



## **European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features**

**River Clun Special Area of Conservation (SAC)  
Site code: UK0030250**



Source: River Clun SSSI/SAC Restoration Strategy, Atkins V.3b March 2012

**Date of Publication: 23 November 2018**

## **About this document**

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to River Clun SAC. This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

**This advice updates and replaces a draft version dated 12 October 2018 following comments from the site's stakeholders.**

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site. Any proposals or operations which may affect the site or its qualifying features should be designed so they do not adversely affect any of the attributes listed in the objectives and supplementary advice.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

**If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email [HDIRConservationObjectivesNE@naturalengland.org.uk](mailto:HDIRConservationObjectivesNE@naturalengland.org.uk)**

## About this site

### European Site information

<b>Name of European Site</b>	River Clun Special Area of Conservation (SAC)
<b>Location</b>	Shropshire and Herefordshire
<b>Site Map</b>	The designated boundary of this site can be viewed <a href="#">here</a> on the MAGIC website.
<b>Designation Date</b>	1 <sup>st</sup> April 2005
<b>Qualifying Features</b>	See section below
<b>Designation Area</b>	14.93 hectares (length 4.7 km)
<b>Designation Changes</b>	Not applicable.
<b>Feature Condition Status</b>	Condition assessment information relating to this site can be found using Natural England's <a href="#">Designated Sites search tool</a> .
<b>Names of component Sites of Special Scientific Interest (SSSIs)</b>	River Teme SSSI underpins the River Clun SAC. N.B. River Clun SAC is a match for Unit 6 of River Teme SSSI although there may be very minor mapping differences.
<b>Relationship with other European or International Site designations</b>	Not applicable

### Site background and geography

The River Clun is a tributary of the River Teme, which is the second largest tributary of the River Severn and drains a hilly, predominantly rural catchment of sandstones and mudstones derived from Silurian and Devonian rocks.

It lies within the [Clun and North West Herefordshire Hills National Character Area](#) (NCA), an undulating, tranquil, rural and sparsely populated area divided by the river valleys of the Clun and Teme. The SAC also forms part of the [Shropshire Hills Area of Outstanding Natural Beauty](#).

The SAC includes only the lower reaches of the river Clun and extends upstream from its confluence with the River Teme to Broadward Bridge near Marlow. This section of the river holds an important population of the freshwater pearl mussel *Margaritifera margaritifera*, one of the few populations left in the lowlands of the UK.

## About the qualifying features of the SAC

The following section gives you additional, site-specific information about the natural habitats and/or species for which this SAC has been designated.

### Qualifying habitats:

Not applicable.

### Qualifying Species:

- **S1029. Freshwater pearl mussel *Margaritifera margaritifera***

The freshwater pearl mussel grows to 140 mm in length, and burrows into sandy substrates, often between boulders and pebbles, in fast-flowing rivers and streams. It requires cool, well-oxygenated soft water free of pollution or turbidity. They inhale water through their exposed siphons to filter out minute organic particles on which to feed.

The freshwater pearl mussel life cycle involves an adult stage, living as a filter feeder, a juvenile stage living interstitially in sediment, and a larval (or glochidial) stage living attached to the gills of trout or salmon. All life stages are important, as is the viability of the host species of fish.

This species does not reach reproductive maturity until at least 12 years old and individuals may live for over 100 years, making it one of the longest-lived invertebrates known.

Population declines have been caused by factors such as human disturbance from pearl-fishing, pollution, acidification, nutrient enrichment, siltation, river engineering, and declining salmonid stocks. Many of the UK's rivers now contain only scattered individuals, with no juvenile mussels recorded; such populations are at risk of extinction due to lack of recruitment. Despite serious declines in both range and total population, the UK is the remaining European stronghold for the freshwater pearl mussel, supporting functional populations in over 50 rivers.

In the UK, the freshwater pearl mussel and its habitat are fully protected by law under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Habitats Regulations. A [licence](#) may be needed before carrying out any activities likely to harm or disturb freshwater pearl mussels.



Clun freshwater pearl mussels © Natural England/Vicki Howden

**Table 1: Supplementary Advice for Qualifying Features: S1029 Freshwater pearl mussel *Margaritifera margaritifera***

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<b>Supporting habitat: structure/function</b>	<b>River habitat mosaic (in-channel structures and morphology)</b>	Restore the in-channel river habitat features to those generally characteristic of the river type, and to a predominantly unmodified plan form.	<p>The characteristics of riverbeds are of critical importance for freshwater pearl mussel populations. The typical substrate preference of mussels is small sand patches stabilised amongst large stones or boulders in fast-flowing streams and rivers. Riffle areas with mixtures of rocks, cobbles and sand, which provide a well-oxygenated and silt-free environment, are important habitats in low gradient sections of river. Juvenile mussels are mostly associated with such riffles, and require fine sediment within which to shelter.</p> <p>Natural in-channel habitats should be present to an extent and in patterns characteristic of natural fluvial processes. Artificial physical habitat modifications should have no, or only minor, effect on physical habitat structure throughout the river, and there should be no increase in physical modifications from existing conditions. Relevant modifications can include channel straightening, widening and deepening, bankside and bed protection.</p> <p>Sections of river that are already significantly physically modified may require measures to restore natural geomorphological processes (including restoration of hydrological continuity between river and floodplain) to allow restoration of characteristic and sustainable river habitats.</p> <p>Numerous weirs and fords have been recorded on the Clun, several of which posed a barrier to migration of aquatic fauna. Several culverts were recorded, especially where the rivers flow through villages. In addition to hindering species migration weirs and culverts interrupt the natural movement of sediment through the river system, causing some areas to become sluggish causing silt to deposit.</p>	ATKINS, 2012; JACOBS, 2013.
<b>Supporting habitat: structure/function</b>	<b>Riparian zone vegetation</b>	Restore a bank and riparian zone vegetation structure which provides sufficient shade for freshwater pearl mussel and better protects the river from silt and nutrient run-off	<p>Intensive land use along the length of the Clun and its tributaries has led to a poorly structured riparian buffer. Freshwater pearl mussel populations are often associated with areas of shade, normally created by overhanging, herbaceous vegetation, scrub and bank-side trees, with little or no bank erosion. Shade keeps water temperatures down during the summer months and inhibits the growth of filamentous algae which can interfere with mussel feeding.</p> <p>A patchy tree cover provides shade protection against rising water</p>	JACOBS, 2013 APEM, 2015

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>temperatures caused by climate change. Between 30-60% riparian tree cover is generally considered optimal for in-channel and riparian habitats. Riparian tree growth is predominantly restricted to a single line of trees along the river bank. Alder disease (<i>Phytophthora</i>) has ravaged the Clun's alder population, with few alders predicted to survive in the long term. Loss of trees can result in substantially accelerated rates of bank erosion, more sediment in the river and loss of habitat.</p> <p>Development of a mixed structure buffer also serves to better protect the river from silt and nutrient run-off. Buffer strips should be sufficient to allow the development of a canopy, shrub, field layer and root zone and should allow for appropriate management. A range of species should be used and should reflect local species. Species prone to disease, such as Alder and Ash should be planted with 'companion' species in order to mitigate against complete loss of tree cover.</p> <p>Bank erosion is a significant problem in the River Clun catchment and loss of riparian cover has accelerated this problem. Sediment from bank erosion that is stored in the river and re-suspended during high rainfall is a significant contributor to the overall silt load of the river.</p>	
<b>Supporting habitat: structure/function</b>	<b>Woody debris</b>	Maintain an abundance of large woody debris within the river channel.	<p>Trees are an important part of riparian habitats and in freshwater pearl mussel rivers both living trees and dead wood help to create variation in riverine habitat and provide shelter and, indirectly, food for their salmonid hosts.</p> <p>Woody material should always be left in channel unless a serious threat to infrastructure. Retaining wood in-situ along the length of the river and its tributaries will also slow down flood water which might otherwise cause scouring, wash out fish from the system as well as washing out adult mussels from the river, which can be a significant cause of loss.</p> <p>Where a tree falls directly onto a mussel bed it can cause damage by impeding water flow and causing river-bed changes through scouring or weir effects. In these situations, it may be better to remove the tree partly or to remove a tree in danger of falling into the river.</p>	ATKINS 2012, JACOBS 2013
<b>Supporting habitat: structure/function</b>	<b>Flow regime</b>	Maintain the natural flow regime of the river at a maximum % reduction from daily naturalised flows*;	River flow affects a range of habitat factors of critical importance to freshwater pearl mussel, including current velocity, water depth, wetted area, substrate quality, dissolved oxygen levels and water temperature. This objective seeks to ensure the area suitable for freshwater pearl mussels is not reduced by a loss of adult or juvenile habitat through inadequate flows.	ATKINS 2012, JACOBS 2013 NATURAL ENGLAND, 2014.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		1. <math>Q_{n95}</math> (Low flows) = 10 2. $Q_{n50-95}$ (Low-moderate flows) = 15 3. $Q_{n10-50}$ (Moderate-high flows) = 20 4. $>Q_{n10}$ (High flows) = 10	<p>The maintenance of both flushing flows and seasonal base flows, based on natural hydrological processes, is vital. Ecological flow criteria already laid down for the river (e.g. for passage of migrating salmon) should be achieved.</p> <p>Adult pearl mussels require enough water to cover them and a velocity at bed level that permits adequate filter feeding, while the substrate needs sufficient interstitial velocity to allow oxygen exchange in the areas where juveniles are living.</p> <p>* Naturalised flow is defined as the flow in the absence of abstractions and discharges.</p> <p>Particularly in the post war period there have been substantial changes made to the hydrology of the River Clun catchment. The loss of upland habitats and their associated wetlands and the extensive drainage systems to facilitate agricultural intensification has significantly altered how water moves through the catchment. In times of high rainfall increased surface runoff across the catchment generates bigger, more powerful and faster flows in the drainage and river network. Larger and more powerful flows with more energy will erode and transport river sediments and affect mussel substrate as well as causing the direct loss of mussels that are washed out of the river. Loss of floodplain woodland and other semi natural habitat has also increased the speed at which water moves through the catchment.</p> <p>Conversely, during dry periods there is little capacity for the landscape to retain water and release it slowly over time, maintaining adequate flows to sustain the ecology of the river, including the freshwater pearl mussel.</p> <p>The susceptibility of some part of the catchment to drying poses a significant risk and ensuring that water is used in a sustainable way within the catchment is paramount.</p>	
<b>Supporting habitat: structure/function</b>	<b>Sediment regime</b>	Maintain naturally low levels of siltation (as indicated by the consistent presence of sediment-sensitive Invertebrates) and concentrations of suspended solids not exceeding a guideline	Natural levels of coarse sediment supply are critical to the maintenance of high quality habitat for mussels and salmonids (fish hosts), maintaining the stability of the river channel and for creating and sustaining key habitat mosaics. However, freshwater pearl mussels are particularly susceptible to damage from unnaturally elevated levels of suspended solids and the direct impacts of siltation.	ATKINS 2012, JACOBS 2013, APEM, 2015.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>annual mean of 10 mg/L-1.</p> <p>Ensure there is no pronounced difference in redox potential (typically &lt;20%) between open water and interstitial water at 5 cm depth</p>	<p>Siltation of the substrate required by mussels can be a severe problem that can be caused by increased sediment load and detrital production due to eutrophication. While river bank erosion, flooding and land drainage all have the potential to affect the river's sediment load and threaten adult mussel beds, even small amounts of sediment can alter the interstitial environment of the juveniles. The infiltration of fine sediment into the gaps and spaces between water and the habitat substrate can result in low oxygen supply. If these interstitial spaces are clogged, young mussels may suffocate.</p> <p>Furthermore, silt accumulating in the interstitial space in the natural substrate causes the substrate to solidify in a process known as concretion. Bed concretion is a serious issue in the River Clun and is such that adult mussels dislodged by high flows are unable to re-bury themselves in the gravel. Juveniles will also be prevented from moving down into the gravel.</p> <p>In the River Clun sediment is one of the primary causes of the decline of the freshwater pearl mussel. Sediment Investigations (APEM 2015) indicate that sediment measured in transport within the Clun originates primarily from agriculture, urban run-off, highway drainage and sediment originating from scoured river banks.</p> <p>Sediment loads in rivers can be difficult to measure but the impact of silt can be ascertained by using the SI Index (Proportion of Sediment-sensitive Invertebrates) has been developed to measure the impact of fine sediment on river-bed invertebrates.</p> <p>The impact of silt on the oxygen levels within the substrate can be measure by taking Redox readings.</p> <p>The presence of overlying silt is also captured during River Habitat Surveys, which are carried out in order to describe the physical habitat of the river and the modifications there on.</p>	
<b>Supporting habitat: structure/function</b>	<b>Passage of host fish</b>	Maintain the free movement of host fish populations into and through the SAC	<p>Freedom of movement throughout the river system is critical to all life stages of fish host populations. Barriers to adult fish migration can limit the ability of individuals to successfully reach their spawning grounds. Because of their critical relationship, barriers to host fish movement may indirectly have adverse effects on freshwater pearl mussel populations.</p> <p>Where there are barriers to movement, attempts should be made to restore fish migration, and to reverse other impacts such as impaired habitat</p>	ATKINS, 2012, JACOBS, 2013



Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			connectivity, sediment transport, and invertebrate movement.	
<b>Supporting habitat: structure/function</b>	<b>Water quality: nutrients</b>	<p>Restore (i.e. reduce) levels of Soluble Reactive Phosphorus ('SRP') to the following levels:</p> <ul style="list-style-type: none"> <li>• <math>\leq 20 \mu\text{g/L-1}</math> SRP annual mean in the short term (for adult survival).</li> <li>• <math>\leq 10 \mu\text{g/L-1}</math> SRP annual mean in the longer term (for juvenile recruitment)</li> </ul>	<p>Freshwater pearl mussels are sensitive to change in water quality. Steps should be taken to avoid low-level enrichment of freshwater pearl mussel rivers that are of near-pristine nutrient status.</p> <p>Much work has been carried out regarding nutrient levels in the River Clun including the production of a Nutrient Management Plan (ATKINS 2014), Levels of soluble phosphorous (also called orthophosphate) exceed the target levels that are required for long term adult survival and juvenile recruitment.</p> <p>Over the past 20 years levels of soluble phosphorous have changed very little, despite enormous investment in the catchment. This is because intensification of agriculture and population growth continue to increase. Apportionment modelling carried out suggests that point sources such as Sewage Treatment Works account for just over a third of the soluble phosphorous load within the Clun with the remaining two thirds coming from diffuse sources. Small domestic sewage sources, highways and urban areas also make a small but significant contribution to the overall load.</p> <p>In order to meet the long term nutrient targets it will be necessary to reduce all of the contributing sources in a fair and proportional way.</p> <p>Achieving these targets is likely to mean innovation in the approaches to addressing small domestic point source pollution sources such as from sewage treatment in remote rural areas in planning decisions, greater use of advanced/novel treatment technology, and more first-time rural sewerage where this is practicable.</p> <p>Measures to reduce the nutrient load from agriculture will be sought and may look beyond existing mechanisms such as Catchment Sensitive Farming and Countryside Stewardship in their current form. Some significant landscape scale restoration of semi-natural habitats and associated agricultural reversion is likely to be required if targets are to be met and the condition of the Clun SAC and its population of freshwater pearl mussels recovered.</p> <p>Any proposed activity that increases nutrients within the River Clun SAC is likely to be regarded to be of detriment and as such will be considered unfavourable. This applies to all activities and sectors so that no restrictions are placed in an unfair and disproportional way.</p>	ATKINS 2014 NATURAL ENGLAND, 2014.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Water quality: organic pollution	<p>Restore river water quality by limiting the concentrations of organic pollutants at or below the following levels:</p> <ul style="list-style-type: none"> <li>• 10%ile Dissolved Oxygen DO (% saturation) = 85;</li> <li>• Mean BOD (mg/L-1) &lt; 1.5;</li> <li>• 90%ile total ammonia (NH3-N, mg/L-1) = 0.25;</li> <li>• 95%ile un-ionised ammonia (NH3-N, mg/L-1) = 0.025</li> </ul>	<p>Freshwater pearl mussels are sensitive to change in water quality and organic pollution affects them in a number of ways, including direct toxicity (from ammonia and nitrite), reduced dissolved oxygen levels (from microbial breakdown of organic material), and nutrient enrichment.</p> <p>Reducing organic pollution levels reduces toxic effects but unmask enrichment effects. Controlling the continuous input of low levels of organic material is critical to controlling the enrichment effect.</p> <p>The water quality objectives for the SAC are currently being exceeded. Using a total limit of 1.5 mg/l Total Oxidised Nitrogen (TON), the River Clun SAC Nutrient Management Plan (ATKINS 2014) found average TON levels in the River Clun SAC are approximately 3 times greater than this.</p> <p>Total oxidised nitrogen loads within the catchment exceed the target of 1.5mg/l. Diffuse agricultural sources contribute 90 of total loads. Atmospheric sources of nitrogen, particularly ammonia, are also thought to contribute to the total annual nitrogen budget of the catchment.</p> <p>Activities in the catchment that add to the nitrogen (or other organic pollution) load are likely to be viewed of detriment to the Clun SAC. Measures to reduce nitrogen and other organic pollutants in the Clun catchment will be taken in a fair and proportional way.</p>	ATKINS, 2014.
Supporting habitat: structure/function	invasive non-native species	<p>Ensure the absence or insignificant presence of invasive non-native species likely to cause impairment of freshwater pearl mussel populations.</p>	<p>Non-native species constitute a major threat to many river systems. Impacts may be on the river habitat itself (e.g. damage to banks and consequent siltation) or directly on characteristic plants and animals (through predation, competition and disease), or a combination of these.</p> <p>Assessment of non-native species is based on the principles used in assessing high ecological status under the Water Framework Directive, and applies to species on the banks and in the riparian zone as well as species of the channel and the margins.</p> <p>There is evidence that American signal crayfish may disturb freshwater pearl mussel, particularly juveniles. The spread of riparian alien species such as Himalayan balsam (<i>Impatiens glandulifera</i>) has increased in the Clun catchment changing the nature of river banks (Natural England, 2013; 2014).</p>	SHROPSHIRE HILLS AONB PARTNERSHIP & NATURAL ENGLAND 2013 & 2014

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Algal cover	In sustainable mussel habitat, ensure filamentous algae is either absent or very sparse (<5% cover) during the season of maximum growth.	Excessive cover of filamentous and epiphytic algae may be indicative of nutrient enrichment, prolonged low flow and/or high summer water temperatures. Algal mats overgrowing mussel beds can impair respiration, feeding, fertilisation and the release of glochidia.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Fisheries host population	<p>Restore the abundance of juvenile salmonids to the following levels expected for the river type under conditions of high physical and chemical quality;</p> <ul style="list-style-type: none"> <li>• an abundance of &gt; 0.1 native juvenile host salmonids per m<sup>2</sup>.</li> <li>• the regular presence of fish infected with glochidia between September and May.</li> </ul>	<p>An abundant supply of native juvenile salmonids is vital to the survival of the mussel's larval stage. This is because mussel larvae, known as glochidia, are released in summer and attach themselves to the gill filaments of juvenile salmonids. Here they encyst and grow until the following spring, when they drop off on to clean gravel and begin maturing. This association does not seem to harm the host fish, and facilitates mussel dispersal.</p> <p>Atlantic salmon (<i>Salmo salar</i>) and brown trout (<i>Salmo trutta</i>) have been confirmed at hosts for the Clun pearl mussel population.</p> <p>The River Clun restoration strategy ((ATKINS 2012, JACOBS 2013) found numerous weirs, several culverts and numerous fords all which may pose a barrier to the migration of migratory fish likely to be important to mussels.</p>	ATKINS 2012, JACOBS,2013
Supporting processes (on which the feature and/or its supporting habitat relies)	Fisheries - introduction of fish species	Maintain the artificial introduction of fish at levels that do not interfere with the ability of the SAC to support self-sustaining populations of the freshwater pearl mussel.	<p>Rainbow trout and brook trout are resistant to glochidial infection and are not, therefore, suitable host species. Stocking of these species may create competition with native salmonids and is likely to reduce host opportunities for glochidia.</p> <p>Proposals to artificially stock fish in catchments supporting freshwater pearl mussel should only be with locally native strains that is known to support the pearl mussels of that population. In general, supporting natural recovery of fish stocks is a better policy than artificial stocking, even with native salmonids.</p> <p>The overall aim is to provide conditions in the river that support a healthy, natural and self-sustaining fish community, achieved through habitat protection/restoration and managed exploitation as necessary.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Supporting off-site riverine habitat	Maintain the extent and quality of any riverine habitats present beyond the SAC boundary upon which freshwater pearl mussel population of the SAC depend	<p>Salmonid host populations within the SAC may be dependent on the continued integrity of sections of river channel, riparian areas, and transitional and marine waters that lie outside of the site boundary.</p> <p>For example, this may include headwater areas and tributaries which salmonids may use these areas for spawning and juvenile development and are critical for sustaining the mussel population within the site.</p>	JBA CONSULTING, 2013.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Work is ongoing on the River Teme to improve the passage of migratory fish which will benefit salmonids arriving at the River Clun e.g. River Teme Restoration Plan (JBA Consulting, 2013). There is also an ongoing project with Environment Agency, Natural England, Canals &amp; Rivers Trust and Severn Rivers Trust to look at improving passage for the whole migratory fish assemblage from the Severn Estuary SAC, up the River Severn and into the River Teme, using Twaite Shad <i>Alosa fallax</i> as an umbrella species.</p>	
<b>Population (of the feature)</b>	<b>Population abundance</b>	<p>Restore the abundance of freshwater pearl mussel to a level expected under un-impacted conditions throughout the SAC (taking into account natural habitat conditions and allowing for natural fluctuations), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p>	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK.</p> <p>Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period. The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>The Clun SAC was surveyed in 1995 when the population was estimated to be in the region of 4000-5000 (Oliver &amp; Killeen, 1996). It is likely that the population was diminished with little or no recruitment at that time. It would be unrealistic to describe this as 'unimpacted conditions'. This can only be regarded as a minimum target. Recent surveys (Measures 2017) suggest that the population is likely to be less than 1000 individuals, and still declining.</p>	<p>OLIVER &amp; KILLEEN, 1996 MEASURES, 2017.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<b>Population (of the feature)</b>	<b>Population viability</b>	Restore the viability of the freshwater pearl mussel population by ensuring a diverse age structure which reflects both active recruitment and longevity.	<p>There should be sufficient levels of juvenile recruitment to ensure that the population is resilient to natural changes and reductions due to natural factors.</p> <p>Adequate recruitment may be indicated by 20% of the population being less than 20 years old. Very few rivers now show this level of recruitment. Adult mortality of 10% per decade has been suggested as sustainable if recruitment is normal.</p> <p>Note: Sizes of mussels vary considerably by region and by river - the size range of mussels under 20 years should be established.</p> <p>The 1995 survey did not specifically look for juveniles, however, of the 404 mussels measured, only 4 were less than 70mm in length (&lt; c. 20 years old) (Oliver &amp; Killeen, 1996). Dead shells are frequently found, especially after flood events, indicating a continuing decline of the population (Killeen, 2008). While fish were found to be encysted with glochidia (Environment Agency, 2018) no juvenile mussels have been recorded within the river.</p>	OLIVER & KILLEEN, 1996
<b>Population (of the feature)</b>	<b>Disturbance from human activity</b>	Reduce and restrict any significant disturbance to the freshwater pearl mussel feature and its supporting habitats.	<p>There has been a long tradition of pearl fishing in some rivers and damage from pearl fishing continues to be a threat, even in depleted populations. There is no safe method of extracting pearls from pearl mussels without damage and therefore pearl fishing is prohibited under the 1981 Wildlife and Countryside Act.</p> <p>Other human activities which can also disturb mussels include engineering works, recreation (e.g. canoeing) and fishing (e.g. wading into river, maintenance of fishing pools).</p> <p>Illegal fishing of Freshwater Pearl Mussel does not appear to be a current issue on the River Clun. Disturbance associated with agricultural management (e.g. livestock encroaching into the river channel) is more of an issue or periodic management for maintenance of infrastructure (e.g. road bridges).</p>	
<b>Supporting processes (on which the feature and/or its supporting habitat relies)</b>	<b>Conservation measures</b>	Maintain the management measures within the SAC and the wider Clun catchment which are necessary to maintain or to restore the structure, functions and supporting processes associated with the freshwater pearl mussel and its supporting	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England.</p> <p>This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the</p>	NATURAL ENGLAND, 2014.  ATKINS, 2014.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		habitats.	underpinning SSSI and/or management agreements.	
<b>Supporting processes (on which the feature and/or its supporting habitat relies)</b>	<b>Adaptation and resilience</b>	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	<p>This recognises the increasing likelihood of allowing supporting habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning.</p> <p>Such environmental changes may include changes in precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary.</p> <p>Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p> <p>The vulnerability of the supporting habitats of this particular SAC to climate change has been assessed by Natural England as being <b>moderate</b>. This means that this site is considered to be vulnerable overall but moderately so. This means that some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p>	NATURAL ENGLAND, 2015.
<b>Version Control</b>				
Advice last updated: n/a				
<b>Variations from national feature-framework of integrity-guidance:</b> n/a				

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