THE CONTRIBUTION OF ACTIVE SURFACE MINES IN THE CONSERVATION OF LOWER PLANT COMMUNITIES IN THE UK

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Reclamation Across Industries

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CELTIC ENERGY

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Lower Plants?

.....vegetation communities in miniature ....

..for many an association with train sets..

** Fruticose *Cladonia cervicornis spp verticillata*

Fruticose *Cladonia unicialis*

Fruticose *Cladonia ramulosa*

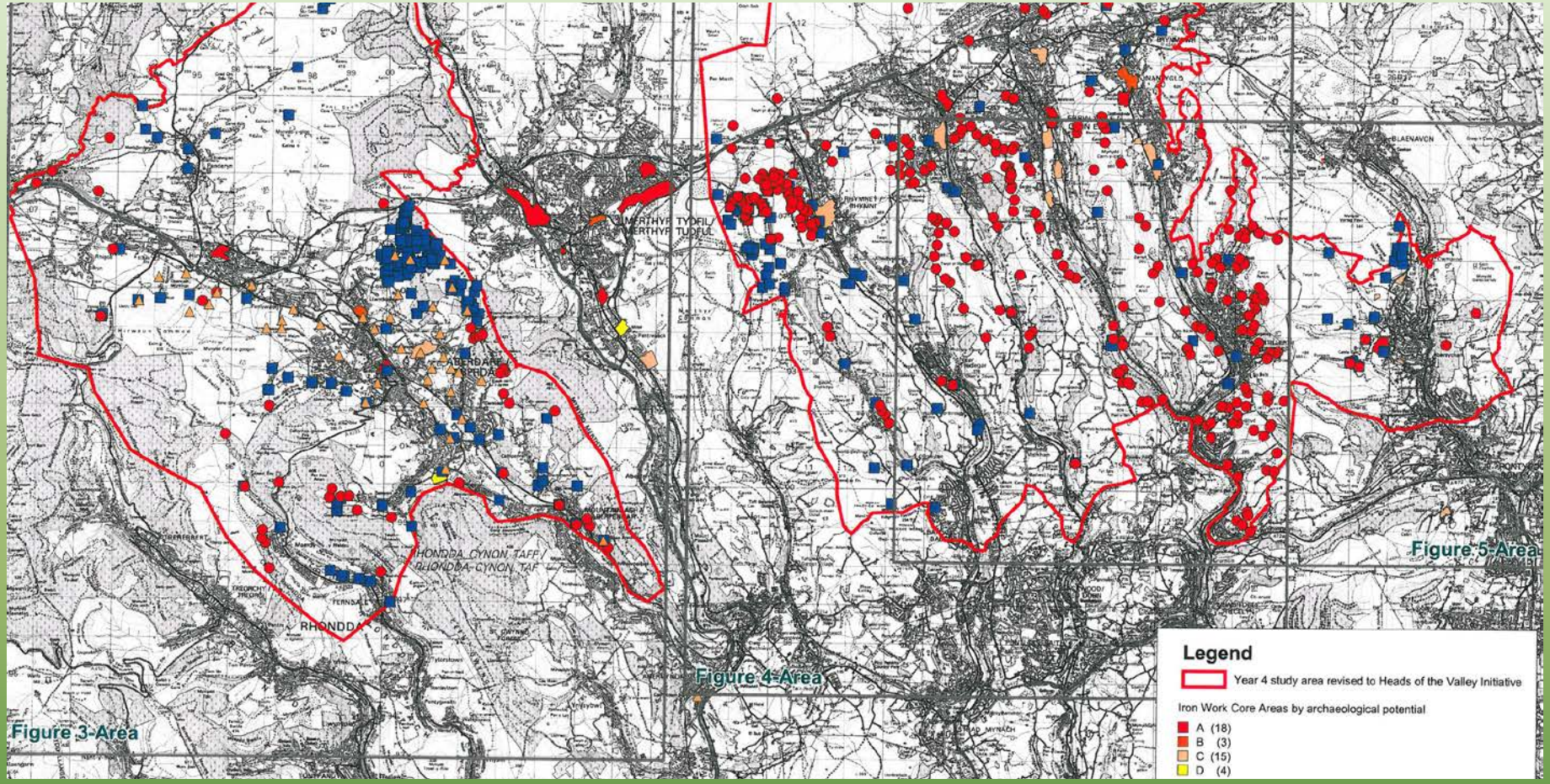
** Fruticose *Cladonia potentosa*

** Foliose *Peltigera membranacea*

Crustose *Baeomyces rufus*

Background

- Lichen communities span almost all of Globe's climatic conditions.
- Reported universally as early colonists of mine spoils.
- Considered in UK to be of ecological and scientific significance >> have own BAP.
- Examples have been designated as protected nationally important sites (SSSI), and local sites (SINCs) – both planning consideration.
- South Wales stands out with its landscape scale of coal spoil tips, but a declining asset.



Extractive landscape of C19th tips

Lichens on Coal Spoil – Study

Methodology

Species/Vegetation Traffic Light System – Miller et al, 2007

To assess the conservation importance of a site, the following was then applied:

1. Presence of any of the characteristic coal-waste plant species? - **yes or no**
2. Presence of clearly developed lichen heath? - **yes or no**
3. If **yes** to 1 or 2, is a range of species (of fruticose (*Cladonia sp*) or terricolous foliose lichens (*Peltigera sp*) and/or characteristic coal waste species (see above list) present? - **yes or no**

If all answers are **no or yes** to only one question, then the site is likely to be of *low conservation* interest, or if answer is **yes** to two questions, site is likely to be of *medium conservation* interest, but if answer is **yes** to three questions the site is probably of *high conservation* interest.

Legacy Coal Spoil Tip

- 13ha area with cluster of 93 mid-C19th tips.
- 49 lichen species + 4 lichenicolous fungi.
- *Cladonia sp* predominant forming carpets.
- Successional community types from early bare spoil crustose communities to species rich lichen heath types to species poorer heathland and grassland late stages.
- Persistence due to arrested succession to heath, scrub and woodland by low levels of grazing by cattle and erosion of steeper sided tips.

Crustose *Baeomyces rufus*

Species rich fruticose lichen assemblage

Later succession to grassland or heathland

Active Mine Spoil

- Nant Helen Surface Mine Site
- Comprising: overburden mound (in place 20 years), 2 soil-forming material storage mounds (14-20 years), restored land on soil-forming material
- 57 lichen species + 3 lichenicolous fungi
- *Cladonia sp* predominant forming carpets
- Successional stages from bare ground communities through species rich assemblages to species poor heath/grassland later stages.

Aerial photograph of Nant Helen Surface Mine © Bing

Crustose *Dibaeis baeomyces*

Species rich fruticose lichen assemblages

Later succession to grassland or heathland

Comparison of old and new sites (1)

Both Legacy Tips & Nant Helen have presence of:

- 'coal-waste' species *sensu* Miller *et al* (2007)
- developed lichen-heath
- range of fruticose and foliose lichens

Both are of high conservation interest and qualify as Priority BAP Habitat (open space-disturbed land)

Comparison of old and new sites (2)

- 4 characteristic 'coal waste' lichen species in common (*B. roseus, C. cervicornis, C. portentosa, Peltigera sp.*)
- 27 lichen species in common & 52 different species
- Active mine site notable lichen flora because of the occurrence of two S42 BAP species – *Cladonia macrophylla* & the lichenicolous fungus *Syzgospora physciacearum*

Lichen flora on abandoned mine sites

Not new observation –

- Lawrey and Ruddolph, 1975
- Goodman and Bray, 1975
- Hedin, 1988
- Prach, 2011
- Middleton & Lunn, 2001

Lichen flora at other active mine sites in South Wales

- Selar – overburden (1) mound >> 90ha
- East Pit– overburden (2) mounds >> 182ha
- Margam– overburden (2) mounds >> 78ha

- Fos-y-fran >> ??
- Other mining schemes >> ??

Potential >> 3.5km^2

Aerial photograph of Selar Surface Mine © Bing

Overburden Mounds at the Selar Surface Mine

Lichen Heath developed on overburden at Selar

Fruticose lichen assemblage

Aerial photograph of Nant Helen Surface Mine © Bing

Aerial photograph of East Pit Surface Mine
© Bing

Aerial photograph of Margam Surface Mine © Bing

Surface Mining & Conservation of Lichen Heath

- The purpose of this paper was answer the question “does the surface mining of coal have a role to play in the conservation of lichen heath habitat?” – **The Answer is YES**.
- Active surface mines have similar and equally important assemblages to those on legacy sites that are now regarded as being of conservation importance.
- Dispelling the myth that important assemblages take decades if not centuries to develop.

Contribution to Biodiversity Programmes

- Contrary to popular belief, operational sites can be a net contributor to national & local (Open Habitat-Coal Mine Spoil) BAPs.
- Current stock of Mine Spoil BAP Habitat declining with predicted extinction within 50 years.
- Long-term overburden mounds have potential to support replacement communities. Estimated 3.5km2 in South Wales alone. As little as 0.25ha qualifies as contribution to UK target.

Strategic & Planning Considerations

- Planning Authorities & Conservation Regulators need to realise the strategic conservation value of long-term overburden mounds for lower plant communities
- The occurrence of lower plant communities on prospective sites should not be seen as a barrier to mining given their ability to re-colonise rapidly.

Restoration Practice

Reliance either –

- Laissez faire >> natural colonisation
- Facilitation of natural colonisation – eg *Dryas*
- Introduction of propagules to 'seed' community

Avoiding dense competitive higher plant cover – unless being allowed to degenerate

Case for monitoring & review to create scientific evidence-base practices

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The opinions expressed are solely the author's