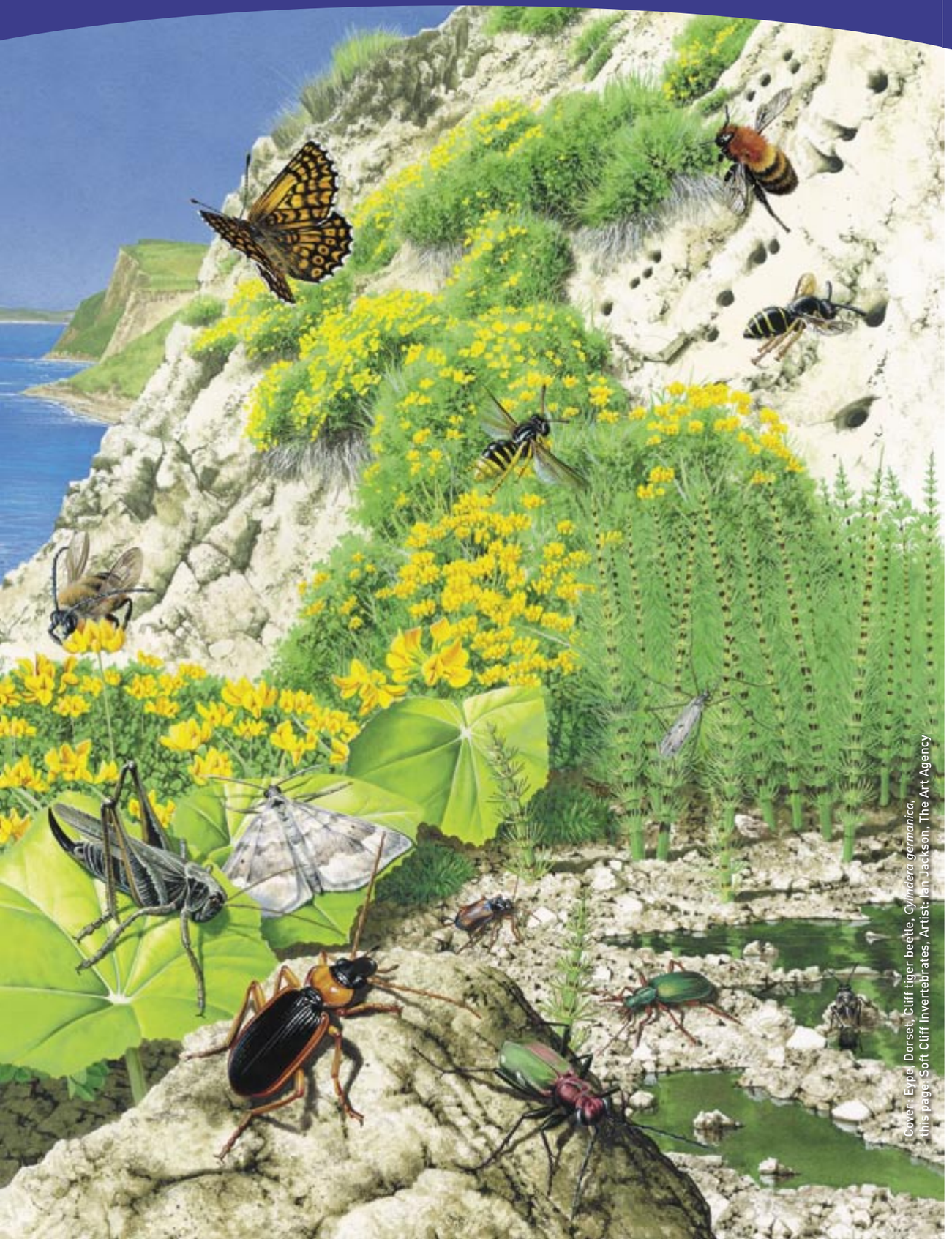
buglife
The Invertebrate Conservation Trust

MANAGING COASTAL SOFT CLIFFS FOR INVERTEBRATES

SUMMARY REPORT

MAY 2007



Cover: Eype, Dorset. Cliff tiger beetle, *Cylindera germanica*, this page: Soft Cliff Invertebrates, Artist: Ian Jackson, The Art Agency

FOREWORD

I have a soft spot for soft cliffs. They form some of our country's most scenic coasts and have a rare quality of being wild and natural. For thousands of years these cliffs have been actively shaped by the same processes of weathering, hydrology and sea erosion that are still active today. This is one of the few habitats in the UK where pioneer communities of invertebrates have been able to survive without disruption by man.

It is perhaps nearly 60 years ago that I first visited Barton cliffs as a child, amazed that the seaside could look so primeval. I was to become a geologist in the Nature Conservancy, presenting at a public inquiry the case against the erection of coast protection on this geological Site of Special Scientific Interest of international importance: we won that round. I then became responsible for invertebrates in the re-named Nature Conservancy Council: some years later I went back to Barton cliffs to investigate the insects and found that much of the cliffs had been drained, terraced and defended from the sea. We can never assume wild places and their invertebrate fauna will remain natural.

As both a geologist and an entomologist, the threats were all too obvious and the solutions had to be more than just aiming for a natural look to the cliffs. In addition to the threat from coast protection, it has become clear that cliff top habitat quality, and restoration of cliff top herb-rich grasslands are a key factor in conserving soft cliff invertebrates. Naturalness of cliff and cliff top contribute to high quality landscape for tourism, and an opportunity for people to appreciate coastal wildlife.

We are very grateful to The Esmée Fairbairn Foundation for its grant to support our three year project. This report focuses on the resource and how to provide for its future. We believe it should be an essential context document in coastal planning, water resource planning and in cliff top improvement for tourism, and sets a new basis for informing conservation policy.

A. E. Stubbs

Alan Stubbs, Chairman, Buglife

Introduction

Coastal soft rock cliffs and slopes are home to many rare insects, spiders and other invertebrates. This habitat is not just important for individual species, soft cliff sites also support an incredible abundance and diversity of invertebrates.

Soft cliffs have been rather neglected by naturalists and conservationists in the past, perhaps due to a lack of impressive sea bird colonies or because of accessibility issues. Many nationally important sites have been damaged or destroyed through coast protection works or inappropriate management of cliff tops.

This summary of the Buglife report "Managing Coastal Soft Cliffs for Invertebrates" describes the importance of coastal soft cliff sites for invertebrate conservation in the UK, identifies current and future threats to soft cliff sites, and provides management guidance for protecting and enhancing the invertebrate faunas of soft cliff sites. The full report provides further detail plus regional gazetteers and specific site management recommendations. It is intended to be an essential resource for coastal planners, conservation practitioners and land managers.

Porth Neigwl on the Llŷn Peninsula is the most important site in Wales for soft cliff invertebrates. It is one of only two sites in the UK that support populations of the endangered mason bee Osmia xanthomelana.

WHAT IS A SOFT ROCK CLIFF?

Coastal soft cliffs are cliffs in rocks that are poorly resistant to the natural processes of erosion that shape our coasts. These cliffs are formed of rocks that have little resistance to erosion such as clays, friable sands, shales and glacial deposits, contrasting with much more resistant 'hard' rocks. The cliffs are subject to frequent slumps and land slips caused by erosion by the sea, erosion by the rain, storms, and groundwater percolating through the cliff. Soft cliffs erode more quickly than hard cliffs and often have shallower gradients which allow far greater colonisation of vegetation and development of a wider range of habitats.

Unprotected soft rock cliffs are a scarce resource in the UK and are concentrated in England and Wales, which are estimated to have lengths of 256 km and 101 km respectively. Far shorter lengths of soft rock cliffs occur in Scotland and Northern Ireland. The UK holds a significant proportion of the habitat in north-western Europe. Some of the richest sites for invertebrates are the landslips along the coasts of Dorset and south Devon, the Isle of Wight, and the Gower and Llŷn peninsulas in Wales. These areas have considerable additional interest in their geology, geomorphology and scenery, exemplified by the recent designation of the Dorset and East Devon Coast World Heritage Site. We have identified many sites around the UK as being of national or international importance for nature conservation.

UK coastal soft cliff sites are concentrated in England and Wales.

Black Ven in Dorset is one of the most extensive landslip systems in Europe, it is also one of the UK's most important invertebrate sites.

Soft cliff biodiversity

Coastal soft rock cliffs and slopes support rich invertebrate assemblages and are a refuge for many rare species. In fact the main biodiversity interest of soft cliffs is their invertebrate faunas. 29 invertebrate species are found only on soft rock cliffs in the UK, of these, 22 are Red Data Book species. Alongside those species restricted to soft cliffs, there are at least another 75 invertebrates that have a strong affinity to the habitat. Well represented groups are the Hymenoptera (bees and wasps), Coleoptera (beetles), Lepidoptera (moths and butterflies), and Diptera (flies).

The importance of coastal soft cliffs for invertebrates hinges on their capacity to provide a historical continuity of micro-habitats rarely found with predictability elsewhere. Pioneer ecological conditions and other micro-habitats provide ideal conditions for a range of species. The unstable nature of soft cliffs and slopes constantly creates bare ground and suppresses ecological succession. Whereas in other situations herb-rich pioneer plant communities are ephemeral features – they naturally progress into closed grassland followed by scrub – the instability of soft cliff slopes suppresses this change maintaining a continuity of early successional vegetation.

Bare ground is a key soft cliff habitat which offers nesting sites for burrowing bees and wasps, hunting grounds for visual predators such as ground beetles and the Cliff tiger beetle *Cylindera germanica*, warm basking areas allowing thermophilic (warmth-loving) species to remain active in cooler conditions, and germination sites for wildflowers.

SOFT CLIFF BIODIVERSITY

Where cliffs are colonised by plants, pioneer plant communities rich in wildflowers such as Colt's foot (*Tussilago farfara*), Common Bird's-foot Trefoil (*Lotus corniculatus*) and Wild Carrot (*Daucus carota*) often dominate. These plant communities provide valuable nectar and pollen sources for bees and other insects. The plants are also the food plants of phytophagous insects (such as the weevil *Baris analis*) and their predators, including many of the solitary wasps that nest on soft cliffs.

Hydrological features such as freshwater seepages and reedbeds accommodate invertebrates with aquatic stages in their life cycle including water beetles, craneflies and soldierflies; and provide food plants and refuge for insects with specific associations with aquatic plants. Seepages and pools provide wet muds that are required by many species of bees and wasps for nest construction, these include the mason bee *Osmia xanthomelana* and Black-headed mason wasp *Odynerus melanocephalus*.

On most soft cliff sites there are a range of these micro-habitats, plus others such as calcareous grassland and scrub. Habitat variation on a very small spatial scale can produce an incredibly complex environment in terms of temperature, exposure, vegetation type and structure, stability, substrate compaction, and water availability. It is often not the presence of one habitat feature but the juxtaposition of a range of micro-habitats that makes a site so important for a particular species. Invertebrate species often rely upon a range of habitat features to complete their life-cycles, if one piece of this set of requirements is missing then a site is not suitable for the species. For example, burrowing bees require friable materials in which to excavate nests, but also depend upon nectar and pollen sources in close proximity. Sites which provide a range of micro-habitats on a small spatial scale are able to support a great range of species.

The Glanville Fritillary butterfly ***Melitaea cinxia*** is confined to areas of short grassland on south-facing soft cliff slopes and chines on the Isle of Wight.

The Cliff tiger beetle ***Cylindera germanica*** is only found on the warm, south facing soft cliffs of Dorset, Devon and the Isle of Wight. The adults are fast running predators and can be seen running over bare ground or sparsely vegetated areas. The larvae are found in burrows in damp sand.

The ground beetle ***Nebria livida*** is found at the base of cliffs where it hides in cracks and under lumps of clay during the day, emerging at night to hunt. In the UK this beetle can only be found at a few eroding soft cliff sites on the Norfolk and Yorkshire coasts.

The apparent concentration of invertebrate biodiversity at soft cliff localities can be partly attributed to the loss of open habitats in the wider countryside through agricultural intensification. The capacity of soft cliffs to offer a continuity of such habitats with such predictability is increasingly rare in the landscape and soft cliffs offer a refuge for many once more widespread species.

UK Biodiversity Action Plan and site protection

Coastal soft cliffs are a key component of the UK Biodiversity Action Plan (BAP) Priority Habitat 'Maritime Cliffs and Slopes'. The main biodiversity importance of this habitat is often the invertebrate fauna. A number of UKBAP Priority species are dependent on the habitat, including the Cliff tiger beetle *Cylindera germanica*, the mining bee *Lasioglossum angusticeps*, the Four-banded weevil wasp *Cerceris quadricincta* and the Dotted bee-fly *Bombylius discolor*.

Many soft cliff sites have been given statutory protection as Sites of Special Scientific Interest (SSSIs), although the invertebrate interest of sites has not always been recognised. A number of sites have also been selected as Special Areas of Conservation (SACs) under the EU Habitats Directive.

MANAGING SOFT CLIFFS – THREATS, SOLUTIONS AND OPPORTUNITIES

Coastal soft rock cliffs and slopes are a habitat that, in the past, has been largely neglected. They are widely recognised for their geological or geomorphological interest and the majority are notified as geological SSSIs. However, their ecological importance, in particular their invertebrate interest, is less well known.

Coastal soft cliffs are amongst the most natural habitats in the UK, on many sites active human intervention or management is not required to maintain the habitat and species diversity. However, due to a lack of recognition for their nature conservation interest much of the UK resource has been altered or lost behind coastal protection schemes, or degraded through inappropriate management of cliffs and slopes and their immediate surroundings.

The main threats and management issues associated with coastal soft cliffs are:

- **coast protection and cliff stabilisation schemes**
- **loss of hydrological features**
- **insensitive cliff top management**
- **climate change.**

Coast protection at Overstrand, North Norfolk

Coast protection

The main threat to the invertebrate fauna of soft cliffs is the disruption of the natural processes of erosion and land slippage that maintain the habitats of vital importance to their survival. The ecological interest of a soft cliff is intrinsically linked to its rate of erosion. Too little erosion leads to the loss of bare ground and early successional habitats, and as the vegetation becomes more stable closed grassland and scrub develop. Too rapid a rate of erosion and there is little chance for an interesting fauna to colonise.

Coastal protection measures and cliff and slope stabilisation have destroyed and damaged both the ecological and geological interest of many sites around the UK and continue to pose a threat.

We recommend that the nature conservation interest of coastal soft cliffs is given full consideration in the Shoreline Management Plan (SMP) process where relevant. Any proposed changes to coastal management must be assessed in terms of their impact on soft cliff invertebrate assemblages. Where this data is not available invertebrate surveys must be included as part of an environmental assessment.

Threats to freshwater habitats

Attempts are often made to stabilise cliffs by altering natural drainage patterns. This can alter the way in which a cliff functions in a geomorphological sense which has a knock-on effect on the continuity and ecological quality of the soft cliff habitats. Altering drainage patterns also robs the cliff of its supply of freshwater, resulting in the loss of freshwater seepages and other hydrological features of high value to invertebrates. The abstraction of water inland can also reduce the supplies to the cliffs.

The disruption of water supply is recognised as a threat to the nature conservation interest of soft cliff sites. Water abstractions within the catchment of soft cliff sites should be assessed for their impact on soft cliff freshwater habitats.

The soft cliff weevil ***Baris analis*** is only found on slumping cliffs in Dorset and the Isle of Wight.

The mason bee ***Osmia xanthomelana*** uses wet mud and clay to construct its nests. This material is collected from freshwater seepages on the cliff slope.

Cliff top management

Insensitive cliff top management has been identified as a significant threat to soft cliff invertebrate faunas. Cliff tops can provide a range of resources for invertebrates of the cliff slope: wildflower-rich habitats can supply a source of nectar or prey, and suitable habitat can also provide ecological linkages between isolated or fragmented soft cliff sites. The nectar and foraging resources provided by cliff top habitats are of great importance where cliff erosion is rapid and where cliff slopes are unvegetated. The cliff top flora also has an influence over the vegetation of the cliff slope by acting as a major source of plant material such as seeds or when whole sections of habitat slump down the cliff slope.

However many soft cliff sites are being damaged or degraded through the insensitive management of cliff tops. On many sites arable agriculture, improved or overgrazed grasslands, or other land uses such as caravan parks extend to the cliff edge offering little semi-natural habitat for soft cliff invertebrates.

There remain many opportunities for enhancing and protecting sites through effective targeting of agri-environment schemes to revert arable and intensive grazing management of cliff tops to herb-rich semi-natural cliff top grassland. One approach is through the use of cliff top buffer strips designed to accommodate the natural retreat of the cliff top and promote the development of semi-natural vegetation. Buffer strips provide opportunities for combining new and improved coastal access for people with the enhancement of biodiversity on soft cliff sites.

Climate change

Climate change and associated sea-level rise are likely to impact on the ecology of coastal soft cliffs in the UK. Alongside a rise in average temperature the changes that have been suggested in future climate change scenarios are: a rise in sea level, changes to precipitation patterns, increased storm frequency and storm ferocity. The majority of impacts on soft cliff invertebrate assemblages identified are negative.

Sea-level rise and increased storminess will increase erosion rates and may alter the morphology of some sites. The destabilisation of slopes has the potential to damage many of our most important soft cliff sites. Changes in precipitation patterns put those invertebrate assemblages associated with hydrological features such as seepages at particular risk. As the climate warms there are likely to be changes to our soft cliff invertebrate fauna, with some thermophilic (warmth-loving) soft cliff specialists able to spread into other suitable habitats, while new colonists from the European mainland may first establish on southern soft cliff sites. However, in general the individual responses of invertebrate species to climate change scenarios are largely unknown and understudied. Shoreline management, including the management of cliff top habitats, must take climate change into account with respect to meeting biodiversity targets and maintaining the existing nature conservation resource.

The Long-horned mining bee ***Eucera longicornis*** was once widespread across southern England and Wales. Due to the intensification of management of the wider countryside this species is now heavily reliant on soft cliff sites. Bees need a source of nectar and pollen and often rely on cliff top habitats to supplement the wildflower resource of the cliff slope.

This summary report should be referenced as:
Whitehouse, A.T. (2007)
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