

West Sutherland Fisheries Trust



Old by-pass channel above loch na Daill (S. Marshall)

2020 Annual Review

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Charity No. SC024426

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Assistant Biologist:		Adam Beynon-Jones
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Chairman's Foreword

It gives me great pleasure to write the foreword to this Report for you.

Its aim is not just to inform you about our activities in the last year; it is to help communicate our research and data to you, and so help us achieve our charitable purpose of education.

None of this would be possible without the hard work and dedication of our permanent staff (all two of them!), occasional contract staff and our volunteers and the money from our funders, and I thank them all heartily.

I must also pay tribute to Nick Joy, my predecessor as Chairman, who steered us well, and to Charles Marsham, one of our original trustees and himself a former Chairman, and to Dick Haldane, both of whom stood down as trustees last year. Thank you all three.

As recommended by the Office of the Scottish Charity Regulator, we have carried out a periodic review of our governing document and our governance generally. As a result, we have adopted a set of regulations to supplement the provisions of our 1996 governing document, based on a SCVO template, and the Board has resolved to convert the Trust to a two-tier Scottish Charitable Incorporated Organisation. We believe these changes will provide a structure for the Trust which will be better suited for the conditions of the 21st century, and we hope to complete the conversion process by the end of 2020.

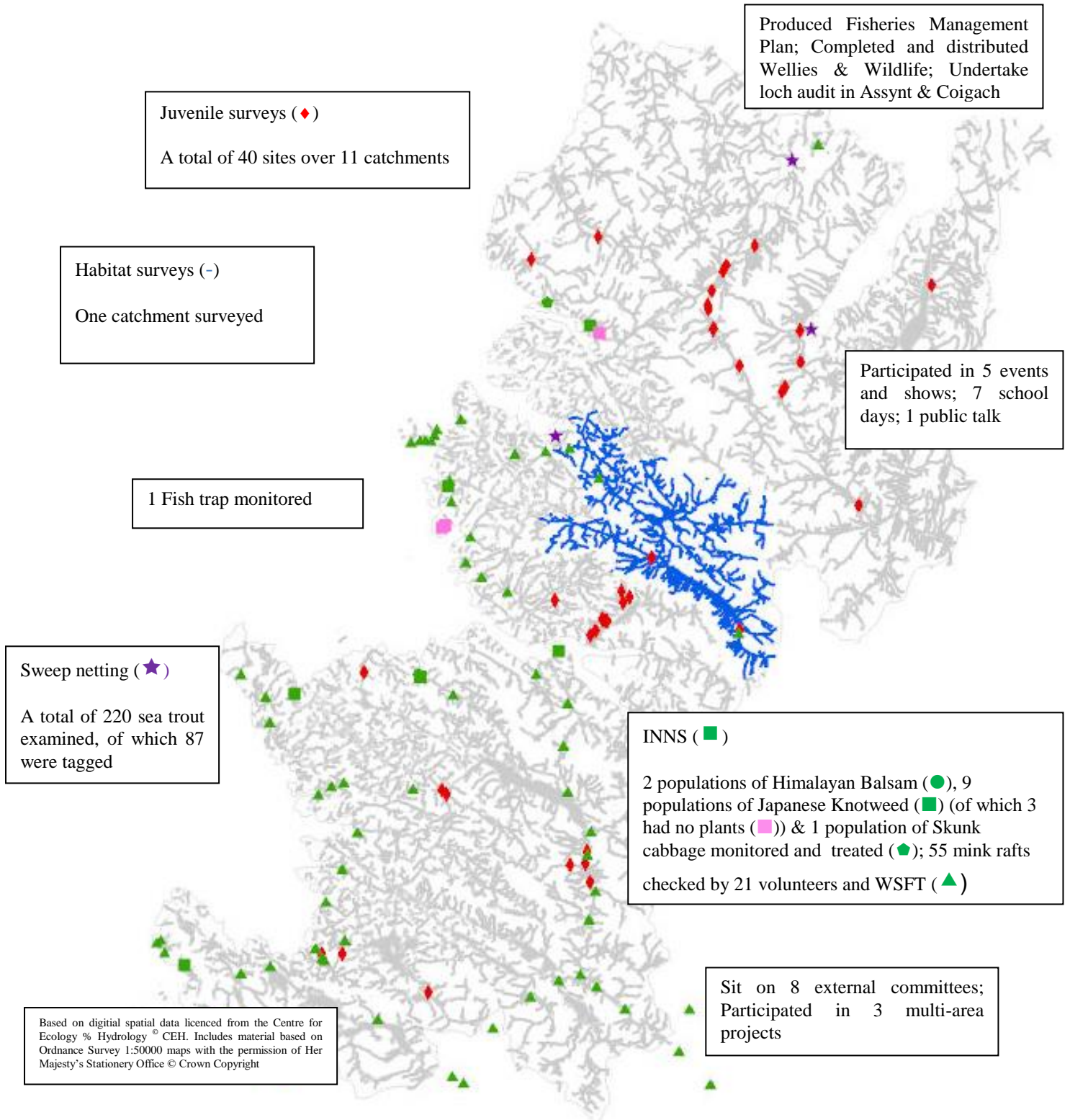
However, as I am writing this, the covid-19 virus pandemic is just taking a grip and we do not know just how much of our 2020 work programme we will be able to achieve. But we will do the most we can within the recommendations and regulations that are given by the Scottish and UK Governments.

Stay safe and well!

Simon Jeffreys

A summary of 2019

This gives a brief summary of some of the field work undertaken by the WSFT during 2019. Further details of the different projects are available in the rest of the document or from the Biologist.



Introduction

The **West Sutherland Fisheries Trust** continues to work towards the conservation and restoration of fish populations. Now entering its twenty fourth year, the information database for the Trust area continues to grow and provide useful data for owners, managers and policy makers. In addition, the Trust retains strong links with a variety of organisations and individuals throughout Scotland, and looks forward to cementing these links in the coming years. These links enable the Trust to move towards the integration of management within the Trust area.

Within the Trust area we are developing projects and practical management tools with a variety of local organisations, including Angling Clubs, the Highlife Highland Ranger Service, the schools system, estates and community groups. These collaborative projects not only assist the Trust with its work but also further integrate it into the local communities, while taking us into a range of different habitats. It is to be hoped that the Trust will continue to be seen as a valuable resource within the community – both to managers and the general public – providing helpful advice and educational opportunities that can be called upon at any point.

Locally, 2019 was a wet year, in contrast to 2018. A very dry April and May were followed by a soggy summer, with a few dry days followed by a few wet making electrofishing difficult. From an anglers point of view the wet weather meant that fish were seen or caught throughout the season. As with the electrofishing, netting was affected over the year, with few events possible (see p. 12).

The mink initiative, now part of the Scottish Invasive Species Initiative, continues to operate under the management of the Trust and we are extremely grateful to all our volunteers for making this possible. There have been more potential sightings this year, although no captures. The volunteers always rally, increasing efforts following sightings and it is to their credit that we remain a relatively mink free area (see page 18). Unfortunately monitoring of the Assynt water voles by Aberdeen University has revealed a collapse in the population. This sort of effect is often linked to an increase in the number of mink and, although no signs have been seen, monitoring effort has increased around the Assynt area.

The Trust would like to take this opportunity to thank the many individuals who have given time and effort to assist with the work programme. Without these committed individuals we would not have the range of information and data currently existing and would therefore not be in the present position of offering advice and guidance to the many owners and managers within the area. In addition, much of the restoration work and biosecurity actions currently in progress would be much further behind.

Partnerships

The Trust continues to maintain a close relationship with partner organisations in Fisheries Management Scotland (FMS) and the Scottish Fisheries Co-ordination Centre (SFCC), and national organisations such as Marine Scotland Science (MSS), Scottish Environmental Protection Agency (SEPA) and Scottish Natural Heritage (SNH). This allows the Trust to access a vast wealth of expertise and information as well as enabling the targeting of research to better further our aims.

The Trust also works closely with the local District Salmon Fishery Board, and the local estates, in order to assist with the management of the area. By providing advice on local issues, as well as assisting with any statutory consultations that arise, we hope to ensure that the fish and their environment are supported and protected. In particular, we are able to provide advice and guidance on stocking, fish farm applications and the Conservation Limits, as well as the use of habitat improvements within the area.

The Future

The WSFT will continue with its current work, maintaining and developing the many datasets and using the data to inform management decisions. It is hoped that we can enlarge the research programme and enhance the many links currently in existence with individuals and organisations. In order to do this, it is reliant on the generosity, both in terms of time and financial aid, of its many supporters, enabling the Trust to move forward with the development of management policies within the area.

Biosecurity remains an important issue for the Trust, in an area that remains relatively free of invasive non-native species (INNS). We hope to keep it like this, operating to decrease the numbers and potentially make the area free of Himalayan Balsam and Japanese Knotweed (see p. 18). 2019 saw the continuation of the Scottish Invasive Species Initiative (SISI), an HLF funded programme of work managed by SNH and involving a number of Trusts throughout Scotland. This will provide funding to enable us to increase our current programme and develop out educational role. In addition, the importance of volunteers to report sightings and locations cannot be over-emphasised. While we have hopes of eradicating some INNS, the presence of rhododendron is a larger problem. It will require a more intense effort from everyone but the results will be worth it as the native vegetation returns and the rivers improve.

The Trust will continue to assist community groups and land managers with practical fisheries management and advice. It is hoped that restoration programmes, as laid out in the Catchment Management Plans, will be developed and progressed. The Trust is always available for discussion and should be contacted if you have any queries or suggestions.

The Trust would also like to further develop the educational aspects of our remit through talks, demonstrations and small “hands on” projects. As in previous years this is likely to involve the Ranger Service and schools, although it is hoped that other groups and individuals will also access this service. Shona is a Science and Engineering Ambassador and therefore can also be accessed through the STEMpoint network. This has the potential to extend our educational remit, and information about the Trust, beyond the local area.

During 2020 the Trust will be participating in a salmon project managed by the Atlantic Salmon Trust. A widespread collaborative project, the aim is to determine the salmon migration routes along the west coast of Scotland. While west Sutherland will not be involved in tracking salmon during 2020, we hope to gain more information on the smolt runs in order to determine suitable populations for tracking in 2021.

The emphasis will continue to be the wellbeing of native wild fish in the West Sutherland area and the Trust will represent them where required and defend their interests where it is felt that these are being ignored. The WSFT and its representatives feel that all populations are important, irrespective of size, and that their protection and enhancement are vital to the survival of these magnificent species.

The Trust was sorry to hear of the death of our long term volunteer and supporter, Dave DeBoer, in 2020. He will be missed by all.



Dave DeBoer, doing what he did best (A. Beynon-Jones)

Catches within the West Sutherland area

While catch statistics are generally used to determine the trends in salmonid populations, it must be recognised that there are a number of potential inaccuracies and inconsistencies inherent within this method. These include the following:

- The numbers of fish noted within the tables relate only to those fish recorded within the books. If anglers fail to report all or part of their catch then the figures will be an under-estimate of the total.
- Angling effort varies between years and is not recorded. A change in effort, either number of anglers, experience or time spent fishing, will be reflected in changes in the catch statistics.
- Weather and river conditions affect the number of fish within the systems and their catchability. Thus a low catch in a dry year may not reflect a poor adult run, simply the timing of the run and the ability of the angler to catch fish.

This leads to the view that the relationship between catches and stocks is complex. Catch records do not reflect the number or quality of fish in the system, but rather the angler ability to catch them under the conditions experienced at that time. Catch figures are therefore most valuable when it comes to expressing long-term trends.

2018

The official catch statistics for salmon and sea trout in Scotland have been published (<http://www.gov.scot/Topics/marine/Publications/stats/SalmonSeaTroutCatches/Data>) and the data for the West Sutherland area are summarised below (Table 1). These statistics are frequently used to indicate long term trends in populations, by region. By extracting the data relevant to the WSFT area, we can gain a greater understanding of the situation, as represented within this area. The data are given as an amalgamation of several rivers, as previously reported by Marine Scotland (Fig. 1). This is the result of a requirement of the Scottish Executive to mask the catches from individual systems in order to retain the confidential nature of the data.

Table 1 The number of wild fish caught by rod and line, by Fishery district

Fishery Board		Salmon & Grilse	Sea Trout
Hope & Grudie	2018	233	1019
	(2017)	(401)	(530)
	5 yr. ave.	400.6	864.6
Inchard – Kirkaig	2018	204	271
	(2017)	(525)	(296)
	5 yr. ave.	419	339.4



Fig. 1 Map showing the location of the WSFT area and the 2 areas described in the table (pale grey = Hope & Grudie; darker grey = Inchard – Kirkaig)

Total salmon catches within the area were once again down on the 2017 catches, with both areas showing a significant decline. This decline was repeated around Scotland, and may reflect in part the extremely hot, dry summer experienced.

The proportion of salmon released within the area during 2018 has increased, such that only 1 salmon was retained over the year and that from the south. The high release rate is encouraging to see and it is to be hoped that it will remain at this level in the future. While it is known that released fish can be re-captured on several occasions, thus influencing the suitability of catch returns to estimate adult runs, it is important at this time of low marine survival to release an increasing number of fish in order to increase the spawning stock. Remember, the fish in the freezer or on the table cannot breed!

Sea trout catches within the area increased considerably during 2018, with the slight decline in the south being amply compensated by the significant increase in the north. This increase, where catches returned to similar levels to those seen in 2016, is likely to reflect the increased fishing effort on the Hope and Polla during 2018 (and reduction in effort in the same area

during 2017). There was 100% catch and release seen in the Hope & Grudie area, while a total of 32 fish were retained in the Inchard – Kirkaig area. This gives an overall total of 98% of fish released and is encouraging. However, it is disappointing to see that only 88% were released in the south and it is to be hoped that this will increase in the future to levels previously witnessed, particularly while the status of this species remains precarious.

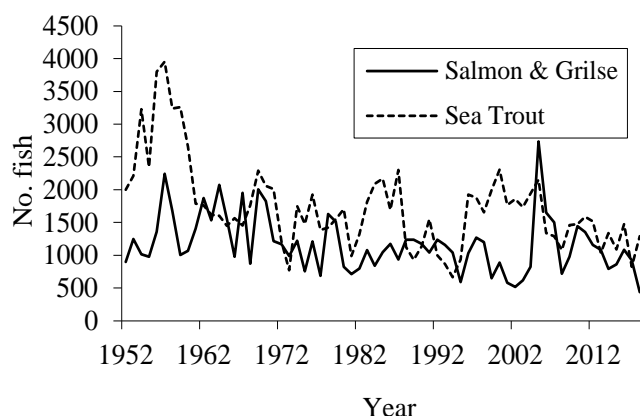


Fig. 2 Rod and line catches within the West Sutherland area, 1952 – 2018

2019

Catch data for the 2019 season are being compiled and will be produced by Marine Scotland Science in 2020. However, some information is available from angler logs and fishing books. Reports indicate a better season throughout the area, with catches of well-conditioned fish being reported throughout the year. Many of the fish from July on were 'stale' but not overly coloured suggesting 2 – 3 weeks in the rivers. Few fresh fish were taken at this time.

Catch and release continues to be an important fisheries management technique within the area and has been adopted by a number of estates. It is to be hoped that this continues to be used, and hopefully increased, by the various estates and their angling clients, adding as it does to efforts throughout the area to improve the situation for fish populations through biosecurity, removal of non-native species and habitat improvements amongst others.

The new conservation limits for the area have been produced, with several rivers moving category (see p. 22). The model has not been altered for 2020, so movement should reflect alterations in catches and a better understanding of the underlying figures within the model. It is to be hoped that all anglers will continue to return fish, despite these changes. While sea trout are not affected by this legislation, the continuing low levels of catches would suggest that catch and release is of equal importance to this species.

All information on the fish populations within lochs and rivers is important when undertaking fisheries management. Any further information that can be provided will be gratefully received, particularly on the brown trout lochs within the area.

A survey of juvenile abundance

Electrofishing surveys are designed to assess the juvenile populations within a system. The equipment operates by creating an electrical field within the water that at first attracts and subsequently stuns them for a brief period, at which point the fish can be netted out and examined under anaesthetic. The Trust has a rolling programme of surveys, with most sites visited every 2 years, while a small number may be sampled annually. When possible all sites are revisited, although some may not be accessed due to time and flow constraints, while others may be added. In 2019 very few repeat surveys were undertaken as we assisted with the National electrofishing survey, developed by Marine Scotland. This involved fishing in specified locations around the area.

The average densities of fish within each catchment are summarised (Table 2). This allows comparison between the catchments, although it should be noted that temporal changes in density throughout the summer months and habitat differences between catchments are not considered in this table, and neither is the number of sites per catchment. The timing of sampling is important, with fish moving within the tributaries as a result of water height and temperature, food availability and size. Thus sampling after a spate may give a low density as a result of washout, whilst drought may decrease density as fish move into deeper water to avoid predation or desiccation, or may increase density as a result of concentration in severe cases. Similarly, densities will be greater shortly after hatching, reducing with time as the fish grow and require a larger territory for survival.

Table 2 Average densities of salmonids per catchment surveyed

Catchment	Average density (100m ²)			
	Salmon fry	Salmon parr	Trout fry	Trout parr
Hope	1.93	3.69	6.16	2.89
Polla	4.97	5.08	2.07	1.36
Dionard	8.78	3.71	0.26	0.35
Oldshoremore	0.00	0.77	0.00	5.42
Sandwood	0.92	8.30	0.92	1.84
Laxford	5.45	11.44	0.29	3.44
Duart	0.00	0.00	25.64	0.00
Maldie	0.00	0.00	16.75	11.63
Oldany	0.00	9.26	7.40	0.00
Inver	11.22	14.52	3.35	1.34
Polly	15.96	4.75	3.93	1.02
West Sutherland area average	5.74	5.30	6.47	3.88

There is a good distribution of salmonid species throughout the West Sutherland area with trout present in every system surveyed. Within salmon dominated systems, juvenile salmon densities were largely moderate to excellent.

Discussion

As NEPS has been developed as an addition to the Salmon Conservation Regulations, attempting to bring juvenile densities into the classifications, the sites are selected on the basis of their accessibility to salmon. As such, the presence of salmon at each site is to be expected. The Duart is the only NEPS site where this did not hold true and is likely to reflect the size and location of the site and the potential presence of an unknown barrier downstream. The Maldie, not sampled as NEPS sites, is above an impassable waterfall and as such only trout would be expected. Trout were present in all catchments and this reflects the more generalist nature of the species.

The densities observed at each site are a reflection of the habitat present as well as the status of the fish population *per se*. Salmon and trout, as well as fry and parr, tend to use different habitats and this is reflected in the results obtained. Despite the selection of the sites for salmon presence, with the exception of the Maldie, the random nature of the site selection ensured that there was no bias in habitat selection and that the results reflect a broad assessment of the west Sutherland population as opposed to that of individual catchments. There does, however, appear to be relatively healthy salmon and trout populations within the area.

The presence of other species is also noted in these surveys (Fig. 3). While not the primary aim of the programme, these data give additional information on the health of the fish populations, and particularly the endangered eel. It is encouraging to note that eels are present in all catchments surveyed, with the exception of the Duart, Maldie and Inver. In the case of the Duart and Maldie this is likely to reflect natural barriers within the systems, particularly as no salmon were found either. However, with the Inver this is more likely to be the result of a man-made barrier within the main river and further assessment and remediation should be considered.

Minnows are not native to the west Sutherland area and as such their presence is the result of historic stocking, primarily by bait fishermen. While no longer legal, this activity has had long term impacts. Minnows have been shown in other areas to have a negative impact on trout populations through competition and as such it was disappointing to find them in the Laxford, Oldany and Polly catchments, although at a low number of sites overall.

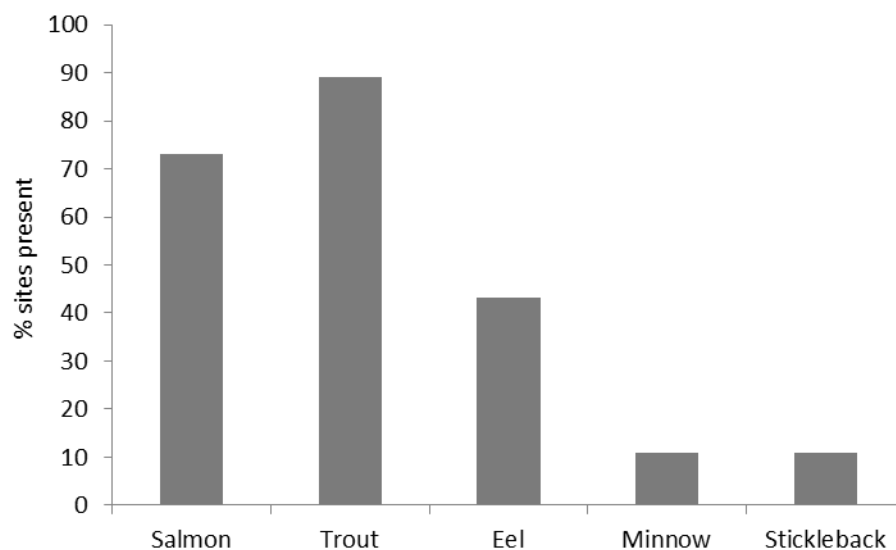


Fig. 3 Species composition and distribution per site

The Bad na Baighe Smolt Trap

A mobile smolt trap was deployed in Bad na Baighe from 11.4.19 to 19.5.19. A temperature recorder was placed in the trap, set to record hourly for the duration of the project.

2019 was an exceptionally dry spring and as such the trap did not flow for much of the sampling period. While attempts were made to dam the trap and keep it flowing this did not have a significant effect on the fish movement, which would be governed by conditions throughout the burn. As such, it was decided to remove the trap early and allow the smolts to run unimpeded.

Water temperature remained relatively static during the trapping period, with diurnal fluctuations dominating (Fig. 4). There was a dip in temperature towards the end of the study period before it rose again. Salmonids require a temperature of about 7°C before starting to move, and this temperature was exceeded for most of the study period.

Salmon dominated the smolt run during 2019 (Fig. 4). Badna Bay has always been considered as primarily a trout system, with a small but significant salmon run. These results would suggest that this situation is changing, repeating as it does the results from previous years.

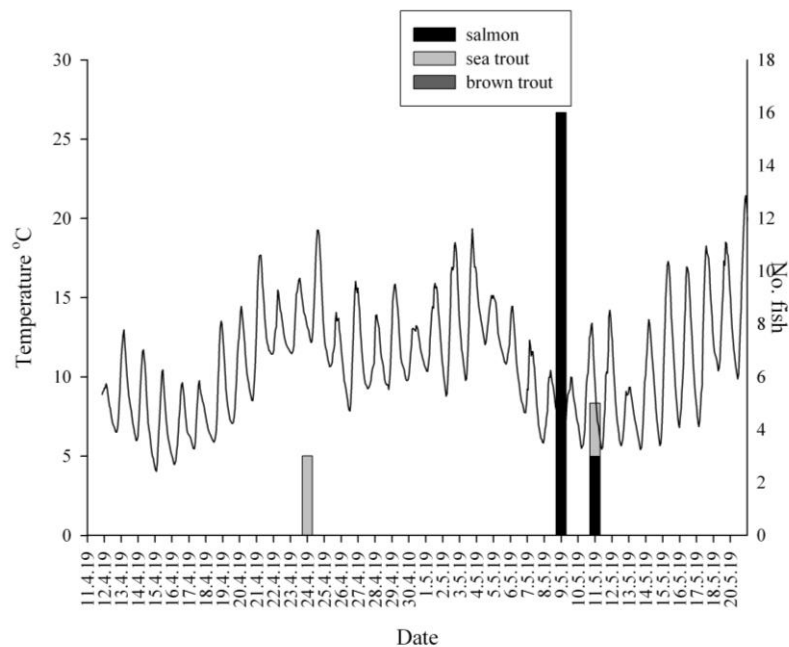


Fig. 4 Showing the temperature regime within the river (line) and no of fish caught on each day (bar)

Monitoring of sea trout post-smolts

Introduction

Started in 1997, this project was originally designed to give an indication of the migrations and growth of sea trout within the area. The individual tagging of fish, combined with the measurements taken at capture, gave a baseline from which to assess these parameters following re-capture by nets or rod and line. In addition to these data, the numbers of sea lice were also assessed. This has now progressed, such that sea lice counts are the most important part of the project, with the tagging of fish giving additional information.

Materials & Methods

Three estuaries, Laxford Bay, the Polla estuary and the Kyle of Durness were sampled monthly where possible from April to September. A total of 218 fish were individually measured and scale samples taken, of which 87 were tagged using a visible implant tag behind the eye. The fish were also examined for the presence of sea lice, which were counted and staged.

Results and Discussion

The fish caught were of varied age and length, reflecting a mixed population structure. The age structure in the three estuaries was similar, although the Polla produced a greater number of mature fish. The predominant smolt age in the rivers is 2 years (S2), although there were a number of S3's also present. S1's were also observed in small numbers in all 3 estuaries. The length distribution of fish within the estuaries was also similar, with post-smolts dominating each estuary. A May smolt run is normal for the Sutherland area and this is supported by these data.

The presence of post-smolts at all sites throughout the year indicates a heavy usage of estuaries by this group, presumably for feeding and shelter. Further information on the usage of the estuary by sea trout will be acquired from the Laxford sea trout tracking undertaken in 2018 reported on Page 23. The condition index was good, although the number of sampling occasions with weight data was low.

Sea Lice Infestations

Sea lice were present to a varying degree in all estuaries throughout the year. The exception to this was July in the Laxford, when no lice were observed. Each estuary showed a mixture of lice stages, with the Chalimus stage dominating. The total number of lice was highest in both Laxford and Polla during May, and highest overall in the Polla. However, the total lice number per sample is dependent on sample size and the use of abundance and intensity data give a better assessment of the situation.

Laxford

Lice were present within the Laxford during May and June only, at relatively low densities. The pattern of lice present in the June sample would appear to reflect a wild population, as demonstrated by Gargan, *et al.* 2003. While Chalimus dominate the May samples *Caligus* were present during May only, with a total of 32 lice on 6 fish.

The neighbouring cages contained fish at the start of the survey period, being harvested out before the end. Lice numbers were low throughout the year with *Caligus* dominating the population. The numbers seen and the pattern of infection do not mirror the densities within the sweep net.

Polla

Lice were present in significant numbers during May, with *Caligus* also present in high numbers. Although the abundance declined significantly in July, there were still high numbers of lice present. *Caligus*, however, declined in July, being present on only one fish (4).

Within the neighbouring cages, numbers of adult female lice over this period are given below. There was an increased number of adult female *Lepeophtheirus* on the Sian cages in April, subsequently followed by a decline. This pattern was reversed at the Kempie site, where low numbers were followed by an increase in numbers from June.

	Kempie	Sian
April	0.39	1.00
May	0.25	0.59
June	1.60	0.50
July	1.25	0.08
August	1.42	0.38
September	F	0.67

Kyle of Durness

Lice were present within the Kyle of Durness sample. Densities were low and there was a mix of stages present. There were no *Caligus* present on the fish sampled.

A risk assessment of the lice numbers present within the wild trout

Taranger, *et al.* (2014) gives a method to assess the increased mortality risk to salmonid populations based on the number of lice present per gram of fish. This is based on physiological effects determined from laboratory experiments taken from literature, and the use of sentinel cages within fjords.

The data are treated differently depending on fish size and give a potential increased risk of mortality to each fish, with increasing risk as the number of lice increase. Thus, 0.1 – 0.2 lice/g will give a 20% increased risk of mortality to a salmonid of < 150g. In order to determine the likely population effect, the proportion of fish within the population appearing in each band is calculated and a population risk determined. The results by year for each estuary are given in Fig. 5. The banding indicates whether the risk is low, moderate or high. Within the low zone it can be taken that there is minimal risk to the population, while the moderate and high zones show potentially population altering impacts.

From this, it can be seen that the potential risk in the Polla estuary during 2019 were considered to be high, indicating that population changing effects are likely to have occurred in this area. In contrast, the Laxford and Kyle of Durness showed a low potential risk. The Laxford and Polla data continue to show a biannual pattern in risk, reflecting the stage of production within the farm.

Sampling within the Kyle of Durness has been more restricted than the other 2 estuaries, but there would appear to be no real pattern within the data. However, the peaks in potential risk do appear to follow the Laxford more closely than the Polla. While not significant, it may reflect the tidal flows around the west coast.

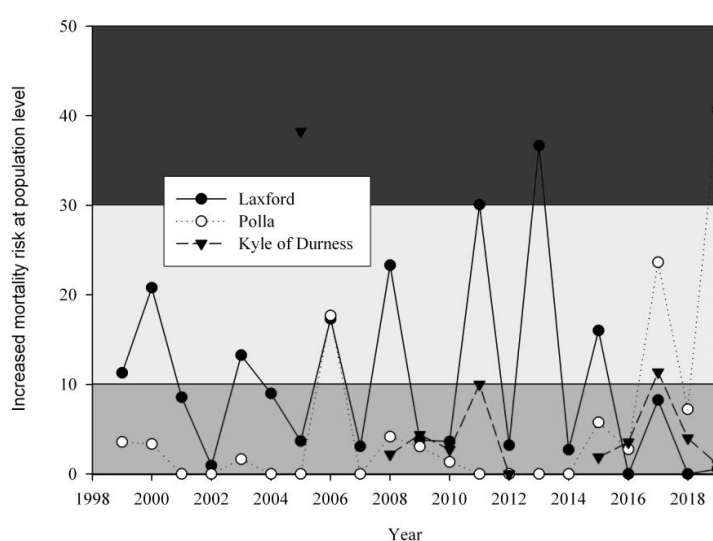


Fig. 5 Showing the increased mortality risk at population level created by sea lice

The full report of this project can be downloaded from the website or obtained by contacting the Biologist. Videos of the sweep netting process are also available to view on the website, Facebook or Youtube (<https://www.youtube.com/user/WSFTrust>).



Sundew (S. Marshall)



Mink raft, in situ (S. Marshall)



Follow me boys.... (S. Marshall)



Bog wood appearing (S. Marshall)



This weever can give a sting (S. Marshall)



Who's watching me? (S. Marshall)



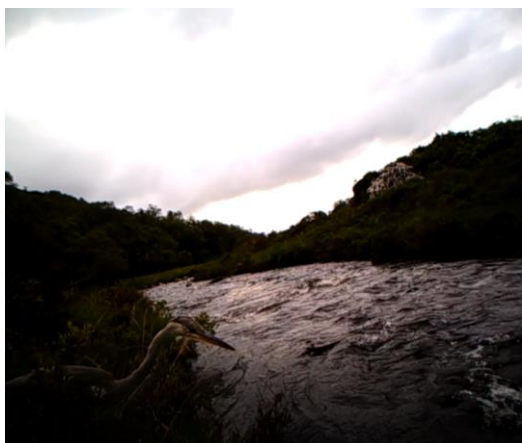
The weather coming in (S. Marshall)



Loading the injector (R. Wright)



Guarding the fish! (H. MacDonald)



I'm waiting..... (S. Marshall)



A good catch at the netting (S. Marshall)

Loch Audit

During 2018 and 2019 data were collected on the fish populations in 20 lochs within the Assynt & Coigach area. Sampling was undertaken by either gill netting alone, a combination of gill netting and angling or angling alone. This combination allowed a greater spread of lochs to be sampled than the use of gill nets alone.

Gill netting was undertaken in 11 lochs around the area. Two multi-mesh survey gill nets were set by boat and allowed to fish for several hours before being retrieved. The nets were set in different locations, with one closer to the shore and the other towards the middle of water body. After retrieval the nets were emptied and the fish returned to the laboratory. Species, length and weight were recorded and a scale sample taken before the fish were dissected in order to determine sex, diet and parasite loading.

Anglers were also supplied with scale packets and details of how to collect scale samples. They recorded date, location and length, together with any comments on the appearance of the fish. All scales were read and back calculation used to determine length at age for all fish.

Species

Trout, Arctic charr and minnows were recorded in the samples. No salmon were taken, despite known populations in some of the lochs. Similarly, due to the methods used, no eels, flounder or stickleback were taken.

Trout were the dominant species found, with minnows also taken in 4 of the 11 lochs sampled by gill net and Arctic charr in 3. Historic records show charr present in a further 3 of the lochs sampled by rod and line, and minnows noted in 2 of the rod and line only lochs. Arctic charr were also recorded in Loch Uidh na Geahaig, a population not previously recorded in literature.

The presence of the invasive non-native minnow reflects an historic use of bait fishing as an angling method within the lochs. Minnows are a fast breeding fish species and known to impact on the trout populations in many of the lochs in which they are found. Bait fishing is now illegal, as is the unlicensed movement of fish between water courses.

Diet

Diet was found to be mixed, with fish from the same loch generally showing similar diets. Given the opportunistic nature of a trout diet this is as expected and reflects prey availability at that point in time. In general, therefore, each loch demonstrated either a planktonic, aerial or benthic diet. However some fish were found to have a more cosmopolitan diet, with both aerial insects and benthic prey within their stomachs.

Growth rates

The average length at age for the Assynt-Coigach area is given in Fig 6. While variations exist between the lochs, length at age is broadly similar throughout the area. The exception to this was Loch Scionascaig, which returned larger fish but with a generally slower growth rate in the earlier stages than the other lochs.

A change in growth rate was observed at about 7 years of age, when the growth rate increased significantly. While this is based on a small sample size – one to two fish – it is likely to be indicative of a change to a more fish based diet.

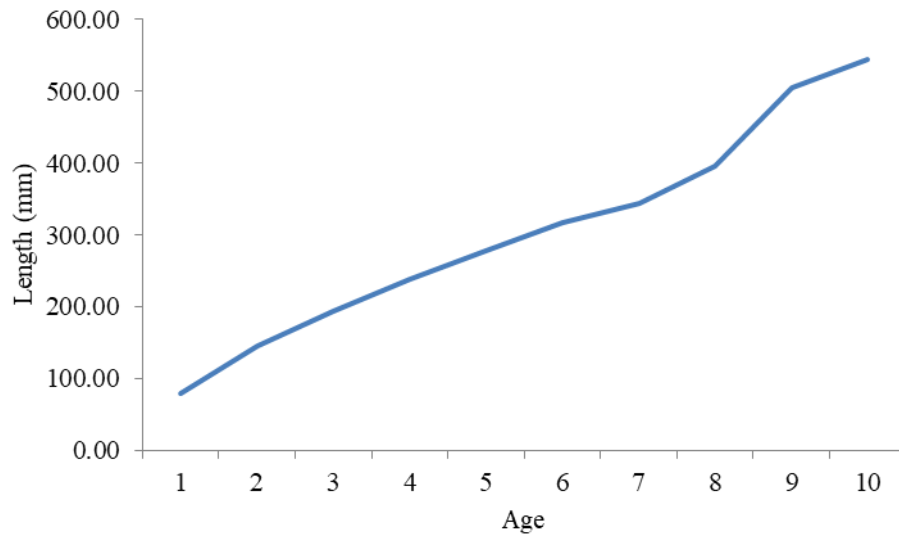


Fig. 6 Average length at age for the Assynt & Coigach trout populations

Parasites and health

The fish examined were in good condition, with 95% having a condition factor >1 . This reflects relatively healthy populations, with no particularly thin individuals encountered. In addition, while present in several of the fish examined, parasite densities were not high in any individual.



Recovering the net (A. Rawlings)

Biosecurity Management

The Trust are partners in the Scottish Invasive Species Initiative (SISI), a 4 year partnership project covering an area of over 29,500 km² and involving 10 fisheries trusts and boards. As part of the project we will be continuing and developing the work started in 2009. We will also be updating the Biosecurity Plan for the area. SISI is being funded by the Heritage Lottery Fund and Scottish Natural Heritage.

Awareness Raising

Undertaken at the Ghillies Seminar, Trust Meetings, the DSFB meetings, the Highland Field Sports Fair, Scourie Gala and Assynt Highland Games, as well as on Facebook and Twitter, issues of Biosecurity and the presence of Invasive Non-Native Species were raised regularly. In particular, the need to disinfect equipment between catchments and the need for added awareness and reporting with regards to non-natives within the area were highlighted.

Biosecurity is an important issue within Sutherland as there are few non-native species present compared to many other areas within the UK. This can make people blasé to the risks posed and the need for care and vigilance. It is important to prevent the spread of non-native species into the area and it is incumbent on all residents and water users to play their part. Gardens, ponds, fishing tackle and water sports equipment are all routes of infection and ones that should be easy to block if care is taken.

American Mink

A network of rafts and tunnels was established as part of the now obsolete Scottish Mink Initiative, monitored by volunteers and Trust staff. This network has been maintained, thankfully with few sightings and only one mink captured. This would suggest that the population is currently small, possibly comprising of roaming males.

However during 2019 we received information that the water vole population had collapsed in Assynt. This is often seen following the arrival of mink into an area, and followed on from more sightings and potential tracks than usually found by our volunteers. As such, there was a concerted effort made to increase the network and deploy traps where signs were seen. We are very grateful to our volunteers, both old and new, for rising to the occasion and helping with the traps and new rafts. Despite their many efforts there have been no captures or further sightings, although we will be continuing the monitoring network.

WSFT is extremely grateful to all our volunteers for their assistance with this project. Without the time and commitment donated by these individuals we would be less able to protect this area against invasive species. If you would be able to look after a mink raft then please contact the Biologist and we'll get you set up. Any mink sightings, or potential sightings, should be reported to the Biologist. This information will then be passed on to the relevant volunteers.

In addition to the mink rafts, WSFT have been trialling the use of trail cameras to monitor for mink. With camera's covering 2 systems we have thankfully not seen any mink, although have a surfeit of deer and sheep – together with star turns from other species. Funded by Scottish Natural Heritage, this provides another means of monitoring in an area with a small human population and could be rolled out in other areas.

Himalayan Balsam, Japanese Knotweed & Skunk Cabbage

2019 saw the Biologists and their intrepid volunteers once again descending on Nedd and Clashnessie to remove any Balsam plants spotted within the river corridors. It is getting increasingly difficult to find these plants, although there are occasional eruptions in numbers in some areas. Thanks go to all those who gave up their time in order to improve the habitat in a small part of Sutherland. This area has been treated since 2010 and it is encouraging to see the success of the operation. While the resilience of the seed bank means that we will have to keep monitoring for a few more years we are all encouraged by the results and hope to make the area 'balsam free'.

Japanese Knotweed is also present, although in small patches. In 2015 it was decided to assess some of the known populations, and put out requests for records of others. Treatment of some of the populations

was then started. Treatment of these populations has continued, with a large decline in the number and size of plants observed. This has made for a more difficult treatment policy, with many of the plants too small to inject and therefore requiring spraying or spot treatment where possible. Treatment has also started on a number of other stands within the area. These plants appear to have a persistent seed, or root, bank and there will remain a need for vigilance in all areas. However, again the success of the treatment is encouraging with no plants found in 1/3 of the monitored area this year.

Skunk cabbage was reported to us in 2017 and the first treatment carried out in 2018. While the treatment did not appear to show major effects it is hoped that we can get on top of this as well by continual treatment. As with the other species, there are few populations within the area and eradication will hopefully follow.

Pink salmon

Pink salmon, native to the Pacific coasts, were introduced sporadically into Russia since the 1950's and have spread to Norway, Sweden, Ireland, Great Britain and Iceland. They have a 2 year life cycle, so 'odd' and 'even' year fish never interbreed. In 2017 there was a large number of pink salmon observed within Scottish rivers. It was therefore feared that 2019 would also see an influx of this species.

While pink salmon were once again observed around Scotland during 2019, the numbers reported were much lower than in 2017. Within West Sutherland only one fish was captured, this in the sweep netting surveys. While it is unlikely that this was the only pink salmon within the area, it demonstrates that the expected 'invasion' did not happen. However, it is important that we remain vigilant and that any captures and sightings are reported and samples collected. Pink salmon can be expected to appear again in 2021.



Pink salmon (S. Marshall)

Plans for 2020

We will continue to push the issue of biosecurity and the need for everyone to play their part in the prevention of the spread of non-native species. At the same time, we will be monitoring the area for the presence of non-native species and would welcome reports from members of the public.

The mink monitoring network is an important part of the INNS work, and the Trust and our team of volunteers will continue to monitor rafts and respond to sightings. The Trust is a contact point for any new sightings or the collection of carcasses, and is happy to respond to any calls. Carcasses will be sampled and passed to Aberdeen University for future genetic analysis.

Treatment against *Gyrodactylus salaris* (Official Scottish Government Guidelines)

1. Drying to a minimum temperature of 20°C for at least two days
2. Heating to above 60°C for at least one hour
3. Deep freezing for at least one day
4. Immersion of materials in a solution of, or addition of one of the following chemicals to water to the concentration indicated:
 - Virkon* 1%
 - Wescodyne* 1%
 - Sodium chloride 3%
 - Sodium hydroxide 0.2%

The Check, Clean and Dry Campaign

Principles

- Non-native species could be spread in any water or material. If you are visiting water bodies there is a real risk that you could spread harmful organisms unless you follow good biosecurity practice.
- Biosecurity means taking steps to make sure that good hygiene practices are in place to reduce and minimise the risk of spreading invasive non-native species. A good biosecurity routine is always essential, even if invasive non-native species are not always apparent.
-

Check, Clean, Dry disinfection procedure

- Check - All clothing and equipment should be thoroughly inspected and any visible debris (mud, plant or animal matter) should be removed and left at the water body where it was found. Particular attention must be paid to the seams and seals of boots and waders. Any pockets of pooled water should be emptied.
- Clean - Equipment should be hosed down or pressure-washed on site. If facilities are not available equipment should be carefully contained, e.g. in plastic bags, until they can be found. Washings should be left at the water body where the equipment was used, or contained and not allowed to enter any other watercourse or drainage system (i.e. do not put them down the drain or sink). Where possible, clean equipment should be dipped in disinfectant solution (e.g. Virkon) to kill diseases, but note this is unlikely to kill non-native species.
- Dry - Thoroughly drying is the best method for disinfecting clothing and equipment. Boots and nets should be hung-up to dry. Equipment should be thoroughly dry for 48 hours before it is used elsewhere. Some non-native species can survive for as many as 15 days in damp conditions and up to 2 days in dry conditions, so the drying process must be thorough.

Further details from: <https://secure.fera.defra.gov.uk/nonnativespecies/checkcleandry/>

Education

Education forms a large part of our remit and the WSFT are particularly keen to get involved with schools and colleges within the area, as well as giving talks and demonstration to adult groups. It is considered to be an important link between the Trust, the general public, nature groups and the local community. It is a medium whereby scientific research data can be available to those interested in it.

Ghillies Seminar

This annual event provides an opportunity for the Ghillies, managers and interested anglers within the area to meet and discuss what's happening in their rivers as well as question some experts in the fields of fisheries management and salmonid biology. A platform for those working in the field to discuss issues that affects them directly, it is also a two-way process not only moving information to the workers, but also taking suggestions and ideas to the scientists and policy makers.

This year's seminar was a mix of different topics linking some of the work of the Trust. Chris Daphne started off with a review of the conservation and protection of freshwater pearl mussels. After lunch we moved on to look at sea trout tracking studies around the west coast, including Loch Laxford. We finished with a discussion on Biosecurity – the why's and how's.

There was keen participation and a genuine desire to address issues particular to this area, with feedback forms enabling future events to be tailored specifically to the audience. The meeting was well received and the notes can be found on the Trust website.

School days

During 2019 we worked with 3 of the local primary schools, undertaking a range of different activities in both the freshwater and marine environments. From newt safari to electrofishing, pond dipping to rock pooling, the children were introduced to a number of habitats and species, their threats and potential conservation. The enthusiasm shown for the natural environment is heartening and should be encouraged at all stages.

Angling Demonstration

At Scourie Gala this year Adam held a fly fishing demonstration and tuition event. Participants were given lessons in fly fishing and had the chance to enter a distance casting competition. Everyone seemed to have a good time and will hopefully be more adept at casting in future. Congratulations to the distance winners.

Public talks

'The Secret Life of the Sea Trout' was the title of a presentation to the Assynt Field Club about all things sea trout. An interesting and well attended meeting, the talk was well received and a lot of questions were generated.

Other Open Events

The Trust also has stalls at The Wildland International Year of the Salmon weekend, The Highland Field Sports Fair, Assynt Highland Games and Scourie Gala. These events gave us another chance to talk to members of the public and promote the work of the Trust. Thanks must go the individuals who assisted on the day - manning the stall, putting up tents and organising the merchandise, and to those who donated prizes for 'Find the Fish'. These events are good fun to do and help in the promotion of the Trust and its works to the wider public.

Wellies & Wildlife

This booklet was devised as a means of helping adults and children to explore the wildlife of Sutherland. It splits the area into different habitat types, giving ideas of how to look for things and demonstrating some of the plants and animals that might be found as well as giving some fun facts about the area and its inhabitants. While it was the brainchild of WSFT, it could not have been produced without the expert knowledge and assistance of a wide range of individuals around the area, who provided photographs, identification and editing skills. Production of the booklet was undertaken with the financial assistance of Coigach & Assynt Living Landscape Project, John Muir Trust and Anne, Duchess of Westminster Charitable Trust.

Salmon conservation regulations

This policy was introduced during the 2016 season. It implemented a variety of measures, including:

- A ban on the taking of any salmon, by rod or net, before 1 April;
- A ban on fishing outwith estuary limits for a period of 3 years;
- The classification of rivers based on a model of population estimates, exploitation rates and biological recruitment. (Further information can be found at: <http://www.gov.scot/Topics/marine/Salmon-Trout-Coarse/fishreform/licence/status>)

The categories denote the conservation measures required such that, for West Sutherland during 2020:

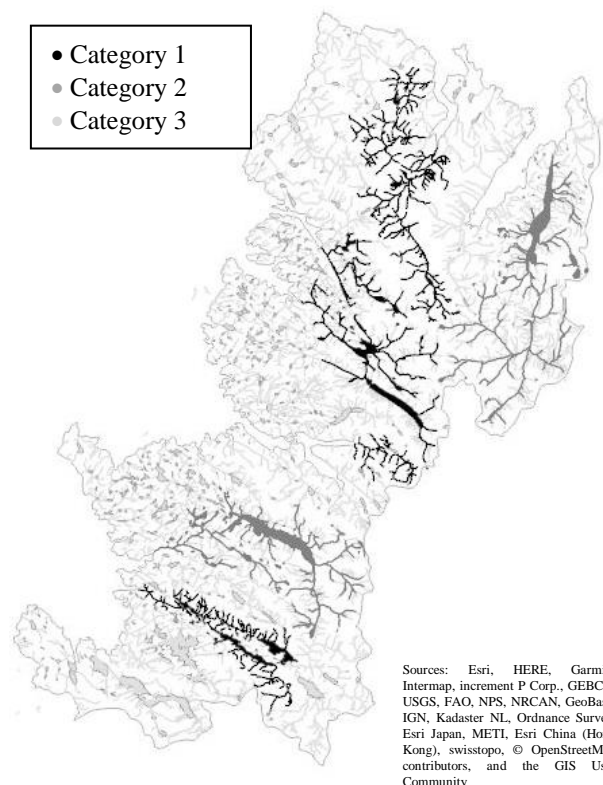
Category 1 – (Rivers Grudie, Dionard, Daill, Rhiconich, Laxford, Gleann Dhub and Kirkaig) where the conservation limit has been met on 4 of the last 5 years, exploitation is sustainable and therefore no additional management action is required.

Category 2 – (Rivers Hope and Inver) where the conservation limit has been met on 3 out of the past 5 years, meaning that management action is necessary to reduce exploitation. While mandatory catch and release will not be required in the first instance, this will be reviewed annually.

Category 3 – (Rivers Polla, Strath Shinary, Oldshoremore, Duartmore, Polly and Osgaig) where the conservation limit has not been met on 3 out of the past 5 years, meaning that exploitation is unsustainable and management actions are required to reduce exploitation for 1 year i.e. mandatory catch and release (all methods).

All systems not listed above have insufficient data and therefore will be classed as Category 3.

In addition to the measures introduced above, all District Salmon Fishery Boards will be required to complete a Fisheries Management Plan, to a template to be advised by Marine Scotland Science. The Trust will work closely with the Board to complete this, when the template is released by Marine Scotland Science. This is likely to be a web-based report aimed at determining local issues and help to build a national picture of impacts and issues for Atlantic salmon throughout Scotland. While centred on the freshwater, there is likely to be the possibility of mentioning marine and coastal issues also, as well as highlighting issues where a lack of resources is contributing to the problem.



Laxford Sea Trout Tracking Project

There is evidence that sea trout numbers in Scotland have declined over recent decades; and that they continue to do so.

Management of trout populations has primarily focused on the freshwater phase of the life cycle; this is in part, because we know much more about the requirements for trout in freshwater water.

By contrast, sea trout ecology in the marine environment is poorly understood. At its simplest, we know very little about where sea trout go when they reach the coast, and what they do when they get there.

We do know however, that the coastal zone around Scotland has changed considerably in the last few decades. The effects of such changes on sea trout are not well understood.

The aim of this study was to address some very basic questions about marine activity by sea trout from the Laxford system, West Sutherland.

We did this by capturing and tracking trout that had smolted and were migrating to sea for the first time (post-smolts) and trout that were using marine habitats for a second (or more) year, (multiple year migrants).

In total 99 fish were tagged with a small tag which emits a coded sound signal that can be detected and logged when close to a receiver.



Thirty eight receivers were deployed in the River Laxford, its estuary and the sea loch, Loch Laxford. Some were positioned close to salmon cage farms and some close to mussel farms to address specific questions related to their potential impact on sea trout.

The study addressed 6 specific questions:

- ***Do sea trout remain within the sea loch of origin during their first summer at sea?***

Our results showed that only 5% of sea trout migrated out of Loch Laxford and into more open coastal waters. Thus, the vast majority of sea trout remained within the sea loch of their natal river to feed over the summer.

- ***What is the extent of habitat use by sea trout in Loch Laxford?***

Although sea trout were recorded across the whole of the Loch Laxford sea loch sea trout use of the area in summer was highly concentrated in a very small patch of the total available habitat. This area comprised a shallow, tidal, estuarine area between the mouth of the river and where it opens out into the deeper sea loch. 75% of fish consistently detected were never detected outside this small (0.2 km²)

shallow but energetically productive area.

• ***Does the pattern of coastal habitat use by sea trout change with time?***

There were indications of the habitat use changing with time. There was evidence that those fish that migrated out from the estuary into the wider sea loch did so later in the summer and after a period of residency in the estuary.

• ***Are sea trout interacting with salmon open net pens at an aquaculture facility?***

There was no evidence of sea trout being attracted to areas around the two salmon cage sites. In this study, no fish were detected at one of the cage sites and only 3 at the other. The total time spent by sea trout close to the cage sites was 46 minutes over the study period of ca 100 days.

• ***Is there an interaction between edible mussel, suspended rope farm units and sea trout habitat use?***

There was evidence that sea trout were using habitat areas occupied by mussel farm units. Of the fish that dispersed from the estuary and entered the wider sea loch, 50% were detected close to a mussel farm unit and there was evidence of residency events of moderate duration in these areas. While it is possible that sea trout are being attracted to mussel farms deployments, possibly because the structure of the farm provides physical protection from predators, it is more likely that the habitat type preference of sea trout, at least in Loch Laxford, coincides with the habitat suitable for a mussel farm deployment.

• ***Does the marine habitat use and migration behaviour of sea trout on their first migration to sea differ from that of individuals making their second or third sea migration?***

Although the sample size of multiple year migrant sea trout in this study was small (N=8) the pattern of behaviour observed was very similar to first year migrants. No multi-year migrants migrated out of Loch Laxford into the open coastal zone, all such fish remained within the energy rich, shallow estuary area or lower reach of the river throughout the study.

We conclude that only a small percentage of sea trout from the River Laxford migrate out into open coastal waters, a larger percentage use the enclosed sea loch for summer feeding but the majority of sea migrants use only a very small, very specific habitat in the estuary. This very high concentration of marine feeding by sea trout in a very small area makes this stage of the life cycle vulnerable to negative effects of marine development and thus such areas in Loch Laxford (and elsewhere) need to be identified and consideration given to their protection.

(Report by I. Moore, SCENE)



The receivers are in! (A. Beynon-Jones)

Acknowledgements

The Trust would not be able to function without the assistance of an army of volunteers, many of whom give up substantial amounts of time to the Trust. Similarly, we would like to acknowledge those who support us financially and without whose help we would not be able to operate. Grateful thanks also for the assistance of the various estates. In particular, sincere thanks must be expressed to Reay Forest Estate and Scourie Estate for their donation of accommodation.

A number of other individuals have assisted the Trust with its work programme, some listed below. Apologies to those not mentioned by name, but our grateful thanks all the same.

Catches and Scale Reading

The WSFT acknowledges the assistance of hotels, estates and anglers in compiling catch records and collecting scale samples.

Monitoring of sea trout post-smolts

This work would not be capable of completion without the assistance of the Loch Duart Ltd and Wildland Ltd. Also to the army of volunteers, in particular Ross Barnes, Dave Debour, Rex Onions and Donald Reid for their help in all weather and conditions.

Funding for this work comes from a variety of sources. The North & West District Salmon Fishery Board, estates, individuals and the Trust add value to a grant from the Scottish Government, received through FMS.

Education

The Ghillies Seminar was partly funded by the District Salmon Fishery Board and the kind donations by our speakers of time and travel.

Biosecurity Planning

Funding of the Scottish Invasive Species Initiative by the Heritage Lottery Fund is gratefully acknowledged. Thanks also to Scottish Natural Heritage for their management of the project.

Loch Audit

Funded by the Heritage Lottery Fund through Scottish Wildlife Trust and Coigach & Assynt Living Landscape Project, this project was dependent on the anglers who agreed to provide scale samples from their catch or assisted with boat handling when gill netting.

The following Charitable Trusts, Foundations, Estates and organisations have kindly donated funds or provided grant funding towards the West Sutherland Fisheries Trust. Our sincere thanks to all listed, and to the many individuals who will remain anonymous but have donated time and money to the Trust and its activities. Without all of this support we would not be able to operate.

Trusts & Organisations

Assynt Angling Company Ltd
Assynt Estate
Brackloch Trust
Coigach & Assynt Living Landscape
Heritage Lottery Fund
North & West District Salmon Fishery Board
Scottish Government
Scottish Natural Heritage
Westminster Foundation

Business (incl. Fish Farms)

Loch Duart Ltd

Estates

John Muir Trust
Rhiconich Estate
Reay Forest Estate
Scourie Estate
Wildland Ltd

Treasurers Report

From a financial aspect this year has been successful the annual accounts showing a satisfying but not excessive surplus. This was due in part to Shona's continued prudence and some generous donations. Turnover, if we can call it that was up by nearly £20000 caused by the high cost high value Sea Trout tracking project and was nearly £30000 more than our original forecast budget.

Our financial reserves remain strong which always provides a cushion against lean years but this must not be taken for granted. Indeed this year may well require the purchase of a new vehicle which will make quite a dent in them.

Finally I would like to thank Nick for his very successful tenure of the chair and the amazing results he has achieved in securing funding from industry and estates, we wish him well in his "retirement" which for someone like Nick I'm sure will not be an idle time.

Tony Rawlings