formal validation procedure

- Install video camera near counter
- Record 30 hours of trail use
- Count trail users in video
- Compare human counts to device counts



2023-03-08T16:30:00-05:00	32
2023-03-08T16:45:00-05:00	33
2023-03-08T17:00:00-05:00	61

Formal validation procedure



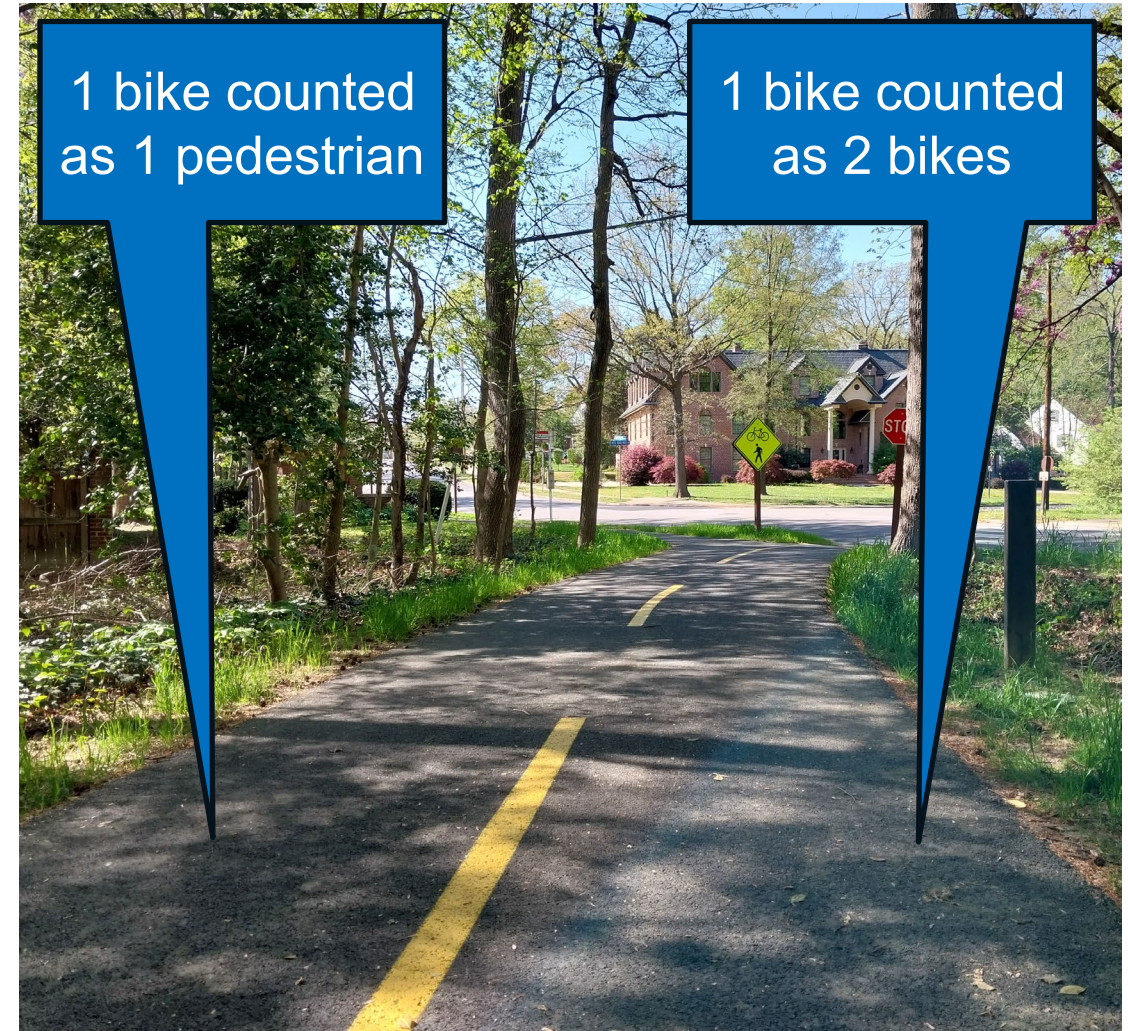
Yikes! Looks like this counter isn't counting as accurately as we would like!

Case Study 1: MVT @ Waynewood Boulevard, Fort Hunt, Virginia



Waynewood Boulevard Field Validation Results

- Bikes in east lane were being counted twice
- Bikes in west lane were not being counted as bikes but were being counted as pedestrians



West Lane

(Facing North)

East Lane

Waynewood Boulevard Counter Performance

Trail	March 2023
Pedestrian	357%
Bicyclist	88%

Percent of trail users recorded by device

Waynewood Boulevard Intervention



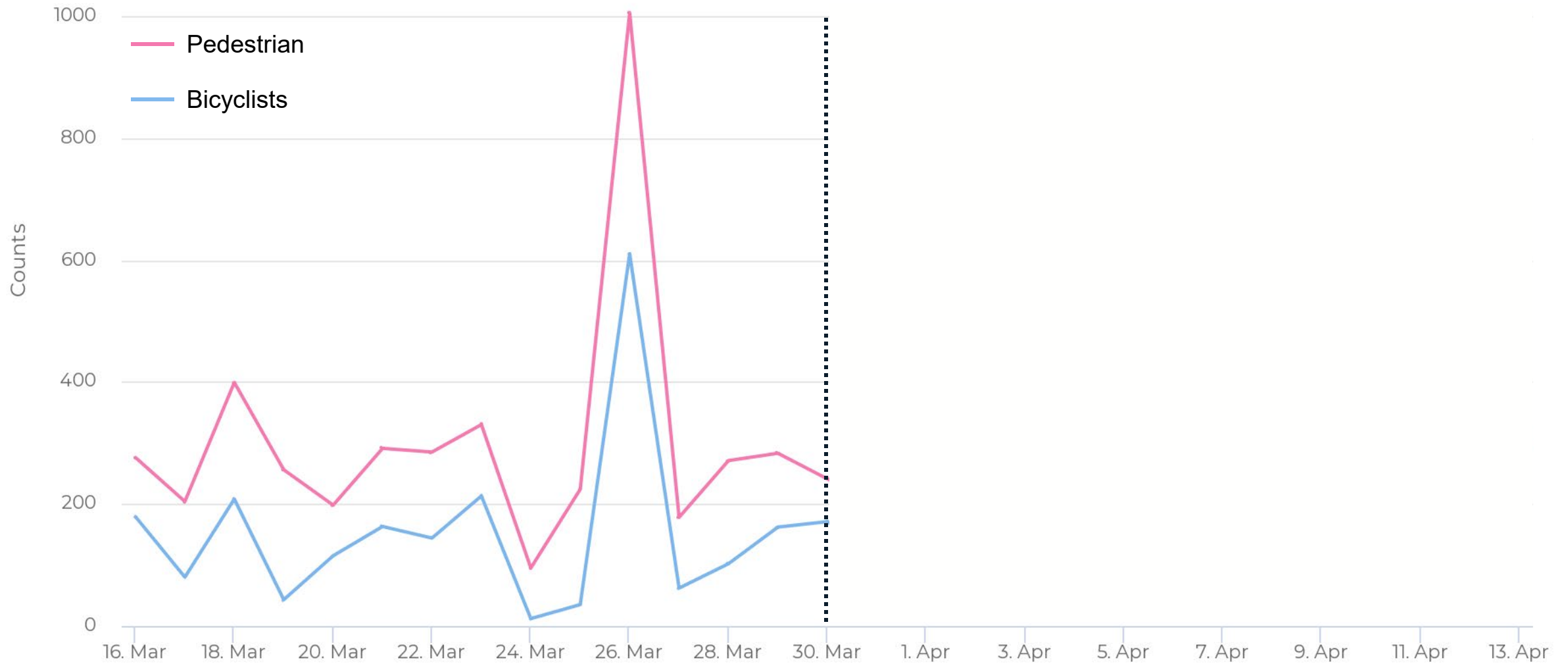


Waynewood Boulevard Counter Performance

Trail	March 2023	April 2023
Pedestrian	357%	112%
Bicyclist	88%	102%

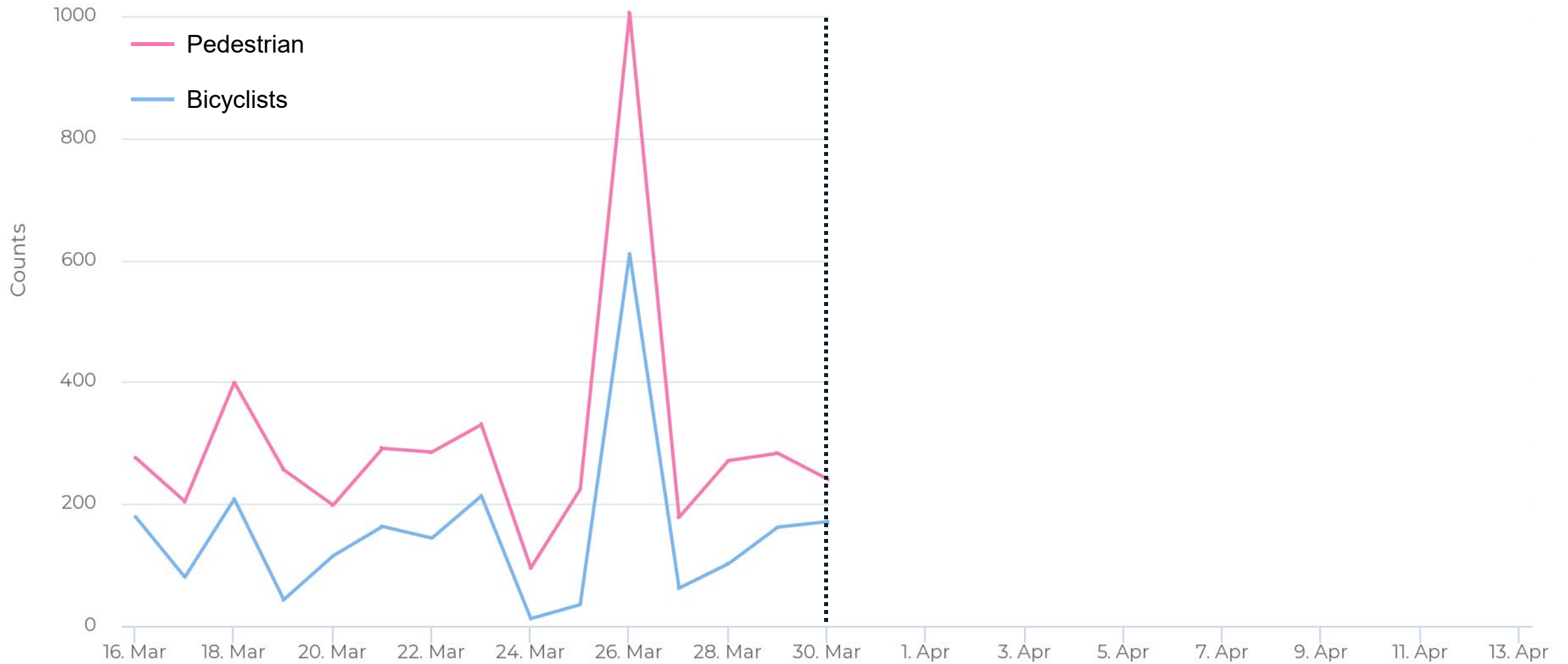
Percent of trail users recorded by device

Poor counter performance not obvious in data

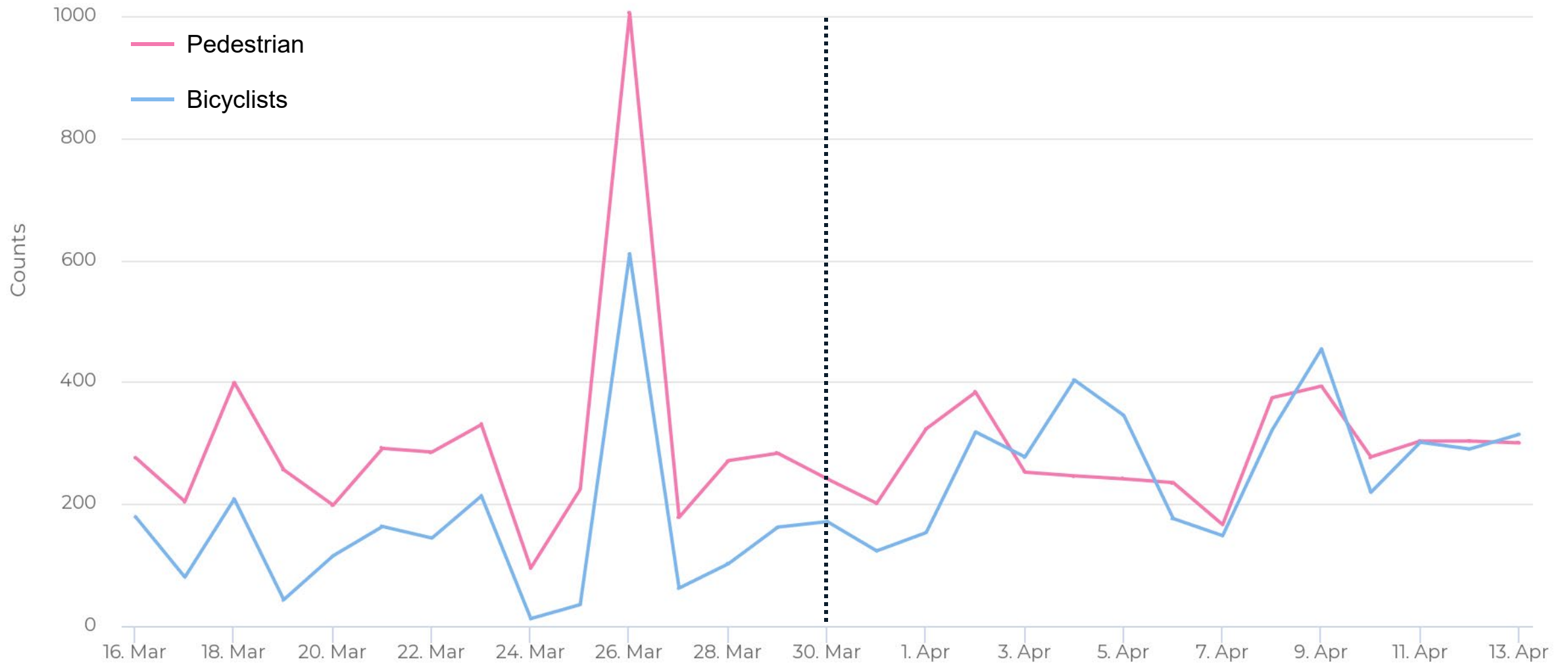


Bad data → Bad decisions

Bad data leads to bad decisions



Bad data leads to bad decisions



The importance of validation

- Good decisions require good data
- You only know your data is good if you validate it
- Validation is essential!

Troubleshooting



www.hsrc.unc.edu

September 17, 2024



Maintenance

- Daily examination of online data to spot signs of trouble
- Follow-up visits as needed when data looks off
- Monthly or quarterly visits for visual inspection and remediation, if needed
- Annual or bi-annual trips to replace batteries
- Quick checks to verify correct counting following any maintenance, i.e. bug removal, battery replacement

Maintenance and Validation are closely linked

- Errors arise from:
 - Installation and set up oversights
 - Battery failure
 - Insect infestations and activity
 - Human-caused events
 - Water damage, especially if electrical connections not protected properly.
- Resolving the errors requires on-site maintenance



Some of the many reasons established counters can miscount

Pollen blocking pyro lens - moving about



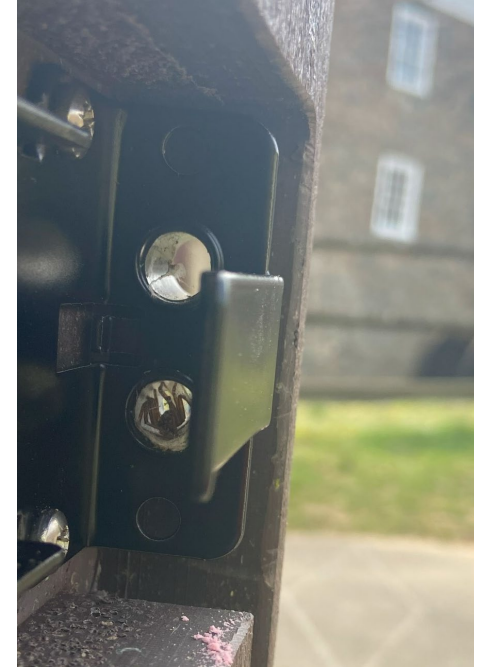
Sticker covering pyro lens -



Bug debris on lens



Spider



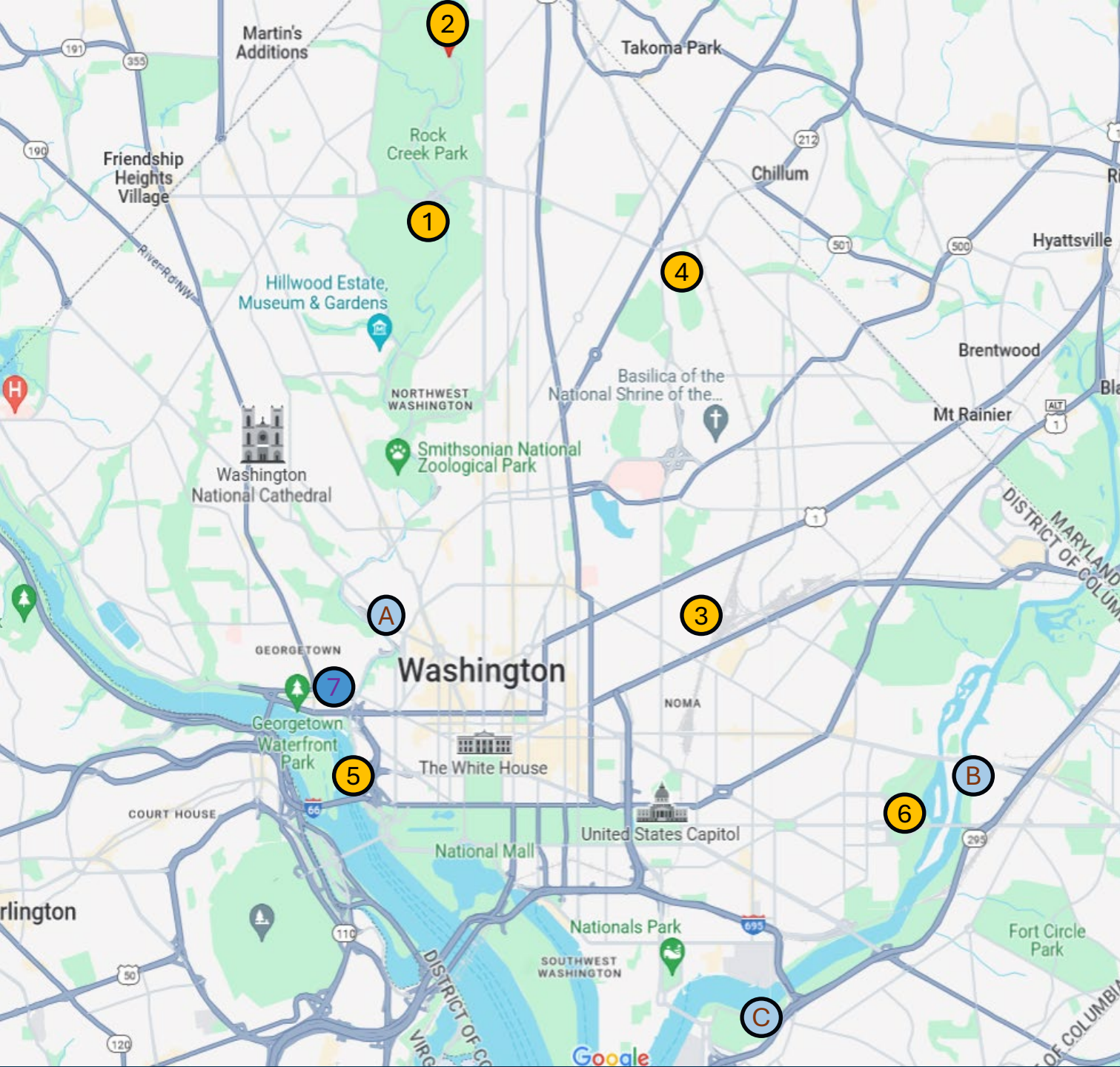
Holes invite cocoons of all sorts



New Counter Installation



www.hsrb.unc.edu



Approximate Locations of New Multi Counters

- 1 ROCR-Beach Drive: US Park Police
- 2 ROCR-Beach Drive: Picnic Grove 10
- 3 MBT: Alethia Tanner Park
- 4 MBT: Fort Totten
- 5 ROCR: Tunnel under Theodore Roosevelt Bridge
- 6 Anacostia River Trail: West Bank

Zelt only counter:

- 7 Virginia Ave NW Cycle Track (bikes only) - Tentative

Approximate Locations of Counters to Repair

- A P Street b@ Rose Park
- B ART – River Terrace
- C ART – 11th Street SE

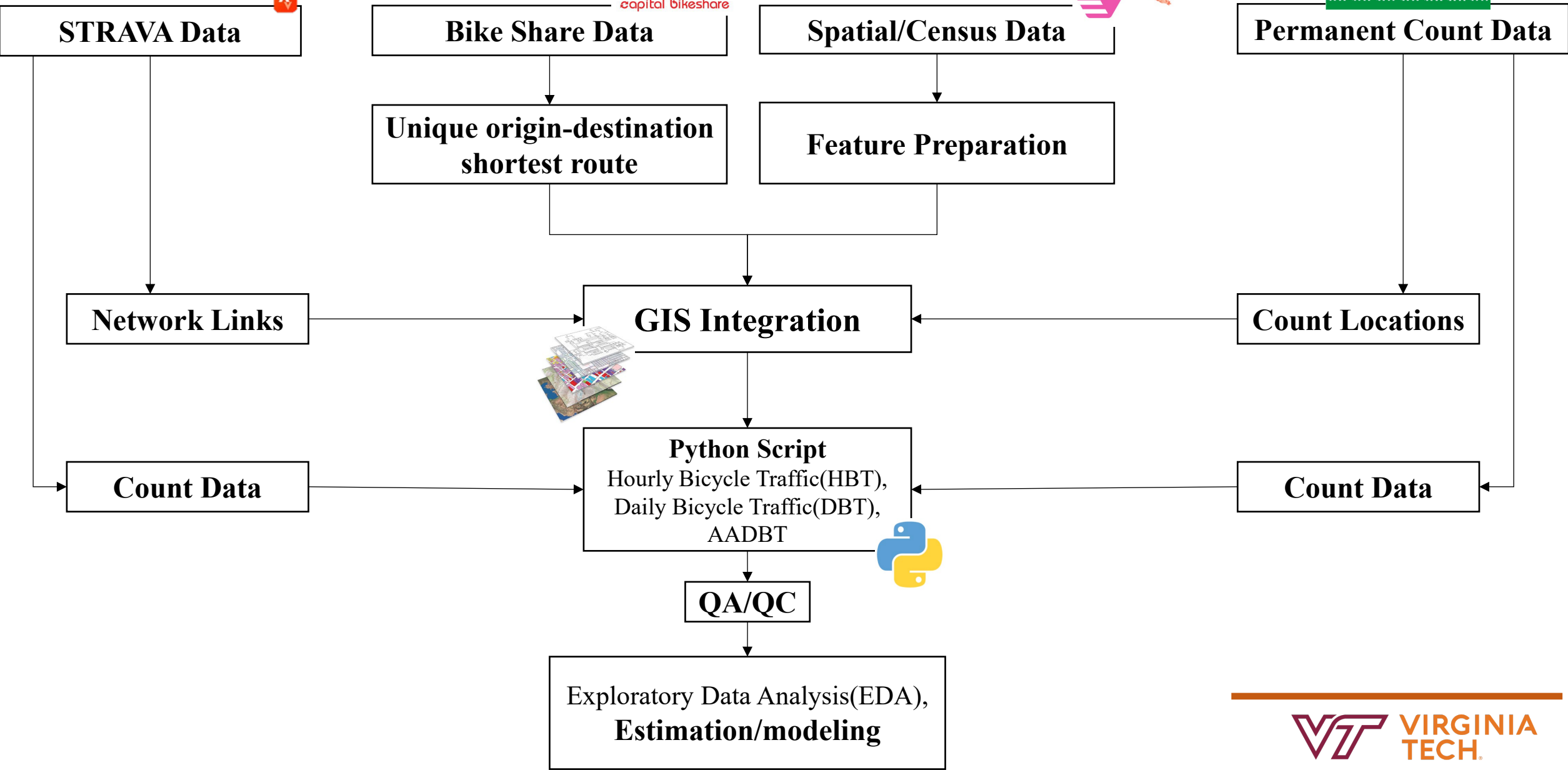
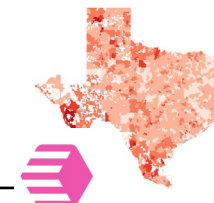
Big Data & Data Fusion

Vahid Bakhshi



www.hsrc.unc.edu

Estimation Framework Overview



Data Dashboard: Bike Ped Portal

Tammy Lee,
Basem Elazzabi

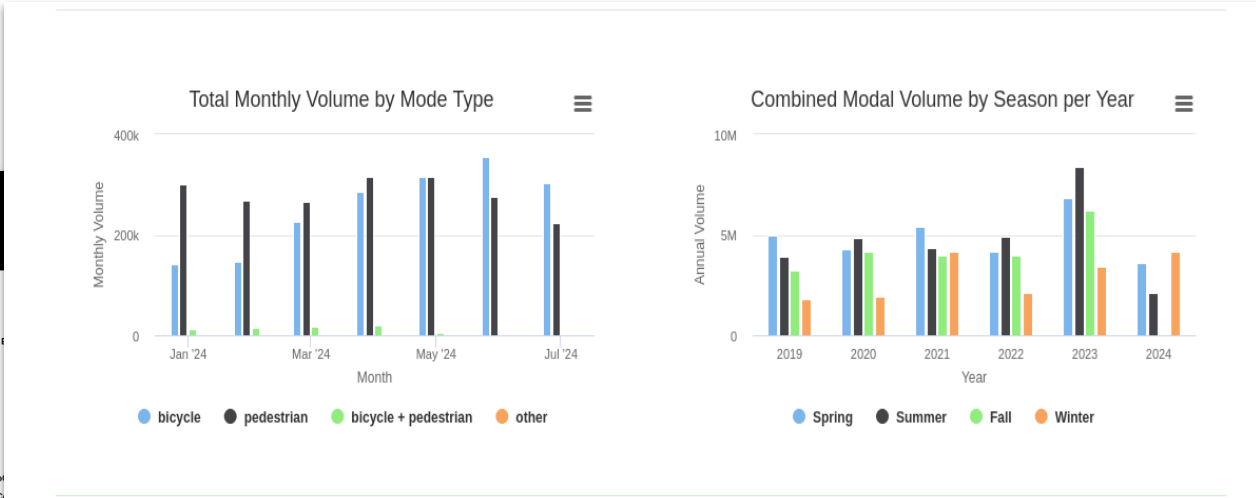
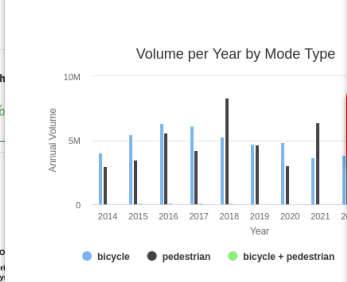
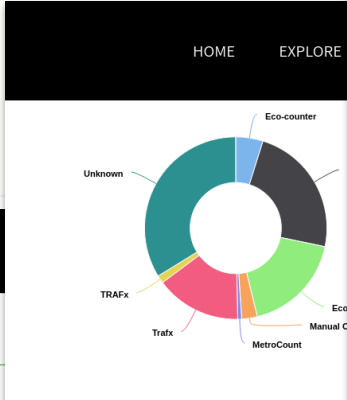
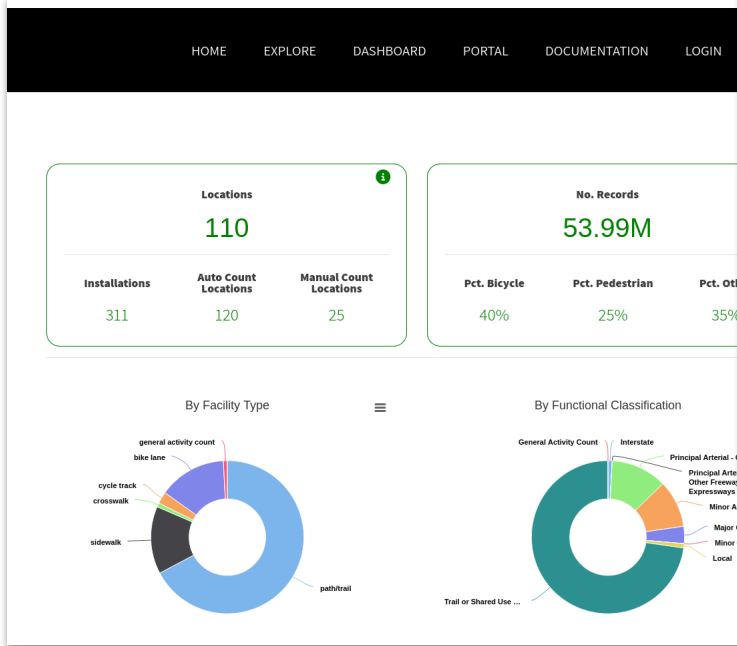


A screenshot of the Bike Ped Portal dashboard. The top navigation bar includes "BikePed Portal", "HOME", "EXPLORE", and "DASHBOARD". Below this is a "Select Data Set" button with a location pin icon and a notification badge with the number "1". The main area displays a map of the National Capital Region, with a red shaded area covering the region. A search bar is visible on the right, and a sidebar menu lists "Select Regions of interest" and "National Capital Region". The map shows various counties and cities, including Chambersburg, Hanover, Hagerstown, Westminister, Martinsburg, Frederick, Towson, Baltimore, Winchester, Leesburg, iithersburg, Glen Burnie, District of Columbia, Manassas, Waldorf, Culpeper, Fredericksburg, and Lexington P.

Public Dashboards & Data Exploration Map

Dashboards

BikePed Portal offers the ability for data owners to create regional dashboards and choose to make them public or keep them private.



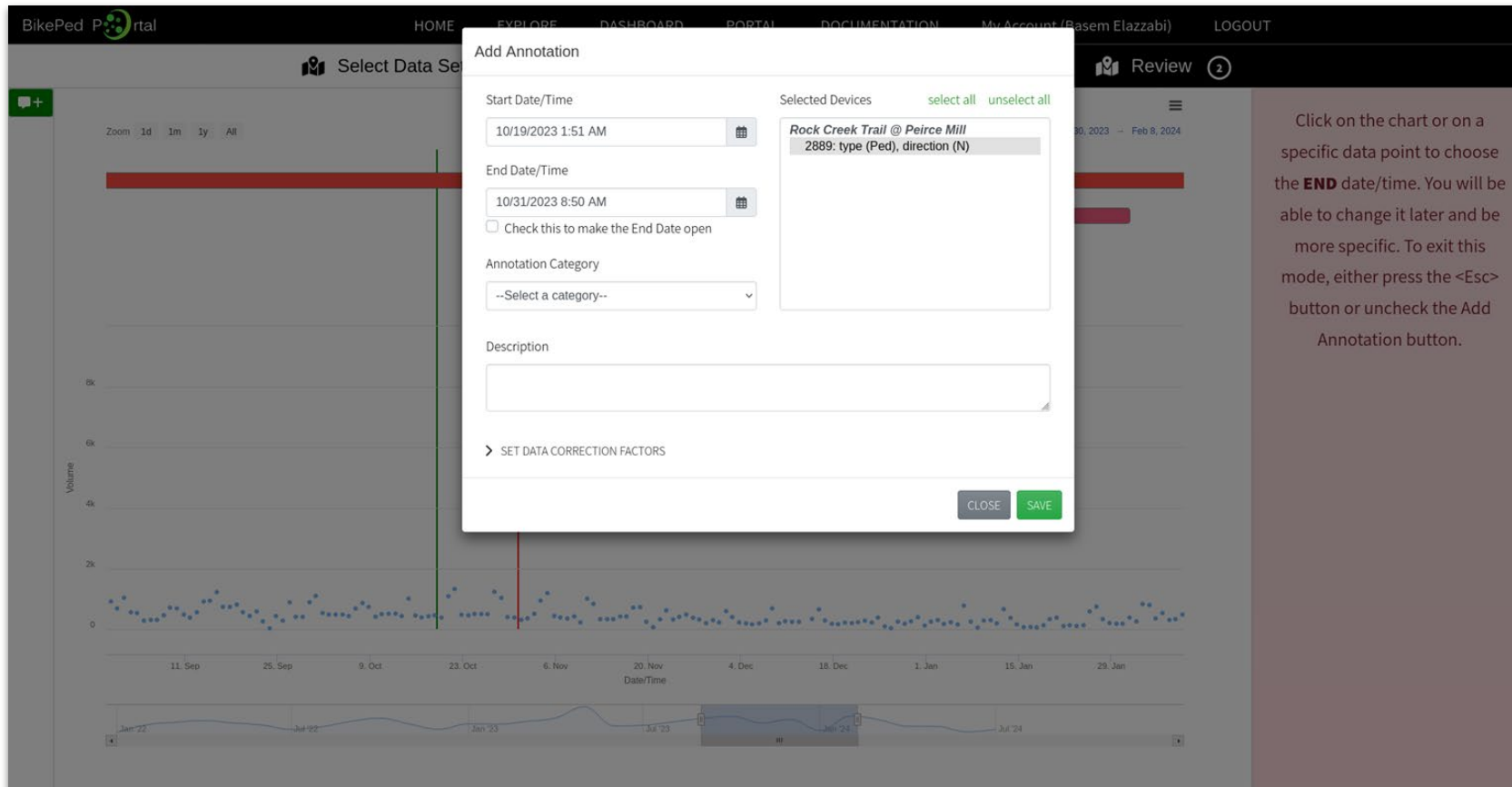
Top 10 Locations - Pedestrian Volume (past 7 days from 2024-07-30)

Location	City	State	Weekly Volume	Daily Volume
Key Bridge	Arlington	VA	23180	
Capital Crescent Trail #1@ Bethesda Ave	Bethesda	MD	12802	
Mt. Vernon Trail (Theodore Roosevelt Island)	Arlington	VA	8305	
Ballston Connector	Arlington	VA	4715	
W&OD Trail (Columbia Pike)	Arlington	VA	4440	
W&OD Trail (East Falls Church)	Arlington	VA	3569	

Tools, QA/QC & Product Development

Annotations

Parade? Battery died? Keep track of events to provide additional context to anomalous and suspicious data.



Correction Factor

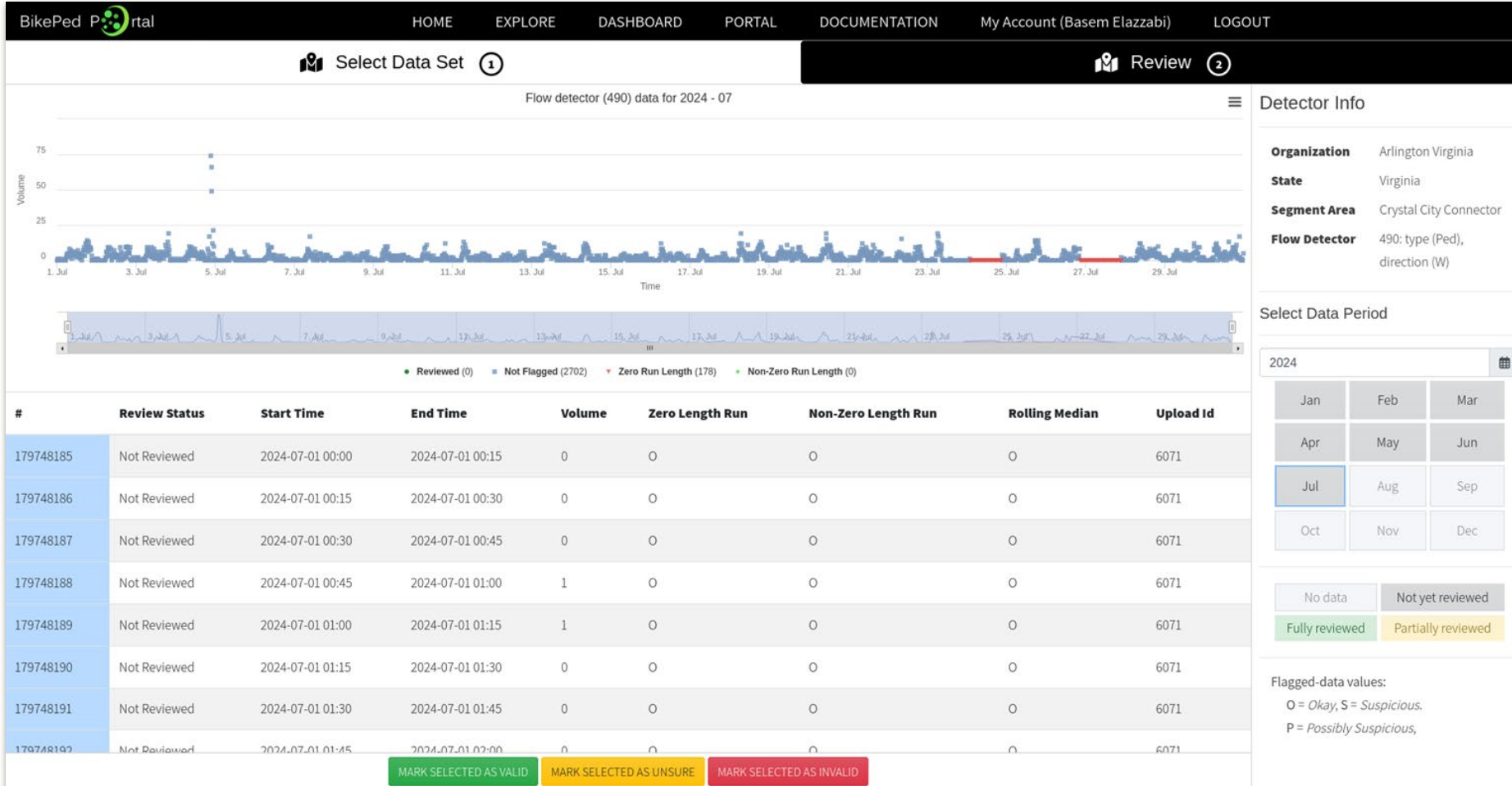
Calibrated the detector and know it's off by a factor of 1.75? Add a correction factor to the data. Both raw and corrected data are retained and available when downloaded.

Click on the chart or on a specific data point to choose the **END** date/time. You will be able to change it later and be more specific. To exit this mode, either press the <Esc> button or uncheck the Add Annotation button.

List of Annotation Categories

- Construction near or at site
- Event (e.g. parade, race, festival, peaceful gatherings, detours, etc.)
- Maintenance on hardware (battery replacement)
- Maintenance on hardware (other)
- Malfunction
- Outside forces affecting device (e.g. insects, animals, vegetation interference)
- Severe weather event
- **Data Correction**

Tools, QA/QC & Product Development



QA/QC

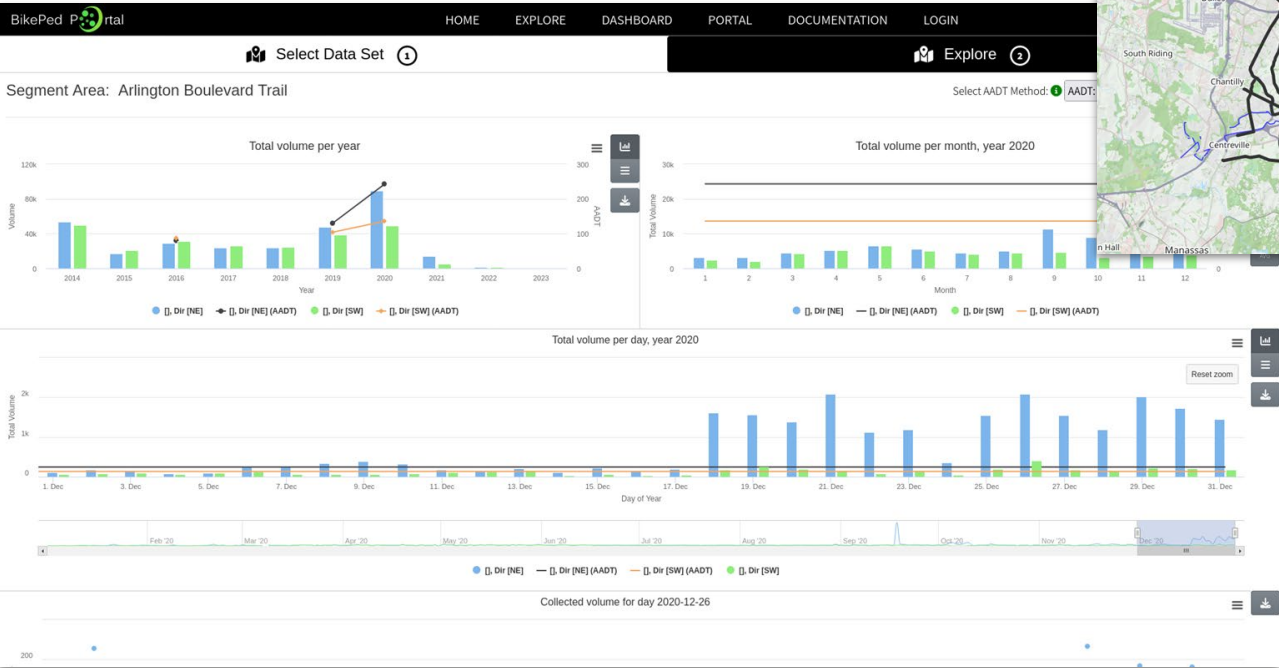
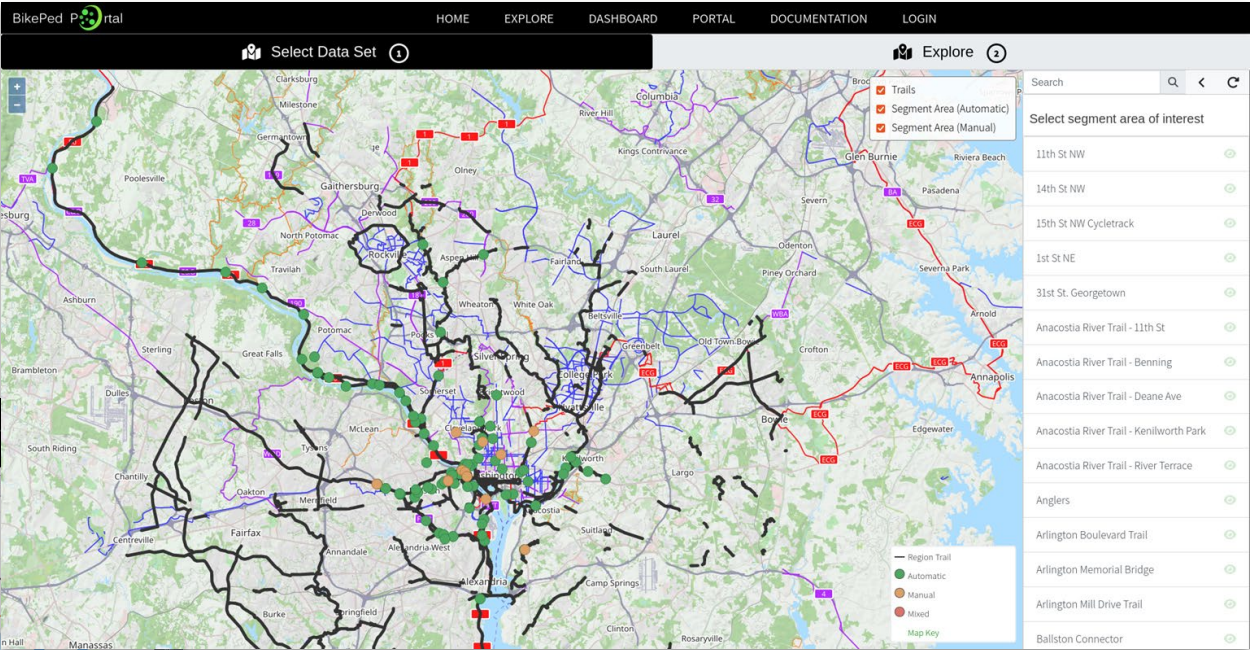
Data checks include:

- Zero run length
- Non zero run length
- Rolling median

Public Dashboards & Data Exploration Map

Data Exploration Map

BikePed Portal offers a publicly-accessible data exploration map. Anyone can explore the data that we have across states, predefined regions, sites, or individual detectors. We are working on adding a much richer data exploration map for data owners.



Thank you!



Krista Nordback, Nordback@hsrc.unc.edu



Stakeholder Organizations

- Jurisdictions
 - City of Alexandria
 - Arlington County
 - District of Columbia
 - Fairfax County
 - Maryland DOT
 - Montgomery County
 - Northern Virginia Transportation Authority
 - Northern Virginia Regional Commission
 - NOVA Parks
 - Prince George’s County
 - Virginia DOT
- National Park Service
 - National Capital Region
 - Chesapeake and Ohio Canal NHP
 - George Washington Memorial Parkway
 - National Capital Parks – East
 - National Mall and Memorial Parks
 - Rock Creek Park
- Nonprofits or Other Stakeholders
 - Capital Trails Coalition (WABA)
 - East Coast Greenway
 - Transportation Planning Board (TPB) / Metropolitan Washington Council of Government (MWCOG)
 - Rails to Trails

Questions?

Krista Nordback

Nordback@hsrc.unc.edu

303-543-0211 cell

Sarah O'Brien

swobrien@hsrc.unc.edu



www.hsrc.unc.edu