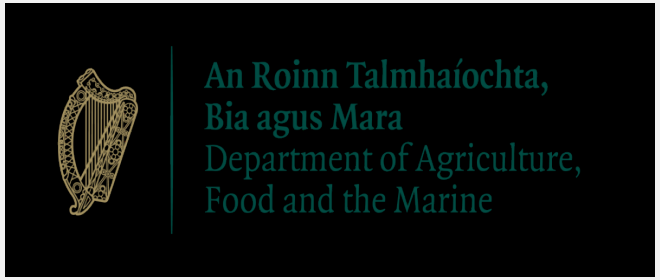
EVALUATION OF RDP IMPACTS ON EMISSIONS FROM AGRICULTURE IN IRELAND

Richard Gooday

Environmental Consultant

ADAS



OUTLINE

- **RDP overview**
- **Evaluation purpose and questions**
- **Evaluation approach**
- **Data**
- **Preliminary findings**
- **Strengths and weaknesses of the approach**
- **Lessons learnt and applicability**

RDP SPEND

RD Priority 5
(resource efficiency)

FAs 5D + 5E
€ 429m

- **M01** € 39 m
- **M04** € 10 m
- **M10** € 374 m
- **M02** € 0.5m
- **M16** € 5 m

RD Priority 4
(ecosystems related to agriculture and forestry)

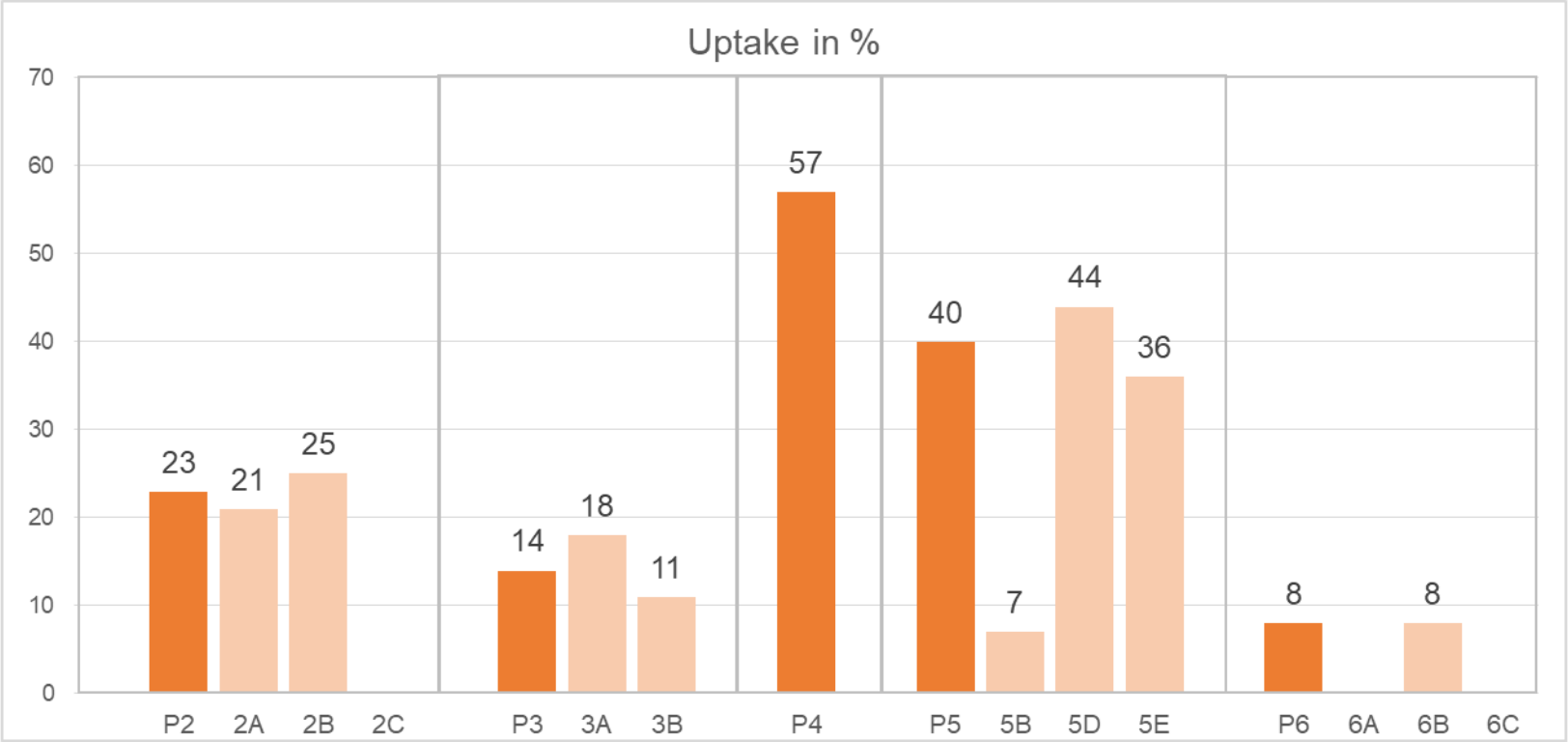
FA 4
€ 2,964 m

- **M01** € 37 m
- **M10** € 1,157 m
- **M04** € 101 m
- **M02** € 1 m
- **M11** € 56 m
- **M16** € 43 m
- **M07** € 6 m
- **M12** € 73 m
- **M13** € 1,491 m

GLAS allocation

M01	€ 12 m
M10	€ 921 m
FA4	€ 827 m
FA5D	€ 19 m
FA5E	€ 75 m

RDP UPTAKE


Uptake in %
70
60
50
40
30
20
10
0
23
21
25
14
18
11
57
40
7
44
36
8
8
P2
2A
2B
2C
P3
3A
3B
P4
P5
5B
5D
5E
P6
6A
6B
6C

GREEN LOW-CARBON AGRI-ENVIRONMENT SCHEME (GLAS)

GLAS uses a 3-tier hierarchy to deliver environmental benefits in relation to biodiversity, climate change & water quality.

Tier 1

- Priority Environmental Assets
- Priority Environment Actions for Intensive Farms
- Organic Farms

Tier 2

- Vulnerable water-courses
- Priority Environment Actions

Tier 3

- Complementary actions on top of Tiers 1 and 2

GLAS Actions

Arable Margins (3, 4, 6m)
Bat Boxes
Bird Boxes
Catch Crops
Commonage
Conservation of Solitary Bees
Coppicing Hedgerows
Environmental Management of Fallow Land
Farmland Birds (Breeding Waders, Chough, Corncrake, Geese/swans, Grey Partridge, Hen Harrier, Twite)
Farmland Habitat (private Natura sites)
Laying Hedgerows
Low-emission Slurry Spreading
Low-input Permanent Pasture
Minimum Tillage
Planting a Grove of Native Trees
Planting New Hedgerows
Protection of Archaeological Sites
Protection of Water Courses
Rare Breeds
Riparian Margins (3, 6, 10, 30m)
Traditional Hay Meadow
Traditional Orchards
Traditional Stone Wall Maintenance
Wild Bird cover

EVALUATION PURPOSE

- **Commissioned by Department of Agriculture, Food and the Marine (DAFM) to:**
  - Assess the Green Low Carbon Agri-Environment Scheme (GLAS)
  - Contribute to Enhanced Annual Implementation Reports in 2017, 2019, and Ex-Post Evaluation
  - Make recommendations for the design on any new agri-environment scheme in the post-2020 RDP
- **Overall project:** field surveys, attitudinal surveys and modelling
- **Modelling to assess the following at catchment and national scale:**
  - Greenhouse gas (methane, nitrous oxide) and ammonia emissions
  - Water quality (nitrate, phosphorus) and soil erosion
- **Timeline:**
  - Overall Project 2015 – 2021
  - Primary modelling component 2015 - 2019

EVALUATION ELEMENTS FROM MODELLING

- **Common Impact Indicators:**
  - Greenhouse gas and ammonia emissions (I.07)
  - Water quality (I.11)
  - Soil erosion (I.13)
- **Common Evaluation Questions for GHGs and Ammonia:**
  - **CEQ14 (FA 5D)** – To what extent have the RDP interventions contributed to reducing GHG and ammonia emissions from agriculture?
  - **CEQ24** To what extent has the RDP contributed to climate change mitigation and adaptation and to achieving the EU 2020 headline target of reducing GHG emissions…?
  - **CEQ28** To what extent has the RDP contributed to the CAP objective of ensuring sustainable management of natural resources and climate action?

EVALUATION APPROACH

- **Monitoring expensive and potentially unable to detect change**
  - Weather variability
  - Long term consequences
  - Options are dispersed across landscape, low anticipated effect
- **Creation of a bespoke modelling framework**
  - Combines multiple pollutants, common hydrology and management data
  - Ability to disaggregate impacts of different options
  - Catchment-level approach required for water quality – all land modelled
- **Approach previously been applied to evaluate policy across the UK**
  - Impacts of Regulation and RDP on WQ and GHG emissions in Scotland
  - Impacts of Agri-Environment Schemes on WQ in Wales

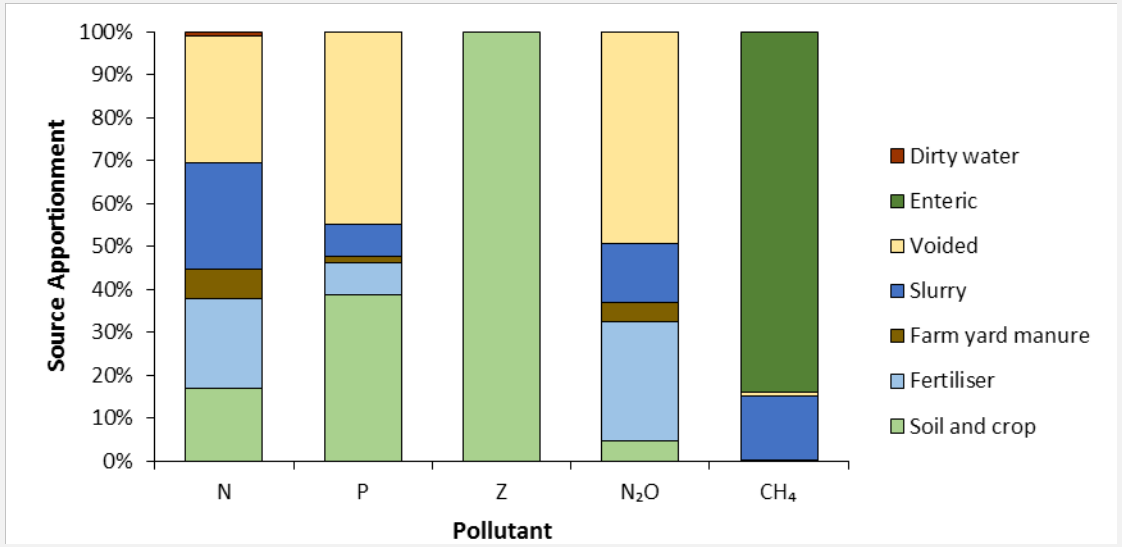
~3,200 WFD waterbodies

MODELLING AND DATA

- **Derive export coefficient based meta-models from a range of models successfully used across the UK**
  - NARSES IPCC MANNER
  - PSYCHIC NEAP-N / NitCat
- **Export coefficients account for local variations in soil and climate**
- **Agricultural Census data**
  - Holding level data for 2015
  - Determine cropping / livestock within each catchment to use with export coefficients
- **Farm types**
  - Define how a unit of livestock / crops is managed – based on range of survey data
  - Vary by farm type to allow for differing management

MITIGATION REPRESENTATION

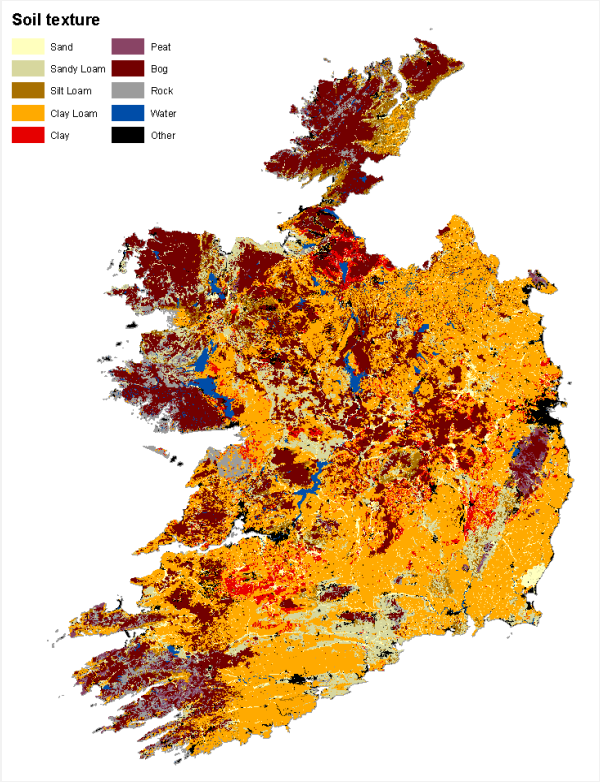
- **Model output expressed using an apportionment system**
- **Mitigation actions described as reductions in components of this system**
- **GLAS contains 12 actions that impact on agricultural pollution (all actions)**
  - Each action parameterised – field scale impact
  - Parameterisation varies by pollutant
  - Evidence from literature and modelling
  - Account for interaction of multiple actions
- **GLAS scheme data**
  - Extent of each action within a catchment
  - By farm type

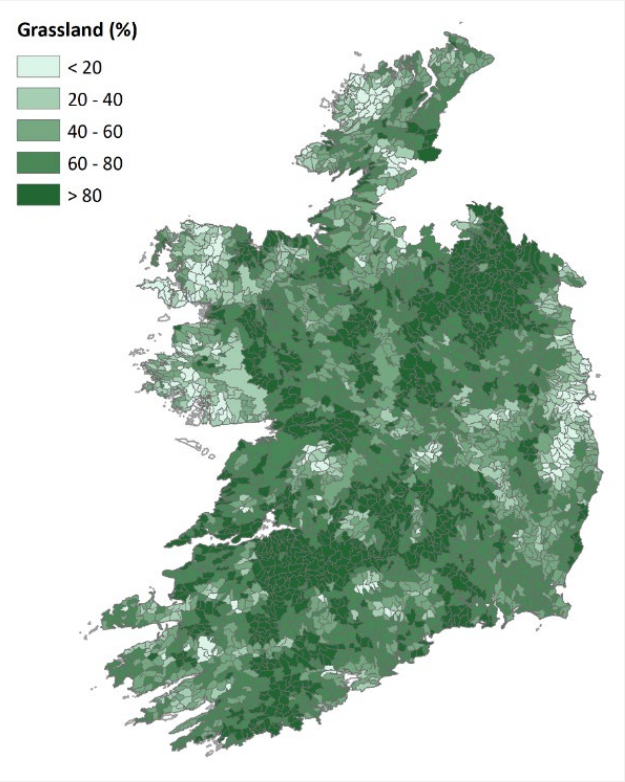


ENVIRONMENTAL DATA

- **Soil series distribution and properties**
- **Surface runoff connectivity**
- **Slope**
- **Land cover**
- **Climate**

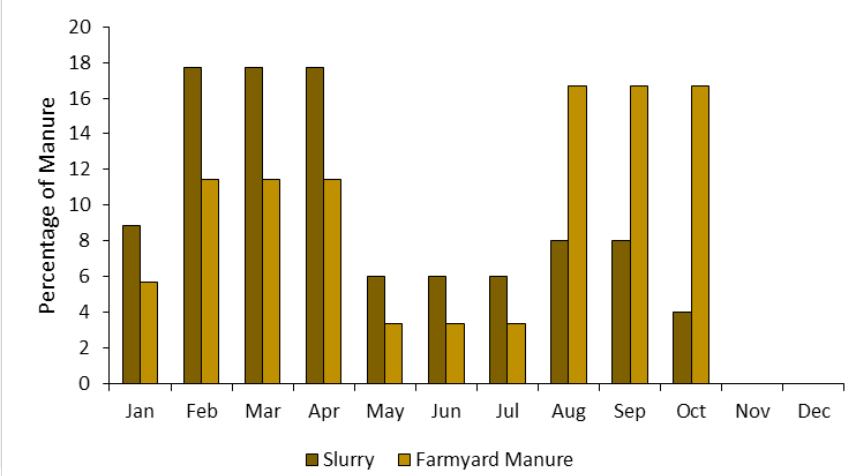
- **Impacts on nitrous oxide losses**
  - Direct – waterlogging & denitrification
  - Indirect – nitrate leaching





AGRICULTURAL DATA

- **Livestock numbers, crop areas, farm types**
  - Holding level data - Irish Census of Agriculture for 2015 (provided by DAFM)
- **Livestock management**
  - Irish GHG inventory Data
- **Manure management**
  - Annual survey data for England and Wales
  - Irish closed periods and survey data
- **Fertiliser management**
  - Annual survey data for England and Wales
  - Irish closed periods and Teagasc fertiliser advice

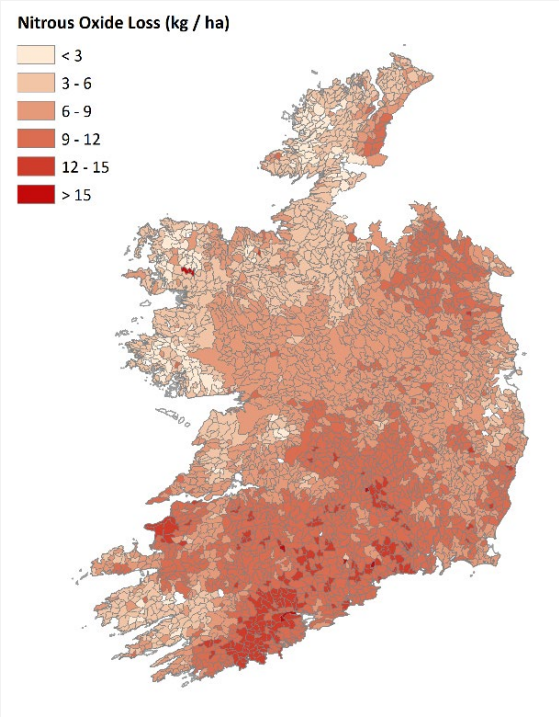


Manure timing to arable cropping

MAJOR FINDINGS

Impacts of GLAS actions to be reported in coming months

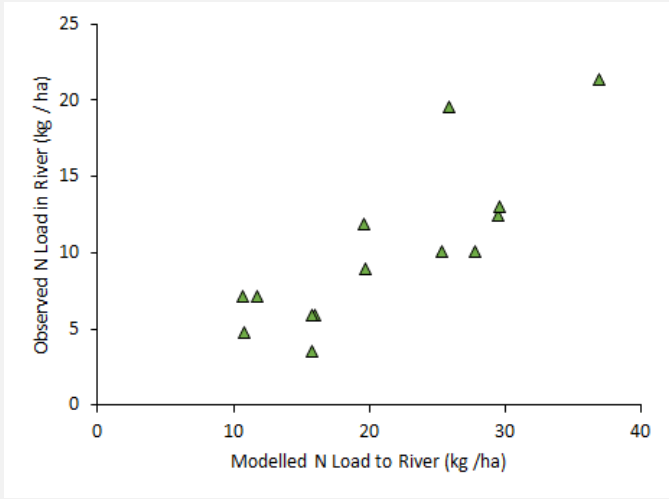
Distribution of emissions



Percentage of agricultural pollution load from farms in GLAS

Area	Nitrous Oxide	Methane	Nitrate	Phosp.	Sediment
32	27	23	27	28	33

Verification of model predictions



STRENGTHS AND WEAKNESSES

Strengths	Weaknesses
• Quantifies impacts that may not easily be observed / monitored • Can provide additional indicators • National scale analysis • High spatial resolution • Method reports net effect / counterfactual • Insight to identify future options	• Development of appropriate models requires significant time and resources • Data intensive • Assumptions on population level behavior (from survey data)

LESSONS LEARNT AND APPLICABILITY

- **Staff resources:** Approximately 2 FTE for 1 year
- **Approach:** builds upon many years of model development and application
- **Models:** those used may not be appropriate to other countries
  - Environment and farm management outside of UK parameterisation
  - Data availability
- **Models:** need to be able to represent RDP measures
- **Data:** significant data requirements. Bespoke farm practice survey data makes analysis more robust (Example)
- **Time:** significant time required for first assessment in order to develop framework and create / obtain environment and management data

Thank you

Richard Gooday

Environmental Consultant, ADAS

richard.gooday@adas.co.uk

www.adas.co.uk

https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/GLASEvaluationBaselineReportModellingPollutantLosses181017.pdf