

Know Your River – Mawddach Salmon & Sea Trout Catchment Summary

Introduction

This report describes the status of the salmon and sea trout populations in the Mawddach catchment. 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.

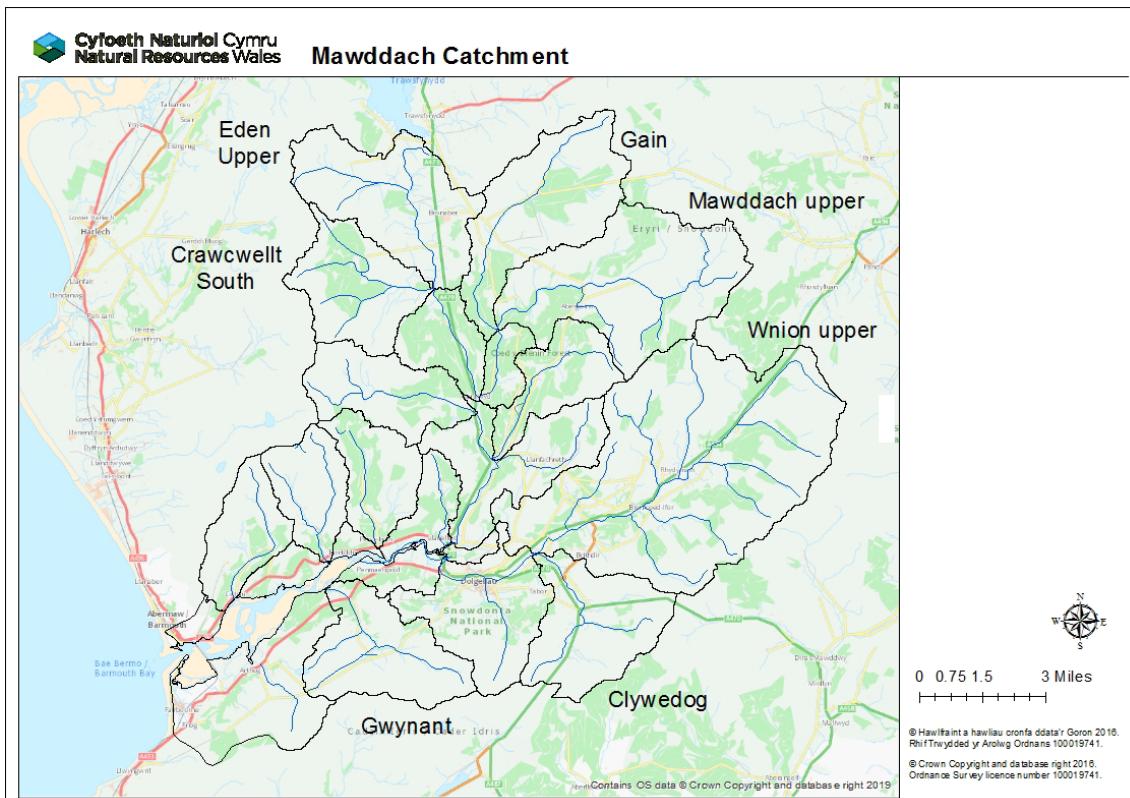
Action tables set out habitat improvements to restore freshwater productivity of salmon and sea trout populations. These tables also include some work which will be carried out by our partner organisations, not just Natural Resources Wales (NRW).

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 of 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 of our principal salmon rivers for the Salmon Action Plans and condition assessments under the Habitats Directive in SAC rivers; all fish species in all of 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 land owners; as well as our partners.

Catchment

The Mawddach catchment is broadly divided into two major subcatchments. The Mawddach subcatchment lies to the north and drains upland moorland which has been extensively afforested. Migratory salmonid access is limited by natural waterfalls on the main Mawddach, Gain & Wen. The Wrion subcatchment drains the area south and south-east of the Mawddach and enters the Mawddach Estuary approximately 1km downstream of the upper tidal influence on the Mawddach. Again, access to many of the tributaries is limited by waterfalls.



There are acidification problems on both subcatchments, exacerbated by coniferous afforestation. There are heavy metal problems in the Mawddach subcatchment, particularly on the Mawddach, Wen and Gain, where an abandoned munitions disposal site is thought to be responsible for poor fish populations. Water from the western tributaries of the Eden are diverted via the Arduddy Leat into Llyn Trawsfynydd.

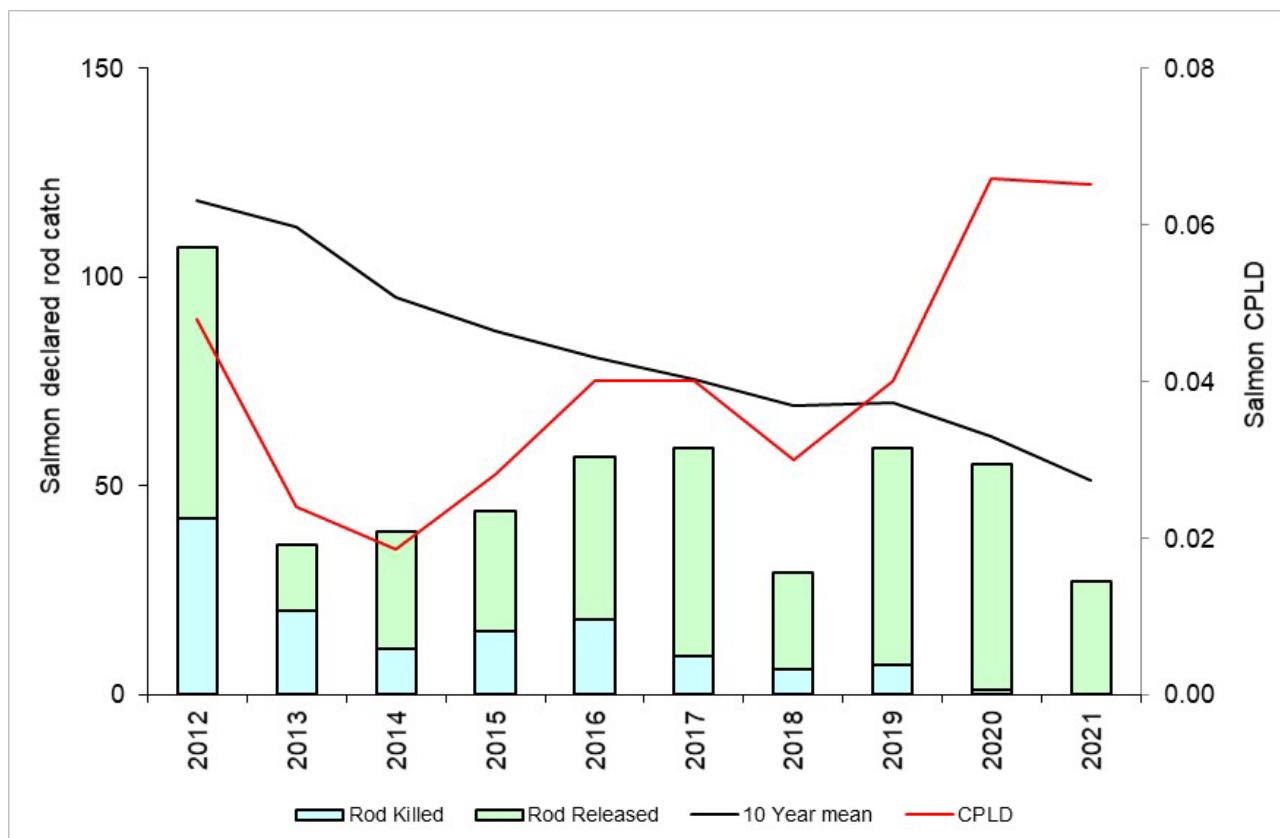
In 1984 a major pollution incident on the Mawddach killed thousands of juvenile salmonids and over 2000 adult salmon and seatrout. Since 1987 a remedial stocking programme has operated on the Mawddach which is due to end in 2021. In 2015 salmonid stocking was terminated due to a policy change by Natural Resources Wales (NRW). Any mitigation stocking was to be delivered through opening additional habitat & habitat works. As the Mawddach anglers have a contract until 2021 the option is with them whether to continue stocking or move to habitat works.

Rod Catches

The following tables/graphs show the total declared rod catches of salmon and sea trout on the Mawddach and Catch Per Licence Day. CPLD is an estimate of the average catch per fishing day on a catchment.

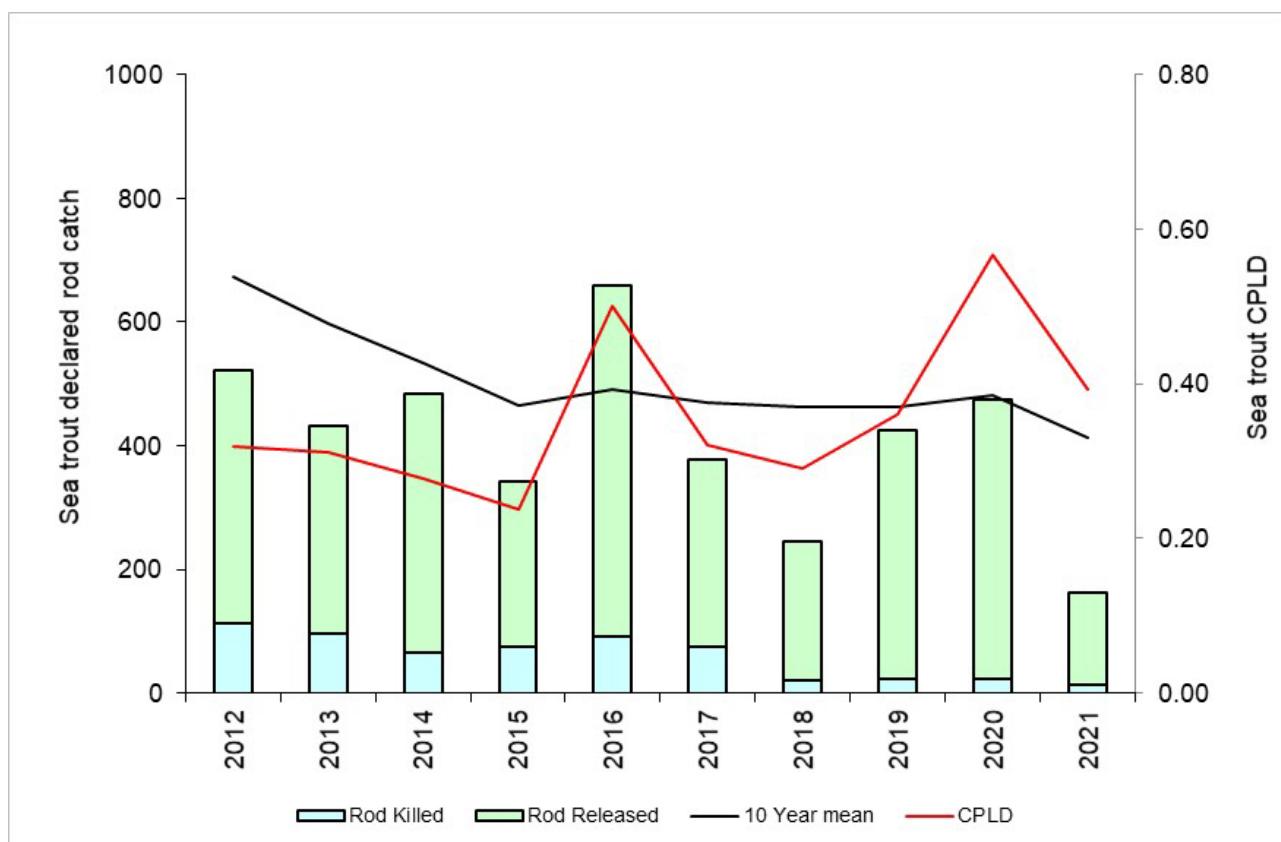
Salmon Rod Catch

Year	Caught	Rod Killed	Rod Released	10 Year mean	Percentage released	Catch per license day
2021	27	0	27	51.2	100	0.065
2020	55	1	54	61.8	98	0.066
2019	59	7	52	69.9	88	0.040
2018	29	6	23	69.1	79	0.030
2017	59	9	50	75.6	85	0.040
2016	57	18	39	80.8	68	0.040
2015	44	15	29	86.9	66	0.028
2014	39	11	28	95.1	72	0.019
2013	36	20	16	111.8	44	0.024
2012	107	42	65	118.3	61	0.048



Sea Trout Rod Catch

Year	Caught	Rod Killed	Rod Released	10 Year mean	Percentage released	Catch per license day
2021	163	13	150	412.2	92	0.394
2020	474	22	452	481.7	95	0.568
2019	425	22	403	463.0	95	0.360
2018	244	20	224	461.6	92	0.290
2017	377	76	301	469.7	80	0.320
2016	660	91	569	491.4	86	0.500
2015	341	74	267	464.1	78	0.237
2014	483	66	417	532.4	86	0.278
2013	433	96	337	596.8	78	0.311
2012	522	113	409	673.1	78	0.319

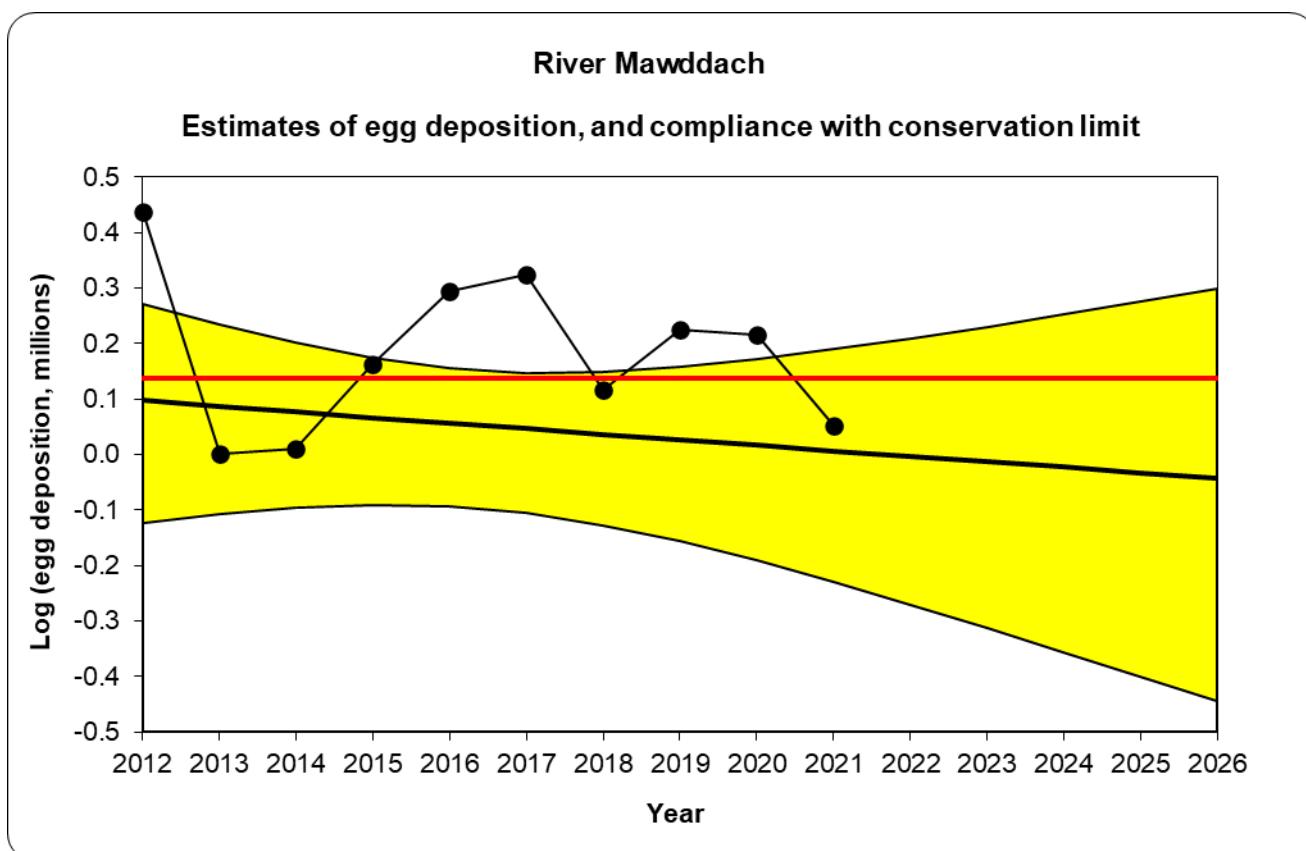


Stock Status

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 to conserve salmon stocks in the future.



Are enough salmon 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 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).

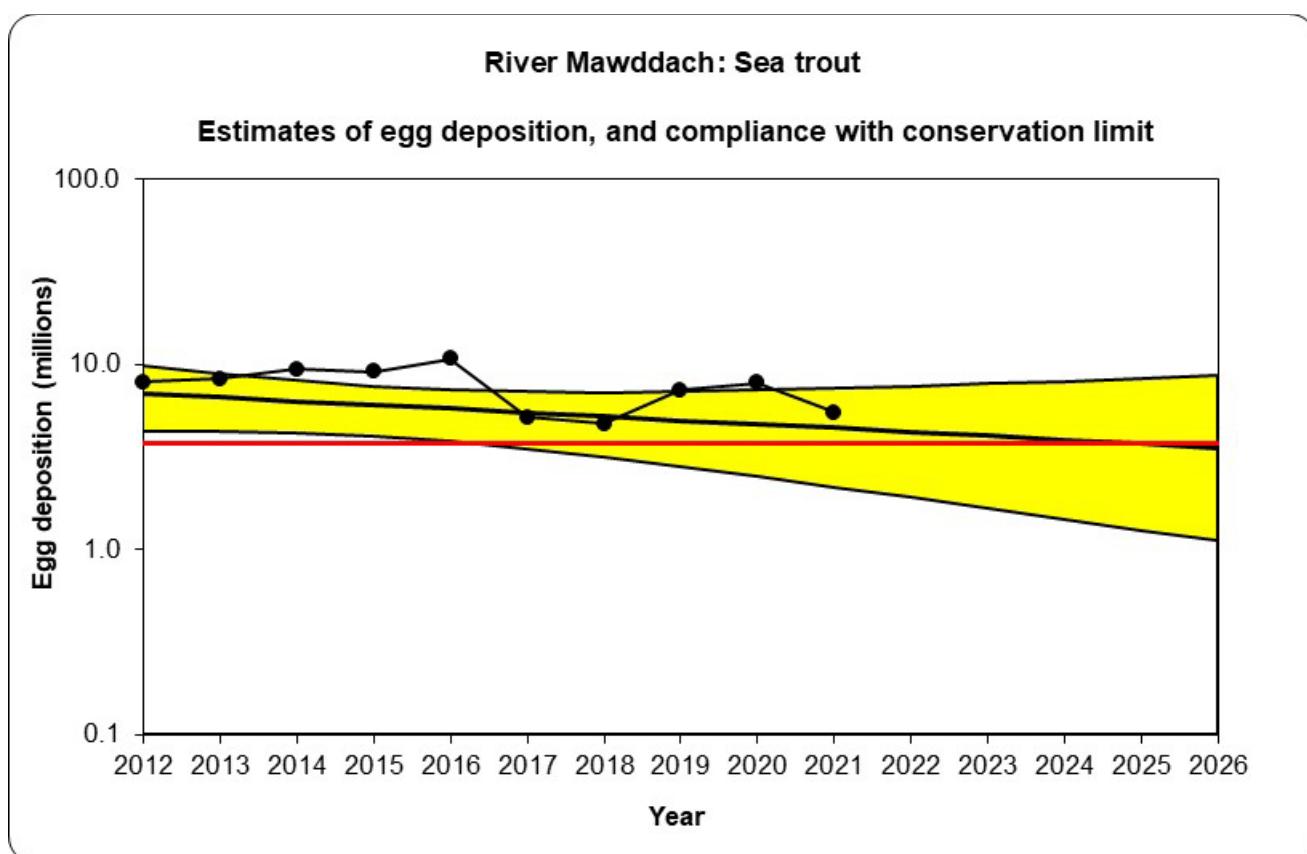
- Current number of eggs being deposited puts stocks **probably at risk**
- In five years' time the predicted status of salmon stocks will be **probably at risk**
- Based on current data, and the projection of the graph, the stocks of salmon on the Mawddach will continue to **decline (uncertain trend)**

Conservation of Sea Trout

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 **probably at risk**
- Based on current data, and the projection of the graph, the stocks of sea trout on the Mawddach will continue to **decline (uncertain trend)**

Juvenile Salmonid Monitoring Programme

In 2022 the temporal (annual) programme consisted of three sites on the Mawddach. The temporal data is used to look at trends in juvenile salmon and trout densities giving an indication of how successful spawning has been across the whole catchment.

Salmon and Trout Classifications

The tables/maps below show the results of the routine juvenile salmonid population surveys on the Mawddach in 2022.

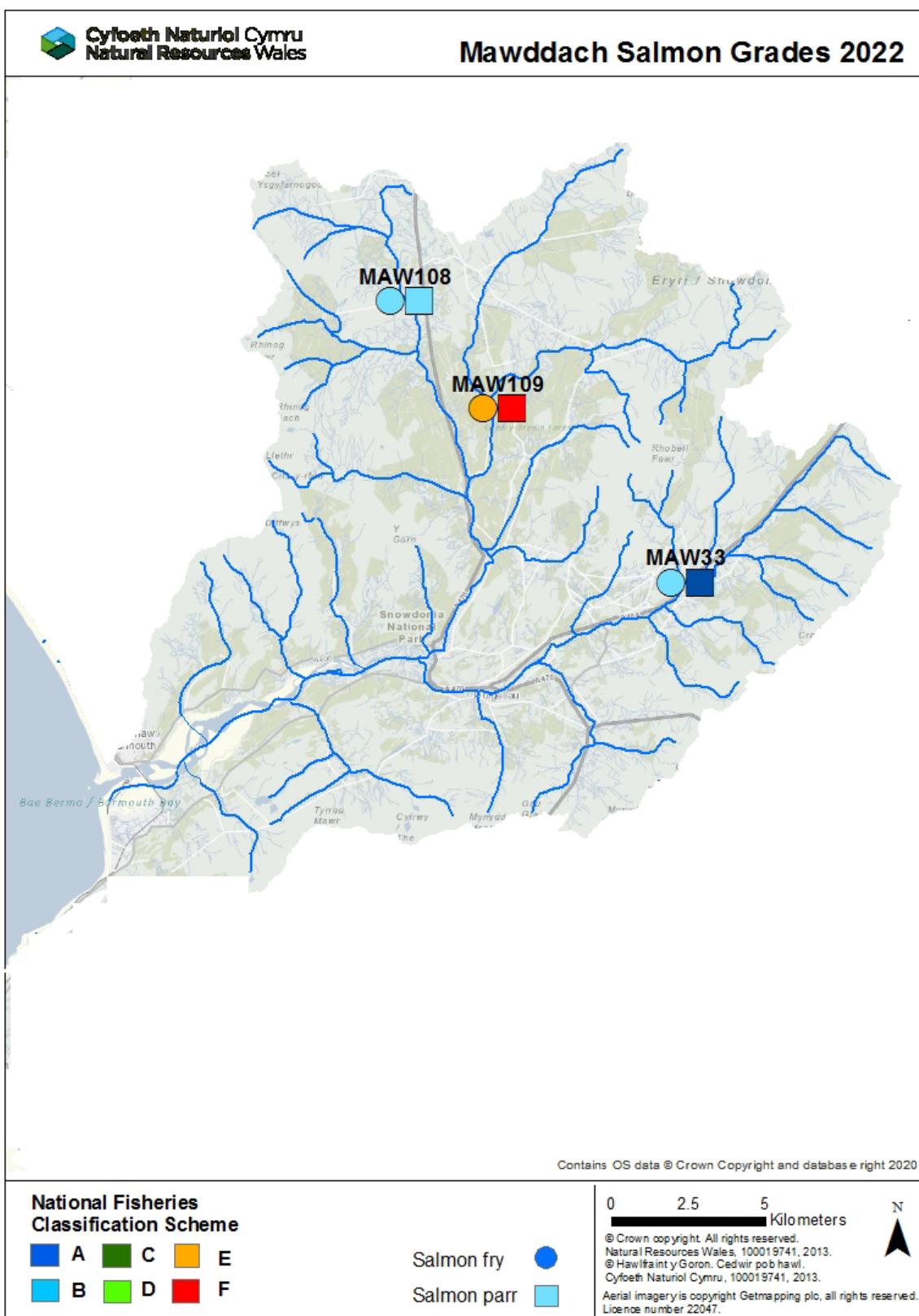
The symbols display the National Fish Classification Scheme (NFCS) grades which have been developed to evaluate and compare the results of fish population surveys in a consistent manner. The NFCS ranks survey data by comparing fish abundance at the survey sites with sites across Wales and England where 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
Wnion	33	2022	B	A	A	B
Eden	108	2022	B	B	C	C
Mawddach	109	2022	E	F	C	E

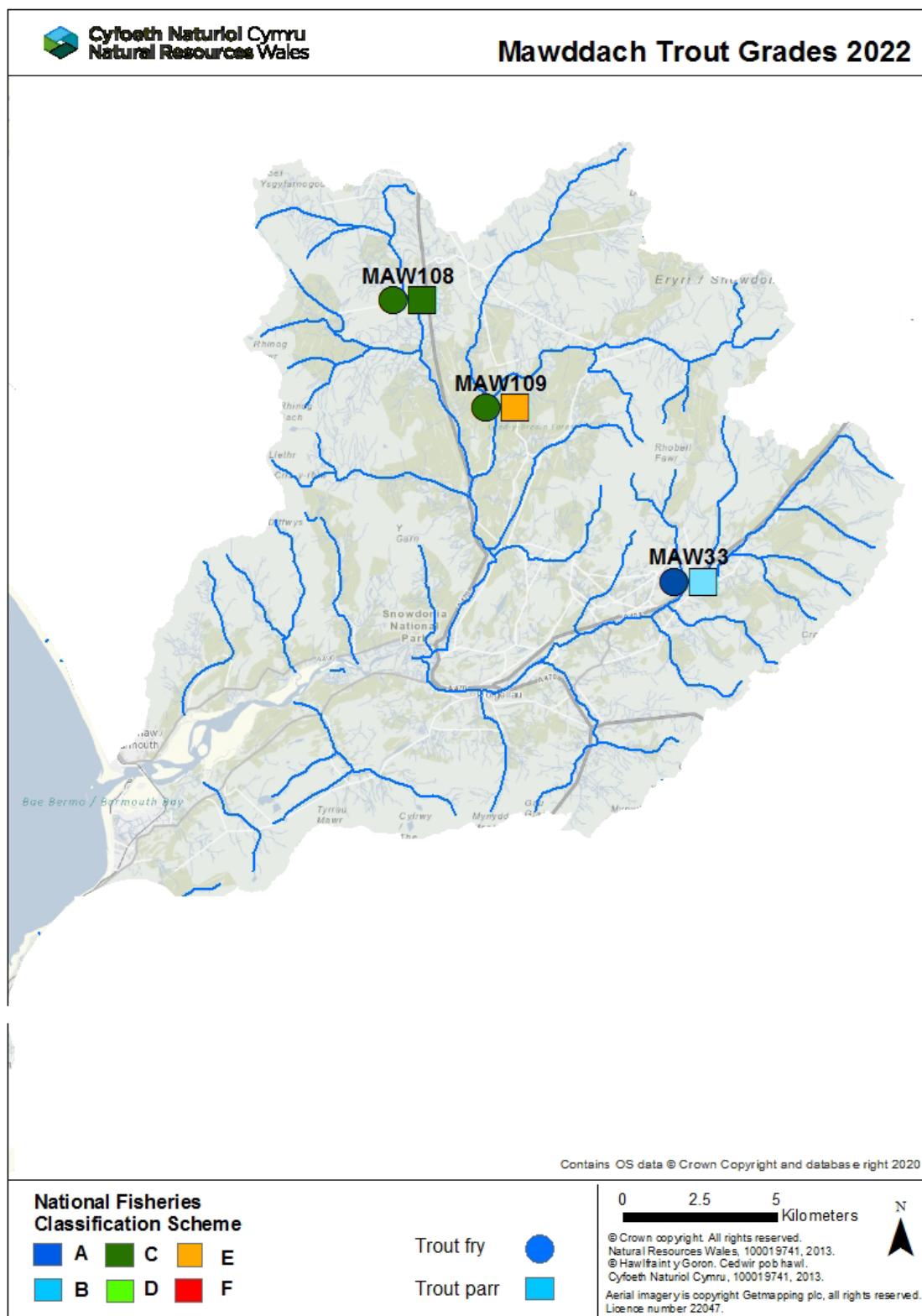


Map of Juvenile Salmon Results





Map of Juvenile Trout Results

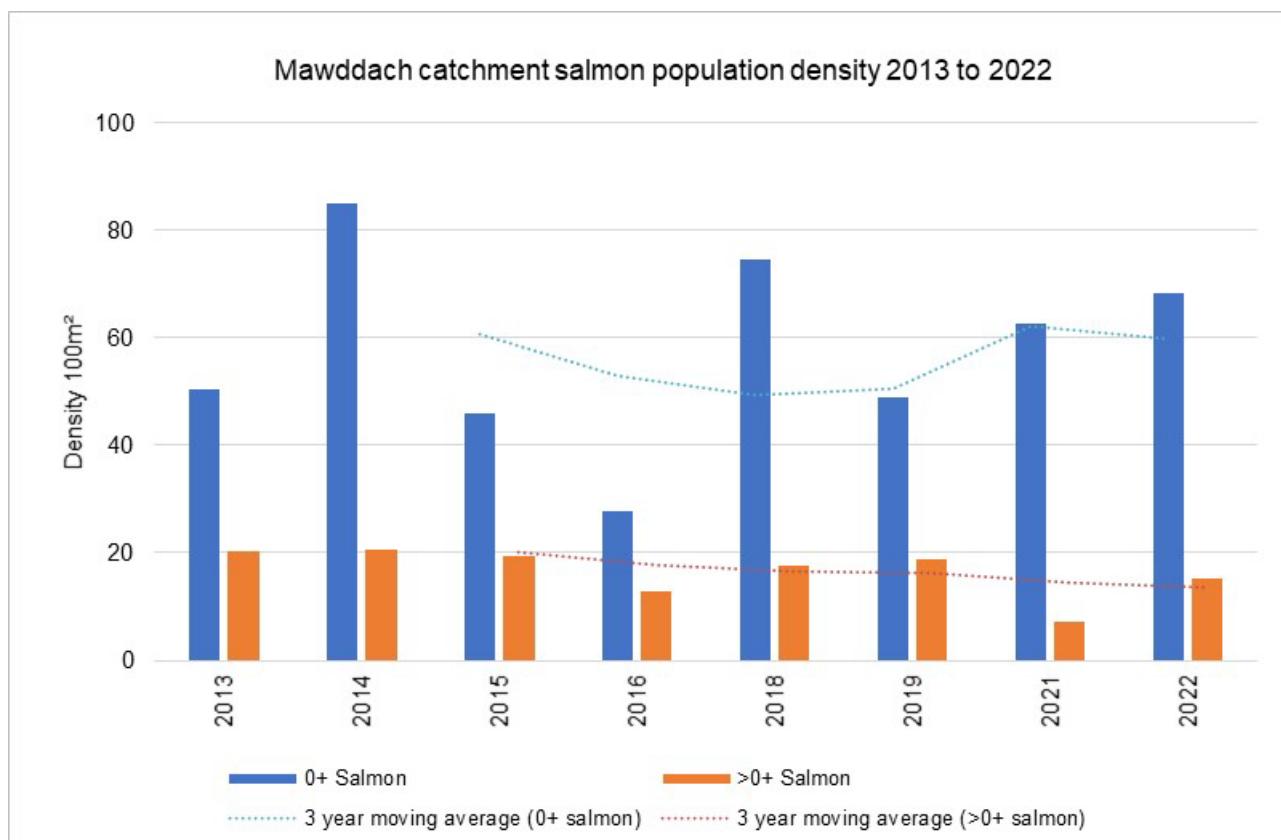


Catchment Population

The tables/graphs below show the average salmon and trout densities from the temporal sites across the Mawdach catchment since 2013. NB – no surveys were carried out in 2017 due to high flows, all surveys were cancelled in 2020 due to covid restrictions. The Mawddach site is not included within the estimated density as the site is very in-consistent and does not fulfil our survey site standards (site is over 10m wide, electro-fishing efficiency is poor). NA stands for not announced.

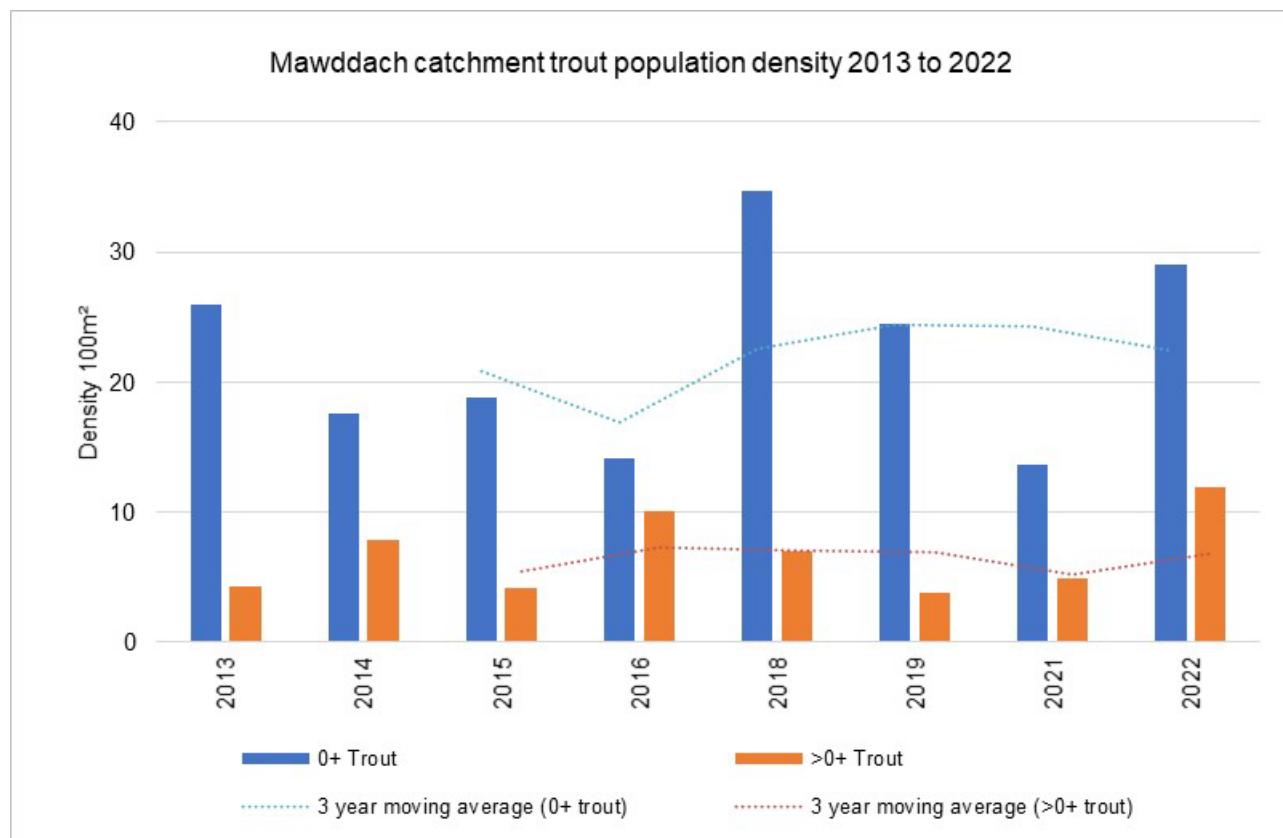
Salmon Population Estimate

Year	0+ Salmon	3-year average (0+ salmon)	>0+ Salmon	3-year average (>0+ salmon)
2022	68.2	59.9	15.1	13.7
2021	62.7	62.0	7.3	14.5
2019	48.8	50.4	18.8	16.4
2018	74.6	49.5	17.5	16.6
2016	27.8	53.0	12.8	17.6
2015	46.0	60.5	19.4	20.1
2014	85.1	NA	20.6	NA
2013	50.5	NA	20.4	NA



Trout Population Estimate

Year	0+ Trout	3-year average (0+ trout)	>0+ Trout	3-year average (>0+ trout)
2022	29.0	22.4	11.9	6.8
2021	13.6	24.3	4.9	5.2
2019	24.5	24.5	3.8	6.9
2018	34.6	22.6	7.0	7.1
2016	14.2	16.9	10.1	7.3
2015	18.9	20.8	4.1	5.4
2014	17.5	NA	7.8	NA
2013	26.0	NA	4.3	NA



Mawddach Fisheries Action Table

Planned actions	Benefits	Lead	Partner(s)	Timescale for delivery
Habitat improvements: River restoration on Eden including reconnecting flood plain, re-introduction of boulders and importation of gravels.	Improvement of habitat via gravel introduction and improved geomorphological structure to retain substrate.	NRW		2022
Alternative mitigation habitat improvements: Investigation and delivery of improvements to habitat (riparian and/or instream) and/or fish passage over barriers.	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	North Wales Rivers Trust		2022-24
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.	More natural river system, reduced siltation, increased flow diversity, improved spawning gravels and juvenile habitat. Improved fish numbers.	NRW		On-going
Enforcement: Action to reduce illegal activity on information provided and investigations.	Reduce illegal activity, more fish remain in the system.	NRW	Stakeholders North Wales Police	On-going

<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>
--	--	------------	---	-----------------