



# **Severn Salmon and Sea Trout stock assessment and review of fisheries regulations**

Appendices to the Technical case for Net Limitation Order and fishery byelaws

February 2021

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# Introduction

This document accompanies the Severn Salmon and Sea Trout stock assessment and review of fisheries regulations technical case for Net Limitation Order and fishery byelaws January 2021.

Presented are the appendices referenced in that technical case.

# Appendix 1 Developing fishing controls for salmon fisheries in England & Wales ("The Decision Structure")

## Conservation Limits (CLs) and Management Targets (MTs)

### Setting CLs

The use of CLs in England and Wales has developed in line with the requirement of ICES and NASCO to set criteria against which to give advice on stock status and the need to manage and conserve individual river stocks. CLs indicate the minimum desirable spawning stock levels below which stocks should not be allowed to fall. The CL is set at a stock size below which further reductions in spawner numbers are likely to result in significant reductions in the number of juvenile fish produced in the next generation.

### Two relationships are required to derive the CLs:

- (i) a stock-recruitment curve – defining, for the freshwater phase of the life cycle, the relationship between the number of eggs produced by spawning adults (stock) and the number of smolts resulting from those eggs (recruits).
- (ii) a replacement line – converting the smolts emigrating from freshwater to surviving adults (or their egg equivalents) as they enter marine homewaters. This relationship requires an estimate of the survival rate at sea.

The model used to derive a stock-recruitment curve for each river assumes that juvenile production is at a 'pristine' level for that river type (i.e. is not affected by adverse water quality, degraded physical habitat, etc.).

Similarly, in deriving the replacement line, marine survival rates for most river stocks were assumed to be equivalent to the rates estimated on UK monitored rivers (such as the North Esk) in the 1960s and 1970s. Default survival values recommended for this purpose were 25% for 1SW salmon and 15% for MSW fish (Environment Agency, 1998). However, that period is thought to be one of high sea survival, and new default values of 11% for 1SW salmon and 5% for MSW fish, which are more representative of sea survival over the last 20-30 years, were introduced by the Environment Agency in April 2003 (Environment Agency, 2003b).

These rates have now been applied in calculating CLs for all the 64 principal salmon rivers in England and Wales. Since 2003, the CLs for all principal salmon rivers for which egg deposition estimates are assessed annually have incorporated the new lower marine survival estimates. The net effect of these changes was to reduce the CLs: the scale varied from river to river, but resulted in a 26% reduction, on average, in England and Wales from values used prior to 2003.

Introducing marine survival rates which are intended to be closer to those currently experienced by UK salmon stocks will reduce the effect of high mortality at sea as a cause of failing CLs. This will help managers focus on other issues over which they have more

control (e.g. poor environmental quality in-river, over-exploitation by net and rod fisheries, etc.) when compliance failure occurs. The reduction in CLs means, however, that lower levels of spawning escapement are accepted before the stock is considered to be threatened. The Environment Agency also uses the 'Management Objective' (MO) for each river (e.g. in reviewing management actions and regulations) that the stock should be meeting or exceeding its CL in at least four years out of five (i.e. at least 80% of the time). This MO is built into statistical procedures for assessing compliance with CLs (below).

### **Compliance assessment**

The performance of salmon stocks in England and Wales is assessed using a compliance scheme designed to give an early warning that a river has fallen below its CL. An approach introduced in 2004 provides a way of summarising the performance of a river's salmon stock over the last 10 years (including the current year), in relation to its CL. Bayesian regression analyses are applied to egg deposition estimates from the last 10 years, on the assumption that there might be an underlying linear trend over the period. The method fits a 20-percentile regression line to the data and calculates the probability that this regression line is above the CL, and thus that the CL will be exceeded four years out of five (the MO). If there is a low probability (<5%) that the 20-percentile regression line is above the CL, the river fails to comply (i.e. is regarded 'at risk'). If the probability is high (>95%), the river complies in that year (i.e. is 'not at risk'), whereas between these probability values we cannot be certain of the stock status (the river is assessed as either 'probably at risk' ( $5\% < p < 50\%$ ) or 'probably not at risk' ( $50\% \leq p < 95\%$ ). The results are in broad agreement with the compliance scheme used prior to 2004. The current scheme also allows the 20-percentile regression line to be extrapolated beyond the current year in order to project the likely future performance of the stock relative to its CL, if recent the recent trend were to continue, and so assess the likely effect of recent management intervention and the need for additional measures.

As well as providing an assessment of the status of a river in relation to its CL, the direction of the trend in the 10-year time-series of egg deposition estimates and its statistical significance may also serve as an important indicator of the need to take management action and of the degree of intervention required. Thus, a clear negative trend would give additional cause for concern.

The MT for each river is a spawning stock level for managers to aim at, to ensure that the objective of exceeding the CL is met four years out of five in the long run (i.e. 80% of the time). The value of the MT has been estimated using the standard deviation (SD) of egg deposition estimates for the last 10 years, where:  $MT = CL + 0.842 \cdot SD$ . The constant 0.842 is taken from probability tables for the standard normal distribution, such that the CL forms the 20-percentile of a distribution, the average (or 50-percentile) of which equates to the MT.

CLs and MTs form only one part of the assessment of the status of a stock, and management decisions are never based simply on a compliance result alone. Because stocks are naturally variable, the fact that a stock is currently exceeding its CL does not mean that there will be no need for any management action. Similarly, the fact that a stock

may fall below its CL for a small proportion of the time may not mean there is a long-lasting problem. Thus, a range of other factors are taken into account, particularly the structure of the stock and any evidence concerning the status of particular stock components, such as tributary populations or age groups, based for example on patterns of run timing and the production of juveniles in the river sub-catchments. These data are provided by a programme of river catchment monitoring.

The assessment approach described above is incorporated into the national decision structure (see below) for guiding decisions on fishery regulations.

## **The Decision Structure for developing fishing controls in England and Wales**

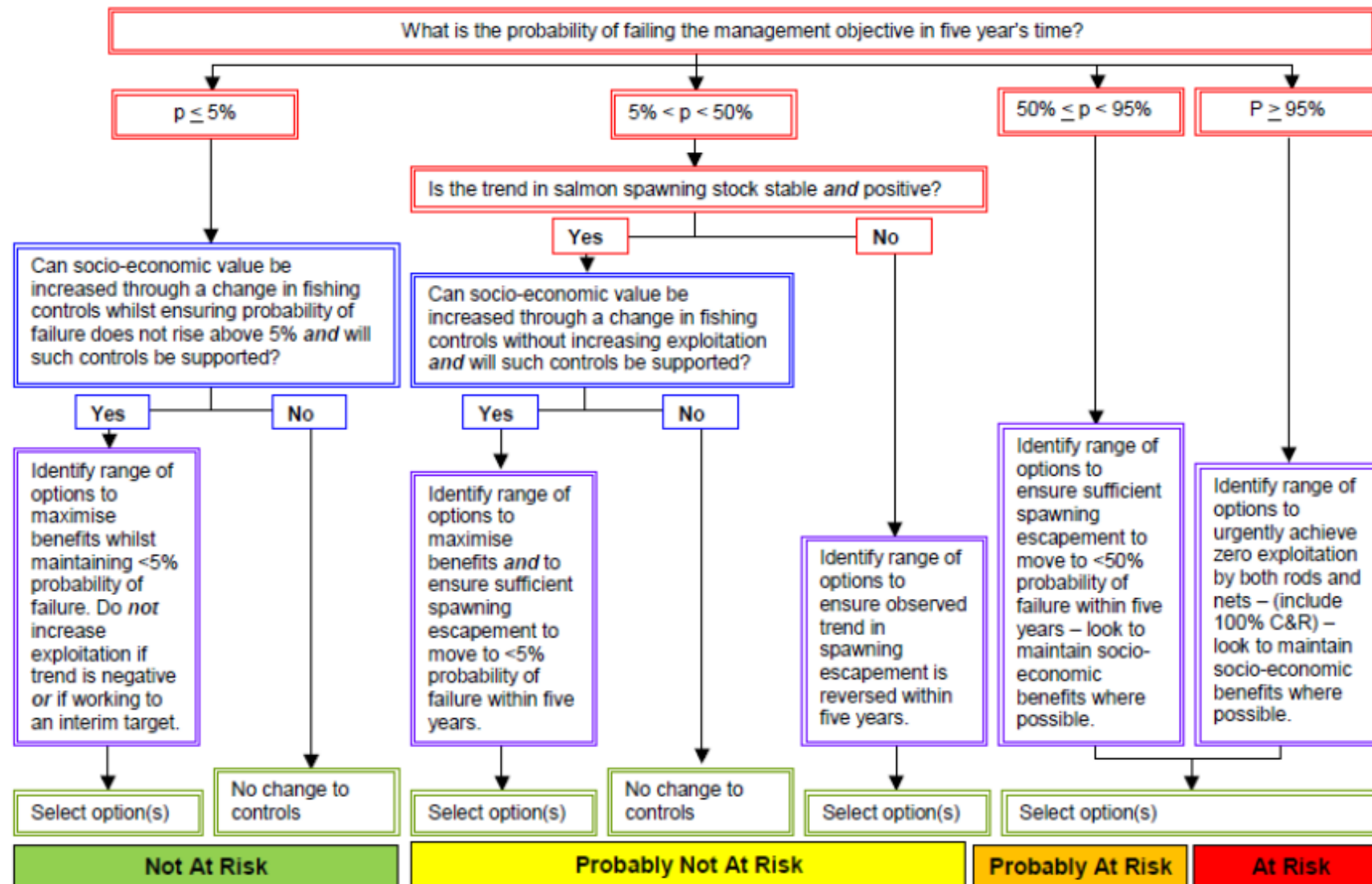
The compliance assessment approach described above for determining the performance of each salmon river is also incorporated into a national Decision Structure for guiding decisions on the need for fishery regulations. The 'Decision Structure' is applied annually to each salmon river in April following the annual stock assessments. Fishery managers for each river are then advised of these assessments and the outcome of applying the 'Decision Structure'. They then decide what, if any, changes in regulation are appropriate as guided by the Decision Structure outputs.

Recovering salmon rivers in England that do not yet have CLs set are deemed to be categorised in the 'At risk' and, under new measures approved in 2018, all such rivers in England will be subject to mandatory C&R from 2019. Similar provisions have also been applied to all principal salmon rivers in Wales from January 2020.

In 1998, NASCO and its Parties agreed to apply a Precautionary Approach to the conservation, management and exploitation of salmon in order to protect the resource and preserve the environments in which it lives. In keeping with this, the assessment and management of salmon in England and Wales seeks to avoid the possibility of stocks reaching unfavourable levels. The Precautionary Approach requires that more caution is exercised when scientific information is uncertain. Where there are threats of serious or irreversible damage to stocks, uncertainty in scientific information should not be used as a reason for postponing or failing to take management and conservation measures.

The 'Decision Structure' is shown in the schematic flow chart below, together with explanatory notes for its use.

## The Decision Structure - Developing fishing controls for salmon fisheries in England and Wales





## Notes to accompany Decision Structure

### 1. Initial stage – stock assessment (red boxes)

This is the assessment of the probability that the salmon river will be meeting its CL four years out of five (the management objective) in five years' time. The information to answer these questions comes from the annual assessment process outlined in Section 8, with the latest results available in the most recent annual assessment report.

### 2. Second stage – initial screening for potential options (blue boxes)

This stage screens options appropriate to those rivers that have a <50% probability of failing the management objective taking into consideration socio-economic concerns and stakeholder support. Management options that would not be supported by stakeholders can be ruled out. One of the possible options is to 'do nothing'.

For rivers where there is >50% probability of failing the management objective, all options must be carried through to the next (evaluation) stage.

### 3. Third stage – option evaluation (purple boxes)

The purpose of this stage is to set out and evaluate options to realise the required changes in exploitation.

For rivers where  $50\% \leq p < 95\%$  (where  $p$  = probability of failing the management objective) and the trend is down and with an annual catch of >20 salmon and C&R rate <90%, then voluntary catch and release (C&R) will be promoted for 1 year. If this fails to significantly improve C&R rates, mandatory C&R or closure of the fishery will be considered. Protected rivers such as SACs (Special Areas of Conservation) are given particular emphasis.

For rivers where the above criteria apply, except that the annual mean salmon catch is <20 salmon, voluntary measures will be promoted.

For rivers where  $p > 95\%$  (i.e. the management objective is clearly being failed) and with an annual catch of >20 salmon and a C&R rate <90%, then voluntary C&R will be promoted for 1 year. If this fails to significantly improve C&R, mandatory C&R or closure of the fishery will be considered.

For rivers where  $p \leq 95\%$  for 5 consecutive years (i.e. the management objective is clearly being met), the possibility of relaxing controls including on nets will be considered if stakeholders agree. Rivers that are recovering from historical degradation that do not yet have CLs set are deemed to have a >95% probability that they are failing unless there is better information available. Fishers on such rivers are encouraged to practice 100% C&R at the same time as regulators and partner organisations work on the necessary environmental improvements. If the potential for these rivers is greater than an average rod catch of 20 salmon, then mandatory C&R is considered throughout the season as an interim measure. However, controlled development of fisheries may be permitted on these rivers in parallel with the recovery of stocks.

### 4. Final stage – selection and implementation (green boxes)

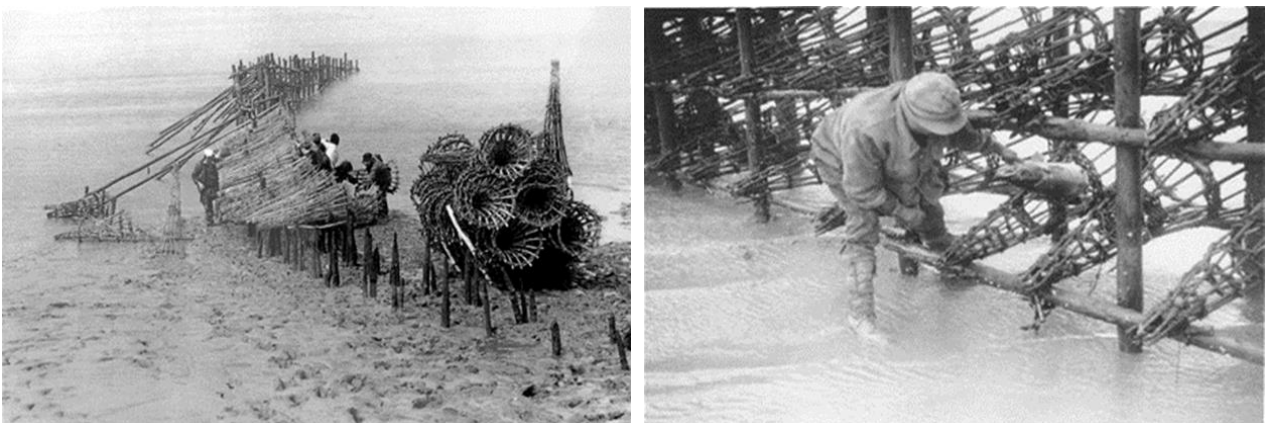
The final stage of the Decision Structure is the selection and implementation of the appropriate regulatory action

## Appendix 2 Severn Estuary Historical Fishing methods as licensed by the Environment Agency

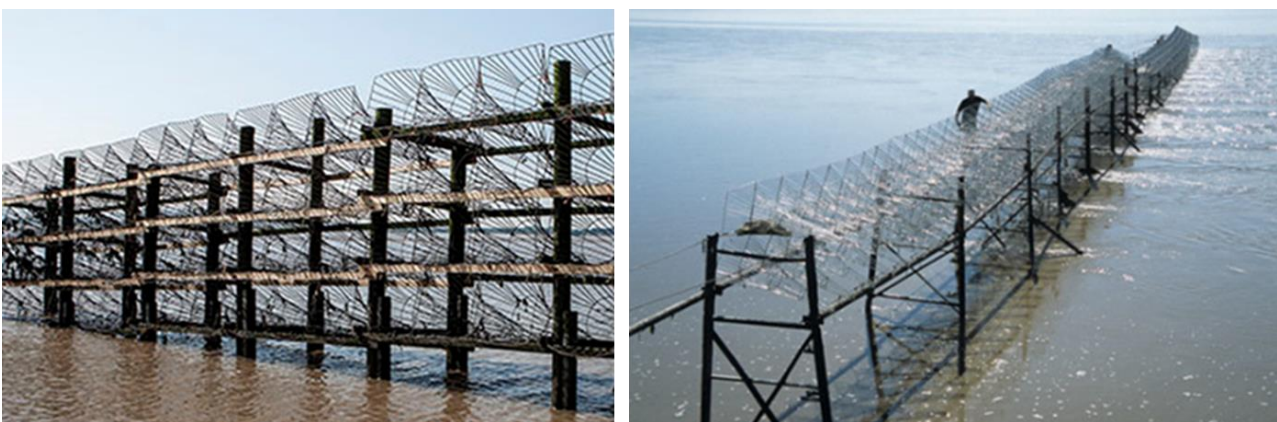
### Historic Installations or Putter Ranks

Historic installation fisheries, also referred to as fixed engine fisheries, use putchers which are conical baskets traditionally made from natural materials (Figure A1), but more recently from steel. They are fished in ranks, often containing many hundreds of baskets, arranged in up to three or four tiers and positioned out across the tidal flow. Fish are caught as they fall back on the ebb tide and are trapped, to be retrieved once the rank is exposed at low tide. Some ranks also catch fish on flood tides.

The number of putcher ranks was set by the issue to each of a Certificate of Privilege (CoP), granted by Government in the 1860s, to about 45 fisheries. The certificates define the precise location of each rank and the number of putts (larger baskets) or putchers that may be used within it. Although there are in excess of 45 entitlements under these CoP to operate putcher ranks in the estuary, very few – less than six – have operated in the last decade. Those remaining are inevitably the more productive ranks, a result of substantial modernisation of the rank, size, location and the use of square cross-sectioned galvanised or stainless steel baskets (Figure A2). Some operate at least partly under a cultural agenda.



*Figure A1 Historical images of the traditional rank and putchers using locally sourced natural materials*



*Figure A2 The current modernised steel construction ranks with square steel putchers*

An annual licence issued by the Environment Agency is required to operate any putcher fishery, however the nature of the CoP means that they cannot be regulated by anything other than byelaw to control their season of operation. However, the Marine and Coastal Access Act (2009) enables the Environment Agency to define specific fishing conditions on putcher rank licences of, such as catch limits. This legal power has been applied to all CoP licences since 2011.

## Lave Nets

Lave nets, as pictured in Figure A3, are large triangular hand-held nets that are used by fishermen to actively intercept and catch individual salmon. Lave net fishing is a rare and specialised form of salmon net fishing and is currently practiced in two areas throughout the whole of England. The number of lave net licences is limited by Net Limitation Order. The operation of lave nets is limited by byelaws defining their dimensions, the area in which they can operate, and also the season and weekly periods in which they are allowed to operate. Catch limits have also been applied as conditions to Lave net licences in recent years.



*Figure A3 The Severn lave net has changed little through history*

## Draft Net

Draft nets are conventional seine nets fished in a way to encircle and catch salmon by use of a boat and hauling the net into shore as depicted in Figure A4. The design of boats and their application to the draft net fishing process at these locations has been adapted to the Severn Estuary and its harsh tidal environment.



*Figure A4 The draft net is similar to many other pull or seine net fisheries,*

One draft net licence is available for issue each year, with this number being defined within the River Severn NLO. The operation of draft nets is limited by byelaws which define their dimensions, the area in which they can operate, and also the season and weekly periods in which they are allowed to operate. As with the other River Severn net fisheries, catch limits have been applied in recent years as a condition of the draft net fishing licence.



# Appendix 3 Record of Habitats Regulation Assessment to Licence fishing for salmon and migratory trout with an instrument other than rod and line in the Severn Estuary

## Stage 1 Habitats Regulations Assessment

Environment Agency record of screening for likely significant effects

This is a record of the screening for likely significant effects required by Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended), undertaken by the Environment Agency in respect of the permission, plan or project (PPP) detailed in Section 1, for the following relevant site(s):

- Severn Estuary/ Môr Hafren SAC (UK0013030)^.
- River Wye/ Afon Gwy SAC (UK0012642)^.
- River Usk/ Afon Wysg SAC (UK0013007).
- Severn Estuary SPA (UK9015022)^.
- Severn Estuary Ramsar (UK11081).

Version: DRAFT V01 2020

This record **was** sent to Natural England for consultation.

For EPR permits only (excluding Flood Risk Activity Permits): Was an additional component charge for habitats assessment levied for this application? **not applicable**

### 1. Permission, plan or project details

**Type of PPP:** Licence to fish for Salmon and Migratory Trout with an instrument other than rod and line (SFFA75)

**Environment Agency reference:** SevEstNets2020

**National grid reference:** Full Extent - Downstream from the confluence of Nords Ditch (SO 758 145) with the River Severn at Bollow, to an imaginary line

between the confluence with the River Wye (ST 548 903) on the west bank of the estuary and Avonmouth (ST 502 788) on the east bank of the estuary.

**Site/project name or reference:** Severn Salmon stock assessment and review of fisheries regulations 2020

## 2. Description of proposal

The annual issue of licenses for the operation of a commercial and cultural net fisheries to catch salmon in the Severn Estuary and the exploitation of salmon within the Severn Estuary by historic installations (HI) (also known as putchers, or fixed engines) and nets (lave nets and draft nets).

The estuary fishery is known from historical studies to exploit a mixture of each of the stocks from the three principal salmon rivers that drain to the estuary (Severn, Wye and Usk) and since the recovery of other South Wales rivers (Ebbw, Rhymney and Taff/Ely) it is likely that the fishery exploits stocks from these rivers also. The mixed stock nature of the fishery is accepted by the Department for Environment, Food and Rural Affairs (Defra).

The rivers Wye and Usk are designated as Special Areas of Conservation (SAC) under the Habitats Directive (HD), with salmon as a primary reason for the designation of both sites. The Severn Estuary itself is designated as a SAC, and also a Special Protection Area (under the European Directive on the conservation of wild birds) and a Ramsar site. Together they constitute the Severn Estuary European Marine Site (EMS) for which salmon is a qualifying feature. Natural Resources Wales the statutory advisor on wildlife to the Welsh Government, has determined the status of the salmon feature in both the Wye and Usk as “unfavourable: unclassified”. The status of the EMS is also deemed “unfavourable” because of the status of the contributing rivers.

In considering applications for net and historic installation licences that will exploit salmon destined for a SAC, the Environment Agency must apply, Regulation 63 of the Conservation of Habitats and Species Regulations 2017, and decide whether these licences to fish are likely to have a significant effect on the SAC. If the licence applications for salmon fishing are deemed likely to have a significant effects we must undertake an appropriate assessment, and we consult with the nature conservation bodies, Natural England (NE) and Natural Resources Wales (NRW) on this assessment.

Because salmon stocks naturally vary from year to year, the Environment Agency aims to ensure that stocks meet the Conservation Limit in four out of five years on average; this is the Management Objective. To meet this, the average

level of a stock typically needs to be around 40% above the Conservation Limit (this higher level is termed the Management Target).

Each of the salmon rivers (Severn, Wye, Usk and Taff/Ely) entering the defined geographical extent of the Severn estuary are principle rivers that have set conservation limits based on egg deposition targets for the catchment. This method involves estimating the numbers of salmon returning to spawn in a river each year, and hence the number of eggs deposited, against the Conservation Limit. The Conservation Limit is considered to be the minimum safe level of spawning salmon (described as the number of salmon eggs deposited) for each river. By regularly failing to reach this limit, the risk of that river's salmon stock suffering serious decline greatly increases.

It is also important to look at the trend for a particular stock, whether it is stable, improving or deteriorating. Stocks are therefore classified according to whether, on the basis of the trend over the past 10 years, they are likely to meet the Management Objective in five years' time. This system is used because it gives an early warning of where a river's salmon stock will be, if current trends are maintained.

The Environment Agency has assessed the probability of the four relevant salmon stocks achieving their spawning targets / conservation limits by 2024. Figures of the three principal rivers are summarised in **table 1** below.

*Table 1 performance of Salmon Stocks*

River	Conservation Limit (numbers of eggs in millions)	Current Compliance Status (2018)	Trend (Probability of upward trend)	Predicted Compliance status in 2024
Severn	CL 12.85	Probably at risk	Improving	Probably at risk
Usk	CL 10.11	Probably at risk	Declining	Probably at risk
Wye	CL 38.57	Probably at risk	Improving	Probably at risk

Our management objectives for salmon stocks are to achieve favourable conservation status under the Habitats Directive where salmon is a feature of a designated site, and to improve stock status so that those rivers currently classed as “at risk” or “probably at risk” (of achieving their spawning compliance) improve to a status of “not at risk.”

Having reviewed the salmon stock assessments and taking into account obligations under the Habitats Directive, it is concluded that there is **likely** to be significant harm if an unconstrained **harvest of salmon were to take place** and reductions in exploitation are still required in the estuary.

An appropriate level of participation must be able to demonstrate that it can operate sustainably for the stocks that support the fisheries. As consistent with previous years further control through Byelaw and Net Limitation Orders are being sought, proposals for future consideration are:

- Taking account of the current salmon stock assessments of all contributing stocks in addition to concerns regarding future salmon stock status, the Environment Agency is considering a suite of measures which may pursue the complete closure of the River Severn draft and putcher net fisheries for the next 10 years. It would seek to achieve this objective by implementing a byelaw to close the Draft net and Patcher fisheries.
- Lave nets, reflecting the heritage, low risk and recreational nature of this netting method, we would seek an agreement through consultation for continued fishing on a 100% catch and release basis. We propose an introduction of a byelaw requiring that all salmon caught in the Severn Estuary lave net fishery are returned immediately and with least possible injury. We will however proposed to continue to limit the number of lave net licences issued by the Environment Agency to fish in the Severn Estuary to 15 by means of reducing Net Limitation Order (NLO) from the current 22 licences.



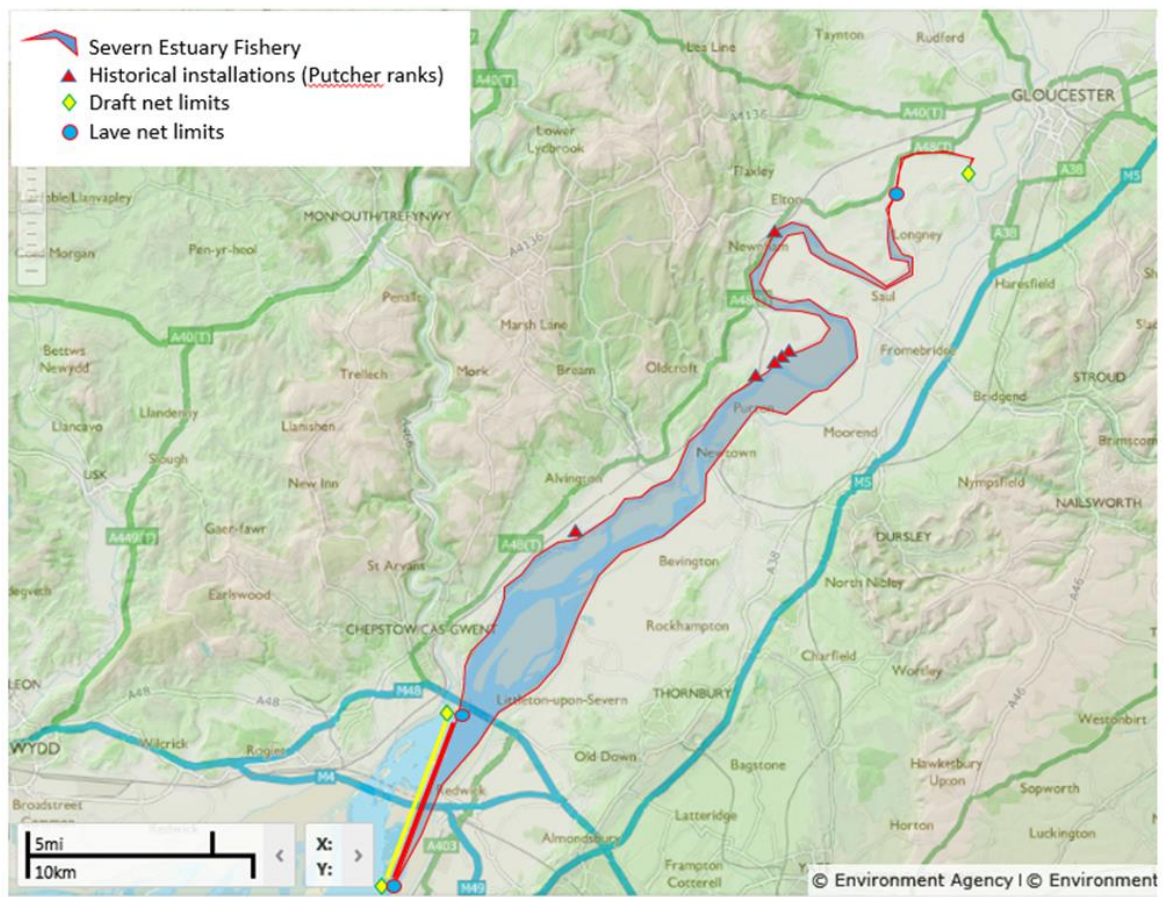


Figure 1 Map to show extent of Severn Estuary Fisheries

### 3. Map(s) showing PPP location and European site(s)

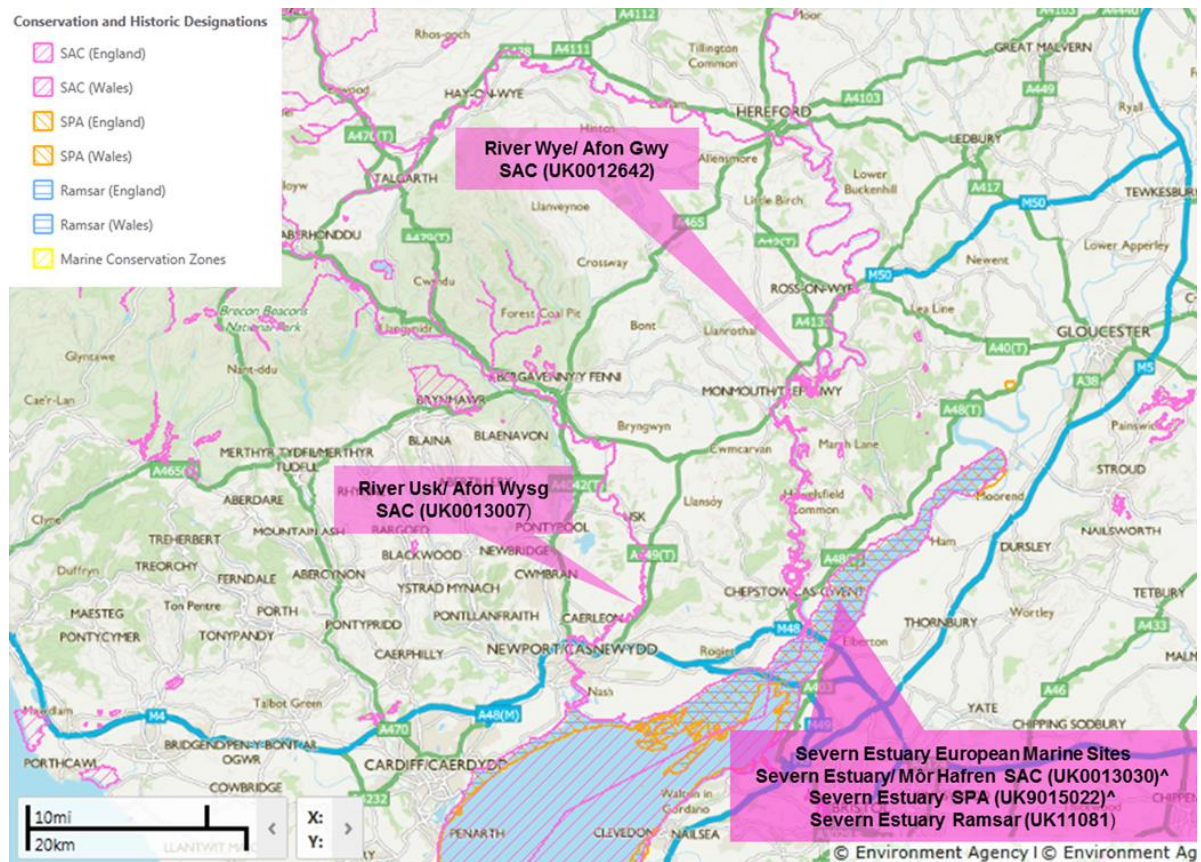


Figure 2 Map showing full extent of the European protected sites

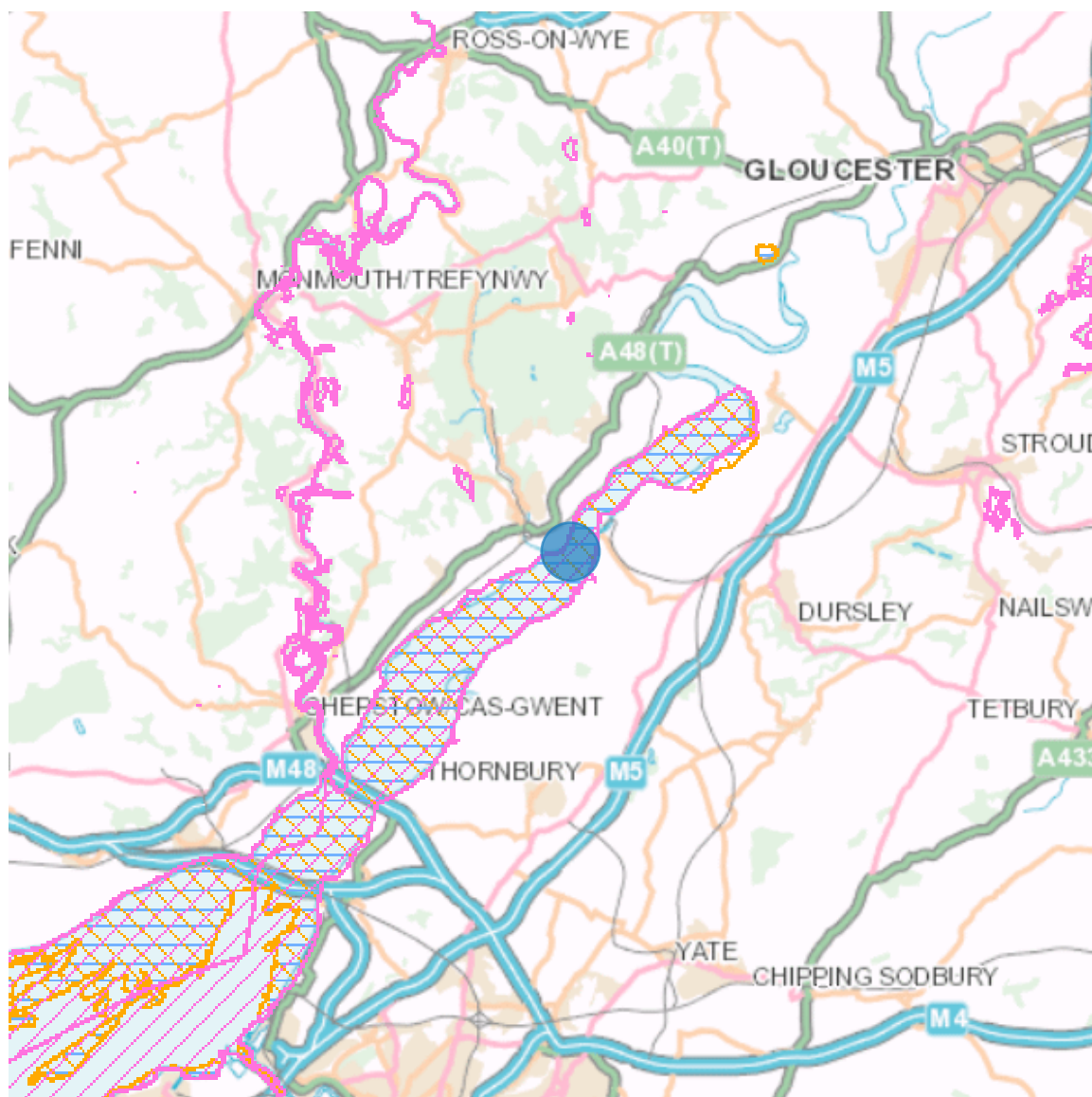








Figure 3 Map including protected sites and central location of the fisheries (PPP)

Scale bar: 0 \_\_\_\_\_ 5000 m

-  Ramsar
-  Special Area of Conservation (SAC)
-  Special Protection Area (SPA)
-  Marine potential SPA
-  Marine Conservation Zone (MCZ)
-  PPP location (automated location, central to the extent of the PPP)

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#### 4. European sites requiring assessment<sup>1</sup>

European site	Complete list of qualifying features
Severn Estuary/ Môr Hafren SAC (UK0013030)^	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )
	Estuaries
	Mudflats and sandflats not covered by seawater at low tide
	Reefs
	River lamprey
	Sandbanks which are slightly covered by sea water all the time
	Sea lamprey
	Twaite shad
River Wye/ Afon Gwy SAC (UK0012642)^	Allis shad
	Asperulo-Fagetum beech forests
	Atlantic salmon
	Brook lamprey
	Bullhead
	Freshwater crayfish
	Lesser horseshoe bat

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<sup>1</sup> This is based on screening criteria the Environment Agency consider appropriate to identify possible significant risk.



European site	Complete list of qualifying features
	Otter
	River lamprey
	Sea lamprey
	Tilio-Acerion forests of slopes, screes and ravines*
	Transition mires and quaking bogs
	Twaite shad
	Water courses of plain to montane levels with R. fluitantis
River Usk/ Afon Wysg SAC (UK0013007)	Allis shad
	Atlantic salmon
	Brook lamprey
	Bullhead
	Otter
	River lamprey
	Sea lamprey
	Twaite shad
	Water courses of plain to montane levels with R. fluitantis
Severn Estuary SPA (UK9015022)^	Bewick's swan (non-breeding)
	Dunlin (non-breeding)
	Greater white-fronted goose (non-breeding)

European site	Complete list of qualifying features
	Redshank (non-breeding)
	Shelduck (non-breeding)
	Waterbird assemblage
Severn Estuary Ramsar (UK11081)	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
	Dunlin (wintering)
	Estuaries
	Greater white-fronted goose (wintering)
	Mudflats and sandflats not covered by seawater at low tide
	Redshank (wintering)
	Ringed plover (passage)
	Run of migratory fish (includes sea trout)
	Sandbanks which are slightly covered by sea water all the time
	Shelduck (wintering)
	Waterbird assemblage (wintering)
	Whimbrel (passage)

^ Protected area under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

\* Priority natural habitat/priority species

Feature information sourced from Natural England

## 5. Conservation objectives

The screening for likely significant effects (and appropriate assessment, if required) will consider the implications of the proposal in view of the site's conservation objectives.

<b>Severn Estuary/ Môr Hafren SAC (UK0013030)^</b>	<b>Version:</b>	<b>Date:</b>
<a href="http://publications.naturalengland.org.uk/publication/6081105098702848?category=5374002071601152">http://publications.naturalengland.org.uk/publication/6081105098702848?category=5374002071601152</a>		
<b>River Wye/ Afon Gwy SAC (UK0012642)^</b>	<b>Version:</b>	<b>Date:</b>
<a href="http://publications.naturalengland.org.uk/publication/6096799802589184?category=5374002071601152">http://publications.naturalengland.org.uk/publication/6096799802589184?category=5374002071601152</a>		
<b>River Usk/ Afon Wysg SAC (UK0013007)</b>	<b>Version:</b>	<b>Date:</b>
<a href="https://www.naturalresources.wales/media/673384/River_Usk%20SAC%20core%20plan.pdf">https://www.naturalresources.wales/media/673384/River Usk%20SAC%20core%20plan.pdf</a>		
<b>Severn Estuary SPA (UK9015022)^</b>	<b>Version:</b>	<b>Date:</b>
<a href="http://publications.naturalengland.org.uk/publication/5601088380076032?category=5374002071601152">http://publications.naturalengland.org.uk/publication/5601088380076032?category=5374002071601152</a>		
<b>Severn Estuary Ramsar (UK11081)</b>	<b>Version:</b>	<b>Date:</b>
There are currently no conservation objectives for Ramsar sites. The SAC/SPA conservation objectives will be used when the qualifying features are the same, and advice sought from Natural England in other cases if necessary.		

## 6. Risks (pressures) relevant to the type of PPP being assessed

Disturbance  
Killing/injury or removal of fish or other animals  
Physical damage

## 7. HRA Stage 1 screening table<sup>2</sup>

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
Severn Estuary/ Môr Hafren SAC (UK0013030)^					
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Physical damage	Only a strictly limited number of licences are issued annually. The netsmen access the estuary with their equipment by foot therefore there is minimal impact especially as this fishing is only seasonal.	No	None known	No
Estuaries	Physical damage	The estuary is the over-arching feature with the physical environment and	No	None known	No

<sup>2</sup> Only features the Environment Agency consider likely to be sensitive to the type of PPP being assessed are included, see [‘Habitats Regulations Assessment: Risk definitions and matrices’](#)



Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
		ecosystem being determined and affected by the tidal regime.			
Mudflats and sandflats not covered by seawater at low tide	Physical damage	<p>As above. Only a strictly limited number of licences are issued annually. The netsmen access the estuary with their equipment by foot therefore there is minimal impact especially as this fishing is only seasonal. It should also be noted that these features are dynamic.</p> <p>However the construction of the HI ranks and putchers may have more interaction and impact on some isolated areas where maintenance or rebuild is required. The competent authority for this activity is the Marine Management Organisation (MMO)</p>	No	None known	No
Reefs	Physical damage	Special significance to the tube-dwelling polychaete worm, Sabellaria alveolata. S. alveolata reefs are often also known	No	None Known	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
		as honeycomb worm reefs. The extent of these reefs in the Severn estuary above the M48 road bridge is largely unknown. Both the HI and the lave net fisheries are believed to be away from these features.			
River lamprey	Disturbance	No known or reported bycatch or migratory impediment. Reasonable to expect some entrapment although anecdotal evidence suggests that lamprey can free themselves from the fixed instruments and are returned from any accidental capture in nets, not significant. Season and low catch limits reduce effort and therefore risk.	No	None Known	No
	Killing/injury or removal of fish or other animals	Lave or draft nets would not target these species but if caught would be returned unharmed	No	None Known	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Nutrient enrichment	N/A	No	None Known	no
	Physical damage	N/A		None Known	No
Sandbanks which are slightly covered by sea water all the time	Physical damage	A limited number of licences are issued annually. The netsmen access the estuary with their equipment by foot therefore there is minimal impact especially as this fishing is only seasonal. It should also be noted that these features are dynamic.	No	None Known	No
Sea lamprey	Disturbance	No known or reported bycatch or migratory impediment. Reasonable to expect some entrapment although suggest not significant. Season and low catch limits reduce effort and therefore risk.	No	None Known	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	Lave or draft nets would not target these species but if caught would be returned unharmed	No	None Known	No
	Nutrient enrichment	N/A			
	Physical damage	N/A			
Twaite shad	Disturbance	No known or reported bycatch or migratory impediment. Reasonable to expect some entrapment although suggest not significant. The season has historically been changed to start 1 <sup>st</sup> June to protect shad species on their upstream migration through the estuary in May. Season and low catch limits reduce effort and therefore risk.			

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	Lave or draft nets would not target these species but if caught would be returned unharmed. Possibility of capture in the HI, season restricts the possibility of capture on upward migration to spawn, some risk to outward migration post spawning. This is not a significant effect.	No	None Known	No
	Nutrient enrichment	N/A			
	Physical damage	N/A			
<b>River Wye/ Afon Gwy SAC (UK0012642)^</b>					
Allis shad	Disturbance	No known or reported bycatch or migratory impediment. Reasonable to expect some entrapment although suggest not significant. The season has historically been changed to start 1st June to protect shad species on their	No		

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
		upstream migration through the estuary in May Season and low catch limits reduce effort and therefore risk.			
	Killing/injury or removal of fish or other animals	Lave or draft nets would not target these species but if caught would be returned unharmed. Possibility of capture in the HI, season restricts the possibility of capture on upward migration to spawn, some risk to outward migration post spawning This is not a significant effect.	No		
	Nutrient enrichment	N/A			
	Physical damage	N/A			
Atlantic salmon	Disturbance	Salmon intentionally targeted and captured in the fishery	Yes	Salmon intentionally targeted and captured in the Black Rock Lave fishery managed by NRW	Yes

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
				Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	
	Killing/injury or removal of fish or other animals	Salmon intentionally captured by, and killed in, the fishery	Yes	Salmon intentionally captured by, and killed in, the Black Rock Lave fishery managed by NRW  Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	Yes
	Nutrient enrichment	N/A			
	Physical damage	N/A			

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
Brook lamprey	Disturbance	Not likely to be present or frequent the areas fished	No	None Known	No
	Killing/injury or removal of fish or other animals	Unlikely to removed or captured in instruments. Returned if accidentally caught	No	None Known	No
	Nutrient enrichment	N/A			
	Physical damage	N/A			
Bullhead	Disturbance	Not likely to be present or frequent the areas fished	No	None Known	No
	Killing/injury or removal of fish or other animals	Unlikely to removed or captured in instruments. Returned if accidentally caught	No	None Known	No
	Nutrient enrichment	N/A			



Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Physical damage	N/A			
Freshwater crayfish	Disturbance	Not likely to be present or frequent the areas fished	No	None Known	No
	Killing/injury or removal of fish or other animals	Unlikely to removed or captured in instruments. Returned if accidentally caught	No	None Known	No
	Nutrient enrichment				
	Physical damage				
Otter	Disturbance	Otters likely to be present on foreshore. May be disturbed by occasional fishermen on foot, but not significantly	No	None Known	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	Potential for entrapment in putchers. Although this has never been recorded in recent history.	No	None Known	
	Nutrient enrichment				
	Physical damage				
River lamprey	Disturbance	As above for Severn Estuary/ Môr Hafren SAC	No	None Known	
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC	No	None Known	
	Nutrient enrichment				
	Physical damage				

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
Sea lamprey	Disturbance	As above for Severn Estuary/ Môr Hafren SAC	No	None Known	
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC	No	None known	
	Nutrient enrichment				
	Physical damage				
Transition mires and quaking bogs	Physical damage	Not going to come in contact as activity in Severn Estuary			
Twaite shad	Disturbance	As above for Severn Estuary/ Môr Hafren SAC	No	None Known	
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC	No	None Known	

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Nutrient enrichment	N/A			
	Physical damage	N/A			
Water courses of plain to montane levels with R. fluitantis	Nutrient enrichment	N/A			
	Physical damage	N/A			
<b>River Usk/ Afon Wysg SAC (UK0013007)</b>					
Allis shad	Disturbance	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	
	Nutrient enrichment				
	Physical damage				
Atlantic salmon	Disturbance	Salmon intentionally targeted and captured in the fishery	Yes	Salmon intentionally targeted and captured in the Black Rock Lave fishery managed by NRW  Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	Yes

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	Salmon intentionally captured by, and killed in, the fishery	Yes	Salmon intentionally captured by, and killed in, the Black Rock Lave fishery managed by NRW  Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	Yes
	Nutrient enrichment	N/A			
	Physical damage	N/A			
Brook lamprey	Disturbance	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Nutrient enrichment				
	Physical damage				
Bullhead	Disturbance	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Nutrient enrichment				

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Physical damage				
Otter	Disturbance	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Nutrient enrichment				
	Physical damage				
River lamprey	Disturbance	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No



Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Nutrient enrichment	N/A			
	Physical damage	N/A			
Sea lamprey	Disturbance	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Nutrient enrichment				

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Physical damage				
Twaite shad	Disturbance	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Killing/injury or removal of fish or other animals	As above for Severn Estuary/ Môr Hafren SAC and River Wye/ Afon Gwy SAC	No	None Known	No
	Nutrient enrichment				
	Physical damage				
Water courses of plain to montane levels with R. fluitantis	Nutrient enrichment	N/A			

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Physical damage	N/A			
<b>Severn Estuary SPA (UK9015022)^</b>					
Bewick's swan (non-breeding)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	No
	Physical damage	N/A	No	N/A	No
Dunlin (non-breeding)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Physical damage	N/A	No	None	No
Greater white-fronted goose (non-breeding)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	No
	Physical damage	N/A		N/A	
Redshank (non-breeding)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Physical damage	N/A	No	None	No
Shelduck (non-breeding)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	No
	Physical damage	N/A	No	None	No
Waterbird assemblage	Disturbance	As well as supporting populations of waterfowl over winter the estuary is also important as a staging area in spring for waterfowl species. The number and distribution is affected by a range of factors therefore despite waterfowl being present this fishing will only represent a marginal increase to the	No	None Known	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
		overall recreational activity that takes place on the estuary.			
	Killing/injury or removal of fish or other animals				
	Physical damage				
<b>Severn Estuary Ramsar (UK11081)</b>					
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Physical damage	The netsmen access the estuary with their equipment by foot therefore there is minimal impact on this habitat especially as this fishing is only seasonal.	No		No
Dunlin (wintering)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	None	No	None	No
	Physical damage	N/A	No	None	No
Estuaries	Physical damage				
Greater white-fronted goose (wintering)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	No
	Physical damage	N/A	No	None	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
Mudflats and sandflats not covered by seawater at low tide	Physical damage	Only a strictly limited number of licences are issued annually. The netsmen access the estuary with their equipment by foot therefore there is minimal impact especially as this fishing is only seasonal. It should also be noted that these features are dynamic.	No	None Known	No
Redshank (wintering)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	
	Physical damage	N/A	No	None	
Ringed plover (passage)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	



Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
	Killing/injury or removal of fish or other animals	None	No	None	
	Physical damage	N/A	No	None	
Run of migratory fish	Disturbance	Salmon intentionally targeted and captured in the fishery. Also although not abundant sea trout may also be targeted.	Yes	Salmon intentionally targeted and captured in the Black Rock Lave fishery regulated and managed by NRW  Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	Yes
	Killing/injury or removal of fish or other animals	Salmon intentionally captured by, and killed in, the fishery. Sea Trout may be intentionally captured and killed	Yes	Salmon intentionally captured by, and killed in, the Black Rock Lave fishery regulated and managed by NRW	Yes

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
				Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	
	Nutrient enrichment				
	Physical damage				
Sandbanks which are slightly covered by sea water all the time	Physical damage	Only a strictly limited number of licences are issued annually. The netsmen access the estuary with their equipment by foot therefore there is minimal impact especially as this fishing is only seasonal. It should also be noted that these features are dynamic	No	None Known	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
Shelduck (wintering)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	No
	Physical damage	N/A	No	None	No
Waterbird assemblage (wintering)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	No
	Killing/injury or removal of fish or other animals	None	No	None	No
	Physical damage	N/A	No	None	No

Qualifying feature	Risk (Pressure)	Likely significant effect alone	Yes or No	Likely significant effect in combination	Yes or No
Whimbrel (passage)	Disturbance	None, fishing season outside of visiting/roosting period.	No	None	
	Killing/injury or removal of fish or other animals	None	No	None	
	Physical damage				

^ Protected area under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

\* Priority natural habitat/priority species

## **8. Alone assessment (further details)**

The population of salmon exploited by the estuary fisheries is mixed, including fish derived from, and destined to return to, the Rivers Wye, Usk, Severn and in lower proportions other rivers flowing into the Bristol channel. The catch of fish will therefore deplete the potential spawning stock in these rivers.

The status of the Wye, Usk and Severn populations is defined by the Environment Agency as “Probably At Risk” of meeting their conservation limit. There is no comparable definition of the status of the salmon and sea trout population within the Ramsar site, which is entirely supported by production in rivers including the Wye, Usk and Severn.

We therefore conclude that the licensing of fishing, resulting in the killing of unconstrained numbers of salmon and sea trout in the European sites is likely to have significant effects on those sites.

## **9. In combination assessment (further details)**

Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary (Severn, Wye and Usk).

The Black Rock Lave Net Fishery which is regulated and managed by NRW has a catch condition set as result of the appropriate assessment conducted by NRW. This fishery exploits the same mixed stock as the Severn Estuary Fisheries, salmon that are destined for the Severn, Wye and Usk. Therefore we conclude that this is a permission that contributes to likely significant effects and must be considered within our appropriate assessment to avoid any adverse effect upon the European protected sites.

## **10. Information / Advice**

NRW have been a consultee of the appropriate assessment process in previous years and have advised the need to continue with the HRA process and limit exploitation through the imposition of catch conditions. As a result of meeting with NRW technical officers at area and national level we have agreed the need for alone and in combination likely significant effect assessment and appropriate assessment.

### **Environment Agency internal advice and consultation (if applicable)**

**HRA Stage 2 Required**

## Natural England information / advice (if applicable)

As a result of meeting with NE catchment officers and national officers we have agreed the need for alone and in combination likely significant effect assessment and appropriate assessment as in previous years are required.

## 12. Decision

We consider that the issue of licences with no limits alone and in combination on catch would have a likely significant effect on the sites identified above and so we will undertake an appropriate assessment.

Name of Environment Agency officer:

Job title: Chris Bainger

Date: Jan 2020

## 13. Consultation (if applicable)

Date sent to Natural England for consultation: **10 March 2020**

Date response received from Natural England: **9 April 2020**

## Natural England advice on the screening for likely significant effects (if applicable)

“... it is a good concise HRA which concluded there will be an adverse effect on the salmon interest for both Wye SAC and Severn SAC/Ramsar site. The mitigation is to impose a bye-law for all salmon caught by the lava net method to be catch&release. Also reducing number of licences from 22 to 6 over 10 years. The putcher method is being stopped for the duration of this permit. The draft net method is being stopped for the duration of this permit.

“Natural England is happy to accept the conclusions of the HRA parts 1 and 2 and agree with the proposed mitigations.”

Do Natural England have concerns about the assessment? **No**

Do Natural England have concerns about the decision? **No**

Name of Natural England officer: Dr Alisa Swanson

Job title: Lead Advisor West Midlands Team

Date: 09 April 2020

# Stage 2 Habitats Regulations Assessment

## Environment Agency record of appropriate assessment

This is a record of the appropriate assessment required by Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended), undertaken by the Environment Agency in respect of the permission, plan or project (PPP) detailed in Section 14 for the following relevant sites:

- Severn Estuary/ Môr Hafren SAC (UK0013030)^.
- River Wye/ Afon Gwy SAC (UK0012642)^.
- River Usk/ Afon Wysg SAC (UK0013007).
- Severn Estuary SPA (UK9015022)^.
- Severn Estuary Ramsar (UK11081).

This record starts at Section 14 because it follows on from the Stage 1 HRA which covers the screening for likely significant effects of this PPP (Sections 1-13).

Version: DRAFT V02 2020

## 14. Permission, plan or project (PPP) details

**Type of PPP:** Licence to fish for Salmon and Migratory Trout with an instrument other than rod and line (SFFA75)

**Environment Agency reference:** SevEstNets2020

**National grid reference: Full Extent-** Downstream from the confluence of Nords Ditch (SO 758 145) with the River Severn at Bollow, to an imaginary line between the confluence with the River Wye (ST 548 903) on the west bank of the estuary and Avonmouth (ST 502 788) on the east bank of the estuary.

**Site/project name or reference:** Severn Salmon stock assessment and review of fisheries regulations 2020

## 15. Summary of Stage 1 (likely significant effect) conclusion

At stage 1 significant effects could not be screened out, those effects requiring appropriate assessment are summarised below.

Qualifying feature	Risk (Pressure)	Likely significant effect alone Yes or No	Likely significant effect in combination Yes or No
Severn Estuary/ Môr Hafren SAC (UK0013030)^			
None	None	No	No
River Wye/ Afon Gwy SAC (UK0012642)^			
Atlantic salmon	Disturbance  Killing/injury or removal of fish or other animals	Yes	Yes
River Usk/ Afon Wysg SAC (UK0013007)			
Atlantic salmon	Disturbance  Killing/injury or removal of fish or other animals	Yes	Yes
Severn Estuary SPA (UK9015022)^			
None	None	No	No
Severn Estuary Ramsar (UK11081)			
Run of migratory fish	Disturbance  Killing/injury or removal of fish or other animals	Yes	Yes



^ Protected area under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

\* Priority natural habitat/priority species

## 16. Further information about the proposal

*The proposal is described in Section 2 of the Stage 1 Habitats Regulations Assessment. Further detail and new information relevant to the appropriate assessment is provided here.*

The International Council for the Exploration of the Sea (“**ICES**”) and the North Atlantic Salmon Conservation Organisation (“**NASCO**”) require conservation limits (“**CLs**”) to be identified for salmon fisheries in England and Wales. Once CLs are identified, advice can be given on the management and conservation of individual river stocks.

The Severn Estuary is classified as an Estuarine Mixed Stock fishery by the ICES. The Severn Estuary is therefore a fishery which comprises fish derived from, and destined to return to, more than one contributing river. Government policy for a fishery classed as an Estuarine Mixed Stock is to manage the fishery to protect the weakest stock present. If this is not possible, the fishery should be closed.

The net fisheries have the potential to affect salmon within the Severn Estuary European Marine Sites (consisting of the Severn Estuary SAC, SPA and Ramsar sites) and also the River Wye and the River Usk Special Areas of Conservation (“**SACs**”) (see Stage 1 Figure 2). The mixed nature of the stock has been previously confirmed by tagging studies and, more recently, a genetic analysis of scale samples from salmon actually taken in the net fishery.

There are approximately 45 putcher rank fishing locations in the Severn estuary between the M48 crossing and Gloucester that are legally allowed to be operated under certificates of privilege (“**CoP**”) granted by the Government in the 1860s. These are collectively referred to as “historic installations” (“**HIs**”).

No more than 6 HIs have been licensed in any one year in the past 10 years. Of the anticipated applicants for HI licences this year, one of the HI fisheries (The Broadoak fishery) is located just outside the Severn Estuary European Marine Site, but it has the potential to affect the population of salmon which is highly migratory within and adjacent to the site.

Lave nets and draft nets can be the subject of licences to fish in the geographical area shown in Figure 1 (Stage 1).

### The Severn Estuary Net fishery

The fishery consists of 3 discrete components using different methods:

- 1) **Historic installation** (HI) fishery, consisting of ranks of putcher baskets, operating under 19<sup>th</sup> century certificates of privilege. The number of HI licence applications is anticipated to be 6 based on expressions of interest received in 2019 :-
  - a) SO 6992 1291 (Broad Oak)
  - b) SO 7060 0724 ; SO 7045 0711 ; and SO 7020 0686. (Awre – 3 HI fisheries in one ownership)
  - c) ST 6189 9947 (Lydney Park)
  - d) SO 6921 0615 (Poulton Court)
- 2) **Lave net licences**, the number of licences issued was capped at 22 by a reducing Net Limitation Order (NLO) to 15 which expired in 2019. A suite of regulation measures to restrict the fishery is being considered by implementation of a byelaw in time for 2021 season. Anticipated number of licence applications is ~20. The previous NLO capped the fishery at a maximum of the previous year for the next year with the potential for the fishery to reduce to 15 if any fisherman leaves the fishery.
  - Permitted fishing locations:-Downstream from the confluence of Nords Ditch (SO 758 145) with the River Severn at Bollow, to an imaginary line between the confluence with the River Wye (ST 548 903) on the west bank of the estuary and Avonmouth (ST 502 788) on the east bank of the estuary.
- 3) **Draft net licences** this was capped at 1 by the Net Limitation Order. Anticipated number of licence applications is 1. The NLO was a phase out order for the next year with the potential for the fishery to be phased out if the licence holder leaves the fishery.
  - Permitted fishing locations:-Downstream of an imaginary line across the river at (SO 791 161) to an imaginary line between the confluence with the River Wye (ST 548 903) on the west bank of the estuary and Avonmouth (ST 502 788) on the east bank of the estuary.

## 17. Appropriate assessment: assessing the effects alone

**Significant effects alone could not be screened out at Stage 1. Further consideration of the 'alone' effects and conditions to achieve no adverse effect are presented here:**

## Overview

The Severn Estuary is classified as an Estuarine Salmon Mixed Stock comprising fish derived from, and destined to return to, more than one contributing river. It is a designated as a Special Area of Conservation, Special Protected Area and Ramsar (collectively known as European Marine site). The Rivers Wye and Usk, which are components of the estuary, are Special Areas of Conservation ("SACs").

Our assessment is that unconstrained catches of salmon in the Severn Estuary threaten the integrity of the SACs (as per Stage 1 HRA: Environment Agency record of screening for likely significant effect). This is particularly so for the Rivers Wye and Usk SACs which we judge to be "probably at risk" of failing the annual conservation limits.

## Stock Assessment - Setting catch limits

The Severn Estuary is a mixed-stock salmon fishery. This means that when fishing nets are used in the Estuary, they could capture salmon destined for more than one river. Previous studies have shown that the salmon captured in the Estuary is most likely to be returning to the Rivers Wye, Usk and Severn and, to a lesser degree, to rivers along the south Wales coast (e.g. River Taff).

A "conservation limit" ("CL") is the lowest desirable spawning stock level. The size of a stock should not be allowed to fall below the CL, otherwise the number of juvenile fish produced in the next generation is likely to be significantly reduced.

Rivers can fall into one of 4 categories:

<b>Not at Risk (NaR)</b>	> 95% probability that the stock assessment will meet the CL
<b>Probably not at Risk (PNaR)</b>	between 50% & 95% probability that the stock assessment will meet the CL
<b>Probably at Risk (PaR)</b>	between 5 & 50% probability that the stock assessment will meet the CL
<b>At Risk (AR)</b>	<5% probability that the stock assessment will meet the CL

The provisional stock assessment \* for the main rivers that are the most likely sources of the Severn Estuary mixed stock are:

- River Severn Probably at risk (PaR)
- **River Wye Probably at risk (PaR)**
- River Usk Probably at risk (PaR)
- **River Taff At Risk (AR)\*\***

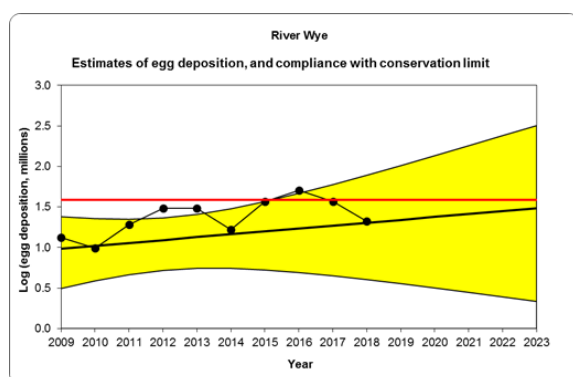
\* Assessment provided for reporting to the International Council for Exploration of the Seas (ICES)

\* This is a recovering river from past industrial pollution and salmon have only recently returned. The population trend is upward but the total population remains short of the potential of the river based on its catchment size.

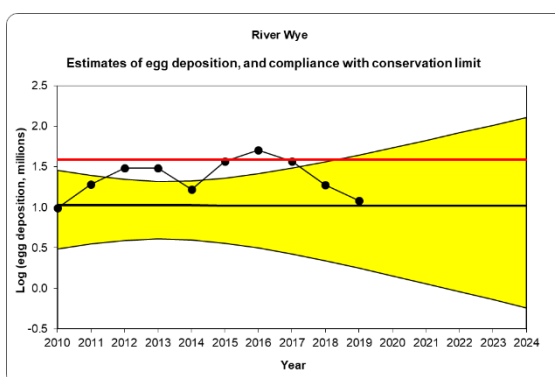
## River Wye

The River Wye has not achieved its salmon Conservation Limit for a number of years and until recently was showing positive signs of recovery. However, from the **2019** assessments it is now clear that the salmon run was poor and has consequently resulted in the stock failing to achieve its conservation limit. The stock is therefore still predicted to be “probably at risk”. A byelaw requiring mandatory 100% catch and release of salmon has applied to the Wye rod fishery since 2012. A new cross borders byelaw 2020 has now been made by NRW, and confirmed by Welsh Government, aligned to the All Wales byelaw which continues the 100% Catch & Release and further method restrictions to maximise survival of rod caught and released salmon. Indications from the Wye riparian owners rod catches data of 2019 already suggest the lowest catches since 2002, which correlates with the assessment and the continued failure to meet minimum biological safe levels and reduces likelihood of meeting management objectives in 5 years’ time.

**2018**



**2019 (Provisional)**



## River Usk

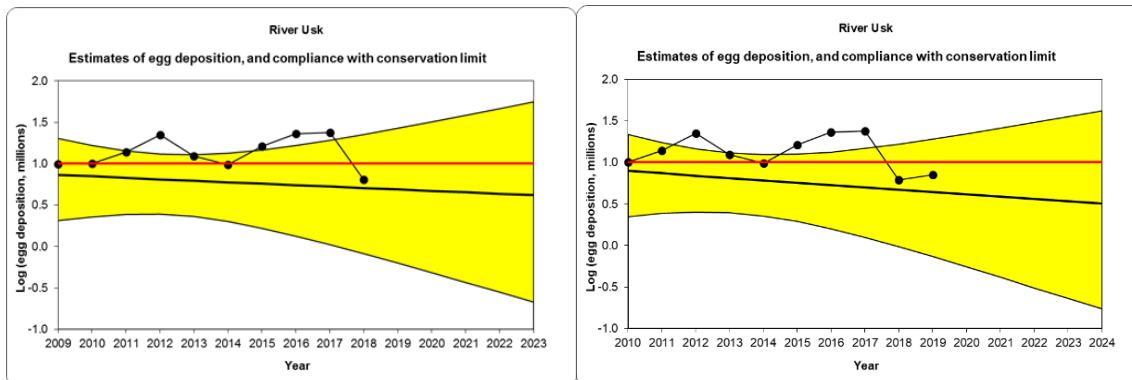
The 2017 assessment identified a Probably Not At Risk status for the Usk and improving trend, but the 2018 assessment had worsened that to Probably At Risk and declining trend. The 2019 assessment highlights that the prediction of the declining trend will continue, with a likelihood of failure of meeting the management objective in 5 years time.

Particular concern is expressed for the future status of the Usk salmon stock because of substantial recent deficits in juvenile salmon production observed since 2016, suggesting

that adult returns during 2020 could be even worse than indicated by those trends. NRW have implemented an all Wales Salmon & Sea Trout byelaw with a mandatory 100% catch and release and method restrictions byelaw be applied to the Usk rod fishery from 2020.

**2018**

**2019 (Provisional)**

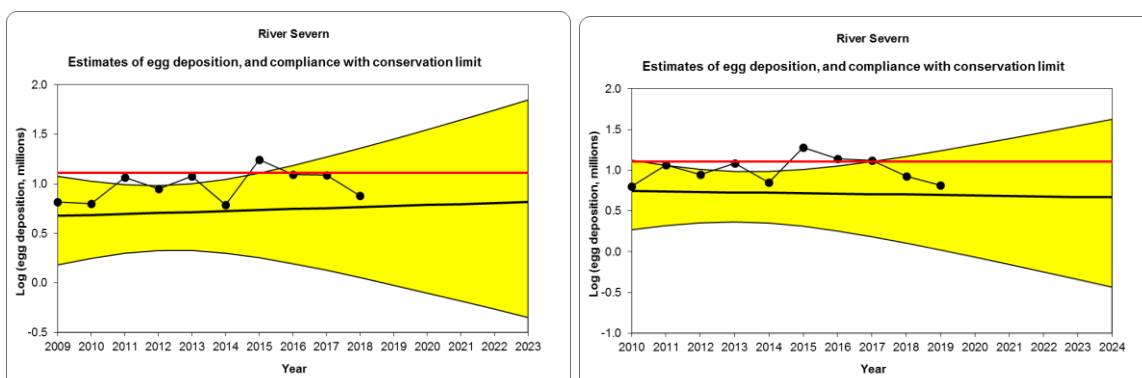


## River Severn

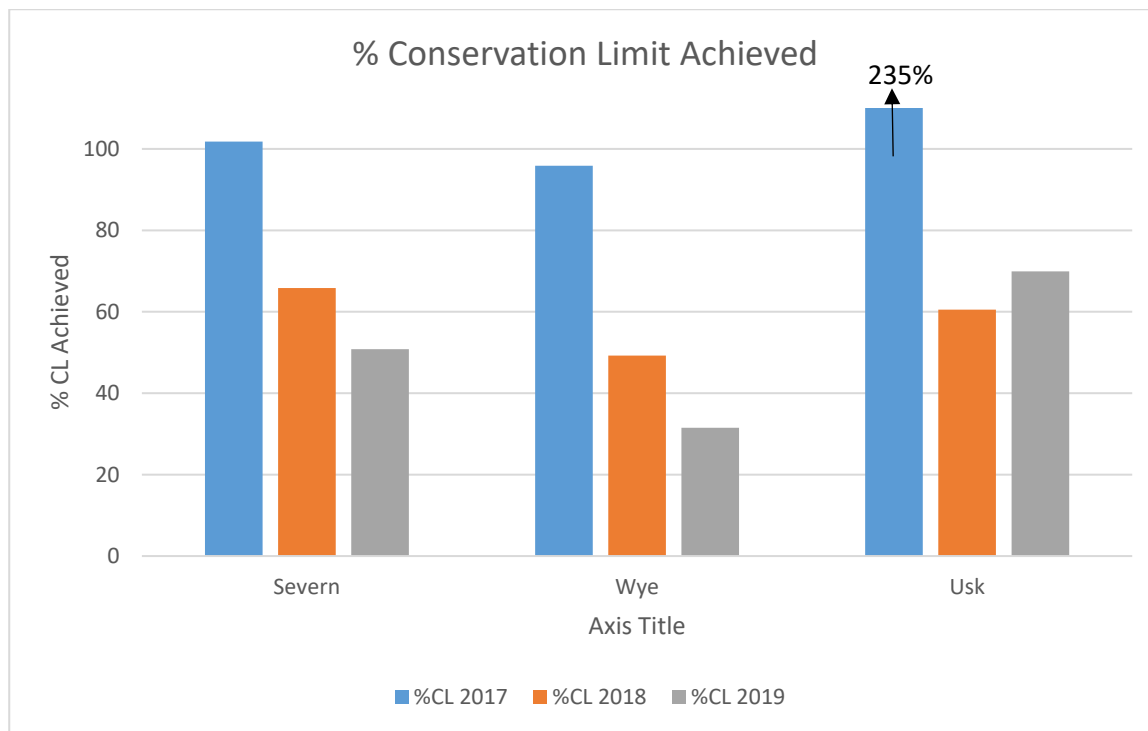
Stock status is defined by the position of the black trend line in relation to the red conservation limit line – above the red line is good and suggests a harvestable surplus of salmon can be taken, but below the red line is bad and indicates that there is no harvestable surplus of salmon. Where previously the Severn salmon stock was classified as being “Probably Not At Risk” of failing its Conservation Limit (minimum biologically safe level) and showing a slight improving trend, the 2018 and 2019 assessments, which now include the more robust and consistent revisions to estimates than had been applied previously, identified the Severn stock to be “Probably At Risk” of failing its Conservation Limit with an uncertain declining trend. For the 2019 season, an emergency byelaw was implemented in the Severn to prevent the taking of salmon by the Severn rod and net fisheries through the 2019 net and rod fishing seasons. These emergency measures were implemented in light of serious decline and deterioration of salmon stocks within recent years and particularly since recorded in 2018. Although those regulations prohibited the taking of salmon, the catch returns and assessments have declined further.

**2018**

**2019 (provisional)**

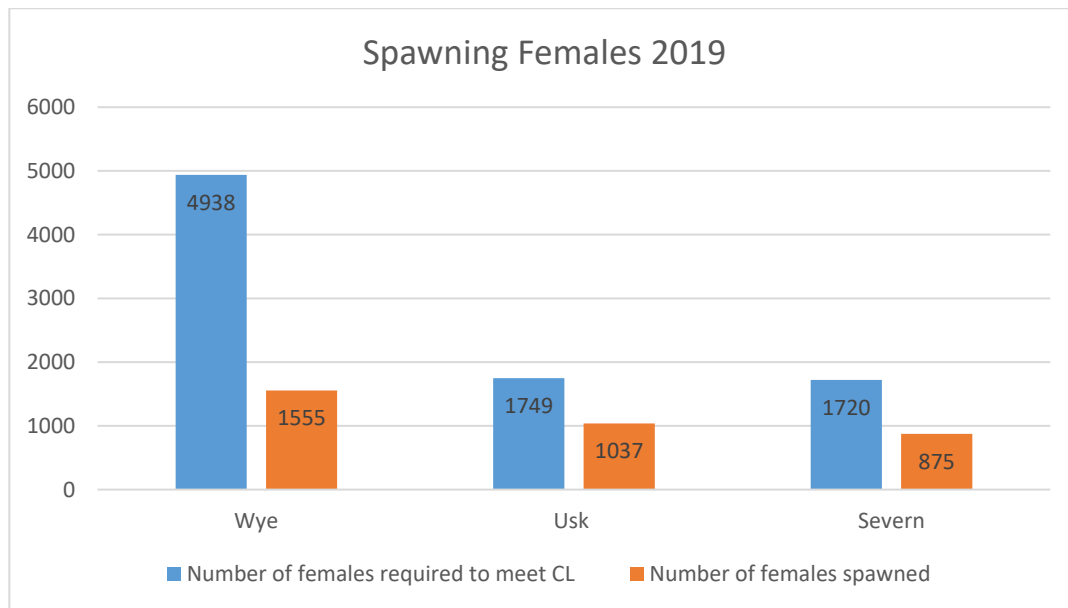


The percentage of the respective Conservation Limits achieved by each river stock in 2017, 2018 and 2019 are illustrated below



The River Wye at 32% of the CL indicates that this river is again the weakest stock. The Severn salmon stock achieved just 51% of its conservation limit in 2019, with the River Usk indicating the most significant decline over this period, with a slight recovery in 2019 to 70% having previously attained a 235% of CL in 2017.

Our stated aim for stocks in the Probably At Risk category is to recover these to Probably Not At Risk category within 5 years. The continued killing of salmon by both net and rod fisheries in such situations, and with such large spawning stock deficits, is not compatible with the aim of improving the stock status, particularly where the prevailing trends in stocks are downwards.



2018	CL (egg deposition)	Avg fecundity (eggs per ♀ spawner)	N° of females spawners to meet CL	Calculated Egg deposition	N° of ♀ spawners calculated from egg deposition	%CL	Shortfall
Wye	38570000	6865	5618	18,990,000	2766	49	2852
Usk	10110000	7204	1403	6,120,881	850	61	554
Severn	12850000	6515	1972	8462274	1299	66	673

2019	CL (egg deposition)	Avg fecundity (eggs per ♀ spawner)	N° of females spawners to meet CL	Calculated Egg deposition	N° of ♀ spawners calculated from egg deposition	%CL	Shortfall
Wye	38,570,000	7811	4938	12,147,441	1555	31	3383
Usk	10,110,000	5779	1749	7,071,298	1037	70	712
Severn	12,850,000	7472	1720	6,534,906	875	51	845

In 2018 there were significant calculated deficits in the number returning adult fish to spawn to meet the conservation limit (minimum biologically safe level) in all three rivers. The combined deficit in female spawners alone across those rivers had been calculated to be ~4079 fish that was 45% of the combined CL. **2019 Shortfall ~ 4940 female spawners that is 59% of the combined CL, an additional 861 female's shortfall on 2018.**

The continued CL assessment declines and extent of the estimated calculated deficits, where measures have been in place to stop the taking of salmon on two rivers, and no catch allocation to the Severn Estuary net fishery in 2019 highlights the need for more urgent long term action to further reduce killing of salmon in the net and rod fisheries to allow more adult salmon to spawn each year. Also, on it's own, even the complete cessation of killing of salmon in the authorised net and rod fisheries will not be sufficient to overcome the current deficits in spawning stocks to meet the 'management objective' that the stock should be meeting or exceeding its CL in at least four years out of five (i.e. >80% of the time), on average.

Studies have shown that the probability that the salmon caught by net in the Severn Estuary is returning to the River Taff is low. As a result, we consider the **River Wye to be the weakest stock component in the Severn Estuary mixed-stock fishery ("Probably at Risk")**. In these circumstances, allowing unconstrained net fishing in the Severn Estuary mixed-stock salmon fishery could result in significant damage to the Severn Estuary European Marine protected sites as well as the River Wye and Usk SAC.

According to the *'Environment Agency Decision Structure – Developing fishing controls for salmon fisheries in England and Wales'*, where rivers are classed at "Probably at Risk" we should identify a "range of options to ensure sufficient spawning escapement to move to < 50% probability of failure within five years – look to maintain socio-economic benefits where possible".

In our judgement, setting appropriate catch conditions to restrict total net capture in previous years has enabled some socio-economic benefits to be maintained but also, critically:

- i. ensures sufficient spawning escapement for rivers Severn Wye and Usk salmon (i.e. the salmon escaping all dangers and fisheries to reach their spawning areas) to reduce its probability of failure; and thereby
- ii. allows us to conclude that there will be no adverse effect on the integrity of the Severn EMS, Rivers Wye and Usk SACs.

The River Wye currently operates a mandatory catch-and-release ("**C&R**") rod fishery). Even with best practice C&R, a small proportion of salmon will die after being caught. A small proportion of salmon will also die naturally, in any event, before spawning. We estimate that some 20% of all rod-caught fish will die in either of these ways. This is known as the "residual mortality" rate.

In previous years it has been appropriate and reasonable that the net fishery in the Severn Estuary has been allowed to continue operating with a catch allocation of approximately 200 salmon, which is a similar mortality rate to that of the River Wye C&R rod fishery, this was seen as parity. At that time not all contributing rivers were failing to meet the conservation limits. In 2019 both the Wye and the Severn had measures in place to return all salmon unharmed in the case of the Severn this was the Severn salmon emergency byelaw 2019 for the Wye continuation of the 2012 byelaw for mandatory 100% catch and release. It is likely that in 2020 all the rod fisheries will take action to reduce mortality and have in place



mandatory catch and release effort as well as additional method restrictions to maximise survival of rod caught fish. It may be considered that there is no longer parity and the net fishery will exceed the harvest and mortality equity of the rod fisheries.

Calculating an allowable catch based upon the residual mortality of the current weakest stock may produce a much lower catch allocation than in previous years. But this lower allocation would still have an impact on two stocks, the Wye and Usk where salmon populations are failing to meet key conservation objectives in the both SAC designated rivers. All three rivers including the Severn have continued to remain in the salmon conservation limit assessment category of 'probably at risk' at a time when measures have been in place to reduce the impact of angling via catch and release and no harvest within the net fisheries. It therefore can only be considered that there is **no harvestable surplus available**.

### Environment Agency opinion on adverse effects alone

**It is NOT possible to ascertain no adverse effect on the integrity of the following site(s) alone:**

**UK0012642 (River Wye / Afon Gwy SAC)**

**UK0013007 (River Usk / Afon Wysg SAC)**

**The Severn Estuary/Môr Hafren European Marine Site, incorporating:-**

- a) the Severn Estuary SAC (UK0013030),**
- b) the Severn Estuary Special Protection Area (UK9015022),**
- c) the Severn Estuary Ramsar Site (UK11081)**

Feature	Risk	Likely significant effect alone	Protected Site
<b>Atlantic salmon</b>	Disturbance	Salmon intentionally targeted and captured in the fishery	<b>River Wye SAC River Usk SAC</b>
<b>Atlantic salmon</b>	Killing removal of fish	Salmon intentionally captured by, and killed in, the fishery	<b>River Wye SAC River Usk SAC</b>
<b>Run of migratory fish</b>	Disturbance	Salmon intentionally targeted and captured in the fishery	<b>Severn Estuary Ramsar</b>
<b>Run of migratory fish</b>	Killing removal of fish	Salmon intentionally captured by, and killed in, the fishery	<b>Severn Estuary Ramsar</b>

The latest ICES 2019 assessments of salmon stocks in the rivers Severn, Wye and Usk are currently classified as “Probably at Risk” and predicted to remain so in five years’ time. This is a disappointing reversal of fortune over the previous few years but is consistent with decline salmon stocks in almost all English and Welsh rivers.

The allocated catch limits for the Severn net fishery (Total Allowable Catch - TAC) had not been fully utilised by the Severn net fishermen in the last 7 years, but despite the application of this catch limit and its underutilisation, the stocks of all three rivers have either continued to decline in the case of the Severn and Wye, or failed substantially when considering the latest rod catch data (344 the lowest recorded since data collected in 2002) in the case of the Wye. This indicates that these previous restrictions are not providing sufficient protection to these three salmon stocks.

**Table of Declared Net catches against Total Allocated Catch (TAC)**

Year	TAC	Lave allocation (declared catch)	Draft allocation (declared catch)	Putcher HI allocation (declared catch)	Declared Catch %age of TAC
2012	297	145 (81)	2 (0)	150 (126)	70%
2013	278	135 (93)	5 (5)	138 (33)	47%
2014	294	145 (77)	5 (5)	144 (96)	61%
2015	157	27 (21)	3 (3)	127 (111)	90%
2016	166	26 (24)	4 (4)	136 (114)	87%
2017	183	25 (18)	4 (4)	154 (0)	16%
2018	188	22 (17)	4 (4)	162 (72)	52%
2019	N/A	0 ( 4 C&R)*	0 (0)	0 (0)	N/A

\*The lave net fishery was allowed to operate in 2019 under byelaw with 100% mandatory catch and release 4 licences were issued.

The table shows the declared catch against total allocation as set by the HD appropriate assessment since 2012. The significant change was 2015 when the method based on the genetics proportionality was no longer used after the legal challenge. At that time we considered that any salmon caught could be a Wye fish (then the weakest stock). Therefore only the Wye was used to calculate the TAC since 2015. As can be seen the nets have not taken their full catch allocation. The trend in the historic level of participation of nets, and the uptake of privileged HI fishing activity under CoP, has declined. In 2019 the introduction of an Emergency Byelaw to restrict both the Severn net and rod fisheries was implemented as there was significant risk to all three contributing rivers and no harvestable surplus.

Although the catch has significantly reduced through implementation of measures and the reduced uptake in participation, this saving has not transferred through to any significant improvement in the conservation limit analysis as evidenced by the ICES 2019 stock assessment.

**It cannot be relied upon by using previous catch allocation methods to set an allowable catch, that 100% of that catch will not be caught.**

**Therefore under the precautionary principle enshrined in the Habitats Directive and Regulations it cannot be concluded with certainty that there would be no adverse impact by the setting of catch conditions for the 2020 fishing season.**

## 18. Appropriate assessment: assessing the effects in combination

**At Stage 1 significant effects 'in combination' could not be screened out. Further assessment of the 'in combination effects' is presented here:**

Feature	Risk	Likely significant effect in combination	Protected Site
<b>Atlantic salmon</b>	Disturbance	Salmon intentionally targeted and captured in the Black Rock Lave fishery managed by NRW  Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	<b>River Wye SAC River Usk SAC</b>
<b>Atlantic salmon</b>	Killing removal of fish	Salmon intentionally captured by, and killed in, the Black Rock Lave fishery managed by NRW  Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	<b>River Wye SAC River Usk SAC</b>
<b>Run of migratory fish</b>	Disturbance	Salmon intentionally targeted and captured in the Black Rock Lave fishery managed by NRW  Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	<b>Severn Estuary Ramsar</b>
<b>Run of migratory fish</b>	Killing removal of fish	Salmon intentionally captured by, and killed in, the Black Rock Lave fishery managed by NRW  Exploitation in these fisheries needs to be considered alongside the rod fisheries operating in all rivers contributing to the mixed stock population present in the estuary	<b>Severn Estuary Ramsar</b>

Natural Resources Wales (NRW) owns the Wye Fishery, this fisheries includes an area of the Severn estuary adjacent to the mouth of the river Wye.

NRW has re-issued a 10 year lease which it (as the Environment Agency) had previously granted to the Black Rock Lave Net Fisherman's Association to catch and take up to 15 salmon per year from the area of the Severn Estuary known (to us) as the Black Rock lave net fishery ( figure 1).

NRW has supported the continuation of a historic fishery by granting a lease to allow the catching and taking of Atlantic salmon by the use of Lave nets.

This fishery exploits the same mixed stock as the Severn Estuary Net Fishery and therefore must be considered in combination to have effect.

In our assessment unconstrained catches of salmon in the Severn Estuary threaten the integrity of the SACs (as per Stage 1 HRA: Environment Agency record of screening for likely significant effect). This is particularly so for the Rivers Wye and Usk SACs which we judge to be “probably at risk” of failing the annual conservation limits.

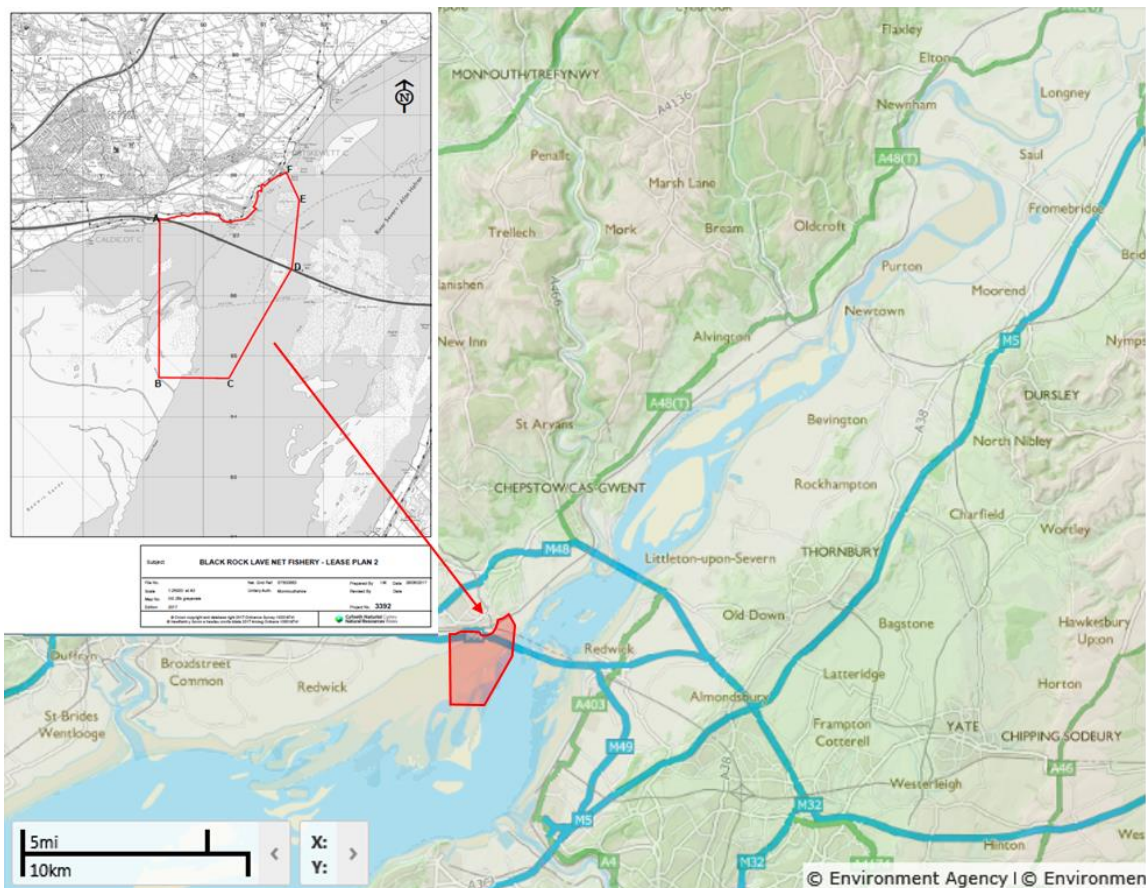


Figure 4 Black Rock Lave Net fishery boundary and location in the Severn Estuary

Fishing for salmon with a lade net is a traditional heritage activity in the Severn estuary. It is considered as a hobby by the Black Rock fishermen, not a business.

The Black Rock lade net fishery has been subject to a very restrictive catch restraint of 15 salmon per season through the 10 year lease issued in 2008 by NRW (previous legacy body the Environment Agency).

Catch returns have shown that this level of catch has not been met over recent year. The average annual catch of salmon between 2006 and 2016 being only 5 salmon.

The Black Rock lease was renewed in 2018. Without the current lease restrictions it is possible that exploitation from this fishery could increase. NRW will complete an annual HRA to condition level of exploitation, similar to that of the Severn Estuary Net Fishery completed by the Environment Agency.

The NRW HRA have concluded that have been unable to determine an acceptable level of exploitation that can be considered insignificant. **Therefore adverse effect upon the integrity of the European sites cannot be ruled out.**

**NRW have determined as the mitigation measure or restriction that the** fishery must operate as a catch and release fishery for salmon. Due to the net being manned at all times and the nature of the netting process being comparatively fish friendly (no enmeshing or gilling of fish) NRW's view is that any salmon caught whilst lade net fishing can be returned unharmed and no handling is necessary.

With Black Rock Lade Net Fishery operating as a catch and release fishery for salmon, **a conclusion of no adverse effect upon the integrity of the European sites was reached by NRW.**

## **PPPs to be assessed in combination**

Black Rock Lade Net Fishery – Managed and regulated by Natural Resources Wales. NRW will complete a 'record of Habitats Regulations Assessment for the Black Rock'. This will consider the in combination effect of the Severn Estuary Net Fishery.

## **Environment Agency opinion on adverse effects in combination**

**We may conclude that there will be no adverse effect in combination to the integrity of these SACs provided the actions of the conditions in mitigation are followed (catch and release).**

## 19. Information / Advice (if relevant)

Natural England comments (if applicable)

## 20. References

2018 HRA Severn Estuary Salmon Net Fisheries

2020 Severn Estuary Net Limitation Order Technical Case

Natural Resources Wales HRA for the Black Rock Lave Net Fishery 2018

## 21. Draft conclusion

The Environment Agency has completed the appropriate assessment and the draft conclusion is: We concluded that the licensing of fishing sectors, resulting in the killing of unconstrained numbers of salmon in the European sites would have an adverse effect.

However adverse effects on the integrity of these sites by can be avoided by ensuring that there is a reduction to zero in the numbers of fish that will be killed in the Severn Estuary Net fishery, to be achieved by:

- introduce a byelaw imposing conditions of catch and release fishing only on lave nets licences;
- introduce a byelaw to stop the fishing with a draft net; and,
- introduce a byelaw to stop the fishing of historical installations (putchers)

We therefore conclude that proposed licensing with conditions and the use of byelaws to restrict fishing methods for the 2020 season will not adversely affect the integrity of the European sites.

Central to our decision we believe that a strict level of control is required to allow time for stocks in all three rivers to recover, it is our capacity to enforce the new provisions and our intent to continue our work to improve known restraining factors whilst continuing to monitor performance of the salmon stock.

Name of Environment Agency officer: **Chris Bainger**

Job title: **Fisheries Technical Specialist**

Date: 20 April 2020 (V2 final amendments 16 Sept 2020)

## 22. Formal consultation

### Natural England consultation

Date sent to Natural England for formal consultation: **10 March 2020**

Date response received from Natural England: **9 April 2020**

Natural England advises:

**that the permission can be granted / the plan or project can go ahead**

Written Response from Email: "... it is a good concise HRA which concluded there will be an adverse effect on the salmon interest for both Wye SAC and Severn SAC/Ramsar site. The mitigation is to impose a bye-law for all salmon caught by the lava net method to be catch&release. Also reducing number of licences from 22 to 6 over 10 years. The putcher method is being stopped for the duration of this permit. The draft net method is being stopped for the duration of this permit.

"Natural England is happy to accept the conclusions of the HRA parts 1 and 2 and agree with the proposed mitigations."

Do Natural England have concerns about the assessment? **No**

Do Natural England have concerns about the decision? **No**

Name of Natural England officer: Dr Alisa Swanson

Job title: Lead Advisor West Midlands Team

Date: 09 April 2020

### Natural Resources Wales consultation

Date sent to NRW for formal consultation:

Date response received from NRW:

Natural Resources Wales advises:

**That the permission can be granted to issue licences for restricted fishing methods, namely lave net fishing, provided any salmon caught are returned immediately to the water with the least possible injury at the point of capture or removal.**



## 23. Final appropriate assessment record

This is a record of the appropriate assessment required by Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended), undertaken by the Environment Agency.

The screening (Stage 1) concluded that the PPP would be likely to have a significant effect on the following site(s):

Severn Estuary/ Môr Hafren SAC (UK0013030)^

River Wye/ Afon Gwy SAC (UK0012642)^

River Usk/ Afon Wysg SAC (UK0013007)

Severn Estuary SPA (UK9015022)^

Severn Estuary Ramsar (UK11081)

An appropriate assessment has been undertaken of the implications of the proposal in view of the site's conservation objectives.

**It can be ascertained that part of the PPP would not have an adverse effect on the integrity of the following site(s), either alone or in combination with other plans and projects:**

Severn Estuary/ Môr Hafren SAC (UK0013030)^

River Wye/ Afon Gwy SAC (UK0012642)^

River Usk/ Afon Wysg SAC (UK0013007)

Severn Estuary SPA (UK9015022)^

Severn Estuary Ramsar (UK11081)

**This conclusion is dependent on the following mitigation and / or conditions:**

***NO Harvestable surplus of salmon has been concluded, therefore a catch allocation cannot be set for this year. The lave net fishery may be licensed to operate on a catch and release basis for salmon only. Any salmon caught when operating with a licensed lave net within the River Severn estuary must be returned immediately to the water with the least possible injury at the point of capture or removal.***

***Putcher and Draft net fisheries would not be able to fish catch and release without adverse effect. Measures via byelaw will restrict and prohibit both fishing methods.***

**It cannot be ascertained that the PPP would not have an adverse effect on the integrity of the following site(s), either alone or in combination with other plans and projects:** Namely the fishing with Putcher or Draft net, licence will not be issued for these methods and will be prohibited by byelaw

Severn Estuary/ Môr Hafren SAC (UK0013030)^

River Wye/ Afon Gwy SAC (UK0012642)^

River Usk/ Afon Wysg SAC (UK0013007)

Severn Estuary SPA (UK9015022)^

Severn Estuary Ramsar (UK11081)

## Appendix 4 Table A – Estimated effects resulting from the introduction of measures currently proposed by the Environment Agency to reduce salmon decline from net and rod fishing (source: Amec Foster Wheeler - Economic Impact of Salmon Fishing Measures April 2018).

Type of effect	Effect from changes to rod and line angling	Effect from changes to net fishing	Overall effect
<b>Personal enjoyment of fishing/angling</b>	For anglers ceasing fishing, the effect is partially captured as change in Direct Expenditure (see below). For anglers continuing, effects are difficult to estimate but may be close to zero (for example, if they already practice C&R consistent with the proposed measures).	The effects on net fishermen are of the same type as on recreational anglers. The aggregate effects will be smaller as there are fewer net fishermen.	A reduction which is not quantified. The effects fall only on some recreational anglers and fishermen.
<b>Value of fish caught</b>	Not estimated but known to be small compared to both anglers' direct financial expenditure and ranges for assumptions in forecasts made here.	Reduction of about £1.38m of annual gross income, mainly from closure of drift net fisheries in the North East.	A reduction of £1.38m of annual gross income for net fishermen. Minor impact on rod anglers (using their current cost as a comparator) which is not quantified.
<b>Direct expenditure by anglers and net fishermen</b>	Reduction in aggregate expenditure of between £0.8m and £6.5m nationally (compared to a current total of £31.7m).	Reduction in expenditure which is uncertain but likely to be less than reduction in gross income. Conservatively assessed as equal to loss in gross income (£1.38m).	Total reduction of between £2.2m and £7.9m.
<b>Wider economic impacts</b>	Changes in expenditure imply a loss of FTE jobs of between 11 and 90 and a range in loss of Gross Value Added (GVA) of between £0.7m and £5.5m.	Difficult to estimate and distinguish from direct losses at fisheries but, assuming expenditure has the same effects as for angling, would lead to a loss of 21 FTE jobs and a loss in GVA of £1.18m.	Total reduction of between 32 and 111 FTE jobs, and between £1.9m and £6.7m in GVA.
<b>Social and cultural value of fishing</b>	Uncertain.	Uncertain.	Likely to be perceived as negative by fishermen, particularly in coastal areas with traditional fishing practices. Not considered as an effect on the wider community but potentially linked to environmental benefits (see below). Not estimated or considered further.
<b>Environmental benefits</b>	The benefits of the measures in terms of fish saved are difficult to link to a clear metric for environmental benefits. The proposed measures will contribute to the preservation of salmon stocks, but are not the only factor in maintaining these stocks. Estimates of the total value of these stocks is £453m based on willingness to pay estimates for the general public (all households). This provides an upper comparator for the value of maintaining stocks.		

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