

**European Community Directive  
on the Conservation of Natural Habitats  
and of Wild Fauna and Flora  
(92/43/EEC)**

Supporting documentation for the  
Third Report by the United Kingdom under  
Article 17

on the implementation of the Directive  
from January 2007 to December 2012  
Conservation status assessment for

Species:

S1095 - Sea lamprey (*Petromyzon marinus*)

**IMPORTANT NOTE – PLEASE READ**

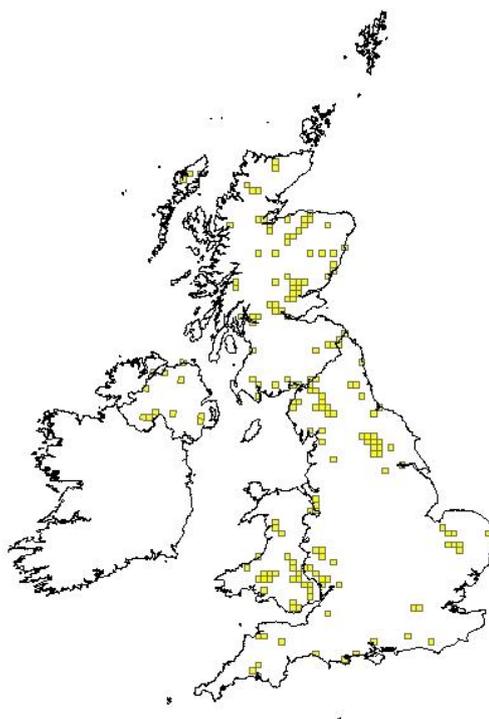
- The country-level reporting information contained in this document is a contribution to the Article 17 UK report for the habitat/species concerned.
- It has been provided by **Natural Resources Wales** and refers only to the state of the habitat/species in **Wales** - it does not constitute an assessment for the whole of the UK.
- The Article 17 UK Approach document provides details on how this information has been used and, combined with information supplied by other Statutory Nature Conservation Bodies
- The format of the document is closely aligned to that set out by the European Commission for Member State reporting – as a result, some of the fields are not applicable at a country-level and have deliberately been left blank – in addition, the content of most fields is constrained by the EC reporting categories.

As of 1 April 2013, the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales became Natural Resources Wales/Cyfoeth Naturiol Cymru

## Reporting format on the 'main results of the surveillance under Article 11' for Annex II, IV & V species

<i>Field name</i>	<i>Brief explanations</i>	
<b>0.2 Species</b>	<b>0.2.1 Species code</b>	<b>S1095</b>
	<b>0.2.2 Species scientific name</b>	<b><i>Petromyzon marinus</i></b>
	<b>0.2.3 Alternative species scientific name</b> Optional	
	<b>0.2.4 Common name</b> Optional	<b>sea lamprey, llyswen pendoll y mor</b>

<b>1.1 Maps</b>			
<b>1.1.1 Distribution map</b>		<b>Sensitive</b>	<b>False</b>



<b>1.1.2 Method used - map</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>		
	See note 2.3.2		
<b>1.1.3 Year or period</b>	<b>2001-2012</b>		
	See note 2.3.2		
<b>1.1.4 Additional distribution map</b>	<b>False</b>		
<b>1.1.5 Range map</b>			

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<b>2.1 Biogeographical region &amp; marine regions</b>	<b>ATL</b>
<b>2.2 Published sources</b>	<p><b>"Campbell D, Clarke S, Williams AE. (2005) Lamprey Survey on the Rivers Tywi, Teifi and Cleddau. CCW Review of Consents Report No. 7. Bangor, CCW / EAW.</b></p> <p><b>Cragg-Hine D, Johns M (1999) Lamprey Habitat Assessment Using RHS in the River Usk. CCW Contract Science Report No. 365. CCW, Bangor.</b></p> <p><b>Davies RN, Griffiths J. (2011) Monitoring adult Sea Lamprey (<i>Petromyzon marinus</i>) migration using a DIDSON imaging sonar on the River Tywi 2009/10. Environment Agency Wales, Cardiff FAT/11/05</b></p> <p><b>Gardiner R.(2003) Identifying Lamprey. Conserving Natura 2000 Rivers Techniques Series No. 4. Peterborough, English Nature.</b></p> <p><b>Garrett H, Thomas Rh (2012) Afon Tywi Population Attribute Condition Assessment for Brook, River and Sea Lamprey 2011. CCW Staff Science Report No. 11/8/5. Bangor, Countryside Council for Wales.</b></p> <p><b>Garrett H, Thomas Rh, Hatton-Ellis TW (in prep) River Usk Population Attribute Condition Assessment for Brook, River and Sea Lamprey 2007-12. CCW Staff Science Report No. 11/8/6. Bangor, Countryside Council for Wales.</b></p> <p><b>Harvey JP, Noble RAA, Cowx IG, Nunn AD, Taylor R. (2007) Monitoring of lamprey in the rivers Wye and Usk SACs. CCW Environmental Monitoring Report No. 41. Bangor, Countryside Council for Wales.</b></p> <p><b>Hatton-Ellis TW (2012) Population Parameters for River Lamprey <i>Lampetra fluviatilis</i> and Sea Lamprey <i>Petromyzon marinus</i> in Wales, 1992-2012. Supplementary information for Article 17 Reporting. CCW Advice to JNCC. DCT-12-399809</b></p> <p><b>Joint Nature Conservation Committee (JNCC). (2005) Common Standards Monitoring Guidance for Freshwater Fauna. Peterborough, Joint Nature Conservation Committee.</b></p> <p><b>Joint Nature Conservation Committee. 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: <a href="http://www.jncc.gov.uk/article17">www.jncc.gov.uk/article17</a></b></p> <p><b>O'Keefe N, Williams A. (2008) Review of Recently Gathered Information on Lamprey Stocks and Conservation Issues in Britain: Sea Lamprey. Report to Environment Agency, North East Region.</b></p>

	<p><b>Teague N, Webb H, Allen V, Cesar CP, Thomas Rh, Hatton-Ellis T. (2012) Lamprey monitoring on the River Dee Special Area of Conservation (SAC) CCW Contract Science Report 975. Bangor, Countryside Council for Wales.</b></p> <p><b>Thomas Rh, Garrett H. (2012) Afon Tywi Population Attribute Condition Assessment for Brook, River and Sea Lamprey 2011. CCW Staff Science Report 11/8/5. Bangor, Countryside Council for Wales.</b></p> <p><b>West, R. 2004. River Dee Candidate Special Area of Conservation Lamprey Survey 2003. Environment Agency Wales Report NEAT/04/17. Environment Agency Wales.</b></p> <p><b>West, R. 2005. River Dee Candidate Special Area of Conservation Lamprey Survey 2004. Environment Agency Wales Report &amp; CCW Review of Consents Report NEAT/04/33 or CCW Review of Consents Report No. 18. Environment Agency Wales, Bangor."</b></p>

2.3 Range					
<b>2.3.1 Surface area Range</b>	Sea lamprey are widely distributed in Wales, though they do not penetrate far up some rivers due to natural and artificial barriers to migration.				
<b>2.3.2 Method used Surface area of Range</b>	<p><b>Estimate based on partial data with some extrapolation and/or modelling</b></p> <p>Based on CSM surveys on SACs (Thomas &amp; Garrett 2012; Garrett et al. 2012; Teague et al. 2012) and anecdotal observations.</p>				
<b>2.3.3 Short-term trend Period</b>	<p><b>2000-2011</b></p> <p>See note 2.3.2 The standard period has been used.</p>				
<b>2.3.4 Short term trend Trend direction</b>	<p><b>increase</b></p> <p>No evidence for range contraction. Improvements to fish access over this period are expected to have improved accessibility to spawning habitats (e.g. River Monnow). In our view it is unlikely that sea lamprey range in Wales is decreasing, and the species may be increasing. The information to assess this is inadequate.</p>				
<b>2.3.5 Short-term trend Magnitude</b>	<table border="1" style="width: 100%;"> <tr> <td style="background-color: #e0e0e0;"><b>a) Minimum</b></td> <td></td> </tr> <tr> <td style="background-color: #e0e0e0;"><b>b) Maximum</b></td> <td></td> </tr> </table>	<b>a) Minimum</b>		<b>b) Maximum</b>	
<b>a) Minimum</b>					
<b>b) Maximum</b>					

<b>2.3.6 Long-term trend Period</b>		
	The standard period has been used.	
<b>2.3.7 Long-term trend Trend direction</b>		
	In our view it is unlikely that sea lamprey range in Wales is decreasing, and the species may be increasing. The information to assess range trend is inadequate.	
<b>2.3.8 Long-term trend Magnitude</b>  Optional	<b>a) Minimum</b>	
	See 2.3.7	
	<b>b) Maximum</b>	
	See 2.3.7	
<b>2.3.9 Favourable reference range</b>	<b>a) Value in km<sup>2</sup></b>	
	JNCC (2007) reported the favourable reference range for the UK as 24,987km <sup>2</sup> . No separate value for Wales was provided. Given the additional records for Wales identified during the 10km <sup>2</sup> data validation exercise, this is a serious underestimate.	
	<b>b) Operator for FRR</b>	
	<b>c) FRR is unknown (indicated by "true")</b>	<b>False</b>
	<b>d) Method used to set FRR</b>	
<b>2.3.10 Reason for change</b>  Is the difference between the reported value in 2.3.1 and the previous reporting round mainly due to...	<b>a) Genuine change?</b>	<b>False</b>
	See 2.3.4	
	<b>b) Improved knowledge/more accurate data?</b>	<b>True</b>
	See 2.3.4	
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>
See 2.3.4		

<b>2.4 Population</b>		
<b>2.4.1 Population size estimation</b> (using individuals or agreed exceptions where possible)	<b>a) Unit</b>	
	<b>b) Minimum</b>	
	<b>c) Maximum</b>	
<b>2.4.2 Population size estimation</b> (using population unit other than individuals) Optional ( <i>if 2.4.1 filled in</i> )	<b>a) Unit</b>	<b>number of map 1x1 km grid cells</b>
		See Hatton-Ellis (2012) for an explanation of how this has been calculated.
	<b>b) Minimum</b>	<b>67</b>
		Based on the data from the Tywi fish counter (Davies & Griffiths 2011) we estimate that annual sea lamprey runs in Wales vary between about 5,000 and 30,000 (Hatton-Ellis 2012).
<b>2.4.3 Additional information on population estimates / conversion</b> Optional	<b>a) Definition of "locality"</b>	
	<b>b) Method to convert data</b>	
	<b>c) Problems encountered to provide population size estimation</b>	<b>We do not yet understand the extent to which lamprey populations vary on an annual basis and / or are spatially distributed. Surveyor error may also be an issue. <i>Petromyzon ammocoetes</i> are relatively difficult to detect using standard techniques, partly because they are much less abundant than <i>Lampetra ammocoetes</i>, which occupy similar habitat. Consequently these estimates are made using small numbers of ammocoetes.</b>
<b>2.4.4 Year or period</b>	<b>2007-2012</b>	
		The standard period has been used.
<b>2.4.5 Method used Population size</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>	
		The standard unit for estimating sea lamprey populations is number of 1x1km squares. However, sampling effort between different periods is very variable and it is necessary to correct for this when estimating the likely number of occupied squares. Therefore, only data from standardised lamprey surveys during the specified time period have been used (Teague et al. 2011, Garrett & Thomas 2012), since, in contrast to NBN data, these datasets also included datapoints where sea lamprey were absent. See Hatton-Ellis (2012) for a description of

	the method.	
<b>2.4.6 Short-term trend Period</b>	<b>1998-2011</b>	
	<p>Prior to 2001, the only data available was a single 1998 survey from the River Usk. We have therefore included this data within the short term dataset and reported long term trend as 'unknown'.</p> <p>The earliest lamprey survey in Wales was in 1998 (Cragg-Hine &amp; Johns 1998). Consequently we have extended the short-term period to encompass this date.</p>	
<b>2.4.7 Short-term trend Trend direction</b>	<b>stable</b>	
	No trend is apparent, though populations appear to be highly variable. See Hatton-Ellis (2012).	
<b>2.4.8 Short-term trend Magnitude</b>	<b>a) Minimum</b>	
	See note 2.4.7	
	<b>b) Maximum</b>	
	See note 2.4.7	
	<b>c) Confidence interval</b>	
	See note 2.4.7	
<b>2.4.9 Short-term trend Method used</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>	
	See Hatton-Ellis (2012).	
<b>2.4.10 Long-term trend – Period</b>		
	The standard period has been used. However, no true long term data are available, as the dataset only goes back 13 years. See Hatton-Ellis (2012) for an analysis of the trend data.	
<b>2.4.11 Long-term trend Trend direction</b>	<b>unknown</b>	
	See 2.4.10.	
<b>2.4.12 Long-term trend Magnitude</b> Optional	<b>a) Minimum</b>	
	See 2.4.10.	
	<b>b) Maximum</b>	
	See 2.4.10.	
	<b>c) Confidence interval</b>	

	See 2.4.10.	
<b>2.4.13 Long term trend Method used</b>	<b>0</b>	
	See Hatton-Ellis (2012) for an analysis of the trend data.	
<b>2.4.14 Favourable reference population</b>	<b>a) Number of individuals/agreed exceptions/other units</b>	
	No favourable reference population can be calculated for Wales at this time. In 2007 favourable reference population was reported as unknown (JNCC 2007).	
	<b>b) Operator</b>	
	See 2.4.14a.	
	<b>c) FRP is unknown indicated by "true"</b>	<b>True</b>
	See 2.4.14a.	
	<b>d) Method used to set FRP</b>	
	See 2.4.14a.	
<b>2.4.15 Reason for change</b> Is the difference between the value reported at 2.4.1 or 2.4.2 and the previous reporting round mainly due to:	<b>a) Genuine change?</b>	<b>False</b>
	<b>b) Improved knowledge/more accurate data?</b>	<b>False</b>
	See 2.4.7.	
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>
See 2.4.7.		

<b>2.5 Habitat for the species</b>	
<b>2.5.1 Area estimation</b>	<b>19.2</b>
Sea lampreys do not have a single habitat. They depend on at least three different habitats to complete their life history. These are (a) Pelagic maritime habitat with large fish species such as basking sharks for the adults to feed and grow; (b) clean river gravels for spawning and (c) silt / sand beds at >1m water depth in rivers for larval growth. No reliable dataset is available for sea lamprey habitat across Wales and without an agreed UK protocol it is not possible to arrive at a useful estimate. However, there is no reason to believe that sea lamprey habitat is declining in area.	

	<p>We have however attempted to estimate the area of running water accessible to sea lamprey. This was done using the occupied 10km squares dataset previously used for range estimation, and overlaying it onto a running waters habitat layer using a GIS package. Since river lampreys are migratory, all 10km squares downstream of any records were also included. A GIS query was then used to select all areas of running water falling within occupied 10km squares (including downstream squares). We removed all habitat within smaller tributaries, as sea lampreys are normally restricted to main river. It is probable that the figure given is an underestimate as there are no sea lamprey records for two larger catchments (Conwy and Clwyd) where they might be expected to occur .</p> <p>There is thought to be a sufficient amount of habitat in the UK to support a viable population of the species.</p>	
<b>2.5.2 Year or period</b>	<b>2001-2012</b>	
	See 2.4.7.	
<b>2.5.3 Method used Habitat for the species</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>	
	See comment in 2.5.1.	
<b>2.5.4 Quality of the habitat</b>	<b>a) Habitat quality</b>	<b>Moderate</b>
	<b>b) Assessment method</b>	<b>CSM lamprey and river monitoring data</b>
	See Teague et al. 2012, Thomas & Garrett 2012; Thomas et al. 2012; Garrett et al. in prep for further details.	
<b>2.5.5 Short-term trend Period</b>	<b>2001-2012</b>	
<b>2.5.6 Short-term trend Trend direction</b>	<b>unknown</b>	
	No data is available to enable trend to be determined.	
<b>2.5.7 Long-term trend Period</b>	<b>1989-2012</b>	
<b>2.5.8 Long-term trend Trend direction</b>	<b>unknown</b>	
<b>2.5.9 Area of suitable habitat for the species</b>	<b>a) Value in km<sup>2</sup></b>	<b>26.87</b>
	This has been calculated by taking the area from 2.5.1, and adding river polygons upstream of artificial barriers to migration but which would otherwise be considered favourable habitat. This includes main river sections in lowland areas: upland river and small tributaries are excluded as per 2.5.1.	
	<b>b) Absence of data indicated as '0'</b>	
<b>2.5.10 Reason for change</b> Is the difference between the value reported at 2.5.1 and the previous reporting round mainly	<b>a) Genuine change?</b>	<b>False</b>
	See note 2.5.1.	

due to	<b>b) Improved knowledge/more accurate data?</b>	<b>False</b>
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>

<b>2.6 Main pressures</b>		
<b>a) Pressure</b>	<b>b) Ranking</b>	<b>c) Pollution qualifier</b>
	H = high importance M = medium importance L = low importance	
C03: Renewable abiotic energy use	H	
J02: human induced changes in hydraulic conditions	H	
H01: Pollution to surface waters (limnic & terrestrial, marine & brackish)	M	OPTX

Sea lamprey are not fished for in Britain, so the main pressures on them are thought to be activities affecting migration. These include dams and barrages, river modification (e.g. canalisation), abstractions and discharges including their effects on hydrological regimes, industrial development and possibly chemical pollution affecting olfactory stimuli. General water pollution may also affect larval development but lamprey ammocoetes are not thought to be particularly pollution sensitive.

<b>2.6.1 Method used – Pressures</b>	<b>mainly based on expert judgement and other data</b>
	See note 2.6

<b>2.7 Threats</b>		
<b>a) Threat</b>	<b>b) Ranking</b>	<b>c) Pollution qualifier</b>
	H = high importance M = medium importance L = low importance	
C03: Renewable abiotic energy use	H	
J02: human induced changes in hydraulic conditions	H	
E06: Other urbanisation, industrial and similar activities	M	

M01: Changes in abiotic conditions	M	
D03: shipping lanes, ports, marine constructions	L	

Sea lampreys are very vulnerable to activities that disrupt their migration pathways. As a result, particular threats are modifications to hydromorphology such as water transfers, dams and barrages etc. The Severn Barrage proposals have recently been abandoned by UK Government but may still be taken forward by a private consortium. The construction and operation of a barrage could have major implications for access to lamprey habitat for rivers including the Wye, Usk and Severn.

There is also increasing demand for water transfers to supply London and south East England. Depending on design, such transfers would reduce flow in the Wye and Severn, with negative effects on sea lamprey.

The effect of climate change on sea lampreys is uncertain. They are a thermophilous species, so in principle warmer conditions may be beneficial. However, lower summer flows may also impede migration, and increased frequency of extreme events may lead to washout of silt beds and the juveniles inhabiting them.

<b>2.7.1 Method used – Threats</b>	<b>expert opinion</b>
	See note 2.7

## 2.8 Complementary information

### 2.8.1 Justification of % thresholds for trends

### 2.8.2 Other relevant information

**Sea lamprey is a thermophilous species, and it is possible that climate change may benefit this species. Measures taken to benefit other migratory fish, especially salmon and shad, should also benefit this species. However, increasing pressure to develop hydropower as a sustainable energy source is likely to increase the number of partial barriers to migration.**

### 2.8.3 Trans-boundary assessment

## 2.9 Conclusions (*assessment of conservation status at end of reporting period*)

Please refer to the United Kingdom assessment for this species.

## 3 Natura 2000 coverage & conservation measures - Annex II species (*only applies to species listed under Annex II of the Directive*)

<b>3.1 Population</b>	
<b>3.1.1 Population size</b>  Estimation of population size included <u>in the SAC network</u>	<b>a) Unit</b> <b>number of map 1x1 km grid cells</b>
	Estimated population, adjusted for SAC rivers only. See section 2.4.2a for method.  As requested, the same unit has been used.
	<b>b) Minimum</b> <b>67</b>
	See Hatton-Ellis (2012). All four rivers used for the population estimate are Natura 2000 sites.
	<b>c) Maximum</b> <b>67</b>
See 3.1.1b.	
<b>3.1.2 Method used</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>  See 3.1.1
<b>3.1.3 Trend of population size within the network (short-term trend)</b>	<b>stable</b>  See Hatton-Ellis (2012). All trend information comes from Natura 2000 sites.

<b>3.2 Conservation measures</b>														
Conservation measures taken (i.e. already being implemented) within the reporting period and provided information about their importance, location and evaluation.														
<b>3.2.1 Measure</b>	<b>3.2.2 Type</b>					<b>3.2.3 Ranking</b>  H = high importance M = medium importance L = low importance	<b>3.2.4 Location</b>  where the measure is PRIMARILY applied			<b>3.2.5 Broad evaluation of the measure</b>				
	a) Legal/statutory	b) Administrative	c) Contractual	d) Recurrent	e) One-off		a) Inside	b) Outside	c) Both inside & outside	a) Maintain	b) Enhance	c) Long term	d) No effect	e) Unknown
1.2: Measures needed, but not implemented				Y	Y	H			Y		Y			

4.1: Restoring/im proving water quality		Y				M			Y					Y
4.2: Restoring/im proving the hydrological regime		Y				H			Y					Y
4.3: Managing water abstraction	Y					H	Y			Y	Y			

Measures to improve sea lamprey condition predominantly relate to modifications to flow regimes (especially abstraction consents), abstraction structures (improvements to fish screening, reducing mortality) and changes to barriers to migration. Although sea lamprey is not thought to be especially pollution-sensitive in comparison to other river fish, Water Framework Directive and agri-environment measures to improve biological quality and fisheries have also and will continue to benefit sea lamprey.

Further one-off measures are required to improve access past certain barriers to migration in both England and Wales, and to improve water quality (especially with respect to nutrients and toxic chemicals) within and outside SACs.