

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

2019-2024

Conservation status assessment for the species:

S1106 - Atlantic salmon

(Salmo salar)

England



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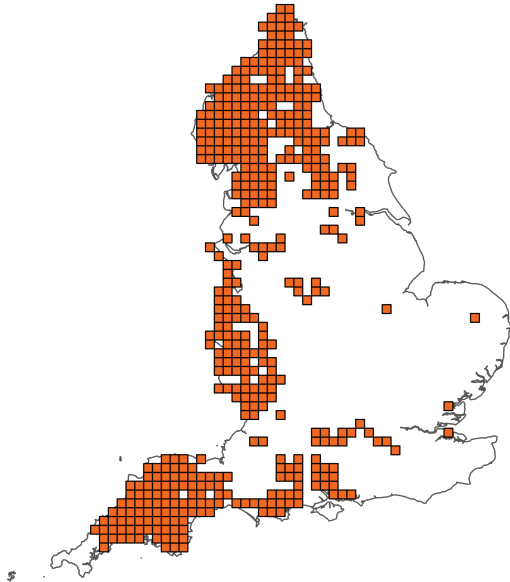
Important note - Please read

- 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: Atlantic salmon

Distribution Map



Range Map

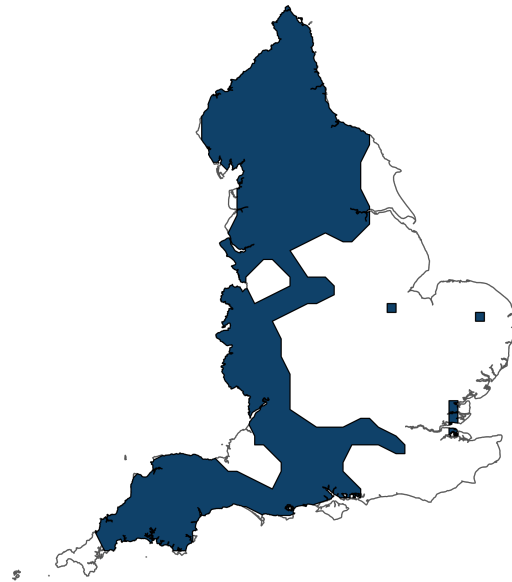


Figure 1: England distribution and range map for S1106 - Atlantic salmon (*Salmo salar*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority. The 10km grid square distribution map is based on available species records within the current reporting period.

Table 1: Table summarising the conservation status for S1106 - Atlantic salmon (*Salmo salar*). 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-bad (U2)

Breakdown of Overall Conservation Status

Range (see section 5)

Favourable (FV)

Population (see section 6)

Unfavourable-bad (U2)

Habitat for the species (see section 7)

Unfavourable-bad (U2)

Future prospects (see section 10)

Unfavourable-bad (U2)

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National Level

1. General information

| | |
|---|--------------------|
| 1.1 Country | England |
| 1.2 Species code | S1106 |
| 1.3 Species scientific name | <i>Salmo salar</i> |
| 1.4 Alternative species scientific name | |
| 1.5 Common name | Atlantic salmon |
| 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 | Complete survey or a statistically robust estimate |

2.5 Additional information

No additional information

3. Information related to Annex V Species

| | |
|--|-----|
| 3.1 Is the species taken in the wild / exploited? | Yes |
| 3.2 What measures have been taken? | |
| a) Regulations regarding access to property | Yes |
| b) Temporary or local prohibition on the taking of specimens in the wild and exploitation | Yes |
| c) Regulation of the periods and/or methods of taking specimens | Yes |
| d) Application of hunting and fishing rules which take account of the conservation of such populations | Yes |

| | |
|--|-----|
| e) Establishment of a system of licences for taking specimens or of quotas | Yes |
| f) Regulation of the purchase, sale, offering for sale, keeping for sale, or transport for sale of specimens | Yes |
| g) Breeding in captivity of animal species as well as artificial propagation of plant species | Yes |
| Other measures | Yes |

Other measures description

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

a) Unit number of adults

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 | 18,927 | 9,651 | 12,479 | 6,563 | 6,952 | 5,399 |
| c) Maximum | - | - | - | - | - | - |
| d) Unknown | - | - | - | - | - | - |

3.4: Hunting bag or quantity taken in the wild; Method used Complete survey or a statistically robust estimate

3.5: Additional information

No additional information

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) 66,561.14

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 less than 2% smaller than the FRR |
|---------------------------------|--|

| | |
|-------------------|----|
| c) Unknown | No |
|-------------------|----|

| | |
|-----------------------|----------------|
| d) Method used | Expert opinion |
|-----------------------|----------------|

e) Quality of information

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

No additional information

6. Population

| | |
|---------------------------|-----------|
| 6.1 Year or period | 2019-2023 |
|---------------------------|-----------|

6.2 Population size (in reporting unit)

| | |
|----------------|------------------|
| a) Unit | number of adults |
|----------------|------------------|

b) Minimum

c) Maximum

| | |
|---|--|
| d) Best single value | 36,296 |
| 6.3 Type of estimate | Multi-year mean |
| 6.4 Quality of extrapolation to reporting unit | moderate |
| 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 | Complete survey or a statistically robust estimate |
| 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 51 - 100% |
| 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 | Complete survey or a statistically robust estimate |
| 6.11 Long-term trend; Period | 2004-2022 |
| 6.12 Long-term trend; Direction | Decreasing |

**6.13 Long-term trend;
Magnitude****a) Minimum****b) Maximum****c) Confidence interval****d) Rate of decrease** Decreasing >1% (more than one percent) per year
on average**6.14 Long-term trend; Method used** Complete survey or a statistically robust estimate**6.15 Favourable Reference Population (FRP)****ai) Population size** 97,404**a ii) Unit** number of individuals**b) Pre-defined increment****c) Unknown** No**d) Method used** Model-based approach**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** No**f) Other reason** No**g) Main reason** Genuine change**6.17 Additional information**

No additional information

6.18 Age structure, mortality and reproduction deviation

Yes, strongly deviating from normal

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 Complete survey or a statistically robust estimate

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 Stable

7.5 Short-term trend; Method used Complete survey or a statistically robust estimate

7.6 Long-term trend; Period 2000-2024

7.7 Long-term trend; Direction Stable

7.8 Long-term trend; Method used Based mainly on extrapolation from a limited amount of data

7.9 Additional information

Atlantic salmon distribution is widespread but reduced across England when compared with their natural/unimpacted reference condition. This decline is generally attributed to

historical reductions in habitat quality due to poor water quality and the historical introduction of physical barriers which stop salmon reaching some areas of freshwater habitat which would previously have been available for spawning. However, there is still likely to be sufficient area of habitat, for the species to persist in the long term. In addition there is increasing acceptance of the need for, and delivery of suitable multi-species fish passage solutions. This will benefit the dispersal of salmon and allow the recolonisation of areas within its natural range. However, changes in thermal regime, flow and other physico-chemical variables related to climate change within both freshwater and marine habitats are likely to negatively impact habitat quality and render it unsuitable for salmon. These impacts may be particularly severe for southerly salmon populations within England.

Salmon have complex habitat requirements as their eggs are laid in well oxygenated gravels and migratory passage must be maintained for adults. In addition, the habitat required during the marine phase of their lifecycle is poorly understood. These factors, combined with sporadic survey effort and the widespread distribution of salmon within England, make a detailed assessment of habitat quality trends impossible at the present time. However, progress has been made with reducing physical barriers, nutrient and organic pollution levels in many rivers across England within the short-term trend period, which may have a beneficial effect on migration and the quality of spawning substrates. Water quality improvements in a number of rivers and estuaries are also likely to facilitate passage to spawning grounds. However, issues of siltation of spawning gravels, remaining physical barriers to migration and physical habitat degradation are still significant stressors for salmon populations within England. The increased focus on run of river hydropower schemes, tidal lagoons and barrages and nuclear new-build may result in man-made barriers to salmon migration or entrainment risks being perpetuated for the foreseeable future. In addition climate change effects may be changing the temperature envelope available to salmon in England. Increased warming of southerly rivers may be leading to a northerly shift in available habitat. This factor may cancel out the gains made in habitat availability due to improved water quality and barrier removal.

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) |
| PI01: Invasive alien species of Union concern | Ongoing and likely to be in the future | High (H) |
| 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) | Ongoing | High (H) |
| PJ10: Change of habitat location, size, and / or quality due to climate change | Ongoing and likely to be in the future | High (H) |
| PJ11: Desynchronisation of biological / ecological processes due to climate change | Ongoing and likely to be in the future | High (H) |
| PG13: Bycatch and incidental killing (due to fishing and hunting activities) | Ongoing and likely to be in the future | High (H) |
| 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 | High (H) |

8.2 Sources of information

See section 14 References

8.3 Additional information

No additional information

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) | High (H) |
| MG05: Reduce bycatch and incidental killing of non-target species | High (H) |
| MC02: Adapt/manage exploitation of energy resources | High (H) |
| MG01: Management of professional/commercial fishing, shellfish and seaweed harvesting (incl. restoration of habitats) | High (H) |

9.6 Additional information

Work has continued to reduce 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 Sites, SSSI and Water Framework objectives continues to drive improvements in water quality with diffuse water pollution prevention plans developed for many sites.

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

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.

In recent years the rapid increase in the installation of run-of-river hydropower schemes has led to concerns over their impacts on migratory fish such as salmon. Research has been undertaken on the safety of various turbine designs but this has mainly focused on fish strike by turbine blades and their associated screening requirements. The effects of these installations on fish behaviour and the associated delays to migration, energy costs to fish and increased predation rates are less well understood. Many of the studies have assessed individual installations. While each individual installation may have a relatively low impact on fish, where multiple schemes have been planned on a river, their in-combination effects on salmon may not have been fully taken into account. In addition, fish passage mitigations at these installations take no account of the loss of geomorphological processes / impact on river habitats within the river and often lead to the barrier and its associated impoundment being perpetuated when opportunities for its complete removal and restoration of river processes may have been available. However, in the case of strong swimming fish species such as salmon, the requirement for fish passage enhancements associated with these installations has led to increased connectivity between marine feeding grounds and riverine spawning habitat at some sites.

Detailed assessments must be made of the potential risks to salmon due to abstractions, discharges and potential barrier effects from new energy infrastructure. Any developments must be fully assessed and mitigation measures developed pre-construction phase. Continuous post construction monitoring must be undertaken and operational procedures modified if required. Tidal lagoon / barrage developments are in their infancy and detailed plans to protect salmon will be required as part of the feasibility and development phase.

Salmon fisheries in all rivers are subject to exploitation controls. Salmon are listed in Annexes II and V of the EC Habitats Directive. Annex II requires that Special Areas of Conservation are designated for salmon and that Member States should ensure 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. The primary legislation for the regulation of salmon exploitation is the 'Salmon and Freshwater Fishery Act 1975'. Under this legislation the Environment Agency has powers to make Net Limitation Orders. Each order limits the number of licences for fishing with nets that may be issued in any specific fishery for up to 10 years. Fishery byelaws regulate when, where and how fishing can take place. In line with NASCO guidelines on protecting the weakest stock, mixed stock fisheries will be phased out for England. All declared net caught wild salmon were returned alive in 2023 in line with national bylaws and it is illegal to sell rod caught wild salmon in England. The EA are currently implementing and updating the 'Salmon Five Point Approach' to conserve salmon stocks across England. Exploitation pressure will be controlled by increasing the levels of catch and release for

rod fisheries and net fishing effort reduced or removed. In 2023 it is estimated that 95% of all rod caught salmon were released

Section 14 of the Wildlife and Countryside Act (WCA) prohibits the introduction into the wild of any animal of a kind which is not ordinarily resident in, and is not a regular visitor to, Great Britain in a wild state, or any species of animal or plant listed in Schedule 9 to the Act. Schedule 9 lists non-native species that are already established in the wild, but which continue to pose a threat to native biodiversity and habitats such that further releases should be regulated. The EU Invasive Alien Species (IAS) Regulation (1143/2014) came into force on 1 January 2015. The Regulation imposes restrictions on species “of Union concern”. These are species whose potential adverse impacts across the European Union are such that concerted action across Europe is required. Under the Water Framework Directive (WFD) invasive non-native species (INNS) have been classified as high, moderate, low or unknown impact. Their presence prevents a site reaching high ecological status. They may also affect the ability of waterbodies to reach the default objective of good ecological status, or may cause a deterioration of status away from good. The presence of viable populations of high impact non-native species constitutes a reason for unfavourable condition of SSSIs and SACs notified for their freshwater habitat. The presence of any non-native species may constitute a reason for unfavourable condition of SSSIs and SACs notified for either their freshwater habitat or particularly freshwater species, depending on the nature of the effect. The Live Fish Movement Scheme (LFMS) enacts the Keeping and Introducing Fish Act 2015 (KIFA). It lists Invasive non-native fish species (Annex 1 species) which cannot be kept in water bodies without a licence. There are a number of strategies in England aimed at limiting the spread of invasive species. Examples include the development of INNS Risk Assessments, pathway action plans such as the ‘angling pathway action plan’ and the ‘boating pathway action plan’ which are required under the IAS regulations, the implementation of the Great Britain Invasive Non-Native Species Strategy and publicity via stakeholders surrounding the importance of biosecurity protocols.

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.

10. Future prospects

10.1a Future trends of parameters

| | |
|------------------------------------|--|
| ai) Range | Very Negative - decreasing >1% (more than one percent) per year on average |
| bi) Population | Very Negative - decreasing >1% (more than one percent) per year on average |
| ci) Habitat for the species | Very negative - important deterioration |

10.1b Future prospects of parameters

| | |
|-------------------------------------|-----|
| aii) Range | Bad |
| bii) Population | Bad |
| cii) Habitat for the species | Bad |

10.2 Additional information

Climate change predictions represent an increasing pressure on the species, particularly in the southern parts of its English range. Improvements in water quality and the removal of barriers to migration in many northern areas and the opportunity to mitigate some climate change effects may indicate a more positive outlook for northern populations, both in terms of available habitat and climate space. However, changes to flow regimes as a result of climate change will generate further stress for salmon, and climate change effects concerning the marine phase of the life cycle will affect all populations. The continued reduction in marine survival and poor juvenile recruitment present serious challenges to English salmon populations as a whole. Restoration measures to maximise the resilience of river ecosystems by restoring natural processes are becoming ever more important in the face of climate change, however, the continued expansion of hydropower schemes and other energy production infrastructure will continue to render the development of natural processes impossible at a number of sites for the design life of these structures. In addition invasive non-native crayfish, with other INNS species, are likely to continue to expand their range and impact on salmon and the potential for the spread of *G. salaris* remains high.

11. Conclusions

| | |
|-------------------|-----------------|
| 11.1 Range | Favourable (FV) |
|-------------------|-----------------|

| | |
|---|-----------------------|
| 11.2 Population | Unfavourable-bad (U2) |
| 11.3 Habitat for the species | Unfavourable-bad (U2) |
| 11.4 Future prospects | Unfavourable-bad (U2) |
| 11.5 Overall assessment of Conservation Status | Unfavourable-bad (U2) |
| 11.6 Overall trend in Conservation Status | Deteriorating |

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 adults |
| b) Minimum | |
| c) Maximum | |
| d) Best single value | 4,810 |
| 12.2 Type of estimate | Multi-year mean |
| 12.3 Population size inside the network; Method used | Complete survey or a statistically robust estimate |

| | |
|--|--|
| 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 | Stable |
| 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 Atlantic salmon in rivers throughout England, the area of freshwater habitat suitable for salmon spawning and juvenile development may be expected to increase, particularly in northern rivers. The rate of improvement may be expected to be greater within the SAC network than outside of it. Set in opposition to this potentially positive outlook is the continuing expansion of INNS and the developing impacts of climate change which may lead to a northerly shift in range, 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 Atlantic salmon. These data have been collated from both routine and ad-hoc fish surveys. Atlantic salmon are well represented within freshwater monitoring and associated reporting programmes. |
| 3.1: Is the species taken in the wild/ exploited | Atlantic salmon are exploited in both commercial net fisheries and by recreational angling. |
| 3.4: Hunting bag or quantity take in the wild; Method used | Data from catches taken by rod and net and fixed engine fisheries collated by the EA. Salmon and sea trout rod licence and commercial net and fixed engine licence holders are required to submit detailed catch returns each year, however, a percentage will fail to submit a return. Methodological details can be obtained from the Assessment of salmon stocks background report. |
| 5.3: Short-term trend; Direction | Although the distribution of Atlantic salmon is still below the historical / pristine condition, due to improvements in water quality and fish passage, salmon populations may be slowly expanding within their natural range. |
| 5.7: Long-term trend; Direction | Although the distribution of Atlantic salmon is still below historical / pristine condition, due to improvements in water quality and fish passage, salmon populations may be slowly expanding within their natural range. |

Records for Atlantic salmon are common and widespread throughout the trend period, however, survey effort is not consistent across the species range. It is therefore impossible to accurately assess a trend direction. The species is being regularly recorded across its natural range and there has been no significant increase in pressures, which suggests that the distribution is at least stable. There is the likelihood of a weak improving trend in distribution due to improvements in water quality in certain river

| | |
|-----------------------------------|--|
| | <p>catchments draining industrial / urban conurbations and the removal of some physical barriers to upstream migration, however, this generally represents a recolonisation of the areas from which salmon had previously been extirpated, rather than a true expansion of range.</p> |
| 6.2: Population size | <p>The estimate is for adult spawning salmon (after exploitation) in the 42 principal salmon rivers in England, rather than numbers of fish returning to rivers. This estimate relates directly to the annual egg deposition figures used in assessing compliance with the river-specific conservation limits (CLs).</p> |
| 6.6: Population size; Method used | <p>Stock assessments for England are evaluated annually for reporting to ICES. From this data estimated numbers of adult salmon returning to English rivers are calculated using a combination of absolute counts using fish counters and traps, combined with estimates derived from rod angler catch returns. A correction factor is then applied to account for salmon which enter the freshwater environment but do not survive to spawn due to exploitation pressures. Full details of the methodologies used can be gained from the Assessment of salmon stocks and fisheries in England and Wales. Standing report on methods, approaches and wider stock conservation and management considerations.</p> |
| 6.9: Short-term trend; Magnitude | <p>56% decrease between 2013 (58558 fish) to 2023 (25256 fish)</p> <p>The recent IUCN red list GB level assessment of freshwater and migratory fish estimated the 3-generation (15 year) percentage change, based on the rate of change in annual ICES pre-fishery abundance estimates for England, Scotland and Wales, was 63%. Atlantic salmon was therefore classified as Endangered in Britain as a result of its continuing population size reduction ($\geq 50\%$ in three generations)</p> |

6.18: Age structure, mortality and reproduction

Rod catches of 1SW salmon for England and Wales show substantially greater year-to-year variability than those of MSW fish in numerical terms. There was a sharp downturn in the 1SW rod catch from 2012 to 2014, which subsequently stabilised at relatively low levels until 2017 and then declined further. The provisional adjusted catch in 2023 was the lowest in the time-series that started in 1992. In contrast, adjusted rod catches of MSW salmon have demonstrated comparatively small numerical changes and have been trending positively over the period as a whole. The adjusted catch of MSW salmon in 2023 was 14% lower than in 2022 and the fourth lowest in the time-series since 1992. The MSW salmon have comprised more than 50% of the estimated total adjusted rod catch, on average, over the past thirteen years, compared with an average of 25% in the preceding period back to 1992.

12.1: Population size inside the pSCIs, SCIs and SACs network

Estimates are based on the total number of spawning adults in the following rivers, all of which are SACs. Rivers that are shared with Wales (the Rivers Wye and Dee SACs) and Scotland (the River Tweed/Till SAC) are not. The River Axe SAC is not included as the SAC only covers the lower section of the river. The headwater streams of Dartmoor SAC are also not included as it is unclear what proportion of the adult population of the River Dart spawn in the headwaters. Figures are the minimum, maximum and mean values from the years 2018 - 2023. Considering the widespread nature of the species in England, the river SAC network contains a substantial component of the English population.

River (Hampshire) Avon = min 526 (2023) max 1359 (2020)
Mean 818

River Camel = min 112 (2021) max 277 (2023) Mean 209

River Derwent = min 399 (2023) max 1187 (2020) Mean 729

River Ehen = 210 (2023) max 781 (2020) Mean 395

River Eden = min 1105 (2023) max 3584 (2020) Mean 2328

River Itchen = min 111 (2022) max 628 (2020) Mean 331

Mean (2018-2023) total for SAC network = 4810

8.3: Additional information

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 spawning 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 salmon or produce lethal effects due to deoxygenation of the water column. In areas where the geological buffering capacity of the watershed is poor, acid precipitation may reduce the pH levels of aquatic environments to toxic levels. In addition, this may mobilise metals, such as aluminium, releasing them into water bodies. A wide variety of other chemicals, including pesticides and endocrine disrupters, have been released into the aquatic environment. These may result in lethal effects, however, a wide variety of sub-lethal effects, such as reduced fertility or osmoregulatory difficulties during the transition from the freshwater to the marine environment, may affect the overall fitness of salmon. 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.

Salmon require clean, well oxygenated gravels for spawning. Changes to the hydrological regime may increase deposition rates of fine sediment on gravels,

increase the resistance of structures to passage by salmon and lead to stranding of parr and smolt during low flows. In addition, river engineering works may increase the velocity of spate flows within the catchment which may result in both adult and juvenile salmon being washed out of areas of favourable habitat within river system. If low flows are maintained over long periods of time, elevated water temperatures, deoxygenation, siltation and bed armouring may become evident. 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 salmon to complete their lifecycle.

Structures such as dams, weirs, fords and culverts may form barriers to the upstream spawning migration of adult salmon and for downstream juvenile migration. The Environment Agency established a geographic database of obstructions across England and Wales. It identified 18,000 manmade obstructions on a river network length of 300,000kms. These range from large dams, which may have been built for navigation and or milling to smaller structures, for example, for irrigating water meadows. However, on some rivers the frequency of obstructions can be much greater. In many cases, obstructions are considered the major cause of Atlantic salmon population decline in England. Riparian land use change due to urbanization, agriculture, forestry and other human activities impacting on riverbanks may reduce riparian vegetation, increase the speed of run-off to the river and alter the river planform. Gravel composition is of vital importance to eggs and alevins. Consequently, gravel extraction and river engineering works may alter flood

dynamics and natural gravel deposits. Erosion and siltation can be influenced by forestry, agriculture, mining and other human activity. Increased siltation may clog spawning gravels or act directly on the fish by clogging of the gills and reducing foraging efficiency.

Hydro-electric schemes often form major obstructions as salmonid 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 salmon 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 fish. Bank reinforcements affect riparian habitats, whilst turbine arrangements without suitable screening can entrain fish, generating injuries and mortalities. Turbine offtakes may attract migratory fish resulting in delays to migration and increased predation. Tidal barrages and lagoons, together with new nuclear energy production projects, have been proposed for a number of major English estuaries. These have the potential to greatly increase the risk of migratory delays and entrainment risks at these locations.

Temperature influences both the period of incubation of eggs and thus the time of emergence, the subsequent development rate of alevins and the survival of migrating smolt and adult salmon. Increases in temperature may produce synergistic effects with other environmental stresses such as increased toxicity of pollutants and more rapid deoxygenation. Changes in the marine environment may affect both the survival and growth of Atlantic salmon and lead to a northern shift in range. Increased water temperatures associated with climate change may be particularly pronounced in the southern extent of the

English Atlantic salmon range. If the expected northward movement of the thermal niche of anadromous salmonids occurs, decreased production and population extinction in the southern part of the distribution area may result in a loss of salmon from southern chalk streams draining to the south coast. Future climate scenarios for the northern hemisphere suggest precipitation is expected to increase so that winter runoff will increase markedly, while the summer will decrease. Milder, wetter winters will result in changes to spring floods and increased winter water temperatures. Hatching of salmon eggs will be accelerated in the southern portion of salmon range, and juveniles will need to start feeding earlier in spring. It is likely that food organisms will be available, as they will also develop more rapidly at higher water temperatures. However, altered flood regimes may present a harsher environment to juvenile salmon. Growth conditions in northern rivers are likely to improve, and so will the production of salmon smolts. In contrast, rivers in the southern part of the distribution range are likely to present salmon juveniles with warmer water at a lower runoff, which may reduce productivity. Altered flow regimes are likely to influence the timing of smolt migration and adult return.

English populations of Atlantic salmon have historically been heavily exploited on marine feeding grounds, in coastal areas during spawning migration, and in their up-river migrations. Exploitation pressure includes both commercial net and recreational rod fisheries. Atlantic salmon have been artificially reared and released into the wild for a variety of reasons including aquaculture escapement, conservation, augmentation, compensation, re-establishment and increased angler catch. This may increase competition between released and wild fish, leading to a displacement of wild fish. Hatchery reared fish demonstrate poorer survival rates but may have a substantial impact if released in large numbers. If releases are based on local populations, the genetic impacts relate to inbreeding and domestication in the artificially

propagated stock. If releases are based on non-native fish, in addition to loss of variability in the hatchery, local adaptations through interbreeding and erosion of the genetic structure of the species may result.

Non-native salmonid species, such as Rainbow trout, are known to compete with native European salmonids, and will suppress Atlantic salmon populations where they establish self-sustaining populations. Even if they do not establish such populations, escaped (or stocked) Rainbow trout may compete with native Atlantic salmon in rivers and in estuaries. Locally absent fish species, such as roach, may be introduced to catchments by anglers and although not well adapted to many of the salmonid habitats will nevertheless exert a competitive pressure. Non-native crayfish species may predate salmon redds, greatly reducing recruitment success. Species such as the signal crayfish (*Pacifastacus leniusculus*) often achieve a higher biomass than the native white-claw crayfish (*Austropotamobius pallipes*) and tolerate a wider range of environmental conditions, increasing their potential predation pressure. Signal crayfish, together with other INNS crayfish species, continue to increase their range and populations in many English river and lake catchments. There are no effective control measures for INNS crayfish and their range is expected to continue to expand in river and lake networks for the foreseeable future. In Norway, catastrophic losses of Atlantic salmon occurred following the introduction of *Gyrodactylus salaris* to the country in the 1970s. By 2002, 44 Norwegian rivers had been infected, and their salmon populations decimated. Fishery losses due to the parasite have been estimated at over 40% of total reported catch of wild salmon. In an attempt to eradicate *G. salaris*, the Norwegian government is carrying out an extensive programme to treat infected rivers with rotenone, killing all fish able to harbour the parasite. Salmon transported from Scottish rivers to Norway and exposed to *G. salaris* were shown to be highly susceptible, and therefore at risk should the parasite ever be introduced

to the UK. Movements of live fish from an infected area represent a high risk to salmon in England with additional risks associated with material from infected waters such as angling equipment and canoes allowing the spread of the parasite to English rivers. Pink salmon (*Oncorhynchus gorbuscha*) have been recorded in very low numbers in UK waters for over 65 years, however, In 2017 much greater numbers of fish were recorded in UK rivers, including England. These fish are thought to have originated from introductions into the White Sea basin. Pink salmon have a strict two year lifecycle with 'even' and 'Odd year' populations. 'Odd year' pink salmon, spawn earlier and are able to withstand colder water temperatures. In 2017 pink salmon were demonstrated to have spawned successfully in Scottish rivers. The impact of competition with Atlantic salmon is currently unknown, however, aggressive behaviour is thought to influence habitat use by Atlantic salmon. Disease and parasite transmission is poorly understood at the present time and the risk to English salmon not determined. Pink salmon may attract piscivorous predators to new areas or to habitats which may not have been subject to significant predation pressure in the past.

6.15: Favourable Reference Population (FRP)

The figure / FRP is the combined returning stock estimate for the 42 English salmon rivers with a 0.91 correction factor applied to account for natural in-river mortality in 1994, a year with a high return rate which is similar to previous high return rates in the period 1971 - 1994. RSE's give the best-case scenario for spawner numbers, if no angling pressure was applied to the stock. Any fish caught by rod-and-line will be subject to an increased risk of mortality even if released, but may be retained on any river without mandatory catch and release requirements. The mortality experienced through rod-and line fishing has not been applied to these estimates but it should be noted that catch and release practices have increased considerably (now >95%) since the start of the time series and therefore the direct removal of fish from the spawning stock has greatly reduced. On this basis it is considered that the RSE

now broadly reflects spawner numbers for the period 2019 – 2024. Data for English spawner numbers was not available prior to 2013.