

**CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES**

**CORE MANAGEMENT PLAN
INCLUDING CONSERVATION OBJECTIVES**

**FOR
GLANNAU ABERDARON AND YNYS ENLLI /ABERDARON
COAST AND BARDSEY ISLAND SPA**

(including part of CLOGWYNI PEN LLŶN/LLEYN SEACLIFFS SAC and
PEN LLŶN A'R SARNAU SAC.

These sites are underpinned by GLANNAU ABERDARON SSSI, YNYS
ENLLI SSSI, AND YNYSOEDD Y GWYLANOD SSSI)

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**More detailed maps of management units can be provided on request.
A Welsh version of all or part of this document can be made available on request.**



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PREFACE

This document provides the main elements of CCW's management plan for the sites named. It sets out what needs to be achieved on the sites, the results of monitoring and advice on the action required. This document is made available through CCW's web site and may be revised in response to changing circumstances or new information. This is a technical document that supplements summary information on the web site.

One of the key functions of this document is to provide CCW's statement of the Conservation Objectives for the relevant Natura 2000 sites. This is required to implement the Conservation (Natural Habitats, &c.) Regulations 1994, as amended (Section 4). As a matter of Welsh Assembly Government Policy, the provisions of those regulations are also to be applied to Ramsar sites in Wales.

1. VISION FOR THE SITE

This is a descriptive overview of what needs to be achieved for conservation on the site. It brings together and summarises the Conservation Objectives (part 4) into a single, integrated statement about the site.

This site encompasses an extensive stretch of the Lleyn Peninsula from Porth Oer on the northern coast, around the tip of the Lleyn to Aberdaron on the southern coast, including the islands of Bardsey (Enlli) and the Gwylans. This geologically diverse coast supports maritime and coastal heath and grassland habitats, which in turn support a range of important vascular and non-vascular plants, and an internationally important population of chough. Bardsey island is the home of one of the largest breeding populations of the Manx shearwater in the UK, for which the island is internationally important.

The site should continue to support a strong breeding population of chough with at least 14 nesting pairs, with 4 of these on Ynys Enlli. The site should also continue to provide sufficient habitat of sufficient quality to support this breeding population, and the non-breeding flocks. Maintenance of grazing of the grassland and heath, bracken control and rotational repair of the traditional cloddiau should be undertaken to maximise available feeding habitat.

Ynys Enlli should continue to sustain a breeding population of at least 10,000 pairs of Manx shearwaters. Their nest sites in the earth banks (cloddiau) in the lowlands of the island and in old rabbit burrows on Mynydd Enlli, and access to them, will remain undisturbed by boundary maintenance or heath management.

There will be no decrease in the areas of heathland present, and we will encourage restoration of the heathland, in terms of its extent and condition, aiming towards re-establishing the areas of heathland that existed (according to mapped evidence) in the early 20th century. This could be achieved by managed rotational cutting and/or burning of the dry heath, grazing management and the control of bracken and European gorse. Maintaining an open structure and diverse age-structure will ensure that the heath is available as a feeding habitat for chough.

The intertidal habitat will continue to support the full range of associated communities. The cliffs offer breeding sites for chough, and the intertidal area is also used by chough as an occasional feeding resource, while Manx shearwaters rely entirely on the sea for feeding.

The heath at Trwyn y Gwyddel is also very important as it supports one of only two UK locations for the spotted rockrose, *Tuburaria guttata*. This plant is hanging on at the edge of its range, and is susceptible to overgrazing and trampling pressures, and control of these factors is necessary to ensure its continued survival. Also present at this site, and more abundantly on the south western slopes of Mynydd Enlli, are two nationally rare heathland lichens, the ciliate strap lichen *Heterodermia leucomela* and the golden hair moss *Teloschistes flavicans*. Peny Cil supports a population of the prostate broom *Cytisus scoparius* subsp. *maritimus*, occurring here as a very isolated outlier at the north of its range. The sites should continue to support healthy populations of all these species.

The site also supports notable breeding populations of cormorant *Phalacrocorax carbo*, shag *P. aristotelis*, peregrine *Falco peregrinus*, herring gull *Larus argentatus* and puffin *Fratercula arctica*, particularly on Ynysoedd y Gwylanod, and should continue to do so.

2. SITE DESCRIPTION

2.1 Area and Designations Covered by this Plan

Grid references: SH167263 to SH167301, SH120220, SH184246 and SH182243.

Unitary authority: Gwynedd Council

Area (hectares): 512.8ha

Designations covered:

Glannau Aberdaron and Ynys Enlli Special Protection Area (SPA) is underpinned by three Sites of Special Scientific Interest (SSSIs): Glannau Aberdaron SSSI, Ynys Enlli SSSI and Ynysoedd y Gwylanod SSSI. The intertidal habitat within these sites is part of Pen Llyn a'r Sarnau Special Area of Conservation (SAC) and the entire remainder of the terrestrial habitat is also part of Clogwyni Pen Llyn SAC. Ynys Enlli/Bardsey Island is also a National Nature Reserve (NNR), and the entire site falls within the Llyn Area of Outstanding Natural Beauty (AONB). The coast is also designated a Heritage Coast.

Detailed maps of the designated sites are available through CCW's web site:

<http://www.ccw.gov.uk/interactive-maps/protected-areas-map.aspx>

For a summary map showing the coverage of this document is see separate Unit Map.

2.2 Outline Description

The site lies at the very southwestern tip of the Llyn Peninsula, almost surrounded by the Irish Sea and exposed to the prevailing winds and weather systems. Its habitats are necessarily influenced by its location, geology and the climate, and the coastal area supports some of the best remaining examples of coastal and maritime heaths and grasslands on the Llyn, while areas further inland supporting more agriculturally improved areas. The site includes three islands, Ynys Enlli and two small islands known as Ynysoedd y Gwylanod. The site is designated an SPA for its ornithological interest, and is particularly important for its chough and Manx shearwater breeding populations.

The area has long been a stronghold for the chough, and over 14 pairs regularly nest here. Chough thrive in the area which supports 5% of the UK population because of the variety of short turf and thin soil feeding habitats and available breeding sites - the sea cliffs and caves provide breeding sites, while the cliffs, heath, maritime grassland, and inland pasture and arable fields provide feeding sites throughout the year for these specialist invertebrate feeders. Manx shearwaters spend most of their lives out in the open sea, but congregate at breeding sites to which they faithfully return throughout their lives. These tend to be offshore islands that are free of predators, and Bardsey supports over 2% of the UK breeding population. They are long-lived birds (a bird ringed in 1955 was recorded again in 2002 and 2003) but productivity is typically low, with a single egg produced by adults (>5years) annually. They are present on the island from mid-March to mid-October, and nest in burrows on the mountain, cliff slopes and in man-made banks and walls.

Ynysoedd y Gwylanod, and particularly the larger Ynys Gwylan Fawr, are important for supporting the largest breeding colony of puffin in North Wales, and razorbills and guillemots also nest in small numbers. There is also a healthy population of breeding cormorant which is in excess of 1% of the UK breeding population.

The site is also important for several vascular and non-vascular plant species, particularly spotted rockrose, *Tuburaria guttata* and prostate broom *Cytisus scoparius* subsp. *maritimus* and two nationally rare heathland lichens, the ciliate strap lichen *Heterodermia leucomela* and the golden hair moss *Teloschistes flavicans*.

2.3 Outline of Past and Current Management

This site includes a long stretch of the coast including two areas of common land, Mynydd Anelog and Mynydd Bychestyn, and three offshore islands, Ynys Elli, Ynys Gwylan Fawr and Ynys Gwylan Fach, and management of different areas has obviously varied over time. Grazing levels and stock type have varied historically, although it is likely that grazing levels were much heavier previously. Areas of heath on the Lleyrn have suffered severe decline since the war (Rees 1929) because of overgrazing and agricultural improvements, and that which remains is only a remnant of what once existed. More common problems these days relate to undergrazing and neglect leading to rank heath and bracken areas, and uncontrolled and too frequent burning, although there is still localised overgrazing. Continued sheep overgrazing is particularly a concern at Trwyn y Gwyddel where the last mainland UK site for spotted rockrose, *Tuburaria guttata* is clinging on. The overgrazing problem here is compounded by trampling problems due to walkers accessing the site.

The structure and composition of the heathland habitats vary across the site. Some good quality coastal heath is to be found, particularly on Ynys Enlli (where maritime heath is well represented), Mynydd Mawr (Trwyn y Gwyddel and Braich y Pwll) and Mynydd Anelog, but in places this has become invaded by bracken. Bracken used to be cut and used for bedding historically, but this practice has not been carried through to the modern day. In some places, for instance at Mynydd Bychestyn, western gorse dominates, possibly due to climatic change since it is susceptible to frosts which occur less frequently nowadays, but almost certainly due to past overburning, and sheep grazing patterns which have an emphasis towards heavier grazing in the autumn and winter. There would be a great advantage in introducing heavy stock at Bychestyn, and many other sections of this site, and cattle and/or pony grazing could be appropriate all year round at low levels. Trampling will help control bracken and open up new areas for heath colonisation. Cattle grazing has recently been reintroduced to Mynydd Enlli following gorse control and it is hoped this will help prevent gorse regeneration and bracken growth. Sheep grazing on these sites should be heaviest in the spring and early summer (April-July) as this will encourage livestock to remove young palatable gorse and grasses whilst allowing ericoids to regenerate. Sheep stocking levels should be much reduced or removed in autumn and winter (September-March) in heathland area as this is the period when they do most damage to ericoids. Young gorse used to be milled locally, and used as nutritious feed, but this practice has died out. Burning favours bracken and western gorse, so this should not be used as a management tool where these species are likely to invade. Large areas, particularly at Mynydd Anelog and along the coast from Porth y Pistyll northwards (where sections are not grazed at all due to fear of losing stock on open cliff slopes), are now dominated by bracken, which limits the areas available for chough to feed and for heathland vegetation to develop. NT has been active in controlling bracken at its holding at Muriau, and work has been carried out recently at Pen y Cil and on Ynys Enlli, but plenty remains to be managed. In 2005, a Management Schedule was drawn up for four sections of the site, Mynydd Anelog, Mynydd Mawr, Mynydd Bychestyn and Pen y Cil, involving partners including NT, RSPB, Cyngor Gwynedd and CYMAD. Some of the work was implemented under the Cadw'r Lliw yn Llyn project, and further work will be implemented as part of the Llyn Heaths Project which has just gained Heritage lottery funding. Sympathetic grazing regimes with heavy stock, the establishment of cutting and burning of heath blocks on long rotation, and control of gorse and bracken form the backbone of these plans.

The UK chough population has suffered a significant decline in the 20th Century as a result of persecution and changing agricultural practice. These pressures led to a contraction of the species range and the fragmentation and reduction of most remaining populations. This national trend mirrored one seen throughout Europe where the species was estimated to be in decline in 90% of its range (Tucker & Heath, 1994). The past two or three decades have seen the UK chough population as a whole stabilising while populations around the Welsh coast appear to be making a recovery in numbers. Despite the population now stabilising in most of

its European range, ongoing declines in some areas mean that it is still regarded as a declining species (Birdlife International 2004).

Glannau Aberdaron and Bardsey are important feeding and breeding areas for chough. The current grazing regime provides the areas of suitable short turf for feeding chough over a good proportion of the site. Management to open up areas of dense heath and provide a wider range of age structure and to clear areas of European gorse and bracken should increase the area of feeding habitat. Areas of pasture, arable land and semi-improved and improved pasture are associated with the coastal strip and within easy reach of the cliff breeding sites.

The Manx shearwater population on Ynys Enlli is largely self-maintaining, and requires little in the way of active management. They simply require suitable nesting locations which are available in abundance on Enlli, access to fish in the open sea, and minimal disturbance. They are entirely pelagic outside the breeding season, and are ill-adapted to movement on land and particularly vulnerable to predation. For this reason, breeding birds are largely restricted to offshore islands with no predators. There used to be rabbits on the island, but they died out on the island in 1996. Prior to this, Manx shearwaters and rabbits coexisted and were even known to share entrance burrows. Manx shearwaters can excavate their own burrows, but will also make use of unoccupied rabbit burrows and may have benefitted from the recent extinction of rabbits and the increased availability of empty burrows. Many of the burrows in use on Enlli are in man-made earthbanks and walls, and restoration management of boundary features must take their presence into account, along with minimising disturbance by human access and management in all other areas with active burrows.

2.4 Management Units

The plan area has been divided into management units to enable practical communication about features, objectives, and management. This will also allow us to differentiate between the different designations where necessary. In this plan, the management subunits have been based on tenure, but these have been lumped together into identifiable management blocks, often related to NT ownership. The National Trust is a major landowner on this section of the coast and an important partner in managing the sites. None of the land within this site belongs to CCW.

The following table confirms the relationships between the management units and the designations covered:

Unit No	SPA	Clogwyni Pen Llŷn SAC	Pen Llŷn a'r Sarnau SAC	SSSI	NNR
<i>Glannau Aberdaron SSSI</i>					
1	✓		✓	✓	
2	✓	✓		✓	
3	✓	✓		✓	
4	✓	✓		✓	
5	✓	✓		✓	
6	✓	✓		✓	
8	✓	✓		✓	
9	✓	✓		✓	
10	✓	✓		✓	
11	✓	✓		✓	
12	✓	✓		✓	
13	✓	✓		✓	
14	✓	✓		✓	
15	✓	✓		✓	
16	✓	✓		✓	
17	✓	✓		✓	
18	✓	✓		✓	
43	✓	✓		✓	
19	✓	✓		✓	
20	✓	✓		✓	
21	✓	✓		✓	
22	✓	✓		✓	
23	✓	✓		✓	
24	✓	✓		✓	
25	✓	✓		✓	
26	✓	✓		✓	
27	✓	✓		✓	
28	✓	✓		✓	
29	✓	✓		✓	
31	✓	✓		✓	
34	✓	✓		✓	
39	✓		✓	✓	
<i>Ynys Enlli SSSI</i>					
35	✓	✓		✓	✓
36	✓	✓		✓	
41	✓	✓		✓	✓
42	✓		✓	✓	
<i>Ynysoedd y Gwylanod SSSI</i>					
37	✓	✓		✓	
38	✓	✓		✓	

3. THE SPECIAL FEATURES

3.1 Confirmation of Special Features

<i>Designated feature</i>	<i>Relationships, nomenclature etc</i>	<i>Conservation Objective in part 4</i>
SPA features		
<p><i>Annex 1 species that are a primary reason for selection of</i></p> <p>Glannau Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA</p> <p>1. The site qualifies under Article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain population of a species listed on Annex 1, in the breeding and non-breeding season:</p> <p>Chough <i>Pyrhocorax pyrrhocorax</i></p> <p>14^P breeding 5% GB 28ⁱ wintering 5% GB ^P = pairs ⁱ = individuals Data source = RSPB 2000</p>	<p>Chough utilise both the mainland and offshore islands for breeding and feeding.</p>	<p>Conservation Objective 1.</p>
<p>2. The site qualifies under Article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain population of a species listed on Annex 1, in the breeding season:</p> <p>Manx shearwater <i>Puffinus puffinus</i>:</p> <p>Data submitted Natura 2000: 6930 pairs (count as at late 1990s, 3.5% of the British population)</p> <p>Bird data submitted at time of classification (updated citation April 1992): About 4.300 pairs (2% of the British breeding population)</p>	<p>Manx shearwaters breed on Ynys Enlli.</p>	<p>Conservation Objective 2.</p>

SAC features		
<p><i>Annex 1 habitats that are a primary reason for selection of</i></p> <p>Clogwyni Pen Llŷn SAC:</p> <p>3. Vegetated sea cliffs of the Atlantic and Baltic coast</p> <p>for which this is considered to be one of the best areas in the United Kingdom (EU Habitat code: 1230)</p>	<p>Atlantic sea cliff is also taken to include coastal heath (dry and maritime), and this feature covers the H8 <i>Calluna vulgaris-Ulex gallii</i> lowland heathland SSSI feature</p>	<p>Conservation Objective 3.</p>
<p><i>Annex 1 habitats that are a primary reason for selection of</i></p> <p>Pen Llŷn a'r Sarnau SAC:</p> <p>4. Reefs</p> <p>for which this is considered to be one of the best areas in the United Kingdom. (EU Habitat code: 1170)</p>	<p>The intertidal area is used by chough for occasional feeding at low tides and the cliffs include nesting sites. Manx shearwaters fish in the open sea habitat.</p>	<p>[Conservation Objectives for Pen Llŷn a'r Sarnau covered in Reg 33 package]</p>
Ramsar features		
<p>Not applicable</p>		
SSSI features		
<p>5. Coastal heath and grassland communities, including seacliff slope vegetation</p>	<p>Occurring on the mainland coast and on the islands.</p>	<p>Conservation Objective 3.</p>
<p>6. Nationally important flowering plants, including the vulnerable spotted rockrose, <i>Tuburaria guttata</i> and prostrate broom <i>Cytisus scoparius</i> subsp, <i>maritimus</i>.</p>	<p>Spotted rockrose occurs on Trwyn y Gwyddel on the mainland. Prostrate broom occurs on cliffs above Paradwys on the mainland</p>	<p>Conservation Objective 3.</p>
<p>7. Two nationally rare heath lichens: Ciliate strap-lichen <i>Heterodermia leucomela</i> and golden hair lichen <i>Teloschistes flavicans</i></p>	<p>Occurring at Trwyn y Gwyddel on the mainland and on the southwestern slopes of Mynydd Enlli.</p>	<p>Conservation Objective 3.</p>
<p>8. Assemblages of nationally important lichens, characteristic of different habitats:</p> <ul style="list-style-type: none"> • An assemblage of lichens found growing on trees and other plants. • An assemblage of lichens of natural rock habitats. • An assemblage of lichens found growing on man-made structures. 	<p>Occurring on Ynys Enlli.</p>	

<p>9. A population of chough, an internationally protected bird species.</p>	<p>Also SPA feature. Birds use both the mainland and islands.</p>	<p>Conservation Objective 1.</p>
<p>10. A variety of high-quality shore types which represent the range and variation present on wave-exposed rocky shores in Cardigan Bay. Marine habitats and communities:</p> <ul style="list-style-type: none"> • good examples of wave-exposed and tide-swept rocky shore communities • communities on overhanging bedrock and in rockpools • complete zonation of rocky shore communities. • Seaweeds in sediment-floored rockpools • Brown seaweeds and kelps in deep rockpools • Coral weed and encrusting coralline seaweed in shallow rockpools • Serrated wrack and under-boulder animals on lower shore boulders • Sponges and red seaweeds on overhanging lower shore bedrock 	<p>Occurring off the coast of the mainland and the islands.</p>	<p>[Conservation Objectives for Pen Llyn a'r Sarnau covered in Reg 33 package]</p>
<p>11. Important geological exposures:</p> <ul style="list-style-type: none"> • Porth Oer: Rocky raised shore platform and sediment sequences associated with glacial events about 20,000 years ago. • Braich y Pwll – Parwyd: Remarkably varied sequence of Precambrian rocks (over 670 million years old) overlain by younger Ordovician sediments (about 500 million years old). 	<p>Occurring on the mainland.</p>	

<p>12. Nationally important flowering plants, including the rare rock sea-lavender, <i>Limonium britannicum</i> subsp. <i>pharense</i>, nationally scarce small adder's tongue, <i>Ophioglossum azoricum</i>, western clover, <i>Trifolium occidentale</i> and sharp rush <i>Juncus acutus</i>.</p>	<p>Occuring on Ynys Enlli in therophyte and maritime grassland and cliffs.</p>	<p>Conservation Objective 3.</p>
<p>13. An assemblage of moss and liverwort species with restricted European distributions, including a number of rare and scarce species.</p>	<p>Occuring on Ynys Enlli.</p>	
<p>14. Breeding population of the seabird Manx shearwater of European importance.</p>	<p>SPA feature. Occuring on Ynys Enlli.</p>	<p>Conservation Objective 2.</p>
<p>15. An important breeding population of puffin <i>Fratercula arctica</i> and cormorant <i>Phalacrocorax carbo</i>.</p>	<p>Occuring primarily on Ynysoedd y Gwylanod.</p>	

3.2 Special Features and Management Units

This section sets out the relationship between the special features and each management unit. This is intended to provide a clear statement about what each unit should be managed for, taking into account the varied needs of the different special features. All special features are allocated to one of seven classes in each management unit. These classes are:

Key Features

KH - a 'Key Habitat' in the management unit, i.e. the habitat that is the main driver of management and focus of monitoring effort, perhaps because of the dependence of a key species (see KS below). There will usually only be one Key Habitat in a unit but there can be more, especially with large units.

KS – a 'Key Species' in the management unit, often driving both the selection and management of a Key Habitat.

Geo – an earth science feature that is the main driver of management and focus of monitoring effort in a unit.

Other Features

Sym - habitats, species and earth science features that are of importance in a unit but are not the main drivers of management or focus of monitoring. These features will benefit from management for the key feature(s) identified in the unit. These may be classed as 'Sym' features because:

- a) they are present in the unit but may be of less conservation importance than the key feature; and/or
- b) they are present in the unit but in small areas/numbers, with the bulk of the feature in other units of the site; and/or

c) their requirements are broader than and compatible with the management needs of the key feature(s), e.g. a mobile species that uses large parts of the site and surrounding areas.

Nm - an infrequently used category where features are at risk of decline within a unit as a result of meeting the management needs of the key feature(s), i.e. under Negative Management. These cases will usually be compensated for by management elsewhere in the plan, and can be used where minor occurrences of a feature would otherwise lead to apparent conflict with another key feature in a unit.

Mn - Management units that are essential for the management of features elsewhere on a site e.g. livestock over-wintering area included within designation boundaries, buffer zones around water bodies, etc.

x – Features not known to be present in the management unit.

The tables below sets out the relationship between the special features and management units identified in this plan:

Glannau Aberdaron SSSI	Management unit							
	1	2	3	4	5	6	8	9
SPA	✓	✓	✓	✓	✓	✓	✓	✓
Clogwyni Pen Llyn SAC		✓	✓	✓	✓	✓	✓	✓
Pen Llyn a'r Sarnau SAC	✓							
SSSI	✓	✓	✓	✓	✓	✓	✓	✓
NNR								
SPA features								
1. Chough	Sym	KS	KS	KS	KS	KS	KS	KS
2. Manx shearwaters	Sym	x	x	x	x	x	x	x
SAC features								
3. Dry heath (Atlantic Sea Cliff)	x	KH	KH	KH	KH	KH	KH	KH
4. Reefs	KH	x	x	x	x	x	x	x
SSSI features								
5. Coastal heath and grassland communities, including seacliff slope vegetation.	x	KH	KH	KH	KH	KH	KH	KH
6. Nationally important flowering plants, including the vulnerable spotted rockrose and prostrate broom	x	x	x	x	x	x	x	x
7. Two nationally rare heath lichens: ciliate strap-lichen and golden hair lichen.	x	x	x	x	x	x	x	x
9. A population of chough, an internationally protected bird species.	Sym	KS	KS	KS	KS	KS	KS	KS
10. A variety marine habitats and communities including high-quality shore types which represent the range and variation present on wave-exposed rocky shores in Cardigan Bay.	KH	x	x	x	x	x	x	x
11. Important geological exposures at Porth Oer and Braich y Pwll – Parwyd.	x	Sym	x	x	x	x	x	x

Glannau Aberdaron SSSI	Management unit									
	10	11	12	13	14	15	16	17	18	43
SPA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clogwyni Pen Llyn SAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pen Llyn a'r Sarnau SAC										
SSSI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NNR										
SPA features										
1. Cough	KS	KS	KS	KS	KS	KS	KS	KS	KS	Sym
2. Manx shearwaters	x	x	x	x	x	x	x	x	x	x
SAC features										
3. Dry heath (Atlantic Sea Cliff)	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH
4. Reefs	x	x	x	x	x	x	x	x	x	x
SSSI features										
5. Coastal heath and grassland communities, including seacliff slope vegetation.	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH
6. Nationally important flowering plants, including the vulnerable spotted rockrose and prostrate broom	x	x	x	x	x	x	x	Sym	x	KS
7. Two nationally rare heath lichens: ciliate strap-lichen and golden hair lichen.	x	x	x	x	x	x	x	Sym	x	Sym
9. A population of cough, an internationally protected bird species.	KS	KS	KS	KS	KS	KS	KS	KS	KS	Sym
10. A variety marine habitats and communities including high-quality shore types which represent the range and variation present on wave-exposed rocky shores in Cardigan Bay.	x	x	x	x	x	x	x	x	x	x
11. Important geological exposures Braich y Pwll – Parwyd.	x	x	x	x	x	x	x	Sym	Sym	Sym

Glannau Aberdaron SSSI	Management unit									
	19	20	21	22	23	24	25	26	27	
SPA	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Clogwyni Pen Llyn SAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Pen Llyn a'r Sarnau SAC										
SSSI	✓	✓	✓	✓	✓	✓	✓	✓	✓	
NNR										
SPA features										
1. Cough	KS	KS	KS	KS	KS	KS	KS	KS	KS	
2. Manx shearwaters	x	x	x	x	x	x	x	x	x	
SAC features										
3. Dry heath (Atlantic Sea Cliff)	KH	KH	KH	KH	KH	KH	KH	KH	KH	
4. Reefs	x	x	x	x	x	x	x	x	x	
SSSI features										
5. Coastal heath and grassland communities, including seacliff slope vegetation.	KH	KH	KH	KH	KH	KH	KH	KH	KH	

6. Nationally important flowering plants, including the vulnerable spotted rockrose and prostrate broom	x	x	x	x	x	Sym	x	x	x
7. Two nationally rare heath lichens: ciliate strap-lichen and golden hair lichen.	x	x	x	x	x	x	x	x	x
9. A population of chough, an internationally protected bird species.	KS	KS	KS	KS	KS	KS	KS	KS	KS
10. A variety marine habitats and communities including high-quality shore types which represent the range and variation present on wave-exposed rocky shores in Cardigan Bay.	x	x	x	x	x	x	x	x	x
11. Important geological exposures at Braich y Pwll – Parwyd.	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	x

Glannau Aberdaron SSSI	Management unit				
	28	29	31	34	39
SPA	✓	✓	✓	✓	✓
Clogwyni Pen Llyn SAC	✓	✓	✓	✓	✓
Pen Llyn a'r Sarnau SAC					
SSSI	✓	✓	✓	✓	✓
NNR					
SPA features					
1. Chough	KS	KS	KS	KS	KS
2. Manx shearwaters	x	x	x	x	x
SAC features					
3. Dry heath (Atlantic Sea Cliff)	KH	KH	KH	KH	x
4. Reefs	x	x	x	x	x
SSSI features					
5. Coastal heath and grassland communities, including seacliff slope vegetation.	KH	KH	KH	KH	x
6. Nationally important flowering plants, including the vulnerable spotted rockrose and prostrate broom	x	x	x	x	x
7. Two nationally rare heath lichens: ciliate strap-lichen and golden hair lichen.	x	x	x	x	x
9. A population of chough, an internationally protected bird species.	KS	KS	KS	KS	KS
10. A variety marine habitats and communities including high-quality shore types which represent the range and variation present on	x	x	x	x	x

wave-exposed rocky shores in Cardigan Bay.					
11. Important geological exposures at Porth Oer and Braich y Pwll – Parwyd.	x	x	x	x	

Ynys Enlli SSSI	Management unit			
	42	35	36	41
SPA	✓	✓	✓	✓
Clogwyni Pen Llyn SAC		✓	✓	✓
Pen Llyn a'r Samau SAC	✓			
SSSI	✓	✓	✓	✓
NNR		✓	✓	✓
SPA features				
1. Chough	Sym	KS	KS	KS
2. Manx shearwaters	Sym	KS	KS	KS
SAC features				
3. Dry heath (Atlantic Sea Cliff)	x	KH	KH	x
4. Reefs	KH	x	x	x
SSSI features				
5. Coastal heath and grassland communities, including seacliff slope vegetation.	x	KH	KH	x
7. Two nationally rare heath lichens: ciliate strap-lichen and golden hair lichen.	x	Sym	x	x
8. Assemblages of nationally important lichens, characteristic of different habitats.	x	Sym	Sym	Sym
9. A population of chough, an internationally protected bird species.	Sym	KS	KS	KS
10. A variety marine habitats and communities including high-quality shore types which represent the range and variation present on wave-exposed rocky shores in Cardigan Bay.	KH	x	x	x
12. Nationally important flowering plants, including the rock sea-lavender, small adder's tongue, western clover and sharp rush.	x	Sym	x	x
13. An assemblage of moss and liverwort species with restricted European distributions, including a number of rare and scarce species.	x	Sym	x	Sym
14. Breeding population of the seabird Manx shearwater of European importance.	Sym	KS	KS	KS

Ynysoedd y Gwylanod SSSI	Management unit	
	37	38
SPA	✓	✓
Clogwyni Pen Llyn SAC		
Pen Llyn a'r Sarnau SAC		
SSSI	✓	✓
NNR		
SPA features		
1. Chough	KS	KS
2. Manx shearwaters	x	x
SAC features		
3. Dry heath (Atlantic Sea Cliff)	x	x
4. Reefs	x	x
SSSI features		
5. Coastal heath and grassland communities, including seacliff slope vegetation.	Sym	x
10. A variety marine habitats and communities including high-quality shore types which represent the range and variation present on wave-exposed rocky shores in Cardigan Bay.	x	x
15. An important breeding population of puffin and cormorant.	Sym	Sym

Given that spotted rockrose occurs at its only mainland Wales location within Glannau Aberdaron SSSI, the management of the coastal heath (dry and maritime heath) (Atlantic Sea Cliff) in Management Unit 7d where it occurs should aim to maintain or increase the population.

4. CONSERVATION OBJECTIVES

Background to Conservation Objectives:

a. Outline of the legal context and purpose of conservation objectives.

Conservation objectives are required by the 1992 ‘Habitats’ Directive (92/43/EEC). The aim of the Habitats Directives is the maintenance, or where appropriate the restoration of the ‘favourable conservation status’ of habitats and species features for which SACs and SPAs are designated (see Box 1).

In the broadest terms, ‘favourable conservation status’ means a feature is in satisfactory condition and all the things needed to keep it that way are in place for the foreseeable future. CCW considers that the concept of favourable conservation status provides a practical and legally robust basis for conservation objectives for Natura 2000 and Ramsar sites.

Box 1

Favourable conservation status as defined in Articles 1(e) and 1(i) of the Habitats Directive

“The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- Its natural range and areas it covers within that range are stable or increasing, and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable.

The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as ‘favourable’ when:

- population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.”

Achieving these objectives requires appropriate management and the control of factors that may cause deterioration of habitats or significant disturbance to species.

As well as the overall function of communication, Conservation objectives have a number of specific roles:

- Conservation planning and management.

The conservation objectives guide management of sites, to maintain or restore the habitats and species in favourable condition.

- Assessing plans and projects.

Article 6(3) of the ‘Habitats’ Directive requires appropriate assessment of proposed plans and projects against a site's conservation objectives. Subject to certain exceptions, plans or projects may not proceed unless it is established that they will not adversely affect the integrity of sites. This role for testing plans and projects also applies to the review of existing decisions and consents.

- Monitoring and reporting.

The conservation objectives provide the basis for assessing the condition of a feature and the status of factors that affect it. CCW uses ‘performance indicators’ within the conservation objectives, as the basis for monitoring and reporting. Performance indicators are selected to provide useful information about the condition of a feature and the factors that affect it.

The conservation objectives in this document reflect CCW’s current information and understanding of the site and its features and their importance in an international context. The conservation objectives are subject to review by CCW in light of new knowledge.

b. Format of the conservation objectives

There is one conservation objective for each feature listed in part 3. Each conservation objective is a composite statement representing a site-specific description of what is considered to be the favourable conservation status of the feature. These statements apply to a whole feature as it occurs within the whole plan area, although section 3.2 sets out their relevance to individual management units.

Each conservation objective consists of the following two elements:

1. Vision for the feature
2. Performance indicators

As a result of the general practice developed and agreed within the UK Conservation Agencies, conservation objectives include performance indicators, the selection of which should be informed by JNCC guidance on Common Standards Monitoring¹.

There is a critical need for clarity over the role of performance indicators within the conservation objectives. **A conservation objective, because it includes the vision for the feature, has meaning and substance independently of the performance indicators, and is more than the sum of the performance indicators.** The performance indicators are simply what make the conservation objectives measurable, and are thus part of, not a substitute for, the conservation objectives. Any feature attribute identified in the performance indicators should be represented in the vision for the feature, but not all elements of the vision for the feature will necessarily have corresponding performance indicators.

As well as describing the aspirations for the condition of the feature, the Vision section of each conservation objective contains a statement that the factors necessary to maintain those desired conditions are under control. Subject to technical, practical and resource constraints, factors which have an important influence on the condition of the feature are identified in the performance indicators.

¹ Web link: <http://www.jncc.gov.uk/page-2199>

4.1 Conservation Objective for Feature 1: Internationally important population (1% or more of the Great Britain population) of breeding and non-breeding season chough *Pyrrhonorax pyrrhonorax*.

Vision for feature 1: Chough.

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The breeding population of chough is at least 14 pairs, or 5% of the GB population.
- The wintering population of chough is at least 28 individuals, or 5% of the GB population.
- Sufficient suitable habitat is present to support the populations.
- Breeding population is stable or increasing.
- Productivity is stable.
- Non-breeding flocks are stable or increasing (summer and winter).
- Breeding and non-breeding birds use Ynys Enlli for feeding throughout the year.
- Chough feeding habitats are themselves in a favourable conservation status and that the specified and operational limits and grazing prescriptions for these habitats incorporate chough feeding requirements (i.e. sward height and bare ground).
- Disturbance of breeding and feeding chough is minimal.
- The factors affecting the feature are under control.

Performance indicators for Feature 1: Chough.

The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators

<i>Performance indicators for chough feature condition</i>		
<i>Attribute</i>	<i>Attribute rationale and other comments</i>	<i>Specified limits</i>
A1. Population size	The Glannau Aberdaron chough (<i>Pyrrhonorax pyrrhonorax</i>) population will be considered in favourable condition when (based on performance indicators and targets as set out in the SPA review site account):	<i>Upper limit:</i> Not required. <i>Lower limit:</i> The SPA wintering population is at least 28 individuals. The SPA population represents at least 5% of the GB breeding and wintering populations
A2. Population extent	The Glannau Aberdaron chough (<i>Pyrrhonorax pyrrhonorax</i>) population will be considered in favourable condition when (based on performance indicators and targets as set out in the SPA review site account):	<i>Upper limit:</i> Not required. <i>Lower limit:</i> >14 pairs are breeding in the SPA, and where traditional breeding sites are occupied in at least 4 of Sections 1, 2, 3, 4, 5 and 6. Sections are defined as: Section 1 = Units 8,9,10,11 Section 2 = Units 13,14 Section 3 = Units 15,16,17,18,43 Section 4 = Units 19,20,21,22,23,24,25,26 Section 5 = Units 27,28,29,31,34 Section 6 = Units 35,36,41,42

A3. Forage habitat extent	The foraging habitat for chough will need to be in favourable condition for chough to be favourable.	<p>Upper limit: None set (although other interest features on the site need to be considered, and should not be compromised).</p> <p>Lower limit: The Vegetated sea cliffs of the Atlantic and Baltic coasts (H7 <i>Calluna vulgaris</i> – <i>Scilla verna</i> heath, H8d <i>Calluna vulgaris</i>-<i>Ulex gallii</i> heath, <i>Scilla verna</i> sub-community, MC8 <i>Festuca rubra</i> – <i>Armeria maritima</i>, MC9 <i>Festuca rubra</i> – <i>Holcus lanatus</i> and MC10 <i>Festuca rubra</i> – <i>Plantago spp</i> maritime grassland communities, coastal grassland and maritime cliff and slope feature within Clogwyni Pen Llŷn SAC must achieve favourable condition.</p> <p>>50% of earthbank is suitable for chough feeding.</p> <p>The approximate extent of heath and short-grazed grassland should be as present in 2001</p>
A4. Habitat quality	Open heath is defined as vegetation where ericoids or <i>Ulex gallii</i> form >30% cover with >20% open ground (occupied by bare soil, annual plants and/or terricolous macro-lichens) or closely-grazed grassland in any 1m radius.	<p>Upper limit: None set (although other interest features on the site need to be considered, and should not be compromised).</p> <p>Lower limit: Within each of plots A - F on the Uwchmynydd, Mynydd Bychestyn, Pen y Cil, and Bardsey sections of the site, there should</p>

	<p>Closely grazed grassland is defined as vegetation in which >50% of the sward is <3cm high in any 1m radius</p> <p>Six monitoring plots, spread across three of the mainland sections of the site (Uwchmynydd, Pen y Cil, Mynydd Bychestyn) were established in 2001. (Refer to Annex 2 of the Clogwyni Pen Llyn 2004 SAC Monitoring Report). Further plots will need to be established on Bardsey. These four sections of the site are known to be the most important both in terms of numbers of breeding pairs and usage by birds outside the breeding season.</p>	<p>be no significant decrease in the proportion of short grazed grassland and open heath relative to that seen in 2001</p> <p>The lower limits for the proportion of open heath and closely grazed grassland in the monitoring plots is as follows: A, B & E = 55% C = 70% D = 60% F = 65%.</p>
<i>Performance indicators for factors affecting the feature</i>		
<i>Factor</i>	<i>Factor rationale and other comments</i>	<i>Operational Limits</i>
F1. Livestock grazing	<p>The site is grazed to various levels, but in some sections, not at all. There is a reluctance to put stock on habitat open to cliffs, but lack of grazing is usually due to the dominance of gorse or bracken scrub, which, in a vicious circle, is due to lack of heathland management, including grazing. Grazing pasture land overwinter is important for chough as the invertebrates found in their dung is an important food source over winter. The use of avermectins should not occur within this site too allow natural invertebrate flora to develop in dung</p>	<p><i>Upper limit:</i> Not set (although other interest features on the site need to be considered, and should not be compromised).</p> <p><i>Lower limit:</i> Grazing levels will ensure extent of forage of sufficient quality to support the chough population.</p>
F2 Disturbance	<p>Nest and roost sites are considered to be subject to few direct threats, as climbing near known nest sites is effectively controlled by voluntary codes of conduct.</p>	<p><i>Upper limit:</i> no breeding attempts to be known to fail because of impact of human disturbance</p> <p><i>Lower limit:</i> None set</p>

<i>Performance indicators for chough feature condition specifically on Ynys Elli</i>		
<i>Attribute</i>	<i>Attribute rationale and other comments</i>	<i>Specified limits</i>
A1. Breeding population	On Ynys Enlli, the breeding population is stable or increasing .	<i>Upper limit:</i> None set <i>Lower limit:</i> 5 pairs in 3 out of 5 consecutive years. Lowest acceptable annual population of 4 pairs or 1% of the UK population or 2% of the Welsh population.
A2. Productivity/ breeding success	On Ynys Enlli, productivity is stable.	<i>Upper limit:</i> None set <i>Lower limit:</i> 15 chicks fledging in 3 out of 5 consecutive years or > 2.5 fledglings per breeding pair
A3. Non-breeding population	On Ynys Enlli, the non-breeding flocks are stable or increasing (summer and winter).	<i>Upper limit:</i> None set <i>Lower limit:</i> 10 non-breeding individuals (in addition to breeding pairs and their young), summer and winter.
A4 Chough feeding	Breeding and non-breeding birds use Ynys Enlli for feeding throughout the year	<i>Upper limit:</i> None set <i>Lower limit:</i> All breeding pairs, fledglings and non-breeding individuals observed feeding on the island.

4.2 Conservation Objective for Feature 2: Internationally important population (1% or more of the Great Britain population) of breeding Manx shearwaters *Puffinus puffinus*.

Vision for Feature 2: Manx shearwater.

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- Breeding population of Manx shearwater (confined to Ynys Enlli) is stable or increasing.
- Reproductive rates remain stable.
- Deaths from the lighthouse attractions, fencing and other infrastructure are minimal.
- No ground predators are introduced.
- Nesting birds are not disturbed by restoration works on boundary walls or recreational activities.
- All factors affecting the achievement of these conditions are under control.

Performance indicators for Feature 2: Manx shearwater.

The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

<i>Performance indicators for feature condition</i>		
<i>Attribute</i>	<i>Attribute rationale and other comments</i>	<i>Specified limits</i>
A1. Breeding population size	Breeding population of Manx shearwater (confined to Ynys Enlli) is stable or increasing	Upper limit: None set Lower limit: 10,000 pairs or 1% of the UK population
A2. Productivity /breeding success	Reproductive rates remain stable.	Upper limit: None set Lower limit: 5 year mean of 0.6 per pair. Lowest tolerable limit of >0.5 for 3 consecutive years
<i>Performance indicators for factors affecting the feature</i>		
<i>Factor</i>	<i>Factor rationale and other comments</i>	<i>Operational Limits</i>
F1. Deaths from lighthouse attraction	On dark moonless nights or when there is poor visibility due to fog, drizzle, cloud cover or rain the lighthouse attracts night flying birds. Individuals may collide with the lighthouse or become exhausted from flying repeatedly round the light.	Upper limit: 30 fatalities per year or <0.3% of the Enlli population. Lower limit: Gantry lights and light exclusion zone in place annually.
F2. Deaths from barbed wire/ other fencing and similar materials.	A small number of Manx shearwater mortalities occur each year as a direct result of entanglement in barbed wire on existing fences, or fence netting. BBFO keep annual records of the number and locations of fatalities.	Upper limit: 5 fatalities per year or <0.05% of the Enlli population. No unnecessary barbed wire erected. Lower limit: All unnecessary barbed wire removed.
F3. Ground-based predators	At present ground predators, such as common rat, fox, mink or hedgehog do not inhabit the island. Should such predators be introduced they could severely threaten the Manx Shearwater population. All measures must be taken to avoid their introduction.	Upper limit: No domestic or wild predators introduced to the island Lower limit: None set.

<p>F4. Avian predators</p>	<p>In recent years crows have been observed taking Manx shearwater eggs from burrows. If not controlled, this apparent learnt behaviour could become more widespread.</p>	<p>Upper limit: None set Lower limit: All crows seen predated in burrows should be controlled</p>
<p>F5. Boundary wall maintenance practice</p>	<p>Many Manx shearwaters dig nesting burrows into both stone-faced and earth walls. Maintenance can only be carried out carefully and on a rotation, as Manx shearwaters seem to be site faithful and perhaps even burrow faithful. Although burrowing Manx shearwaters appear to benefit from easier access in derelict stone/earth boundary walls, landscape issues and other conservation features would benefit from restoration and <i>repair of such boundaries</i>. All burrows are protected under UK law. They are protected while in use by the birds as nest sites, and protected outside the nesting season by the provisions of the SSSI legislation.</p>	<p>Upper limit: None set Lower limit: All boundary restoration work must take account of the potential effects on Manx shearwaters and must only be carried out to the strict guidelines set out in the Ynys Enlli Management Plan. All staff, contractors or volunteers working on field boundaries must be made aware of the guidelines.</p> <p>All field boundaries have been surveyed and the number of Manx shearwater burrows in each recorded. Boundaries have thus been categorised as to whether they are of importance to Manx shearwaters. Significant boundaries are those with 5 or more burrows per 100m</p>
<p>F6. Marine pollution incidents</p>	<p>Manx shearwaters frequently settle on the water surface to rest, swim and dive for food. They are therefore, particularly vulnerable to pollution at sea, particularly oil pollution.</p>	<p>Upper limit: No incidences of island generated pollution. No major pollution incidents within 30 miles of Ynys Enlli Lower limit: None set.</p>
<p>F7. Human disturbance/trampling</p>	<p>Human disturbance can be through erosion or collapse of shearwater burrows or by disturbing individuals on land at night. Collapse of burrows during the breeding season would be particularly detrimental to breeding success</p>	<p>Upper limit: 2 burrows accidentally damaged per year Lower limit: All promoted paths should avoid Manx shearwater burrows. All visitors to be advised of sensitive areas.</p>

4.3 Conservation Objective for Feature 3: Vegetated sea cliffs of the Atlantic and Baltic coasts (H7 *Calluna vulgaris* – *Scilla verna* heath, H8d *Calluna vulgaris*-*Ulex gallii* heath, *Scilla verna* sub-community, MC8 *Festuca rubra* – *Armeria maritima*, MC9 *Festuca rubra* – *Holcus lanatus* and MC10 *Festuca rubra* – *Plantago spp* maritime grassland communities, coastal grassland and maritime cliff and slope).

Vision for Feature 3: Coastal heath (Dry and maritime heath) (Atlantic Sea Cliff).

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- Extent of coastal or maritime heath is stable or increasing.
- At least 2 different coastal or maritime heath NVC community types are present and support a range of characteristic plant species.
- Areas of heath form a mosaic with maritime grassland with patches of bare ground – no blanket heath cover
- Pioneer heath plants are present
- Grazing occurs annually at a level which prevents a long sward developing but does not suppress heather growth or flowering. A low sward height in grassland habitats and an open, varied structure in heath will be maintained within the cliff top habitats for feeding chough, without causing a decline in the extent or quality of the grassland and heathland.
- The coastal heath will comprise vegetation with *Ulex gallii* present and at least 30% ericoid cover, usually *Calluna vulgaris*, with at least one maritime indicator present such as *Armeria maritima*, *Plantago maritima*, *Plantago coronopus* or *Scilla verna*.
- Healthy populations of the rare vascular plants (including spotted rockrose, *Tuburaria guttata*, prostrate broom *Cytisus scoparius* subsp. *maritimus*, rock sea-lavender *Limonium britannicum* subsp. *pharense*, small adder's tongue, *Ophioglossum azoricum*, western clover, *Trifolium occidentale* and sharp rush *Juncus acutus* will be present.
- Healthy populations of rare non-vascular plant species, including moss and liverwort species with restricted European distributions, and the soil-living lichens, ciliate strap-lichen *Heterodermia leucomela* and golden hair lichen *Teloschistes flavicans* will be present.
- Species indicative of rank or unmanaged conditions including European gorse, *Ulex europeus*, bracken *Pteridium aquilinum*, foxglove *Digitalis purpurea*, ragwort species *Senecio sp*, dock *Rumex obtusifolius* and nettle *Urtica dioica* should be largely absent:
- Grass species indicative of improvement including creeping bent *Agrostis stolonifera*, cock's foot *Dactylus glomerata*, perennial rye-grass *Lolium perenne* and Yorkshire fog *Holcus lanatus* should be largely absent.
- Associated important species such as feeding Chough and nesting Manx shearwater are recorded in coastal or maritime heath areas.
- All factors affecting the achievement of these conditions, including grazing intensity and burning, will be under control.

Performance indicators for Feature 3: Coastal heath (Dry and maritime heath) (Atlantic Sea Cliff).

The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators

Performance indicators for feature condition		
Attribute	Attribute rationale and other comments	Specified limits
A1. Extent of the coastal heath (dry and maritime)	Lower limit is based on 2003 mapped extent (mainland) and 1996 survey of Ynys Enlli.	Upper limit: As limited by other habitats, but not set. Lower limit: 92.7 ha Recording should initially target those Management Units where dry heath is a Key Habitat (KH). These are all units except 1, 37, 38, 39, 41, 42
A2. Condition of the coastal heath (dry and maritime)	At least 75% of coastal heath should be good quality open heath <ul style="list-style-type: none"> • Dwarf-shrubs should make up between 25-75% cover • <i>Ulex gallii</i> cover should be <50% of the dwarf-shrub cover • A quarter of the heathland vegetation will be in early pioneer stage (0-3 years old) at any time (i.e. $\frac{1}{12}$ vegetation managed in each year giving a total of $\frac{1}{4}$ in 3 years. Three year old heather is taken to be less than 5cm high). • There should be less than 5% of unbroken stands of bracken, European gorse and other scrub. • There should be no more than 5 fronds bracken or European gorse >50cm tall within a 2m radius in 75% of the habitat. • There should be less than 5% of the following grasses and weedy species indicative of improvement within a 1m radius over 75% of the site: <i>Agrostis stolonifera</i>, <i>Dactylus glomerata</i>, <i>Lolium perenne</i>, <i>Holcus lanatus</i>, <i>Urtica dioica</i> and <i>Cirsium spp.</i> • In maritime heath one of the following should be present: <i>Scilla verna</i>, <i>Armeria maritime</i> or <i>Plantago maritima</i>. 	Upper limit: Not required Lower limit: At least 75% of coastal heath should be good quality open heath Recording should initially target those Management Units where dry heath is a Key Habitat (KH). These are all units, except 1, 37, 38, 39, 41, 42 The specified limits also meet the requirements for maritime grassland, chough and lichen interests.
A3. Associated significant features	This habitat needs to meet the requirements for other habitats and species associated with coastal or maritime heath, including maritime grassland, chough, lichens (ciliate strap-lichen <i>Heterodermia leucomela</i> and golden hair lichen <i>Teloschistes flavicans</i>) and rare vascular plants (particularly spotted rockrose, <i>Tuberaria guttata</i>).	Upper limit: Same as lower limit. Lower limit: Chough should be recorded using all areas of maritime heath for feeding. Nationally significant lichen species should be present. Healthy populations of nationally rare vascular plants should be present.

<i>Performance indicators for factors affecting the feature</i>		
<i>Factor</i>	<i>Factor rationale and other comments</i>	<i>Operational Limits</i>
F1.Grazing	Coastal heath and grasslands require grazing to maintain a good open structure and to prevent the heath becoming dominated by scrub, bracken and gorse. Ideally, cattle and ponies are preferable to sheep as they are less- selective grazers. Graziers must be encouraged to appropriately graze the two blocks of common in this site: Mynydd Anelog and Mynydd Bychestyn. The number of active graziers has been falling in recent years. At present, only two graziers are associated with Mynydd Bychestyn, and exact graziers of Mynydd Anelog are unknown.	Upper limit: Grazing levels will not lead to excessive poaching damage or reduction of dwarf-shrub cover to below 25%. Lower limit: The site will be lightly grazed by a mixture of stock during the spring and summer.
F2 Burning	Burning is likely to favour bracken and western gorse, so this should not be used as a management tool where these species are likely to invade. Cutting may be more appropriate in these areas. Some cutting or burning management is necessary to maintain a diverse age structure. This should occur as long-term small-patch burning on a 12-year rotation. Burning should not occur unless followed up by grazing.	Upper limit: To maintain open heathland the dwarf-shrub vegetation will be managed by burning or cutting on a 12 year rotation so that $\frac{1}{12}$ of the habitat will be managed each year. Lower limit: A quarter of the heathland vegetation will be in early pioneer stage (0-3 years old) at any time.
F3 Bracken	Bracken does dominate large areas of the cliffs and has spread up into the heath in places. This has happened due to decreased grazing pressure and a shift away from cattle grazing. Heavy stock control bracken by damaging the rhizomes and crushing new growth.	Upper limit: There should be no more than 5 fronds bracken within a 2m radius in 75% of the habitat. Lower limit: There should no more than 5% of unbroken stands of bracken.

Site-specific habitat definitions

Open coastal heath

Dwarf-shrub vegetation where $\frac{1}{4}$ of the vegetation has been cut or burnt within the last 3 years and is in early pioneer stage. To maintain open heathland the dwarf-shrub vegetation will be managed by burning or cutting on a 12 year rotation so that $\frac{1}{12}$ of the habitat will be managed each year. On *Ulex gallii* dominated heath the minimum rotation recommended is 12 years to help break *Ulex* dominance. On sites with no particular species interest a longer rotation is recommended, however where chough are present there is a need to maintain open vegetation so the minimum 12 year rotation is considered most appropriate. Rapid *Ulex* re-growth will be controlled by appropriate grazing.

5. ASSESSMENT OF CONSERVATION STATUS AND MANAGEMENT REQUIREMENTS

This part of the document provides:

- A summary of the assessments of the conservation status of each feature.
- A summary of the management issues that need to be addressed to maintain or restore each feature.

5.1 Conservation Status and Management Requirements of Feature 1: Internationally important population (1% or more of the Great Britain population) of breeding and non-breeding season chough *Pyrhocorax pyrrhocorax*.

Conservation Status of Feature 1: Chough.

The condition of the chough population at January 2008 is **Favourable, Maintained**.

The past two or three decades have seen the UK chough population as a whole stabilising while populations around the Welsh coast appear to be making a recovery in numbers. At a local level the breeding population has been stable over the last 10 years and there is no evidence that the area included within the SPA boundary as a whole has ever supported significantly higher numbers of breeding birds.

However, it is important to note that recent grazing regimes on Ynys Enlli have led to decline in some areas of chough feeding habitat and that non-breeding summer flocks have declined in recent years. The non-breeding flock may have been lost to nearby areas on the mainland where chough feeding habitat may have increased in quality and extent. It cannot be assumed that breeding and non-breeding populations on Ynys Enlli will be secure in the medium or long term. Suitable alterations in habitat management, particularly grazing regimes have the potential to improve the quality and extent of chough feeding areas on the island and reverse the recent decline in some areas.

Management Requirements of Feature 1: Chough

Habitat Type

Choughs use a wide variety of invertebrate-rich habitats, including improved semi-improved and unimproved pasture, lowland, coastal and maritime heath, arable stubble and maritime grassland. In addition, Ynys Enlli is the only place in Wales where choughs have regularly been recorded feeding on invertebrates in accumulated rotting seaweed, regularly sighted on the beach at Solfach. Stone features such as rocky outcrops and traditional cloddiau are also important, particularly where bare earth is evident. Grazed earth banks provide an additional important feeding habitat. Management to maintain short swards, through for example grazing, is important to allow choughs easy access to the ground. Adjacent area of grazed pasture outside the boundary of the site are also important to the population as they are also used by chough who access them for feeding.

Breeding choughs nest on rocky ledges, the majority of which are around the mainland coast, but some sites have been recorded on Mynydd Enlli. Due to their inaccessibility, these areas are largely self-maintained. Climbing near known nest sites apparently being effectively controlled by voluntary codes of conduct.

Grazing and Sward Height

Short swards and bare ground are important for feeding choughs as they allow easy access to invertebrate food in the soil and on the ground surface. In some areas, these conditions can be created and maintained by natural conditions (e.g. wind and salt spray, naturally formed thin soils over/around rock outcrops); elsewhere management is a necessity. In most cases management of short swards and bare ground is maintained through suitable grazing regimes. Grazing animals also provide an

additional source of food for chough by creating dung invertebrate habitats. Burning can also be an important management activity, reducing vegetation height and exposing bare ground.

Winter grazing should be carried out to help maintain a short sward throughout the year. Wherever possible, a variety of stock type (sheep, cattle or ponies) should be used. Grazing with cattle or ponies should be encouraged in any areas where they will not compromise other conservation interests. The feasibility of introducing more cattle or ponies should be investigated

Stock Type

The type of stock used will affect the type of sward achieved and dung produced. Beetles and other insects associated with animal dung are a major component of the chough's diet (McCracken & Foster 1990). The practice of wintering stock outside provides an ongoing supply of dung. Sheep tend to graze close to the ground and produce close-cropped swards beneficial to feeding chough. Cattle tend to graze longer vegetation and can deal with rank grasses, which sheep leave. Cattle do not tend to produce close-cropped swards, but they do create a large amount of bare ground through poaching/scuffing and help control the spread of bracken/scrub which would be beneficial to feeding chough. In addition, cattle dung has been reported to support greater invertebrate populations. Grazing ponies would provide similar benefits to those of cattle.

In practice, it is the effect of the type of grazing on sward height, bare ground and dung invertebrate habitat that is important rather than the actual type of stock used. In North Wales choughs use areas grazed by sheep, ponies and cattle. Mixed grazing regimes providing a variety of chough feeding habitats would be most beneficial to chough.

Pesticides

Livestock suffer from the livestock pests, liver fluke and blowfly. The use of certain anti-parasitic drugs or worming agents such as the avermectins results in the release of chemical treatments into the wider environment through livestock dung and urine. This subsequently destroys those insects that feed on, or lay eggs in, dung. The use of such pesticides potentially reduces food supply for chough. Batten (1990) states that recently fledged birds may rely heavily on dung insects for food; as such they would be particularly affected by the use of these treatments. A precautionary approach is advised, and use of avermectins should be avoided.

Bracken Control

Choughs have been observed feeding in areas where bracken had been cleared but not recorded feeding in areas with thick bracken cover. Bracken control could provide additional feeding habitat to benefit chough, and may help restore heathland habitat. Bracken control on Ynys Enlli may also help encourage non-breeding summer flocks back to feed. Control should only be undertaken where suitable grazing follow-up can be ensured to prevent bracken re-growth, which could take the form of grazing with heavier stock, or where repeat cutting is possible.

Fencing of Cloddiau

Earth and stone-faced field boundaries (cloddiau) provide an important feeding habitat for chough. It is necessary that these are grazed to prevent excessive growth of vegetation which would be of little value to feeding chough. The position of fencing on walls is therefore significant. A fence located close to the base of the wall (on one or both sides) will prevent livestock access to the wall and hence grazing.

Preferred options for the alignment of fences which also allows grazing access would be:

- along the top of walls
- along one side of the wall to allow livestock access from the other side. Fencing should be positioned at a distance which allows access to both sides of the wall from the open side.

On Ynys Enlli, if fencing along the top of the wall is proposed, potential damage to Manx shearwater burrows and the integrity of the wall itself must be evaluated.

Seaweed Clearance

On Ynys Enlli, large quantities of seaweed can be washed-up at Porth Solfach and other shores around the island. The washed up seaweed creates an important invertebrate habitat and these areas are known to be important sources of insect food for choughs (Roberts, 1983).

The presence of large quantities may be considered by some to be detrimental to aesthetics of the island. However, its removal will result in the loss of a food supply, particularly in winter when other invertebrate sources tend to be limited.

The retention of natural strandline seaweed should also occur on mainland beaches.

Arable Crops

Choughs have been recorded feeding on invertebrates and grains in cereal arable fields (McCracken & Foster 1990) and were found to use spring barley stubbles on the mainland following an RSPB trial. In general, a small number of fields are cultivated each year. Where cereals are grown, the retention of winter stubble is desirable.

Anthills

Anthills provide an important feeding habitat for chough. A number of areas on the mainland and Ynys Enlli contain anthills. In general, anthills are not under threat but activities such as mowing with a tractor driven flail may harm them and should be avoided.

Predation

Avian predators, particularly peregrine falcon (*Falco peregrinus*), may predate choughs. Control of raptors is illegal in the UK. The current impact on the chough population is thought to be low and does not require intervention.

Human Disturbance

Breeding birds are vulnerable to human disturbance during the breeding season. Disturbance may be by informal scrambling close to nest sites. Most nest sites are naturally protected from disturbance as they are in inaccessible cliff areas. Birds at the nest could potentially be disturbed by boating or diving activity in the immediate vicinity of the cliffs.

Feeding birds may also be disturbed by walkers, although chough seem generally unperturbed by passers by unless directly approached. Increases in visitor pressure may prove a cause for concern, and monitoring should be undertaken with necessary mitigation where problems exist.

5.2 Conservation Status and Management Requirements of Feature 2: Internationally important population (1% or more of the Great Britain population) of breeding Manx shearwaters *Puffinus puffinus*.

Conservation Status of Feature 2: Manx shearwaters.

The condition of the Manx shearwater population at January 2008 is **Favourable, Maintained**.

Data are not currently available for all the performance indicators listed, however the increase in population figures over a long period combined with sustained reproductive success indicates that the feature can be considered 'favourable maintained'.

Management Requirements of Feature 2: Manx shearwaters.

The Manx shearwater population is largely self-maintaining and requires little in the form of active management. However, precautions are required to ensure that that birds are not disturbed in any way or that boundary restoration works are not harmful to breeding birds or burrow sites.

Introduction of Ground Predators

At present ground predators, such as common rat, fox, weasels, mink, hedgehog or snakes do not inhabit the island. Should such predators be introduced ,they could severely threaten the Manx shearwater population. All measures must be taken to avoid their introduction. Domestic animals, particularly cats, ferrets, and some dog breeds could pose a serious risk to shearwaters and must not be introduced. No wild or domestic animal may be brought onto Ynys Enlli without prior permission from CCW.

Predation by Birds

Leaper (2001) observed 73 corpses of Manx shearwater during the May to June survey period. 70% showed signs of attack by peregrine falcon (*Falco peregrinus*). A resident breeding pair is thought to be responsible. It is likely that a considerable proportion of the remaining casualties were due to predation by ravens, crows and gulls. Gull populations have increased considerably in the last 100 years but there is no evidence to suggest that this increase has seriously affected the numbers of Manx shearwaters in British colonies, presumably because Shearwaters come to land, and change over at the nest burrow, only at night. In recent years crows have been observed taking Manx shearwater eggs from burrows. If not controlled, this apparent learnt behaviour could become more widespread. Protected predator species such as peregrine falcon (*Falco peregrinus*) cannot be controlled. Any pairs of crows, magpies etc known to harm Manx shearwaters through, for example, the taking of eggs from burrows, should be eliminated to prevent the spread of learned behaviour. CCW consent and permit must be sought in advance of any control. Control must be by shooting or the use of Larsen traps. Control of gulls should only be undertaken if new evidence suggests that they are a serious predation problem.

Fencing and Stone/Earth Field Boundary Maintenance

Many Manx shearwaters dig nesting burrows into both stone-faced and earth walls. Of the 1,750 pairs breeding recorded in the lowlands in 1997, 94% were found to nest in boundary walls. Even remnant walls (low linear banks where stone-work has been removed) contain numerous burrows. Access can be gained more easily into remnant walls and it appears that a period of less meticulous wall repair in the middle and latter part of the 20th Century has encouraged Manx shearwaters to burrow in these remnant boundaries.

Although burrowing Manx shearwaters appear to benefit from easier access in derelict stone/earth boundary walls, landscape issues and other conservation features would benefit from restoration and repair of such boundaries. All burrows are protected under UK law. They are protected while in use by the birds as nest sites, and protected outside the nesting season by the provisions or the SSSI

legislation. To ensure the interests of the island's Manx shearwater population, all boundary restoration work must take account of the potential effects on Manx shearwaters and must only be carried out to the strict guidelines outlined in the Ynys Enlli Management Plan. All staff, contractors or volunteers working on field boundaries must be made aware of the guidelines.

The island's stock proof fences are erected either on top of boundary walls or along the base of the wall. Fencing posts (particularly large straining posts) erected on the bank itself may damage the bank and interfere with burrowing sites. If such fencing is carried out during the breeding season inserted posts may intrude into a burrow and cause the burrow to cave in; obstruct the burrow entrance; or cause direct damage to eggs, nestlings or adults. Again, guidelines on fencing are available in the Ynys Enlli Management Plan. All staff, contractors or volunteers working on field boundaries must be made aware of the guidelines.

Gorse Burning

In some locations Manx shearwaters burrow beneath gorse, and some areas of gorse scrub contain a high density of Manx shearwater. It is not known whether the presence of gorse, possibly providing additional cover from predators, affects the desirability of these sites. Loss of gorse cover through burning may prove detrimental in such areas. Under UK law, lowland gorse can be burned from 1 November to 31 March. However, since Manx shearwater can be present on the island from mid-March, burning during the breeding season could potentially damage adults, eggs or chicks. Gorse burning should be avoided in areas with a high density of burrows. Gorse burning must not be carried out between mid-February and mid-October to avoid the breeding season.

Lighthouse Attractions

On dark moonless nights or when there is poor visibility due to fog, drizzle, cloud cover or rain the lighthouse attracts night flying birds. Individuals may collide with the lighthouse or become exhausted from flying repeatedly round the light. Down-lights are fitted on each corner of the lighthouse to light the surrounding ground and encourage birds to land. Portable floodlights placed outside the lighthouse compound with the aim of attracting birds to the ground have been shown to have little or no effect in attracting Manx Shearwaters away from the lighthouse. Birds will often come to land, but once rested will return to circling the light.

On nights when large numbers of birds are attracted to the light, landed birds are collected and placed in sheds during the night to protect them from predation and prevent them from returning to circling the light. Likewise, birds found around the lighthouse compound in daylight are also collected and held in sheds to prevent attack by crows or other predators. The stored birds are released safely at dusk.

Between 1953 and 1999 660 Manx Shearwaters were killed by attraction to the lighthouse. Annual numbers vary between 1 and 42 (BBFO reports) and have risen over the period, probably in line with the overall population rise, but perhaps also due to an increase in intensity of the light in 1986. Between 1985 and 1999 the average has been nearly 25 per year (BBFO reports). Attractions peak in late May and August and early September, the latter corresponding to the time when juveniles embark on their first flight. The majority of casualties are not ringed, indicating that they are likely to be either juveniles of that year or individuals returning to land for the first time to breed.

It is not known whether measures to reduce mortalities significantly reduce the number of resultant deaths, however, they will have some positive impact. The current mortality rate of Manx shearwaters resulting from lighthouse attractions is a small proportion of the overall population (<0.25%) and therefore not considered a cause for concern.

- The two down-pointing sodium lights positioned immediately below the balcony railings at the NE and SW corners of the lighthouse tower should be maintained and in operation. These light the ground below the lighthouse.
- Maintain the blocked-off section of glazing in the lighthouse to produce a 'dark area' which breaks the circle of the beams and creates a non-lit area towards Mynydd Enlli in the NE.

- Manx shearwaters landing in the lighthouse compound during attractions should continue to be collected and placed in sheds before being released the following evening. Collection should take place both during the attraction and the following morning if necessary

Human Disturbance

Human disturbance can be through erosion or collapse of shearwater burrows or by disturbing individuals on land at night. Collapse of burrows during the breeding season would be particularly detrimental to breeding success. Boating and diving activity in the vicinity of the island may lead to the disturbance of feeding Manx shearwater. There are currently no official constraints on any vessels operating around the island, either in terms of speed restrictions or exclusion zones/periods.

- Visitors and new residents should be informed of the presence of Manx shearwaters and the importance of the island's population. They should be advised to avoid sensitive areas and to avoid disturbance.
- Paths should be diverted away from sensitive areas.
- Visitors should be advised not to walk on burrows or field boundary walls.

Disturbing Manx shearwaters in the course of scientific research (ringing, intrusive survey techniques etc) is strictly regulated by law. CCW permits and ringing permits are required for individuals studying/ringing Manx shearwaters. In general all activity on the island complies with the necessary regulations and is not considered a threat to the well being of the birds.

Egg Collecting and Taking of Birds for Scientific Purposes

Earlier this century, collecting eggs and chicks for food may have been significant on the island. Today the collection of birds or their eggs is prohibited under UK law. There is the possibility that eggs could be taken illegally for collections; however, it is thought that, if at all, this is a very rare occurrence on Enlli. The taking of birds and eggs for scientific research is also strictly regulated by law and require a permit from CCW. Current activities on the island comply with the necessary regulations.

Pollution at Sea

Manx shearwaters frequently settle on the water surface to rest, swim and dive for food. They are therefore, particularly vulnerable to pollution at sea, particularly oil pollution. Small-scale oil or chemical pollution may be caused by discharges from small boats in the vicinity of Ynys Enlli or spill during the transfer of oil or diesel supplies to the island from boats. Providing such discharges are small and infrequent, natural currents around the island should disperse pollutants and therefore will not pose a great threat. Manx shearwaters may also suffer through ingestion of discarded plastic articles. The species features little among beached corpses and the actual affects of localised marine pollution are not known.

There is also a risk of a major oil spill from heavy tanker traffic in the Irish Sea and the potential for future oil and gas exploration or drilling in nearby waters. Large-scale oil or chemical pollution incidents are rare but could have devastating consequences. Prevention of such incidents is outside of the scope of this management plan. Ensuring that appropriate emergency response plans are in place will help to minimise impact in such an event.

Fishing, Food Availability and Feeding Conditions

Food supply is clearly a key factor in influencing Manx shearwater populations, however, they feed over very large sea areas and fish stocks and fishing pressures are beyond the scope of this management plan. Certain fishing practices may also harm Manx shearwaters, as they may become trapped and drown in monofilament nets as they dive for fish. Such pressures are also outside of the remit of this plan.

5.3 Conservation Status and Management Requirements of Feature 3: Vegetated sea cliffs of the Atlantic and Baltic coasts (H7 *Calluna vulgaris* – *Scilla verna* heath, H8d *Calluna vulgaris*-*Ulex galli* heath, *Scilla verna* sub-community, MC8 *Festuca rubra* – *Armeria maritima*, MC9 *Festuca rubra* – *Holcus lanatus* and MC10 *Festuca rubra* – *Plantago spp* maritime grassland communities, coastal grassland and maritime cliff and slope).

Conservation Status of Feature 2: Coastal heath (Dry and maritime heath) (Atlantic Sea Cliff)

The condition of the dry coastal and maritime heaths (Atlantic Sea Cliff) at January 2008 is **Unfavourable, Recovering**.

The condition of the feature was assessed by using sample plots placed in key areas of maritime grassland and maritime or coastal heath (SAC Monitoring Report 09/01/04). Overall, the vegetated sea cliffs were recorded to be in an unfavourable condition, although separate monitoring of the coastal or maritime heath on Ynys Enlli in 2003 found that it was Favourable, Recovering.

On Ynys Enlli, areas of coastal heath which were historically overgrazed have recovered considerably since the 1980's and early 90's. In all grazing compartments heather cover is at an acceptable level and pioneer and mature plants are present along with characteristic species. There is no immediate risk of loss or sudden decline. Choughs are known to feed in all areas and associated soil lichens and notable vascular plants are present in healthy populations. All compartments are grazed annually and are not at risk of agricultural improvement or other development. Bracken, gorse and other negative species are within specified limits. Erosion is restricted to a few narrow paths. However, some areas are currently under-grazed where sward height exceeds specified limits. Future adjustments to the grazing regime should address this issue; hence the condition of coastal or maritime heath is considered 'favourable recovering'.

(Note caution regarding the definition of dry heath. This is not officially is not a feature of this the Clogwyni Pen Llŷn SAC. Considering that dry heath is makes up a large percentage of this site and it is a notified feature of the component SSSIs it makes little sense that it has not been designated as a SAC feature, and it is intended to rectify this situation).

The populations of rare vascular plants on the mainland, particularly spotted rockrose, *Tuberaria guttata* and prostrate broom *Cytisus scoparius* subsp, *maritimus*, and the mainland soil-lichens ciliate strap-lichen *Heterodermia leucomela* and golden hair lichen *Teloschistes flavicans* are all considered to be Unfavourable, Declining.

Management Requirements of Feature 3: Dry heath (Atlantic Sea Cliff)

Rare vascular and non-vascular plants:

Mynydd Mawr is an extremely important site for spotted rockrose *Tuberaria guttata* which is found on the summit and slopes of Mynydd y Gwyddel. This is the only site for the species on mainland Wales. The population has been closely monitored and shows fluctuations in size and extent, although the ephemeral life cycle of this species means that such counts may not give a complete picture. The plants are much smaller and less luxuriant than plants at a comparable location on Anglesey. Sheep grazing is thought to reduce the vigour of the population and is therefore threatening its long-term survival. There are proposals to reduce sheep grazing in favour of ponies which should help halt the decline of this species in particular.

Prostrate broom *Cytisus scoparius* subsp, *maritimus* occurs on the cliff above the important geological exposure at Parwyd. The cliff top is fenced off from the heavily grazed improved fields behind, although the fence doesn't quite meet the cliff edge and the sheep can get around the fence at the edges and obviously do graze occasionally. A 1993 survey found plants occurring on both the actual cliff and on the cliff top fenced off section. Growth on the cliff was recorded as more luxuriant than the stunted, grazed plants on the cliff top, and repair of the fencing would prevent grazing and allow further recovery of this species.

The two rare soil lichen species, golden hair lichen *Teloschistes flavicans* and ciliate strap lichen *Heterodermia leucomela* are present on the Mynydd Mawr. The former is found on rocky outcrops and short turf the latter is found primarily at the heathland/coastal grassland transition. Again, they are both less luxuriant than at their Ynys Enlli locations. Both species of lichen and the spotted rockrose are very sensitive to burning and every effort should be made to prevent burning where they occur.

Grazing:

The 2004 assessment of condition was based on the fact that habitat was under-grazed in parts and overgrazed in parts. Some good quality western gorse heath is found on the National Trust land but in places this has become invaded by bracken due to undergrazing. Bracken encroachment is also a serious problem in some sections of the site. There has been a more active management of sections of the heath since this assessment, including bracken control and rotational cutting of some areas, hence the current qualifier that it is recovering. The NT has been active in controlling bracken at its holding at Muriau, and work has been carried out recently at Pen y Cil and on Ynys Enlli.

In 2005, a Management Schedule was drawn up for four sections of the site, Mynydd Anelog, Mynydd Mawr, Mynydd Bychestyn and Pen y Cil, involving partners including NT, RSPB, Cyngor Gwynedd and CYMAD. Some of the work was implemented under the Cadw'r Lliw yn Llyn project, and further work will be implemented as part of the Llyn Heaths Project which has just gained Heritage lottery funding. Sympathetic grazing regimes with heavy stock, the establishment of cutting and burning of heath blocks on long rotation, and control of gorse and bracken form the backbone of these plans.

In the long-term favourable condition of the vegetation will only be achieved with appropriate grazing. Grazing should remove excess grass growth preventing the build-up of litter and a dense thatch. Grazing should also remove young western gorse and a small proportion of ericoid (heather) growth. Heavy grazing in the autumn can result in excessive removal of ericoids resulting in their gradual replacement by western gorse. Grazing is best focused early in the season when grasses and young gorse are most palatable. Heavy livestock such as cattle or ponies are better than sheep at controlling both gorse and bracken regeneration.

Burning/Cutting

Management will promote the development of more diverse heathland vegetation with an increase in the cover and abundance of ericoids (bell heather *Erica cinerea* and common heather *Calluna vulgaris*) and a concurrent decrease in the dominance of western gorse *Ulex gallii*. Structural diversity will be improved by rotational management to provide areas of short open heath with all the intermediate stages through to tall mature heath. A rotation of 12 years or more is recommended to break the dominance of western gorse. Burning tends to encourage the spread and dominance of western gorse and bracken therefore burning of heathland will be discouraged during the restoration phase but may be reintroduced at a later date for maintenance management. Restoration management will be carried out by patch cutting with patches measuring approximately 0.5-1ha.

6. ACTION PLAN: SUMMARY

This section takes the management requirements outlined in Section 5 a stage further, assessing the specific management actions required on each management unit. This information is a summary of that held in CCW's Actions Database for sites, and the database will be used by CCW and partner organisations to plan future work to meet the Wales Environment Strategy targets for sites.

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
001	001683	Unit 1 Intertidal	Identify any issues and remedies through the updating and revision of the SAC management plan for Pen Llyn a'r Sarnau SAC in 2008-09. This work to be led by the relevant authorities for the SAC (Countryside Council for Wales, Gwynedd Council, Ceredigion County Council, Powys County Council, Snowdonia National Park Authority, North Western & North Wales Sea Fisheries Committee, Environment Agency Wales, Dwr Cymru, Severn Trent Water and Trinity House), working with the SAC Liaison Group and other groups, organisations and individuals.	No
002	001684	Unit 2a Porth Oer	Overgrazing with sheep an issue here - needs to be lighter, possibly the timing adjusted to allow for heavier grazing in the spring. Ideally heavier stock are needed - cattle or ponies. The coastal path is a constraint for cattle grazing - long-term aim to open up the coastal corridor a field back to allow freer stock movement or incorporate 'break-outs' along the path.	Yes
003	001685	Unit 2b Porth Oer	Overgrazing with sheep an issue here - needs to be lighter, possibly the timing adjusted to allow for heavier grazing in the spring. Ideally heavier stock are needed - cattle or ponies. The coastal path is a constraint for cattle grazing - long-term aim to open up the coastal corridor a field back to allow freer stock movement or incorporate 'break-outs' along the path.	Yes
004	001686	Unit 3a Carreg Farm	Overgrazing with sheep an issue here - needs to be lighter, possibly the timing adjusted to allow for heavier grazing in the spring. Ideally heavier stock are needed - cattle or ponies. The coastal path is a constraint for cattle grazing - long-term aim to open up the coastal corridor a field back to allow freer stock movement or incorporate 'break-outs' along the path.	Yes
005	001687	Unit 3b Carreg Farm	Problem here possibly undergrazing - need to negotiate increased grazing levels and appropriate stock management - again heavier stock would be desirable.	Yes
007	001689	Unit 3c Carreg Farm	Units 34 and 35 run together. Land tends to be grazed in winter, with nothing in spring. Emphasis of grazing pattern needs to change to spring grazing.	Yes
008	001690	Unit 4a Mynydd Anelog	Units 34 and 35 run together. Land tends to be grazed in winter, with nothing in spring. Emphasis of grazing pattern needs to be changed to spring grazing. Previous issues with illegal spreading of slurry on heath and cutting. Shetland ponies recently introduced.	Yes

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
009	001701	Unit 4b Mynydd Anelog	Common land, open to Unit 37. However ownership of the common unclear, and grazing levels are unmanaged. Heath used to overgrazed, now probably undergrazed, but good quality.	Yes
010	001702	Unit 4c Mynydd Anelog	Common land belonging to the National Trust. Used to be heavily overgrazed, but stocking levels have dramatically dropped in recent years, and now undergrazed. Only active grazier is at Anelog Farm. The common is open to Unit 36. Bracken control is needed. Heavy stock grazing, ideally ponies, would be desirable here.	Yes
011	001703	Unit 4d Mynydd Anelog	Very small unit. Management unknown.	Yes
012	001704	Unit 4e Mynydd Anelog	Very small unit. Management unknown.	Yes
013	001707	Unit 5a Porth Llanllawen	Historically deliberately heavily grazed for Chough. Now managed along with land under S15 Management Agreement and heath in good condition. Gorse control under the agreement, and bracken controlled 2007 by NT.	Yes
014	001711	Unit 5b Porth Llanllawen	Historically deliberately heavily grazed for Chough. Now managed along with land under S15 Management Agreement and heath in good condition. Gorse control under the agreement, and bracken controlled 2007 by NT.	Yes
015	001713	Unit 6 Llanllawen Fawr	Historically deliberately heavily grazed for Chough. Now managed along with land under S15 Management Agreement and heath in good condition. Gorse control under the agreement, and bracken controlled 2007 by NT.	Yes
016	001714	Unit 7a Braich y Pwll	Historically deliberately heavily grazed for Chough. Now managed along with land under S15 Management Agreement and heath in good condition. Gorse control under the agreement, and bracken controlled 2007 by NT.	Yes
017	001716	Unit 7b Braich y Pwll	Generally overgrazed, with most serious effects in Unit 46, which is open to adjoining units. <i>Tuberaria guttata</i> occurs here at its only mainland site and is suffering from the effects of sheep grazing. To protect this species, the grazing needs to be modified to lighter pony grazing, with possibly a complete break from grazing for a period to allow the population to recover. Impacts also on soil lichens <i>Heterodermia</i> and <i>Teloschistes</i> which also occur here. Burning at this site inappropriate at this stage due to areas over-burned in the past, and cutting favoured instead, along with bracken and gorse control. RSPB involvement necessary due to importance of area for chough, but the mosaic habitat which should develop will support both heath and associated vascular and non-vascular species and chough. TG agreement being negotiated.	Yes

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
018	001721	Unit 7c Braich y Pwll	Generally overgrazed, with most serious effects in Unit 46, which is open to adjoining units. <i>Tuberaria guttata</i> occurs here at its only mainland site and is suffering from the effects of sheep grazing. To protect this species, the grazing needs to be modified to lighter pony grazing, with possibly a complete break from grazing for a period to allow the population to recover. Impacts also on soil lichens <i>Heterodermia</i> and <i>Teloschistes</i> which also occur here. Burning at this site inappropriate at this stage due to areas over-burned in the past, and cutting favoured instead, along with bracken and gorse control. RSPB involvement necessary due to importance of area for chough, but the mosaic habitat which should develop will support both heath and associated vascular and non-vascular species and chough. TG agreement being negotiated.	Yes
019	001722	Unit 8 Porth Felen	Possible issues with grazing type and timing. Narrow strip above cliffs with improved pasture behind.	Yes
020	001724	Unit 9	This section has become quite rank in recent years, and the timing of grazing is probably the problem. NT tenancy renewed recently with conservation clause for variation of grazing regime as necessary. Stocking will be 50 sheep in Spring then remove half for the rest of the grazing season. Cattle will be run in the field adjoining with access to the coastal strip. Gorse control by NT.	Yes
021	001728	Unit 10a Mynydd Bychestyn	Common dominated by western gorse with very little heather. Currently sheep grazed autumn/winter, but stock absent in spring, so grazing regime issues need to be resolved. Studies have revealed an absence of heather seed in the soil seed bank, almost certainly due to past frequent over-burning. Seedbank needs to be restored artificially, by cutting patches and putting on heather brash harvested by brush-cutter from adjoining land in Sept/Oct, or burning heather brash on scarified land to stimulate seed. Subsequently, cattle grazing could be introduced, through management agreement with CCW.	Yes
022	001729	Unit 10b Mynydd Bychestyn	Common dominated by western gorse with very little heather. Currently sheep grazed autumn/winter, but stock absent in spring, so grazing regime issues need to be resolved. Studies have revealed an absence of heather seed in the soil seed bank, almost certainly due to past frequent over-burning. Seedbank needs to be restored artificially, by cutting patches and putting on heather brash harvested by brush-cutter from adjoining land in Sept/Oct, or burning heather brash on scarified land to stimulate seed. Subsequently, cattle grazing could be introduced, through management agreement with CCW.	Yes

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
023	001730	Unit 10c Mynydd Bychestyn	Common dominated by western gorse with very little heather. Currently sheep grazed autumn/winter, but stock absent in spring, so grazing regime issues need to be resolved. Studies have revealed an absence of heather seed in the soil seed bank, almost certainly due to past frequent over-burning. Seedbank needs to be restored artificially, by cutting patches and putting on heather brash harvested by brush-cutter from adjoining land in Sept/Oct, or burning heather brash on scarified land to stimulate seed. Subsequently, cattle grazing could be introduced, through management agreement with CCW.	Yes
024	001732	Unit 11 Parwyd	Prostrate broom occurs here on the cliffs of Parwyd. Fenced off section at the top of the cliff is not fully stockproof, allowing some sheep access, and the broom may be being constrained to the inaccessible cliff because of this. Improved land above heavily grazed, but on thin soils and very exposed to salt-laden wind so potential for restoration/expansion of maritime grassland area. Possible management agreement or Llyn Partnership project.	Yes
025	001734	Unit 12a Pen y Cil	Moderate to heavy sheep grazing, with areas that are grassy with agricultural weeds due to previous stock feeding. Some nice areas of maritime grassland. Heavier stock would help break up the land and create opportunities for heath colonisation/expansion. Burning plan needs to be developed - burning on the coastal slopes with dense gorse has been consented previously to allow stock access.	Yes
026	001736	Unit 12b Pen y Cil	Moderate to heavy sheep grazing, with areas that are grassy with agricultural weeds due to previous stock feeding. Some nice areas of maritime grassland. Heavier stock would help break up the land and create opportunities for heath colonisation/expansion. Burning plan needs to be developed - burning on the coastal slopes with dense gorse has been consented previously to allow stock access.	Yes
027	001738	Unit 12c Pen y Cil	Small unit. No known issues.	No
028	001742	Unit 13a Porth y Pistyll	No known issues.	No
029	001743	Unit 13b Porth y Pistyll	No known issues.	No
031	001745	Unit 15 Cwrt (inc Porth Meudwy)	Large unit owned by NT and tenanted by Cwrt includes coast from Porth y Pistyll to Porth Simdde. Issues with accessibility to stock, leading to areas which are dominated by bracken and scrub. Water supply also an issue if grazing to be encouraged. Cwrt has an existing TG agreement.	Yes
034	001748	Unit 16. Porth Simdde	No known issues. Scrub?	No

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
035	001749	Unit 17a Ynys Enlli	Interior land on Ynys Enlli; mainly agricultural land with the SAC features mainly confined to the coastal areas and Mountain in Unit 66. Land covered by Management Agreements with BITL, BBFO and new agreement being negotiated with RSPB and sub-tenant with project proposals identified annually. Lowland gorse burning on rotation, annual bracken cutting, drainage and boundary management issues in this area.	Yes
036	001750	Unit 17b Ynys Enlli	Lighthouse compound. Current issues relate to proposals for wind turbines and solar panels.	Yes
037	001751	Unit 18a Ynys Gwylan Fawr	This unit is considered to be under appropriate conservation management.	No
038	001752	Unit 18b Ynys Gwylan Fach	This unit is considered to be under appropriate conservation management.	No
039	002054	Unit 1a Intertidal	Porth Oer. Not included in Pellyn a'r Sarnau SAC, but part of Clogwyni Penllyn SAC and Glannau Aberadaron SPA, underpinned by Glannau Aberadaron SSSI.	Yes
041	002056	Unit 17c Ynys Enlli	Unit includes coastal land and mountain land which supports the majority of the SAC features. A management agreement exists with BBFO, BITL and a new agreement is being negotiated with RSPB as BITL tenant, and their sub-tenant. Management under this agreement already being implemented, including cattle grazing of the mountain and gorse burning on 7 year rotation. The overall condition of the site features are favourable or unfavourable improving, and this will be maintained by this management.	Yes
042	002383	Unit 14 Bardsey Island SSSI- marine 1	Identify any issues and remedies through the updating and revision of the SAC management plan for Pen Llyn a'r Sarnau SAC in 2008-09. This work to be led by the relevant authorities for the SAC (Countryside Council for Wales, Gwynedd Council, Ceredigion County Council, Powys County Council, Snowdonia National Park Authority, North Western & North Wales Sea Fisheries Committee, Environment Agency Wales, Dwr Cymru, Severn Trent Water and Trinity House), working with the SAC Liaison Group and other groups, organisations and individuals.	No
043	002925	Unit 7d Braich y Pwll	This unit is considered to be under appropriate conservation management.	No

7. GLOSSARY

This glossary defines some of the terms used in this **Core Management Plan**. Some of the definitions are based on definitions contained in other documents, including legislation and other publications of CCW and the UK nature conservation agencies. None of these definitions is legally definitive.

Action	A recognisable and individually described act, undertaking or project of any kind, specified in section 6 of a Core Management Plan or Management Plan , as being required for the conservation management of a site.
Attribute	A quantifiable and monitorable characteristic of a feature that, in combination with other such attributes, describes its condition .
Common Standards Monitoring	A set of principles developed jointly by the UK conservation agencies to help ensure a consistent approach to monitoring and reporting on the features of sites designated for nature conservation, supported by guidance on identification of attributes and monitoring methodologies.
Condition	A description of the state of a feature in terms of qualities or attributes that are relevant in a nature conservation context. For example the condition of a habitat usually includes its extent and species composition and might also include aspects of its ecological functioning, spatial distribution and so on. The condition of a species population usually includes its total size and might also include its age structure, productivity, relationship to other populations and spatial distribution. Aspects of the habitat(s) on which a species population depends may also be considered as attributes of its condition.
Condition assessment	The process of characterising the condition of a feature with particular reference to whether the aspirations for its condition, as expressed in its conservation objective , are being met.
Condition categories	The condition of feature can be categorised, following condition assessment as one of the following ² : <ul style="list-style-type: none"> Favourable: maintained; Favourable: recovered; Favourable: un-classified Unfavourable: recovering; Unfavourable: no change; Unfavourable: declining; Unfavourable: un-classified Partially destroyed; Destroyed.
Conservation management	Acts or undertaking of all kinds, including but not necessarily limited to actions , taken with the aim of achieving the conservation objectives of a site. Conservation management includes the taking of statutory and non-statutory measures, it can include the acts of any party and it may take place outside site boundaries as well as within sites. Conservation management may also be embedded within other frameworks for land/sea management carried out for purposes other than achieving the conservation objectives.
Conservation objective	The expression of the desired conservation status of a feature , expressed as a vision for the feature and a series of performance indicators . The conservation objective for a feature is thus a composite statement, and each feature has one conservation objective.

² See JNCC guidance on Common Standards Monitoring <http://www.jncc.gov.uk/page-2272>

Conservation status	A description of the state of a feature that comprises both its condition and the state of the factors affecting or likely to affect it. Conservation status is thus a characterisation of both the current state of a feature and its future prospects.
Conservation status assessment	The process of characterising the conservation status of a feature with particular reference to whether the aspirations for it, as expressed in its conservation objective , are being met. The results of conservation status assessment can be summarised either as ‘favourable’ (i.e. conservation objectives are met) or unfavourable (i.e. conservation objectives are not met). However the value of conservation status assessment in terms of supporting decisions about conservation management , lies mainly in the details of the assessment of feature condition , factors and trend information derived from comparisons between current and previous conservation status assessments and condition assessments.
Core Management Plan	A CCW document containing the conservation objectives for a site and a summary of other information contained in a full site Management Plan .
Factor	Anything that has influenced, is influencing or may influence the condition of a feature . Factors can be natural processes, human activities or effects arising from natural process or human activities, They can be positive or negative in terms of their influence on features, and they can arise within a site or from outside the site. Physical, socio-economic or legal constraints on conservation management can also be considered as factors.
Favourable condition	See condition and condition assessment
Favourable conservation status	See conservation status and conservation status assessment . ³
Feature	The species population, habitat type or other entity for which a site is designated. The ecological or geological interest which justifies the designation of a site and which is the focus of conservation management.
Integrity	See site integrity
Key Feature	The habitat or species population within a management unit that is the primary focus of conservation management and monitoring in that unit.
Management Plan	The full expression of a designated site’s legal status, vision , features , conservation objectives , performance indicators and management requirements. A complete management plan may not reside in a single document, but may be contained in a number of documents (including in particular the Core Management Plan) and sets of electronically stored information.
Management Unit	An area within a site, defined according to one or more of a range of criteria, such as topography, location of features , tenure, patterns of land/sea use. The

³ A full definition of favourable conservation status is given in Section 4.

key characteristic of management units is to reflect the spatial scale at which **conservation management** and **monitoring** can be most effectively organised. They are used as the primary basis for differentiating priorities for conservation management and monitoring in different parts of a site, and for facilitating communication with those responsible for management of different parts of a site.

Monitoring An intermittent (regular or irregular) series of observations in time, carried out to show the extent of compliance with a formulated standard or degree of deviation from an expected norm. In **Common Standards Monitoring**, the formulated standard is the quantified expression of favourable **condition** based on **attributes**.

Operational limits The levels or values within which a **factor** is considered to be acceptable in terms of its influence on a **feature**. A factor may have both upper and lower operational limits, or only an upper limit or lower limit. For some factors an upper limit may be zero.

Performance indicators The **attributes** and their associated **specified limits**, together with **factors** and their associated **operational limits**, which provide the standard against which information from **monitoring** and other sources is used to determine the degree to which the **conservation objectives** for a **feature** are being met. Performance indicators are part of, not the same as, conservation objectives. See also **vision for the feature**.

Plan or project **Project:** Any form of construction work, installation, development or other intervention in the environment, the carrying out or continuance of which is subject to a decision by any public body or statutory undertaker.
Plan: a document prepared or adopted by a public body or statutory undertaker, intended to influence decisions on the carrying out of **projects**. Decisions on plans and projects which affect Natura 2000 and Ramsar sites are subject to specific legal and policy procedures.

Site integrity The coherence of a site's ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it is designated.

Site Management Statement (SMS) The document containing CCW's views about the management of a site issued as part of the legal notification of an SSSI under section 28(4) of the Wildlife and Countryside Act 1981, as substituted.

Special Feature See **feature**.

Specified limit The levels or values for an **attribute** which define the degree to which the attribute can fluctuate without creating cause for concern about the **condition** of the **feature**. The range within the limits corresponds to favourable, the range outside the limits corresponds to unfavourable. Attributes may have lower specified limits, upper specified limits, or both.

Unit See **management unit**.

Vision for the feature The expression, within a **conservation objective**, of the aspirations for the **feature** concerned. See also **performance indicators**.

Vision Statement The statement conveying an impression of the whole site in the state that is intended to be the product of its **conservation management**. A ‘pen portrait’ outlining the **conditions** that should prevail when all the **conservation objectives** are met. A description of the site as it would be when all the **features** are in **favourable condition**.

8. REFERENCES

Kath Hewitt Field Liaison Officer 2002 and Helen Wilkinson Field and Liaison Officer 2003, *Ynys Enlli/Bardsey Island National Nature Reserve Conservation Management Plan 2002-2006*, Second Draft October 2003. CCW and Bardsey Island Trust Ltd.

Clogwyni Penllŷn cSAC; H1230: Vegetated Sea Cliffs of The Atlantic and Baltic Coasts SAC Monitoring report (draft). 09/01/04. CCW.

CCW Management Schedule for Glannau Aberdaron (Mynydd Mawr). 2005

CCW Management Schedule for Mynydd Bychestyn and Pen y Cil. 2005

CCW Management Schedule for Mynydd Anelog. 2005

J A Lister, AP Foster 1993, National Trust Biological Surveys. Carreg Farm, North Aberdaron

J A Lister, AP Foster 1993, National Trust Biological Surveys. Porth Llanllawen, North Aberdaron

J A Lister, AP Foster 1993, National Trust Biological Surveys. Pen y Cil, South Aberdaron

J A Lister, AP Foster 1993, National Trust Biological Surveys. Cwrt Farm, South Aberdaron

J A Lister, AP Foster 1993, National Trust Biological Surveys. Braich y Pwll, South Aberdaron.

J A Lister, AP Foster 1993, National Trust Biological Surveys. Mynydd Anelog, North Aberdaron.

J A Lister, AP Foster 1993, National Trust Biological Surveys. Mynydd Bychestyn, Gwynedd

K. Alexander, W. Lutley & K. Hearn, 1981. National Trust Biological Survey Lleyn Peninsula (1) Aberdaron Area, Dwyfor, Gwynedd.