

WATER RESOURCES ACT 1991

**THE WALES ROD AND LINE (SALMON AND SEA TROUT) BYELAWS 2017
THE WALES NET FISHING (SALMON AND SEA TROUT) BYELAWS 2017**

**DOCUMENT NRW/1
PROOF OF EVIDENCE
OF
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PRINCIPAL FISHERIES ADVISOR**

**on behalf of
NATURAL RESOURCES WALES**

NOVEMBER 2018

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1 Personal Background

- 1.1 My name is Peter Gough and I am the Principal Fisheries Advisor for Natural Resources Wales (**NRW**). I have worked for NRW, its predecessor bodies in Wales and for other similar bodies in England for 38 years. During this time, I have worked on fisheries matters, principally the management of migratory salmonids and the maintenance, improvement and restoration of their habitats. I have also contributed to national (England and Wales) fora to oversee technical and scientific advances in salmonid management and the development and implementation of the current salmon stock management process. I have managed the technical fisheries resource in NRW on matters relating to salmonid stock assessment and reporting and the management of exploitation to protect stocks.
- 1.2 I am a Master of Science in Hydrobiology, a member of the Institute of Fisheries Management and a Chartered Environmentalist.

2 Scope of evidence

2.1 In my evidence, I address the following issues in relation to the status of salmon and sea trout stocks in Wales and to the proposed Wales Rod and Line (Salmon and Sea Trout) Byelaws 2017 and the Wales Net Fishing (Salmon and Sea Trout) Byelaws 2017 (**the All Wales Byelaws**): -

- a. identification of the status of salmon and sea trout stocks in Wales;
- b. consideration of whether the available data indicates that there is a decline in these stocks and if so, its nature and extent;
- c. assessment of the causes of stock decline;
- d. NRW's proposed measures to address this decline;
- e. consideration of the contribution and effectiveness of the All Wales Byelaws as part of these measures;
- f. the proportionality of the All Wales Byelaws as a means to address the decline in stock.

2.2 Appended to my proof of evidence are the following documents:

Appendix 1 - Measures to reduce fishing mortality¹

Appendix 2 - Byelaws Explanatory Table²

Appendix 3 – Glossary of terms³. Where a term within my evidence is capitalised, this indicates that it can be found in the glossary.

¹ NRW/1(B)

² NRW/1(c)

³ NRW/1(D)

3 Introduction

3.1 There are about 33 rivers in Wales that support populations of migratory salmonids – salmon and sea trout. Principal Salmon Rivers, of which there are 23, were designated under a Ministerial Direction in 1998 (**the Direction**)⁴ which required the Environment Agency (**EA**) (the duties of which became part of NRW's statutory roles in 2013) to: -

- a. prepare salmon action plans by 2002 (for the rivers listed in a table attached to the Direction, and which included the 23 principal salmon rivers in Wales⁵);
- b. develop and set spawning targets for each river, in preparing these plans;
- c. review compliance of stock levels with these targets annually giving due regard to stock characteristics such as age composition and run-timing, and take appropriate action;
- d. ensure that target setting and compliance assessment procedures are regularly revised to take account of improvements in methodologies and new data;
- e. take account of the compliance of stock levels with spawning targets when initiating and conducting reviews of Net Limitation Orders and byelaws for salmon fisheries: and;
- f. maintain a comprehensive and complete data archive of catches and other assessment data for (English and) Welsh rivers, reporting definitive stock and fishery assessments annually.

3.2 NRW's current procedures follow this Direction. NRW assesses the compliance of salmon stocks with spawning targets each year and reports these to appropriate national audiences and, in partnership with the Environment Agency and Cefas, to ICES – the International Council for the Exploration of the Sea (e.g. Cefas et al, 2018⁶). NRW's policy is to conduct reviews of the Net Limitation Order in Wales on a

⁴ LEG/13

⁵ The principle Salmon rivers are: Wye*, Usk, Taff & Ely, Ogmore, Tawe, Tywi, Taf, Eastern Cleddau, Western Cleddau, Nevern, Teifi, Rheidol, Dyfi, Dysinni, Mawddach, Dwyrhyd, Glaslyn, Dwyfawr, Seiont, Ogwen, Conwy, Clwyd, Dee*. Asterisks denote cross-border rivers which are outside the scope of the All Wales Byelaws.

⁶ ACC/25

maximum ten-yearly basis (under the Salmon and Freshwater Fisheries Act 1975⁷) and of byelaws for fisheries, as required.

- 3.3 NRW has statutory fisheries duties and has received statutory guidance on this duty from Welsh Government⁸. NRW also has specific duties under recent Welsh legislation (the Environment (Wales) Act 2016⁹ and the Wellbeing of Future Generations Act 2015¹⁰), as set out in the Witness Statement of Ruth Jenkins, as well as under EU directives and international obligations under conventions¹¹. Amongst the latter is adoption of the Precautionary Principle to the conservation, management and exploitation of salmon as adopted by NASCO (the North Atlantic Salmon Conservation Organisation) and its Contracting Parties¹² and guidelines of NASCO for the management of salmon fisheries¹³.
- 3.4 In practice, NRW protects and conserves stocks to ensure that spawning reserves are maximised during periods of stock depletion whilst it seeks to optimise river habitats to maximise survival and production and remove bottlenecks to these.

⁷ LEG/1

⁸ APP/4 1.4 p.20

⁹ LEG/24

¹⁰ LEG/23

¹¹ APP/4 1.5 pp 21-25

¹² POL/13

¹³ POL/14

4 Identification of the status of salmon and sea trout stocks in Wales

Salmon stock assessment measures

- 4.1 The Direction¹⁴ was issued to the Environment Agency in August 1998, during the course of the work being undertaken by the Salmon and Freshwater Fisheries Review Group, which reported to Government in 2000.
- 4.2 The Direction was issued in accordance with adoption of a Precautionary Principle for the management of salmon, recognising growing pressures on stocks that were resulting in depletion of the resource. It is evident today that this situation has grown steadily worse (see evidence of Ian Davidson¹⁵).
- 4.3 This Direction, which remains in force, establishes the management regime that includes production of Salmon Action Plans and the routine compliance-based reporting of salmon stock status, described above at para 3.1. The results of annual assessments are used together within a 'Decision Structure' (**DS**) (see Annex 4 of the Technical Case¹⁶ and Cefas, EA, NRW (2018a)¹⁷) developed to provide consistency across Wales. This informs NRW's precautionary approach to the conservation of stocks.

Stock assessment method for sea trout

- 4.4 Sea trout is a species with a very similar life history strategy to that of salmon and which consequently is exposed to many of the same pressures both in fresh and marine waters. A new target-based stock assessment process has been applied to the assessment sea trout stocks and the identification of management interventions to restore sustainability (see evidence of Ian Davidson¹⁸).
- 4.5 Annual stock assessments for sea trout have been reported since 2008. The revised approach to sea trout has been recently adopted¹⁹.

¹⁴ **LEG/13**

¹⁵ **NRW/2 Section 3**

¹⁶ **APP/4 Annex 4**

¹⁷ **ACC/25**

¹⁸ **NRW/2 section 4**

¹⁹ **APP/4 p52**

4.6 Each of the 23 Principal Salmon Rivers are also amongst the 33 Welsh rivers recognised as “main sea trout rivers”²⁰. These constitute the set of rivers in Wales where the average annual rod catch of sea trout exceeded 50 fish at the time of designation.

4.7 Most relevant jurisdictions have recognised the difficulty in following this stock assessment approach for sea trout, largely due to the difficulty in setting quantitative targets against which to assess stock compliance. However, NRW has introduced such a methodology which is consistent with the principles of the approach for salmon. This is set out in the NRW Technical Case²¹, published to support the statutory consultation in 2017. This issue is also addressed in the proof of evidence of Mr Ian Davidson²².

Monitoring undertaken by NRW

4.8 NRW carries out monitoring and assessment of adult and juvenile salmon and sea trout populations for stock assessment and to understand the performance of streams in which the young fish grow to the migratory smolt phase. Principally this is to assess compliance with environmental targets and objectives, but also to determine stock sustainability (Table 4).

Table 4 Summary of fish stock evidence collected by NRW

Monitoring and Assessment Activity	Detail
Fishing catch statistics – annual	Statutory catch returns from rod and net fishermen. Data are collated and published in annual reports
Adult stock assessments – annual	Carried out for rivers wholly or partly in Wales: 23 Principal Salmon Rivers 33 Main Sea Trout Rivers

²⁰ The main sea trout rivers are: Severn*, Wye*, Usk, Rhymney, Taff, Ogmere, Afan, Neath, Tawe, Loughor, Gwendraeth Fawr & Fach, Tywi, Taf, Eastern & Western Cleddau, Nevern, Teifi, Aeron, Ystwyth, Rheidol, Dyfi, Dysynni, Mawddach & Wnion, Artro, Dwyrhyd, Glaslyn, Dwyfach & Dwyfawr, Llyfni, Gwyrfai, Seiont, Ogwen, Conwy, Clwyd, Dee*. Asterisks denote cross-border rivers which are outside the scope of the All Wales Byelaws.

²¹ APP/4 p51-54

²² NRW/2 section 4

Monitoring and Assessment Activity	Detail
	<p>Salmon:</p> <p style="padding-left: 40px;">standard tool used to: assess status of salmon stocks</p> <p style="padding-left: 40px;">decision structure to identify management option</p> <p>Sea Trout:</p> <p style="padding-left: 40px;">similar tool built to assess status of sea trout stocks</p> <p style="padding-left: 40px;">decision structure principle used to identify options</p>
Juvenile salmonid surveys	<p>Annual temporal sites – these are sites sampled each year to provide evidence of change in stocks over time.</p> <p>Periodic spatial sites (currently 6-yearly) – sites sampled periodically to provide evidence for any spatial variation in population data.</p> <p>Occasional ‘special investigation’ rivers, most recently:</p> <p style="padding-left: 40px;">Clwyd, Teifi and Usk in 2017</p> <p style="padding-left: 40px;">Clwyd, Teifi, Usk and Tywi in 2018.</p> <p>Special commissioned reports</p>

4.9 Communication of results and the routine stock assessment analyses are presented to NRW’s internal strategy and reporting groups, to stakeholders - including the membership of NRW’s strategic group (the Wales Fisheries Forum) and to NRW’s Local Fisheries Groups. Papers including periodic ‘Know Your Rivers’ reports²³ that

²³ POL/10

are aimed at stakeholders and include these analyses, are placed on the NRW website for further public scrutiny.

- 4.10 This assessment approach is addressed in the Witness Statement of my colleague Ian Davidson²⁴. In particular, he addresses the reliability of evidence in relation to fish populations and trends and catch statistics, in addition to the use and effectiveness of the new assessment process for sea trout.
- 4.11 The results of these assessments were presented in the appendices to the NRW Technical Case²⁵, and updated evidence is now enclosed with NRW's evidence²⁶.

Evidence of decline

- 4.12 Through its annual adult salmon and sea trout stock assessments and the evidence drawn from juvenile salmonid population surveys, NRW has gathered substantial evidence of the status of salmonid fish stocks. This evidence was provided in the Technical Case²⁷, which is now supplemented by further evidence of stock status gathered since consultation. The evidence is further discussed in the proof of Ian Davidson²⁸.
- 4.13 This evidence is summarised in Annex 3 to the Technical case²⁹, which has been updated since the consultation, with further evidence drawn from 1 additional year of both adult and juvenile assessments³⁰. It indicates that: -
- a. adult salmon stock assessments are largely unchanged, generally showing continued pattern of decline. 91% of salmon stocks in Wales are projected to be either 'at risk' or 'probably at risk';
 - b. adult sea trout stock assessments show deterioration with 7 stocks deemed 'At Risk' and 16 'Probably At Risk', compared to 10 and 7 respectively at the time of consultation;
 - c. routine juvenile population surveys, supplemented by targeted investigations on rivers where surveys in 2016 gave rise to serious concern for the success

²⁴ NRW/2 sections 3 and 4

²⁵ APP/4 p48 -54

²⁶ ACC/23

²⁷ APP/4

²⁸ NRW/2

²⁹ App/4

³⁰ ACC/23

of spawning in 2015/16 and the subsequent prospects for adult salmon and sea trout in 2018 – 2022 (principally 2019 – 2021), confirm the poor status of most populations. The analysis of the 2017 survey data was contracted to APEM who have now produced a draft report (APEM, 2018³¹), and a further commission to review evidence collected in 2018 is currently being prepared.

Salmon stock assessment used for forward look - the statistical debate

- 4.14 The annual datasets for salmon are used to assess the likely status of stocks into the future. This method uses a 10-year time period of annual data and the fitting of a regression line that is extended to a 5-year estimate of future stock status. The method for doing this is a complex one, using Bayesian statistics, and is described by NRW's advisors, Cefas, in a witness statement by Dr Jonathan Barry³². Dr Barry also addresses a critique of the statistical modelling that was commissioned by the Angling Trust on behalf of a consortium of anglers.
- 4.15 The forward look at stock status, together with the Decision Structure³³ are used to identify whether further exploitation management is required to ensure that appropriate management action is taken to secure the key objective that stocks should meet their management targets. The management target adopted is for adult stocks to exceed their annual conservation target in at least four of every five years.

³¹ ACC/14

³² NRW/3

³³ APP/4 section 4 p.48

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5 Consideration of whether the available data indicates that there is a decline in stocks and if so, its nature and extent

- 5.1 In considering NRW's response to poor stock status, it is noted that Welsh salmon stocks are generally in a worse condition than those in England. From the latest (2017) assessment of compliance with Conservation Limits³⁴, 36% of principal salmon rivers in Wales are projected to be 'at risk' in five years' time and 55% are projected to be 'probably at risk'; i.e. 91% in total in the poorest risk classes. This compares to 10% and 69% of salmon rivers in England with a projected class of 'at risk' and 'probably at risk' respectively or 79% in total in the poorest risk classes – a better position than in Wales.
- 5.2 NRW must have regard to relevant Welsh legislation and statutory guidance concerning how this must be considered and applied. This is set out in paragraph 3.15(b) of this document and more fully in the Witness Statement of my colleague Ruth Jenkins³⁵.
- 5.3 The great majority of salmon stocks in Wales and most sea trout stocks are falling below their management targets (achievement of which requires stocks to exceed their annual egg deposition targets for at least 4 years in any 5) and are deemed unsustainable because of the risk of ongoing decline. Most stocks are failing to achieve their management targets and are therefore at risk of ongoing decline to unsafe stock levels. Salmon contribute to the designations of 6 rivers in Wales as Special Areas of Conservation under the Natura 2000 Network and, where classified, are contributing to failure of the sites to attain their conservation objectives.
- 5.4 Ongoing decline in stocks means that it is now imperative for spawning fish to be preserved so that stock levels do not fall to unsafe levels and that declines are reversed for the benefit of future generations and of sustainability.
- 5.5 Further evidence of the nature and extent of the problem is provided in the proof of Mr Ian Davidson, and set out in the Technical Case³⁶.

³⁴ ACC/28

³⁵ NRW/5 section 4

³⁶ APP/4 Section 5, p. 62-84

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6 Assessment of causes of stock decline

- 6.1 NRW recognises that a range of factors contribute to decline of salmon and sea trout stocks. This section of my statement and Robert Vaughan's statement provide a summary of those which are considered most relevant.
- 6.2 All exploited fish populations, those in which adult fish are harvested as food supplies, must be managed on a precautionary basis so that the future viability of stocks is not unduly threatened. However, this has become more challenging as human influence on the environment that supports fish populations has developed, starting with the agricultural and industrial revolutions. Negative influence on all stages of the salmonid life cycle have increased substantially over the past century and in some cases over the past few decades. Examples include intensification of resource use for agriculture and forestry.
- 6.3 The complex nature of the migratory life cycle of salmon and sea trout exposes the fish to pressures in each of the environments they inhabit: the sea, the estuary and the river, and the transitions between these.
- 6.4 Therefore, the key causes of stock decline relate to pressures on the marine and riverine environments, which are considered in turn below. I also briefly consider two additional pressures on the stock populations; avian predation and climate change. Appendix 1 to my evidence³⁷ sets out further information regarding factors leading to decline of stocks.

Marine Environment

- 6.5 Across their North Atlantic range, salmon stocks have been declining over the past half-century in response to a range of environmental pressures. On entering the coastal environment in the mid to late Spring, Atlantic salmon smolts quickly migrate towards the North Atlantic, probably making use of seasonal currents that transport them to seasonal feeding areas. In the coastal environment, there is an increasing range and prevalence of industrial developments, many of which might be expected to adversely affect salmonid migration. These include construction works, including factors such as pile-driving, which are activities thought to contribute towards

³⁷ NRW/1B

detrimental effects on salmon migratory behaviour³⁸, and industrial abstraction and discharges³⁹.

- 6.6 Further offshore in the seas around Europe, there is potential unintended trapping or 'bycatch' of migrating salmon smolts in pelagic fisheries and consequential depletion of fish and invertebrate resources on which predators such as salmon and many seabird populations depend. Of major concern are the projected changes to the marine environment that are increasingly evident, and which are ascribed to the effects of climate change⁴⁰, discussed further below. These have recently been implicated through significant changes in geographical location of exploited marine fish stocks that are themselves a response to changes in typical regimes of temperature, salinity and acidity.
- 6.7 In response to this, the rate of marine survival, as determined by the rate of return to home rivers of tagged smolts, is now the lowest on record. The Atlantic Salmon Trust has estimated that there are fewer maturing salmon at sea today than ever before⁴¹.
- 6.8 Similar issues probably affect sea trout at sea. However the extent of their migrations appears to be more limited than those of salmon (see **ACC/21**).

Riverine Environment

- 6.9 Both species rely on high quality freshwater habitats in order to spawn and for optimum survival of juveniles. The quality of habitats depends on the quantity and quality of water and the quality of the physical environment of the rivers. In optimum conditions, recruitment will be maximised and there will be an optimum production and emigration of smolts.
- 6.10 A range of pressures damages the environmental quality of our rivers. These include pressures in the freshwater environment (e.g. management of water resources and water quality); managing the occurrence and impact of water pollution incidents, including those arising from agriculture; and addressing deterioration in physical habitat quality of many streams and rivers; and acting to assess and respond to the potential impact of illegal fishing and predatory birds. This is in addition to work to protect spawning reserves of fish by ensuring that fishing is sustainable.

³⁸ **ACC/41**

³⁹ **ACC/42**

⁴⁰ **ACC/43**

⁴¹ **ACC/7**

Avian predation

- 6.11 In addition to pressures in the marine and riverine environments, avian predation also affects populations.
- 6.12 The potential impact of two of the species of bird that predate upon fish, the cormorant and the goosander, has become a highly emotive matter for many anglers and fisheries groups. The process of predation is a natural one. However this has become clouded by relatively recent adjustments to the geographic range of both bird species, with goosander having spread their geographical range in the UK to the south, and cormorants increasingly evident in inland waters. The reasons for these changes are unclear, but in the case of cormorant may be conjectured to be due to shortages of prey species in coastal waters. The process would be presumed comparatively harmless when fish populations are in good condition, however depleted stocks of fish may not withstand ongoing predation that might still occur as birds are attracted by and target more abundant species.
- 6.13 At early stages of the salmon and sea trout life cycles natural mortality, including that due to predation, is comparatively high. However, there is natural compensation for this through subsequent higher survival of fitter individuals. Once past a critical life history stage, considered to be the pre-smolt stage (shortly before salmon and sea trout migrate, as smolts, towards the sea) the impact of further predation can no longer be compensated by higher survival rates amongst the residual population. After this so-called density dependent stage, there is no longer scope for higher survival rates regulated by fish population density. Losses at this stage are therefore irreplaceable losses to the stocks that will later support fishing and breeding.

Climate change

- 6.14 Salmon and trout are highly sensitive to temperature, particularly in the final stages of adult maturation and in their development from eggs to young fish. If the water temperature rises above about 6°C, loss of gamete and embryo viability progressively rises to a critical value of about 12°C above which development is fatally disrupted and the embryos die.
- 6.15 Rising temperatures and acidification of the oceans will disrupt marine ecosystems and lead to further stress on salmon and sea trout during their time at sea.

- 6.16 Salmon and trout will be affected directly by the impact of rising temperatures and wider changes in the physical environment, such as river flows, and indirectly by changes in populations of other organisms, such as their food species.
- 6.17 The impacts of changing climate appear to be manifest in Wales, and appear to have been demonstrated by the failure in breeding success resulting from the salmonid spawning season in the winter of 2015/16. It is postulated by NRW that this was due to exceptional climatic conditions in December 2015 when a low pressure weather system resulted in record high river flows in part of Wales and a widespread record high temperature that resulted in exceedance of temperatures known to cause damage to gametes and early stages of fertilised eggs⁴². In 2016 NRW observed unprecedented low levels of salmon and some trout 0+ fry production in many nursery areas, and this subsequently led to very low levels of 1+ parr in 2017 (0+ fry are juveniles derived from spawning in the previous winter, and 1+ parr are that cohort in their second summer of life in freshwater, prior to their typical seaward migration as smolts as 2-year old fish in the spring). This will have resulted in reduced abundance of smolts, typically in 2018, and consequently in 1-sea-winter salmon and two sea-winter salmon in 2019 and 2020 when the breeding population will be depleted because of this effect.

⁴² ACC/43, ACC/44, ACC/45, POL/33, ACC/46

7 NRW's proposed measures to address the decline in stocks

- 7.1 As noted above, NRW is responding to the problem in three complementary ways:
- a. First, NRW is proposing catch control byelaws which would have effect for a period of ten years, to apply to rod and net fishing on rivers that are wholly within Wales, and which will ensure that spawning populations are maximised (the All Wales Byelaws). In addition, NRW is proposing further but separate byelaws in respect of the three cross border rivers.
 - b. Secondly, NRW is implementing a suite of land management measures to improve the river environment.⁴³
 - c. Thirdly, NRW is implementing remedial action to restore river habitat quality and to address other factors operating in the freshwater environment.⁴⁴
- 7.2 The 'All Wales' Byelaws are described in this section. Details of the suite of land management measures and remedial action proposed by NRW can be found in the evidence of Robert Vaughan⁴⁵. The current NLO, renewed in 2018, and cross border byelaws are addressed in Appendix 1 to this statement⁴⁶.

The 'All Wales' Byelaws

- 7.3 The provisions of the proposed 'All Wales' Byelaws are set out in tables at Appendix 2 to this proof of evidence⁴⁷. In summary, the 'All Wales' Byelaws will implement the following measures over the course of their ten year lifespan.
- a. Catch and release of salmon – a mandatory requirement that any fish caught by rods and nets will be returned to the river.
 - b. Rod fishing method controls which introduce and require
 - (a) A ban on treble and double hooks on lures
 - (b) A ban on treble hooks with a gape-size larger than 7mm for flies

⁴³ These measures will be addressed in the evidence of Mr Robert Vaughan **NRW/6**.

⁴⁴ These measures are addressed in Appendix 1 to my proof of evidence (**NRW/1B**).

⁴⁵ **NRW/6**

⁴⁶ **NRW/1B**

⁴⁷ **NRW/1C**

- (c) Use of barbless and debarbed hooks only
- c. Ban on fishing for salmon with worm bait
- d. Slot limit of 60cm for rod-caught sea trout
- e. Net fishing season changes (see Appendix 2 for full details).

Further targeted measures for sea trout stocks

7.4 Additional measures are proposed to protect sea trout stocks on targeted rivers where these are deemed necessary (see Appendix 2 for full details): -

- (a) Statutory C&R fishing by rod in rivers in the period prior to 1st May, when net fishing on those rivers is also constrained each year until 1st May;
- (b) Method controls imposing prohibition of bait fishing before 1st May in specified rivers.

Additional measures

7.5 Following NRW's consultation in August 2017 and as a response to the consultation responses received, the proposed byelaws were adjusted to make the following changes:

- a. The current byelaw 8 (1)(a)(2) (as proposed) provides that in no case shall any bait or lure have more than nine hooks and no weight or sinker can be attached below the lure or bait. This could be interpreted as 9 individual hooks. The proposal is to clarify the byelaw such that on artificial lures, the use is restricted to one single hook only to a maximum gape of 13 millimetres. This restriction to one single hook shall not apply to wobblers, plugs or artificial imitation fish baits which are allowed up to a maximum of 3 single hooks.
- b. River specific proposal - Usk catch and release: statutory catch and release rod fishing to end on 31 December 2021 (this was amended following advertisement to reflect an end to expected deficit in returning adult fish following the 2015/16 spawning failure);
- c. Cenarth (Teifi): Byelaw 13(a)(2)(iii)(b) of the Rod and Line Byelaws 1995 (Fishing near Obstructions in the West Wales Fisheries District) to be

revoked to remove the historic 'bait fishing only' controls at this site. Removing the restriction will allow fishing for salmon and sea trout to continue but with fly and spinner. We no longer believe there is a high risk of anglers deliberately foul hooking at the site.

5 year interim review

- 7.6 There will be ongoing annual assessments of stock status. However it is also proposed there will be a substantive 5 year interim review in order to monitor performance of the 'All Wales' Byelaws.

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8 Consideration of the contribution and effectiveness of the All Wales Byelaws as part of these measures

8.1 This section of my evidence considers in turn each of the measures proposed in the All Wales Byelaws, and assesses their effectiveness, in combination with other measures, in protecting and increasing salmon and sea trout stocks. I conclude that the measures imposed in each of the All Wales Byelaws are necessary and that they, in combination both with each other and with the other measures described in the evidence of Bob Vaughan, can achieve the best outcome for salmon and sea trout populations.

Survival after catch and release

8.2 A number of fisheries byelaws which control fishing already exist in Wales⁴⁸ and these are set out to help fishermen in the Rod Fishing Byelaws 2018 - A guide for anglers in Wales⁴⁹. These have been introduced in the past to reduce the potential risks from intentional foul hooking and to reduce injury to fish that may be released after capture. The National Salmon Byelaws (1999 and 2008) were the first to set C&R fishing for salmon on a statutory basis, and to introduce restrictions on some angling methods.

a) In rod fisheries

8.3 C&R has become an increasingly common management tool to maintain fish stocks and fisheries following many reviews and investigations into its effectiveness and impacts (e.g. Arlinghaus et al 2007⁵⁰; [NASCO 2009](#)⁵¹; EA 2017⁵²). Although there is extensive information on the C&R of salmon and non-anadromous trout (brown and rainbow), there is comparatively little known about the efficacy of C&R on sea trout. However, due to the similarities between salmon and sea trout it is considered likely that the impacts and effectiveness will be broadly similar.

8.4 Most of the studies that report mortality rates after C&R have used skilled anglers or artificially hooked captive fish. This may lead to lower estimates of mortality rate than might be expected if less experienced anglers caught the fish. Efforts have been

⁴⁸ LEG/28

⁴⁹ POL/26

⁵⁰ ACC/2

⁵¹ ACC/39

⁵² POL/31

made in a number of countries to inform anglers about good C&R practice through, for example, free instruction videos and advisory leaflets.

8.5 The main factors that can reduce post-release survival are:

- the fishing method used;
- deep hooking of fish leading to tissue damage and bleeding;
- physical damage to fish resulting from poor handling leading to scale loss abrasions and infection;
- fish being held out of the water after capture for a prolonged period, often for photographing;
- high water temperatures above 18°C.

8.6 Physical injury caused by hooking is the most important cause of post-release mortality. Hooks that penetrate vital fish organs or tissues can cause critical damage. If hooks are deeply embedded (penetrating the oesophagus and/or stomach with resultant damage to internal organs such as the heart and liver), this will almost certainly result in serious injury and mortality.

8.7 The fishing gear used by anglers can influence hooking damage. The three main fishing methods are bait, lure or spinner, and fly, and there are very variable estimates of survival using the three methods. It is agreed by most anglers that post C&R survival is highest for fish caught on fly (often above 90%), lower for those caught on lure (around 50-80% survival) and lowest for those caught using bait (generally less than 50% in the case of worm⁵³).

8.8 In the most recent extensive review made of pan-holarctic post release mortality of angled Atlantic salmon, Lennox et al (2017)⁵⁴ concluded that salmon captured by flies had higher survival (95%) than salmon captured by lures (85%) or bait (86%).

b) In net fisheries

8.9 Most of the net fisheries in Wales have operated under C&R restrictions for salmon for the past 20 years. As with all C&R fishing there will be some residual mortality of

⁵³ ACC/17

⁵⁴ ACC/17

fish released from nets. However NRW salmon and sea trout radio tracking telemetry studies to date have provided evidence of successful return alive of captured fish. In these studies, adult salmon and sea trout were caught in the Tywi seine net fishery and provided to researchers for insertion of transmitters so that subsequent migrations could be studied.⁵⁵ The successful outcome of these studies showed that, if handled correctly, survival of fish can be high.

- 8.10 There are currently no survival estimates for fish released from a coracle net. The nets used in coracle fishing work by enmeshing the fish in a pocket, similar to a Trammel Net rather than a Gill Net. As such the risk of injuries is reduced compared to a gill net. However there is still a risk of suffocation associated with the operculum being covered, if the fish is not retrieved quickly.
- 8.11 There are relatively few appropriate or comparable published studies on survival of net released fish. However recent published studies⁵⁶ suggest a mortality rate of 24% for Pacific salmon from tangle net fisheries with reported similar mesh sizes from the Western United States (95.4% immediate survival and 80.1% in the longer term).
- 8.12 It is also important to note that some of the coracle and seine net fishermen have been practicing C&R since the introduction of the National Salmon Byelaws in 1999. This is because they principally target sea trout, with a smaller bycatch of salmon and so these fisheries were made exempt from the byelaws on the condition that salmon caught prior to 1st June in any year should be released alive and well. This is an important precedent. NRW's own radio tracking studies of salmon and sea trout has used seine caught fish as a source and showed that, if handled correctly, salmon and sea trout show high levels of survival. On the basis of this evidence, C&R fishing is expected to be successful. NRW also have no observations of non-compliance or of fish mortalities, during regular enforcement inspections, either immediately within nets or through fish succumbing to their injuries later in fresh water.

Effectiveness of barbs/debarbed hooks

Hooks

- 8.13 A large variety of different hook designs are readily available to anglers. In most cases the selection is a matter of personal choice. However, some fisheries

⁵⁵ ACC/34, ACC/35, ACC/36

⁵⁶ ACC/19

prescribe, via local voluntary or mandatory codes, the number and size and design of hooks. A number of byelaws already exist in Wales to control fishing. These have been introduced in the past for a range of reasons in order to reduce the potential risks from foul hooking and to reduce injury to fish.

Why barbless?

- 8.14 In many forms of angling (especially C&R based fisheries), barbless hooks are now regarded as preferable and as effective as hooks with barbs. In some cases barbless hooks have become the standard hook pattern used because they are more easily removed from fish.
- 8.15 Barbless or de-barbed hooks can help in minimising handling time when releasing fish, and reduce the physical damage associated with unhooking especially deeply hooked fish. NRW would interpret de-barbed hooks as those where the barb has been squashed, crimped or filed down.
- 8.16 Reducing the mortality associated with angling by requiring barbless or de-barbed hooks is an important step in protecting fish stocks. Doing so can increase survival of juvenile and adult fish by reducing handling time required to take out the hook, and reduce also injury from handling as well as exposure to the air.
- 8.17 Exposure to air is one of the key factors in fish survival post capture. Arlinghaus et al (2007)⁵⁷ concluded that barbless hooks are consistently less injurious and result in less mortality than barbed hooks and suggest that barbless hooks should be widely adopted by anglers.
- 8.18 When there is a conservation concern for a wild salmon population, each fish is valuable for its potential contribution to recovery of the population.
- 8.19 In an unpublished review carried out by the Environment Agency after the introduction of the National Spring Salmon Byelaws, the use of barbless/de-barbed hooks was much lower than would be hoped for and may be influenced by a perception that this hook type will reduce the catch rate.
- 8.20 In a review carried out by the Atlantic Salmon Federation (2008)⁵⁸, hook removal time was significantly longer when barbed hooks were used compared to barbless hooks.

⁵⁷ ACC/2

⁵⁸ ACC/1

Mortality was also higher for fish caught with treble hooks compared with single hooks, due to the increase in hook-point penetrations increasing the probability of injury to critical locations and associated bleeding. Their findings are summarised as:

- a. *“...fish caught on barbed hooks had higher mortality rates than fish caught on barbless hooks.*
- b. *“...the mortality rate for fish caught with barbed flies or lures is almost double the mortality rate of fish caught with barbless flies or lures.*
- c. *“The overall average mortality rate in these 18 studies was just under 12%. Under the best conditions, with barbless flies or lures, the percentage dropped to under 3%.”*

8.21 The use of barbless or debarbed hooks therefore complements adoption of C&R principles.

Hook size rules

8.22 The proposed restriction on hook size aims to reduce the chances of hooks penetrating fish deeply enough to cause fatal injury.

8.23 Worm fishing for salmon is normally carried out using a relatively large hook and multiple worms sometimes referred to as “bunching”

8.24 Restricting worm fishing to a single small hook and single worm will help minimise the potential bycatch of salmon. It is acknowledged that this will not completely stop salmon taking a worm but will substantially reduce the risk.

8.25 The use of a small hook reduces the risks associated with larger hooks that, when swallowed, might penetrate vital organs leading to death. Small hooks reduce the size and number of worms that can be effectively used when targeting sea trout with worm bait and when there is a risk of a bycatch of salmon. Thus, allowing use of a single worm on a small hook will allow worm fishing for sea trout to continue with reduced potential impact on salmon.

8.26 If enforcement responses demonstrate significant abuse, then NRW would need to consider extending bait bans to other species.

Trebles and doubles

- 8.27 Hooks used in fly fishing may be single, double or treble hooks, with or without barbs. Treble and double hooks are also used in combination with Tubeflies and Waddington Shanks (commonly used flies). Traditionally one or several sets of treble hooks are used with spoons, spinners and plugs. When fishing with worms, single hooks are most commonly used, but whilst fishing with shrimp or prawn treble hooks are normally employed.
- 8.28 A very recent scientific review on the subject of hook patterns and C&R survival (Lennox et al, 2017⁵⁹), quoted in the Technical Case⁶⁰ concludes that '*physical injury caused by hooking is the most important predictor of post-release fisheries mortality*'.
- 8.29 The use of fewer hooks, or single hooks generally, reduces the potential injury and unhooking times. The use of treble hooks, particularly when more than one set of hooks is used on lures, is likely to represent the greatest risk of injury in deeply hooked fish. To reduce both the risk of injury and delay in release in order to minimize to post release mortality, NRW considers that the prohibition on the use of trebles will substantially improve C&R survival and embed accepted good practice.
- 8.30 Comparative studies of fish mortality linked to the use of singles, doubles and trebles have sometimes shown contradictory results⁶¹. Single hooks may be more deeply ingested than treble or double hooks however, if ingested, treble hooks can cause more severe injuries. A recent scientific review on the subject of hook patterns and C&R survival⁶² concludes that '*physical injury caused by hooking is the most important predictor of post-release fisheries mortality*'.
- 8.31 Generally treble hooks are less easily manipulated and removed when compared to double or singles, and therefore the removal of treble hooks generally requires longer handling times. Replacing treble hooks with single hooks (or even double hooks) is a means of reducing injuries associated with hook penetration.
- 8.32 The use of fewer hooks, or single hooks generally and especially barbless single hooks, reduces potential injury to fish and unhooking times. Treble hooks, particularly when more than one treble hook is used on lures, are likely to represent the greatest

⁵⁹ ACC/17

⁶⁰ APP/4

⁶¹ ACC/8

⁶² ACC/17 quoted in the Technical Case, APP/4 p.114-116

risk of injury in deeply hooked fish. To minimise both the risk of injury and delay in release in order to reduce post release mortality NRW considers that the prohibition on the use of treble hooks will substantially improve C&R survival and embed accepted good practice.

Flying C type lures

- 8.33 Increasing concern has been expressed about the deep hooking potential and subsequent survival of fish caught on the popular spinner baits that are known as ‘flying Cs’. These lures have become highly popular due to their effectiveness. However they tend to be engulfed by fish which are caught and thereby become deeply hooked in the back of the mouth/oesophagus and in the gills causing increases in fish injury and mortality.
- 8.34 Gargan et al (2015)⁶³ reported on the survival of wild Atlantic salmon after C&R angling in three Irish rivers. In total, 76 fish were tagged with radio transmitters after C&R angling. Survival to spawning was much higher for fly caught fish (98% survival – 59 of the 60 fish surviving) than lure caught fish (55%, 6 of 11 fish survived). Importantly, the lures in this study were spinning lures (flying C type lures).
- 8.35 The risks from these types of lures can be reduced if the treble hooks are replaced with an appropriate single hook. Some suppliers in Wales have already recognised this and are stocking this type of lure with single hooks for anglers who want to increasingly release fish. Experience with single-hook flying c lures on the River Wye has been very good with few fish believed to be lost due to the hook type⁶⁴.

Banning worm bait

- 8.36 Based on feedback received from public engagement, NRW is aware that many fisheries are primarily focused on sea trout. These may be difficult to fish with other methods such as fly and spinning except in high flows, and in several cases the stocks being fished for are sustainable. NRW therefore proposes to allow bait fishing for sea trout to continue. It is acknowledged that there will be some bycatch of salmon, with an associated potential mortality. This is, however, considered acceptable, based on experience from current restrictions to protect early run spring salmon. NRW considers that introducing measures to restrict the size of hook for

⁶³ ACC/4

⁶⁴ Marsh-Smith, pers. com.

worm-fishing for sea trout, and to a single worm will help reduce, though not eliminate, the bycatch of salmon.

- 8.37 The use of a small hook reduces the risks associated with larger hooks penetrating vital organs and reduces the size and number of worms that can be effectively used compared with methods normally used when targeting salmon with worm.
- 8.38 This will allow fisheries to effectively continue worm-fishing for sea trout whilst reducing the risks to salmon.

Seasonal restrictions on bait

- 8.39 In general, air exposure is harmful and potentially lethal to all captured salmonids. The effects of air exposure is dependent on numerous factors including water temperature, water quality, 'playing' time, handling time, weather conditions and the size of the fish.
- 8.40 C&R of salmon in rivers with water temperatures less than 17-18°C has been widely reported to result in low mortalities (0-6%, subject to capture method). Several reviews and studies suggest that temperatures of 17-18°C and above can result in elevated levels of both immediate and delayed mortality⁶⁵.
- 8.41 Recovery is affected by a number of factors. Fish that are caught in either of these warm weather conditions, become fully exhausted, or are handled extensively are likely to require the longest period to recover. Studies mainly on trout have shown that fish played to exhaustion can still have a high level of survival (i.e. greater than 90%). However mortality increases rapidly with exposure to air and has been suggested to reduce to 60% after 30 seconds exposure and to around 30% after 60 seconds.
- 8.42 Following discussions with, and feedback from stakeholders, NRW acknowledges that the majority of fish caught on shrimp or prawn are hooked in the front of the mouth and therefore have a high probability of survival once released.
- 8.43 However, NRW is also mindful that shrimp/prawn fishing can be particularly effective in low water conditions during the summer when water temperatures may be above 18 degrees Celsius and the rate of post-release survival would be low.

⁶⁵ ACC/17

- 8.44 Physical injury caused by hooking is the most important predictor of post-release fisheries mortality, followed closely by water temperature and length of exposure of the fish to the air.
- 8.45 NRW has therefore proposed that shrimp and prawn may be used, but only after 1st September when water temperatures are cooler and C&R survival using these baits may be expected to be high

Slot limit for sea trout

- 8.46 A sea trout of 60cm is just under 6lbs, and these are normally fish that have survived to spawn on more than one occasion. They are therefore considered to be fit fish and important contributors to spawning. Using the Future Lifetime Egg (**FLE**) method, developed as part of NRW's approach, these fish can be seen to be a valuable component of the spawning stock.
- a. Reducing the kill of these fish in the rod fishery is proportionate with the proposed reductions in the net fisheries.
 - b. It also targets the fish that have been saved as a result of the reductions in net catch.
- 8.47 It is accepted that a 60cm limit will not affect many rivers, and it has been suggested by some anglers on the Teifi that 50cm may be more appropriate in some catchments. NRW wanted to propose an all Wales measure for all sea trout stocks that would reflect the general concerns about spawning stocks. A 50cm limit would disproportionately target rivers such as the Dyfi, saving approximately 200 fish, however our assessments suggest that the Dyfi sea trout fishery is performing well and no further measures are currently required to maintain spawning stocks. Fisheries may of course voluntarily introduce their own more stringent measures.
- 8.48 The current minimum size for brown trout and sea trout is 23cm (9 inches), and it has been suggested that this should be increased to 30cm (12 inches) to protect a greater proportion of the whitling stock. We would suggest that this measure is not currently warranted and would make a limited difference to any spawning stock principally due to the following: -
- a. Anglers already release a high proportion of these sized fish in particular

- b. There is a much higher proportion of males in this size/age range of fish compared to the larger ones.
- c. The Future Lifetime Eggs contributions from this size of fish would suggest that it is not as effective as a contribution as the larger fish which NRW has targeted for measures

8.49 NRW has sought to introduce a suite of balanced measures. Clubs, Associations, private fisheries and catchment groups may of course voluntarily introduce their own more stringent measures to further contribute to the sustainability of their fisheries.

Enforceability

8.50 The effectiveness of any measure is directly linked to its uptake and, where mandatory, its enforceability.

8.51 Most anglers are fully aware of similar controls such as the National Salmon Byelaws and comply with the requirements. Much of this is as a result of the normal uptake of statutory controls by fishermen and by peer pressure. NRW carries out intelligence-led enforcement of all fisheries legislation and byelaws and will not hesitate to take appropriate enforcement action in accordance with its Enforcement Policy⁶⁶.

8.52 NRW has a duty under section 6(6) of the Environment Act 1995⁶⁷ “to maintain, improve and develop fisheries of salmon, trout, eels, lampreys, smelt and freshwater fish”.

8.53 The powers to meet these duties are contained primarily in the Salmon and Freshwater Fisheries Act 1975⁶⁸ (including licensing of angling and net fishing), the Water Resources Act 1991⁶⁹ (including making of byelaws to regulate fishing), the Eels (England and Wales) Regulations 2009⁷⁰ (including powers to facilitate eel passage) and the Keeping and Introduction of Fish Regulations 2015⁷¹ (including regulating the movement and introduction of fish).

⁶⁶ POL/23

⁶⁷ LEG/11

⁶⁸ LEG/1

⁶⁹ LEG/6

⁷⁰ LEG/19

⁷¹ LEG/22

- 8.54 NRW and its predecessor bodies have previously used these powers to make byelaws for the better protection and management of fish stocks.
- 8.55 Similar method restrictions have proved enforceable in the past. For example the National Salmon Byelaws (1999 and 2008) make C&R fishing a statutory requirement in all net fisheries prior to 1st June each year (if they operate under a dispensation, as they primarily target sea trout and are able to return salmon alive and well) and in all rod fisheries prior to 16th June. They also require no worm fishing for salmon before 16th June. Other byelaws in Wales place controls on hook sizes and baits for brown trout. Most anglers are fully aware of these controls and comply with their requirements.
- 8.56 Other byelaws around Wales place other local requirements on angling methods, for example method restrictions on the rivers Dee Wye and Usk and in the upper Severn in Wales. All byelaws are explained to fishermen in the Guide for Anglers in Wales that is published each year⁷².
- 8.57 Most anglers are aware of these controls and comply with the requirements. Much of this is a result of the normal uptake of statutory controls by fishermen and by peer pressure. NRW carries out intelligence-led enforcement (targeted enforcement activity responding to a database of reported incidents) of all fisheries legislation and byelaws and will not hesitate to take appropriate enforcement action.
- 8.58 NRW is in the process of reviewing its organisational design and is proposing to extend the role of warranting of officers so that more may undertake routine fisheries enforcement work. This capacity will be further increased through briefing and training of other NRW field operatives so that they may provide intelligence on potentially illegal fisheries activity.
- 8.59 NRW has various powers under statute to take such enforcement action as it deems appropriate in order to protect our fisheries resource. Protection of fisheries resources is one of the highest priorities for NRW's fisheries work and there are more fisheries staff in our Environmental Crime teams than in other areas of fisheries work.

Conclusion: Effectiveness of the All Wales Byelaws

- 8.60 In conclusion: -

⁷² POL/26

- Survival of fish, released after capture, can be high and guarantees an opportunity to survive to contribute to spawning that would not otherwise exist;
- Reductions in hooking injuries and handling time can be achieved by controls on hooks and barbs. These are important benefits to support the proposed regulation change to promote C&R fishing. This is very evident in proposed controls for Flying-C type lures that are known to have a comparatively high risk of mortality from deep-hooking.
- The ban on worm fishing for salmon should minimise the number of fish hooked on this bait, which generally results in deep and sometimes fatal hooking.
- The proposals for seasonal use of shrimp and prawn will extend fishing opportunity whilst not increasing post-C&R mortality
- The slot limit will ensure that large, successful and fecund sea trout will survive to contribute to further spawnings

Overall, NRW considers that although there will be challenges, these measures are enforceable, as similar measures have been in the past.

9 The proportionality of the All Wales Byelaws to address the decline in stock.

9.1 Restoration of salmon and sea trout stocks to sustainable levels is a key NRW objective, not only in the delivery of its core fisheries duties, but also to secure the outcomes required by EU directives (the Water Framework Directive⁷³ and the Habitats Directive⁷⁴) and by other legislation focussed on securing the sustainable management of natural resources (such as the Environment (Wales) Act 2016⁷⁵). Recent statutory guidance to NRW from Welsh Government⁷⁶ reiterates that NRW must both:

- a) “pursue the principles of SMNR, in relation to Wales and,
- b) Apply the principles of SMNR in the exercise of its functions, so far as consistent with their proper exercise.”

9.2 It is therefore clear that the management of the natural resources of salmon and sea trout must be pursued in order to secure the range of benefits that can arise from them, including socioeconomic benefits and health and wellbeing objectives that can arise from outdoor recreation.

9.3 The statutory basis of underpinning legislation and formal guidance from Welsh Government clearly indicates that all possible approaches to the restoration of sustainability in our salmon and sea trout populations is warranted.

The legitimate aim of conserving salmonid stocks

9.4 The All Wales Byelaws are proportionate to the legitimate aim of conserving salmonid stocks.

9.5 The principle under which NRW manages migratory salmonids in Wales must be to protect, through best-practice scientific management and the ecosystem approach, the sustainability and productivity of wild salmon and sea trout stocks.

Consideration of alternative restrictions

⁷³ LEG/16

⁷⁴ LEG/9

⁷⁵ LEG/24

⁷⁶ POL/18

9.6 NRW has considered alternative and less restrictive measures as part of its overall assessment of the need for the All Wales Byelaws.

9.7 Alternatives considered include:

- a. Targeted closure of fisheries to ensure full escapement of fish to spawn
- b. Reduction or closure of net fisheries
- c. Banning of all bait fishing and/or further hook controls

Option	Strengths	Weaknesses
Current byelaw proposals	Addresses current stock deficits Maintains fisheries for recreation Maintains socioeconomic benefit Keeps anglers on the river banks Consistent methods proposed for salmon angling will be easily understood by anglers	Unpopular with some anglers Unpopular with net fishermen
Closure of fisheries in targeted rivers	Saves all fish and maximises spawner abundance Optimum time for initial stock recovery	Ends local socioeconomic benefit arising from fishing Dis-engagement with local fisheries interests
Targeted reduction or closure of net fisheries	Reduces or ends local net catches, increasing entry of fish to rivers Optimises socioeconomic benefit arising from annual run of fish Increases spawning escapement	Discriminates against net anglers Possible harm to local heritage operation
Ban on all bait fishing and/or further hook controls	Eliminates mortality of fish due to fishing with methods incompatible with safe C&R fishing Doesn't include fishery closure Potentially increases revenue for fisheries	Alienates part of the fishing community Potentially discriminatory against elderly and/or inform anglers

9.8 Compared to these alternatives NRW believes that current proposals are proportionate as they: -

- a. are appropriate for the scale of depletion evident in nearly all stocks;
- b. secure high survival of post-release salmon due to commensurate angling method controls;
- c. are targeted at specific sea trout stocks that are 'At Risk' or 'Probably at Risk';
- d. do not prevent people from fishing for salmon and sea trout in any river in Wales;
- e. do not prevent worm fishing (except for salmon and, in specified locations and times, sea trout);
- f. do not prevent worm fishing for other species.

Would less onerous restrictions suffice?

- 9.9 NRW notes that voluntary C&R fishing has been promoted across Wales for at least 10 years and that uptake of this has generally been good. However, the rate of return of sea trout is more variable and is generally poorer.
- 9.10 NRW notes and welcomes the fact that some netmen voluntarily return fish specifically the Teifi coracle fishery which collectively returned all salmon in 2017. This however was not evident in 2018, or across other fisheries. It would not be proportionate or reasonable to differentiate between the net and rod fisheries utilising statutory controls on one sector whilst allowing a voluntary approach in the other. Coracle fish has a heritage value. However fish stocks must first be sustainable before allowing fish to be taken by this traditional method.
- 9.11 The majority of anglers with whom NRW engage operate C&R fishing. Indeed in 2017, 798 anglers who reported catching salmon released all the salmon they caught, however 134 anglers killed all the salmon they caught.
- 9.12 The most recent catch figures from the 2017 returns indicate that anglers returned 2,783 (86%) of salmon, and 7,665 (77%) of the sea trout they caught. In the last five years the figures have risen from 60% of salmon returned to 86%, whilst sea trout C&R fishing has risen from 71% to 77%
- 9.13 The decline in most stocks has been ongoing over the past decade despite this response by anglers (and, in one season, by the Teifi coracle netmen who released all salmon that they caught).

- 9.14 Logic clearly indicates that if more fish are saved, the spawning resource will increase and lead to the production of greater numbers of juvenile fish. Improvements to habitat quality will be more effective if there are improving numbers of spawning fish to take advantage of this.
- 9.15 NRW considers that other less onerous measures suggested during the consultation process would be comparatively ineffective or inappropriate. In particular the potential use of (i) bag limits and carcass tags, and (ii) a programme of stocking is considered in paragraph 9.33 of this statement.
- 9.16 NRW's stock assessments for salmon and, more recently also for sea trout, are carried out annually on a catchment-specific basis and the outcome of these is considered for potential management response, also on a catchment-specific basis. The criticism that NRW is applying a single 'one size fits all' response is incorrect. The analysis of stock status reveals that all 21 principal salmon rivers in Wales were assessed either as 'at risk' or 'probably at risk' (of failing to achieve their management target by 2021). NRW is unaware of any issue that might mean that smaller non-principal salmon rivers (numbering around 10) around Wales are performing differently and therefore concluded that it was appropriate to include these in the proposed byelaw package.
- 9.17 NRW's assessments for sea trout stocks were different in that approximately two-thirds were in better condition and did not therefore warrant similar proposals to the other third that were deemed 'at risk' or 'probably at risk'. This has therefore resulted in the targeted approach featuring in our byelaw proposals.
- 9.18 The only exception to this is the River Usk which was narrowly classified as 'probably not at risk'. The juvenile salmon reductions were particularly marked on the Usk salmon stock and it was therefore concluded that a similar approach based on statutory C&R fishing should be applied there, but on a shorter timescale until the full implications of the reduction in the 2016 cohort of fish became fully apparent.
- 9.19 In following this approach, NRW is conscious that more restrictive approaches might be appropriate, for example the closure of rivers to salmon fishing in order to avoid residual post-release mortality. This more robust approach might be especially relevant on rivers assessed 'at risk' that are in ongoing decline, and in rivers classified as Special Areas of Conservation under the EU Habitats Directive, with salmon as a qualifying feature.

- 9.20 NRW is aware of and has considered examples derived from other jurisdictions, notably the Republic of Ireland, which shut their most poorly-performing rivers to all forms of angling.
- 9.21 NRW has however sought to identify the least intrusive measures necessary to address the problem of salmon and trout depletion whilst at the same time enabling, to the extent possible, the ability of anglers to engage in their sport.
- 9.22 To this end NRW considers that post release survival can be maximised through the mandatory use of angling lures and flies that are more conducive to post-release survival and by the proposed ban on use of worm bait.
- 9.23 A combination of statutory and voluntary measures have been in place for at least the past 20 years. Early season (prior to 16th June) statutory C&R has been in place for salmon angling and has been followed on all rivers by increasingly urgent messages seeking full uptake of C&R fishing by additional voluntary action.
- 9.24 Full statutory C&R fishing for salmon and sea trout at all times has been in place on the rivers Taff and Wye for the past 7 years. This has been in response to the tentative recovery of the Taff from industrial pollution, and the sharp decline in salmon stocks on the River Wye in the preceding period of approximately 20 years.
- 9.25 Despite these controls certain components of salmon stocks and some sea trout have continued to decline. This is complex and in the case of salmon it is the one sea-winter (grilse) component that has declined sharply. Larger multi sea-winter salmon, which were the specific target for protection by the National Salmon Byelaws have performed better and there is evidence that the decline has halted in some locations.
- 9.26 This provides evidence for the efficacy of C&R fishing that adds to the first principle, based on logic, that saving breeding fish is clearly an objective if future stock sustainability is a key objective of fisheries management.
- 9.27 Other less onerous measures that were suggested during the consultation process would be ineffective or inappropriate. In particular, two proposed measures are considered here: (i) bag limits and carcass tags, and (ii) programmes of stocking.

Ineffectiveness of measures such as bag limits and carcass tags

- 9.28 Bag limits or carcass tags may well be effective measures of controlling the numbers of fish killed where stocks can sustain some level of exploitation. However, virtually all salmon stocks in Wales, and many sea trout stocks, are 'at risk' or 'probably at risk' of failing their Management Objective and so are in deficit in terms of spawner or egg numbers (see for example Tables 7 and 9 of the Technical Case⁷⁷). In this respect, the byelaw proposals on these failing rivers equate to a Bag limit or carcass tag provision of 'zero'.
- 9.29 Where a surplus of fish – above the Management Target – is evident and sustainable harvesting of fish may be acceptable, then a carcass tagging scheme could offer an acceptable means of controlling exploitation. However, such schemes can be impracticable as they are often administratively difficult and costly.
- 9.30 Simulations have shown that a bag limit of one fish per angler (if all anglers who caught one fish in a season were to kill it) would equate to a C&R rate of approximately 60% in Wales - a lower rate than currently prevails on most rivers by voluntary means. So unless a stock could sustain a 40% kill rate, then even a single fish bag limit would be inappropriate.
- 9.31 Carcass tags offer the possibility of finer control on the numbers of fish killed and are used, for example, in Ireland to manage levels of angling exploitation ('Total Allowable Catch'). On the smaller river systems in Wales, it is likely that, for a carcass tagging scheme to operate, then (in order to ensure the necessary controls on kill levels) fewer tags may be available than anglers requesting them. The administration of tags in these cases (which, it has been suggested could operate through tag allocation following a lottery process), indeed on small river systems in particular, may prove too costly to be practicable and might be considered unethical by some.
- 9.32 A carcass tagging system already exists on the net fisheries in Wales as a byelaw requirement, but is not generally administered as a means of controlling exploitation but rather to deter the illegal take of fish).

⁷⁷ APP/4

Programme of stocking in lieu of or complementing the All Wales Byelaws

- 9.33 The issue of artificial rearing and stocking of salmon and sea trout as a means to address current low levels of stocks through supplementation has been frequently raised by some.
- 9.34 A full review of stocking and its impacts and potential risk was carried out by NRW in 2014 and the conclusion of the NRW Board was that all salmon and sea trout stocking in Wales should end. No further stocking schemes, other than those confirmed to be required for closely specified and targeted research and, in very extreme cases, restoration will be permitted.
- 9.35 In taking this decision NRW was mindful of growing concerns in the published scientific literature around the risks associated with stocking, and the significance of new WG policy and legislation emerging at that time centred upon the Sustainable Management of Natural Resources. The principles and risk were recognised for rivers designated as Special Areas of Conservation under the EC Habitats Directive⁷⁸ but extended under the same principle of risk avoidance to all salmon stocks and to sea trout stocks in Wales.
- 9.36 The Environment Agency came to a similar conclusion on the risks associated with stocking of salmon in rivers designated under the Habitats Directive in England.
- 9.37 The objective of NRW for management of salmon and sea trout stocks is the restoration and protection of sustainable and productive wild salmon and sea trout stocks in Wales.
- 9.38 Noting the concerns expressed by some to this decision, NRW hosted a workshop in September 2015 to which some of those representing a consensus opposing view were invited. The event included contributions from two recognised leading academic experts in the field (Professor Carlos Garcia de Leaniz and Professor Phil McGinnity). Their concluding remarks included:
- a. stocking does not increase catch or protect populations;
 - b. un-stocked rivers are not worse-off;
 - c. stocking is inherently risky;

⁷⁸ LEG/9

- d. stock resilience and fitness (“the ability to pass genes to the next generation”) are important considerations;
- e. NRW is not alone in considering this and that in many other cases stocking is being stopped;
- f. hatcheries are damaging; and
- g. there is an opportunity to brand all our stocks and fisheries in Wales as ‘natural’.

9.39 NRW noted at the time, and continues to contend that: -

- a. although there is no single study that absolutely replicates the management issues we seek to address, there is an increasing consensus that hatcheries do not achieve any meaningful outcome in the context of our management obligations
- b. contemporary publications support the thesis that stocking is unsuccessful as a strategy to improve stocks
- c. removing wild broodstock, with unknown spawning destinations, to supply an artificial rearing programme is damaging for a number of reasons, including the loss of wild spawning itself and the risk of damage to, or loss of, local adaptations
- d. the best technical advice is not to adopt a hatchery strategy when there is a viable wild stock present.

9.40 Two leading salmon conservation bodies have made recent statements concerning the imperative of protecting salmon stocks:

- a) a theme-based Special Session held at the annual meeting of NASCO in June 2017: ‘Understanding the risks and benefits of hatchery and stocking activities to wild Atlantic salmon populations’

The conclusions, recently published by NASCO⁷⁹ included the following:

⁷⁹ ACC/39

“ these are challenging times for the Atlantic salmon, not least because of the uncertainty associated with a changing climate. ICES advises that environmental and genetic adaptation can facilitate adjustment to changing environmental conditions if the rate of change in the environmental conditions does not exceed the capacity of the organism for genetic adaptation. Maintaining the genetic diversity present in the wild stocks is therefore vital and stocking programmes need to be carefully considered with that in mind.....

Given the substantial information presented at the Theme-based Special Session, the Steering Committee believes that if the genetic integrity of wild salmon is a management priority, stocking of hatchery fish should only be contemplated after careful evaluation of the risks and benefits and only after other alternatives have been considered. There should be a strong presumption against stocking for socio-political reasons.....”⁸⁰

- b) The International Union for the Conservation of Nature states that “There should be a presumption against stocking practices undertaken to enhance salmon and sea trout fisheries”⁸¹.

Socioeconomic impact of the All Wales Byelaws

9.41 NRW is conscious of the positive socioeconomic benefits arising from ongoing salmon and sea trout angling, often in rural parts of Wales. NRW has recently commissioned a review of socioeconomic benefit arising from fishing the rivers of Wales⁸² which indicates that £20m Gross Value Added (a measure of the value of goods and services produced in a sector of an economy) per annum and more than 700 FTE (full-time equivalent) jobs are supported. NRW is anxious that such benefits are protected so far as is commensurate with securing the savings in stocks required to reduce ongoing pressure on them. NRW has not therefore proposed to close any Welsh river to angling and will keep this under review as stocks continue to be annually assessed.

⁸⁰ ACC/39

⁸¹ ACC/43

⁸² ACC/7

9.42 NRW has responsibilities under the Equality Act 2010⁸³, specifically section 149, which came into force in April 2011. The Act seeks to ensure that: -

“...public authorities and those carrying out a public function consider how they can positively contribute to a fairer society in their day-to-day activities through paying due regard to eliminating unlawful discrimination, advancing equality of opportunity and fostering good relations.”

“The Regulations place duties on the devolved public sector, including Welsh Government, covering equality impact assessments, publishing and reviewing Strategic Equality Plans, engagement, pay differences, procurement, reporting arrangements and equality and employment information.”

9.43 NRW carried out an Impact assessment⁸⁴ and concluded: -

“Restriction of use of bait fishing might constrain previous lawful activity of some elderly and disabled anglers less able to use fly-fishing and spinning techniques.

However, the proposed restrictions are partial as they: (i) propose bait fishing on all salmon stocks and (ii) propose early season (prior to 1st May) prohibition on bait fishing for sea trout in defined rivers (thereafter bait fishing for sea trout would be permitted).

Overall therefore the proposals are for partial control and not full prohibition on bait fishing. We aim to amend the proposal for a bait ban (the use of shrimp and prawn) partly as a result of consideration in this equality assessment.”

And: -

“A large proportion of licence sales are concessionary sales to senior citizens and disabled citizens.

They are all currently able to use bait fishing for sea trout (and brown trout and non-salmonid fish) either all-season or after the 1st May (for sea trout) on specified rivers.

⁸³ LEG/31

⁸⁴ APP/30

Allowing bait fishing to continue for salmon is not sustainable.

Conclusion:

We have considered potential alteration of proposals using data from our rod licence sales system, but not currently by analysis of 'blue badge' holders amongst the angling community.

We are unaware of any groups amongst the net fishing community who might be affected by any of our proposals.

The proposals seek to control the use of tactics available to concessionary licence holders (the use of bait) and not to deprive the opportunity to continue fishing.

We therefore see no reason to offer a dispensation for an extended use of bait over and above that which would be offered under the proposals.”

- 9.44 NRW has therefore concluded, having considered its duties under the Equality Act 2010⁸⁵ and the provisions of the Equality Act 2010 more generally, that its proposals are appropriate and proportionate to meeting its legitimate aim (and indeed statutory duty) of protecting salmon and sea trout stocks.

Conclusion: Proportionality of implementation of both sets of byelaws

- 9.45 Most stocks of salmon and many stocks of sea trout are in ongoing decline having fallen below their management targets. (See evidence of Ian Davidson⁸⁶). The risk of further decline to lower abundance is considered high. Ongoing catch and kill fishing increases this risk by sustaining the ongoing depletion of spawning reserves and theoretically at least bringing stocks closer to a point of extirpation. At these levels, important genetic characteristics making local stocks fitter through adaptation may be reduced or even lost, making the following populations more vulnerable to environmental pressures.
- 9.46 The implementation of both sets of byelaws (nets and rods) which comprise the All Wales Byelaws is firstly about the need to regulate the take of fish in these fisheries

⁸⁵ LEG/31

⁸⁶ NRW/2 section 3

for conservation purposes and secondly to ensure a degree of equity between the fisheries in meeting these conservation requirements. The two sets of byelaws for nets and rods, though independent, are designed to be complementary, balancing the interests of both net and rod fishery sectors while addressing the underlying need to restore stocks to sustainable levels. The socio-economic benefits, for example, of favouring rod fisheries over net fisheries do not form part of this judgement. In terms of measures to protect vulnerable salmon stocks – the byelaw proposals seek a no kill policy on both fisheries. For sea trout, where stocks require it, the balance of regulatory measures proposed on the two fisheries is influenced partly by the observed difference in average size of fish taken by these fisheries – with the larger, more fecund sea trout more likely to be killed in the net fisheries. The proposed later start of net fishing seasons and the slot limit in the rod fishery are intended to save this important stock component.

- 9.47 The proposed duration of the All Wales Byelaws (10 years) would ensure (depending on the outcome of a mid-term review) protection of 2-3 Generations of fish, most of which in Wales have a generation time of 5 years. However, this period of implementation is out-of-step with systems operated by neighbouring jurisdictions (e.g. Scotland and Ireland) where management measures are reviewed and potentially adjusted each year in response to the results of annual stock assessments. In Wales (and England) the main constraint on introducing an annual system of assessment/management is a legal one (associated with the time required to consult on new byelaw proposals) rather than a limitation of the stock assessment process; stocks will, in any event, continue to be assessed annually to meet national and international obligations.
- 9.48 NRW is working with Cefas and the Environment Agency in seeking to develop and introduce an annual assessment/management process in the near term. This would ensure stocks could fall in and out of regulation in response to their annual status - a flexible approach more likely to be accepted by fisheries interests without compromising the protection of stocks.
- 9.49 Whilst it is vital to protect the important spawning resource of salmon and sea trout in all rivers targeted by the proposed new byelaws, this must happen alongside a range of initiatives to improve the environmental quality of the rivers. This range is essential if the rivers are to achieve optimum performance of the stocks, thus ensuring progress towards important targets under EU directives but, more importantly, restoration of the stocks to sustainable levels that can sustain

exploitation and support the range of associated socioeconomic activities and societal benefits.

10 Summary and conclusion

- 10.1 This statement, supported by those of my colleagues in NRW and Cefas, presents evidence on the current status of salmon and sea trout stocks in Wales and how to address the problem of their depletion.
- 10.2 Salmon stocks have been in decline for at least two decades and now 19 of the 20 salmon stocks wholly in Wales (and a further cross-border river) are 'At Risk' or 'Probably at Risk' of failing to achieve their management targets until at least 2022. Where salmon support river site designations under the Habitats Directive those 6 sites are in unfavourable condition (or are not yet classified).
- 10.3 More than half of Welsh sea trout stocks are also deemed 'At Risk' or 'Probably at Risk' and are in similar unsustainable condition.
- 10.4 Surveys of young salmon and trout in 2016 revealed a major failure in spawning success in the winter of 2015/16 that appears to be related to an extreme weather event. This has since been confirmed in several rivers following repeat surveys in 2017. The outcome of this will be potentially serious reductions in the current most common age class of Welsh adult salmon in 2019 to 2021, placing further pressure on the spawning reserve of fish. The outcome for sea trout is less certain but similar depletion is possible.
- 10.5 Together, most stocks are severely depleted and therefore unsustainable. They cannot support ongoing exploitation by net and rod fisheries if they are to return to a more favourable population status in future. Continued exploitation of stocks at current levels presents a manageable risk to their return to favourable population status in future.
- 10.6 Most anglers have responded well to ongoing encouragement by NRW and some fisheries bodies to practice conservation angling, releasing their catch alive and well. However some do not, and this can no longer be sustained.
- 10.7 For these natural resources to be managed sustainably, NRW considers that the proposed package of byelaw controls is essential.
- 10.8 Whilst the important spawning reserves are protected, NRW is committed to ongoing work to restore the quality of freshwater habitats. This is being done through a combination of regulation of activities that threaten our rivers with pollution, and the repair of damaged physical habitats. The legacy of barriers to migration that restrict

or prevent access of spawning fish to pristine habitats in the upper reaches of rivers persists, and the impact of poor land management continues to constrain ecological performance.

- 10.9 NRW considers that the All Wales Byelaws, in combination with other measures, are an essential means of addressing the urgent and severe problem of salmon and trout stock depletion in Wales.

Statement of Truth

10.1 I hereby declare that:

- I. This proof of evidence includes all the facts which I regard as being relevant to the opinions that I have expressed and that the inquiry's attention has been drawn to any matter which would affect the validity of that opinion;
- II. I believe the facts that I have stated in this proof of evidence are true and that the opinions I have expressed are correct; and
- III. I understand my duty to the inquiry to help it with matters within my expertise and I have complied with that duty.

Peter Gough

Principal Adviser (Fisheries)

Natural Resources Wales