

# Annex 5

## Assessment of management options

This Annex contains the details of the assessments made on the impact to the stock of each of the proposals for the management of the rivers Usk and Wye. Explanations of how each assessment was made are given for each proposal.

Assessments were made using licence returns for the Usk, and a mixture of licence and owner returns for the Wye, as appropriate. Details of which source is used for the Wye calculations is given below.

The mortality rate of 20% was used to estimate the loss to stock of fish after they have been returned to the water. This rate includes an underlying natural mortality of 10%.

All calculations, aside from those on catch and release, assume 100% C&R of salmon.

## River Usk - catch and release for salmon and sea trout.

Gain to the stock from proposed measures:

1. 100% C&R salmon – approximately 46 fish
2. C&R before 1<sup>st</sup> May for sea trout – approximately 1 fish
3. 100% C&R sea trout – approximately 11 fish

In assessing the impact of catch and release measures on the stock, the assumption has been made of a return to a high level of voluntary release. On the Usk, the 5 year average prior to mandatory catch and release being brought in at the start of 2020 has been used. Using the average rod catch, the loss to the stock under voluntary (20% post release mortality plus the number killed) and mandatory (20% post release mortality) was calculated; the difference between the two being the gain to the stock from imposing mandatory catch and release measures.

Measure	Average rod catch 2015-2019	Average % released 2015-2019 (voluntary)	Average % killed 2015-2019	Predicted number released	Predicted number killed	Loss to stock under voluntary C&R (20% mortality plus number killed)	Loss to stock under mandatory C&R (20% mortality)	Difference in loss between voluntary and mandatory
Salmon 100% C&R	414	86	14	356.0	58.0	129.2	82.8	46.4
Sea trout C&R pre 1 <sup>st</sup> May	14	93	7	13.0	1.0	3.6	2.8	0.8
Sea trout 100% C&R	99	86	14	85.1	13.9	30.9	19.8	11.1

## River Usk - extend prawn/shrimp fishing season to 1<sup>st</sup> September to 17<sup>th</sup> October (currently 1<sup>st</sup> September to 15<sup>th</sup> September).

### Additional loss to the stock from proposed measures – between 1 and 2 fish

To determine the loss to the stock, the average number of fish caught on bait in September (2015-2019) was calculated. An estimated 20% of these would die post-release; the loss to the stock under the current measures. The potential catch (if the season was extended from 2 weeks to 5 weeks) was calculated and the associated loss to the stock under these measures; the difference between the two being the additional loss to the stock from increasing the prawn/shrimp fishing season.

In assessing the impact on the salmon stock of increasing the prawn/shrimp fishing season the assumption has been used that effort for bait fishing would remain relatively consistent, with no increased uptake of prawn/shrimp fishing due to relaxing the measures. As such, these assessments may represent an underestimate of potential impact.

Year	Fish reported caught with bait in September	Loss to stock under current measures	Potential catch if season extended	Loss to stock under proposed measures	Difference in loss between current and proposed measures
2015	11	2.2	27.5	5.5	3.3
2016	1	0.2	2.5	0.5	0.3
2017	12	2.4	30	6.0	3.6
2018	0	0.0	0	0.0	0.0
2019	3	0.6	7.5	1.5	0.9
<b>Average</b>	<b>5.4</b>	<b>1.1</b>	<b>13.5</b>	<b>2.7</b>	<b>1.6</b>

## River Usk - ban on shrimp fishing for salmon.

### Gain to the stock from proposed measures – approximately 1 fish

To determine the stock saving, the average number of fish caught by bait (2015-2019) was calculated. An estimated 20% of these would die post-release, therefore, that 20% of the catch would be saved by banning shrimp or prawn fishing. Again, the assumption has been used that effort for fly fishing and spinning would remain relatively consistent, and no account is taken of any switch in preference if bait fishing was not available.

Year	Fish reported as caught with bait in September	Number fish lost after post-release mortality
2015	11	2.2
2016	1	0.2
2017	12	2.4
2018	0	0.0
2019	3	0.6
<b>Average</b>	<b>5.4</b>	<b>1.1</b>

## River Usk - bring forward start of spinning season to 3<sup>rd</sup> March (currently 1<sup>st</sup> June).

### Additional loss to the stock from proposed measures – approximately 9 fish

To determine the loss to the stock, an estimate is needed of the number of fish that would be caught by spinning between 3<sup>rd</sup> March and 31<sup>st</sup> May.

The average number of fish caught on fly and by spinning was calculated (2015 to 2019); and a ratio of fly:spin determined. June was used to determine the ratios for Spring running fish, rather than an average for the whole season. The ratio was then applied to the average catch of salmon (2015 to 2019) caught between 3<sup>rd</sup> March and 31<sup>st</sup> May to get a predicted catch by spinning. An estimated 20% of these would die post-release; this is the estimated loss to the stock from starting the spinning season on the 3<sup>rd</sup> March.

In assessing the impact on the salmon stock of the proposal to bring forward the start of the spinning season, the assumption has been used that effort for spinning or fly fishing would remain relatively consistent, and no account is taken of any switch in preference or additional uptake of spinning. As such, these assessments may represent an underestimate of potential impact.

Year	Fish caught on fly in June	Fish caught by spinning in June	Ratio of fly : spin catch for June	Fish caught by fly <1/6	Predicted catch by spinning for 3/3 to 31/5	Number fish lost after post-release mortality
2015	51	53	1.04	42	44	9
2016	90	98	1.09	67	73	15
2017	105	72	0.69	73	50	10
2018	11	4	0.36	39	14	3
2019	30	21	0.70	30	21	4
<b>Average</b>	<b>57.4</b>	<b>49.6</b>	<b>0.86</b>	<b>50.2</b>	<b>43</b>	<b>9</b>

## River Usk - delay start of the spinning season to 1<sup>st</sup> July (currently 1<sup>st</sup> June).

### Gain to the stock from proposed measures – approximately 10 fish

To determine the stock saving, the average number of fish caught by spinning in June (2015-2019) was calculated. An estimated 20% of these would die post-release, therefore, 20% of the June catch would be saved by not spinning in that month. Again, the assumption has been used that effort for fly fishing would remain relatively consistent, and no account is taken of any switch in preference if spinning was not available.

Year	Fish recorded as caught by spinning in June	Number fish lost after post-release mortality
2015	53	10.6
2016	98	19.6
2017	72	14.4
2018	4	0.8
2019	21	4.2
<b>Average</b>	<b>49.6</b>	<b>9.9</b>

## River Usk - ban on fishing with worm for sea trout.

### Gain to the stock from proposed measures – approximately 2 fish

To determine the stock saving, the average number of sea trout caught on worm (2015-2019) was calculated. An estimated 20% of these would die post-release, therefore, that 20% of the catch would be saved by not fishing using worm. Again, the assumption has been used that fishing effort using other methods would remain relatively consistent, and no account is taken of any switch in preference if worm fishing was not available.

Year	Number of sea trout caught on worm	Number fish lost after post release mortality
2015	3	0.6
2016	29	5.8
2017	11	2.2
2018	0	0.0
2019	5	1.0
<b>Average</b>	<b>9.6</b>	<b>1.9</b>

## River Wye - catch and release for salmon and sea trout

Gain to the stock from proposed measures:

1. 100% C&R salmon – approximately 111 fish
2. 100% C&R sea trout – approximately 5 fish

In assessing the impact of C&R proposals for the Wye, voluntary C&R rates from the Usk have been used (86% for salmon and for sea trout). Voluntary C&R rates for the Wye from the period 2007 to 2011 would not accurately reflect the overall increase in voluntary release rates seen across Wales over the past decade. Using the average rod catch, the loss to the stock under voluntary (20% post release mortality plus the number killed) and mandatory (20% post release mortality) was calculated; the difference between the two being the gain to the stock from imposing 100% catch and release measures.

Measure	Average rod catch 2015-2019	Usk average % released 2015-2019 (voluntary)	Average % killed 2015-2019	Predicted number released	Predicted number killed	Loss to stock under voluntary C&R	Loss to stock under mandatory C&R (20% mortality plus number killed)	Gain to stock from mandatory C&R
Salmon 100% C&R	991	86	14	852.3	138.7	309.2	198.2	111.0
Sea trout 100% C&R	46	86	14	39.6	6.4	14.4	9.2	5.2



## River Wye - start salmon season on 26<sup>th</sup> January (currently 3<sup>rd</sup> March).

### Additional loss to the stock from proposed measures – between 1 and 2 fish

Using the licence returns from 1994 to 1998 (when the fishing season started in January), the proportion of early running salmon (caught before July) that were caught before the 3<sup>rd</sup> March was estimated. This proportion was then applied to the Spring catches in the 5 years (2015 to 2019) to give an estimate of the predicted catch between 26<sup>th</sup> January and 2<sup>nd</sup> March; note that this was calculated from Owners' returns as they are more accurate on the Wye. An estimated 20% of these would die post-release; this is the estimated loss to the Wye stock from starting the season on the 26<sup>th</sup> January.

In assessing the impact on the salmon stock of the proposal to bring forward the start of the fishing season, the assumption has been used that fishing effort would remain relatively consistent, and no account is taken of any additional uptake of fishing.

Year	Fish caught before July (Spring run)	Fish caught before 3rd March	Proportion of spring fish caught before 3rd March
1994	782	14	1.8%
1995	525	0	0.0%
1996	732	3	0.4%
1997	322	8	2.5%
1998	157	11	7.0%
<b>Average</b>	<b>503.6</b>	<b>7.2</b>	<b>1.4%</b>

Year	Fish caught before July (Spring run)	Estimate of fish that would have been caught before 3rd March	Number of fish lost after post -release mortality
2015	696	10.0	2.0
2016	822	11.8	2.4
2017	489	7.0	1.4
2018	337	4.8	1.0
2019	241	3.4	0.7
<b>Average</b>	<b>517</b>	<b>7.39</b>	<b>1.5</b>

## River Wye - end salmon season for whole river on 17<sup>th</sup> October (currently 26<sup>th</sup> October above Llanwrthwl Bridge and tributaries).

### Gain to the stock from proposed measures – approximately 1/3 of a fish

To determine the stock saving, the average number of salmon caught between 18<sup>th</sup> and 26<sup>th</sup> October (2015-2019) was calculated. An estimated 20% of these would die post-release, therefore, that 20% of the catch would be saved by not fishing in that week. This number was factored up to account for the under reporting on licence returns.

Year	Fish caught licence returns (18 <sup>th</sup> to 26 <sup>th</sup> Oct)	Gain to stock from proposed measure (licence returns)	Gain to stock from proposed measure (owners' returns)
2015	0	0	0
2016	3	0.6	1.0
2017	2	0.4	0.6
2018	0	0	0
2019	0	0	0
<b>Average</b>	<b>1.00</b>	<b>0.2</b>	<b>0.3</b>

Licence returns	Owners' returns	Proportion of licence returns to owners' returns
828	1212	1.46
1020	1691	1.66
801	1181	1.47
299	526	1.76
243	348	1.43
<b>638</b>	<b>992</b>	<b>1.55</b>