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:

S1103 - Twaite shad (*Alosa fallax*)

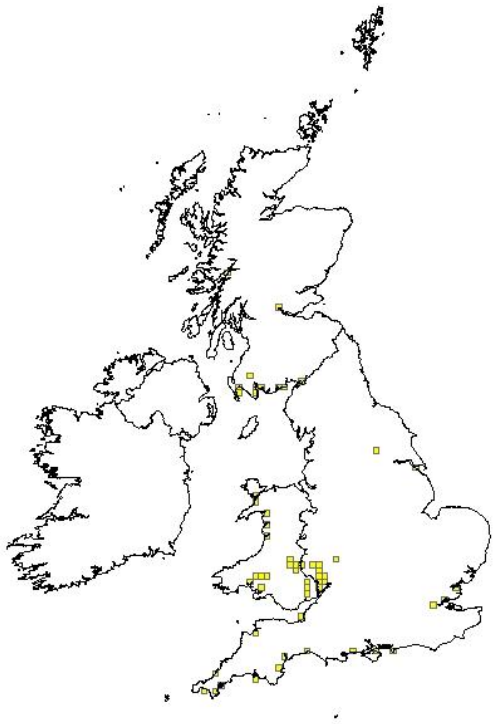
IMPORTANT NOTE – PLEASE READ

- 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 England** and refers only to the state of the habitat/species in **England** - 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.

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

Field name	*Brief explanations*	
0.2 Species	**0.2.1 Species code**	**S1103**
	0.2.2 Species scientific name	***Alosa fallax***
	0.2.3 Alternative species scientific name Optional	
	0.2.4 Common name Optional	**Twaite shad**

1.1 Maps			
1.1.1 Distribution map		**Sensitive**	**False**



1.1.2 Method used - map	**Estimate based on partial data with some extrapolation and/or modelling**
	There are uncertainties over the ability to discriminate between twaite and allis shad in the records available for the 2 species, particularly considering that the 2 species hybridise. For this reason the distribution map is based on species records for A fallax and genus-level records which may be of either species.
1.1.3 Year or period	**1990-2012**

1.1.4 Additional distribution map	**False**
1.1.5 Range map	

2.1 Biogeographical region & marine regions	**ATL**
2.2 Published sources	**"Hatton-Ellis, T., Aprahamian, M and Mainstone, C.P. (2012) Accessibility of shad spawning rivers in Wales and England, 1998-2012. Supplementary information for Article 17 reporting.** **Jolly, M, T., Aprahamian, M. W., Hawkins, S. J., Henderson, P. A., Hillman, R., O'Maoiléidigh, N., Maitland. P. S., Piper, R. and Genner, M. J. (2012). Population genetic structure of protected allis shad (Alosa alosa) and twaite shad (Alosa fallax). Marine Biology.** **Aprahamian, M. W., Aprahamian, C. D. and Knights, A.M. (2010). Climate change and the green energy paradox: the consequences for twaite shad Alosa fallax from the River Severn, U.K. Journal of Fish Biology 77:1912-1930.** **Environment Agency (2009) River Basin Management Plan: Severn River Basin District. Annex C: Actions to deliver objectives. Available online at www.environment-agency.gov.uk/research/planning/124941.aspx** **Worcestershire Biodiversity Partnership (2008) Twaite and Allis Shad Alosa fallax and Alosa alosa. Species Action Plan. Available online at http://www.worcestershire.gov.uk/cms/pdf/S7%20Shad%20Action%20Plan.pdf** **Hillman, R. J., I. G. Cowx, and J. P. Harvey. 2003. Monitoring Allis & Twaite Shad.Conserving Natura 2000 Rivers Monitoring Series 3. English Nature, Peterborough.** **Hillman, R. J., I. G. Cowx, and J. P. Harvey. 2003. Monitoring Allis & Twaite Shad.Conserving Natura 2000 Rivers Monitoring Series 3. English Nature, Peterborough.** **Maitland, P., and T. Hatton-Ellis. 2003. Ecology of the Allis and Twaite Shad. Life in UK Rivers Ecology Series No. 3. English Nature, Peterborough.** **Aprahamian, M.W., Baglinière, J. L., Sabatié, M. R., Alexandrino, P., Thiel, R. and Aprahamian, C. (2003). Biology, status and conservation of the anadromous twaite shad, Alosa fallax fallax. In: K. E. Limburg and J. R. Waldman (eds.) Biodiversity, status, and conservation of the world's shads. American Fisheries Society, Symosium 35, Bethesda, Maryland. Pp. 103-124.**

	Aprahamian, M. W., J.-L. Baglinière, R. Sabatié, P. Alexandrino, and C. D. Aprahamian. 2002. Alosa alosa and Alosa fallax spp.: Literature Review and Bibliography. R&D Technical Report W1-014/TR. Environment Agency, Swindon. **Hillman, R. 2002. The distribution, biology, ecology and conservation of allis and twaite shad (Alosa alosa and Alosa fallax Lacépède) in Southwest England.R&D Technical Report W1-047/TR. Environment Agency, Bristol.** **Caswell, P. A., and M. W. Aprahamian. 2001. Use of River Habitat Survey to determine the spawning habitat characteristics of Twaite Shad (Alosa fallax fallax). Bulletin Francais de la Peche et de la Pisciculture 362/363:919-929.** **Aprahamian, M.W. and Aprahamian, C. D. (2001). The influence of water temperature and flow on year class strength of twaite shad (Alosa fallax fallax) from the River Severn, England. Bulletin Français de la Pêche et de la Pisciculture. 362/363: 953-972** **Aprahamian, M.W. and Lester, S.M. (2001). Variation in the age at first spawning of female twaite shad (Alosa fallax fallax) from the River Severn, England. Bulletin Français de la Pêche et de la Pisciculture. 362/363: 941-951** **Aprahamian, M. W., S. M. Lester, and C. D. Aprahamian. 1999. Shad Conservation in England and Wales. Environment Agency R & D Technical Report W110. Environment Agency, Bristol.** **Aprahamian, M.W. and Aprahamian, C.D. (1990). Status of the genus Alosa in the BritishIsles; past and present. Journal of Fish Biology 37 (Supplement A): 257-258.** **Aprahamian, M. W. (1989). The diet of juvenile and adult twaite shad Alosa fallax fallax (Lacépède) from the rivers Severn and Wye (Britain). Hydrobiologia, 179: 173 182.** **Aprahamian, M. W. (1988). The biology of the twaite shad, Alosa fallax fallax (Lacepede), in the Severn Estuary. Journal of Fish Biology 33, (Supplement A): 141 152."**

2.3 Range	
2.3.1 Surface area Range	
2.3.2 Method used Surface area of Range	**Estimate based on partial data with some extrapolation and/or modelling**
	There are uncertainties over the ability to discriminate between twaite and allis shad in the records available for the 2 species. Due to these

	difficulties, a considerable number of records are reported at genus level only. For this reason the range is mapped and calculated based on the species records for twaite shad plus all genus records. This may over-estimate the range of the two individual species.	
2.3.3 Short-term trend Period		
2.3.4 Short term trend Trend direction		
2.3.5 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	
2.3.6 Long-term trend Period		
2.3.7 Long-term trend Trend direction		
2.3.8 Long-term trend Magnitude Optional	**a) Minimum**	
	b) Maximum	
2.3.9 Favourable reference range	**a) Value in km²**	
	Historically, A. fallax has been recorded from most coastal areas around the British Isles (Aprahamian et al., 2003); Aprahamian et al. (1998) state that it was historically recorded in 37 UK waters, four of which were known to support spawning populations (rivers Wye, Usk, Severn, Tywi and Thames) (see Map 1.2). The species no longer has access to much of those spawning grounds on the Rivers Severn and Thames. The favourable reference range is considerably greater than the current range and should cover those areas of the Severn system that have become artificially inaccessible fo the species. It is unclear whether the Thames should be included in the favourable reference range.	
	b) Operator for FRR	
	c) FRR is unknown (indicated by	**False**

	"true")	
	d) Method used to set FRR	
2.3.10 Reason for change Is the difference between the reported value in 2.3.1 and the previous reporting round mainly due to…	**a) Genuine change?**	**False**
	b) Improved knowledge/more accurate data?	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.4 Population		
2.4.1 Population size estimation (using individuals or agreed exceptions where possible)	**a) Unit**	**area covered by population in m2**
	Based on an estimate of the area of river habitat that has good access for both shad species across England and Wales in 2012, using a knowledge of the location of artificial barriers to upstream spawning migration - see Hatton-Ellis et al 2012 for further details. In England, the estimate covers the River Severn and key tributariies within England (though not the Teme, although this is known to have had a historic run of shad to an unknown upstream limit, or the Lugg, which is thought to be too narrow to have supported shad), and the Tamar catchment in south west England. The Thames is known to have supported a population historically, but the extent of usage of the river and its tributaries is unknown. As such the figure should be regarded as a minimum estimate.	
	b) Minimum	**12980000**
	c) Maximum	
2.4.2 Population size estimation (using population unit other than individuals) Optional *(if 2.4.1 filled in)*	**a) Unit**	**length of inhabited feature in km**
	b) Minimum	**265**
	c) Maximum	

2.4.3 Additional information on population estimates / conversion Optional	**a) Definition of "locality"**	
	b) Method to convert data	
	c) Problems encountered to provide population size estimation	
2.4.4 Year or period	**2012-**	
2.4.5 Method used Population size	**Estimate based on partial data with some extrapolation and/or modelling**	
2.4.6 Short-term trend Period	**1999-2012**	
2.4.7 Short-term trend Trend direction	**stable**	
2.4.8 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
2.4.9 Short-term trend Method used	**Estimate based on partial data with some extrapolation and/or modelling**	
	Based on estimated accessible river habitat for both shad species in 1999 compared to 2012, using a knowledge of the location of artificial barriers to upstream spawning migration and measures that have been taken to address these barriers. See Hatton-Ellis et al. (2012) for details.	
2.4.10 Long-term trend – Period	**1989-2012**	
2.4.11 Long-term trend Trend direction	**stable**	

2.4.12 Long-term trend Magnitude Optional	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
2.4.13 Long term trend Method used	**1**	
	Although no parallel estimate of accessible river habitat has been made for 1989, there has been no significant change in accessibility between 1989 and 1999 in England. There have been no new in-channel structures in the recent past and measures to address existing key artificial barriers to shad migration are still in the planning phase.	
2.4.14 Favourable reference population	**a) Number of individuals/agreed exceptions/other units**	**362**
	This is an estimate of the length (in km) of river available to both species of shad in England in the absence of artifical barriers to access. The estimate covers the River Severn and its key tributariies within England (though not the Teme, although this is known to have had a historic run of shad to an unknown upstream limit, or the Lugg, which is thought to be too narrow to have supported shad), and the Tamar catchment in south west England. The Thames is known to have supported a population historically, but the extent of usage of the river and its tributaries is unknown. As such the figure should be regarded as a minimum estimate. There will be some overlap with the estimate for Wales around the English-Welsh border.	
	b) Operator	**more than**
	c) FRP is unknown indicated by "true"	**False**
	d) Method used to set FRP	**Map-based aggregation of river reaches known to be accessible to shad species. See Hatton-Ellis et al. 2012 for details.**
2.4.15 Reason for change Is the difference between the value reported at 2.4.1 or 2.4.2 and the previous	**a) Genuine change?**	**False**

reporting round mainly due to:	**b) Improved knowledge/more accurate data?**	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.5 Habitat for the species		
2.5.1 Area estimation	**13**	
2.5.2 Year or period	**2012-**	
2.5.3 Method used Habitat for the species	**Estimate based on partial data with some extrapolation and/or modelling**	
	Based on an estimate of the area of river habitat that has good acesss for both shad species across England and Wales in 2012, using a knowledge of the location of artificial barriers to upstream spawning migration. In England, the estimate covers the River Severn and key tributariies within England (though not the Teme, although this is known to have had a historic run of shad to an unknown upstream limit, or the Lugg, which is thought to be too narrow to have supported shad), and the Tamar catchment in south west England. The Thames is known to have supported a population historically, but the extent of usage of the river and its tributaries is unknown. As such the figure should be regarded as a minimum estimate.	
2.5.4 Quality of the habitat	**a) Habitat quality**	**Moderate**
	Access to historical river habitat is the primary issue for the species, which has been described under Section 2.4. Whilst there are concerns about the quality of currently accessible habitat, and of habitat that will become accessible in future following measures to address artificial barriers, the extent to which river habitat quality constrains recruitment to the adult stock is not clear. The lower River Wye suffers from heavy loads of fine sediment from arable (particularly potato) farming, which may affect the quality of shad spawning beds and reduce juvenile recruitment. Nutrient enrichment may also affect substrate quality through the more rapid accrual of periphyton biomass. This said, the species is a broadcast spawner and so will not be as susceptible to substrate quality problems as species such as Atlantic salmon, which uses the deeper layers of the substrate. In the Thames catchment, the loss of spawning shad populations has been attributed primarily to water quality rather than physical barriers to migration (Aprahamian and Aprahamian 1990), although both a likely to be significant factors and there is interaction between the two - weirs generate impoundment that results in greater fine sediment and nutrient retention, which can seriously affect spawning substrate quality for shad. Many sections of riffle habitat are known to have been lost from the main stem of the River Thames as a result of making the river navigable through	

	installation of weirs and locks. The importance of degraded habitat quality is therefore likely to be highly variable across the historical range of the species, with more acute effects in the Thames catchment than the Severn catchment.	
	b) Assessment method	**Expert judgement of water quality, flow and spawning substrate requirements. Condition assessment of the River Wye SAC.**
2.5.5 Short-term trend Period	**2001-2012**	
2.5.6 Short-term trend Trend direction	**stable**	
	Whilst habitat quality is showing improvements in some aspects, access to habitat is the major issue and is driving this judgement of trend.	
2.5.7 Long-term trend Period	**1989-2012**	
2.5.8 Long-term trend Trend direction	**stable**	
	See note on 2.5.6.	
2.5.9 Area of suitable habitat for the species	**a) Value in km²**	
	It is not possible to provide an estimate of suitable habitat.	
	b) Absence of data indicated as '0'	
2.5.10 Reason for change Is the difference between the value reported at 2.5.1 and the previous reporting round mainly due to	**a) Genuine change?**	**False**
	b) Improved knowledge/more accurate data?	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.6 Main pressures		
a) Pressure	**b) Ranking**	**c) Pollution qualifier**
	H = high importance M = medium importance L = low importance	
J03: Other ecosystem modifications	H	

A01: Cultivation	M	
F02: Fishing and harvesting aquatic resources	M	
H01: Pollution to surface waters (limnic & terrestrial, marine & brackish)	M	X
J02: human induced changes in hydraulic conditions	M	

In river habitat, twaite shad requires good access to spawning areas, clean, well-oxygenated gravels for spawning, adequate water quality and appropriate thermal regime, and slackwater refuge areas for juveniles before they drop down to the estuary for further development. The presence of in-channel barriers to migration (weirs etc.), excessive fine sediment delivery from the catchment, nutrient enrichment, channel engineering or other in-river activities that disturb spawning gravels or make them unsuitable, and water regulation/abstraction are all pressures that can interfere with these requirements. Fishing activities also have the potential to suppress populations, through direct angling within the river and also through accidental capture in by-catch in coastal fisheries. Whilst the criticality of artificial barries to migration is well-established, the significance of the current levels of these other pressures to the status of the species is not clear.	
2.6.1 Method used – Pressures	**mainly based on expert judgement and other data**

2.7 Threats		
a) Threat	**b) Ranking**	**c) Pollution qualifier**
	H = high importance M = medium importance L = low importance	
A01: Cultivation	H	
J03: Other ecosystem modifications	H	
F02: Fishing and harvesting aquatic resources	M	
H01: Pollution to surface waters (limnic & terrestrial, marine & brackish)	M	X
J02: human induced changes in hydraulic conditions	M	
M01: Changes in abiotic conditions	M	

All of the pressures listed in 2.6 are set to continue into the future. However, measures being implemented or planned should reduce their importance over time. The importance of climate change to the future status of the species is not clear, but predicted changes in hydrological and temperature regimes, and the associated potential for higher loads of pollutants running off catchments, make climate change both a

concern and a potential benefit to the species (the latter through the possibility of a more favourable thermal regime for spawning). Activities that involve new in-stream barriers to migration, such as for hydropower and/or recreation, amenity or other areas of economic development) are a significant threat. The focus of in-river hydropower schemes in England generally relates to the use (or re-use) of existing structures rather than completely new structures, but such schemes may consolidate existing access problems for shad. In estuaries, tidal barrages are a major threat - various proposals have been made for a barrage across the Severn Estuary and such proposals probably constitute the greatest threat to the current status of the shad populations in the Severn catchment.

2.7.1 Method used – Threats	**expert opinion**

2.8 Complementary information	
2.8.1 Justification of % thresholds for trends	
2.8.2 Other relevant information	
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)***

3.1 Population		
3.1.1 Population size Estimation of population size included in the SAC network	**a) Unit**	
	b) Minimum	
	The River Wye SAC is the only river SAC in England that currently supports the species (although some estuary SACs support adults and juveniles but not spawning). No estimate of population size or habitat area within the English part of the River Wye SAC is available.	
	c) Maximum	
3.1.2 Method used	**Absent data**	

3.1.3 Trend of population size within the network (short-term trend)	**unknown**

3.2 Conservation measures

Conservation measures taken (i.e. already being implemented) within the reporting period and provided information about their importance, location and evaluation.

3.2.1 Measure	**3.2.2 Type**					**3.2.3 Ranking** H = high importance M = medium importance L = low importance	**3.2.4 Location** where the measure is PRIMARILY applied			**3.2.5 Broad evaluation of the measure**					
	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**	**f) Not evaluated**
2.2: Adapting crop production		Y	Y	Y		M			Y		Y	Y			
4.0: Other wetland-related measures		Y	Y	Y	Y	H			Y		Y	Y			
4.1: Restoring/improving water quality	Y	Y	Y	Y		M			Y		Y	Y			
4.2: Restoring/improving the hydrological regime	Y	Y				M		Y			Y	Y			
4.3: Managing water abstraction	Y					M			Y		Y	Y			

7.2: Regulation/ Management of fishery in limnic systems	Y					M			Y	Y		Y			Y
7.3: Regulation/ Management of fishery in marine and brackish systems		Y						Y		Y	Y				Y

Within the English river SAC network, and to a lesser extent the wider network of nationally designated rivers, considerable effort has been expended on the development and implementation of strategic plans aimed at restoring the condition of the river habitat. Beyond the designated site network, management measures are largely governed by the Water Framework Directive. Within the first round of river basin management planning, a considerable amount of WFD-related effort is being expended on confirming, and investigating the causes of problems with, ecological status. Better harmonisation of plans and activities under the WFD and Habitats Directive is needed.

An account of each type of conservation measure is given below.

2.2 The England Catchment Sensitive Farming Initiative is continuing to promote a range of best agricultural practices to reduce pollution loads to priority aquatic sites, including a range of river SACs and nationally designated rivers. The initiative is voluntary and uses awareness-raising and incentives to bring about management change. Modelling has predicted benefits in terms of reduced pollution loads, but it is still unclear how far a voluntary approach will go towards achieving favourable conditions for the habitat.

4.0 Since the last Article 17 report, a major programme of physical restoration has been implemented on the designated river network in England (including the Rivers Wye and Teme), involving the development of a long-term strategic plan for each river and its programmed implementation over suitable timescales. These plans address key issues such as dams and weirs, channelisation, flood embankments, bank reinforcements, lack of riparian habitat, lack of riparian trees and lack of woody debris in the channel. The development and implenmentation of these plans is providing an important strategic focus for river restoration on the designated river network, and is valuable in promoting a strategic approach on the wider river network. Outside of the designated site network, practical measures have focused on addressing the many weirs and dams on the river network in England. The general WFD aim is to remove problem structures where possible, or to reduce their impacts on fish migration. Through these processes, key barriers to shad migration will progressively be resolved.

4.1 In addition to Catchment Sensitive Farming, work has continued to implement the review of discharge consents affecting the Natura network in England. Further phosphorus removal processes have been fitted to sewage effluents under the water industry's programme of strategic improvements.

4.2/4.3 The review of abstraction licences affecting the Natura network in England has been completed. However, agreement is needed on further action on water regulation/abstraction to ensure that the flow regime of SAC rivers and other nationally designated rivers are properly protected.

7.2/7.3 Since the Article 17 last reporting round, the Marine and Coastal Access Act 2009 has been enacted. This enables the licensing and control of exploitation of shad species. Byelaws can be

established and can be enforced. Under these new powers, a byelaw requiring catch-and-release of shad by river anglers has been imposed (in practice this only relates to a few anglers that specialise in shad). Measures to control by-catch in coastal and estuarine net fisheries have not been evaluated.