CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

SITE OF SPECIAL SCIENTIFIC INTEREST CITATION

CONWY	**PEN Y GOGARTH/GREAT ORMES HEAD**
Date of Notification:	1957, 1982, 2002
National Grid Reference:	SH 767833
O.S. Maps:	1:50,000 Sheet number: 118 1:10,000 Sheet number: SH 78 SE
Site Area:	329.2 ha (approx.)

Description:

Pen y Gogarth/Great Ormes Head is of special interest for its geological, botanical, entomological, ornithological and marine biological features. The limestone headland, which rises to a height of 207 m, includes sea cliffs and boulder strewn shores, and extends for nearly 8km along the North Wales coastline, separating Conwy Bay and Llandudno Bay. There are sheer limestone cliffs on the north-eastern side, with less severe slopes with a series of low tiers of limestone ridges falling to soft sediment cliffs to the south-west.

The site supports the following features of special interest. The site is significant for its Carboniferous Limestone which contains nationally important faunal assemblages in coastal cliffs, inland outcrops, disused quarries and road sections. Additionally, the Great Orme Copper Mines provide the best UK example of an internationally important class of ore referred to as the Copper-Dolomite association. The limestone and associated sedimentary deposits supports sizable areas of calcicolous (lime-loving) grassland, limestone and acidic heath, maritime cliff vegetation and a mixture of other plant communities and habitats. The endemic wild cotoneaster *Cotoneaster cambricus*, spiked speedwell *Veronica spicata ssp. hybrida*, goldilocks *aster Aster linosyris* and spotted cat's-ear *Hypochaeris maculata* and a variety of nationally scarce species are present, along with an isolated population of horseshoe vetch *Hippocrepis comosa*, here at its only site in North Wales and the rare, nationally endemic Welsh hawkweed, *Hieracium cambricum*. An assemblage of bryophytes and lichens including the nationally vulnerable species *Collema fragile* and *Synalissa symphorea* are present. The Great Orme supports populations of the silky wave moth Idaea dilutaria, silver-studded blue *Plebejus argus caernensis* and grayling *Hipparchia semele thyone* endemic butterflies. It also supports the weevil *Helianthemapion aciculare*, the rare pollen beetle *Meligethes brevis* and a large grassland invertebrate assemblage. It has the largest extent of moderately exposed rock, supporting a complete zonation of marine biotopes as well as specialised and nationally scarce animals and algae most typically associated with rock pool, cave and limestone rock habitats found between The Great Orme and the Solway Firth. The sea cliffs regularly support a large colony of breeding sea birds.

Geology:

There are two separate geological features on the Great Orme.

Great Orme (Lower Carboniferous) - Historically one of the classic Dinantian sites in Wales, the Great Orme is one of the most widely known Carboniferous Limestone faunal sites in Britain and is the type-locality for numerous species. Its Asbian-Brigantian section has received little sedimentological or palaeoecological study in modern terms and has great research potential. The locality is of great importance for studies of Welsh palaeogeography, sedimentation and faunas in the late Dinantian.

Great Orme Copper Mines (Mineralogy of Wales) - The old copper mines on the Great Orme headland constitute the first and prime UK example of the internationally important class of ore deposits referred to as the Copper-Dolomite association. In other metallogenic provinces of the world, this class of mineralization is spatially associated with cogenetic, exhalative lead-zinc deposits of the Irish type. The primary mineralization at Great Orme consists of chalcopyrite crystals scattered over a dolomite gangue, in a matrix of cavernous and highly dolomitized Carboniferous Limestone. This mineralization also includes Mississippi Valley Type vein-type lead and uraniferous hydrocarbons, with which attempts have been made radiometrically to date the mineralization. Secondary modification of the primary carbonates and sulphides has led to the development of a complex, multiphase supergene assemblage featuring several generations of malachite and calcite. The Great Orme is also of international archaeological importance as a site of Bronze Age copper mining, and as such has been the focus of much excavation, which continues to reveal many features of metallogenic and archaeological interest.

Biology:

The distribution of the grassland and heath plant communities is intimately bound to the pattern of soils, which in turn are influenced by slope and aspect. Soils are derived from three main sources, limestone bedrock, wind blown sand or loess and glacial till. The former gives rise to base-rich shallow soils with an organic-enriched mineral surface horizon, whilst the latter two give rise to deeper soils less influenced by the underlying limestone. All soils are free-draining. The combination of bedrock, soils, topography and bioclimatic conditions interacting with past and present human activities has given rise to a complex mosaic of plant communities, exemplified in the zonations between acid heath, various forms of limestone heath and limestone grassland and vegetated sea cliffs, all of which are of outstanding ecological interest. The occurrence of medieval ridge and furrow and older field enclosures indicate past cultivation of some of the site.

Maritime influences upon the heath and grassland are not strong with only local occurrences of species such as sea plantain *Plantago maritima*, spring squill *Scilla verna* and thrift *Armeria maritima*. The latter occurs either in association with grassy ledges amongst the sea cliffs on the northern and western sides or where there are spoil banks arising from old mine sites.

The rockiest and thinnest soils (to 4 cm deep) occupy the drought prone edges and tops of the tiers of south facing limestone cliffs and crags. This supports open short turf containing sheep's fescue *Festuca ovina*, crested hair grass *Koeleria macrantha*, meadow oat-grass *Avenula pratensis* and quaking grass *Briza media* with abundant herbs that include wild thyme *Thymus polytrichus*, salad burnet *Sanguisorba minor*, carline thistle *Carlina vulgaris*, common rock rose *Helianthemum nummularium*, kidney vetch *Anthyllis vulneraria* and the nationally scarce hoary rock-rose *Helianthemum canum*. The Great Orme supports the largest expanse of this grassland type in Great Britain. Mosses such as *Weissia controversa, Tortella tortuosa* and *Trichostomum brachydontium* are also common.

Where soils are deeper (to 15 cm deep) on less steep slopes away from cliff and crag tops, the

most extensive grassland community is a closed sward of grasses and sedges, including sheep's fescue, crested hair-grass, quaking grass, common bent *Agrostis capillaris*, spring sedge *Carex caryophyllea* and glaucous sedge *Carex flacca*. Herbs remain prominent with common rock-rose, salad burnet, wild thyme, common bird's-foot-trefoil *Lotus corniculatus*, lady's bedstraw *Galium verum*, dropwort *Filipendula ulmaria*, and harebell *Campanula rotundifolia* among the most frequent of the many species present. Spring squill *Scilla verna* occurs where maritime influences are greatest. Mosses common in this sward include *Dicranum scoparium* and *Scleropodium purum*. Local modifications to this sward brought about by either more intensive livestock grazing or the trampling of the many visitors reduce the moss component and lead to increases in species such as crested dog's-tail *Cynosurus cristatus* and white clover *Trifolium repens*.

Overlooking Llandudno, on south-facing slopes where grazing is less intense, is a taller rank sward where downy oat-grass *Helictotrichon pubescens* and red fescue *Festuca rubra* are the principal grasses and where fewer herbs such as wild thyme and mouse-ear hawkweed *Hieracium pilosella* occur. In extreme cases this gives way to scrub encroachment by for example, gorse *Ulex europaeus*, non-native shrubs including *Cotoneaster spp*. and secondary woodland dominated by ash *Fraxinus excelsior*. North-facing slopes support small stands of a grassland dominated by sheep's fescue, common bent and thyme *Thymus praecox* and includes species indicative of cooler, shadier and less base-rich conditions such as tormentil *Potentilla erecta*, common dog violet *Viola riviniana*, heath grass *Danthonia decumbens*, and the mosses *Hylocomium splendens* and *Thuidium tamariscinum*.

The bulk of the heath vegetation is dominated by heather, *Calluna vulgaris* and western gorse *Ulex gallii* mainly where lenses of loess overlie glacigenic deposits on the less steep slopes. The heath occurs in an intimate mosaic with the grassland communities throughout the site and also includes a vegetation type characterised as calcicolous grass heath where western gorse is conspicuous by its virtual absence but where ericoids are abundant. This heath also contains many species typical of the 'species-rich' calcicolous grassland. The area occupied by calcicolous grass heath is similar in extent to the heather and western gorse heath, where western gorse is co-dominant with bell heather *Erica cinerea*. This heath can be described in three forms; species-poor, where the dominant shrubs form a tall closed canopy with small amounts of heather and herbs such as harebell, heath bedstraw *Galium saxatile* and tormentil are present but rare, shorter and more open heath, where grasses such as heath-grass and bent *Agrostis spp*. are present in quantity with other herbs that include slender St John's-wort *Hypericum pulchrum* and very open species-rich heath, where the dominant shrubs share dominance with calcicolous species that include common rock-rose, dropwort, glaucous sedge, wild thyme and common bird's-foot-trefoil making it floristically very similar to the sheep's fescue and meadow oat-grass *Helictotrichon pratense* grassland that often occurs in close proximity. There are a number of both calcicolous (lime-loving) and calcifugous (lime-hating) species present in this species-rich heath vegetation. Salad burnet, lady's bedstraw, quaking-grass and fairy flax *Linum catharticum* are calcicolous species, whereas slender St John's-wort, heath-grass and tormentil are calcifugous. Almost entirely confined to the north-facing slopes above and below the Marine Drive to the east of the lighthouse and only thinly scattered elsewhere is a different heath vegetation, characterized by heather and bell heather *Erica cinerea* which is present in small quantity. This short vegetation also contains bent, sheep's fescue and tormentil but with few calcicolous species.

The intergrading mixtures of limestone grassland and dry heathland are particularly well displayed at Great Ormes Head, and there are extensive repeated sequences of limestone grassland and basic to acidic heath along the south-western flank of the promontory.

Limestone pavements at the western end have grikes (cracks in the rock) containing a rich scrub woodland flora that includes blackthorn *Prunus spinosa*, hawthorn *Crataegus monogyna*, wild privet *Ligustrum vulgare*, ivy *Hedera helix*, wild madder *Rubia peregrina*, wood anemone *Anemone nemorosa*, lords-and-ladies *Arum maculatum*, dog's mercury *Mercurialis perennis* and herb-robert *Geranium robertianum.* In addition, the ferns black spleenwort *Asplenium adiantum-nigrum* hart's-tongue *Phyllitis scolopendrium* and brittle bladder-fern *Cystopteris fragilis* are present. The occurrence of Danish scurvygrass *Cochlearia danica* and pellitory-of-the-wall *Parietaria judaica* here is unique for limestone pavement in North Wales.

The precipitous cliffs to the west of the lighthouse and above the Marine Drive at Pen Trwyn support a maritime cliff-ledge community with wild cabbage *Brassica oleracea*, thrift and sea plantain clinging onto narrow ledges and crevices in the sheer cliff faces accompanied by calcicolous species intolerant of livestock grazing such as bloody cranesbill *Geranium sanguineum.*

Other vegetation includes dense stands of bracken *Pteridium aquilinum* where soils are deepest in the vicinity of Pant yr Eglwys, Mynydd Isaf and the glacial till slopes to the west of Llys Helig Drive where they present a threat to grassland and species-rich heath.

Small stands of secondary woodland occupy the steepest slopes above Llandudno where livestock grazing has diminished since the nineteenth century. These have a canopy of ash *Fraxinus excelsior* and sycamore *Acer pseudoplatanus* over a shrub layer of hawthorn, hazel *Corylus avellana* and elder *Sambucus nigra*. The ground and field layer are dominated by dog's mercury, false brome *Brachypodium sylvaticum*, ivy and bramble *Rubus fruticosus*. Scrubby fringes of this woodland support the nationally scarce ivy broomrape *Orobanche hederae*.

Important species present on the site that have a disjunct distribution in the British Isles include hoary rock-rose, goldilocks aster *Aster linosyris*, spotted cat's-ear *Hypochaeris maculata* spiked speedwell *Veronica spicata ssp. hybrida*, Nottingham catchfly *Silene nutans* and hutchinsia *Hornungia petraea*. A northern element is represented by mountain everlasting *Antennaria dioica*, spring sandwort *Minuartia verna* and dark-red helleborine *Epipactis helleborine*. Other rare species of note include Welsh hawkweed *Hieracium cambricum*, spring cinquefoil *Potentilla neumanniana* and white horehound *Marrubium vulgare*. A large population of horseshoe vetch occurs here, remote from its main centre of distribution.

The native endemic species wild cotoneaster *Cotoneaster cambricus* is present at its only location in the world where a small population maintains a grip on limestone crags.

This site supports a notable assemblage of rock and soil-inhabiting bryophytes and lichens, characteristic of Carboniferous Limestone cliff, outcrops and crevices. The lichen population includes the nationally vulnerable species *Collema fragile* and *Synalissa symphorea* and the nationally rare *Opegrapha parasitica* and *Rinodina immersa*. The bryophyte population includes the nationally rare species *Bryum funckii* and *Funaria pulchella*.

The limestone grasslands of the Great Orme support an outstanding assemblage of invertebrates. The majority of the most significant species are thermophilous i.e. they are confined to the hot, south and west facing slopes of the headland, particularly where mosaics of low scrub and herb-rich grassland develop under reduced grazing pressure. The site is especially noteworthy for two unique butterfly sub-species, the grayling *Hipparchia semele thyone* and the silver-studded blue *Plebejus argus caernensis*, whilst the weevil *Helianthemapion aciculare* occurs here at its only

British site. The latter two species breed on luxuriant growth of the rockrose and this plant is also the host for the nationally rare pollen beetle *Meligethes brevis*, which occurs here in its strongest British population. Rockrose is also believed to be the main food plant of the silky wave moth *Idaea dilutaria*, which is otherwise known in Britain only from the South Gower coast and the Avon Gorge. Another highly restricted species nationally is the horehound plume moth *Wheeleria spilodactyla* which feeds as a larva on white horehound *Marrubium vulgare* growing in disturbed limestone grassland. Other scarce invertebrate species of the grasslands on the Great Orme include the chalk carpet moth *Scotopteryx bipunctaria*, the ground beetle *Amara curta*, the weevil *Limobius borealis* and the spider *Episinus truncatus*. In a few places where springs emanate from the limestone slopes shallow seepages support an important fly fauna which includes the nationally rare craneflies *Limonia goritiensis* and *Orimarga virgo* and the scarce soldier-flies *Oxycera pygmaea* and *Oxycera pardalina*.

The site is important as it supports the largest breeding colony of seabirds in the East Gwynedd Area of Search. These occur on the sea cliffs predominantly between March and August of each year and include guillemot *Uria aalge*, razorbill *Alca torda*, and kittiwake *Rissa tridactyla*. Breeding pairs of cormorant *Phalacrocorax carbo* and shag *Phalacrocorax aristotelis* are also present.

The headland caves support hibernating populations of lesser horseshoe bat *Rhinolophus hipposideros*.

Marine Biology:

The marine biology of the site is of special interest because the shoreline is the largest extent of moderately exposed rock between the Great Ormes Head and the Solway Firth. In addition, it exhibits the best example of intertidal moderately exposed rock communities expected to occur on this type of coastline. A complete zonation of marine communities on cliff faces and across the shoreline, occurs with a variety of specialised habitats and species associated with cave, boulder and rock pool habitats. Nationally important populations of 'piddock' rock-boring bivalves *Pholadidae spp*. occur in a continuous band around the headland on rock outcrops and boulders amongst oarweed *Laminaria digitata* or serrated wrack *Fucus serratus* seaweeds.

Steep sea cliffs exhibit an almost uninterrupted zonation with broad bands of yellow and grey lichens, the black tar lichen *Verrucaria maura*, acorn barnacles *Chthamalus montagui*, *Semibalanus balanoides* and limpets *Patella vulgata*, and the common mussel *Mytilus edulis*. The western extent of the intertidal adjacent to Hornby Cave has the greatest wave exposure, here acorn barnacles and common mussels dominate the mid shore, whereas less exposed eastward cliffs display a zonation of the red seaweeds carragheen moss *Mastocarpus stellatus* and dulse *Osmundia pinnatifida* amongst serrated wrack and oarweed to seaward. All of the lower shore rock and boulder is pitted with 'piddock' holes. Within the eastward cliffs are numerous narrow caves of varying depth which support sponges including *Halichondria panicea, Hymeniacidon perleve, Halisarca dujardini* and *Myxilla incrustans*, anemones *Sargatia elegans, Actinia equina* and *Metridium senile*, and sea squirts such as *Dendrodoa grossularia, Botryllus schlosseri* and *Morchellium argus*.

Broken cliffs above bedrock and boulder platforms are found on the north side of the site. Here the shore is wider and consequently, whilst exhibiting a similar zonation to the vertical cliffs, there are broader bands of acorn barnacles and limpets with distinct areas of brown and red seaweeds such as dulce *Palmaria palmata* and occasional carragheen moss *Mastocarpus stellatus.*

Frequent seepages of freshwater through the rock substrata promote ephemeral seaweeds such as gutweed *Enteromorpha* species. Mid to upper shore mobile cobbles and boulders are sparsely colonised, whereas lower shore examples have ephemeral gutweed and laver seaweed *Porphyra purpurea*.

The eastern extent of the intertidal between Pen Trwyn and Llandudno pier is similarly composed of boulders in front of hard limestone rock. The lichen zonation continues around the shoreline where hard rock backs the shore. Channel wrack *Pelvetia caniculata* and spiral wrack *Fucus spiralis* with an abundance of acorn barnacles and periwinkles *Littorina spp*., occuring to seaward. Knotted wrack *Ascophylum nodosum* is more typical of sheltered upper shores. An area of large common mussels occur to seaward with serrated wrack, dulse or carragheen moss. As boulder size decreases near low water mark, serrated wrack is superceded by wide bands of oarweed. Large under-boulder communities of common starfish *Asterias rubens*, edible crab *Cancer pagurus* and velvet swimming crab *Necora puber* are common. Larger boulder shaded overhangs are dominated by sponges such as Hymeniacidon perleve, the breadcrumb sponge *Halichondria panicea* and red algae such as dulce, *Membranoptera alata* and *Plocamium cartinagineum*. Sea squirts such as *Botryllus schlosseri, Botrylloides leachi* and *Aplidium spp*. and bryozoans such as *Scrupocellaria rupens* with abundant 'dead man's fingers' *Alcyonium digitatum*, occur lower down the shore.

Remarks:

1. Part of the site is leased by the North Wales Wildlife Trust.

2. Terrestrial areas of the site support 'European Dry Heath', 'Semi-Natural Dry Grassland' and 'Vegetated Sea Cliff' habitat as described under Annex 1 of the EC Habitats Directive (Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) these are a component part of the Great Ormes Head / Pen y Gogarth Special Area of Conservation (SAC).

3. The intertidal section of this site contains 'reef' habitat features as described under Annex 1 of the EC Habitats Directive. Areas of this site below Mean Low Water mark are part of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

4. Wild cotoneaster and spiked speedwell are schedule 8 species in the Wildlife and Countryside Act (as amended).

5. Wild cotoneaster, goldilocks aster, hairy-fruited cornsalad, Welsh hawkweed and spotted cat's-ear are Red Data Book species.

6. The lichens *Collema fragile* and *Synalissa symphorea* are listed as 'vulnerable' in the Red Data Book list.

7. The grayling, silver-studded blue, silky wave moth and horehound plume moth, and the weevil *Helianthemapion aciculare* and the pollen beetle *Meligethes brevis* are Red Data Book species.

please contact CCW in writing.