

**Vägytans tillstånd,
historik och framtid**

Johan Lang

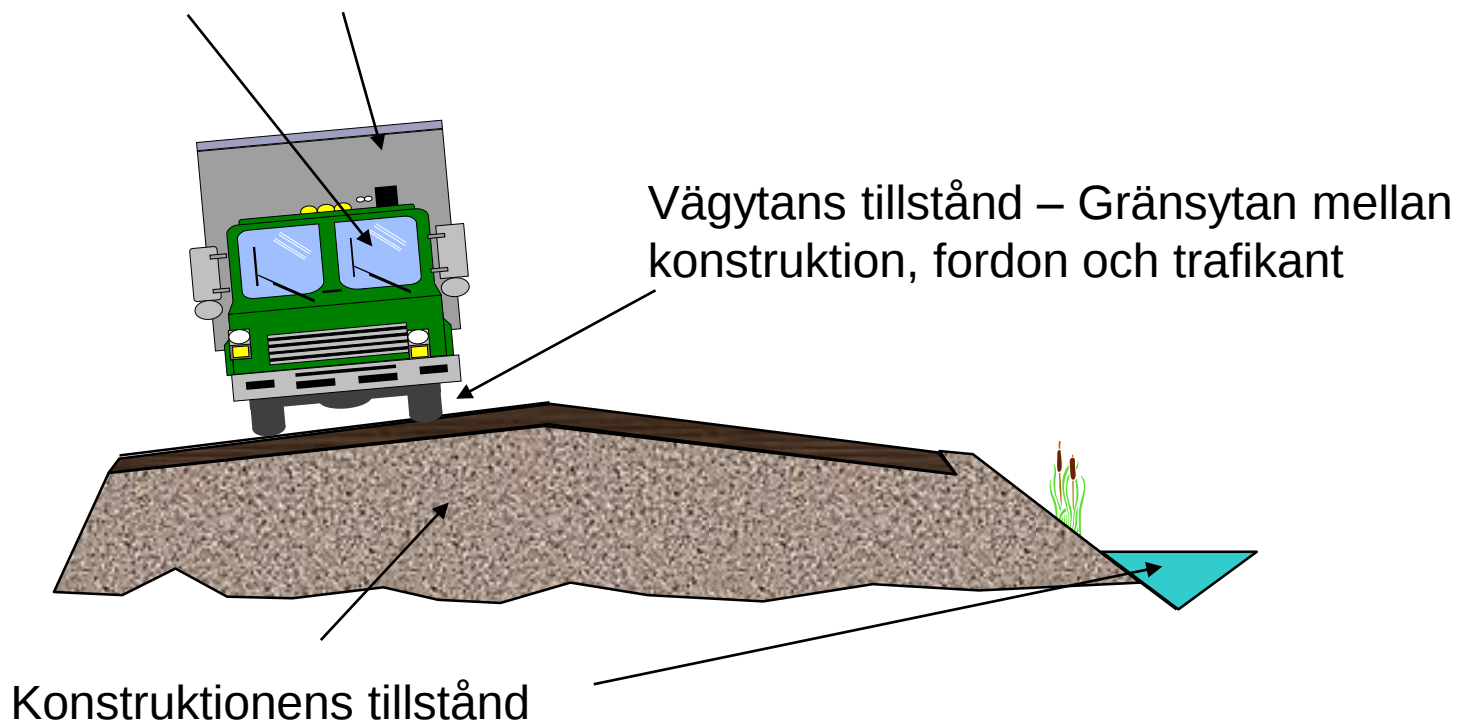


TRAFIKVERKET

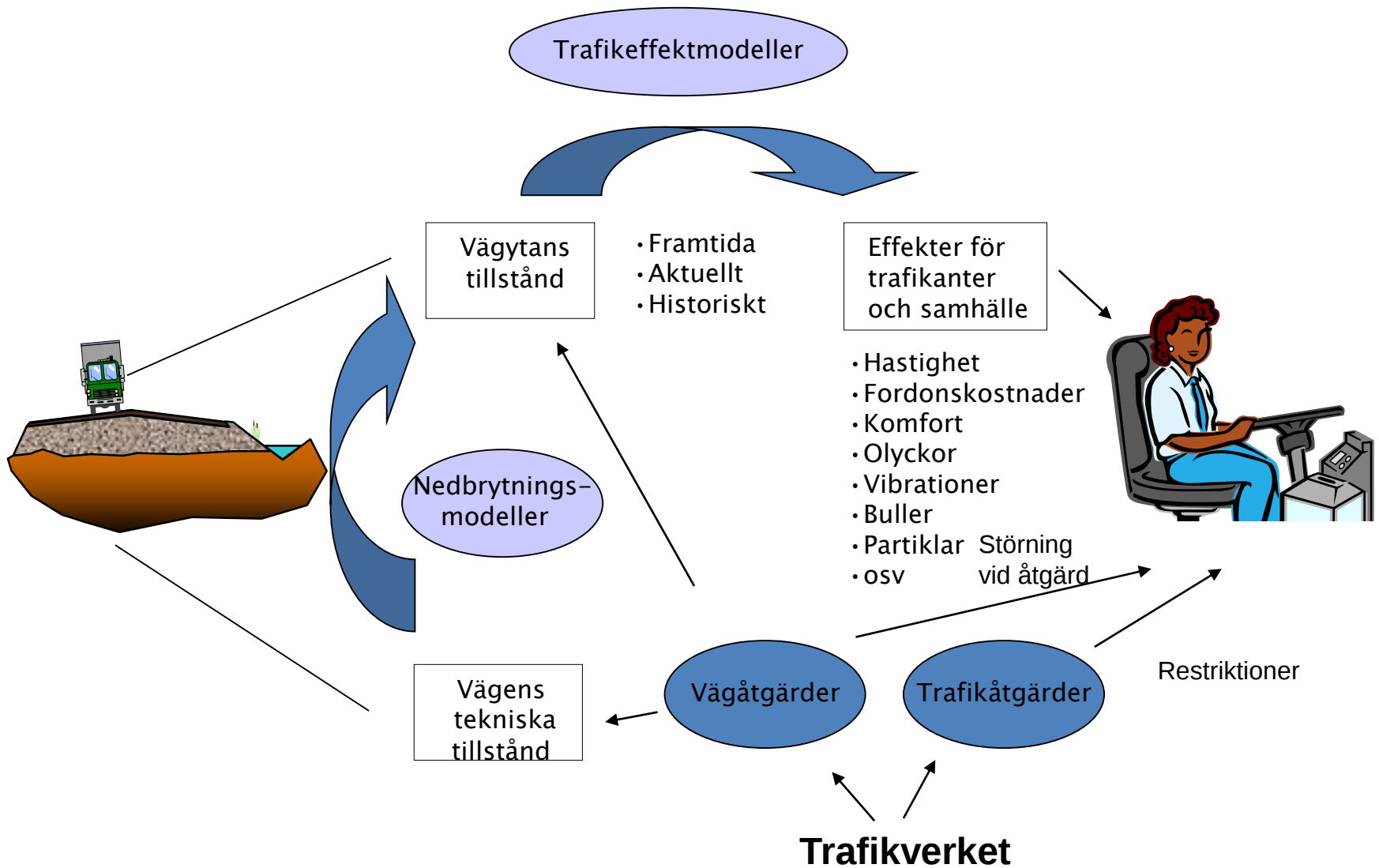
Vägytans tillstånd, historik och framtid

Vägytemätningar visar tillståndet som trafikanten möter

Effekt på trafikant och fordon



Konstruktionens tekniska tillstånd påverkar vägytans tillstånd. Ett eftersatt tekniskt tillstånd påverkar trafikanten idag och i framtiden

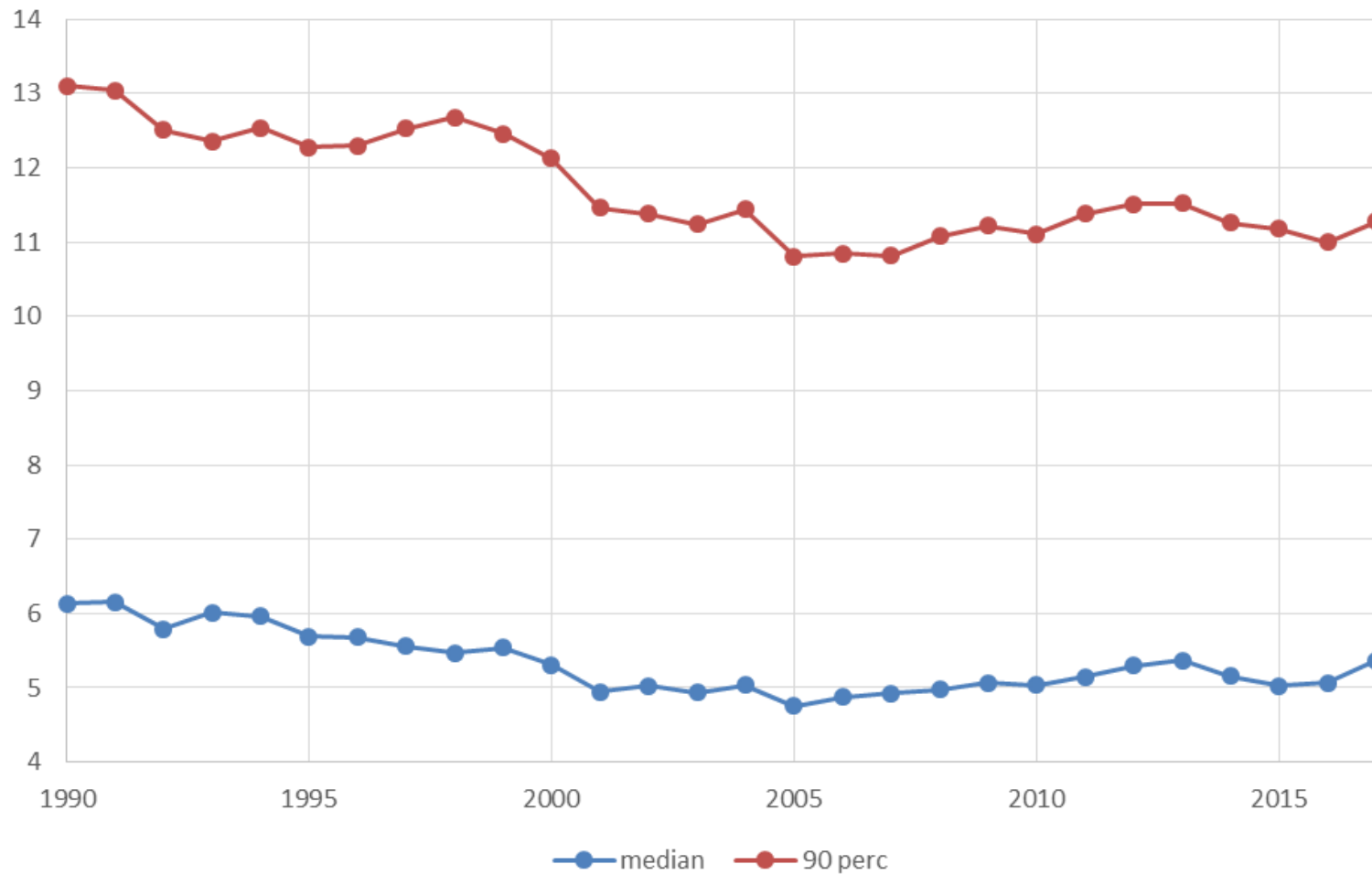


Tillgång till data

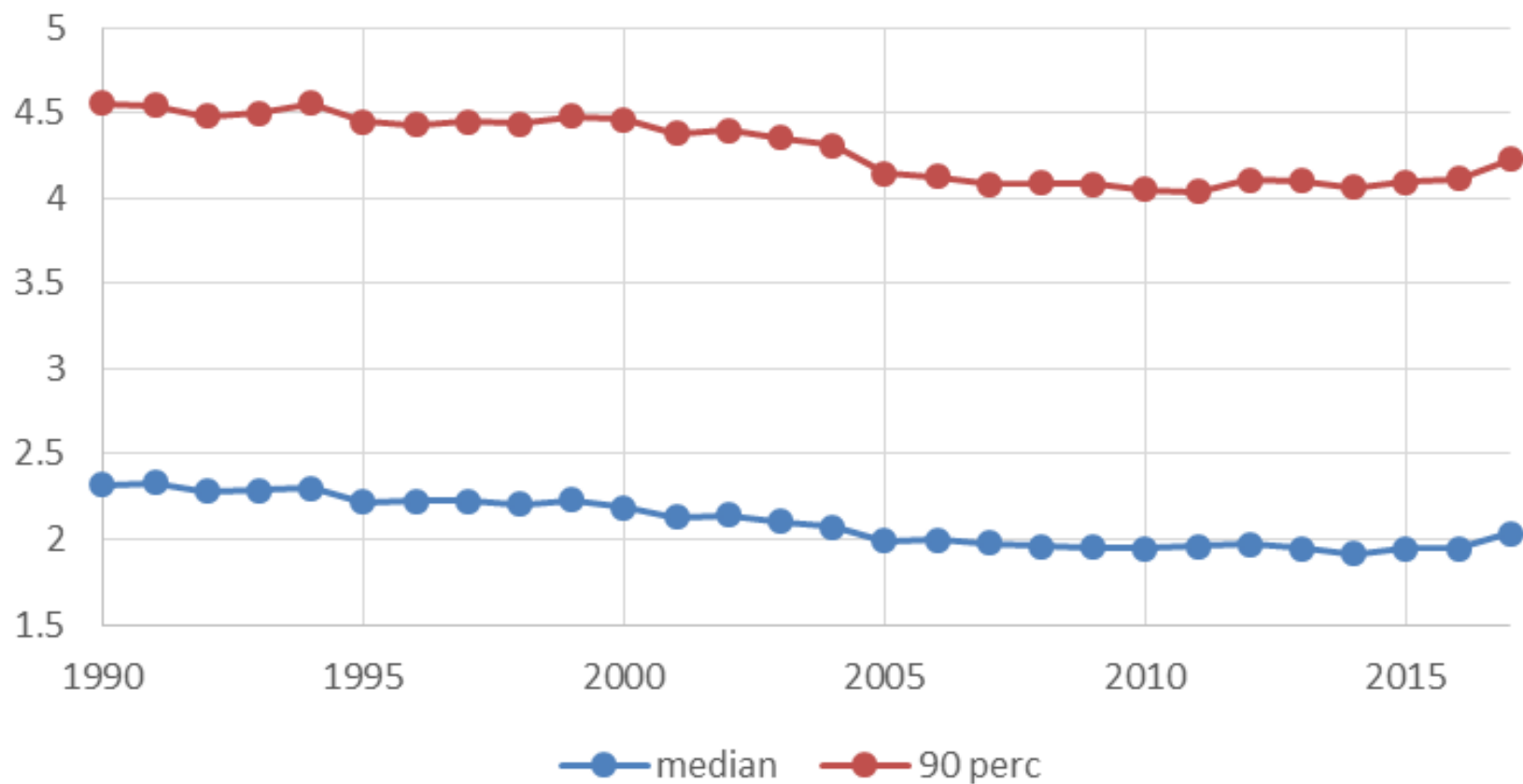
- Belagda statliga vägnätet är ca 80 000 km
- Miljontals km har mätts sedan 1987
- Alla belagda vägar har mätts flera gånger
- Mätningarna upphandlas från konsulter
- Alla mätningar kvalitetsäkras för att upprätthålla jämförbarhet mellan åren

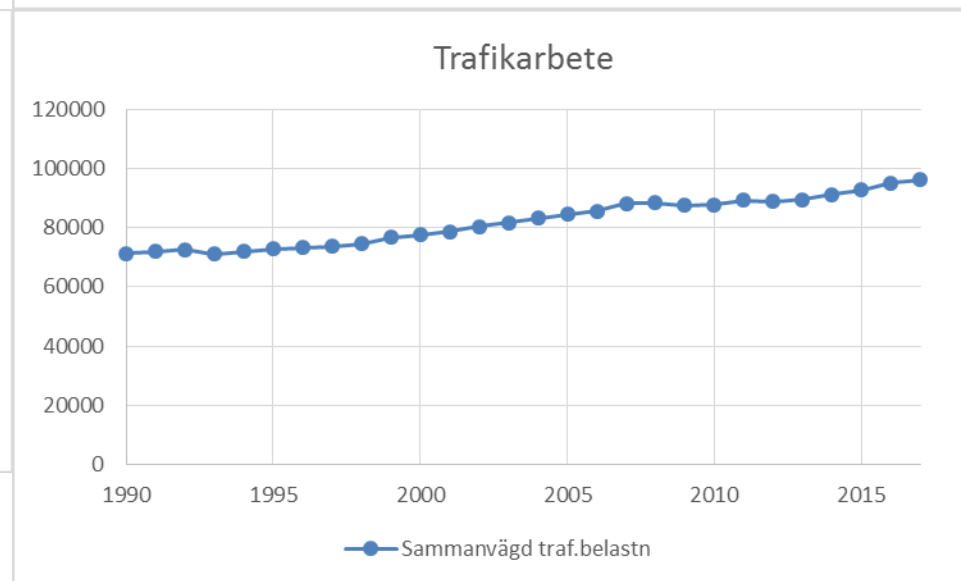
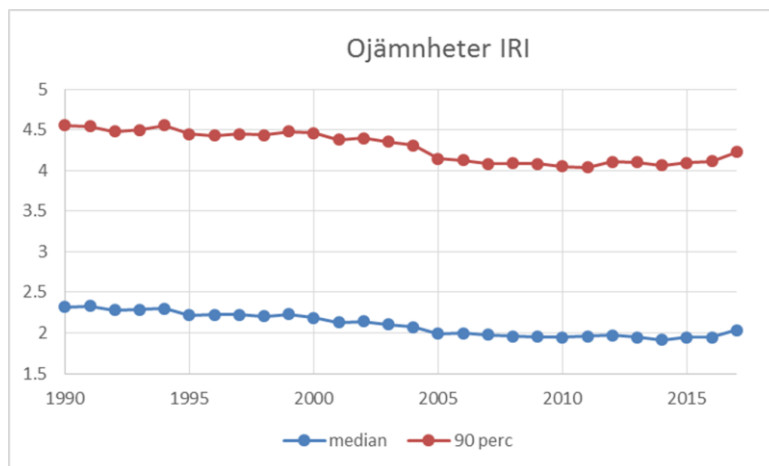
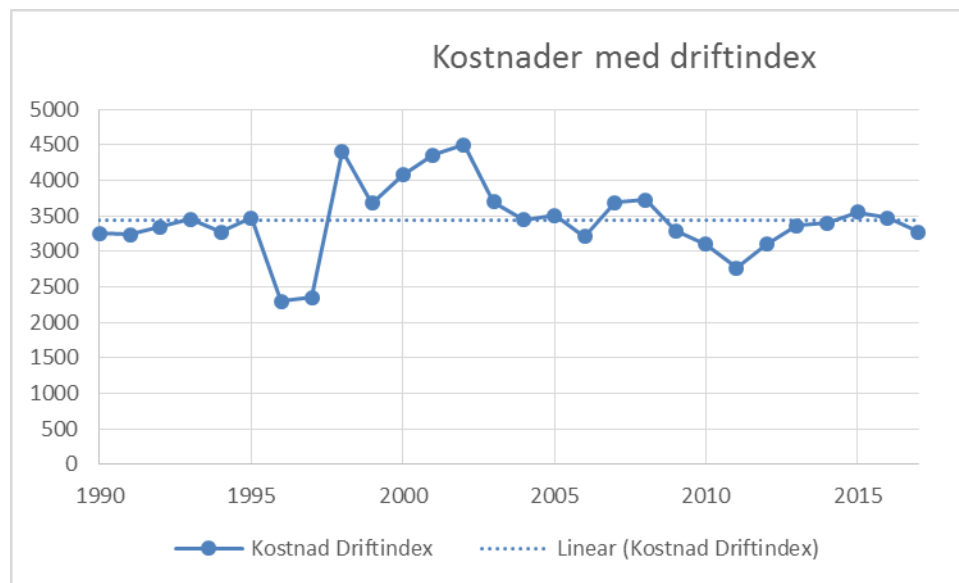
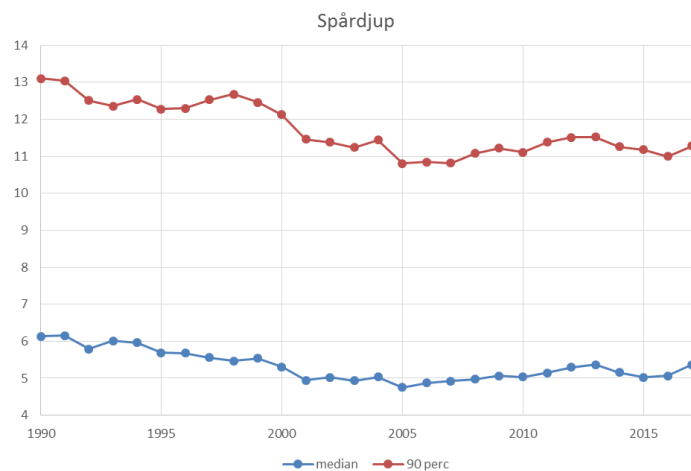


Spårdjup

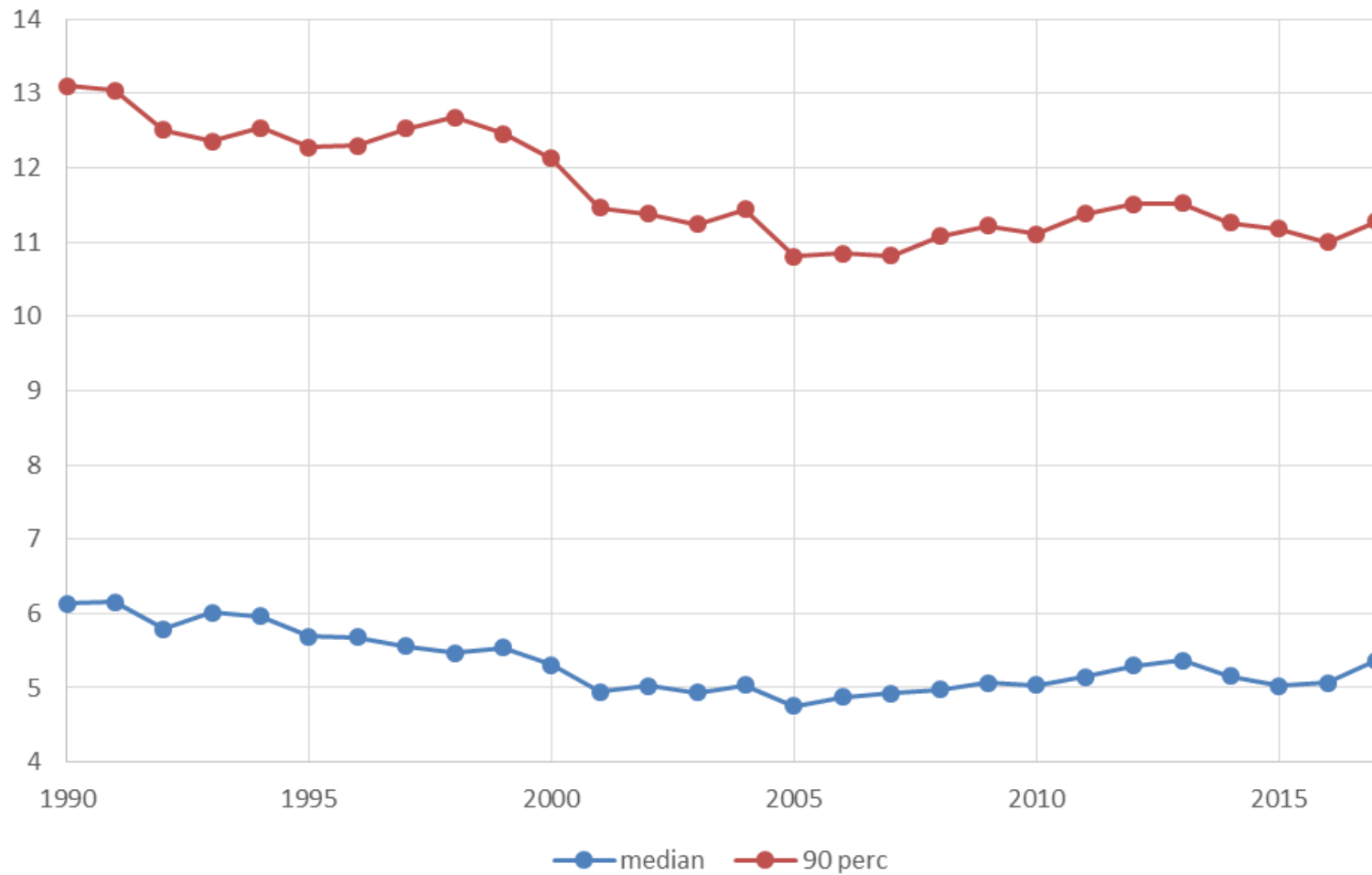


Ojämnheter IRI

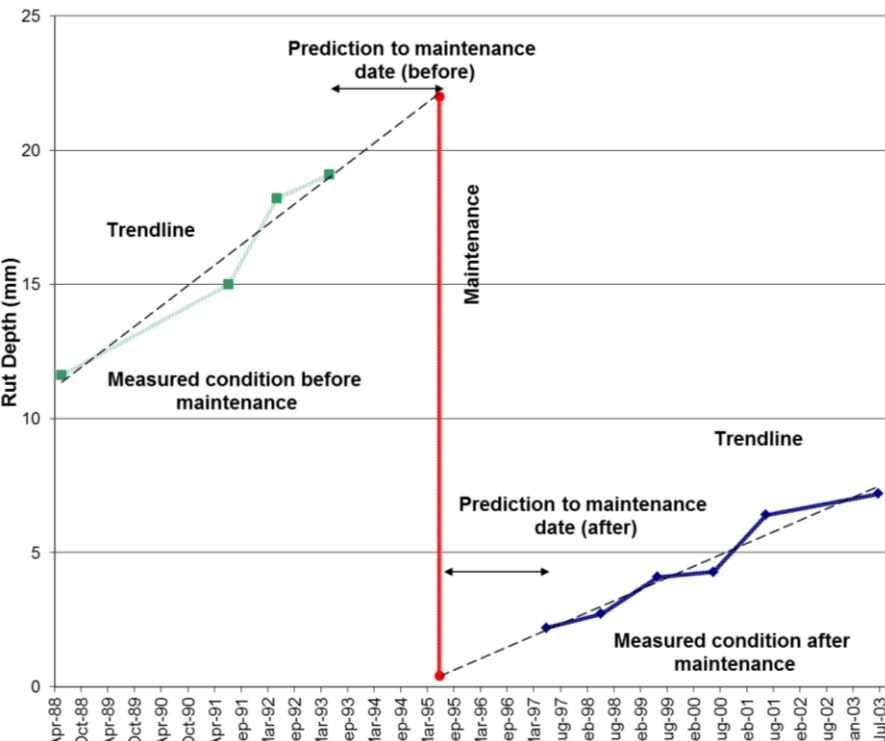




Spårdjup



Analysis database



After processing, the analyse database consist of:

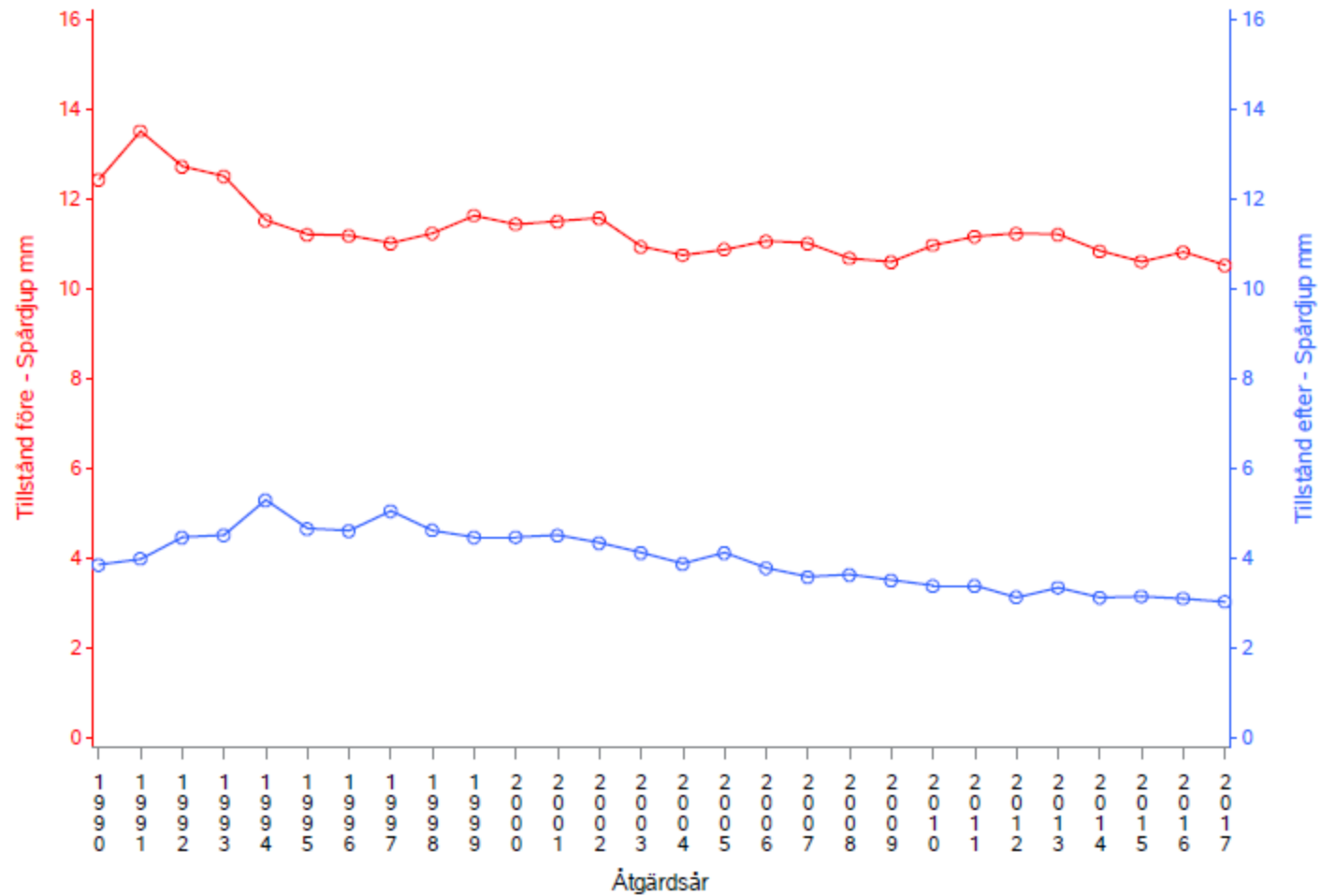
- Predicted condition before a treatment
- Predicted condition after a treatment
- Yearly change in condition before a treatment
- Yearly change in condition after treatment
- Treatment age
- Information about treatments, traffic, heavy traffic, road width, posted speed, road type (2-lane, 4-lane etc.), region etc.

Based on available data, the following have been analysed:

- Condition before and after maintenance
- Change in condition before and after maintenance
- Yearly change in condition before and after maintenance.
- Influence of surface condition variables in decision about maintenance projects
- Experienced durability of treatments.
- etc.

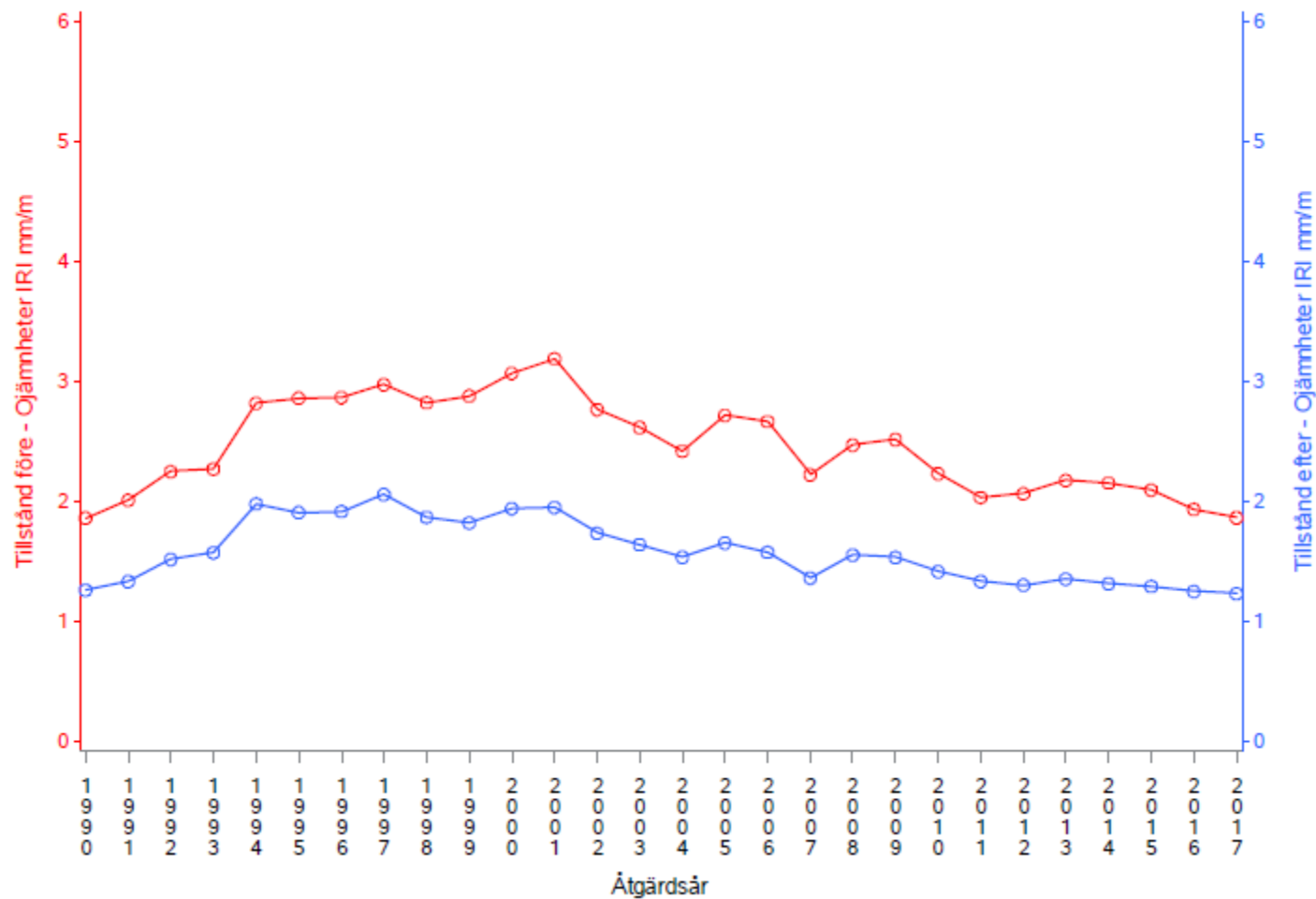
Tillstånd före och efter åtgärd - Spårdjup

Trafikclass=Alla



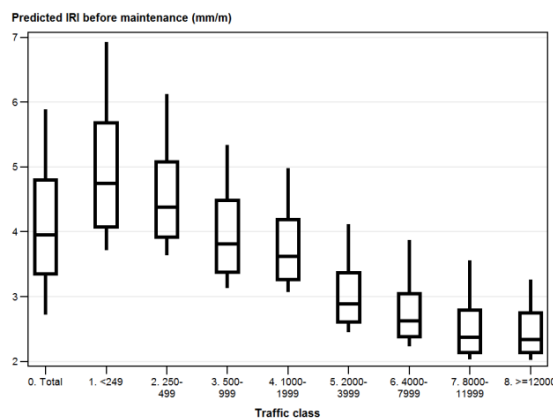
Tillstånd före och efter åtgärd - Ojämnheter IRI

Trafikklass=Alla



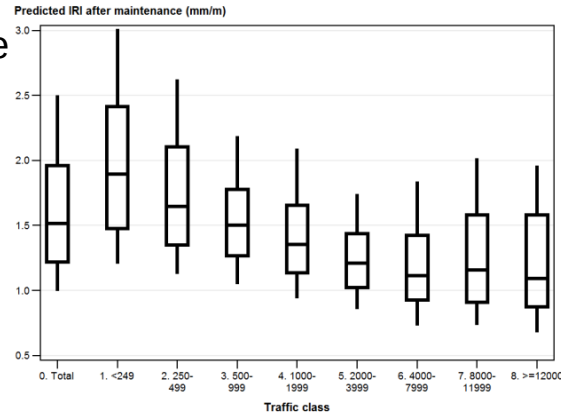
Condition before and after maintenance, IRI

Before



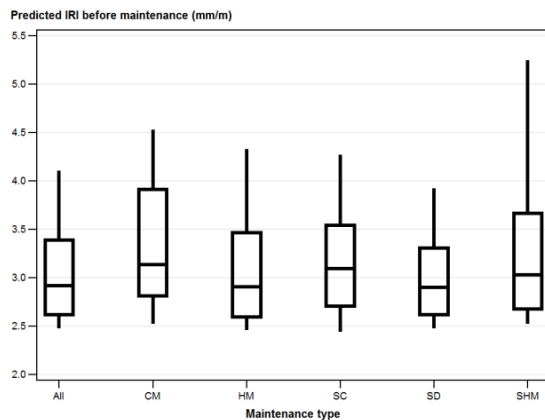
IRI before maintenance depends on maintenance standard and changes in maintenance standard and changes in budget

After



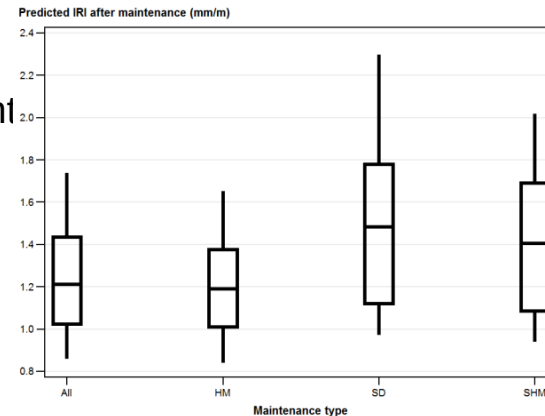
IRI after maintenance is dependant on IRI before maintenance.

Traffic1=5. 2000-3999



Example in one traffic class. Median constant but variations dependent on changes in maintenance standard and changes in budget

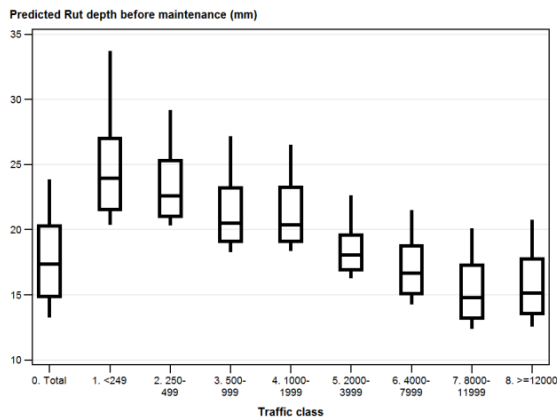
Traffic1=5. 2000-3999



Example in one traffic class. Median varies dependant on treatment but variations are small. Higher median for SD (surface dressing) may depend on variations in preparatory work

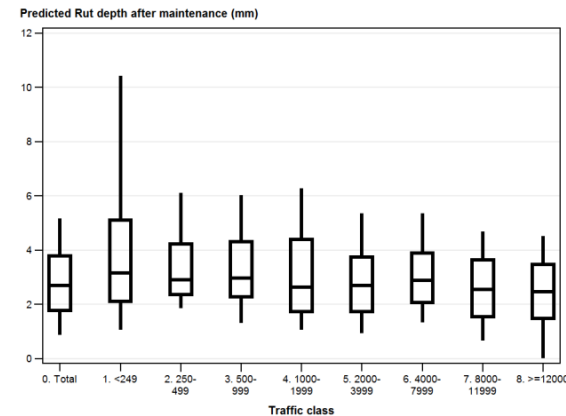
Condition before and after maintenance, Rut Depth

Before



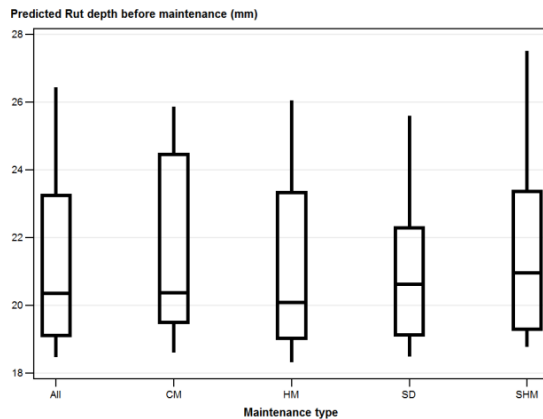
Rut Depth before maintenance depends on maintenance standard and changes in maintenance standard and changes in budget

After



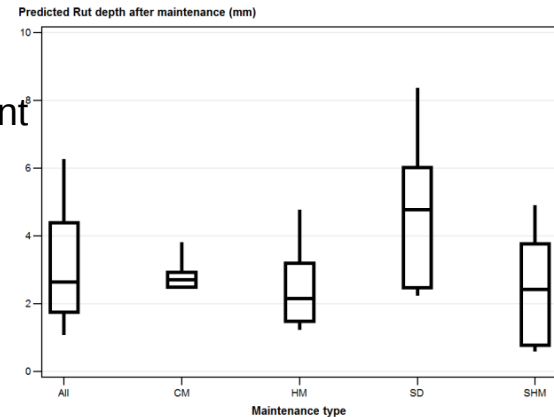
Rut Depth after maintenance seems to be independent on rut depth before maintenance

Traffic1=4. 1000-1999



Example in one traffic class. Median constant but variations dependent on changes in maintenance standard and changes in budget

Traffic1=4. 1000-1999



Example in one traffic class. Median varies dependent on treatment but variations are small. Higher median for SD (surface dressing) may depend on variations in preparatory work

Change in condition before and after maintenance

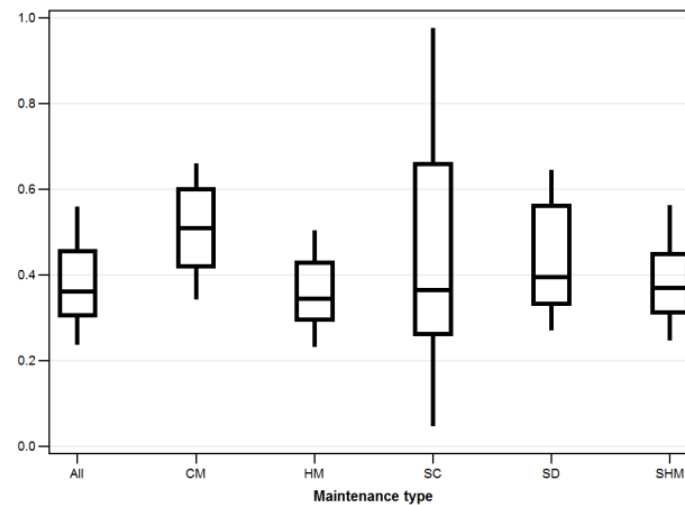
Traffic1=4, 1000-1999

The ratio of condition after and before treatment shows the initial effect of a treatment. If the ratio is low, the initial effect is high and if the ratio is high, initial effect is low.

$$IRI_{\text{after}} = \text{ratio} * IRI_{\text{before}}$$

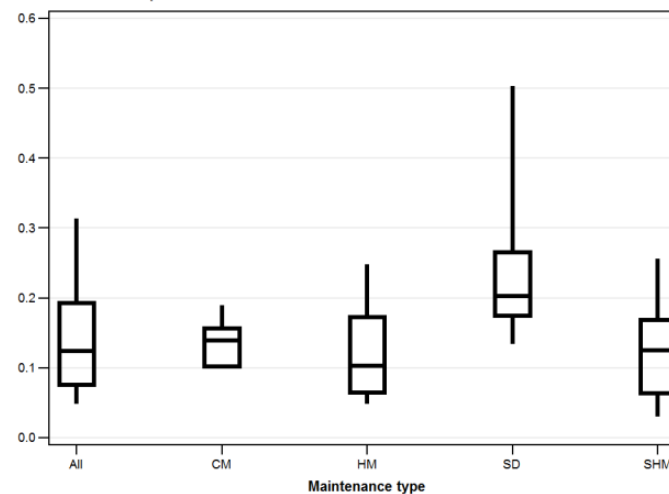
$$\text{Rut depth}_{\text{after}} = \text{ratio} * \text{Rut depth}_{\text{before}}$$

Reduction in IRI due to maintenance



Traffic1=4, 1000-1999

Reduction in Rut Depth due to maintenance

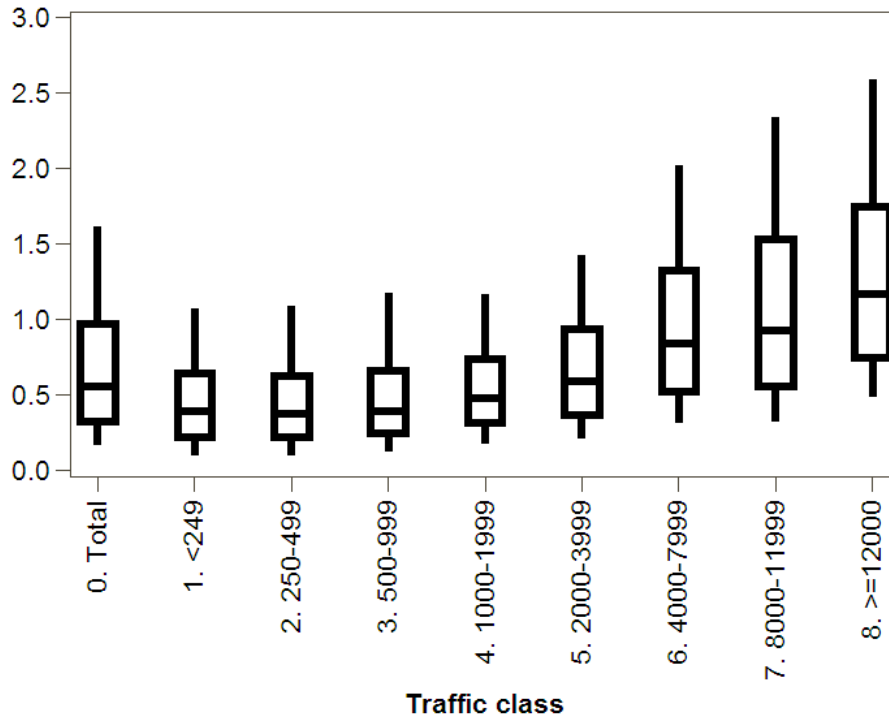


Yearly change in condition

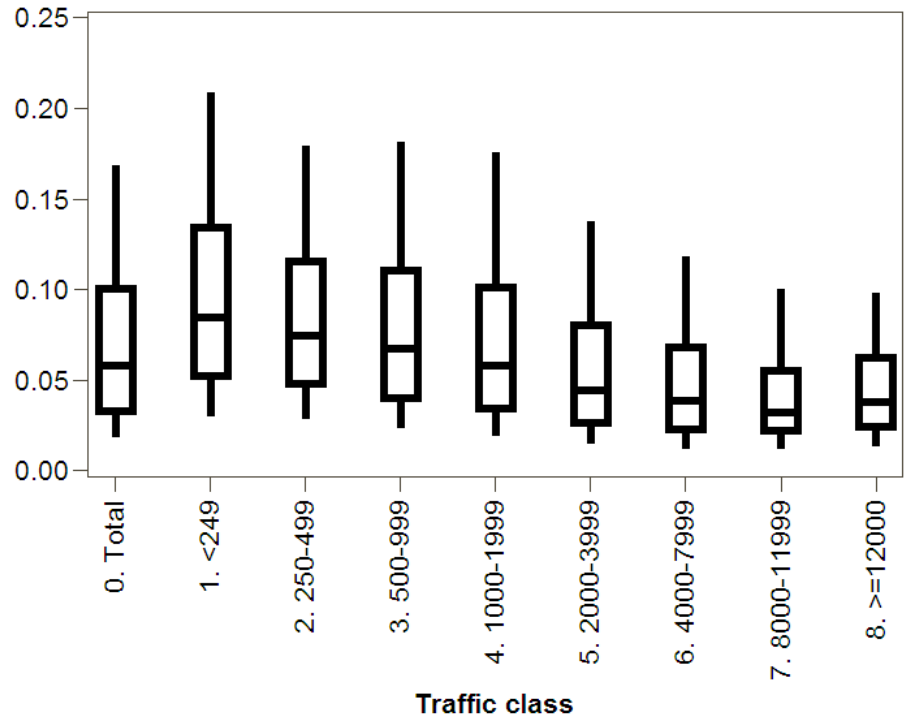
Analysis of the yearly change in condition is based on a straight line regression analysis of time series of measured data.

Average IRI 0.06 mm/m/year
Average Rut Depth 0.6 mm/year

Yearly change in Rut depth after maintenance (mm/year)



Yearly change in IRI after maintenance (mm/m/year)



Vägytans tillstånd - Framtid

- Mer analys

HDM-4 Highway Development and Management

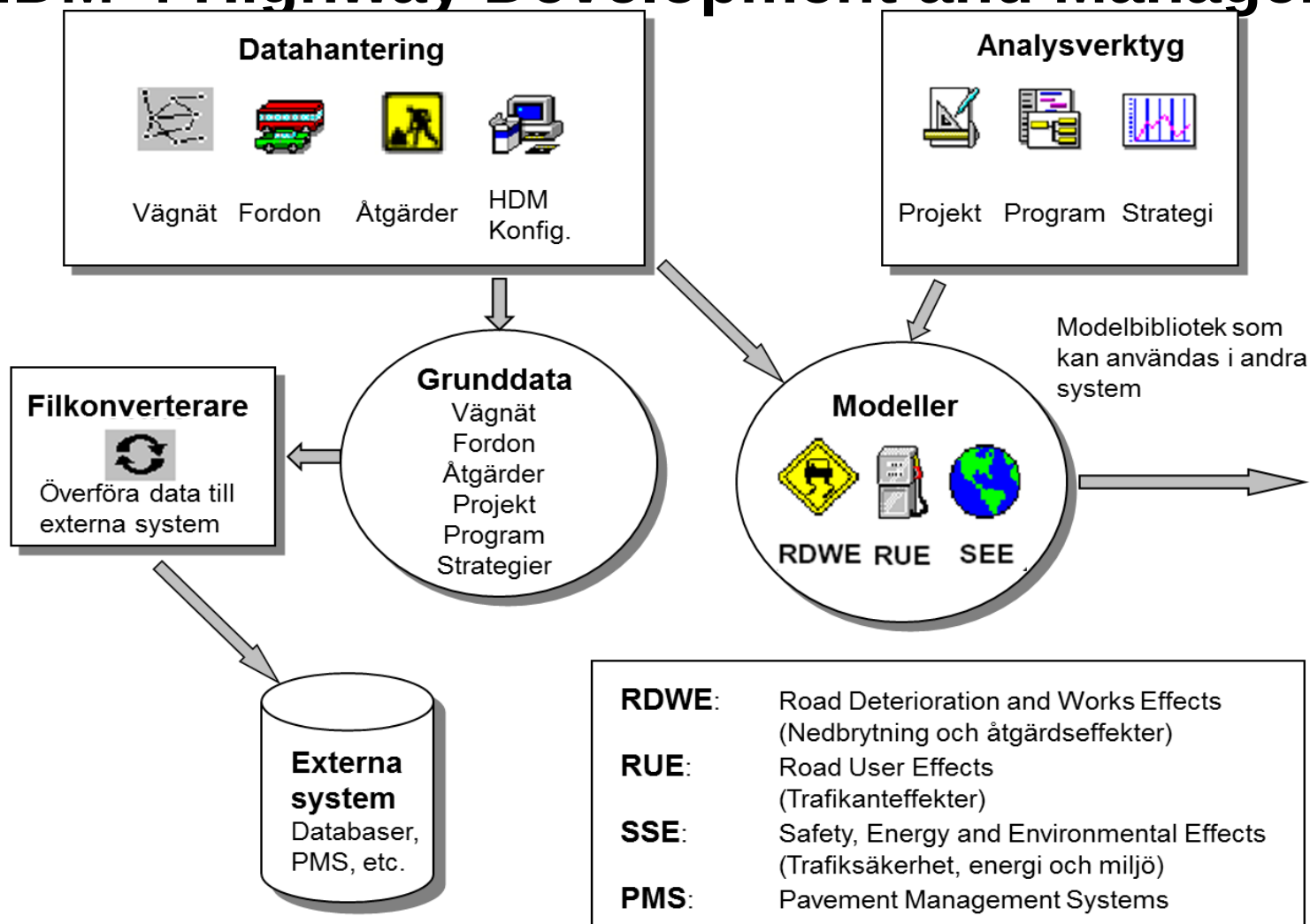
HDM-III Highway Design and Maintenance Standards Model

HDM-4 Highway Development and Management

First developed by the World Bank

Today managed by PIARC (The World Road Association)

HDM-4 Highway Development and Management



Average Roughness by Section (Graph)

Study Name: MY3 Hdm_2012_300_10

Run Date: 10-04-2013

Section: 8210024

Sensitivity: No Sensitivity Analysis Conducted

ID: 8210024

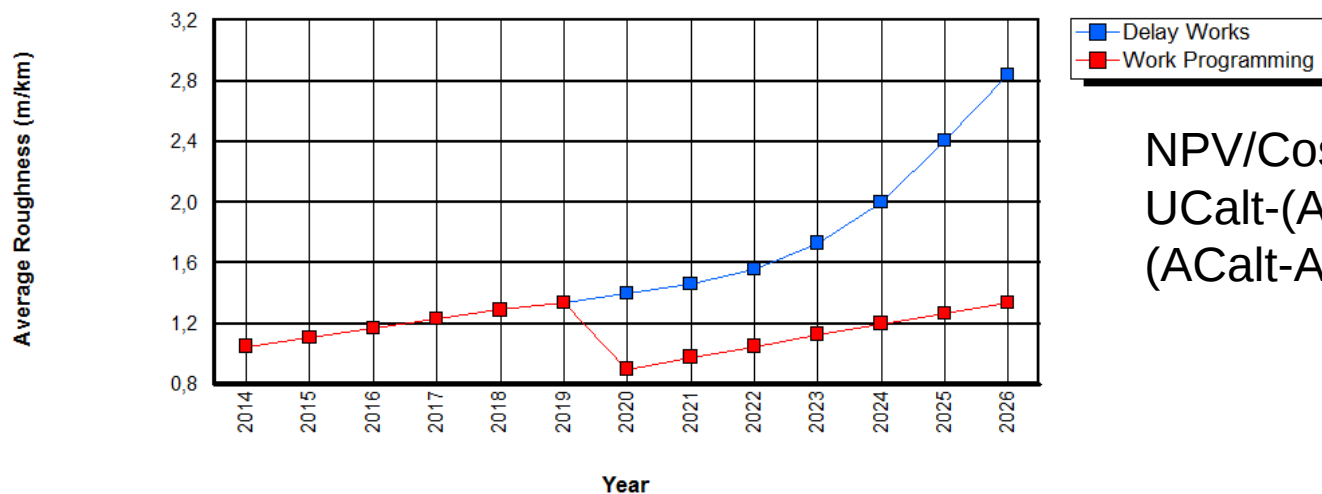
Rise + Fall: 0,77m/km

Road Class: Övriga nationella vägar

Width: 7,00m

Length: 2,10km

Curvature: 2,80deg/km



$$NPV/Cost = \frac{UC_{base} - UC_{alt} - (AC_{alt} - AC_{base})}{(AC_{alt} - AC_{base})}$$

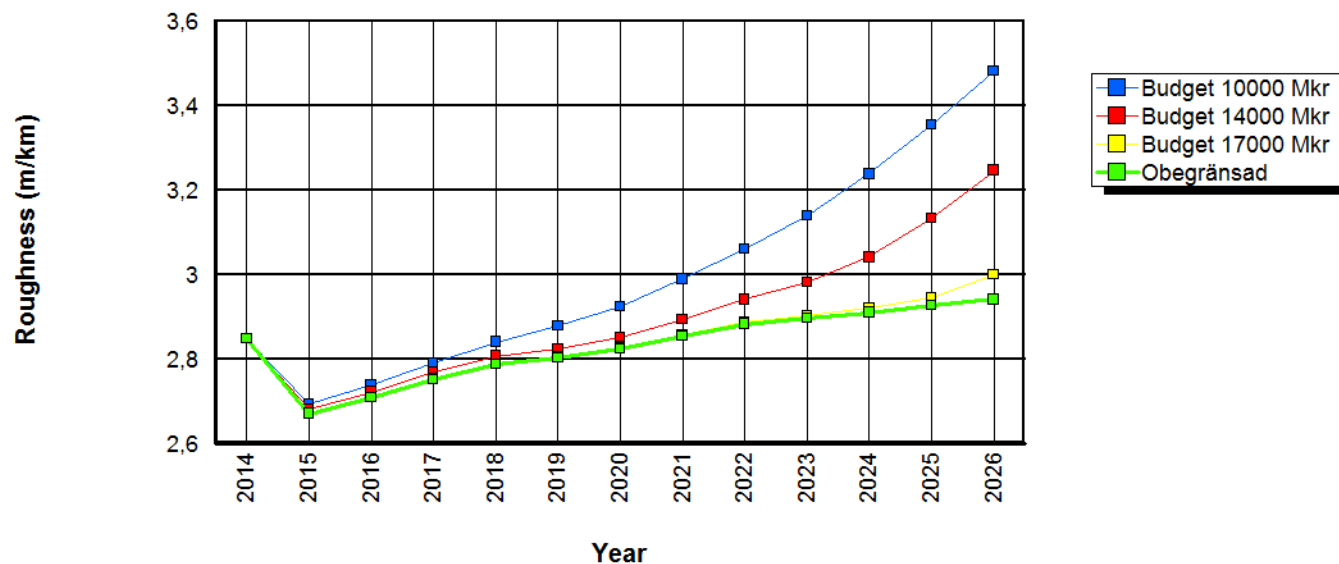
Roughness: Average for Road Network by Budget Scenario (Graph)

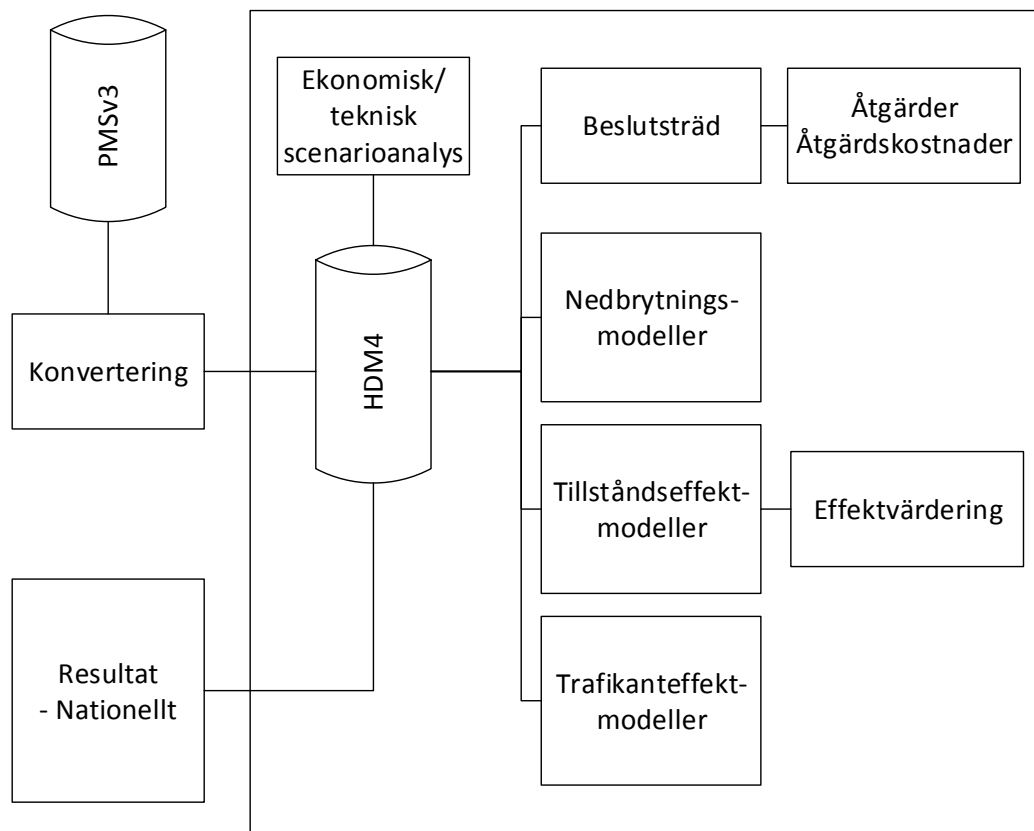
Study Name: MY3 Hdm_2012_300_10

Run Date: 10-04-2013

Surface Class: Bituminous

Annual Average Roughness for each Surface Class of the Optimised Work Programme (weighted by length)





HDM4 analys 2012-13
HDM4 analys 2016-17

Kalibrering av HDM4

Förutsättningar för fortsatt
utveckling

Rekommendationen är att överväga andra alternativ än HDM-4 på sikt men att behålla användandet av HDM-4 tills att en alternativ lösning är driftsatt.

HDM4 analys 2019-20???

