

Supporting Scotland's Land Use Transformations: Quantitative Story Telling

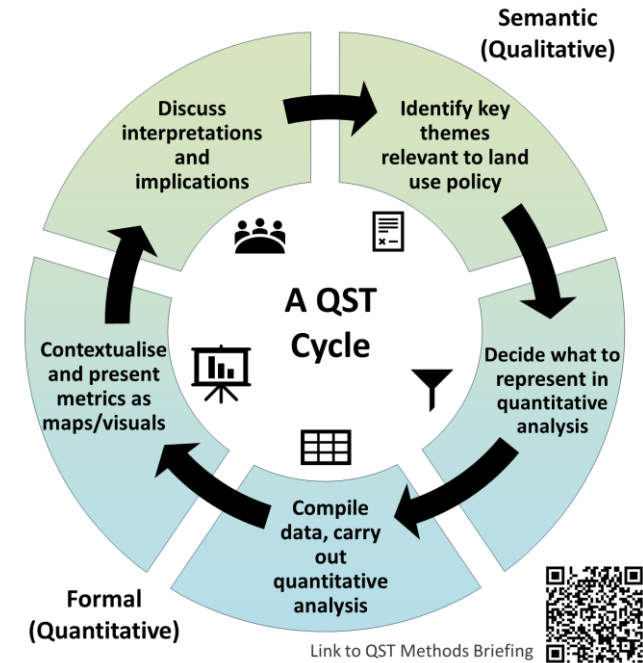


The James
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Keith Matthews, Kirsty Blackstock
End of Year 4 meeting with Scottish Government
21 April 2026, Summary Slides for JHI- C3-1.

Introduction

- **Context**
 - Quantitative Story Telling is the process used to conduct policy-led analysis with ScotGov colleagues within the Land Use Transformations project.
 - The stages of this transdisciplinary working are illustrated in the figure opposite, with ScotGov colleagues particularly strongly involved in identifying the key themes and interpreting the implications.
- **QST projects in Year 4**
 - Existing QST projects
 - QST1 Enhanced Conditionality – saw no further development but may be returned to in Year 5
 - QST2 Payment Region – saw further enhancement of the capability of the Scenario Generator – looking at VCS and LFASS options.
 - New QST projects were
 - QST3a Supporting RESAS’ Monitoring and Evaluation of Agricultural Reform Programme (see p5 below)
 - QST3b Land Use Strategy (see p15 below)



QST in Year 5

- Expectation that no new QST processes given Year 5 also sees significant commitment of senior staff to writing project for the next Strategic Research Programme.
- Do expect continued interactions with ScotGov on:
 - **QST2 Regionalisation** – both doing step-by-step analyses of government-led queries and more experimental use of the scenario tools to look at substantially different measures (e.g. alternative regionalisation of disadvantage payments) or combinations of schemes (e.g. alternative VCS payments schemes that remove area-based payments from current Region 2 and 3 land).
 - QST3a – **Monitoring of the ARP** using the systems models to help design the choices of indicators for monitoring the ARP outcomes and their interactions (see p13 for more detail)
 - QST3b – **Land Use Strategy** options to
 - Enhance the visualisations in the Story Map linked to the Land Use Strategy Evidence Pack and/or add further supporting content
 - Use the LUS Story Map with Pioneer Catchments initiative – though here there are issues of which datasets can be shown at more granular local levels.
 - Support the Land Use Strategy Implementation Plan





QST3a - Supporting RESAS' Monitoring and Evaluation of Agricultural Reform Programme

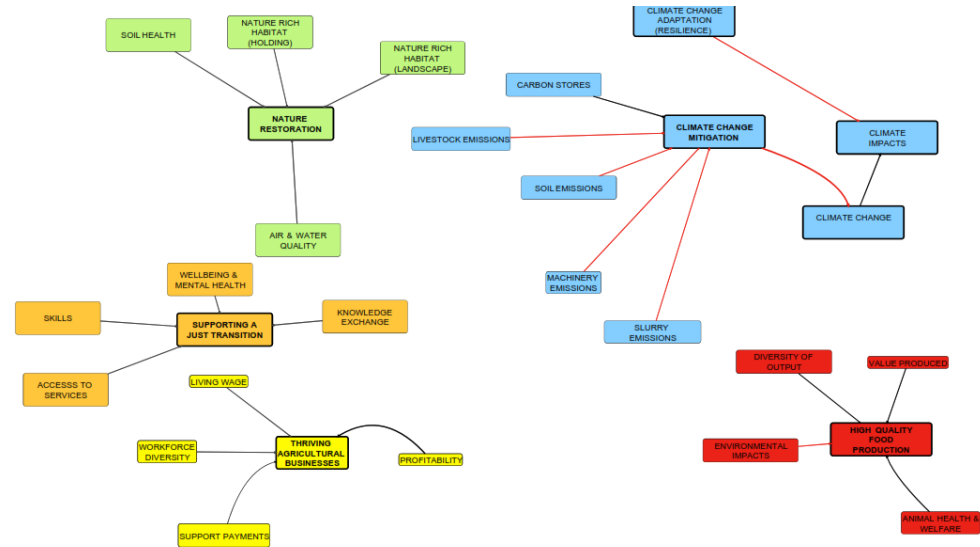


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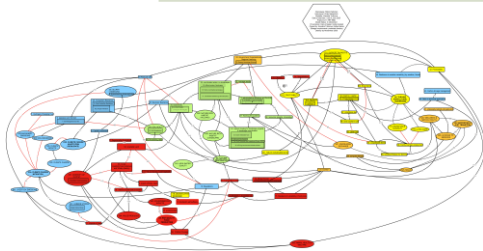
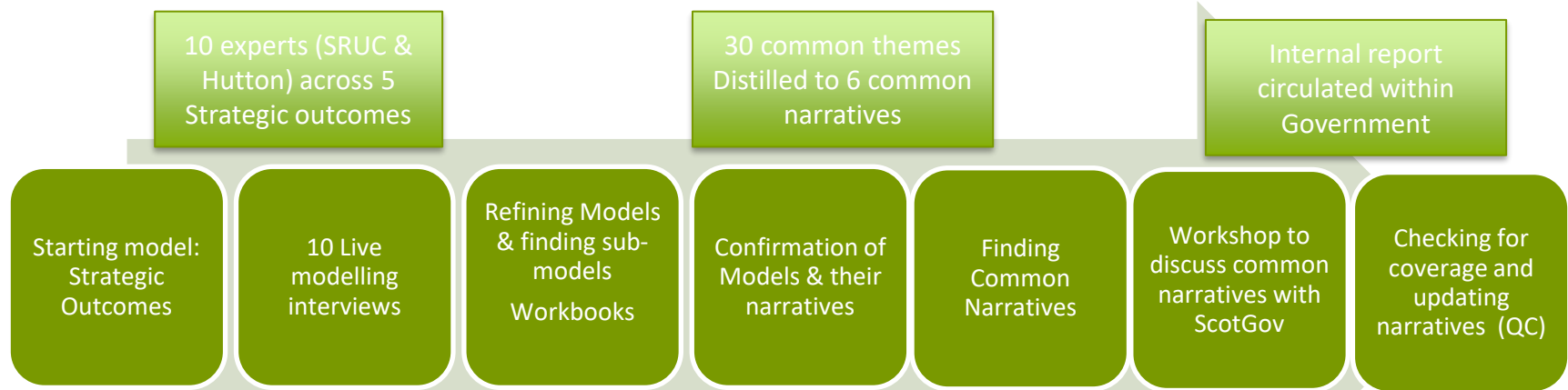
Focus of Systems research: M&E of ARP

- Support for RESAS theory-led M&E framework
 - Rapid response (May – Oct 25)
- To explain trends & why (not) reaching outcomes
 - Potential interactions between the outcomes
 - Other ‘interventions’ that change actions OR mean actions don’t achieve outcomes
- Our objective
 - Identify how the system might work until 2045
 - Identify issues to monitor to understand outcomes
 - Capacity-building – new methodology for the team, exploring how to use it for policy support



Note: used Outcomes available in June 2025 – these have since changed

Methodology



Example of individual causal loop diagram

+60 narratives
from 10
workbooks



Example of common narrative discussed in workshop

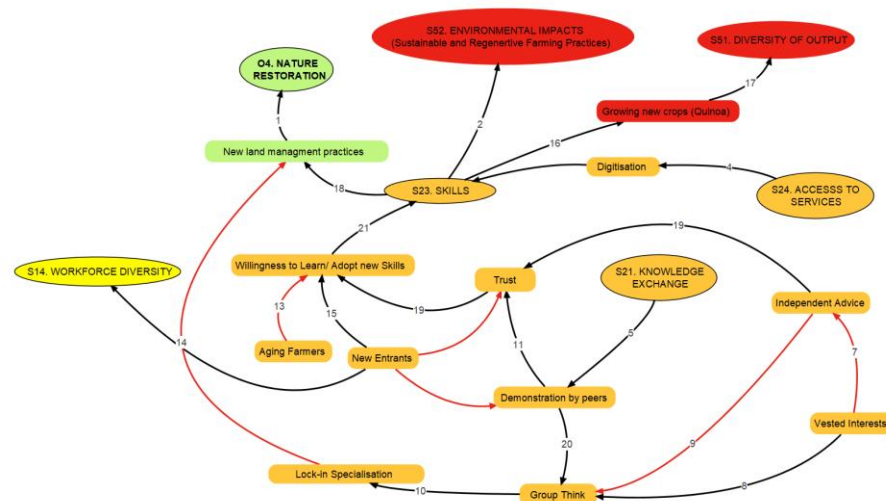
Common Narratives

Focus on six 'common narratives' – aspects highlighted across several individual models that help understand potential cause-and-effect relationships:

1. Support payments, Financial resilience & Supply chains
2. Alternative pathways
3. Land Sharing or Land Sparing
4. Products, Markets & Choices
5. The burden on farmers to do more
6. Skills & Knowledge

Explored following aspects for M&E:

- Cycles (balancing or reinforcing)
- Qualitative simulation (increase or decrease)
- Things to 'keep an eye on' (monitor/evaluate)



Common Narrative 6 updated post-workshop

Feedback on common narratives

Support payments, Financial resilience & Supply chains:

- Relationships between support payments, profitability & sustainable livelihoods
- Supply chain actors (up and downstream of farmers)
- Lock-in versus different types of new entrants (private finance); social acceptability
 - 7 suggested aspects to 'keep an eye on'

Pathways to climate mitigation, nature restoration & high-quality food production

- Livestock emissions, health and byproducts – link to bioenergy
- Lack of market signals for cover crops compared to commodities (barley, beef)
- Attention to disease and pest risks, changing farm management and climate
 - 8 suggested aspects to 'keep on eye on'

Land Sharing or Land Sparing

- Land sharing about multi-functionality – land health linked to food production and profitability
- Limits to food production due to LCA; choices depend on size and location of farm
- Some land sparing uses are harder to reverse – lock-in to commodities (food or carbon)
 - 2 suggested aspects to 'keep on eye on'

Feedback on common narratives

Products, Markets & Choices:

- Production choices based on multiple factors including climate variability
- Attention to value chains, accreditation and opportunity costs of export/imports
- Regenerative agriculture linked to skills, investments and mitigation
 - 6 suggested aspects to 'keep an eye on'

The burden on farmers to do more

- Burden falls on smaller farms – proportionality; definition of 'small' farms
- Several potential consequences of burdens – including opportunities for new entrants
- Importance of data on land tenure, management and outcomes
 - 9 suggested aspects to 'keep an eye on'

Skills & Knowledge

- Peer-to-peer is important but needs facilitation to ensure innovation not lock-in
- Enable passing local knowledge to new entrants
- Consumers need education to make informed food choices
 - 5 suggested aspects to 'keep an eye on'

Quality Check for individual models

- All Strategic outcomes (and sub-outcomes) discussed
- Climate and agricultural businesses most coverage, HQFP and Nature lower coverage
- May be explained by bias in sample, or wording of outcomes

Sub-outcomes connected to new nodes in all 10 models

Profitability*

Skills

Livestock Emissions

Soil Health

Three of the five strategic outcomes were changed:

Thriving Agricultural Businesses;
Profitability; Living Wage
Climate impacts; Climate
change; Soil emissions
Historic Environment

(Sub)-outcomes connected to new nodes in fewer models

Nature-rich habitats (holdings) (50% models)

Climate Impacts (50%)

Slurry emission (50%)

Climate Change (20%)

Supporting a Just Transition (50%)

Findings - Discussion

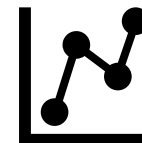
Common Narrative diagrams

- Illustrate complexity and dynamics but a challenge to summarise and explain.
- Valuable to elicit views on the interactions, potential gaps and intervention points.
- Common narratives acted as ‘boundary objects’ without having to find consensus.



Common themes and gaps

- Different uses of land, consequences of land use change, potential change to land capability play out across strategic outcomes.
- Tension between support for successful commodities (Beef, Whisky) & resilience to climate and trade shocks.
- Working across the chain (input providers, farmers, wholesale/processors, retailers and consumers) to meet objectives.
- More nuanced understanding of new entrants .v. incumbents.
- Broaden understanding of human health, plant health & risk from disease, pests, pathogens.
- Need for a spatially explicit approach and/or attention to business motivations and size.
- New data needs: who owns land, who benefits, to allow tailored interventions.



Implications for Monitoring Framework

The workshop has highlighted a three-step approach for planning and prioritizing the content of the M&E framework:

- Immediate indicators to baseline and monitor (issues that the Rural Support Plan can influence, and crucial context);
- Things that other Scottish Government policy areas should baseline and monitor to complement ARP M&E;
- Things that are not yet important enough to be in core indicator set but should be checked after five years.
- Baseline study should include existing trends to understand how interventions make an additional contribution.
- Monitoring slow change variables (e.g. farmers leaving the workforce) could be useful to anticipate rapid and unexpected knock-on effects (e.g. loss of knowledge).



Draft Plans for Year 5

As proposed to RESAS social researchers (Henry et al.)

- Feedback on monitoring strategy for Rural Support Plan
 - Are there gaps suggested by our systems work? Suggested indicators?
 - Consider distribution of burdens and benefits geographically and by farm types
- Insights for evaluation strategy and specific monitoring strategies
 - Create common meta narrative from revised common narratives
 - Map tiers and schemes onto common meta-narrative to simulate outcomes
- Consider who is involved in delivery of RSP outcomes:
 - Implied actors and roles within our models or common meta-narrative
 - Also which actors involved in data sharing for monitoring and evaluation
 - Links to policy coherence work
 - May support RESAS analysis on how to prepare farmers for 2030

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Staff web pages: [currently under construction]

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[Esther Banks - The James Hutton Institute](#)

Further research in the RESAS Strategic Research Programme 2022-27, in the [Land Use Transformations](#) (C3-JHI-1), [Large Scale Modelling](#) (KJHI-C5) and [Galvanising Change via Natural Capital](#), (KJHI-D5-3)

Participants from across the Strategic Research Programme: Theme B, Theme C, Theme D, & Theme E:

Graham Begg, Ian Merrell, Jagadeesh Yeluripati, Keith Matthews, Lee-Ann Sutherland, Mike Rivington, Pete Ianetta, Robin Pakeman, Steven Thompson, Tim George; and from Scottish Government (RESAS & Policy Units).

The James Hutton Institute is supported by the Scottish Government's Rural and Environment Science and Analytical Services Division (RESAS)

QST3b Land Use Strategy Evidence Pack and Story Map



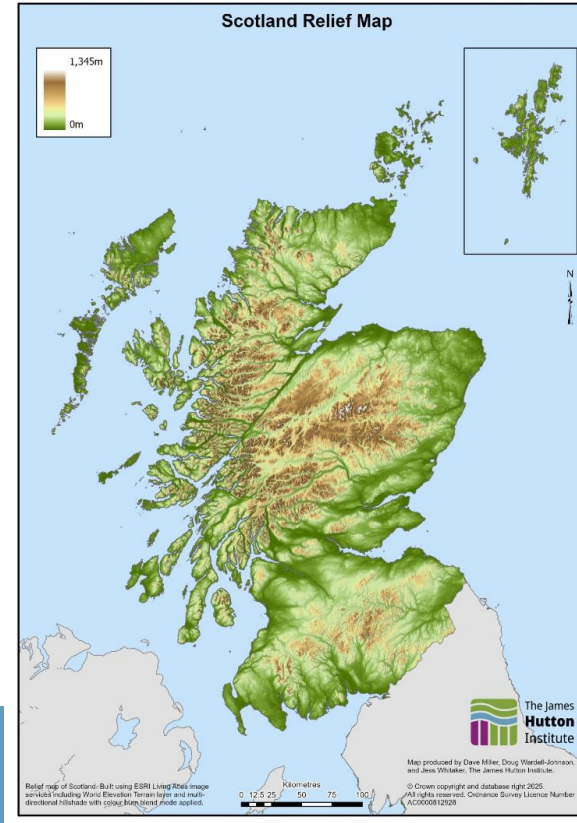
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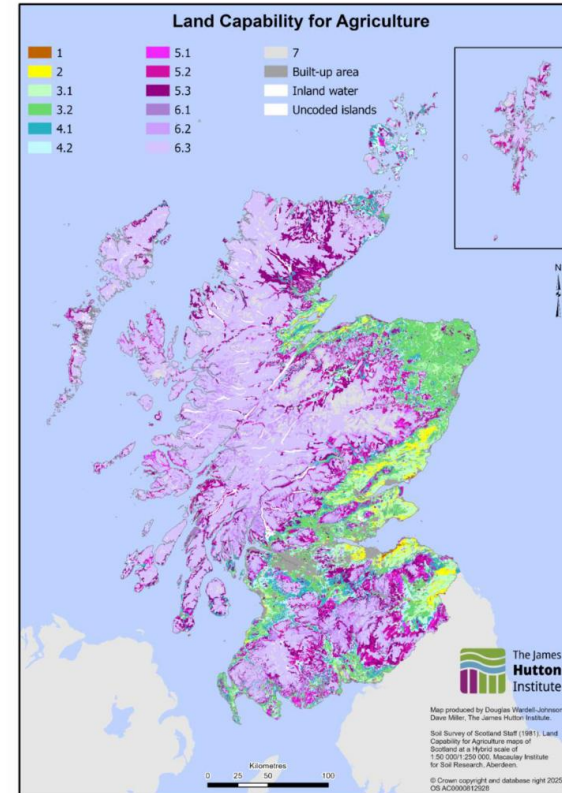
Origins and process

- Offer to support LUS publication – via LUT staff participation in LUS Experts Group meetings (spring/summer 2026)
- RESAS led Supporting Evidence Pack initiated – QST option to supplement with Story Map agreed.
- Initial scope was comprehensive – revised in discussion with ministers to focus on state of play and opportunities
 - Several questions raised in the initial scope would still merit further investigation – for example mapping urban/peri-urban domestic, industrial and service sectors land uses.
 - Worth considering some of them as specific topics within the next SRP.
- Delivered in March 2026 – see [link](#)



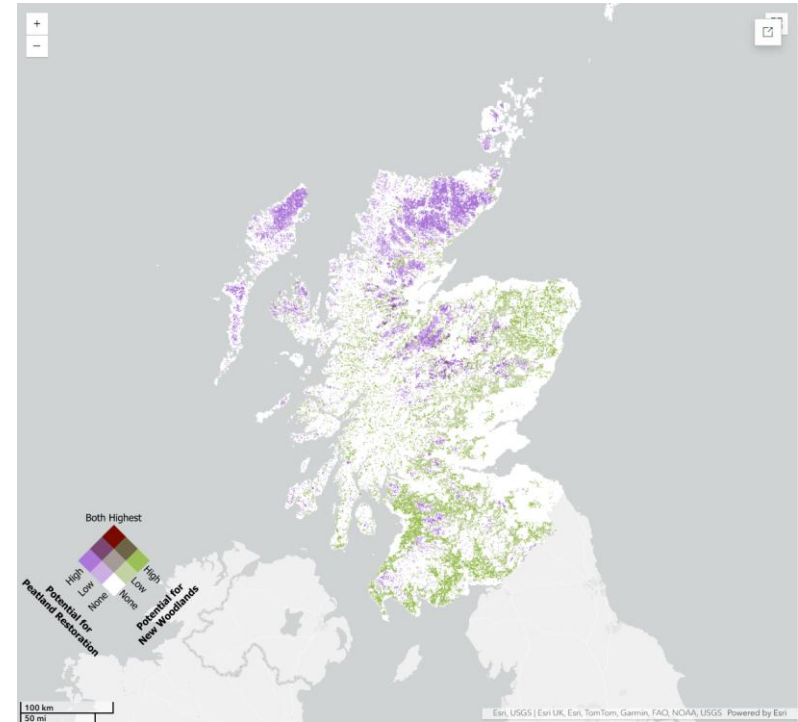
Evidence pack – content and process

- Exploited a back catalogue of mapping from Land Use Transformations, other SRP/CoE projects, work in CRF and EU projects
- Uses new technologies (story maps) to do more that is possible within the limits of maps within conventional report – e.g. change in area of interest, comparisons between data sources, statistics generated *ad hoc*.
- Partnership working with SG colleagues in RESAS
 - Evidence Pack - SG led with Hutton inputs (maps and text review)
 - Story Map – Hutton led with SG review of maps – modified and extended SG text.
 - Shared working spaces with SG staff using Hutton infrastructure – frequent interactions and revisions to content and visualisations.
 - Linked publications – Evidence Pack via ScotGov website linked to LUT story maps



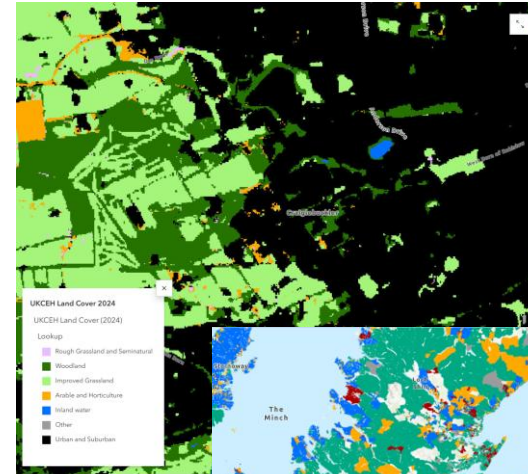
Response to the Evidence Pack

- 433 views, 183 users for initial month but some expectation that the story map may have reuse value for other projects and as a reference “atlas” for ScotGov staff.
 - Options to add more maps or comparative/statistical tools to the story map in Year 5
- RESAS project lead on process - *This has been a new way of working between SG and JHI, [...], we have been really successful, and the proof is in the products we were able to publish today; they look excellent, [...] hopeful that this work can serve as a good example of collaborative working and trust building as we continue to work together through this research programme and into the next.*

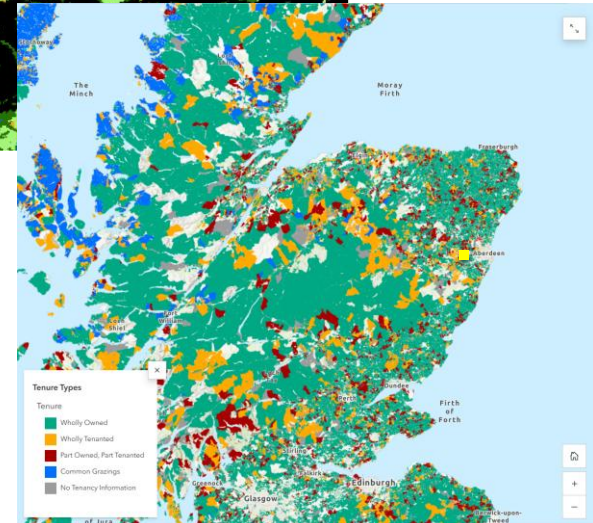


Remaining Challenges and Options

- Limits on the scale at which spatial data can be presented in story maps (the maximum zoom in). This limits the utility of the story maps for work within regions e.g. for the Pioneer Catchments initiatives where there are requests for “local” versions of the datasets.
- Map makers worked hard to make the outputs conform to disclosure requirements (e.g. using rates rather than payment totals) and to limit potential for re-identification (e.g. removing farm boundaries) yet several of the maps were late in the day seen as likely to provoke negative reactions.
- Given the aspirations for the next SRP, it may be worth engaging with stakeholder representative organisations in Year 5 to gauge their concerns. It may also be worth checking if, with the greater use of map-based tools, there needs to be amendment or reinterpretation of the guidelines on the use of administrative data for research, policy support and wider stakeholder engagement.



Land Cover ~1:36k scale and could be even larger scale with vector mapping



Tenure ~1:2.5M scale

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Previous related analyses are also available from the Hutton Land Systems Research Team website -
<https://ics.hutton.ac.uk/research/land-systems-research-team/>

The sets of slides and maps generated in Agriculture Policy analysis from 2010 onwards are available from -
<https://ics.hutton.ac.uk/research/land-systems-research-team/cap-analysis/>

For woodland expansion analysis see - [online mapping](#) and [paper](#).

[Story Map for Land Use Transformations](#) - land use change modelling.

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