PART TWO DESCRIPTION

5.0 THE RESOURCE: PHYSICAL

5.1 Geology and Geomorphology

5.1.1 Landform

Approximately 1 kilometre upstream of Hell Wath, the River Skell emerges from the narrow valley in Studley Royal Park (the 'Valley of the Seven Bridges') and emerges into an open area consisting of undifferentiated fluvio-glacial deposits. The river has cut a series of channels through this material to form the shallow valley occupied by Hell Wath Local Nature Reserve. Abandoned meanders are discernable at Grid Reference . The river has eroded much of the drift material in its course through Hell Wath and the Lower Magnesian limestone is clearly visible.

5.1.2 Solid geology

The solid geology of the area is still under investigation by Field Staff of the British Geological Survey (British Geological Survey 1984). Figure 3 illustrates the extent of information currently available.

Permian strata

Lower Magnesian Limestone outcrops at Hell Wath at Grid Reference SE 300701 where it forms a meander bluff. The rock is composed of dolomite, dolomitic limestone and beds of mudstone.

Elsewhere in the vicinity of the site the Lower Magnesian Limestone is overlain by the Middle Marl (reddish-brown calcareous mudstones), the Upper Magnesian Limestone (thinly bedded dolomitic limestone) and the Middle Marl (reddish-brown calcareous mudstones).

5.1.3 Drift deposits

The information is represented in Figure 5. Apart from the results obtained from an analysis of an exposure in a band of Fluvioglacial Terrace deposits adjacent to Hell Wath (Grid Reference 3070) no detailed work has been carried out by the British Geological Survey on the structure of either alluvial deposits or undifferentiated river terrace deposits at Hall Wath.

The fluvioglacial deposit is composed (British Geological Survey 1984) of carboniferous sandstone (presumably of Pennine origin) and magnesian limestone forming a clayey gravel.

5.2 Soils

The soils at Hell Wath fall into two main groups reflecting the composition of the parent material (Bills et al 1988). A full account is contained in Appendix 4 together with a plan showing distribution of soil types at Hell Wath.

Soils formed over alluvial deposits

These are much distributed by quarrying and other activities possibly associated with occupation by the army. The soils are characterised as freely-draining brown earths. They are similar to the Wick series of soil defined by the Soil Survey of England and Wales.

Soils formed over undifferentiated river terrace deposits

These are heavier-textured but freely-draining. They are characterised as a typical brown calcareous alluvial soils similar to the Ure Series defined by the Soil Survey.

5.3 River

The Skell is a major tributary of the river Ure. It disappears into a swallow hole approximately 1 kilometre upstream of Hell Wath under summer flow conditions. The relationship between groundwater and surface water flow in this area is imperfectly understood (National Rivers Authority 1989) and it is possible that the flow through Hell Wath could be derived from springs at Grid Reference SE 293700 immediately to the south west.

The Skell is classified as Water Quality Class 1A. Details of chemical composition, pH and biological oxygen demand are contained in Appendix 5.

6.0 THE RESOURCE: BIOLOGICAL

6.1 Vegetation

6.1.1 Grassland

Grassland covers more than 70% of the Hell Wath. A plan showing the main vegetation types is represented in Figure 5. Until approximately 11 years ago the grassland was fenced and grazed. The abandonment of grazing has resulted in a rank tussocky sward exceeding 80 cm in height in July with a deep mat (100-150 mm) of dead vegetation at the base. Scrub (Cretageus monogyna and Prunus spinosa) is encroaching into the grassland.

Survey work (Burgess et al 1989a) following the National Vegetation Classification has characterised the grassland as broadly mesotrophic or neutral, dominated by grasses with associated herbaceous dicotelydons but lacking strong calcicole or calcifuge elements. A summary of the results is contained in Appendix 6. There are two main comminities present in the site:

a) Arrhenatherum eliatoris coarse grassland (MG1). This is the dominant grassland plant community on the site. It is dominated by Holcus lanatus, Dactylis glomerata and Arrenatherum elatius. Other than grasses, species such as Plantago lanceolata and Rumex acetosa are also dominant. Lathyrus pratensis adds to the sprawling mass of vegetation by mid-summer.

Research into the occurance of this community elsewhere (Rodwell 1986a) suggests that this is archetypal unmanaged grassland which thrives on well-structured freely-draining mesotrophic soils such as those found over the alluvial deposits at Hell Wath. It is invasive and will spread into other communities unless management work is carried out.

The sub-community present at Hell Wath approximates to that defined Rodwell as Centaurea nigra. This is richer and more varied than other Arrhenathereta, with Arrhenatherum elatius relatively less dominant.

b) Cynosaurus cristatus - Centaurea nigra meadow and pasture (MG5). This community is typically treated as a hay meadow and where this treatment is traditional (shut up for hay in March-April with aftermath grazing from August following the removal of the hay crop with fertilization in the form of a light manuring in spring only) results in a species-rich sward of high conservation value (Rodwell 1986a p. 117).

Hedera helix and Geum urbanum are also frequent. Eurynchium praelongum is common in the ground layer. Scrub (Cretageus monogyna/Prunua spinosa) is encroaching into the grassland. It is well-established and has shaded out grassland plants in many areas although a bryophyte layer persists. Evidence of succession to woodland is visible in areas where Fraxinus has begun to overtop the shrubs.

Woodland also occurs along the margins of the Skell. It is dominated by Alnus glutingosa.

The tree cover adjacent to the Skell-Laver confluence is probably of relatively recent origin having colonised disturbed ground abandoned by the military after the 1918 war. Cretageus is a dominant species here and there is a marked absence of canopy trees.

6.1.4 Riverine vegetation

No survey work has been undertaken on aquatic or emergent plant species. Mimilus glutatus is conspicious on rocks in midstream.

6.2 Fauna

6.2.1 Birds

Surveys by several individuals (Appendix 9) confirm that Hell Wath supports a range of breeding passerine species (resident and migrant) as well as predatory species such as Kestral, Sparrow Hawk and Tawny Owl. Kingfisher, Dipper (breeding) and Heron are present on the Skell.

6.2.2 Mammals

The presence of Bank Vole (Clethrionomys glareolus) and Wood Mouse (Apodemus sylvaticus) was confirmed by a survey undertaken in December 1988 (Derbyshire et al 1988 Appendix 10). The prescence Field Vole (Microstus agrestis) was deduced from runs found in the dead mat of vegetation. Grey squirrel (Sciurus carolinensis) Mole (Talpa europea) and Rabbit (Oryctolagus carolinensis) have been noted on the site.

6.2.3 Invertebrates

A survey conducted by Crossley in 1989 (Appendix 11) concentrated in Diptera in order to make a preliminary assessment of the entomological value of the site in a limited time period. Evaluation is facilitated by readily available information about the status of these species contained in the Invertebrate Site Register produced by the Nature Conservancy Council (NCC 1989c).

At Hell Wath the sub-community approximates to Gallium verum (MG5 2). It exists at Hell Wath only in restricted patches over thin soils formed over undifferentiated river terrace deposits. The dominant grasses are Cynosaurus cristatus, Festuca rubra and Dactylis glomerata. Herb species include Trifolium pratense, Sanguisorba minor, Lotus corniculatus and Gallium verum. Briza media is also present.

6.1.2 Wetland

Wetland habitats are restricted in extent but are nonetheless of relatively high conservation value. They occur in three areas:

a) Seepages

These are located in the woodland adjacent to the confluence of the Skell possibly associated with Triassic deposits (Sherwood sandstone group). They are characterised by a distinctive vegetation including Geranium robertianum, Petasites hybridus, Hedera helix and Equisetum spp. Woody shrub cover is composed predominantly of sambucus nigra together with seedlings and saplings of canopy species such as Acer psuedoplatanus and Fraxinus excelsior.

b) Wet grassland

The site of the former pond supports a range of wetland plant species including Phalaris arundinacea, Equisetum sylvaticum, Mentha aquatica and the locally uncommon Ophioglossum vulgatum (Appendix 7).

c) Carr

An area of woodland bordering the Skell adjacent to the Skell Laver confluence constitutes a distinctive vegetation type. It is dominated by Alnus glutinosa. The field layer is virtually obscured by a mass of Petasites hybridus from early summer, although Campanula latifolia, Aegepodium podagraria, Polygonum bistorta and Glandulifera impatiens occur on the margins.

6.1.3 Woodland and scrub

Broadleaved woodland and scrub covers approximately 30% of Hell Wath. Survey work (Burgess 1989b) following the National Vegetation Classification suggests that the woodland can be classified as Fraxinus excelsior - Mercuralis perennis - Acer campestre woodland (Geramium robertianum sub-community). A summary of the results is contained in Appendix 8. The dominant tree species are Ulmus glabra (all mature specimens are now dead although there is still some re-growth from the bases of the trees) Fraximus excelsior and Acer psuedoplatanus. Fagus sylvatica (presumably planted) is also common. Cretageus monogyna and Sambucus nigra are common understorey shrubs. The field layer is dominated by Mercuralis.

The results of the survey revealed the presence of several nationally rare species with British Red Data Book status (RDB2 and RDB3 plus Notables). A range of regionally-uncommon species were also identified at Hell Wath. All these species are associated with wetland habitats.