CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

CORE MANAGEMENT PLAN
INCLUDING CONSERVATION OBJECTIVES

FOR

AFON TEIFI / RIVER TEIFI SAC
(SPECIAL AREA OF CONSERVATION)

Version: **2 (Minor map edit, August 2012)**

Date: **20 April 2011**

Approved by: Charlotte Gjerlov

A Welsh version of all or part of this document can be made available on request.

Cyngor Cefn Gwlad Cymru
Countryside Council for Wales

NATURA 2000

Ramsar

Llywodraeth Cynulliad Cymru
Welsh Assembly Government
CORFF NODDEDIG | SPONSORED BODY

CONTENTS

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.

The Afon Teifi/River Teifi SAC will be maintained or, where necessary, restored to high ecological status, including its largely unmodified and undisturbed physical character, so that all of its special features are 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 are not only attractive but 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. Patches of white-flowered water-crowfoots will continue to be widespread in the main river and in many of the tributaries. In the more shaded reaches mosses and liverworts predominate.

Five special fish species will be present in numbers that reflect a healthy and sustainable population supported by well-distributed good quality habitat. Bullhead and brook lamprey complete their entire life cycles within the river. Migratory species such as the Atlantic salmon, sea and river lamprey, which swim up river to spawn and go through their juvenile stages in the river, will be able to complete their migrations and life cycles unhindered by artificial barriers such as weirs, pollution, or depleted flows.

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

There will be healthy populations of floating water-plantain in the Teifi Pools and in the river around Tregaron. The Teifi Pools will continue to contain their current range of distinctive aquatic plants that are characteristic of these clear-water upland lakes.

The presence of the Afon Teifi/River Teifi SAC and its special wildlife will continue to 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 be recognised and promoted through appropriate land management. The river will remain a focus for education to promote increased understanding of its biodiversity and the essential life support functions of its ecosystems.

2. SITE DESCRIPTION

2.1 Area and Designations Covered by this Plan

Grid reference: SN515508

Unitary authorities: Ceredigion; Caerfyrddin/ Carmarthenshire; Penfro/ Pembrokeshire

Area (hectares): 715.58

Designations covered: **Afon Teifi SSSI** (the SAC and SSSI boundaries are concurrent)

The **Afon Teifi/River Teifi SAC** flows through (dissects) Cors Caron SAC, NNR and SSSI, Elenydd SSSI and Elenydd-Mallaen SPA, but these latter sites are each dealt with in separate management plans. The underpinning SSSI designations do not overlap.

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

See summary map on CCW's web site showing the coverage of this document.

2.2 Outline Description

At 122 km, the Afon Teifi is one of the longest rivers in Wales, with one of the most pristine river catchments in lowland Britain. From its source in the oligotrophic Teifi Pools, situated at 455m in the Cambrian Mountains, the river descends steeply through the upland pastures and flows through the raised mire complex of Cors Caron. Below Cors Caron the Teifi meanders through lowland farmland, joined by a number of small tributaries from either side of the valley. Rocky, tree-lined sections are a feature of the lower part of the river, and there are several impressive gorges, particularly at Alltycafan, Henllan and Cilgerran, with spectacular waterfalls at Cenarth. Below Cilgerran gorge the estuary begins, winding its way past the wildlife-rich Teifi Marshes and the town of Cardigan before flowing out into Cardigan Bay. The whole of the river from source to sea is included in the SAC, as are ten tributaries: the Groes, Brefi, Dulas, Grannell, Clettwr, Cerdin, Tyweli, Ceri, Cych and Piliau.

The underlying geology consists of Ordovician and Silurian mudstones, siltstones and sandstones, which are extensively mantled by Quaternary deposits of variable, but sometimes considerable thicknesses. These consist of sands and gravels, glacial lake clays, alluvium and peat. This geology produces a generally low to moderate nutrient status and a low to moderate base-flow index, making the river characteristically flashy. The run-off characteristics and nutrient status are significantly modified by land use in the catchment, which is predominantly pastoral with some woodland and commercial forestry in the headwaters and a limited amount of arable in the lower catchment.

The ecological structure and functions of the site are dependent on hydrological and geomorphological processes (often referred to as hydromorphological processes), as well as 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 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. Reductions in flow 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 as near to natural as constraints will allow in order to support the functioning of the river ecosystem. Two of the Teifi Pools, Llyn Teifi and Llyn Egnant, are artificially regulated for water abstraction, and this affects the species composition of the oligotrophic lake vegetation they contain. The compensation flows released below the dams ensure that downstream river flow is not adversely affected.

Geomorphological processes of erosion by water and subsequent deposition of eroded sediments downstream create the physical structure of the river habitats. While some sections of the river are naturally stable, especially where they flow over bedrock, others undergo continual and at times rapid change through the erosion and deposition of bed and bank sediments as is typical of meandering sections within floodplains (called 'alluvial' rivers). These processes help to sustain the river ecosystem by allowing a continued supply of clean gravels and other important substrates to be transported downstream. In addition, the freshly deposited and eroded surfaces, such as shingle banks and earth cliffs, enable processes of ecological succession to begin again, providing an essential habitat for specialist, early-successional species. 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. At Cors Caron, the Afon Teifi flows through an area of fine-grained lake sediments and provides an exceptional opportunity for studying fluvial transport processes dominated by suspended sediment movement. It provides a marked contrast with the upstream and downstream reaches where coarse bed-load transport is dominant, which is more typical of upland rivers in mid-Wales.

Riparian habitats, including bank sides 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 habitat for breeding and resting sites. It is important that appropriate amounts of tree 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 managing grazing levels, selective coppicing of riparian trees and restoring adjacent wetlands. The mobility of the Teifi has resulted in the formation of significant areas of off-channel habitat in the form of ox-bows, wet woodlands, willow scrub etc. These are predominantly away from the main channel, and form important areas for otter to rest-up in or support breeding sites. In the few urban sections the focus may be on maintaining the river as a communication corridor but this will still require that sufficient riparian habitat is present and managed to enable the river corridor to function effectively.

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. Naturally isolated feature populations that are identified as having important genetic distinctiveness should be maintained. 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 must be designed to allow safe passage. The continuity of riparian habitats enables a wide range of terrestrial species, 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. Where the Teifi flows through Cors Caron, a 1.5 km reach in the centre of the bog was artificially straightened at the end of the 19th century. This has had the effect of reducing the naturalness and habitat diversity of the river and its connectivity with the surrounding fen and mire habitats of Cors Caron SAC. The previous meandering channel still exists in the form of cut off meanders, and restoration of this section to its previous course would enhance the river ecosystem structure and function, and its connectivity with the raised bog system.

External factors, operating outside the SAC, may also be influential, particularly for the migratory fish and otters. For example, salmon may be affected by inshore fishing and environmental conditions prevailing in their north Atlantic feeding grounds. Otters may be affected by developments that affect resting and breeding sites outside the SAC boundary.

2.3 Outline of Past and Current Management

There are many different aspects to the management of this large and complex site that may affect its conservation status. These are summarised in the Site Management Statement for the Afon Teifi SSSI.

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:

- SAC/SSSI boundary
- Natural hydromorphology, where there are significant differences in management issues/key features between reaches
- Estuary: the reach below the tidal limit is treated as a separate unit
- Artificial barriers, where they significantly affect one or more of the features' range (the Llyn Teifi dam)
- Tenure boundaries: Cors Caron NNR
- The units include one or more of EA's River Basin Management Plan water bodies; as far as is practicable, unit boundaries coincide with these water body boundaries.

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

Unit number		SAC	SSSI	CCW owned	Surrounded by
Afon Teifi SSSI					
1		✔	✔		
2		✔	✔		
3		✔	✔		
4		✔	✔		
5		✔	✔	✔	Cors Caron SAC, Ramsar & NNR
6	6.1	✔	✔		
	6.2	✔	✔		Elenydd-Mallaen SPA
7		✔	✔		Elenydd-Mallaen SPA

3. THE SPECIAL FEATURES

3.1 Confirmation of Special Features

Designated feature	***Relationships, nomenclature etc***	***Conservation Objective in part 4***
SAC features		
Annex I habitats that are a primary reason for selection of this site		
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation ***(EU Habitat Code: 3260)***		4.2
Annex II species that are a primary reason for selection of this site		
Brook lamprey *Lampetra planeri* ***(EU Species Code: 1096)***	These two species are generally indistinguishable for the purposes of monitoring; however management requirements are similar	4.3
River lamprey *Lampetra fluviatilis* ***(EU Species Code: 1099)***		
Atlantic salmon *Salmo salar* ***(EU Species Code: 1106)***		4.3
Bullhead *Cottus gobio* ***(EU Species Code: 1163)***		4.3
European otter *Lutra lutra* ***(EU Species Code: 1355)***		4.4
Floating water-plantain *Luronium natans* ***(EU Species Code: 1831)***		4.5

Annex I habitats present as a qualifying feature, but not a primary reason for site selection		
Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* ***(EU Habitat Code: 3130)***		4.6
Annex II species present as a qualifying feature, but not a primary reason for site selection		
Sea lamprey *Petromyzon marinus* ***(EU Species Code: 1095)***		4.3
SPA features		
Not applicable		
Ramsar features		
Not applicable		
SSSI features		
Running water		
Standing water		
Marginal inundation communities		
Marshy grassland		
Swamp		
Saltmarsh		
Semi-natural woodland		
Fluvial geomorphology of Wales		
Water sedge *Carex aquatilis*		
Dotted sedge *Carex punctata*		
Cetti's warbler *Cettia cettia*		
Toadflax leaf beetle *Chrysolina sanguinolenta*		
Multi-fruited river-moss *Dendrocryphaea lamyana*		
Club-tailed dragonfly *Gomphus vulgatissimus*		
Graceful pondweed *Potamogeton x olivaceus*		
Violet crystalwort *Riccia huebeneriana*		
Cornish moneywort *Sibthorpia europaea*		
A blackfly: *Simulium morsitans*		
Brown hairstreak *Thecla betulae*		
Assemblage of RDB and/or Nationally Scarce and/or Atlantic-Western British bryophytes		
Assemblage of RDB and/or Nationally Scarce vascular plants		
Breeding bird assemblage of lowland open waters and their margins		

3.2 Special Features and Management Units

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

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

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

a) they are present in the unit but may be of less conservation importance than the key feature; and/or
b) they are present in the unit but in small areas/numbers, with the bulk of the feature in other units of the site; and/or
c) their requirements are broader than and compatible with the management needs of the key feature(s), e.g. a mobile species that uses large parts of the site and surrounding areas.

Nm - an infrequently used category where features are at risk of decline within a unit as a result of meeting the management needs of the key feature(s), i.e. under Negative Management. These cases will usually be compensated for by management elsewhere in the plan, and can be used where minor occurrences of a feature would otherwise lead to apparent conflict with another key feature in a unit.
Mn - Management units that are essential for the management of features elsewhere on a site e.g. livestock over-wintering area included within designation boundaries, buffer zones around water bodies, etc.
x – Features not known to be present in the management unit.

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

Afon Teifi / River Teifi	**Management unit**						
	1	**2**	**3**	**4**	**5**	**6**	**7**
SAC	✔	✔	✔	✔	✔	✔	✔
SSSI	✔	✔	✔	✔	✔	✔	✔
CCW ownership					✔		
SAC Features							
1. Rivers with floating vegetation often dominated by water-crowfoot	x	**KH**	**KH**	**KH**	**KH**	Sym	x
2. Brook lamprey	Sym	Sym	Sym	Sym	Sym	Sym	x
3. River lamprey	Sym	Sym	Sym	Sym	Sym	Sym	x
4. Sea lamprey	**KS**	**KS**	x	x	x	x	x

Afon Teifi / River Teifi	Management unit						
	1	2	3	4	5	6	7
5. Atlantic salmon	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	x
6. Bullhead	Sym	Sym	Sym	Sym	Sym	Sym	x
7. European otter	**KS**	**KS**	**KS**	**KS**	**KS**	**KS**	Sym
8. Floating water-plantain	x	x	x	**KS**	**KS**	x	**KS**
9. Clear-water lakes with aquatic vegetation and poor to moderate nutrient levels.	x	x	x	x	x	x	**KH**
SSSI Features							
Running water	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**	x
Standing water	Sym	Sym	Sym	Sym	Sym	Sym	**KH**
Marginal inundation communities	Sym	Sym	Sym	Sym	Sym	Sym	x
Marshy grassland	**KH**	Sym	Sym	Sym	Sym	Sym	x
Swamp	**KH**	Sym	Sym	Sym	Sym	Sym	x
Saltmarsh	Sym	x	x	x	x	x	x
Semi-natural woodland	**KH**	Sym	Sym	Sym	Sym	Sym	x
Fluvial geomorphology of Wales	x	Geo	x	x	Geo	x	x
Water sedge *Carex aquatilis*	x	Sym	Sym	Sym	Sym	x	x
Dotted sedge *Carex punctata*	Sym	x	x	x	x	x	x
Cetti's warbler *Cettia cettia*	**KS**	x	x	x	x	x	x
Toadflax leaf beetle *Chrysolina sanguinolenta*	Sym	x	x	x	x	x	x
Multi-fruited river-moss *Dendrocryphaea lamyana*	Sym	**KS**	Sym	x	x	x	x
Club-tailed dragonfly *Gomphus vulgatissimus*	Sym	x	x	x	x	x	x
Graceful pondweed *Potamogeton x olivaceus*	x	Sym	Sym	x	x	x	x
Violet crystalwort *Riccia huebeneriana*	x	Sym	x	Sym	Sym	x	x
Cornish moneywort *Sibthorpia europaea*	x	Sym	x	x	x	x	x
A blackfly: *Simulium morsitans*	x	x	x	x	Sym	x	x
Brown hairstreak *Thecla betulae*	Sym	x	x	x	x	x	x
Assemblage of RDB and/or Nationally Scarce and/or Atlantic-Western British bryophytes	Sym	Sym	Sym	Sym	Sym	Sym	Sym
Assemblage of RDB and/or Nationally Scarce vascular plants	Sym	Sym	Sym	Sym	Sym	x	**KS**
Breeding bird assemblage of lowland open waters and their margins	Sym	Sym	Sym	Sym	Sym	Sym	Sym

- The feature 'Rivers with floating vegetation often dominated by water-crowfoot' occurs in Units 2 - 6 and is selected as a key habitat in units 2-5.
- Atlantic salmon migrates through Unit 1 and spawns in all the remaining units except Unit 7, so is selected as a key feature in all of these units.
- Sea lamprey is known to spawn in the lower river as far upstream as Henllan (Unit 2), and has been recorded at Llandysul in wet summers, (although the natural waterfalls at Cenarth may present a partial barrier to upstream migration). Although the distribution of sea lamprey on the Teifi is poorly understood, it is assumed to be generally absent from Unit 3 and upstream due to natural range limits. The distribution of river lamprey is very poorly known.
- Management for Atlantic salmon and sea lamprey should also be sympathetic for river/brook lamprey and bullhead.

- Specific management measures for otter relating to adjacent habitats and disturbance require its selection as a key feature in all units.
- Unit 7 (the Teifi Pools) is the only unit that supports the feature ‘Clear-water lakes with aquatic vegetation and poor to moderate nutrient levels’. It is selected as a key habitat in this unit.
- Floating water-plantain occurs both in Unit 7 (the Teifi Pools) and in the main river in Units 4 and 5, with its river population centred around Cors Caron. Outlying plants have been recorded as far down-stream as Cwmann.

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 of 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 & quality, physical habitat, community composition & structure. It is anticipated that these limits will concur with the relevant standards used by the Review of Consents process given in Annexes 1-3.

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 habitat 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, e.g. weirs, bridge sills, acoustic barriers.

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 each migratory fish species feature will not be depleted by abstraction to the extent that passage upstream to spawning sites is hindered.

4.1.11 Flow objectives for assessment points in the Teifi Catchment Abstraction Management Strategy (CAMS) as they relate to the Afon Teifi SAC will be agreed between EA and CCW as necessary. It is anticipated that these limits will concur with the standards used by the Review of Consents process given in Annex 1 of this document.

4.1.12 Levels of nutrients, in particular phosphate, will be agreed between EA and CCW for each Water Framework Directive water body in the Afon Teifi 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 given in Annex 2 of this document.

4.1.13 Levels of water quality parameters that are known to affect the distribution and abundance of SAC features will be agreed between EA and CCW for each Water Framework Directive water body in the Afon Teifi 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 given in Annex 3 of this document.

4.1.14 Levels of suspended solids will be agreed between EA and CCW for each Water Framework Directive water body in the Afon Teifi 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.

4.1.15 Potential sources of pollution not addressed in the Review of Consents, such as contaminated land, will be considered in assessing plans and projects.

4.2 Conservation Objective for Feature 1: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (EU Habitat Code: 3260)

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:

FCS component		*Supporting information / current knowledge*
4.2.1	***The conservation objective for the water course as defined in 4.1 above must be met***	
4.2.2	***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 e.g. depth and stability of flow, stability of bed substrate, and ecosystem structure and functions e.g. 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.***	*Stands of this feature are known to be widespread in the Afon Teifi SAC including many of the tributaries. However, further information on its natural range, distribution and variation is desirable. Sympathetic management will be promoted wherever the feature is present.* *Species indicative of unfavourable condition for this feature e.g. filamentous algae associated with eutrophication and invasive non-native species, should be maintained or restored below an acceptable threshold level, indicative of high ecological status within the SAC.*
4.2.3	***The area covered by the feature within its natural range in the SAC should be stable or increasing.***	*Adverse factors may include elevated nutrient levels, shading or altered flow and/or sediment regimes.* *It is possible that reaches with slightly elevated nutrient levels and/or regulated flows may have a higher cover of the feature than under natural conditions, though species composition may also be affected (see 4.2.4)*
4.2.4	***The conservation status of the feature's typical species should be favourable. 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 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*: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (EU Habitat Code: 3260)**			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Distribution within catchment	Distribution within site units	Healthy *Ranunculion* vegetation will be present in any three representative sample stretches of suitable habitat in each of units 2-6	2-6
b) Typical species	Site-specific definitions for reference **Healthy *Ranunculion* vegetation** type (Southey & Broughton, 2006)	Should conform to appropriate JNCC type for the site unit as appropriate: **1) CB5: Atlantic bryophyte *Callitriche hamulata*/*Ranunculus penicillatus* ssp. *penicillatus* rivers** 6 or more of the following species *Ranunculus penicillatus*, *Callitriche* spp. (count as 1 species only), *Myriophyllum alterniflorum*, *Potamogeton* spp[2]. (each species counts as 1), *Hygrohypnum ochraceum*, *H. luridum*, *Amblystegium* spp., *Fontinalis antipyretica*, and *F. squamosus* are present in at least one 10m stretch in each 100m sample length, **Or;** *Ranunculus penicillatus*, *Callitriche* spp. or a combination of both form >20% cover in at least three 10m stretches of each sample length, **2) CB6a: Slow-flowing base-poor rivers** 5 or more of the following species *Nuphar lutea*, *Schoenoplectus lacustris*, *Potamogeton* spp.* (each species counts as 1), *Sparganium emersum/erectum* (count as 1 species only), *Ranunculus penicillatus*, *Myriophyllum alterniflorum*, *Alisma plantago-aquatica*, *Luronium natans*, *Equisetum fluviatile*, are present in at least one 10m stretch of each 100m sample length,	2-6

[2] *Potamogeton* spp. refers only to those broad-leaved species widespread and typical of the Afon Teifi catchment, namely *P. polygonifolius*, *P. natans* and *P.* x *olivaceus*. It does not include eutrophic indicator species such as *P. pectinatus.* An increase or new occurrence of such species would be indicative of a shift to unfavourable condition.

b) Typical species (cont.d)	Site-specific definitions for reference **Healthy *Ranunculion* vegetation** type (cont.d)	**3) CB6b: Fast-flowing bryophyte-dominated rivers** 5 or more of the following species *Hygrohypnum ochraceum*, *H. luridum*, *Fontinalis squamosa/F. antipyretica*, *Brachythecium plumosum, Sphagnum auriculatum*, *Racomitrium aciculare*, *Hyocomium armoricum*, *Rhyncostegium riparioides*, *Scapania undulata*, *Amblystegium* spp., *Chiloscyphus polyanthos*, *Jungermannia atrovirens*, *Juncus bulbosus* and *Callitriche hamulata*, are present in at least one 10m stretch of each 100m sample length, **Or;** Bryophytes (species from the list above) form a minimum of 10% cover in at least four 10m stretches of each sample length.	2-6
Performance indicators for factors affecting the feature			
Negative indicators			
a) Native species	Cover of indicators of eutrophication maintained below threshold over the medium to long term Ref: as above	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 Afon Teifi SAC: Algae indicative of eutrophication *(Enteromorpha* spp., *Cladophora* spp. and *Vaucheria* spp.) should not have a cover value of greater than 10% in 3 consecutive years in any three representative sample stretches of suitable habitat.	2-6
b) Alien / introduced species	No impact on native biota from alien or introduced species Ref: as above	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 Afon Teifi SAC, therefore assessment of this attribute relies on locally defined thresholds and expert judgement. For the Afon Teifi SAC: Non-native species such as *Elodea* spp. should not be dominant in more than 20% (maximum of 1 in 5) of 10m sample stretches in any one representative sample 100m length of suitable habitat. Details for other non-natives to be confirmed.	2-6

4.2 Conservation Objective for Features 2-6: Brook lamprey *Lampetra planeri* (EU Species Code:1096); River lamprey *Lampetra fluviatilis* (EU Species Code:1099); Sea lamprey *Petromyzon marinus* (EU Species Code:1095); Atlantic salmon *Salmo salar* (EU Species Code:1106); Bullhead *Cottus gobio* (EU Species Code:1163)

Vision for features 2-6

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

FCS component		*Supporting information / current knowledge*
4.3.1	***The conservation objective for the water course as defined in 4.1 above must be met***	
4.3.2	***The population of the feature in the SAC is stable or increasing over the long term.***	*Refer to sections 5.2 to 5.6 for current assessments of feature populations.* *Entrainment in water abstractions directly impacts on population dynamics through reduced recruitment and survival rates. Fish stocking can adversely affect population dynamics through competition, predation, introduction of disease and alteration of population genetics.*
4.3.3	***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 sections 2.2 and 5). Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future. Natural factors such as waterfalls may limit the natural range of individual species. Existing artificial influences on natural range that cause an adverse effect on site integrity, such as physical barriers to migration, will be assessed in view of 4.3.4***	*Some reaches of the Afon Teifi SAC are more suitable for some features than others. These differences influence the management priorities for individual reaches and are used to define the site units described in section 3.2. Further details of feature habitat suitability are given in section 5. In general, management for one feature is likely to be sympathetic for the other features present in the river, provided that the components of favourable conservation status for the watercourse given in section 4.1 are secured.* *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.* *Upland coniferous forestry plantations in parts of the upper catchment, including the Groes, Berwyn and Brefi catchments, adversely affect the run-off and sediment characteristics and water quality of the river. In a few locations there are also problems with toxic run-off from abandoned metal mines. Measures should be taken to restore the hydrological characteristics of headwater areas including wetland functions.* *Salmon migration can be affected by acoustic barriers and by high sediment loads, which can originate from a number of sources including construction works.*

FCS component	*Supporting information / current knowledge*
4.3.4 There is, and will continue to be, a sufficiently large habitat to maintain the feature's population in the SAC on a long-term basis.	

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* and River lamprey *Lampetra fluviatilis			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Age/size structure of ammocoete population	Samples of < 50 ammocoetes contain at least 2 size classes Samples of > 50 ammocoetes contain at least 3 size classes	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.	1-6
b) Distribution of ammocoetes within catchment	Present at not less that 2/3 of sites surveyed within natural range	The combined natural range of these two species in terms of ammocoete distribution includes all units above the tidal limit except unit 7 (the Teifi Pools). Presence at less than 2/3 of sample sites will lead to an unfavourable condition assessment.	1-6
	No reduction in distribution of ammocoetes	Reduction in distribution will be defined as absence of ammocoetes from all samples within a single unit or sub-unit/tributary, and will lead to an unfavourable condition assessment.	
c) Ammocoete density	Optimal habitat: $>10m^{-2}$ Overall catchment mean: $>5m^{-2}$	Optimal habitat comprises beds of stable fine sediment or sand ≥15cm deep, low water velocity and the presence of organic detritus, as well as, in the Teifi, shallower sediment, often patchy and interspersed among coarser substrate.	1-6

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*: Sea lamprey *Petromyzon marinus			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Distribution within catchment	Suitable habitat adjacent to or downstream of suitable spawning sites should contain *Petromyzon* ammocoetes.	This attribute provides evidence of successful spawning and distribution trends. Current information regarding spawning sites is incomplete and further investigation is required. Spawning locations may move within and between sites due to natural processes and new sites may be discovered over time. Silt beds downstream of all known and 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. Monitoring undertaken by APEM in 2004 failed to yield any sea lamprey ammocoetes or transformers despite reports of adult fish spawning in the system, and a HIFI study in 2002 found only a single ammocoete.	1 - 2
	Spawning adults to be reported from units 1 - 2 in at least 5 years out of 6	Given the difficulty in locating sea lamprey ammocoetes due to their likely preference for silt beds in deeper water, observations of spawning adults should be encouraged and collated, and the results used to support condition assessments made on the basis of a) & b).	
b) Ammocoete density	Ammocoetes should be present in at least four sampling sites each not less than 5km apart.	This standard CSM attribute establishes a minimum occupied spawning range, within any sampling period, of 15km.	1 - 2

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*: Atlantic salmon *Salmo salar			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Adult run size	Conservation Limit complied with at least four years in five (see 5.4)	CSM guidance states: Total run size at least matching an agreed reference level, including a seasonal pattern of migration characteristic of the river and maintenance of the multi-sea-winter component. Adult run size in the Teifi is calculated using rod catch data. A fish counter is in operation, but the results are currently not considered sufficiently reliable for this purpose (EA pers. comm.). Further details can be found in the EA Teifi Salmon Action Plan.	1-6
b) Juvenile densities	Expected densities for each sample site using HABSCORE	CSM guidance states: These should not differ significantly from those expected for the river type/reach under conditions of high physical and chemical quality. Assessed using electrofishing data.	2-6
Performance indicators for factors affecting the feature			
Water quality			
a) Biological quality	Biological GQA class A	This is the class required in the CSM guidance for Atlantic salmon, the most sensitive feature.	1-6
b) Chemical quality	RE1	It has been agreed through the Review of Consents process that RE1 will be used throughout the SAC (see Annex 3)	1-6
Hydromorphology			
a) Flow	Targets are set in relation to river/reach type(s)	Targets equate to those levels agreed and used in the Review of Consents (see Annex 1)	1-6

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*: Bullhead *Cottus gobio			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Population densities	No less than 0.2 m^{-2} in sampled reaches	CSM guidance states that densities should be no less than 0.2 m^{-2} in upland rivers (source altitude >100m) and 0.5 m^{-2} in lowland rivers (source altitude ≤100m). A significant reduction in densities may also lead to an unfavourable condition assessment.	2-6
b) Distribution	Bullheads should be present in all suitable reaches. As a minimum, no decline in distribution from current.	Suitable reaches will be mapped using fluvial audit information validated using the results of population monitoring. Absence of bullheads from any of these reaches, or from any previously occupied reach, revealed by on-going monitoring will result in an unfavourable condition assessment.	2-6
c) Reproduction / age structure	Young-of-year fish should occur at densities at least equal to adults	This gives an indication of successful recruitment and a healthy population structure. Failure of this attribute on its own would not lead to an unfavourable condition assessment.	2-6

Note: Performance Indicators for water quality and flow have only been set for feature 5: Atlantic salmon, and not for the other fish features. This is because salmon occurs in all the river units, and its CSM requirements for the above factors exceed those for the other fish features.

4.4 Conservation Objective for Feature 7: European otter *Lutra lutra*

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:

FCS component		*Supporting information / current knowledge*
4.4.1	***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, as determined by natural levels of prey abundance and associated territorial behaviour.***	*Refer to section 5.9 for current assessment of feature population*
4.4.2	***The natural range of otters 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 that are potentially suitable to form part of a breeding territory and/or provide routes between breeding territories. The whole area of the Teifi SAC is considered to form potentially suitable breeding habitat for otters. The size of breeding territories may vary depending on prey abundance. The population size should not be limited by the availability of suitable undisturbed breeding sites. Where these are insufficient they should be created through habitat enhancement and where necessary the provision of artificial holts. 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.***	*Survey information shows that otters are widely distributed in the Teifi catchment.* *While the breeding population on the Teifi is not currently considered to be limited by the availability of suitable breeding sites, there is some uncertainty over the number of breeding territories which the SAC is capable of supporting given near-natural levels of prey abundance.* *The decline in eel populations may be having an adverse effect on the population of otters on the Teifi.*
4.4.3	***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.***	*Road and bridge improvement schemes within the catchment should take appropriate measures towards achievement of this objective.*

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	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Distribution	Otter signs present at 75% of Otter Survey of Wales sites (Liles, 2004)	The Otter Survey of Wales undertaken in 2002 surveyed 111 reference sites in the Teifi catchment, of which 97% were positive. This continued an upward trend in signs from 38% in 1977-78, 40% in 1984-85, and 59% in 1991. The next full Otter Survey of Wales is planned in 2009, but CCW is also currently considering setting up a monitoring programme of OSW survey sites using a network of volunteers.	All
b) Breeding activity	2 reports (within the catchment) of cub/family sightings, or 2 reports of cub, lactating or pregnant female road casualties at least 1 year in 3 (Liles, 2004)	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). Based on current information, 7 centres of breeding activity have been estimated within the SAC.	All
c) Actual and potential breeding sites	No decline in number and quality of mapped breeding sites in the Teifi catchment (Liles, 2004)	In the Teifi catchment, 47 actual or potential breeding sites have been identified, distributed throughout the catchment on the main river and tributaries.	All

4.5 Conservation Objective for Feature 8: Floating water-plantain *Luronium natans* (EU Species Code: *1831*)

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:

FCS component		*Supporting information / current knowledge*
4.5.1	***The conservation objective for the water course as defined in 4.1 above must be met.***	
4.5.2	***The floating water-plantain populations will be viable throughout their current distribution in the SAC (maintaining themselves on a long-term basis). Each floating water-plantain population must be able to complete sexual and/or vegetative reproduction successfully. Potential for genetic exchange between floating water-plantain populations, in and/or outside the SAC, must be evident in the long-term. Dispersal of floating water-plantain must be unhindered.***	*Floating water-plantain populations are known to be present in the main river reaches through and downstream of Cors Caron (units 4 and 5), and in each of the Teifi Pools (unit 7).* *Vegetative reproduction is believed to be the main means of regeneration and dispersal for these populations, but they are known to flower periodically in the Teifi Pools during dry summers. Sexual reproduction is important, especially in the long-term, as this provides an alternative means of dispersal and genetic exchange over short and long distances.*
4.5.3	***The SAC will have sufficient suitable habitat to support floating water-plantain populations within their current distribution. There will be no contraction of the current floating water-plantain distribution in the SAC. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. water levels in Teifi Pools, water depth, stability of river flows, stability of bed substrate, ecosystem structure and functions e.g. nutrient levels, and shade (as described in section 2.2).***	*Adverse factors may include elevated nutrient levels, artificial regulation of water levels ('draw-down') in the reservoirs at Llyn Teifi and Llyn Egnant, altered river flow and/or sediment regimes, and shading.* *Species indicative of unfavourable condition for this feature e.g. filamentous algae associated with eutrophication, invasive non-native species, should be maintained or restored below an acceptable threshold level, indicative of high ecological status within the SAC.*

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	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Distribution of floating water-plantain in the main river	Present at 90% of upstream (principal) monitoring sites for river populations one year in six. Present at 70% of downstream (marginal) monitoring sites for river populations one year in six (sites to be determined). (CCW Monitoring Report No. 98/2/7, 1998)	The 90% and 70% figures for river populations are based on evidence that riverine floating water-plantain populations can become extinct due to the less-constant character of river environments compared with those in lakes. Downstream populations have a potential for recolonisation from the upstream locations.	4 and 5
b) Distribution of floating water-plantain in the Teifi pools	Live vegetative material present in each of Llyn Teifi, Llyn Egnant, Llyn Hir and Llyn y Gorlan. (CCW Environmental Monitoring Report No. 13, 2004)	Floating water-plantain is also present in Llyn Bach but this very small water body is not considered critical to monitor at present, as there is no obvious threat to this population.	7
c) Presence of floating flowers in the Teifi pools	Present in at least one of Llyn Teifi, Llyn Egnant, Llyn Hir, Llyn y Gorlan and Llyn Bach, (or in any part of these) one year in 6. (CCW Environmental Monitoring Report No. 13, 2004)	This indicator will show that lake populations have the potential for seed dispersal and genetic exchange. It is important that there is evidence of sexual reproduction, especially in the long term. There is no requirement for floating water-plantain to flower in the river, although it is known that it does so occasionally due to the coincidence of suitable conditions for flowering and dispersal.	7

Performance indicators for factors affecting the feature			
Negative indicators			
a) Native species	Cover of indicators of eutrophication maintained below threshold over the medium to long term	Epiphytic filamentous green algae indicative of eutrophication should have a cover value of not greater than 50% on the surface of each plant for the first 9 out of any 10 aquatic macrophytes examined, in 3 consecutive years, in any of the pools.	7
b) Alien / introduced species	No impact on native biota from alien or introduced species	The presence of non-native invasive plant species, including but not limited to *Crassula helmsii*, will not be tolerated in any of the Teifi Pools.	7

4.6 Conservation Objective for Feature 9: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* (EU Habitat Code: 3130)

Vision for feature 9

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

FCS component		*Supporting information / current knowledge*
4.6.1	***The conservation objective for the water course as defined in 4.1 above must be met***	
4.6.2	***The Littorelletea uniflorae aquatic upland lake community will be present in all five of the Teifi Pools (Llyn Hir, Llyn Teifi, Llyn Egnant, Llyn y Gorlan and Llyn Bach), and will be self-maintaining on a long-term basis.***	*Stands of this upland lake plant community are present in each of the Teifi Pools.* *Adverse factors may include elevated nutrient levels, artificial regulation of water levels ('draw-down') in the reservoirs at Llyn Teifi and Llyn Egnant, and poaching of exposed lake shores by livestock during periods of low water levels.* *Species indicative of unfavourable condition for this feature e.g. filamentous algae associated with eutrophication, invasive non-native species, should be maintained or restored below an acceptable threshold level, indicative of high ecological status within the SAC.*
4.6.3	***A fully developed Littorelletea community will be present in Llyn Hir, including all of the component species typical of the SAC feature, as represented in the Afon Teifi SAC.*** ***The typical species are defined with reference to the species composition of the JNCC standing water type for the SAC feature, unless differing from this type due to natural variability when other typical species may be defined as appropriate.***	*It is considered necessary to maintain a fully developed Littorelletea community in Llyn Hir only. The development of the community in Llyn Bach and Llyn y Gorlan is restricted by the small size of these lakes.* *The development of the community in Llyn Egnant and Llyn Teifi is restricted by the current management of these two lakes as reservoirs, since several of the key component species of the Littorelletea community are unable to cope with the effects of frequent draw-down.*
4.6.4	***For each of Llyn Teifi, Llyn Egnant, Llyn y Gorlan and Llyn Bach, the extent and species composition of the Littorelletea community will be stable or increasing in range. There will be no deterioration in the conservation status of the feature as represented in these lakes.***	*These latter four lakes, in their current condition, contribute to maintaining the feature as a whole in favourable condition, but it is not necessary for them to support a fully developed Littorelletea community.*

Performance indicators for feature 9

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	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Macrophyte community composition: Llyn Hir	All of the following characteristic species should be present in Llyn Hir: *Lobelia dortmanna*, *Littorella uniflora*, *Isoetes* spp.*, *Subularia aquatica*, *Sparganium angustifolium*, *Luronium natans*, *Carex rostrata*. *Both *Isoetes lacustris* and *I. echinospora* are recorded in the Teifi Pools.	*Utricularia minor* is also a key species of the community, but is not considered appropriate for effective monitoring as it is easily overlooked.	7
b) Macrophyte community composition: Llyn Teifi, Llyn Egnant, Llyn y Gorlan and Llyn Bach	For each of Llyn Teifi, Llyn Egnant, Llyn y Gorlan and Llyn Bach those of the characteristic species listed above, recorded as present between 1997 and October 2005, should be present.	References: a) CCW Environmental Monitoring Report No. 13 (2004) b) Dŵr Cymru Welsh Water Report BM00846/ENV4/8 (2005) c) CCW Contract Science Report No. 705 (2006).	7

Performance indicators for factors affecting the feature			
Negative indicators			
a) Native species	Cover of indicators of eutrophication maintained below threshold over the medium to long term	Epiphytic filamentous green algae indicative of eutrophication should have a cover value of not greater than 50% on the surface of each plant for the first 9 out of any 10 aquatic macrophytes examined, in 3 consecutive years, in any of the pools.	7
b) Alien / introduced species	No impact on native biota from alien or introduced species	The presence of non-native invasive plant species, including but not limited to *Crassula helmsii*, will not be tolerated in any of the Teifi Pools.	7

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: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (EU Habitat Code: *3260*)

Conservation Status (2006)

Status: Favourable

Although this feature was previously reported as unfavourable, baseline survey and monitoring work carried out for CCW (Southey & Broughton, 2006) has provided new information to support an assessment of favourable for this feature. The *Ranunculion* feature is widely distributed across the Teifi and many of its tributaries, with healthy examples of the three JNCC river types CB5, CB6a and CB6b each being well-represented.

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. These factors often interact, and can produce unfavourable conditions by promoting the growth of a range of algae and other species indicative of eutrophication. 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. A favourable flow regime can be defined with reference to naturalised flows (removing the influence of artificial abstractions and discharges from flow records). While more sophisticated analysis of depth and velocity has been carried out locally for the Review of Consents process, a flow level criterion is generally applied to regulate abstractions. Based on current available information, the recent level of flow depletion downstream of abstractions in the Afon Teifi SAC is not considered to be damaging to this feature, either through limiting its range or adversely affecting its community composition.

The level of shading is a determining factor to the presence of this feature in some reaches, particularly on certain of the tributaries. Very shaded tributaries do not support the macrophyte diversity seen in more open reaches, but these wooded reaches provide good breeding habitat for otters and the uprooting of roots as trees fall within the channel provide clean gravel runs for salmon spawning. On some reaches, some localised and selective coppicing and pollarding of bankside trees may be required, but the requirements of this feature must also be balanced with those of other SAC features such as fish species and otters.

Although the catchment has been grazed for centuries, the effects of grazing, particularly by cattle, are worth considering. Cattle grazing can damage water-crowfoot beds, introduce silt (through poaching and localised erosion), and can lead to enrichment or pollution of the river. Conversely, grazing can increase the variety of niches available to plants and animals; reduce the ingress of marginal vegetation into the main channel; and control the development of woody vegetation.

Fencing river banks to limit access to the channel will address the negative implications of cattle grazing but, at the same time, is likely to accelerate the development of woody vegetation and rank, bank-top vegetation, with longer-term implications for shading levels. It may also increase the likelihood of invasion by non-native plant species such as Japanese knotweed and Himalayan balsam. Balanced decisions are required relating to the optimal stocking level and grazing duration to minimise the potential for negative effects.

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. In the Afon Teifi 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, separating clean and dirty water in farmyards, and the establishment of fenced buffer zones on river reaches adjacent to intensively managed livestock grazing or arable land. Additional 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.

Invasive non-native plants may also have a detrimental impact on this feature, and control programmes for Japanese knotweed and Himalayan balsam should be considered, with the aim of reducing their extent in the SAC.

5.2 Conservation Status and Management Requirements of Feature 2 and 3: Brook lamprey *Lampetra planeri* (EU Species Code: 1096) and River lamprey *Lampetra fluviatilis* (EU Species Code: 1099)

Conservation status (2005)

Status: Unfavourable: Unclassified

Brook/river lamprey monitoring undertaken in 2004 (Campbell, Clarke & Williams, 2005) showed the overall catchment mean ammocoete density to be 2.9 m^{-2} (sd ±0.7). This does not meet the target of $5m^{-2}$ in the JNCC (2005) guidance. The mean density in optimal habitat was 6.9 m^{-2} (sd ± 1.2), which was below the guidance target of 10 m^{-2}, and thus the catchment was considered to be in unfavourable condition.

When the sites were assessed individually, only 10 of the 28 (36%) sites surveyed met the target of 10 m^{-2} for optimal habitat. The remaining optimal sites did not meet the density requirement to be considered favourable. Taking the SAC sites in isolation, the mean optimal habitat density of *Lampetra* spp. was 7.2 m^{-2} (sd ± 1.6). The mean density for all habitat in the SAC was 3.2 m^{-2} (sd ± 0.9). Six of 18 (33%) sites thus met the density requirement to achieve favourable status within the SAC. The age structure and distribution targets were met. There did not appear to be any grading in the geographic distribution or densities of *Lampetra* spp.; rather a patchy distribution across the catchment.

It has not been possible to distinguish between these two species during monitoring, due to the reliance on juvenile stages (ammocoetes). Anecdotal evidence suggests that both species are likely to be present in many reaches, though brook lamprey are expected to predominate in the headwaters and river lamprey may be the more abundant species in the main channel and the lower reaches of larger

tributaries. More information on the relative abundance of these two species in different parts of the Afon Teifi SAC is desirable. Records of spawning adult river lampreys would be particularly useful.

Management requirements

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.

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 impacts of barriers to migration and flow depletion are highlighted in the assessment of conservation status for this feature. The most significant potential obstruction to migration of lamprey is the Cenarth Falls (unit 2). Although sea lamprey are known to get past them, no transforming *Lampetra* spp. were found above the falls in the 2004 study, so it is not known whether they present an obstruction to the smaller river lamprey. The falls are of a size that they may present a significant barrier to lamprey movement at certain flows. In addition to Cenarth Falls, four small weirs exist on the Ceri that may prevent access to the upper parts of this tributary for migratory lamprey. There is also another group of weirs fairly low down in the Clettwr sub-catchment, which may prevent access to the majority of this tributary. The impact of artificial barriers should be assessed on a case-by-case basis. Physical modification of these barriers is required where depth/velocity/duration of flows is unsuitable to allow passage.

Brook and river lamprey are likely to benefit from positive management for the other SAC features, and may see improvement in condition as a result. On-going monitoring will allow a better understanding of population fluctuations, distributional changes etc.

5.3 Conservation Status and Management Requirements of Feature 4: Sea lamprey *Petromyzon marinus* (EU Species Code: 1095)

Conservation status (2005)

Status: Unfavourable: Unclassified

Sea lamprey monitoring undertaken in 2004 (Campbell et al., 2005) failed to find juvenile sea lamprey at any sites either on the main river Teifi or any of the tributaries. Therefore the Afon Teifi SAC failed the JNCC target threshold, and targets for spawning site & ammocoete distribution. The LIFE Teifi field trials study in 2002 (Harvey & Cowx, 2003) found only a single ammocoete.

A lack of juvenile sea lamprey in surveys of this type is common to a number of rivers despite the presence of spawning adults. The contractors postulate that separation of habitat is occurring between brook/river lamprey and sea lamprey, the former spawning earlier in the year (March/April) compared to sea lamprey, which spawn in June. They consider that juvenile sea lamprey are being excluded from optimum habitat and are having to utilise silt beds in deeper water, habitat that is not monitored as part of the standard assessment.

Migrating adult sea lamprey, spawning adults and dead individuals are reported from the lower reaches of the Teifi each year, regularly occurring as far upstream as Henllan (Unit 2). In 2007 (a wet summer) spawning adults were recorded at Llandysul.

Management requirements

The impacts of barriers to migration and flow depletion are highlighted in the assessment of conservation status for this feature. The most significant potential obstruction to migration of lamprey is the Cenarth Falls (unit 2). Although sea lamprey are known to get past them, as noted above, the falls are of a size that they may present a significant barrier to lamprey movement at certain flows. In addition to Cenarth Falls, four small weirs exist on the Ceri that may prevent access to the upper parts of this tributary for migratory lamprey. There is also another group of weirs fairly low down in the Clettwr sub-catchment, which may prevent access to the majority of this tributary. The impact of artificial barriers should be assessed on a case-by-case basis. Physical modification of these barriers is required where depth/velocity/duration of flows is unsuitable to allow passage.

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 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.

5.4 Conservation Status and Management Requirements of Feature 5: Atlantic salmon *Salmo salar* (EU Species Code: 1106)

Conservation status (2007)

Status: Unfavourable: Unclassified

Monitoring of Atlantic salmon in the Teifi relies on two methods,

i. Estimation of adult run size from angling catch returns, supported by fish counter data,
ii. Electro-fishing for juveniles in nursery areas.

The estimate of adult numbers is converted into an estimate of numbers of eggs deposited which is compared against an Egg Deposition Target (EDT), calculated by considering the area of suitable spawning habitat within the catchment. The equivalent adult run to achieve the EDT is described in terms of a Conservation Limit, which must be exceeded 4 years in 5 for the Management Target to be considered attained. Electro-fishing for juveniles is either quantitative or semi-quantitative, and estimated juvenile densities are classified in one of six categories A to F. The monitoring guidance produced by the LIFE in UK Rivers project recommends that ideally juvenile densities should be compared to predicted densities for the sample reach using the HABSCORE model (Cowx & Fraser, 2003). These targets are calculated and monitored by the Environment Agency as part of the Salmon Action Plan for the Teifi.

The Conservation Limit for adult run size has been exceeded in nine out of the past ten years, but for juvenile population densities, around 50% of the surveys carried out between 1995-2005 produced densities at a level to cause concern (categories D-F) with little improvement observed in recent years. In the recent surveys, there are still many headwater streams that show salmon densities of grade D or below. The current unfavourable status therefore results from a precautionary assessment of juvenile

distribution and abundance and also the presence of adverse factors, in particular the potential for flow depletion and localised water quality failures. Invertebrate depletion due to sheep dip pollution is a factor in the upper reaches of the river, and acidification due to forestry affects some tributaries.

Management requirements

The Atlantic salmon is the focus for much of the management activity carried out on the Teifi. The relatively demanding water quality and spawning substrate quality requirements of this feature mean that reduction in diffuse pollution and siltation impacts is a high priority. Measures to address these problems include the establishment of buffer zones on reaches adjacent to intensively managed livestock grazing or arable land. Tree management, especially coppicing and pollarding to increase light levels to the channel, is also carried out. In-stream liming, using limestone sand, has been trialled in the acidified Berwyn tributary. In recent years, much of this work has been supported or directly undertaken by Environment Agency Wales under their 'Sustainable Fisheries' programme. Other work has included reduction in exploitation pressure through the introduction of 'catch and release' angling (both mandatory, through EA byelaws, and voluntary, encouraged by the local angling clubs).

Elevated levels of fines (particles <0.83mm) within spawning substrates can interfere with egg and fry survival. Clean substrate free from excessive siltation should predominate at suitable spawning sites. Spawning habitat is defined as stable coarse substrate without an armoured layer, in the pebble to cobble size range (16-256 mm) but with the majority being <150 mm. Water depth during the spawning and incubation periods should be 15-75 cm. Fry habitat is indicated by water of <20 cm deep and a gravel/pebble/cobble substrate. Parr habitat is indicated by water 20-40 cm deep and similar substrate. Holding areas are defined as pools of at least 1.5 m depth, with cover from features such as undercut banks, vegetation, submerged objects and surface turbulence. Coarse woody debris should not be removed from rivers as it plays a significant role in the formation of new gravel beds, and provides cover for fish and a source of food for invertebrates.

In the Teifi 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. Contamination by synthetic pyrethroid sheep dips, which are extremely toxic to aquatic invertebrates, has a devastating impact on invertebrate 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, 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.

In all river types, artificial barriers should be made passable. On the Teifi artificial barriers are not considered to be a major issue, but local problems exist. The impact of existing barriers should be assessed on a case-by-case basis. Physical modification of barriers is required where depth/velocity/duration of flows is unsuitable to allow passage. Complete or partial natural barriers to potentially suitable spawning areas should not be modified or circumvented.

Development activities that may cause long-term or temporary physical, acoustic, chemical and sediment barrier effects will need to be addressed in the assessment of specific plans and projects.

Entrainment in water abstractions directly impacts on population dynamics through reduced recruitment and survival rates. Intake screens must meet statutory requirements under the Salmon & Freshwater Fisheries Act.

A small-scale salmon rearing and stocking programme has recently been commenced on the lower Teifi by a local angling association, using brood-stock taken from the river. The management objectives for SAC salmon populations are to attain naturally self-sustaining populations. Salmon stocking should not be routinely used as a management measure. Salmon stocking represents a loss of naturalness and, if successful, obscures the underlying causes of poor performance (potentially allowing these risks to perpetuate). It carries various ecological risks, including the loss of natural spawning from brood-stock, competition between stocked and naturally produced individuals, disease introduction and genetic alterations to the population. There should therefore be a presumption against salmon stocking in the Afon Teifi SAC.

The presence of artificially high densities of other fish species can create unacceptably high levels of predatory and competitive pressure on juvenile salmon and the aim should be to minimise these risks in considering any proposals for stocking. Escapes from fish farms are a form of uncontrolled introduction and should be prevented by effective screening on all intakes and discharges.

Controls on exploitation should include migratory passage to the SAC within territorial waters, including estuarine and coastal net fisheries, as well as exploitation within the SAC from rod fisheries. Net Limitation Orders are used to control the estuarine fishery. Exploitation of salmon by rod fisheries is regulated by EA licensing and byelaws controlling the fishing season and allowable methods.

5.5 Conservation status and management requirements of Feature 6: Bullhead *Cottus gobio* (EU Species Code: 1163)

Conservation status (2006)

Status: Unfavourable: Unclassified

The current unfavourable status results from the presence of adverse factors, in particular flow depletion and localised water quality failures. Records obtained from juvenile salmon monitoring 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. They will therefore prevent recolonisation of upper reaches affected by lethal pollution episodes, and will also lead to constraints on genetic interactions that may have adverse consequences. 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. Some reaches may naturally have lower tree cover.

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.

5.6 Conservation Status and Management Requirements of Feature 7: European otter *Lutra lutra* (EU Species Code: 1355)

Conservation status (2004)

Status: Favourable

The conservation status of otters in the Afon Teifi SAC is determined by monitoring their distribution, breeding success, and the condition of potential breeding and feeding habitat outlined in the Performance Indicators. Their current condition can be considered favourable, but with scope for further improvement, if habitat and other natural factors can be maintained and enhanced.

Management requirements

Although recent monitoring (Liles, 2004) suggests that the otter population on the Teifi may well be at the carrying capacity for the catchment, it is possible that, if all the breeding sites achieve optimal habitat conditions and fish and amphibian stocks are secured, the catchment may then support further breeding animals. However, the amount of compression of home ranges that otters will accept cannot as yet be determined.

Although it is not possible to conclude whether the overall number of potential breeding sites in the catchment is high or low (in relation to the total length of watercourse), there does appear to be a marked difference in the number and distribution of sites in the two halves of the catchment. In particular, an assessment of otter breeding habitat has indicated that there may be a shortage of suitable breeding sites in the upper half of the catchment, which may affect the long-term viability of the population. This could be addressed by habitat enhancement, including stock exclusion from suitable woodlands near to the river, coppicing discrete areas close to the bank edge to promote scrub growth, and the construction of log-pile otter holts.

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. The involvement of river users and land managers will be important in improving potential breeding habitat near to the river. 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.

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, and similar concerns are apparent with respect to amphibian numbers on a UK scale. Recent survey work on the upper reaches of the river has suggested a possible decline in otter use of these stretches, and this may in turn be linked to reduced fish populations, as a knock-on effect of invertebrate depletion due to sheep dip pollution.

Measures to ensure the safe movement of otters around the catchment will be promoted, in particular the 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.

Pollution of rivers with toxic chemicals, such as PCBs, was one of the major factors identified in the widespread decline of otters during the last century. There should be no increase in pollutants potentially toxic to otters.

5.7 Conservation Status and Management Requirements of Feature 8: Floating water-plantain *Luronium natans* (EU Species Code: 1831)

Conservation status (2004)

Status: Favourable

The condition assessment is based on recent monitoring of this feature at the Teifi Pools (Southey & Broughton, 2004), and on observational data from the main river in and downstream of Cors Caron (2000, 2002). Additional and more comprehensive monitoring data for the river populations would be valuable.

Management requirements

The principal factors influencing the river populations of this feature are broadly similar to those affecting the *Ranunculion* vegetation (Feature 1). These include flow, substrate quality and water quality. Favourable management for this feature is 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 feature. A favourable flow regime can be defined with reference to naturalised flows (removing the influence of artificial abstractions and discharges from flow records). While more sophisticated analysis of depth and velocity has been carried out locally for the Review of Consents process, a flow level criterion is generally applied to regulate abstractions. Based on current available information, the current abstraction regime in the Afon Teifi SAC is not considered to be damaging to this feature. The maintenance of sufficient suitable habitat for the feature in terms of water quality is likely to require catchment-wide measures to control diffuse pollution from agriculture, as the principal source of phosphate. In the Afon Teifi 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, separating clean and dirty water in farmyards, and the establishment of fenced buffer zones on river reaches adjacent to intensively managed livestock grazing or arable land. Additional 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.

While acknowledging the lack of available information on the management of upland lakes for floating water-plantain, the LIFE report on the ecology of the species (Lansdown & Wade, 2003), quoting Welsh data, suggests that upland lake populations are amongst the most stable, and that management is unlikely to be needed unless there is a change in the water chemistry or processes suppressing succession.

Monitoring has shown there to be healthy populations of floating water plantain in all three of the principal Teifi Pools: Llyn Teifi, Llyn Egnant and Llyn Hir. The species grows most abundantly at 1-2.5m depth, and relies predominantly on vegetative reproduction for maintenance and dispersal of the population, although it is known to flower periodically during dry summers. Llyn Teifi and Llyn Egnant are artificially regulated as reservoirs for public water supply, operated by Dŵr Cymru Welsh Water since the late 1950s. The impact of the current operation of these reservoirs has been investigated as part of the Environment Agency's Review of Consents process (Environment Agency Wales, 2007), which concluded that the floating water-plantain is remarkably tolerant of the fluctuating water levels that result from the abstraction regime, and that there is no negative impact on the feature.

Annual flowering populations of floating water plantain are often associated with the draw-down zones of permanent water bodies such as Llyn Teifi and Llyn Egnant, probably formed by plantlets which break off from stolons on deeper plants and are washed to the margins of the lakes, where they root and form flowering stands (Lansdown and Wade). Southey & Broughton noted particularly strong colonies upon the thick, silty margins of Llyn Teifi. Seasonal fluctuations in water levels in the regulated lakes are amplified by abstraction, resulting in prolonged exposure of the lake margins, particularly in years of low rainfall (such as 1976 or 1995). Draw-down events are likely to stimulate flowering of the deep water populations of floating water plantain, leading to the production of viable seed. The Teifi Pools has been described as one of the centres for genetic diversity of floating water plantain populations (Lansdown and Wade), and the abstraction regime of the regulated lakes may contribute to this element by encouraging more frequent flowering events.

Llyn Hir is known to have been limed by Dŵr Cymru Welsh Water in 1985, but there is no recorded indication of a negative impact on the aquatic flora. Liming of upland catchments has not been shown to affect floating water-plantain, and given the range of pH data and substrate affinities recorded, it appears unlikely that it will have any significant effect (Lansdown & Wade).

EA water quality monitoring (2004 data, quoted in Burgess et al., 2006) has indicated higher than expected phosphate levels in the three main pools, although only marginally so in Llyn Hir. Elevated phosphate levels may in theory have a negative impact on the feature by encouraging the growth of more vigorous competitive plant species, but in the Teifi Pools this appears unlikely to occur due since few other species can persist at the depth favoured by the floating water-plantain. Possible reasons for elevated nutrient levels include enrichment from livestock dung (sheep) and sediment inputs from stock-mediated soil erosion exacerbated by sheep trampling around the shores. Significant livestock reduction measures have recently been implemented in the Teifi Pools catchment under the auspices of the Tir Gofal agri-environment scheme, and these will contribute to reducing nutrient enrichment from these sources.

There is a risk that the introduction of invasive non-native plants, such as Australian swamp stonecrop *Crassula helmsii*, could also have a detrimental impact on this feature. A significant source of such introductions could be via the boots, clothing or equipment of anglers visiting the Teifi Pools, and angling clubs should be encouraged to follow best practice guidelines for cleansing / decontaminating clothing and equipment before travelling between angling waters.

5.8 Conservation Status and Management Requirements of Feature 9: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* (EU Species Code: 3130)

Conservation status (2007)

Status: Favourable.

The condition assessment is based on recent monitoring of this feature at the Teifi Pools (Southey & Broughton, 2004), and on work carried out in support of the Environment Agency's Review of Consents process for the Dŵr Cymru Welsh Water abstraction licences for Llyn Teifi and Llyn Egnant.

The *Littorelletea* feature is present in all five of the Teifi Pools, although the development of the community in Llyn Bach and Llyn y Gorlan is restricted to some extent by the small size of these water-bodies. Llyn Teifi and Llyn Egnant are artificially regulated as reservoirs for public water supply, operated by Dŵr Cymru Welsh Water since the late 1950s; the structure and hydrology of Llyn Hir is natural and unmodified. The selection of the Teifi Pools for their *Littorelletea* vegetation was based on primarily on the representation of a high quality example of this SAC feature in Llyn Hir, supported by the *Littorelletean* communities in Llyn y Gorlan and Llyn Bach. The primary reason

for the inclusion of Llyn Teifi and Llyn Egnant within the Afon Teifi SAC is for their internationally important populations of floating water-plantain, and although they contribute to the overall representation of the *Littorelletea* feature in the SAC, it is not necessary for these two regulated lakes to support a fully developed *Littorelletea* community.

Management requirements

The current operation of Llyn Teifi and Llyn Egnant as reservoirs for public water supply has been investigated in considerable detail as part of the Environment Agency's Review of Consents process, and the impact of abstraction licences on the SAC features have been subjected to Appropriate Assessment (Environment Agency Wales, 2007). The outcome of the assessment with reference to the *Littorelletea* community was that although a lower abstraction rate from the regulated lakes would be of benefit to this feature, the current abstraction licences do not have a significant negative impact upon the integrity of the feature as a whole within the SAC, in terms of its conservation objectives.

Recent studies have shown that the *Littorelletea* community within Llyn Hir is the most diverse within the SAC in terms of the number of species present. The Teifi Pools as a whole contain a high diversity of macrophytes associated with the *Littorelletea* community, including seven of the eight principal species characteristic of the feature. All surveys have highlighted the consistent absence of water lobelia *Lobelia dortmanna* and awlwort *Subularia aquatica*, species that are particularly intolerant of fluctuating water levels, in the regulated Llyn Teifi and Llyn Egnant and the presence of these species in the unregulated Llyn Hir (Southey & Broughton, 2004; Pickard, 2005; Burgess et al. 2006).

The conservation objectives require a fully developed *Littorelletea* community to be maintained in Llyn Hir only; for each of the other lakes, the objective is the maintenance of community species diversity recorded as present between 1997 and 2005. The main concern regarding the two Teifi Pools abstraction licences is the concentration of high species diversity within only one of the lakes. In the event of a pollution incident within Llyn Hir, a potentially irreplaceable element of the community could be permanently lost from the SAC; hence the requirement to maintain the existing condition of the *Littorelletea* in the remaining water bodies, allowing the possibility of species recolonisation.

Seasonal fluctuation in water levels in the regulated lakes is amplified by abstraction, resulting in prolonged exposure of the lake margins, particularly in years of low rainfall (such as 1976 or 1995). Unfortunately there is no data available on the impact of a dry year upon the existing *Littorelletea* community within Llyn Teifi and Llyn Egnant; however it is safe to assume that some populations of individual *Littorelletea* community species within the lakes will be negatively impacted in years of extreme draw-down. It is also evident that the current *Littorelletea* community within Llyn Teifi and Llyn Egnant has been able to recover from such extreme draw-down events in the past.

Both Llyn Egnant and Llyn Teifi are exposed, wind-stressed sites, which may further restrict the growth and distribution of a number of macrophyte species in the littoral zone (Burgess et al., 2006). Although wind stress reflects habitat quality and not condition, it could be an important factor if exacerbated by draw-down, for example, by making isoetids vulnerable to uprooting by wind.

EA water quality monitoring (2004 data, quoted in Burgess et al.) has indicated elevated phosphate levels in Llyn Teifi and Llyn Egnant, but only a marginal increase in Llyn Hir. Significantly elevated phosphate levels may have a negative impact on the *Littorelletea* feature, and contribute to the absence of some macrophyte species, particularly those that are sensitive to nutrient enrichment; for example, this may have contributed to the absence of water lobelia from Llyn Egnant (Burgess et al.). Possible reasons for these elevated nutrient levels include enrichment from livestock dung (sheep) and sediment inputs from stock-mediated soil erosion exacerbated by sheep trampling around the shores. Significant livestock reduction measures have recently been implemented in the Teifi Pools catchment under the auspices of the Tir Gofal agri-environment scheme, and these will contribute to reducing nutrient enrichment from these sources, as well as reducing the impact of grazing and trampling of exposed littoral zones. Nutrient-rich droppings from the Canada geese that have recently colonised the

Teifi Pools may also have a negative impact, and culling of this outlying population of an alien species should be considered.

Llyn Hir is known to have been limed by Dŵr Cymru Welsh Water in 1985, prior to the SSSI and SAC designation, but there is no record of its impact on the aquatic plant community. Liming may have a negative impact on the *Littorelletea* feature, which is characteristic of low alkalinity levels, and there is therefore a presumption against the repetition of this treatment.

There is a risk that the introduction of invasive non-native plants, such as Australian swamp stonecrop *Crassula helmsii*, could also have a detrimental impact on this feature. A significant source of such introductions could be via the boots, clothing or equipment of anglers visiting the Teifi Pools, and angling clubs should be encouraged to follow best practice guidelines for cleansing / decontaminating clothing and equipment before travelling between angling waters.

Climate change may pose a threat to the Teifi Pools through accelerated erosion of peat within the catchments, changes to temperature and rainfall regimes, subsequent increases in sedimentation and in turn, changes in macrophyte composition and structure. Conversely, reductions in sulphur deposition and consequent increases in lake pH, ANC (acid neutralising capacity) and DOC (dissolved organic carbon) may lead to increased diversity in lake macrophyte species assemblages (Burgess et al. 2006).

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	001553	Unit 1: Teifi estuary, Cilgerran Gorge and Teifi marshes	The mosaic of freshwater-brackish transitional vegetation communities at the Teifi Marshes has deteriorated in the past due to the collapse of a culvert allowing uncontrolled tidal ingress to the Pentwd marshes, coupled with difficulties in providing suitable grazing. This led to a loss of open communities and increasing dominance of Phragmites. Since the reinstatement of the culvert the Wildlife Trust has worked hard to introduce reed management and re-establish an appropriate grazing regime, with the ongoing aim of restoring a more stable and appropriate balance of communities, to the benefit of the SSSI features. Unsustainable exploitation of salmon may be contributing towards the unfavourable status of this feature. Regulation of rod and net fisheries should be kept under review and byelaws amended as appropriate to ensure the conservation of salmon stocks. Increased boat activity in the estuary, and unrestrained canoeing in Cilgerran gorge, could both have a negative impact on otters through increased disturbance. These activities need to be kept under review. Invasive species, including Himalayan balsam and Japanese knotweed, are present locally throughout the reach. They suppress local biodiversity and can lead to bank instability.	Yes

2	001554	Unit 2: Teifi between Llechryd & Llandysul, including tributaries	Diffuse pollution and siltation: Agricultural land management affects run-off from land and has negative impacts on water quality. Thirteen unsatisfactory intermittent discharges from waste water treatment works in units 2-4 require further investigation and improvement. EA's Catchment sensitive farming project has identified incidents of slurry pollution as an issue in the lower catchment, and particularly on the Ceri. The DCWW abstraction at Llechryd has the potential to entrain juvenile river & sea lamprey migrating down river to the sea, due to inadequate screening. The EA RoC process has identified 3 non-consumptive abstractions in unit 2 that have the potential to significantly impact on water levels and create migratory barriers for migratory fish, and to reduce or remove habitats for juvenile life stages of both migratory and resident species (Allt-cafan - Teifi, Brongest - Ceri, Dreifa Mills - Cych). Some also have screening and entrainment issues. An artificial weir at Felin Geri on the Ceri forms a partial barrier to fish migration. Invasive species, including Himalayan balsam, and occasionally Japanese knotweed, are present throughout the reach. They suppress local biodiversity and can lead to bank instability. Regulation of rod and net fisheries should be kept under review and byelaws amended as appropriate to ensure the conservation of salmon stocks.	Yes

3	001555	Unit 3: Teifi between Llandysul & Llanybydder, including tributaries	Diffuse pollution and siltation: Agricultural land management affects run-off from land and has negative impacts on water quality. Point source pollution: the EA RoC process has identified 13 unsatisfactory intermittent discharges from waste water treatment works in units 2-4 require further investigation and improvement. The RoC process has also identified 2 non-consumptive abstractions on the Clettwr in unit 3 (Dolbantau and Rock Mills) that have the potential to significantly impact on water levels and create migratory barriers for migratory fish, and to reduce or remove habitats for juvenile life stages of both migratory and resident species. Both also have the potential to cause entrainment of fish due to inadequate screening. The top weir at Dolbantau also forms a partial barrier to fish migration. Invasive species, including Himalayan balsam, and occasionally Japanese knotweed, are present in parts of the reach. They suppress local biodiversity and can lead to bank instability. Regulation of rod and net fisheries should be kept under review and byelaws amended as appropriate to ensure the conservation of salmon stocks.	Yes
4	001556	Unit 4: Teifi between Llanybydder & Cors Caron, including tributaries	Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. Point source pollution: the EA RoC process has identified the discharge at Llanddewi Brefi waste water treatment works on the Brefi as causing water quality problems downstream of the discharge point. In addition, 13 unsatisfactory intermittent discharges from waste water treatment works in units 2-4 require further investigation and improvement. In the upper catchment, pollution from synthetic pyrethroid sheep dips has a negative impact on river invertebrates. Invasive species, including Himalayan balsam, and occasionally Japanese knotweed, are present in parts of the reach. They suppress local biodiversity and can lead to bank instability. Regulation of rod and net fisheries should be kept under review and byelaws amended as appropriate to ensure the conservation of salmon stocks.	Yes

5	001557	Unit 5: Teifi at Cors Caron	Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. In the upper catchment, pollution from synthetic pyrethroid sheep dips has a negative impact on river invertebrates. There are also concerns about toxic pollution from a small number of abandoned metal mines. Regulation of rod and net fisheries should be kept under review and byelaws amended as appropriate to ensure the conservation of salmon stocks. Historical canalisation of a reach in the centre of the unit has reduced the naturalness and habitat diversity of the river and its connectivity with the surrounding fen and mire habitats of Cors Caron SAC. Restoration of this section to its previous channel form should be actively considered.	Yes
6.1	001558	Unit 6.1: Teifi upstream of Cors Caron (outside Elenydd SPA)	Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. In the upper catchment, pollution from synthetic pyrethroid sheep dips has a negative impact on river invertebrates. There are also concerns about toxic pollution from a small number of abandoned metal mines. Invasive species, including Japanese knotweed, are occasionally present in parts of the reach. They suppress local biodiversity and can lead to bank instability. Regulation of rod and net fisheries should be kept under review and byelaws amended as appropriate to ensure the conservation of salmon stocks.	Yes
7	001612	Unit 7: Teifi Pools	Currently no significant management issues known to be negatively impacting the features. Recent Tir Gofal agreements are having beneficial impacts in terms of littoral grazing, trampling and dung input reductions to the Teifi Pools. Any future changes to the DCWW abstraction regime will require prior assessment.	Yes

6.2	002983	Unit 6.2: Teifi upstream of Cors Caron (within Elenydd SPA)	Diffuse pollution and siltation: Agricultural and forestry land management affects run-off from land and has negative impacts on water quality. In the upper catchment, pollution from synthetic pyrethroid sheep dips has a negative impact on river invertebrates. There are also concerns about toxic pollution from a small number of abandoned metal mines. Regulation of rod and net fisheries should be kept under review and byelaws amended as appropriate to ensure the conservation of salmon stocks.	Yes

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 (CSM)	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[3]: Favourable: maintained; Favourable: recovered; Favourable: un-classified Unfavourable: recovering; Unfavourable: no change; Unfavourable: declining; Unfavourable: un-classified Partially destroyed; Destroyed.
Conservation management	Acts or undertaking of all kinds, including but not necessarily limited to **actions,** taken with the aim of achieving the **conservation**

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

	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.**[4]
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.

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

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. 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

Burgess, A., Goldsmith, B. & Hatton-Ellis, T. Site condition assessments of Welsh SAC and SSSI standing waters features. *CCW Contract Science Report No. 705, 2006. (Available on request)*

Campbell, D., Clarke, S. & Williams, A (APEM). Lamprey survey of the rivers Tywi, Teifi & Cleddau. *CCW Review of Consents Report No. 17, 2005 (Available on request)*

Cowx I.G. & Fraser D. Monitoring the Atlantic Salmon. *Conserving Natura 2000 Rivers Monitoring Series No.7, English Nature, Peterborough. 2003.*

Davis S. The Afon Teifi cSAC Conservation Strategy. *Conserving Natura 2000 Rivers. English Nature, Peterborough. 2003.*
http://www.english-nature.org.uk/lifeinukrivers/strategies/teifi/teifi.html

Environment Agency Wales. The River Teifi Salmon Action Plan. *Environment Agency Wales, South West Wales Fisheries Ecology and Recreation, 2000.*

Environment Agency Wales. Teifi Habitats Directive Appropriate Assessment Investigative Project: Teifi Pools Stage 3b Appropriate Assessment, Teifi SAC. *EAW Review of Consents Report HWM/HD/Teifi/05/TP/001/v3 (2007).*

Harvey JP & Cowx I,G. Monitoring the River, Brook and Sea Lamprey, *Lampetra fluviatilis, L. planeri* and *Petromyzon marinus*. *Conserving Natura 2000 Rivers Monitoring Series No.5, English Nature, Peterborough. 2003.*
http://www.english-nature.org.uk/LIFEinUKRivers/species/lamprey_monitoring.pdf

Jones, R. A. Luronium natans (Floating water-plantain) at Cors Caron NNR. *CCW Monitoring Report No. 98/2/7, 1998. (Available on request)*

Jones, T. & Jones, D. Otter Survey of Wales 2002. *Environment Agency Wales. Cardiff (2004).*

Lansdown R.V. &Wade P.M. Ecology of the Floating Water-plantain, *Luronium natans*. *Conserving Natura 2000 Rivers Ecology Series No. 9, English Nature, Peterborough. 2003.*

Liles, G. Enhancing the status of the otter. *Conserving Natura 2000 Rivers Conservation Techniques Series No.5, English Nature, Peterborough. 2003.*

Lyles G. Current and potential distribution, condition and breeding success of the otter (*Lutra lutra*) in the Afon Teifi catchment area. *CCW Environmental Monitoring Report No.5, 2004. (Available on request)*

Pickard, M. Botanical Investigations Supporting Appropriate Assessment of Teifi Pools. *Hyder Consulting Limited / Dŵr Cymru Welsh Water report BM00846/ENV4/8 (2005).*

Radcliffe, D.A., Birks, H.J.B. & Birks, H.H. (1993). The Ecology and Conservation of the Killarney Fern *Trichomanes speciosum* Willd. in Britain and Ireland. *Biol. Cons., **66**, 231-247*

Southey, J. & Broughton, D.A. (Scott Wilson Kirkpatrick Ltd). Development of monitoring methods to assess the condition of the 'Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*' Natura 2000 habitats and the *Luronium natans* population at Afon Teifi cSAC. *CCW Environmental Monitoring Report No.13, 2004. (Available on request)*

Southey, J. & Broughton, D.A. (Scott Wilson Ltd). Development of monitoring methods to assess the condition of the 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-batrachion* vegetation' at Afon Teifi cSAC. *CCW Environmental Monitoring Report No.14, 2006. (Available on request)*

ANNEX 1 – STANDARDS USED IN THE AFON TEIFI REVIEW OF CONSENTS FOR FLOW

The flow target used in the Environment Agency (EA) Resource Assessment and Management Framework (RAM) utilises the Habitats Directive Ecological River Flow (HDERF) objective. The maximum permissible percentage reduction from naturalised flow levels is given in Table 1. All reaches within the Afon Teifi SAC are classified as having Very High or High sensitivity to abstraction.

Table 1 HDERF1 - River flow thresholds for SAC/SSSI rivers

EW band (sensitivity)	Maximum % reduction from daily naturalised flow		
	>Qn50	Qn50-95	<Qn95
Very High	10	10	1-5
High	15	10	5-10

For reaches below reservoirs, the effect of abstraction from storage is excluded from the resource assessment, so that the target flow is a 'benchmark' flow, incorporating the reservoir compensation release, rather than a naturalised flow. At times of low flow, compensation releases may increase the flow downstream of the reservoir above natural levels. For the Teifi Pools reservoirs, the benchmark flows used in the assessment include the effect of the reservoir compensation flows which increases low flows slightly; however any reservoir spill is ignored, therefore benchmark mean flow is slightly lower than natural.

ANNEX 2 – STANDARDS USED IN THE AFON TEIFI REVIEW OF CONSENTS FOR PHOSPHATE

Source: 'Phosphorus standards for the Tywi, Teifi and Cleddau Rivers Special Areas of Conservation'. Environment Agency Wales Technical Memo No: TMW05_15 (November 2005).

INTRODUCTION

The Environment Agency, English Nature and the Countryside Council for Wales have agreed on a methodology for the determination of guideline phosphorus standards on SAC rivers. The methodology is based upon catchment geology and river size, and a set of guideline standards has been applied to the typology which permits a reasonable degree of anthropogenic change but which should be consistent with the favourable condition of SAC interest features. The full details can be found in WQTAG048b – Guideline Phosphorus Standards for SAC Rivers.

The purpose of this report is to detail how these guidelines have been applied to the Afon Teifi SAC.

1.1 Determining River Size Class

There are three size classes, representing headwaters, river, and large river (Table 1). The division is based on the river flow categories used in the General Quality Assessment and the River Habitat Survey (Table 2). By reference to these data, the river can be allocated to one of the 3 classes.

Table 1. River size classification

River class	**GQA flow band**
1 – Headwaters	1 –2
2 – River	3 – 8
3 – Large river	9 – 10

All SAC rivers in SW Wales fall into categories 1 and 2.

Table 2. GQA Flow Bands

GQA flow band	**Long Term Average Natural Flow (cumecs)**	**Equivalent in ML/day**
1	<0.31	<26.8
2	<0.62	<53.6
3	<1.25	<108
4	<2.5	<216
5	<5.0	<432
6	<10	<864
7	<20	<1728
8	<40	<3456
9	<80	<6912
10	>80	>6912

On the basis of their GQA flow bands, the main river Teifi, together with and the larger SAC tributaries: the Clettwr, Cych, Dulas, Grannell and Tyweli, are classed as 'river'. The smaller SAC tributaries: the Brefi, Ceri, Cerdin, Groes and Piliau, together with the uppermost reach of the Teifi (immediately below the outflow of Llyn Teifi) are classed as 'headwaters'.

1.2 Determining the Geological Class

The Methodology identifies five geological types (Table 3). All SAC rivers in SW Wales fall into categories A and B.

Table 3. Geological classification

A. Hard upland geologies (all land over 330m)	Igneous, plus Cambrian to Devonian series and Carboniferous. Low porosity, poor geology with hill farming and v. low population density
B. Other Cambrian – Devonian, and Carboniferous	Hard mudstones, sandstones, limestones. Improved pasture plus some arable, low population density
C. Jurassic and Cretaceous limestones	Soft limestones and chalk. More intensive agriculture and higher population densities, but relatively resistant to P enrichment due to soil/geological adsorption capacity. Form major aquifers whose P levels set background P concentrations of the rivers
D. Triassic sandstones and mudstones	Soft sandstones and mudstones in lowland areas, agriculture and population densities similar to (C) but more vulnerable to P enrichment due to low adsorption capacity. Form major aquifers whose P levels set background P concentrations of the rivers
E. Mesozoic clay vales and Tertiary clays	Very low porosity, rich soils in lowland areas. Intensive agriculture and high population densities, yielding highest background P levels.

The rock types outcropping across the Teifi catchment all fall within the range of Cambrian through to Carboniferous strata as applicable to both Classes A and B. The actual strata present are Ordovician and Silurian shales, mudstones and sandstones, with drift deposits occurring along the main valley floor. In determining the class, the topography and factors of farming characteristics and rural population density have therefore also been taken into account. On this basis, it is considered that Llanybydder lies at the broad divide between upland and lowland areas, with Class A incorporating all land over 330m AOD. Above Llanybydder therefore it would be appropriate to set the geological classification as Class A, and down-river of Llanybydder as Class B. In line with this, all tributaries upstream of Llanybydder should be taken as Class A, and the others as Class B.

1.3 Combining River Size and Geological Class

Combining the river size and geological class information allows an appropriate guideline standard to be allocated (Table 4).

Table 4. Phosphorus values assigned to river types (total reactive phosphorus mg/l, except * total phosphorus)

Geological class	1. Headwaters	2. River	3. Large river
A			
Natural	Undetectable	0.02	0.02
Standard	**0.02**	**0.04**	**0.06**
Threshold	*0.04*	*0.06*	*0.10*
B			
Natural	0.02	0.02	0.03
Standard	**0.06**	**0.06**	**0.10**
Threshold	*0.10*	*0.10*	*0.10*
C			
Natural	0.02	0.02	0.02
Standard	**0.04**	**0.06**	**0.06**
Threshold	*0.06*	*0.10*	*0.10*
D			
Natural	0.02	0.02	0.03
Standard	**0.06**	**0.06**	**0.10**

Threshold	*0.10*	*0.10*	*0.20*
E			
Natural	0.02	0.03	0.03
Standard	**0.06**	**0.10***	**0.10***
Threshold	*0.10*	*0.20**	*0.20**

A map of P standards for the Afon Teifi SAC is shown in Figure1:

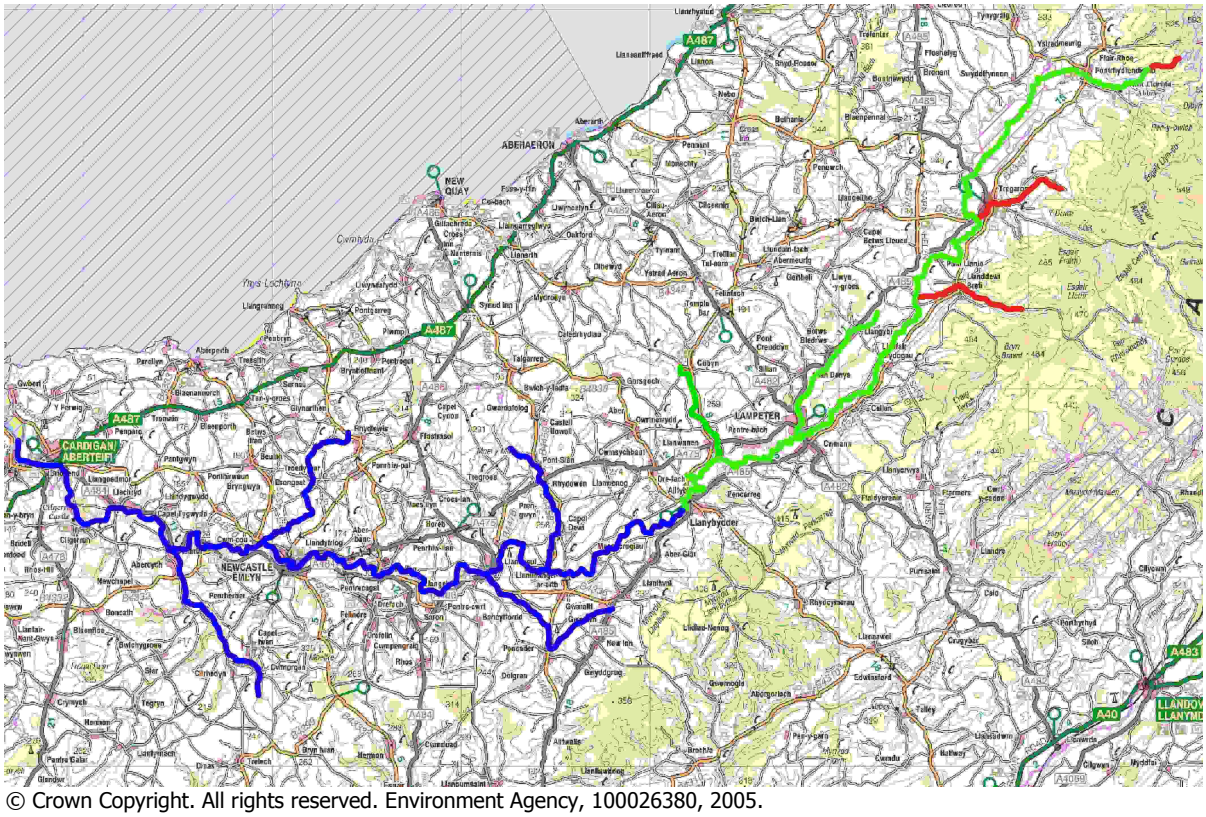

Figure 1. Map of Afon Teifi SAC showing phosphorus standards (blue = 0.06 mg/l, green = 0.04 mg/l, red = 0.02 mg/l)

ANNEX 3 – STANDARDS USED IN THE AFON TEIFI REVIEW OF CONSENTS FOR WATER QUALITY

Table 1 sets out the targets specified in the EA Appropriate Assessment for the Afon Teifi Review of Consents. River Ecosystem Standard RE1 applies to all of the designated SAC reaches of the Afon Teifi.

Table 1: River ecosystem (RE) classification

Class	**Dissolved O xygen (% sat) 10%ile**	**Biological Oxygen Demand (mg/l) 90%ile**	**Total Ammonia (mg N/l) 90%ile**	**Un-ionised Ammonia (mg N/l) 95%ile**	**pH (lower limit as 5%ile, upper limit as 95%ile)**	**Hardness (mg/l $CaCO_3$) Mean**	**Dissolved Copper (µg/l) 95%ile**	**Total Zinc (µg/l) 95%ile**
RE1	80	2.5	0.25	0.021	6.0-9.0	≤10 >10 and ≤50 >50 and ≤ 100 >100	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6.0-9.0	≤10 >10 and ≤50 >50 and ≤ 100 >100	5 22 40 112	30 200 300 500