

Know Your River – Seiont, Gwyrfai & Llyfni Salmon & Sea Trout Catchment Summary

Introduction

This report describes the status of the salmon and sea trout populations in the Seiont, Gwyrfai and Llyfni catchments. Bringing together data from rod catches, stock assessments and juvenile monitoring, it will describe the factors limiting the populations and set out the challenges faced in the catchment.

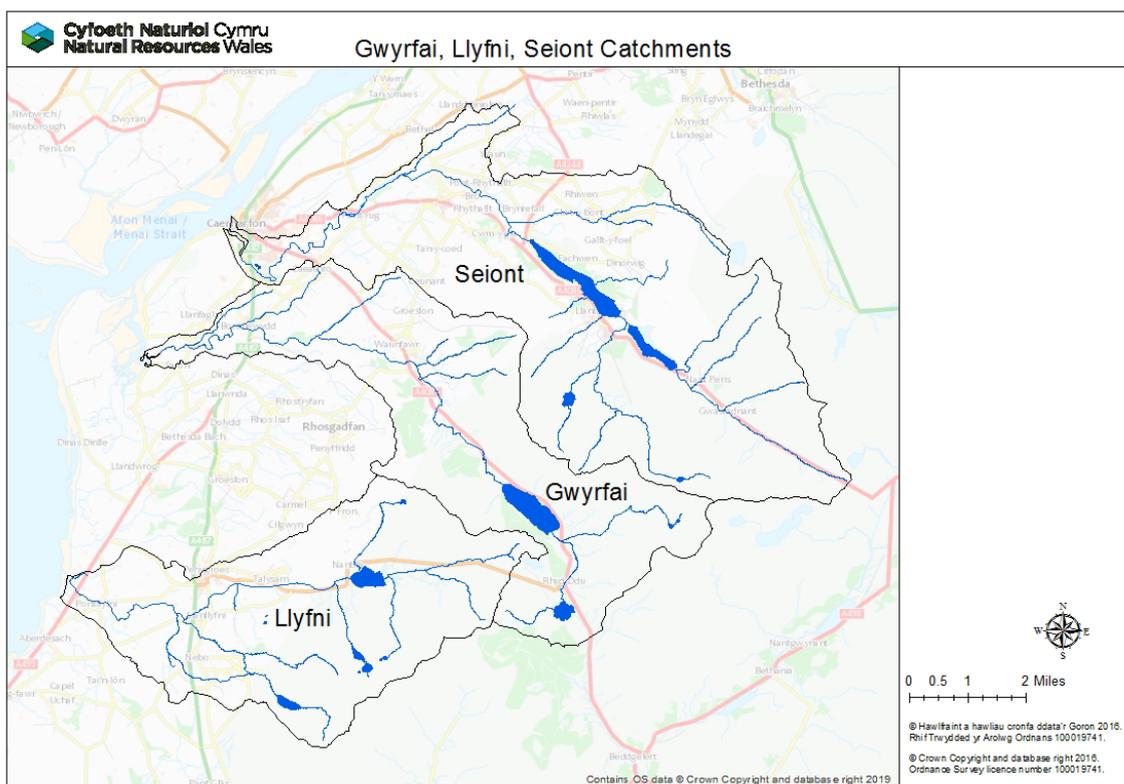
Action tables set out habitat improvements to restore freshwater productivity of salmon and sea trout populations. These tables also include some work which will be carried out by our partner organisations, not just Natural Resources Wales (NRW).

NRW has a duty, defined in the Environment (Wales) Act 2016 to have Sustainable Management of Natural Resources (SMNR) at the core of everything that we do. By applying the principles of SMNR in all our activities - from agriculture, forestry, and flood defence to development planning - we are undertaking catchment-wide initiatives that will deliver for fish stock improvements. Our reports highlight the importance of considering the whole catchment when identifying and addressing fisheries issues; and of working with partners.

NRW is committed to reporting on the status of salmon stocks in all our principal salmon rivers for the Salmon Action Plans and condition assessments under the Habitats Directive in SAC rivers; all fish species in all our rivers are reported for the Water Framework Directive (WFD). This report will fulfil these commitments and provide an informative and useful summary of stock status and remedial work planned, for our customers, specifically anglers, fishery and landowners, as well as our partners.

Catchment

The Seiont catchment, covering an area of 84.1 km², drains an extensively slate-mined upland area and lowland brown earth. Classed as a small spate river, the Afon Seiont rises at the head of the Llanberis Pass and is joined by many tributaries as it flows 7.8 km into Llyn Padarn (a 692-hectare lake, 3.2 km in length). From leaving this lake the river flows for 14.5 km before entering the Menai Straits by Caernarfon Castle.



Built beneath the old Dinorwig slate quarry, a hydro-electric power station (HEP) utilities Llyn Peris and Llyn Marchlyn Mawr, supplying electricity to the national grid. The power station owned by First Hydro Limited began operating in February 1982, building up to full capacity in 1984. Adult salmon and sea trout swimming up the Afon Seiont can swim through Llyn Padarn but not Llyn Peris due to HEP operations. Access for migratory salmonids to the upper part of the Seiont catchment (Afon Nant Peris and associated tributaries), by-passing Llyn Peris, is via a 2 km unlit fish tunnel. Salmon and sea trout are known to successfully negotiate the tunnel. To mitigate the loss of spawning grounds and juvenile habitat in the upper Seiont catchment to migratory salmonids, a stocking programme began in 1979. The stocking of fry and parr took place in Llyn Dwythwch, Nant Peris and associated tributary streams. All stocking was stopped in 2015 due to a NRW policy change. To replace the stocking programme options are being reviewed to open additional areas to migratory salmonids. Weirs and natural waterfalls limit access for migratory salmonids to most of the main and smaller tributaries. In addition to stocks of salmon and sea trout the Seiont system supports stocks of brown trout, eels, and Arctic charr within Llyn Padarn.

The Gwyrfai and Llyfni both have their sources at the foot of Snowdon near Rhyd Ddu. The rivers take two different routes out to sea with the Gwyrfai discharging into the Foryd estuary and the Llyfni flowing out into Caernarfon Bay at Pont Llyfni. The Gwyrfai catchment covers an area of 53km² and the Llyfni catchment covers an area of 50km² and they drain a predominantly upland catchment. The main populated areas are Bontnewydd on the Gwyrfai and Penygroes on the Llyfni. Both catchments focus on agriculture, sheep farming being the main land use. The area is an important tourist location due to large sections of the catchment being within the Snowdonia National Park.

The bulk of Eryri's rocks are of Cambrian age, although Ordovician rocks are found in both the north and the south of the area. Igneous intrusions have metamorphosed many of these sedimentary shales, resulting in the formation of slate, which was once so important to the local economy.

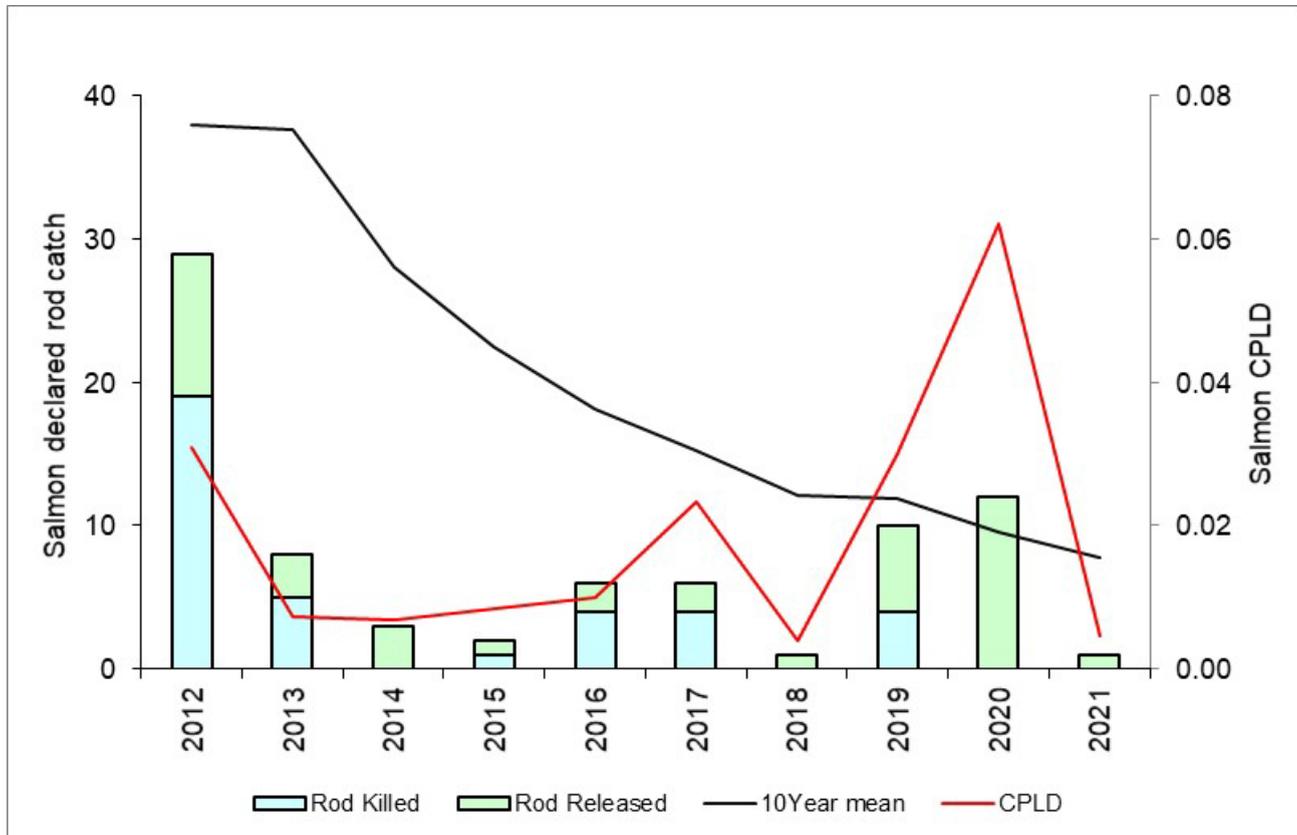
The Gwyrfai & Llyn Cwellyn are a SAC area based upon its salmon, otters & floating water plantain. Llyn Cwellyn hosts one of the three remaining native Welsh populations of Arctic char (*Salvelinus alpinus*) a locally distinct relict species from the last Ice Age.

Rod Catches

The following tables/graphs show the total declared rod catches of salmon and sea trout on the Seiont, and only sea trout for the Gwyrfai and Llyfni, as they are classed as sea trout rivers. Catch Per Licence Day (CPLD) is an estimate of the average catch per fishing day on a catchment.

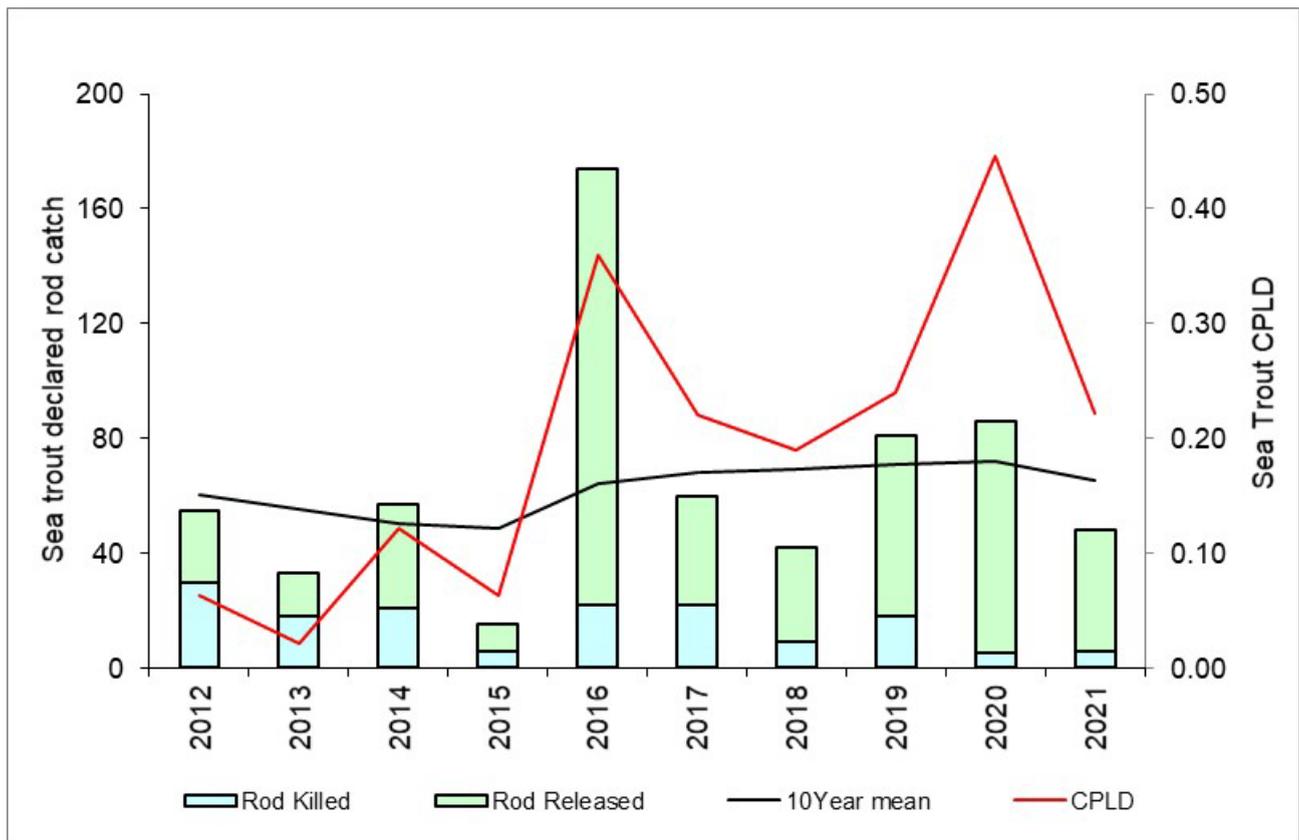
Salmon Rod Catch (Seiont)

Year	Caught	Rod Killed	Rod Released	10 Year mean	Percentage released	Catch per license day
2021	1	0	1	7.8	100	0.005
2020	12	0	12	9.6	100	0.062
2019	10	4	6	11.9	60	0.030
2018	1	0	1	12.1	100	0.004
2017	6	4	2	15.2	33	0.023
2016	6	4	2	18.1	33	0.010
2015	2	1	1	22.5	50	0.008
2014	3	0	3	28.0	100	0.007
2013	8	5	3	37.6	38	0.007
2012	29	19	10	38.0	34	0.031



Sea Trout Rod Catch (Seiont)

Year	Caught	Rod Killed	Rod Released	10 Year mean	Percentage released	Catch per license day
2021	48	6	42	65.1	88	0.222
2020	86	5	81	72.2	94.2	0.446
2019	81	18	63	70.7	77.8	0.240
2018	42	9	33	69.5	78.6	0.190
2017	60	22	38	68.1	63.3	0.220
2016	174	22	152	64.2	87.4	0.360
2015	15	6	9	48.7	60.0	0.063
2014	57	21	36	50.1	63.2	0.121
2013	33	18	15	55.6	45.5	0.022
2012	55	30	25	60.5	45.5	0.063

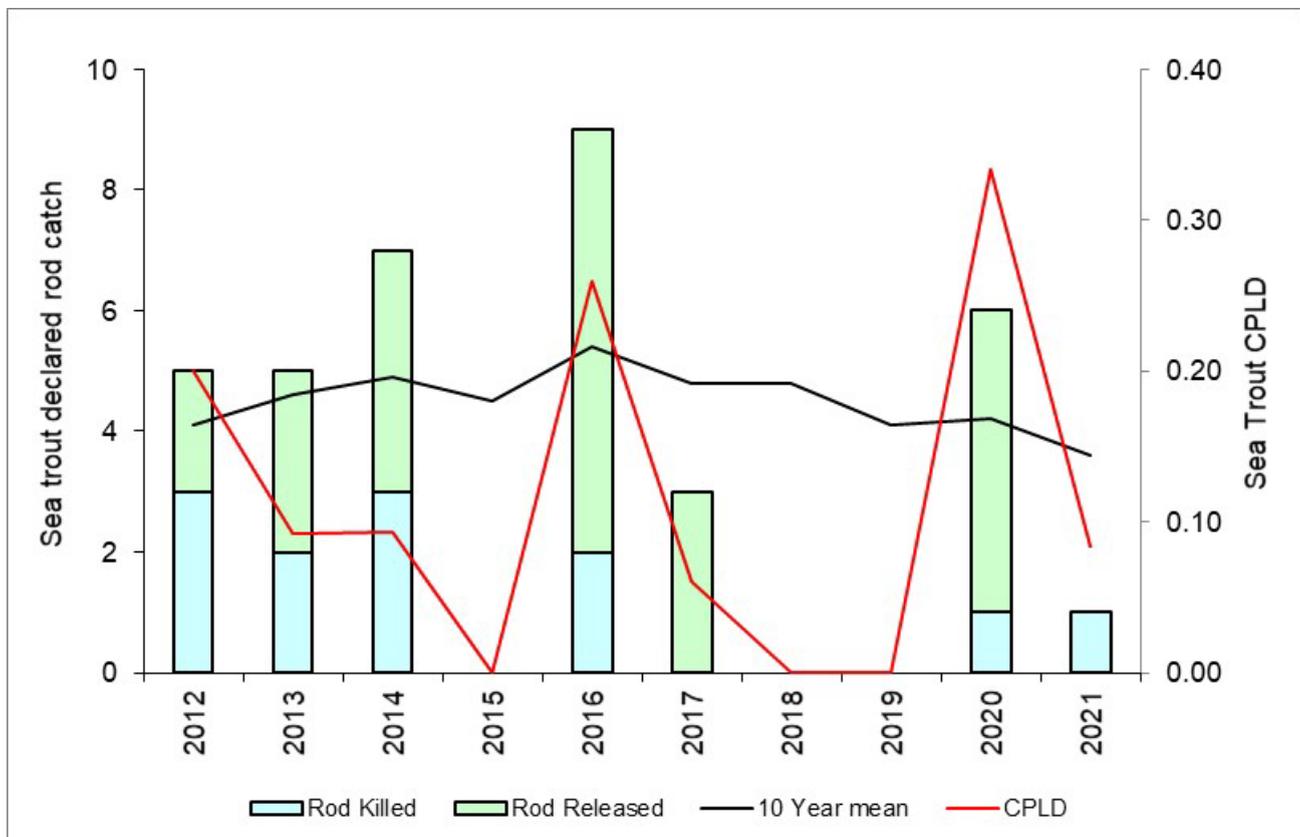


Rod Catches

As the Gwyrfai/Llyfni are classed as major sea trout rivers rather than salmon, only the sea trout data has been included. Salmon catches are minor. The following tables show the total declared rod catch for sea trout on the Gwyrfai/Llyfni. In years where there was no catch, percentage released is coded as NC (No Catch).

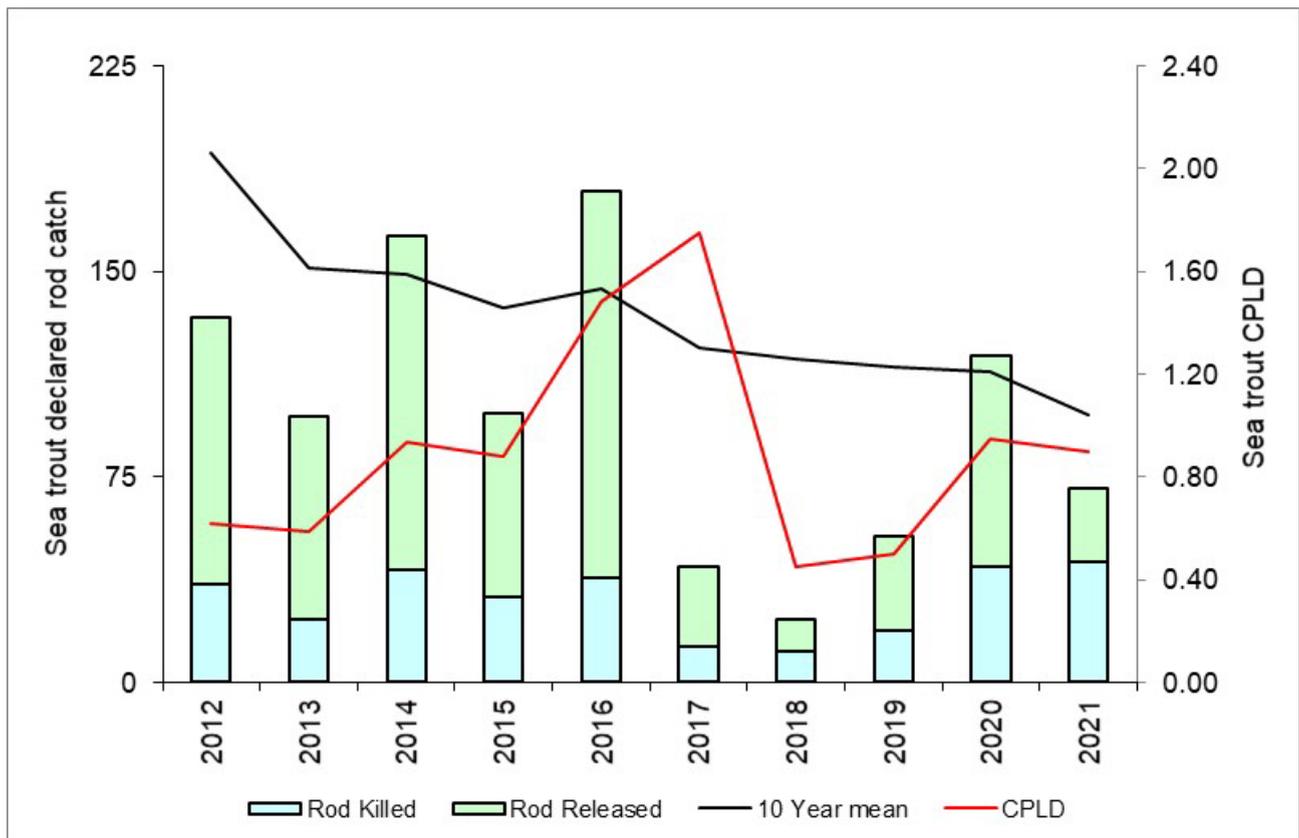
Sea Trout Rod Catch (Gwyrfai)

Year	Caught	Rod Killed	Rod Released	10 Year mean	Percentage released	Catch per license day
2021	1	0	1	3.6	0	0.083
2020	6	1	5	4.2	83	0.333
2019	0	0	0	4.1	NC	NC
2018	0	0	0	4.8	NC	NC
2017	3	3	0	4.8	100	0.060
2016	9	7	2	5.4	78	0.260
2015	0	0	0	4.5	NC	NC
2014	7	4	3	4.9	57	0.093
2013	5	3	2	4.6	60	0.093
2012	5	2	3	4.1	40	0.200



Sea Trout Rod Catch (Llyfni)

Year	Caught	Rod Killed	Rod Released	10 Year mean	Percentage released	Catch per license day
2021	71	44	27	97.8	38	0.899
2020	119	42	77	113.6	65	1.090
2019	53	19	34	115.1	64	0.500
2018	23	12	11	118.3	52	0.450
2017	42	29	13	122.3	69	1.750
2016	179	141	38	143.8	79	1.480
2015	98	67	31	136.7	68	0.882
2014	163	122	41	149.0	75	0.938
2013	97	74	23	151.4	76	0.587
2012	133	97	36	193.5	73	0.618

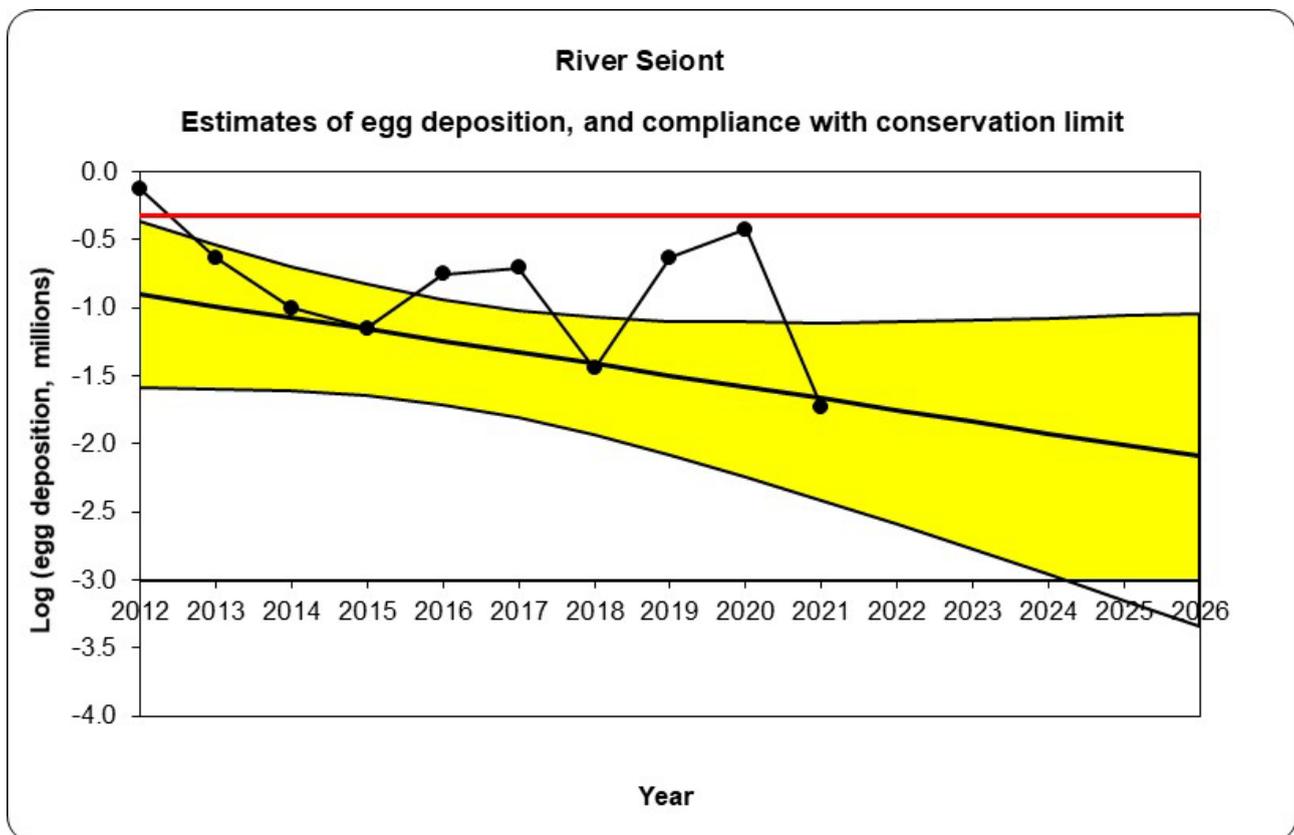


Stock Status

Conservation of Salmon

Salmon stock status is assessed using 'Conservation Limits' which provide an objective reference point against which to assess the status of salmon stocks in individual rivers.

This is calculated by applying assumed angling exploitation rates to catch data to derive run estimates; adopting standard sex ratios and weight-fecundity relationships to generate egg deposition figures. The numbers of salmon a river can produce (and consequently the catches that the stocks support) are a function of the quality and quantity of accessible spawning and rearing area. Therefore, in general, big rivers have larger catches and have correspondingly bigger total spawning requirements than small rivers. Thus, for any given rivers there should be an optimum level of stock which the conservation limit seeks to protect. The conservation limit represents the number of eggs that must be deposited each year within a given catchment in order to conserve salmon stocks in the future.



Are enough salmon eggs being deposited to conserve salmon stocks in the catchment?

The red line represents the number of eggs required to be deposited to sustain a healthy salmon stock. The black trend line and its confidence limits (the yellow band) is fitted to the most recent ten-year series of egg deposition estimates (2012-2021).

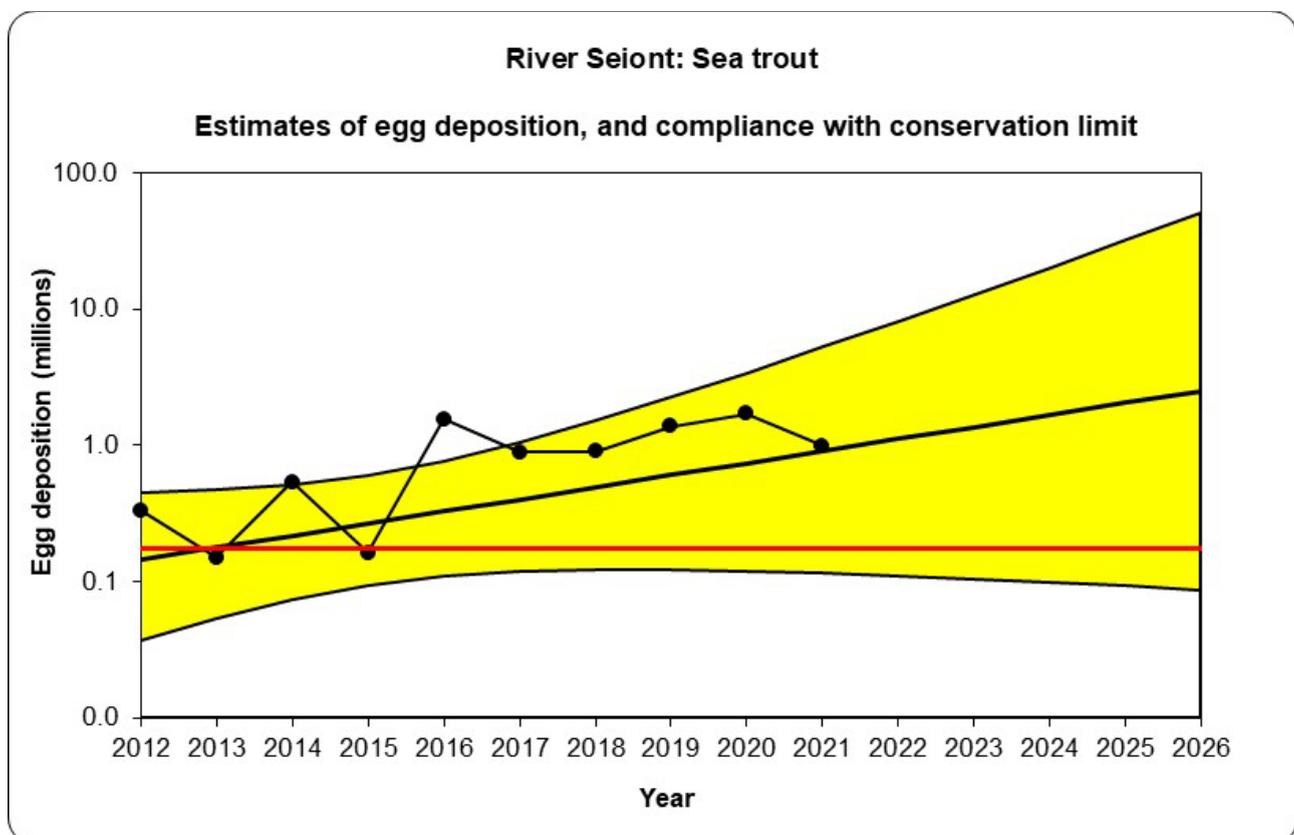
- Current number of eggs being deposited puts stocks **at risk**
- In five years' time the predicted status of salmon stocks will be **at risk**
- Based on current data, and the projection of the graph, the stocks of salmon on the Seint will continue to **decline (uncertain trend)**

Conservation of Sea Trout - Seiont

In contrast to salmon, no established methods of setting Conservation Limits or similar have been available for sea trout. In the absence of such analysis, NRW and the Environment Agency have, for several years, routinely applied a fishery-based assessment to the principal sea trout rivers. This method – used previously in this report - utilises time-series' of angling catch per unit effort (CPUE) data ('catch per day') to examine sea trout performance on a river-by-river basis.

Recently an alternative stock-based assessment method has been developed by NRW and is applied here. This utilises angling catch data to derive run and egg deposition estimates for sea trout in much the same way that similar data sets are used in Conservation Limit compliance procedures for salmon assessment.

Further details on this method are given in the recent Technical Case supporting net and rod fishery byelaw proposals on all rivers in Wales and the cross-border rivers Wye and Dee (see: [Technical case for fishing controls to protect salmon and sea trout](#)).

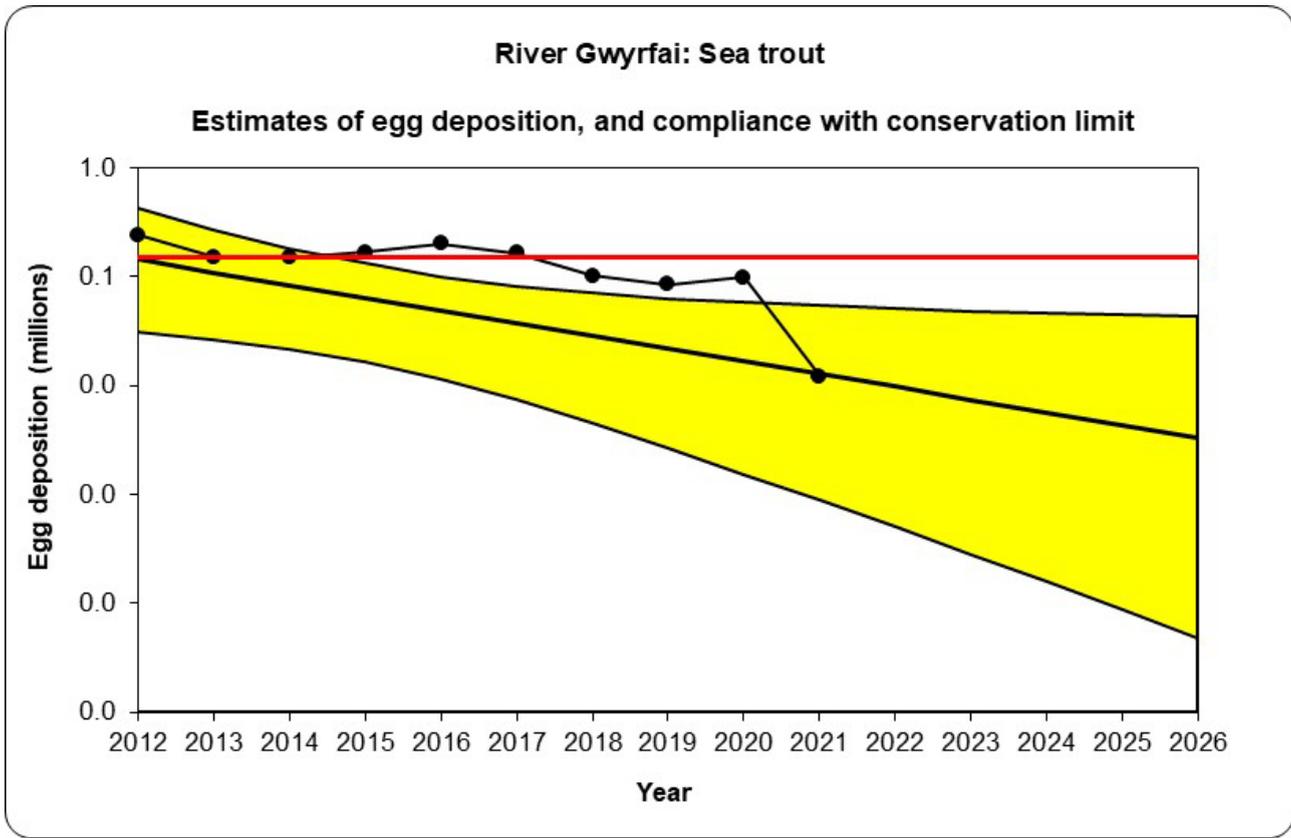


Are enough sea trout eggs being deposited to conserve stocks in the catchment?

The red line represents the number of eggs required to be deposited to sustain a healthy sea trout stock. The black trend line and its confidence limits (the yellow band) is fitted to the most recent ten-year series of egg deposition estimates (2012-2021).

- Current number of eggs being deposited puts stocks **probably not at risk**
- In five years' time the predicted status of salmon stocks will be **probably not at risk**
- Based on current data, and the projection of the graph, the stocks of sea trout on the Seiont will continue to **improve (uncertain trend)**

Conservation of Sea Trout - Gwyrfai

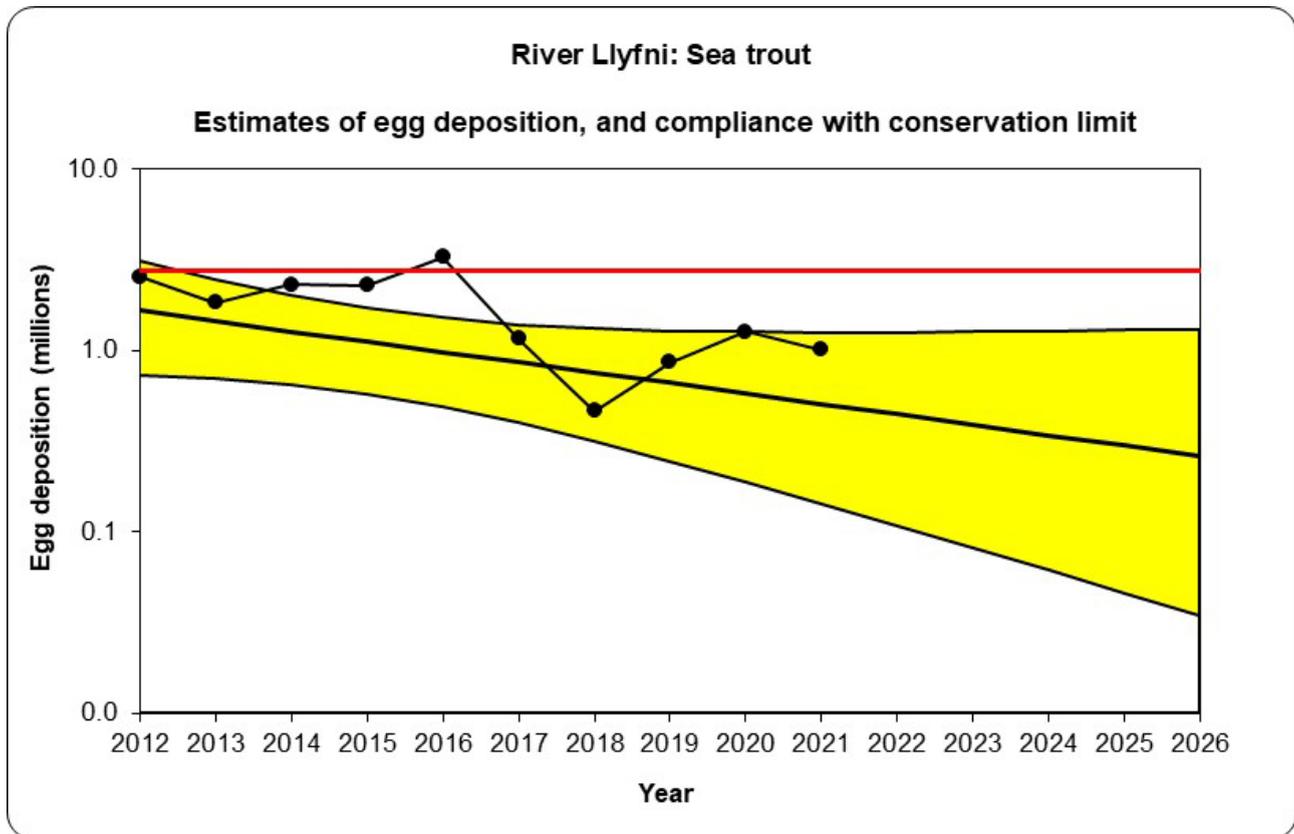


Are enough sea trout eggs being deposited to conserve stocks in the catchment?

The red line represents the number of eggs required to be deposited to sustain a healthy sea trout stock. The black trend line and its confidence limits (the yellow band) is fitted to the most recent ten-year series of egg deposition estimates (2012-2021).

- Current number of eggs being deposited puts stocks **at risk**
- In five years' time the predicted status of salmon stocks will be **at risk**
- Based on current data, and the projection of the graph, the stocks of sea trout on the Gwyrfai will continue to **decline (downward trend)**

Conservation of Sea Trout - Llyfni



Are enough sea trout eggs being deposited to conserve stocks in the catchment?

The red line represents the number of eggs required to be deposited to sustain a healthy sea trout stock. The black trend line and its confidence limits (the yellow band) is fitted to the most recent ten-year series of egg deposition estimates (2012-2021).

- Current number of eggs being deposited puts stocks **at risk**
- In five years' time the predicted status of salmon stocks will be **at risk**
- Based on current data, and the projection of the graph, the stocks of sea trout on the Llyfni will continue to **decline (uncertain trend)**

Juvenile Salmonid Monitoring Programme

In 2022 the temporal (annual) programme consisted of one semi quantitative site on each catchment for the Seiont, Gwyrfai & Llyfni. Three additional five-minute fry temporals have also been added to each catchment. The temporal data is used to look at trends in juvenile salmon and trout densities giving an indication of spawning across the whole catchment.

Salmon and Trout Classifications

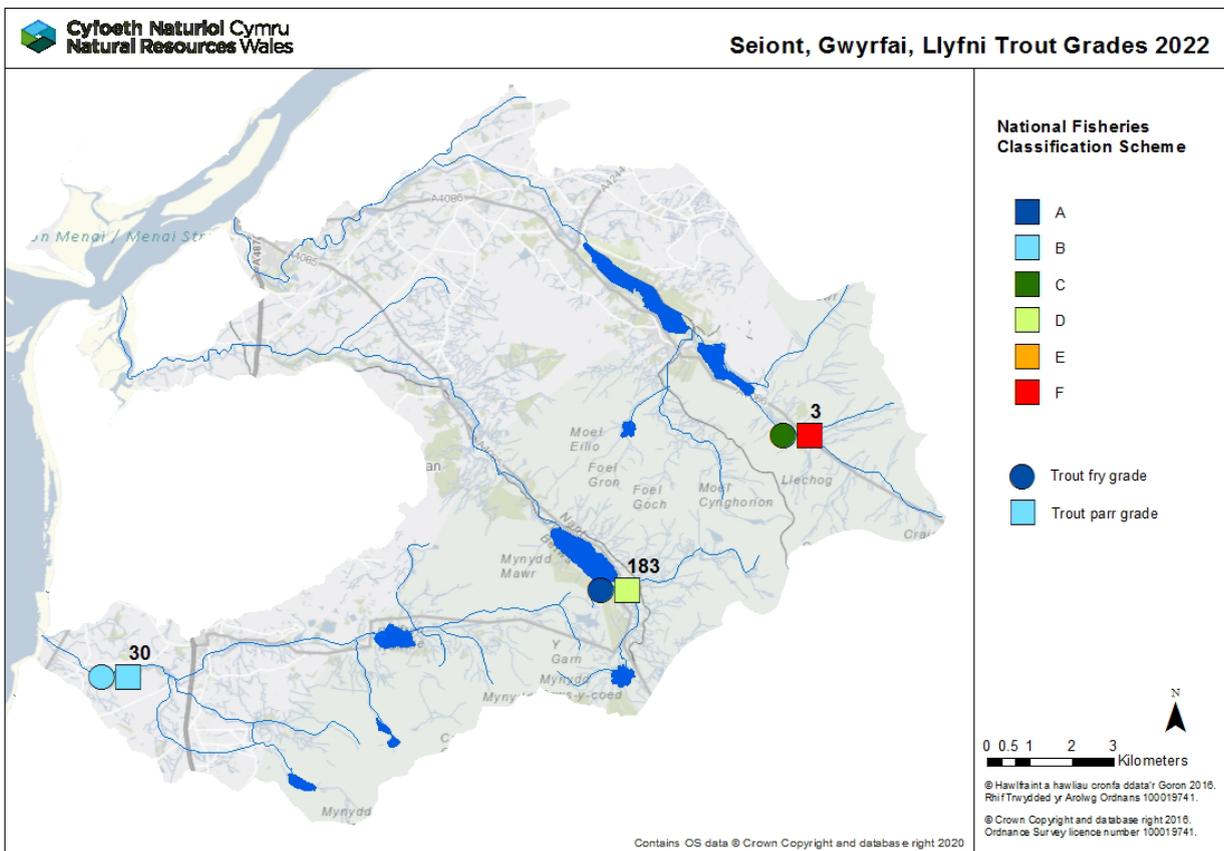
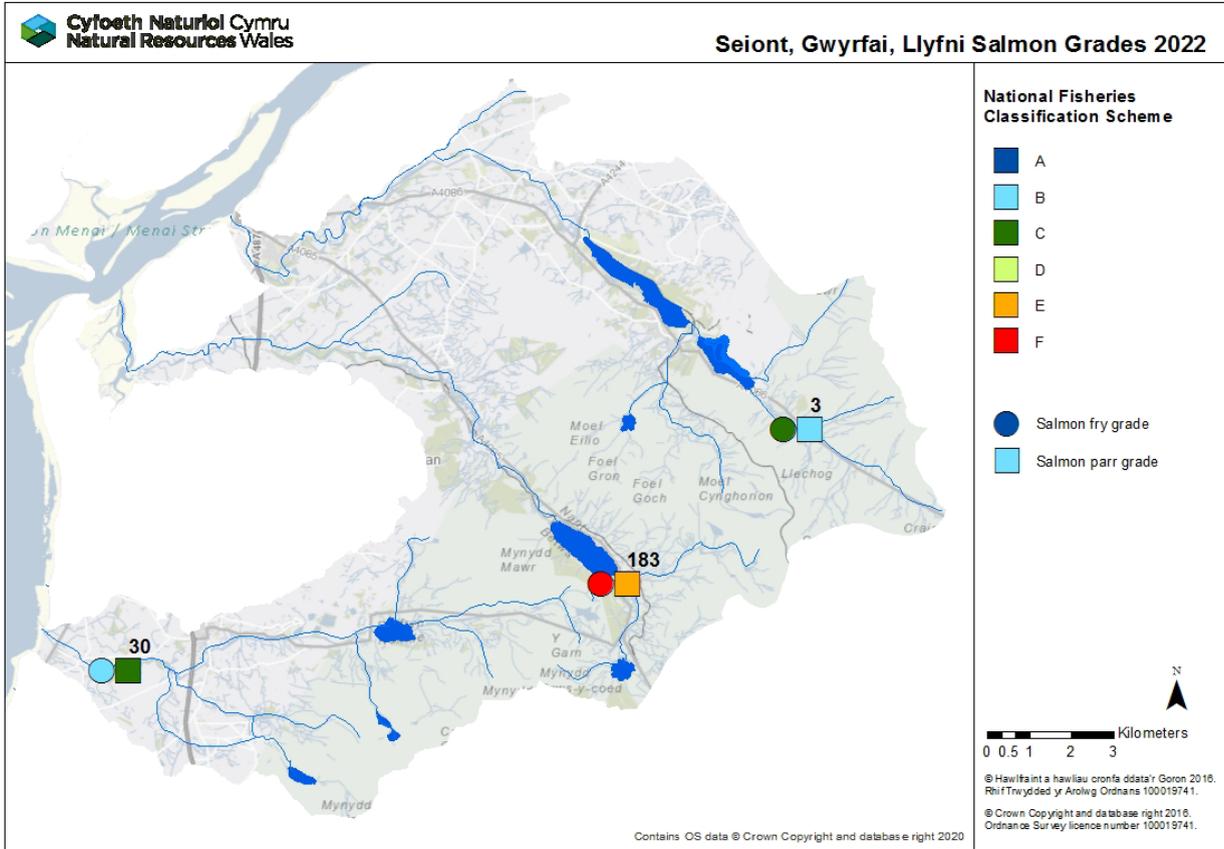
The following tables/maps shows the results of the routine juvenile salmonid population surveys from 2022 on the Seiont, Gwyrfai & Llyfni.

The symbols display the National Fish Classification Scheme (NFCS) grades which have been developed to evaluate and compare the results of fish population surveys in a consistent manner. The NFCS ranks survey data by comparing fish abundance at the survey sites with sites across Wales and England where juvenile salmonids are present. Sites are classified into categories A to F, depending on densities of juvenile salmonids at the site. The following table shows the values and classification of NFCS.

Grade	Descriptor	Interpretation
A	Excellent	In the top 20% for a fishery of this type
B	Good	In the top 40% for a fishery of this type
C	Fair	In the middle 20% for a fishery of this type
D	Fair	In the bottom 40% for a fishery of this type
E	Poor	In the bottom 20% for a fishery of this type
F	Fishless	No fish of this type present

Catchment	Site code	Year	Salmon fry grade	Salmon parr grade	Trout fry grade	Trout parr grade
Seiont	3	2022	C	B	C	F
Gwyrfai	183	2022	F	E	A	D
Llyfni	30	2022	B	C	B	B

Seiont, Gwyrfai and Llyfni Juvenile Salmon/Trout Grades 2022



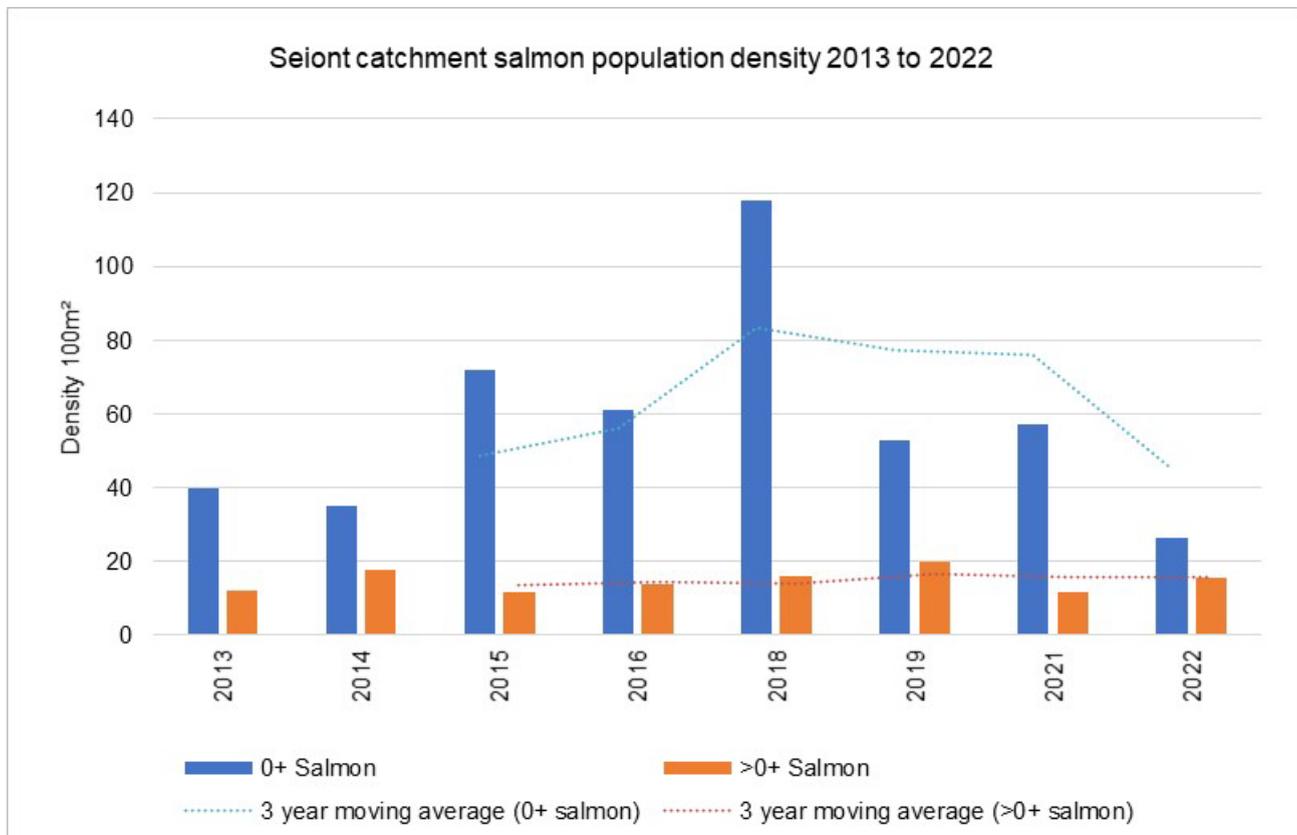
Catchment Population Trends

The table below show a simple comparison of average salmon and trout densities on the Seiont catchment (Nant Peris temporal site) since 2013. NB – no survey was carried out in 2017 due to high flows, covid restrictions cancelled all surveys in 2020. NA stands for not applicable.

Since 2014 an additional twenty metres have been fished at the Nant Peris site to better represent all fish species.

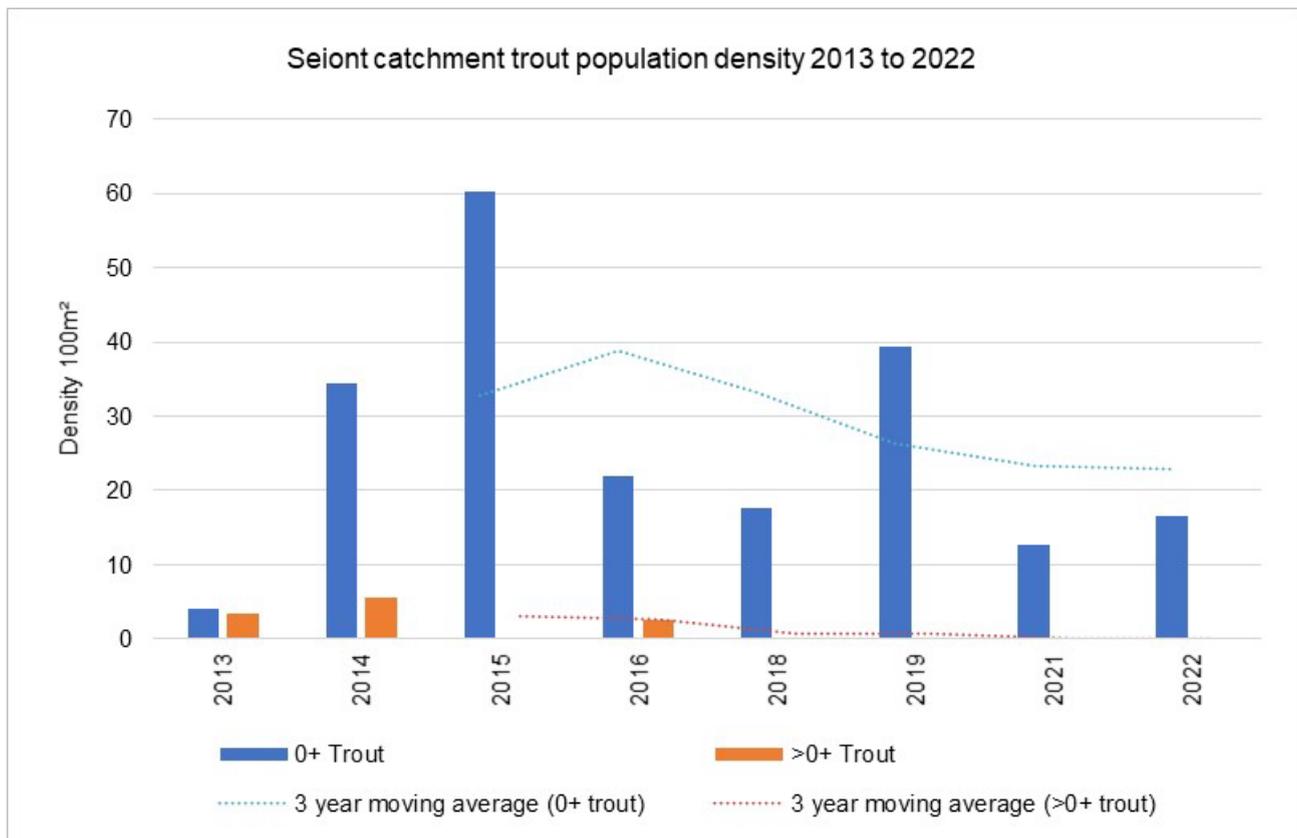
Salmon population estimate - Seiont

Year	0+ Salmon	3-year average (0+ salmon)	>0+ Salmon	3-year average (>0+ salmon)
2022	26.5	45.5	15.4	15.6
2021	57.1	75.9	11.5	15.9
2019	52.8	77.2	20.0	16.7
2018	117.8	83.6	16.2	13.9
2016	61.1	56.1	13.8	14.4
2015	71.9	49.0	11.6	13.8
2014	35.1	NA	17.9	NA
2013	39.8	NA	12.0	NA



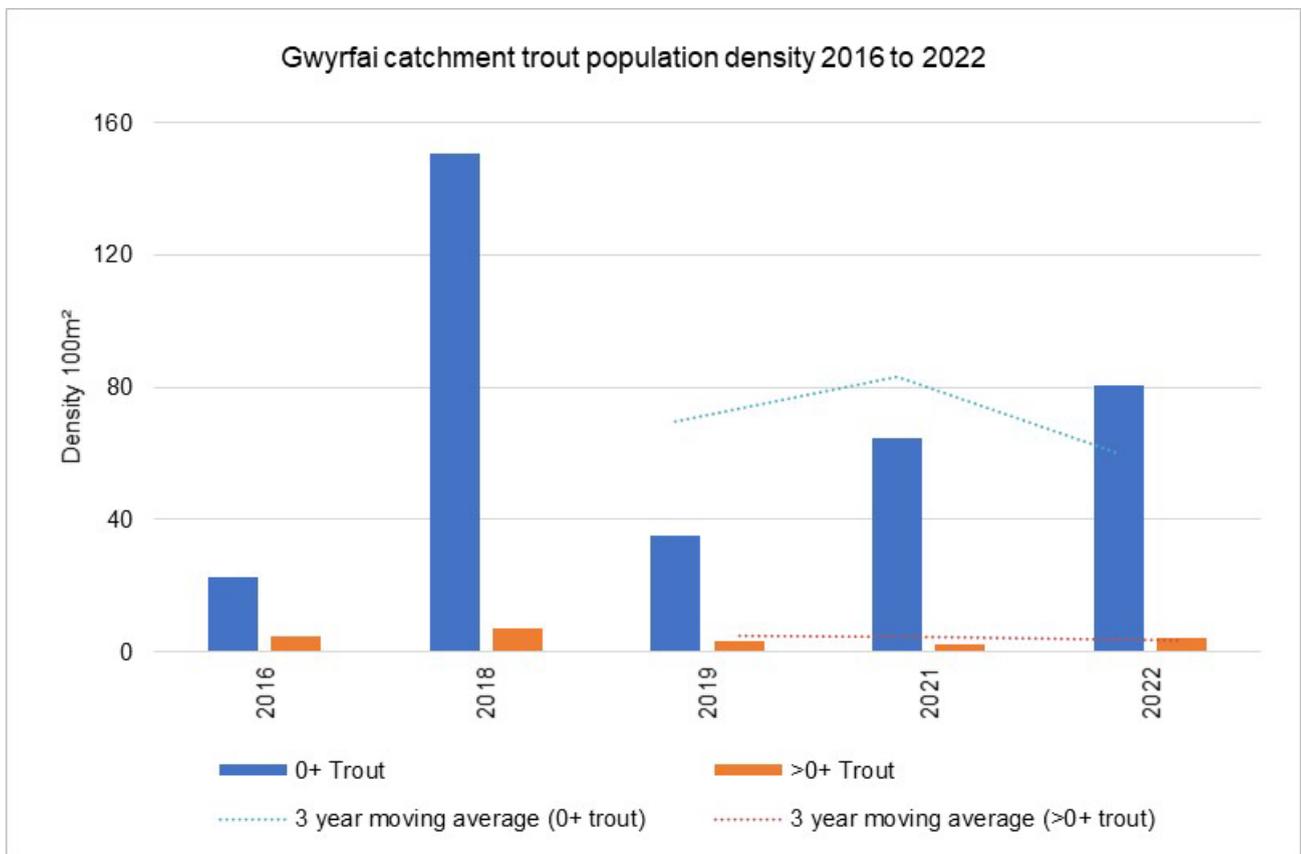
Trout population estimate - Seiont

Year	0+ Trout	3-year average (0+ trout)	>0+ Trout	3-year average (>0+ trout)
2022	16.6	22.9	0.0	0.0
2021	12.7	23.2	0.0	0.0
2019	39.4	26.3	0.0	0.8
2018	17.5	33.2	0.0	0.8
2016	21.8	38.8	2.5	2.7
2015	60.2	32.9	0.0	3.0
2014	34.4	NA	5.5	NA
2013	4.1	NA	3.5	NA



Trout population estimate – Gwyrfai

Year	0+ Trout	3-year average (0+ trout)	>0+ Trout	3-year average (>0+ trout)
2022	80.5	60.0	4.1	3.3
2021	64.3	83.3	2.4	4.2
2019	35.1	69.5	3.3	5.0
2018	150.5	NA	7.0	NA
2016	22.7	NA	4.7	NA

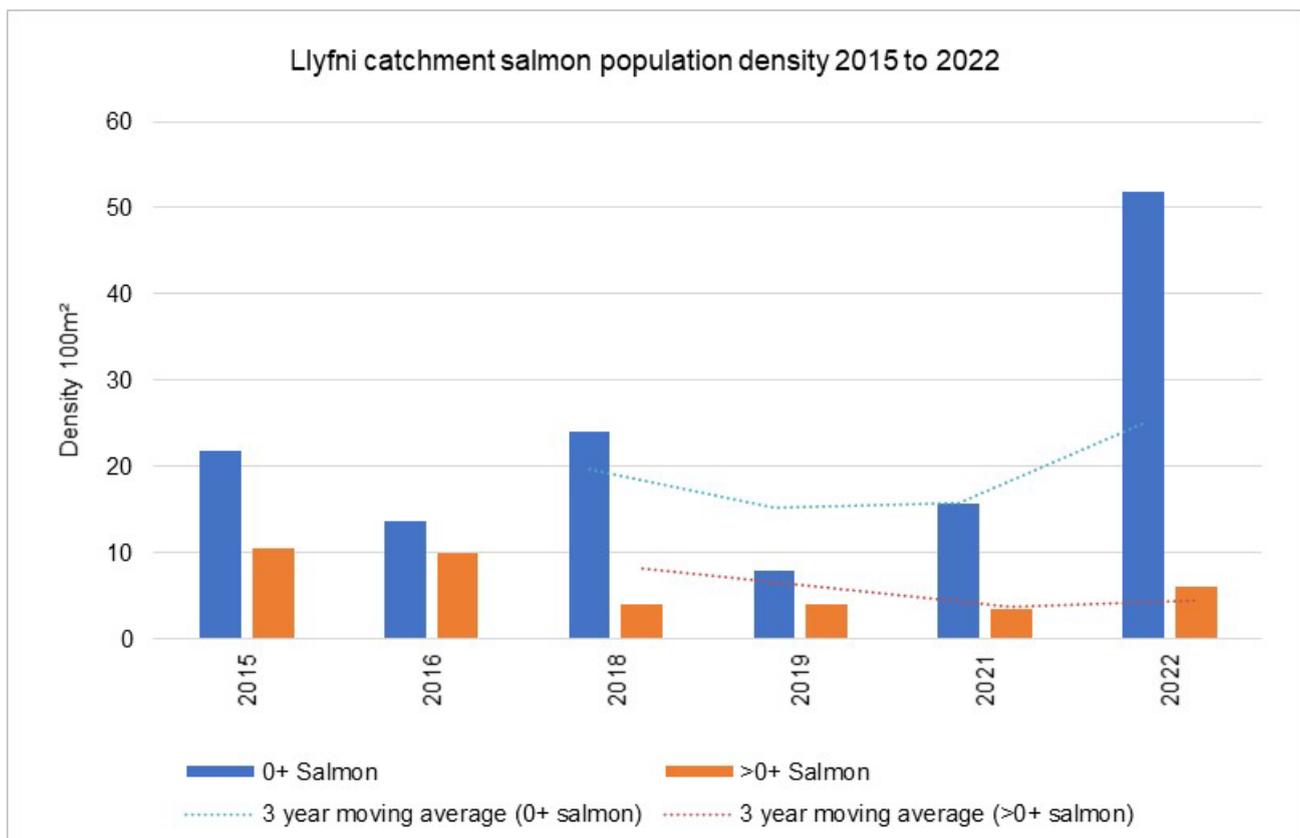


Catchment Population Trends

The table below show a simple comparison of average salmon and trout densities on the Llyfni catchment since 2015 when we first started fishing the site. NB – no survey was carried out in 2017 due to high flows, covid restrictions cancelled all surveys in 2020. NA stands for not applicable

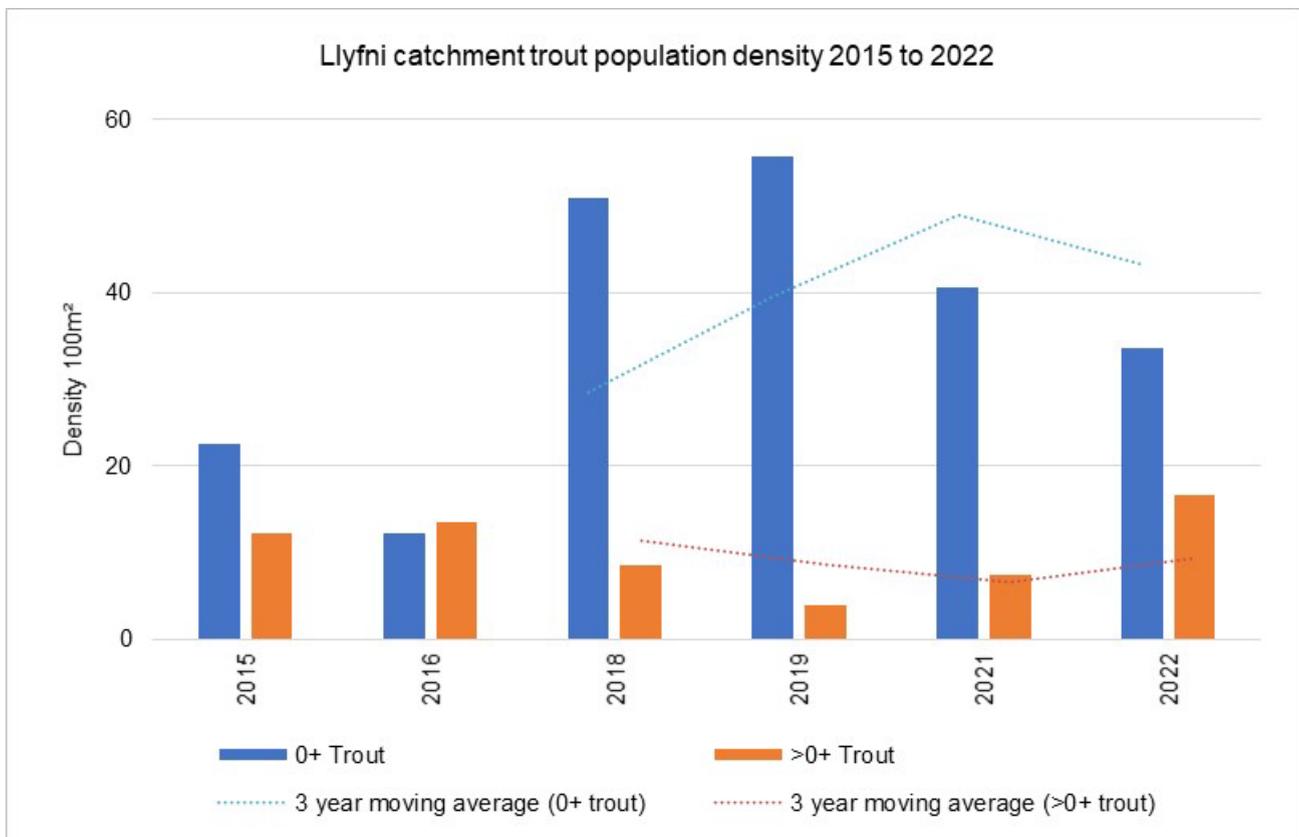
Salmon population estimate - Llyfni

Year	0+ Salmon	3-year average (0+ salmon)	>0+ Salmon	3-year average (>0+ salmon)
2022	51.8	25.1	6.0	4.4
2021	15.7	15.8	3.3	3.7
2019	7.8	15.1	3.9	5.9
2018	23.9	19.7	3.9	8.1
2016	13.6	NA	9.9	NA
2015	21.7	NA	10.4	NA



Trout population estimate - Llyfni

Year	0+ Trout	3-year average (0+ trout)	>0+ Trout	3-year average (>0+ trout)
2022	33.6	43.2	16.6	9.3
2021	40.5	49.0	7.4	6.6
2019	55.6	39.5	3.8	8.6
2018	50.8	28.5	8.5	11.4
2016	12.2	NA	13.4	NA
2015	22.5	NA	12.2	NA

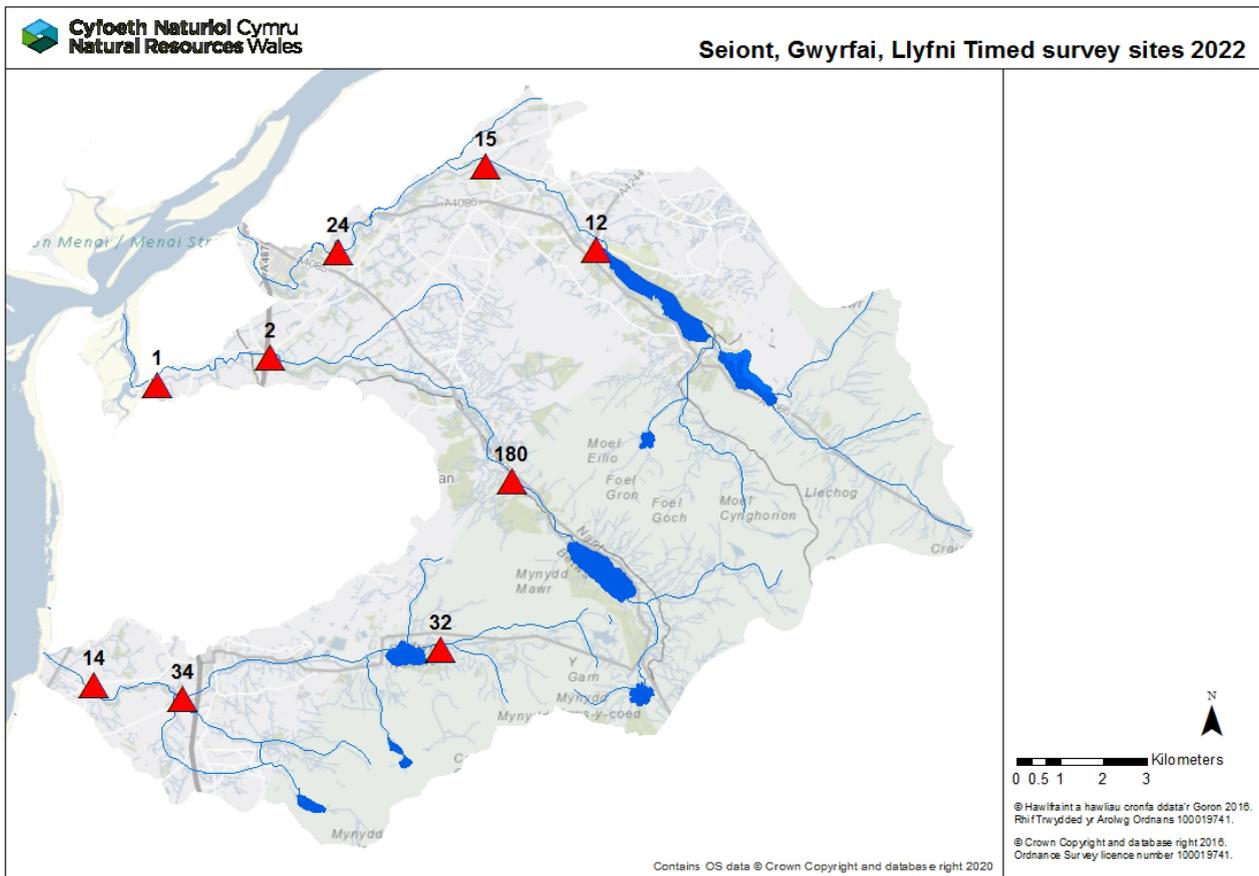


Seiont, Gwyrfai & Llyfni temporal five-minute fry surveys

Three additional five-minute fry surveys have been added on each catchment to give a better overview of production throughout the waterbody. As this is the first time that some sites have been surveyed, we will only present the data in a tabulated form. The map on the following page highlights where the sites are.

Five-minute fry surveys – number caught

Catchment	Site Code	Name	Salmon fry	Salmon parr	Trout fry	Trout parr
Seiont	12	Penllyn	2	3	11	3
Seiont	15	Crawia	3	3	6	1
Seiont	24	Glan Gwna	2	11	18	1
Gwyrfai	1	Penrhyn Bach	0	3	7	6
Gwyrfai	2	Bontnewydd	3	20	17	3
Gwyrfai	180	Irish bridge	21	3	15	4
Llyfni	14	Pont y Cim	1	2	15	5
Llyfni	32	US Llyn Nantlle	0	0	21	1
Llyfni	34	DS Crychddwr	0	25	16	11



Seiont, Gwyrfai and Llyfni Fisheries Action Plan

Planned actions	Benefits	Lead	Partner(s)	Timescale for delivery
<p>Seiont alternative mitigation habitat improvements: Investigation and delivery of improvements to habitat (riparian and/or instream) and/or fish passage over barriers.</p>	<p>Improved river function, through more naturalised systems, increased flow diversity, improved spawning and juvenile habitat and gravels. Improved numbers of fish and more resilient populations. and improved.</p>	<p>North Wales Rivers Trust</p>		<p>2022-2024</p>
<p>Habitat improvements: We will investigate where there is opportunity to improve habitat for fish through improving access over barriers, restoration of riparian and instream habitat, including control of invasive species.</p>	<p>More natural river system, reduced siltation, increased flow diversity, improved spawning gravels and juvenile habitat. Improved fish numbers.</p>	<p>NRW</p>		<p>On-going</p>
<p>Water Framework Directive: We will continue to work to ensure no deterioration, monitor the status of the environment and investigate the causes of failures. Together with our partners we will look to put in place measures that protect and improve the status of the water environment.</p>	<p>Waterbodies protected and improved WFD waterbodies achieving Good Status/Potential.</p>	<p>NRW</p>	<p>NRW Wildlife trusts Local authorities Landowner DCWW</p>	<p>On-going</p>
<p>Enforcement: Action to reduce illegal activity on information provided and investigations.</p>	<p>Reduce illegal activity, more fish remain in the system.</p>	<p>NRW</p>	<p>Stakeholders North Wales Police</p>	<p>On-going</p>