



Using innovative technology to help understand environment-species interaction

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Environmental consultancy

- Ecology
- Agri-environment
- Ecosystem services
- Agriculture
- Invasive species and plant disease
- Remote sensing & GIS

Application in policy development via provision of evidence base; survey and assessment for new development; crop management and land use planning.



Light Pollution Mapping for Bat Conservation in Pembrokeshire

- Evidence for planning policy
- Identify locations for sympathetic lighting
- Inform highways lighting strategy.
- Public awareness of the impacts of inappropriate lighting and where action may be taken.



Cyfoeth
Naturiol
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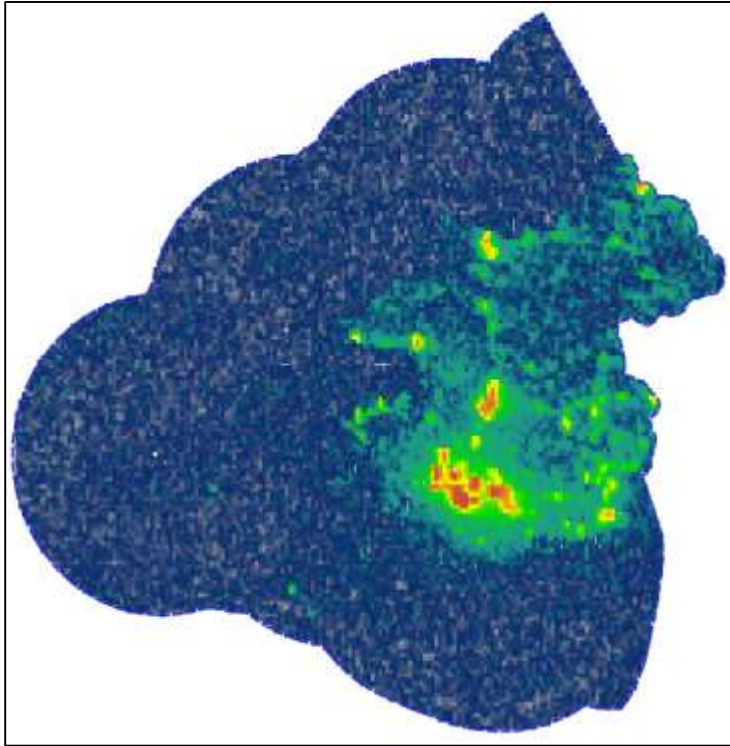


Project Objectives

- To source and display light pollution data.
- To source and display Highways and Trunk Road lighting layers.
- To source and map light sensitive roost data for annex II species.
- Present the above data as multiple layers or amalgamated into one ensuring that specific locations of roosts are not possible to located by the general public.



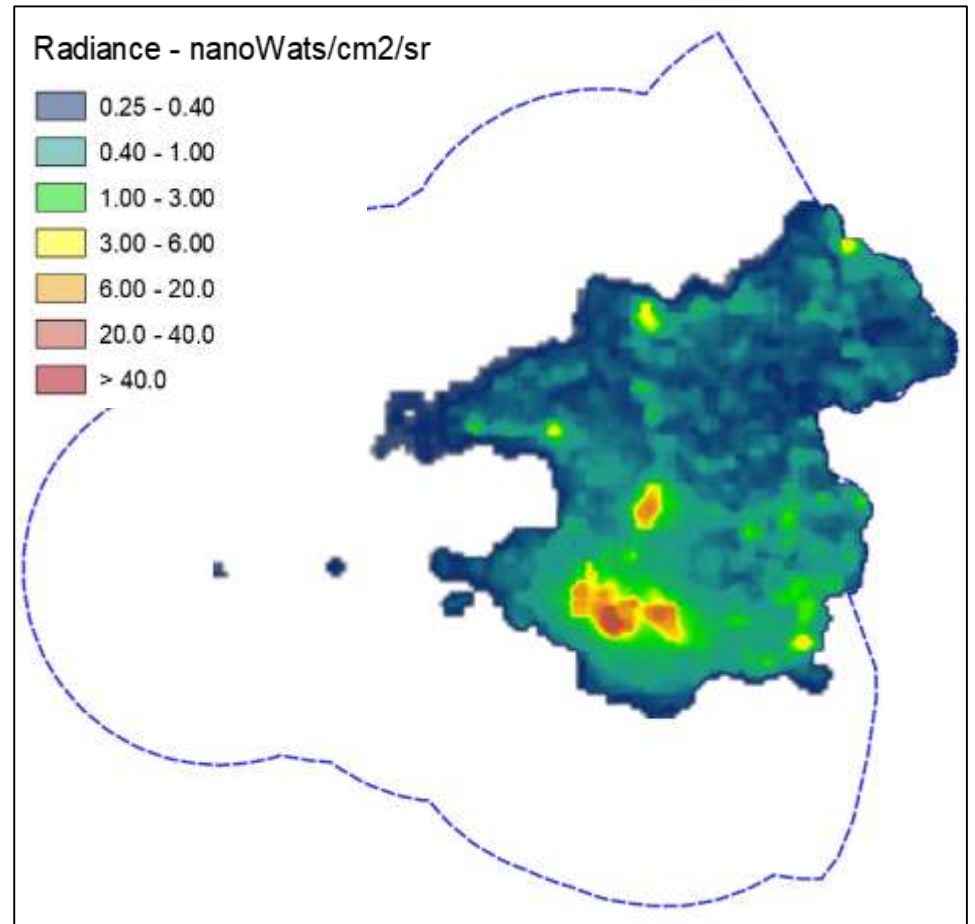
Visible Infrared Imaging Radiometer Suite (VIIRS) (Day/Night Band)

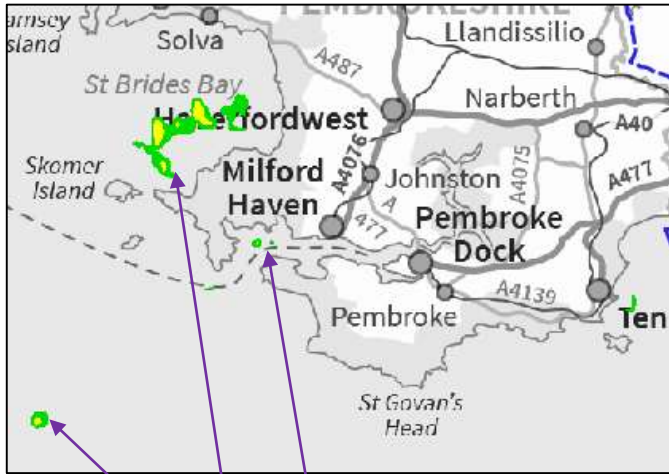


- Open source
- 'Noisy'
- 500m x 500m pixel

Image processing

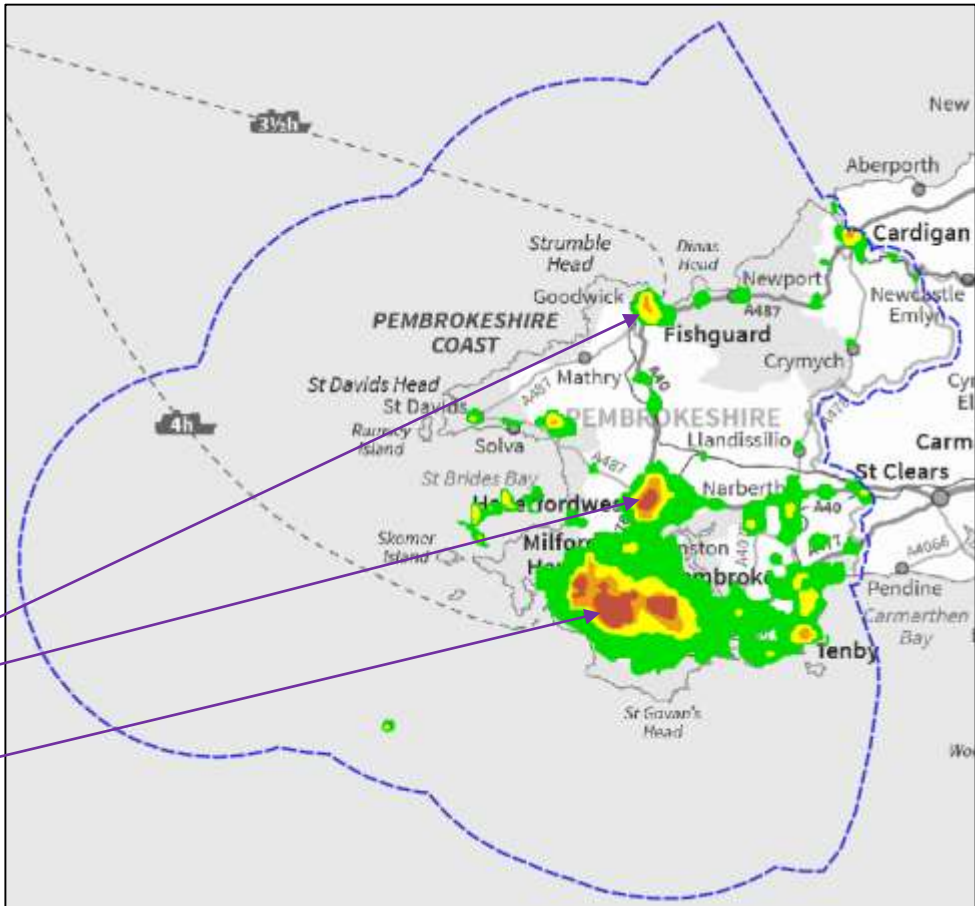
- Atmospheric correction
- Resample to 50m x 50m pixel
- Loss of transient features





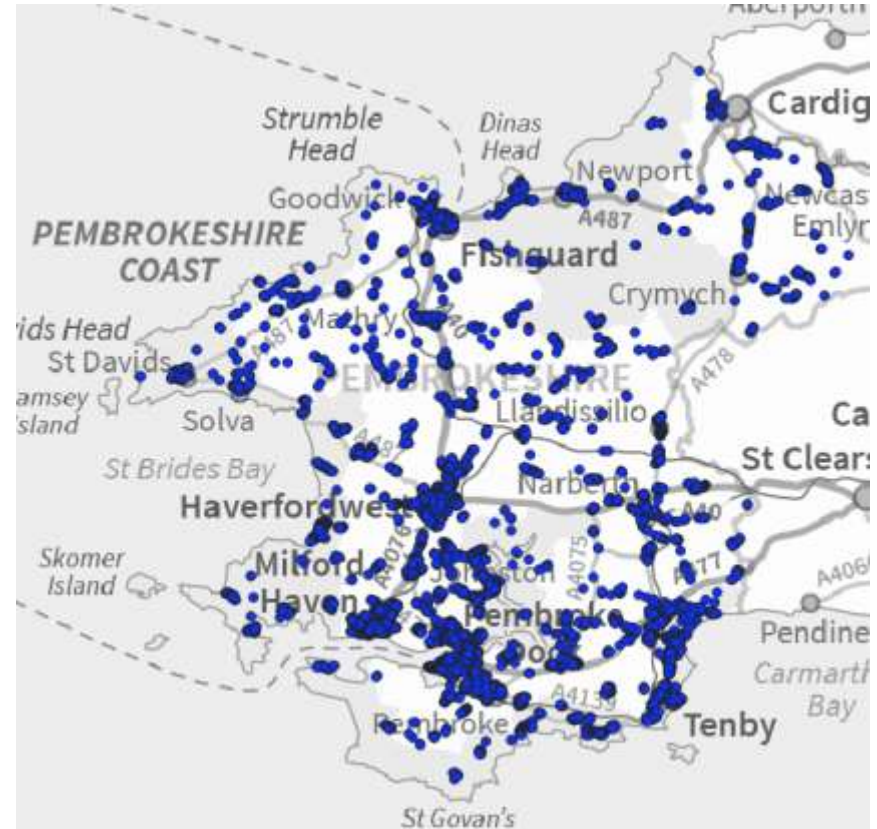
Moored vessels?

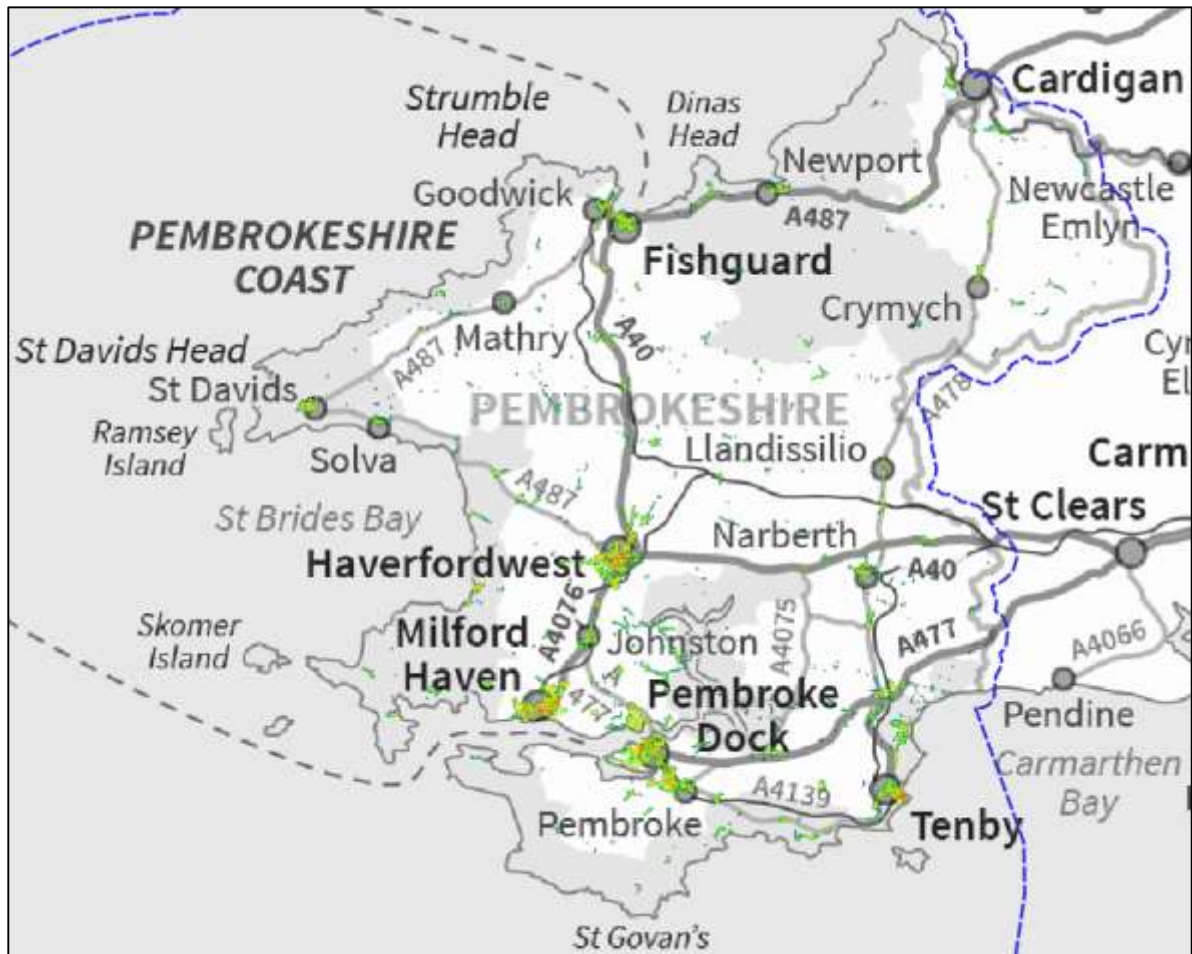
Higher levels of light pollution



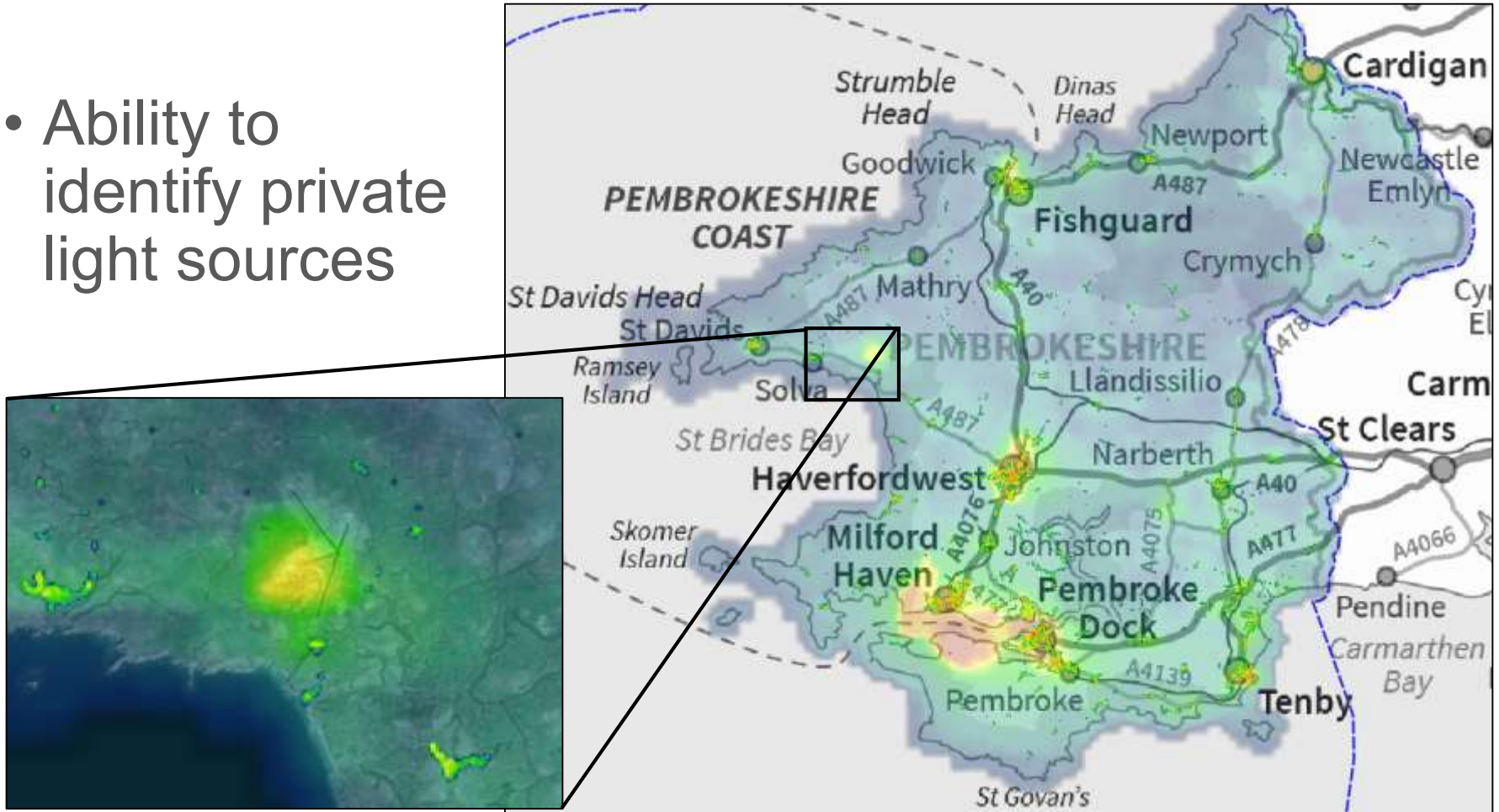
Street Lighting, trunk roads and known building mounted

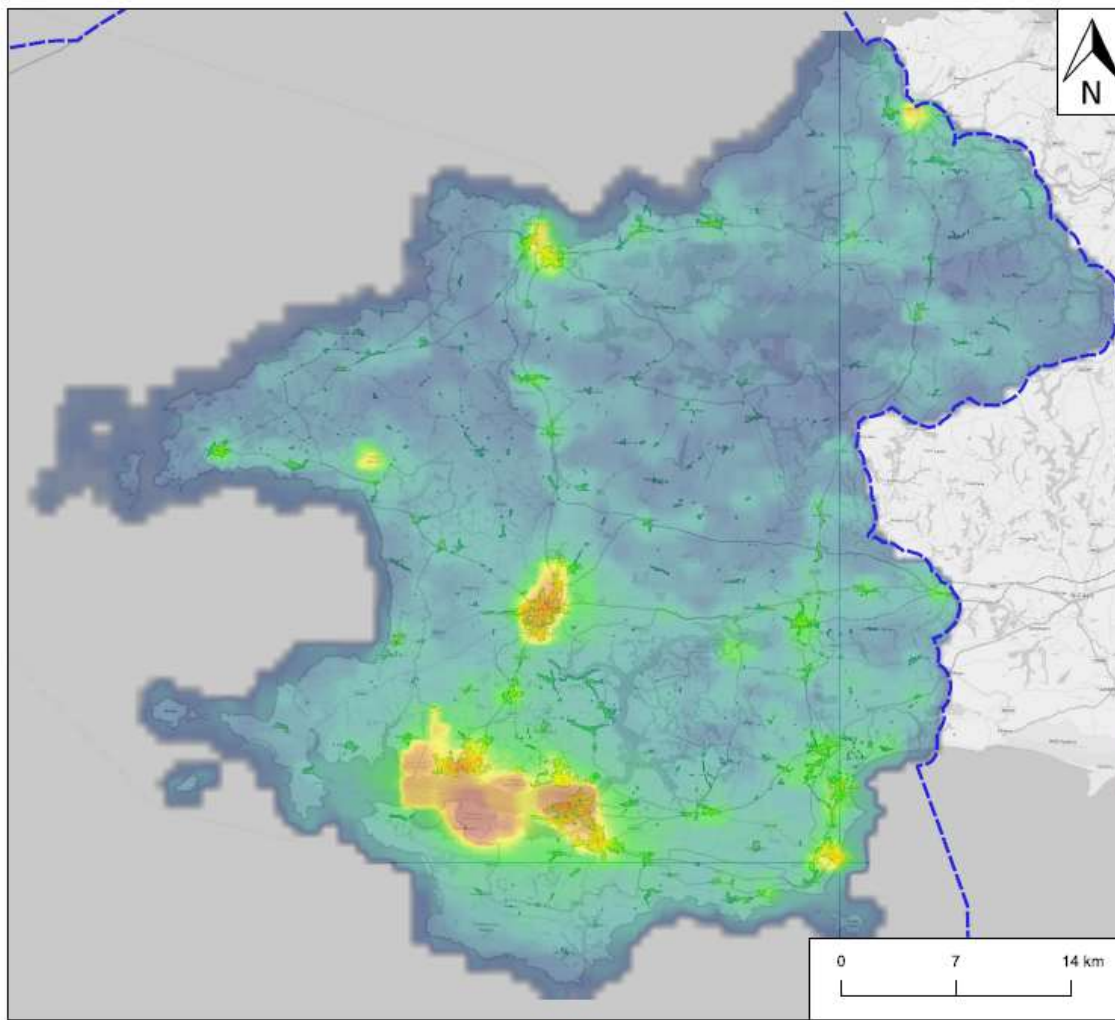
- Street light data provided in shapefile.
- Point features representing 19,068 street lights
- 120 different lamp types





- Ability to identify private light sources



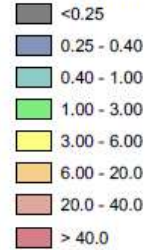


Light Sensitive Mapping for Biodiversity

Artificial Nighttime Light

Key:

Radiance - nanoWats/cm2/sr



Map prepared by Environment Systems Ltd.
 Map contains data acquired from Earth Observation Group, NOAA National Centers for Environmental Information (NCEI)



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 evidence and insight



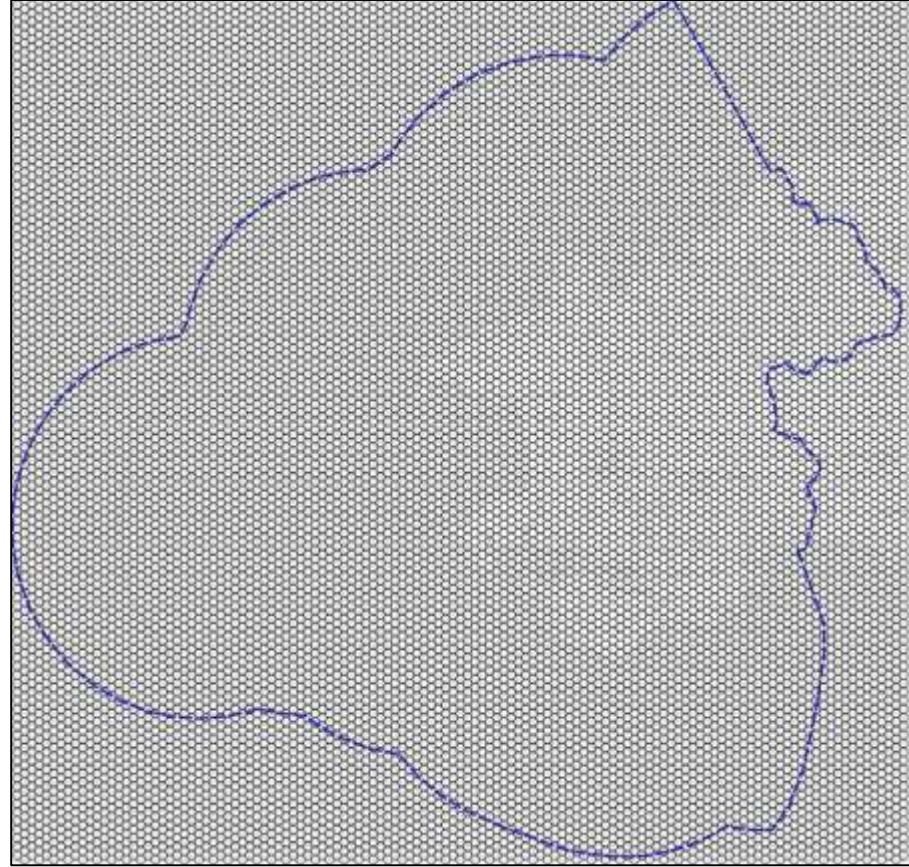
Bats

- Highly mobile, relatively easy to disperse
- Can maintain population using less habitat
- Do need height/ canopy features
- Low artificial light
- Places where prey are present
- Proximity to shelter

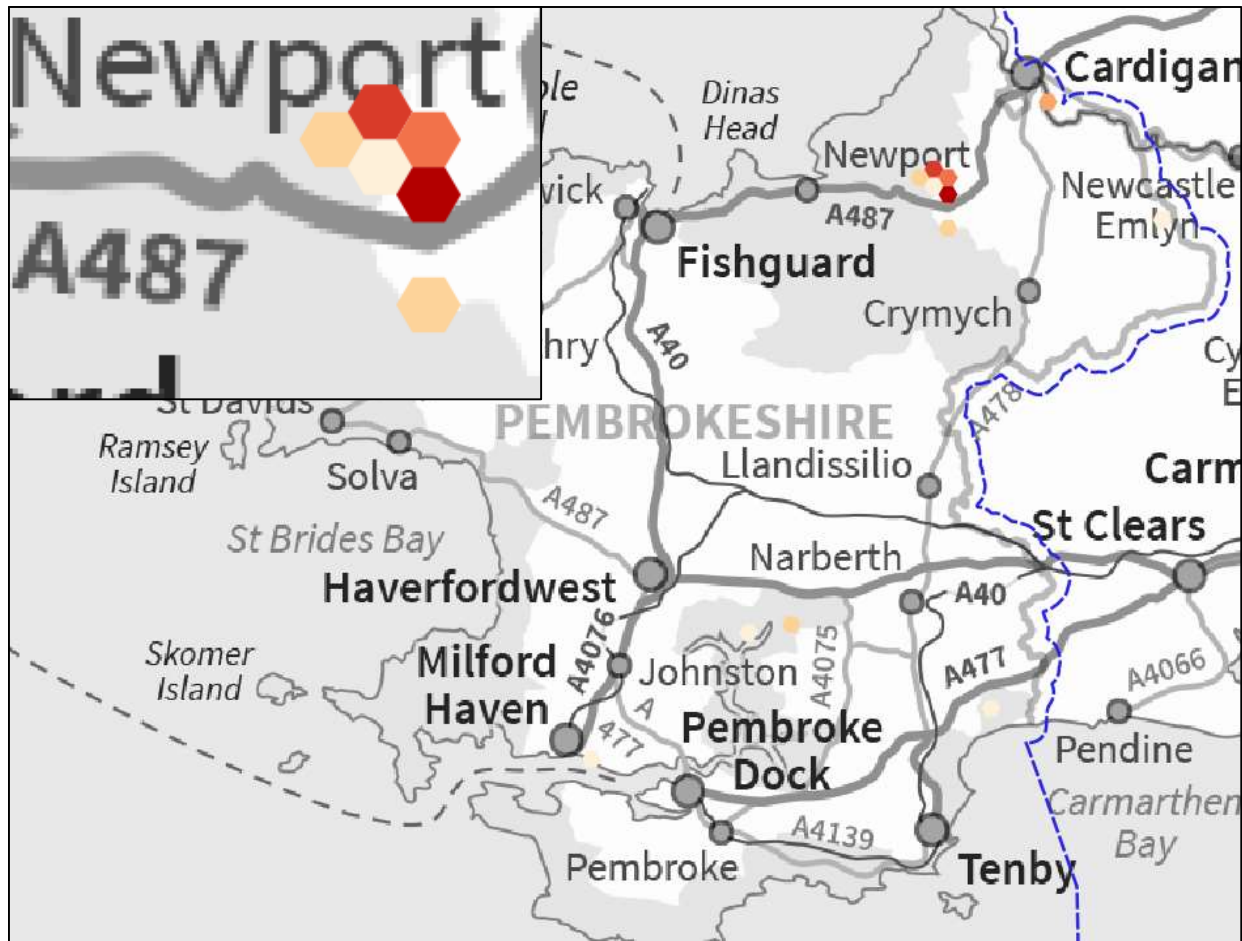
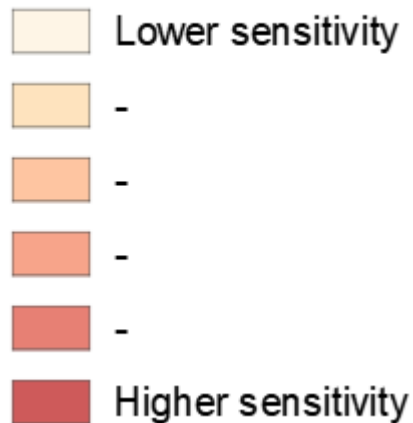


Creating a layer using sensitive records






- Provided by West Wales Biodiversity Information Centre (WWBIC) - Shapefile
- Filter and selection
- Attribution of a arbitrary value to facilitate visualisation.
- Use of hexagonal 1km grid

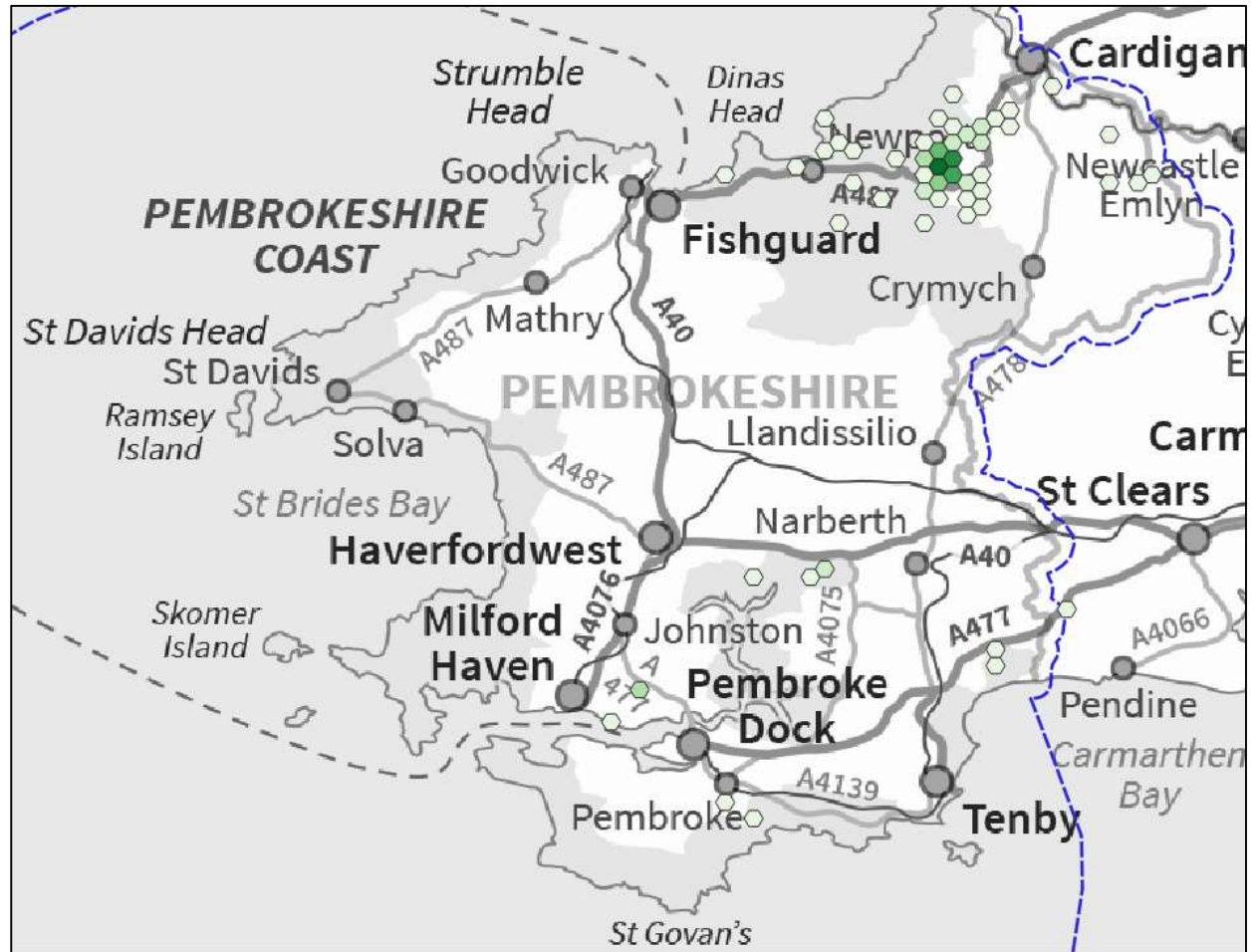


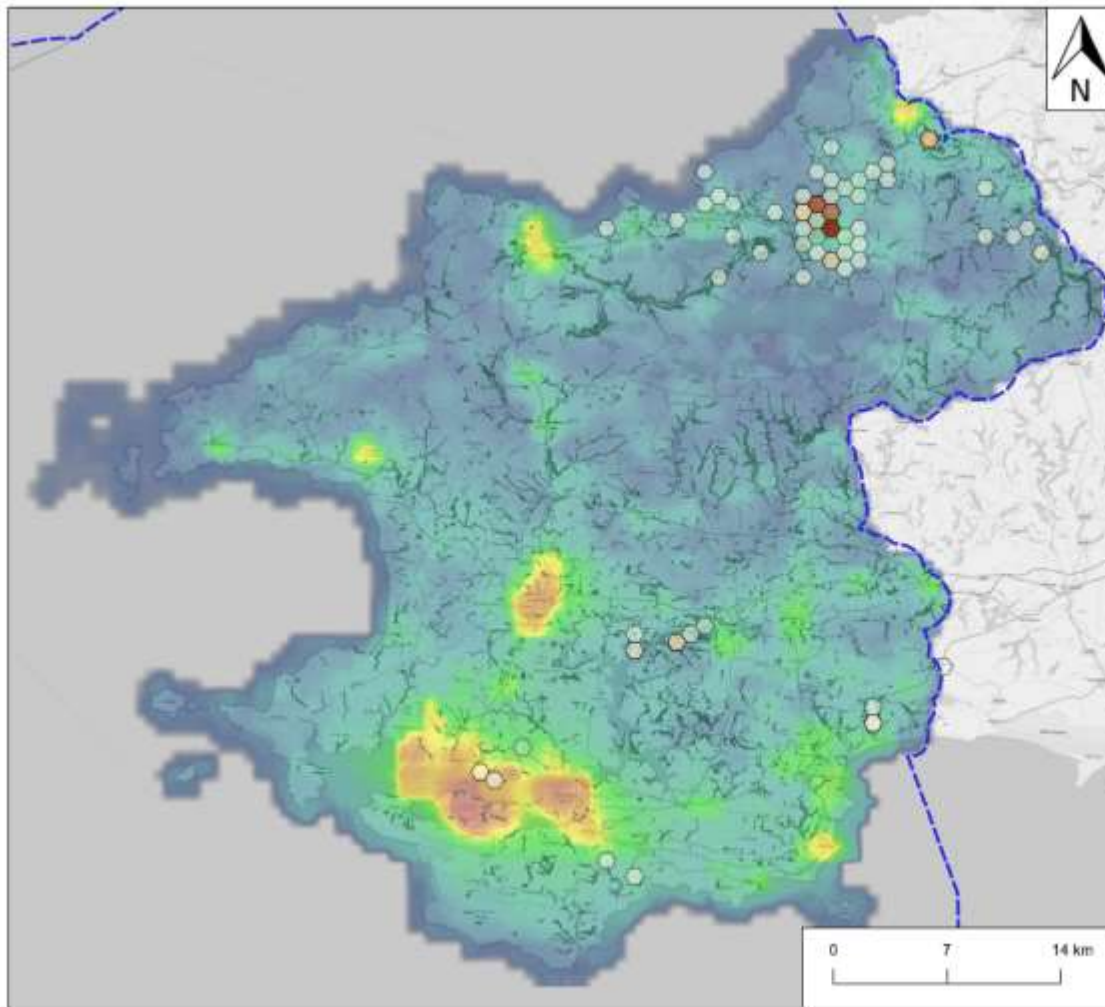
Roosting Areas



Foraging Areas

-  Lower number of bat passes
-  -
-  -
-  -
-  Higher number of bat passes





Light Sensitive Mapping for Biodiversity

Artificial Nighttime Light & Barbastelle Roosting Areas

Key:

Radiance - nanoWats/cm2/sr

<math>< 0.25</math>

0.25 - 0.40

0.40 - 1.00

1.00 - 3.00

3.00 - 6.00

6.00 - 20.0

20.0 - 40.0

> 40.0

Roosting Areas

Lower sensitivity

-

-

-

-

-

Higher sensitivity

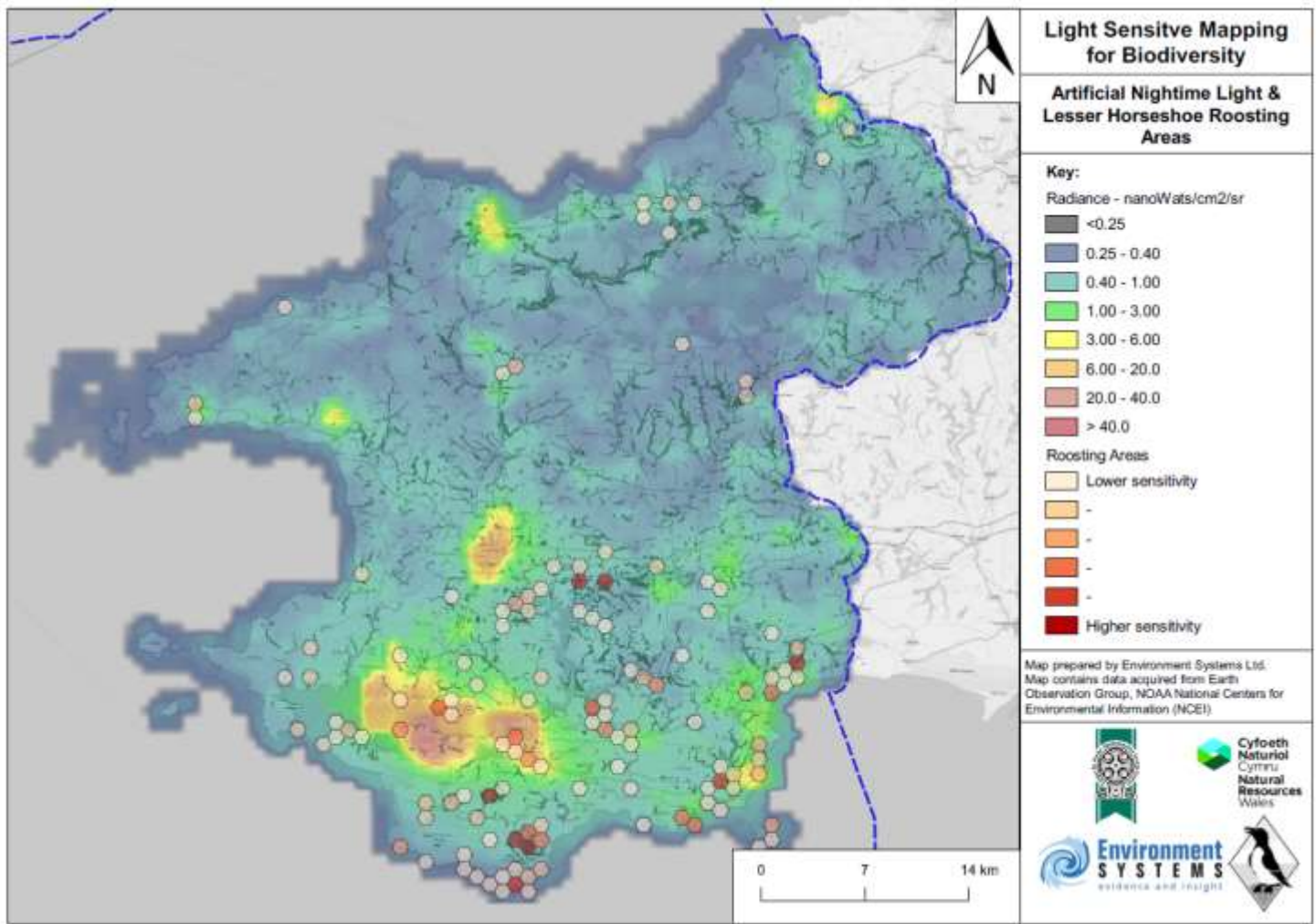
Map prepared by Environment Systems Ltd.
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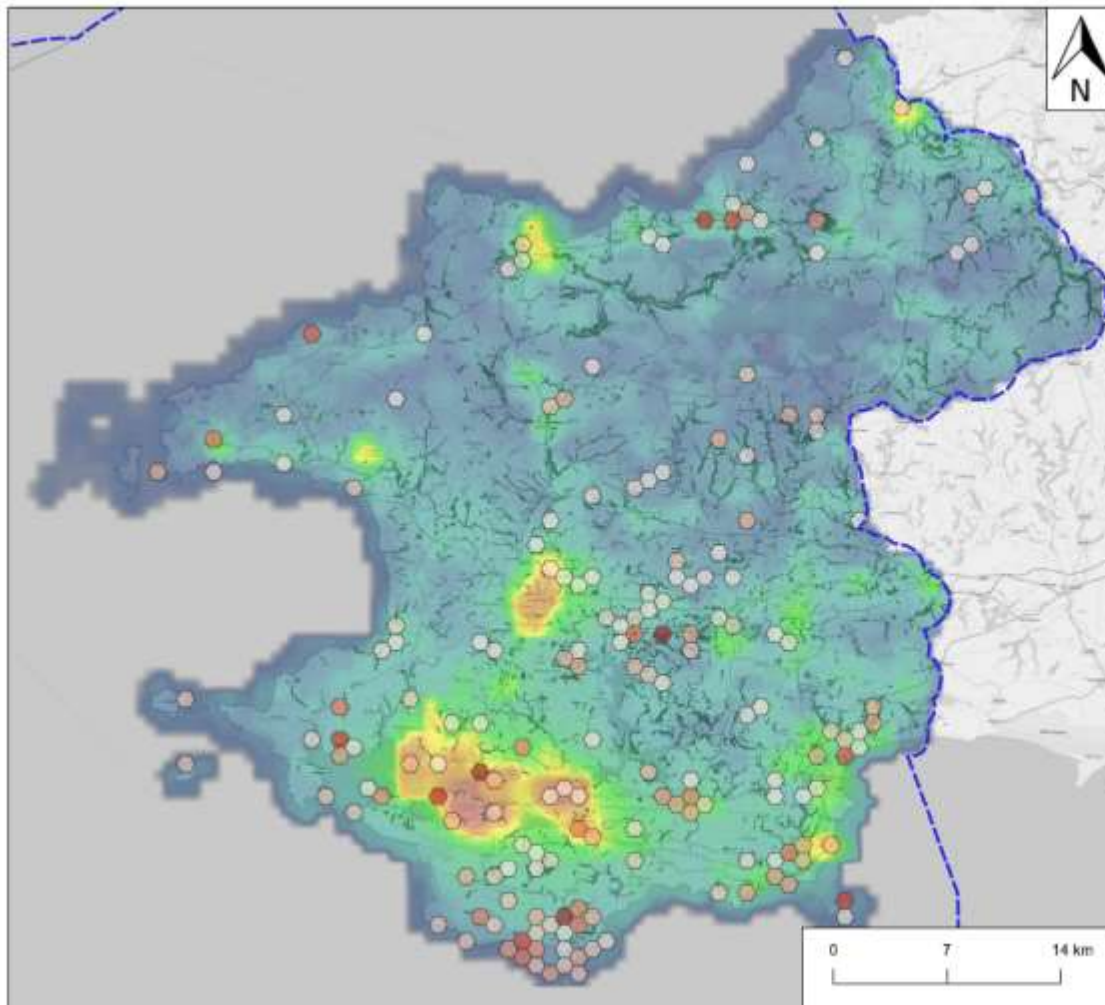


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Light Sensitive Mapping for Biodiversity

Artificial Nighttime Light & Greater Horseshoe Roosting Areas

Key:

Radiance - nanoWatts/cm²/sr

- <0.25
- 0.25 - 0.40
- 0.40 - 1.00
- 1.00 - 3.00
- 3.00 - 6.00
- 6.00 - 20.0
- 20.0 - 40.0
- > 40.0

Roosting Areas

- Lower sensitivity
-
-
-
-
- Higher sensitivity

Map prepared by Environment Systems Ltd.
 Map contains data acquired from Earth Observation Group, NOAA National Centers for Environmental Information (NCEI)



Summary

- Consistent light data for large area from satellite
- Some known/ available lamp data but not to the level of detail we would like (ILE08/18).
- Always difficulty with only having positive species records. No negative survey results. But it is the best available!
- Subjective interpretation of the records?
- Provides an early output which can be developed further and can start being used to inform planning and policy

Next steps

- Satellite data has a large swath width – can be applied for the whole of the UK.
- Gather temporal scenes and create composite satellite output to help refine loss of transient features.
- Develop greater information on the available lamp data
- Approach to species records needs review with local recorders.
- Can be applied to different species and habitats
- Interactive web tool



Access to satellite data:

<https://data.envsys.co.uk/portal/search/>



Thank you for listening!



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