CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

SITE OF SPECIAL SCIENTIFIC INTEREST CITATION

PEMBROKESHIRE **DE PORTH SAIN FFRAID / ST BRIDE'S BAY SOUTH**

Date of Notification: 2002

National Grid Reference: SM 761092 - 855128

O.S. Maps: 1: 50, 000 Sheet Number: 157
1: 10, 000 Sheet Number: SM 81 SW
SM 71 SE
SM 70 NE

Site Area: 133.9 ha

Description:

The site is of special interest for its rocky and sandy shore marine communities, including rock pool, cave and overhang communities, for grey seals *Halichoerus grypus*, ancient sessile oak woodland and its geology. This site stretches for approximately 13 km from Martin's Haven in the south-west, to Little Haven in the north-east, and is located approximately 10 km south-west of the town of Haverfordwest. This indented coastline encompasses rocky platforms with steep vertical cliffs ranging in height from 20 to 70 metres, interspersed with bays and beaches consisting of boulders, cobbles, shingle and/or coarse sand.

The coastline between Musselwick Sands and Little Haven displays a series of complex folds and faults in Palaeozoic sedimentary rocks, except between Foxes' Hole and Musselwick Bay where there is a fault-bounded block of Precambrian igneous rock. The structural features were mainly formed 300-270 million years ago. Some of the faults are, however, the result of rejuvenation of much older, deep-seated fractures in the crust. Soils along the cliff top are mostly of acid brown earth type, loamy in character, with gleying in waterlogged areas. On the outcrop of the igneous rock they are often more peaty, almost podsolic, in nature.

GEOLOGY

Variscan Structures

Musselwick Bay: Cliff and foreshore outcrops provide critical exposures of the Johnston Thrust, one of the most important structures formed during the Variscan mountain building episode (orogeny) in South Wales. The Johnston Thrust is a major, gently inclined plane of dislocation. Beneath this thrust, sandstones and shales of Carboniferous age have been deformed into tight, inclined folds and dissected by a series of minor thrusts and faults. Above the thrust plane are igneous rocks of the Precambrian Johnston Group which are much older than the Carboniferous rocks beneath and formerly were part of the 'basement' upon which the Carboniferous and other Palaeozoic rocks were deposited. During the Variscan Orogeny, intense compression caused the

crust to distort and fracture producing deep-seated, flat-lying dislocations such as the Johnston Thrust. Continued compression caused massive displacements on such thrusts, resulting in the stacking of older and formerly deeper rocks on top of younger strata. This is a nationally important locality for the study of the Variscan Orogenic Belt.

Mill Haven: This site provides excellent exposures of the Benton Fault, an important crustal dislocation thought to have played an active part in the Upper Palaeozoic evolution of this region for perhaps 200 million years. The fault currently separates Devonian Old Red Sandstone strata from much older Precambrian igneous rocks of the Johnston Group. However, this is thought to disguise a complex history of movement involving phases of downward displacement of the crust during deposition of the Palaeozoic succession forming in a basinal area on the south side of the fault. A thick and continuous succession accumulated in this basin whilst the uplifted block to the north only received an intermittent and restricted supply of sediment. During the Variscan mountain building episode (orogeny), movement on the Benton Fault is thought to have taken place in the reverse direction as a result of intense compression, but the amount of this displacement, however, varies considerably from east to west along the fault. This is a critical locality exposing one of the most important structures of the Variscan orogenic belt in South Wales.

Musselwick Sands: Cliff and foreshore outcrops within this site provide important exposures of the Musselwick Fault, an important dislocation formed during the Variscan mountain building episode (orogeny). The fault here consists of a steeply dipping zone with a number of separate dislocation planes and contains an isolated slice of rock strata, probably part of the Silurian Gray Sandstone Group. Beneath the fault are Devonian, Old Red Sandstone strata, whilst above are much older Ordovician Llandeilo Flags. During the Variscan Orogeny, intense compression caused the crust to distort and fracture producing deep-seated dislocations such as the Musselwick Fault. Continued compression caused massive displacement on these faults, estimated in this case at about 1,500 metres, resulting in the stacking of older and formerly deeper rocks on top of younger strata. This outcrop of the Musselwick Fault is now recognised as the surface expression of a major thrust fault at depth, the counterpart of the Ritec Fault in eastern Pembrokeshire, making this a very important locality for the study of the Variscan Orogenic Belt.

BIOLOGY

The majority of this shoreline has a northwesterly or westerly aspect and is exposed to considerable wind and wave action. The north-eastern part of the site has a more northerly aspect and is subject to slightly less exposure. The shore alternates between stretches of gently sloping bedrock, sometimes with pinnacles and platforms, and boulder shores with cobbles and pebbles, or sandy beaches. The cliffs reach a height of 70 m and are unstable in places.

The lower shore is dominated by kelps along much of the site, mainly *Laminaria digitata* and furbellows *Saccorhiza polyschides*. Dabberlocks *Alaria esculenta* is more common where wave exposure is greater. There is an understorey of encrusting and filamentous red algae in places, often with serrated wrack *Fucus serratus* and patches of the mussel *Mytilus edulis*. In other parts of the site, this zone supports a mixture of red algae, including dulse *Palmaria palmata* and pepper dulse *Osmundea pinnatifida*, carageen moss *Mastocarpus stellatus* and coral weed *Corallina officinalis*, or brown algae such as thong weed *Himanthalia elongata* and serrated wrack, sometimes as single species bands. A number of animal species are found underneath boulders at Borough Head, including butterfish *Pholis gunnelis*, broadclawed porcelain crab

Porcellana platycheles, saddle oysters *Anomidae* indet. and sea urchin *Psammechinus miliaris*.

The mid-shore bedrock supports an encrusting fauna of barnacles *Semibalanus balanoides*, *Chthamalus* spp. and limpets *Patella* spp., with bladder wrack *Fucus vesiculosus* (including the non-vesiculate variety *linearis*) and channelled wrack *Pelvetia canaliculata*. Many rockpools contain specialised communities of plants and animals. Rockpools in the bedrock areas include those dominated by coralline algae, fucoid algae, kelps and sometimes the brown alga *Bifurcaria bifurcata*. Some rockpools have sediment floors, with algae such as *Ahnfeltia plicata* and *Furcellaria lumbricalis*. Shaded overhangs support rich, specialised communities of red algae and sponges. Gullies support encrusting coralline algae. Shaded areas at Musselwick have rich communities of red algae, including *Plumaria plumosa* and *Cryptopleura ramosa*; the purse sponges *Grantia compressa* and *Scypha ciliata*, breadcrumb sponge *Halichondria panicea*; and seasquirts.

Barnacles, limpets and bladder wrack tend to dominate the upper shore, above which is an intermittent band of pygmy lichen *Lichina pygmaea*, the black tar lichen *Verrucaria maura* and then yellow and grey lichens (such as *Caloplaca* spp. and sea ivory *Ramalina* sp.) in the splash zone. Caves at the back of the beaches at Falling Cliff and Musselwick contain the red algae *Rhodothamniella* sp. and *Catanella caespitosa*.

Boulder and shingle beaches tend to show the same zonation as the cliffs, but with wider bands of barnacles, fucoids and thong weed. Coarse, mobile sand at Musselwick Sands supports a community of crustaceans including the isopods and amphipods *Eurydice pulchra*, *Haustorius arenarius* and *Bathyporeia* spp. Sand at St Bride's Haven in less coarse and supports polychaete worms such as lug worm *Arenicola marina* and cat worm *Nephtys* spp. Sand / bedrock interfaces at Musselwick Sands are colonised by ephemeral algae such as *Enteromorpha* spp. and *Porphyra* spp.

The steep cliffs of Goultrop Roads support dense woodland of sessile oak *Quercus petraea*, extending down to the foreshore. It is the most extensive example of such sea-cliff woodland in West Wales outside of the Milford Haven waterway. Much of the oak is low-growing, with an understorey of hazel *Corylus avellana*, spindle *Euonymus europaeus*, ivy *Hedera helix* and honeysuckle *Lonicera periclymenum*. Much of the field layer is dominated by great wood-rush *Luzula sylvatica* or fern species. More notable plants include wood spurge *Euphorbia amygdaloides*, sweet woodruff *Galium odoratum*, wild madder *Rubia peregrina* and sea spleenwort *Asplenium marinum*. Along the coast to the southwest, a wooded partial stack at Musselwick Sands is the most westerly semi-natural oak woodland in Wales.

Elsewhere, the cliffs support ledge and crevice communities, with swathes of coastal grassland along their tops. Species include thrift *Armeria maritima*, sea plantain *Plantago maritima*, red fescue *Festuca rubra*, sea beet *Beta vulgaris*, sea campion *Silene uniflora* and common scurvygrass *Cochlearia officinalis*. Shorter turf supports buck's-horn plantain *Plantago coronopus*, English stonecrop *Sedum anglicum*, rock sea-spurrey *Spergularia rupicola* and sheep's-bit *Jasione montana*. Some sections of the cliff-top support bird's-foot trefoil *Lotus corniculatus*, kidney vetch *Anthyllis vulneraria*, devil's-bit scabious *Succisa pratensis* and sea mayweed *Tripleurospermum maritimum*.

Where the grassland is less exposed, it tends to be more rank and often dominated by cock's-foot *Dactylis glomerata* or Yorkshire-fog *Holcus lanatus*. In these areas, saw-wort *Serratula*

tinctoria, betony *Betonica officinalis* and common knapweed *Centaurea nigra* are frequent. Sheltered areas where soils are deeper support bracken *Pteridium aquilinum* and bramble *Rubus fruticosus* with an understorey of bluebell *Hyacinthoides non-scripta*. Sheltered gullies have patches of primrose *Primula vulgaris*. Coastal scrub consists mainly of common gorse *Ulex europaeus*, bramble and blackthorn *Prunus spinosa*. Coastal heath is limited in extent and dominated by heather *Calluna vulgaris*.

Caves occur throughout this stretch of coast. These, along with some of the foreshore areas that are less accessible from land, are often used by grey seals *Halichoerus grypus* for breeding during autumn. This coastline regularly contributes small numbers of pups to the West Wales grey seal population.

Remarks:

The site lies entirely within the Pembrokeshire Coast National Park.

The site is a component part of Pembrokeshire Marine/Sir Benfro Fôrol Special Area of Conservation for its bays, reefs and grey seals.

Grey seals are listed on Annex IIa of the EC Habitats Directive (Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora).