Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A

2019-2024

Conservation status assessment for the species:

S1103 - Twaite shad

(*Alosa fallax*)

England

NATURAL ENGLAND

JNCC

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Important note - Please read

- The information in this document represents the England Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A, for the period 2019-2024.
- It is based on supporting information provided by Natural England, which is documented separately.
- The Habitats Regulations reporting 2019-2024 Approach Document provides details on how this supporting information contributed to the UK Report and the fields that were completed for each parameter.
- Maps showing the distribution and range of the species are included.
- Explanatory notes (where provided) are included at the end. These provide additional audit trail information to that included within the assessments. Further underpinning explanatory notes are available in the related country reports.
- Some of the reporting fields have been left blank because either: (i) there was insufficient information to complete the field; (ii) completion of the field was not obligatory; and/or (iii) the field was not relevant to this species (section 12 National Site Network coverage for Annex II species).

Further details on the approach to the Habitats Regulations Reporting 2019-2024 are available on the JNCC website.

Assessment Summary: Twaite shad

Distribution Map

Range Map

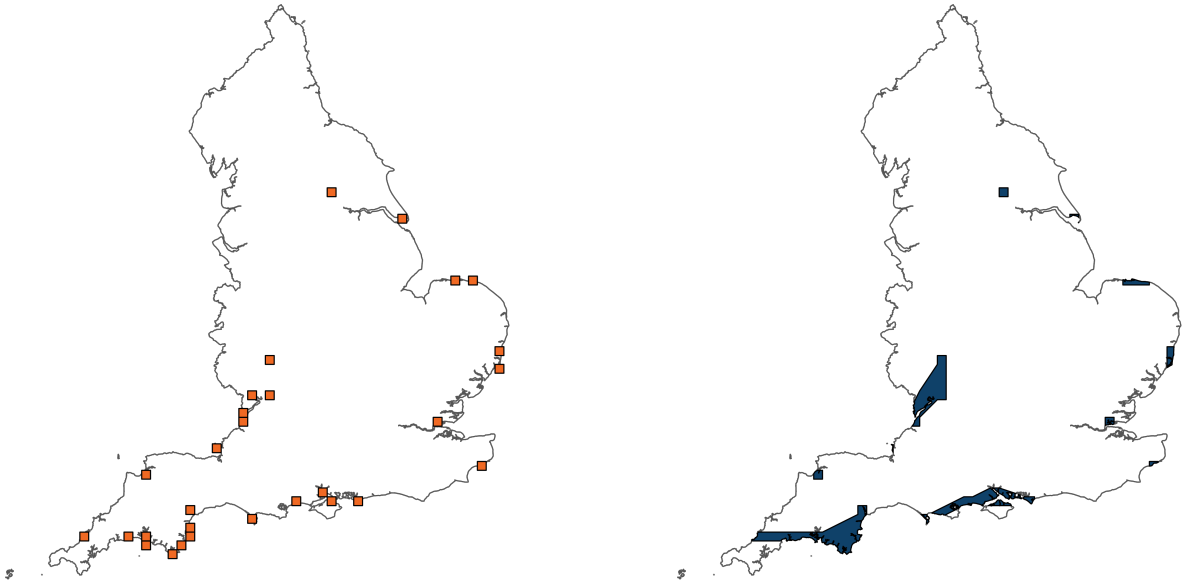

Figure 1: England distribution and range map for S1103 - Twaite shad (*Alosa fallax*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority. The 10km grid square distribution map is based on available species records within the current reporting period.

Table 1: Table summarising the conservation status for S1103 - Twaite shad (*Alosa fallax*). Overall conservation status for species is based on assessments of range, population, habitat for the species, and future prospects.

Overall Conservation Status (see section 11)

Unfavourable-inadequate (U1)

Breakdown of Overall Conservation Status

Range (see section 5)	**Unfavourable-inadequate (U1)**
Population (see section 6)	**Unfavourable-inadequate (U1)**
Habitat for the species (see section 7)	**Unfavourable-inadequate (U1)**
Future prospects (see section 10)	**Unfavourable-inadequate (U1)**

List of Sections

National Level

1. General information

1.1 Country	England
1.2 Species code	S1103
1.3 Species scientific name	*Alosa fallax*
1.4 Alternative species scientific name	
1.5 Common name	Twaite shad
Annex(es)	II, V

2. Maps

2.1 Sensitive species	No
2.2 Year or period	2000-2024
2.3 Distribution map	Yes
2.4 Distribution map; Method used	Based mainly on extrapolation from a limited amount of data

2.5 Additional information

No additional information

3. Information related to Annex V Species

3.1 Is the species taken in the wild / exploited?	No

3.2 What measures have been taken?

a) Regulations regarding access to property	
b) Temporary or local prohibition on the taking of specimens in the wild and exploitation	
c) Regulation of the periods and/or methods of taking specimens	
d) Application of hunting and fishing rules which take account of the conservation of such populations	

e) Establishment of a system of licences for taking specimens or of quotas

f) Regulation of the purchase, sale, offering for sale, keeping for sale, or transport for sale of specimens

g) Breeding in captivity of animal species as well as artificial propagation of plant species

Other measures

Other measures description

3.3: Hunting bag or quantity taken in the wild for Mammals and Acipenseridae (Fish)

a) Unit

Table 2: Quantity taken from the wild during the reporting period (see 3.3a for units). For species with defined hunting seasons, Season 1 refers to 2018/2019 (autumn 2018 to spring 2019), and Season 6 to 2023/2024. For species without hunting seasons, data are reported by calendar year: Year 1 is 2019, and Year 6 is 2024.

	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
b) Minimum	-	-	-	-	-	-
c) Maximum	-	-	-	-	-	-
d) Unknown	-	-	-	-	-	-

3.4: Hunting bag or quantity taken in the wild; Method used

3.5: Additional information

Twaite shad are not directly exploited as a quarry species for recreational angling in England. It is possible that they could be captured as bycatch when fishing for other freshwater fish species, however, they have specific protection under Schedule 5 of the

Wildlife and Countryside Act 1981 and general protections from fishery activity under the Salmon and Freshwater Fisheries Act 1975.

Biogeographical Level

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	ATL

4.2 Sources of information

See section 14 References

5. Range

5.1 Surface area (km²)	4,798.98
5.2 Short-term trend; Period	2013-2024
5.3 Short-term trend; Direction	Stable
5.4 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
5.5 Short-term trend; Method used	Based mainly on extrapolation from a limited amount of data
5.6 Long-term trend; Period	2000-2024
5.7 Long-term trend; Direction	Stable
5.8 Long-term trend; Magnitude	
a) Minimum	

b) Maximum	
c) Rate of decrease	
5.9 Long-term trend; Method used	Based mainly on extrapolation from a limited amount of data

5.10 Favourable Reference Range (FRR)

a) Area (km²)	
b) Pre-defined increment	Current range is between 2% and 10% smaller than the FRR
c) Unknown	No
d) Method used	Expert opinion
e) Quality of information	moderate

5.11 Change and reason for change in surface area of range

a) Change	No
b) Genuine change	
c) Improved knowledge or more accurate data	
d) Different method	
e) No information	
f) Other reason	
g) Main reason	

5.12 Additional information

There is no evidence of a change to overall range during the reporting period. However, due to the delivery of technical fish pass solutions, barrier removal and river restoration projects passage efficiency for individual fish is likely to have improved, allowing access to a greater area of suitable habitat within their natural range during the reporting period.

6. Population

6.1 Year or period	2000-2024

6.2 Population size (in reporting unit)

a) Unit	number of map 1x1 km grid cells
b) Minimum	
c) Maximum	
d) Best single value	59
6.3 Type of estimate	Best estimate
6.4 Quality of extrapolation to reporting unit	low

6.5 Additional population size (using population unit other than reporting unit)

a) Unit	
b) Minimum	
c) Maximum	
d) Best single value	
e) Type of estimate	
6.6 Population size; Method used	Based mainly on expert opinion with very limited data
6.7 Short-term trend; Period	2013-2024
6.8 Short-term trend; Direction	Decreasing
6.9 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	Decreasing 0 - 12%
d) Unknown	No
e) Type of estimate	Best estimate
f) Rate of decrease	Decreasing >1% (more than one percent) per year on average

6.10 Short-term trend; Method used	Based mainly on extrapolation from a limited amount of data
6.11 Long-term trend; Period	2000-2024
6.12 Long-term trend; Direction	Decreasing
6.13 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Confidence interval	
d) Rate of decrease	
6.14 Long-term trend; Method used	Based mainly on expert opinion with very limited data

6.15 Favourable Reference Population (FRP)

ai) Population size	
aii) Unit	
b) Pre-defined increment	Current population is between 5% and 25% smaller than the FRP
c) Unknown	No
d) Method used	Expert opinion
e) Quality of information	moderate

6.16 Change and reason for change in population size

a) Change	Yes
b) Genuine change	Yes
c) Improved knowledge or more accurate data	
d) Different method	
e) No information	
f) Other reason	

g) Main reason	Genuine change

6.17 Additional information

No additional information

6.18 Age structure, mortality and reproduction deviation	Unknown

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat (for long-term survival)

a) Is area of occupied habitat sufficient?	Yes
b) Is quality of occupied habitat sufficient?	No
c) If No or Unknown, is there a sufficiently large area of unoccupied habitat of suitable quality?	No

7.2 Sufficiency of area and quality of occupied habitat; Method used

a) Sufficiency of area of occupied habitat; Method used	Based mainly on extrapolation from a limited amount of data
b) Sufficiency of quality of occupied habitat; Method used	Complete survey or a statistically robust estimate
7.3 Short-term trend; Period	2013-2024
7.4 Short-term trend; Direction	Increasing
7.5 Short-term trend; Method used	Complete survey or a statistically robust estimate
7.6 Long-term trend; Period	
7.7 Long-term trend; Direction	

7.8 Long-term trend; Method used

7.9 Additional information

Access restrictions (due to physical barriers) to historical river habitat is the primary issue for the species. However, water quality is thought to have been responbsible for the loss of shad species from the River Thames, although it is likely that there would be an interaction between polluting inputs to the river and the presence of barriers, such as weirs, which may have compounded the impacts of individual stressors on the species. An example of this would be impoundments behind in-channel structures leading to increased deposition of fine sediment. This reduces the mosaic of habitats which characterise a naturally functioning riverine environment and provide the range of microhabitats utilised by twaite shad at different stages of their lifecycle. The extent to which poor water quality has effected shad populations is uncertain, however, excessive fine sediment may smother spawning gravels and nutrient enrichment may stimulate increased algal growth in these areas. Twaite shad release their eggs into the water column, unlike salmon which bury their eggs in redds deep within the gravel, therefore, twaite shad eggs may be less suceptable to deoygenation effects related to gravel clogging than those of salmonid species. It is likely that the effects of water quality and physical habitat degredation are highly variable across the range of twaite shad. The current barriers to migration are likely to limit access to some areas of habitat which would be of suitable quality to maintain a viable twaite shad population, however, without further improvements in both water quality and habitat quality, there is unlikley to be a sufficient area of currently unoccupied high quality habitat to maintain the species at FCS.

Surveys of the R. Severn catchment in 2015 identified no specific shad habitat in the main stem of the R. Severn downstream of Diglis weir as the substrate was deemed unsuitable for spawning and there was a lack of marginal deadwater/backwaters for juvenile nursery habitat. However, the River Teme offered offered both spawning and nursery habitats.

8. Main pressures

8.1 Characterisation of pressures

Table 3: Pressures affecting the species, including timing and importance/impact ranking. Pressures are defined as factors acting currently and/or during the reporting period (2019–2024). Rankings are: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Pressure	Timing	Ranking
PK01: Mixed source pollution to surface and ground waters (limnic and terrestrial)	Ongoing and likely to be in the future	High (H)
PG13: Bycatch and incidental killing (due to fishing and hunting activities)	Ongoing	Medium (M)
PL01: Abstraction from groundwater, surface water or mixed water (mixed or unknown drivers)	Ongoing and likely to be in the future	Medium (M)
PA17: Agricultural activities generating pollution to surface or ground waters (including marine)	Ongoing and likely to be in the future	High (H)
PL05: Modification of hydrological flow (mixed or unknown drivers)	Ongoing and likely to be in the future	High (H)
PJ14: Other climate related changes in abiotic conditions	Ongoing and likely to be in the future	High (H)
PL03: Old barriers or other obsolete infrastructures (mixed or unknown drivers)	Ongoing and likely to be in the future	High (H)
PJ03: Changes in precipitation regimes due to climate change	Ongoing and likely to be in the future	High (H)
PL06: Physical alteration of water bodies (mixed or unknown drivers)	Ongoing and likely to be in the future	High (H)
PD02: Hydropower (dams, weirs, run-off-the-river and respective infrastructure)	Ongoing and likely to be in the future	Medium (M)
PG06: Freshwater fish and shellfish harvesting (professional)	In the past but now suspended due to measures	Medium (M)
PD01: Wind, wave and tidal power (including infrastructure)	Only in future	High (H)
PI02: Other invasive alien species (other than species of Union concern)	Ongoing and likely to be in the future	Medium (M)
PI01: Invasive alien species of Union concern	Ongoing and likely to be in the future	Medium (M)

8.2 Sources of information

See section 14 References

8.3 Additional information

PK01: Physical barriers which prevent twaite shad reaching their spawning grounds have been a pressure on many populations throughout their range. These barriers may also act synergistically with water quality problems such as increased sediment and nutrient load. Impoundments behind structures may lead to increased deposition of fine sediment on gravels and dissolved oxygen sags due to a lack of turbulent flow. In some areas fish passes have been added to barrier structures, however, these may not be suited to the passage of shad which generally require lower flow velocities.

Twaite shad require clean, well oxygenated gravels for spawning and slackwater refuge areas for juveniles. Changes to the hydrological regime may increase deposition rates of fine sediment on gravels and increase the resistance of structures to passage by twaite shad. In addition river engineering works may increase spate flows within the catchment which may result in both adult and juvenile shad being washed out of areas of favourable habitat within the river system. If low flows are maintained over long periods of time, elevated water temperatures, deoxygenation, siltation and bed armouring may become evident. Low flows may hinder the passage of in-channel structures. Conversely very high flows may scour gravel spawning beds and deposited eggs. Increased pressure on water supplies for drinking water and agricultural irrigation may lead to increased abstraction and lower flows within the channel. Increased channel engineering and flow modification for flood risk management may continue to degrade the complex habitat mosaic required for shad to complete their lifecycle.

Diffuse agricultural pollution has increased the input of fine sediment, phosphate and nitrate to rivers leading to eutrophication issues such as increased algal production in spawning areas and smothering of gravels. Urbanization and industrialization have resulted in discharges of both raw and treated sewage, industrial effluents and diffuse urban pollution. These discharges may prove acutely toxic to shad or produce lethal effects due to deoxygenation of the water column. A wide variety of other chemicals, including pesticides and endocrine disrupters, have been released into the aquatic environment. These may result in obvious lethal effects, however, a wide variety of sub-lethal effects, such as reduced fertility may affect the overall fitness of shad. Due to the diverse array of sources and impacts, the severity and contribution of each individual stressor on the population as a whole is unknown. While great improvements have been made in water quality across England, particularly relating to point source inputs of gross organic pollution, diffuse rural sources of nutrients and sediment emanating from agricultural land use are likely to continue to be a stress on the aquatic environment.

Invasive non-native fish species such as zander and wels catfish have the potential to increase predation pressure on shad. Zander are now well established within the

R.Severn system and may have a competetive advantage over pike within modified and turbid river reaches. INNS species, continue to increase their range and populations in many English river and lake catchments. There are no effective control measures for many INNS and their range is expected to continue to expand in river and lake networks for the foreseeable future.

English populations of shad may be captured as bycatch during commercial fishing on their marine feeding grounds, in coastal areas during spawning migration, and in their up-river migrations. Fishing pressure includes both commercial net and recreational rod fisheries. However, shad cannot be legally targeted and are therefore only impacted as bycatch. Shad are not considered to be a particularly robust species, therefore, stress related to capture and handling may either kill them or render them less likely to spawn successfully.

Increases in temperature may produce synergistic effects with other environmental stresses such as increased toxicity of pollutants and more rapid deoxygenation. Low flows may reduce the ability of shad to pass barriers and high spate flows may lead to adults, juveniles and eggs being washed out of areas of suitable habitat. The potential for climate change to impact on future twaite shad populations is poorly understood. Future climate change scenarios indicate a shift to a pattern of increasingly extreme events such as more prolonged low flows and higher, more energetic spate flows. This is likely to add further stress to shad populations by making migratory barriers harder to pass and the ability to utilise high quality in-river habitats more difficult. Conversely, warmer waters may favour shad populations and allow a northerly range expansion.

Hydro-electric schemes may form major obstructions as twaite shad populations are denied passage over spillways, through turbines and impoundments. Impounding structures may disrupt sediment movement down river, deepen and stabilise water levels, reduce hydraulic scour and increase siltation behind the structure. They may restrict the free movement of shad up and down the river. Designs may require the abstraction of water out of the channel through an off-line turbine, leaving a depleted reach. Other designs divert water within the channel through the turbine which may create current velocities that attract migrating shad. Bank reinforcements affect riparian habitats, while turbine arrangements without suitable screening can entrain shad, generating injuries and mortalities. Turbine offtakes may attract migratory fish resulting in delays to migration and increased predation.

The future development of tidal barrages and infrastructure associated with nuclear new build has the potential to represent a threat to future twaite shad populations, unless suitably mitigated.

9. Conservation measures

9.1: Status of measures

a) Are measures needed?	Yes
b) Indicate the status of measures	Measures identified and taken
9.2 Main purpose of the measures taken	Restore the habitat of the species (related to 'Habitat for the species')
9.3 Location of the measures taken	Both inside and outside National Site Network
9.4 Response to measures	Medium-term results (within the next two reporting periods, 2025–2036)

9.5 List of main conservation measures

Table 4: Key conservation measures addressing current pressures and/or anticipated threats during the next two reporting periods (2025–2036). Measures are ranked by importance/impact: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Conservation measure	Ranking
MK01: Reduce impact of mixed source pollution	High (H)
MA10: Reduce/eliminate point or diffuse source pollution to surface or ground waters (including marine) from agricultural activities	High (H)
MF02: Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructure, operations and activities	High (H)
MK03: Restoration of habitats impacted by multi-purpose hydrological changes	High (H)
MF09: Adapt the management of water abstraction for public supply and for industrial and commercial use to reduce negative impacts on habitats and species (incl. restoration of habitats)	High (H)
MJ01: Implement climate change mitigation measures	High (H)
MG02: Management of hunting, recreational fishing, and the recreational or commercial harvesting or collection of plants and fungi (incl. restoration of habitats)	Medium (M)

9.6 Additional information

Work has continued to reduce point and diffuse discharges to both the national site network and wider river network. Major infrastructure projects to improve sewerage, such as removal or upgrade of combined sewer overflows and improved phosphorus removal from treated sewage effluent has been funded via the water industry's programme of strategic improvements such as AMP and PR rounds. However, further investigations are needed into the application of new best available technology for phosphorus removal and the increased availability of mains sewerage for rural populations. The England Catchment Sensitive Farming Initiative is continuing to promote a range of best agricultural practices to reduce pollution loads to priority aquatic sites. A combination of Habitats Site, SSSI and Water Framework objectives continues to drive improvements in water quality with diffuse water pollution prevention plans developed for many sites. New Countryside Stewardship payments are being developed to incentivise good agricultural practices.

A major programme of physical restoration has been implemented on the designated river network, involving the development of a long-term strategic plan for each river and its programmed implementation. These plans address key issues such as dams and weirs, floodplain reconnection, channel modifications, lack of riparian habitat, lack of riparian trees and lack of woody debris in the channel. Outside of the designated site network, river restoration schemes have focused on addressing channel modifications and the many weirs and dams on the river network in England. A further driver for river restoration has been the increased prominence of natural flood management. If properly implemented, NFM has the potential to enable widespread improvements in many previously degraded riverine habitats.

The rationale behind restoring river habitat in England is the restoration of natural riverine processes, which creates characteristic habitats and provides for individual species to an extent dependent on the natural character of the river. This rationale is also the main adaptation response for combatting climate change. Some aspects of restoring natural function are also seen as climate change mitigation measures, such as the re-establishment of natural tree cover and riparian vegetation which is being implemented as part of many river restoration schemes and agri-environment schemes. These interventions may result in moderated extremes of flow, reductions in water temperature and increased water quality.

Improvements have been achieved with limiting abstraction volumes and improving flow regimes by altering compensation flows from water company assets via AMP and PR rounds. However, further improvements are required to naturalise flows at many sites. As part of the on-going abstraction reform process, abstraction licences will become

environmental permits and a greater emphasis will be given to environmental considerations. Since 2022 many previously exempt abstractions require a permit.

Detailed assessments are being made of potential risks to shad due to abstractions from existing and new water supply infrastructure. Where problems are highlighted mitigation measures such as improved screening or modified operating procedures are being implemented.

Fisheries in all rivers are subject to exploitation controls. Twaite shad are listed in Annexes II and V of the Habitats Directive. Annex II requires that Special Areas of Conservation are designated for twaite shad, with the appropriate management of these and other sites where they are known to occur so that the favourable conservation status of the species can be secured. Additional fishery specific issues are addressed by the 'Salmon and freshwater fisheries act 1975' and the Marine and Coastal Access Act. Under these legislations the Environment Agency has powers to licence fisheries that may interact with shad. Fishery byelaws regulate when, where and how fishing can take place. The licencing approach limits exploitation pressure on shad populations.

10. Future prospects

10.1a Future trends of parameters

ai) Range	Overall stable
bi) Population	Overall stable
ci) Habitat for the species	Overall stable

10.1b Future prospects of parameters

aii) Range	Good
bii) Population	Unknown
cii) Habitat for the species	Unknown

10.2 Additional information

As improvements continue to be made regarding water quality and re-establishment of natural riverine processes in England and plans are developed and implemented to improve fish passage for shad at key sites such as the River Severn and River Tamar, together with other estuaries and rivers around England, the area of freshwater habitat suitable for shad spawning and juvenile development may be expected to increase. Set in opposition to this generally positive outlook are the unknowns of climate change

effects which may lead to more extreme flow variations, the potential for continued diffuse agricultural pollution resulting in inputs of nutrients and fine sediment and the possibility of increases in energy production infrastructure associated with run of river hydropower, tidal barrages, lagoons and nuclear power. It is perhaps this final threat that, if implemented, may present the most serious long-term threat to the continuation of twaite shad populations in English coastal, estuarine and freshwater habitats.

11. Conclusions

11.1 Range	Unfavourable-inadequate (U1)
11.2 Population	Unfavourable-inadequate (U1)
11.3 Habitat for the species	Unfavourable-inadequate (U1)
11.4 Future prospects	Unfavourable-inadequate (U1)
11.5 Overall assessment of Conservation Status	Unfavourable-inadequate (U1)
11.6 Overall trend in Conservation Status	Stable

11.7 Change and reason for change in conservation status

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

11.7 Change and reason for change in conservation status trend

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

11.8 Additional information

No additional information

12. UK National Site Network (pSCIs, SCIs, SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network

a) Unit	number of map 1x1 km grid cells
b) Minimum	
c) Maximum	
d) Best single value	24
12.2 Type of estimate	Best estimate
12.3 Population size inside the network; Method used	Based mainly on extrapolation from a limited amount of data
12.4 Short-term trend of population size within the network; Direction	Decreasing
12.5 Short-term trend of population size within the network; Method used	Complete survey or a statistically robust estimate
12.6 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Direction	Increasing
12.7 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Method used	Complete survey or a statistically robust estimate

12.8 Additional information

The situation within the SAC network broadly reflects the general situation within higher quality areas of the river resource outside of the network. As improvements continue to be made regarding water quality and re-establishment of natural riverine processes in England and plans are developed and implemented to improve fish passage for twaite shad in rivers throughout England, the area of freshwater habitat suitable for shad spawning and juvenile development may be expected to increase. The rate of improvement may be expected to be greater within the SAC network than outside of it. Set in opposition to this generally positive outlook are the unknowns of climate change effects which may lead to more extreme flow variations and the potential for continued diffuse agricultural pollution resulting in inputs of nutrients and fine sediment. In addition major infrastructure projects are planned within the SAC series, however, they may not be permitted within the SAC site series without suitable mitigations being in place.

13. Complementary information

13.1 Justification of percentage thresholds for trends

No justification information

13.2 Trans-boundary assessment

No trans-boundary assessment information

13.2 Other relevant information

No other relevant information

14. References

Biogeographical and marine regions

4.2 Sources of information

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Main pressures

8.2 Sources of information

No sources of information

15. Explanatory Notes

Field label	Note
2.4: Distribution map; Method used	Data contained within the National Biodiversity Network Database has been used to produce distribution maps for twaite shad. These data have been collated from both routine and ad-hoc fish surveys. Twaite shad distribution is likely to be under-represented in England as they are often not recorded in routine surveys due to their migratory life history. There are uncertainties over the ability to discriminate between twaite and allis shad in the records available for the two species, and the species have the ability to hybridise. Therefore a considerable number of records are reported at genus level only. Range maps are based on the species records for A. fallax.
6.15: Favourable Reference Population (FRP)	The JNCC FRP audit spreadsheet has twaite shad listed as being assessed under IUCN extinction risk criteria as Least Concern, however, the 2023 red list assessment lists twaite shad as Vulnerable
6.16: Change and reason for change in population size	A significant decline in the R.Severn twaite shad population has been recorded between 2017 – 2024. It is unknown whether this is a genuine population decline due to an unknown pressure or whether it is a natural fluctuation in numbers.
6.18: Age structure, mortality and reproduction	The lack of a coordinated monitoring programme which encompasses all lifestages of twaite shad makes it impossible to accurately assess whether the population is recruiting efficiently, however, monitoring undertaken for the Unlocking the Severn project in 2016-17 demonstrated that a range of sizes of both male and female shad undertook migration runs on the R. Severn. Scale reading indicated that a number of fish had previously spawned, on up to 5 occasions, meaning that the population contained fish of at least 9 years old. Of 25 tagged fish in the study, 17 were shown to have migrated back downstream indicating a post spawning survival rate of 68%. These findings cooborated earlier research on twaite shad demonstrating that the

	population dynamics may not have changed significantly since the 1980's.
7.4: Short-term trend; Direction	Twaite shad are widely distributed and have complex habitat requirements as they are anadromous and require migratory passage, with relatively low flow velocities and turbulence. In addition, the habitat required during the marine/estuarine phase of their lifecycle is poorly understood. These factors, combined with sporadic survey effort make a detailed assessment of habitat quality trends impossible at the present time. However, progress has been made with reducing nutrient and organic pollution levels in many rivers across England within the short-term trend period, which may have a beneficial effect on the quality of shad habitat. Water quality improvements in a number of rivers and estuaries are also likely to facilitate passage to spawning grounds. There has been a significant change in accessibility / passage efficiency within the trend period for the River Severn (Unlocking the Severn Project) and other potential twaite shad sites 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 in the planning phase, therefore, the likely trend may be inferred as increasing. However, physical barriers to migration and physical habitat degradation are still significant stressors for shad populations within England. In addition, the increased focus on run of river hydropower schemes, nuclear new-build and the potential for tidal barrage systems may result in man-made barriers to shad migration being perpetuated for the foreseeable future
7.8: Long-term trend; Method used	Water quality improvements across a range of estuarine and freshwater sites, combined with an increase in multi-species fish passage solutions and river habitat restoration projects over the trend period have improved access for shad to previously inaccessible areas within their natural range.

10.1: Future trends and prospects of parameters	a) Assumes relatively widespread species, with a large natural range within England. The species may expect to become increasingly distributed within this range, assuming no further increases in barriers to upstream migration associated with hydropower and estuarine infrastructure development and unsuitable fish passage solutions. b)Although the species may be expected to have increasing access to areas within its natural range, the potential impact from estuarine infrastructure related to power generation is currently unknown as much of the work is currently at the planning stage and the level to which impacts may be mitigated has not been determined. c)River habitat restoration may be expected to continue and shad may have increasing access to areas of good quality habitat within its natural range. However, the potential impact from estuarine infrastructure related to power generation is currently unknown as much of the work is currently at the planning stage and the level to which impacts may be mitigated has not been determined.