

Appendix Two

Who's on the Trail Methodology Report

Since 2005, Parks & Trails New York, with support from the New York State Canal Corporation, has conducted trail counts at dozens of locations along the Canalway Trail. This report describes the methodology used to conduct the counts and to analyze the data gathered. The methodology report is intended to be a companion to the annual Who's on the Trail: Canalway Trail report issued by Parks & Trails New York.

Electronic Count Protocol

PTNY's electronic count process relies on the PYRO-Box counter manufactured by Eco-Counter, a French company that sells a range of pedestrian and bicycle counting products. PTNY currently uses the PYRO-Box counters, Eco-Counter's most popular counter.

The PYRO-Box counter is a simple gray plastic box that can be installed on a sign or fence post or other vertical surface. The counter uses infrared pyroelectric technology to count the people passing within range of the sensor by detecting body temperature. Counters are installed for a minimum of one month, although PTNY prefers to install counters for one year or longer to use actual counts rather than samples of data to estimate full-year counts.

Counter locations are selected by PTNY staff in consultation with NYS Canal Corporation. A site visit is required to ensure that a suitable location can be found for installing the counter, although in some cases this visit occurs while the counter is installed. Counters are installed by PTNY staff, with notification to the state or municipal entity responsible for maintenance on that stretch of the Canalway Trail. Once installed, counters collect data continuously without manual interference or coordination.

To collect recorded data from the counter, PTNY staff visit the counter and use Bluetooth technology to connect the counter to a mobile phone application or laptop program and sync the data. Data is uploaded to Eco-Counter's Eco-Visio software, from which staff can download and analyze the data at 15-minute, one hour, one day, or one-month intervals for each counter.



National Bicycle and Pedestrian Documentation Project Methodology

The calculations used to extrapolate partial year count figures into full year use estimates were primarily based on the methodology published by the National Bicycle and Pedestrian Documentation Project (NBPDP). More information is available on the NBPDP website at <https://www.bikepeddocumentation.org/>.

The NBPDP extrapolation figures allow for the conversion of hourly, daily, or monthly count data into daily, weekly, or yearly figures, respectively. The instructions to the NBPDP extrapolation spreadsheet, which is publicly available at <http://bikepeddocumentation.org/>, are based on the use of manual counts. The directions recommend that estimates are based on the average of at least two and preferably three two-hour counts during the same period and week or during consecutive weeks. Weekday counts are directed to occur on Tuesdays through Thursday and not on holidays, and weekend counts can be completed on either Saturday or Sunday.

The extrapolation spreadsheet calls for five input variables - count dates, count times, type (multi-use path or street/sidewalk), climate region, and two-hour count volume. Count dates provide the spreadsheet with information on the day of week and month of the count, and count time provides the inputs on what times were observed. The “type” factor allows the extrapolation methodology to be used for multi-use pathways or for users cycling on the street or walking on sidewalks in medium- to high-density areas. All electronic counts, and most of the manual counts, included in this analysis were done on paths and use the “path” extrapolation factors; one of the manual counts was done on a sidewalk and as a result uses the “street/sidewalk” factors. Climate region gives users one of three choices: “Long Winter-Short Summer,” “Moderate Climate,” or “Very Hot Summer-Mild Winter.” All of the counts in New York were categorized in the “Long Winter-Short Summer” climate region. Finally, the input calls for the two-hour count total. Based on these five variables, the NBPDP spreadsheet is set up to return the daily, weekly, monthly, and annual count figures based on a two-hour count total.

The NBPDP structure is based on three tables. Table One calculates daily use based on hour-long periods as a percentage of total daily use. These figures differ based on path or street/sidewalk, on weekdays or weekend, and on whether the counts are done between April and September or between October and March. For each of these circumstances, each hour of time between 6:00 a.m. and 10:00 p.m. is estimated to be a set percentage of total daily use. For example, from 5:00 p.m. to 6:00 p.m. on a path on a June weekday is considered 7% of daily use at that location. An observed two-hour count is first multiplied by 1.05 to account for the fact that 6:00 a.m. to 10:00 p.m. is assumed to be 95% of all trail usage, and then the resulting figure is divided by the two-hour count proportion to come up with a daily estimate.

	APR-SEP				OCT-MAR			
	6am - 9pm				6am - 9pm			
	---- Path ----		-Street/Sidewalk-		---- Path ----		-Street/Sidewalk-	
	wkdy	wkend	wkdy	wkend	wkdy	wkend	wkdy	wkend
600	2%	1%	1%	1%	2%	0%	1%	0%
700	4%	3%	2%	1%	4%	2%	2%	1%
800	7%	6%	4%	3%	6%	6%	3%	2%
900	9%	9%	5%	3%	7%	10%	5%	4%
1000	9%	9%	6%	5%	9%	10%	6%	5%
1100	9%	11%	7%	6%	9%	11%	8%	8%
1200	8%	10%	9%	7%	9%	11%	9%	10%
1300	7%	9%	9%	7%	9%	10%	10%	13%
1400	7%	8%	8%	9%	9%	10%	9%	11%
1500	7%	8%	8%	9%	8%	10%	8%	8%
1600	7%	7%	7%	9%	8%	8%	7%	7%
1700	7%	6%	7%	8%	7%	5%	6%	6%
1800	7%	5%	7%	8%	6%	3%	7%	6%
1900	5%	4%	7%	8%	4%	2%	7%	6%
2000	4%	3%	7%	8%	2%	1%	6%	6%
2100	2%	2%	6%	8%	2%	1%	5%	5%

The second table converts the daily total to a weekly total using a similar estimation factor, where each day of the week is given a percentage of total weekly use. This figure is used to generate the monthly estimate (without using a separate table) by multiplying the weekly estimate by the number of weeks in the month (accounting for partial weeks). While the notes in the table include a correction that holidays should be accounted for weekend usage rates, it does not appear that the formulas account for that correction.

The final table adjusts the monthly estimate to an annual estimate and is based on the climate regions. For each of the three climate regions, each month of the year is a set portion of total annual use. The three tables as they appear in NBPD are listed below (with the categories that don't apply to the upstate region removed).

Table 2: Day to Week	
DAILY ADJUSTMENT FACTORS	
SUN	18%
MON	14%
TUES	13%
WED	12%
THURS	12%
FRI	14%
SAT	18%
Note: Holidays use weekend rates	

Table 3: Region and Month	
MONTHLY ADJUSTMENT FACTORS	
CLIMATE REGION	Long Winter Short Summer
JAN	3%
FEB	3%
MAR	7%
APR	11%
MAY	11%
JUN	12%
JUL	13%
AUG	14%
SEP	11%
OCT	6%
NOV	6%
DEC	3%

The underlying assumption used by the NBPD factors is that any given two-hour period represents a set percentage of total annual bicycle and pedestrian use at that location. With additional data collected, those assumptions can be calculated more precisely and be less reliant on formulas to “fill in the gaps” in collected data.

PTNY Extrapolation Methodology

For PTNY's electronic count sites, the observed usage was extrapolated to calculate a full-year estimate for that site. The raw data was downloaded for the entirety of the time the counters were installed at each location. Data was downloaded at an hour-level granularity to ensure that it was available for hour-by-hour analysis. The data was checked for any anomalies, and any data excluded that may have been downloaded from outside the period when the counter was installed.

Once the data was cleaned, the process of extrapolating up to a full year began. Typically, only partial data was available for the day the counters were installed, and for the day that data was downloaded from the counter. When only a portion of the full day's use was available, PTNY disregarded any data from the hour stretch in which the counter was installed or when data was retrieved, as staff passing in front of the counter would skew the data. Using the remaining hours, and the appropriate NBPD factors for that day, the partial day use was extrapolated to a full day use estimate for that day.

The data was then aggregated by day, using observed data for all days and the calculated estimate for the beginning and end day. With this data, a similar process was undertaken for partial month data. However, it was done slightly differently from the NBPD calculations. NBPD extrapolation calculates an estimated weekly use figure, using the day of the week as a percentage of weekly use, with a note that holidays use weekend rates. This weekly estimate is then multiplied by the number of weeks in the count month (number of days in the month divided by seven). However, this process ignores the different weekdays that may be found in any given month, and the formulas don't appear to actually account for holiday use. To adjust for those factors, each day of the year was assigned a “daily use” adjustment factor. These factors were the daily adjustment factor for each regular weekday, and the “holiday rate” of 18% for each New York State observed holiday. Using these factors, it was possible to calculate a “daily use” rate for each day as a percentage of total monthly use. This was calculated by summing all of the “daily use” adjustment factors and dividing each day's factor by the total monthly aggregate use percentage.

Once “daily use” rates were calculated, total estimated monthly use could be determined. This was only done for months for which less than the full month’s use was collected. Total estimated monthly use was calculated by dividing the total observed data for that month by the percentage of total estimated monthly use that those days represent.

The monthly use factors represent the final piece of the calculation used by PTNY to determine annual use. This process followed a similar format to the above calculations, with full month data used where available, and the “calculated” full month data used following the process shown above. The NBPD calculations provide monthly extrapolation factors - based on the climate region (all counts were considered to have taken place in the “Long Winter Short Summer” region). Based on these figures, a similar formula could be calculated to that shown above, dividing the total available data (including full month observed data and calculated partial month data), and dividing that by the percentage of total estimated monthly use that those days represent.

A slightly different procedure was followed for locations where multiple two-hour observational counts volumes were collected. For these locations, each two-hour volume was entered into a sheet that determined each time frame’s estimated proportion of total annual use. As multiple two-hour stretches were added to the sheet, the total observed figure represented a greater proportion of the total estimated annual use. The total observed data was divided by that estimated percentage of annual use figure to determine the total estimated annual use at those locations.

The Who’s on the Trail report does not claim to identify total use for any given year. Rather, Who’s on the Trail calculates an overall “Estimated Annual Use” figure, based on calculating the total annual use using all available data from the period counters were installed. This formula works for locations that had counters installed for more than one year as well, determining an estimated “12 month” figure for locations with more than 12 months of data.

TECHNICAL MEMORANDUM

TO: Parks and Trails New York (PTNY)

FROM: Lindsay Zefting, PE; Verity Engineering, D.P.C.

RE: Empire State Trail User Estimate

The purpose of this memorandum is to document the results and methodology used to estimate the total number of annual users for the Empire State Trail. This methodology and report does not claim to identify total use for any given year. Rather, it calculates an overall “Estimated Annual Use” figure, based on calculating the total annual use at locations and missing intervals along the trail.

Count Location Annual Trail Estimate Methodology

Full year or partial counts were available for 78 locations along the Empire State Trail taken between 2020 and 2025. Previous adjusted counts were utilized at 19 locations along the Erie and Champlain Canalways. An additional 17 full and partial count locations were completed in 2024 and 2025 by PTNY. Counts from 42 locations along the Hudson Valley Greenway corridor were also received from Hudson River Valley Greenway (HRVG). These count locations are shown in Map 1.

Counts that spanned the full year were used without modifications. Counts that spanned two years but included all twelve months were used without modifications. Missing months were calculated for 16 of the count locations using the methodology described below.

HRVG:

Count Locations with Full Years: 6
 Count Locations Spanning Two Years: 32
 Count Locations with Partial Years: 4

PTNY:

Count Locations with Full Years: 4
 Count Locations Spanning Two Years: 1
 Locations with Partial Years: 12

Month	Ave % of Annual Trail Users
Jan	3.4%
Feb	4.5%
Mar	5.2%
Apr	7.0%
May	10.3%
Jun	11.3%
Jul	14.3%
Aug	11.4%
Sep	13.0%
Oct	10.3%
Nov	6.2%
Dec	3.1%

Month Calculation

Using the count locations with full years, a monthly average percentage of trail users was determined. This percentage was used to calculate missing or partial months data to arrive at a yearly estimate for these partial year locations. August was the month with the most consistent trail usage as a percentage of the annual usage, so it was used as the base month to calculate others when available.

Detailed Methodology

Previous methodologies utilized a correlation between population density and existing counts to estimate trail users. This resulted in a factor to be able to estimate trail usage at any given point along the trail by sampling population density from the surrounding area. Sample points are then collected along the trail and then added together for total trail usage.

Additional count data is available from when this methodology was originally developed, allowing the current methodology to be further defined. Key changes include separate trendlines for urban and rural areas, a correlation between trail usage and municipal density, and more reliance on count data.

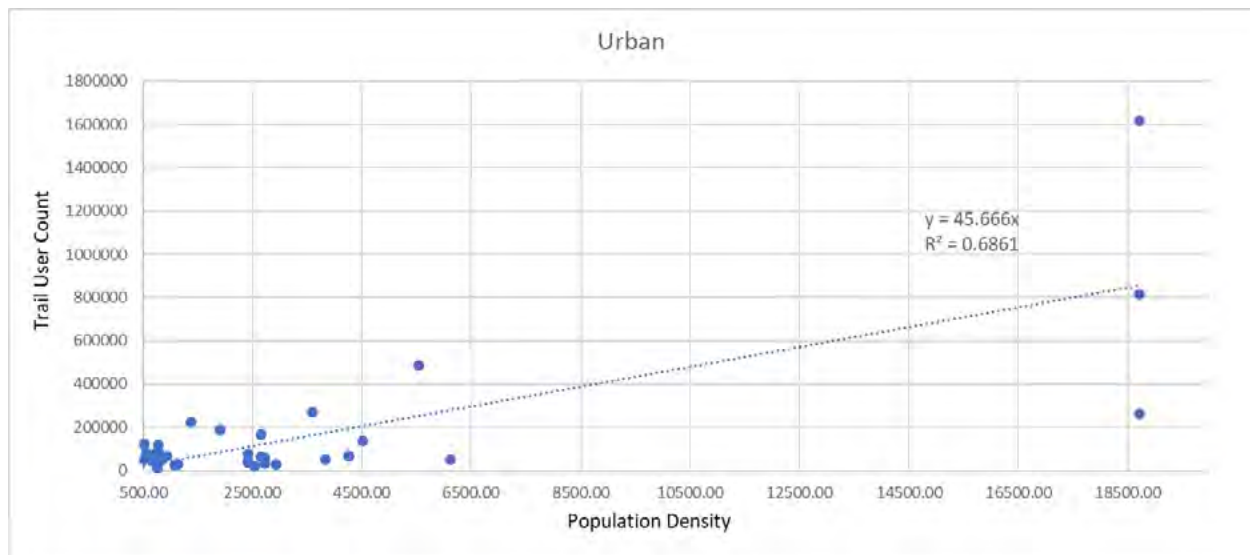
Population Density

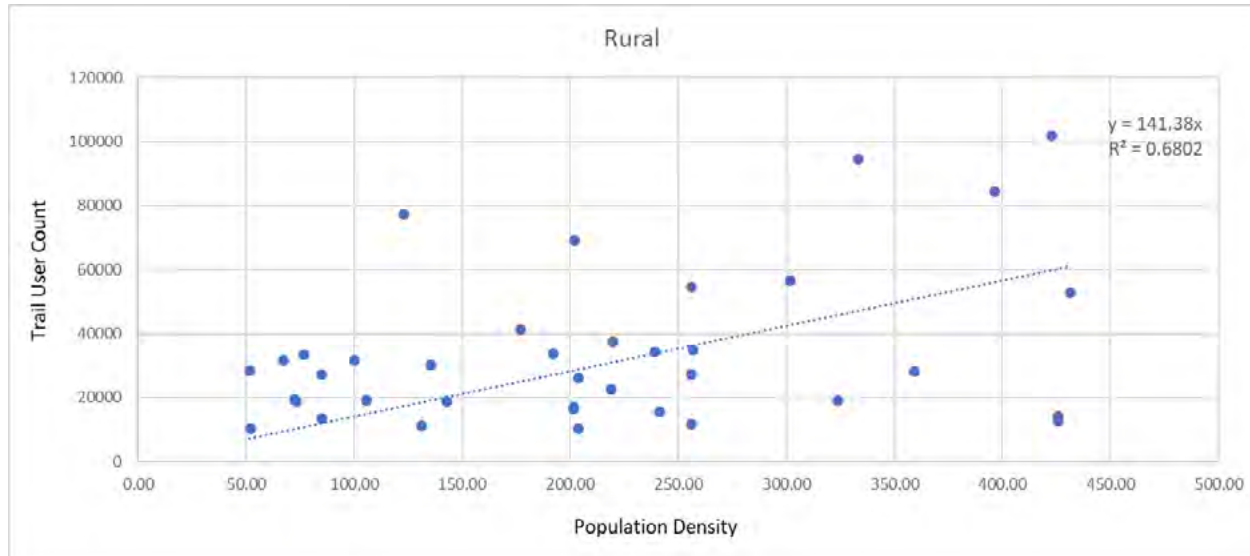
The correlation between population density of municipal density and census block density within 3 miles of the count location resulted in similar correlations and more accuracy when comparing urban versus rural density. Municipal density using 2020 population data was used for this analysis.

Urban Versus Rural Density

Trail counts completed in rural areas (defined here as a population density less than 500 people per square mile) were consistently above the trendline. As most of the estimated locations would be in these rural areas, it would result in an underestimation of overall trail users for the Empire State Trail. Instead, two trendlines were developed.

For an urban context, trail users = $45.666 \times \text{population density}$. This linear trendline has an R^2 value of 0.6861. For a rural context, trail users = $141.38 \times \text{population density}$. This linear trendline has an R^2 value of 0.6802.





Count Data and Estimate Locations

The number of calculated points was reduced due to the higher number of count locations along the trail. To generate trail user estimates in the gaps between count locations, it was assumed that the average trip distance for a pedestrian or cyclist on the Empire State Trail is 5 - 10 miles. Points along the Empire State Trail were generated at these two intervals, then points within 5 or 10 miles of count locations were removed. Note that in areas of the Empire State Trail where there are significant lengths of on-road facilities, this interval was further increased to 20+ miles to account for the limited number of pedestrians likely on these portions of the trail. These count estimate locations are shown in Map 2.

Manhattan Count Adjustments

There are three count locations in Manhattan in close proximity to each other relative to other count locations, totalling 7,517,830 users. NYCDOT also supplies their own estimate of 7,000 users per day, or 2,555,000 users, which exceeds data at any one count location. To avoid duplicating user counts. This lower user estimate was used.

Trail User Estimates

Trail user estimates were developed for the Empire State Trail in total and for four subsections of the EST: Erie Canalway Trail, Hudson River Valley Greenway, Champlain Canalway (Whitehall south), and Champlain Canalway (Whitehall north). These estimates are shown in the table below. Column 1 is the total of the count data. Column 2 is the total of the count data plus the calculated locations at 5 mile intervals. Column 3 is the total of the count data plus the calculated locations at 10 mile intervals.

These user estimates were checked against an estimate of trail users just using the formula trendline at an interval of 5 miles.

	Count Data	Count + 5 Mile Analysis	Count + 10 Mile Analysis	5 mile interval
ECT	1,884,190	<u>3,664,100</u>	2,280,403	3,445,650
HRVG	5,458,970	6,547,280	<u>5,559,693</u>	3,654,420
CCT (South of Whitehall)	232,785	<u>445,598</u>	261,635	508,362
CCT (North of Whitehall)	-	93,269	<u>79,405</u>	93,269

Based on this, as well as local knowledge of the corridor and their unique contexts, a combination of Count + 5 mile and Count + 10 mile are used for an overall Empire State Trail user estimate. For the Erie Canalway Corridor and Champlain Canalway Corridor (South), the Count + 5 mile analysis is used. This is more accurate due to the context of the corridor and current frequency of count locations. For the Hudson River Valley Greenway and Champlain Canalway Trail (North), the Count + 10 mile analysis is used. For HRVG, this is due to the current higher frequency of count locations and for Champlain Canalway Trail (North), this is due to the frequency and length of on-road segments.

The total estimated trail users for the Empire State Trail is 9,748,796. As this is an estimate, it should be assumed that the estimate actually ranges from 9 million to 10.5 million annual trail users.

