CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

CORE MANAGEMENT PLAN
INCLUDING CONSERVATION OBJECTIVES

FOR

RIVER USK SPECIAL AREA OF CONSERVATION

Version: 1.5

Date: 7th March 2008

Approved by: David Mitchell

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

Cyngor Cefn Gwlad Cymru
Countryside Council for Wales

NATURA 2000

Ramsar

Llywodraeth Cynulliad Cymru
Welsh Assembly Government
CORFF NODDEDIG | SPONSORED BODY

CONTENTS

Preface: Purpose of this document

1. Vision for the Site

2. Site Description
- **2.1 Area and Designations Covered by this Plan**
- **2.2 Outline Description**
- **2.3 Outline of Past and Current Management**
- **2.4 Management Units**

3. The Special Features
- **3.1 Confirmation of Special Features**
- **3.2 Special Features and Management Units**

4. Conservation Objectives
Background to Conservation Objectives
- **4.1 Conservation Objective for the watercourse**
- **4.2 Conservation Objective for Features 1-5:** Sea lamprey; River lamprey & brook lamprey; Allis shad & twaite shad; Atlantic salmon; Bullhead
- **4.3 Conservation Objective for Feature 6:** European otter
- **4.4 Conservation Objective for Feature 7:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

5. Assessment of Conservation Status and Management Requirements:
- **5.1 Conservation status and management requirements of Feature 1:** Sea lamprey
- **5.2 Conservation status and management requirements of Feature 2:** River lamprey & brook lamprey
- **5.3 Conservation status and management requirements of Feature 3:** Allis shad & twaite shad
- **5.4 Conservation status and management requirements of Feature 4:** Atlantic salmon
- **5.5 Conservation status and management requirements of Feature 5:** Bullhead
- **5.6 Conservation status and management requirements of Feature 6:** European otter
- **5.7 Conservation status and management requirements of Feature 7:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

6. Action Plan: Summary

7. Glossary

8. References and Annexes

PREFACE

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

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

1. VISION FOR THE SITE

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

Our vision for the River Usk SAC is to maintain, or where necessary restore the river to high ecological status, including its largely unmodified and undisturbed physical character, so that all of its special features 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, are maintained or restored to a level necessary to maintain the features in favourable condition for the foreseeable future. In places such as urban environments where natural processes are likely to cause significant damage to the public interest, artificial control measures are likely to be required.

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 contain the variety and abundance of species expected for this type of river, in conditions of suitably clean water and bed substrate combined with a relatively stable flow regime. Locally, there are patches of white-flowered water-crowfoots. In the more shaded reaches, aquatic plants may be scarce, consisting mainly of mosses and liverworts.

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

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

The presence of the River Usk SAC and its special wildlife enhances 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 are recognised and promoted through appropriate land management. The river is 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: SO126219

Unitary authorities: Powys County Council, Monmouthshire County Council, Newport County Borough Council

Area (hectares): 1008.26

Designations covered:

River Usk (Upper Usk) SSSI
River Usk (Lower Usk) SSSI
River Usk (Tributaries) SSSI
Penllwyn-yr-hendy SSSI
Coed Dyrysiog SSSI
Coed Nant Menascin SSSI
Coed Ynysfaen SSSI

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

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

A summary map showing the coverage of this document is shown below:

2.2 Outline Description

The River Usk SAC rises in the Black Mountain range in the west of the Brecon Beacons National Park and flows east and then south, to enter the Severn Estuary at Newport. The overall form of the catchment is long and narrow, with short, generally steep tributaries flowing north from the Black Mountain, Fforest Fawr and Brecon Beacons, and south from Mynydd Epynt and the Black Mountains. The underlying geology consists predominantly of Devonian Old Red Sandstone with a moderate base status, resulting in waters that are generally well buffered against acidity. This geology also produces a generally low to moderate nutrient status, and a moderate base-flow index, intermediate between base-flow dominated rivers and more flashy rivers on less permeable geology. 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 arable in the lower catchment. The Usk catchment is entirely within Wales.

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

Geomorphological processes of erosion by water and subsequent deposition of eroded sediments downstream, create the physical structure of the river habitats. Whilst some sections of the river are naturally stable, especially where they flow over bedrock, others undergo constant 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.

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 habitats as breeding and resting sites. It is important that appropriate amounts of tree cover, in general at least 50% high canopy cover, tall vegetation and other semi-natural habitats are maintained on the riverbanks and in adjacent areas, and that they are properly managed to support the SAC features. This may be achieved, for example, through managing grazing levels, selective coppicing of riparian trees and restoring adjacent wetlands. In the 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, for example lesser horseshoe bats, to migrate and disperse through the landscape. Connectivity should be maintained or restored where necessary as a means to ensure access for the features to sufficient habitat within the SAC.

External factors, operating outside the SAC, may also be influential, particularly for the migratory fish and otters. For example, salmon may be affected by barriers to migration in the Severn Estuary, 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

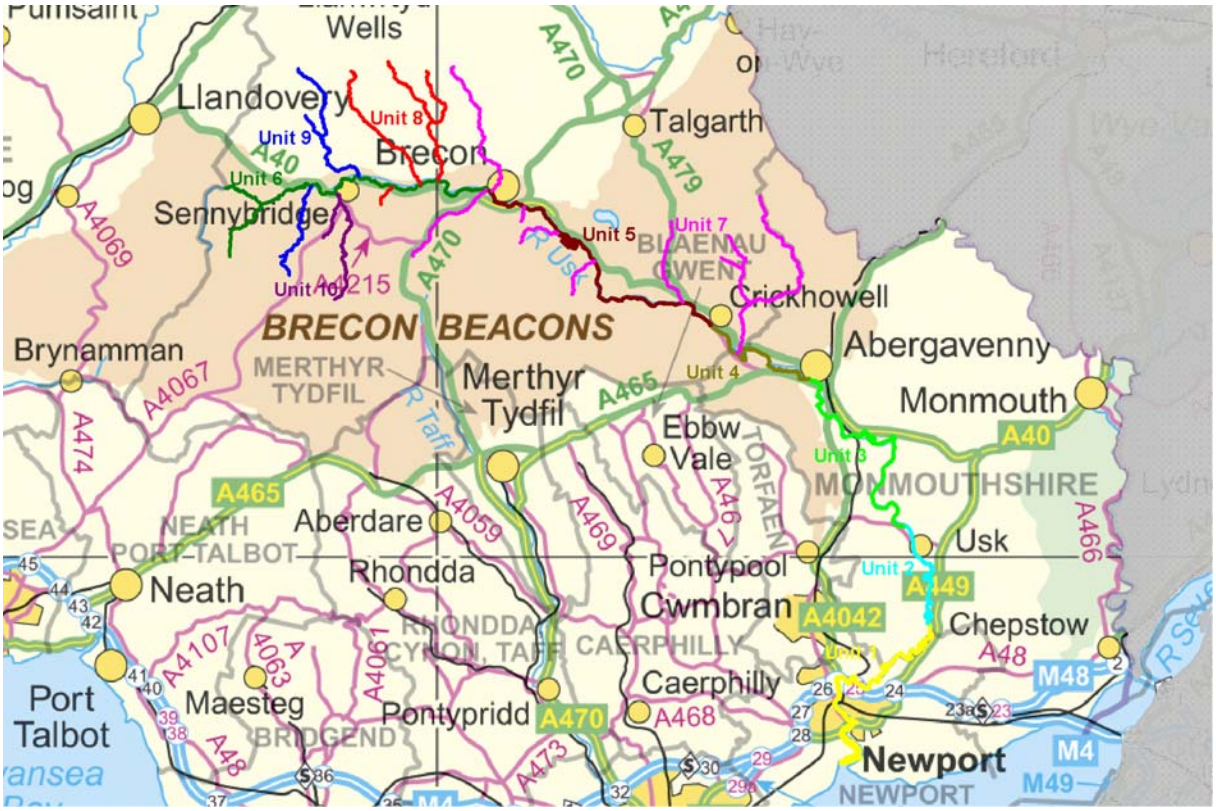
There are many different aspects to the management of this large and complex site that may affect its conservation status. These are summarised in the Site Management Statements for the component SSSIs.

2.4 Management Units

The plan area has been divided into management units to enable practical communication about features, objectives, and management. This will also allow us to differentiate between the different designations where necessary. In this plan the management units have been based on the following:

- SSSI boundaries
- Artificial barriers, where they significantly affect one or more of the features' range
- Major impacts, in particular major water abstractions
- Natural hydromorphology, where there are significant differences in management issues/key features between reaches
- Estuaries: the reach below the tidal limit is treated as a separate unit
- 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.

A map showing the management units referred to in this plan is shown below:



3. THE SPECIAL FEATURES

3.1 Confirmation of Special Features

Designated feature	***Relationships, nomenclature etc***	***Conservation Objective in part 4***
SAC features		
Annex II species that are a primary reason for selection of this site		
Sea lamprey *Petromyzon marinus*		1
Brook lamprey *Lampetra planeri* River Lamprey *Lampetra fluviatilis*	These two species are generally indistinguishable for the purposes of monitoring; however management requirements are similar	2
Twaite shad *Alosa fallax*	Management for this feature is effectively the same as for allis shad	3
Atlantic salmon *Salmo salar*		4
Bullhead *Cottus gobio*		5
European otter *Lutra lutra*		6
Annex I habitats and Annex II species present as qualifying features, but not primary reasons for site selection		
Allis shad *Alosa alosa*	Management for this feature is effectively the same as for twaite shad	3
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation		7
SPA features		
Not applicable		
Ramsar features		
Not applicable		
SSSI features		
To be added		

3.2 Special Features and Management Units

This section sets out the relationship between the special features and each management unit. This is intended to provide a clear statement about what each unit should be managed for, taking into account the varied needs of the different special features.

All special features are allocated to one of seven classes in each management unit. These classes are:

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

Other Features

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

a) they are present in the unit but are of less conservation importance than the key feature; and/or
b) they are present in the unit but in small areas/numbers, with the bulk of the feature in other units of the site; and/or
c) their requirements are broader than and compatible with the management needs of the key feature(s).

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

Mn - Management units with no special feature present but which are of importance for management of features elsewhere on a site e.g. livestock over-wintering area included within designation boundaries.

x – Features not present in the management unit.

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

River Usk (Lower Usk) SSSI	**Management unit**				
	1	**2**	**3**		
SAC	**[**	**[**	**[**		
SSSI	**[**	**[**	**[**		
CCW ownership					
SAC Features					
1. Sea lamprey	**KS**	**KS**	**KS**		
2. River lamprey	Sym	Sym	Sym		
3. Brook lamprey	x	Sym	Sym		
4. Twaite shad	**KS**	**KS**	**KS**		
5. Allis shad	Sym	Sym	Sym		
6. Atlantic salmon	Sym	Sym	Sym		
7. Bullhead	x	Sym	Sym		
8. European otter	**KS**	**KS**	**KS**		
9. Rivers with floating vegetation often dominated by water-crowfoot	x	**KH**	**KH**		
SSSI Features					
To be added					

- Twaite shad and sea lamprey spawn within Units 2 & 3 and migrate through Unit 1, where they may be subject to disturbance impacts, so are selected as key features in all units.
- Management for twaite shad and sea lamprey should also be sympathetic for Atlantic salmon, river/brook lamprey (spawning habitat) and bullhead.
- Specific management measures for otter relating to adjacent habitats and disturbance require its selection as a key feature in all units.
- The feature 'Rivers with floating vegetation often dominated by water-crowfoot' occurs in Units 2 & 3 in this SSSI and is selected as a key habitat.

- The status of allis shad is uncertain in River Usk (Lower Usk) SSSI. It is assumed to be present in the same units as twaite shad.

River Usk (Upper Usk) SSSI	**Management unit**				
	4	**5**	**6**		
SAC	**[**	**[**	**[**		
SSSI	**[**	**[**	**[**		
CCW ownership					
SAC Features					
1. Sea lamprey	**KS**	**KS**	x		
2. River lamprey	Sym	Sym	Sym		
3. Brook lamprey	Sym	Sym	Sym		
4. Twaite shad	**KS**	**KS**	x		
5. Allis shad	Sym	Sym	x		
6. Atlantic salmon	Sym	Sym	**KS**		
7. Bullhead	Sym	Sym	Sym		
8. European otter	**KS**	**KS**	**KS**		
9. Rivers with floating vegetation often dominated by water-crowfoot	x	x	x		
SSSI Features					
To be added					

- Atlantic salmon is a key feature in Unit 6 due to the presence of spawning sites, although salmon may occasionally also spawn within Units 4 & 5.
- Twaite shad is recorded only infrequently in Unit 5 as their distribution is constrained by the barrier created by Crickhowell Bridge footings.
- Sea lamprey is recorded more frequently than shad within Unit 5 but may also be affected to an extent by Crickhowell Bridge. The natural range of sea lamprey may extend upstream into Unit 6, however the degree to which their distribution may be constrained by Brecon weir is poorly understood. Sea lamprey is assumed to be generally absent from Unit 6 due to natural range limits.
- Management for Atlantic salmon, twaite shad and sea lamprey is expected to be sympathetic for river/brook lamprey (spawning habitat) and bullhead.
- Specific management measures for otter relating to adjacent habitats and disturbance require its selection as a key feature in all units.
- The status of the features Allis shad and 'Rivers with floating vegetation often dominated by water-crowfoot' is uncertain in River Usk (Upper Usk) SSSI. Allis shad is assumed to be present in the same units as twaite shad.

River Usk (Tributaries) SSSI	**Management unit**				
	7	**8**	**9**	**10**	
SAC	**[**	**[**	**[**	**[**	
SSSI	**[**	**[**	**[**	**[**	
CCW ownership					
SAC Features					
1. Sea lamprey	x	x	x	x	
2. River lamprey	Sym	Sym	**KS**	**KS**	
3. Brook lamprey	Sym	Sym	**KS**	**KS**	
4. Twaite shad	x	x	x	x	
5. Allis shad	x	x	x	x	

6. Atlantic salmon	**KS**	**KS**	**KS**	**KS**	
7. Bullhead	Sym	Sym	Sym	Sym	
8. European otter	**KS**	**KS**	**KS**	**KS**	
9. Rivers with floating vegetation often dominated by water-crowfoot	**x**	**x**	**x**	**KH**	
SSSI Features					
Atlantic salmon	**KS**	**KS**	**KS**	**KS**	
Brook lamprey	Sym	Sym	**KS**	**KS**	
Bullhead	Sym	Sym	Sym	Sym	
European otter	**KS**	**KS**	**KS**	**KS**	

- Atlantic salmon spawns in all tributaries within this SSSI and so is selected as a key feature in all units.
- Twaite shad, allis shad and sea lamprey are thought not to occur within this SSSI.
- River/brook lamprey are selected as key features within Units 9 & 10, which are thought to contain a higher proportion of suitable ammocoete habitat compared to other units so are expected to hold important populations of these features[4]. Monitoring confirms this to an extent[2].
- Unit 10 is the only unit within this SSSI known to contain the feature 'Rivers with floating vegetation often dominated by water-crowfoot'. The good stands of water-crowfoot dominated vegetation justify its selection as a key feature in this unit.

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 water course is a major determinant of FCS for all features. The required conservation objective for the water course is defined below.

4.1 Conservation Objective for the water course

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 and quality, physical habitat and community composition and 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. In the case of the Usk Tributaries SSSI, the SAC habitat is not underpinned by a river habitat SSSI feature. In this case, the target is to maintain the characteristic physical features of the river channel, banks and riparian zone.

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

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 Usk Catchment Abstraction Management Strategy 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 Usk 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 Usk 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 Potential sources of pollution not addressed in the Review of Consents, such as contaminated land, will be considered in assessing plans and projects.

4.1.15 Levels of suspended solids will be agreed between EA and CCW for each Water Framework Directive water body in the Usk SAC. Measures including, but not limited to, the control of suspended sediment generated by agriculture, forestry and engineering works, will be taken to maintain suspended solids below these levels.

4.2 Conservation Objective for Features 1-5:
- Sea lamprey *Petromyzon marinus* **(EU Species Code: *1095*) ;**
- Brook lamprey *Lampetra planeri* **(EU Species Code : *1096*) ;**
- River lamprey *Lampetra fluviatilis* **(EU Species Code : *1099*) ;**
- Twaite shad *Alosa fallax* **(EU Species Code : *1103*) ;**
- Allis shad *Alosa alosa* **(EU Species Code : *1102*) ;**
- Atlantic salmon *Salmo salar* **(EU Species Code : *1106*) ;**
- Bullhead *Cottus gobio* **(EU Species Code : *1163*)**

Vision for features 1-5

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 population of the feature in the SAC is stable or increasing over the long term.**	Refer to sections 5.1 to 5.5 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, and alteration of population genetics and introduction of disease.
4.2.3	**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 eg. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions eg. food supply (as described in sections 2.2**	Some reaches of the Usk SAC are more suitable for some features than others e.g. the Senni has important populations of brook/river lamprey and salmon but is not used by shad due to its small size and distance from the estuary. 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 water course given in section 4.1 are secured. The characteristic channel morphology provides the diversity of water depths, current velocities and

	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 4.2.4	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. The presence of hard bank revetments in a number of active alluvial reaches e.g. through Brecon and upstream of Abergavenny, adversely affects the processes that maintain suitable habitat for the SAC features. Hydrological processes in the Usk are currently affected by large abstractions, especially at Prioress Mill and Brecon Weir. However, there are many smaller abstractions not considered to cause a problem at present. Shad and salmon migration can be affected by acoustic barriers and by high sediment loads, which can originate from a number of sources including construction works.
4.2.4	**There is, and will probably continue to be, a sufficiently large habitat to maintain the feature's population in the SAC on a long-term basis.**	Allis and twaite shad are affected by range contraction due to artificial barriers to migration in the Usk. It is likely that this loss of habitat affects their maintenance in the SAC on a long-term basis.

Performance indicators for features 1-5

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.

Sea lamprey *Petromyzon marinus* : ***Performance indicators for feature condition***			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Distribution within catchment	Suitable habitat adjacent to or downstream of known spawning sites should contain *Petromyzon* ammocoetes.	This attribute provides evidence of successful spawning and distribution trends. Spawning sites known to have been used within the previous 10 years and historical sites considered still to have suitable habitat, are shown in Annex 4. Spawning locations may move within and between sites due to natural processes or new sites may be discovered over time. Silt beds downstream of all sites identified in Annex 4 will be sampled for presence or absence of ammocoetes. Where apparently suitable habitat at any site is unoccupied feature condition will be considered unfavourable.	1-5

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. In the Usk, spawning sites within units 2 to 5 will be assessed against this attribute.	2-5
	Overall catchment mean >0.1m^{-2} (Harvey & Cowx 2003)[1]	Although this attribute is not used in CSM for sea lamprey, baseline monitoring in the Usk gave an overall catchment mean of 2.27 ammocoetes m^{-2} in suitable habitat[2], therefore 0.1 m^{-2} is a conservative threshold value for unfavourable condition.	

Brook lamprey *Lampetra planeri* and River lamprey *Lampetra fluviatilis* : ***Performance indicators for feature condition***			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Age/size structure of ammocoete population	Samples < 50 ammocoetes ~ 2 size classes Samples > 50 ammocoetes ~ 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.	2-10
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 ie. all except unit 1 Presence at less than 2/3 of sample sites will lead to an unfavourable condition assessment.	2-10
	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 Usk, shallower sediment, often patchy and interspersed among coarser substrate.	2-10

Twaite shad *Alosa fallax* and Allis shad *Alosa alosa* : ***Performance indicators for feature condition***			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Spawning distribution	No decline in spawning distribution	Spawning distribution is assessed by kick sampling for eggs and/or observations of spawning adults. A representative sample of	1-5

		sites within units 2 to 5 will be monitored at 3 yearly intervals. Absence from any site in 2 consecutive surveys will result in an unfavourable condition assessment.	
Performance indicators for factors affecting the feature			
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). Shad are particularly sensitive to flow. The ideal regime is one of relatively high flows in March-May, to stimulate migration and allow maximum penetration of adults upstream, followed by rather low flows in June-September, which ensures that the juveniles are not washed prematurely into saline waters and grow rapidly under warmer conditions. The release of freshets to encourage salmonid migration should therefore be discouraged on shad rivers during this period.	1-5

Atlantic salmon *Salmo salar* :			
Performance indicators for feature condition			
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. As there is no fish counter in the Usk, adult run size is calculated using rod catch data. Further details can be found in the EA Usk Salmon Action Plan.	All
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.	6-10
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.	6-10
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)	All
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)	All

Bullhead *Cottus gobio* : ***Performance indicators for feature condition***			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Adult 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.	2-10
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.	2-10
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.	2-10

4.3 Conservation Objective for Feature 6:
- European otter *Lutra lutra* **(EU Species Code: *1355*)**

Vision for feature 6
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
4.3.1	**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
4.3.2	**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 Usk SAC is considered to form potentially suitable breeding habitat for otters. The size of breeding territories may**	Survey information shows that otters are widely distributed in the Usk catchment. While the breeding population in the Usk is not currently considered to 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 in the Usk.

	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.	
4.3.3	**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.**	Restrictions on the movement of otters around the SAC, and between adjoining sites are currently a particular concern in the reach through Newport as a result of a continued decrease in undisturbed suitable riparian habitat.

Performance indicators for feature 6

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

Performance indicators for feature condition			
Attribute	***Specified limits***	***Comments***	***Relevant unit(s)***
a) Distribution	Otter signs present at 90% of Otter Survey of Wales sites	Ref: CCW Environmental Monitoring Report No 19 (2005)[3]	All
b) Breeding activity	2 reports of cub/family sightings at least 1 year in 6	Ref: CCW Environmental Monitoring Report No 19 (2005)[3]	All
c) Actual and potential breeding sites	No decline in number and quality of mapped breeding sites in sub-catchments (see Ref)	Ref: CCW Environmental Monitoring Report No 19 (2005)[3] In the Usk catchment, 77 actual or potential breeding sites have been identified, distributed throughout the catchment on the main river and tributaries.	All

4.4 Conservation Objective for Feature 7:
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

Vision 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.

FCS component		Supporting information / current knowledge
4.4.1	**The conservation objective for the water course as defined in 4.1 above must be met**	
4.4.2	**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 eg. depth and stability of flow, stability of bed substrate, and ecosystem structure and functions eg. nutrient levels, shade (as described in section 2.4). 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.**	More information is required on the natural range and distribution of this feature in the Usk. Important examples of the feature may be present outside currently known locations. Sympathetic management will be promoted wherever the feature is present. Species indicative of unfavourable condition for this feature eg. 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.
4.4.3	**The area covered by the feature within its natural range in the SAC should be stable or increasing.**	Important stands of the feature are known to occur within site management unit nos. 2, 3 & 10. Management to maintain or increase the feature within these units will be a priority. Adverse factors may include elevated nutrient levels, shading or altered flow and/or sediment transport regimes.
4.4.4	**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**	More information on the typical species expected to be found with each management unit in the SAC is required.

may be defined as appropriate.

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 within catchment	Distribution within site units 2,3 & 10	*Ranunculus* spp. will be present with an MTR species cover score of at least 5 in: Any three representative sample 100m stretches of suitable habitat between Usk Town bridge and the bridge at Newbridge-on-Usk: AND In one representative sample 100m stretch of suitable habitat along the Senni	2,3,10
b) Typical species	Species list for reference vegetation type	Should conform to appropriate JNCC type or other list for site unit as appropriate. Details to be confirmed	2,3,10
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	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 Usk SAC: Algae indicative of eutrophication *(Enteromorpha* spp., *Cladophora* spp. and *Vaucheria* spp.) should not have an MTR cover value of greater than 5 (ie.10%) in 3 consecutive years in: Any three representative sample 100m stretches of suitable habitat between Usk Town bridge and the bridge at Newbridge-on-Usk: AND In one representative sample 100m stretch of suitable habitat along the Senni	2,3,10
b) Alien / introduced species	No impact on native biota from alien or introduced species	In the CSM guidance, the SERCON scoring system for naturalness of aquatic and marginal macrophytes and naturalness of banks and riparian zone, are used to assess this attribute. SERCON protocols have not been applied in the Usk SAC, therefore assessment of this attribute relies on locally defined thresholds and expert judgement. Details to be confirmed	

5. ASSESSMENT OF CONSERVATION STATUS AND MANAGEMENT REQUIREMENTS

This part of the document provides:

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

5.1 Conservation status and management requirements of Feature 1: Sea lamprey *Petromyzon marinus*

Conservation status

Status: Unfavourable: Unclassified. Sea lamprey monitoring showed that overall catchment mean ammocoete density considerably exceeded the JNCC target threshold and also complied with targets for spawning site and ammocoete distribution. A caveat on the latter is uncertainty over whether the natural range of sea lamprey extends above Brecon weir: this is assumed not to be the case.

Factors leading to an unfavourable assessment are the presence of probable partial barriers further downstream (notably Crickhowell Bridge), and flow depletion resulting from abstractions including Brecon canal and Prioress Mill public water supply abstraction. The latter in particular has been shown to have effects both on a seasonal timescale by reducing spate flows during the migration period and on a diurnal timescale by substantially depleting flows during the night time to the extent that sea lamprey nests and nursery areas are likely to be exposed above the water level. The effect of the Brecon canal abstraction has been shown to comprise a substantial depletion of flows, at least locally, during low flow periods with a resulting reduction in river depth downstream of the off-take weir.

Management requirements

The impacts of barriers to migration and flow depletion are highlighted in the assessment of conservation status for this feature. The impact of 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. Crickhowell Bridge is considered to be the most significant barrier to fish migration in the Usk. Management to reduce or remove the effect of this barrier is a high priority for the River Usk SAC. An assessment of options will be carried out in conjunction with the other relevant competent authorities.

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

The impact of flow depletion resulting from a small number of major abstractions was highlighted in the Review of Consents process. As a result of this process, flow targets have been set which are considered likely to significantly reduce or remove the impacts on SAC features. These targets (given in Annex 1) are expressed as, 1) a flow duration curve using recent daily mean flow data, used to set abstraction licence conditions including ‘hands-off flows’, 2) hourly maximum abstraction rates for certain licences to reduce or remove the effect of diurnal flow variations. There are also requirements for screening of intakes to reduce or remove the impact of impingement and entrainment on juvenile fish migrating downstream.

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.

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

Conservation status

Status: Favourable. Brook/river lamprey monitoring showed that overall catchment mean ammocoete density considerably exceeded the JNCC target threshold and also complied with targets for ammocoete distribution[1].

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 Usk SAC is desirable. Records of spawning adult river lamprey 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 currently favourable condition assessment suggests that there are no strongly adverse factors influencing these species. However, the species are likely to benefit from positive management for the other SAC features, and may see further 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 3: Twaite shad *Alosa fallax* and Allis shad *Alosa alosa*

Conservation status

Status: Unfavourable: Unclassified. Monitoring of these species in the Usk relies on two methods,

i. Kick sampling for eggs provides qualitative information on spawning distribution,
ii. Netting for juveniles in the lower river and tidal reaches during late summer/autumn when juveniles drift downstream towards the estuary.

These methods do not distinguish between the two species. Allis shad is thought to be rare, with no recent records in the Usk, while twaite shad is relatively common. Kick sampling for eggs is only able to give a broad scale indication of presence or absence at sampled locations. Netting for juveniles gives a quantitative estimate of abundance, though may be subject to a high degree of uncertainty due to sampling error. This uncertainty is likely to be compounded by variation between years in the size of the adult run, spawning success and resulting numbers of juveniles. Poor adult runs are likely to result from unsuitable flows during the March to June migration period, in particular prolonged low flows, while poor survival of eggs and juveniles is related to spate flows in the mid to late summer which can flush them into the estuary prematurely.

CSM guidance states that adult run size should comply with an agreed target for each river, with no drop in the annual run greater than would be expected from variations in natural mortality alone. This attribute is not currently assessed in the Usk due to the absence of a fish counter.

The current unfavourable status results from a precautionary assessment of feature distribution and abundance, and from the presence of adverse factors, in particular flow depletion and physical barriers to migration.

Management requirements

The impacts of barriers to migration and flow depletion are highlighted in the assessment of conservation status for these features.

Artificial physical barriers are probably the single most important factor in the decline of shad in Europe. Impassable obstacles between suitable spawning areas and the sea can eliminate breeding populations of shad. Both species (but particularly allis shad) can make migrations of hundreds of kilometres from the estuary to spawning grounds in the absence of artificial barriers. Existing fish passes designed for salmon are often not effective for shad. Any new provisions need to take their requirements into account. The impact of existing barriers in the Usk 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. Crickhowell Bridge is considered to be the most significant barrier to fish migration in the Usk. Management to reduce or remove the effect of this barrier is a high priority for the River Usk SAC. Other barriers that may be significant include Trostrey Weir and Radyr Weir . An assessment of options will be carried out in conjunction with the other relevant competent authorities.

Development pressure in the lower catchment can cause temporary physical, acoustic, chemical and sediment barrier effects that need to be addressed in the assessment of specific plans and projects. Noise/vibration e.g. due to impact piling, drilling, salmon fish counters present within or in close proximity to the river can create a barrier to shad migration. Land on both sides of the river in Newport is potentially highly contaminated. Contamination of the river can arise when this is disturbed e.g. as a result of development. Contamination can also arise from pollution events (which could be shipping or industry related). Barriers resulting from vibration, chemicals, low dissolved oxygen and artificially high sediment levels must be prevented at key times (generally March to June). The possible barrier effects that might be caused by the installation of an acoustic salmonid fish counter should also be evaluated.

The impact of flow depletion resulting from a small number of major abstractions was highlighted in the Review of Consents process. As a result of this process, flow targets have been set which are considered likely to significantly reduce or remove the impacts on SAC features. These targets (given in Annex 1) are expressed as, 1) a flow duration curve using recent daily mean flow data, which is used to set abstraction licence conditions including ‘hands-off flows’, 2) hourly maximum abstraction rates for certain licences to reduce or remove the effect of diurnal flow variations. There are also requirements for screening of intakes to reduce or remove the impact of impingement and entrainment on juvenile shad drifting downstream and post-spawning adult shad.

The extent and quality of suitable shad habitat must be maintained. Spawning habitat is defined as stable, clean gravel/pebble-dominated (approximately 70%) substrate without an armoured layer and with <10% fines in the top 30 cm. Water depth during the spawning and incubation periods should be 50-75 cm. Holding areas are defined as pools of at least 200 cm depth, with cover from features such as undercut banks, vegetation, submerged objects and surface turbulence.

Anglers occasionally fish for shad, and they are sometimes taken in quite large numbers. Further research is necessary to define sustainable levels of angling. If this shows there is cause for concern, a temporary cessation of fishing activity in the vicinity of known spawning grounds during the spawning period should be considered, particularly where shad are known to be taken regularly. Exploitation of shad is currently unregulated and controls are being considered through the review of freshwater fisheries legislation.

Commercial fishermen also take shad as a by-catch, with whitebait and shrimp fishing being of particular concern. Changes in fishing methods need to be promoted to minimize captures, whilst both anglers and trawler men should be encouraged to return alive any individuals caught.

Artificially enhanced densities of other fish may introduce unacceptable competition or predation pressure and the aim should be to minimise these risks in considering any proposals for stocking.

5.4 Conservation status and management requirements of Feature 4: Atlantic salmon *Salmo salar*

Conservation status

Status: Unfavourable: Unclassified. Monitoring of Atlantic salmon in the Usk relies on two methods,

i. Estimation of adult run size from angling catch returns,
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[6]. These targets are calculated and monitored by the Environment Agency as part of the Salmon Action Plan for the Usk.

The current unfavourable status results from a precautionary assessment of feature distribution and abundance, in particular the results of juvenile surveys, and from the presence of adverse factors, in particular flow depletion and localised water quality failures.

Management requirements

The Atlantic salmon is the focus for much of the management activity carried out on the Usk. 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 often carried out. The Wye and Usk Foundation through their Usk Project have carried out much of this work in recent years. Other work has included removal of weirs and construction of fish passes to ease artificial barriers to salmon migration, and reduction in exploitation pressure through buying out net fisheries in the estuary.

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 Usk 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 crayfish populations and can deprive fish populations of food over large stretches of river. These impacts can arise if recently dipped sheep are allowed access to a stream or hard standing area, which drains into a watercourse. Pollution from organophosphate sheep dips and silage effluent can be very damaging locally. Pollution from slurry and other agricultural and industrial chemicals, including fuels, can kill all forms of aquatic life. All sheep dips and silage, fuel and chemical storage areas should be sited away from watercourses or bunded to contain leakage. Recently dipped sheep should be kept off stream banks. Used dip should be disposed of strictly in accordance with Environment Agency Regulations and guidelines. Statutory and voluntary agencies should work closely with landowners and occupiers to minimise the risk of any pollution incidents and enforce existing regulations.

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

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

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

In all river types, artificial barriers should be made passable. The impact of existing barriers in the Usk 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 pressure in the lower catchment can cause temporary physical, acoustic, chemical and sediment barrier effects that need to be addressed in the assessment of specific plans and projects. Land on both sides of the river in Newport is potentially highly contaminated. Contamination of the

river can arise when this is disturbed eg as a result of development. Contamination can also arise from pollution events (which could be shipping or industry related) e.g. chemical spillage, low dissolved oxygen.

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.

There is currently no stocking of salmon into the Usk. 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 broodstock, competition between stocked and naturally produced individuals, disease introduction and genetic alterations to the population. Therefore, there is a presumption against salmon stocking in the Usk SAC.

The presence of artificially high densities of other fish 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 5: Bullhead *Cottus gobio*

Conservation status

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, which will be addressed by targeted monitoring in 2007.

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 instream structures should be avoided, whilst the impact of existing artificial structures needs to be evaluated.

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

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

conditions. Suitable refuges include pools, submerged tree root systems and marginal vegetation with >5 cm water depth.

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

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

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

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

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

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

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

5.6 Conservation status and management requirements of Feature 6: European otter *Lutra lutra*

Conservation status

Status: Favourable. The conservation status of otters in the Usk 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

The catchment should be capable of supporting at least 18 breeding females, based on one breeding female per 20km stretch of river. It is possible that if all the breeding sites achieve optimal habitat conditions and fish and amphibian stocks are secured that 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[3].

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.

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.

Certain areas of the SAC are critical to the movement of otters both within the system and to adjacent sites. The Usk SAC provides a key movement corridor for otters passing between the relatively high densities in mid Wales and the south-east Wales coastal strip (Seven Estuary and Gwent Levels). The function of this aspect of the site should be protected through the maintenance of suitable resting sites (in terms of size, quality and levels of disturbance) through the major urban centre of Newport.

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 7: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

Conservation status

Status: Unfavourable: Unclassified. This feature is not identified as one of the primary reasons for designation of the River Usk SAC; its distribution being apparently limited by the availability of suitable hydromorphological conditions. Important stands have been identified in the lower reaches of the main river below Abergavenny down to the tidal limit, and in the upper reaches of a headwater stream, the Afon Senni. These reaches may represent a sub-type of the feature where large submerged and floating leaved flowering plants, in particular *Ranunculus*, are dominant. Habitat suitability studies[4] suggest that the natural range of the feature may be more widespread within the SAC. More widespread sub-types may consist of communities dominated by aquatic bryophytes. Where necessary, examples of these sub-types may be identified as priorities for management, for example through the management of riparian vegetation to preserve shade and humidity. Further understanding of the distribution and status of this feature and its natural range within the River Usk SAC is required.

The present unfavourable status of the feature results from the over-abundance of invasive non-native species of bankside plant communities, which are included within the feature definition. These are predominantly giant hogweed and Himalayan balsam in the lower reaches of the main river.

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, producing 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 major abstractions in the River Usk SAC is not considered to be damaging to this feature, either through limiting its range or adversely affecting its community composition[5].

The conservation objectives require that the area covered by the feature is stable or increasing within its natural range, which is likely to require catchment-wide measures to control diffuse pollution from agriculture, as the principal source of phosphate. Measures should be targeted initially at those reaches identified as holding important stands of this vegetation, in particular the Afon Senni.

Invasive non-native plants are a detrimental impact on this feature. Giant hogweed, Himalayan balsam and Japanese knotweed should be actively managed to control their spread and hopefully reduce their extent in the SAC.

6. ACTION PLAN: SUMMARY

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

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
001	000467	Tidal reach	Development pressures in Newport leading to increased disturbance and pollution risk.	Yes
002	000468	Prioress Mill to tidal limit	Dwr Cymru Prioress Mill abstraction causing flow depletion and fish entrainment. Invasive weeds affect river bank areas.	Yes
003	000469	Llanfoist Bridge to Prioress Mill	Trostrey Weir forms a partial barrier to migration of shad. Invasive weeds affect river bank areas.	Yes
004	000470	Crickhowell Bridge to Llanfoist Bridge	Trostrey Weir and Llanfoist Bridge form a partial barrier to migration of shad. Tipped waste affects a significant length of river bank at Llanfoist. Invasive weeds affect river bank areas.	Yes
005	000471	Brecon Weir to Crickhowell Bridge	Crickhowell Bridge forms a near-total barrier to migration of shad. Canal abstraction at Brecon Weir causes localised significant flow depletion at low flows. Himalayan balsam is invasive over large areas of river bank.	Yes
006	000472	Usk Reservoir to Brecon Weir & Afon Hydfer	Brecon Weir forms a partial barrier to fish migration. The main River Usk is partially regulated by Usk Reservoir. Forestry affects the upper part of Afon Hydfer. Agriculture and forestry affect run-off regime and water quality.	Yes
007	000473	Usk Tributaries, Brecon downstream	Partial barriers to fish migration at several locations. Caerfanell is regulated by Talybont Reservoir. Grwynne Fawr is regulated by Grwynne Fawr Reservoir. Agricultural land management affects run-off regime and water quality.	Yes
008	000474	Camlais, Bran & Ysgir	Agricultural land management affects run-off regime and water quality.	Yes
009	000475	Crai & Cilieni	Crai is regulated by Cray Reservoir. Agricultural land management affects run-off regime and water quality.	Yes
010	000476	Afon Senni	Agricultural land management affects run-off regime and water quality.	Yes
011	000488	Upper Nant Menascin	No known significant issues.	No

7. GLOSSARY

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

Action	A recognisable and individually described act, undertaking or **project** of any kind, specified in section 6 of a **Core Management Plan** or **Management Plan**, as being required for the **conservation management** of a site.
Attribute	A quantifiable and monitorable characteristic of a **feature** that, in combination with other such attributes, describes its **condition**.
Common Standards Monitoring (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[2]: Favourable: maintained; Favourable: recovered; Favourable: un-classified Unfavourable: recovering; Unfavourable: no change; Unfavourable: declining; Unfavourable: un-classified Partially destroyed; Destroyed.
Conservation management	Acts or undertaking of all kinds, including but not necessarily limited to **actions,** taken with the aim of achieving the **conservation objectives** of a site. Conservation management includes the taking of statutory and non-statutory measures, it can include the acts of any party and it may take place outside site

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

	boundaries as well as within sites. Conservation management may also be embedded within other frameworks for land/sea management carried out for purposes other than achieving the conservation objectives.
Conservation objective	The expression of the desired **conservation status** of a **feature,** expressed as a **vision for the feature** and a series of **performance indicators**. The conservation objective for a feature is thus a composite statement, and each feature has one conservation objective.
Conservation status	A description of the state of a **feature** that comprises both its **condition** and the state of the **factors** affecting or likely to affect it. Conservation status is thus a characterisation of both the current state of a feature and its future prospects.
Conservation status assessment	The process of characterising the **conservation status** of a **feature** with particular reference to whether the aspirations for it, as expressed in its **conservation objective**, are being met. The results of conservation status assessment can be summarised either as 'favourable' (i.e. conservation objectives are met) or unfavourable (i.e. conservation objectives are not met). However the value of conservation status assessment in terms of supporting decisions about **conservation management**, lies mainly in the details of the assessment of feature **condition**, **factors** and trend information derived from comparisons between current and previous conservation status assessments and condition assessments.
Core Management Plan	A CCW document containing the conservation objectives for a site and a summary of other information contained in a full site **Management Plan**.
Factor	Anything that has influenced, is influencing or may influence the **condition** of a **feature**. Factors can be natural processes, human activities or effects arising from natural process or human activities, They can be positive or negative in terms of their influence on features, and they can arise within a site or from outside the site. Physical, socio-economic or legal constraints on **conservation management** can also be considered as factors.
Favourable condition	See **condition** and **condition assessment**
Favourable conservation status	See **conservation status** and **conservation status assessment**[3]
Feature	The species population, habitat type or other entity for which a site is designated. The ecological or geological interest which justifies the designation of a site and which is the focus of conservation management.
Integrity	See **site integrity**
Key Feature	The habitat or species population within a **management unit** that is the primary focus of **conservation management** and **monitoring** in that unit.
Management Plan	The full expression of a designated site's legal status, **vision**, **features**, **conservation objectives**, **performance indicators** and

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

	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

[1] Harvey JP & Cowx IG (2003). *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.
http://www.english-nature.org.uk/LIFEinUKRivers/species/lamprey_monitoring.pdf

[2] Hull International Fisheries Institute (2006). *Monitoring of lamprey in the rivers Wye and Usk SACs 2005-2006.* Unpublished report to CCW, available on request.

[3] Morgan P (2005). *Current and potential distribution, condition and breeding success of the otter (Lutra lutra) in the River Usk catchment.* CCW Environmental Monitoring Report No.19

[4] Geodata Institute (2005). *Fluvial audit of the Upper Usk Tributaries.* CCW

[5] Holmes NTH (2004). *A review of water quality monitoring on the Usk catchment using macrophytes.* Environment Agency Wales, South East Area

[6] Cowx IG & Fraser D (2003). *Monitoring the Atlantic Salmon.* Conserving Natura 2000 Rivers Monitoring Series No.7, English Nature, Peterborough.
http://www.english-nature.org.uk/LIFEinUKRivers/species/salmon_monitoring.pdf

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

The flow target used in the Environment Agency (EA) Resource Assessment and Management Framework (RAM) for the River Usk utilises the Habitats Directive Ecological River Flow (HDERF) objective during the key fish migration period in April to June. The maximum permissible percentage reduction from naturalised flow levels during this period is given in Table 1. Within the River Usk SAC, all reaches above Abergavenny are classified as having Very High sensitivity to abstraction, and below Abergavenny as High sensitivity. At other times of year the flow objective is derived from the CAMS River Flow Objective and recent actual abstraction scenario, whichever is the more stringent. At low flows this is equivalent to the HDERF objective. Some licences including the major public water supply abstractions in the lower river have Hands-off Flow conditions, which prevent abstraction during low flows.

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 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. There may also be effects resulting from reduced water temperature.

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

Source: 'Usk Phosphate Target setting' Environment Agency Wales Ref. No: EASE/TM/04/03

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 favorable 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 Usk 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

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

When the SIMCAT model of the Usk was built, Hydrology provided flow gauge information, flow estimates and headwater flow estimates (see Usk SIMCAT Final Model Build Report). The information from these was used to determine the GQA flow band and hence the river class.

The main River Usk is classed as a 'river' from just below Usk reservoir to the tidal limit. The SAC tributaries will obviously start off as headwaters but invariably reach 'river' size by the time they enter the main river Usk. In order to differentiate the point at which the tributary changed from 'headwater' to 'river' class, detailed flow data along the length of the tributaries would be required rather than the usual two flow estimates that we currently have. Therefore, to keep the classification simple, the SAC tributaries will be classed as 'river' along their entire lengths.

1.2 Determining the Geological Class

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 Methodology identifies five geological types (Table 3).

The Usk catchment is predominantly Old Red Sandstone and was therefore assigned to category '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 (Figure 1).

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**

The Usk SAC falls into flow category 2 'River' and Geological class 'B', and therefore gets a P Target of 0.06 mg/l.

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

Table 1 sets out the targets specified in the EA Appropriate Assessment for the River Usk Review of Consents. RE1 applies to all of the designated SAC reaches of the River Usk (RE2 applies to some non-designated tributaries).

Table 1 River ecosystem (RE) classification

	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