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Guide to the Classical and Other Long-term Experiments, Datasets and Sample Archive



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North Wyke Farm Platform

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especially on Plot 3d which has received no fertiliser inputs since the experiment was established in 1856. At North Wyke, the ECN monitoring is split between two areas, the Farm Platform (Figure 18) and Rowden Moor. The North Wyke TSS is a 0.66 ha paddock of permanent grassland on Rowden Moor where no nitrogen fertiliser has been applied since 1984.

The ECN uses well defined and agreed protocols (Sykes *et al.*, 1996) for the sampling, measurement and analyses of key physical, chemical and biological variables, indicative of the causes and effects of environmental change; especially atmospheric pollution and climate variables. They are monitored using automated weather stations, bulk rain water collectors and NO₂ diffusion samplers, amongst other things. At ECN Rothamsted we have seen a decrease in the annual mean amount of NO₂ of around 50% (Figure 17); from a maximum of 11.6 µg N m⁻³ (4.4 kg N ha⁻¹) in 1996 to 5.9 µg N m⁻³ (2.2 kg N ha⁻¹) in 2012 (Scott *et al.*, 2015). The wet and dry N deposition data from ECN Rothamsted was used to show that the reductions in atmospheric N deposition in recent decades have had positive effects on recovery of some plant species (especially legumes), on the Park Grass experiment (Storkey *et al.* 2015; see above).

Further details of the Rothamsted and North Wyke ECN sites together with results from the first 20 years of monitoring can be found in two recent booklets (Scott *et al.*, 2015 and Beaumont *et al.*, 2016). The ECN network (www.ecn.ac.uk) and resulting datasets (<http://data.ecn.ac.uk>) are managed and collated by the Central Coordinating Unit, Centre for Ecology and Hydrology.

Rothamsted also hosts environmental monitoring equipment at the Harpenden and North Wyke sites on behalf of the

United Kingdom Acidifying and Eutrophying Atmospheric Pollutants (UKEAP) project (<http://www.pollutantdeposition.ceh.ac.uk/ukeap>) and COSMOS-UK (<http://cosmos.ceh.ac.uk/>). The latter is a new long-term network monitoring changes in soil moisture using cosmic-ray measurement technologies. Both projects provide freely available data on-line.

NORTH WYKE FARM PLATFORM

Establishment of the North Wyke Farm Platform (NWFP) began in 2010. It is located to the north of Dartmoor National Park, Devon on a ridge at 120 – 180 m above sea level, where the land slopes down on the west to the River Taw and on the east to one of its tributaries, the Cocktree stream. Over a 30-year period from 1982, the mean annual precipitation at the North Wyke site was 1044 mm. A significant feature of the site is the presence of clay-rich subsoils beneath the sub-surface horizons. Below the topsoil layer, the subsoil is highly impermeable to water and is seasonally waterlogged with most excess water leaving by surface and sub-surface lateral flow across the clay layer. This pattern in the movement of water allows for interception by a bounded drainage system and was a key factor in making this farm-scale experiment viable.

The NWFP comprises three farming systems in “farmlets”, each consisting of five component catchments totalling approximately 21 ha per farmlet. The farmlets test, through life cycle analysis, the productivity and environmental sustainability of contrasting temperate grassland beef and sheep systems at appropriate farm and land management scales (Figure 18). These approaches are:

1. Permanent pasture: managed using inorganic fertilisers (Green farmlet).

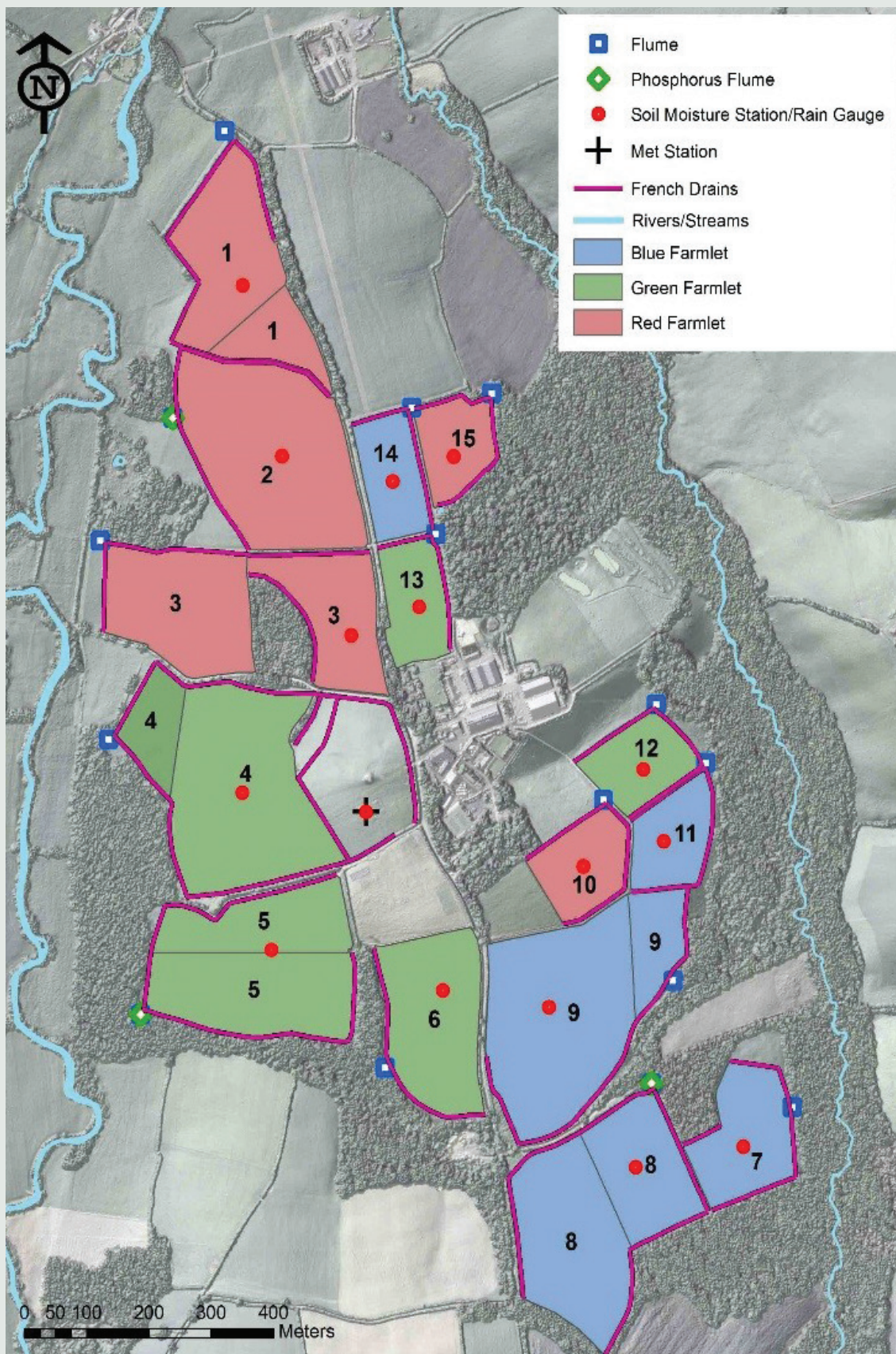


Fig. 18 North Wyke; aerial view of North Wyke showing location of farmlets etc.

2. Increased use of legumes: nitrogen fertilisers replaced with biological fixation using sown legume and grass mixtures (Blue farmlet).
3. Planned reseeding: regular renewal of swards, providing opportunities for introducing innovative cultivars with desirable traits. Currently, high sugar and deep rooting grasses are studied (Red farmlet).

Each of the 15 catchments is hydrologically isolated through a combination of topography and a network of 9.2 km of drains constructed around the perimeters of each catchment. The drainage network is made up of 800 mm deep trenches containing perforated drainage pipes and backfilled to the surface with 20-50 mm clean, carbonate-free granite chips. The trench bed and outer face are lined with plastic damp-proof-plastic membrane. This type of construction is commonly referred to as a French drain. Surface and sub-surface lateral flow from the drainage network for each catchment is directed through H-flumes, each sized according to the catchment characteristics and based on a predicted 1 in 50-year flood event.

At each flume, a cabin houses a range of *in-situ* state-of-the-art instruments that record water flow and water chemistry. Each catchment also has a centrally-located soil moisture station to record soil moisture, soil temperature and precipitation. In addition, meteorological variables are collected at a single NWFP site. All water flow, water chemistry, soil moisture and meteorological data are recorded at a fine-scale (15 minute) temporal resolution. Gaseous emissions of nitrous oxide, carbon dioxide, and methane are measured at strategic locations across the NWFP at differing temporal resolutions.



Catchment flumes and instrumentation cabin

Livestock performance and all agricultural operations such as tractor operations, spreading inorganic fertilisers and organic manures, spraying agrochemicals, ploughing, drilling seeds and silage making that occur on the NWFP fields are also recorded. The data collected are made publicly available via the NWFP data portal: <https://nwfp.rothamsted.ac.uk/>.

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