

**The wildlife and the geodiversity of the coastal and marine environment is an extremely important asset to the county. The range and complexity of coastal wildlife habitats in Dorset owe their existence to a rich geological and geomorphological setting. Climate and weather combine to maintain a variety of soils and exposures of hard and soft rocks, on which the wildlife habitats have evolved.**



### **Geology and Geomorphology**

The geology of the Dorset coast includes the Mesozoic and Cenozoic Eras of Earth history, a period spanning 250 million years.

West Dorset is formed from Jurassic sediments that provides exceptional fossil records. Here landslides provide an outdoor classroom for students but can also threaten coastal towns like Lyme Regis. Along the south Dorset coast, Jurassic rocks of the Portlandian supply the world with building stone and

Chesil Beach, protecting the The Fleet lagoon is one of the worlds finest barrier beaches and is of international importance for birds and wildlife.

The structural ridges and up turned strata of the Isle of Purbeck and the Weymouth anticline lead to a dramatic landscape. The Purbeck beds record the transition into the Cretaceous revealing dinosaur footprints and a fossil forest. In the east the cliffs at Redcliff in Poole Harbour to Highcliff include exposures through a very large delta.

This diverse geology gives rise to landforms which in turn provide us with a diverse geomorphology, range of soil types, natural landscape, biodiversity and wealth of nature. The importance of these features in Dorset is reflected in the designation of over half the county as Areas of Outstanding Natural Beauty (AONBs).

### **Geodiversity**

Geodiversity is the range of rocks, fossils, minerals, soils, landforms and natural processes that make up the Earth's landscape and structure. Geodiversity is seen across the landscape and in coastal cliffs, beaches, lagoons, quarries and river cuttings. It can

be protected for its intrinsic value, ecological value, scientific value, heritage value and educational value. Geodiversity links people, culture, landscape and biodiversity and it underpins all activities from farming to engineering, gardening to waste management, recreation to industry.

The complex and varied geology of the Dorset coast has led directly to the evolution and maintenance of most of the important wildlife habitats. This complexity continues below the low water line and is responsible for the rich variety of underwater habitats.

The geodiversity of the area, is just as important as wildlife and culture. Like biodiversity, geodiversity can be affected, both positively and negatively, by man's actions.

### **Issues**

One of the largest threats to the geodiversity along the coast is through the construction of coastal defences as these may interfere with natural processes and obscure the geological interests. The coastal towns are where people live, work, visit and discover the coast. With climate change, rising sea

levels and a predicted increase in stormy weather and winter rainfall, the conflict between coast defence and the protection of the World Heritage Site will only increase.

To address this issue careful choice of building stone and loose cobbles for coast defence structures can ensure the geodiversity of our coastline is maintained.

Also abandoned structures and materials can degrade the quality of the Site although they do not often destroy the interest. There are actions in the county to look at specific areas where abandoned structures may be cleared.

The Dorset Local Geodiversity Action Plan This action plan aims to draw together existing information and ongoing projects concerned with the geology, geomorphology, soils and landscapes of Dorset and the East Devon Coastal Corridor, and to initiate further actions that will lead to:

- The conservation and enhancement of the geological resource.
- Providing guidance to the planning authorities on sustainable policies in the geological context.
- Increasing appreciation and understanding of the geological heritage of the area.

[The Dorset Local Geodiversity Action Plan](#)

### **Landscape and Seascape**

Much of the coastline lies within areas of recognised landscape importance, and its visual appeal owes much to the maintenance of extensive areas of semi-natural habitat.

The uses, recreation (diving, angling, sailing and other water sports), tourism, quarrying and minerals extraction, shipping and ports and renewable energy. All create opportunities as well as imposing potential pressures on landscape character and some may have effects on views and panoramas.

[A Landscape and Seascape Assessment](#) for an area of the Dorset coast will take the form of a useable and accessible report, supported by GIS mapping, that will provide a sound evidence base to help inform a wide range of planning and management decisions.

[The Dorset Landscape Character Assessment](#) (LCA) is a detailed assessment of the character of the county. It works within the national framework of Countryside Character Areas and Natural Areas, identifying variations in landscape character at a sub-regional level. The purpose of it is to provide practical, readily accessible information and guidance which can contribute to the conservation and enhancement of the special characteristics of the county as a whole, and the distinctiveness of its individual character types. It provides an understanding on how the landscape has evolved

and helps in making informed decisions about how change in the future could be managed.

### **Dorset's marine and coastal biodiversity habitats and species**

#### **Maritime cliff and slope**

The cliffs and undercliffs of Dorset's coastline comprise soft and hard cliffs. They vary between massive vegetated landslides, high chalk cliffs and pinnacles, grey shales and clays, and sheer limestone faces and ledges. The habitats that develop on the cliffs and slopes are varied, and some of the most natural anywhere in the county. Cliff ledges provide important nesting sites for breeding colonies of birds: of particular note are the guillemot and puffin colonies on Durlston ledges. The coastal cliffs expose a complete section through the upper Jurassic to Cretaceous rock succession, which has earned the coast World Heritage Site status. They also expose the deltaic sequences of the tertiary between Canford Cliffs and Chewton Bunny

#### **Coastal Sand dunes**

Sand dunes are entirely a coastal phenomenon in Dorset. They comprise windblown sand formations that are both stable and shifting, and their associated slacks, grassland and scrub. The only significant sand dunes in Dorset occur at Studland in Purbeck, which comprise approximately 204 hectares of dune and associated habitat. Relict

dunes occur at Sandbanks, Hengistbury, Mudeford and occasionally on the cliff tops at Southbourne

### **Coastal Vegetated Shingle**

Shingle is defined as sediment with particle sizes in the range 2-200mm. Large shingle beaches where areas of shingle become stabilised and support vegetation are relatively few with Chesil Bank as an exceptional shingle structure. It is an internationally important breeding ground for Little Terns, areas may become colonised by specialist vegetation. Small areas of vegetated shingle also occur in Poole Harbour.

### ***Sabellaria alveolata* reefs**

*Sabellaria alveolata* reefs are formed by the honeycomb worm of the same name. Reefs are mainly found on the bottom third of the shore attached to a variety of hard or mixed substrates, with an adjacent area of sand for reef building. The reefs can increase the diversity of the site. As such they provide a biogenic habitat that allows many species to become established. Significant *Sabellaria spinulosa* reefs have been recorded 4 km east of Swanage pier.

### **Mudflats**

Mudflats are intertidal, soft sediment habitats created by deposition of silts and clays in low energy coastal environments, such as estuaries. Characterised by high biological productivity and

abundance of organisms, they provide important feeding and resting areas for migrant and wintering wildfowl. Extensive intertidal mudflats occur in Poole Harbour.

### **Coastal Saltmarsh**

Coastal saltmarshes are restricted to sheltered locations in estuaries, and the development of saltmarsh vegetation is dependent on the presence of intertidal mudflats. They are an important resource for wading birds and wildfowl. In Dorset, the largest area of salt marsh is found around Poole Harbour, with small stands by The Fleet (Weymouth) and in Christchurch Harbour.

### **Sheltered Muddy Gravels**

A coastal/marine habitat that can be subtidal and/or intertidal in nature and found in a variety of salinities. It consists of a variety of mixed sediments ranging from fine silt and mud to pebbles and cobbles.

### **Littoral Chalk**

Littoral and sublittoral chalk is a geological habitat. It is crumbly rock that is easily eroded. In Dorset this habitat occurs on coastlines formed of calcareous rock, including those areas of chalk subject to inundation by the tide. Littoral rock tends to be colonised by algae in wave-sheltered conditions, and by limpets, barnacles and mussels. Chalk and limestone can support rock-boring species. Littoral

rock habitats are widespread in Dorset, but vary in species richness depending on geology and wave exposure.

### **Saline Lagoons**

Saline lagoons are natural or artificial bodies of saline water wholly or partially separated from the adjacent sea. Lagoons are one of the priority habitats listed under the EC Habitats Directive. The Fleet is the largest saline lagoon in Britain. Sea water percolates through the shingle influencing the salinity along its length, and a low freshwater input results in saline conditions throughout most of the lagoon.

### **Seagrass Beds**

Seagrass (*Zostera* spp) is one of the few flowering plants adapted to living fully submerged in marine conditions. Seagrass beds develop in sheltered intertidal and shallow subtidal areas on sand and muds. Extensive beds may form which stabilise the substratum and provide attachment for associated species and shelter for fish, and a food source for wildfowl.

### **Sublittoral Sand and Gravels**

This habitat is permanently submerged and the particle structure found in this habitat ranges from mainly sand, through various combinations of sand and gravel, to mainly gravel with occasional pebbles.

It supports a wide range of species, such as amphipods, bivalves and polychaetes.

### Tidal Rapids

Tidal rapids are 'strong tidal streams resulting from a constriction in the coastline at the entrance to, or within, an enclosed body of water'.

### Maerl Beds

Maerl is a collective term for certain coralline red algae that grow unattached on a clean, tidally swept seabed, and may accumulate to form maerl beds. Maerl is slow growing, but over long periods its dead calcareous skeleton can accumulate into deep deposits overlain by a thin layer of pink, living maerl. Maerl beds support a rich associated fauna. Maerl beds are found

### Sublittoral Chalk

Sublittoral chalk consists largely of rocky reefs which fringe the coastline, particularly adjacent to hard cliffs and shores. They support a range of plants and animals, depending on a range of factors such as turbidity of water, depth, tidal streams and substratum stability.

### Mud Habitats in Deep Water

Mud habitats in deep water occur below 20-30m in the UK's marine environment. The relatively stable conditions often lead to the establishment of communities of burrowing fauna. Of particular interest in Dorset, Portland Harbour contains

important communities of the fragile sea pen *Virgularia mirabilis*.

### *Mytilus edulis* beds

The species *Mytilus edulis* form mussel beds off Durlston Head and Portland Bill. They are biogenic reefs supporting a wide diversity of marine invertebrates and fish, and are therefore of high biodiversity importance locally.

### Brittlestar beds

Extensive brittlestar beds have recently been found approx 2 km off Kimmeridge Bay. The species forming these beds is *Ophiothrix fragilis* and the number of individual brittlestars involved in forming a bed is likely to be in the thousands. They are of high biodiversity importance locally.

## The Regulations

### International

- [Ramsar Convention on wetlands of International Importance](#) (For Dorset: Poole Harbour, Dorset Heathlands, Chesil & The Fleet)

### Europe

- [EC Directive 79/409 on the Conservation of Wild Birds: Special Protection Areas](#) – (For Dorset Poole Harbour, Dorset Heathlands, Chesil & the Fleet)

- [EC Directive 92/43](#) on the Conservation of Natural Habitats and of Wild Flora and Fauna: Special Areas of Conservation - Dorset Heathlands; Dorset Heathlands (Purbeck & Wareham) & Studland Dunes; Isle of Portland to Studland Cliffs; St. Alban's Head to Durlston Head; Chesil & The Fleet; Sidmouth to West Bay; Poole Bay to Lyme Bay (marine) proposed
- EC Directive 83/337 on the Assessment of the Effects of Certain Public and Private Projects on the Environment
- SAC Management Plans

### National

- [Wildlife & Countryside Act 1981](#) (as amended) for Sites of Special Scientific Interest (SSSI) & National Nature Reserves
- National Parks & Access to the Countryside Act 1949 for National Nature Reserves and Local Nature Reserves  
<http://www.statutelaw.gov.uk/content.aspx?activeTextDocId=1151254>
- [Countryside and Rights of Way Act 2000](#)
- Natural Environment and Rural Communities Act 2007: Biodiversity duty,
- [Planning Policy Statement 9](#) (PPG9) Biodiversity and Geological conservation  
<http://www.communities.gov.uk/publication/s/planningandbuilding/planningpolicystatement9>

- [Marine and Coastal Access Act 2009](#) – developments in the marine environment in licencing, national and regional marine planning, introduction of Marine Conservation Zone networks, and inshore fisheries managed by Inshore Fisheries and Conservation Authorities.

### Sub Regional

- Marine Conservation Zone network planned at regional level: [Dorset Finding Sanctuary](#)
- County & [District Planning & Compensation Act 1991](#) requires structure, local and unitary development plans to include policies to protect the natural environment. A county-wide network of non-statutory Sites of Nature Conservation Interest (SNCI) has been established in Dorset and are managed by Dorset Wildlife Trust
- [Dorset Biodiversity Strategy](#) – sets out a programme of actions in a marine and coastal topic action plan to reverse the decline of biodiversity in Dorset has a marine strand to deliver the Dorset BAP targets.

### Dorset's Marine Wildlife Data Resource

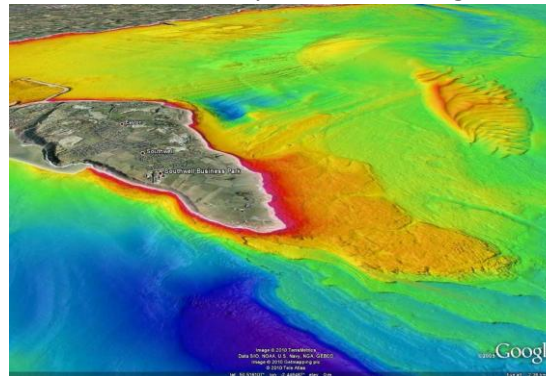
**The Dorset Environmental Records Centre** DERC have collected, managed and disseminated records of the wildlife and geology for the coastal zone (and the rest of Dorset) since 1985. Marine records have

been collated on to Marine Recorder since 1995 including data from oil exploration environmental surveys of the early 1990s.

**Seabed Mapping** - In 2008, the first large area, high resolution seabed survey in Dorset took place between Abbotsbury and Swanage, producing a detailed seabed habitat map. Seabed data is available through DERC, C-SCOPE and the Channel Coastal Observatory.

### Climate change & ocean acidification

Warmer seas are likely to lead to changes in the



distribution of species and habitats – some changes which could be attributed to warming have already been observed – such as the spread of sea bream into Dorset waters. Sea level rise and increased storminess could affect intertidal and coastal

habitats, especially where there is little room for habitat re-alignment.

Increased atmospheric CO<sub>2</sub> is taken up by seawater – this causes an increase in acidity by a simple chemical reaction. The full implications of this change are not yet understood, but a change in seawater chemistry could alter the behaviour and survivability of some marine species.

### Who's doing what for marine biodiversity in Dorset?

- [Dorset Seasearch](#) encourages voluntary recording of marine life by recreational divers, and organises an annual survey and training programme.
- [The Purbeck Marine Wildlife Reserve](#) is managed by a partnership of stakeholder groups and aims to protect the unique environment of the area through education, awareness raising and research activities.
- [Dorset Coastlink](#) is a network of the principal coastal visitor centres in Dorset. It provides an opportunity to promote co-ordinated marine interpretation and research.
- [Dorset Marine and Coastal Biodiversity Working Group](#) is a sub-group of the Dorset Biodiversity Partnership Management Committee, formed to help the delivery of targets in the Dorset Biodiversity Strategy.

- Dorset Wildlife Trust's Living Seas project contributes to a return to a healthy marine environment which is rich in species and a wide range of habitats, and which provides sustainable livelihoods for those that rely on the resources or services it can provide.
- Shoreline Management Plans
- World Heritage Site Management Plan

***Also at a regional level -***

- The Southwest Biodiversity Implementation Plan sets out a framework of policy, priorities and actions to assist in a more integrated approach to delivering biodiversity aims, with the coastal and marine environment identified as a key programme of work.
- [Climate SouthWest Partnership](#), focuses on climate change impacts and practical adaptation responses in the marine, coastal and terrestrial environments.

**Contributors to this paper:**

P.Tinsley – Dorset Wildlife Trust

S.Schriven – Jurassic Coast team