

Salmon stock performance in Wales 2019

1. Introduction

- This report examines salmon stock performance on the 23 principal salmon rivers in Wales for 2019 (including the border rivers Severn, Wye and Dee) based on compliance with Conservation Limits. Provisional results for each of these rivers are given in Tables 1 and 2 and Figs 2 and 3.
- Under Ministerial Direction, each of these 23 rivers (alongside 40 rivers in England - excluding the above border rivers) (i) have produced Salmon Action Plans; (ii) assess and report on compliance with Conservation Limits annually and (iii) utilise the latter in reviewing Net Limitation Orders and byelaws.
- This report fulfils the second of these requirements and informs the third; i.e. it serves to assess the conservation status of individual river stocks and helps to ensure that Natural Resources Wales has appropriate fisheries management measures in place. The latter principally take the form of voluntary or mandatory controls on exploitation by net and rod fisheries as guided by the Decision Structure (Appendix II).
- This is also a requirement under Ministerial Direction which, aside from informing domestic fisheries management, fulfils reporting obligations to ICES (the International Council for the Exploration of the Sea) and NASCO (North Atlantic Salmon Conservation Organisation) for the purposes of salmon stock assessment at the North Atlantic scale. This is used to help regulate international fisheries in Greenland and the Faroes and for the provision of wider management advice, including to UK governments.
- A more comprehensive annual report on the status of salmon stocks and fisheries in England and Wales - including compliance with Conservation Limits – has been produced jointly by Cefas, the Environment Agency and Natural Resources Wales; see:

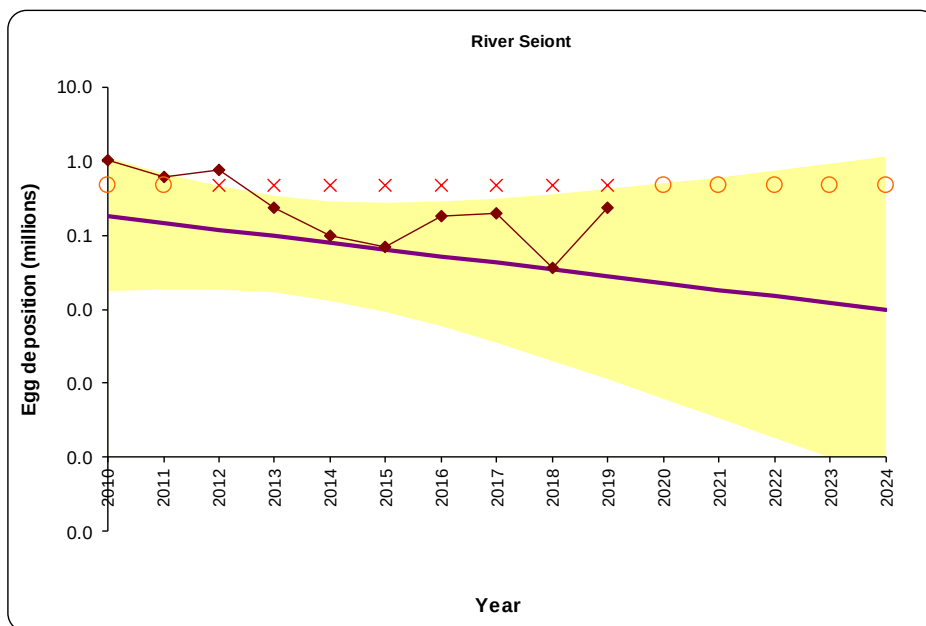
<https://www.gov.uk/government/publications/assessment-of-salmon-stocks-and-fisheries-in-england-and-wales-in-2018>

<https://www.gov.uk/government/publications/assessment-of-salmon-stocks-and-fisheries-in-england-and-wales-background-report-2018>

2. Conservation Limits and compliance assessment

- Conservation Limits (CLs) are based on estimates of the salmon producing capacity of individual catchments. They are expressed in terms of egg deposition levels (Table 1) and are set to help ensure that adequate numbers of fish go on to spawn.
- Compliance assessment involves:
 - (i) Estimating the numbers of salmon returning each year and their likely egg contribution. On most rivers these estimates are based on rod catches – except where the operation of fish traps or counters allows more direct enumeration of the returning stock.
 - (ii) Applying a formal (trend-based) statistical compliance method to assess the status of individual river stocks against their CLs. The latter process is designed to test whether the ‘Management Objective’ has been achieved; i.e. that stocks meet or exceed their CL four years out of five, in the long-term.
- Natural fluctuations in spawner and egg numbers mean that, on average, stocks must be some way above the CL in order to achieve the Management Objective. This average stock level equates to an additional layer of protection and is indicated by the Management Target (MT). *[The MT - as estimated for each principal river in Table 1 - is calculated from the latest 10-year time-series of egg figures; as such, although the MT may be presented as a fixed value, it will change a little each year with variations in egg numbers.]*
- The trend-based compliance process is carried out annually on the latest 10-year time-series of egg deposition estimates (ending with the current year) and includes projection of the fitted linear trend line 5 years into the future. *[Time-series of egg deposition estimates from 1994 onward – including the last 10 years - are shown for all principal salmon rivers in Appendix I.]*
- Fig 1 shows an example of the graphical output associated with this procedure - in this case for the River Seiont. The filled-in connected symbols indicate annual egg deposition estimates. The (off-set) linear trend line fitted to these estimates includes a (yellow) band of uncertainty. The horizontal line – in this case signified by ‘O’ and ‘X’ symbols - represents the CL.

Fig 1 Trend-based CL compliance graph for salmon on the River Seiont: 2019 assessment.



- The position of the trend line and its band of uncertainty relative to the CL is used to classify the compliance or 'risk' status of the river stock. Stocks which are statistically 'passing' or 'failing' their Management Objective (i.e. there is a greater than ~95% chance they are in one of these categories) are classed as 'not at risk' or 'at risk', respectively. The 'X' symbols on the CL line in Fig 1 indicate years where the Seiont stock is classified as 'at risk' – i.e. where the yellow uncertainty band falls below the CL line. This includes the current year (2019).
- River stocks in an intermediate position are classified as either 'probably not at risk' or 'probably at risk' – in both cases indicated by an 'O' symbol on the CL line. Here the yellow uncertainty band will overlap the CL line in the year concerned, and the trend line (representing the 50%tile) will either be above the CL line – with the stock classified as 'probably not at risk', or below – with the stock classified as 'probably at risk'. In the Seiont example in Fig 1, the 'O' symbol on the CL line always indicates a 'probably at risk' classification – including the projected status 5 years into the future (2024).
- In applying the Decision Structure, it is the compliance or 'risk' status projected 5 years into the future which is the most important performance measure, as well as the upward or downward trend in egg numbers. These statistics, along with compliance status in the current year and angling catch-and-release levels, are summarised in Table 1. Risk status maps for all the principal rivers in Wales are given for the current year (2019) and 5-year projection (2024) in Figs 2 and 3, respectively.
- Table 2 ranks the 23 principal salmon rivers to help characterise the vulnerability of stocks across Wales. Firstly, river stocks have been ranked by their risk status projected 5 years into the future (2024). Secondly, within each risk status grouping, rivers are ranked by the strength of negative trend in the latest 10 year-time series of egg deposition

estimates. Finally, within the latter groupings, stocks are ranked by the % egg shortfall/surplus against the Management Target based on average egg deposition over the last 5-years.

3. Management response

- In line with the Decision Structure, steps should be taken to significantly reduce or even eliminate net and rod fishery exploitation (i.e. the numbers of fish killed) on those rivers projected to be “at risk” or “probably at risk” in 5 years time (i.e. 2024 in the current assessment). Where possible (principally on rod fisheries), voluntary measures to control exploitation should be promoted in the first instance before considering mandatory action. Timely intervention to protect stocks is particularly important on the SAC rivers for Atlantic salmon (namely: Wye, Usk, Teifi, Mawddach, Gwyrfa and Dee).
- For rivers which have been in the “not at risk” category for 5 consecutive years, consideration should be given to relaxing fishing controls - including on net fisheries, where these exist.
- Recovering rivers should be considered as “at risk” unless assessment information is available and indicates otherwise. C&R levels of 100% should be implemented at the same time as working on the necessary environmental improvements.
- Water Framework Directive (WFD) Good Ecological Status (GES) assessments for salmon (where available) for catchment water bodies should be considered alongside CL compliance results and other sources of evidence as part of the management decision making process.

Table 1 Angling catch-and-release statistics, latest 10-year trends in egg numbers and CL compliance status in the current year (2019) and projected in 5 years time (2024) for the 23 principal salmon rivers in Wales.

	Accessible wetted area (m2)	Conservation Limit Eggs (millions)	Management Target Eggs (millions)	% Rod released:					Current compliance			Trend
				2015	2016	2017	2018	2019	2019	2024		
River Severn	8,980,737	12.85	15.90	72.4	77.8	76.6	80.9	93.1	Prob at risk	Prob at risk	Uncertain	-
Wye	17,210,439	38.57	49.53	99.6	100.0	98.5	100.0	99.6	Prob at risk	Prob at risk	Uncertain	-
Usk	4,070,931	10.11	15.70	83.0	81.8	90.1	96.9	91.2	Prob at risk	Prob at risk	Uncertain	-
Taff & Ely	1,457,195	3.19	3.49	100.0	100.0	100.0	50.0	63.6	At risk	At risk	Uncertain	--
Ogmore	612,070	1.10	1.38	100.0	95.2	94.4	100.0	100.0	At risk	At risk	Uncertain	---
Tawe	878,493	1.85	2.32	76.9	76.1	84.0	70.6	84.2	At risk	At risk	Down	---
Tywi	5,000,722	11.30	15.50	60.4	59.0	70.8	69.4	59.7	At risk	At risk	Uncertain	---
Taf	901,208	1.70	2.70	69.2	50.0	53.7	82.1	60.7	At risk	At risk	Down	---
E&W Cleddau	866,130	1.55	1.74	64.3	80.0	64.4	62.5	82.6	At risk	At risk	Uncertain	---
NeVERN	185,530	0.48	0.62	85.0	75.0	85.7	100.0	100.0	At risk	At risk	Uncertain	---
Teifi	3,259,156	8.65	11.42	62.1	66.1	71.6	85.1	71.8	At risk	At risk	Down	---
Rheidol	306,345	0.68	0.80	88.9	100.0	100.0	100.0	100.0	At risk	At risk	Uncertain	--
Dyfi	1,791,306	4.21	5.41	71.8	72.9	64.2	69.8	69.2	At risk	At risk	Uncertain	--
Dysyni#	314,883	0.68	0.73	75.0	80.0	100.0	100.0	100.0	Prob at risk	Prob at risk	Uncertain	+
Mawddach	566,610	1.37	2.02	65.9	68.4	84.7	79.3	88.1	Prob at risk	Prob at risk	Uncertain	--
Dwyrhyd#	92,400	0.19	0.26	50.0	0.0	66.7	100.0	0.0	At risk	Prob at risk	Uncertain	--
Glaslyn	250,122	0.48	0.66	81.5	78.6	87.5	50.0	90.9	At risk	Prob at risk	Uncertain	--
Dwyfawr#	333,101	0.86	1.02	25.0	77.8	0.0	100.0	77.8	At risk	Prob at risk	Uncertain	--
Seiont	210,534	0.48	0.76	50.0	33.3	33.3	100.0	60.0	At risk	Prob at risk	Uncertain	--
Ogwen	239,027	0.87	1.56	52.9	46.7	64.9	63.0	82.5	Prob at risk	Prob at risk	Uncertain	-
Conwy	630,101	1.17	1.89	66.2	70.8	84.0	91.3	92.4	Prob at risk	Prob at risk	Uncertain	--
Clwyd	839,231	1.99	3.34	100.0	83.3	90.0	80.0	100.0	At risk	At risk	Uncertain	---
Dee	6,170,351	15.30	17.41	86.3	86.3	90.6	94.4	93.8	At risk	At risk	Uncertain	---

Mean rod catch <20 (1994-2013)

Trend:	p<0.05	---
	p<0.10	--
	0.10<=p<0.30	--
	0.30<=p<0.50	-
	0.70=>p>0.50	+
	0.90=>p>0.70	++
	p>0.90	+++
	p>0.95	+++

Fig 2 Main salmon rivers in Wales: Risk status 2019

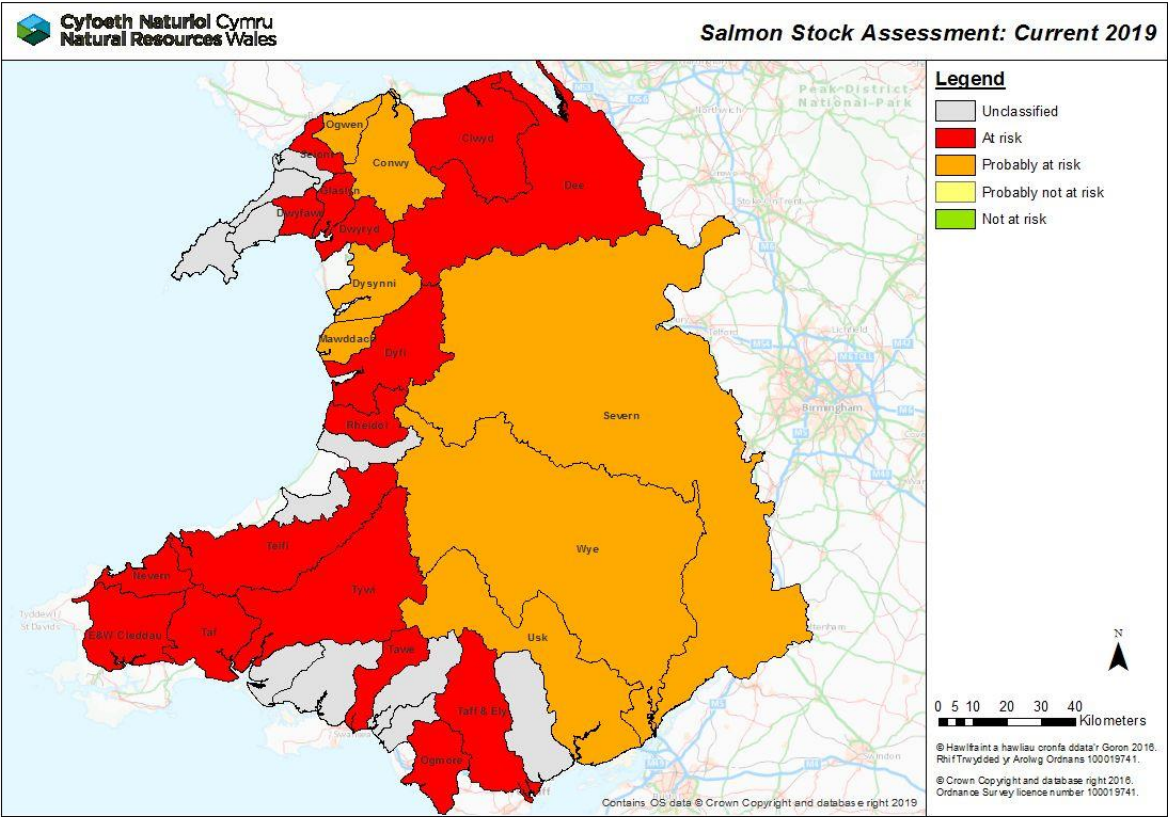


Fig 3 Main salmon rivers in Wales: Projected risk status 2024

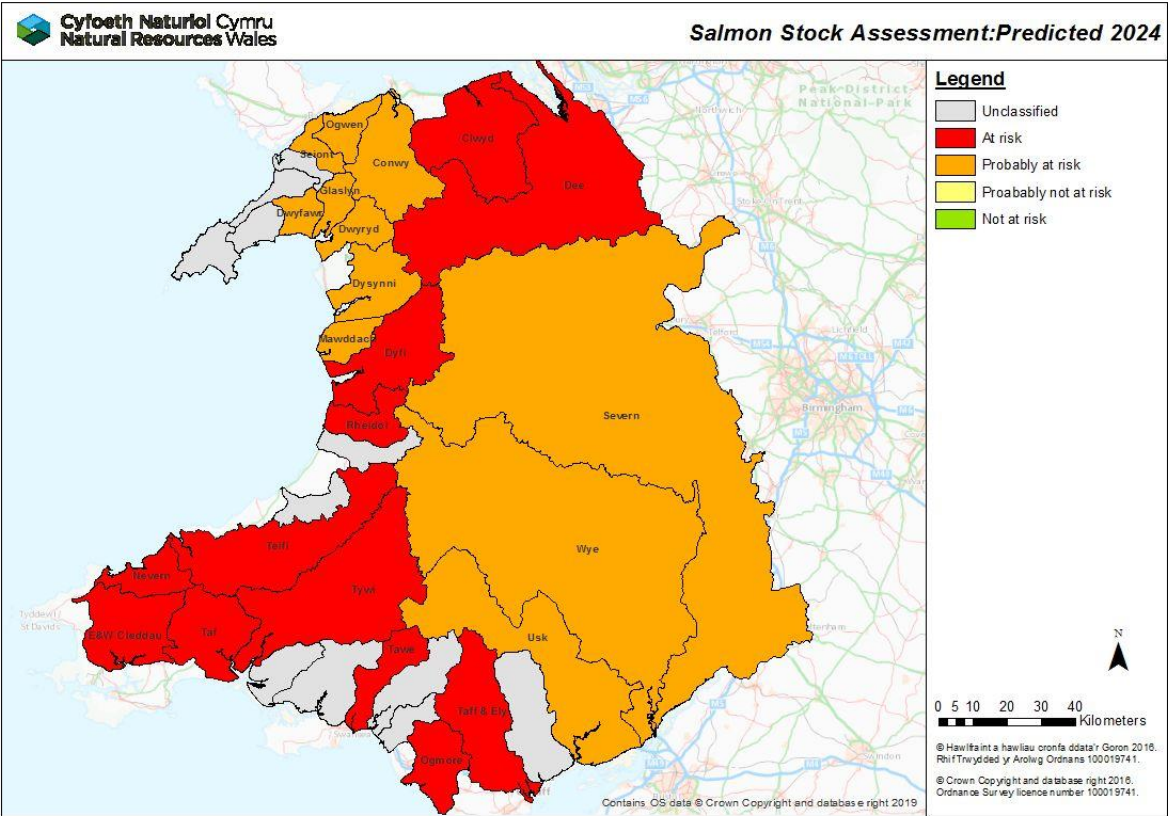


Table 2 Overview of salmon stock status: 2019 assessment

River Risk' status:
2024 Trend *Egg deficit/surplus on
Management Target (%)

Tawe		At risk	---	-84.7
Teifi	#	At risk	---	-79.0
Taf	#	At risk	---	-69.8
Clwyd		At risk	---	-88.4
Ogmore		At risk	---	-86.0
E&W Cleddau	#	At risk	---	-73.9
NeVERN	#	At risk	---	-56.0
Tywi	#	At risk	---	-54.2
Dee		At risk	---	-44.6
Rheidol		At risk	--	-87.7
Taff & Ely		At risk	--	-84.2
Dyfi	#	At risk	--	-68.1
Dwyfawr		Prob at risk	--	-89.3
Seiont		Prob at risk	--	-84.7
Dwryrd	#	Prob at risk	--	-58.3
Glaslyn	#	Prob at risk	--	-47.3
Mawddach	#	Prob at risk	--	-17.4
Conwy	#	Prob at risk	--	-9.0
Wye		Prob at risk	-	-44.4
Severn	##	Prob at risk	-	-32.1
Ogwen		Prob at risk	-	-19.9
Usk		Prob at risk	-	-16.7
Dysinni	#	Prob at risk	+	-88.0

Stock vulnerability

High

Low

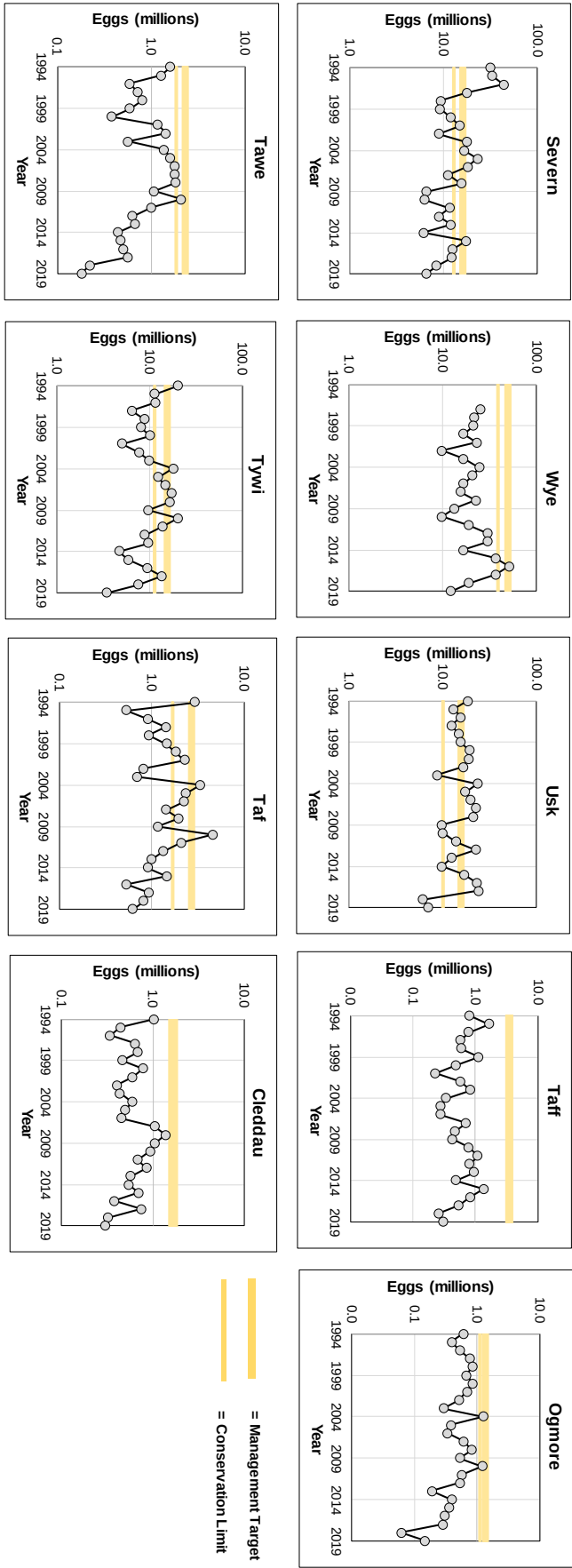
Trend:	
p<0.05	---
p<0.10	--
0.10<=p<0.30	-
0.30<=p<0.50	+
0.70=>p>0.50	++
0.90=>p>0.70	+++
p>0.90	+++
p>0.95	+++

Review of Net Limitation
Order 2017
England lead on fisheries
regulation

* Egg deficit/surplus based on
5-year mean 2015-2019

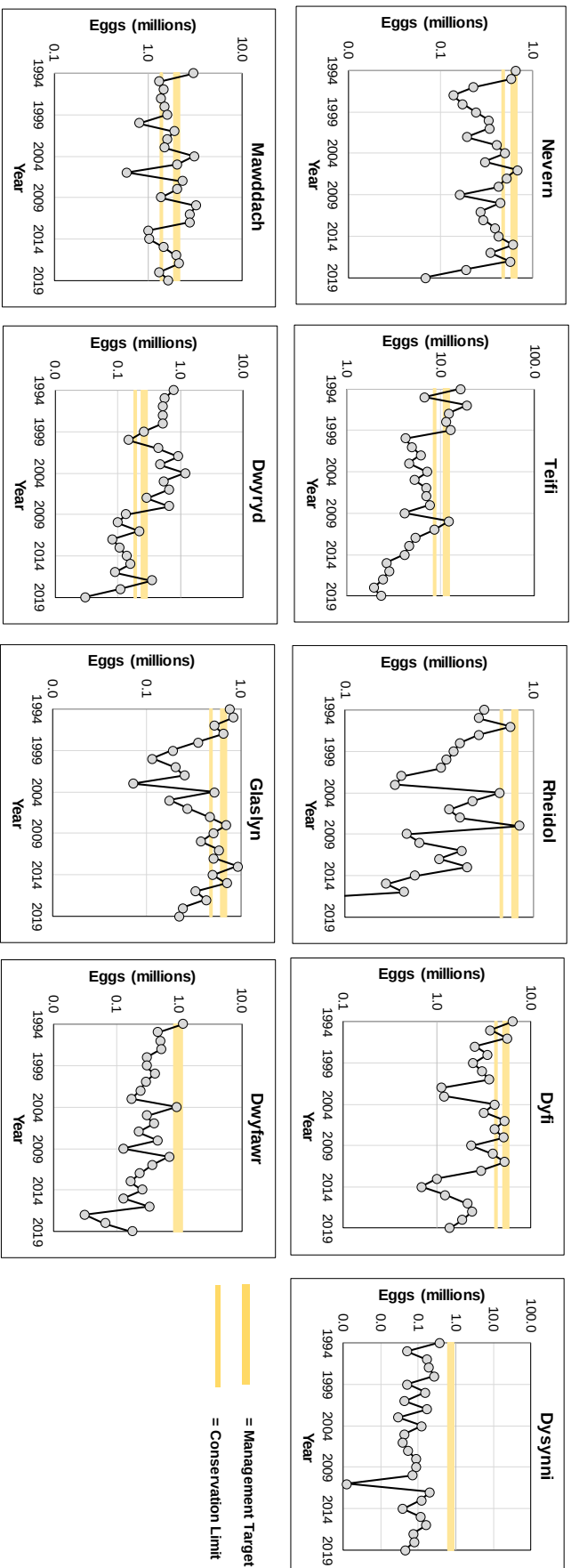
Appendix I Egg deposition estimates for the 23 principal salmon rivers in Wales, 1994-2019

a. River Severn to St. David's Head

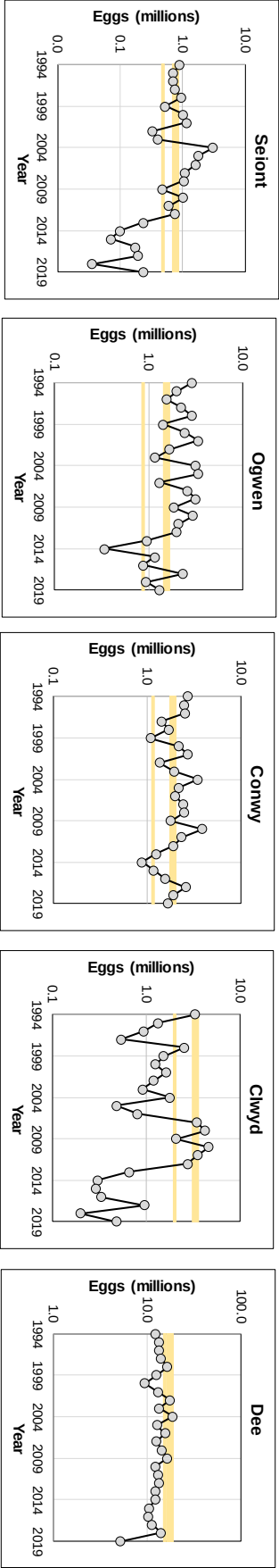


Appendix I Egg deposition estimates for the 23 principal salmon rivers in Wales, 1994-2019 (contd.)

b. St. David's Head to Lleyn Peninsula



Appendix I Egg deposition estimates for the 33 principal salmon rivers in Wales, 1994-2019 (contd.) **C. Lleyn Peninsula to River Dee**



= Management Target
 = Conservation Limit

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

