CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

CORE MANAGEMENT PLAN
INCLUDING CONSERVATION OBJECTIVES

FOR

AFONYDD CLEDDAU / CLEDDAU RIVERS SAC (SPECIAL AREA OF CONSERVATION)

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

Cyngor Cefn Gwlad Cymru
Countryside Council for Wales

NATURA 2000

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PREFACE

This document provides the main elements of CCW's management plan for the site named. It sets out what needs to be achieved on the site, 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 site. 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.

Our vision for the Afonydd Cleddau SAC will be to maintain, or where necessary restore the river to high ecological status, including its largely unmodified and undisturbed physical character, so that all of its special features will be able to sustain themselves in the long-term as part of a naturally functioning ecosystem. Allowing the natural processes of erosion and deposition to operate without undue interference and maintaining or restoring connectivity maintains the physical river habitat, which forms the foundation for this ecosystem. The quality and quantity of water, including natural flow variability, and the quality of adjacent habitats, will be maintained or restored to a level necessary to maintain the features in favourable condition for the foreseeable future.

The aquatic plant communities that characterise parts of the river will not only be attractive but will also give a good indication of the overall quality of the environment. They will contain the variety and abundance of species expected for this type of river, in conditions of suitably clean water and bed substrate combined with a relatively stable flow regime. Locally, there will be patches of white-flowered water-crowfoots. In the more shaded reaches, aquatic plants may be scarce, consisting mainly of mosses and liverworts.

The special fish species found in the river, both residents such as the bullhead and brook lamprey, and migratory species such as the sea and river lamprey which swim up river to spawn and go through their juvenile stages in the river, will be present in numbers that reflect a healthy and sustainable population supported by well distributed good-quality habitat. The migratory fish will be able to complete their migrations and life cycles largely unhindered by artificial barriers such as weirs, pollution, or depleted flows.

The abundance of prey and widespread availability of undisturbed resting and breeding sites, allows a large otter population to thrive. They will continue to be found along the entire length of the river and its main tributaries.

The presence of the River Cleddau SAC and its special wildlife will enhance the economic and social values of the area, by providing a high quality environment for ecotourism, outdoor activities and peaceful enjoyment by local people and visitors. The river catchment's functions of controlling flooding and supplying clean water will continue to be recognised and promoted through appropriate land management. The river will be a focus for education to promote increased understanding of its biodiversity and the essential life support functions of its ecosystems.

There will be areas of undisturbed yet naturally dynamic alluvial forests throughout the SAC, providing cover and breeding opportunities for the otter. Areas of lowland raised bog, fen and swamp within the river floodplain and SAC will be maintained and where necessary restored.

2. SITE DESCRIPTION

2.1 Area and Designations Covered by this Plan

Grid references: SM 955 155 Haverfordwest town weir (Western Cleddau)
SN 060 144 Blackpool Bridge (Eastern Cleddau)

Unitary authorities: Pembrokeshire County Council
Pembrokeshire Coast National Park

Area (hectares): 751 ha

Designations covered:

Afon Cleddau Dwyreiniol (Eastern Cleddau River) SSSI
Afon Cleddau Gorllewinol (Western Cleddau River) SSSI
Esgyrn Bottom SSSI
Corsydd Llangloffan SSSI
Wallis Moor SSSI
Treffgarne Gorge and Tors

Detailed maps of the designated sites are available through CCW's web site:
http://www.ccw.gov.uk/interactive-maps/protected-areas-map.aspx

2.2 Outline Description

The River Cleddau is one of the westernmost rivers in Britain and can be broadly divided into the Eastern and Western arms.

A striking feature of this river is that it flows southwards, cutting across the structural orientation in the underlying rocks, which are of Precambrian to Silurian age (650-395 million years ago). In contrast to the orientation of the main channel, its main tributaries follow the orientation of the rocks or are controlled by structural features such as faults and folds.

The catchment is predominantly agricultural land with significant areas of permanent pasture, broadleaved woodland and other semi-natural vegetation. Most of the soils are of clay-rich acidic brown earth type, developed under former and surviving woodland cover, although there are also peaty deposits and peaty soils in some areas.

The **Eastern Cleddau** River
Starting at an altitude of 225m, approximately 1.5km from Mynachlog-ddu and at the foot of the Preseli hills of north Pembrokeshire, the river flows for 26km (74km including tributaries) south to its tidal limit at Blackpool Bridge, where it discharges into the Milford Haven Waterway SAC.

From its source the river flows south, across an ancient valley wetland. The boundary for the upper reach of the Eastern Cleddau River and Afon Wern abuts the Mynydd Preseli SSSI. The gradient of the river increases producing a turbulent flow during its journey south through narrow wooded valleys. In its lower reaches the river meanders through a wide valley floodplain bordered by low bluffs.

The tributaries included within the Eastern Cleddau are the Afon Wern, Llanycefn, Rhyd-afallen, Afon Syfynwy, Rhyd-y-Brown Brook, Ty-llosg Brook, Deepford Brook, Cotland Brook, Afon Conin, Pont Shan and Narberth Brook.

The **Western Cleddau** River
The main channel stretches for 30km between its source at Mathry, which lies at an altitude of 112m, to the tidal limit of the Daugleddau Estuary at Haverfordwest, flowing over sands and gravels deposited as the ice sheets from the last glaciation retreated.

In its upper course the river flows over soft substrates, across a marshy valley, bounded by the extensive mire of Corsydd Llangloffan NNR/SSSI. As it enters the wooded valley of Priskilly Forest the gradient of the river increases, and this relatively rapid section continues to Wolf's Castle and through the gorges at Treffgarne. In its lower reaches the river meanders through a wide valley floodplain bordered by low bluffs, to its tidal limit at Haverfordwest, where the Western Cleddau discharges into the Milford Haven Waterway SAC.

The tributaries included within the Western Cleddau are the Afon Cleddau, Nant-y-bugail, Afon Anghof, Nant-y-coy Brook, Spittal Brook, Rudbaxton Water, Camrose Brook and Cartlett Brook.

At the head of the Afon Cleddau is Esgyrn Bottom SSSI, the best example of a raised bog in the county as well as the most south-westerly example of this habitat in the UK

The ecological structure and functions of the site are dependent on hydrological and geomorphological processes (often referred to as hydromorphological processes), the quality of riparian habitats and connectivity of habitats. Animals that move around and sometimes leave the site, such as migratory fish and otters, may also be affected by factors operating outside the site.

Hydrological processes, in particular river flow (level and variability) and water chemistry, determine a range of habitat factors of critical importance to the SAC features, including current velocity, water depth, wetted area, substrate quality, dissolved oxygen levels and water temperature. Maintenance of both high 'spate' flows and base-flows is essential. Reduction in flows may reduce the ability of the adults of migratory fish to reach spawning sites. Water-crowfoot vegetation thrives in relatively stable, moderate flows and clean water. The flow regime should be characteristic of the river in order to support the functioning of the river ecosystem.

Geomorphological processes of erosion by water and subsequent deposition of eroded sediments downstream, create the physical structure of the river habitats. Whilst some sections of the river are naturally stable, processes at the wider catchment scale generally govern processes of erosion and deposition occurring at the reach scale, although locally, factors such as the effect of grazing levels on riparian vegetation structure may contribute to enhanced erosion rates. In general, management that interferes with natural geomorphological processes, for example preventing bank erosion through the use of hard revetments or removing large amounts of gravel, are likely to be damaging to the coherence of the ecosystem structure and functions.

Riparian habitats, including banksides and habitats on adjacent land, are an integral part of the river ecosystem. Diverse and high quality riparian habitats have a vital role in maintaining the SAC features in a favourable condition. The type and condition of riparian vegetation influences shade and water temperature, nutrient run-off from adjacent land, the availability of woody debris to the channel and inputs of leaf litter and invertebrates to support in-steam consumers. Light, temperature and nutrient levels influence in-stream plant production and habitat suitability for the SAC features. Woody debris is very important as it provides refuge

areas from predators, traps sediment to create spawning and juvenile habitat and forms the base of an important aquatic food chain. Otters require sufficient undisturbed riparian habitats as breeding and resting sites. It is important that appropriate amounts of tree cover, in general at least 50% high canopy cover, tall vegetation and other semi-natural habitats are maintained on the riverbanks and in adjacent areas, and that they are properly managed to support the SAC features. This may be achieved, for example, through setting up stream-side corridors in appropriate locations, managing grazing levels, selective coppicing of riparian trees and restoring adjacent wetlands.

Habitat connectivity is an important property of river ecosystem structure and function. Many of the fish that spawn in the river are migratory, depending on the maintenance of suitable conditions on their migration routes to allow the adults to reach available spawning habitat and juvenile fish to migrate downstream. For resident species, dispersal to new areas, or the prevention of dispersal causing isolated populations to become genetically distinct, may be important factors. Artificial obstructions including weirs and bridge sills can reduce connectivity for some species. In addition, reaches subject to depleted flow levels, pollution, or disturbance due to noise, vibration or light, can all inhibit the movement of sensitive species. The dispersal of semi-terrestrial species such as the otter can be adversely affected by structures such as bridges under certain flow conditions, therefore, these need to be designed to allow safe passage. The continuity of riparian habitats enables a wide range of terrestrial species, for example lesser horseshoe bats, to migrate and disperse through the landscape. Connectivity should be maintained or restored where necessary as a means to ensure access for the features to sufficient habitat within the SAC.

2.3 Outline of Past and Current Management

There are many different aspects to the management of this large and complex site. Refer to the Eastern Cleddau and Western Cleddau SSSI Site Management Statements for details.

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 units have been based on the following:

- SSSI boundaries
- Location of key features such as Alluvial woodland and Ranunculion beds
- Differences in the physical character and flow volumes between the reaches
- Differences in land use and management issues between reaches
- Estuaries: the reach below the tidal limit is a separate SAC

See accompanying maps showing the management units referred to in this plan.

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

Unit no.	Unit name	SAC	SSSI	NNR	Other
Western Cleddau					
1	Main channel: *Haverfordwest – junction with Spittal Brook* Camrose Brook	✔	✔		
2	Cartlett Brook	✔	✔		
3	Main channel: *Spittal Brook junction – confluence of Western Cleddau & Afon Cleddau*	✔	✔		
4	Rudbaxton Water Spittal Brook	✔	✔		
5	Nant y Bugail Nant y Coy	✔	✔		
6	Afon Anghof	✔	✔		
7	Afon Cleddau & Western Cleddau head waters	✔	✔		
Eastern Cleddau					
8	Narberth Brook Pont Shan	✔	✔		
9	Conin	✔	✔		
10	Main channel: *Canaston bridge – junction with Syfynwy*	✔	✔		
11	Deepford Brook, inc. Cotland brook	✔	✔		
12	Syfynwy below reservoir	✔	✔		
13	Syfynwy above reservoir	✔	✔		
14	Main channel: *junction with Syfynwy – confluence of Afon Wern & EC*	✔	✔		
15	Afon Rhyd Afallen Llanycefn	✔	✔		
16	Eastern Cleddau from the confluence with Afon Wern	✔	✔		
17	Afon Wern	✔	✔		
Corsydd Llangloffan					
18	CCW section	✔	✔	✔	CCW owned
19	Central section	✔	✔	✔	Privately owned
20	WTSWW section	✔	✔	✔	Wildlife Trust owned
30	Jordanston section	✔	✔		
Esgyrn Bottom					
21	Esgyrn Western section	✔ (part)	✔		
22	Esgyrn NE section		✔		
23	Esgyrn SE Section		✔		
29	Esgyrn Core		✔		
Wallis Moor					
24	Wallis 1 (the part of the SSSI not SAC)		✔		Common land
25	Wallis 2 (the part of the SSSI not SAC)		✔		Common land
26	Wallis 3 (the part of the SSSI not SAC)		✔		Common land

Unit no.	Unit name	SAC	SSSI	NNR	Other
27	Wallis 4		✔		Common land
31	Cleddau SAC running through Wallis 2	✔	✔		
32	Cleddau SAC running through Wallis 1	✔	✔		
33	Cleddau SAC running through Wallis 4	✔	✔		
Treffgarne Gorge & Tors					
28	Components of TG&T SSSI & SAC		✔		Geo SSSI

3. THE SPECIAL FEATURES

3.1 Confirmation of Special Features

Designated feature	***Relationships, nomenclature etc***	***Conservation Objective in part 4***
SAC features		
Annex II species that are a primary reason for selection of this site		
Brook lamprey *Lampetra planeri*	These two species are generally indistinguishable for the purposes of monitoring; however management requirements are similar	4.3
River Lamprey *Lampetra fluviatilis*		4.4
Bullhead *Cottus gobio*		4.5
European otter *Lutra lutra*		4.6
Annex I habitats and Annex II species present as qualifying features, but not primary reasons for site selection		
Sea lamprey *Petromyzon marinus*		4.2
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alon-Padion, Alnion incanae, Salicion albae)* *Priority feature		4.8
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation		4.7
Active raised bogs *Priority feature		4.9
SPA features		
Not applicable		
Ramsar features		
Not applicable		
SSSI features		
Potamogeton berchtoldii x P. polygonifolius (cf.)	Eastern Cleddau River SSSI	
Semi-natural broadleaved woodland and scrub	Cleddau Rivers SSSI	
Associated riverside habitats (including marshy grassland, fen, swamp, mire and wet dwarf shrub heath)	Cleddau Rivers SSSI	
SSSI features for other SSSI's covered by plan to follow		

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 focus of management and monitoring effort, perhaps because of the dependence of a key species (see KS below). There will rarely be more than one Key Habitat in a unit.
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 focus of management and 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 focus of management or 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 are 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).

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 with no special feature present but which are of importance for management of features elsewhere on a site e.g. livestock over-wintering area included within designation boundaries.
x – Features not present in the management unit.

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

River Cleddau (Western Cleddau)	**Unit**						
	1	2	3	4	5	6	7
SAC	✔	✔	✔	✔	✔	✔	✔
SSSI	✔	✔	✔	✔	✔	✔	✔
SAC Features							
1. Brook lamprey	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**
2. River lamprey	Sym	Sym	Sym	Sym	Sym	Sym	Sym
3. Sea lamprey	Sym	Sym	Sym	Sym	Sym	Sym	Sym
4. Bullhead	Sym	Sym	Sym	Sym	Sym	Sym	Sym
5. Otter	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**
6. Alluvial forests	Sym	Sym	Sym	**KH**	Sym	**x**	Sym
7. *Ranunculion* habitat	**KH**	**KH**	**KH**	Sym	Sym	Sym	**KH**
8. Active raised bogs	**x**	**x**	**x**	**x**	**x**	**x**	**x**
SSSI features							

- Otter is present throughout and specific management measures for otter relating to adjacent habitats and disturbance require its selection as a key feature in all units.
- The feature 'Rivers with floating vegetation often dominated by water-crowfoot' occurs in Units 1, 3 & 7 in this SAC and is therefore selected as a key habitat.
- Both good alluvial woodland and Ranunculion habitat occur in units 3 & 4, which is why they have been selected as KH/sym in the same unit despite differing management requirements. The units are large enough to allow for both features to occur.
- The feature 'Rivers with floating vegetation often dominated by water-crowfoot' is noted in unit 2, however it is selected as a KH as a driver for improved management
- Brook lamprey are selected as a KS throughout, although where ranunclulion habitat is present, this will be the focus of management, with brook lamprey, sea lamprey and river lamprey and bullhead benefiting from sympathetic management. Where ranunclulion habitat is not present, brook lamprey will be the focus of management with sea lamprey and river lamprey and bullhead benefiting from sympathetic management.
- Bullhead are widespread across the site with particularly high numbers recorded at Pelcombe Brook and Knook Brook, tributaries of the Main channel above Haverfordwest and Camrose Brook respectively. Management for other fish species is likely to be sympathetic for bullhead.
- Local knowledge indicates sea lamprey and river lamprey were not getting past the Town weir in the past.

Esgyrn Bottom SSSI	**Units**			
	21	22	23	29
SAC				✔
SSSI	✔	✔	✔	✔
SAC Features				
1. Brook lamprey	x	x	x	x
2. River lamprey	x	x	x	x
3. Sea lamprey	x	x	x	x
4. Bullhead	x	x	x	x
5. Otter	Sym	Sym	Sym	Sym
6. Alluvial forests	x	x	x	x
7. *Ranunculion* habitat	x	x	x	x
8. Active raised bogs	**KH**	**KH**	**KH**	**KH**
SSSI features				

- Esgyrn Bottom lies at the head of the Afon Cleddau on the Western Cleddau and is the best example of a raised bog in the country, as well as the most south-westerly example of this habitat in the UK.

Corsydd Llangloffan	**Units**			
	18	19	20	30
SAC	✔	✔	✔	✔
SSSI	✔	✔	✔	✔
SAC Features				
1. Brook lamprey	Sym	Sym	Sym	Sym
2. River lamprey	Sym	Sym	Sym	Sym
3. Sea lamprey	Sym	Sym	Sym	Sym
4. Bullhead	Sym	Sym	Sym	Sym
5. Otter	**KS**	**KS**	**KS**	**KS**
6. Alluvial forests	**KH**	**x**	**x**	**x**
7. *Ranunculion* habitat	**x**	**KH**	**x**	**KH**
8. Active raised bogs	**x**	**x**	**x**	**x**
SSSI features				

River Cleddau (Eastern Cleddau)		Unit									
		8	9	10	11	12	13	14	15	16	17
SAC		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
SSSI		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
SAC Features											
1	Brook lamprey	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**
2	River lamprey	Sym	Sym	Sym	Sym	Sym	**x**	Sym	Sym	Sym	Sym
3	Sea lamprey	Sym	Sym	Sym	Sym	Sym	**x**	Sym	Sym	Sym	Sym
4	Bullhead	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym
5	Otter	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**
6	Alluvial forests	Sym	Sym	x	Sym	Sym	**x**	Sym	**KH**	Sym	**x**
7	*Ranunculion* habitat	Sym	Sym	**KH**	Sym	Sym	Sym	Sym	Sym	Sym	Sym
8	Active raised bogs	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
SSSI features											
Potamogeton berchtoldii x P. polygonifolius (cf.)		**x**	**x**	✔	**x**	**x**	**x**	**x**	**x**	**x**	**x**

- Otter is present throughout and specific management measures for otter relating to adjacent habitats and disturbance require its selection as a key feature in all units.
- Significant Alluvial woodland occurs in unit 15 to justify its selection as a KH and is present in units 9, 14 & 16 where it will benefit from sympathetic management.
- The feature 'Rivers with floating vegetation often dominated by water-crowfoot' occurs in unit 10 and is noted in units 8, 11 & 14. It is therefore selected as KH in unit 10, and as a sympathetic feature in 8, 11 & 14.
- Brook lamprey are selected as a KS throughout, although where ranunclulion habitat is present, this will be the focus of management, with brook lamprey, sea lamprey and river lamprey and bullhead benefiting from sympathetic management. Where ranunclulion habitat is not present, brook lamprey will be the focus of management with sea lamprey and river lamprey and bullhead benefiting from sympathetic management.
- Local knowledge indicates sea lamprey and river lamprey were not getting past the weir at Canaston in the past.

• 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 Monitoring[1].

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

The ecological status of the watercourse is a major determinant of FCS for all features. The required conservation objective for the watercourse is defined below.

4.1 Conservation Objective for the watercourse

4.1.1 The capacity for the habitats in the SAC to support each feature at near-natural population levels, as determined by predominantly unmodified ecological and hydromorphological processes and characteristics, should be maintained as far as possible, or restored where necessary.

4.1.2 The ecological status of the water environment should be sufficient to maintain a stable or increasing population of each feature. This will include elements of water quantity and quality, physical habitat and community composition and structure. It is anticipated that in most instances these limits will concur with the standards used by the Review of Consents process.

4.1.3 Flow regime, water quality and physical habitat should be maintained in, or restored as far as possible to, a near-natural state, in order to support the coherence of ecosystem structure and function across the whole area of the SAC.

4.1.4 All known breeding, spawning and nursery sites of species features should be maintained as suitable habitat as far as possible, except where natural processes cause them to change.

4.1.5 Flows, water quality, substrate quality and quantity at fish spawning sites and nursery areas will not be depleted by abstraction, discharges, engineering or gravel extraction activities or other impacts to the extent that these sites are damaged or destroyed.

4.1.6 The river planform and profile should be predominantly unmodified. Physical modifications having an adverse effect on the integrity of the SAC, including, but not limited to, revetments on active alluvial river banks using stone, concrete or waste materials, unsustainable extraction of gravel, addition or release of excessive quantities of fine sediment, will be avoided.

4.1.7 River SSSI features should be in favourable condition.

4.1.8 Artificial factors impacting on the capability of each species feature to occupy the full extent of its natural range should be modified where necessary to allow passage, eg. weirs, bridge sills, acoustic barriers. The reservoir dams on the Syfynwy are excluded.

4.1.9 Natural factors such as waterfalls, which may limit the natural range of a species feature or dispersal between naturally isolated populations, should not be modified.

4.1.10 Flows during the normal migration periods of sea and river lamprey will not be depleted by abstraction to the extent that passage upstream to spawning sites is hindered.

4.1.11 Levels of nutrients, in particular phosphate, will be agreed between EA and CCW for each Water Framework Directive water body in the Cleddau SAC, and measures taken to maintain nutrients below these levels. It is anticipated that these limits will concur with the standards used by the Review of Consents process.

4.1.12 Levels of all other water quality parameters that could affect the distribution and abundance of all species will be agreed between EA and CCW for each Water Framework Directive water body in the Cleddau SAC, and measures taken to maintain pollution below these levels. It is anticipated that these limits will concur with the standards used by the Review of Consents process. Potential sources of pollution not addressed in the Review of Consents, such as contaminated land, will be considered in assessing plans and projects.

4.1.13 Potential sources of pollution not addressed in the review of consents, such as contaminated land, will be considered in assessing plans and projects.

4.1.14 Levels of suspended solids will be agreed between EA and CCW for each Water Framework Directive water body in the Usk SAC. Measures including, but not

limited to, the control of suspended sediment generated by agriculture, forestry and engineering works, will be taken to maintain suspended solids below these levels.

In the Cleddau catchment, the most significant sources of diffuse pollution and siltation are from agriculture, including fertiliser run-off, livestock manure, silage effluent and soil erosion from ploughed land. The most intensively used areas such as heavily trampled gateways and tracks can be especially significant sources of polluting run-off. Preventative measures can include surfacing of tracks and gateways, moving feeding areas, and separating clean and dirty water in farmyards. Farm operations should avoid ploughing land which is vulnerable to soil erosion or leaving such areas without crop cover during the winter.

Among toxic pollutants, sheep dip and silage effluent present a particular threat to aquatic animals in this predominantly rural area, especially in the head waters of the Eastern Cleddau. Contamination by synthetic pyrethroid sheep dips, which are extremely toxic to aquatic invertebrates, has a devastating impact on crayfish populations and can deprive fish populations of food over large stretches of river. These impacts can arise if recently dipped sheep are allowed access to a stream or hard standing area, which drains into a watercourse. Pollution from organophosphate sheep dips and silage effluent can be very damaging locally. Pollution from slurry and other agricultural and industrial chemicals, including fuels, can kill all forms of aquatic life. All sheep dips and silage, fuel and chemical storage areas should be sited away from watercourses or bunded to contain leakage. Recently dipped sheep should be kept off stream banks. Used dip should be disposed of strictly in accordance with Environment Agency Regulations and guidelines. Statutory and voluntary agencies should work closely with landowners and occupiers to minimise the risk of any pollution incidents and enforce existing regulations.

Measures to control diffuse pollution in the water environment, including ‘Catchment Sensitive Farming’, may be implemented as a result of the Water Framework Directive and, along with existing agri-environment schemes, including CCW’s Living rivers Scheme will help to achieve the conservation objectives for the SAC.

Discharges from sewage treatment works, urban drainage, engineering works such as road improvement schemes, contaminated land, and other domestic and industrial sources can also be significant causes of pollution, and must be managed appropriately. Current consents for discharges entering, or likely to impact upon the site should be monitored, reviewed and altered if necessary.

Overhanging trees provide valuable shade and food sources, whilst tree root systems provide important cover and flow refuges for juveniles. At least 50% high canopy cover to the water course/banks should be maintained, where appropriate. Some reaches may naturally have lower tree cover. Cover may also be lower in urban reaches.

4.2 Conservation Objective for Feature 1: Sea lamprey *Petromyzon marinus* (EU Species Code: *1095*)

Vision for feature 1

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

- The conservation objective for the watercourse as defined in 4.1 above is met.
- The population of the feature in the SAC must be stable or increasing over the long term.
- The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
  The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term.
  Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. food supply (as described in section 2.2).
  Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future.
- Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs.
- The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age.

Performance indicators for feature 1

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:* Sea lamprey *Petromyzon marinus		
Attribute	***Attribute rational and other comments***	***Specified limits***
a) Distribution within catchment	This attribute provides evidence of successful spawning and distribution trends. There is currently a lack of data regarding current and historical sea lamprey spawning sites. Spawning locations may move within and between sites due to natural processes or new sites may be discovered over time. Silt beds downstream of all potential sites will be sampled for presence or absence of ammocoetes. Where apparently suitable habitat at any site is unoccupied feature condition will be considered unfavourable	Lower limit: not determined Upper limit: none set Any silt beds adjacent to or downstream of suitable spawning sites should contain *Petromyzon* ammocoetes.

b) Ammocoete density	This standard CSM attribute establishes a minimum occupied spawning range within any sampling period of 15km.	Ammocoetes should be present in at least four sampling sites each not less than 5km apart.

4.3 Conservation Objective for Feature 2 & 3: Brook lamprey *Lampetra planeri* (EU Species Code : *1096*); River lamprey *Lampetra fluviatilis* (EU Species Code : *1099*)

Vision for features 2 & 3

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

- The conservation objective for the watercourse as defined in 4.1 above is met
- The population of the feature in the SAC must be stable or increasing over the long term.
- The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
  The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term.
  Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. food supply (as described in section 2.2).
  Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future.
- Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs.
- The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age.

Performance indicators for features 2 & 3

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: **Brook lamprey *Lampetra planeri* & River lamprey *Lampetra fluviatilis*:**		
Attribute	***Comments***	***Specified limits***
a) Age/size structure of ammocoete population	This gives an indication of recruitment to the population over the several years preceding the survey. Failure of one or more years recruitment may be due to either short or long term impacts or natural factors such as natural flow variability, therefore would trigger further investigation of the cause rather than leading automatically to an unfavourable condition assessment	Samples < 50 ammocoetes 2 size classes Samples > 50 ammocoetes at least 3 size classes
b) Distribution of ammocoetes within catchment	The natural range of this species in terms of ammocoete distribution includes all units A minimum of 30 sample sites will be monitored at 6 yearly intervals when presence at less than 2/3 will lead to an unfavourable condition assessment	Present at not less that 2/3 of sites surveyed within natural range
	Reduction in distribution will be defined as absence of ammocoetes from all samples within a single unit, and will lead to an unfavourable condition assessment	No reduction in distribution of ammocoetes
c) Ammocoete density	Optimal habitat is defined as stable fine sediment or sand ≥15cm deep, low water velocity and the presence of organic detritus. Sub-optimal habitat is defined as shallow sediment, often patchy and interspersed among coarser substrate	Optimal habitat: $>10m^{-2}$ Overall catchment mean: $>5m^{-2}$

4.4 Conservation Objective for Feature 4: - Bullhead *Cottus gobio* (EU Species Code : *1163*)

Vision for feature 4

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

- The conservation objective for the watercourse as defined in 4.1 above must be met
- The population of the feature in the SAC must be stable or increasing over the long term.
- The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
  The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term.
  Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and

substrate type at spawning sites, and ecosystem structure and functions e.g. food supply (as described in section 2.2).
Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future.

- Passage of the feature through the SAC is not to be hindered by artificial barriers such as weirs.
- The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age.

Performance indicators for feature 4

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: Bullhead *Cottus gobio*		
Attribute	***Comments***	***Specified limits***
a) Adult densities	CSM guidance states that there should be no reduction in densities from existing levels, and in any case no less than 0.2 m^{-2} in upland rivers (source altitude >100m) and 0.5 m^{-2} in lowland rivers (source altitude ≤100m)	No less than 0.2 m^{-2} in sampled reaches
b) Distribution	Absence of bullheads from reaches identified as suitable or previously occupied, revealed by on-going monitoring will result in an unfavourable condition assessment	Bullheads should be present in all suitable reaches. As a minimum, no decline in distribution from current
c) Reproduction / age structure	This gives an indication of successful recruitment and a healthy population structure	Young-of-year fish should occur at densities at least equal to adults

4.5 Conservation Objective for Feature 5: - European otter *Lutra lutra* (EU Species Code: *1355*)

Vision for feature 5
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The population of otters in the SAC is stable or increasing over the long term and reflects the natural carrying capacity of the habitat within the SAC
- The SAC will have sufficient habitat, including riparian trees and vegetation and wetlands, to support the otter population in the long term
- The natural range of otters in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.

- The otter must be able to breed and recruit successfully in the SAC. The size of breeding territories may vary depending on prey abundance.
- Otter food sources must be sufficient for maintenance of the population.
- The safe movement and dispersal of individuals around the SAC is facilitated by the provision, where necessary, of suitable riparian habitat, and underpasses, ledges, fencing etc at road bridges and other artificial barriers.
- No otter breeding site should be subject to a level of disturbance that could have an adverse effect on breeding success. Where necessary, potentially harmful levels of disturbance must be managed.

Performance indicators for feature 5

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 rational and other comments***	***Specified limits***
a) Distribution	Results from the Otter Survey of Wales 2002 show that otter signs (spraints or footprints) were found at 97% of the sites searched throughout the Cleddau catchment. The figure for the lower limit is set at 85% to allow for a small number of sites to be negative as a result of factors such as weather conditions or surveyor error.	Lower Limit: Otter signs found at 85% of Otter Survey of Wales full survey sites (current level: 97%) within the Eastern and Western Cleddau. Upper Limit: None set.
b) Breeding activity	Evidence that otter breeding has taken place within the catchment is usually derived from three sources: otter road mortalities where pregnant/lactating females, and/or cubs are involved, sighting of cubs (usually together with the female); and cubs found abandoned (either separated from the family group or orphaned as a result of the death of the mother.)	**Lower Limit:** 2 reports (within the catchment) of otter cub/family sightings **or** 2 reports of cubs, lactating females or pregnant females from otter road casualties are recorded for at least 1 year in any three year period. **Upper Limit:** None set.
c) Actual and potential breeding sites	*21 actual or potential sites have been identified on the Western Cleddau, and 20 sites identified on the Eastern Cleddau.	Lower Limit: There should be no reduction or decline in the number or quality of identified actual or potential breeding sites. Upper Limit: None set.
Performance indicators for factors affecting the feature		
Water quality		
a) Water quality	River Ecosystem Classification. (EA classification).	To maintain and restore RE1 across catchment with no increase in pollutants potentially toxic to otters
Ecosystem structure and function		

b) Food availability	Studies have indicated that the viability of an otter population partially relates to the viability of its food sources Otters depend on food that comes from a range of aquatic environments, such as small streams and marshes (Chanin 2003a). Fish make up the majority of the otter diet (often >75%), though amphibians and crustaceans are also constituents. Eels are particularly favoured. At times, an alternative prey, such as frogs, can assume a greater importance than fish. Data on fish stocks from Environment Agency. (EA assessments for Salmonids and non-salmonids)	Fish biomass stays within expected natural fluctuations
c) Riparian habitat	Certain areas of the SAC are critical to the movement of otters both within the system and to adjacent sites.	No overall permanent decrease and no overall loss in sensitive areas.
Negative indicators		
a) Anthropogenic mortality	Road deaths have been clearly noted as a primary threat to the otters conservation status across Wales. Liles and Colley (2000) identified numerous road death black spots in the Cleddau catchment, and mitigation has taken place. Future mitigation should be focused on sites identified adjacent to potential breeding areas.	No increase in numbers of recorded Road Deaths.
b) Disturbance	Otters are sensitive to human disturbance and especially to sudden changes in activity. They are particularly sensitive to disturbance by dogs. The female otter is particularly sensitive to disturbance when she has cubs.	No significant change to bank side usage, no significant development, particularly in sensitive areas.

*78 sites were identified during an initial desk top study (35 on the Western and 43 on the Eastern). Of these 21 sites on the Western and 20 sites on the Eastern were classified in categories A-C, as defined below:

A: Good habitat, "Confirmed" sites from corroborative evidence such as Road deaths of lactating bitches or cubs, sightings of cubs or family groups and an assessment of age from description.
B: Habitat good for breeding but no historical supportive evidence but field signs suggest breeding
C: Good habitat but no corroborative evidence.

Jones, (2004) states that the of the original 78 sites, those not included in the above categories, and therefore discarded as breeding sites are not necessarily never used by otters as breeding sites, however they do not compare in habitat terms with these listed sites.

4.6 Conservation Objective for Feature 6: - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (EU Habitat code: 3260)

Vision for feature 6

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.

- The conservation objective for the watercourse as defined in 4.1 above must be met
- The natural range of the plant communities represented within this feature should be stable or increasing in the SAC.
  The natural range is taken to mean those reaches where predominantly suitable habitat exists over the long term.
  Suitable habitat and associated plant communities may vary from reach to reach. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms eg. depth and stability of flow, stability of bed substrate, and ecosystem structure and functions eg. nutrient levels, shade (as described in section *2.2*).
  Suitable habitat for the feature need not be present throughout the SAC but where present must be secured for the foreseeable future, except where natural processes cause it to decline in extent.
- The area covered by the feature within its natural range in the SAC should be stable or increasing.
- The conservation status of the feature's typical species should be favourable condition. The typical species are defined with reference to the species composition of the appropriate JNCC river vegetation type for the particular river reach, unless differing from this type due to natural variability when other typical species may be defined as appropriate.

Performance indicators for feature 6

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	***Comments***	***Specified limits***
a) Distribution within catchment	*Ranunculus* spp. will be present with an MTR species cover score of at least 50 in: Any three representative sample 100m stretches of suitable habitat in units 1, 3, 7 & 10 The feature should also be present in one representative sample 100m stretch of suitable habitat in unit 2, although failure of this unit alone will not make the feature fail as a whole.	Distribution within site units 1, 3, 7 & 10

b) Typical species	Should conform to appropriate JNCC type: *Ranunculion fluitantis* and *Callitricho-Batrachion* Vegetation communities: CB5: Atlantic bryophyte *Callitriche hamulata/Ranunculus penicillatus* spp. p*enicillatus* rivers. Typical species also include *Potamogeton crispus, Myriophyllum alternifolium, Fontinalis antipyretica, F. squamosa, Hygrohypnum ochraceum, Amblystegium fluviatile, Amblystegium riparium, Brachythecium plumosum, Racomitrium aciculare, Rhyncostegium riparoides and Scapania* spp.	Characteristic plant species should dominate the assemblage
Performance indicators for factors affecting the feature		
Negative indicators		
a) Native species	CSM guidance states: Care should be taken with the setting of these targets as thresholds may vary considerably by site and conservation goals For the Afonyd Cleddau SAC: Algae indicative of eutrophication *(Enteromorpha* spp., *Cladophora* spp. and *Vaucheria* spp.) should not have an MTR cover value of greater than 5 (ie.10%) in 3 consecutive years in: Any three representative sample 100m stretches of suitable habitat in units 1, 3, 7 & 10 AND In one representative sample 100mm stretch of suitable habitat in unit 2, although failure of this unit alone will not make the feature fail as a whole.	Cover of indicators of eutrophication maintained below threshold over the medium to long term
b) Alien / introduced species	In the CSM guidance, the SERCON scoring system for naturalness of aquatic and marginal macrophytes and naturalness of banks and riparian zone, are used to assess this attribute. SERCON protocols have not been applied in the Afonydd Cleddau SAC, therefore assessment of this attribute relies on locally defined thresholds and expert judgement. Details to be confirmed	No impact on native biota from alien or introduced species

4.7 Conservation Objective for Feature 7: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (EU Habitat code: 91E0)

Vision for feature 7

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

- The canopy is dominated by single stands of alder *Alnus glutinosa* or willow *Salix spp.* In alluvial woods with free draining soils there may be ash or oak in the canopy, but in the wetter alluvial woodlands ash *Fraxinus excelsior* is more likely to be limited to areas of relatively drier ground
- The structure of alluvial woodland is recognised as being dynamic therefore the presence of over mature trees is desirable but not essential
- The river itself should be dynamic to allow for areas of outwash and deposition that trees can regenerate on.
- Lying or standing deadwood (> 20cm diameter and > 1m length) is present at all sites
- The feature should support alluvial ground flora including two of the following: meadowsweet *Filipendula ulmaria*, yellow flag *Iris pseudacorus*, nettle *Urtica dioica*, common reed *Phragmities austrailis*, greater tussock sedge *Carex paniculata*, opposite-leaved golden saxifrage *Chrysosplenium oppositifolium*, rushes *Juncus spp*, tufted hair-grass *Deschampsia cespitosa*, hemlock water-dropwort *Onanthe crocata*, and wild angelica *Angelica sylvestris*.

Performance indicators for feature 7

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 rational and other comments***	***Specified limits***
Extent	To be defined following further survey, as original estimate of 132.66 ha was based on a contract survey (Jones, 2004); the accuracy of which is questioned following limited field-testing. Loss of woodland cover should only occur through natural processes e.g. river movement creating natural re-channelling, silt deposits; and storm damage. The feature was considered to be present on 44 sites on the Western Cleddau and 28 sites on the Eastern Cleddau, however the accuracy of the data requires field-testing (See map 4.8.1)	**Lower Limit:** To be defined following further survey. **Upper Limit:** None set. **AND** No reduction in the total number of sites: **Lower Limit:** 72 sites supporting alluvial woodland **Upper Limit:** Not required

Quality	The site-specific definition of **good condition alluvial woodland** provided below is based on Common Standards Monitoring Guidance For Woodland Habitats (JNCC, 2004) and CCW SAC monitoring in 2004. (See Lovering, 2005).	*Upper Limit*: none set *Lower Limit*: 3 out of 4 sample woodlands on each arm of the Cleddaus to meet site-specific assessment of **good condition alluvial woodland**.
Structure and processes	The canopy is dominated by alder *Alnus glutinosa* or willow *Salix* spp. In alluvial woods with free draining soils there may be ash or oak in the canopy, but in the wetter alluvial woodlands ash *Fraxinus excelsior* will be limited to areas of relatively drier ground. 50% - 90% of the canopy forming trees are alder. • At least one example of each age component present (sapling if the survey site has a gap or woodland edge, mature, over mature, deadwood) • The under-storey covers between 5-30% in at least 80% of survey sites • Gaps large enough to cause a noticeable growth response from ground vegetation in >40% of survey sites • Dense thickets of bramble cover <10% of individual sites and are confined to drier margins of habitat. • **Deadwood, lying or standing > 20 cm diameter and > 1 m length present at 80% of survey sites. (see note, below) • No evidence of alder disease.	
Regeneration	***Regeneration occurring and 90% alder and willow (see note, below)	
Non-native species	<5% of the canopy forming trees across the woodland are non-native	
	Exotics cover < 10% ground	
Ground flora	60% of the survey sites should support alluvial ground flora including two of the following: meadowsweet *Filipendula ulmaria*, yellow flag *Iris pseudacorus*, nettle *Urtica dioica*, common reed *Phragmities austrailis*, greater tussock sedge *Carex paniculata*, opposite-leaved golden saxifrage *Chrysosplenium oppositifolium*, rushes *Juncus spp*, tufted hair-grass *Deschampsia cespitosa*, hemlock water-dropwort *Onanthe crocata*, and wild angelica *Angelica sylvestris*.	
Site-specific habitat definitions		
good condition alluvial woodland		
Performance indicators for factors affecting the feature		
Hydrology	Extensive bramble cover is an indicator that the site maybe drying out. However, it is worth noting that dense bramble cover offers potential for otter natal holts if other conditions pertaining to otters are satisfied. (area >0.5ha, one or more natal dens, free from flood risk and close to a good food supply)	Dense thickets of bramble cover <10% of individual sites and are confined to drier margins of habitat.
Grazing	Grazing pressure will have an influence on the ground layer and regeneration. Light, controlled grazing is permitted, stock exclusion is preferable	No impact on regeneration and ground flora criteria satisfied

*Specified area tbc.
**Deadwood

Alluvial woodland is a dynamic habitat and lying deadwood can be flushed away or deposited seasonally through a series of sites. Therefore failure in this quality indicator alone will not result in the site failing.

***Regeneration
There is very little (if any) regeneration from seed within alluvial woodland, this is to be expected as *Alnus, Salix and Betula* generally seed along edges or into open areas of successionally younger vegetation, where there is less competition for light. Therefore it is accepted that there is unlikely to be any seedling establishment within the woodland itself. In order to ensure continuation of the woodland it is expected that regeneration will be vegetative from the base of stems and from vertical growth from fallen branches.

4.8 Conservation Objective for Features 8: Active raised bogs (EU Habitat code 7110)

Vision for feature 8

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

- On the mire expanse there are at least 3 of *Calluna vulgaris, Erica tetralix, Eriophorum angustifolium*, *E.vaginatum* & *Trichophorum cespitosum* constant, with a combined cover not exceeding 80%
- No single species > 50% cover
- At least one of *Andromeda polifolia, Drosera rotundifolia, Empetrum nigrum, Narthecium ossifragum* and *Vaccinium oxycoccos* occurs at least frequently
- On the mire expanse only there are at least 2 of the following spp. constant, with a combined cover > 20%: *Sphagnum capillifolium, S. magellanicum, S. papillosum, S. tenellum*
- No reduction in extent of microtopographic features (e.g. bog pools).

Performance indicators for feature 8

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 rational and other comments***	***Specified limits***
a) Extent	There should be no reduction in the total extent (area) of bog, including any associated pools and lagg fen as mapped by Phase II *Lowland Peatland Survey* (August 2005): The extent of the **Active raised bog** : NVC communities M2a:<0.1 ha; M17: 1.3 ha, M18: 1.0 ha; M21: <0.1 ha) Total extent: c. 2.3 ha. and **lagg fen** communities: NVC communities M6: c. 1.0 ha; M23: 1.8 ha: M25: 7.1 ha; M27: 0.3 ha; S4: 0.1 ha; W4: 0.1 ha) Total extent: 10.4 ha and **degraded bog** communities: NVC communities: M15: 3.2 ha; M25: 7.1 ha (as in lagg above) or dry heath types H4: 1.5 Total extent: 11.8 ha.	**Lower Limit:** No reduction in extent. **Upper Limit**: Not set
b) Habitat composition	Site Specific definitions: **Bog** is taken here to be the peat deposit together with typical bog vegetation, irrespective of the precise nature and condition of that vegetation. **Lagg fen** comprises both peat deposit and vegetation, irrespective of nature and condition.	**Lower limit:** **mire expanse** (2.3 ha): M2a: at least 0.1 ha i.e. 10% of M17-M18 in I & L, M18 at least 1.0 ha and, M17 upper limit 1.3 ha. **lagg fen** (10.4 ha): M6: c. 1.0 ha M23: 1.8 ha: M25: 7.1 ha; M27: 0.3 ha; S4: 0.1 ha; W4: 0.1 ha **Upper Limit:** Not set
Performance indicators for factors affecting the feature		
a) Indicators of negative change-non-woody vascular plant species	This target applies to the whole bog, not just the mire expanse. The plants listed are indicators of enrichment or of drying out of the bog. *Phragmite*s is acceptable around upwellings or their equivalent on ditched bogs. Invasive non-native plant species should be	**Lower limit:** none set **Upper limit:** No more than 1% cover of the following on the bog surface (subject to exceptions in comments column): *Phragmites australis,Phalaris arundinacea,*

	absent or no more than rare (if present at baseline)	*Glyceria maxima,Epilobium hirsutum, Urtica dioica, Pteridium aquilinum, Rubus fruticosus, Juncus effusus,Deschampsia cespitosa, Cirsium* spp.
b) Development of scrub	Invasion by woody species and their development to healthy maturity may indicate drying out and/or enrichment. Trees and shrubs will exacerbate drying out. *Salix* spp. and *Myrica gale* can occur on raised bogs, but scrub generally constrains itself to areas where it receives a source of nutrients (e.g. near water that has passed through or over a mineral soil). As a result, it often is found close to or on the 'rand' of the raised bog, where it is more acceptable.	**Lower limit:** not set **Upper limit:** On the mire expanse, trees and shrubs (*Betula, Salix, Rhododendron, Pinus* species, other gymnosperms no more than rare and < 5% cover On the bog margin (rand) woody species < 10% cover
Drainage	Raised bogs need a high and relatively constant water table level. Artificial drainage has had a major impact at this site; this results in water table drawdown, oxidation and wastage of peat, and the release of nutrients into the peat, and dissolved organic carbon into dependent water courses. The effects of drainage at this site need to be countered through a programme of hydrological restoration using peat dams and bunds.	**Limits**: Water table depths should not exceed 20 cm below ground level in an average summer. Flooding should be confined to natural hollows only and result from rainfall and not overbank flooding.
Atmospheric deposition	Rainfall constitutes the sole supply of water and nutrients to raised bog habitats. This results in characteristically nutrient-poor and acidic soil chemistry. This characteristic also renders raised bogs highly sensitive to atmospheric pollution. Nitrogen is of particular concern, and N deposition in the area has been estimated at 21.6 kg N/ha/yr (source: UK Air Pollution Information Service – www.apis.ac.uk), well in excess of the published Critical Load for this habitat of between 5 and 10 kg N/ha/yr. Improvements in air quality require concerted policy measures at a UK level, as well as local development control to eliminate or reduce proximal sources of nitrogen.	**Upper limit: 10 kg N/ha/yr** Lower limit. None set.

5. ASSESSMENT OF CONSERVATION STATUS AND MANAGEMENT REQUIREMENTS

This part of the document provides:

- A summary of the assessment 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: Sea lamprey *Petromyzon marinus*

Conservation status

Status: Unfavourable: Unclassified.

Monitoring in 2004 found no sea lamprey ammocoetes in either optimal or sub-optimal habitat.
There are no records of adult migrating sea lamprey held on file.
For this reason the status of sea lamprey must be considered unfavourable.

Whilst barriers to migration are considered, it is unlikely that these are the only reason for the lack of sea lamprey found.
Recent improvements to the two main barriers to migration in the SAC have been undertaken. In 2003 a fish pass has been installed in Haverfordwest Weir on the Western Cleddau that should be negotiable by sea lamprey. On the Eastern Cleddau at Canaston Bridge a special lamprey pass was installed in 2007. These improvements should have removed the two main barriers to migration.

It is possible that sea lamprey ammocoetes may occupy different habitat to that of river and brook lamprey. Also, as river and brook lamprey spawn earlier than sea lamprey, they may occupy the optimal habitat to the exclusion of sea lamprey, forcing sea lamprey to find other suitable habitat and to spawn in deeper areas of the river.
It is a recommendation of the 2005 APEM report that areas such as deeper pools are assessed for the presence of sea lamprey ammocoetes.

Management requirements

The impacts of barriers to migration have been largely over come since installation of the fish passes at Haverfordwest and Canaston Bridge. Smaller weirs remain, on the Anghof, upper Eastern Cleddau, Vicars Mill on the Eastern Cleddau and the Llys y Fran Dam on the Syfynwy, but these barriers are higher in the catchment, leaving much of the river accessible.

The impact of acoustic (i.e. noise/vibration) and sediment/chemical barriers arising from plans or projects should also be assessed. When arising from construction or other development related activities it may be necessary to restrict timing of such activities.

The impact of flow depletion downstream of a number of abstractions was assessed in the Review of Consents process. Abstractions which may have an impact on the features of the SAC have passed to stage 4 for options appraisal. The outcome of these assessments is awaited.

Entrainment in water abstractions directly impacts on population dynamics through reduced recruitment and survival rates. Information on likely rates of entrainment of lamprey ammocoetes is required before acceptable levels can be assessed.

The impact of lowered temperatures from the hypolimnial release at Llys y Fran on the Cleddau also has the potential to impact upon lamprey. The anadromous sea lamprey is temperature dependent at critical freshwater life stages. Migration of sea lamprey into estuaries usually occurs from April onwards at temperatures of between 10-18^{o}C, and spawning occurs when water temperatures increase above a threshold of 15^{o}C, usually between May and June. The critical spawning temperature range for sea lamprey is considered to be 11-25^{o}C, and eggs require temperatures of 15-25^{o}C to hatch. Distribution of lamprey within the Cleddau catchment is therefore also likely to be limited by the current river temperature regime.

The extent and quality of suitable sea lamprey habitat must be maintained. Elevated levels of fines (particles <0.83mm) within spawning substrates can interfere with egg survival. Spawning habitat consists of well-oxygenated gravel/pebble substrate of >10cm depth in a range of water depths (0.2 to 1.5m). Sea and river lamprey tend to spawn in deeper water than brook lamprey. Nursery habitat consists of open-structured, aerated, silty and sandy substrates between 2 and 40cm depth generally in shallow (<0.5m) slack-water channel margins with some shade.

The 2005 APEM report describes optimal habitat [nursery areas] as areas identified with:
- Several square metres of stable, fine sediment at least 150mm deep
- Low water velocity
- Shallow water depth
- Organic detritus
- Presence of shade

The APEM report also describes sub-optimal habitat [nursery areas] as patchy, shallow sediment interspersed among coarser substrate with comparatively high velocity flow, more typically described as salmonid fry and parr habitat. All of the sub-optimal habitat sites contained a few square centimetres of silt or fine sand.

In the Afonydd Cleddau catchment, the most significant sources of diffuse pollution and siltation are from agriculture, including fertiliser run-off, livestock manure, silage effluent and soil erosion from ploughed land. The most intensively used areas such as heavily trampled gateways and tracks can be especially significant sources of polluting run-off. Preventative measures can include surfacing of tracks and gateways, moving feeding areas, and separating clean and dirty water in farmyards.

If appropriate, land bordering the SAC can be entered into a Living Rivers Agreement for improvements such as stock exclusion and buffer strips, especially on reaches adjacent to intensively managed livestock grazing or arable land.

Other measures to control diffuse pollution in the water environment, including 'Catchment Sensitive Farming', may be implemented as a result of the Water Framework Directive and, along with existing agri-environment schemes, will help to achieve the conservation objectives for the SAC.

A pilot project looking at Catchment Sensitive Farming on the Deepford brook began in 2006/07 running through until the end of the 07/08 financial years. Deepford brook was chosen as a pilot in order to work on a predominantly dairy/intensive livestock catchment. The primary aim of the work was to investigate methods for reducing diffuse pollution coming from agricultural practice, and the response of the farming community to these methods and the interventions needed to undertake them. The way the project aimed to achieve these reductions was through provision of advice, support and financial grants to farmers/landowners in order to allow them to change aspects of their farm infrastructure or management in ways that will reduce run off and the potential of that run off to be loaded with pollutants such as soil, phosphorus, ammonia, sheep dip and organic material.
The effectiveness of this scheme now needs to be assessed.

A trial project targeting all farms in the catchments of the Cartlett, Anghof and Syfynwy tributaries is currently underway in partnership with the Environment Agency. All farms will be offered advice on

best land management practice and free soil testing to determine correct levels of fertiliser application. If appropriate, land bordering the SAC can be entered into a Living Rivers Agreement.

Management for all sea, river and brook lamprey is likely to be sympathetic.

The currently unfavourable condition assessment suggests that there may be adverse factors influencing these species and further survey work is required to gain a clearer picture of sea lamprey population.

5.2 Conservation status and management requirements of Features 2 & 3: Brook lamprey *Lampetra planeri* & River lamprey *Lampetra fluviatilis*

Conservation status

Status: Unfavourable: Unclassified.

Monitoring in 2004 showed the Afonyd Cleddau to have an overall mean density of Lampetra spp. 4.5 m^{-2} (sd ±0.8) when all habitats are taken into account. This does not meet the target of $5m^{-2}$ in the JNCC (2005) guidance.

For optimal habitat, the mean density of Lampetra spp. was 9.2 m^{-2} (sd ±1.2), which is below 10 m^{-2} target (JNCC, 2005).

When the sites in the catchment are considered individually (map 4.3.1), 16 of 34 (47%) optimal sites met the target to be considered favourable. The remaining 18 sites failed to reach the target.

For the sites within the SAC alone, the mean density of *Lampetra* spp. in optimal habitat was 9.5 m^{-2} (sd ±1.2) and 0 m^{-2} in sub-optimal habitat. The SAC wide mean (including all habitat) was 4.6 m^{-2} (sd ±0.8). Of the sites within the SAC, 16 of 33 (48%) met the optimal density target of 10 m^{-2}.

However, it was not possible to distinguish between river and brook lamprey during monitoring, due to the reliance on juvenile stages (ammocoetes/transformers).
The most recent survey by APEM in 2004 was conducted in October, possibly too late as transformers may have migrated from the silt. Transformers are required to distinguish between brook and river lamprey and if the survey is conducted too late, transforming adults may have already migrated (into the estuary for river lamprey and riffles / pools for brook lamprey).

There is a lack of evidence to gauge river lamprey numbers with few records of adult held on file. More information on the relative abundance of river lamprey in different parts of the Afonydd Cleddau SAC is desirable. Records of spawning adult river lamprey would be particularly useful.

Management requirements

The impacts of barriers to migration have been largely over come since installation of the fish passes at Haverfordwest and Canaston Bridge. Smaller weirs remain, on the Anghof, upper Eastern Cleddau, Vicars Mill on the Eastern Cleddau and there is also the Llys y Fran Dam on the Syfynwy, but these barriers are higher up the catchment, leaving much of the river accessible.

The extent and quality of suitable habitat for brook and river lamprey must be maintained. Elevated levels of fines (particles <0.83mm) within spawning substrates can interfere with egg survival. Spawning habitat consists of well-oxygenated gravel/pebble substrate of >10cm depth in a range of

water depths (0.2 to 1.5m). Sea and river lamprey tend to spawn in deeper water than brook lamprey. Nursery habitat consists of open-structured, aerated, silty and sandy substrates between 2 and 40cm depth generally in shallow (<0.5m) slack-water channel margins.

The 2005 APEM report describes optimal habitat [nursery areas] as areas identified with:

- Several square metres of stable, fine sediment at least 150mm deep
- Low water velocity
- Shallow water depth
- Organic detritus
- Presence of shade

The APEM report also describes sub-optimal habitat [nursery areas] as patchy, shallow sediment interspersed among coarser substrate with comparatively high velocity flow, more typically described as salmonid fry and parr habitat. All of the sub-optimal habitat sites contained at few square centimetres of silt or fine sand.

The impact of flow depletion downstream of a number of abstractions was assessed in the Review of Consents process. Abstractions that may have an impact on the features of the SAC have passed to stage 4 for options appraisal. The outcome of these assessments is awaited.

Entrainment in water abstractions directly impacts on population dynamics through reduced recruitment and survival rates. Information on likely rates of entrainment of lamprey ammocoetes is required before acceptable levels can be assessed.

The impact of lowered temperatures from the hypolimnial release at Llys y Fran on the Cleddau also has the potential to impact upon lamprey. The freshwater brook lamprey and anadromous river lamprey are temperature dependent at critical freshwater life stages. River and brook lamprey start to spawn in British rivers when water temperatures reach 10-11^{o}C, usually between March and April for river lamprey and March and May for brook lamprey. Distribution of lamprey within the Cleddau catchment is therefore also likely to be limited by the current river temperature regime.

In the Afonydd Cleddau catchment, the most significant sources of diffuse pollution and siltation are from agriculture, including fertiliser run-off, livestock manure, silage effluent and soil erosion from ploughed land. The most intensively used areas such as heavily trampled gateways and tracks can be especially significant sources of polluting run-off. Preventative measures can include surfacing of tracks and gateways, moving feeding areas, and separating clean and dirty water in farmyards.

If appropriate, land bordering the SAC can be entered into a Living Rivers Agreement for improvements such as stock exclusion and buffer strips, especially on reaches adjacent to intensively managed livestock grazing or arable land.

Other measures to control diffuse pollution in the water environment, including ‘Catchment Sensitive Farming’, may be implemented as a result of the Water Framework Directive and, along with existing agri-environment schemes, will help to achieve the conservation objectives for the SAC.

A pilot project looking at Catchment Sensitive Farming on the Deepford brook began in 2006/07 running through until the end of the 07/08 financial years. Deepford brook was chosen as a pilot in order to work on a predominantly dairy/intensive livestock catchment. The primary aim of the work was to investigate methods for reducing diffuse pollution coming from agricultural practice, and the response of the farming community to these methods and the interventions needed to undertake them. The way the project aimed to achieve these reductions was through provision of advice, support and financial grants to farmers/landowners in order to allow them to change aspects of their farm infrastructure or management in ways that will reduce run off and the potential of that run off to be loaded with pollutants such as soil, phosphorus, ammonia, sheep dip and organic material.
The effectiveness of this scheme now needs to be assessed.

A trial project targeting all farms in the catchments of the Cartlett, Anghof and Syfynwy tributaries is currently underway in partnership with the Environment Agency. All farms will be offered advice on best land management practice and free soil testing to determine correct levels of fertiliser application. If appropriate land bordering the SAC can be entered into a Living Rivers Agreement.

Management for all sea, river and brook lamprey is likely to be sympathetic.

On-going monitoring will allow a better understanding of population fluctuations, distributional changes etc

5.3 Conservation status and management requirements of Feature 4: Bullhead *Cottus gobio*

Conservation status

Status: Unfavourable: unclassified

The current unfavourable status results from a lack of appropriate survey data.

Records obtained from ad hoc surveys show that bullhead are widespread in the main river and tributaries. There is a need for quantitative information on bullhead abundance.

Management requirements

Vertical drops of >18-20 cm are sufficient to prevent upstream movement of adult bullheads. New in stream structures should be avoided, whilst the impact of existing artificial structures needs to be evaluated.

The extent and quality of suitable bullhead habitat must be maintained. Elevated levels of fines can interfere with egg and fry survival. Spawning habitat is defined as unsilted coarse (gravel/pebble/ cobble) dominated substrate: males guard sticky eggs on the underside of stones. Larger stones on a hard substrate providing clear spaces between the stream bed and the underside of pebbles/cobbles are therefore important.

The importance of submerged higher plants to bullhead survival is unclear, but it is likely that where such vegetation occurs it is used by the species for cover against predators. Weed cutting should be limited to no more than half of the channel width in a pattern of cutting creating a mosaic of bare substrate and beds of submerged plants. Slack-water areas provide important refuges against high flow conditions. Suitable refuges include pools, submerged tree root systems and marginal vegetation with >5 cm water depth.

Bullheads are particularly associated with woody debris in lowland reaches, where it is likely that it provides an alternative source of cover from predators and floods. It may also be used as an alternative spawning substrate. Debris dams and woody debris should be retained where characteristic of the river/reach. Woody debris removal should be minimised, and restricted to essential activities such as flood defence.

Maintenance of intermittent tree cover in conjunction with retention of woody debris helps to ensure that habitat conditions are suitable. At least 50% high canopy cover to the water course/banks should be maintained, where appropriate. Some reaches may naturally have lower tree cover. Cover may also be lower in urban reaches.

Bullhead densities have been found to be negatively correlated with densities of non-native crayfish, suggesting competitive and/or predator-prey interactions. Non-native crayfish should be absent from the SAC.

The presence of artificially high densities of salmonids and other fish will create unacceptably high levels of predatory and competitive pressure on juvenile and adult bullhead. Stocking of fish should be avoided in the SAC.

Escapes from fish farms are a form of uncontrolled introduction and should be prevented by effective screening on all intakes and discharges.

Bullheads are relatively sedentary and interactions between populations in different parts of the catchment and in different catchments are likely to be limited, suggesting the existence of genetically discrete populations. Since they are of no angling interest, deliberate transfers between sites are unlikely to have been undertaken in the past, such that the genetic integrity of populations is likely to be intact. There should be no stocking/transfers of bullhead unless agreed to be in the best interests of the population.

In general, management for other SAC features is expected to result in favourable habitat for bullhead, through improvements in water quality and flow regime and maintenance of suitable physical habitat.

5.4 Conservation status and management requirements of Feature 5: European otter *Lutra lutra*

Conservation status

Status: Favourable: Maintained.

The conservation status of otters in the Afonydd Cleddau SAC is based on records of otter distribution, general riparian habitat quality, breeding records and current breeding habitat quality as outlined in the Performance Indicators.

Management requirements

The catchment is capable of supporting 11 breeding females on the Western Cleddau, and 8 breeding females on the Eastern Cleddau. This is determined by the number of existing breeding territories as identified by Jones, (2004).

Management should aim to ensure that there is sufficient undisturbed breeding habitat to support an otter population of a size determined by natural prey availability and associated territorial behaviour. Involvement of river users and land managers will be important in improving potential breeding habitat near to the river. Living Rivers Agreements, agri-environment schemes and the Better Woodlands for Wales scheme provide possible mechanisms for maintaining suitable sites, such as lightly grazed woodlands, areas of dense scrub, and tussocky fens with purple moor-grass.

There is the opportunity to increase the number of breeding sites through targeted management under the Living Rivers Scheme. Of an initial 78 breeding sites identified through a desk top study in 2004, 37 were considered sub-optimal. It was noted that this would not necessarily preclude breeding activity. A survey of these sites is required with an assessment of the potential for improvement to 'optimal' condition.

Food availability is an important factor. Fish biomass should stay within expected natural fluctuations. A potential problem appears to be the decline in eel populations.

Measures to ensure the safe movement of otters around the catchment will be promoted, in particular the ongoing provision of ledges, tunnels and fencing on new road bridge schemes. Where bridges are being repaired or replaced, or at especially bad locations for otter road deaths, such features may be retro-fitted.

5.5 Conservation status and management requirements of Feature 6: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

Conservation status

Status: Unfavourable: unclassified

Important stands of the habitat have been identified in the lower reaches of the Western Cleddau main river below Welsh Hook, at Wolf's Castle and at Pont Llangwarren.

Further understanding of the distribution and status of this feature and its natural range within the Afonydd Cleddau SAC is required.

Management requirements

Factors that are important to the favourable conservation status of this feature include flow, substrate quality and water quality, which in turn influence species composition and abundance.
Under conditions of prolonged low flows and high nutrient status, epiphytic algae may suppress the growth of aquatic flowering plants. Favourable management for this feature is therefore largely dependent on ensuring that sufficient depth, velocity and duration of flow and sufficiently low phosphate levels are maintained within the natural range of the vegetation.

The level of shading is a determining factor to the presence of this feature in many reaches. The Afon Rhyd Afallen and the Conin are two such stretches where communities are bryophyte dominated. On reaches where the feature is identified, some coppicing of bank side trees may be required.

Localised water quality issues can have an impact on the feature. There are a number of smaller sewage treatment works within the SAC, which can have a detrimental effect if not operating to a high standard.

The conservation objectives require that the area covered by the feature is stable or increasing within its natural range, which is likely to require catchment-wide measures to control diffuse pollution from agriculture, as the principal source of phosphate. Measures should be targeted initially at those reaches identified as holding important stands of this vegetation, units 1,3,7 & 10 and as a mechanism to improve the overall quality of the river, unit 7.

In the Afonydd Cleddau catchment, the most significant sources of diffuse pollution and siltation are from agriculture, including fertiliser run-off, livestock manure, silage effluent and soil erosion from ploughed land. The most intensively used areas such as heavily trampled gateways and tracks can be especially significant sources of polluting run-off. Preventative measures can include surfacing of tracks and gateways, moving feeding areas, and separating clean and dirty water in farmyards.

If appropriate, land bordering the SAC can be entered into a Living Rivers Agreement for improvements such as stock exclusion and buffer strips, especially on reaches adjacent to intensively managed livestock grazing or arable land.

Other measures to control diffuse pollution in the water environment, including 'Catchment Sensitive Farming', may be implemented as a result of the Water Framework Directive and, along with existing agri-environment schemes, will help to achieve the conservation objectives for the SAC.

A pilot project looking at Catchment Sensitive Farming on the Deepford brook began in 2006/07 running through until the end of the 07/08 financial years. Deepford brook was chosen as a pilot in order to work on a predominantly dairy/intensive livestock catchment. The primary aim of the work was to investigate methods for reducing diffuse pollution coming from agricultural practice, and the response of the farming community to these methods and the interventions needed to undertake them. The way the project aimed to achieve these reductions was through provision of advice, support and financial grants to farmers/landowners in order to allow them to change aspects of their farm infrastructure or management in ways that will reduce run off and the potential of that run off to be loaded with pollutants such as soil, phosphorus, ammonia, sheep dip and organic material.
The effectiveness of this scheme now needs to be assessed.

A trial project targeting all farms in the catchments of the Cartlett, Anghof and Syfynwy tributaries is currently underway in partnership with the Environment Agency. All farms will be offered advice on best land management practice and free soil testing to determine correct levels of fertiliser application. If appropriate, land bordering the SAC can be entered into a Living Rivers Agreement.

Invasive non-native plants are a detrimental impact on this feature. Himalayan balsam and Japanese knotweed are problematic on the Afonydd Cleddau. A strategy to control these species must be developed in partnership with the Environment Agency.

More information is required on the natural range and distribution of this feature in the Afonydd Cleddau. Important examples of the feature may be present outside currently known locations. Sympathetic management will be promoted wherever the feature is present, if possible through the use of Living Rivers Agreements with land owners.

5.6 Conservation status and management requirements of Feature 7: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)

Conservation status

Status: Unfavourable: Unclassified

A survey to map the complete distribution of the feature and collect summary condition data of the entire series of alluvial forest (>1 ha in area) within the Afonydd Cleddau cSAC was undertaken in 2003-2004 by the Wildlife Trust of South and West Wales (Jones, 2004). This was carried out in conjunction with a contract to assess the current and potential distribution, condition and breeding success of otter within the cSAC, the primary feature of notification. The aim of the survey was to provide a clear overview of the many areas of alluvial woodland present within the cSAC; not to provide a condition assessment of the feature. The survey data would then allow CCW condition monitoring effort to be efficiently directed toward a small set of woodlands representative of the series. A survey condition assessment proforma was provided by CCW to record site-specific details of each woodland compartment to inform selection of sites to be monitored and condition assessed (N.B. the data collated within each survey condition assessment proforma by contract survey does not provide evidence of the feature condition as favourable or unfavourable at any site or across the SAC despite claims made by the survey report that the feature was in favourable condition). Unfortunately

when the survey data was field-tested in 2004 by T. Lovering and G. Wootton it was found to be often unreliable or inaccurate and therefore did not allow us to target sites for monitoring as had been the aim of survey or provide an accurate summary of condition across the series. Some of the sites did not meet the criteria of alluvial forest since ash formed the dominant canopy species rather than appearing as a component of the community. Other sites occupied elevated ground above the river system, which would not be subject to alluvial flooding. Given the limited time available for further survey CCW selected sites for SAC monitoring through re-surveying 2004 contract survey sites and including additional potential sites until we arrived at four suitable sites, on each arm, that could accurately be described as alluvial woodland.

Subsequent targeted monitoring provided SAC condition assessment based on site-specific performance indicators developed by Tracey Lovering (CCW SAC Monitoring Team). SAC condition assessment of the Alluvial woodland feature across the SAC required 3 out of 4 sites on each arm to pass individual condition assessments. Three sites failed: 2 from the Eastern Cleddau and 1 from the Western. Therefore the condition assessment is **Unfavourable: Unclassified**. The sub-category of Unclassified is provided since there was no previous data available for these sites with which a trend could be assessed.

In future years of monitoring CCW is likely to monitor a new set of 8 sites in the series of alluvial woodlands on the Cleddaus. This will provide greater information on individual sites and highlight site-specific management issues to bring the series into favourable condition. We will continue to assess the condition of the sites based on the same attributes/sub-attributes, with site-specific amendments. In this way we will gradually build up a database on all of the sites on the Cleddau, we will gain the actual extent of the feature and will be in a position to prioritise management decisions.

Selected sites with Condition Assessment Summary (P=Pass; F= Fail)

Eastern Cleddau: Henry's Moat (P), Cotland Mill, Deepford Brook (P); Southfield Villa, Pont Crwca (F); Abystree (F);
Western Cleddau: Esgyrn Bottom (P); Brimaston, Nant y Coy Brook (P); Wiston Mill, Cartlett Brook (P); Cuffern Bridge (F)

Site-specific management issues that led to assessment of site as Unfavourable

Southfield Villa: *Limited associated ground flora, sparse ground cover; dense thickets of bramble 30-80% (Target: Dense thickets of bramble <10%; confined to drier margins of habitat).*
Abystree: *Canopy gap occupied by dense bramble with no evidence of saplings (Target: At least 2 saplings established in canopy gap (2-5m trees) (advance regeneration) but only alder, ash, willow i.e. no beech or sycamore)*
Cuffern Bridge: *Dense thickets of bramble* c. 7% *in places (along woodland edge) (Target: Dense thickets of bramble <10% and confined to drier margins of habitat). Sycamore dominating canopy with rhododendron understorey (Targets: 50-90% of the canopy forming trees are alder; <5% of the canopy forming trees across the woodland are non-native; Exotics <5%).*

Management requirements

Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) comprises woods dominated by alder *Alnus glutinosa* and willow *Salix* spp. on flood plains in a range of situations from islands in river channels to low-lying wetlands alongside the channels. The habitat typically occurs on moderately base-rich, eutrophic soils subject to periodic inundation.

Many such woods are dynamic, being part of a successional series of habitats. Their structure and function are best maintained within a larger unit that includes the open communities, mainly fen and swamp, of earlier successional stages. On the drier margins of these areas other tree species, notably

ash *Fraxinus excelsior* and elm *Ulmus* spp., may become abundant. In other situations the alder woods occur as a stable component within transitions to surrounding dry-ground forest, sometimes including other Annex I woodland types. These transitions from wet to drier woodland and from open to more closed communities provide an important facet of ecological variation. The ground flora is correspondingly varied. Some stands are dominated by tall herbs, reeds and sedges, for example common nettle *Urtica dioica*, common reed *Phragmites australis*, greater tussock-sedge *Carex paniculata*, and meadowsweet *Filipendula ulmaria*, while others have lower-growing communities with creeping buttercup *Ranunculus repens*, common marsh bedstraw *Galium palustre*, alternate-leaved golden-saxifrage *Chrysosplenium oppositifolium* and marsh-marigold *Caltha palustris*.

In the UK this Annex I habitat falls mainly within the following NVC types:

- W5 *Alnus glutinosa – Carex paniculata* woodland
- W6 *Alnus glutinosa – Urtica dioica* woodland
- W7 *Alnus glutinosa – Fraxinus excelsior – Lysimachia nemorum* woodland
- W2a *Salix cinerea – Betula pubescens – Phragmites australis* woodland, *Alnus glutinosa – Filipendula ulmaria* sub-community

Alder requires high light levels to regenerate from seed and will not, therefore, regenerate under a canopy. However, it readily self-coppices from the base as trunks fall. This 'coppice' re-growth is counted as regeneration in the performance indicators. At present, natural processes of trees falling and re-growing appear to be maintaining the required structural diversity across most of the site, but some coppicing might be required in areas where trees have not been falling down.

Excessive grazing can have a negative affect on natural regeneration and the ground flora of the sites, where livestock have access, fencing may be needed to control or preferably exclude livestock.

Some sites have non native species present, namely Rhododendron, Himalayan Balsam and Japanese Knotweed, and control of these will be required.

Where works are required a Living Rivers Agreement can be offered to the landowner.

Areas of new alluvial woodland are being established in areas of previous wet grasslands. This is a natural progression within the wetland communities.

Further survey work is required to assess the condition of the alluvial forests and management requirements on a site by site basis.

Alder root disease can have a devastating impact on alluvial forests. Coppicing the affected trees has been shown to prolong their life and this course of action will be taken when alder root disease is found in survey sites or on ad hoc site visits.

Alluvial woodlands don't necessarily have to be wet and can occur on free draining soils. In these circumstances ash and oak can form a component of the canopy. However, most alluvial woodlands are also wet simply because these tend to be the areas that haven't been cleared for other land uses. Wet Alluvial woodlands are at risk of drying out where artificial drains have been dug in the past which will allow species of drier habitats, notably bramble and ash, to take over. There is a risk of drier woodland communities taking over from the alluvial woodland in these areas. There may exist the possibility of blocking drains on some sites and new drains should be created without first seeking advice from CCW.

5.7 Conservation status and management requirements of Feature 8: Active raised bogs

Conservation status

Status: Unfavourable: declining

Primary (i.e. un-cut) mire occupies a limited area of the site, and appears to have been truncated by past drainage and peat cutting operations (Baird and Money, 1998). The primary mire edges display damage in the form of slumping and cracking, particularly along the northeast and northwest margins of the area. There is a general predominance of *Calluna vulgaris* and under-representation of *Sphagna* across the bog surface, which may be symptomatic of progressive dehydration, but long-term trends are still unclear. As such the overall condition of the primary raised mire should provisionally be considered to be unfavourable, declining

Raised mires are dependent upon a high and seasonally stable water table, together with an acidic water chemistry and low levels of plant nutrient availability, for both their development and maintenance. The chief factor affecting the raised bog vegetation is its hydrology. The construction of sluices on outflow ditches has been postulated as a means of countering the effects of peat cutting and drainage.

Raised mires are termed ombrotrophic, meaning that they are entirely dependent on atmospheric precipitation alone for both their water and nutrient inputs. Any nutrient enrichment by for example drift of agricultural inputs such as lime and herbicide/pesticide sprays may have a detrimental impact on the vegetation. Esgyrn Bottom is surrounded by steep wooded slopes which provide a suitable buffer against such occurrences. More insidious impacts could occur through pollution of groundwater, for example through intensification of agriculture. This threat should be addressed through maintenance of semi-natural vegetation and encouragement of good agricultural practice within the catchment area of the valley.

Fire, particularly if affecting extensive areas of the mire, may damage the hydrology of the site by destroying the microclimate amelioration and water holding capacity of the mire vegetation. As such, whilst loss of the vegetation cover may be short-lived, recovery to an active peat-forming state is likely to take a number of years or even decades. Fire episodes also increase the opportunity for the establishment of tree/shrub species and encourage the spread of fire tolerant competitive species notably *Molinia*. Measures should be taken to prevent fires.

Scrub encroachment is not currently thought to be a problem. Examination of aerial photographs suggests that there was some localised scrub expansion between 1971 and 1983, but further expansion was very limited between 1983 and 1992 (Baird & Money, 1998). Scrub largely comprises *Salix cinerea* and *Alnus glutinosa* aligned along ditch lines and other wet depressions, suggesting that current scrub distribution is influenced more by base-rich conditions than dehydration.

Grazing does not currently occur on the raised bog, but introduction of stock on to areas of secondary raised mire would help to control *Molinia* and scrub.

Management requirements

Grazing

Grazing should not be necessary to keep the primary raised bog in good condition, but very light grazing may be of value on sites impacted by drainage. The secondary raised bog has been grazed in the past, and grazing by larger animals such as cattle, ponies or deer would have positive effects if re-

introduced. Grazing here should aim to keep the purple moor-grass tussocks in check, and create a mixture of moor-grass and other plants varying between ankle-height and knee-height.

Burning

Although burning is sometimes used as a traditional method of rejuvenating areas of purple moor-grass, the bog here should not be burnt. The layer of *Sphagnum* moss and underlying peat would be damaged, and the growth of purple moor-grass encouraged. Accidental summer burns are particularly damaging, and an effort should be made to prevent these from occurring.

Scrub Cutting

Scrub appears to be spreading across the secondary raised bog. The non-native rhododendron is a particular concern. Occasional cutting may be necessary to stop this from spreading further and shading out the native bog plants. Treatment of stumps with a suitable herbicide would be necessary to prevent re-growth.

Pollution

Activities that could affect water draining on to the bog should be carried out carefully. Where possible, use of fertilisers or other chemical inputs on fields adjoining the bog should be limited. This will ensure a clean supply of water draining on to the bog margins. Any felling in the woodland should avoid causing silt problems. Aerial pollution has a damaging impact on sensitive bog plants, and originates from both local sources and further afield.

Drainage

The raised bog is dependent on the maintenance of a natural drainage pattern. No new drainage systems should be put in place, and no pools should be created. A programme of ditch blocking and hydrological restoration is urgently required within an immediately adjacent to the raised bog and this will be progressed by CCW and relevant partners.

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?
1	001009	WC Lower main channel & Camrose	The currently unfavourable condition assessment of river lamprey and seal lamprey suggests that there may be adverse factors influencing these species and further survey work is required to gain a clearer picture of sea lamprey population. Investigation is required firstly at the Weir in Haverfordwest to assess migration passage up river.	Yes
2	001010	WC Cartlett	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality - the EA have identified this reach as having particularly poor water quality with no fish recorded during the latest round of monitoring.. Invasive species, notably Himalayan balsam and isolated stands of rhododendron are present in the unit and lead to a reduction in local biodiversity and in the case of Himalayan balsam, bank instability. Otters are present throughout the reach with two areas identified as potential breeding sites. There have been occasional accidental discharges and pollution events recorded in the unit.	Yes
3	001012	WC Upper main channel	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability. Otters are present throughout the reach with an identified as potential breeding site at Priskilly forest. There have been occasional accidental discharges and pollution events recorded in the unit.	Yes
4	001013	WC Rubaxton & Spittal	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability. Otters are present throughout the reach with identified potential breeding sites throughout the entire unit.	Yes
5	001014	WC Nant y Bugail & Nant y Coy	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability. Otters are present throughout the reach with 2 identified potential breeding sites on the Nant Y Coy and one on the Nant y Bugail.	Yes

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
6	001015	WC Anghof	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality. the reach has been recognised as having particularly poor water quality and is to be targeted by the EA under a CSF scheme. Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability. Otters are present throughout the reach with 2 identified potential breeding sites. there have been occasional pollution incidents, farming related reported on this reach.	Yes
7	001016	WC Cleaddau & WC headwaters	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality. Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability. Otters are present throughout the reach with potential breeding sites at Llangloffan Fen and Esgyrn Bottom.	Yes
8	001017	EC Narberth & Pont Shan	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality. Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability. Otters are present throughout the reach but no potential breeding sites have been identified.	Yes
9	001018	EC Conin	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality. Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability. Otters are present throughout the reach but no potential breeding sites have been identified.	Yes
10	001020	EC Lower main channel	The currently unfavourable condition assessment of both sea and river lamprey suggests that there may be adverse factors influencing these species and further survey work is required to gain a clearer picture of sea lamprey population.	Yes
11	001021	EC Deepford & Cotland	Diffuse pollution and sediment inputs from agricultural land management have negative impacts upon water quality. The Deepford brook catchment sensitive farming scheme has been in operation but there has been limited uptake of streamside corridor fencing. Otters are present throughout the reach.	Yes

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
12	001022	EC Syfynwy below reservoir	Otters are present throughout the reach with identified potential breeding sites immediately below the reservoir and on the Rhyd y Brown. There has been one road death reported at Walton Mill. Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. Reductions in flows downstream of Llys y Fran may lead to drying out of lamprey spawning areas The Abstraction at Walton Mill has the potential to reduce levels and wetted perimeter within a 250m reach between the points of abstraction and discharge. This may impact upon lamprey habitat and may also hinder the migration of sea and river lamprey through this section. there is one further abstraction identified under the RoC process - a fish farm immediately below the reservoir - this has passed through to a stage 4 options appraisal. Invasive species, including Japanese knotweed are present throughout the reach. They suppress local biodiversity and can lead to bank instability.	Yes
13	001023	EC Syfynwy above reservoirs	Otters are present throughout the reach with an identified potential breeding site on the reach and further potential breeding habitat throughout. Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. The abstractions on the Rosebush and Llys-y-Fran reservoirs have the potential to entrain juvenile brook lamprey. reductions in flows downstream of Rosebush may lead to drying out of brook lamprey spawning areas The reservoirs act as a barrier to migration of fish species, populations of bullhead would not be able to recolonise if wiped out by a pollution event. Some Japanese knotweed present in the top of the reach	Yes
14	001024	EC Upper main channel	Otters are widespread and present throughout the reach with an identified potential breeding site at Rydwilym Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. There is an abstraction at Pont Hywel which may have an impact - this is progressing to stage 4 options appraisal with the EA	Yes
15	001025	EC Afon Rhyd Afallen & Llanycefn	Otters are widespread and present throughout the reach with an identified potential breeding sites located on both the Afon Rhyd Afallen and the Llanycefn. Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability.	Yes

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
16	001026	EC Headwaters (EC)	Otters are widespread and present throughout the reach with an identified potential breeding sites located at Glandy Bridge and Waunlwyd Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability.	Yes
17	001027	EC Afon wern	Otters are widespread and present throughout the reach although no potential breeding sites have been identified. Invasive species, notably Himalayan balsam are present in the unit and lead to a reduction in local biodiversity and bank instability.	Yes
18	001028	Llangloffan CCW section	Otters are present throughout the unit with good identified breeding habitat in the undisturbed and dense woodland / scrub areas. Diffuse pollution and siltation: Agricultural land management affects run-off from land, especially to the north and has negative impacts on water quality. the channel has been straightened and deepened in the past, management works have been undertaken to limit the drying of the terrestrial habitats and pools excavated in the location of historical meanders. There is excellent public access through the unit via a recently installed boardwalk. The unit is also an NNR and is managed according to a CCW management plan.	Yes
19a	001029	Llangloffan central section (south)	This unit is privately owned and a management agreement with the landowner is in place. (Expires 20??)	Yes
20	001030	Llangloffan WTSWW section	Otters are present in the unit with good identified breeding habitat throughout. Diffuse pollution and siltation: Agricultural land management affects run-off from land and has negative impacts on water quality. The channel has been straightened and deepened in the past, the Wildlife Trust are proposing works to reintroduce meanders and water control measures to help stop the terrestrial habitats from further drying out. The Wildlife Trust is building a carpark on-site but outside the boundary of the SAC. Proposals are under development to introduce public access. The unit is also an NNR and is managed within the suite of WTSWW nature reserves. Tighter control over grazing is required to prevent banks from collapsing and associated sediment inputs, also to ensure more effective management of marshy grassland components of unit	Yes
24	001031	Esgyrn western section	Not SAC - details to be added	No
25	001032	Esgyrn NE section	Not SAC - details to be added	No

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
26	001033	Esgyrn SE section	Not SAC - details to be added	No
27	001969	Esgyrn Bottom core	Hydrological investigations have revealed that the northern margin of the raised bog is being impacted by an old drainage ditch. Remediation work is planned here. Any grazing management proposals would require new fencing with attendent landscape issues. Grazing (with guanacas) only takes place on a small section on the northern edge of the bog - provided the hydrology of the bog functions naturally, growth of competitive species such as Molinia and Ulex species should remain limited and no grazing management of the primary raised mire should be required. Rhododendron is present around the margins of the primary raised mire, and should be eradicated. Past pollution from a dairy yard at Gelli has affected the western end of the raised mire, but the catchment is otherwise well buffered against run-off. Air pollution has the potential to impact on the low nutrient status of the mire surface. The site has not been burnt since the 1980s, but fire has the potential to damage the habitat.	Yes
22	002449	Llangloffan Jordanston	There is a CCW management agreement in force on this unit (expires 20??)	No
92	002913	Treffgarne gorge SSSI		No
82	002914	Cleddau SAC & Wallis SSSI (2)	Otters are present throughout the reach with identified potential breeding sites throughout the entire unit. there are issues concerning the SSSI management to be addressed later	No
58	002915	Cleddau SAC & Wallis SSSI (1)	Otters are present throughout the reach with identified potential breeding sites throughout the entire unit. there are issues concerning the SSSI management to be addressed later	No
77	002916	Cleddau SAC & Wallis SSSI (4)	Otters are present throughout the reach with identified potential breeding sites throughout the entire unit. there are issues concerning the SSSI management to be addressed later	No
19b	005712	Llangloffan central section (north)		No
23	005713	Llangloffan Pencnwch		No

7. GLOSSARY

This glossary defines the 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]:

Favourable: maintained;
Favourable: recovered;
Favourable: un-classified
Unfavourable: recovering;
Unfavourable: no change;
Unfavourable: declining;
Unfavourable: un-classified
Partially destroyed;
Destroyed.

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

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.

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 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.

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

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 AND ANNEXES

APEM Aquatic Scientists. 2005. Lamprey Survey on the Rivers Tywi, Teifi & Cleddau. Review of consents report No 7.

Grieve, N., Clarke, Caswell, S.B. & Newman, J.R. 2003. Macrophyte Surveys of the Cleddau Rivers and Selected Tributaries. CCW Contract Science Report No. 578

Henderson, Seaby and Somes. 2007. A review of the ststus of Salmon and Bullhead in eight SAC rivers. CCW Environmental Monitoring Report No 35.

JNCC. 2004. Common Standards Monitoring Guidance For Woodland Habitats. JNCC. Peterborough.

Jones. 2004. Current and potential distribution, condition and breeding success of the otter *(Lutra lutra)* in the Afonydd Cleddau catchments and condition mapping of Alluvial forests in the Afonydd Cleddau cSAC. Report produced by The Wildlife Trust of South and West Wales' Water for Wildlife Team. CCW Report no.CCW/WA/31.

Jones & Jones. 2004. Otter Survey of Wales 2002. The Environment Agency Wales.

Jones and Parry An Assessment of the Conservation and Restoration of the Cleddau Catchment.

Lee Donaldson Associates. 1993. Western Cleddau Catchment River Corridor Survey (tributaries)

Lee Donaldson Associates. 1993. Eastern Cleddau Catchment River Corridor Survey (tributaries)

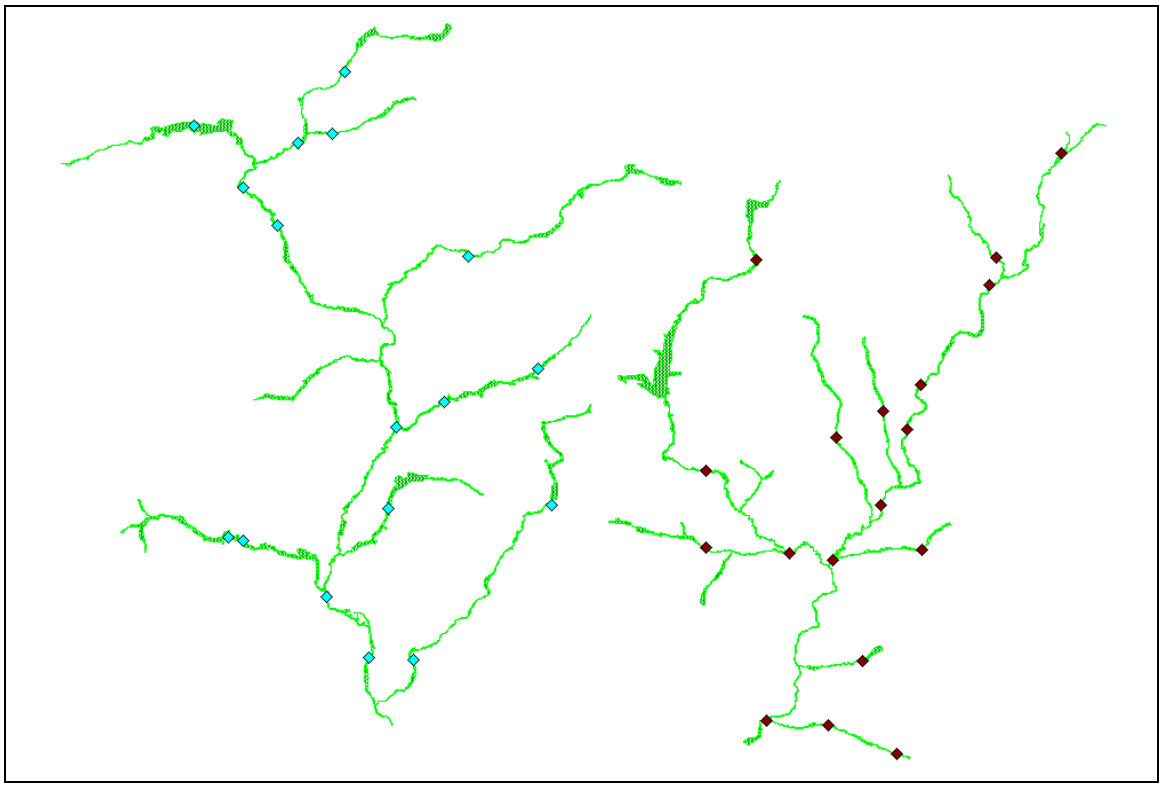
Liles, G. 2004. Current and potential distribution, condition and breeding success of the otter (*Lutra lutra*) on the Afon Teifi catchement area. CCW Environmental monitoring Report No. 5.

Lovering, T. 2005. Afonydd Cleddau SAC Monitoring Report: Alluvial Woodland 2004. Internal unpublished report.

Small, C. 1991. Western Cleddau River Corridor Survey.

ANNEX 1 – LAMPREY SURVEY SITES

Site No.	Site Name
W1	W.Cleddau, Upstream of road bridge
W2	Cartlett Brook, Shoalshook Lane
W3	Cartlett Brook, U/S of Penty Park Lodge
W4	W.Cleddau, D/S of Camrose Brook
W5	Camrose Brook, U/S Camrose Mill Bridge
W6	Camrose Brook, D/S Camrose Mill Bridge
W7	Rudbaxton Water, U/S of road bridge
W8	W.Cleddau, U/S Treffgarne Bridge
W9	Spittal Brook, Wood End, Spittal
W10	Spittal Brook, Scollock Bill
W11	Anghof, Beulah Bridge
W12	W.Cleddau, Coed Ty-Newydd Grug
W13	W.Cleddau, Priskilly Forest Footbridge
W14	W.Cleddau, Pont Llangloffan
W15	Cleddau, Pont Llanwarren
W16	Bugail, New Bridge
W17	Cleddau, Dolau Cottage
W35	Millin Brook, Cooks Bridge
E1	E.Cleddau, Narberth Brook confluence
E2	Narberth Brook, Ford by East Atheston
E3	Narberth Brook, Sewage Works
E4	E.Cleddau, Pont Shan
E5	E.Cleddau, Conin confluence
E6	Syfynwy, Deepford Brook confluence
E7	Deepford Brook, Road bridge
E8	Syfynwy, Stepaside Bridge
E9	Syfynwy, Rhyd Fawr Bridge
E10	E.Cleddau, Glancleddau
E11	Rhyd-a-fallen, Rhyd-a-fallen Bridge
E12	E.Cleddau, Llwyn-dwfr Bridge
E13	Llancefyn, Llancefyn Mill
E14	E.Cleddau, Gors
E15	E.Cleddau, Pont Hywel Bridge
E16	Wern, Pont Mynachlogddu
E17	E.Cleddau, Caermeini Ganol
E18	Conin, Crug y deri

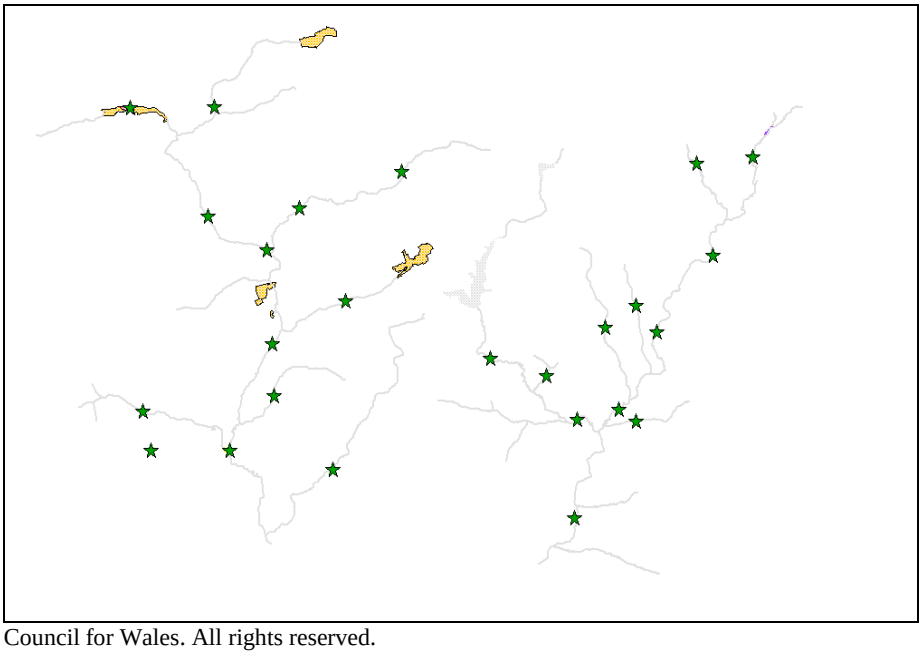


ANNEX 2 – 2001 MACROPHYTE SURVEY SITES

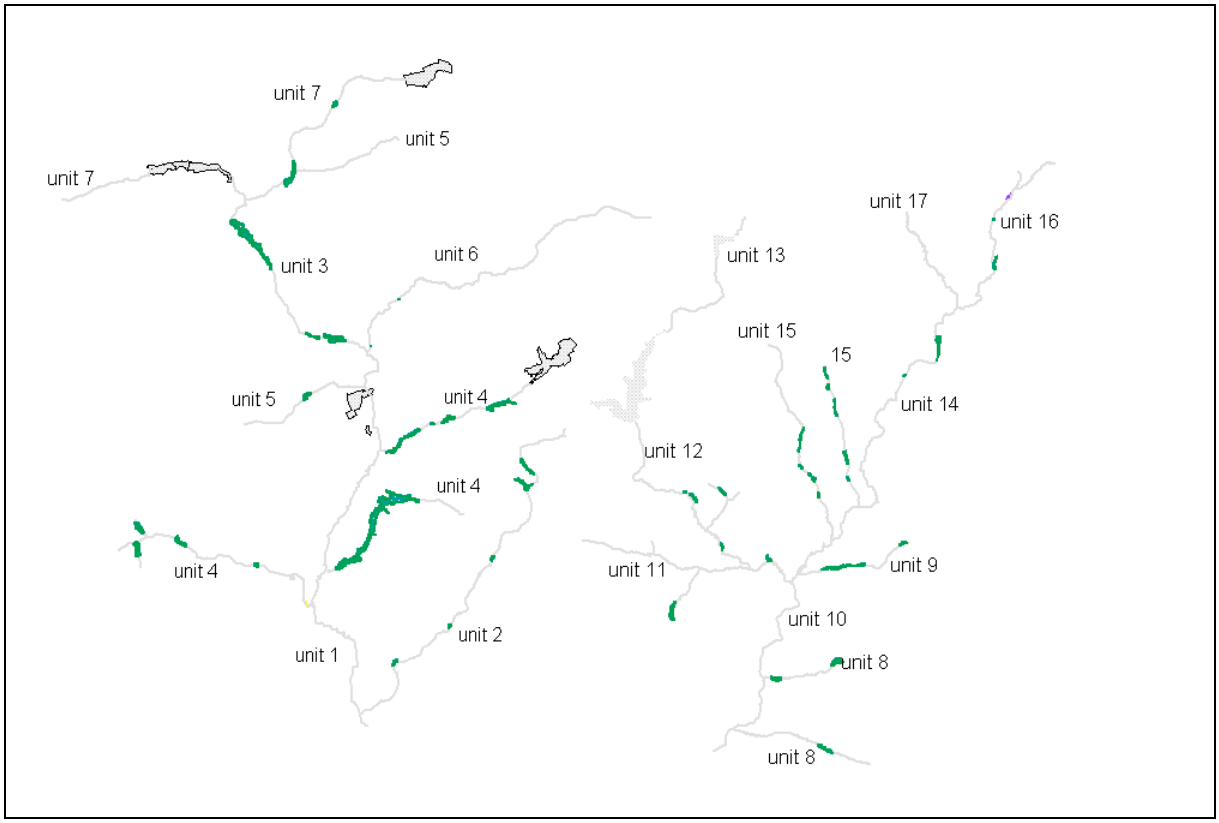
(GRs are located at mid point of survey stretch)

Site No	Name	GR
WC1	Western Cleddau at Pont Llangloffan	SM904319
WC2	Afon Cleddau: Trecoed to Nant y Bugail confluence	SM935319
WC3	Western Cleddau at Welsh Hook	SM934277
WC4	Afon Anghof at Puncheston	SN008294
WC5	Afon Anghof at Sealyham	SM968280
WC6	Western Cleddau at Wolfscastle	SM957264
WC7	Spittal Brook upstream of Golden Hill	SM986245
WC8	Western Cleddau at Treffgarne	SM959229
WC9	Camrose Brook at Stock Park Farm	SM908203
WC10	Knock Brook at Keeston Bridge SITE REJECTED – UNSUITABLE	SM911188
WC11	Western Cleddau at Cutty Bridge	SM941188
WC12	Carlett Brook upstream of Crundale level crossing	SM981180
EC13	Afon Wern tributary	SN122298
EC14	Eastern Cleddau at Waun Isaf	SN144300
EC15	Eastern Cleddau downstream of Llangloman	SN127262
EC16	Llanycefn tributary	SN098244
EC17	Eastern Cleddau at Rhyd-y-Bil confluence	SN106234
EC18	Rhyd Afallen tributary SITE REJECTED – UNSUITABLE	SN086235
EC19	Rhyd y Brown / Ty Llosg tributary. (Relocated)	SN063216
EC20	Syfynwy downstream of Southfield Villa	SN043223
EC21	Syfynwy at Deepford Brook confluence	SN075200
EC22	Eastern Cleddau at Llandre Bridge	SN091204
EC23	Eastern Cleddau at Abystree	SN075163
WC25	Treffgarne Gorge	

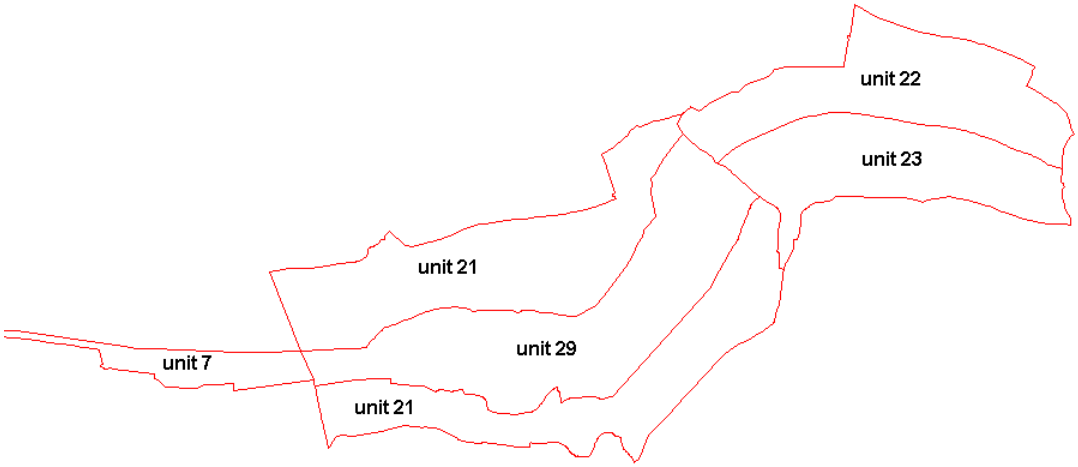
EC19: Site was relocated slightly downstream of that originally chosen, which was outside the suggested SSSI / SAC boundary and located in a wooded area where shading may reduce aquatic macrophyte cover. New location is below wooded area and also below confluence with small trib entering from west on right bank.



ANNEX 3 – MAP OF ALLUVIAL WOODLAND LOCATIONS (Jones, 2004)



ANNEX 4 – DETAIL OF ESGYRN BOTTOM UNITS



ANNEX 5 – SUMMARY OF THE LIVING RIVERS SCHEME

Objectives of the Rivers scheme

As nutrient and sediment levels increase, deterioration of the SSSIs may occur in terms of changes in plant and animal communities, growth of harmful weed and algae and a decline in the species of interest.

Agricultural sources may be one source for increased levels of nitrates and phosphates within the rivers, and may also increase the levels of sediment within the river system. Pesticides and herbicides that leach into the river can also cause pollution problems.

A reduction in pollution from agricultural sources is therefore an objective for the scheme.

In summary, the scheme will:

- Create appropriate buffer zones/riverside corridors in order to safeguard and improve water quality and provide a sheltered corridor to benefit invertebrates, birds and mammals including otters.
- **Maintain and enhance natural habitats and features of the river by tree planting, pollarding, fencing and cutting of vegetation.**
- Safeguard and improve the habitat for populations of bullhead, brook, sea and river lamprey species, otters and water crowfoot beds.
- Maintain and enhance existing wetland habitats, in particular wet woodlands and raised bog.
- Promote the advantages to both wildlife and agriculture of sympathetic management practices.
- Undertake a monitoring programme of the special features of the site.