THE UNIVERSITY OF NORTHAMPTON
School of Science and Technology

NENE VALLEY
Nature • Improvement • Area
connecting people and nature

Mapping Ecosystem Services & biodiversity with a view to developing Payments for Ecosystem Service (PES) schemes

Jim Rouquette, Stella Watts, Kat Harrold and Jeff Ollerton

26th February 2013

Outline

- Mapping biodiversity
- Modelling and mapping ecosystem services
- Developing Payments for Ecosystem Services (PES) schemes


Mapping biodiversity

Biodiversity records

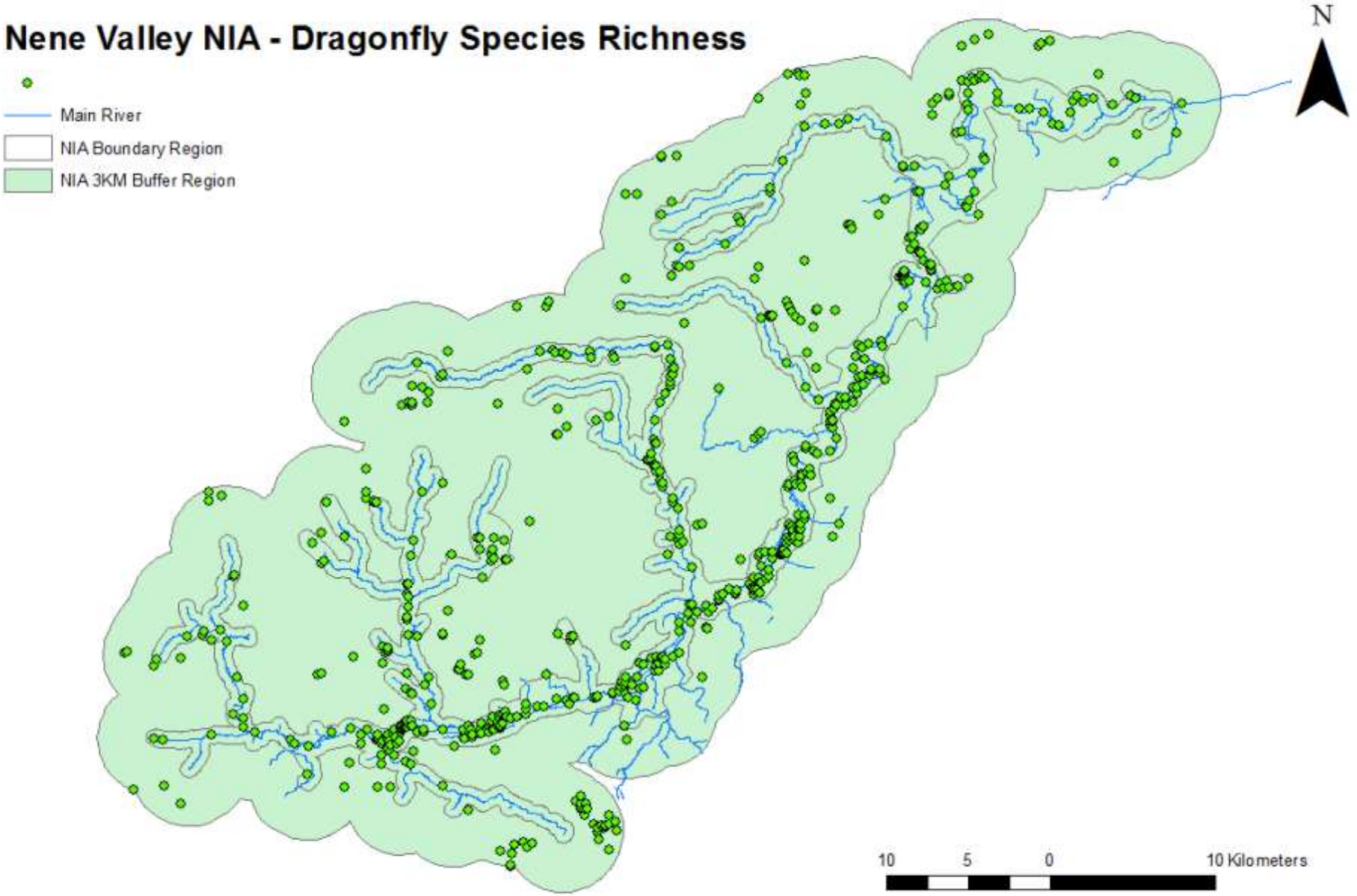
- Collected existing records from all possible sources:
  - NBN gateway
  - Biological Records Centre
  - County Recorders
  - Local wildlife groups
  - University of Northampton
- Data checked, cleaned and duplicates removed
- Cropped records to NIA plus 3 km buffer
- Mapped using ArcGIS
- Converted data into species richness for each location

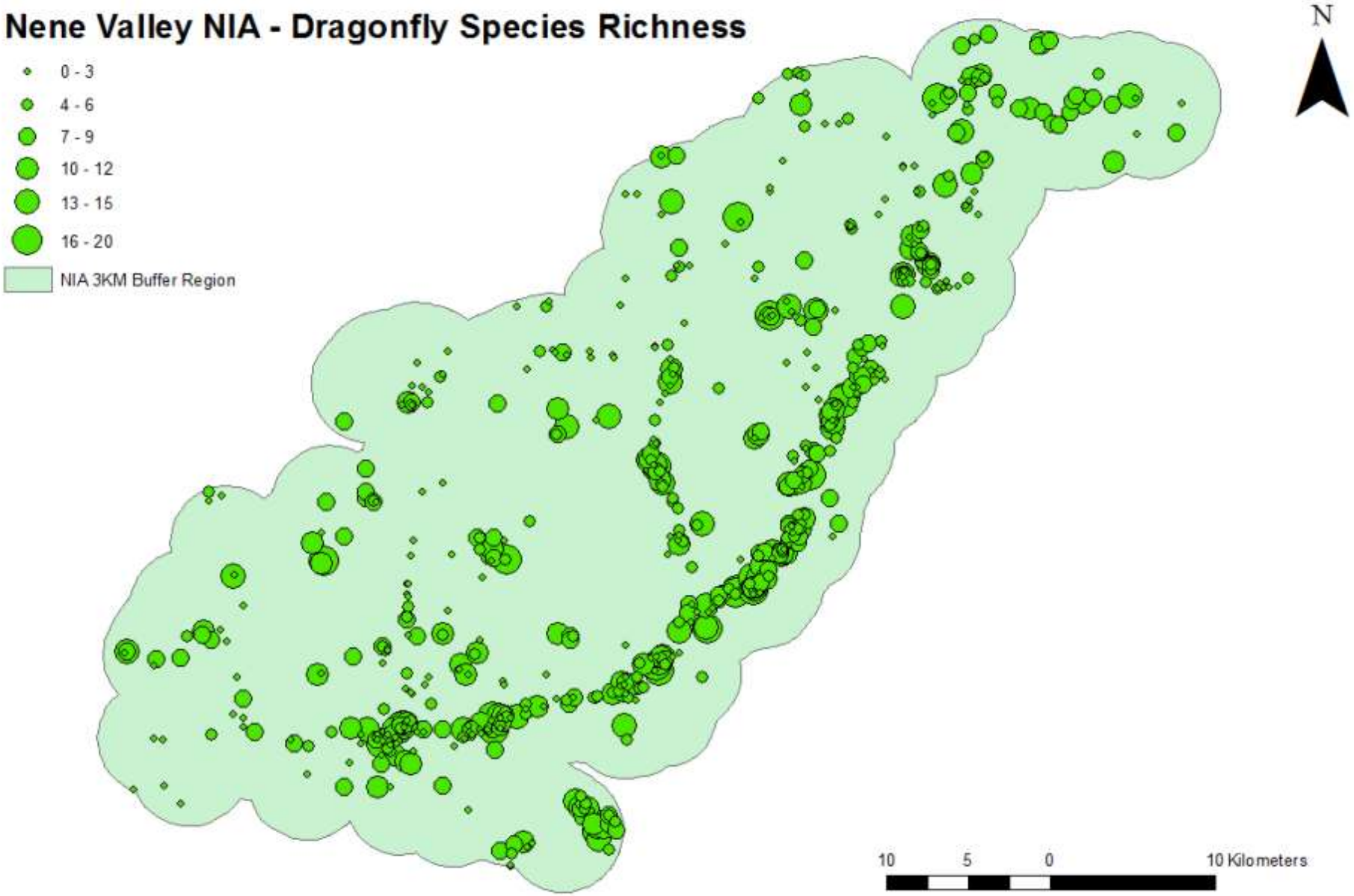


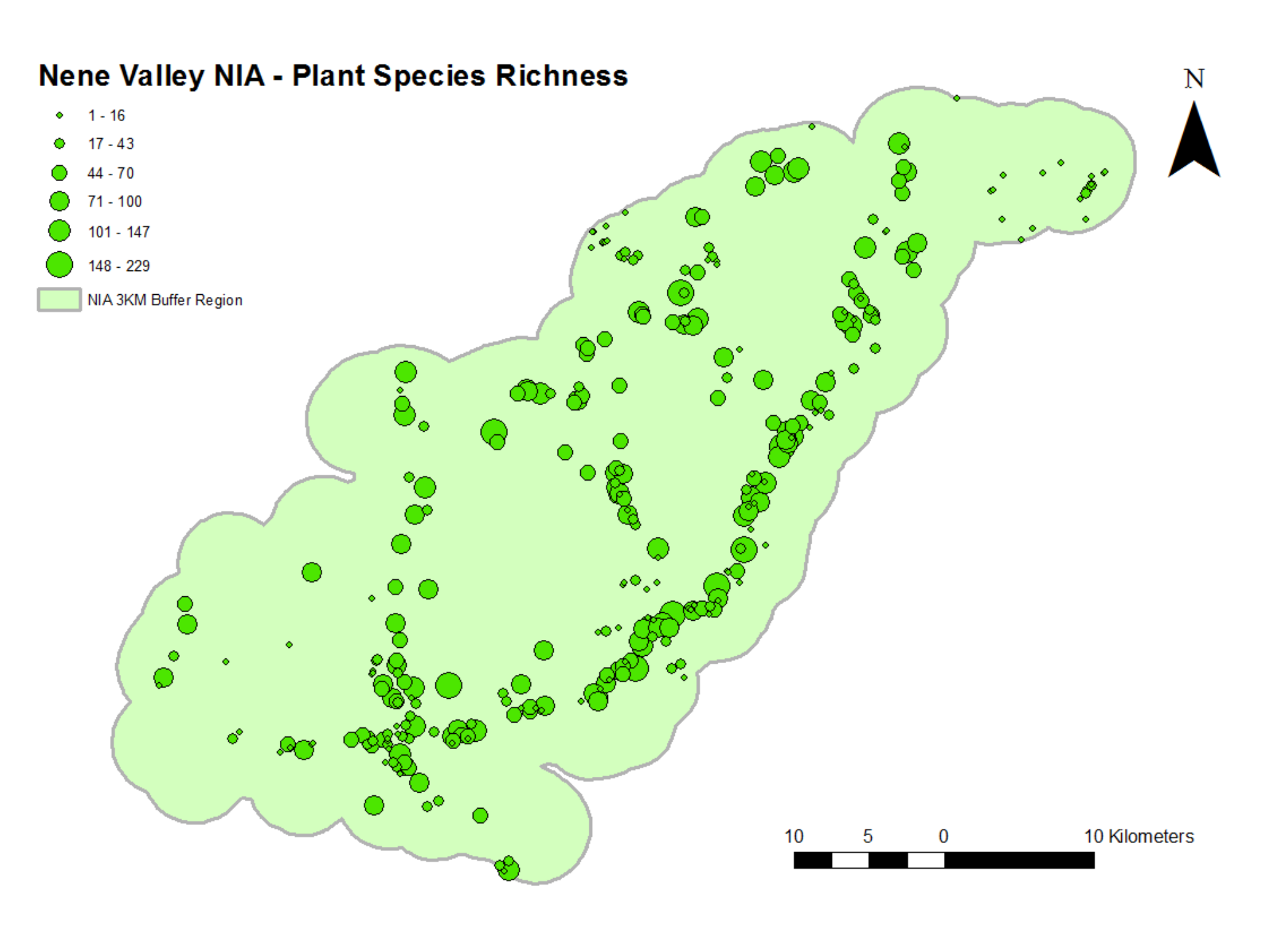

Number of records

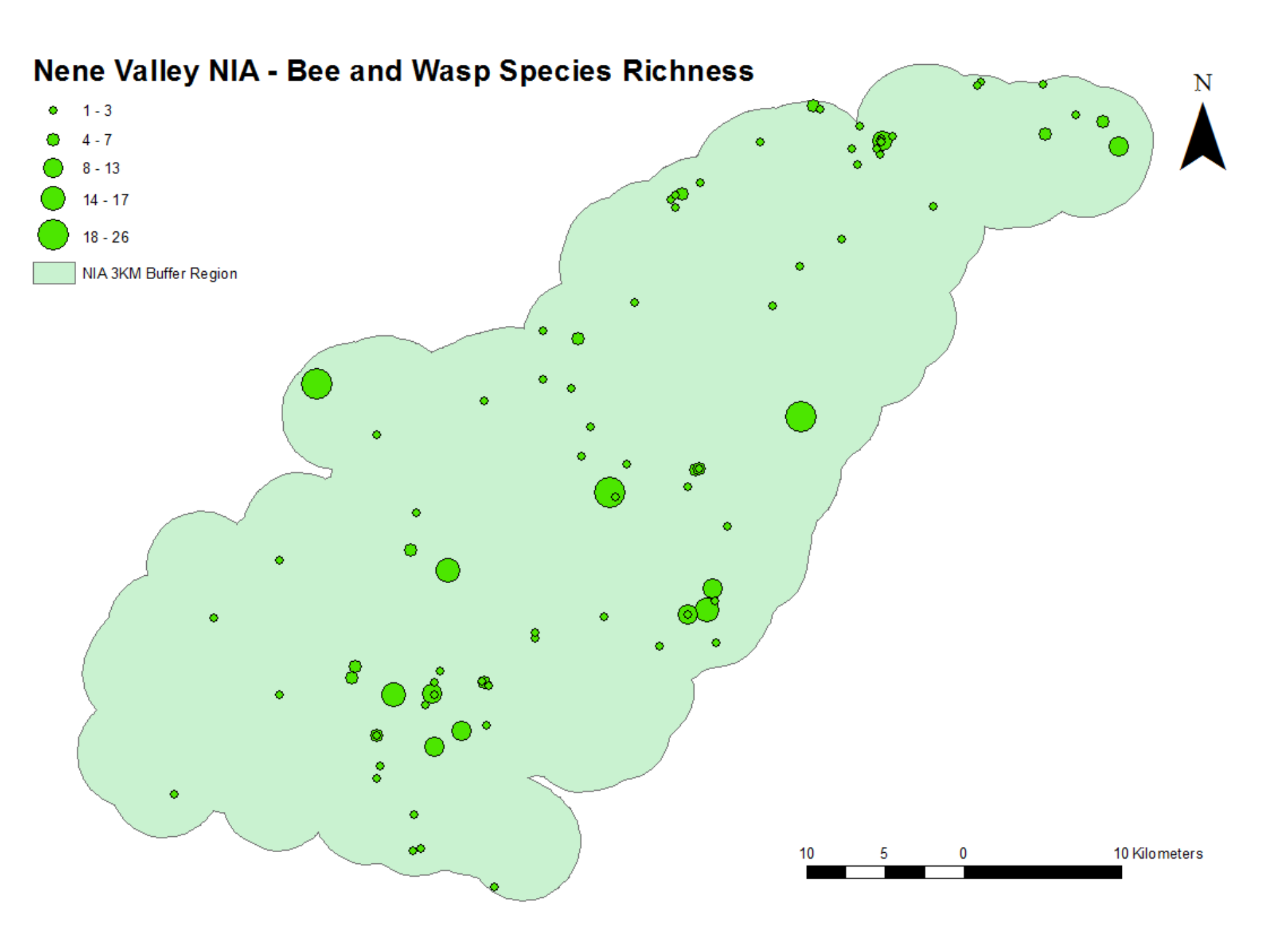
Taxa	Number of records
Plants	43,753
Fish	36,823
Butterflies	75,950
Moths	120,291
Dragonflies	16,444
Bees & wasps	1,615
Syrphidae	4,679
Birds	Pending
Bats	No access
GRAND TOTAL	**299,555**

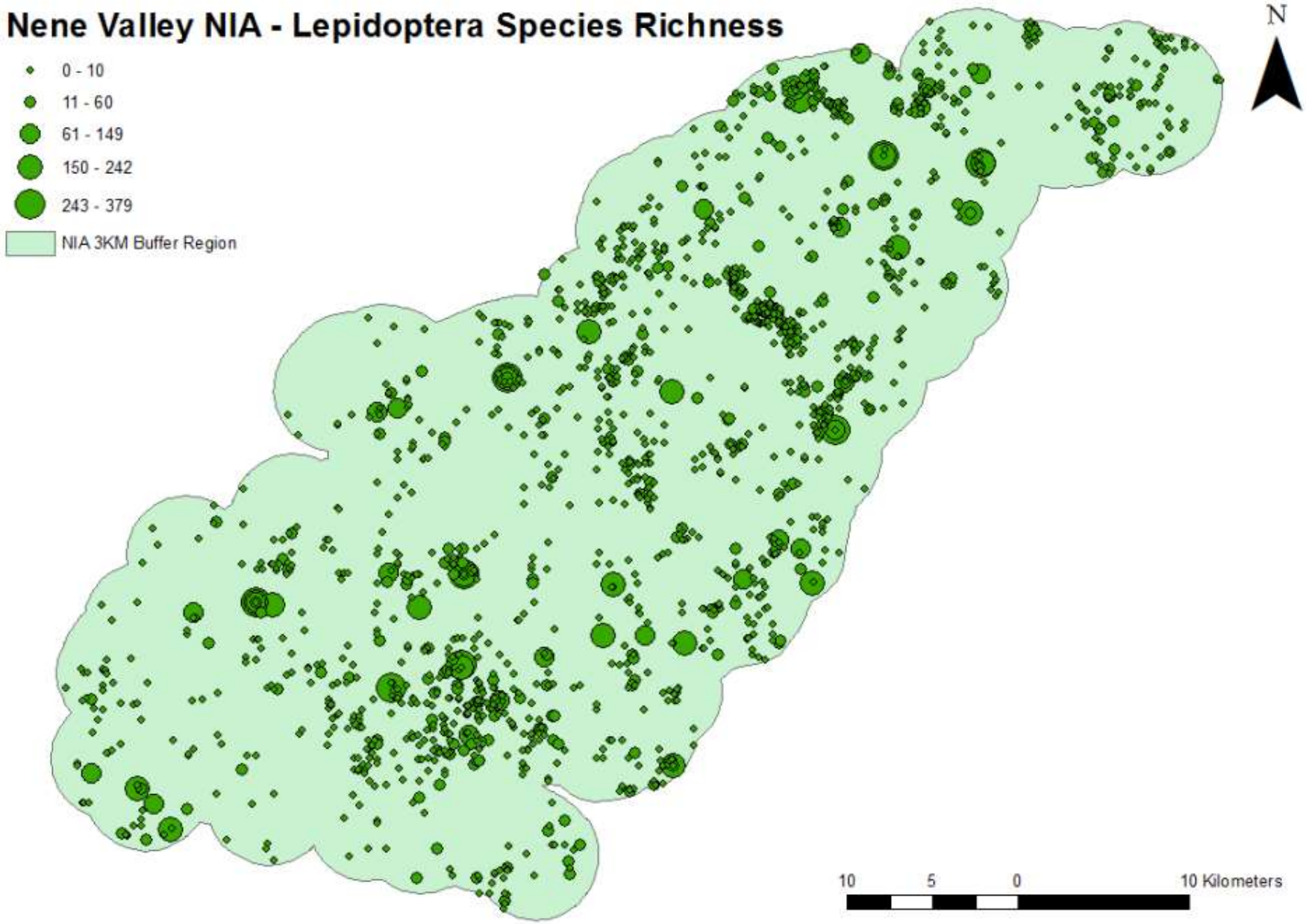
The Nene Valley Nature Improvement Area


Nene Valley NIA - Dragonfly Species Richness
Main River
NIA Boundary Region
NIA 3KM Buffer Region
N
10
5
0
10 Kilometers


Nene Valley NIA - Dragonfly Species Richness
0 - 3
4 - 6
7 - 9
10 - 12
13 - 15
16 - 20
NIA 3KM Buffer Region
N
10
5
0
10 Kilometers


Nene Valley NIA - Plant Species Richness
1 - 16
17 - 43
44 - 70
71 - 100
101 - 147
148 - 229
NIA 3KM Buffer Region
N
10 5 0 10 Kilometers


Nene Valley NIA - Bee and Wasp Species Richness
1 - 3
4 - 7
8 - 13
14 - 17
18 - 26
NIA 3KM Buffer Region
N
10
5
0
10 Kilometers

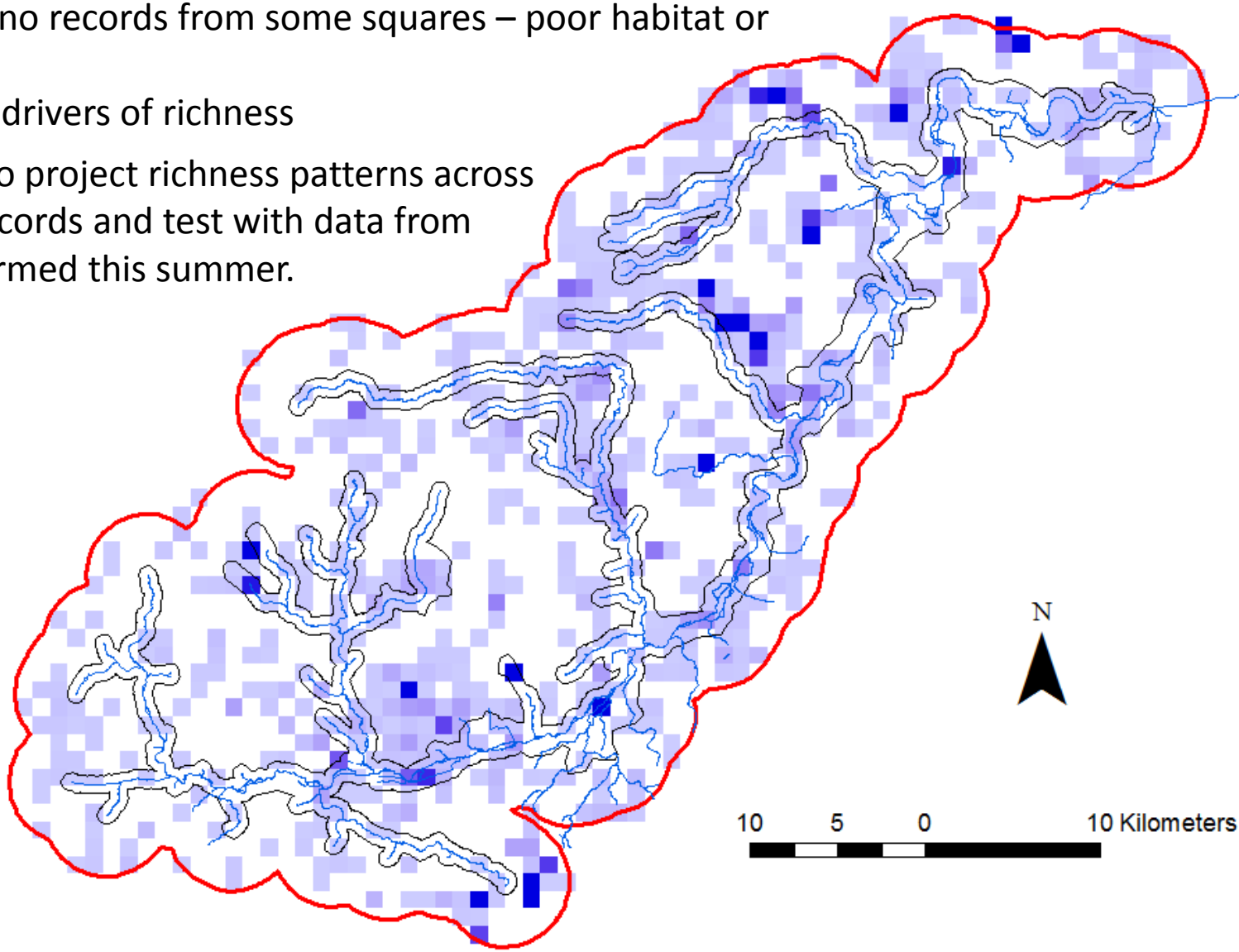

Nene Valley NIA - Lepidoptera Species Richness
0 - 10
11 - 60
61 - 149
150 - 242
243 - 379
NIA 3KM Buffer Region
N
10
5
0
10 Kilometers

Nene Valley NIA – Butterfly records in 1 km squares

Richness patterns will be analysed for each group to determine:

1. Why there are no records from some squares – poor habitat or access issues?
2. Environmental drivers of richness

Will then be able to project richness patterns across squares with no records and test with data from new surveys performed this summer.



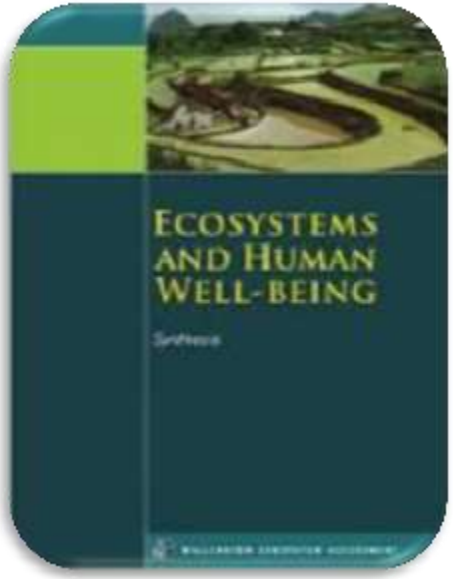

Modelling and mapping
ecosystem services

Ecosystem services

Ecosystem services are the benefits that people derive from the natural environment

Types of ecosystem service:

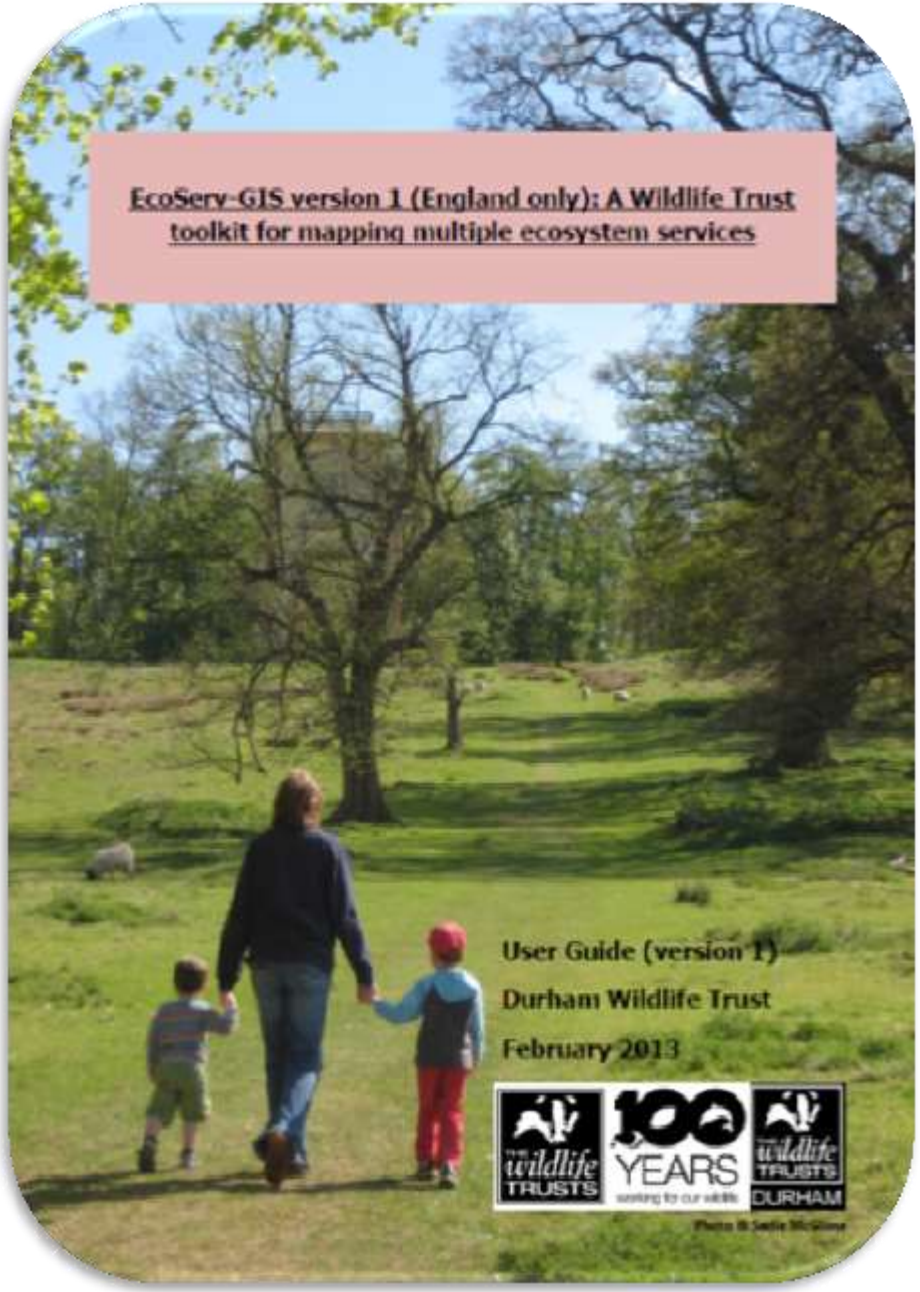
- **Provisioning services:** tangible physical and energetic goods obtained from ecosystems e.g. food and fibre
- **Regulatory services:** benefits obtained from ecosystem processes that regulate aspects of the environment, e.g. air quality, climate and water regulation
- **Cultural services:** non-material benefits people obtain from ecosystems e.g. recreation, aesthetic experiences, health and wellbeing
- **Supporting services:** services comprising internal processes within ecosystems essential for the production of all other ecosystem services, e.g. soil formation, primary production, nutrient cycling.



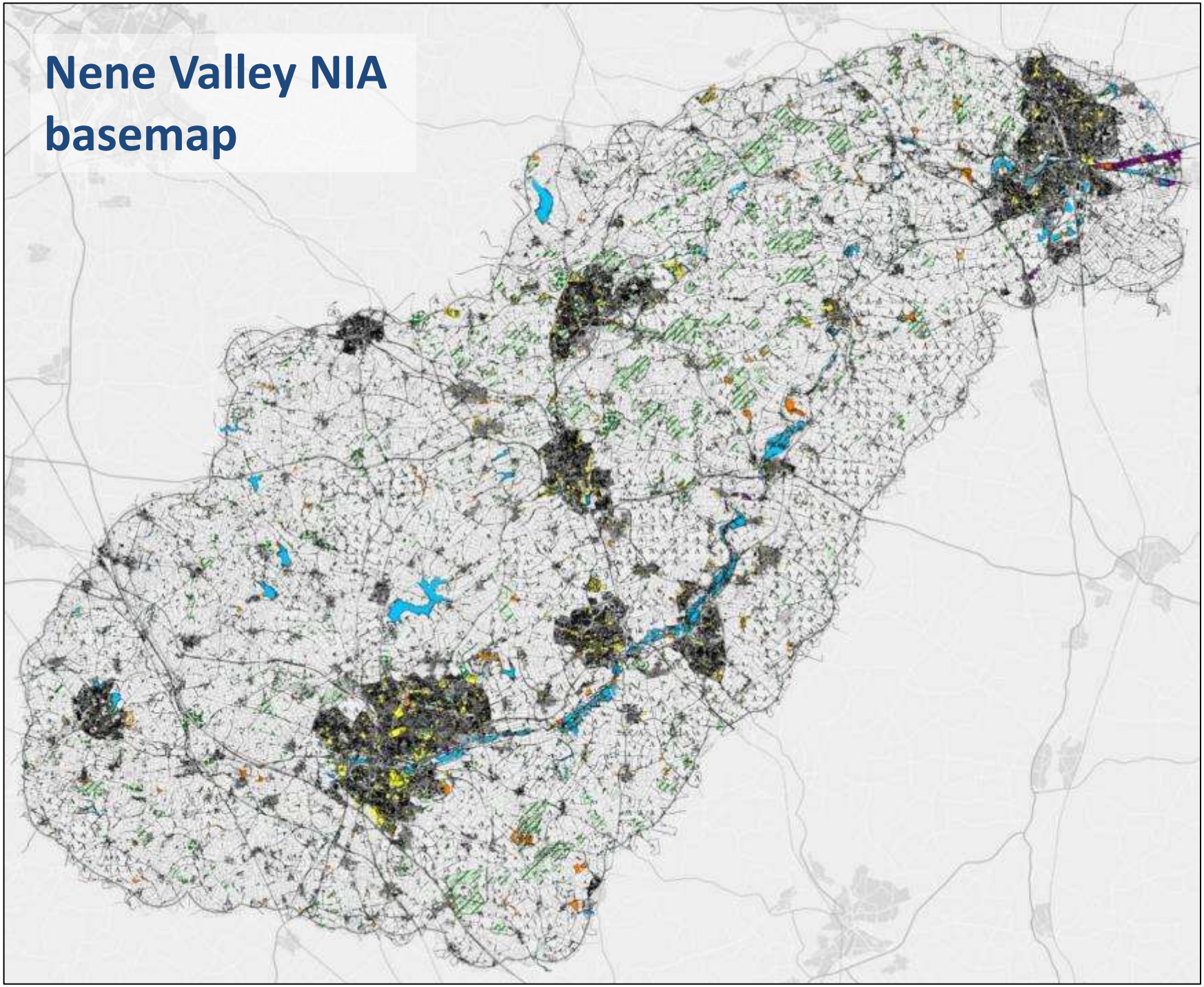
Which services?

1. Wildlife watching
2. **Accessible nature**
3. Education opportunities
4. Community cohesion
5. Carbon storage
6. Local climate regulation
7. Water purification
8. **Pollination**
9. Noise regulation
10. Air pollution regulation
11. Aesthetics
12. Timber

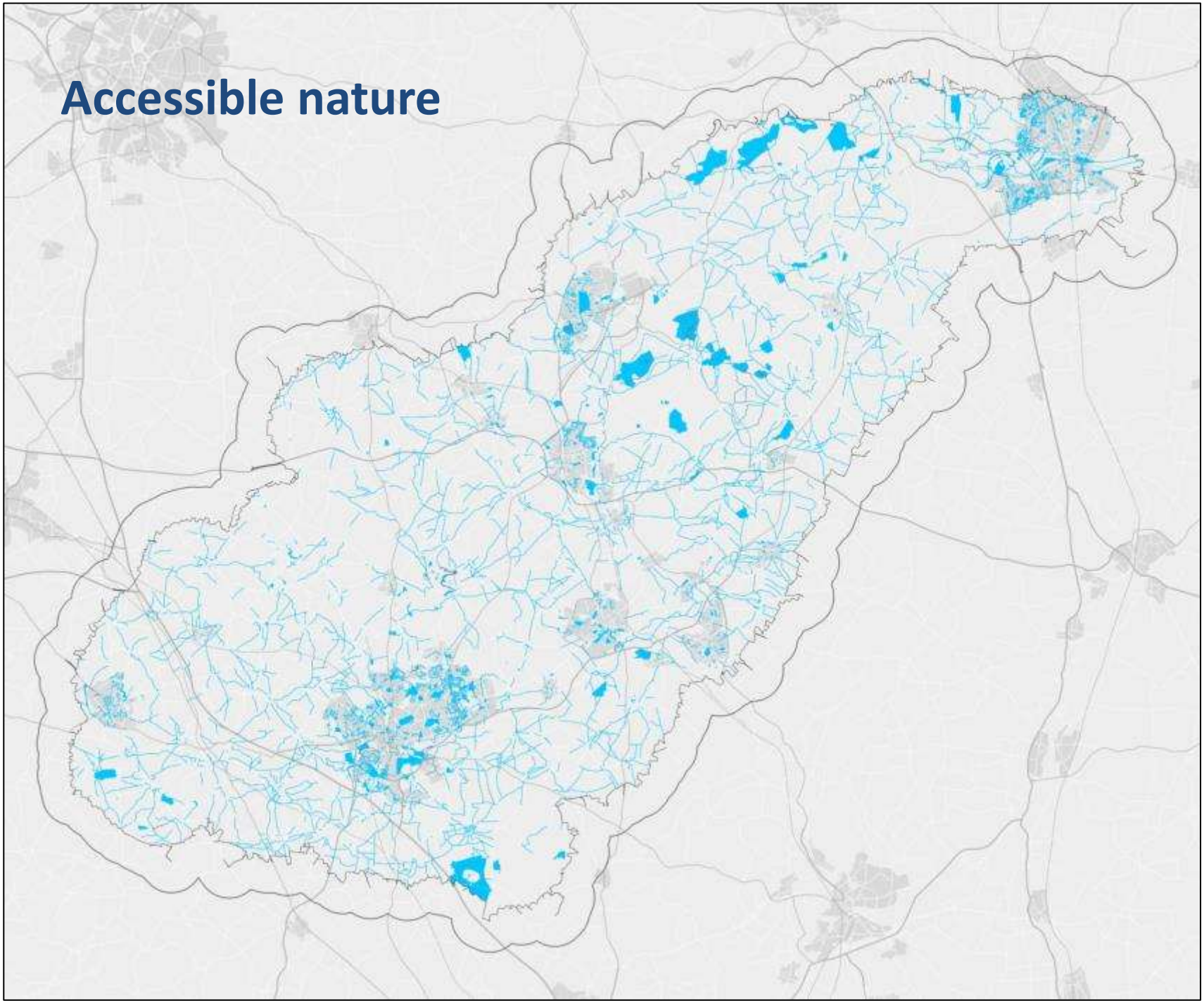
Cultural ecosystem services also being mapped using internet-based participatory GIS



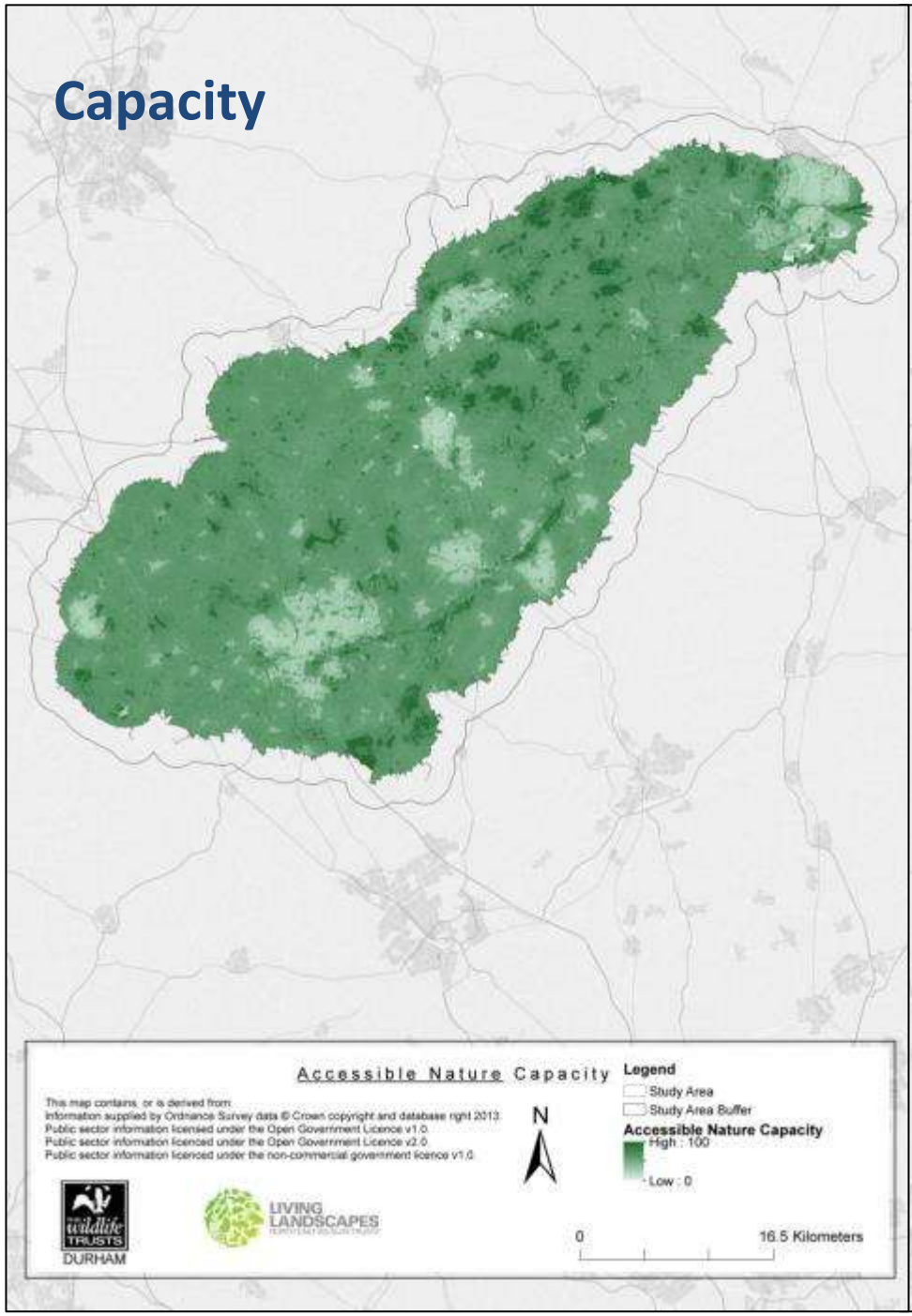
Nene Valley NIA basemap



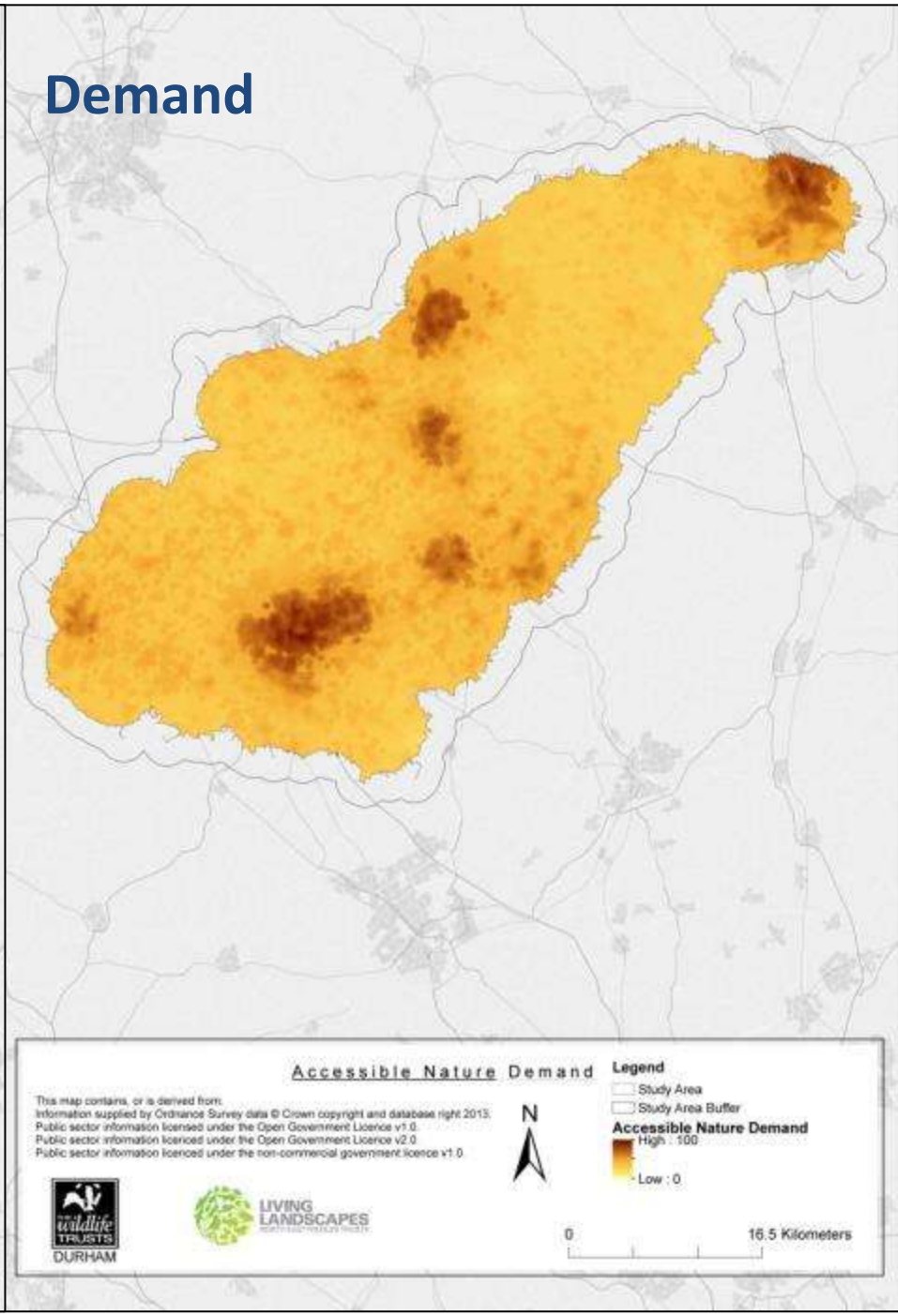
Accessible nature

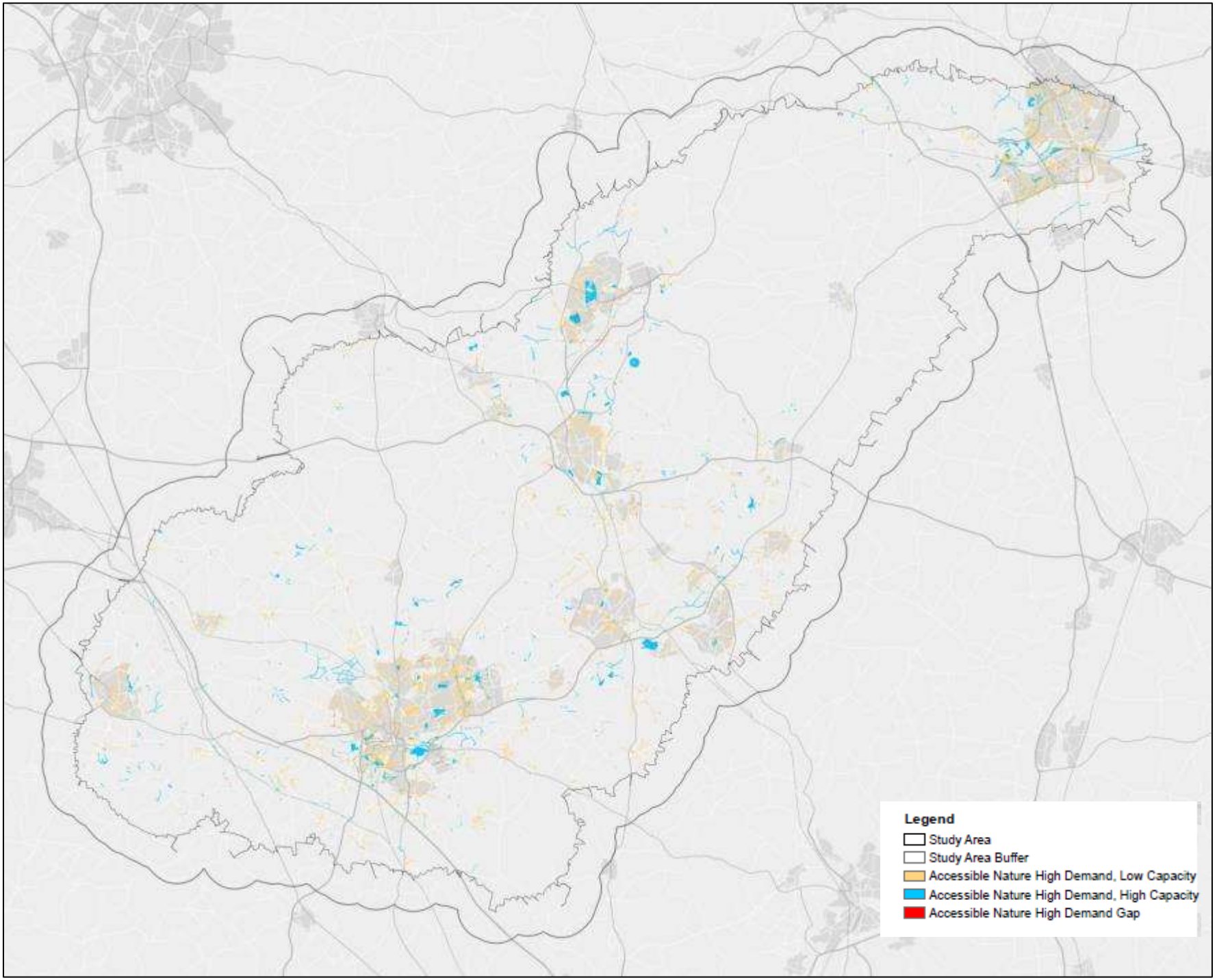


Capacity

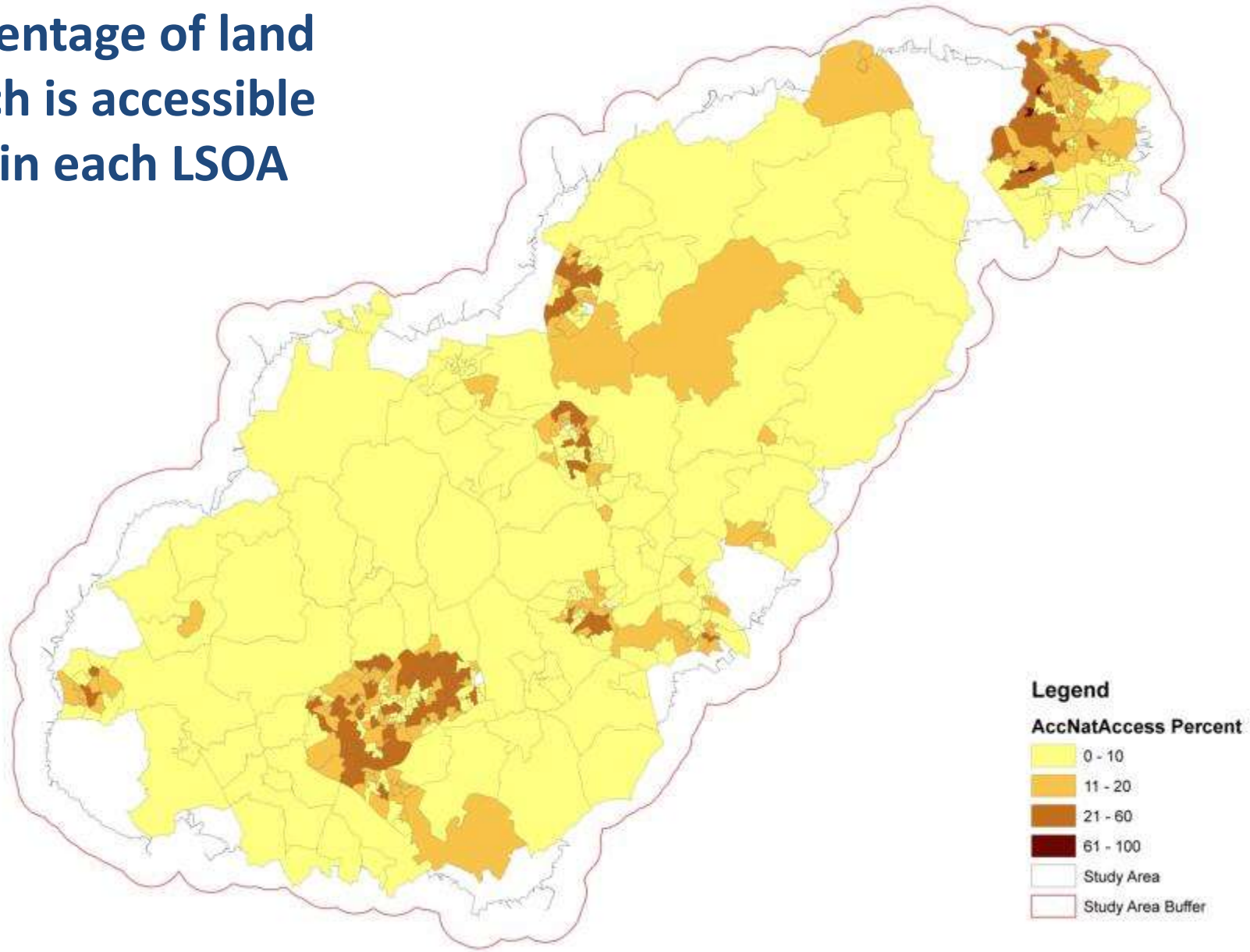


Demand

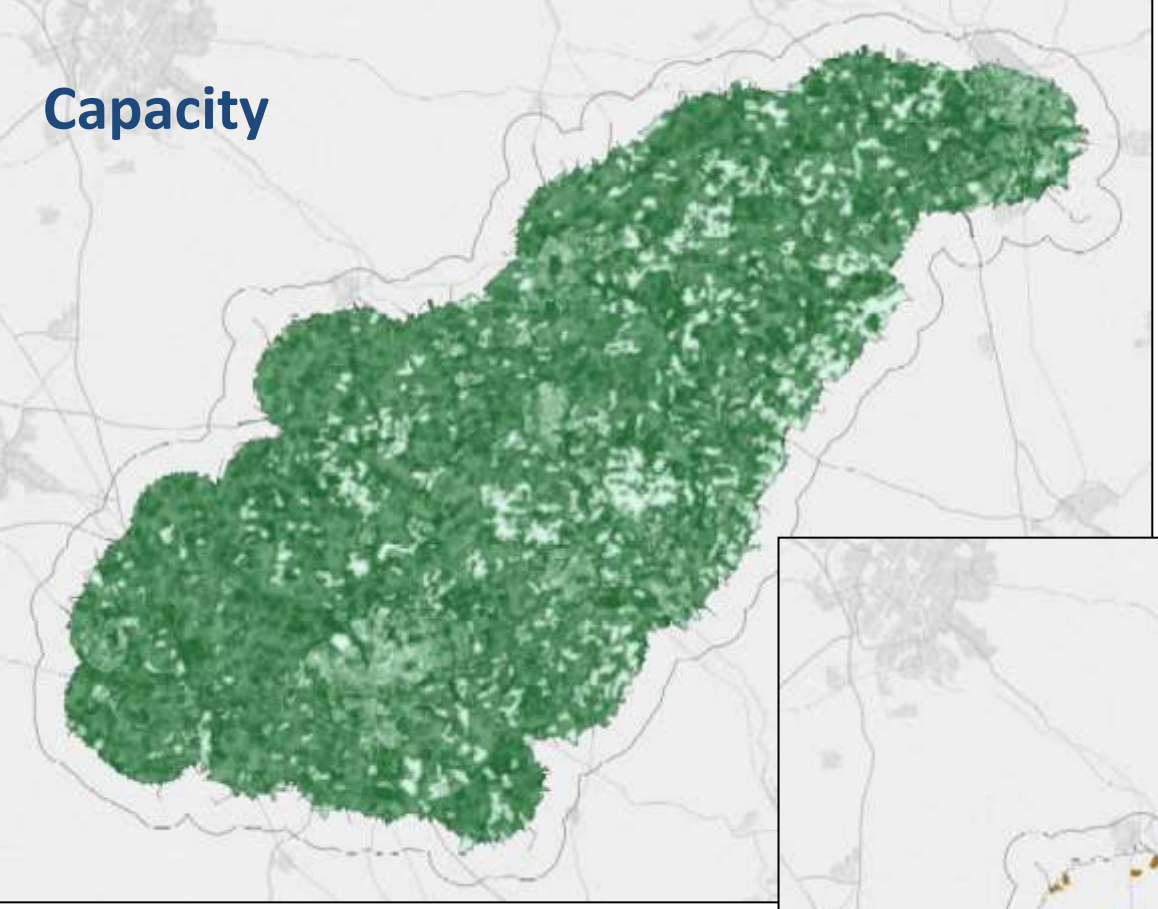


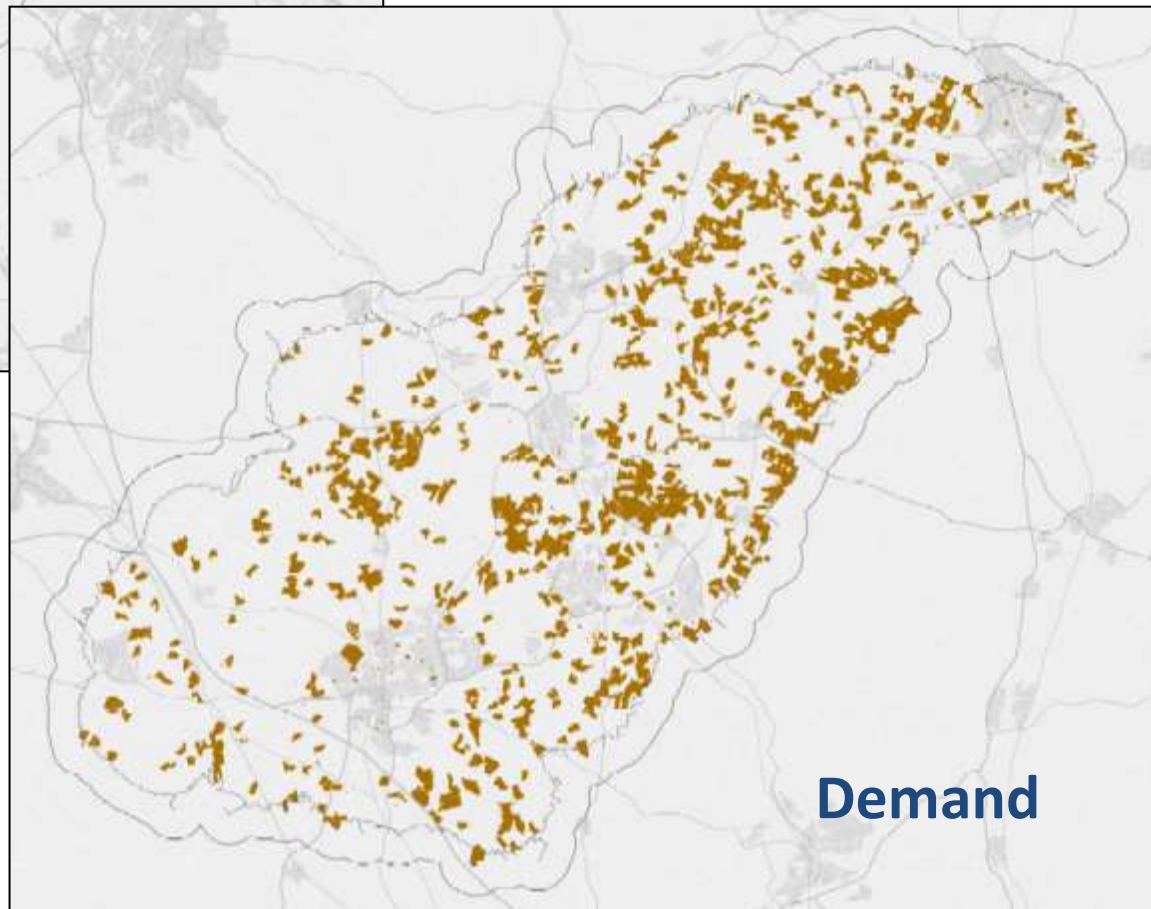

Legend
Study Area
Study Area Buffer
Accessible Nature High Demand, Low Capacity
Accessible Nature High Demand, High Capacity
Accessible Nature High Demand Gap

Percentage of land which is accessible within each LSOA

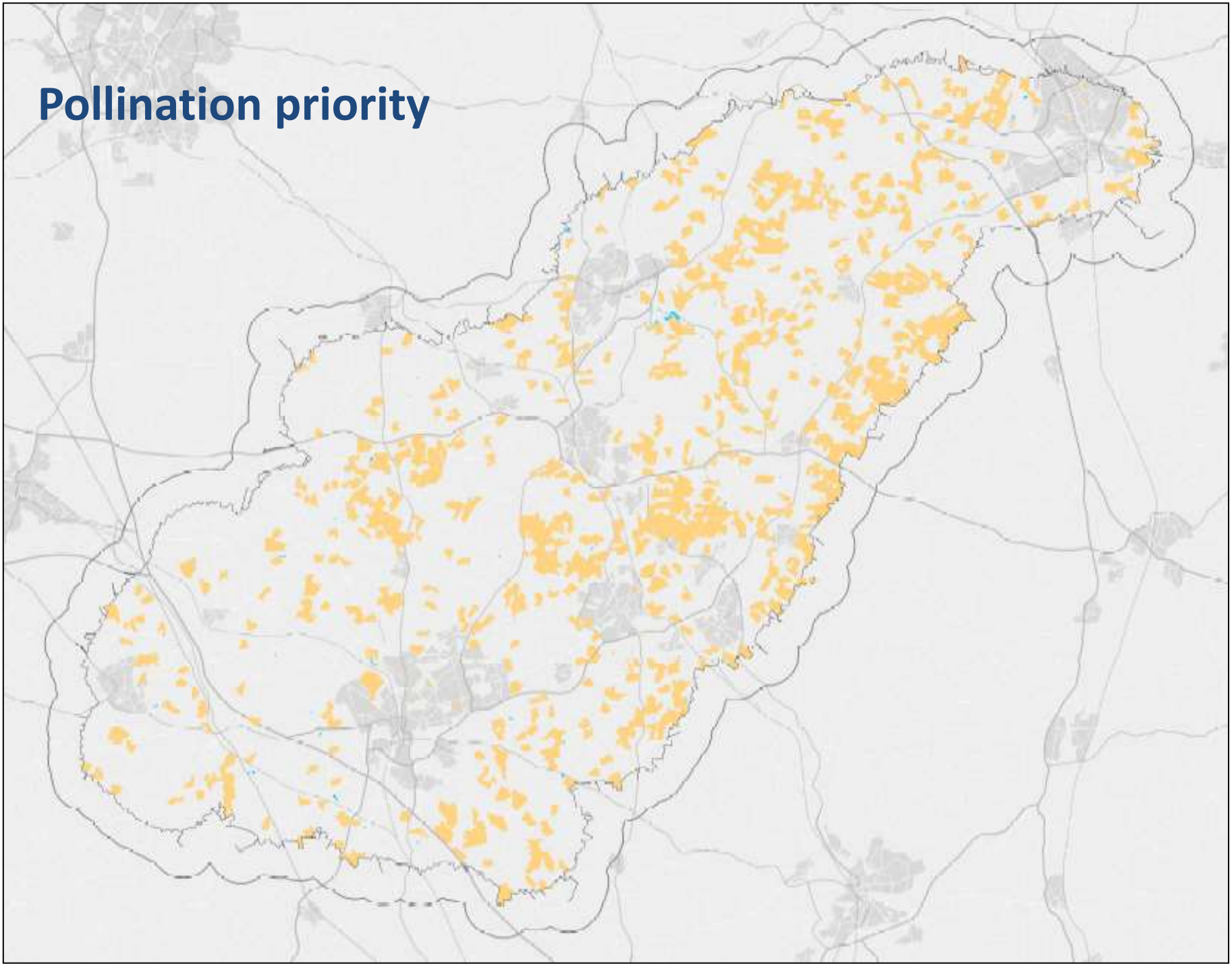


Pollination



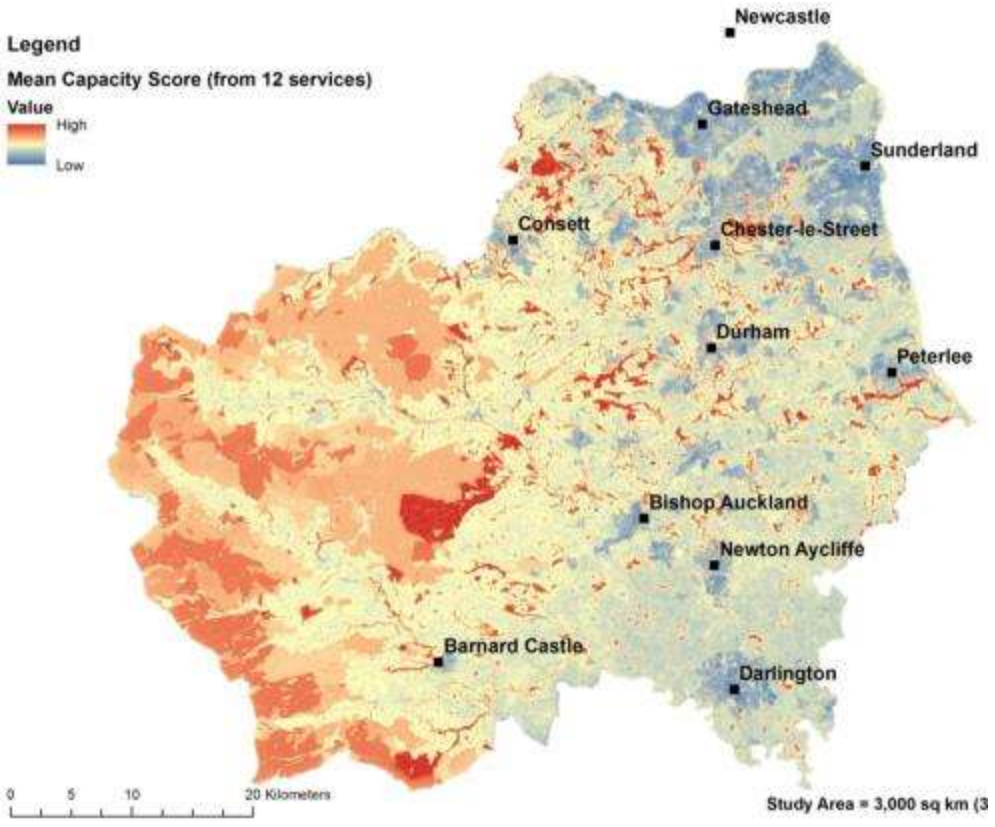


Pollination priority



What can we do with this biodiversity and ES information?

- Co-occurrence of multiple ES
- Links between biodiversity and ES
- Trade-off's and synergies



- Targeting
  - Areas to conserve / protect
  - Areas to manage better or restore
- Scenario modelling
- Ecosystem markets and PES

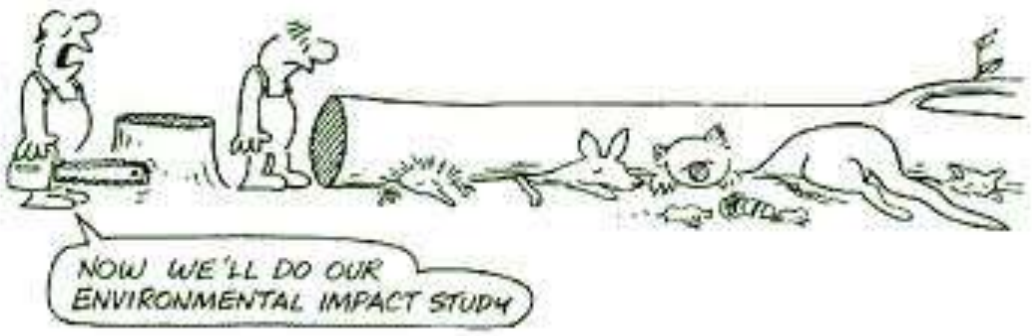
Developing Payments for Ecosystem Services (PES) schemes

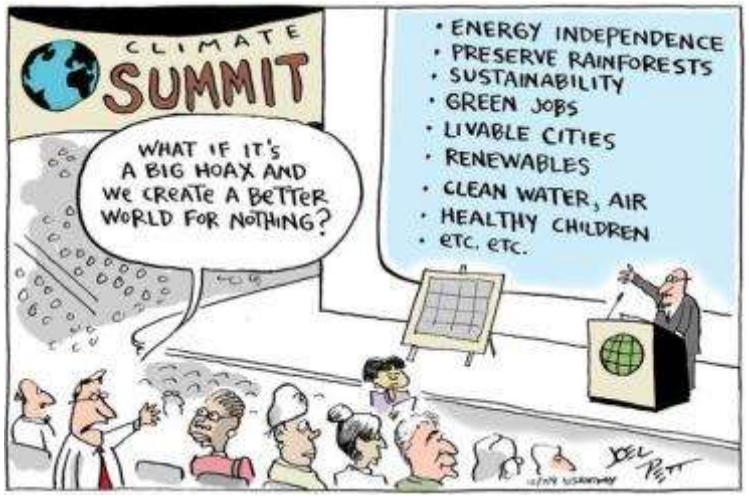
Developing PES schemes

1. Informing dialogue with stakeholders
   - Engage with stakeholders to produce locally relevant list of potential projects
   - Identify buyers, sellers and intermediaries

Developing PES schemes

1. Informing dialogue with stakeholders
2. Influencing planning policy and planning gain
   - ES design guide for planners and developers
   - Influence local plans and strategies
   - Section 106 agreements





Developing PES schemes

1. Informing dialogue with stakeholders
2. Influencing planning policy and planning gain
3. Agri-environment scheme targeting
   - AE schemes are “PES-like”
   - New scheme will be targeted and at the landscape scale
   - May involve greater range of ES
   - Natural England and Defra developing ideas about how to target but biodiversity and ES maps could be highly informative

Developing PES schemes

1. Informing dialogue with stakeholders
2. Influencing planning policy and planning gain
3. Agri-environment scheme targeting
4. Biodiversity and carbon offsetting
   - Biodiversity and ES mapping can be used to determine the best locations for offsetting projects

Developing PES schemes

1. Informing dialogue with stakeholders
2. Influencing planning policy and planning gain
3. Agri-environment scheme targeting
4. Biodiversity and carbon offsetting
5. Other opportunities

Setting up a water quality PES with Anglian Water

- Local water treatment works failing for metaldehyde, clopyralid and total pesticides
- Chemical treatment difficult, altering farm practices through PES would be ideal
- We have worked with Anglian Water to develop a potential PES scheme around Pitsford reservoir (subject to OffWat approval)

Key points

- We have mapped biodiversity across the NIA using existing records
- We are producing models of the environmental drivers of richness across the landscape
- Currently modelling and mapping a range of ecosystem services using EcoServ and other methods
- These can be used to determine the links between biodiversity and ES and to target appropriate areas for conservation action
- They can be used to inform the setting up of Payments for Ecosystem Services schemes.

Thank You!

Jim.Rouquette@northampton.ac.uk