

EO 4 Ecosystem Accounting 2022



Living England: Managing Uncertainty in England's Habitat Map



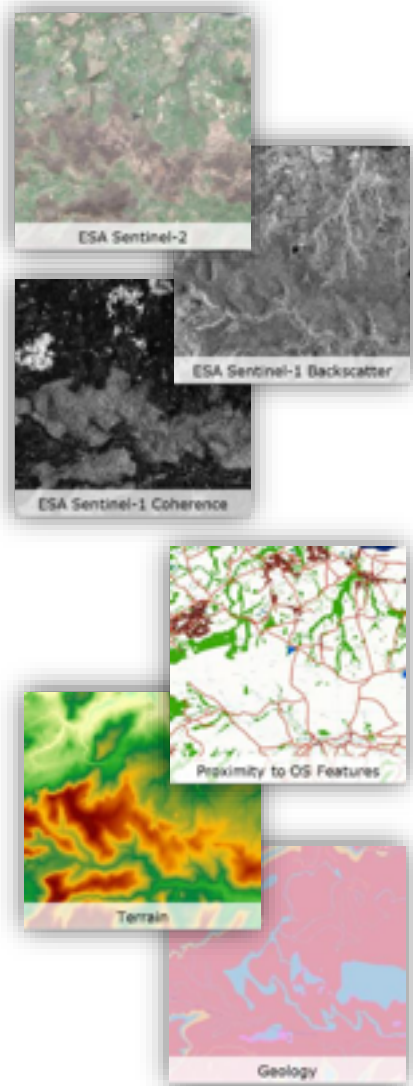
Dr Amy Woodget & the Living England Team
NCEA, Natural England

1st December 2022



+ THE EUROPEAN SPACE AGENCY

WHAT IS LIVING ENGLAND?



What is it?

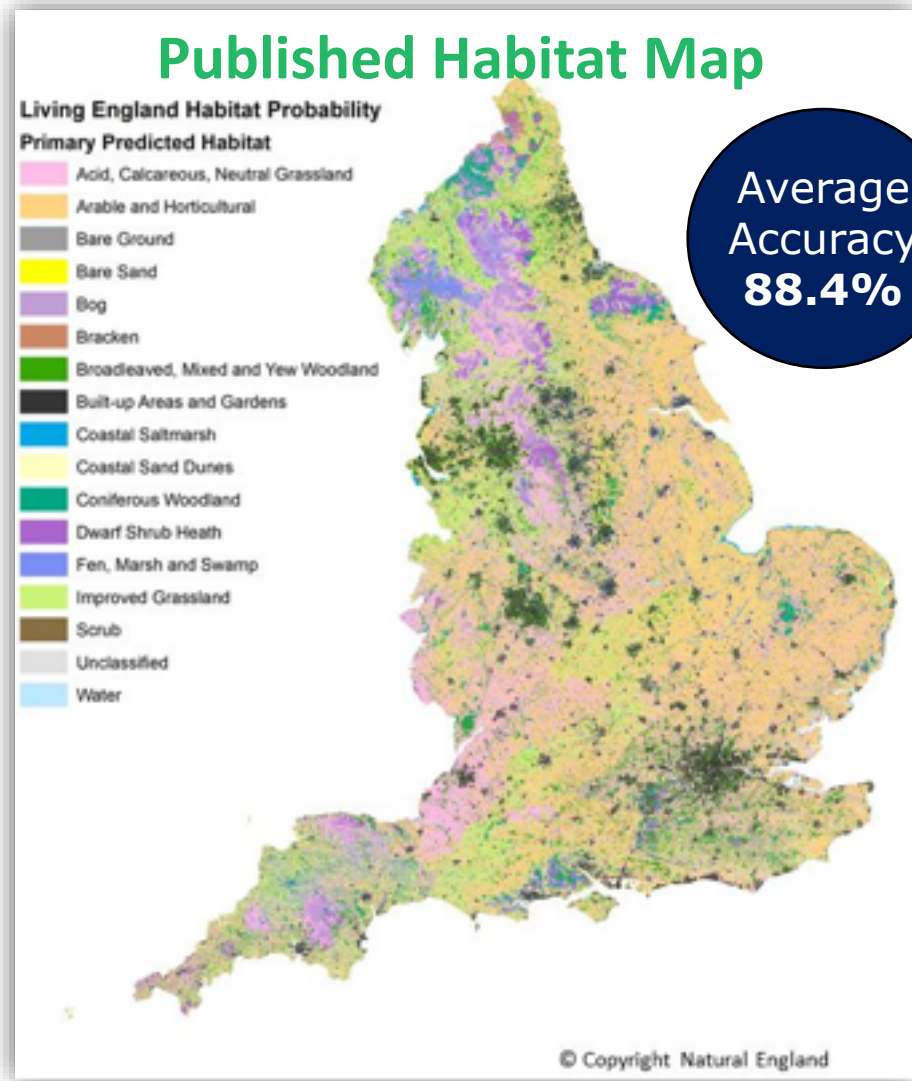
- National habitat map for England (UKBAP)
- Initiated in 2015 by Natural England (gov.advisor)
- Released under Open Gov Licence – April 2022

How is it created?

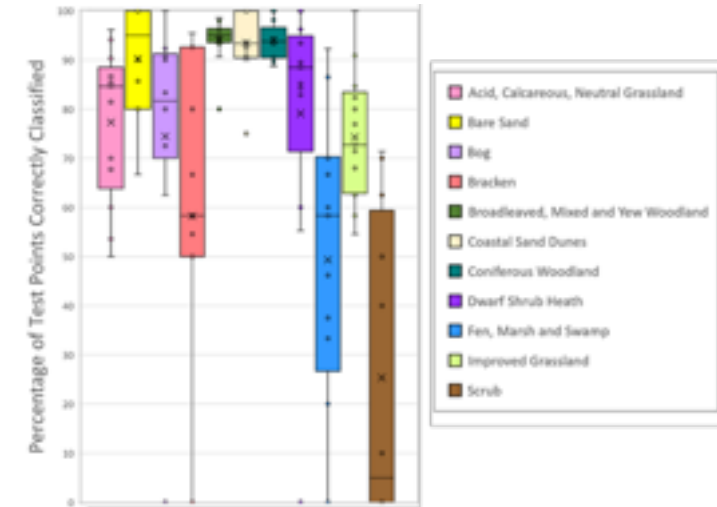
- Derived from ESA Sentinel satellite data & other open source national datasets
- Twin approach: machine learning based & ‘burned in’ classifications from other Defra data products
- Separate models for each Biogeographic Zone
- Object-based (segmentation) rather than pixel-based
- Trained & validated using ground truth data from dedicated field surveys (FieldMap App) & other available habitat inventories & survey data



HOW RELIABLE IS LIVING ENGLAND?



- Modelled output – inevitably contains uncertainty
- Overall & zone/habitat specific accuracies
- Limited in-depth validation until recently - expensive in terms of time & resources



- Open publication has highlighted local issues
- So, how best can we...
 1. Quantify the errors & uncertainties at segment level?
 2. Communicate these effectively to end users?
 3. Improve the process for future iterations of Living England?

1. QUANTIFYING UNCERTAINTY

Validation data = random 20% of the ground truth data (currently c. 5.5k points)

Uncertainty Measure	Metric	Specificity
1. Accuracy of predictions	F1 Scores (derived from confusion matrices)	Zone/habitat
2. Validation data representativeness	Age (% newer than 5 years)	Zone/habitat
3. Validation data sampling confidence	Confidence Level (no. of points relative to areal coverage)	Zone/habitat
4. Model confidence	'A' Probability	Segment



A_prediction	Improved Grassland	Coniferous Woodland
A_probability	57%	98%
F1 Score	75.6%	92.4%
Age	40%	98.3%
Sampling_Confidence	85%	97%

2. A RELIABILITY SCORE

1. Convert all metrics to 0-1 scale
2. Average metrics to give score out of 1
3. Classify into 5 equal reliability classes:
 - Very Low, Low, Medium, High, Very High
4. Add standard forcing criteria:
 - Location of incorrect test point – FORCE V. LOW
 - Location of correct test point – FORCE V. HIGH
5. Sensitivity testing (R Shiny App)
 - Weighting metrics
 - Other forcing criteria
 - Feedback
 - Comparison with other maps



BGZ 01
No weightings
No forcings

BGZ 01
Age * 50%
No forcings

BGZ 01
Age * 50%
Force -1 if Age < 10%
Force -1 if A_prob < 20%
Force +1 if A_prob > 80%

3. FUTURE PLANS

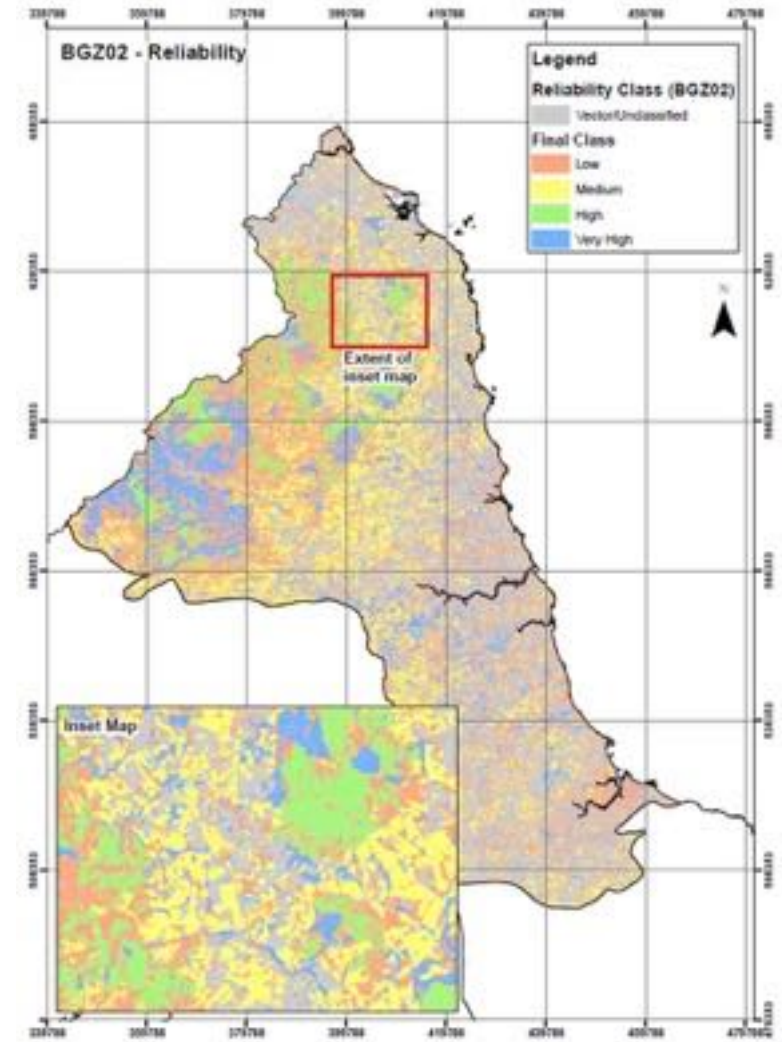
Communicate:

Publicly released reliability layer to accompany future LE habitat maps

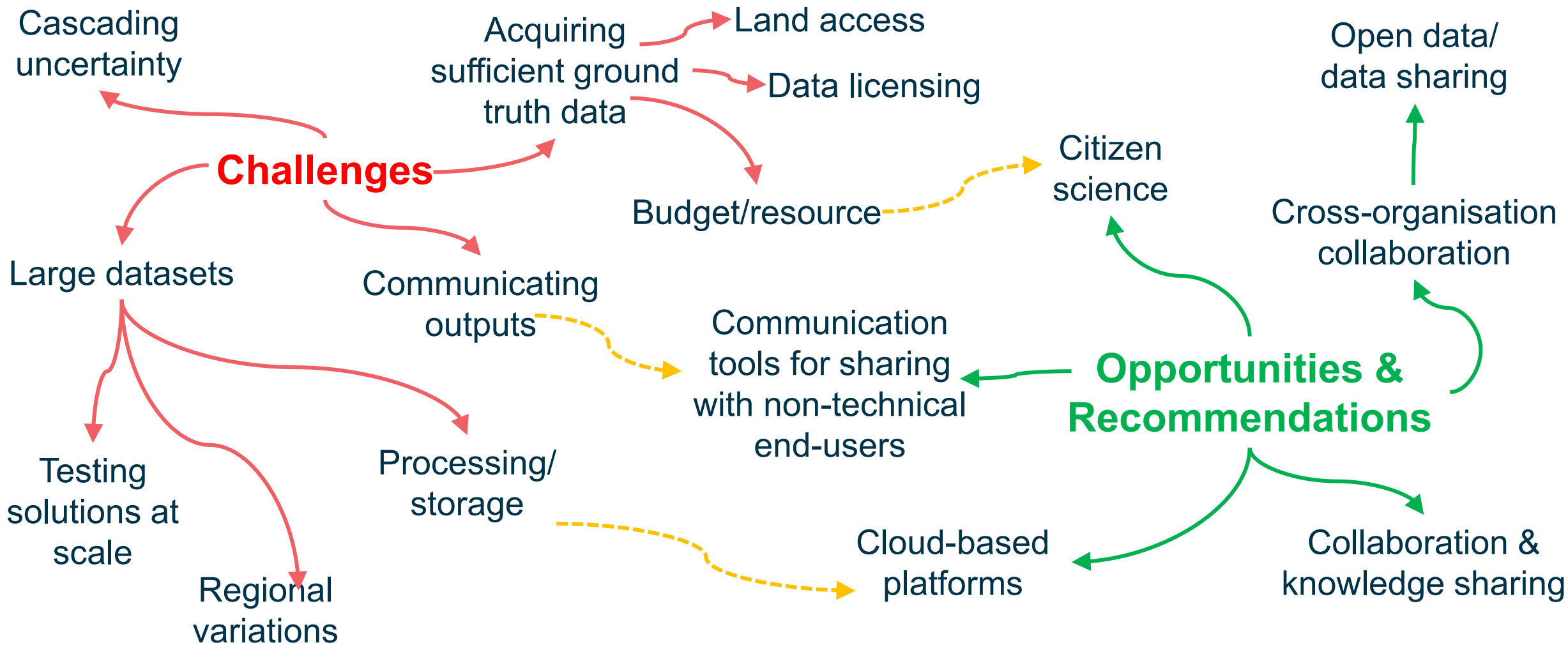
Improve:

Design a 'Validation Management Assistant'

- How many more points to meet 95% confidence level?
- Where are these points best located?
- Is better class definition needed in the model?



EO CHALLENGES, OPPORTUNITIES & RECOMMENDATIONS



ACCESSING LIVING ENGLAND

Many thanks to the Living England Team:

Alex Kilcoyne, Miles Clement, Chris Moore, Guy Picton Phillips, Rob Keane, Sophie Potter, Anne Stefaniak, Becky Trippier & James Tomlinson

Thanks also to colleagues within NCEA, the EA & JNCC for on-going collaboration & knowledge sharing.



DOWNLOAD HABITAT DATA FROM
LIVING ENGLAND PHASE 4



GET IN TOUCH

earth.observation@naturalengland.org.uk

