

CORE MANAGEMENT PLAN INCLUDING CONSERVATION OBJECTIVES

FOR

RIVER WYE / AFON GWY SPECIAL AREA OF CONSERVATION (SAC)

Version	Date	Summary of changes made	Approved by
Version 2	September 2017	Update to water quality standards	Gillian Barter
Version 1	28 th February 2008	Original plan	David Mitchell

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PREFACE

This document provides the main elements of Natural Resources Wales' management plan for the site(s) named. It sets out what needs to be achieved on the site(s), and advice on the action required. This document is made available through Natural Resources Wales' 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 Natural Resources Wales' web site.

One of the key functions of this document is to provide Natural Resources Wales' statement of the Conservation Objectives for the relevant Natura 2000 site(s). This is required to implement the Conservation of Habitats and Species Regulations 2010, as amended. As a matter of Welsh Government Policy, the provisions of those regulations are also to be applied to Ramsar sites in Wales.

1. VISION FOR THE SITE

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

The purpose of the designation of Natura 2000 sites is to help secure the maintenance or restoration of habitats and species to favourable conservation status *for the foreseeable future*. Given that we foresee a changing climate, despite the uncertainty of the nature, degree and timing of those changes, we must address the need to ensure the resilience of each site to that changing environment. This will be achieved in the first instance by ensuring favourable condition of the important features, since a healthy feature is likely to be more resilient to the effects of climate change than one which is already stressed. Secondly, consideration must be given to those structures, functions and processes which maintain or boost the resilience of ecosystems to climate stress, including the avoidance, reduction or mitigation of other stress factors such as invasive species, nutrient enrichment, habitat and population fragmentation.

This site forms part of a wider network, and is ecologically connected with its surroundings and with other designated sites in the region. Although the focus of this document is on the individual site, the conservation objectives and management requirements need to be considered in the wider context. A connected network of sites is more robust than sites in isolation, and more resilient to pressures such as climate change.

Our vision for the River Wye 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. Patches of white-flowered water-crowfoots are widespread in the main river and in many of the tributaries. 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 Wye catchment forms an important refuge for the globally endangered white-clawed crayfish. The species is abundant and widely distributed in suitable habitat and is protected from the harmful effects of pesticide pollution and non-native crayfish. Non-native crayfish such as American signal crayfish are eradicated from the Wye catchment.

The presence of the River Wye 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(s): SO109369

Unitary authority(ies): Powys County Council, Monmouthshire County Council

Area (hectares): 2234.89

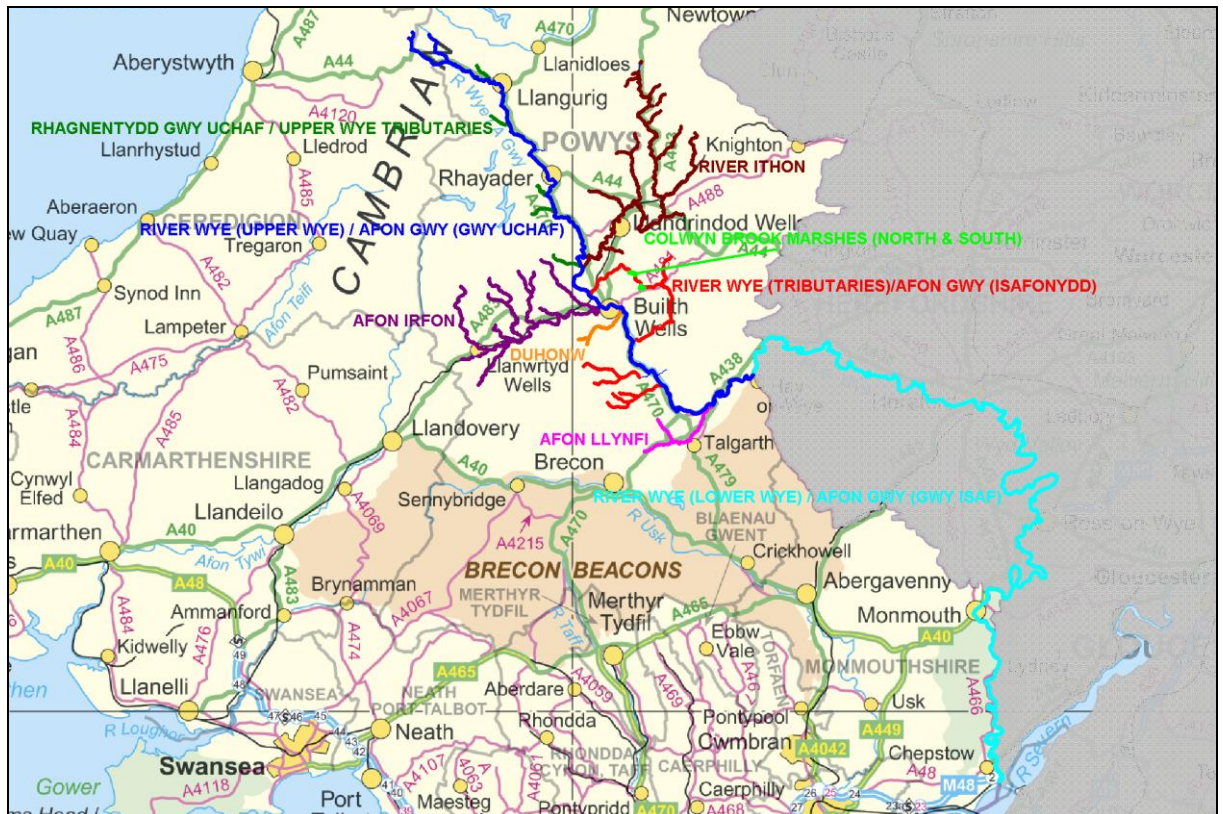
Designations covered:

River Wye (Lower Wye) SSSI
River Wye (Upper Wye) SSSI
River Wye (Tributaries) SSSI
Afon Llynfi SSSI
Duhonw SSSI
Afon Irfon SSSI
River Ithon SSSI
Upper Wye Tributaries SSSI
Colwyn Brook Marshes (North & South) SSSI

Note: a number of smaller SSSI have part of their area included within the River Wye SAC. These are not all included separately in this plan. Unless otherwise stated, management actions for adjacent SAC units also apply to these sites.

Detailed maps of the designated sites are available on the Natural Resources Wales web site.

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



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2.2 Outline Description

The River Wye rises on Plynlimon in the Cambrian Mountains and flows in a generally south-easterly direction to enter the Severn Estuary at Chepstow. The upper catchment comprises several large sub-catchments, including the Irfon on the generally infertile upland landscape in the north-west, the Ithon in the north-east often on more low-lying, fertile terrain and the Lugg in the east in a predominantly low-lying fertile landscape much of which lies within England. The underlying geology consists predominantly of impermeable, acidic rocks of Silurian and Ordovician age in the north-west and more permeable Devonian Old Red Sandstone with a moderate base status in the middle and lower catchment. This geology produces a generally low to moderate nutrient status and a low to moderate base-flow index, making the river characteristically flashy. The run-off characteristics and nutrient status are significantly modified by land use in the catchment, which is predominantly pastoral with some woodland and commercial forestry in the headwaters and arable in the lower catchment and the Lugg. The Wye catchment is divided between Wales and England; the river forms the border from south of Monmouth to Chepstow and to the east of Hay-on-Wye.

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

Hydrological processes, in particular river flow (level and variability) and water chemistry, determine a range of habitat factors of importance to the SAC features, including current velocity, water depth, wetted area, substrate quality, dissolved oxygen levels and water temperature. Maintenance of both high 'spate' flows and base-flows is essential. Reductions in flow may reduce the ability of the adults of migratory fish to reach spawning sites. Water-crowfoot vegetation thrives in relatively stable, moderate flows and clean water. The flow regime should be 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. While some sections of the river are naturally stable, especially where they flow over bedrock, others undergo continual and at times rapid change through the erosion and deposition of bed and bank sediments as is typical of meandering sections within floodplains (called 'alluvial' rivers). These processes help to sustain the river ecosystem by allowing a continued supply of clean gravels and other important substrates to be transported downstream. In addition, the freshly deposited and eroded surfaces, such as shingle banks and earth cliffs, enable processes of ecological succession to begin again, providing an essential habitat for specialist, early-successional species. Processes at the wider catchment scale generally govern processes of erosion and deposition occurring at the reach scale, although locally factors such as the effect of grazing levels on riparian vegetation structure may contribute to enhanced erosion rates. In general, management that interferes with natural geomorphological processes, for example preventing bank erosion through the use of hard revetments or removing large amounts of gravel, are likely to be damaging to the coherence of the ecosystem structure and functions.

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-stream consumers. Light, temperature and nutrient levels influence in-stream plant production and habitat suitability for the SAC features. Woody debris is very important as it provides refuge areas from predators, traps sediment to create spawning and juvenile habitat and forms the base of an important aquatic food chain. Otters require sufficient undisturbed riparian habitat for breeding and resting sites. It is important that appropriate amounts of tree cover, 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 area covered by this plan 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
- Natural hydromorphology, where there are significant differences in management issues/key features between reaches
- Units partly within England coincide with Natural England's equivalent units, as far as is practicable
- The units include one or more River Basin Management Plan water bodies; as far as is practicable, unit boundaries coincide with these water body boundaries.

Maps showing the management units referred to in this plan are on this site's web page.

3. THE FEATURES

3.1 Confirmation of Features

Designated feature	Relationships, nomenclature etc	Conservation Objective in part 4
SAC features		
Sea lamprey <i>Petromyzon marinus</i>		1
Brook lamprey <i>Lampetra planeri</i>	These two species are generally indistinguishable for the purposes of monitoring; management requirements are similar	2
River Lamprey <i>Lampetra fluviatilis</i>		
Twaite shad <i>Alosa fallax</i>	Management for this feature is effectively the same as for allis shad	3
Atlantic salmon <i>Salmo salar</i>		4
Bullhead <i>Cottus gobio</i>		5
European otter <i>Lutra lutra</i>		6
Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation		7
White-clawed crayfish <i>Austropotamobius pallipes</i>		8
Annex II species present as a qualifying feature, but not a primary reason for site selection		
Allis shad <i>Alosa alosa</i>	Management for this feature is effectively the same as for twaite shad	3
Quaking bogs and transition mires		9

3.2 Features and Management Units

This section sets out the relationship between the designated 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 features are allocated to one of seven classes in each management unit. These classes are:

Key Features

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

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

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

Other Features

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

- (a) they are present in the unit but may be of less conservation importance than the key feature; and/or
- (b) they are present in the unit but in small areas/numbers, with the bulk of the feature in other units of the site; and/or
- (c) their requirements are broader than and compatible with the management needs of the key feature(s), e.g. a mobile species that uses large parts of the site and surrounding areas: and/or
- (d) key features (KH, KS) are closely associated with these features, and the conservation of key features depends on them being managed appropriately.

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

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

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

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

River Wye (Lower Wye) SSSI	Management unit			
	1A	1B	1C	1D
SAC	✓	✓	✓	✓
SSSI	✓	✓	✓	✓
NRW ownership				
SAC Features				
1. Sea lamprey	KS	KS	KS	KS
2. River lamprey	Sym	Sym	Sym	Sym
3. Brook lamprey	x	x	Sym	Sym
4. Twaite shad	KS	KS	KS	KS
5. Allis shad	Sym	Sym	Sym	Sym
6. Atlantic salmon	Sym	Sym	Sym	Sym
7. Bullhead	x	x	Sym	Sym
8. European otter	KS	KS	KS	KS
9. Rivers with floating vegetation often dominated by water-crowfoot	x	KH	KH	KH
10. White-clawed crayfish	x	x	x	Sym
11. Quaking bogs and transition mires	x	x	x	x

River Wye (Lower Wye) SSSI	Management unit				
	1A	1B	1C	1D	
SSSI Features					
To be added					

- Twaite shad spawn in Unit 1C & possibly in 1D and migrate through Units 1A & 1B, where they may be subject to disturbance impacts, so are selected as key features in all units. Sea and river lamprey migrate through all units and may spawn.
- Management for twaite shad and sea lamprey is expected to also be sympathetic for Atlantic salmon, river/brook lamprey and bullhead.
- Specific management measures for otter relating to adjacent habitats and disturbance require its selection as a key feature in all units.
- The status of allis shad is uncertain in River Wye (Lower Wye) SSSI. It is assumed to be present in the same units as twaite shad.
- White-clawed crayfish have been recorded in the River Wye at Hay-on-Wye and in adjacent tributaries including Clyro Brook and Dulas Brook.

River Wye (Upper Wye) SSSI	Management unit				
	2A	2B			
SAC	✓	✓			
SSSI	✓	✓			
NRW ownership					
SAC Features					
1. Sea lamprey	KS	Sym			
2. River lamprey	Sym	Sym			
3. Brook lamprey	Sym	Sym			
4. Twaite shad	KS	x			
5. Allis shad	Sym	x			
6. Atlantic salmon	Sym	KS			
7. Bullhead	Sym	Sym			
8. European otter	KS	KS			
9. Rivers with floating vegetation often dominated by water-crowfoot	KH	KH			
10. White-clawed crayfish	Sym	x			
11. Quaking bogs and transition mires	x	x			
SSSI Features					
To be added					

- Atlantic salmon is a key feature in Unit 2B due to the presence of spawning sites, although salmon may occasionally also spawn within Unit 2A.
- Twaite shad is recorded spawning throughout Unit 2A but only infrequently upstream of the River Irfon confluence.
- The status of Allis shad is uncertain in the River Wye SAC. Allis shad is assumed to be present in the same units as twaite shad, but normally migrates further upstream and therefore would be expected to occur in the upper river.
- Sea lamprey is frequently recorded spawning within Unit 2A; spawning has also been recorded within Unit 2B as far upstream as Rhayader.

- Management for Atlantic salmon, twaite shad and sea lamprey is expected to be sympathetic for river/brook lamprey and bullhead.
- Specific management measures for otter relating to adjacent habitats and disturbance require its selection as a key feature in all units.

River Wye (Tributaries) SSSI	Management unit				
	3				
SAC	✓				
SSSI	✓				
NRW ownership					
SAC Features					
1. Sea lamprey	x				
2. River lamprey	Sym				
3. Brook lamprey	Sym				
4. Twaite shad	x				
5. Allis shad	x				
6. Atlantic salmon	KS				
7. Bullhead	Sym				
8. European otter	KS				
9. Rivers with floating vegetation often dominated by water-crowfoot	KH				
10. White-clawed crayfish	KS				
11. Quaking bogs and transition mires	x				
SSSI Features					

- The tributaries included in this SSSI form the core range of the white-clawed crayfish in the River Wye SAC.
- Atlantic salmon spawn in all tributaries within this SSSI although in the Sgithwen and Cletwr their natural range is limited to the lower reaches by waterfalls.
- Twaite shad, allis shad and sea lamprey are thought not to occur within this SSSI.

Afon Llynfi SSSI	Management unit				
	4				
SAC	[
SSSI	[
NRW ownership					
SAC Features					
1. Sea lamprey	x				
2. River lamprey	Sym				
3. Brook lamprey	Sym				
4. Twaite shad	x				
5. Allis shad	x				
6. Atlantic salmon	KS				
7. Bullhead	Sym				
8. European otter	KS				
9. Rivers with floating vegetation often dominated by water-crowfoot	KH				
10. White-clawed crayfish	KS				
11. Quaking bogs and transition	x				

mires					
SSSI Features					

- An important population of white-clawed crayfish occurs in this SSSI.
- Twaite shad, allis shad and sea lamprey are not known to occur within this SSSI but habitat in the lower reaches may possibly be suitable.

Duhonw SSSI	Management unit				
	5				
SAC	✓				
SSSI	✓				
NRW ownership					
SAC Features					
1. Sea lamprey	x				
2. River lamprey	Sym				
3. Brook lamprey	Sym				
4. Twaite shad	x				
5. Allis shad	x				
6. Atlantic salmon	KS				
7. Bullhead	Sym				
8. European otter	KS				
9. Rivers with floating vegetation often dominated by water-crowfoot	KH				
10. White-clawed crayfish	KS				
11. Quaking bogs and transition mires	x				
SSSI Features					

- An important population of white-clawed crayfish formerly occurred in this SSSI; restoration of the species here is a management objective.
- Twaite shad, allis shad and sea lamprey are thought not to occur within this SSSI.

Afon Irfon SSSI	Management unit				
	6				
SAC	✓				
SSSI	✓				
NRW ownership					
SAC Features					
1. Sea lamprey	Sym				
2. River lamprey	Sym				
3. Brook lamprey	Sym				
4. Twaite shad	KS				
5. Allis shad	Sym				
6. Atlantic salmon	KS				
7. Bullhead	Sym				
8. European otter	KS				
9. Rivers with floating vegetation often dominated by water-crowfoot	KH				
10. White-clawed crayfish	KS				

11. Quaking bogs and transition mires	x				
SSSI Features					

- Small populations of white-clawed crayfish are known to occur in the rivers Hafrena and Chwefri in this SSSI; restoration of the species here and to parts of its former range including the Garth Dulas is a management objective.
- Twaite shad is frequently recorded spawning in the lowest approximately 0.6km of the Afon Irfon and at the confluence with the River Wye.
- The status of Allis shad is uncertain in the River Wye SAC. Allis shad is assumed to be present in the same units as twaite shad, but normally migrates further upstream and therefore would be expected to occur in the upper river.
- Sea lamprey is reported spawning within the Afon Irfon.
- Atlantic salmon is recorded spawning throughout this SSSI but reproductive success is limited in parts of the upper Afon Irfon and Gwesyn due to acidification related to forestry.

River Ithon SSSI	Management unit				
	7				
SAC	✓				
SSSI	✓				
NRW ownership					
SAC Features					
1. Sea lamprey	x				
2. River lamprey	Sym				
3. Brook lamprey	Sym				
4. Twaite shad	x				
5. Allis shad	x				
6. Atlantic salmon	KS				
7. Bullhead	Sym				
8. European otter	KS				
9. Rivers with floating vegetation often dominated by water-crowfoot	KH				
10. White-clawed crayfish	Sym				
11. Quaking bogs and transition mires	x				
SSSI Features					

- White-clawed crayfish has been recorded in this SSSI, including in Howey Brook, however its restoration to this sub-catchment is not a current management objective.
- Twaite shad, allis shad and sea lamprey are not known to occur within this SSSI but habitat in the lower reaches may possibly be suitable.

Upper Wye Tributaries SSSI	Management unit				
	8				
SAC	✓				
SSSI	✓				
NRW ownership					

SAC Features						
1. Sea lamprey		x				
2. River lamprey		Sym				
3. Brook lamprey		Sym				
4. Twaite shad		x				
5. Allis shad		x				
6. Atlantic salmon		KS				
7. Bullhead		Sym				
8. European otter		KS				
9. Rivers with floating vegetation often dominated by water-crowfoot		KH				
10. White-clawed crayfish		x				
11. Quaking bogs and transition mires		x				
SSSI Features						

- This SSSI forms an important part of the spawning range of Atlantic salmon.

Colwyn Brook Marshes (North & South) SSSI	Management unit											
	9A	9B	9C	10 A	9D	10 B	10C	9E	10D	9F	9G	10 E
SAC	✓	✓	✓		✓			✓		✓	✓	
SSSI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
NRW ownership												
SAC Features												
1. Sea lamprey	x	x	x	x	x	x	x	x	x	x	x	x
2. River lamprey	x	x	x	x	x	x	x	x	x	x	x	x
3. Brook lamprey	x	Sym	Sym	x	Sym	x	x	Sym	x	Sym	Sym	x
4. Twaite shad	x	x	x	x	x	x	x	x	x	x	x	x
5. Allis shad	x	x	x	x	x	x	x	x	x	x	x	x
6. Atlantic salmon	x	x	x	x	x	x	x	x	x	x	x	x
7. Bullhead	x	x	x	x	x	x	x	x	x	x	x	x
8. European otter	KS	KS	KS	x	KS	x	x	KS	x	KS	KS	x
9. Rivers with floating vegetation often dominated by water-crowfoot	x	x	x	x	x	x	x	x	x	x	x	x
10. White-clawed crayfish	x	?	KS	KS	KS	x	x	KS	x	x	KS	x
11. Quaking bogs and transition mires	x	KH	KH	x	Sym	x	Sym	Sym	x	Sym	x	x
SSSI Features												
To be added.												

- This is the only component SSSI of the River Wye SAC that contains the feature 'quaking bogs and transition mires'.
- The site comprises 5 separate ownership units.

4. CONSERVATION OBJECTIVES

Background to Conservation Objectives:

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

Conservation objectives for individual SACs and SPAs are required by the 1992 'Habitats' Directive (92/43/EEC). The aim of the Habitats Directive is the maintenance, or where appropriate the restoration, of the 'favourable conservation status' (FCS) of habitats and species listed in the Annexes to the Directive (see Box). Therefore FCS provides the overarching framework for defining the conservation objectives for individual SACs.

Although neither the Birds Directive nor the Ramsar Convention refer to FCS, Natural Resources Wales considers that the overall aim of both those legal instruments is sufficiently similar to FCS to make it practical and proportionate to use the same guiding principle when establishing the conservation objectives for SPAs and Ramsar sites, as well as SACs. Therefore the Habitats Directive definition of FCS is considered to provide the overarching framework for conservation objectives for all SACs, SPAs and Ramsar sites in Wales.

Favourable conservation 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."

The achievement of FCS is not an objective that applies at the level of the individual sites. Rather it is a wider objective to which each individual site contributes. Therefore

the conservation objectives for an individual site are intended to express what is considered to be that site's appropriate contribution to achieving FCS. Since SACs are the most important mechanism in the Habitats Directive for achieving FCS, and the sites represent the most important areas for conservation of the Annex I habitat types and Annex II species, the objectives for each individual SAC should seek to ensure that the site makes a substantial contribution which properly reflects its importance in a local, national and European context and the particular reasons why the site was selected for inclusion in the network. A similar approach is taken to setting conservation objectives for SPAs and Ramsar sites.

Achieving the conservation objectives of individual sites requires appropriate management and the control of factors which are influencing, or may influence the features.

The conservation objectives have a number of specific roles:

- **Communication**
The conservation objectives should help convey to stakeholders what are the reasons for the designation and what it is intended to achieve.
- **Site planning and management**
The conservation objectives guide management of sites, to maintain or restore the designated habitats and species. They provide the basis for identifying what management is required both within the site boundary, and outside it, where achieving the objectives requires action to be taken outside the site.
- **River Basin Management Planning**
Conservation Objectives for aquatic and water dependent Natura 2000 features are also used as the "standards and objectives" referred to in Article 4 (1c) of the Water Framework Directive (WFD) (2000/60/EC). In 2009, Welsh Ministers decided that where Natura 2000 conservation objectives are more stringent than 'Good Ecological Status' (GES) as defined in the WFD, they (and the standards they contain) are the objectives referred to in Article 4(1c) of the WFD.
- **Assessing plans and projects**
Article 6(3) of the 'Habitats' Directive requires the assessment of proposed plans and projects in view of 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. There are similar requirements for the review of existing decisions and consents.
- **Monitoring and reporting**
In addition to foregoing purposes, conservation objectives provide the basis for defining the evidence that will be used for assessing the condition of a feature and the status of factors that affect it. That evidence is contained in a separate but closely related set of 'performance indicators' which provide the basis for monitoring and reporting. To avoid confusion between the conservation objectives and the measures specified in performance indicators, the performance indicators are set out in an Appendix to this document.

The conservation objectives in this document reflect Natural Resources Wales' 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 Natural Resources Wales in the 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 (JNCC 2016b).

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.

4.1 Conservation Objective for the watercourse

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

- 4.1.1 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 included in Appendixes 1 and 2.
- 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. Where the SAC habitat is not underpinned by a river habitat SSSI feature, 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, wholly or partially, 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 Wye 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 Appendix 2 of this document.
- 4.1.12 Water Quality targets follow those in the revised Common Standards Monitoring Guidance for Rivers (JNCC 2016). These are detailed in

Appendix 1 with targets for organic pollution (DO, BOD and ammonia), phosphate¹, trophic diatom index and acidification.

- 4.1.13 Potential sources of pollution not addressed in the Review of Consents, such as contaminated land, will be considered in assessing plans and projects.
- 4.1.14 Levels of suspended solids will be agreed between EA and CCW for each Water Framework Directive water body in the Wye 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	<i>Supporting information / current knowledge</i>
4.2.1 <i>The conservation objective for the water course as defined in 4.1 above must be met</i>	
4.2.2 <i>The population of the feature in the SAC is stable or increasing over the long term.</i>	<i>Refer to sections 5.1 to 5.5 for current assessments of feature populations</i> <i>Entrainment in water abstractions directly impacts on population dynamics through reduced recruitment and survival rates.</i> <i>Fish stocking can adversely affect population dynamics through competition, predation, introduction of disease and alteration of population genetics.</i>
4.2.3 <i>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</i>	<i>Some reaches of the Wye SAC are more suitable for some features than others eg. the Edw has important populations of salmon but is not used by shad due to its small size. 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</i>

¹ All waterbodies within or overlapping a freshwater dependant protected area (or draining into a freshwater dependant protected area) have gone through a process of setting phosphorus targets which involved comparison of targets in the CSM guidance and the WFD. This is to ensure that these waterbodies have a single phosphorus target (the most stringent) for use by Natural Resources Wales for management and monitoring.

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 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

that the components of favourable conservation status for the watercourse given in section 4.1 are secured.

The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age.

Hydrological processes in the Wye are affected by abstraction and regulation releases from the Elan Valley reservoirs. While these effects cannot practicably be removed any adverse effects on the integrity of the SAC should be minimised as far as possible.

Extensive coniferous forestry plantations in the upper catchment, including the Irfon catchment, adversely affect the run-off and sediment characteristics and water quality of the river. Measures should be taken to restore the hydrological characteristics of headwater areas including wetland functions.

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.

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	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 have been identified. Spawning locations may move within and between sites due to natural processes	1A-D, 2A, 2B, 6, 7

	contain <i>Petromyzon</i> ammocoetes.	and new sites may be discovered over time. Silt beds downstream of all spawning sites identified will be sampled for presence or absence of ammocoetes. Where apparently suitable habitat at any site is unoccupied feature condition will be considered unfavourable.	
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.	1A-D, 2A, 2B, 6, 7

**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.	All
b) Distribution of ammocoetes within catchment	Present at not less than 2/3 of sites surveyed within natural range No reduction in distribution of ammocoetes	The combined natural range of these two species in terms of ammocoete distribution includes all units above the tidal limit. Presence at less than 2/3 of sample sites will lead to an unfavourable condition assessment. 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.	All
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 Wye, shallower sediment, often patchy and interspersed among coarser substrate.	All

**Twaiite 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 sites within units 1C and 2A will be monitored at 3 yearly intervals. Absence from any site in 2 consecutive surveys will result in an unfavourable condition assessment.	1A-D, 2A

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 Appendix 2). 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.	1A-D, 2A
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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 fish counter data in the Wye is considered unreliable (EA pers. comm.), adult run size is calculated using rod catch data. Further details can be found in the EA Wye 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.	All except 1A-D, 2A

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.	All
b) Chemical quality	RE1	It has been agreed through the Review of Consents process that RE1 will be used	All

throughout the SAC (see Appendix 1)

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 Appendix 2)	All
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Bullhead *Cottus gobio* :

Performance indicators for feature condition

Attribute	Specified limits	Comments	Relevant unit(s)
a) Population densities	No less than 0.2 m ⁻² in sampled reaches	CSM guidance states that densities should be no less than 0.2 m ⁻² in upland rivers (source altitude >100m) and 0.5 m ⁻² in lowland rivers (source altitude ≤100m). A significant reduction in densities may also lead to an unfavourable condition assessment.	All except 1A, 1B
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.	All except 1A, 1B
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.	All except 1A, 1B

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 <i>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.</i>	<i>Refer to section 5.9 for current assessment of feature population</i>

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 Wye SAC is considered to form potentially suitable breeding habitat for otters. The size of breeding territories may vary depending on prey abundance. The population size should not be limited by the availability of suitable undisturbed breeding sites. Where these are insufficient they should be created through habitat enhancement and where necessary the provision of artificial holts. No otter breeding site should be subject to a level of disturbance that could have an adverse effect on breeding success. Where necessary, potentially harmful levels of disturbance must be managed.

Survey information shows that otters are widely distributed in the Wye catchment. However, an assessment of otter breeding habitat has indicated that there may be a shortage of suitable habitat around the middle reaches of the river, which may affect the long-term viability of the population. This should be addressed by habitat enhancement including stock exclusion from suitable woodlands near to the river but outside the floodplain.

The decline in eel populations may be having an adverse effect on the population of otters in the Wye.

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.

Road and bridge improvement schemes within the catchment should take appropriate measures towards achievement of this objective.

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 82-90% of Otter Survey of Wales sites in sub-catchments	Ref: CCW Environmental Monitoring Report No 30 (Lyles 2006)	All
b) Breeding activity	Reports of	Ref: CCW Environmental Monitoring	All

	cub/family sightings (no specified limit)	Report No 30 (Lyles 2006)	
c) Actual and potential breeding sites	No decline in number and quality of mapped breeding sites in sub-catchments. Increase from 5 to 9 sites in Middle Wye sub-catchment (Lyles 2006)	Ref: CCW Environmental Monitoring Report No 30 (Lyles 2006) In the Wye catchment within Wales, 32 actual or potential breeding sites have been identified (19 within the Wye SAC), distributed throughout the catchment on the main river and tributaries. It is recommended that this should increase to at least 40 (23 within Wye SAC, Lyles 2006. Note: breeding territories typically contain more than one breeding site.	All

4.4 Conservation Objective for Feature 7:

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

Vision for feature 7

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

FCS component	Supporting information / current knowledge
4.4.1 <i>The conservation objective for the water course as defined in 4.1 above must be met</i>	
4.4.2 <i>The natural range of the plant communities represented within this feature should be stable or increasing in the SAC. The natural range is taken to mean those reaches where predominantly suitable habitat exists over the long term. Suitable habitat and associated plant communities may vary from reach to reach. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms eg. depth and stability of flow, stability of bed substrate, and ecosystem structure and functions eg. nutrient levels, shade (as described in section 2.2). Suitable habitat for the feature need not be present throughout the SAC but where present must be secured for the foreseeable future, except where natural processes cause it to decline in extent.</i>	<p><i>Stands of this feature are known to be widespread in the Wye SAC including many of the tributaries. However, further information on its natural range, distribution and variation is desirable. Sympathetic management will be promoted wherever the feature is present.</i></p> <p><i>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.</i></p>
4.4.3 <i>The area covered by the feature within its natural range in the SAC should be stable or increasing.</i>	<p><i>Adverse factors may include elevated nutrient levels, shading or altered flow and/or sediment regimes.</i></p> <p><i>It is possible that reaches with slightly elevated nutrient levels and/or regulated flows may have a higher cover of the feature than under natural conditions, though species composition may also be affected (see 4.4.4)</i></p>
4.4.4 <i>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</i>	<p><i>More information on the typical species expected within each management unit in the SAC is required.</i></p> <p><i>The effects of artificial factors such as flow regulation on species composition should be examined eg. river jelly lichen may prefer</i></p>

type for the particular river reach, *greater flow variability.* unless differing from this type due to natural variability when other typical species 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	<i>Ranunculus</i> spp. will be present with a cover of at least 10% in any three representative sample 100m stretches of suitable habitat in: [reaches to be confirmed]	All
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	All

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 Wye SAC: Algae indicative of eutrophication (<i>Enteromorpha</i> spp., <i>Cladophora</i> spp. and <i>Vaucheria</i> spp.) should not have a cover value of greater than 10% in 3 consecutive years in: [reaches to be confirmed]	All
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 Wye SAC, therefore assessment of this attribute relies on locally defined thresholds and expert judgement. Details to be confirmed	All

4.5 Conservation Objective for Feature 8:

- White-clawed crayfish *Austropotamobius pallipes* (EU Species Code: 1092)

Vision for feature 8

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

FCS component	Supporting information / current knowledge
4.5.1 <i>The conservation objective for the water course as defined in 4.1 above must be met</i>	
4.5.2 <i>The population of the feature in the SAC is stable or increasing over the long term.</i>	<p>Refer to section 5.8 for current assessment of feature population</p> <p>Presence of non-native crayfish adversely affects population dynamics through competition, predation and introduction of disease (crayfish plague). This is thought to invariably lead to local extinction of white-clawed crayfish. American signal crayfish are present in the Bachawy and Lugg and Arrow sub-catchments (outside the SAC) and have been reported in the Edw.</p> <p>The release of highly toxic sheep dips into streams has caused mass mortality and local extinction in the SAC from which populations may be very slow to recover.</p>
4.5.3 <i>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. substrate type, water hardness and temperature, and ecosystem structure and functions eg. food supply, absence of invasive non-native competitors (as described in sections 2.2 and 5). Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future. Natural factors such as waterfalls may limit the natural range of individual species. Existing artificial influences on natural range that cause an adverse</i>	<p>Some reaches of the Wye SAC are more suitable for some features than others eg. the natural range of white-clawed crayfish may be limited by water hardness and temperature (which may possibly also mediate competition with non-native crayfish to some extent). 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.</p> <p>Eradication of American signal crayfish, or control of its spread in the Wye catchment is considered essential to the long-term suitability of the SAC for white-clawed crayfish. At present there are no known effective methods for eradication or long-term control of signal crayfish.</p> <p>Prevention of release of toxic sheep dips and other harmful diffuse pollution into water courses is essential.</p>

effect on site integrity will be assessed in view of 4.2.4

4.5.4 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.

Invasion of American signal crayfish is likely to make existing habitat in the Wye SAC unsuitable for white-clawed crayfish in the long term. There may be a need to translocate white-clawed crayfish to suitable habitat outside its present (and historic) range.

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.

*White-clawed crayfish *Austropotamobius pallipes* :*

Performance indicators for feature condition

Attribute	Specified limits	Comments	Relevant unit(s)
a) Adult/juvenile densities	Abundance in habitat patches above threshold	Average number of crayfish in each habitat patch surveyed by stone turning and trapping combined should be greater than 1 (Roger and Watson 2004).	3, 4, 5, 6
b) Distribution	Distribution in suitable reaches (monitoring units)	Suitable reaches within the relevant management units will be mapped using fluvial audit information validated with historic data and the results of population monitoring. Absence of white-clawed crayfish from any of these reaches revealed by on-going monitoring will result in an unfavourable condition assessment.	3, 4, 5, 6

Performance indicators for factors affecting the feature

Negative indicators

a) Invasive non-native crayfish	Absence of non-native crayfish from the SAC	Collation of <i>ad hoc</i> records of non-native crayfish in the Wye catchment and adjacent areas and monitoring in conjunction with control programmes using trapping.	All
b) Porcelain disease in white-clawed crayfish	Incidence <10%	Incidence to be recorded during population monitoring.	3, 4, 5, 6

4.6 Conservation Objective for Feature 9:

- Quaking bogs and transition mires (EU Habitat Code: 7410)

Vision for feature 9

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

FCS component

Supporting information / current knowledge

4.6.1	The conservation objective for the water course as defined in 4.1 above must be met	
4.6.2	The 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 near-natural hydrological and geomorphological processes and landforms favour the development of this habitat. The feature need not be present in all suitable locations in the SAC but where present must be secured for the foreseeable future.	<i>This feature is represented within the SAC at Colwyn Brook Marshes SSSI. Other locations with similar habitat within and adjacent to the SAC are not considered to qualify as examples of this feature e.g. Waen Rhyd SSSI, but may have similar management requirements.</i> <i>Species indicative of unfavourable condition for this feature eg. invasive native trees and shrubs and non-native species, should be maintained or restored below an acceptable threshold level, indicative of high ecological status within the SAC.</i>
4.6.3	The area covered by the feature within its natural range in the SAC should be stable or increasing.	<i>Adverse factors may include elevated nutrient levels or altered hydrological processes through drainage or groundwater abstraction.</i>
4.6.4	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 NVC type(s), unless differing from this type due to natural variability/local distinctiveness when other typical/indicator species may be defined as appropriate.	<i>More information on the typical species expected within each management unit is required. Details to be confirmed</i>

Performance indicators for feature 9

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

Performance indicators for feature condition			
Attribute	Specified limits	Comments	Relevant unit(s)
a) Habitat extent	No reduction in total extent	This would be indicative of drying out due to a change in hydrological processes/wetland structure and function.	9
b) Habitat composition	No significant increase in woodland/scrub	This would be indicative of drying out due to a change in hydrological processes/wetland structure function and/or vegetation succession due to a change in grazing pressure.	9
c) Habitat structure	Cover of exposed substrate/litter	May indicate either over- or under-grazing.	9
d) Vegetation composition	Indicator species presence/frequency	Should conform to appropriate NVC type(s) and/or locally defined	9

	for reference vegetation type(s). No significant reduction in key type(s)	vegetation composition criteria as appropriate. Shifts in vegetation composition may indicate change in hydrology, nutrient status and/or grazing pressure. Details to be confirmed	
Performance indicators for factors affecting the feature			
Negative indicators			
a) Native species	Cover of indicators of under-grazing, drainage, eutrophication or disturbance maintained below threshold	May include graminoids such as <i>Phragmites australis</i> , <i>Phalaris arundinacea</i> , <i>Glyceria maxima</i> , <i>Typha latifolia</i> , <i>Juncus</i> spp., <i>Molinia caerulea</i> ; tall herbs such as <i>Epilobium hirsutum</i> , <i>Urtica dioica</i> , <i>Pteridium aquilinum</i> , <i>Rubus fruticosus</i> ; bryophytes such as <i>Brachythecium rutabulum</i> , <i>Eurhynchium praelongum</i> , <i>Sphagnum recurvum</i> ; tree and shrub spp. (CSM Lowland fens guidance)	9
b) Invasive non-native species	No impact on native biota from invasive non-native or introduced species	Possible invasive non-natives include New Zealand swamp-stonecrop <i>Crassula helmsii</i> : although not recorded at the site, any records should be verified and followed up with control measures.	9

5. ASSESSMENT OF STATUS AND MANAGEMENT REQUIREMENTS

This section provides:

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

5.1 Status and Management Requirements of Feature 1: Sea lamprey *Petromyzon marinus*

Status of Feature 1

Status: Favourable: Unclassified. Sea lamprey monitoring showed that overall catchment mean ammocoete density at 2.58 ammocoetes m⁻² in suitable habitat² considerably exceeded the target threshold of 0.1 m⁻² suggested by Harvey and Cowx (2003) and also complied with JNCC targets for spawning site and ammocoete distribution (JNCC 2016a). Sea lamprey ammocoetes were recorded in good numbers immediately upstream of the falls at Rhayader, their most upstream recorded site on the main Wye. They were also recorded in the Irfon and Ithon tributaries.

Management Requirements of Feature 1

The potential impact of flow depletion resulting from a small number of major abstraction licences, if they were to be fully utilised, 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 potential impacts on SAC features. These targets (given in Appendix 2) 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.

The currently favourable condition assessment suggests that there are no strongly adverse factors influencing this species. However, the species is 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.

5.2 Status and Management Requirements of Feature 2: Brook lamprey *Lampetra planeri* and River lamprey *Lampetra fluviatilis*

Status of Feature 2

Status: Unfavourable: Unclassified. Brook/river lamprey monitoring showed that overall catchment mean ammocoete density considerably exceeded the JNCC target threshold. However, *Lampetra* ammocoetes were recorded at only 30 of the 54 sample sites (56%), thus failed to meet the criterion of presence in at least two thirds of sites within their natural range (Harvey and Cowx 2003, CCW 2006). However, further clarification is needed concerning a number of sample sites in the upper reaches (Upper Wye and Elan), which may reflect unsuitable habitat and be outside the natural ranges of the species (CCW 2006).

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 Wye SAC is desirable. Records of spawning adult river lamprey would be particularly useful.

Management Requirements of Feature 2

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.

5.3 Status and Management Requirements of Feature 3: Twaite shad *Alosa fallax* and Allis shad *Alosa alosa*

Status of Feature 3

Status: Unfavourable: Unclassified. Monitoring of these species in the Wye 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 confirmed records in the Wye, 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 Wye due to the absence of a suitable fish counter.

Physical barriers to migration are a major cause of unfavourable status of these species in Europe as a whole; however, there are not thought to be any significant barriers to shad migration in the Wye.

The current unfavourable status results from a precautionary assessment of feature abundance, and from the presence of adverse factors, in particular the potential for damaging flow depletion and entrainment/impingement in water intakes (Maitland and Hatton-Ellis 2003, CCW 2007)

Management Requirements of Feature 3

Development activities 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 eg. due to impact piling, drilling, salmon fish counters present within or in close proximity to the river can create a barrier to shad migration. 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 potential impact of flow depletion resulting from a small number of major abstraction licences, if they were to be fully utilised, 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 Appendix 2) 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, while 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 Status and Management Requirements of Feature 4: Atlantic salmon *Salmo salar*

Status of Feature 4

Status: Unfavourable: Unclassified. Monitoring of Atlantic salmon in the Wye 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 (Cowx and Fraser 2003). These targets are calculated and monitored by the Environment Agency as part of the Salmon Action Plan for the Wye.

The current unfavourable status results from failure of the Management Target for adult run size as well as a precautionary assessment of juvenile distribution and abundance and the presence of adverse factors, in particular the potential for flow depletion and localised water quality failures. Acidification due to forestry is a factor in the upper reaches of the Wye and Irfon.

Management Requirements of Feature 4

The Atlantic salmon is the focus for much of the management activity carried out on the Wye. 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. Liming has also been

carried out in some of the acidified headwaters. The Wye and Usk Foundation through their pHISH 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, reduction in exploitation pressure through buying out net fisheries in the estuary and the introduction of 'catch and release' angling (both mandatory, through EA byelaws, and voluntary).

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 Wye 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 Wye should be assessed on a case-by-case basis. Physical modification of barriers is required where depth/velocity/duration of flows is unsuitable to allow passage. Complete or partial natural barriers to potentially suitable spawning areas should not be modified or circumvented.

Development activities can cause temporary physical, acoustic, chemical and sediment barrier effects that need to be addressed in the assessment of specific plans and projects.

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

A small-scale salmon rearing and stocking programme is currently in operation in the Wye, run by the Wye and Usk Foundation. 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 that salmon stocking in the Wye SAC will be phased out over time.

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 Status and Management Requirements of Feature 5: Bullhead *Cottus gobio*

Status of Feature 5

Status: Unfavourable: Unclassified. The current unfavourable status results from the presence of adverse factors, in particular localised water quality failures. Records obtained from juvenile salmon monitoring show that bullhead are widespread in the

main river and tributaries. Quantitative information on bullhead abundance is being provided through targeted monitoring.

Management Requirements of Feature 5

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 Status and Management Requirements of Feature 6: European otter *Lutra lutra*

Status of Feature 6

Status: Unfavourable. The conservation status of otters in the Wye SAC is determined by monitoring their distribution, breeding success, and the condition of potential breeding and feeding habitat as outlined in the Performance Indicators. Their current condition is considered unfavourable due a lack of suitable breeding sites around the middle reaches of the river.

Management Requirements of Feature 6

The catchment within Wales should be capable of supporting at least 17 breeding females, based on one breeding female per 20km stretch of river⁵. It is possible that, if all the breeding sites achieve optimal habitat conditions and fish and amphibian stocks are secured, the catchment may then support further breeding animals. However, the amount of compression of home ranges that otters will accept cannot as yet be determined⁶.

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 Wye 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 urban centres such as Monmouth.

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 Status and Management Requirements of Feature 7: Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation

Status of Feature 7

Status: Unfavourable: Unclassified. The present unfavourable status of the feature results from reduced water quality in some tributaries of the Wye e.g. parts of the Ithon and Llynfi sub-catchments, due mainly to diffuse pollution from agriculture. (Note: status reported in error as Unfavourable: Declining in SAC feature status report to JNCC, 2006)

A further adverse factor is the over-abundance of invasive non-native species of bankside plant communities, which are included within the feature definition. Japanese knotweed and Himalayan balsam are widespread in the catchment, including the Irfon sub-catchment.

Management Requirements of Feature 7

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, and flow augmentation in middle reaches due to releases from the Elan Valley reservoirs, is not considered to be damaging to this feature, either through limiting its range or adversely affecting its community composition.

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 reaches identified as holding potentially important stands of this vegetation that are also known to be suffering from diffuse pollution, such as parts of the Ithon catchment.

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

5.8 Status and Management Requirements of Feature 8: White-clawed crayfish *Austropotamobius pallipes*

Status of Feature 8

Status: Unfavourable: Declining. There is considerable anecdotal evidence of a major decline in the distribution and abundance of the native white-clawed crayfish in the Wye catchment over the last few decades. Native crayfish may have been lost from the main river channel, from tributaries such as the Duhonw and Ithon and have almost disappeared from the Afon Irfon. Significant populations within the Wye SAC are now confined to the Sgithwen, Cletwr, Edw, Llynfi Dulas and Builth Road Dulas. The most recent assessment of the condition of crayfish in the Wye SAC, using modified Common Standards Monitoring techniques, found that populations are unfavourable⁹.

Management Requirements of Feature 8

The American signal crayfish is present in the Wye catchment and poses a very serious threat to the continued existence of the native white-clawed crayfish in the site and in Wales. Native crayfish are unable to co-exist where signal crayfish are present, due to the latter's superior competitive ability and a disease, crayfish plague, which it carries but to which native crayfish have no immunity. Signal crayfish are also extremely harmful to fish communities and the overall ecology of the river. It is illegal to release non-native crayfish into the wild, to keep live crayfish in most of Wales or to trap crayfish without a licence from the Natural Resources Wales. The regulations on the keeping, release and trapping of non-native crayfish in Wales should be strictly enforced. The signal crayfish eradication programme implemented by the statutory bodies and partner organisations should be continued.

American signal crayfish and crayfish plague are widespread and abundant in nearby catchments such as the Lugg, Arrow and Severn. Crayfish plague can be transferred to streams on wet fishing gear, boots, canoes, machinery, stocked fish etc., so measures such as raising awareness, disinfection facilities and where appropriate restrictions on access, should be implemented where a significant risk is identified.

Contamination by synthetic pyrethroid sheep dips has a devastating impact on crayfish populations. 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. 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 Natural Resources Wales 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.

The statutory bodies and partner organisations should implement a programme of licensed translocations to enable white-clawed crayfish to be reintroduced to reaches where they have been wiped out by sheep dip pollution and/or crayfish plague outbreaks.

Engineering works such as bridge repairs in reaches where white-clawed crayfish are known to occur should include appropriate pollution prevention measures and a crayfish rescue by a suitably licensed person where there is a risk of physical damage to crayfish.

5.9 Status and Management Requirements of Feature 9: Transition mires and quaking bogs

Status of Feature 9

Status: Unfavourable: Unclassified. This feature is currently assessed as being in unfavourable condition due to under-grazing.

Management Requirements of Feature 9

A suitable grazing regime should be implemented by agreement with the land managers. Any risk of elevated nutrient status due to run-off into the site should be addressed by measures including buffer zones around the mire area and inflow streams

6. ACTION PLAN: SUMMARY

This section takes the management requirements outlined in Section 5 a stage further, assessing the specific management interventions required on each management unit.

- A summary of the information held in Natural Resources Wales' Actions Database for sites

6.1 Actions in Natural Resources Wales' actions database

Unit Number	NRW Unique Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
2a	000618	Upper Wye, downstream of Ithon confluence	Key areas for shingle dwelling invertebrates are threatened by gravel extraction, trampling or invasive balsam. Under or over-grazing of banks is a localised issue, as is run-off of soil and nutrients from arable land.	Yes
4	000619	Llynfi	Diffuse agricultural pollution (from fertiliser and silt run-off and aerial deposition from poultry units) is a major issue in this catchment that could be addressed by agri-environment scheme agreements or by regulatory mechanisms if necessary.	Yes
3	000620	Wye Tributaries	Important white-clawed crayfish population is threatened by sheep-dip misuse and other diffuse pollution from agriculture, recreation (motocross), development (A470 improvement) and, especially, invasive non-native signal crayfish and crayfish plague. Heavy grazing of some river banks may be causing habitat damage and erosion and invasive Japanese knotweed may be a threat in places. Accumulation of debris may be obscuring the important geological exposures on the Dulas Brook.	Yes
5	000621	Duhonw	White-clawed crayfish possibly extinct in this sub-catchment. Sheep-dip pollution may be the cause. Management target to reintroduce this species here.	Yes

Unit Number	NRW Unique Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
6	000622	Irfon	Upper catchment subject to acidification due to air pollution. Agriculture and forestry affect run-off regime and water quality. Some river banks are impacted by heavy grazing causing increased erosion. Spawning salmon numbers very low so additional fishing restrictions may be needed. Remnant white-clawed crayfish populations exist here. Management target to reintroduce this species in suitable streams. Invasive weeds affect river bank areas. River jelly lichen and other aquatic lichens are vulnerable to shading by overhanging trees but riverside woodland should not be felled or thinned in areas that are likely to be used by otters.	Yes
7	000623	Ithon	Agricultural land management affects run-off regime and water quality. Some areas of bank are overgrazed and poached. Diffuse pollution from agriculture is identified as a particular problem in some sub-catchments eg. Camddwr, Aran and Mithil Brook, this may be partly due to the spreading of poultry manure from numerous small units. Invasive weeds affect river bank areas. Unauthorised extraction of gravel occurs on some farms. Woodland on the river banks should not be felled or thinned, in order to prevent disturbance to otters.	Yes
8	000624	Upper Tributaries	The Afon Elan has a highly regulated flow regime and low water temperature due to Elan Valley Reservoirs but this is not believed to be having a significant impact on spawning salmon. Some parts of the smaller tributaries may benefit from a reduction in grazing on the river banks.	No
9a	000626	Colwyn Brook Marshes, Bwlch	Still requires agri-environment funding to maintain favourable management?	Yes
2b	001800	Upper Wye, upstream of Ithon confluence	Agriculture and forestry affect run-off regime and water quality. Some areas of river bank are heavily grazed and poached. Invasive Japanese knotweed may be damaging the river bank habitat in places. Spawning salmon numbers are very low so additional fishing restrictions may be needed. Proposal to extend canoe access upstream to Llangurig requires new launching/landing areas.	Yes

Unit Number	NRW Unique Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
1d	001801	Lower Wye, Hay-on-Wye to Rhydspence	A major issue here is the loss of open river shingle habitat (used by invertebrates and breeding birds) to invasive Himalayan balsam and scrub. An important area at Bronydd is no longer grazed. Loss of cattle grazing on the steeper river banks has reduced the amount of bare earth available as habitat for the club-tailed dragonfly. Large riverside trees supporting important moss communities require pollarding to extend their lives. Run-off of sediment and fertiliser from potato fields may also be a problem in some places.	Yes
1c	001802	Lower Wye, Wyastone to Redbrook	Entrainment of fish may occur in the abstractions at Monmouth. Excessive headroom in abstraction licences has potential to cause flow depletion. Invasive alien weeds may be a threat to bank side habitats. Additional fishing restrictions may be needed to protect migrating salmon.	Yes
1b	001803	Lower Wye, Redbrook to Brockweir bridge	Invasive Indian balsam, Japanese knotweed and giant hogweed may be a threat to river bank habitats and hybrid wood stitchwort populations in particular. Additional fishing restrictions may be required to protect migrating salmon.	Yes
1a	001804	Lower Wye, Brockweir bridge to estuary		No
9b	003011	Colwyn Brook Marshes, Caregeon	Now part of Cefn Bychan Farm. Funding needed for suitable grazing and scrub control.	No
9c	003012	Colwyn Brook Marshes, Cefn Bychan, SAC land	Ongoing programme of scrub control required.	No
9d	003013	Colwyn Brook Marshes, Carneddau, SAC land	Suitable management under agreement with NRW.	Yes
9e	003014	Colwyn Brook Marshes, Cilberllan, SAC land	Suitable management under Glastir.	Yes

Unit Number	NRW Unique Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
9f	003015	Colwyn Brook Marshes, Wern Heulog, SAC land	This compartment has been left un-grazed for several years (5+ years) and has been extensively invaded by willow scrub. S15 agreement required to secure programme of scrub control and follow on grazing.	Yes
9g	003016	Colwyn Brook Marshes, Matts Farm, SAC land	Grazing regime secured under agreement but further scrub control needed - to be undertaken September 2016.	No
2d	003524	Lower Marteg	Problems with silt run-off resolved .	No
2c	003525	Lower Bach Howey	Subject to some riparian habitat management by the Wye & Usk Foundation in the past. There is an ongoing project to eradicate signal crayfish from the Bach Howey.	No

7. GLOSSARY

This glossary defines some of the terms used in this **Core Management Plan**. Some of the definitions are based on definitions contained in other documents, including legislation and other publications of Natural Resources Wales and the UK nature conservation agencies.

Action	A recognisable and individually described act, undertaking or project of any kind, specified in section 5 or 6 of a Core Management Plan or Management Plan , as being required for protecting, managing or enhancing one or more of the features for which a site is designated.
Attribute	A quantifiable and monitorable characteristic of a feature that, in combination with other such attributes, describes its condition .
Common standards	See JNCC common standards .
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 is considered favourable when all the conservation objectives are being met.
Conservation management	Acts or undertaking of all kinds, including but not necessarily limited to actions , taken with the aim of achieving the conservation objectives of a site. Conservation management includes the taking of statutory and non-statutory measures, it can include the acts of any party and it may take place outside site boundaries as well as within sites. Conservation management may also be embedded within other frameworks for land/sea management carried out for purposes other than achieving the conservation objectives.
Conservation objective	The expression of the desired state of a feature , expressed as a composite statement defining the condition that we wish the feature to be in. Each feature has one conservation objective.

Core Management Plan	A Natural Resources Wales 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 management of the site can also be considered as factors.
Favourable condition	See condition .
Favourable conservation status	The Habitats Directive definition of Favourable Conservation Status (FCS) is given in full in section 4.
Feature	The species population, habitat type or other entity for which a site is designated. The ecological or geological interest which justifies the designation of a site and which is the focus of conservation management .
Integrity	See Site integrity .
JNCC common standards	A set of principles developed jointly by the UK nature 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.
Key Feature	The habitat or species population within a management unit that is the primary focus of management and monitoring in that unit.
Management Plan	The full expression of a designated site's legal status, vision , features , conservation objectives , performance indicators and management requirements. A complete management plan may not reside in a single document, but may be contained in a number of documents (including in particular the Core Management Plan) and sets of electronically stored information.

Management Unit

An area within a site, defined according to one or more of a range of criteria, such as topography, location of **features**, tenure, patterns of land/sea use. The key characteristic of management units is to reflect the spatial scale at which site 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 monitoring of sites designated for habitat and species conservation, 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 factors together with their associated target values (or ranges of values) 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.

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

This is defined in Welsh Government policy as 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 Natural Resources Wales' 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 limits 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 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**.

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Appendix 1. Water Quality Targets

(as revised in Common Standards Monitoring guidance for Rivers, JNCC 2016)

1.1 Organic pollution

Organic pollution is assessed using a combination of physio-chemical and biological attributes. The following table provides the target values to be applied across all river types. Targets apply throughout the assessment unit, not just at sparsely distributed monitoring sites.

Table A1. Organic pollution targets.

Attribute	Target
10%ile DO (% saturation)	85
Mean BOD (mg L ⁻¹)	1.5
90%ile total ammonia (NH ₃ -N, mg L ⁻¹)	0.25
95%ile un-ionised ammonia (NH ₃ -N, mg L ⁻¹)	0.025

1.2 Reactive phosphorus

Tables A2 and A3 provide generic targets values for soluble reactive phosphorus (SRP) according to a broad river typology. Where current phosphorus concentrations comply with the values in table A2 then these values form the target. Where a reach is not compliant with the target then those values in table A3 apply. However, if standards for good ecological status under the Water Framework Directive are more stringent than targets in tables A2 and A3 then those values apply. Normal rules for WFD of no deterioration apply.

Table A2. Proposed phosphorus targets (µg L⁻¹ SRP) for near-natural examples of SSSI/SAC river habitat as annual mean & March-September growing season mean.

River type		Headwater	River	Large river	
High altitude (>80 metres)	Low alkalinity (<50 mg L ⁻¹ CaCO ₃)	5	10	20	
	High alkalinity (>50 mg L ⁻¹ CaCO ₃)	7	15	25	
Low altitude (<80 metres)	Low alkalinity (<50 mg L ⁻¹ CaCO ₃)	15	20	30	
	High alkalinity (>50 mg L ⁻¹ CaCO ₃)	Chalk	20	30	40
		Clay	20	30	40

To be applied as growing season means (March to September inclusive) and annual means.

River Habitat Survey (RHS) river flow categories are used to discriminate river size – RHS flow 1-2 = Headwaters; RHS flow 3-8 = Rivers; RHS flow 9-11 = Large rivers.

Table A3. Proposed maximum phosphorus concentrations (µg L⁻¹ SRP) consistent with favourable condition of SSSI/SAC river habitat as annual mean & March-September growing season mean.

River type		Headwater	River	Large river	
High altitude (>80 metres)	Low alkalinity (<50 mg L ⁻¹ CaCO ₃)	10	20	30	
	High alkalinity (>50 mg L ⁻¹ CaCO ₃)	15	25	40	
Low altitude (<80 metres)	Low alkalinity (<50 mg L ⁻¹ CaCO ₃)	30	40	50	
	High alkalinity (>50 mg L ⁻¹ CaCO ₃)	Chalk	40	50	50
		Clay	40	50	60

To be applied as both growing season means (March to September inclusive) and annual means.

River Habitat Survey (RHS) river flow categories are used to discriminate river size – RHS flow 1-2 = Headwaters; RHS flow 3-8 = Rivers; RHS flow 9-11 = Large rivers.

Individual phosphate targets for all waterbodies in the River Wye SAC (or draining into the SAC) are given in table A4. As explained previously, where the WFD phosphate standard for good ecological status is more stringent than this is used and in addition normal rules for WFD no deterioration apply.

Table A4. Phosphate target and typology for all waterbodies in or draining into the River Wye SAC.

Water Body Name	Water Body ID	Type*	Phosphate target (mg/L)**	Reason***
Afon Bidno - source to conf R Wye	GB109055042340	HL	0.010	CSM (max allowable)
Afon Cammarch - source to conf R Irfon	GB109055041880	HL	0.010	CSM (near natural)
Afon Chwefru - source to conf R Irfon	GB109055042190	HL	0.010	CSM (max allowable)
Afon Elan - Caban-coch Rsvr to conf R Wye	GB109055042260	HL	0.010	CSM (near natural)
Afon Elan - source to Pont ar Elan	GB109055042300	HL	0.028	WFD (good)
Afon Garth Dulas - source to conf R Irfon	GB109055041890	HL	0.010	CSM (max allowable)
Afon Gwesyn - source to conf R Irfon	GB109055041870	HL	0.010	CSM (max allowable)
Afon Llynfi - conf Dulas Bk to conf R Wye	GB109055036950	HH	0.025	CSM (max allowable)
Afon Llynfi - source to conf Dulas Bk	GB109055036900	HH	0.022	Lake target
Afon Marteg - source to conf R Wye	GB109055042310	HL	0.013	WFD (high)
Aran - source to conf R Ithon	GB109055042110	HH	0.015	CSM (max allowable)
Bach Howey Bk - source to conf R Wye	GB109055037060	HH	0.015	CSM (max allowable)
Bachell Bk - source to conf Clywedog Bk	GB109055042120	HL	0.010	CSM (max allowable)
Builth Dulas Bk - source to conf R Wye	GB109055037160	HH	0.015	CSM (max allowable)
Camddwr Bk - source to conf R Ithon	GB109055042130	HH	0.013	WFD (high)
Camnant Brook - source to confluence R Edw	GB109055042370	HH	0.015	CSM (near natural)
Clas Bk - source to conf R Edw	GB109055037140	HH	0.021	WFD (high)
Cledan - source to conf R Irfon	GB109055036680	HL	0.010	CSM (max allowable)
Clettwr Bk - source to conf R Wye	GB109055037030	HH	0.015	CSM (max allowable)
Clywedog Bk - conf Bachell Bk to conf R Ithon	GB109055042070	HL	0.010	CSM (near natural)
Clywedog Bk - source to conf Bachell Bk	GB109055042090	HL	0.010	CSM (max allowable)
Duhonw - source to conf R Wye	GB109055037050	HH	0.015	CSM (max allowable)
Dulas Bk - source to conf Afon Llynfi	GB109055036920	HH	0.025	CSM (max allowable)
Edw - conf Camnant Bk to conf Clas Bk	GB109055037130	HH	0.015	CSM (near natural)
Edw - conf Clas Bk to conf R Wye	GB109055037080	HH	0.015	CSM (near natural)
Edw - source to conf Colwyn Bk	GB109055042200	HH	0.015	CSM (near natural)

Ennig - source to conf Afon Llynfi	GB109055036910	HH	0.06	WFD (good)
Gwenlas Bk - source to conf R Ithon	GB109055042170	HL	0.010	CSM (max allowable)
Howey Bk - source to conf R Ithon	GB109055041900	HH	0.015	CSM (max allowable)
Irfon - conf Afon Gwesyn to conf Cledan	GB109055036760	HL	0.010	CSM (max allowable)
Irfon - conf Cledan to conf R Wye	GB109055037090	HL	0.010	CSM (near natural)
Ithon - conf Camddwr Bk to conf R Wye	GB109055042270	HH	0.025	CSM (max allowable)
Ithon - conf Gwenlas Bk to conf Camddwr Bk	GB109055042140	HL	0.010	CSM (max allowable)
Ithon - conf Llaethdy Bk to conf Gwenlas Bk	GB109055042150	HL	0.010	CSM (max allowable)
Ithon - source to conf Llaethdy Bk	GB109055042180	HL	0.010	CSM (max allowable)
Llaethdy Bk - source to conf R Ithon	GB109055042160	HL	0.010	CSM (max allowable)
Mithil Bk - source to conf R Ithon	GB109055041960	HH	0.015	CSM (max allowable)
Monnow - conf Afon Honddu to conf R Wye	GB109055029720	LH	0.047	WFD (high)
Nantmel Dulas - source to conf R Ithon	GB109055042080	HL	0.010	CSM (near natural)
Scithwen Bk - source to conf R Wye	GB109055036990	HH	0.015	CSM (max allowable)
Tirabad Dulas - source to conf R Irfon	GB109055036690	HL	0.010	CSM (max allowable)
Triffrwd - source to Dulas	GB109055036970	HH	0.015	CSM (max allowable)
Trothy - conf Llymon Bk to conf R Wye	GB109055029680	LH	0.083	WFD (good)
Wye - conf Afon Bidno to conf Afon Marteg	GB109055042320	HL	0.010	CSM (max allowable)
Wye - conf Afon Elan to conf R Ithon	GB109055042250	HL	0.010	CSM (near natural)
Wye - conf R Irfon to Scithwen Bk	GB109055037115	HL	0.016	WFD (high)
Wye - conf to conf Afon Marteg to conf Afon Elan	GB109055042280	HL	0.020	CSM (max allowable)
Wye - conf Walford Bk to Bigsweir Br	GB109055037111	LH	0.039	WFD (high)
Wye (Avon Gwy) - conf R Ithon to conf R Irfon	GB109055037150	HL	0.015	WFD (high)

* Site altitude and alkalinity for each waterbody as used in the phosphate standards in the CSM guidance for Rivers. HH= High altitude, High alkalinity, HL= High altitude, Low alkalinity LH= Low altitude, High alkalinity and LL= Low altitude, Low alkalinity(JNCC 2016b).

** Phosphate target expressed in $\mu\text{g L}^{-1}$ SRP based on annual geometric mean.

*** Reason for phosphate target: CSM (near natural/max allowable) are derived from the CSM guidance for Rivers and WFD (good/high) from the relevant Water Framework Directive standard.

1.3 Trophic diatom index

The target using the Trophic Diatom Index (TDI) Ecological Quality ration should be an EQR of ≥ 0.8 , equivalent to high ecological status. This target should be used as an adjunct to nutrient targets proposed in tables 2 and 3 respectively.

1.4 Acidification

This target only applies to assessment units whose water body type is classified as siliceous or peat. Other types have good buffering ability and so will not be affected by acidification.

Table A5. Acidification targets.

Targets for acidification	Method of assessment
ANC: Mean ANC for all waters > 80 pH (Clear waters with $\text{DOC} < 10 \text{ mg L}^{-1}$): mean > 6.54 pH (Humic waters with $\text{DOC} > 10 \text{ mg L}^{-1}$): mean > 5.1	Analysis of water chemistry data from environment agencies. At least 36 samples (3 years of data) are required, which must include winter samples.

Appendix 2. Standards used in the Wye Review of Consents for flow.

The flow target used in the Environment Agency (EA) Resource Assessment and Management Framework (RAM) for the River Wye utilises the Habitats Directive Ecological River Flow (HDERF) objective throughout the year. The maximum permissible percentage reduction from naturalised flow levels is given in the table below. Within the River Wye SAC, all reaches above Rhydspence (the downstream end of Unit 1D) are classified as having Very High sensitivity to abstraction, and below Rhydspence as High sensitivity. Welsh Water's Wye Transfer abstraction at Monmouth and Severn Trent Water's Micheldean abstraction at Lydbrook are supported by regulation releases from the Elan Valley reservoirs when the flow at Redbrook gauging station falls below approximately Q90.

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 and regulation releases may increase the flow downstream of the reservoir above natural levels. There may also be effects resulting from reduced water temperature

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