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 2A

SUMMARY PROOF OF EVIDENCE

OF

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on behalf of
NATURAL RESOURCES WALES

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NATURAL RESOURCES WALES

1 Introduction

1.1 My name is Ian Davidson. I am the Senior Technical Advisor on Salmonids for Natural Resources Wales (NRW). I have worked for NRW and its predecessor bodies for 33 years and have been primarily involved in the monitoring and assessment of salmon and sea trout.

1.2. I have a BSc in Zoology and an MSc in Applied Hydrobiology.

2 Scope of evidence

2.1. My evidence explains how NRW has assessed the status of salmon and sea trout stocks in Wales, and how that assessment has informed its decision to promote the protective measures set out in the byelaw proposals. More specifically it:

2.1.1 describes the main types of fisheries monitoring data routinely collected by NRW for assessment purposes identifying what, in general terms, the patterns and trends in these data sets indicate about the health of these populations;

2.1.2 examines the use of Conservation Limits as a means of assessing salmon stocks and sea trout stocks in Wales;

2.1.3 explains why the use of Conservation Limits in the assessment of sea trout stocks in Wales is an improvement on the previous approach;

2.1.4 refers to the latest (i.e. 2017) assessments of Conservation Limit compliance for salmon and sea trout - a year-on from the NRW's Technical Case supporting the byelaw proposals– and examines what these latest assessments say about stock status; and

2.1.5 reviews the evidence base as outlined and sets out why NRW concludes that the status of many of the river stocks of salmon and sea trout in Wales is poor and at risk of further deterioration, and why, in conjunction with other remedial measures (e.g. to improve environmental quality), the additional protection provided by the proposed byelaws is necessary.

3. The evidence base for assessment of fish populations

3.1 Monitoring programmes for salmon and trout/sea trout undertaken by NRW, provide the evidence base to evaluate the status of fish stocks in Wales, and inform related management decision making. This includes consideration of historic data sets collected by bodies which preceded NRW, e.g. the Environment Agency (**EA**) and the National Rivers Authority (**NRA**).

3.2.1 These monitoring programmes focus on three key activities:

3.2.2 The collection, collation and reporting of rod and net catch statistics

3.2.3 Use of fish traps and automated fish counters to enumerate numbers of returning adult salmon and sea trout

3.2.4 Annual monitoring of the abundance and distribution of juvenile salmon and trout populations using electrofishing methods

The collection, collation and reporting of rod and net catch statistics*.*

3.3 These statistics are available for most rivers and coastal fisheries in Wales since 1951 and, in some cases, for much longer.

3.5 Provision of catch returns by net and rod fishermen is a statutory duty. Catch statistics for all net and rod fisheries in E&W are reported annually by the EA and NRW.

3.6 Catch data serve as indicators of stock abundance as well as providing information on the size/age composition of returning fish.

3.7 The time-series of catch records available are un-matched in the length of time they cover compared to other sources of fisheries data, and so catches provide invaluable insight into long-term trends.

3.8 Where reporting rates are known or can be estimated, correction factors have been applied to declared catches to attempt to account for under-reporting.

3.9 Incorporating these corrections, the time-series of 'all Wales' net and rod catches for salmon and sea trout indicate that:

3.9.1 For both species, while catches show considerable variation year-on-year, the overall pattern is one of progressive decline.

3.9.2 In the case of salmon, catches have reached a 40-year low in the last few years – marked by a rolling 3-year mean catch (nets and rods combined) of c.3,800 fish in 2013-2015, less than 20% of the maximum recorded at the start of the period .

3.9.3 For sea trout, catches in the last decade have also been among the lowest of the time-series, but the decline has been less pronounced than in salmon (c.35% of the maximum).

3.10 The ‘all Wales’ view of catch trends described reflects patterns of decline evident on many rivers. However, there are exceptions to this pattern, for example, improved rod catches of sea trout in recent years on a number of North Wales rivers e.g. Dyfi, Ogwen, Conwy, Clwyd, Dee. Catch information for individual rivers in Wales is provided in Annex 1 of my full Proof of Evidence.

3.11 In the case of salmon, a down-turn in catch since 2010 has occurred during a period when catches were already relatively poor, and so gives particular cause for concern. This decline can be seen within the rolling 10-year assessment period used to evaluate Conservation Limit compliance for the Technical Case (i.e. 2007-2016). Similarly, the same decline is encompassed within the latest (i.e. 2017) assessment.

Use of fish traps and automated fish counters for returning adult salmon and sea trout.

3.12 Fish trapping and counting activities are resource intensive and so limited to a few river systems. However, they collect some of the most detailed information available on the abundance and composition of returning stocks.

3.13 The focus of this examination has been the run data for salmon from the ‘counted’ rivers in Wales. On the Dee, additional information has been examined on changes in the sea age composition of returning salmon - based on scale readings from trap sampled fish.

3.14 This examination indicates:

3.14.1 Salmon counts from the three Welsh rivers with traps and counters, the Taff, Teifi and Dee, all exhibit similar patterns of recent decline comparable to those suggested by catch returns (this is also the case with salmon counts from a number of rain-fed systems in England – namely Tamar, Fowey, Lune, Kent – to which I refer in my full proof of evidence).

3.14.2 The counts on the Taff, Teifi and Dee were the lowest on record in 2017. In all three cases, this followed a period of almost year-on-year decline over the last decade, with little sign that this downward trend may be abating.

3.15 This and other evidence, for example (i) highly correlated time-series of catch and count data for both salmon and sea trout, and (ii) common patterns evident in sometimes disparate catch records collected over many years, strongly suggest that catch returns do provide meaningful indicators of abundance.

3.16 Regarding run composition, separate time-series of run estimates examined on the Dee for 1-sea winter (1SW) salmon or ‘grilse’ and multi-sea winter (MSW) salmon,

reveal contrasting patterns in the data, namely, a marked reduction in the grilse component of the Dee run, but some improvement in the return of MSW salmon.

3.17 For grilse, the Dee run has declined by more than 80% from a maximum 3-year mean of 5,400 fish in 1993-95 to a minimum of 860 fish in 2015-2017. The equivalent statistics for MSW salmon show an improvement in run of c50%, from a minimum of around 1,200 fish in 2000-2002 to 2,300 fish in 2011-2013.

3.18 Despite the improvement in numbers of MSW salmon, levels of egg deposition from both sea age groups have been insufficient to meet the Conservation Limit on the Dee.

3.19 This change in the contribution of 1SW and MSW fish to the salmon run on the Dee is also apparent on other monitored rivers in England and elsewhere. This may be part of a long-term cyclical pattern, for example, the ratio of 1SW:MSW salmon on the Dee in recent years has been similar to that 50 years ago when around 80% of the return was made up of MSW salmon. However, while we may be experiencing the trough of such a cycle at present, we cannot be certain that this is the case. Factors such as global warming - not so evident or potentially damaging 50 years ago may also be at play. The precautionary response is to take steps now to protect stocks and not to be complacent and expect a natural recovery which may take a decade or more to be realised, if at all.

3.20 Finally, most of the principal salmon rivers in Wales are grilse dominated – so marked reductions in grilse numbers are likely to be a significant causal factor in many Welsh rivers failing to meet their Conservation Limits.

Annual monitoring of abundance and distribution of juvenile salmon and trout populations using electrofishing methods:

3.21 Electrofishing surveys to assess the distribution and abundance of juvenile salmon and trout have been undertaken on most catchments in Wales - with the earliest data sets extending back about 30 years. Electrofishing surveys provide abundance estimates for fry and parr stages of salmon and trout, but are not comparable to adult assessments. (Although electrofishing data can be used to identify and address underperformance and potential environmental pressures).

3.22 Results from electrofishing survey programmes are summarised, catchment by catchment, up to 2017, in Annex 1 to my full proof of evidence and in the Technical Case[1].

[1] **APP/4.**

3.23 The 2016 data show a marked and widespread reduction in abundance of salmon and trout fry (and to a lesser extent parr) across a number of catchments in Wales. This was more pronounced in some catchments (e.g. Usk, Tywi, Conwy and Clwyd) than others (e.g. Wye, Teifi and Dee); for example a 94-100% reduction in salmon fry recruitment in the former catchments compared to a 51-56% reduction in the latter group.

3.24 While levels of recruitment in 2017 were better, this leaves significant cause for concern about numbers of adult salmon returning from the 2016 year-class – particularly on the worst affected rivers.

3.25 The 2016 observations coincided with a period of extreme weather in the winter of 2015 (in part, at least, linked to 'Storm Desmond') producing, on some river systems, record high flows and river temperatures. Such extreme conditions, occurring at a time when adult fish (the parents of fry hatched in 2016) would have been spawning or preparing to spawn, have been identified as possible causes of recruitment failure.

3.26 Given the majority of rivers in Wales have recently seen levels of salmon spawning/egg deposition well below Conservation Limits this will have left populations less resilient to the impacts of adverse episodic events such as the extreme winter weather conditions of 2015/16.

3.27 All these factors have implications for the future vulnerability and status of salmon (and trout/sea trout) stocks in Wales and the wider southern Atlantic area - in view of climate change scenarios and other environmental pressures.

4. The use of Conservation Limits as a means of assessing salmon stocks and sea trout stocks in Wales

4.1 Under a Ministerial Direction in 1998, NRW and the EA are required to set and use Conservation Limits to assess stocks annually on 64 principal salmon rivers in E&W.

4.2 The Conservation Limits derived for all 'principal salmon rivers' in E&W have been based on modelled stock and recruitment curves which relate spawner or egg numbers to smolt output. Stock and recruitment curves have been developed from river-specific measures of the extent and quality of freshwater habitat. They also incorporate information from a stock and recruitment relationship produced from long-term monitoring data collected on the River Bush, N. Ireland.

4.3 Conservation Limits serve as a 'limit' reference point below which further reductions in spawner numbers are likely to result in a significant fall-off in smolt production.

Compliance procedures require that spawning levels are above the Conservation Limit in four years out of five, (i.e. 80% of the time) for a stock to meet its 'Management Objective' and the associated 'Management Target' (a 'target' reference point) defines the average stock level required to achieve this.

4.4 The compliance procedure ensures there is a high probability that stocks are exceeding their Conservation Limit – a precautionary approach in-line with the recommendations of ICES and NASCO.

4.5 For each river, estimates are produced annually. In most cases these estimates are derived from rod catches and assumed angling exploitation rates. Other information, for example relating to the size and sea age composition of returning salmon, catch declaration rates and the egg contribution of rod-released fish is also built into spawner/egg estimates.

4.6 Compliance is tested each year using a statistical procedure which fits a trend line to the latest 10-year time-series of estimates for each river and examines the position of that trend line relative to the Conservation Limit.

4.7 The position of the trend line and its confidence limits in relation to the Conservation Limit determines the risk status of the stock in any one year. This status is normally reported for the current assessment year and projected (by extrapolation of the trend line) 5-years into the future.

4.8 The resulting (5-year projected) compliance status for each river is examined annually against a 'Decision Structure' (DS). This provides a standard and consistent decision making process to guide management actions for the regulation of exploitation of stocks in both the rod and net fisheries.

5 Conservation Limits and the assessment of sea trout in Wales – the new procedures developed and applied since 2016:

5.1 Unlike salmon, no established methods of setting Conservation Limits or similar 'Biological Reference Points' have been available for sea trout. The need to develop such methods has been widely recognised, and an ICES Working Group has recently been established with this aim. This group is set to report in 2019.

5.2 In the absence of stock-based reference points for sea trout – NRW and the EA have applied a fishery- based assessment to each of the principal sea trout rivers. This assessment is based on trends in angling catch per unit effort data ('catch per day').

5.3 However, this method uses a shifting 10-year reference period which may not reflect a biological optimum, and could, in a prolonged period of low stock levels/poor fishery performance result in a favourable assessment of stocks well below carrying capacity.

5.4 The 'risk' classification associated with this assessment, while mimicking that used in salmon Conservation Limit compliance, has no comparable meaning and provides no biological information which might help determine appropriate remedial measures.

5.5 To address this, NRW has developed a stock-based Conservation Limit approach to assessing sea trout stocks. This method was applied for the first time in 2016. It utilises angling catch data to derive run and egg deposition estimates for sea trout in much the same way as in Conservation Limit compliance procedures for salmon. These catch derived estimates are used to generate stock and recruitment relationships for individual river stocks of sea trout, deriving from these relationships, reference points that are broadly equivalent to the Conservation Limits and Management Targets used in salmon assessment, and which allow use of the same trend-based statistical compliance procedures to assess the 'risk' status of the stock.

5.6 Unlike the fishery-based method; this stock-based assessment defines a reference point with biological meaning. Procedures used to derive the Conservation Limit and assess compliance are similar or identical to those used in salmon. That includes use of the same 'risk' classification along with the facility - through the identification of average spawner or egg shortfalls – to better target regulatory action.

6. What the latest (2017) assessments of Conservation Limit compliance for salmon and sea trout - a year-on from NRW's Technical Case say about stock status.

6.1 The details of these assessments are set out in the full proof of evidence and were provided to Local Fisheries Groups in summer 2018.

6.2 For the principal salmon rivers in Wales there is little change in the pattern of projected risk status since the Technical Case. The exceptions are an improvement on the Dyfi ('at risk' to 'probably at risk') and a decline on the Dwyfawr ('probably at risk' to 'at risk).

6.3 Extending this comparison back to the 2015, 2014 and 2013 assessments reveals that, in all these years, salmon stocks on the great majority of rivers in Wales have been classified as either 'at risk' or 'probably at risk', with, in any one year, only 2 or 3 rivers

achieving the more favourable classification of ‘probably not at risk’ (and none considered ‘not at risk’).

6.4 For sea trout the changes in projected risk status between 2016 and 2017 are more extensive - with fewer rivers in the ‘at risk’ class in 2017 (7 compared to 10), but more in the ‘probably at risk’ class (16 compared to 7). Six rivers have seen an improvement in risk status, of which three have moved into ‘probably not at risk’ (Severn and Artro) or ‘not at risk’ classes (Ogwen). The remainder (Rhymney, Aeron and Ystwyth) are all now classed as ‘probably at risk’.

6.5 The overall conclusion from these assessments is that individual salmon and sea trout stocks in Wales remain at least as vulnerable in 2017 as when NRW developed its Technical Case to support the proposed Byelaws.

7. Why NRW concludes that the additional protection provided by the proposed byelaws is necessary.

7.1 For both salmon and sea trout, the evidence of both (i) general patterns and trends in data collected (catch statistics; counts of returning adults; and juvenile electrofishing data) and (ii) the results of Conservation Limit compliance assessment, is consistent with the conclusion that most salmon and many sea trout stocks in Wales are in a depleted state. This is supported by the latest 2017 data sets.

7.2 For salmon, the great majority of river stocks have been classified in the poorest risk classes (‘at risk’ and ‘probably at risk’) in (at least) each of the last 5 years. In-line with the Decision Structure, this triggers the need to seek remedial action through management of the fisheries.

7.3 For sea trout, Conservation Limit compliance assessment also indicates that many stocks are in the poorest risk classes. However as the assessment procedures are new, and subject to additional scrutiny and possible further development, the byelaws proposals in this case stop short of the full C&R measures recommended for salmon.

8 Conclusions

8.1 I have examined the evidence base used by NRW to assess the status of salmon and sea trout stocks in Wales – including the latest results for 2017.

8.2 The patterns and trends in the main types of fisheries monitoring data routinely collected by NRW for assessment purposes (‘all Wales’ net and rod catch statistics; counts of returning adults on three rivers in Wales; and juvenile electrofishing data)

indicate that catches of both salmon and sea trout have declined progressively over the last 40 years, and are now at (salmon) or close to (sea trout) the lowest on record.

8.3 A downturn in salmon catches since 2010 is mirrored by salmon counts on the Taff, Teifi and Dee (and is evident on other counted rivers in England). Salmon counts on all three Welsh rivers in 2017 were the lowest recorded and continue a trend in decline which shows little sign of abating.

8.4 Trapping data from the Dee and elsewhere indicates that this downturn has been driven by a sharp decline in the return of grilse. In part this is being compensated for by improved runs of MSW salmon; however, as most of the principal salmon rivers in Wales are grilse-dominated this is likely to be a significant causal factor in rivers failing to meet Conservation Limits.

8.5 Electrofishing surveys have identified widespread reductions in the abundance of salmon and trout fry (and to a lesser extent parr) across a number of rivers in Wales in 2016. Similar observations have been made elsewhere, and it is likely that this failure of recruitment was linked to extreme weather conditions in the winter of 2015, as well as to low levels of spawning. Investigations into this event are ongoing, but poor recruitment of the 2016 year class is likely to have consequences for adult returns in 3-5 years' time, particularly on the worst affected rivers.

8.6 The use of Conservation Limits as NRW's main approach to the assessment of salmon stocks and (more recently) sea trout stocks in Wales is appropriate. The use of CLs in relation to sea trout is an improvement on the previous fishery-based assessment.

8.7 The latest assessments for compliance with Conservation Limits indicate little positive change in the status of salmon or sea trout stocks in 2017 compared to the previous years' assessment, and deterioration on a number of rivers. This, coupled with the overview of catches, counts and juvenile performance outlined above provides a coherent picture of most salmon and many sea trout stocks in Wales remaining in a depleted state, and confirms that the protection offered by the proposed byelaws is still required.