Wester Ross Fisheries Trust

Newsletter, October 2023

This newsletter summarises Trust activities on land, in rivers and in the sea from March 2023 to September 2023. Field work focussed on sampling sea trout in the sea and juvenile salmon in freshwater. Please read on to find out more.

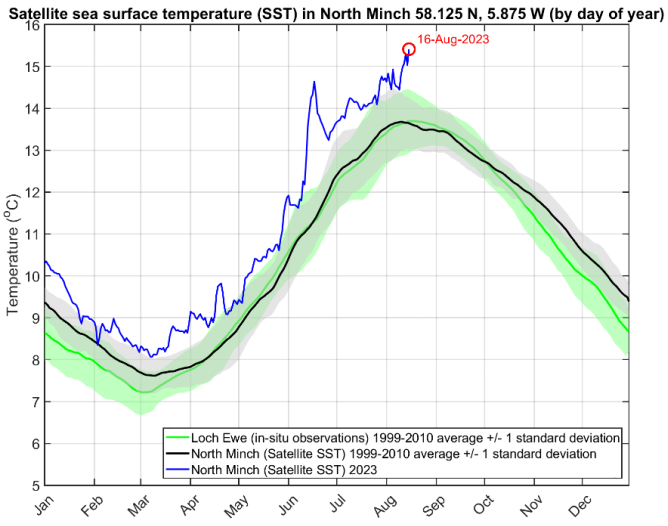
Context: a mostly warmer than average year so far

Coastal water temperatures rose in June to a record high of almost 15C in the Minch as the west of Scotland experienced an unprecedented marine heat wave (in recent records). Sea water temperatures remained above average through the summer.

Large barrel jellyfish (*Rhizostoma pulmo*) were seen from early spring; some were stranded on local beaches. July and August 2023 were notable for sightings of humpback whale, fin whale, sei whale, many minke whales and pods of common dolphins within the Wester Ross Marine Protected Areas and other parts of the Minch where they fed on krill, shoals of sprats (& juvenile herring?) and other fish.

In some rivers, water levels fell to near their lowest levels on record in June. SEPA issued a water shortage warning for the Loch Maree area at the end of the month.

(left) Sea surface temperature graph for North Minch to August 2023; note the unusual high peaks for the North Minch in June and August. Thank you to Keith Dunbar and Sam Jones, Scottish Association of Marine Science. (right) This large barrel jellyfish was stranded on the shore by Loch Kanaird in June as we were sweep netting for sea trout nearby.



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As the local schools broke up for the summer holidays, the weather pattern changed with heavy rainfall. July, August and September were mostly showery; however, still plenty of bright sunny days to enable WRFT field work to progress. At the time of writing (early October 2023), heavy rain is falling across Wester Ross and much of the Highlands; the rivers are full.

Staff and supporters

As ever, the Trust has relied on support from many people to carry out its work.

Dr Shraveena Venkatesh worked for the Trust as a Nature Scot graduate trainee from March 2023. With fisheries survey experience and a PhD focussing on environmental DNA, Shraveena provided much enthusiastic, energetic and very capable support in the field and in the office. Shraveena has also been studying zooplankton diversity in coastal waters around Gairloch. She has now completed her placement with us for which we thank her very much. Shraveena plans to continue to work with us as a volunteer.

Dr Sue Ward joined the Trust in August as the new administrator. Sue previously worked as a research ecologist and teaching in terrestrial systems. As well as looking after the day to day running of the Trust, Sue has already provided support with juvenile fish surveys in some particularly challenging Wester Ross terrain (deep heather, rain, with plenty of midges)! Peter Jarosz will continue to provide guidance and support as Sue becomes familiar with her new role.

For much help with Trust work, including administration and field work, thank you to many other people especially Emma Watson, Nic Butler, James Close, Roger McLachlan, Chris Wall and Kitty Bell.

West of Scotland Herring Hunt eDNA and plankton sampling

From February to April, as part of the West of Scotland Herring Hunt (WOSHH) project, samples of sea water were collected and filtered at Melvaig for eDNA analyses to find out about using this method to learn about the occurrence of spawning herring nearby. Plankton samples were taken from a kayak to look for herring larvae. Several < 2 week-old clupeid larvae (herring or sprat) were found; but at lower densities compared to 2022, providing no evidence of herring spawning nearby. During late February – early March a northerly swell ran down the Minch, herring may have spawned to the south of Red Point?

Thank you to Dr Campbell Pert at Marine Scotland Science for help with identifying juvenile fish larvae.

The eDNA sampling site for West of Scotland Herring Hunt project at Melvaig, March 2023.

Catchment Vegetation Revival workshop at Kinlochewe

This meeting took place on 25th & 26th April at Beinn Eighe NNR and at Kinlochewe. The purpose of the meeting was to consider how rivers with salmon populations can be made more resilient to very heavy rainfall events associated with climate change; and also, to look more broadly at managing river catchment areas of Wester Ross area for biodiversity and carbon sequestration.

(left) Participants examining biodiversity of a hummock by the Pony Path on Beinn Eighe NNR, on 25 April 2023. Vegetation cover is thicker and spongier where ecosystem fertility is higher.

Presenters included those with much first-hand practical experience of working in upland areas including deer management, peatland restoration, woodland restoration and ecology. Delegates included representatives from regional Nature Scot and SEPA offices in addition to people who live and work in nearby areas.

(right) Dr James Merryweather leading a discussion about mycorrhiza fungi at the Catchment Vegetation workshop by Kinlochewe Hall, with Beinn Eighe in the background.

Thank you to everyone who came on the field excursion up the Pony Path to visit Donald McVean's fertilised plots and look at hummocks on 25th April 2023 and to the workshop at Kinlochewe Village Hall on 26th April 2023.

To review all the presentations and discussion summaries, please see: https://www.wrft.org.uk/news/newsitem.cfm?id=245 .

A poster highlighting the significance of hummocks where birds and mammals add nutrients in their droppings within otherwise rather nutrient deficient peatland landscapes, prepared ahead of the field excursion, can be found here https://www.wrft.org.uk/files/peatlandnutrition&hummockposter.pdf.

A follow up meeting with Dr Tanya Ogilvy (SEPA & Riverwoods), Prof Des Thompson (Nature Scot) and Dr Stuart Mathieson (SEPA) considered opportunities for related studies at Beinn Eighe NNR.

Poorly treated sewage effluent flows into the Kinlochewe River

The Kinlochewe River flows into Loch Maree and provides some of the most important habitat for juvenile salmon production within the River Ewe system. It is also used by sea trout as they migrate upstream towards spawning areas in headwater streams.

On 31st May, the WRFT field team and Franki Kalinowski and Donald McLeod of Kinlochewe estate observed an unusually high flow of poorly treated sewage effluent with white lumps discharging from the end of the pipe into the river *(right*). As water levels were low and water temperatures rising, and with the additional input of waste from campervans discharged at Kinlochewe, SEPA was contacted to request action to investigate. Scottish Water responded quickly and reported finding a 'fatberg' in the village sewage treatment system preventing normal operation. The fatberg was removed.

What impact did the poorly treated septic tank effluent have on life in the river?

Minnows were seen tucking in!

Aquatic invertebrates were checked using a kick–sampling method by the WRFT field team on 31st May (*below, right*) and SEPA team on 2nd August 2023. The WRFT team followed the Buglife 'Riverfly Monitoring' protocol; the SEPA team used the 'Walley, Hawkes, Paisley & Trigg' (WHPT) metric to assess the health of the river. Both teams recorded higher scores at sampling sites downstream from the septic tank outflow than upstream from the outflow!

On this basis, might one argue that the ecological quality of river water in Wester Ross can be higher with the addition of some septic tank effluent?

These results again highlight the nutrient deficient status of some rivers in Wester Ross, sometimes to the detriment of aquatic life including wild salmon. However, concerns remain that if sewage effluent levels or water temperatures were to rise further in future years, we may not be so lucky! WRFT will keep an eye on the outflow during periods of low flows and high temperatures in future years.

Thank you to SEPA and Scottish Water for their quick response to concerns about the outflow.

To raise awareness of fatberg and other problems which can affect sewage treatment works operation, Scottish Water have a Nature Calls campaign . . . https://www.scottishwater.co.uk/Help-and-Resources/Document-Hub/Your-Home/Nature-Calls. Be careful about what you flush down your sink!

Sea trout sea lice monitoring: too many sea lice to south of Gairloch

To learn about parasitic sea lice infestation pressures around Wester Ross, samples of sea trout were collected using a seine net at Flowerdale (Loch Gairloch) in April, June, July and September; at Applecross, monthly, from May to September; and from the River Kanaird estuary in June and August.

On 5th April 2023, thirty over-wintered sea trout were caught at Flowerdale. Many of these fish were heavily sea-liced, At Applecross on 25th May, the average infestation level on over-wintered finnock and sea trout was over 100 lice per fish (0.43 lice per gram of fish); there were over 500 lice on one of the fish.

(right) Sea lice on a sea trout at Applecross, 25 May 2023.

(below) this sea trout's dorsal fin has been damaged by sea lice, Applecross 25 May 2023.

Several anglers reported high numbers of sea lice on sea trout caught in the sea around Ullapool – Little Loch Broom area. In June, lice levels were still high on some fish taken at Applecross. Later in the summer and in September much lower sea lice levels were recorded at all sites where samples were taken.

(below) Sweep netting teams at the River Kanaird estuary (left) and Applecross River estuary (right), June 2023.

Sweep netting in 2023 was supported by The Scottish Government (via Fisheries Management Scotland) and at Applecross under contract for MOWI as part of the Caol Mor (east of Skye) salmon farm Environment Management Plan [EMP], a Highland Council condition of planning permission for the MOWI Scalpay salmon farm. Thank you to many volunteers and other helpers for help with sea trout sampling.

Boor Coastal fyke net June – July 2023

After trials at the Boor site in Loch Ewe in autumn 2023 (see 'coastal fyke catches spotty cod' story on WRFT website), the coastal fyke net fish trap was redeployed early in June 2023 to sample sea trout in the sea for the purposes of sea lice monitoring.

(left) Dr Shraveena Venkatesh and (right) Roger McLachlan and Nic Butler helping with fish processing by the Boor coastal fyke net in June 2023.

The trap was set to fish over a 24-hour period typically twice per week between 8th June and 18th July. The main reason for not running it continuously was to minimise the possibility of recaptures. All fish that were caught were lightly sedated and measured then released back into the sea nearby. Catches were dominated by juvenile coalfish, cod and pollack and much data was collected for fish lengths and 'black spot' infestation caused by parasite *Cryptocotyle ligua* (a trematode fluke).

After an initial catch of nine small sea trout, catches declined to just one to three sea trout per night. So overall, the trap produced less trout per unit effort than sweep netting at Boor Bay in previous years.

(right) Pollack and red mullet taken in coastal fyke at Boor on 9th June.

An alternative site for the coastal fyke net in Loch Ewe may provide better results for catching sea trout. Sea trout were seen jumping by Aultbea and off Firemore during the summer.

Operation of the trap was supported by the Scottish Government and the Wester Ross Area Salmon Fishery Board. Thank you to Ray Dingwall (Inveran estate) for help with the boat.

(right) Scad or horse mackerel taken in the Boor fyke net fish trap on 16th June 2023 during a period of unusually high sea temperatures.

Juvenile salmon production: not enough fry & parr food in some rivers!

To find out about the occurrence of juvenile salmon and the health of wild salmon populations, the WRFT electrofishing team surveyed sites in the following river systems: Kanaird, Ullapool, Dundonnell, Gruinard, Little Gruinard, Allt Beith, Tournaig, Ewe (tributaries at Kernsary, Bruachaig, Kinlochewe, Coulin, Slattadale), Sguod, Kerry, Balgy, Cuaig and Applecross. Sites were surveyed as part of the National Electro-fishing Programme of Scotland [NEPS] funded by the Scottish Government and for the biennial survey to inform the Wester Ross Area Salmon Fisheries Board. Additional sites may be surveyed in October.

Salmon fry and parr were recorded at Catch per Unit Effort [CPUE] levels indicative of generally healthy salmon populations (in terms of numbers of fish) in the Little Gruinard River system (including tributaries around the Fionn Loch), in the River Kanaird – including a site in the Runie, the River Kerry, the Allt Beith, the Coulin River, Grudie River and Docherty burn. Fewer salmon were found in the Applecross River and in the Little Tournaig system (very few fry); none were found at the top of the Balgy system and a site in the Cuaig. Salmon fry of wild origin were found in the Bruachaig (Ewe system) by the Heights of Kinlochewe in July 2023 indicating that wild salmon had spawned above the falls in 2022 for the first time since 2018.

(below) Nic Butler and Dr Shraveena Venkatesh by Loch Beannach Beag with Beinn Airigh Charr reflected, en route to a NEPS juvenile fish survey site above the Fionn Loch, Little Gruinard Special Area of Conservation (SAC) for Atlantic salmon, 10th August 2023.

As in previous recent surveys, there was a big difference in the size at age of juvenile salmon.

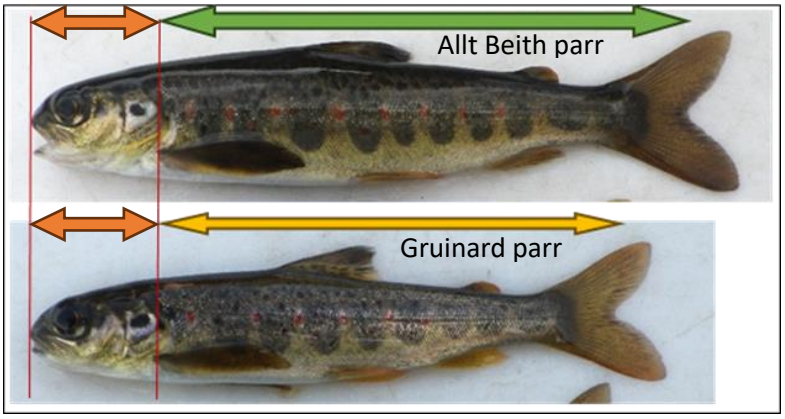
Salmon fry were particularly small for their age at some sites in the Gruinard River, in the Little Gruinard River and in the Coulin River (Ewe headwaters). Some fish looked like they were starving with a disproportionately large head and thin body.

Especially during the late summer, juvenile salmon in some of the wider rivers without riparian trees, woody debris or other nutrient sources entering the river, grow very slowly or not at all because of an inadequate food supply, and perhaps also because of higher water temperatures which causes them to use up their energy reserves faster. Huusko et al (2011) found that juvenile salmon may shrink when subject to harsh living conditions, with shortening of the spine.

How many juvenile salmon populations in Wester Ross have shrinking salmon? Consider the following:

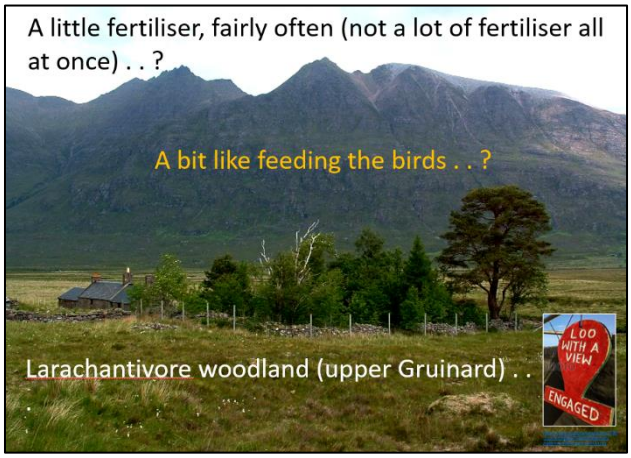
All fish in following photos were returned to water after recovering from mild sedation. (below, left) salmon fry and (right) 2-year old salmon parr from the Gruinard River on 7th September 2023; site NEPS23_03717.

(below, left) Three age classes of juvenile salmon from the Allt Beith. (below right) The parr at the top from the Allt Beith (Aultbea River) taken on 15th August 2023 shown together with a parr from the Gruinard River on 7th September 2023. They are both putative 2-year old parr (scales still to read). Like peas in a pod? No! Contrast the size of the head (22mm for both fish) vs. the size of the rest of the fish. The Gruinard River parr has a disproportionally large head compared to the Allt Beith parr; another indication of inadequate nutrition for juvenile salmon in the Gruinard River. Which one do you think will do best at sea (. . . if it survives to become a smolt)?



Grant applications have been submitted to 'Riverwoods' to develop tree seed source enclosures to help to revive riparian woodlands, rebuild fertility and provide more food to support juvenile salmon smolt production along several important rivers within the Wester Ross area.

Please contact the WRFT Biologist if you might like to sponor a riparian woodland enclosure to help threatenned wild salmon populations and other widlife like this one *(right)* by the Larachantivore bothy in the upper Gruinard River catchment area.



In addition to tree planting, there is also a need to develop short-term means of providing supplementary feed for juvenile salmon at times of year when natural sources are no longer adequate. Marine Scotland Science (now the Marine Directorate) scientists have supported related studies over many years; we look forward to practical guidance at this critical time for wild salmon populations.

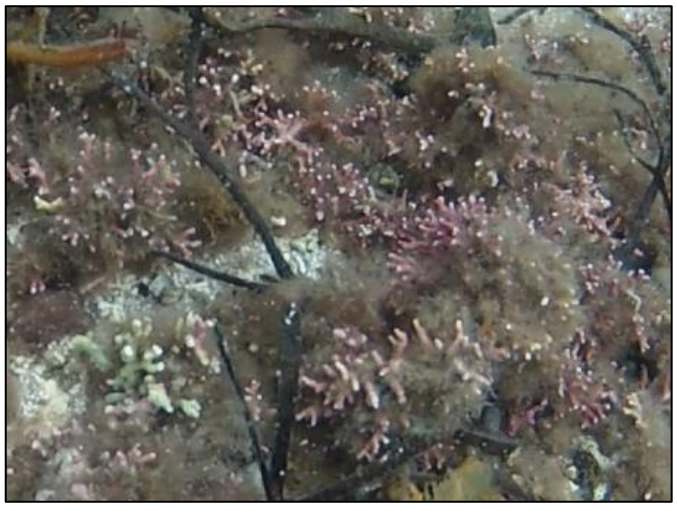
Support for local citizen-science freshwater and marine surveys and monitoring

Thank you to Dr Rebecca Lewis of Buglife for coming to Aultbea in March 2023 to set up a new citizen-science 'Guardians of Our Rivers' group with local wildlife enthusiasts to monitor aquatic invertebrates in the Allt Beith (Aultbea River). The Allt Beith has juvenile salmon, trout and eels; and the loch at the top of the river, Loch a' Bhaid Luachraich, has a population of rarely seen Arctic charr (*Salvelinus alpinus*) and minnows. So there is much of interest for people, young and old, who live nearby. After Buglife training, local volunteers were able to monitor invertebrates at two sites once per month following the Riverfly partnership protocol. Well done!

(right) Nic Butler, Dr Shraveena Venkatesh (Nature Scot graduate trainee) and Dr Sue Ward (WRFT administrator) using the Riverfly partnership guide to learn about aquatic invertebrates in the Coulin River, an important salmon nursery stream in the River Ewe headwaters.

In response to concerns about the prolific growth of filamentous algae on important seabed, the WRFT Biologist carried out surveys to learn more about the health of seagrass and maerl habitats in Loch Torridon where there is much open cage salmon farming. A previously undocmented area of seagrass was recorded to the south of the former netting station by Red Point beach – the extent of this can be seen on satellite images on-line. Previously recorded maerl beds in Loch Torridon were revisited to find out about growth of flimanetous algae on maerl. Video recordings of both the seagrass habitats and maerl beds were shared with members of the Loch Torridon community, many of whom expressed much interest in follow-up surveys to learn more about the health of seabed habitats within Loch Torridon.

(below) Live seagrass and maerl were found by snorkelling in Loch Torridon in June and August 2023. These video stills are of seagrass near Red Point and maerl near the head of Loch Torridon; both habitats are 'priority marine features' but have filamentous algae growing over them, an indication of eutrophication?



Monitoring wild adult salmon

At the time of writing (October 2023) there is much concern about low numbers of wild adult salmon returning from the sea to rivers around Scotland. The 2023 salmon fishing season has a couple of weeks still to run, however reports from anglers and ghillies indicate that for many rivers, the 2023 season will finish with near lowest total catches for rod caught salmon on record. WRFT attempted to obtain samples of rod caught adult salmon for the Scottish Government funded adult salmon monitoring project, however despite support from several estates and from experienced anglers fishing the best beats during the peak of the salmon fishing season, only a handful of fish were seen.

In 1999, the Tournaig trap project was set up to monitor numbers of salmon and sea trout entering a small river system from the sea and numbers of salmon smolts and sea trout smolts emigrating from the system each year. Since then, numbers of adult salmon recorded have fluctuated from over 40 in 2012, to zero in 2021 and 2022. Very high spate flows, especially in recent years, may have enabled some fish to bypass the trap without being recorded. In July 2023, repairs were made to the fish ladder and to the upstream fish trap at Tournaig following damage during a big winter spate flow.

(below) Chris Dossi and Chris Wall repairing the fish ladder and upstream fish trap at Tournaig, and the repaired trap in operation in July 2023. It's the best it has ever been!

Following repairs, three grilse were recorded in the upstream trap, all fresh from the sea: the first adult salmon recorded in the trap since 2020. The fish were lightly sedated, measured, then after recovery, released above the trap to continue their journeys to spawning grounds. Maybe we will find higher numbers of salmon fry in nursery areas in 2024 than in 2023?

(below) Fresh run grilse, taken in the Tournaig upstream trap in July 2023. Photo by Ben Rushbrooke.

Thank you to Chris Dossi and Chris Wall for repairing the fish ladder and trap; and especially to Ben Rushbrooke (who can usually be found at Tournaig Garden Cottage Nursery) for also looking after and operating the traps over many years. The Tournaig trap project is supported by MOWI.