West Sutherland Fisheries Trust

The River Kirkaig (S. Marshall)

2021 Annual Review

Contents

THE WEST SUTHERLAND FISHERIES TRUST

Gardeners Cottage, Scourie, by Lairg, Sutherland, IV27 4SX
Tel: 01971 502259
e-mail: wsft@btconnect.com
web: www.wsft.org.uk
Twitter: @WSFTrust
Facebook: www.facebook.com/westsutherlandfisheriestrust
Instagram: https://www.instagram.com/westsutherlandfisheriestrust/

Charity No. SC024426

Board of Trustees	Simon Jeffreys	Chairman (Angler)
	Anthony Rawlings	Treasurer (Angler)
	David Allison	(Reay Forest Estate)
	David Davies	(Inverpolly Estate)
	Nick Joy	(Loch Duart Ltd)
	Douglas Low	(Trout Angler)
	Cathel MacLeod	(Assynt Angling Club)
	Don O'Driscoll	(John Muir Trust)
	Richard Osborne	(Rhiconich Estate)
Observer:	Sue Agnew	(Nature Scot)
	Donald Mitchell	(Highlife Highland Ranger Service)
Accountant & Advisor:	Mr T. Wright	(Elphin)

Fisheries Biologist:	Shona Marshall
Assistant Biologist:	Adam Beynon-Jones
Field Assistant:	Hugh Panton
Book-keeper:	Kirsty MacLeod

Chairman's Foreword

Last year was an awful year for everyone. It was therefore a case for us of doing what we could, when we could, and otherwise ensuring we survived as an organisation.

We were able to do this, as we have been prudent with our money over the years, but we did take out a Bounceback loan to give us a bigger margin of comfort. We have not made progress with converting to a SCIO during last year, but we are still heading in that direction.

One worrying development for us during 2020 was the huge increase in the number of "dirty camping" incidents in our area. Active citizens and local estates were left to clean up the resulting mess. Nothing of course can be done about the grey water and human sewage that was dumped into or near our watercourses last year. Community investment into waste disposal sites should help alleviate the problem with campervans in 2021. But the potential for tourist demand to exceed the available supply of accommodation for camping and campervans remains a worry for the condition of our environment if huge numbers decide to staycation in the north-west highlands. A boost for the tourist economy is welcome, but there needs to be regard for the environment, or else in time there won't be the setting to keep the tourists coming.

As ever, I thank my fellow trustees for their efforts over the year, our small staff for their fortitude, and our supporters and volunteers for sticking with us.

For much of last year, I was locked in by a busted achilles tendon and then locked down in Kent by Covid, so I hardly got out on our ground and sadly did not contribute at all to the angling effort! I heartily hope for a better year for all of us in 2021, while remaining very cautious for the time being.

Simon Jeffreys

A summary of 2020

Despite the issues arising as a result of the Covid-19 restrictions, the WSFT managed to undertake a range of field work during 2020. Further details of the different projects are available in the rest of the document or from the Biologist.

Produced Biosecurity Plan (p. 17)

Juvenile surveys (♦) (p. 10)

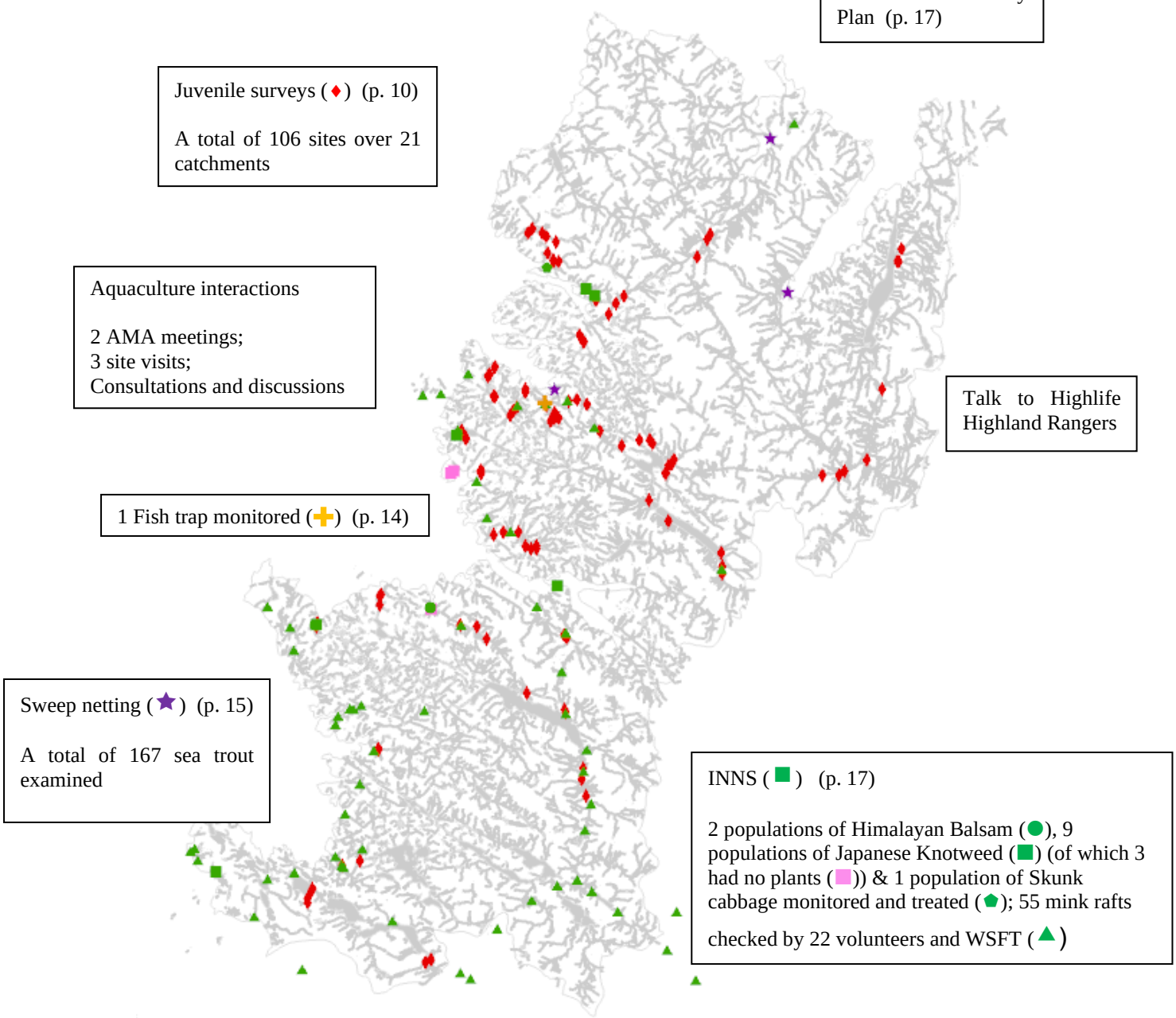
A total of 106 sites over 21 catchments

Aquaculture interactions

2 AMA meetings;
3 site visits;
Consultations and discussions

Talk to Highlife Highland Rangers

1 Fish trap monitored (✚) (p. 14)



Sweep netting (★) (p. 15)

A total of 167 sea trout examined

INNS (■) (p. 17)

2 populations of Himalayan Balsam (●), 9 populations of Japanese Knotweed (■) (of which 3 had no plants (■)) & 1 population of Skunk cabbage monitored and treated (⬟); 55 mink rafts checked by 22 volunteers and WSFT (▲)

Sit on 8 external committees;
Participated in 1 multi-area project

25 years of data

As the Trust enters its 25th year – very hard to believe I know – it's time to look at where we are and what we have.

Over this time we have collected a vast amount of data across the area and produced a plethora of reports and recommendations. This ranges from routine collection through to one-off projects or short-term monitoring. Some have taken the form of University projects, some originating from external sources and others from within the Trust. These data form a valuable resource, both now and in the future, on the rivers and fish of west Sutherland.

Since 1997:

1035 individual electrofishing events have been undertaken, covering 270 sites in 37 catchments.

- Monitor the catchment for any changes occurring over time in order to inform management requirements and provide 'before' information in the event of any incident, management activity or industry proposal;
- contract work for, i.e. hydro-electric developments or aquaculture as part of industry monitoring practices;
- Contract work for statutory bodies, i.e. Nature Scot and SEPA. The Trust has also participated in the National Electrofishing Programme, Scotland.

276 sweep netting events, examining 7519 fish of which 4859 were tagged with Visible Impact tags. Sea lice were counted and marks noted.

- Recaptures have provided information on specific growth rates and fish migrations;
- Sea lice data has been fed back to the Area Management Agreements and used in interactions with the neighbouring fish farms;
- Data on damage, particularly net marks, is fed back to the Estates and used for fisheries management;
- The sea lice data has been combined with data from across the west coast of Scotland to assess potential impacts from fish farming activities. It has also been combined with information from Ireland, with the production of a paper on the impacts of sea lice on sea trout;
- Information on bycatch has been recorded and used in studies by external groups.

Smolt traps have been operated in 5 catchments at varying times and for different purposes. Of these, some have been used for secondary purposes.

- Provide information on the size, timing and dynamics of the smolt run;
- Determine the presence of migratory fish within a catchment;
- Manse trap, operated from 1999 to 2005. A two-way trap, also catching adults, this carried out a stock assessment on a small catchment that was being stocked with fry. This trap also formed part of a PhD study into the impacts of a novel sea lice medication.
- Bad na Baighe trap, also providing information on the proportion of sea trout captured in the sweep netting that originated from the Bad na Baighe catchment.

Habitat surveys have been carried out on 22 catchments, leading to the production of management plans.

- Provide recommendations to help improve habitat;
- Provide a baseline from which to monitor any changes, both natural and as a result of management activities.

Since 1997, the first full season of field work, we have amassed a large collection of salmonid scales, giving information on age and growth for fish from numerous lochs and rivers around the area. This scale collection is available for additional analysis should this be requested by external bodies or projects developed within the Trust.

Introduction

The **West Sutherland Fisheries Trust** continues to work towards the conservation and restoration of fish populations. Now entering its twenty fifth 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, schools, 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.

National restrictions to deal with the Covid-19 pandemic led to an altered, and reduced, work programme for the Trust during 2020. The necessary safety measures meant that outreach and volunteering activities were cancelled or reduced and that work protocols were altered. Despite this, however, and with the help of family members and agreement with Hugh we still managed to undertake a substantial range of activities. The weather was relatively kind, enabling a good electrofishing season (see p. 10). However, despite the good electrofishing weather there were still reports of fish being seen or caught in reasonable numbers by anglers.

An extensive mink monitoring network, 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 17). While some rafts could not be checked, many were still monitored while the volunteers undertook their daily exercise.

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 Nature Scot (NS). 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. 17). 2021 will see the continuation of the Scottish Invasive Species Initiative (SISI), a Heritage Lottery Fund funded programme of work managed by NS and involving several 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 reported 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, and time to allow recovery, 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 STEM network. This has the potential to extend our educational remit, and information about the Trust, beyond the local area.

During 2021 it is hoped that 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. We will be involved in tracking salmon smolts as they leave the river and move through and out of coastal waters. An exciting initiative, this project will attempt to answer many of the unknowns in the transition of salmon to the feeding grounds.

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.

Slow recovery after the removal of rhododendron (S. Marshall)

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.

2019

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	2019 (2018) *5 yr. ave.*	251 (233) *375.8*	874 (1019) *861.8*
Inchard – Kirkaig	2019 (2018) *5 yr. ave.*	309 (204) *397.8*	291 (271) *307.4*

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 up slightly on the 2018 catches, with the greatest increase in the Inchard to Kirkaig area. However, catches across the area are still below the 5-year average.

Unfortunately the release rate within the area has decreased from that seen in 2018, at 95%, although similar to levels observed previously. Contrary to previous patterns, the greatest proportion of salmon released (96%) were from Inchard – Kirkaig, with only 90% release from the north. This is still a high release rate and encouraging to see but it is to be hoped that it will increase 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 showed a slight decrease compared to 2018, with the slight increase in the south being cancelled by the significant decrease in the north. The latter may be a function of

changing management within the main sea trout fisheries. The overall numbers are equal to the 5-year average for the area, suggesting a levelling in the population. There was 100% catch and release seen in the Hope & Grudie area, while a total of 36 (12%) fish were retained in the Inchard – Kirkaig area. This gives an overall total of 91% of fish released. It is disappointing to see that the release of sea trout, the species which has shown the greatest overall decline during this recording period, continues to lag behind that of salmon and it is to be hoped that this will increase in the future, particularly while the status of this species remains precarious.

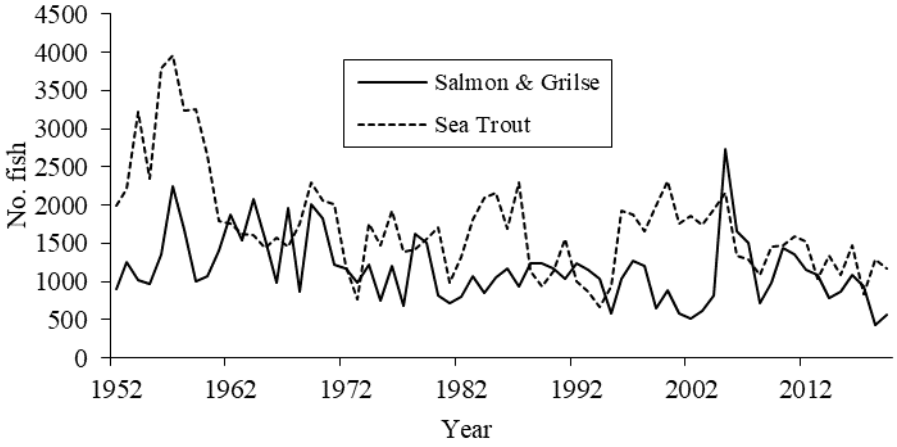


Fig. 2 Rod and line catches within the West Sutherland area, 1952 – 2019

2020

Catch data for the 2020 season are being compiled and will be produced by Marine Scotland Science in 2021. However, some information is available from angler logs and fishing books. Reports indicate that, despite having a very late start as a result of the Covid restrictions, this was a good season, with good numbers of fish seen and caught.

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. 19). The model has not been altered for 2021, 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 sea trout from the sweep netting (S. Marshall)

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 covering 35 catchments around the area, with a number of catchments covered in each year. When possible, all sites within a catchment are revisited, although some may not be accessed due to time and flow constraints, while others may be added. In 2020 we repeated surveys of 17 catchments and added sites in a further 4 catchments linked to the NEPS programme and a potential future project.

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

	Average density (100 m^2)			
Catchment	**Salmon fry**	**Salmon parr**	**Trout fry**	**Trout parr**
Hope	13.66	5.42	9.37	4.19
Achriesgill	2.02	0.00	6.48	8.48
Oldshoremore	6.45	3.66	6.56	3.55
Loch Innis na Ba Buidhe	0.00	0.00	22.82	21.29
Loch na Thull	40.56	8.03	47.69	2.08
Laxford	21.69	10.18	32.13	2.81
Bad na Baighe	10.09	6.62	6.01	7.78
Claise na Fearna	2.38	6.74	18.83	16.32
Loch nam Brac	0.00	0.00	22.47	9.15
Bhadaidh Daraich	0.00	0.00	7.69	12.54
Geisgeil	7.57	1.15	7.66	5.59
Duart	10.85	10.56	16.02	12.66
Quinag	20.30	8.66	17.26	7.97
Gleann Leireag	0.00	0.00	25.32	8.94
Oldany	0.37	1.95	8.68	0.37
Clashnessie	0.00	1.21	2.42	16.92
Culag	3.59	0.42	1.18	0.00
Garvie	2.88	4.55	13.69	9.77
NEPS additional sites	15.86	8.68	1.56	0.28
West Sutherland area average	**8.33**	**4.10**	**14.41**	**7.93**

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. However, a comparison of the area average with the SFCC absolute regional classification scheme for salmonids indicates that salmon densities for the area are moderate to poor, while trout densities are good. This is likely to reflect the fact that trout are present throughout the survey, while salmon are only present in 79% of the catchments.

Within the individual catchments, historic trends indicate that most of the populations have remained relatively constant with time. However, 38% of both salmon and trout populations have shown an increase over time, with 8% and 6% respectively showing a decline in density.

Discussion

Suspension of the 2020 NEPS programme as a result of Covid-19 enabled a more wide-ranging assessment of catchments within the area. The decision was made, however, to include some of the previous NEPS sites and these have been included within this report. While reported within the summary as NEPS, and treated as a single catchment, it included information on 3 separate catchments – Dionard, Inver and Polly.

Catchments surveyed during 2020 included 4 trout dominated systems, of which 2 are inaccessible to migratory fish. This is balanced with the inclusion of 2 larger salmon dominated catchments which would suggest that the area average is a good reflection of the situation within West Sutherland and not dominated by catchment selection. This indicates that trout are the more dominant species within the area, with both fry and parr densities being greater than salmon. This is as expected given the nature and scale of the rivers and burns within the area, with a large number of small, coastal burns and a few larger salmon dominated systems.

The spread of minnows within the area is of some concern and reflects angler practice to a large extent. Introduced historically as live bait, their spread partly reflects the accessibility of the sites, i.e. proximity to roads, and their relatively high reproductive rate. Where present they can out-compete salmonids, thus impacting on their population. This should therefore be monitored to ensure that there is no spread to virgin sites.

Whilst instream habitat characteristics within the West Sutherland area are generally favourable for salmonids, strategic planting of mixed broadleaf trees within riparian zones would undoubtedly improve fish cover, food availability, and bankside stability.

While undertaking these surveys we also encounter other species within the sites (Fig. 3). Trout can be seen to be present at the majority of sites surveyed, with only 5 catchments having sites that did not contain the species. Salmon, in contrast, were only present at all sites in 3 catchments. Eels were present in all catchments, apart from Quinag, but only at all sites within 6 catchments, indicating some variability in distribution. Minnows were also widespread throughout the area, although absent from 8 catchments, and with only the Culag returning minnows at each site. This is likely to reflect the location of the sites and the fact that the minnow is an introduced species and therefore more likely to be patchily distributed. Stickleback were only recorded during the assessment of additional NEPS sites, specifically within the Dionard.

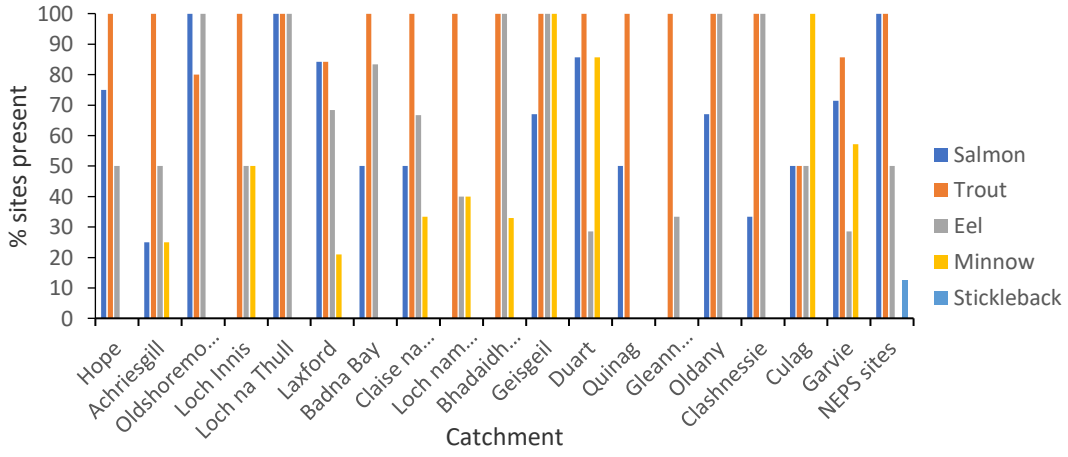
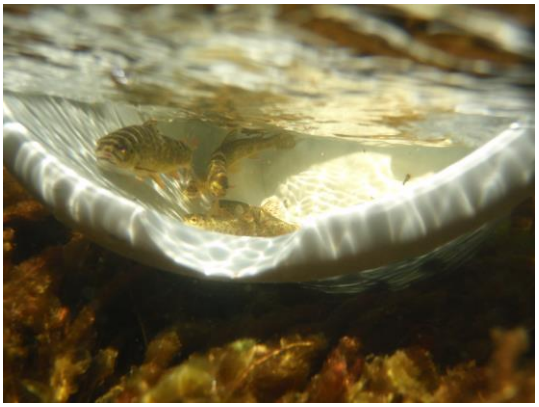


Fig 3. Species composition and distribution per catchment



The trout are thinking about it (S. Marshall)

A snuffling badger (S. Marshall)

Electrofishing in action (J. Magnusson)

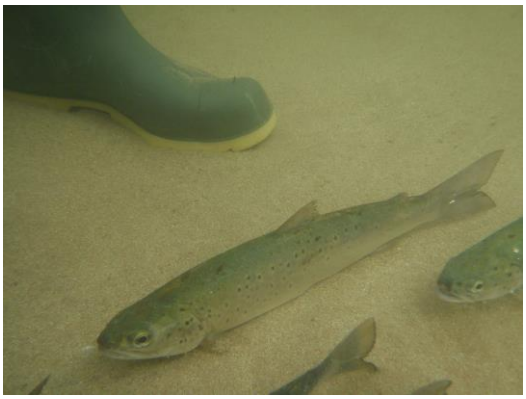
Eel to go….. (S. Marshall)

Green bank engineering (S. Marshall)

Salmon make a move (S. Marshall)

A handsome profile (S. Marshall)

Phenomenal construction (S. Marshall)



Sea trout (S. Marshall)

Protecting the catch! (S. Marshall)

The Bad na Baighe Smolt Trap

A mobile smolt trap was deployed in Bad na Baighe from 13.4.20 to 24.5.20. A temperature recorder was placed in the trap, set to record hourly for the duration of the project.

2020 was a dry spring and as such the trap did not flow between 23.4.20 and 8.5.20. While attempts were made to dam the trap and keep it flowing, the lead net was lifted on 2.5.20 to allow unimpeded movement of the fish.

Water temperature remained relatively static during the trapping period, with diurnal fluctuations dominating (Fig. 4). A temperature shift appeared to occur on 9 May, coinciding with the start of the rain. Salmonids require a temperature of about 7ºC before starting to move, and this temperature was exceeded for most of the study period.

Salmon continue to dominate the smolt run during 2020 (Fig. 4). While this may be a reflection of the timing of the trap, or possibly that the trout are more likely to run in low waters and therefore bypassed the trap, it is possible that the system is altering from a trout to a salmon dominated one. Several sea trout kelts were taken during April.

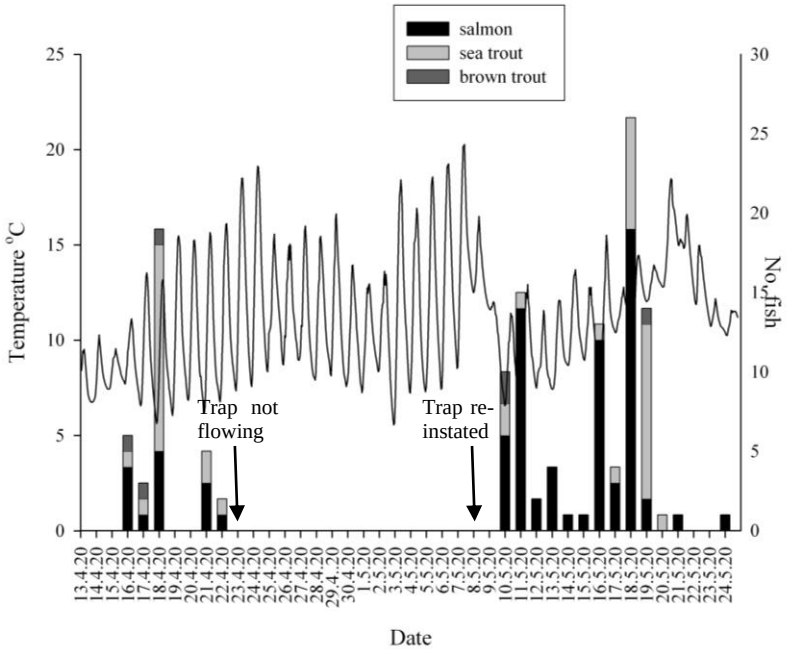


Fig. 4 Showing the temperature regime within the river (line) and no of fish caught on each day (bar)

Follow me! (S. Marshall)

Monitoring of sea trout post-smolts

Introduction

The occurrence of Covid-19 during 2020 affected the sweep net programme, with no netting possible between April and June. Subsequent nettings were undertaken where possible in a 'Covid-safe' manner. Started in 1997, this project was originally designed to give an indication of the migrations and growth of sea trout within the area. 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.

Materials & Methods

Three estuaries, Laxford Bay, the Polla estuary and the Kyle of Durness were sampled monthly where possible from July to October, at low tide. A total of 167 fish were individually measured and scale samples taken. 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 estuaries was similar, with a predominant smolt age in the rivers of 2 years (S2), although there were a number of S3's also present. S1's were also observed in small numbers in both the Polla and Kyle of Durness. The length distribution of fish within the estuaries was also similar, with post-smolts dominating each estuary. There were several mature fish taken in both estuaries, with the largest being seen in the Polla.

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 can be seen in the Laxford sea trout tracking project undertaken in 2018 and available at https://www.wsft.org.uk/images/pdf/Laxford_sea_trout_tracking.pdf. The condition index was good, although it was not possible to record weights on all sampling occasions.

Sea Lice Infestations

Sea lice were present to a varying degree in both the Kyle of Durness and the Polla estuary throughout the year. The exception to this was July in the Kyle of Durness when no lice were observed. No sea lice were seen on the Laxford fish, but the catch was particularly low with only one fish on each occasion. Each estuary showed a mixture of lice stages, although Chalimus were only present on one occasion in both estuaries. Lice numbers showed an increasing trend with time in the Kyle of Durness, while this declined 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

There were no lice present within the Laxford, although only 1 fish was observed in each month. No Caligus were observed either.

The neighbouring cages were stocked for the period of the survey. Lepeophtheirus numbers were zero or very low throughout the year. However, Caligus dominated the population with numbers increasing throughout the year.

Polla

Lice were present in both months surveyed, although in much lower numbers than in 2019. The abundance dropped between August and October, as did the maximum number of lice per fish. Caligus were also present in both months, again declining in October, both in number of lice and number of infected fish.

Within the neighbouring cages, Sian was stocked in April, while Kempie remained fallow until October. There were no adult lice at Sian until August, when they started to appear, although remaining at low densities. Adult lice were present at Kempie in October, indicating transfer of mobile stages either between the sites or from wild to caged fish.

Kyle of Durness

Lice were present within the Kyle of Durness sample with the exception of July. Densities varied by month, with no pattern discernible. 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. Fig. 5 gives the results by year for each estuary, with the banding indicating whether the risk is low (green), moderate (yellow) or high (red). 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 2020 was considered to be medium, indicating that there are potentially population changing effects likely to have occurred in this area. However, this is a significant decline from the potential impacts observed in 2019. In contrast, the Laxford and Kyle of Durness showed a low potential risk, although the Laxford is based on a particularly small sample size. The Kyle of Durness results, while still low, show an increase from 2019.

The Laxford and Polla data continue to show a biannual pattern in risk, reflecting the stage of production within the farm. While sampling within the Kyle of Durness has been less regular over time than the other 2 estuaries, there would appear to be no real pattern within the data. However, the peaks in potential risk did appear to follow the Laxford more closely than the Polla, with 2020 negating this pattern. While not significant, it may reflect the tidal flows around the west coast.

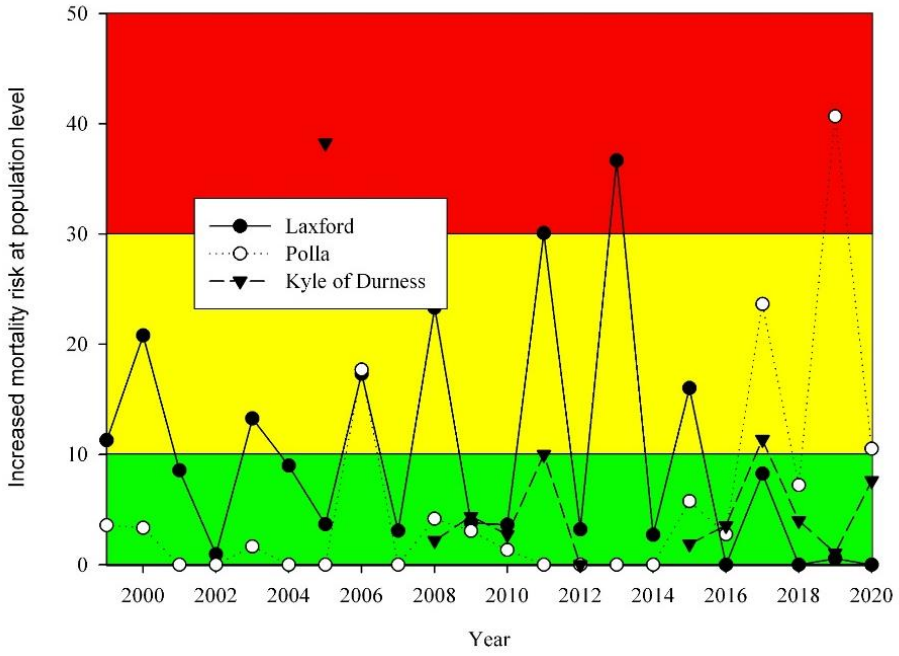


Fig. 5 Showing the increased mortality risk at population level created by sea lice

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).

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 km^2 and involving 10 fisheries trusts and boards. As part of the project we will be continuing and developing the work started in 2009. We have also updated the Biosecurity Plan for the area. SISI is being funded by the Heritage Lottery Fund and Nature Scot.

Awareness Raising

As a result of the Covid-19 situation, all awareness raising of Biosecurity was undertaken through social media rather than face-to-face. However, we continued to raise the matter as and when we could. We also undertook the updating of the area Biosecurity Plan, reviewing the actions undertaken as part of the 1st Biosecurity Plan and proposing actions for the next 10 years as part of the 2nd. This document is reliant on the collaboration of a number of stakeholders from different sectors and is an ambitious vision for the future. This includes the action of anglers and other water users, with the simple 'Check, Clean, Dry' method of biosecurity being promoted to all. It can be viewed at:
https://www.wsft.org.uk/images/pdf/West_Sutherland_Fisheries_Trust_Biosecurity_Plan_20_-_29.pdf

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 and expanded in areas. While there have been a few sightings reported around the area during 2020 there were, unfortunately, no captures. This would suggest that the population is currently small, possibly comprising of roaming males.

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 this 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. During 2020 perhaps the most noteworthy clip was of 2 pine martens playing on the river bank. Funded by Nature Scot, 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

2020 saw the Biologists once again descend on Nedd and Clashnessie to remove any Balsam plants found within the catchment. It is good to see that we are having increasing difficulties in finding the plants in the wider area around the 'starter' populations, although there was the odd eruption in some areas. 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 hopeful that we can make the area 'balsam free'.

Japanese Knotweed is also present within the area, 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 several 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 plots 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, although at least one is extensive and will be difficult to eradicate.

Plans for 2021

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. We will also continue to work towards our aim of eradication of the known balsam and knotweed populations.

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 a water body 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/

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;
- 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)

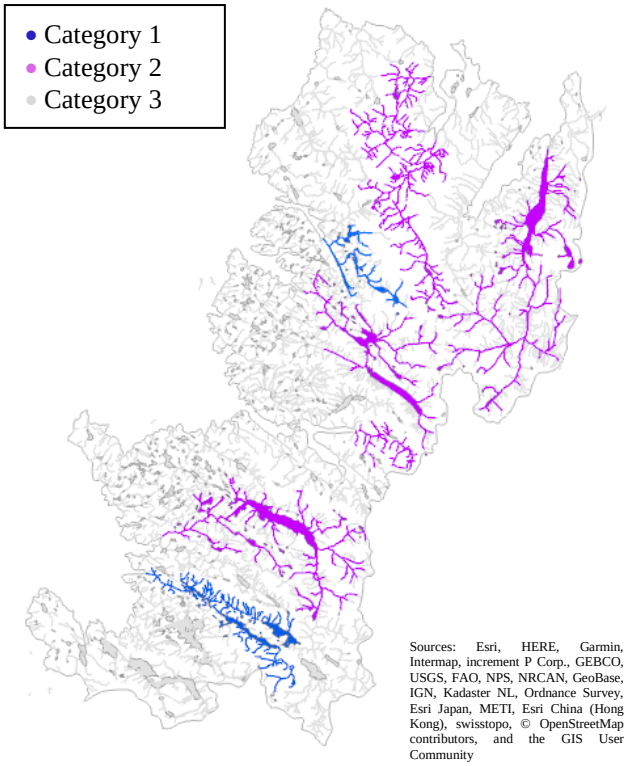
The categories denote the conservation measures required such that, for West Sutherland during 2021:

Category 1 – (Rivers Rhiconich 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, Grudie, Dionard, Daill, Laxford, Gleann Dhub 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.



The Trust has assisted with the development of a 'pressure map' for Marine Scotland Science. Undertaken throughout Scotland, this digital resource aims to determine the impacts of a variety of factors on the salmon populations. The information is given by river reach rather than catchment and will help to build a national picture of impacts and issues for Atlantic salmon throughout Scotland. While centred on the freshwater, marine and coastal issues are also included, and areas requiring more data are also included.

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, and Adam and Liam Barnes for stepping up to the mark and assisting with field work throughout the year.

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 Reay Forest Estate and Wildland Ltd. Also to Adam, Liam, Andy Johnston and Tony Rogerson for their assistance in this difficult year.

Funding for this work comes from a variety of sources. The North & West District Salmon Fishery Board, estates and individuals.

Biosecurity Planning

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

The following Charitable Trusts, Foundations, Estates and organisations have kindly donated funds or provided grant funding towards the West Sutherland Fisheries Trust in the 2019/20 financial year. 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. The full accounts can be found at: https://wsft.org.uk/images/Accounts_1920.pdf

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

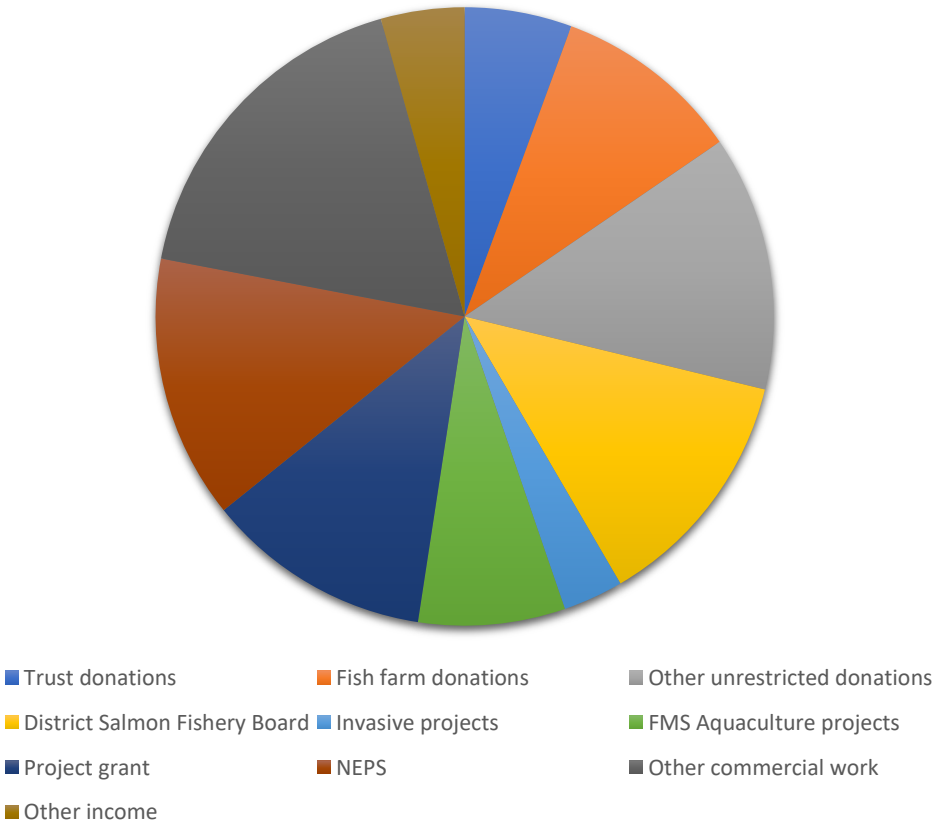


Fig. 6 Showing a breakdown of income for 2019/20

Treasurers Report

This year has not only been challenging for the everyday activities of the Trust. The Covid restrictions have damaged our finances through loss of income owing to cancelled projects, the NEPS electrofishing for example. These projects are central to our core income but fortunately we went into 2020 in a sound financial position. The generosity of our donors over the years has always been an important part of our income and I'm pleased to say that despite the effects of the pandemic that has continued.

Early on in 2020 the Board were very concerned about the potential for loss of income and as a precaution decided to take up the Government offer of a Bounce Back Loan which is interest free for a year. Hopefully this year will not be disrupted so significantly and we will be in a position to repay that without interest.

The Trust's purse strings are very prudently controlled by Dr Marshall and without her careful day to day running of the show our financial position would not be in the sound state it is today.

Tony Rawlings