Cyfoeth Naturiol Cymru
Natural Resources Wales

CORE MANAGEMENT PLAN INCLUDING CONSERVATION OBJECTIVES

FOR

River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC

Cyfoeth Naturiol Cymru
Natural Resources Wales

Noddir gan
Lywodraeth Cymru
Sponsored by
Welsh Government

Version	Date	Summary of changes made	Approved by
Version 3	September 2022	Revision of water quality targets for river features, updated formatting, clarification of the relationship between Conservation Objectives and Performance Indicators.	Dave Powell
Version 2	July 2021		Dave Powell
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The LIFE Dee River project commenced in September 2019 and will work to: remove constraints to fish passage; restore or improve natural riverine physical processes; improve agricultural and forestry land management practices to reduce their impact; initiate conservation management for freshwater pearl mussel; and establish and build long-term relationships with stakeholders. LIFE Dee River will also carry out a review the core management plan for the River Dee and Bala Lake SAC by December 2024. Features of management units are based on current ranges but are expected to change in the immediate future as works are completed as part of LIFE Dee River.

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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 Special Area of Conservation (SAC) and Special Protection Area (SPA) site(s). This is required to implement the changes through the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 in addition to the existing Conservation of Habitats and Species Regulations 2017. As a matter of Welsh Government Policy, the provisions of those regulations are also to be applied to Ramsar sites in Wales.

The River Dee and Bala Lake SAC is a cross-border site between Wales and England; this plan and Conservation Objectives only cover the parts of the SAC which are in Wales. Conservation Objectives for the parts of the River Dee which are in England are available on Natural England's website (Natural England, 2018, 2019).

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 into a single, integrated statement about the site.

The purpose of the designation of SAC and SPA 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 Dee and Bala Lake SAC is that it will be maintained at, or where necessary restored to, high ecological status with all its features at favourable conservation status. Factors under human control that may significantly affect its feature species or populations in or outside of the site, will be controlled in such a way that the features will sustain themselves as part of a functioning ecosystem. This will be true both for plants and animals whose life cycles remain entirely within the site's boundaries, and for migratory species that only spend certain stages of their lives in the SAC.

Water is clearly fundamental to a riverine SAC. Therefore the quality, quantity and flow variability of water, plus the quality of adjacent habitats, will be maintained or adjusted to a level necessary to maintain the features in favourable condition for the foreseeable future. Natural processes of erosion and deposition will operate without interference.

The protected aquatic and emergent plant communities will continue to characterise parts of the river and lake. In addition to enhancing its appearance, such communities provide a good indication of the overall quality of the river and lake environment and provide important habitats for fish and invertebrates.

The protected fish species found in this SAC, both those that are resident all year round, such as the bullhead and brook lamprey, and migratory species such as the Atlantic salmon, sea and river lampreys, swim up river to spawn and go through their juvenile stages in the river. These species will be present in numbers that reflect a healthy and sustainable population supported by well-distributed good quality habitat.

The migratory fish will be able to complete their migrations and life cycles largely unhindered by artificial barriers such as weirs, disturbance, pollution and external factors such as being caught in the by-catch of fishing operations at sea.

Llyn Tegid is the largest natural lake in Wales. It will have a healthy ecosystem that is not suffering from nutrient enrichment or acidification, and where use as a reservoir does not impinge on its wildlife interest. As a result, it supports flourishing populations of three rare species: gwyniad, glutinous snail, and floating water-plantain.

The abundance of prey and widespread availability of undisturbed resting and breeding sites, will allow a large otter population to thrive. Otters will be found throughout the SAC and in adjacent, supporting habitat.

Site Description

Area and Designations Covered by this Plan

Grid reference(s): SH887311 to SJ287710

Unitary authority(ies): Gwynedd Council, Denbighshire County Council, Wrexham County Borough Council, Flintshire County Council, Snowdonia National Park Authority

Area (hectares): 1151 ha

Designations covered: Llyn Tegid SSSI, Llyn Tegid Ramsar Site, Afon Dyfrdwy (River Dee) SSSI, Afon Dyfrdwy a Llyn Tegid SAC.

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

Outline Description

The source of the River Dee lies within the Snowdonia National Park and its catchment contains a wide spectrum of landscapes from high mountains around Bala, steep-sided wooded valleys, near Llangollen, to the rich agricultural plains of Cheshire and north Shropshire and the vast mudflats of the estuary.

The course and topography of the River Dee and its tributaries were strongly influenced and modified during the last Ice Age. The underlying geology of the Dee ranges from impermeable Cambrian and Ordovician shales in the west, through Silurian to Carboniferous Limestone outcrop at Llangollen to Coal Measures and thick boulder clay overlying the Triassic sandstones of the Lower Dee valley.

The site extends from the western extremity of Llyn Tegid taking in the entire lake and its banks to its outfall into the River Dee. It then takes in the river and its banks downstream to where it joins the Dee Estuary SSSI. A number of the Dee's tributaries are also included, these being the Ceiriog, Meloch, Tryweryn, and Mynach. In its swifter upper reaches, the Dee flows through the broad valley near Corwen, and the spectacular Vale of Llangollen before entering the Cheshire plain at Erbistock where it meanders northwards through the Cheshire plain to Chester. Below Chester Weir, the river is largely Estuarine in character. However there is a tidal influence as far upstream as Farndon, as high tides regularly exceed the weir's height. In its slower, more mature reaches the river is characteristic of a floodplain river with meanders, oxbows and other river-formed landscape features.

Llyn Tegid, the Tryweryn and the Dee form part of the River Dee Regulation System. The flow of water is controlled by Natural Resources Wales, primarily to minimise flooding and for the transportation of water to abstraction points down stream. The level of control is such that the Dee itself is said to be the most regulated river in Europe. However, of the water that reaches Chester, only about a third is regulated (this is based on an average. the proportion varies depending on conditions and operational requirements). Of the tributaries within the SAC and SSSI, the only regulated tributary is the Afon Tryweryn.

Parts of the Rivers Dee and Ceiriog lie within both Wales and England. They have therefore been notified as two separate SSSIs – the Afon Dyfrdwy (River Dee) SSSI in Wales and the River Dee (England) SSSI in England. However, the features for which the SSSIs are notified, in particular migratory fish, depend upon the whole river ecosystem.

Outline of Past and Current Management

The River Dee is probably the most regulated river in Western Europe, providing drinking water for a large population in NW England and NE Wales, in addition to providing water for the Shropshire Union Canal. The regulation also contributes to flood control. Several major lakes and storage reservoirs are situated in the upper part of the basin, including Llyn Tegid; the largest natural lake in Wales.

Llyn Tegid was first used for river regulation in the early 1800s when Thomas Telford constructed a weir at the outlet to permit controlled releases to sustain flows into the Shropshire Union Canal at Llangollen. The most significant changes however occurred

in 1956 when the Dee and Clwyd River Board constructed the Bala Lake Scheme, creating the present regulation facilities. The natural lake outlet was lowered by approximately 2 metres, sluice gates were built and the Afon Tryweryn was diverted to join the River Dee, downstream of the lake.

The river is an important fishing and tourist facility. In recent years there have been several pollution incidents arising from industrial and agricultural activity that have caused fish kills.

Llyn Tegid has also been vulnerable to blue-green algal blooms, related to phosphate enrichment from the surrounding catchment. This is being tackled through a multi-agency/local community initiative as well as NRW's River Basin Management Plan measures.

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
- Tributary confluences
- Natural hydromorphology
- Artificial barriers where they mark a change in river character
- National boundaries
- Unitary Authority Boundaries
- The tidal and navigational limit
- The units include one or more of 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 can be viewed on the Welsh Government's GIS website Map Data Cymru.

The table below gives a brief description of each unit and the reasoning for the location of its boundaries.

Management Unit Descriptions

NRW Internal Reference	SAC Management Unit	Unit Name	Unit Description
14	1781	English Border to Dee Estuary SSSI	Where the Dee emerges from England to where it joins the 'Dee Estuary' SSSI, SAC, SPA, Ramsar. This is a predominately canalised section. At its north-western limit there are two small unconnected parts of the River Dee SSSI. These were areas not included in the Dee Estuary SSSI and were therefore notified as part of the River Dee SSSI.
16	1783	Afon Mynach	The Afon Mynach, a relatively small, low nutrient tributary of the Dee. Flows in this tributary are not regulated.
17	1784	Afon Meloch	The Afon Meloch, a relatively small, low nutrient tributary of the Dee. Flows in this tributary are not regulated.
18	1785	Ceiriog – upstream of Teirw	The Afon Ceiriog is a larger tributary of the Dee. It is a low nutrient river with a 'flashy' storm hydrograph. Flows in this tributary are not regulated. This unit is entirely within Wales.
19	1786	Ceiriog – confluence Dee to Teirw	The Afon Ceiriog is a larger tributary of the Dee. It is a low nutrient river with a 'flashy' storm hydrograph. Flows in this tributary are not regulated. At some locations in this unit, the river flows directly along the Wales/England border but is frequently within one country or the other, though always close to the border. This may reflect the uncontrolled, flashy nature of this river, as it is likely that the river formed the national boundary when first drawn. The Ceiriog also forms part of the Dee SSSI in England and this unit abuts part of Unit 3 of the River Dee (England) SSSI
4	7847	Llyn Tegid	All of Llyn Tegid (Bala Lake) to its outfall
2	7848	Tryweryn - Mynach to Llyn Celyn	The Afon Tryweryn. This carries water from Llyn Celyn to Section R1 from which it may either be allowed to flow down-stream into the main Dee system or upstream into Llyn Tegid. NRW Lease the canoeing and rafting centre on the Tryweryn and to support this, Dwr Cymru / Welsh Water periodically modifies patterns of water release.

NRW Internal Reference	SAC Management Unit	Unit Name	Unit Description
3	7849	Tryweryn - Dee to Mynach	The Afon Tryweryn. This carries water from Llyn Celyn to Section R1 from which it may either be allowed to flow down-stream into the main Dee system or upstream into Llyn Tegid. NRW lease the canoeing and rafting centre on the Tryweryn and to support this, Dwr Cymru /Welsh Water periodically modifies patterns of water release.
6	7850	Dee - Alwen to Llyn Tegid	From the outfall of Llyn Tegid to the confluence of the Dee and the Alwen. This unit includes part of the canalised sections around the Bala sluice system as well as the Bala sluice gate. This section includes the confluence with the Meloch (part of the SSSI/SAC) and the undesignated Hirnant, Caletwr, Ceidiog, Llynor and Trystion.
7	7851	Dee – Ceiriog to Alwen	From the confluence with the Alwen to the confluence with the Ceiriog the river flows over the Horseshoe falls, through Llangollen and passes from Denbighshire to Wrexham in the Vale of Llangollen at Trevor. This unit includes the Dee Bridge (Upper Carboniferous) and the Rhewl Section (fluvial geomorphology) GCR sites.
10	7852	Dee - Chester Weir to Ceiriog	From the confluence with the Afon Ceiriog to the English Border. In places, the river forms the boundary with England and the River Dee (England) SSSI (Units 3, 4 and 5). At Erbistock Weir the nature of the river changes.Above it, the river is relatively steep, flowing through entrenched meanders and gorges, to lose approximately 130 m in height from Bala. Below the weir the gradient tends to be much lower as the Dee flows across the Cheshire Plain. Here it is characterised by complex, sometimes active meanders as it falls only another 25 m or so before reaching Chester. The unit includes the Holt to Worthenbury GCR site, where the SSSI boundary reaches out into the floodplain to incorporate the fluvial geomorphology interest (explained in The Features section)

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

NRW Internal Reference	SAC Management Unit	SSSI	Ramsar	Waterbody IDs within Unit
14	1781	Afon Dyfrdwy		GB531106708200 (Transitional)
16	1783	Afon Dyfrdwy		GB111067051990
17	1784	Afon Dyfrdwy		GB111067051960
18	1785	Afon Dyfrdwy		GB111067051610
19	1786	Afon Dyfrdwy		GB111067051910
4	7847	Llyn Tegid	Llyn Tegid	GB31134987 (Lake)
2	7848	Afon Dyfrdwy		GB111067051980
3	7849	Afon Dyfrdwy		GB111067051900
6	7850	Afon Dyfrdwy		GB111067052240
7	7851	Afon Dyfrdwy		GB111067052060
10	7852	Afon Dyfrdwy		GB111067057080 (part of this waterbody is in England).

The Features

Confirmation of Features

Designated feature	Primary Reason for Site Selection?	Relationships, nomenclature etc
1. Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* Vegetation	Yes	EU Habitat Code: 3260
2. Atlantic salmon *Salmo salar*	Yes	EU Species Code: 1106
3. Floating water-plantain *Luronium natans*	Yes	EU Species Code: 1831
4. Sea lamprey *Petromyzon marinus*	No	EU Species Code: 1095
5. Brook lamprey *Lampetra planeri*	No	EU Species Code: 1096
6. River Lamprey *Lampetra fluviatilis*	No	EU Species Code: 1099
7. Bullhead *Cottus gobio*	No	EU Species Code: 1163
8. European otter *Lutra lutra*	No	EU Species Code: 1355

SSSI and Ramsar features are listed in the tables below.

Where features are also a SAC feature they will share the same conservation objective(s)

Designated Feature	Designated Site	Relationship
9. The lake and aquatic / emergent vegetation.	Llyn Tegid Ramsar Llyn Tegid SSSI	SSSI and Ramsar feature
10. Lake fen /swamp incl. wet woodland.	Llyn Tegid Ramsar Llyn Tegid SSSI	SSSI and Ramsar feature
11. Fish. *Coregonus lavaretus* Gwyniad.	Llyn Tegid Ramsar Llyn Tegid SSSI	SSSI and Ramsar feature
12. Invertebrate. *Myxas glutinosa* Glutinous snail.	Llyn Tegid Ramsar Llyn Tegid SSSI	SSSI and Ramsar feature
Nationally important species. *Luronium natans* Floating water-plantain	Llyn Tegid Ramsar Llyn Tegid SSSI Afon Dyfrdwy (River Dee) SSSI	Managed as a SAC feature
Type VII Mesotrophic upland plateau rivers	Afon Dyfrdwy (River Dee) SSSI	Managed as SAC feature 1
Type VIII Moderate-gradient sand/shale rivers below uplands.	Afon Dyfrdwy (River Dee) SSSI	Managed as SAC feature 1
Type VI Middle reaches of upland rivers traversing more base rich strata.	Afon Dyfrdwy (River Dee) SSSI	Managed as SAC feature 1
Type II Clay rivers with diverse substrates and flow patterns.	Afon Dyfrdwy (River Dee) SSSI	Managed as SAC feature 1
Saltmarsh / freshwater transition habitats	Afon Dyfrdwy (River Dee) SSSI	SSSI feature
A range of habitat types qualifying as a mixture	Afon Dyfrdwy (River Dee) SSSI	SSSI feature
Slender hare's-ear *Bupleurum tenuissimum*	Afon Dyfrdwy (River Dee) SSSI	SSSI feature
Sea barley *Hordeum marinum*	Afon Dyfrdwy (River Dee) SSSI	SSSI feature
Hard-grass *Parapholis strigosa*	Afon Dyfrdwy (River Dee) SSSI	SSSI feature
Club tailed dragonfly *Gomphus vulgatissimus*	Afon Dyfrdwy (River Dee) SSSI	SSSI feature
Scare yellow sally *Isogenus nubecula*	Afon Dyfrdwy (River Dee) SSSI	SSSI feature
Yellow crucifer weevil *Aulacobaris lepidii*	Afon Dyfrdwy (River Dee) SSSI	SSSI feature
Atlantic salmon *Salmo salar*	Afon Dyfrdwy (River Dee) SSSI	Managed as a SAC feature
Sea lamprey *Petromyzon marinus*	Afon Dyfrdwy (River Dee) SSSI	Managed as a SAC feature
Brook lamprey *Lampetra planeri*	Afon Dyfrdwy (River Dee) SSSI	Managed as a SAC feature

River Lamprey *Lampetra fluviatilis*	Afon Dyfrdwy (River Dee) SSSI	Managed as a SAC feature
Bullhead *Cottus gobio*	Afon Dyfrdwy (River Dee) SSSI	Managed as a SAC feature
European otter *Lutra lutra*	Afon Dyfrdwy (River Dee) SSSI	Managed as a SAC feature
Holt to Worthenbury Section	Afon Dyfrdwy (River Dee) Geological/ Geomorphological SSSI	SSSI feature
Rhewl Section	Afon Dyfrdwy (River Dee) Geological/ Geomorphological SSSI	SSSI feature
Dee Bridge	Afon Dyfrdwy (River Dee) Geological/ Geomorphological SSSI	SSSI feature

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

SAC Management Unit	1783	1784	1785	1786	7847	7848	7849	7850	7851	7852
Unit Name	Afon Mynach	Afon Meloch	Ceiriog u/s of Teirw	Ceiriog -Teirw to Dee	Llyn Tegid	Trywern- Mynach to Llyn Celyn	Trywern-Dee to Mynach	Dee-Alwen to Llyn Tegid	Dee-Ceiriog to Alwen	Dee-Chester weir to Ceiriog
SAC Features										
Cottus gobio	KS	KS	KS	KS	KS	KS	KS	KS	KS	KS
Lampetra fluviatilis	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	KS
Lampetra planeri	KS	KS	KS	KS	KS	KS	KS	KS	KS	KS
Luronium natans					KS		KS	KS		
Lutra lutra	KS	KS	KS	KS	KS	KS	KS	KS	KS	KS
Petromyzon marinus	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	KS
Salmo salar	KS	KS	KS	KS	KS	KS	KS	KS	KS	KS
Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	KH	KH	KH	KH		KH	KH	KH	KH	KH
SSSI Features										
Aulacobaris lepidii										KS
Bupleurum tenuissimum										
Carex aquatilis					Sym					
Carex aquatilis x *C.acuta*					Sym					
Coregonus lavaretus					KS					
Cottus gobio	KS	KS	KS	KS	KS	KS	KS	KS	KS	KS
Fluvial geomorphology of Wales									Geo	Geo
Gomphus vulgatissimus										KS
Hordeum marinum										
Inter-tidal										
Isogenus nubecula									KS	KS
Lampetra fluviatilis	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	KS
Lampetra planeri	KS	KS	KS	KS	KS	KS	KS	KS	KS	KS

SAC Management Unit	1783	1784	1785	1786	7847	7848	7849	7850	7851	7852
Limosella aquatica					Sym					
Luronium natans					KS		KS	KS		
Lutra lutra	KS	KS	KS	KS	KS	KS	KS	KS	KS	KS
Myxas glutinosa					KS					
Namurian of England and Wales									Geo	
Osmerus eperlanus										Sym
Other: Marginal/inundation										
Petromyzon marinus	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	Sym	KS
Running water	Sym	Sym	Sym	Sym		Sym	Sym	KH	Sym	KH
Salmo salar	KS	KS	KS	KS	KS	KS	KS	KS	KS	KS
Salt-marsh										
Semi-natural woodland	Sym	Sym	Sym	Sym						
Standing water					KH					
Swamp					KH					

Conservation Objectives

Background to Conservation Objectives:
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) as implemented through the Conservation of Habitat and Species Regulations 2017 (As amended). 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 UK National Sites Network of SACs. 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 SAC and SPA 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 SAC and SPA 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. Note that the assessment of plans and projects should be made in view of the entirety of the conservation objectives for the site, including the performance indicators.
- **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 sub-set of conservation objectives called 'performance indicators'. The performance indicators are those conservation objectives which are quantifiable and measurable, and which provide the basis for monitoring and reporting. The performance indicators are set out in Appendix 1.

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.

Format of the conservation objectives

Each conservation objective is a composite statement defining a site-specific aspiration for each designated feature. This composite statement contains clauses that correspond to all the elements of FCS, namely:

For habitat features:

- Extent should be stable in the long term, or where appropriate increasing*;
- Quality (including in terms of ecological structure and function) should be being maintained, or where appropriate improving;
- Populations of the habitat's typical species must be being maintained or where appropriate increasing*;
- Factors affecting the extent and quality of the habitat and its typical species (and thus affecting the habitat's future prospects) should be under appropriate control.

For species features:

- The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term;
- The distribution of the population should be being maintained;
- There should be sufficient habitat, of sufficient quality, to support the population in the long term;
- Factors affecting the population or its habitat should be under appropriate control.

The elements above constitute a generic checklist or guide to the elements that should normally be included in the conservation objectives, in order to ensure that the site makes an effective and appropriate contribution to achieving favourable conservation status for the habitats and species for which it is designated.

There is one conservation objective for each designated feature listed above. In some cases, where there are distinct areas or forms of a designated habitat or separate populations of a designated species within a site, the conservation objective is sub-divided into different sections to enable different aspirations to be expressed for different occurrences of the features within the site.

As well as describing the aspirations for the condition of the feature, each conservation objective contains a statement that the factors which significantly affect the feature are under appropriate control.

Conservation Objective for watercourse:

The ecological status of the watercourse is a major factor in determining FCS for all site features. The required conservation objective for the watercourse is defined below. This section is an integral part of the conservation objectives for all features of this SAC.

- 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.
- Water quality standards for the river Dee follow those in the revised Common Standards Monitoring Guidance for Rivers (JNCC 2016). These are detailed in Appendix 2. There will be no deterioration in water quality, as defined by these standards, other than that temporarily generated by natural variations in water flow or by man-made variations occurring as a result of operating the River Dee flow control regime within its normal operating parameters.
- The Dee flow regime should remain within 10% of 'recent actual flow' as described by Bethune (2006).
- The river planform and profile should be predominantly unmodified. Physical modifications having an adverse effect on the integrity of the SAC will be avoided.
- Artificial factors impacting on the capability of each feature to occupy the full extent of its potential range should be modified where necessary to allow passage, eg. weirs, bridge sills, or other forms of barrier.
- Natural limiting factors such as waterfalls, which may limit the natural range of a feature or its dispersal between naturally isolated populations, should not be modified.
- Levels for nutrients, in particular phosphate, will be agreed for cross-border water bodies between NRW and NE, and measures taken to maintain nutrients below these levels.
- Potential sources of pollution, nutrient enrichment and/or suspended solids that have not been addressed in the Review of Consents such as, but not confined to, diffuse pollution or disturbance to sediments, will be considered in assessing plans and projects.

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

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

- The conservation objective for the watercourse as defined above must be met.
- The extent of this feature within its potential range in this SAC should be stable or increasing
- The extent of the sub-communities that are represented within this feature should be stable or increasing.
- The conservation status of the feature's typical species should be favourable.
- All known, controllable factors, affecting the achievement of these conditions are under control (many factors may be unknown or beyond human control).

Conservation Objective for Feature 2: Atlantic salmon *Salmo salar* (EU Species Code: 1106)

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

- The parameters defined in the vision for the watercourse as defined above must be met
- The SAC feature populations will be stable or increasing over the long term.
- The natural range of the features in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
- There will be no reduction in the area or quality of habitat for the feature populations in the SAC on a long-term basis
- All known, controllable factors, affecting the achievement of these conditions are under control (many factors may be unknown or beyond human control).

Conservation Objective for Feature 3: *Luronium natans* / Floating water-plantain

The conservation objective for the lake water body as defined in the conservation objective for features 9 and 10 must be met. The vision for this feature is for it be in favourable conservation status, where all of the following conditions are satisfied:

- There will be no contraction of the current *L. natans* extent and distribution, and the populations will be viable throughout their current distribution & will be able to maintain themselves on a long-term basis. Each *L. natans* population must be able to complete sexual and/or vegetative reproduction successfully.
- The lake will have sufficient habitat to support existing *L. natans* populations within their current distribution and for future expansion.
- All factors affecting the achievement of these conditions are under control.

Conservation Objective for Features 4, 5, and 6: Sea lamprey *Petromyzon marinus* (EU Species Code: 1095), Brook lamprey *Lampetra planeri* (EU Species Code : 1096), River lamprey *Lampetra fluviatilis* (EU Species Code : 1099)

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

- The parameters defined in the vision for the watercourse as defined above must be met.
- The SAC feature populations will be stable or increasing over the long term.
- The natural range of the features in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
- There will be no reduction in the area or quality of habitat for the feature populations in the SAC on a long-term basis.
- All factors affecting the achievement of these conditions are under control.

Conservation Objective for Feature 7: Bullhead *Cottus gobio* (EU Species Code: 1163)

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

- The parameters defined in the vision for the watercourse as defined above must be met.
- The SAC feature populations will be stable or increasing over the long term.
- The natural range of the features in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
- There will be no reduction in the area or quality of habitat for the feature populations in the SAC on a long-term basis.
- All factors affecting the achievement of these conditions are under control.

Conservation Objective for Feature 8: European otter *Lutra lutra* (EU Species Code: 1355)

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

- The parameters defined in the vision for the watercourse as defined above must be met.
- The SAC otter population is stable or increasing over the long term, both within the SAC and within its catchment.
- There will be no loss of otter breeding or resting sites other than by natural means (such as naturally occurring river processes) within the SAC or its catchment.
- The number of potential resting sites within the SAC will not be a factor limiting that limits the otter population's size or extent.
- There should be no reduction of fish biomass within the SAC or its tributaries except for that attributable to natural fluctuations.
- There should be no loss of amphibian habitat likely to provide a source of prey for members of the SAC otter population.
- The potential range of otters in the within the SAC or its catchment is neither being reduced nor is likely to be reduced for the foreseeable future.
- All known or potential access or dispersal routes within the catchment for otters that might be considered part of the SAC population should be maintained such that their function is not impaired including the incorporation of measures or features required to avoid disturbance.
- Off site habitats likely to function as 'stepping stones' within the catchment for members of the SAC otter population will be maintained for migration, dispersal, foraging and genetic exchange purposes.
- All man-made structures within or likely to be used by otters from the SAC population must incorporate effective measures to facilitate the safe movement and dispersal of otters.
- All known, controllable factors, affecting the achievement of these conditions are under control (many factors may be unknown or beyond human control).

Conservation Objectives for lake and marginal wetland SAC & Ramsar features 9 and 10: The lake and aquatic /emergent vegetation, Lake fen/swamp inc. wet woodland.

- The total extent of the lake area, including lake fen and swamp shall be maintained. This includes some 10 ha of swamp/fen in total; of which at least 6 ha is attributable to NVC S11 *Carex vesicaria* swamp community.
- The abundance and distribution of rare aquatic and emergent species will be maintained or increased and continue to be self-sustaining.
- The abundance and distribution of typical species of aquatic /emergent species will be common and continue to be self-sustaining. See tables below.

- The fen and swamp layers comprises locally native species, see table below for the relevant species for each vegetation community. The abundance of typical species of each fen and swamp type will be common.
- The abundance and distribution of uncommon / rare plants occurring within each fen and swamp vegetation community will be maintained or increased and continue to be self-sustaining.
- Invasive non-native species such as rhododendron, Japanese knotweed, Canadian pondweed and Himalayan balsam will not be present. This condition is considered under “factors”.
- Water quality targets for the lake should be of a standard that will ensure it reaches Good Ecological Status or better as defined by the Water Framewok Directive. The river Dee should reach its water quality targets as set out in Appendix 2.
- Eutrophication of the lake from diffuse and point source pollution will be under control and incidences of blue/green algal blooms will have stopped. The nutrient levels in the lake will similar to the levels inferred from the diatom assemblages for the lake prior to 1925.
- All factors affecting the achievement of these conditions are under control.

Indicative lists of species of the typical emergent, fen / swamp & wet woodland communities

Submerged or Floating Species	DAFOR Scores (Burgess *et at*. 2006)
Isoetes lacustris	D
Littorella uniflora	D
Callitriche hamulata	A
Elatine hexandra	A
Luronium natans	A
Nitella flexilis agg.	A
Eleocharis acicularis	F
Fontinalis antipyretica	F

NVC community name	Emergent, Fen/swamp community constant species	Emergent, Fen/swamp community preferential species	Embergent, Fen/swamp community rarities
NVC S11 *Carex vesicaria* swamp	*Carex vesicaria*, *Equisteum fluviatile* & *Galium palustre*	*Mentha aquatica, Myosotis scorpiodes, Filipendula ulmaria.*	*Carex aquatilis. Carex acuta .* Hybrid of *C. acuta* & *C. aquatilis.*
NVC S9 *Carex rostrata* swamp	*Carex rostrata*	*Polygonum amphibium, M. aquatica. Juncus effusus*.	
NVC S28 *Phalaris arundinacea* tall-herb fen	*Phalaris arundinacea*	*G. palustre Juncus effusus. Myosotis scorpiodes*.	
NVC W1 *Salix cinerea – Galium palustre* woodland	*Salix cinerea. G. palustre*	Field layer: *M. aquatica*, *J. effusus.* Ground layer: Bare ground or patchy bryophyte cover *Eurhynchium praelongum*, *Chiloscyphus polyanthos*.	

Indicative list of rare species of the aquatic / emergent communities.

Feature Species
Mudwort *Limosella aquatica*
Six stamened-waterwort *Elatine hexandra*
Floating water plantain *Luronium natans*
Small water-pepper *Polygonum minus*
Needle spike-rush *Eleocharis acicularis*
Slender-tufted sedge *Carex acuta*
Water sedge *Carex aquatilis*
Hybrid sedge *C. acuta x aquatilis*

Indicative list of typical aquatic /emergent vascular plant species

Vascular plant species name
Lesser marshwort *Apium inundatum*
Pedunculate / Intermediate water starwort *Callitriche brutia / hamulata*
C. stagnalis
Needle spike-rush *Eleocharis acicularis*
Water mint *Mentha aquatica*
Water forget-me-not *Myosotis scorpioides*
Alternate water milfoil *Myriophyllum alterniflorum*
Water pepper *Persicaria hydropiper*
Reed canary grass *Phalaris arundinacea*
Broad leaved pond weed *Potamogeton natans*
Marsh cinquefoil *Potentilla palustris*
Common water crowfoot *Ranunuculus aquatilis*
Round leaved crowfoot *R. omniophyllus*
Water horsetail *Equisetum fluviatile*
Small sweet-grass *Glyceria declinata*
Floating sweet-grass *G. fluitans*
Quillwort *Isoetes lacustris*

Conservation Objective for Feature 11. Gwyniad *Coregonus lavaretus*.

There are fewer than 10 recorded populations of whitefish in the British Isles and the Llyn Tegid population is the only one in Wales. Dwelling mainly in the deeper and cooler offshore waters this carnivorous fish feeds on microscopic animals floating in the water. Each year, between January and February, it moves into the shallower waters of the lake to spawn in clean gravel beds. Between 2004 and 2007 an attempt was made to establish a 'refuge' population at Llyn Arenig Fawr, an upland oligotrophic lake in Migneint-Arenig-Dduallt SAC (Refer to Migneint-Arenig-Dduallt SAC plan).

The conservation objective for the lake water body as defined in conservation objectives for features 9 &10 must be met. The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The population of the feature in the SAC is stable or increasing over the long term.
- The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
- Suitable habitat is defined in terms of near-natural hydrological regime, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. food supply.
- All factors affecting the achievement of these conditions are under control.

Conservation Objective for Feature 12. Glutinous snail. *Myxas glutinosa*.

The conservation objective for the lake water body as defined in conservation objective for features 9 &10 must be met. The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- This population will continue to thrive and colonise all suitable areas of habitat in the marginal zone. The species will have been extensively studied and its ecology, especially its response to fluctuating water levels, will be better understood so that its niche requirements can continue to be met. In addition, we will fully understand whether the apparently different mean growth rates in snail populations at different locations around the lake is due to minor habitat variance or to isolated sub-population differences.
- Maintenance of the quality and extent of suitable habitat.
- All factors affecting the achievement of these conditions are under control.

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.

Status and Management Requirements of Feature 1: Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

Status of Feature 1: Unfavourable unclassified.

This site's most recent vegetation survey was that of Scarlett et al in 2003. Data was collected from twenty three field sites and an attempt was made to classify each site as a 'CB type' (a sub-type of the feature) using the method of Hatton-Ellis and Grieve (2003). Only seven sites conformed to a CB type.

However the authors state that "The majority or sites are rather atypical and could not be placed into any of the CB group. This may be partly attributed to the absence of *Myriophyllum spicatum* and the scarcity of some species due to recent flooding".

In view of these difficulties the condition assessment was based upon a preliminary study undertaken in June 04, which only looked at a small amount of the resource across the site. During the next monitoring cycle (2007-2012) the feature will be monitored against JNCC guidelines, probably using revised methods. This will provide NRW with an improved condition assessment but will not give a clear indication of the extent of the feature throughout the site. It is therefore likely that there will also be some form of rapid, walk over (or rather next to) survey, to provides an indication of where the feature is likely to be present.

Management Requirements of Feature 1

As discussed above, it is important that further knowledge of the condition and extent of this feature is acquired in order to better inform decisions about its management. However, as stated by Hatton-Ellis and Grieve (2003) "There remain many gaps in understanding of the reproductive biology of individual species, the identification and distribution of subspecies, and the ecological tolerances of plant assemblages". So until there is a greater understanding of the requirements of this feature the emphasis will be on promoting and retaining a mosaic of bank-side and emergent vegetation, and of resisting changes to the aquatic environment unless they can be shown as being unlikely to have a significant effect.

Status and Management Requirements of Feature 2: Atlantic salmon *Salmo salar*

Status of Feature 2: Unfavourable

Justification – According to Pisces Conservation Ltd (2007), the Dee fails on the criteria listed as failing on the following table

Attribute	Pass	Fail	Not determined
Population			
Adult run		X	
Juvenile population densities	X		
Water quality			
Biological GQA		X	
Chemical GQA		X	
Soluble reactive phosphorus		X	
Suspended solids		X	
Flow (see below)	X		
River morphology			
Artificial barriers	X		
Maintaining characteristic physical features	X		
River substrate			
Spawning sites			X
Negative indicators			
Stocking of other species	X		
Environmental disturbance			
Management objectives of SAC salmon populations		X	
Screening			X
Sustainable exploitation		X	
OVERALL ASSESSMENT		X	

Flow: Pisces Conservation Ltd (2007) based their result on Naturalised Daily Flow. For the Dee this is not applicable because of the nature of its regulation scheme. Therefore for this river the criterion for being in favourable condition is that flows should, as far as climatic conditions allow, remain within 10% of 'Recent Actual flow' as described by Bethune (2006), (See Conservation Objective for Feature 2: Atlantic salmon *Salmo salar* (EU Species Code: 1106)).

Management Requirements of Feature 2

Attribute	Requirement
Population	
Adult run	Increase to Conservation Limit
Juvenile population densities	Maintain
Water quality	
See Appendix 2. Water Quality Targets for River Waterbodies	Improve to required standard
Suspended solids	Improve to required standard
Flow (see below)	Maintain
River morphology	
Artificial barriers	Maintain or improve
Maintaining characteristic physical features	Maintain or improve
River substrate	
Spawning sites	Location and extent to be determined
Negative indicators	
Stocking of other species	Before any such stocking can take place, it must first be determined whether or not it is likely to have a significant effect on the river's salmon population (or on any other).
Environmental disturbance	
Management objectives of SAC salmon populations	Salmon stocking must only occur in order to compensate for the loss of habitat upstream of the Celyn dam. Stocking beyond this should not be required.
Screening	Screening must be of a standard sufficient to prevent any significant effect on the Salmon population
Sustainable exploitation	Any form of exploitation detrimental to salmon successfully completing their reproductive cycle is difficult to justify until the following criteria have been met:- The salmon population is consistently reaching its targets, There is no salmon stocking, other that compensating for the habitat loss caused by to the construction of Llyn Celyn.

Pisces Conservation Ltd, 2007 also recommend that "Data on spawning site substrates and screening required".

Status and Management Requirements of Feature 3: Floating water-plantain *Luronium natans* (Code: 1831)

Status of Feature 3: Favourable Un-classified

The floating water-plantain is assessed as Favourable Un-classified on the basis of existing survey data. A population has been known from Llyn Tegid since 1780 and again in 1805, but only recently in the 1990s was it realised that a more extensive submerged population was present within Dolfawr and Glanllyn bays at the SW end of the lake. As there is therefore only partial baseline data it is not possible to distinguish trends. Floating water-plantain can thrive in quite eutrophic water conditions in the U.K. There is no reason therefore to suppose, because of current factors operating, that the population has declined over recent years**.**

Monitoring submerged lake populations of *Luronium natans* is difficult without using diving techniques although there has been some recent exploratory work conducted by Ian Winfield of CEH into using new and more sensitive hydroacoustic survey equipment to monitor submerged vegetation communities.

- A baseline survey of *Luronium natans* should be carried out.

Management Requirements of Feature 3

- Physical damage to floating plants and their habitat from motorised craft should continue to be controlled by limiting the number of motorised boats to emergency craft operated by SNPA warden staff. The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
- No lake bottom sediment should be dredged because it could disturb submerged populations and /or destroy suitable substrate for *Luronium natans* to colonise.
- The pools at Glanllyn, where *Luronium natans* has long been recorded, are now dominated by the alien species *Elodea canadensis* Canadian pondweed. Some control such as light mechanical harvesting should be considered if observation/research elsewhere indicates that this management is likely to be successful.

Status and Management Requirements of Feature 4: Sea lamprey *Petromyzon marinus*

Status of Feature 4: Unfavourable Un-classified

This species failed its ammocoete density target, as monitored by APEM (2006). The Performance Indicators for Featues 4, 5 & 6., and the Common Standards Monitoring Guidance (JNCC 2005) state that “ammocoetes should be present in at least 4 sampling sites each not less than 5km apart”. Sea lamprey were only caught in 3 sites**.**

The low numbers recorded by APEM (2006) make it difficult to draw any firm conclusions as to the distribution of the species within the site but report also

expresses concerns over barriers to migration for sea lamprey. This suggests that the river morphology attribute would also fail.

In addition the river also failed its Biological GQA and soluble reactive phosphorus targets (Pisces Conservation Ltd., 2007).

Management Requirements of Feature 4

Currently, we don't have sufficient information about Petromyzon marinus in the Dee SAC to know the size or dynamics of its population, the amount of habitat available for its spawning and subsequent development, or the other main factors that limit its development. In view of this, the management requirements are:

- Identification of spawning sites
- Undertake research to try and determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment.
- Identify which resources are limiting the development of the current population.
- Undertake measures to improve the availability of limiting resources.

This is relevant to the Horseshoe Falls weir. The weir is believed to present a barrier to the upstream migration of lamprey. The structure should therefore be modified to enable such fish to reach the river beyond it.

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. In addition, screening must be of a standard sufficient to prevent any significant effect on the Lamprey population.

Fish stocking can be damaging to ecosystem structure and function through competition, predation and introduction of disease – ensure any fish stocking is very carefully controlled to avoid these problems, and subject to an appropriate assessment.

Status and Management Requirements of Feature 5: Brook lamprey *Lampetra planeri*

Status of Feature 5: Unfavourable Un-classified

APEM (2006) report that *Lampetra* spp. were caught at 36 out of 59 sites (25 out of 29 optimal sites and 11 out of 30 sub-optimal sites). This provides a value for distribution within the catchment of 61% which fails the 66% JNCC target (JNCC 2005).

The river fails the Biological GQA and soluble reactive phosphorus targets (Pisces Conservation Ltd, 2007).

It is not normally possible to distinguish between river and brook lamprey in the field. Results are reported for *Lampetra spp*. Therefore, even if population levels for

Lampetra spp. appear to be acceptable, they cannot be considered as being in favourable condition until values for the individual species can be obtained.

Management Requirements of Feature 5

Currently, due to the complexities of identifying *Lampetra planeri* in the field, we don't have sufficient information about the species in the Dee SAC to know the size or dynamics of its population, the amount of habitat available for its spawning and subsequent development (The Dee Fluvial Audit may be of use here), or the other main factors that limit its development. In view of this, the management requirements are:

- To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC.
- To instigate a survey that identifies spawning sites
- To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment.
- Identify which resources are limiting the development of the current population.
- Undertake measures to improve the availability of limiting resources.

This is relevant to the Horseshoe Falls weir. The weir is believed to present a barrier to the upstream migration of lamprey. The structure should therefore be modified to enable such fish to reach the river beyond it.

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. In addition, screening must be of a standard sufficient to prevent any significant effect on the Lamprey population.

Fish stocking can be damaging to ecosystem structure and function through competition, predation and introduction of disease – ensure any fish stocking is very carefully controlled to avoid these problems, and subject to an appropriate assessment.

Status and Management Requirements of Feature 6: River Lamprey *Lampetra fluviatilis*

Status of Feature 6: Unfavourable Un-classified

APEM (2006) report that *Lampetra* spp. were caught at 36 out of 59 sites (25 out of 29 optimal sites and 11 out of 30 sub-optimal sites). This provides a value for distribution within the catchment of 61% which fails the 66% JNCC target (JNCC 2005).

The river fails the Biological GQA and soluble reactive phosphorus targets (Pisces Conservation Ltd, 2007).

It is not normally possible to distinguish between river and brook lamprey in the field. Results are reported for *Lampetra spp*. Therefore, even if population levels for *Lampetra spp*. appear to be acceptable, they cannot be considered as being in favourable condition until values for the individual species can be obtained.

Management Requirements of Feature 6

Currently, due to the complexities of identifying *L. fluviatilis* in the field, we don't have sufficient information about the species in the Dee SAC to know the size or dynamics of its population, the amount of habitat available for its spawning and subsequent development (The Dee Fluvial Audit may be of use here), or the other main factors that limit its development. In view of this, the management requirements are:

- To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC.
- To instigate a survey that identifies spawning sites
- To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment.
- Identify which resources are limiting the development of the current population.
- Undertake measures to improve the availability of limiting resources.

This is relevant to the Horseshoe Falls weir. The weir is believed to present a barrier to the upstream migration of lamprey. The structure should therefore be modified to enable such fish to reach the river beyond it.

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. In addition, screening must be of a standard sufficient to prevent any significant effect on the Lamprey population.

Fish stocking can be damaging to ecosystem structure and function through competition, predation and introduction of disease – ensure any fish stocking is very carefully controlled to avoid these problems, and subject to an appropriate assessment.

Status and Management Requirements of Feature 7: Bullhead *Cottus gobio*

Status of Feature 7: Unfavourable Un-classified

Attribute	Pass	Fail	Not determined
Population			
Adult pop. densities		X	
Distribution within SAC		X	
Reproduction / Age structure	X		
Water quality			
Biological GQA		X	
Chemical GQA	X		
Soluble reactive phosphorus		X	
Suspended solids	X		
Flow (see below)	X		
River morphology			
Weed cutting	X		
Woody debris	X		
Impediments to fish movement between reaches	X		
SSSI features in favourable condition	X		
Reduction in extent of slack water refuges, etc.			X
Negative indicators			
Non-native crayfish	X		
Stocking of other species	X		
Aspects of environmental disturbance			
Bullhead stocking	X		
Screening			X
OVERALL ASSESSMENT		X	

Except for 'Flow' result, table copied from Pisces Conservation Ltd, 2007.

Flow: Pisces Conservation Ltd (2007) based their result on Naturalised Daily Flow. For the Dee this is not applicable because of the nature of its regulation scheme. Therefore for this river the criterion for being in favourable condition is that flows should, as far as climatic conditions allow, remain within 10% of 'recent actual flow' as described by Bethune (2006), (See Conservation Objectives for Bullhead).

In the Pisces Conservation Ltd (2007) survey, two of the population targets for this species (adult population density and distribution within the SAC) fail.

The river also fails the Biological GQA and soluble reactive phosphorus targets (Pisces Conservation Ltd 2007).

Management requirements of feature 7

Attribute	Requirement
Population	
Adult pop. densities	Increase to CSM target
Distribution within SAC	Increase distribution to all areas of potential habitat. Pisces Conservation Ltd (2007) state that "Distribution within the SAC revealed considerable differences between sites with the species absent from some areas within the SAC". However the Pisces survey only looked a five field sites within the SAC so more data will be required before this opinion can be verified with confidence.
Juvenile population densities	Maintain
Water quality	
See Appendix 2. Water Quality Targets for River Waterbodies	Improve to required standard
Suspended solids	Maintain or improve
Flow (see below)	
River morphology	
Submerged macrophytes	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. JNCC's Common Standards Monitoring Guidance for Freshwater fauna (2005) states that "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". However, in view of the lack of clarity as to the importance of such plants to this species, and as much of the aquatic vegetation is a protected feature of this site in its own right, the precautionary principle should apply. Therefore, there should be no cutting of submerged macrophytes other than that specified in Appendix 1: Performance Indicators.Performance Indicators for Feature 1.
Woody debris	Maintain existing position
Impediments to fish movement between reaches	Maintain existing position
SSSI features in favourable condition	Maintain existing position
Reduction in extent of slack water refuges, etc.	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
Spawning habitat	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. Elevated levels of fines can interfere with egg and fry survival (See also 'Woody debris' above)
Negative indicators	
Non-native crayfish	Maintain existing position
Stocking of other species	Maintain existing position
Environmental disturbance	
Bullhead stocking	Maintain existing position
Screening	To be determined

Pisces Conservation Ltd (2007) also make recommendations for the following:

- Further data on any reductions in extent of slack water refuges, etc. required
- Clarification of the extent and timing of brown trout stocking, and its potential effects on bullhead populations is required.
- Information on screening of intakes and discharges is required.
- Information on the status of the bullhead populations needs to be focused in future within the area of the SAC.

Status and Management Requirements of Feature 8: European otter *Lutra lutra*

Status of Feature 8: Favourable Un-classified

The status of "Favourable" is based on the results of a survey by Philip Morgan undertaken in 2003 (Morgan 2004). However, this survey could not make a reliable estimate of population size nor, on its own, identify any trend in population change. i.e. is the population decreasing, stable or increasing? Therefore, until the site can be re-surveyed, the "un-classified" suffix is likely remain in place.

Management requirements of feature 8

Most of the following requirements are based on the main recommendations of Morgan (2004):

- Further survey work is needed in order to better estimate the number of otters in the SAC population. Morgan (2004) states that "It is impossible to judge just how many otters are present on the Dee catchment today. DNA analysis of spraints to identify individual animals is probably the only way by which this might be ascertained with some certainty".
- Establish a procedure to undertake an appraisal of road kill sites. The object being to attempt to identify reasons for otters being on the road – at least 14 otters were killed on roads in the Dee catchment in the six years prior to the survey.
- Undertake further survey work to specifically identify holts and in particular natal holts – Morgan states that such information is particularly sparse but

suggest that it is best gathered by dedicated volunteer groups and suggest that a volunteer survey/monitoring group be established in North East Wales.

- Fencing of river banks with a suitable buffer should be considered a high priority – This will encourage the establishment of areas with a dense understorey of shrub close to the river – a habitat favoured by otters. It will also reduce grazing pressure and disturbance.

Status and Management Requirements of Feature 9: The lake & aquatic / emergent vegetation (Ramsar)

Status of Feature 9: Unfavourable

The lake & aquatic / emergent vegetation is assessed as Unfavourable as the water quality is unfavourable. There is no evidence to suggest that the aquatic/emergent vegetation is unfavourable although there has not been a recent quantitative survey. Good quality presence and absence data from around the lake exists over a long time period. There is no evidence to suggest, that the aquatic/emergent vegetation or the rare plants adapted to the fluctuating water levels, have declined over recent years. We are however concerned that there may be gradual changes in the flora and ecology of the lake as it continues to become more eutrophic.

A project commissioned by the then National Rivers Authority in the early 1990s, aimed at producing a lake classification system, concluded that Llyn Tegid's enrichment or "degree of eutrophication" had increased almost six fold, compared with presumed conditions in 1930. In January 1995 a project was initiated to assess the current nutrient inputs to the lake with a view to using a predictive algal growth model and to determine appropriate management options. A succession of blue/green algal blooms dating from August 1995 has reinforced the urgency of this work. In 2006 there were around 10 blooms but no severe ones and once the wind picked up, such blooms dispersed within about 2 hours. The health concerns for people and livestock have further raised the profile of the study and focused the attention of local people, business users as well as conservationists.

Llyn Tegid should naturally be a low nutrient level lake but human activities in the catchment have increased the level of nutrients such as phosphates. The current nutrient level is too high and any increase beyond current levels is likely to have an increasingly adverse effect on its wildlife. Eutrophication may promote growth of a narrower range of plant species at the expense of the desired species. It also encourages the development of algal "blooms" which smother natural plant populations, de-oxygenate the water and in extreme cases lead to loss of fish or other animal species and nitrates. Enrichment or eutrophication can potentially affect the whole ecology of the lake including the balance of plants and animals living within it.

During the winter the water levels fluctuate widely, from 0.6m to 2.6m (or higher in severe flood) above the sluice cill. Once the rain ceases and the water level downstream of Bala starts to fall, the excess storage in Llyn Tegid is released by raising the sluices clear of the water in order to empty the flood storage prior to the next flood event. During the summer the fluctuations are smaller and less frequent because the lake level is maintained between 1.1m and 1.5 m above the sluice gate cill level by EAW. In summary the lake level is highly regulated between two

seasonal band levels with a cill level 2m below the natural pre 1956 level. There are 12 agreed release dates from Llyn Celyn down the Afon Tryweryn for canoeing at Canolfan Tryweryn. On such occasions the water level of Llyn Tegid can rise by 3 inches.

After a prolonged drought there can be a need to ensure water supply to the Dee, so proposals involving pumping water to the Dee and/or supplementing the two other reservoirs which are part of the Dee Regulation Scheme, Llyn Celyn and Llyn Brenig, may be developed, as happened in 1996. Such proposals if implemented could result in a drop in water level in Llyn Tegid (a two metre drop was part of one proposed scheme in 1996). Such major changes in water regulation would be very likely to have a significant effect. The original drop in water level since 1956 has resulted in a drying out of the swamp and loss of water sedge, which is particularly noticeable at the boathouse, on the north eastern shore.

Management Requirements of Feature 9

- To reduce/halt point and diffuse sources of pollution (enrichment) in the catchment.
- Within the catchment, forestry managers should be encouraged to adhere to guidelines for applying fertilisers and the suggestions for minimising the release of sediment at all stages of forestry practice from ground preparation to harvesting.

These sources give rise to the following pollution issues:

- Nitrate is very soluble and excessive application can lead to fertiliser seeping through to groundwater, or being washed into rivers through drains or subsurface flow;
- Phosphorus can also be carried in this way, but more commonly binds tightly to soil and is lost through surface run-off or erosion from ploughed or eroded land;
- Agrochemicals such as sheep dip, fungicides and insecticides can be washed into surface or ground waters if not correctly handled and applied;
- Microbial pathogens from manure can be washed into surface waters by rain or where livestock have direct access to watercourses; and
- River sediment levels can be increased by soil erosion due to inadequate livestock or soil management and when livestock damage riverbanks or churn up sediment within the riverbed.

Efforts have been made to tackle point sources of enrichment such as from sewerage treatment and other discharges within the catchment and more diffuse sources including land run-off. A pilot ‘catchment sensitive farming project’ for two tributary rivers, the Afon Llafar and the Afon Twrch, was initiated in 2005 with the aim of improving water quality by reducing diffuse pollution from agricultural operations. Landowners joining the scheme are offered a farm audit which highlights opportunities for improving nutrient planning, soil erosion control, loss of soil structure and organic matter, manure management and sheep dipping.

The Welsh Assembly Government, through a partnership with NRW legacy bodies and SNPA, led the project, with funding by all partners and European Union

Objective 1 funds. This pilot project finished in 2008 and analysis of the success of the scheme to be published, but we can be confident that a similar scheme for the whole catchment of Llyn Tegid would greatly improve water quality and reduce eutrophication and the frequency of blue-green algal blooms.

In the absence of such a project, then eutrophication can only be addressed by land owners in the catchment joining other voluntary agri-environment schemes. Within the boundary of the SSSI / SAC, operations that may contribute to eutrophication may be mitigated at a very localised level through the consultation for consent process.

Status and Management Requirements of Feature 10: Lake fen / swamp (Ramsar)

Status of Feature 10: Unfavourable

The lake fen/swamp is assessed as Unfavourable as the *Carex vesicaria* swamp was damaged in 1996 by the Environment Agency when they carried out flood bank maintenance work. The land has never been adequately restored, so mounds of spoil stand proud of the level of the swamp. The area of the swamp, from air photos and site visits, has also reduced since 1996 for unknown reasons.

- A survey of the fen / swamp should be carried out.

Management Requirements of Feature 10

Grazing can help prevent sedge swamp communities and other wetland from developing into willow scrub as well as promoting plant diversity in these habitats and grassland. Some plants are however particularly grazing sensitive and will benefit from grazing exclusion or periods without grazing. Marshy grassland, fen and swamp continues to be cattle and sheep grazed at the southern end of the site. The Bala end was horse grazed until the late 1980s-early 1990s after which grazing ceased.

- Fen/swamp requires grazing of different zones with some areas not grazed and others lightly summer grazed by cattle/ponies.

Mowing including topping rushes can be a good way of controlling ranker vegetation growth and increasing diversity. An area of the site at the northern end was managed as meadow in the past and the rushes growing on part of the southern marshy grassland are regularly topped. Mowing or rush topping may however adversely affect the bladder sedge fen if it is too frequent so it is important that this vegetation is monitored.

- Mowing/topping may continue as appropriate.

Scrub control is often needed at Llyn Tegid, particularly at the northern end, as the fluctuating water level, natural changes in the vegetation as well as lack of grazing all tend to result in scrub growth and encroachment onto grassland and drier fen swamp.

- A programme of scrub control should continue.

Water sports and other recreation, including swimming, sailing, canoeing, wind surfing, canoeing and sail boarding, are enjoyed by many visitors to the lake. The use of powerboats at Llyn Tegid is however restricted to rescue craft by SNPA. Water sports have resulted in the development of supporting infrastructure, including boat storage areas, slipways and boathouses and the creation of launching points. Sometimes the creation of launching points involves moving boulders, an operation that may damage the special interest in some locations, so this aspect needs to be carefully assessed before it is consented. Water sports can also result in a demand for dredging (see below), excavating channels and shoreline modifications. It is important that development does not spread further along the foreshore creating extensive areas bare of vegetation and that construction of infrastructure is controlled.

Car parking and amenity areas were formalised in 1995-97 and measures were put in place at the Bala end of the lake to control cars driving onto adjacent grassland. Part of northern end of the shore is managed by SNPA as an amenity area and a car park with picnic benches. Such facilities are important in enabling a range of visitors to enjoy the countryside at Llyn Tegid. Appropriate planning of visitor infrastructure including paths can ensure development without significant damage to the wildlife interest.

- Recreational activity and infrastructure needs to be managed.

Dredging took place in Glanllyn Bay in 1951 and in 1984 when part of the lake area (6700 sq m) was deepened to permit launching of canoes from Glanllyn at times of lower lake levels. An estimated 10,000 tons of sediment was removed from the bay and dumped in an offshore area of the lake. There was another proposal to dredge in 1997. There has also been a proposal to reroute the Afon Llafar, so that it would enter the lake to the east of Glanllyn Bay, presumably to try to reduce sedimentation. Dredging releases nutrients from the sediments and can therefore impact negatively on the nutrient levels of the lake and on the water quality. Small-scale excavation of gravel takes place at a number of locations around the lake. Such operations are only acceptable where the impact on the special interest has been fully assessed and is considered not to be significant.

- There should be a presumption against dredging.

Invasive alien plants such as Japanese knotweed, which was mapped in 1990 and has been controlled by SNPA since then, should not be allowed to re-colonise and spread. New Zealand stone crop and other aliens should not be allowed to establish themselves adjacent to or in feeder streams or the lake itself.

- Control of Japanese knotweed should continue and local agencies should monitor and be notified of the occurrence of any new invasive species.

Status and Management Requirements of Feature 11: Gwyniad / *Coregonus lavaretus* (Ramsar)

Status of Feature 11: Unfavourable

The gwyniad population of Llyn Tegid is assessed as Unfavourable (2007 survey) as it has been considered for a number of years to be threatened by deteriorating environmental conditions, especially those associated with eutrophication. Further research is required to collate more data to inform specific management prescriptions. These have been identified by Winfield (2001) as;

- The continuation of oxygen and temperature profiling.
- An investigation of gwyniad spawning grounds,
- An investigation of the fish community,
- A monitoring programme for gwyniad,
- The management of allochthonous sediment sources.

A refuge population was set up in Llyn Arenig Fawr between 2003 – 2007 and it remains to be seen how many of the fertilised eggs hatched and have attained adulthood. Refer to the Migneint-Arenig-Dduallt management plan.

Management requirements of Feature 11

The management requirements of the lake also apply to the gwyniad (see feature 9 above).

- To reduce diffuse sources of pollution (enrichment and sediments) in the catchment. Refer to feature 9.
- During the spawning season, January – end February the lake water levels should be sufficiently high to ensure that gwyniad fish eggs which are laid in the shallows around the edge of the lake are not exposed.
- There should be a presumption against fish introductions into the lake.
- There should be a presumption against significant dredging or any in-lake works between the end of October and the end of May.

Status and Management Requirements of Feature 12: Glutinous snail / *Myxas glutinosa* (Ramsar)

Status of Feature 12: Favourable

The glutinous snail *Myxas glutinosa* is assessed as Favourable based on the 2006 survey and current trends.

Myxas glutinosa has been known in Llyn Tegid since at least 1852. There was a hiatus in recorded presence in the lake between 1953 and 1998 when a CCW/Snowdonia National Park Authority funded survey relocated the species. The snail was found to be widely distributed around about 8.5km of lake margin (>80% of the total shore margin), but was not found in the silted bay where the River Dee enters the south-western end of the lake. Where present, the snail was found almost exclusively on the lower surface of cobbles and small boulders lying on sand, gravel, cobbles or boulders.

Survey sampling undertaken by divers at several of the monitoring stations in November 1999 found that *Myxas* only lives in the littoral regions of Llyn Tegid, extending to depths of only about 2.4m at 'winter' lake levels (1.4m for low summer levels). This reliance of the snail upon the shallow margins of the lake may make it particularly vulnerable to sudden or extreme lake level changes. Subsequent surveys and studies undertaken at different times of the year between 1998 and 2001 suggest that the snail has an annual life cycle. The adult snails appear to reach maturity in late winter, mostly dying off after reproducing in February/March. In the period April - June snails are very difficult to locate. By

August, partially grown snails are relatively easy to locate around most of the lake margins (at sites previously shown to support the snail). These grow throughout the autumn, whilst population numbers decline due to predation and/or other factors.

When populations of the snail were monitored in September 2001 the whole lake was affected by a 'blue-green algal' bloom which lasted several weeks. Total numbers of snails recorded during the monitoring programme was significantly lower than in the years 1998 - 2001, but, given the increase in numbers in 2002, this is likely, at least in part, to be a consequence of poor visibility hampering searches rather than fluctuating population levels. Monitoring visits should therefore avoid episodes of algal bloom if at all possible. At the time of writing this Conservation Objective, Llyn Tegid supports the only known extant population of *Myxas* on the British mainland and this makes the implementation and regular review of this Conservation Objective of the utmost importance.

This small snail is found at locations in the shallow shoreline with rock substrates of cobbles (100 – 200mm) to boulder (>200mm) grade particle sizes. The snail dwells on the undersides of rocks in shallow waters (15 – 50cm) of the lake marginal zone. The literature suggests that *Myxas* has an annual life cycle with individuals reaching full size in winter and breeding in spring, although this creatures' habits in the UK are poorly understood.

Management requirements of Feature 12

Water quality

- To reduce diffuse sources of pollution (enrichment) in the catchment. Refer to feature 9.

Maintenance of habitat extent and quality

- Sufficient supply of cobbles and boulders in the marginal zone will be maintained by allowing natural processes to deposit and erode the accretion of substrate materials. Substrate materials should not be added or removed from the marginal zone by human activity. Existing habitats should not be allowed to silt over as a result of human induced activity.

Water level fluctuations

- The winter water level should not be so low as to expose the snail's habitat for very long periods which may lead to animals desiccating.

Action Plan: Summary

This section takes the management requirements outlined in Assessment of Status and Management Requirements a stage further, assessing the specific management interventions required on each management unit. Below is a summary of the information held in Natural Resources Wales' Actions Database for sites.

Actions in Natural Resources Wales' actions database

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
16	1783	Afon Mynach	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon *Salmo salar*	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: - Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation FEATURE 5: Brook lamprey *Lampetra planeri* Conservation status: Unfavourable un-classified Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC. To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources. FEATURE 7: Bullhead *Cottus gobio* Conservation status Unfavourable un-classified. Actions currently identified: - Raise water quality to required standards	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter *Lutra lutra* Conservation status: Favourable: Un-classified Actions currently identified: - Research or surveys are required in order to more accurately determine: the size of the SAC otter population the extent of the SAC otter population its level of breeding success its age structure the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer	
17	1784	Afon Meloch	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon *Salmo salar* Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: - Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation FEATURE 5: Brook lamprey *Lampetra planeri* Conservation status: Unfavourable un-classified Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC.	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources. FEATURE 7: Bullhead *Cottus gobio* Conservation status Unfavourable un-classified. Actions currently identified: - Raise water quality to required standards Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter *Lutra lutra* Conservation status: Favourable: Un-classified Actions currently identified: - Research or surveys are required in order to more accurately determine: the size of the SAC otter population the extent of the SAC otter population its level of breeding success its age structure	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer	
18	1785	Upper Afon Ceiriog Entirely Within Wrexham CB	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon *Salmo salar*	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: - Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation FEATURE 5: Brook lamprey *Lampetra planeri* And FEATURE 6: River Lamprey *Lampetra fluviatilis* Conservation status: Unfavourable un-classified Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC. To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources. FEATURE 7: Bullhead *Cottus gobio* Conservation status Unfavourable un-classified.	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			Actions currently identified: - Raise water quality to required standards Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter *Lutra lutra* Conservation status: Favourable: Un-classified Actions currently identified: - Research or surveys are required in order to more accurately determine: the size of the SAC otter population the extent of the SAC otter population its level of breeding success its age structure the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer	
19	1786	Lower Afon Ceiriog from	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
		English Border to Confluence	on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon *Salmo salar* Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: - Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation FEATURE 5: Brook lamprey *Lampetra planeri* And FEATURE 6: River Lamprey *Lampetra fluviatilis* Conservation status: Unfavourable un-classified	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC. To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources. FEATURE 7: Bullhead *Cottus gobio* Conservation status Unfavourable un-classified. Actions currently identified: -	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			Raise water quality to required standards Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter *Lutra lutra* Conservation status: Favourable: Un-classified Actions currently identified: - Research or surveys are required in order to more accurately determine: the size of the SAC otter population the extent of the SAC otter population its level of breeding success its age structure the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer	
4	7847	Llyn Tegid		Yes
2	7848	Tryweryn - Mynach to Llyn Celyn	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon Salmo salar Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: -Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			FEATURE 5: Brook lamprey Lampetra planeri Conservation status: Unfavourable un-classified Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC. To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources. FEATURE 7: Bullhead *Cottus gobio* Conservation status Unfavourable un-classified. Actions currently identified: - Raise water quality to required standards Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter *Lutra lutra* Conservation status: Favourable: Un-classified Actions currently identified: - Research or surveys are required in order to more accurately determine: the size of the SAC otter population the extent of the SAC otter population its level of breeding success its age structure the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer.	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
3	7849	Tryweryn - Dee to Mynach	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon Salmo salar Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: -Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation FEATURE 5: Brook lamprey Lampetra planeri Conservation status: Unfavourable un-classified Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC. To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources. FEATURE 7: Bullhead Cottus gobio Conservation status Unfavourable un-classified. Actions currently identified: - Raise water quality to required standards Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter Lutra lutra Conservation status: Favourable: Un-classified Actions currently identified: - Research or surveys are required in order to more accurately determine: the size of the SAC otter population the extent of the SAC otter population its level of breeding success its age structure the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer. Section of the lower Teweryn is largely canalise and comprises the sluice controls for water entering the Dee downstream. Sections have an artificial base which has been covered by gravels, silts and sands to create a semi-natural habitat of greval beds, emergent reedbed and willow banks. This is important resting up area for otter. Upstream migrtaion of fish species is currently impeded by the sluice and weirs .	
6	7850	Dee - Alwen confl to	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
		Bala sluice gates	on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon Salmo salar Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: -Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation FEATURE 5: Brook lamprey Lampetra planeri And FEATURE 6: River Lamprey Lampetra fluviatilis Conservation status: Unfavourable un-classified Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC. To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources.	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			FEATURE 7: Bullhead Cottus gobio Conservation status Unfavourable un-classified. Actions currently identified: - Raise water quality to required standards Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter Lutra lutra Conservation status: Favourable: Un-classified Actions currently identified: -Research or surveys are required in order to more accurately determine: the size of the SAC otter population the extent of the SAC otter population its level of breeding success its age structure the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer	
7	7851	Dee - Alwen confl to Ceiriog confl	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon Salmo salar Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: -Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation FEATURE 5: Brook lamprey Lampetra planeri And FEATURE 6: River Lamprey Lampetra fluviatilis Conservation status: Unfavourable un-classified Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC. To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources. FEATURE 7: Bullhead Cottus gobio Conservation status Unfavourable un-classified. Actions currently identified: - Raise water quality to required standards Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter Lutra lutra Conservation status: Favourable: Un-classified Actions currently identified: -Research or surveys are required in order to more accurately determine: the size of the SAC otter	

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			population the extent of the SAC otter population its level of breeding success its age structure the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer	
10	7852	Dee Lower Chester Weir to Ceiriog	In general, for this SAC there is currently insufficient data to identify management requirements specific to individual units. In view of this, much of the text in this section makes general points about the features on a whole site basis. In the future, as our knowledge improves, management requirements will be developed that are more tailored for each unit. Please note that only requirements for features that have been identified as `Key habitats? or `Key species? for this unit are included here. FEATURE 1: Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Conservation status: Unfavourable unclassified Management Requirements Actions currently identified Map extent of this feature and any of its sub-types within the SAC Identify units where substrate problems may be restricting the extent or quality of this feature from existing fluvial audit or other sources. Raise water quality to required standards FEATURE 2: Atlantic salmon Salmo salar Conservation status: Unfavourable unclassified. Management Requirements Actions currently identified: -Where necessary, raise water quality to required standards Prevent exploitation until population criteria are met Improve the habitat for feature by managing/fencing off bankside vegetation	Yes

NRW Internal Reference Number	Unique SAC Unit Number	Unit Name	Summary of Conservation Management Issues	Action needed?
			FEATURE 5: Brook lamprey Lampetra planeri And FEATURE 6: River Lamprey Lampetra fluviatilis Conservation status: Unfavourable un-classified Actions currently identified: - To instigate a survey that, if necessary includes the destructive sampling of a small numbers of ammocoetes, in order to gain some understanding of the distribution and abundance of the species within the SAC. To instigate a survey that identifies spawning sites To instigate research that attempts to determine what is required by way of resources for there to be a sustainable population of this species within the Dee catchment. Identify which resources are limiting the development of the current population. Undertake measures to improve the availability of limiting resources. FEATURE 7: Bullhead Cottus gobio Conservation status Unfavourable un-classified. Actions currently identified: - Raise water quality to required standards Instigate more detailed survey than that of Pisces Conservation Ltd (2007) to clarify the current status Instigate reasons for distribution problems identified by Pisces survey eg survey slack water refuges, substrate quality, woody debris in units where substrate is sub-optimal FEATURE 8: European otter Lutra lutra Conservation status: Favourable: Un-classified Actions currently identified: -Research or surveys are required in order to more accurately determine: the size of the SAC otter population the extent of the SAC otter population its level of breeding success its age structure the extent of its dispersal and recruitment the routes commonly used for its dispersal and recruitment whether the availability of potential resting sites is a limiting the population size or extent, or whether it is increasing the risk of anthropogenic mortality Establish a procedure to analyse road death locations to try and identify reasons for otter mortality. Where possible initiate the fencing of river banks with a suitable buffer	

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 Assessment of Status and Management Requirements section or Action Plan: Summary section 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 the Conservation Objectives section.

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	A subset of the conservation objectives that are quantifiable and measurable. They consist of **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 SAC, SPA 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: Performance Indicators

These performance indicators are a sub-set of the conservation objectives and describe the evidence, including in particular evidence to be obtained from monitoring of sites and features, that will be used to inform judgements about whether or not the conservation objectives are being met.

The assessment of plans and projects should be made in view of the entirety of the conservation objectives, including the performance indicators.

Performance Indicators for Feature 1. Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (EU Habitat Code: 3260)

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
A1. Distribution within catchment	Though surveys have identified this feature at various sample sites, the feature's extent, or the extent of suitable habitat for it, within the protected site has never been mapped (The fluvial audit of the Dee (Hill and Emery, 2004) recorded vegetation cover of the river bed and looked at statistical associations with certain other variables. They did not however identify this SAC feature vegetation community)	*Upper limit:* Insufficient information *Lower limit:* Insufficient information. May occur in all site units except 1 and 14
Typical species	Should conform to Plant community: species composition and abundance targets in Table 1a of the current version of JNCC's Common Standards Monitoring Guidance for Rivers (March 2005)	*Upper limit:* Insufficient information *Lower limit:* See Table 1a of JNCC's *Common Standards Monitoring Guidance for Rivers* 2005.
Plant community Reproduction	For this attribute, the 'Targets', 'Method of assessment', and 'Comments' criteria are as those described in Table 1a of the current version of JNCC's Common Standards Monitoring Guidance for Rivers (Current version – March 2005), except for the lower limit. In the guidance, the 'minimum value is defined in terms of the "total habitat	See comments (to the left) for details of when cutting can occur. *Upper limit:* at least 50% of the habitat / macrophyte population should be left uncut for the full duration of the remaining growing season and there should be no

Performance indicators for feature condition		
	/ macrophyte population that should be left uncut". For the Dee percentages of total habitat area or total macrophyte population cannot be expressed because the total area covered by the habitat is not known. Therefore in this SAC, the value expressed applies to a percentage of the width of channel, but **only at locations where control measures such as weed cutting are an established practice as agreed by NRW**. In all other locations there should be no cutting of feature vegetation.	further cutting at the same location for at least two further growing seasons. *Lower limit:* Nil
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
Bank and riparian zone vegetation	In addition to being integral to SSSI river habitat (plant community) types, it is clear that the various types of semi-natural bank and riparian zone vegetation each contribute to the ecological well being of the site and its features in different ways. Examples include: - • Fallen leaves - these provide of a source of allochthonous vegetative input to the aquatic food web. • Fallen trees and branches – woody debris in the water provides cover for fish and invertebrates, and may generate eddies that aid their movement within the site. • Fringing and emergent vegetation at the waters edge provides cover for juvenile fish and invertebrates • Dense vegetation on river banks provides a buffer between intensively farmed land and the river • Ground layer, dense scrub and woodland vegetation on river banks provide a range of terrestrial habitat for otter.	*Upper limit:* None set *Lower limit:* Bank and riparian zone vegetation should form a semi-natural mosaic. However, where it forms part of a plant community classified as a qualifying SSSI habitat feature, it should remain within its notified classification

Performance indicators for feature condition		
	Conversely, dense woodland excludes light from the river and may limit the extent of this feature. In view of these and other known and unknown associated factors, the "mosaic" objective should ensure that all the wide-ranging interactions between bank-side vegetation and the in-river ecosystem can continue to take place.	
Species indicative of eutrophication	Cover values should not increase significantly from an established baseline. Methods used to establish these values should be as indicated in the current version of JNCC's Common Standards Monitoring Guidance for Rivers (March 2005), which rely on the method of Holmes (1983) and a standard check-list of macrophyte species. Taxa typically associated with enrichment are considered negative indicators of favourable condition. The species will vary depending on the River Community Type. For most such species, as there has not been an MTR survey on the Dee, a baseline has yet to be established. However, for blanket weed, epiphytic or other algae, the generic CSM value has been used	*Upper limit:* Cover, The Combined cover values of blanket weed, epiphytic or other algae should not exceed 25% *Lower limit:* none set
Alien / introduced species	In the CSM guidance, the SERCON scoring system for naturalness of aquatic and marginal macrophytes and naturalness of banks and riparian zone, are used to assess this attribute. SERCON protocols have not yet been applied in the Dee SAC, therefore assessment of this attribute relies on locally defined thresholds and expert judgement. Details to be confirmed	*Upper limit:* No impact on native biota from alien or introduced species. *Lower limit:* None set
Water quality	Water quality should be compliant with the standards set out in JNCC's Common Standards Monitoring Guidance for Rivers (Current version 2016), provided in Appendix 2.	See Appendix 2.

Performance indicators for feature condition		
	To a large extent, water flow in the Dee and certain of its tributaries, is regulated by NRW under a set of rules called the Dee General Directions, a requirement of the Dee and Clwyd River Authority Act 1973. The Dee was made a SSSI and SAC with these directions in place. The meaning of "recent actual flow" is as described by Bethune (2006)	*Upper limit:* +10% of recent actual flow. *Lower limit:* -10% of recent actual flow.
Light levels	This factor is partly addressed above in relation to "Bank and riparian zone vegetation" and "Species indicative of eutrophication". However, light levels reaching this feature vegetation community may be affected by other factors such as buildings, bridges or other structures. The specific ranges and values of light parameters beyond which this feature would be significantly affected is not known and therefore in all cases of doubt, the precautionary principle should apply	*Upper limit:* Insufficient information *Lower limit:* Insufficient information

Performance Indicators for Feature 2. Atlantic salmon *Salmo salar* (EU Species Code: 1106)

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
A1. Adult run size	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. For the river Dee the Conservation Limit (CL) is 5100 spawning adults per year and the Management Limit (ML) is 6300 spawning adults per year (from Davidson (2005) but details also	*Upper limit:* None Set *Lower limit:* Conservation Limit 5100 spawning adults per year complied with at least four years in five.

Performance indicators for feature condition		
	given in Pisces Conservation Ltd, (2007).	
A2. Juvenile densities	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.	*Upper limit:* Not Applicable *Lower limit:* Expected densities for each sample site using HABSCORE (Cowx and Fraser, 2003).
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
Water Quality	Water quality should be compliant with the standards set out in JNCC's Common Standards Monitoring Guidance for Rivers (Current version 2016), provided in Appendix 2.	See Appendix 2.
Flow	To a large extent, water flow in the Dee and certain of its tributaries, is regulated by NRW under a set of rules called the Dee General Directions, a requirement of the Dee and Clwyd River Authority Act 1973. The Dee was made a SSSI and SAC with these directions in place. The meaning of "recent actual flow" is as described by Bethune (2006)	*Upper limit:* +10% of recent actual flow. *Lower limit:* -10% of recent actual flow.
River morphology	a)Artificial barriers	*Upper limit:* No artificial barriers preventing significant numbers of adults from reaching existing and historical spawning grounds, and smolts from reaching the sea. *Lower limit:* Nil
	b)Characteristic physical features "The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the spawning, juvenile and migratory requirements of Atlantic salmon. The close proximity of different habitats facilitates movement to new preferred habitats with age. Operations that widen, deepen and/or straighten	*Upper limit:* Not Applicable *Lower limit:* Maintain or enhance characteristic physical features to a level where habitat can support salmon population targets.

Performance indicators for feature condition		
	the channel reduce variations in habitat. New operations that would have this impact are not acceptable within an SAC, whilst restoration may be needed in some reaches." (Extract from the current version of JNCC's *Common Standards Monitoring Guidance for Freshwater Fauna*). This offers specific guidance to the habitat requirements of some of this species' life stages	
Compensation stocking of salmon populations by NRW	Salmon stocking must only occur in order to compensate for the loss of habitat upstream of the Llyn Celyn dam. Stocking beyond the 200,000 target from the existing compensation scheme or any form or enhancement stocking should not occur	*Upper limit:* 200,000 *Lower limit:* None set

Performance Indicators for Feature 3. *Luronium natans* / Floating water plantain

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
A1. Population extent and abundance	Presence of *Luronium natans* recorded as plants that are attached to substrate. Detached fragments (unless obviously detached during monitoring) will not be counted.	Abundant *L. natans* should be found in at least, the pools at Glanllyn, Dolfawr bay and near the River Dee outfall.
A2. Sufficient habitat.	Submerged populations of *L . natans* require substrates comprising of mud or stable fine gravel or silt in depths of clear water up to 3m.	Sufficient good quality habitat should exist to support the expansion of existing populations. Extent of good quality habitat should not be reduced.
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
F1. Dredging	Dredging could directly damage *L. natans.*	No dredging likely to affect *L. natans* should occur at Glanllyn and Dolfawr bays.

Performance indicators for feature condition		
F2. Disturbance by motorised craft	Motorised craft could directly damage *L. natans*.	Number and usage of motorised craft should not rise from current level of warden's use, emergency craft and as consented for research.
F3. Water quality	L. natans is recorded elsewhere across a spectrum of nutrient levels including fairly eutrophic canals.	The lake should achieve WFD Good Ecological Status or better.

Performance Indicators for Featues 4, 5 & 6. Sea lamprey *Petromyzon marinus* (EU Species Code: 1095) Brook lamprey *Lampetra planeri* (EU Species Code: 1096) River lamprey *Lampetra fluviatilis* (EU Species Code: 1099)

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
A1. Age Structure (*Lampetra* sp. only)	Electrofishing of suitable habitat using quadrats. Suitable habitat includes silt and sand beds in the river, either at the margins or in the main channel. **Age structure** Lamprey ammocoetes grow at a reasonably steady rate and distinct size classes are usually apparent. Ammocoetes typically range from 10 – 150 mm, corresponding to up to six year classes. The largest ammocoetes are usually brook lampreys (river lampreys metamorphose at about 100 – 120 mm), while the smallest individuals are likely to be young-of-year sea lampreys, since this species spawns later in the year than *Lampetra*. The full range of age classes of ammocoete larvae, from 0+ up to metamorphosis should be present. However, sampling error may make these difficult to discern unless large samples are taken.	*Upper limit: Not applicable.* *Lower limit:* For samples of 50 or less, at least two distinct size classes should normally be present. If more than 50 ammocoetes are collected, at least three size classes should be present.

Performance indicators for feature condition		
A2 Distribution within catchment	Distribution in the catchment should be appropriate to the natural geomorphology. Any accessible silt beds should be expected to contain ammocoetes of *Lampetra spp*, although in practice some beds are likely to be naturally unoccupied (e.g. due to washout). Any silt beds adjacent to or downstream of known *Petromyzon* spawning sites should contain *Petromyzon* ammocoetes. Where barriers to migration or pollution issues are thought to be a problem, the population should be classed as being in unfavourable condition and targets for an appropriate increase should be set.	*Upper limit:* *Lower limit:* Lampreys should be present at not less than 2/3 of sites surveyed. As a minimum, there should be no reduction in the distribution of ammocoetes within the catchment.
A3. Spawning Activity (*Petromyzon* only)	Direct observation or redd counts - sea lamprey ammocoetes are typically much less numerous than river / brook lamprey ammocoetes, so this may be the only cost-effective means of determining that a healthy spawning population is present. They are usually easily observed at traditional spawning sites (*Common Standards Monitoring Guidance for Freshwater fauna*, 2005).	*Upper Limit:* None set *Lower Limit:* No reduction in extent of spawning activity year on year
Flow	To a large extent, water flow in the Dee and certain of its tributaries, is regulated by NRW under a set of rules called the Dee General Directions, a requirement of the Dee and Clwyd River Authority Act 1973. The Dee was made a SSSI and SAC with these directions in place. The meaning of “recent actual flow” is as described by Bethune (2006)	*Upper limit:* +10% of recent actual flow. *Lower limit:* -10% of recent actual flow.
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
Water quality	Water quality should be compliant with the standards set	See Appendix 2.

Performance indicators for feature condition		
	out in JNCC's Common Standards Monitoring Guidance for Rivers (Current version 2016), provided in Appendix 2.	
Hydromorphology		
a) Barriers	The impact of barriers should be assessed on a case-by-case basis. Physical modification of barriers is required where depth/velocity/ duration of flows is unsuitable to allow passage. The impact of acoustic (ie noise/vibration) and sediment/chemical barriers should also be assessed on a case by case basis. When arising from construction or other development related activities it may be necessary to restrict the timing of such activities	*Upper limit:* No artificial barriers significantly impairing adults from reaching existing and historical spawning grounds *Lower limit:* None set Impact of existing structures needs to be evaluated.
b) Spawning site availability	The location and extent of the actual and/or potential area of the SAC that is/ could be spawning habitat is currently unknown	*Upper limit:* None set *Lower limit:* Insufficient information
b) Spawning habitat	Spawning habitat usually 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 Elevated levels of fines (particles <0.83mm) can interfere with egg survival	*Upper limit:* None set *Lower limit:* No significant reduction in spawning habitat
Exploitation	Exploitation can directly on impact population dynamics through reduced recruitment and survival rates	*Upper limit:* Zero exploitation of sea lamprey until further notice *Lower limit:* nil

Performance Indicators for Feature 7. Bullhead Cottus gobio (EU Species Code : 1163).

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
Population	Single-pass electrofishing in August / September. Data analysis as in a-c. below. For details see the LIFE in UK Rivers Project protocol	*Upper limit:* *Lower limit*: see sub-attributes in a-c below
a) Population densities	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.	*Upper limit:* *Lower limit:* No less than 0.2 m^{-2} in sampled reaches
b) Distribution	In the UK, bullhead are widespread in any flowing water at an altitude of less than 300 m. Well oxygenated water over a gravel / pebble / cobble substrate is preferred (and is essential for successful reproduction). Riffles are a favoured microhabitat. Very sluggish water with a clay / silt substrate or cold, steep-gradient upland sections with numerous cascades and boulder / bedrock substrate should be viewed as sub-optimal. Bullheads can occur in very small channels (<1 m wide) where they may be the only fish species present. Bullhead are very poor colonists, to the extent that catchments may contain many individual subpopulations. It is not feasible to assess each of these individually, but it is very important that there is no loss of these populations, and that access routes between them are not impeded	*Upper limit* *Lower limit:* Bullheads should be present in all suitable reaches. As a minimum, no decline in distribution from current

Performance indicators for feature condition		
c) Reproduction / age structure	This gives an indication of successful recruitment and a healthy population structure.	*Upper limit:* *Lower limit:* Young-of-year fish should occur at densities at least equal to adults
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
Water quality	Water quality should be compliant with the standards set out in JNCC's Common Standards Monitoring Guidance for Rivers (Current version 2016), provided in Appendix 2.	See Appendix 2.
Flow	To a large extent, water flow in the Dee and certain of its tributaries, is regulated by NRW under a set of rules called the Dee General Directions, a requirement of the Dee and Clwyd River Authority Act 1973. The Dee was made a SSSI and SAC with these directions in place. The meaning of "recent actual flow" is as described by Bethune (2006)	*Upper limit:* +10% of recent actual flow. *Lower limit:* -10% of recent actual flow.
Hydromorphology		
a) Barriers	CSM guidance: Vertical drops of >18-20 cm are sufficient to prevent upstream movement of adult bullheads. They will therefore prevent recolonisation of upper reaches affected by lethal pollution episodes, and will also lead to constraints on genetic interactions that may have adverse consequences. New in stream structures should be avoided, whilst the impact of existing structures needs to be evaluated	*Upper limit:* No significant artificial barriers to essential fish movement between reaches *Lower limit:* None set Impact of existing structures needs to be evaluated.
b) Woody debris removal	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	*Upper limit:* Woody debris removal should be restricted to essential activities such as flood risk management. *Lower limit:* Nil

Performance indicators for feature condition		
	be used as an alternative spawning substrate. Debris dams and woody debris should be retained where characteristic of the river/reach	
f) Bankside tree cover	Maintenance of intermittent tree cover in conjunction with retention of woody debris ensures that habitat conditions are suitable. Some reaches may naturally have lower tree cover. Cover may also be lower in urban reaches. In reaches without any riparian trees orwhere bullhead may be more reliant on woody debris, it may be desirable to introduce a limited amount of cover.	*Upper limit :* None set. Any proposed change to bankside tree cover must be considered individually taking into account factors mentioned in the comments column (see left) and any other significant local factors *Lower limit:* Nil
a) Non-native crayfish	Bullhead densities have been found to be negatively correlated with densities of non-native crayfish, suggesting competitive and/or predator prey interactions.	*Upper Limit:* none set *Lower Limit:* Non-native crayfish should be absent
b) Stocking of other fish	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. Escapes from fish farms are a form of uncontrolled introduction and should be prevented by effective screening on all intakes and discharges	*Upper limit:* Introductions or restocking should not adversely impact populations. *Lower limit:* Nil
c) Stocking / transfers	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	*Upper limit :* Stocking / transfers of bullhead should not adversely impact populations. *Lower limit:* Nil

Performance Indicators for Feature 8.
European otter *Lutra lutra (EU Species Code : 1355).*

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
A1 Population size	In 2004 Morgan provided an intuitive estimate of the catchment population size of 22 breeding pairs. However, he states that this not accurate as it is based on an assessment of the habitat available. The presence of otters can be determined by carrying out standard sign surveys. The main problem with monitoring otter populations is the lack of a clear relationship between the density of signs and the density of otters. There is currently no way of reliably estimating otter density, although the use of DNA extracted from spraints may provide a solution to this in the future (Common Standards Monitoring Guidance for Mammals (2004),). In view of this, some form of survey or more accurate means of assessment is required	*Upper limit: None set* *Lower limit:* Insufficient information
A2. Extent	The limits expressed here are based on the 'Sites', and their numbers, used by the Otter Survey of Wales within the River Dee SSSI's catchments. 46 of the 59 equates to 78% of sites. However, while these values may be useful for monitoring purposes, it is highly likely that otters range throughout the SAC and beyond. Therefore extensive survey work is required in order to adequately determine the extent, distribution and mobility of the SAC otter population. The use of artificial sprainting sites may be necessary in parts of the SAC, and beyond, where natural	*Upper limit:* None set *Lower limit:* Otter signs to be found at 46 of the 59 sites (See comments to the left for the definition of 'sites') More extensive survey work required

Performance indicators for feature condition		
	sprainting sites appear to be sparse.	
A3. Breeding Success	Morgan (2004) identified 77 potential 'Otter Sites'. Of these he could confirm only five as being actual breeding sites but no natal holts were actually identified. A number of live sightings were reported but few of these were of cubs and their survivorship is unknown. In view of this, clearly further survey or research is required.	*Upper limit:* None set *Lower limit:* Insufficient information
A4. Age structure	In order to properly assess the favourable conservation status of this feature it would clearly be beneficial to have some understanding of age structure. The only information currently available for this it that of Morgan (2004), based on road deaths and live sightings. However, the numbers involved were very low. Therefore further information is required	*Upper limit:* None set *Lower limit:* Insufficient information
A5 Dispersal and recruitment	Little is currently known of the extent, rate or direction of dispersal of otters from the SAC population, either within the SAC or in the wider catchment. Similarly, little is known of the of recruitment into the population, either from births within it or from otters dispersing from other populations. Such knowledge would enable assessment of the robustness of the population and its potential ability to recover from losses. It would provide some knowledge of its likely genetic diversity.	*Upper limit:* None set *Lower limit:* Insufficient information
A4. Good quality vegetation for breeding otters	Good quality vegetation for breeding otters includes dense scrub (e.g. bramble, blackthorn and gorse); reed-beds; deciduous woodland with an under-story; young conifer plantations; Rhododendron	*Upper limit:* None set *Lower limit:* No reduction in the quality of or extent of suitable otter habitat

Performance indicators for feature condition		
	thickets; and wetlands (particularly with areas of *Molinia caerulea*).	
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
F1 Potential Breeding Sites	Though clearly the presence of sites where otters can breed is a critical factor for any population, the *Common Standards Monitoring Guidance for Mammals* (2004), specifically excludes breeding sites as a factor or attribute for assessing conservation status of otter. It does so because “It would also be extremely difficult to decide on a reasonable target and a means of measuring the attribute.” However, as the survey of Morgan (2004) collected such data, the number of potential breeding sites has been included here as a factor.	*Upper limit:* None set *Lower limit:* There should be an increase in the number of known potential (in addition to actual) breeding sites on the River Dee from 72 to 76. Lakeside habitat that could provide potential breeding sites for otter should be retained at current levels.
F2 Potential resting sites	Otters use a range of types of resting or laying up sites, and these may vary in type or location depending on conditions and availability. Surveys within the Dee SAC have found many potential sites but there are sections where few have been found. Where these coincide with sections of the site where little otter activity has been detected, research should be undertaken to determine whether the presence of resting sites is a limiting factor. If it is, measures should be undertaken to increase the number of potential resting sites. In addition, where potential resting sites are few, otters may travel further to find them. This may lead to a greater risk of death due to anthropogenic mortality, particularly where road crossing may occur.	*Upper limit:* None set *Lower limit:* Insufficient information

Performance indicators for feature condition		
F2 Food availability	Otters depend on food that comes from a range of aquatic environments, such as streams, marshes, ponds and backwaters. Their diet may, among other things, include fish, amphibians and crustaceans. Eels are thought to be particularly favoured though at times prey, such as frogs, can assume a greater importance than that of fish. Data should be sought on fish stocks from EAW. Specific assessment limits have yet to be devised	*Upper limit :* None set. *Lower limit:* Fish biomass stays within expected natural fluctuations. There should be no loss of amphibian habitat likely to be used by otters from the SAC population. More specific limits to be devised
F3 Dispersal and access routes	Little is currently known of dispersal or access routes used by otters from the SAC population, either within the SAC or in the wider catchment. However, such routes are essential for the dynamics of a healthy population. Therefore further information is required	*Upper Limit:* none set *Lower Limit:* No loss or impairment of any such routes. More specific limits to be devised
F4 Anthropogenic mortality	Road deaths have been noted as a primary threat to the otters conservation status across Wales, and if the numbers reported by Morgan (2004) are compared to his estimate of population size, clearly of such deaths are a significant factor affecting the population of this SAC.	*Upper limit:* No increase in numbers of recorded Road Deaths. Analysis of road death locations should be used to try and identify reasons for such mortality. *Lower limit:* Nil
F5 Disturbance	Otters are sensitive to human disturbance and especially to sudden changes in activity. They are particularly sensitive to disturbance by dogs. The female otter is particularly sensitive to disturbance when she has cubs.	*Upper limit :* No significant increase disturbance to otters. *Lower limit:* Nil

Performance Indicators for lake and marginal wetland SAC & Ramsar features 9 and 10. The lake and aquatic /emergent vegetation, Lake fen/swamp incl. wet woodland.

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
A.1 Extent of communities / assemblages		
A1.1. Extent of aquatic /emergent macrophyte assemblages	See Conservation Objectives above which lists aquatic/emergent species. The use of the lake as a reservoir & flood defence has substantially affected the marginal community.	The collated data in Evans and Benoit (1996) provides the lower limit acceptable. Need to monitor to ensure no further deterioration
A1.2. Extent of fen /swamp communities	The location of fen / swamp was mapped at Phase 1 level in early 1990s. Evans & Benoit (1996) also mapped some other areas of swamp (including *Carex vesicaria* swamp/fen). A compilation 1996 Map has been drafted. It appears that the area of swamp has reduced during the period 1996-2008.	Lower limit of extent for fen/ swamp communities is based on the map in annex 1(1996). Sufficient expansion areas for fen/swamp communities should be maintained.
A.2 Distribution of communities / assemblages		
A2.1 Distribution of aquatic /emergent macrophyte assemblages	The extent of aquatic macrophytes is a good indicator of the health of the lake. Growth in deeper water indicates good light penetration through the water column. A full CSM was carried out in 2004, and Llyn Tegid is scheduled for monitoring by NRW. The use of hydroacoustic techniques for mapping vegetation is currently being trialled on the lake.	The collated data in Evans and Benoit (1996) provides the lower limit acceptable. Lower Limit: Maximum depth of plant growth should not be less than 2.5m.
A2.2. Distribution of fen / swamp types	NVC S11 *Carex vesicaria* lower limit is based on 1996 survey map by Evans & Benoit. It appears that the area of *Carex vesicaria* swamp has reduced during the period 1996-2008.	The lower limit of distribution for fen/ swamp communities is based on Map in annex 1 (1996).
A.3 Frequency and abundance of typical & key species		
A3.1 Typical species of aquatic	Dominant species or community constant species	Typical species of aquatic /emergents & fen /

Performance indicators for feature condition		
/emergents & fen / swamp	will continue to be recorded at the expected frequency and abundance for their community. Refer to tables in the Conservation Objective section for aquatic /emergents and fen / swamp. Refer also to Rodwell (1995) and Evans & Benoit (1996).	swamp should continue to be present at previously recorded frequency and abundance. The wet woodland that has developed on swamp should include sedges and a wetland under storey. Aquatic Species Lower Limit: 90% or more of sample points should have one or more of the following species recorded: *Isoetes spp; Littorella uniflora; Luronium natans; Elatine hexandra; Nitella spp; Callitriche hamulata.*
A3.2. Uncommon/key species aquatic /emergents & fen / swamp	Refer to table in Conservation Objective section. *Luronium natans* has separate conservation objectives. (See feature 2).	Uncommon/key species aquatic/emergents & fen / swamp species should continue to be present at previously recorded frequency and abundance. Evans & Benoit (1996).
A3.3. Non- native species	Non- native species can out compete native species and reduce the natural biodiversity of the vegetation.	Invasive non-native species should be absent (NB *Elodea nuttalli* present but rare)
A.4 Habitat Structure and Function		
A4.1. Water quality	Water quality should allow lake to be classed as an oligo-mesotrophic water body. Refer to management requirements section above for details of the research carried out on water quality and actions taken to tackle point and diffuse sources of pollution in the catchment.	Water quality in the lake should be of a standard that will ensure it reaches at Good Ecological Status or better as defined by the Water Framework Directive.
A4.2 Shoreline substrates	Shoreline substrate should be allowed to accrete and erode under the natural influence of the lake's tributaries. The wildly fluctuating lake level, including	Map and photograph existing constraints (2008) on natural erosion/accretion and ensure this does not

Performance indicators for feature condition		
	very high levels, results in gravels being washed up the shore including onto tracks in places. Severe winter storms promotes roller wave action leading to buffeting and erosion of the swamp communities on the north east shoreline.	increase and that opportunity is taken to remove constraints.
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
F1. Water level regulation	Water levels in the lake are regulated and the current regime ensures that a "conservation" level is imposed and this arrangement should be continued.	Continue existing regime unless evidence of a negative impact or adverse trend.
F2. Water sports	Extent or distribution of marginal wetland should not be compromised by recreational infrastructure.	Map and photograph existing infrastructure (2008) and ensure this does not increase and that opportunity is taken to restore habitats as appropriate.
F3. Dredging	Dredging took place in Glanllyn Bay in 1951, 1984 & there was another proposal to dredge in 1997. Small-scale excavation of gravel takes place at a number of locations around the lake. Such operations are only acceptable where the impact on the special interest has been fully assessed and is considered not to be significant.	There is a presumption against dredging.
F4. Flood defence work incl. works on tributaries and re-routing rivers.	Flood embankments maintenance work can result in loss of swamp and damage to the marshy grassland and other grassland if heavy machinery is driven within the SSSI and ruts are left, soil is compacted, disturbed, and/or moved.	No further damage should take place through flood defence or other engineering works. Previously damaged stands should be restored.
F5. Scrub control	Scrub control is often needed at Llyn Tegid, particularly at the northern end, as the fluctuating water level, natural changes in the vegetation as well as lack of grazing all tend to result in	A scrub control programme should continue.

Performance indicators for feature condition		
	scrub growth and encroachment onto grassland and drier fen swamp. The Bala Lake Railway Company regularly fell/coppice trees and scrub along the edge of the railway line in order to maintain views and also as a health and safety measure.	
F6. Mowing	Mowing including rush topping can be a good way of controlling ranker vegetation growth and increasing diversity. An area of the site at the northern end was managed as meadow in the past and the rushes growing on part of the southern marshy grassland are regularly topped. Mowing or rush topping may however adversely affect the bladder sedge fen if it is too frequent so it is important that this vegetation is monitored.	Consented mowing as appropriate.
F7. Grazing	Grazing can help prevent sedge swamp communities and other wetland from developing into willow scrub as well as promoting plant diversity in these habitats and grassland. Some plants are however particularly grazing sensitive and will benefit from grazing exclusion or periods without grazing. Marshy grassland, fen and swamp continues to be cattle and sheep grazed at the southern end of the site. The Bala end was horse grazed until the late 1980s early 1990s after which grazing ceased.	Zoned grazing with some areas not grazed and others lightly summer grazed.

Performance Indicators for Feature 11. Gwyniad *Coregonus lavaretus.*

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
A1 Population abundance & demographic structure.	Variation in abundance levels at other white fish sites is great, so reference values must be calculated for each site (Bean, 2003). Lack of historical data preclude this calculation for Llyn Tegid so specified limits are provisional until more data is available.	90% of individuals in the 0+/1+ age class (corresponding to gwyniad in the small length class of 40 – 99mm).
A2 Range	The natural range is taken to mean those water columns where predominantly suitable habitat for each life stage exists over the long term.	Deeper cooler waters required in the summer and shallow spawning waters required late winter.
A3 Maintenance of habitat quality for each stage of their lifecycle i.e. spawning & feeding grounds.	Shallow water gravels are used for spawning between January and February. Gwyniad feed in the deeper water columns on a wide variety of invertebrates but predominantly *Daphnia* (water fleas).	Sufficient suitable spawning areas should be available every season.
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
F1. Water level regulation	Low winter water levels could expose the shallow water spawning gravels in January & February.	Sufficient suitable spawning areas shall be available every season. Deeper water feeding columns to be maintained.
F2. Water quality	See performance indicators for feature 9 (the lake).	See performance indicators for feature 9 (the lake).
F4. Environmental conditions; Water temperature profiles.	Coregonids are unable to tolerate a wide range of temperatures and high temperatures can be lethal. Levels are assessed for vertical distribution.	Water column temperatures should not rise above 15°C.
F5. Presence of alien fish species; roach & ruffe.	Roach *Rutilis rutilis* (competition), ruffe *Gymnocephalus cernuus* (predation of gywniad eggs).	Accept presence as only a pragmatic option. Review approach if evidence of adverse impact and

Performance indicators for feature condition		
		suitable control methods are available.
F6. Nutrient state & sediment input.	See performance indicators for feature 9 (the lake).	See performance indicators for feature 9 (the lake).
F8. Dredging	Dredging can directly damage gwyniad spawning areas.	No dredging likely to affect gwyniad spawning areas to be consented between January – end of May.

Performance Indicators for Feature 12. Glutinous snail *Myxas glutinosa*

Performance indicators for feature condition		
Attribute	**Attribute rationale and other comments**	**Specified limits**
A1 Population abundance & extent.	These are the targets to maintain the population at a Favourable Conservation Status – separate targets have been compiled should the status change and the population needs to be restored – see Willing, M.J., (2006) Condition assessment of the glutinous snail *Myxas glutinosa* in Llyn Tegid in 2005. CCW Contract Science Report No. 726. Bangor. CCW.	*Lower limit:* The combined total number of semi-grown snails at the 8 monitoring sites is 40 and where the snail is recorded at 6 of the 8 monitoring sites (Map Y showing monitoring stations in Appendix X).
A2 Maintenance of habitat extent and quality.	In water depths of Om - ca 2.5 m (with lake levels between 0.75 - 1.35m) the habitat consists predominantly of cobbles and boulders lying on varying mixtures of sand, gravel and cobbles (but not noticeable amounts of mud or silt). There is little organic detritus between the stones and filamentous and slime forming algal species are scarce or absent from the rock surfaces. The lower surfaces of rocks appear blackened and, with the exception of occasional freshwater sponges, are largely devoid of other living	*Lower limit:* Cobbles and boulders at 6 of the 8 monitoring stations give no more than 20% of the rock surface covered in silt and/or slime forming algae. *Lower limit:* Still, calm lake water should have clarity to 1.5m depth.

Performance indicators for feature condition		
	encrustations. Lake water (judged in still weather with a calm or reasonably calm lake surface) has good clarity such that stones can be seen clearly to at least 1.5m depth. Water is not turbid due to silt suspension or floating algal blooms.	
Performance indicators for factors affecting the feature		
Factor	**Factor rationale and other comments**	**Operational Limits**
F1. Water level fluctuations	Very low water levels could expose the shallow gravel shelf and snails could desiccate. (See factors affecting feature no. 11 for details).	Sufficient suitable areas of small gravel substrate with shallow water levels (between 1.4m – 2.4m) shall be available throughout the year.
F2. Water quality.	See performance indicators for feature no. 9 & 10 for lake.	See performance indicators for feature no. 9 & 10 for lake.

Appendix 2. Water Quality Targets for River Waterbodies

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

River SACs designated under the Habitats Regulations 2017 (UK Gov, 2017) overlap river water bodies designated under Water Framework Directive Regulations (NRW, 2015; UK Gov, 2015). The water quality standards that apply come from the source legislation – i.e. for the water body the WFD Regulations standards and for a SAC the Habitats Regulations standards. Note that the words targets and standards are used under the various documents that sit under these two Regulations. We have interpreted these to mean the same thing and for this document we will use the term standard unless directly quoting from a specific document. Water quality standards for Special Area of Conservation (SAC) rivers are set via agreement at a UK level and presented in the JNCC Common Standards Monitoring (CSM) guidance (JNCC 2016).

However, having two sets of standards for the same area of river can lead to confusion as to which apply in a given situation. This Appendix sets out the standards for water quality attributes for river water bodies in the Afon Dyfrdwy a Llyn Tegid SAC. Where they are more stringent, WFD Regulation 2017 standards are adopted as the CSM standards.

Note that for the transitional (estuarine) waterbody GB531106708200, specific water quality standards are not yet available. Therefore the standard for this waterbody is to achieve WFD Good Ecological Status.

1. Organic pollution

Table A2.1a provides the values for the physio-chemical attributes to be applied across all river types. Standards apply throughout the assessment unit, not just at sparsely distributed monitoring sites.

The standards for DO, BOD and un-ionised ammonia are the same for all river water bodies whereas the standard for total ammonia varies according to river type and previous WFD Regulations classification for ammonia (Table A2.1a). For the 90%ile total ammonia the CSM target is 0.25mg/l. However, if High Status under WFD is being reached for a water body for certain river types then the more stringent WFD standard at 0.2mg/l is applied. This is due to the no deterioration principle. Total ammonia standards for each waterbody are given in Table A2.1b.

Table A2.1a. Organic pollution standards for SAC rivers.

Organic pollution attribute	Unit	Test Statistic	Target
Dissolved Oxygen (DO)	% saturation	10%ile	≥85
Biochemical Oxygen Demand (BOD)	mg l^{-1}	Mean calculated over a 3-year period	≤1.5
Total Ammonia	mg l^{-1}	90%ile	Varies by water body. See Table 2.1b.
95%ile un-ionised ammonia	mg l^{-1}	95%ile	≤0.025

Table A2.1b. Total Ammonia standards for river water bodies in the Afon Dee SAC.

***** Reason for total ammonia standard: some water bodies that meet WFD high status for ammonia have the WFD high target of 0.2 mg l^{-1}, all other water bodies have the CSM target of 0.25 mg l^{-1}.

Water Body ID	Water Body Name	Total Ammonia (90%ile, mg l^{-1})	Reason for total ammonia standard*
GB111067051960	Meloch	0.2	WFD (high)
GB111067051990	Mynach	0.2	WFD (high)
GB111067051900	Tryweryn - Dee to Mynach	0.2	WFD (high)
GB111067052060	Dee - Ceiriog to Alwen	0.2	WFD (high)
GB111067052240	Dee - Alwen to Llyn Tegid/ Bala Lake	0.2	WFD (high)
GB111067057080	Dee - Chester Weir to Ceiriog	0.25	CSM

Water Body ID	Water Body Name	Total Ammonia (90%ile, mg l^{-1})	Reason for total ammonia standard*
GB111067051610	Ceiriog - upstream of Teirw	0.2	WFD (high)
GB111067051910	Ceiriog - confluence Dee to Teirw	0.25	CSM
GB111067051980	Tryweryn - Mynach to Llyn Celyn	0.2	WFD (high)

2. Reactive phosphorus

Phosphorous standards are set according to altitude, alkalinity, and river size, with the tightest targets in low alkalinity, high altitude headwater areas, reflecting natural variation (JNCC 2016). River Habitat Survey (EA, 2003) river flow categories are used to determine river size.

The process also includes an alignment procedure to ensure that standards are never less stringent than the Water Framework Directive (WFD) phosphorus standard for the same water body. If the WFD standard is more stringent than the CSM standard then the WFD standard applies.

Individual phosphorus standards for all waterbodies in the Dee SAC are given in Table A2.2. As explained previously, the WFD phosphate standard has been applied where it is more stringent than CSM targets.

Table A2.2. Phosphorus standards and typology for river waterbodies in the Afon Dee SAC. * Phosphorus standard to be applied to annual and growing season means. Standard calculated from annual mean expressed in µg L-1 SRP. ** Reason for phosphorus standard: CSM (near natural/max allowable) are derived from the CSM guidance for Rivers and WFD (good/high) from the relevant Water Framework Directive standard.

Water Body ID	Water Body Name	SAC Manage-ment Unit	Phospho-rus standard * (µg l^{-1})	Reason for phosphorus standard**	CSM_ Alt type	CSM_Alk type	River size
GB11106 7051910	Ceiriog - confluence Dee to Teirw	1786	25	CSM (max allowable)	high Alt >80m	high Alk >50mg/l	river
GB11106 7051610	Ceiriog - upstream of Teirw	1785	10	CSM (near natural)	high Alt >80m	low Alk <50mgl	river

Water Body ID	Water Body Name	SAC Manage-ment Unit	Phospho-rus standard * (µg l^{-1})	Reason for phosphorus standard**	CSM_ Alt type	CSM_Alk type	River size
GB11106 7052240	Dee - Alwen to Llyn Tegid/ Bala Lake	7850	10	CSM (near natural)	high Alt >80m	low Alk <50mgl	river
GB11106 7052060	Dee - Ceiriog to Alwen	7851	10	CSM (near natural)	high Alt >80m	low Alk <50mgl	river
GB11106 7057080	Dee - Chester Weir to Ceiriog	7852	50	CSM (max allowable)	low Alt <80m	high Alk >50mg/l	river
GB11106 7051960	Meloch	1784	10	CSM (max allowable)	high Alt >80m	low Alk <50mgl	headwater
GB11106 7051990	Mynach	1783	10	CSM (max allowable)	high Alt >80m	low Alk <50mgl	headwater
GB11106 7051900	Tryweryn - Dee to Mynach	7849	10	CSM (near natural)	high Alt >80m	low Alk <50mgl	river
GB11106 7051980	Tryweryn - Mynach to Llyn Celyn	7848	10	CSM (near natural)	high Alt >80m	low Alk <50mgl	river

3. Trophic diatom index

The standard should be equivalent to WFD high ecological status using the current version of the diatom classification tool (via light microscopy). This is a tool developed to measure increases in nutrient concentrations through assessing degree of change in floristic composition in benthic diatoms (algae) in streams and rivers.

4. Acidification

This standard 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. See tables 4a and 4b for standards for all water bodies in the Afon Dee SAC.

Two of the WFD water bodies in the Afon Dee SAC are classed at risk of acidification (Hankin *et al*. 2014). However, to comply with CSM guidance, acid targets have been applied for all river water bodies. **Note that monitoring and reporting will only be carried out for water bodies classified as either 'at risk' or 'probably at risk'.** If ANC data is available then water bodies should be assessed against the ANC standard but if ANC data is not available then pH should be used.

Table A2.4a. Acidification targets for SAC rivers.

*Acid Neutralising Capacity; ** Dissolved Organic Carbon

Targets for acidification	Method of assessment
ANC*: Mean ANC for all waters > 80 pH (Clear waters with DOC**<10 mg L-1): mean > 6.54 pH (Humic waters with DOC>10 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.

Table A2.4b. Acidification targets for river waterbodies in the Afon Dee SAC.

Water Body ID	Water Body Name	Acidification risk	Acid Neutralising Capacity (ANC)	pH
GB111067051910	Ceiriog - confluence Dee to Teirw	Not at risk	>80	>6.54
GB111067051610	Ceiriog - upstream of Teirw	Probably not at risk	>80	>6.54
GB111067052240	Dee - Alwen to Llyn Tegid/ Bala Lake	Probably at risk	>80	>6.54
GB111067052060	Dee - Ceiriog to Alwen	Not at risk	>80	>6.54
GB111067057080	Dee - Chester Weir to Ceiriog	Probably not at risk	>80	>6.54
GB111067051960	Meloch	Probably not at risk	>80	>6.54
GB111067051990	Mynach	Probably not at risk	>80	>6.54
GB111067051900	Tryweryn - Dee to Mynach	Probably not at risk	>80	>6.54
GB111067051980	Tryweryn - Mynach to Llyn Celyn	Probably at risk	>80	>6.54

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