

# Impact of the Glastir Scheme:

## Measure Centric Approach to Modelling Effects of Land Management Options

Steven Anthony  
Principal Scientist  
ADAS UK Ltd



Llywodraeth Cymru  
Welsh Government



**GMEP**

Glastir Monitoring  
and Evaluation  
Programme

# Glastir outcome: \*Result and Impact Indicators

\*Common Monitoring and Evaluation Framework

- Improving Soil and Water Management
  - Water Balance and Soil Erosion
  - Nitrate and Phosphorus Leaching
  - Pesticides and Veterinary Medicines
- Combating Climate Change
  - Methane Emissions
  - Nitrous Oxide Emissions
  - Carbon Dioxide Emissions (On-Farm)



# Wales Diffuse Pollution Emissions Framework

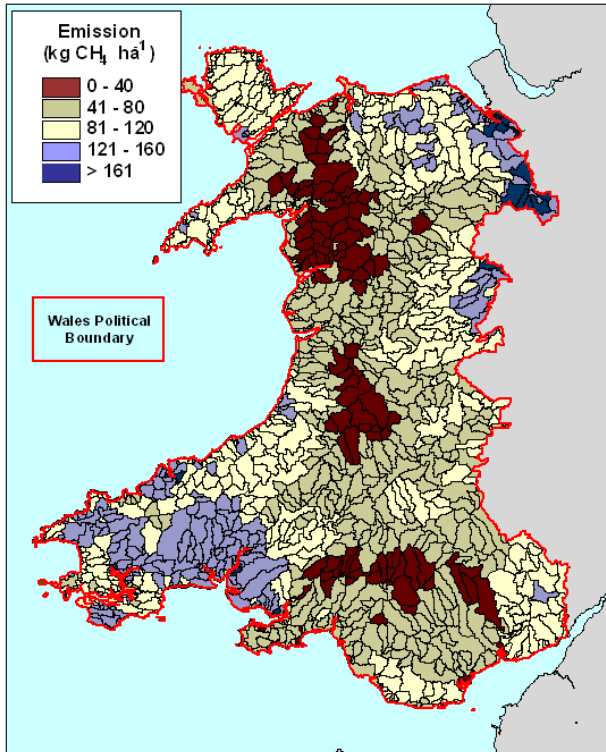
- Integration of pedigree Policy and Regulatory models at Farm Scale driven by surveys of current Farm Management
- Prediction of Multiple Pollutant losses from Multiple Sectors and Sources, Areas and Pathways
- Applied throughout United Kingdom:
  - Nitrate Vulnerable Zones Designation
  - Water Framework Directive Characterisation
  - Multi Media Cost Effectiveness of Mitigation
  - Evaluation of Tir Cynnal and Tir Gofal
  - Impact of General Binding Rules



# Agricultural Emissions

## Climate Change

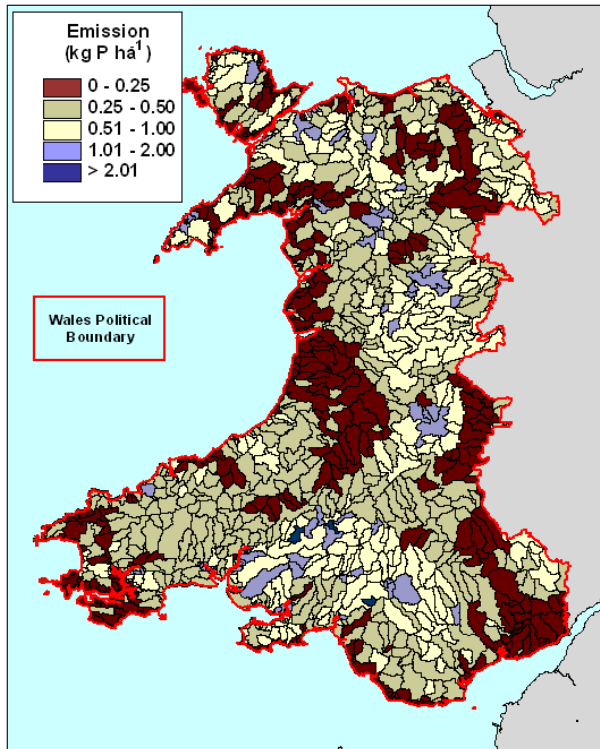
Present Day Modelled Methane Emission from all Agricultural Land Including Commons



131.9 kt CH<sub>4</sub>

## Nutrients / Sediment

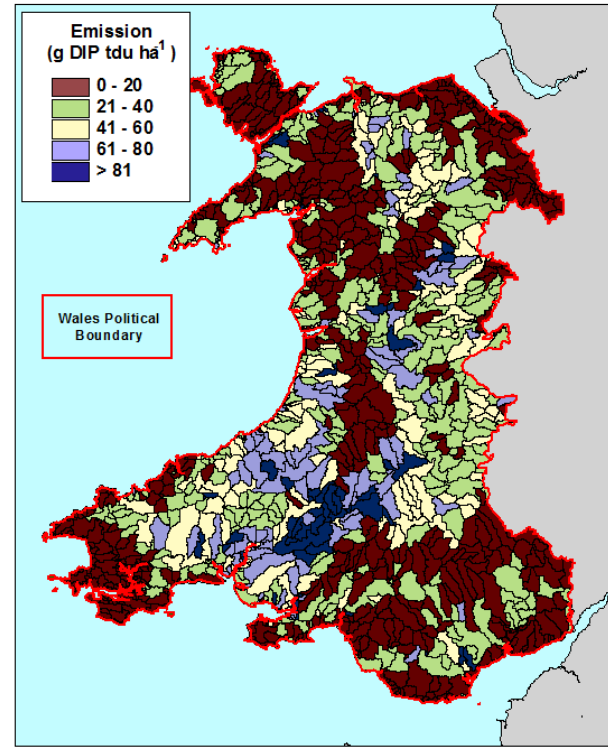
Present Day Modelled Phosphorus Emission from all Agricultural Land Including Commons



719.4 t P

## Chemicals / Veterinary

Present Day Modelled Spent Sheep Dip Emission from all Agricultural Land Including Commons



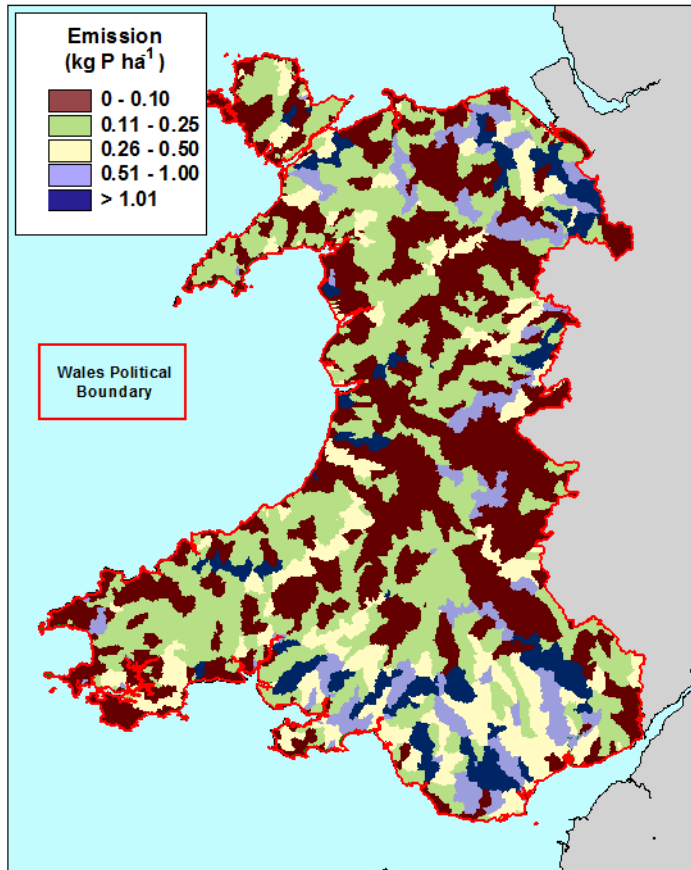
49.2 t TDU

## Farm Management Interactions *with* Soils, Climate and Connectivity

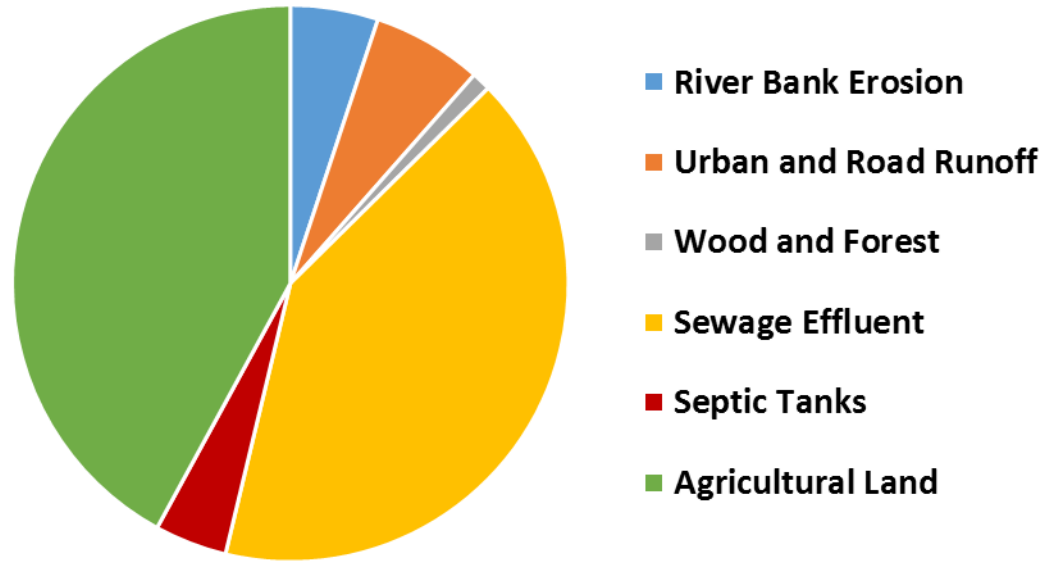


# Non Agricultural Emissions

Present Day Modelled Phosphorus Emission from all Non-Agricultural Sources

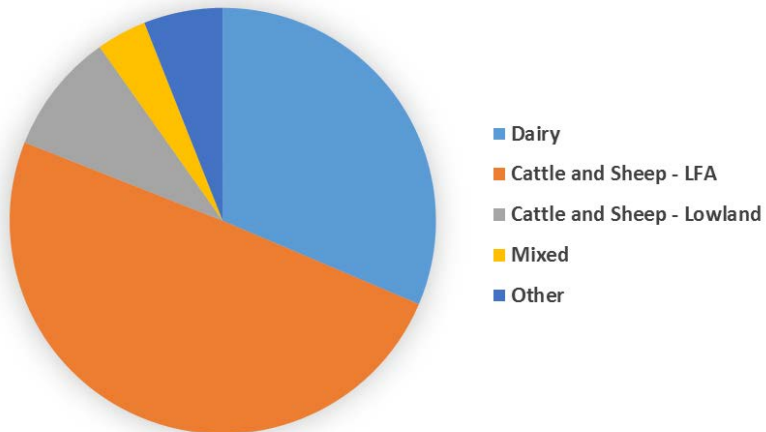


## Phosphorus Sector Apportionment

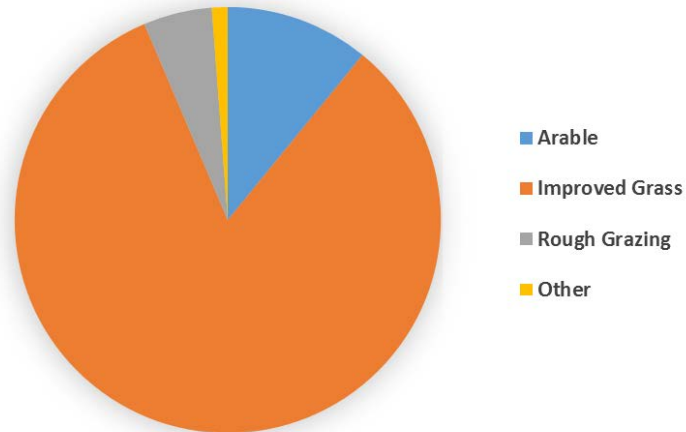


# Farm Source Apportionment: Nitrate

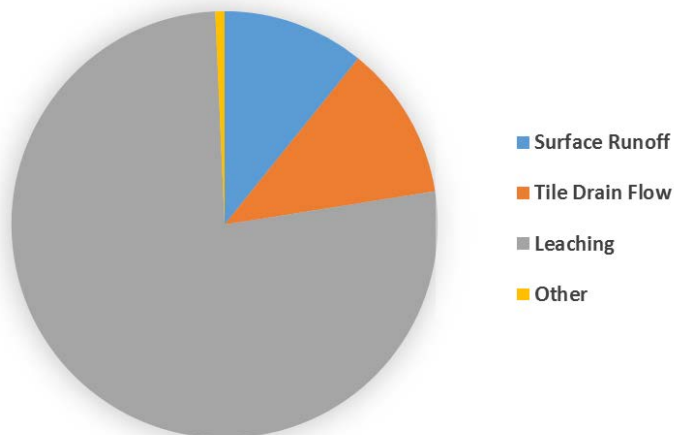
Farm Type



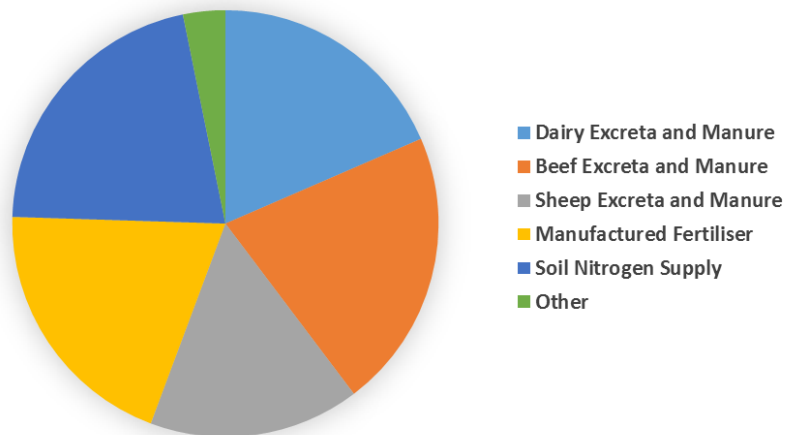
Land Use



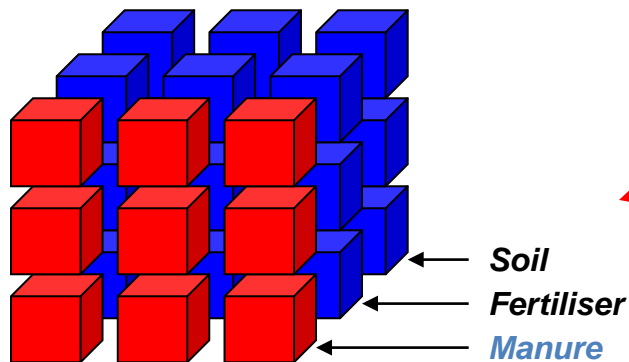
Pathway



Source



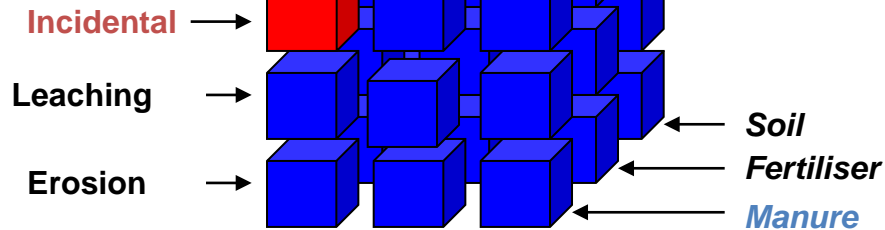
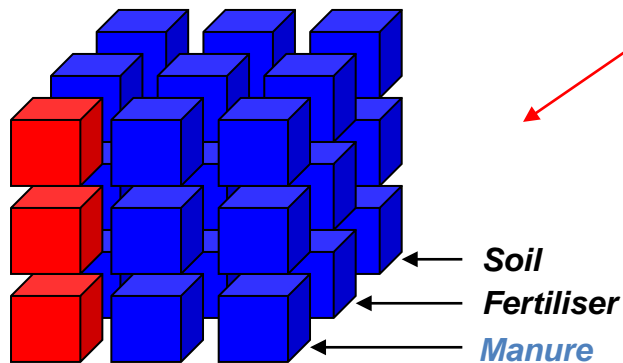
# Impact of Changes in Farm Practice



Change of Animal Diet

Manure Placement

Application Timing



Runoff

Drain flow

Groundwater

Runoff

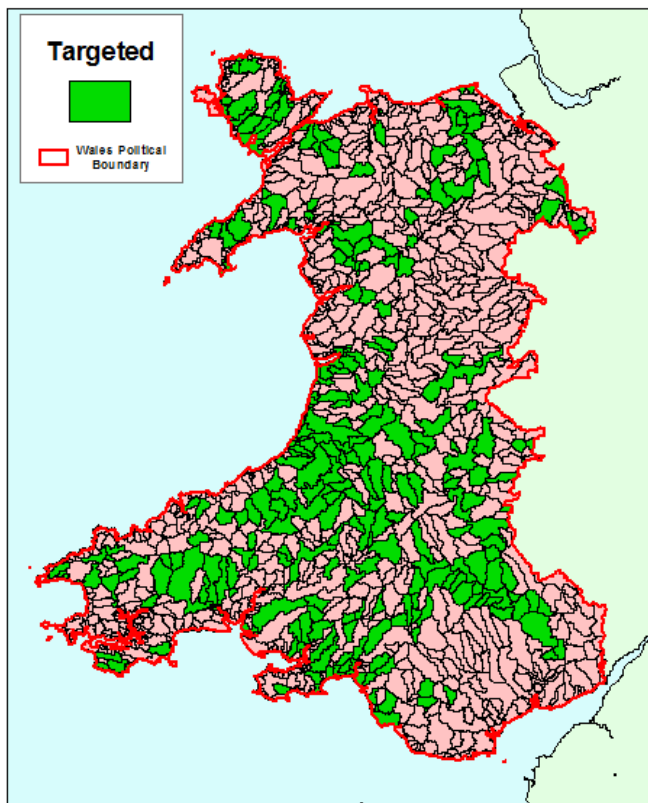
Drain flow

Ground water



# Glastir Scenarios: Direct Impact


WFD River Catchments Selected for Targeting of Water Quality Mitigation Options



## All Wales No. 15: Permanent Pasture No Inputs

*No manufactured fertiliser nitrogen or organic manures spread to permanent pasture – to reduce leaching.*

### Source Targeting:

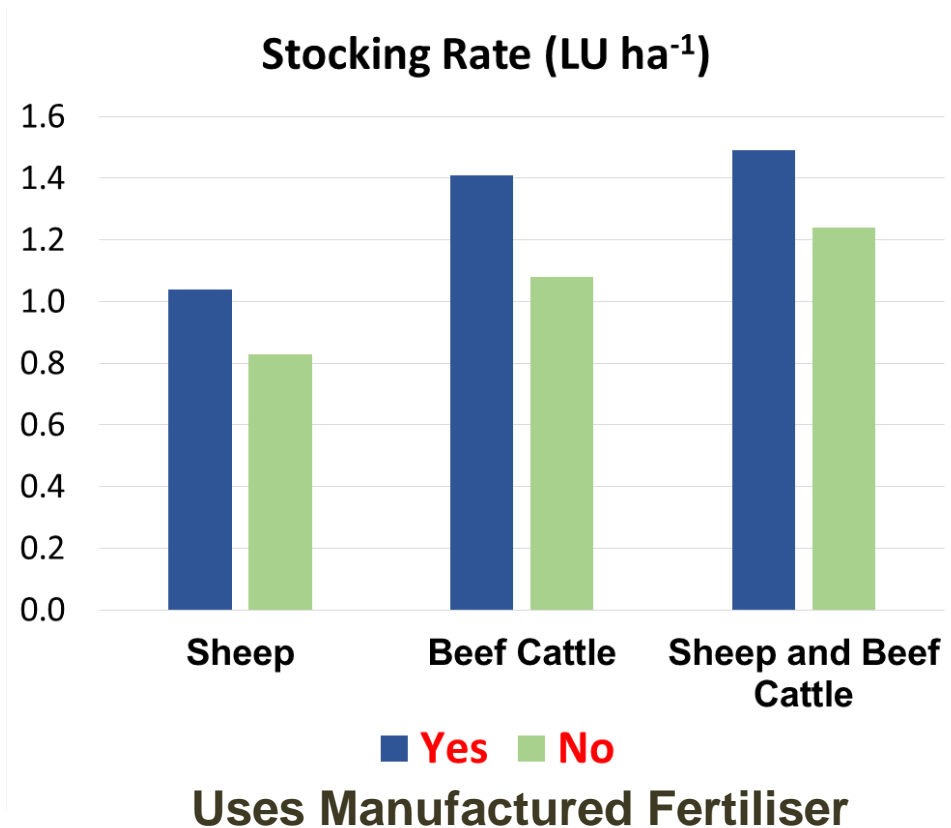
- **Baseline All Sources (100%)** 34.0 kt NO<sub>3</sub>-N
  - **Cattle and Sheep Farms (58%)**
  - **Spatial Targeting (28%)**
  - **Improved Grassland (23%)**
  - **Manufactured Fertiliser (5%)** 1.7 kt NO<sub>3</sub>-N
- 





# Glastir Scenarios: Indirect Impact

## Surveyed Differences in Stock Rates – Welsh Farm Data



## Source Targeting:

- **Baseline All Sources (100%)**
- **Cattle and Sheep Farms (58%)**
- **Spatial Targeting (28%)**
- **Beef Cattle and Sheep (15%)**

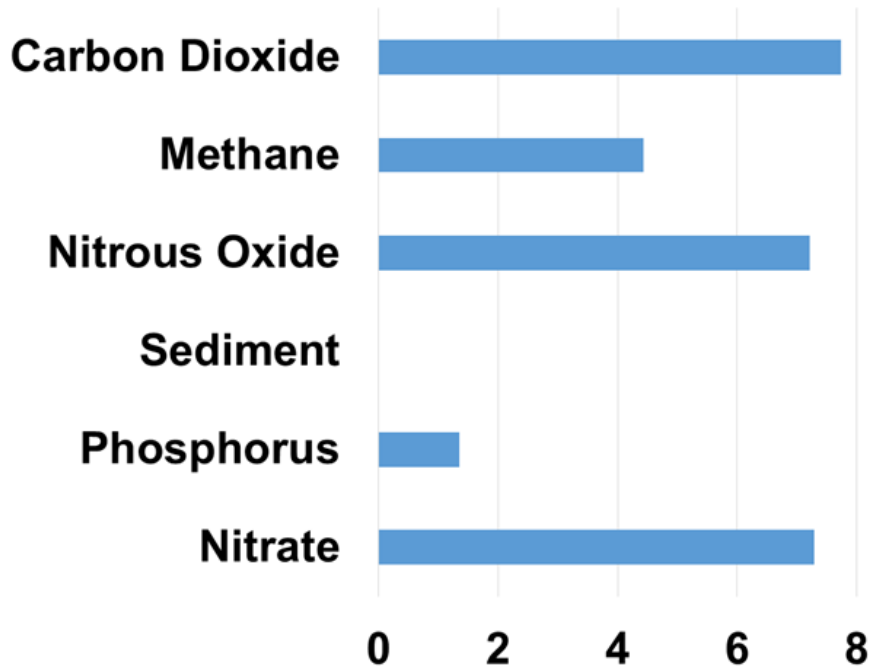


**5.3 kt NO<sub>3</sub>-N**

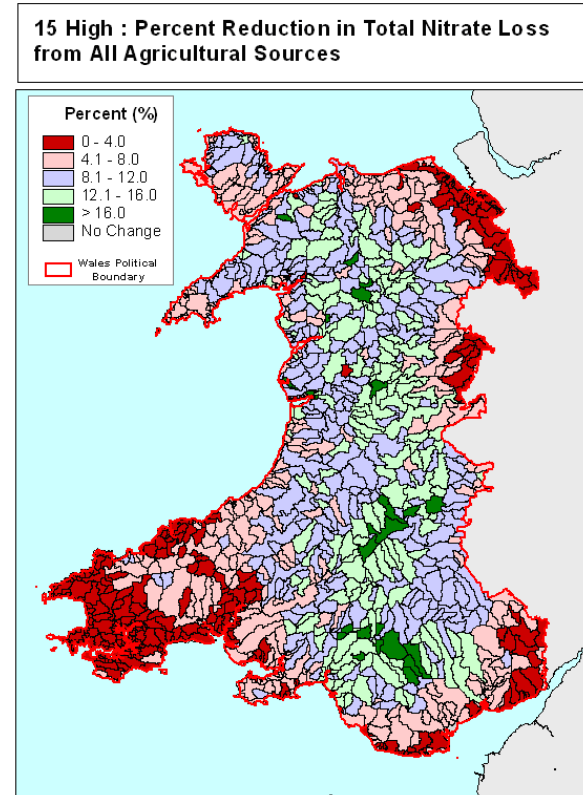


# Glastir Scenarios: Net Impact

## National Average Agricultural Pollutant Load Reduction (%)



## Local Agricultural Pollutant Load Reduction (<1 to 20%)



# Next Steps for GMEP

- Evaluating impact of current Glastir options: scoping uptake and effect in advance of monitoring
- Enable selection and targeting options for maximum utility: potential reduction and environment sensitivity
- Supported by second Wales Farm Practice Survey to assess indirect effects and to establish baseline levels of good practice



Thank you *and* any questions?

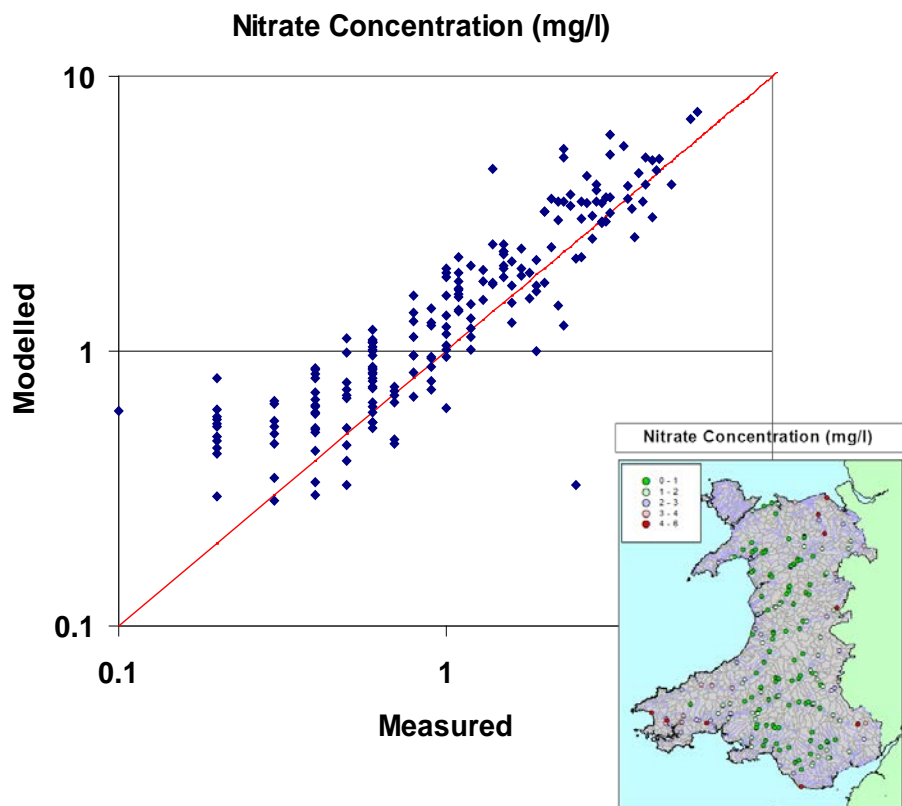
Framework critically depends on farm survey for establishing changes in farm management and additionality.



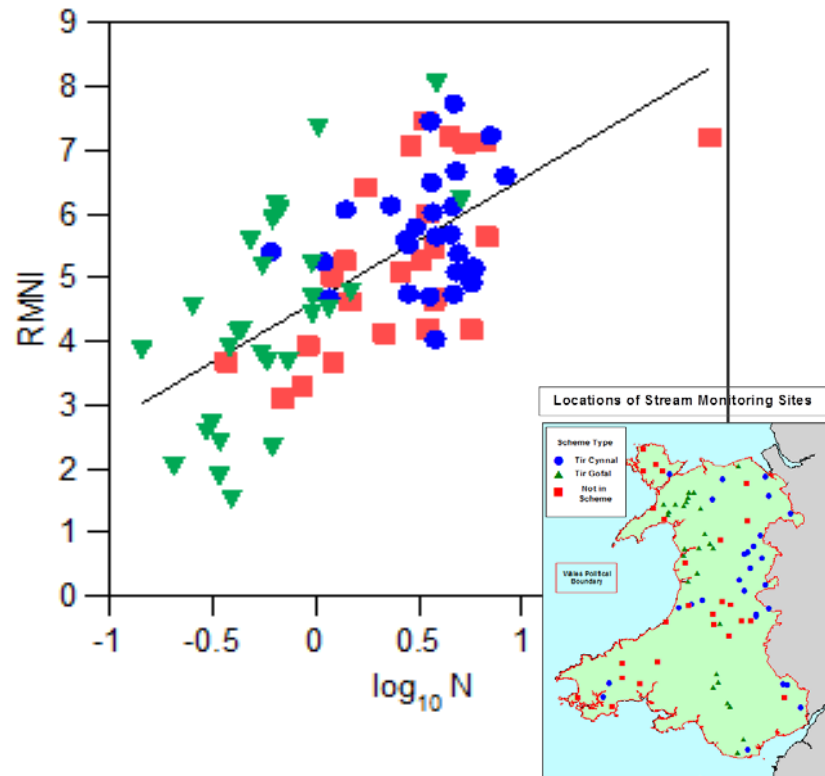


# Model Verification: Nitrate

## Measured and Modelled River Nitrate Concentrations



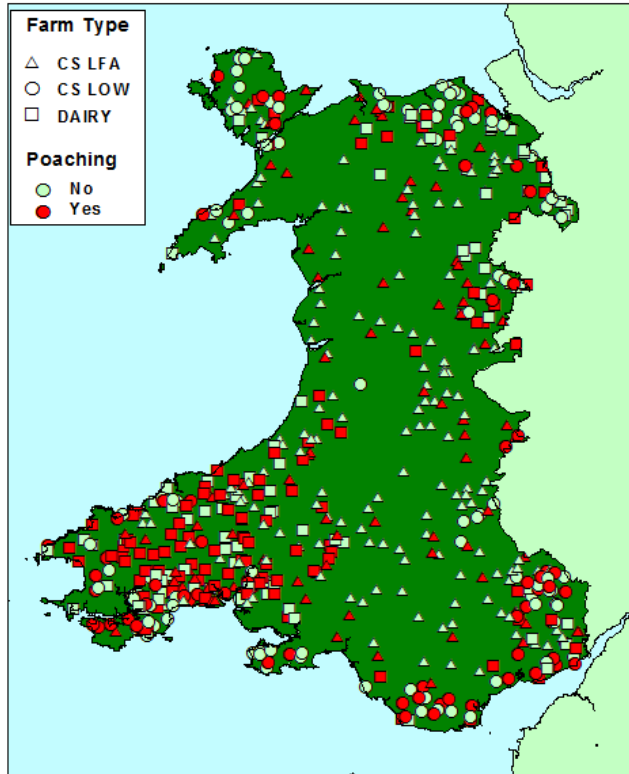
## Measured River Plant Community and Modelled Nitrate Concentrations



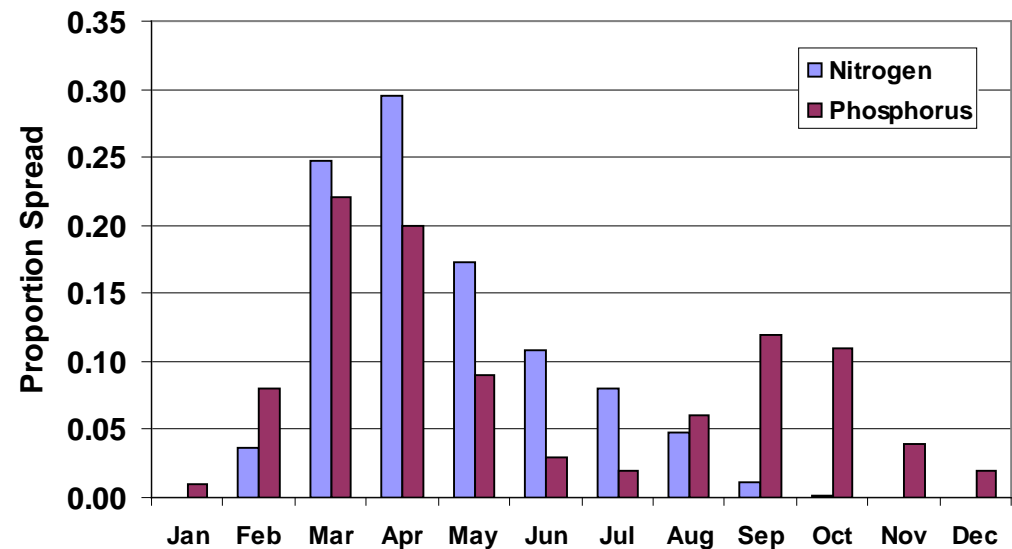
# Baseline Condition and Management Surveys

## Wales Farm Practice Survey

### Farms Reporting Poaching of Soil



## Timing of Nitrogen and Phosphorus Fertiliser Applications to Grass



(Welsh extract from British Survey of Fertiliser Practice)



# Surveying Management Change



## Wales Farm Practice Survey

*Percent of farms completing  
a Soil Nutrient Plan*

Scheme Type	Farm Type		
	CS LFA	CS LOW	DAIRY
Non-Scheme	41	31	59
Organic Farming	n/a	n/a	n/a
Tir Cynnal	58	70	88
Tir Gofal	40	39	56

