

Rocky foreshore

(Reviewed in 2004; updated 2007)

1. A Definition

The term 'rocky foreshore' covers areas of bedrock, their geological and geomorphological features and their associated fauna and flora, typically between mean high water and mean low water marks. It also includes any higher rock surfaces which are subject to marine action, for instance during spring tides and storms and the associated "Splash Zone" immediately above high water mark, the upper limit of existence for some intertidal species. Where present, soft-sediment beach systems or coastal cliffs may also define the upper or landward limits of the habitat. Man-made structures such as piers and breakwaters are included in this plan as they often mimic the physical characteristics of natural rocks on the foreshore.

The rocky foreshore habitats of Devon are among the richest in Britain, and are home to a diverse and fascinating range of animals and plants. The warm waters that bathe Devon's coast enable animals and plants of a more southern distribution and which are found in few other places in Britain to survive here.



The geology of Devon is one of the most interesting, varied and complex in Europe; indeed Devon is the only county in Britain to give its name to a geological system of world-wide recognition - the Devonian. From the early Devonian Period, around 400 million years ago, there is only one major geological time period not to have proven deposits in the County, the Neogene. The great variety of environments and processes which have taken place over this long interval have produced the wonderful diversity of rock types and fossiliferous deposits we see today.

Rocky foreshores form part of Devon's prime geological resources, superbly exposing a wide range of different rock types and units representing most of the County's geological history. Not surprisingly, therefore, some of the key features of the Dorset and East Devon World Heritage Site in the County are rocky foreshore exposures. Such areas are swept clean twice a day by the

sea and although local sediment movement and marine growth may obscure some outcrops, rocky foreshores are maintained in an excellent condition for education and scientific research by natural processes.

Devon's coast is subject to widely different physical influences, and this is reflected in the physical and biological nature of the habitats. The rocky foreshore of the north coast, much of which is relatively inaccessible by foot, is exposed to the full force of westerly gales, and animal and plant communities that thrive there reflect these conditions. In contrast, much of the south coast of Devon is relatively sheltered from the prevailing winds (except in strong easterlies) and a more diverse assemblage of organisms can exist in this more benign environment.

2. Why an Action Plan?

There can be few other environments which receive as much attention from man as the rocky foreshore areas; they are used by holiday-makers - and biologists! - for rock-pool rambling, fishermen for bait collecting, wrinkle and mussel picking and sea angling, geologists for fossil-finding, and are subject to the threat of oil and other chemical pollution from accidental and intentional incidents. Coastal development including defence works may also pose a threat.

The rocky foreshore environments of Devon are indeed a valuable resource for education, recreation and commerce, and as such we must ensure that they continue to be cherished and conserved. Above all, raising awareness of the factors which can affect rocky foreshore areas – both adversely and positively – can help improve their condition by influencing the way in which visitors interact with them as well as reducing the risk of damage from engineering or other operations.

The Devon Biodiversity Action Plan (BAP) is an ambitious yet realistic vision for the conservation and enhancement of Devon's most important wildlife and geological features into the new millennium. This plan promotes a co-ordinated approach to the conservation of the rocky foreshore by means of local partnerships. It defines challenging conservation objectives, the actions that are required to achieve them, sets targets for their implementation and identifies the potential deliverers.

3. Characteristic wildlife

Examples of species distinctive to the habitat in Devon include:

- **Birds**: oystercatcher, *Haematopus ostralegus*
- **Fish**: leopard spotted goby, *Thorogobius ephippiatus*; Montagu's Blenny *Coryphoblennius galerita*

- **Cup Corals**: Devonshire cup coral, *Caryophyllia smithii*
- **Anemones**: beadlet anemone *Actinia equina*; snakelocks anemone *Anemonia viridis*; an anemone, *Isozanthus sulcatus*
- **Sponges**: *Hymeniacidon perleve*, *Dysidea fragilis*
- **Bryozoans**: sea mats *Scrupocellaria* spp., *Schizomavella linearis*, *Crisiidae* spp., *Bugula plumosa*
- **Crustaceans**: shorecrab *Carcinus maenas*; barnacles *Balanus* spp. *Semibalanus* spp., *Cthamalus* spp.
- **Molluscs**: limpets, *Patella depressa*, *P. aspera*; painted topshell, *Calliostoma zizyphinum*
- **Worms**: tubeworms *Spirorbis* spp.; honeycomb worm *Sabellaria alveolata*
- **Algae**: seaweeds *Laminaria digitata*, *Fucus* spp., *Cystoseira* spp., *Lomentaria articulata*, *Gastrodoxonium ovatum*, *Chondrus crispus*, *Corallina officinalis*

4. Special species

The following species of conservation concern are associated with rocky foreshore in Devon. Species marked (p) are 'Species of Principal Importance in England' (NERC Act, S. 41).

- **Mollusc**: native oyster (p)
- **Worm**: honeycomb worm (*Sabellaria alveolata*)
- **Cup corals**: gold and scarlet star coral
- **Anemones**: trumpet anemone
- **Birds**: turnstone, purple sandpiper

5. Special geodiversity features

Key Geological Features, including potential Global Geosites, well represented in rocky foreshore exposures in Devon include:

- Stratigraphical (Phanerozoic): Devon (marine) carbonates and clastics
- Permian-Triassic red-bed sequence
- Lower Jurassic, classic marine Hettangian-Toarcian
- Palaeontological: Early Jurassic marine reptiles and insects

- Geomorphological features, erosional and depositional processes, and landscapes: Erosional structure/lithology-controlled coast
- Historic, for development of geological science: Early Jurassic (Lias) vertebrate faunas
- *Structural: Variscan nappes and allochthon/ parautochthon of Devon and Cornwall

Other geological features are also well represented in rocky foreshore areas, including:

- Devonian Igneous rocks
- Lower Carboniferous stratigraphy and palaeontology (marine)
- Upper Carboniferous stratigraphy and palaeontology (marine and non-marine)
- Albian (upper Lower Cretaceous) stratigraphy and palaeontology (marine)
- Cenomanian to Maastrichtian (Upper Cretaceous) stratigraphy and palaeontology (marine)
- Quaternary glacial and periglacial deposits and landforms

6. Current extent

There are no figures currently available of the hectareage of rocky foreshore in the County, although Devon has approximately 4, 950 ha of intertidal land, a large part of which is rocky.

7. Current problems for rocky foreshore in Devon

Oil spills are a constant threat and can cause extensive medium to long term damage to foreshore biological communities. The cumulative effect of routine bilge emptying may result in significant amounts of oil polluting intertidal areas, although individual incidents usually go un-noticed. Chronic low level pollution from fuel and oil spillages during re-fuelling and engine oil changing is also a factor on some stretches of coast.

Anti-fouling treatments for boats may still be used on recreational craft. Such compounds are poisonous to marine life, and can cause local damage if they enter the coastal environment, as may happen during spraying down or scraping boat hulls before re-painting.

Pollution from sewage outfalls may be detrimental to intertidal life, although more information is needed on this topic. Certainly, sewage detracts from the enjoyment of human visitors to sites near raw sewage outfalls. It also can pose a very real health threat to site users, including educational groups. In recent years this problem has been gradually addressed by building sewage treatment works in coastal areas, as in Torbay, and water quality is improving.

Inappropriate management of coastal municipal sites, such as cleaning pedestrian routes with bleach, may affect areas of rocky foreshore. Similarly, other forms of run-off or other pollution derived from coastal development can locally become an issue.

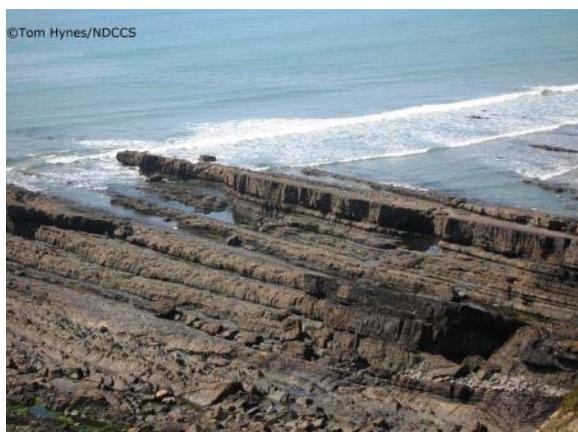
Sea defences affect the degree of exposure of intertidal areas to wave action, and as such play a role in determining the kinds of biological communities that exist. They also can directly or indirectly (e.g. by changing sediment movement patterns) lead to the loss of key geological exposures.

Shoreline developments of various kinds (piers, jetties, outfall pipes, etc) cause a fundamental change to intertidal environments, through direct loss of habitat or geological exposure, by contamination or by changes to sediment movement and other active coastal processes.

Recreation pressures may affect certain sites (careless rockpooling, pollution from lost fishing tackle, shellfish collecting) especially on Devon's south coast where sites are more accessible and visitors tend to be most concentrated. Issues concern both disturbance and contamination/ pollution.

Locally, rare mineral or fossil deposits can result in inappropriate collecting resulting in disturbance of and damage to key geological exposures (including the use of rock saws to remove specimens). Such sites may also be vulnerable to collecting by uninformed amateur groups. Such collecting offers no scientific or heritage gain, as the material is typically lost into a private collection or to the global marketplace. In certain circumstances the operation may also be illegal, especially in the context of a protected site.

Most geologists (including amateur), however, and geological societies and educational institutions now apply national guidelines for the responsible use of sites, including concerning sample collecting for educational and scientific purposes. Responsible site use such as this is beneficial to conservation and both raises awareness of broader issues concerning the habitat and improves the documentation and understanding of the features being studied.



Many new geological discoveries have been made in this way, although there is currently no centralised repository for the site and specimen records generated. As a result, key documentary information of potentially great value to conservation bodies, site managers and science is not being recorded. In addition, key specimens representing facets of Devon's rich geological heritage are being 'lost' as deposition in a Devon-based museum is not always encouraged or promoted. Conservation in a museological context is a natural extension of site-based conservation.

8. Recent changes in extent

The rocky foreshore is a largely immutable resource, excepting other in the very long term, where the effects of natural erosion may be detected)Changes to its quality and extent do occur, however, either naturally, as a result of storms or changes in sedimentation patterns, or due to human activity as outlined above. Loss of foreshore exposure and habitat is a typical consequence of coastal defence works and although losses may be small, cumulatively effects can become significant. Coastal works in east Devon at Sidmouth and west of Seaton have resulted in minor losses but no significant areas of rocky foreshore are known to have been lost in the County since 1998.

9. Current site protection

Large sections of the coast of Devon, including intertidal rocky foreshore areas, lie within geological or ecological SSSIs, including:

Axmouth-Lyme Regis NNR, Sidmouth to Beer Coast SSSI, Ladram Bay to Sidmouth SSSI, Otter Estuary SSSI, Exe Estuary SSSI, Dawlish Cliffs SSSI, Babbacombe Cliffs SSSI, Hopes Nose to Walls Hill SSSI, Meadfoot Sea Road SSSI, Daddihole SSSI, Roundham Head SSSI, Saltern Cove SSSI, Berry Head to Sharkham Point SSSI (and NNR), Froward Point SSSI, Hallsands to Beesands SSSI, Prawle Point to Start Point SSSI, Salcombe to Kingsbridge Estuary SSSI, Bolt Head to Bolt Tail SSSI, Erme Estuary SSSI, Wembury PointSSSI, Plymouth Sound, Shores and Cliffs SSSI, Westward Ho! Cliffs SSSI, Marsland to Clovelly SSSI, , Hobby to Peppercombe SSSI, Mermaid's Pool to Rowdens Gut SSSI, Fremington Quay Cliffs, Saunton to Baggy Point Coast SSSI, Mill Rock SSSI, Barricane Beach SSSI, Morte Point SSSI, Hele, Sampson's and Combe Martin Bays, West Exmoor Coast and Woods SSSI, Blackstone Point SSSI, Lundy SSSI (also an NNR/ MNR).

Lundy Marine Nature Reserve, the only MNR in England, affords statutory protection to intertidal and subtidal environments.

Plymouth Sound and Estuaries, Sidmouth to West Bay and Lundy are Special Areas of Conservation (SACs) under the EC Habitats Directive, The Exe Estuary is a classified Specially Protected Area (SPA) under the EC Birds Directive.

Sugar Loaf and Saltern Cove and the Kingsbridge Estuary are Local Nature Reserves (LNRs) and include rocky foreshore areas.

A number of County Geological Sites (CGS) have been established to conserve coastal exposures which include key areas of rocky foreshore exposure. The recent establishment of a database of CGS in Devon will ultimately facilitate their listing.

In 2001 the coastline from Orcombe Rocks, Exmouth, Devon and Studland Bay, Dorset was designated as the 'Jurassic Coast' World Heritage Site. It

represents one of the best exposed sections through the entire Jurassic System in the world, with contiguous Triassic and Cretaceous sequences respectively below and above; 185 million years of Earth History exposed along the 95 miles of coastline.

10. Current positive initiatives for rocky foreshores in Devon

The County Geological Sites (CGS) and County Wildlife Sites (CWS) schemes identify non-statutory sites of (at least) County importance for their geology and wildlife, and provide planning authorities with this information to steer development away from such sites or to ameliorate potential damage. Devon RIGS Group (see below) and Devon Biodiversity Records Centre co-ordinate the identification of CGS and CWS, respectively.

The Devon RIGS (Regionally Important Geological/Geomorphological Sites) Group promotes geological conservation, by working with local authorities, landowners and others, and provides advice, on request, on County Geological Sites and the management needed to retain or enhance their geological interest. The RIGS Group is undertaking detailed Local Authority surveys, those completed include: North Devon AONB, mining districts in West Devon, Torbay, Exeter, South Hams, East Devon, Teignbridge, Teign Estuary and Dartmoor.

The Ussher Society is a forum for presenting and discussing the results of geological research into Earth heritage sites in the South West of England. These results are published annually in *Geoscience in south-west England*.

The British Geological Survey has recently completed new surveys of parts of the County (including Plymouth and Torbay). New geological maps have been published, supported by descriptive memoirs (Plymouth) and a brief review (Torbay).

Devon Educational register of Geological Sites provides a web-based resource for educational groups and includes over 80 CGSs and SSSIs (www.devon.gov.uk/geology). A significant number of these sites include rocky foreshore areas.

Devon County Council and Natural England have supported Devon RIGS Group in the establishment of a database of County Geological Sites, including descriptions, maps and photographs. Some of this information is available via the newly established Devon RIGS website.

Torbay is now a 'European Geopark', a programme supported by UNESCO. Details of the English Riviera Geopark can be found here: www.englishrivierageopark.org.uk

The development of the UNESCO-supported Global Geosites initiative provides

a context within which the international importance of certain geological and geomorphological features of Devon's rocky foreshores can be independently demonstrated.

The Dorset and East Devon 'Jurassic Coast' World Heritage Site has implications for sites near the coast of East Devon and a Local Geodiversity Action Plan has been prepared.

EC Urban Waste Water Directive, which defines legal standards for waste water effluent from towns and cities, has led to improvements in the quality of water flowing over rocky foreshores in the County.

11. Biodiversity planning context

National BAP Context

Habitats of Principal Importance in England (NERC Act, S.41):

- Intertidal boulder communities
- Estuarine rocky habitats
- *Sabellaria alveolata* reefs

Current national BAP targets can be viewed on the [Biodiversity Action Reporting System](#) (BARS).

Regional BAP Context

Regional targets for priority BAP habitats can be found on the website of [Biodiversity South West](#).

Associated Action Plans within the Devon BAP:

- Rocky seabed
- Sea cliff and slope
- Estuaries
- Dynamic coastal landforms and habitats
- Pink sea fan

12. Biodiversity objectives and targets for rocky foreshore in Devon

Objective 1

Improve understanding and documentation of the rocky foreshore areas of Devon in terms of their distribution, the ecology of their fauna and flora, their geological features and the processes, including human-induced and natural, that affect them.

Targets:

- Establish a county geological records centre to gather and manage site records and reports.
- Encourage the reporting of new discoveries and deposition of important specimens at county-based institutions.

Objective 2

Ensure that damage to rocky foreshore areas as a result of human activities is minimised and develop mechanisms and methodologies which do not harm habitats or geological features or may even improve them.

Target:

- Ongoing.

Objective 3

Ensure the natural processes of erosion and sediment movement continue to operate on all areas of conservation interest, with due regard to essential coastal protection of settlements.

Targets:

- No new sea defences or upgrading of existing sea defences unless there is an overriding benefit to society in social, economic or environmental terms.
- Natural processes of erosion and sediment movement are restored to all currently defended localities, wherever possible and appropriate.

Objective 4

Foster continuing and increased understanding and awareness by

landowners and managers of management practices which encourage wildlife and maintain Earth heritage features on rocky foreshores.

Target:

- All landowners and managers are well informed about rocky foreshore nature conservation management needs by 2010.

Objective 5

Foster an increased understanding, awareness and enjoyment by all users of the intertidal environment of the importance of the habitat and its geological features the threats it faces and the ways in which damage to it can be prevented or ameliorated.

Targets:

- Provide information for visitors to all key sites of geological and ecological importance, including interpretation schemes, guides and web-based resources.
- Promote codes of good practice for visitors, including those using the geological resource

13. Wider benefits from pursuing these objectives

The pursuit of the objectives and targets set out in this Plan will not only benefit the biodiversity and geodiversity of the rocky foreshore. Conservation has wider benefits and advantages for society, by providing a resource which is the basis of many aspects of the local economy, and by adding to the quality of life of the people of Devon in ways which are beyond financial measure. Thus, enhancing a knowledge of, or interest in, bio- and geodiversity will also enhance the interests of society as a whole. Benefits could include an enhanced attractiveness of the coastal environment for recreation and tourism, thus benefiting local economies, an improved documentation of the species and geological heritage of coastal areas to inform decision making and a more sustainable use of natural resources, including shellfish.

Crucially, the conservation of geological materials, especially fossils and minerals, involves aspects of both site and specimen conservation. Specimen collecting is also an essential part of the scientific and educational process. In many cases, conservation on-site is also not an option as the natural processes of weathering and erosion and the risk of inappropriate removal

make it prudent to remove the specimen or specimens from the site on which it was found and place it in a secure location. Working with county-based museums will ensure that such material remains available for future study and display, including for raising awareness of Devon's rich geological heritage, thereby fulfilling a number of the key functions of such institutions.

14. Priority or indicative actions for rocky foreshore in Devon

Action	Key Partners
1. Ensure that oil and gas license conditions are influenced by the requirements of nature conservation during normal operations and in emergencies.	DTI
2. Seek to ensure that leisure and commercial boat maintenance laws prevent chemical pollution (including antifouling paints and oil) from entering the coastal environment.	EA; HrAs; LAs
3. Continue to promote initiatives for reduction of minor pollution incidents including municipal cleaning operations adjacent to tidal rocks.	LAs; EA
4. Ensure that there are ecologically benign cleanup policies within oil spill contingency plans.	LAs; EA; EN; DWT; DSFC
5. Supply Planning Authorities with up to date information and advice on nature conservation issues relating to shore-side development and other potentially damaging activities so that informed decisions may be made.	LAs; NE; EA; DWT; DBRC
6. Promote increased understanding and awareness among the public of the value of the intertidal environment by providing interpretation facilities, literature, curriculum based schools information and events. To include impacts of rockpooling, invertebrate collecting (e.g. winkles) and geological specimen collecting (including codes of good practice)	DWT; NE; LAs; NT; DRIGSG
7. Continue to survey and monitor key rocky foreshore habitats.	NE; DWT; DBRC
8. Contribute to research programmes which strive for a better understanding of natural and human processes that impact upon rocky foreshore habitat.	Universities; NE; DEFRA; HrAs
9. Complete CGS/ RIGS assessments and designation for all remaining intertidal areas, including within Local Authority areas where reports exist.	DRIGSG, LAs
10. Establish a geological records centre for Devon and promote the reporting and recording of new finds.	DRIGSG, museums, universities, DCC, landowners including NT

Rocky Foreshore Action Plan Champion - **not currently assigned**

Abbreviations used in text and table

BAP Biodiversity Action Plan
 CGS County Geological Site (= RIGS/ Regionally Important Geological / Geomorphological Site
 DSFC Devon Sea Fisheries Committee
 DRIGSG Devon RIGS Group

DTI	Department of Trade and Industry
DWT	Devon Wildlife Trust
EA	Environment Agency
HCS	Heritage Coast Service
HrAs	Harbour Authority
LA	Local Authority
DEFRA	Department of Environment, Food and Rural Affairs
NE	Natural England
NT	National Trust
SAC	Special Area of Conservation
SPA	Specially Protected Area
SSSI	Site of Special Scientific Interest
VMCA	Voluntary Marine Conservation Area