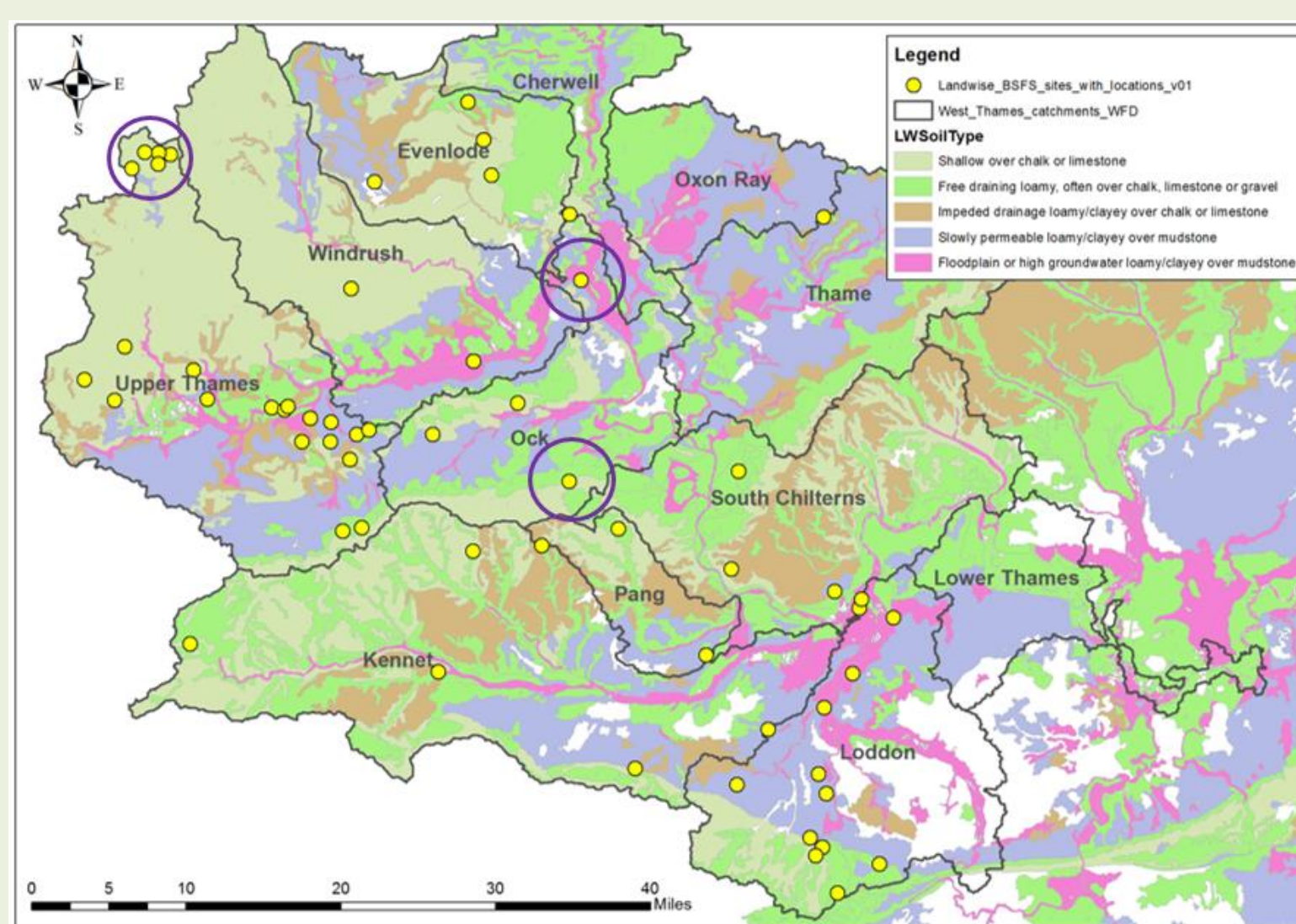


Introduction

Land use and management have potential to improve soil structure, increase infiltration and soil water storage.

As a result, it can slow the flow of water and reduce flooding caused by surface run-off, rivers and groundwater.

The LANDWISE project examined the potential of land based NFM in lowland groundwater-fed catchments in the River Thames Basin, England.



Survey locations in the West Thames Catchment. Yellow dots = broadscale survey, purple circles = detailed survey.



Survey measurements including: VESS, soil sampling for bulk density, texture and OM analysis, saturated conductivity, surface infiltration, root & horizon depth.

Methods

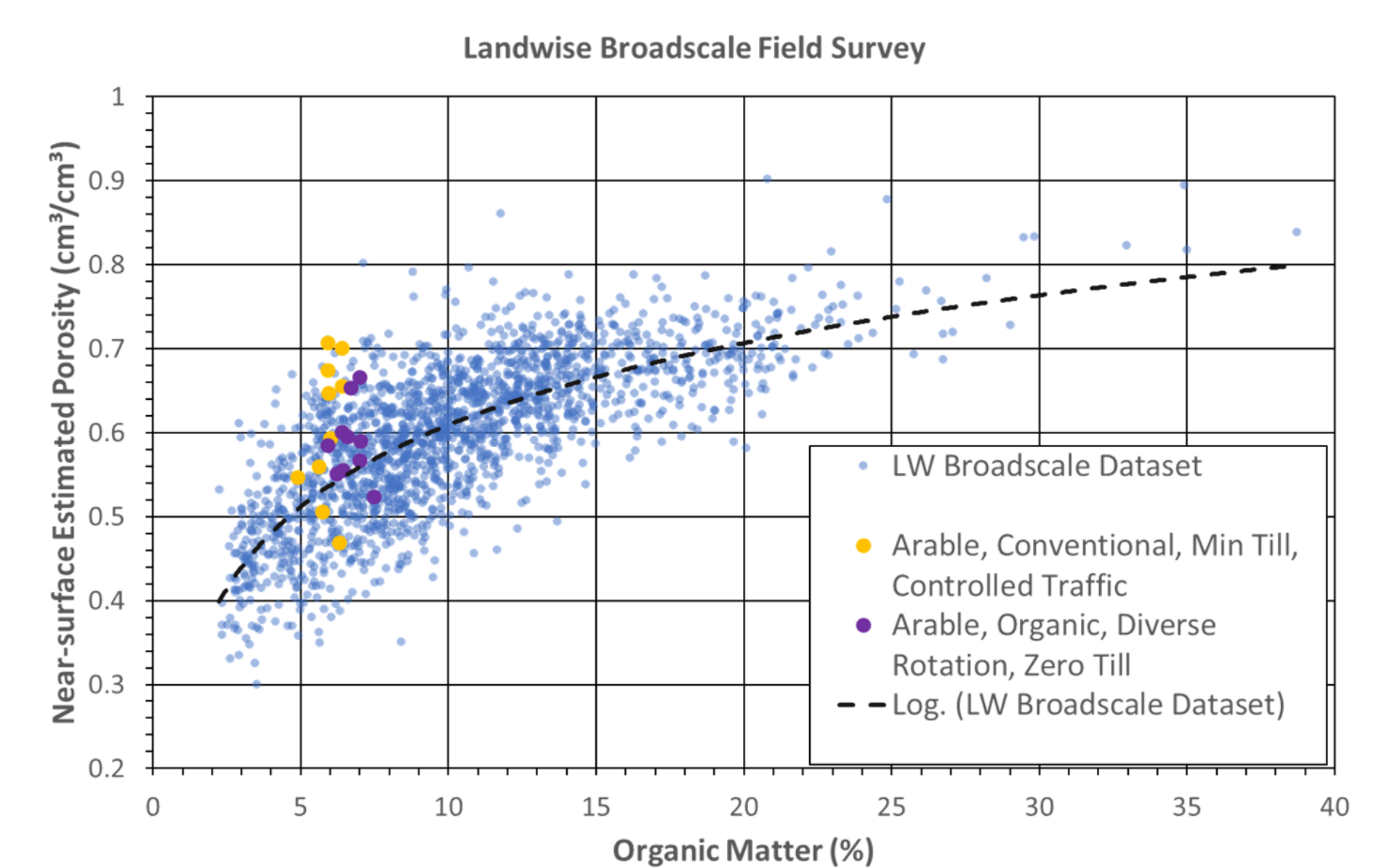
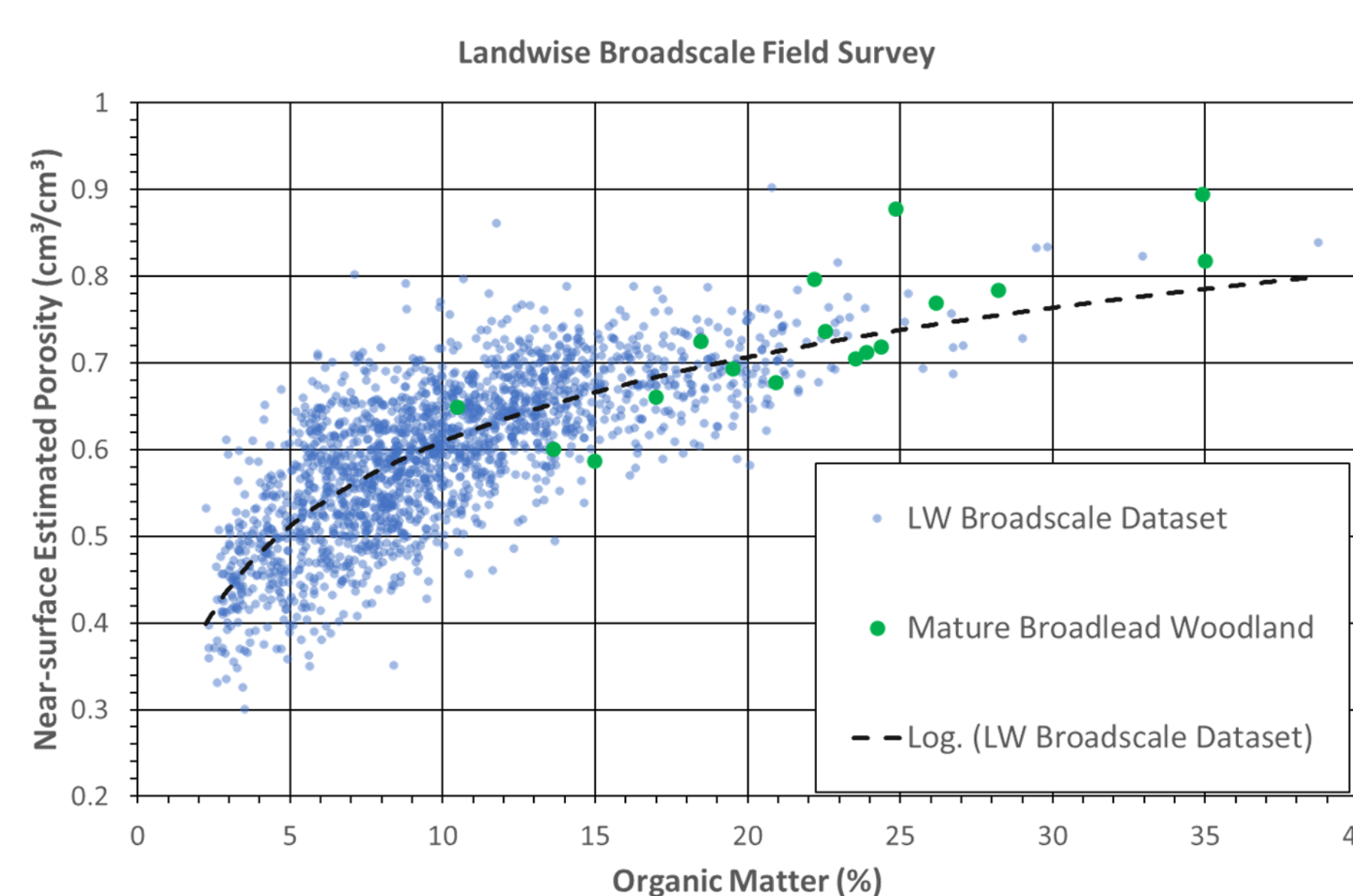
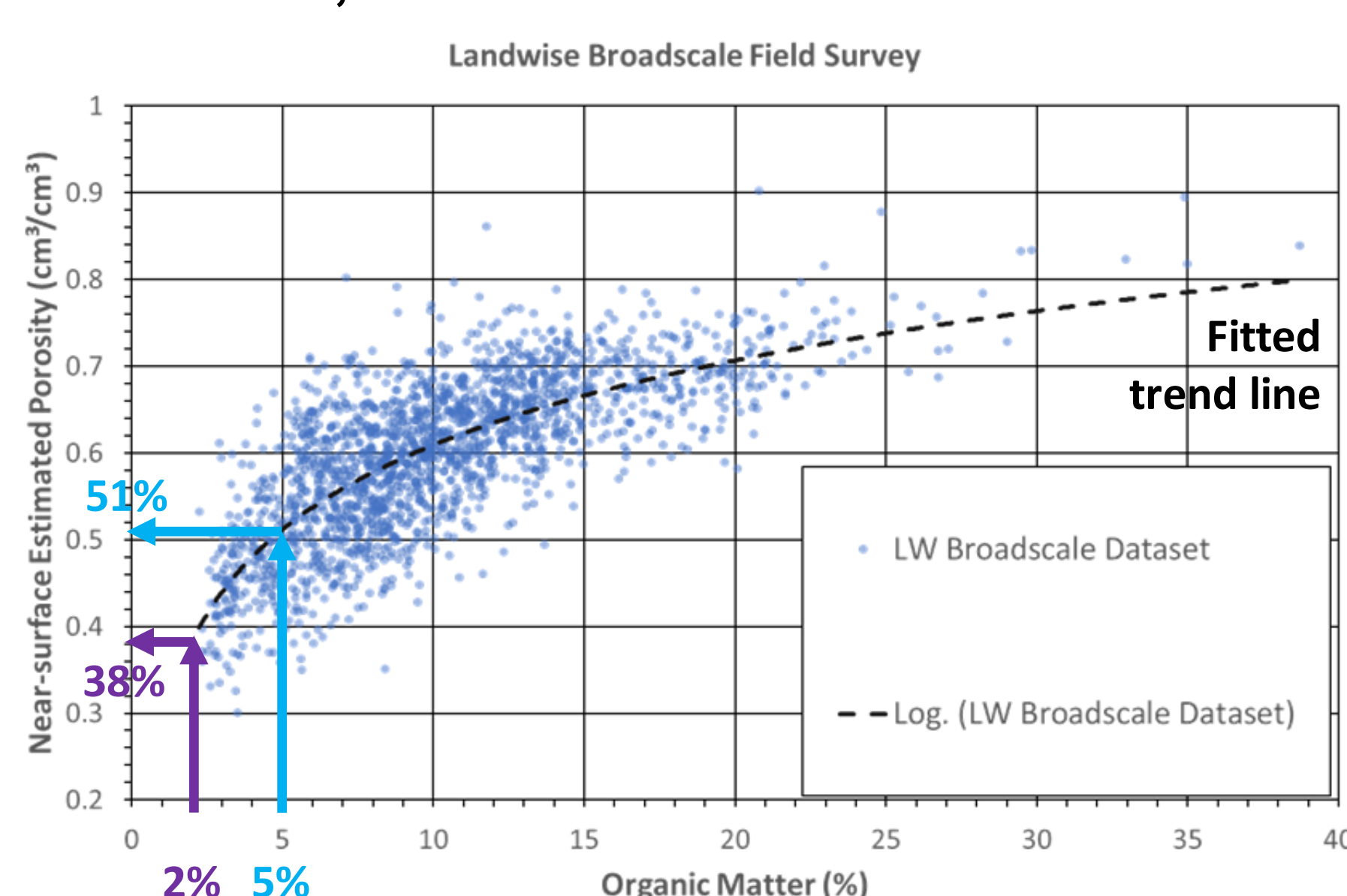
We focused on five soil types within two geology types (carbonate and mudstone); across agricultural land, grassland and woodland.

We compared conventional and innovative farming systems, including; grass rotations, controlled traffic, cover crops, min/zero till.

We gathered empirical evidence of within and between field variation through a broad survey of 164 fields and an in-depth survey of 7 sites with different soil use and management strategies.

Results

- Management of near-surface soil properties is important so that available deeper storage is accessible.
- Increasing organic matter content increases soil porosity.
- If organic matter is 'low' (1-2%) to 'medium' (2-4%) modest increases can significantly increase porosity.
- Land use and management practices can have a significant impact on soil porosity.
- Mature broadleaf woodland results in the highest soil porosity, relative to arable and grassland.
- Innovative conventional and organic farming practices can increase soil porosity, including controlled traffic, min till, zero till and diverse rotations.



Soil porosity data for all field conditions (infield, trafficked, margins: blue dots) estimated from bulk density using soil mineral particle and organic matter typical densities and relative proportions. Examples show typical woodland (green dots), innovative conventional (yellow dots) and organic (purple dots) farming practices over a range of soil types.

Conclusions

- We can improve soil structure and increase porosity through achievable land use and management practices, including; addition of organic matter, controlling traffic, reducing tillage and addition of woodland.
- This is important for Natural Flood Management as these practices can be controlled to increase soil water storage and mitigate the effects of flooding.
- We are still exploring these data; investigating soil texture, management systems and depth effects further.