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Reduced Daylight, Not Weather: The Fundamental Driver of Stockholm's Network-Wide Cycling Decline Post-Autumn Break (2015–2023)

Github: cycling_autumn_shift_Stockholm

Introduction

This analysis investigates how cycling patterns in Stockholm shift around the Swedish höstlov (autumn break), which consistently falls in week 44 and typically aligns with Sweden's switch to wintertime on the last Sunday of October. The analysis examines how daylight, route characteristics, weather, and the traffic environment influence these shifts. By mapping these factors, the analysis provides clear actions for Stockholm Stad, Trafikverket, and Cykelfrämjandet on how to support cyclists specifically during the clock change and the darker evenings. The report also points to areas where these institutions can improve their ways of working.

Methods

Quantitative methods:

- Descriptive time-series analysis
- Seasonal comparison (week 43 vs. week 45, 2015–2023)
- Change calculations (absolute & percentage)
- Weather comparison (causal elimination)
- Network-level design and lighting analysis
- Ranking of path segments
- Spatial mapping and geospatial reasoning
- Visualization-driven EDA

Qualitative methods:

- Semi-structured expert interviews with Stockholm Stad, Trafikverket, and Cykelfrämjandet to understand:
- how cycling data is managed
- how traffic planners interpret seasonal patterns
- practical challenges in data coordination and lighting inspections

Data Sources

- Cycling count data (Stockholm Stad, 2015–2023)
- Bicycle network map data (Stockholm Stad)
- Illumination point data (Stockholm Dataportalen – “Belysningsmontage”)
- Weather data (temperature & precipitation)
- Daylight and DST timing information
- Semi-structured interviews with analysts at Stockholm Stad, Trafikverket, and Cykelfrämjandet

Key Insights from Charts

1. How do cycling volumes change after höstlov?

Insight: Analysis shows a consistent decline in cycling volume, ranging from 3–19% (excluding 2022), between week 43 and week 45. The year 2016 is noted as the clear outlier, owing to a sharp temperature fall.

Takeaway: Cycling activity reliably dips after höstlov, indicating a recurring seasonal shift across the network.

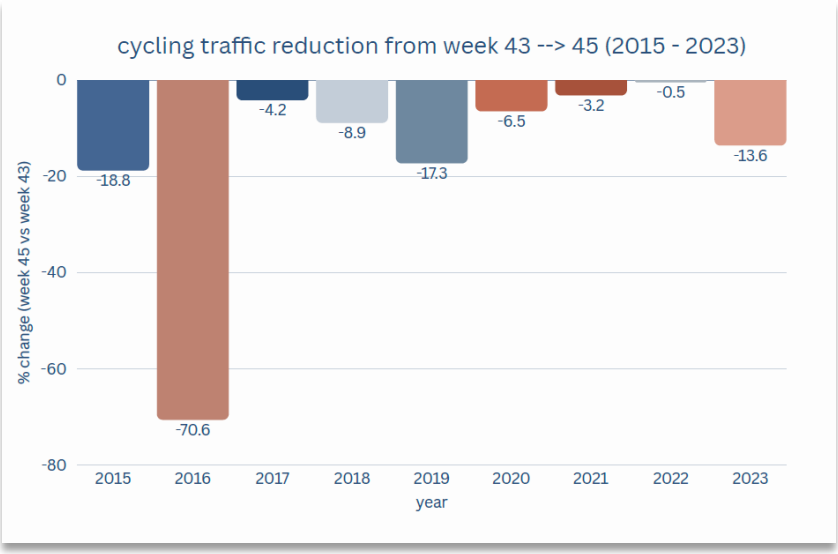

Figure 1: cycling reduction week 43/45 (2015 – 2023)

2. How is the cycling decline influenced by daylight compared with weather?

Insight: The Sunday of Week 43 clock switch, which moves sunset one hour earlier, causes a dramatic, light-driven drop in cycling volume -18% in the evenings and -46% at night. This steep reduction is confirmed as weather factors (neither temperature nor precipitation) showed significant worsening between week 43 and week 45.

Takeaway: The decline is driven by reduced daylight, not weather.

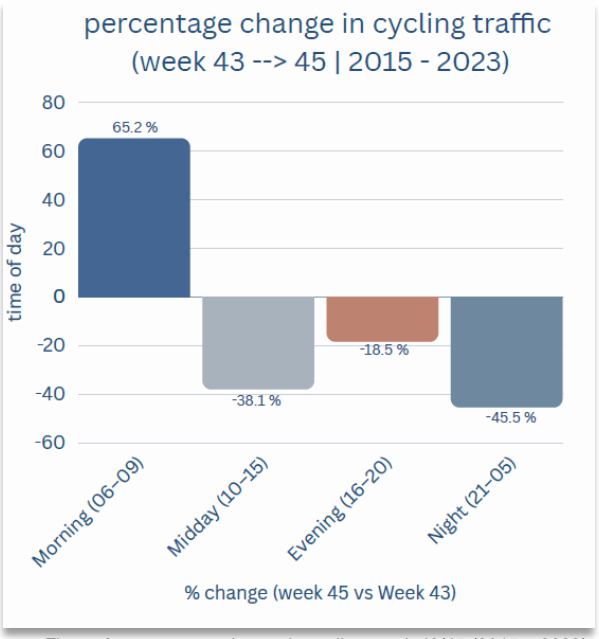

Figure 2: percentage change in cycling week 43/45 (2015 – 2023)

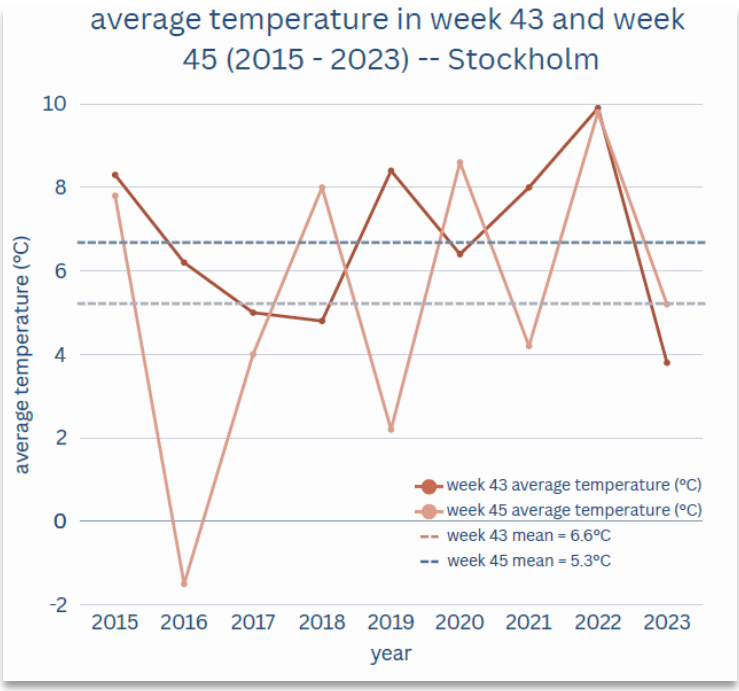

Figure 3: average temperature in week 43/45 (2015 – 2023)

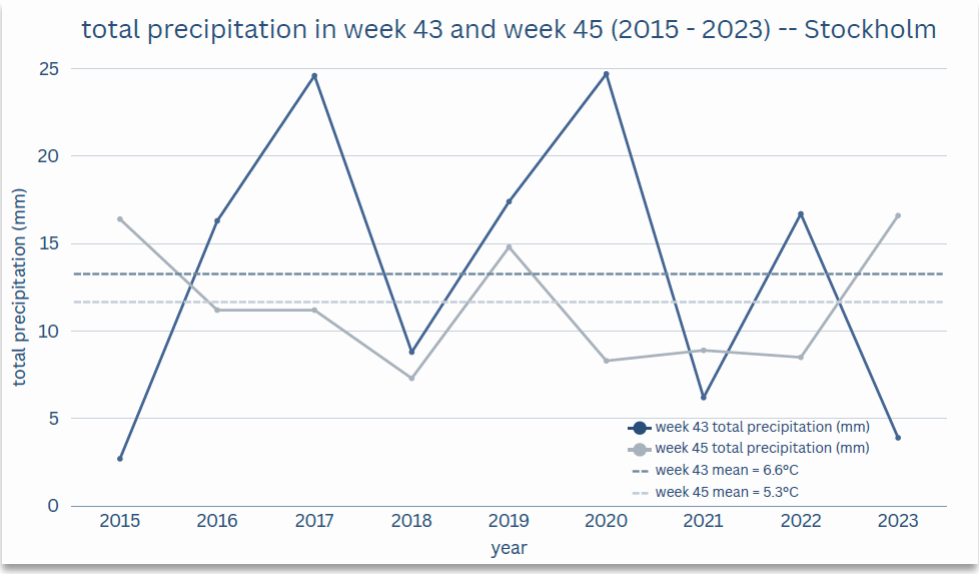

Figure 4: total precipitation week 43/45 (2015 -2023)

3. Do cyclists ride less, or do they change well-lit routes?

Insight: Only three of the top 20 cycling paths (Magelungsvägen, Örbyleden and Hjorthagen) show insufficient or widely spaced lighting. Still, nearly all routes including these three see reduced traffic after höstlov.

Takeaway: This confirms that the downturn is network-wide, not caused by lighting weaknesses.

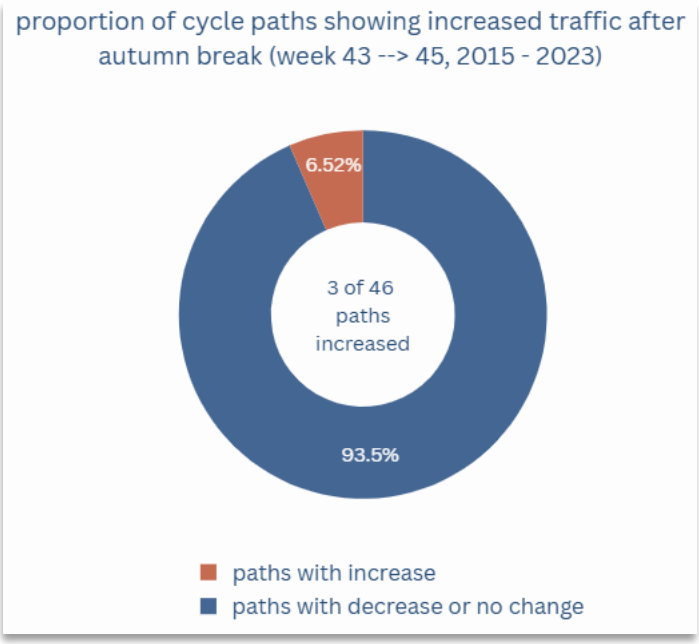

Figure 5: increased traffic after autumn break 43/45 (2015- 2023)

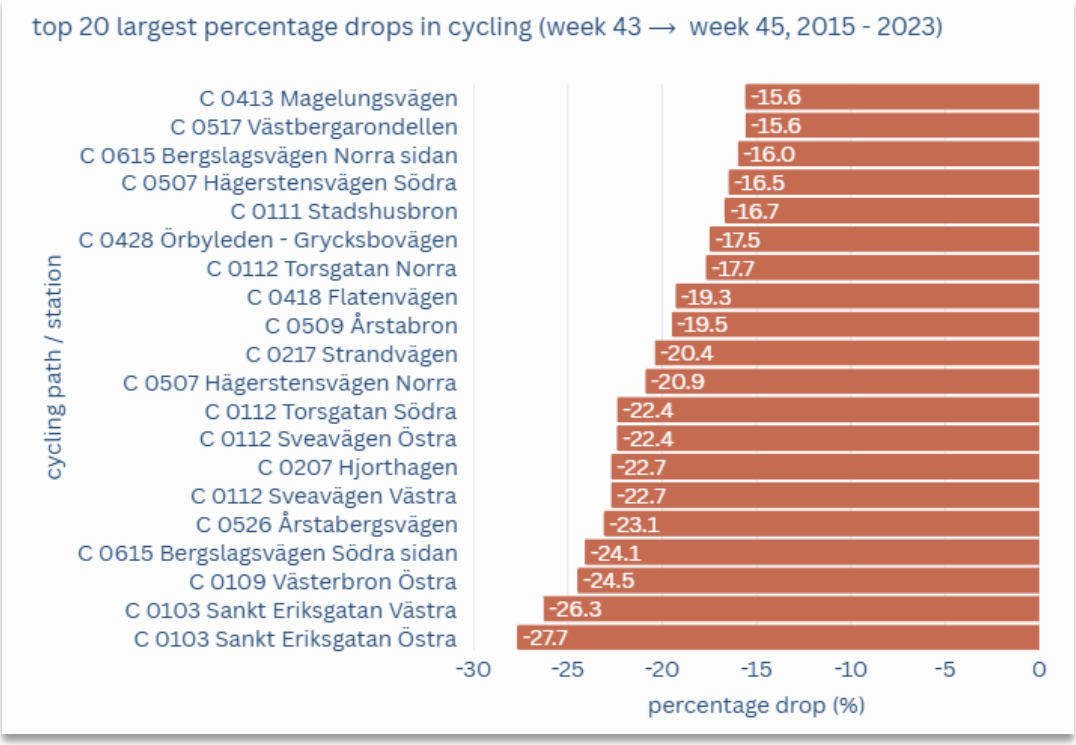

Figure 6:top 20 percentage drops in week 43/45 (2015 -2023)

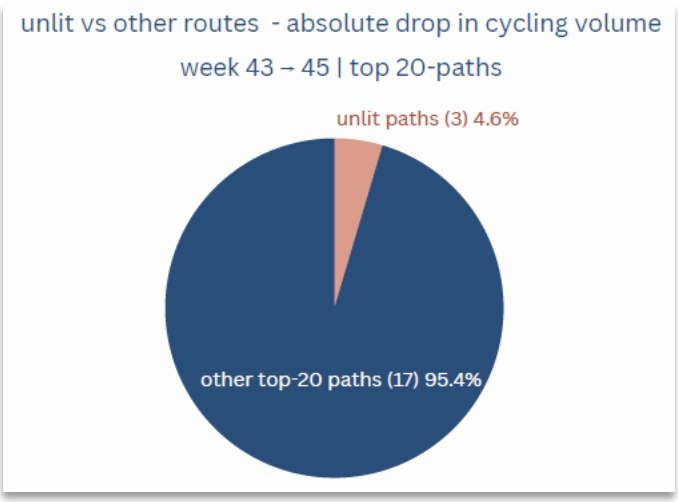

Figure 7: unlit vs other routes – absolute drop in cycling volume week 43/45 top 20 path

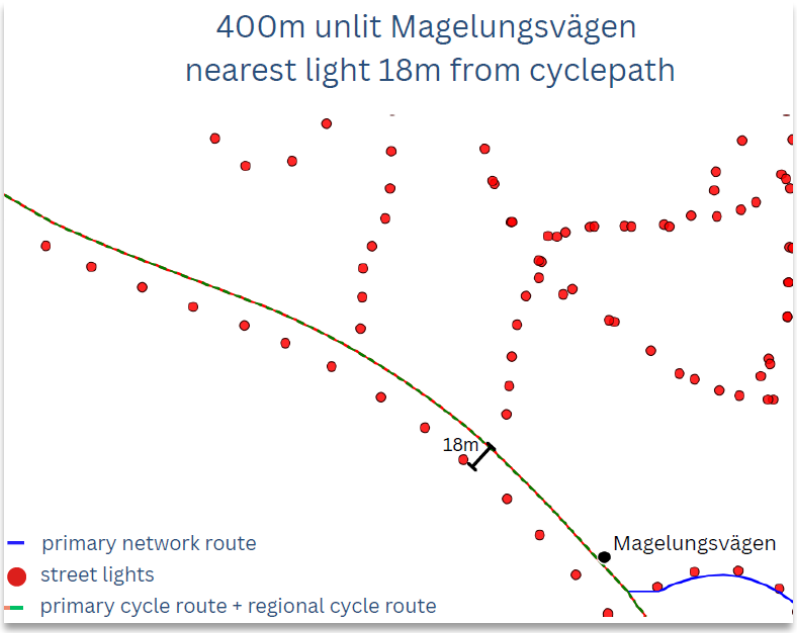

Figure 8: unlit Magelungsvägen

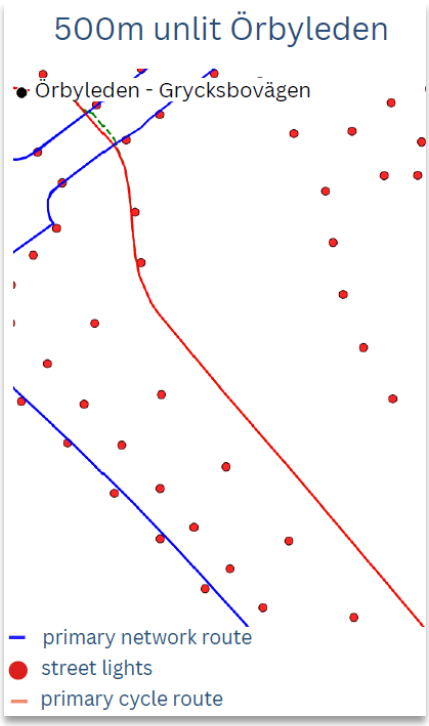

Figure 9: unlit Örbyleden

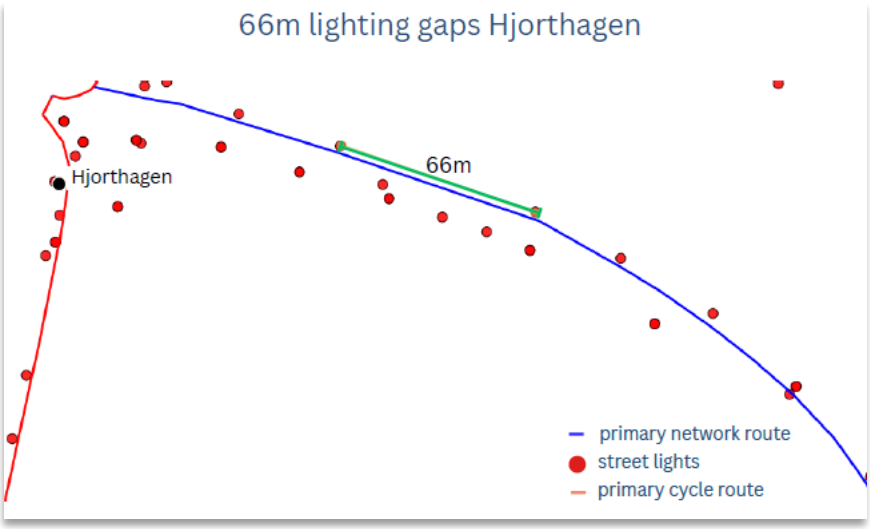

Figure 10: lighting gaps Hjorthagen

4. To what extent does bike-path design shape changes in cycling volumes?

Insight: Three opposing-direction cycle paths account for nearly 14% of the total drop within the top-20 declines.

Takeaway: Just three opposing directions create a disproportionately large dent in total cycling volumes.

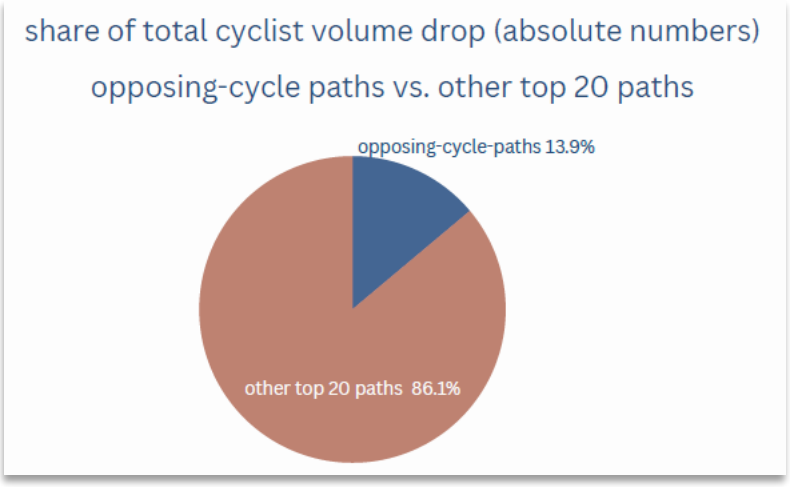

Figure 11: share of opposing cycle paths vs. other top 20 paths

Conclusion:

- **Reliable Seasonal Decline:** Cycling in Stockholm consistently drops after the autumn break (week 44), when the switch to wintertime makes evenings suddenly darker. Each year, this results in a 3–19% decline between week 43 and week 45, with the steepest reductions occurring after sunset (–18% in the evening and –46% at night), as returning commuters are confronted by the early darkness.
- **Causation Confirmed:** The data confirms that this decline in cycling activity is fundamentally driven by reduced daylight. Neither temperature nor precipitation showed any significant worsening between week 43 and week 45, eliminating generalized weather deterioration as the primary cause of the downturn
- **Decline Timing:** The reduction in cycling volume is highly concentrated during hours without natural light. The largest drop in traffic occurs after sunset, with an 18% drop observed in the evenings and a substantial 46% drop occurring at night
- **Network Scope vs. Lighting:** The overall downturn is confirmed to be network-wide, meaning nearly all routes experience reduced traffic after höstlov. Crucially, the analysis confirms that this decline is not caused by generalized lighting weaknesses. This is evidenced by the fact that only 3 of the top 20 declining cycling paths showed signs of insufficient or widely spaced lighting
- **Design Impact:** Although the decline affects the entire network, specific design issues amplify the overall drop. Three opposing-direction cycle paths account for nearly 14% of the volume loss among the top 20 declining routes, creating a disproportionately large impact on total cycling levels. These routes are sufficiently lit, yet the pattern still raises the question of whether cyclists feel they cannot see or be seen well enough when meeting riders from the opposite direction.

Actions:

How can Trafikverket, Stockholm City, and Cykelfrämjandet encourage cyclists to keep riding as the days get darker?

- Stockholm City could put up banners at the start of week 43 to remind cyclists about the upcoming DST change, using messages like “Lys starkt – mörkret börjar nu.”
- Trafikverket could hand out reflective vests or bike lights on opposing-direction cycle paths to strengthen cyclists’ ability to see and be seen, improving both visibility and safety.
- Stockholm’s cycle-path lighting should undergo annual inspections to ensure routes like Magelungsvägen, Örbyleden and Hjorthagen remain properly lit before each DST shift.

- Cykelfrämjandet could email members in week 42, informing them about the DST change and reminding them to check lights and reflective gear.
- Cykelfrämjandet could also set up a free bike-repair drop-in stand on a major cycling route, such as near Strömbron, to educate riders about the light change and check their bike lighting.

Collaboration:

What future ways of working would make Stockholm an even more cycling safe city?

- Trafikverket and Stockholm should adopt a unified way to track cyclists. Today they use different SWEREF 99 coordinate systems (TM vs. 18 00), which makes data harder to combine. A shared system and harmonized measurement-station IDs would speed up mapping and create a stronger, more coherent database for cycling volumes.
- Cykelfrämjandet should work more data-driven, using cycling data to identify issues and present them to Stockholm City or Trafikverket. Facts are usually more effective than opinions.

References:

Stockholm Stad (2015–2025) *Cykelflöden – automatiska mätstationer*. Cycling count data provided directly by the City of Stockholm.

Stockholm Stad (2025) *Cykelnätets geodata*. Geographic bicycle network map data provided directly by the City of Stockholm.

Stockholm Dataportalen (2025) *Belysningsmontage – street lighting point data*. Available at: https://dataportalen.stockholm.se/dataportalen/ (Accessed: [31.10.2025]).

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European Union (no date) *Daylight Saving Time rules – end of summer time (last Sunday in October)*. Available at: https://europa.eu (Accessed: [03.11.2025]).

Stockholm Stad, Trafikverket & Cykelfrämjandet (2025) *Semi-structured interviews with cycling and traffic data analysts*. Conducted by the author between [November] 2025.