INTRODUCTION

- Cost-effective management of soil erosion and in-stream sediment is important to prevent the deterioration of soil and freshwater resources
- Robust quantification of eroded soil, or sediment, from a river catchment is essential to investigate the influence of catchment characteristics, for example, soil drainage type and land use on sediment export
- Comparison of sediment export to recommended targets is useful to prioritise catchment soil and sediment management strategies
- This study investigated sediment export in five intensive agricultural catchments in Ireland with contrasting soil drainage classes and land use types

METHODS

- Suspended sediment concentration (SSC) and suspended sediment yield (SSY) was estimated from October 2009 to September 2014 at each catchment outlet
- High-resolution SSC was calculated from calibrated turbidity measurements (example Fig 3) using measured SSC (Fig 4)
- SSC data was combined with discharge (Q) to estimate suspended sediment yields (SSY)

RESULTS & DISCUSSION

- Sediment export was low compared to European river catchments with similar climates (Fig 5) likely due to landscape complexity (ditches/hedgerows/small fields)
- SSCs were below the Freshwater Fish Directive threshold (25 mg/l)
- Annual average SSYs were lower than recommended thresholds (poor and moderately drained catchments 40 t/km²/yr, well-drained catchments 20 t/km²/yr – Fig 6)
- Annual average SSY was greater where soils were poorly- and moderately-drained due to surface transport pathways
- Where arable land use was situated on poorly-drained soils SSYs were highest (Arable B)
- SSY was low in the arable catchment with well-drained soils (Arable A) as sub-surface pathways reduced surface connectivity
- Inter-annual SSY variability was high (greater than the annual average differences between catchments)

IMPlications

- Annual average sediment losses are low to moderate despite agricultural intensity
- Landscape complexity; small field sizes, dense field hedgerow and drainage networks are likely to reduce hydrological connectivity and intercept pathways to lessen sediment export
- Although SSY is low, shorter-term fluctuations may negatively impact aquatic ecology

ACKNOWLEDGMENTS

Walsh Fellowship Programme, Teagasc; University of Dundee, UK; Agricultural Catchments Programme, Teagasc; farmers and landowners of the study catchments