River Ribble Net Limitation Order and Byelaw review – 2017

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Table of Contents

List of Figures

1. Executive Summary

At the time of preparation and consultation of this Ribble NLO and byelaw review, an initiative is currently underway nationally (for English salmon rivers) to consider options for further reducing the exploitation of salmon as part of the "Salmon Five Point Approach". This Approach, which is being delivered jointly by key angling and fishery organisations, the Environment Agency and with the support of Government, is seeking to restore the abundance, diversity and resilience of salmon stocks throughout England. Options for managing salmon exploitation under this Approach will be informally consulted on during 2017 and may differ from the current approach, as set out in the Environment Agency's "Decision Structure for salmon fishery management in England" that we have followed through this Ribble NLO review.

Over the ten year lifetime of the current Net Limitation Order and byelaws (2007 to 2016), the Ribble salmon stock has declined most notably over the last 5 to 6 years. This is reflected in reduced catches to the estuary nets, particularly during August; reduced catches to the rods, particularly during September and October; and also reflected in a reduced number of large fish crossing the resistivity fish counter approximately 36km upstream of the tidal limit. These data support the observations of a widespread lack of grilse returning to the river in summer and autumn, in common with the situation across the North East Atlantic area.

Over this period, the number of net licences available has reduced from 6 to 4 as two netsmen have retired from the fishery, and the current reducing Order means their licences cannot be made available to new applicants. In addition, a short-term agreement between the netsmen and the rod fisheries reduced the netting effort to just 2 active licencees in the 2014 season.

Catch and release rates for the rod fishery have increased through voluntary means from around 73% ten years ago, to now around 92%. While the current byelaw for the rod fishery restricts the kill of salmon to two salmon per licencee per season, only 5 anglers reported killing this number of salmon in 2015, based on provisional catch return data. This compares with 57 anglers who reported killing this number of salmon in the 2007 season.

In conjunction with the decline in adult returns, juvenile salmon numbers also appear to have decreased in the most recent surveys.

The Ribble salmon stock is now classified as "Probably at risk" of failing its conservation limit, based on the 2015 stock assessment, and is also predicted to remain probably at risk in 5 years time. Note that this assessment is based on a rod exploitation estimate of 20% of the total salmon run, and is also based on Fishery Association catch returns for 2015 when it was recognised that statutory catch returns appeared to markedly under-estimate the true salmon stock.

Further restrictions on the killing of salmon are therefore recommended for the rod and net fisheries.

In order to reduce exploitation by the net fishery, it is recommended that a new reducing NLO is applied from 2017, reducing the number of available licences to 1 as current licensees retire from the fishery. In addition, a new byelaw that limits the number of salmon that may be killed by a licensee in a season is recommended. A total limit for the net fishery of 48 salmon is recommended – a level equating to 2% of the Ribble Conservation Limit.

In order to reduce the exploitation by the rod fishery and recognising the already high rate of catch and release (over 90%), it is recommended that the current 2-salmon per angler per season byelaw is maintained, and changes to fishing methods will be sought through voluntary means, in order to maximise the survival of salmon that are caught and released. A voluntary approach to catch and release, as currently promoted by the Angling Trust, will be applied to the Ribble rod fishery with the aim of maintaining this high rate of catch and release and maximising the survival of released salmon.

The sea trout stock appears to have improved over this period. Although the net catch of larger sea trout has declined in recent years, net catches have only ever been relatively minor. Rod catches are markedly higher and have improved in recent years. The rod fishery exercises a high degree of catch and release for sea trout increasing from around 76% ten years ago, to now around 87%. Juvenile trout numbers do not appear to have changed markedly either positively or negatively in this time.

No further restrictions are therefore recommended for the net and rod sea trout fisheries on the Ribble at this time, but the current level of voluntary catch restraint should be at least maintained.

2. Introduction

This document describes the recent status of salmon and sea trout stocks in the River Ribble, to inform the review of the current Net Limitation Order (2007), and time limited fishery byelaws.

The River Ribble rises at Newby Head Moss (NGR SD 793845) in the Pennines, at an altitude of 422 metres. The river then flows south and west through the Yorkshire Dales National Park and the Forest of Bowland, before entering the Irish Sea to the west of the town of Preston, a total distance of 110 km from source to sea (Map 1). The Ribble is joined in its middle reaches, to the south of the town of Clitheroe, by two major tributaries. The River Hodder on the western side of the catchment rises in the Forest of Bowland and is abstracted from for drinking water supplies. The River Calder to the eastern side of the catchment is a river in recovery from its industrial past, with improving water quality and significant recent efforts to improve fish passage and habitats around the many weirs that have been built on this river.
Two further large tributaries enter the Ribble in its lower reaches downstream of the tidal limit. The River Darwen drains the urban areas of Darwen and Blackburn and meets the Ribble at Preston. The River Douglas drains the towns of Wigan and Skelmersdale and enters the Ribble in the estuary, to the west of Preston.

Significant rod and line fisheries for salmon and sea trout operate throughout the main freshwater Ribble and Hodder. As yet, there are only very limited reports of occasional sea trout and salmon seen in the Douglas catchment – specifically in the River Yarrow sub-catchment, while there are no such reports for the River Darwen. No significant fisheries operate on these two rivers, with barriers to migration, poor quality river habitat and water quality being significant impacts here. Significant weir removals and fish pass installations over the last 6 years, mostly undertaken by the Ribble Rivers Trust, combined with water quality improvements mean that the Calder catchment is now accessible to salmon and sea trout again, although natural recolonisation has so far been slow, with only very occasional juvenile salmon encountered in surveys.

A drift net fishery for salmon operates in the Ribble estuary, seaward of a line drawn due South from the Naze at Freckleton, and landward of a line drawn from the seaward end of St Anne's pier at Lytham to Gut Buoy thence to the seaward end of Southport pier. (Map 1).

The rod fishing season for salmon on the Ribble runs from 1st February to 31st October each year, although the killing of salmon is prohibited prior to 16th June, by National Spring Salmon byelaws. These season and Spring salmon byelaws are not being reviewed here. A local time-limited byelaw restricting the kill of salmon to 2 salmon per angler per season on the Ribble and its tributaries is also in place, and this byelaw is being reviewed here.
Rod fishing for sea trout is restricted to the season defined from 1st April to 30th September.

The current Net Limitation Order for the Ribble Estuary is a reducing Order, aimed at reducing the number of available net licences (from 6 when this Order was originally

brought in, in 2007) down to 2. At the present time, 4 licences are still regularly taken up. Netting prior to 1st June is prohibited by National Spring Salmon byelaws. These National byelaws are not being reviewed here. The net fishery is also subject to a local byelaw defining a weekly close time from 6am on Saturday to 6am the following Monday. Although this is not a time limited byelaw, it considered in this review as a possible means of reducing the fishing effort and, by inference, the kill of salmon in the net fishery.

Map 1 – map of Ribble catchment and Ribble estuary

3.0 River Ribble salmon stock

3.1 Net catches

The numbers of salmon caught in the Ribble estuary net fishery from 1951 to 2016 are presented in figure 3.1 below. Note that although only a maximum of 6 licencees have operated in this fishery throughout this period, the permitted fishing season has been reduced in order to limit the impact of this fishery as stocks have apparently declined. Most recently the fishing season was last reduced in 1999 through national spring salmon byelaws and has remained unchanged since then. Through the prevailing reducing Net Limitation Order, the number of net licences used on the estuary has reduced from 6 through 2007 and 2008 to 5 through 2009, 2010 and 2011 and reduced to 4 from 2012 onwards. In addition, an agreement between the local Fisheries Association and the netsmen involved two of the licencees not fishing during the 2014 season. Despite this zero fishing effort by these two licencees in this year, the total reported fishing effort by the remaining two netsmen and their catch of salmon remained very similar to the preceding years.

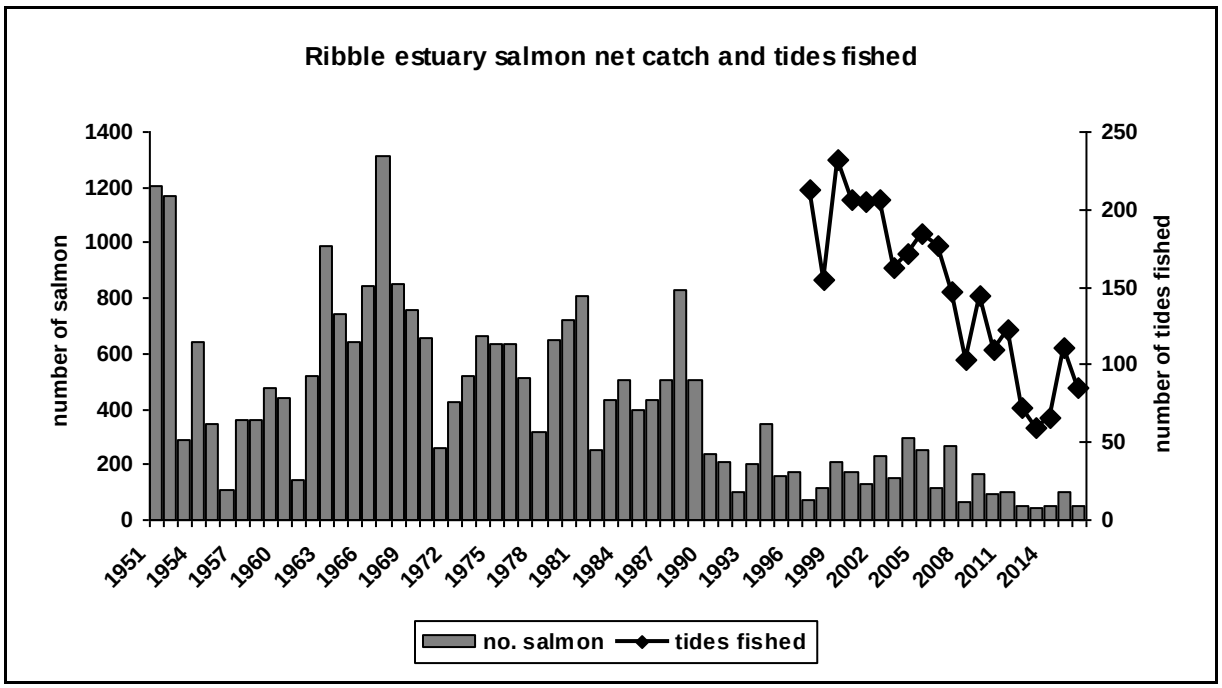

Figure 3.1 – Ribble estuary net catch of salmon 1951 to 2016 and number of tides fished (2005 to 2016).

Prior to 1990, the average annual net catch was over 580 salmon per year. From 1990 to 2011, the average annual catch was 175 salmon per year, while for the last 5 years (2012 to 2016) the average annual catch has been 58 salmon per year. Notably, the lowest 4 recorded total net catches have occurred in the last 5 years, ranging from 42 to 53 salmon.

Monthly salmon catches and tides fished in the net fishery are presented in figure 3.2 below. June catches are typically low throughout the years presented here, averaging 13 salmon up to 2006 (during the previous NLO), and averaging less than 8 salmon per year since 2007, under the current NLO. The average number of tides

fished in June has more than halved since 2007, averaging 36 previously (2001 to 2006), and now averaging 15 (2007 to 2016). July catches have been greater than in June, averaging 43 prior to 2007 and averaging 31 since then. July fishing effort has also halved, averaging 65 tides pre-2007 and 32 tides post-2007. August catches have tended to be the greatest of the current net fishing season, but have noticeably declined in recent years. The average August salmon catch from 2001 to 2006 was over 140 salmon, but from 2007 to 2016 that average has decreased to 25, again emphasising the recent loss of grilse and summer salmon. Importantly, the number of tides fished out of the available season is relatively low, averaging 16% from 2007 to 2016, having averaged 23% from 2001 to 2006. Notably, the highest catch in the recent record (99 salmon in 2015) was associated with the highest recent netting effort (21% of tides fished). Also, in 2014 when two licencees agreed not to fish, the remaining two licencees fished 25% of the available tides. There is therefore clear potential for licencees to increase their fishing effort from the current level.

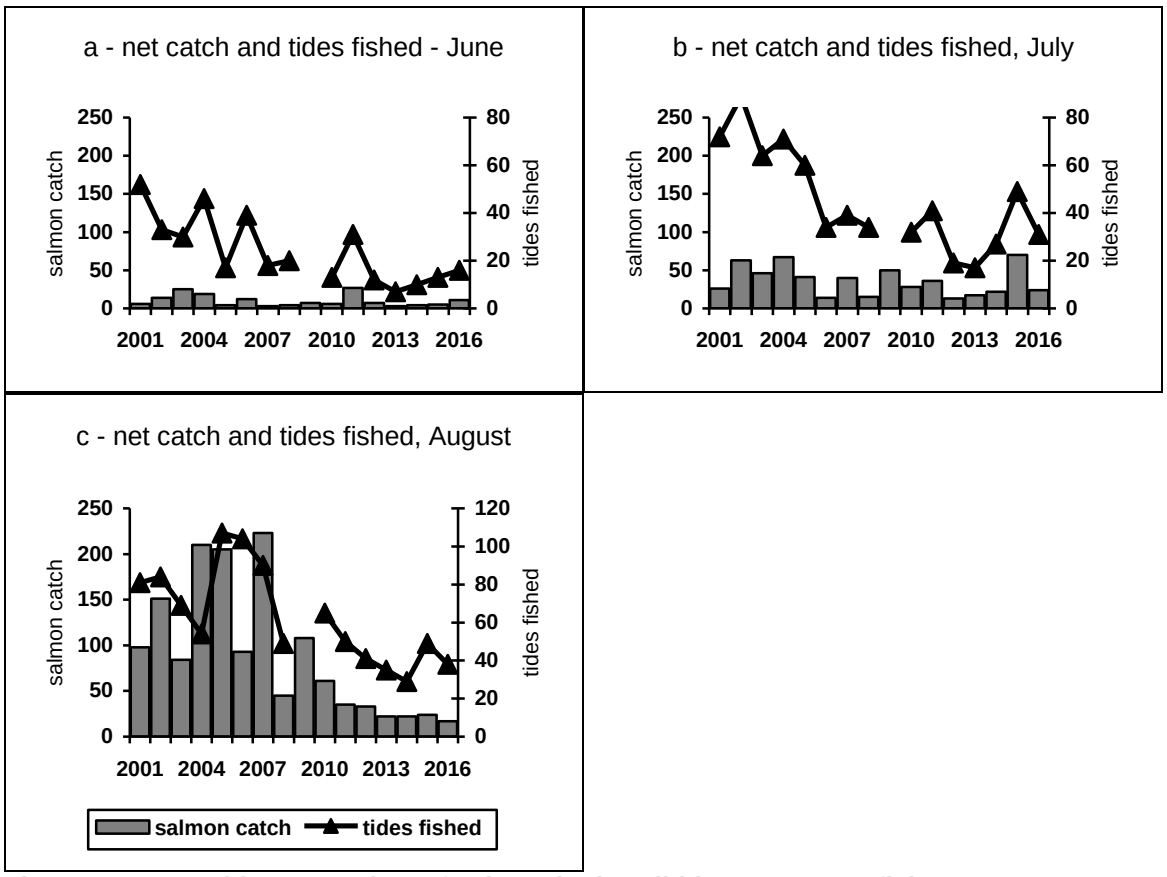

Figure 3.2 – Monthly net catches of salmon in the Ribble Estuary net fishery, 2001 to 2016.

While there would appear to be significant scope for the Ribble netsmen to increase their fishing effort (in terms of the number of tides they fish) it should be recognised that fishing this estuary is particularly time consuming – taking around eight hours for those fishing the ebb tide from the upstream limit of the estuary. Also, two of these licencees are over 70 years old, and likely to retire from the fishery within the ten year lifetime of the next Net Limitation Order. The actual opportunity to fish more tides is therefore more limited than it appears simply in terms of the number of available tides. The licencees on this fishery report that their best conditions for catching salmon occur during westerly storms.

The catch of salmon in the net fishery expressed as the catch per tide fished is presented in figure 3.3 below. These data indicate that the lowest catch per tide occurs in June, with the highest catch per tide occurring in July. The catch per tide during August was previously the highest of the three months fished, but appears to have declined over this period.

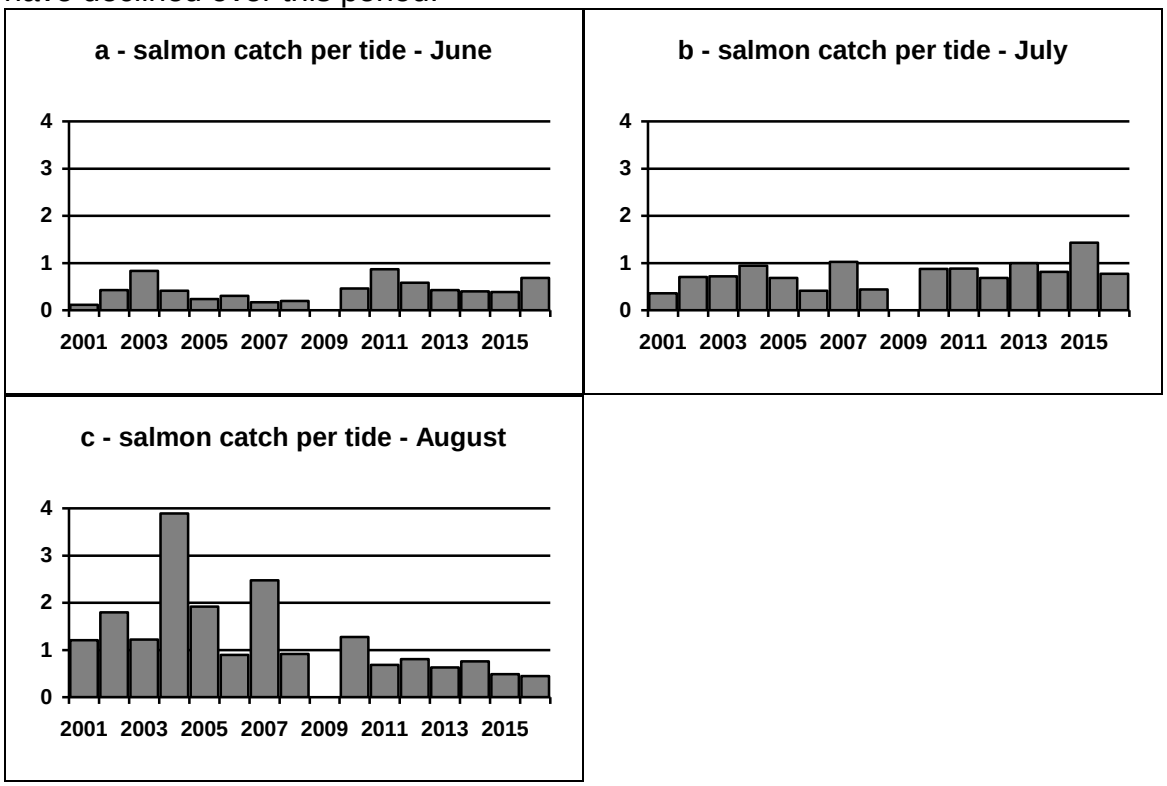

Figure 3.3 – Ribble estuary net fishery, monthly salmon catch per tide fished 2001 to 2016.

The four active netsmen have averaged a catch of 27, 26, 7 and 13 salmon per year over the period 2007 to 2016.

3.2 Rod catches

The number of salmon caught by the Ribble and Hodder rod fisheries between 1951 and 2015 is presented in Figure 3.4 below.

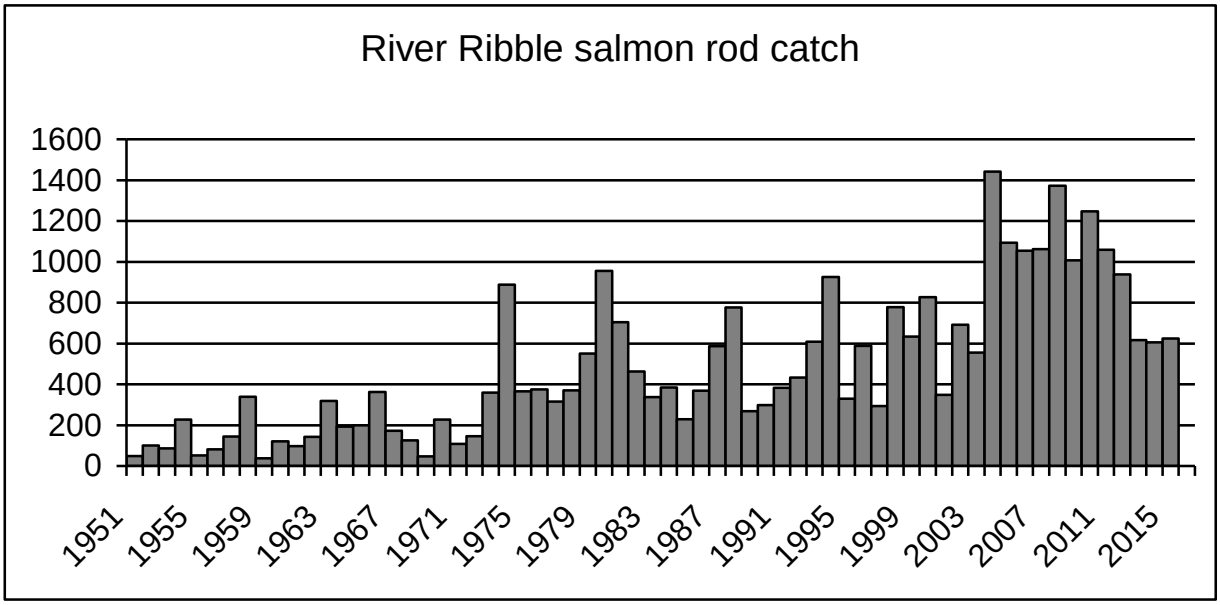

Figure 3.4 – River Ribble annual salmon rod catch, 1951 – 2015.

Note 2015 rod catch return data presented here is based on Ribble Fisheries Consultative Association collation of fishing club catch data for this year. Statutory angler catch return data supplied to EA was recognised to be approximately 33% lower than this locally collated catch data for 2015.

Rod catch statistics are characterised in three phases. From 1951 to 1973 the total annual rod catch averaged 162 salmon per year. From 1974 to 2003, the rod catch averaged 520 salmon per year. Since 2004, the rod catch has averaged 1005 salmon per year. Notably, the pattern of catches since the peak of 2004 has shown a clear decline, with the catches reported in 2012 to 2015 being the lowest in the recent record, (938, 616, 605, and 624 respectively). Importantly, the Ribble Fisheries Consultative Association actively promoted a voluntary catch limit of 1 salmon per angler per season in 2015, amongst the anglers and clubs that fish the Ribble. While this measure may not have reduced the declared catch of salmon, it did appear to contribute to the higher catch and release rate (Fig 3.6) and to the reduction in the number of salmon killed in 2015 (Fig 3.9).

The pattern of monthly catches over the last ten years is presented in Figure 3.5 below. Total annual catches have been dominated by catches recorded in September and October every year, with these two months catches typically comprising around 80% of the annual totals. However it is noticeable that the catches recorded in these two months has declined in recent years – coinciding with the observation of reduced runs and catches of summer and autumn grilse. While it is recognised that unseasonably dry weather conditions have presented very poor angling opportunities in September and October in recent years, the recent reduced catches do reflect a genuine lack of salmon, rather than just a delayed run, coming after the end of the angling season at the end of October.

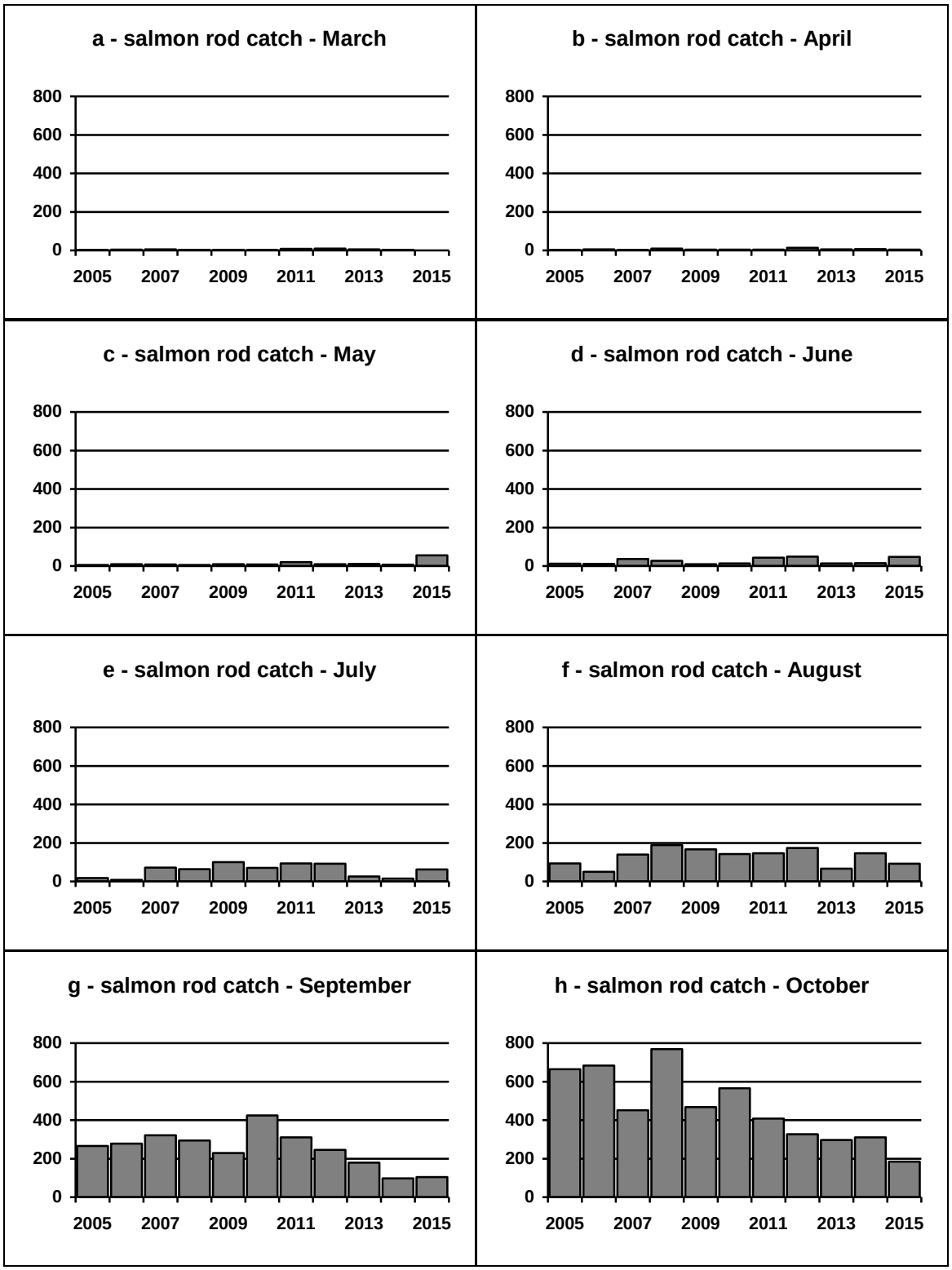

Figure 3.5 – River Ribble monthly salmon rod catch, 2005 – 2015.

Based on catch returns submitted to EA – 2015 total is recognised to be around 33% lower than returns collated by Ribble Fisheries Consultative Association.

The rate of catch and release angling has increased in recent years from around 75% in the mid-2000s to now in excess of 90% in 2015, based on EA declared statistics (Figure 3.6). Recognising that mandatory 100% catch and release applies up to 16th June through National Spring Salmon Byelaws, the catch and release rate for the 16th June to 31st October is presented separately, but shows a broadly similar pattern of release rates, ranging from 73% in 2005 to now in excess of 90%.

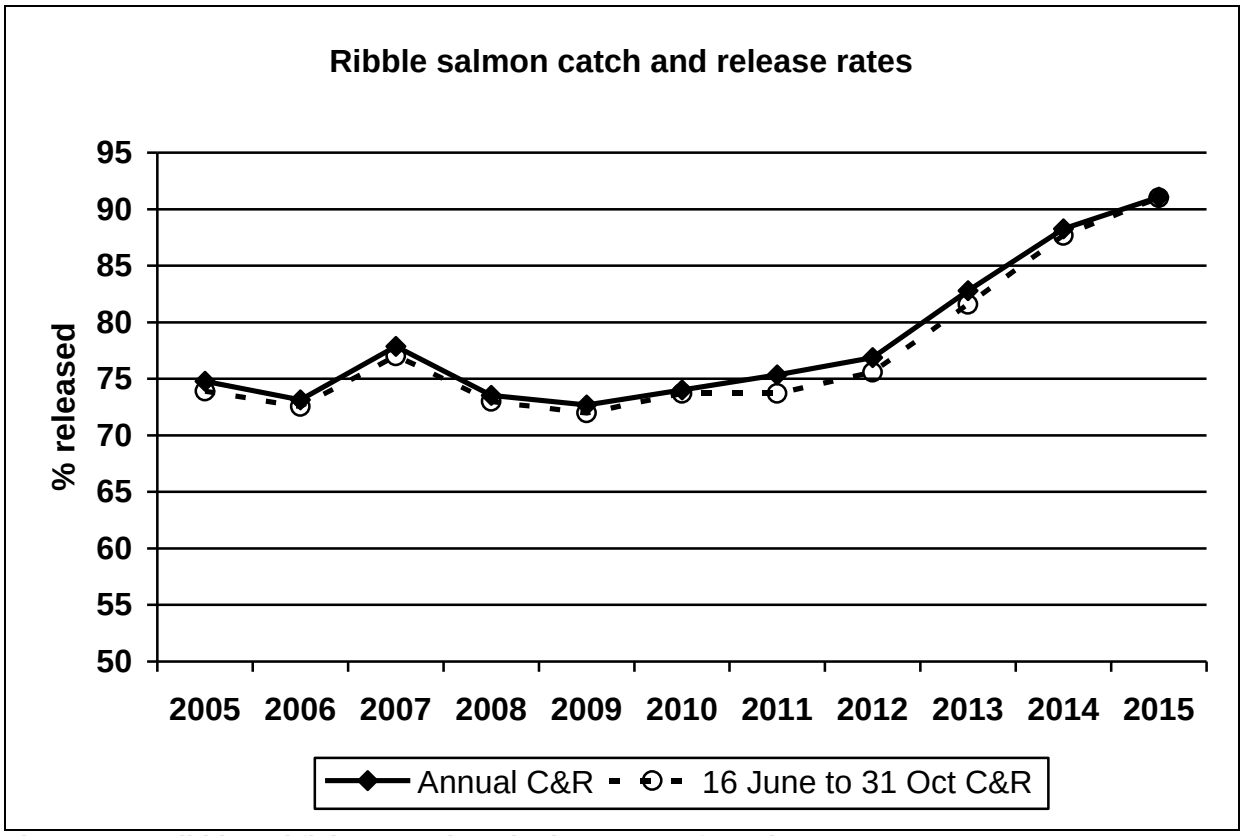

Figure 3.6 – Ribble rod fishery catch and release rates for salmon, 2005 – 2015.

Based on catch returns submitted to EA – 2015 total is recognised to be around 33% lower than returns collated by Ribble Fisheries Consultative Association

Over the period 2010 to 2014, on average 55% of the total salmon catch was caught on fly, 29% caught by spinning and 13% was caught on bait (Figure 3.7)

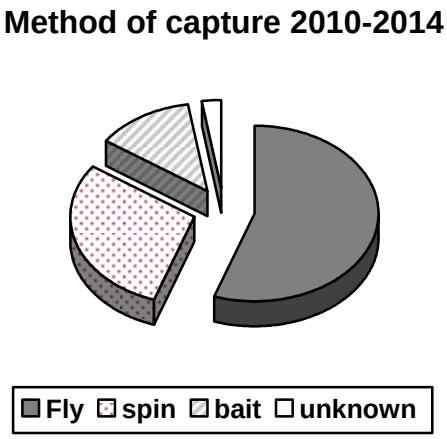

Figure 3.7 – River Ribble methods of capture reported for the salmon rod fishery 2010 to 2014.

Of the salmon caught on fly – 84% were released, of those caught by spinning – 72% were released and of those caught on bait – 69% were released.

The number of catch returns submitted (that include a record of fishing effort) over the period 2005 to 2015 is presented in Figure 3.8 below, along with the total number of fishing days recorded for each season and the declared catch associated with those catch returns that included a measure of fishing effort. The number of catch returns submitted by Ribble anglers has varied over the period from a low of 809 in 2006 to a high of 1123 in 2011, averaging 992 anglers catch returns per season. Equally, the number of days fishing recorded (Note that a fishing "day" should be recognised as a fishing event rather than a specific timed duration) has varied in a similar manner, ranging from a low of 7741 days in 2006 to a high of 11630 days in 2011, averaging 9768 days per season over this period. Notably, the number of catch returns (that include fishing effort) and the declared fishing effort have both declined since the recent peak of 2011.

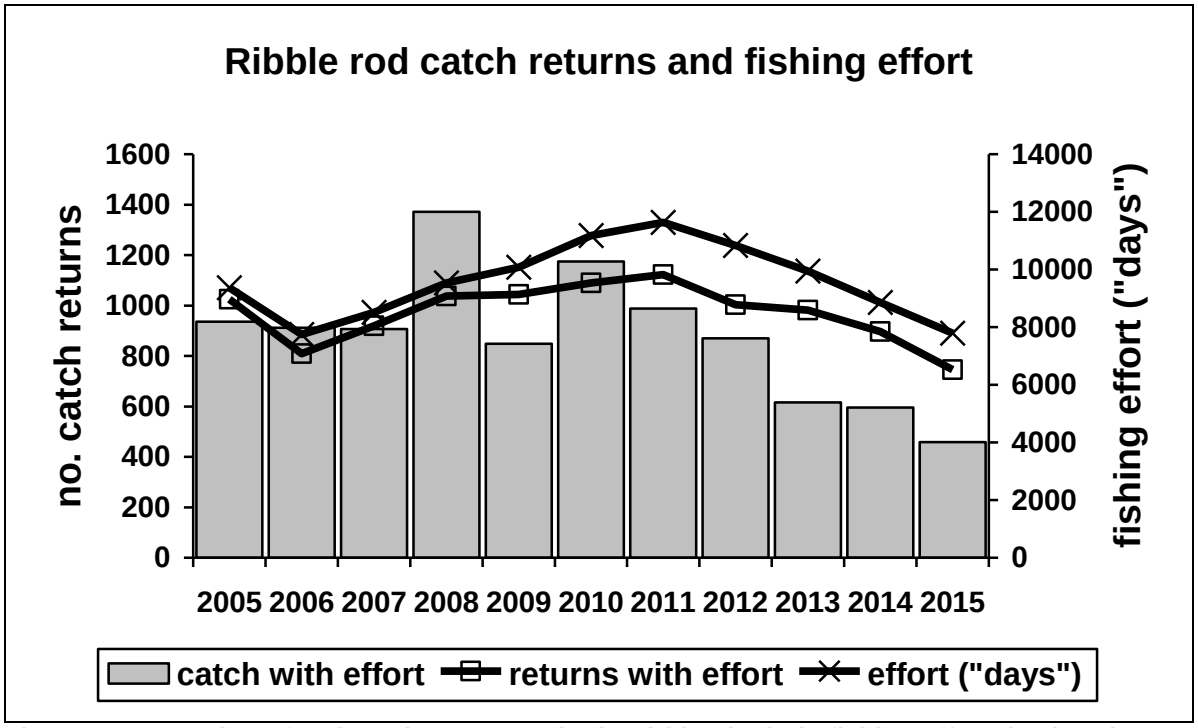

Figure 3.8 – Number of rod catch returns submitted (that include fishing effort data) and recorded fishing effort ("days") for the Ribble salmon fishery, 2005 to 2015. Rod catch from these catch returns (that include fishing effort) is also presented.

Note that this catch statistic is usually lower than the published total declared catch each year due to some catch returns not including their record of fishing effort data.

The number of anglers declaring a catch of salmon from the Ribble and the number of anglers declaring a kill of salmon each season is presented in Figure 3.9 below. From 2005 to 2012 those numbers have been relatively stable, peaking in the high catches of 2008, and averaging 376 anglers catching salmon and 191 anglers killing salmon over this period. However both measures have declined markedly in the last three years, sequentially recording the lowest respective values for both measures since 2012.

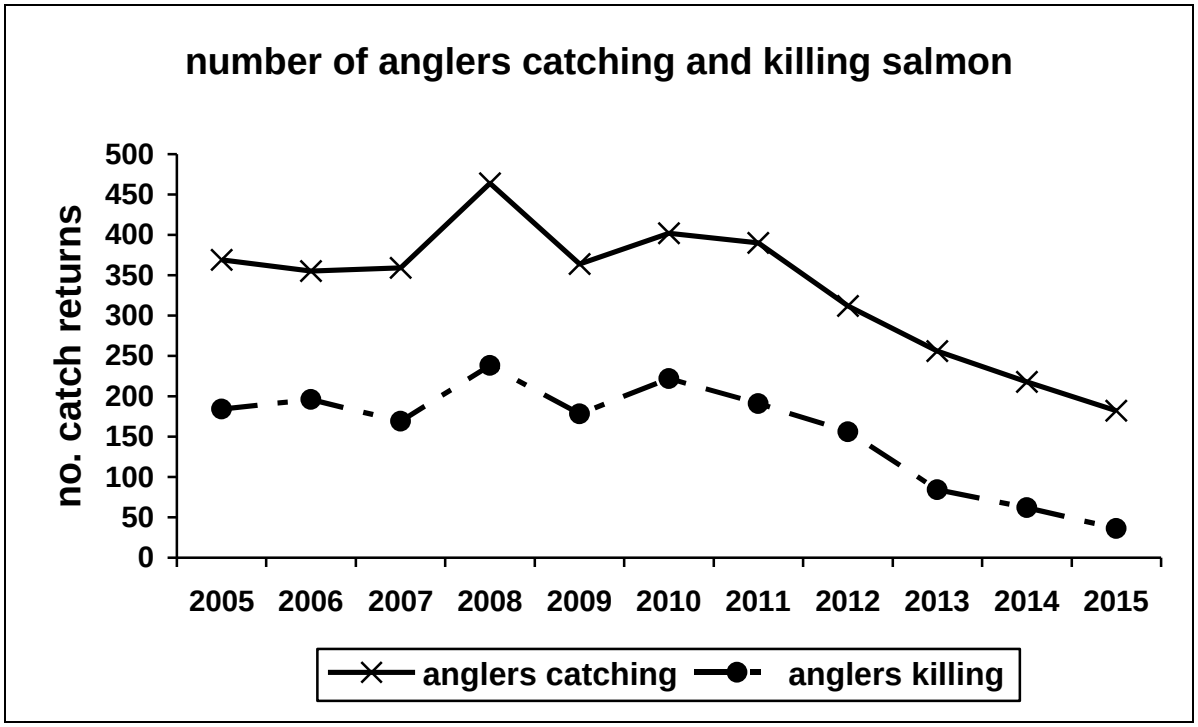

Figure 3.9 – Number of anglers declaring a catch of salmon and number of anglers declaring a kill of salmon from the Ribble 2005 to 2015.

Based on catch returns submitted to EA – 2015 total is recognised to be around 33% lower than returns collated by Ribble Fisheries Consultative Association.

The distribution of the number of salmon killed by Ribble anglers over recent years is presented in Figure 3.10 below. A high proportion of anglers who declare a catch of salmon, return all of their catch and this number seems relatively consistent over the period presented. The number of anglers reporting a kill of more than two salmon per season is particularly low, with no anglers reporting killing more than two salmon in either 2014 or 2015 seasons. Importantly, when a number of these anglers have been questioned about these entries on their catch returns they have stated that they have mistakenly recorded released salmon as killed salmon in these catch returns, and that they have not in fact killed more than two salmon in the season. While it is inherently difficult for us to prove to the contrary, it is possible that some degree of contravention of this byelaw has occurred, albeit likely at a low level. The number of anglers killing 2 salmon and the number killing 1 salmon per season have both declined in recent years – likely in part reflecting the reduced abundance of salmon to potentially be caught, and also reflecting the increasing voluntary catch and release ethic prevailing amongst Ribble anglers and reflected in the consistently highest catch and release rate for any of the four large salmon rivers in Cumbria and Lancashire in recent years.

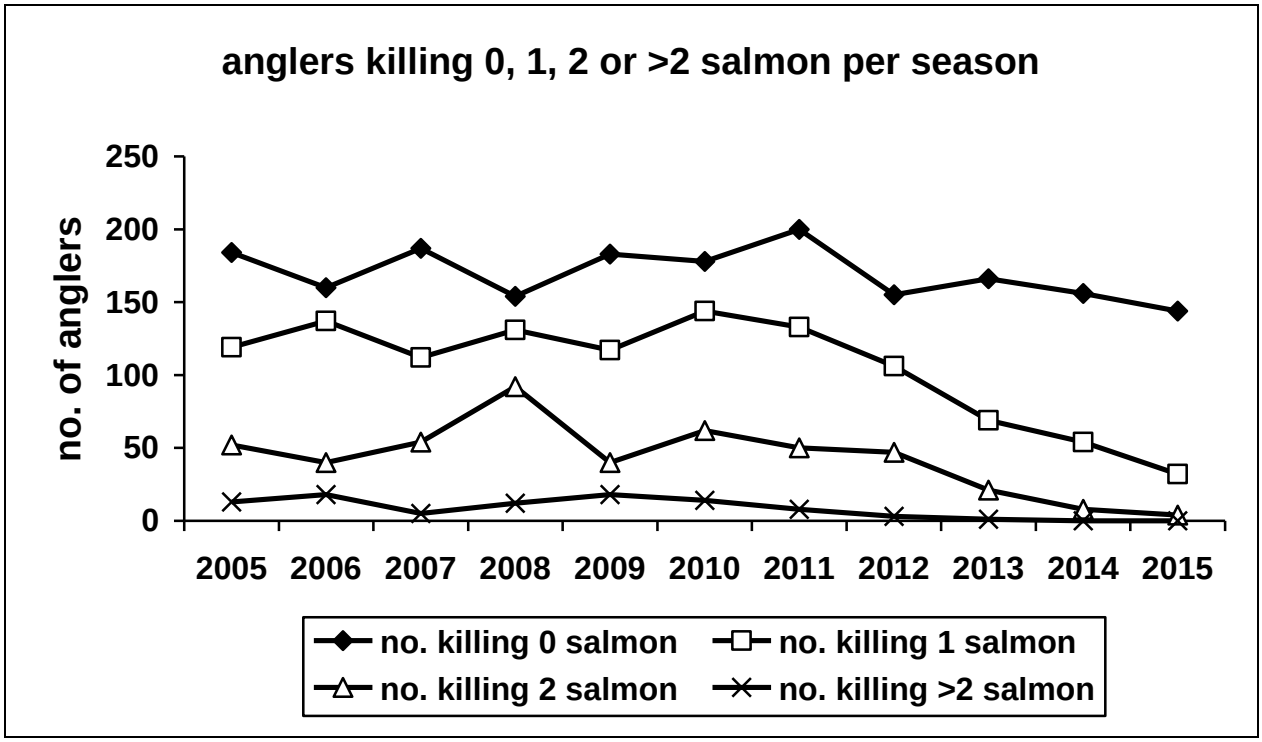

Figure 3.10 – Number of Ribble anglers killing 0, 1, 2 and more than 2 salmon per season 2005 to 2015.

Based on catch returns submitted to EA – 2015 total is recognised to be around 33% lower than returns collated by Ribble Fisheries Consultative Association. Also note that the statistics in this graph represent the reported kill of salmon by anglers who caught fish. The zero kill statistic does not include anglers who went fishing but did not catch anything, only those who caught salmon but returned them all alive to the river.

3.3 Fishing Mortality

Apportionment of recent fishing mortality is summarised in Table 3.1 below.

Year	Pre net stock[a]	Net Mortality		Pre rod stock	Rod kill		C&R Mortality (10%)		Total rod	Total rod+net
		No.	%		No. [b]	%	No. [c]	%	%	%
2011	5917	98	1.66	5819	287	4.93	88	1.51	6.44	8.09
2012	5207	53	1.02	5154	238	4.63	79	1.54	6.16	7.18
2013	3427	42	1.23	3385	116	3.44	56	1.66	5.10	6.32
2014	3372	48	1.42	3324	78	2.35	59	1.77	4.11	5.53
2015	3528	99	2.81	3430	68	1.99	62	1.80	3.79	6.59

Table 3.1 – Approximate apportionment of fishing mortality by rods and nets 2011 to 2015.

[a] based on corrected rod catch (declared catch x 1.1) multiplied by 5 (20% exploitation rate) + declared kill by nets.
[b] corrected kill = declared kill x 1.1
[c] C&R mortality assumed to be 10% of corrected release (declared release x 1.1). A mortality rate of 20% of released fish is commonly applied, as a more precautionary estimate. 10% is applied here given the high prevalence of less destructive fly fishing.

Over recent years the mortality of salmon in the rod fishery, based on the direct kill of salmon plus an estimated mortality of 10% of released salmon, has decreased markedly as the number of fish killed has been voluntarily reduced. However this still amounts to more than the mortality in the net fishery, although overall the total net and rod kill together represent an estimated 6 to 8% of the available stock over recent years. Notably net exploitation roughly doubled in 2015 (Table 3.1) and represented the first occasion that the direct kill of salmon by the net fishery exceeded the direct kill of salmon by the rod fishery.

3.4 Counter data

A resistivity fish counter is sited in the fish pass at Waddow weir, near Clitheroe on the main River Ribble, approximately 36 kilometres upstream of the tidal limit, and upstream of the Hodder and Calder confluences. The number of >50cm fish counted at this site since 2000 is presented in figure 3.11 below.

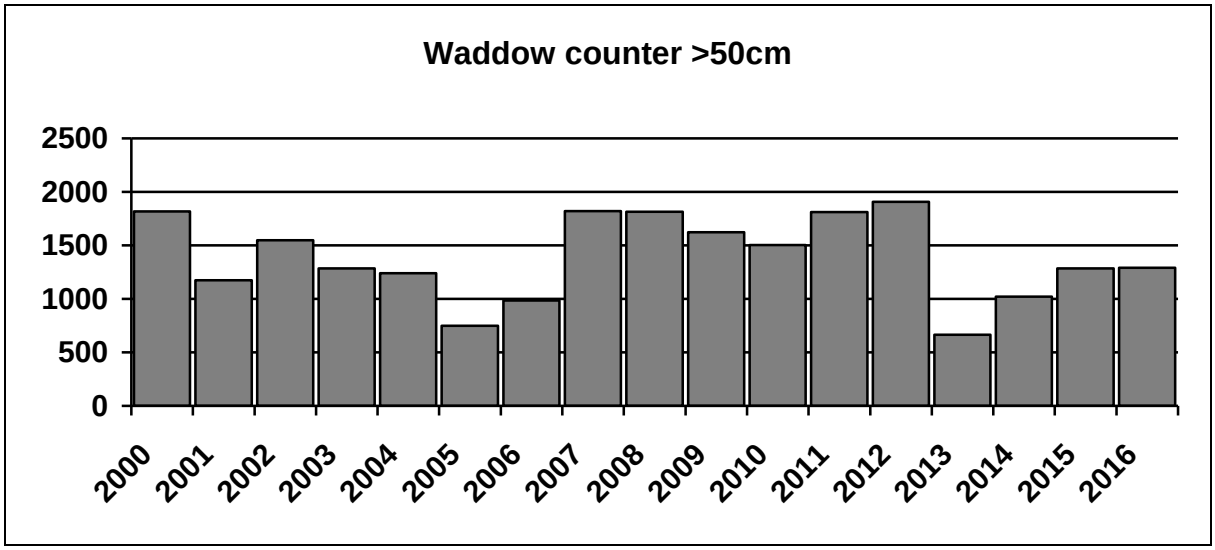

Figure 3.11 – Total annual count of large fish (>50cm) at Waddow resistivity fish counter, River Ribble 2000 – 2016.

While the precise split of salmon and sea trout crossing this counter is not known, the number of >50cm fish recorded by this counter is used as an index of salmon abundance, as not many sea trout will exceed this length. However it is recognised that some fish do by-pass this counter by ascending the weir itself under appropriate higher flows, although this is considered to represent a very low single figure percentage of the total run. It remains apparent that the 2013 to 2016 counts, are noticeably lower than in recent years, supporting the conclusions about salmon abundance drawn from catch data and observations from the net and rod fisheries.

3.5 Juvenile monitoring data

Juvenile salmon and trout populations are surveyed at a small number of sites (up to 12) in the wider Ribble catchment every year to illustrate any possible changes in annual juvenile production at key salmon producing sites, and also at a larger number of sites (up to 47) every 5 to 6 years to illustrate the wider distribution and abundance of salmon and trout.

The numbers of salmon fry and parr over recent years at a number of annually monitored sites is presented below. Note the scales of the vertical axes differ between graphs.

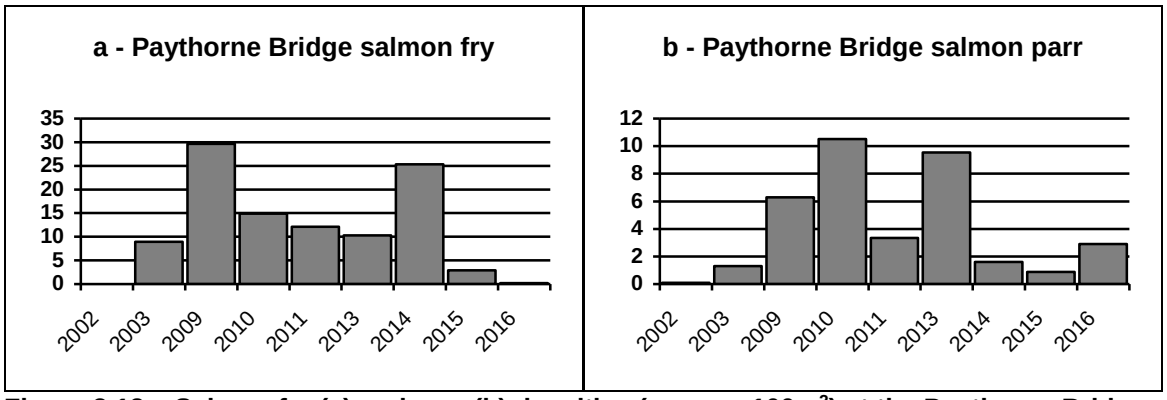

Figure 3.12 – Salmon fry (a) and parr (b) densities (nos per 100m^2) at the Paythorne Bridge survey site, River Ribble, 2002 – 2016.

The Paythorne Bridge site produced particularly low numbers of salmon fry (Fig 3.12a) in 2015 and 2016, with parr numbers (Fig 3.12b) being particularly low in 2014 and 2015.

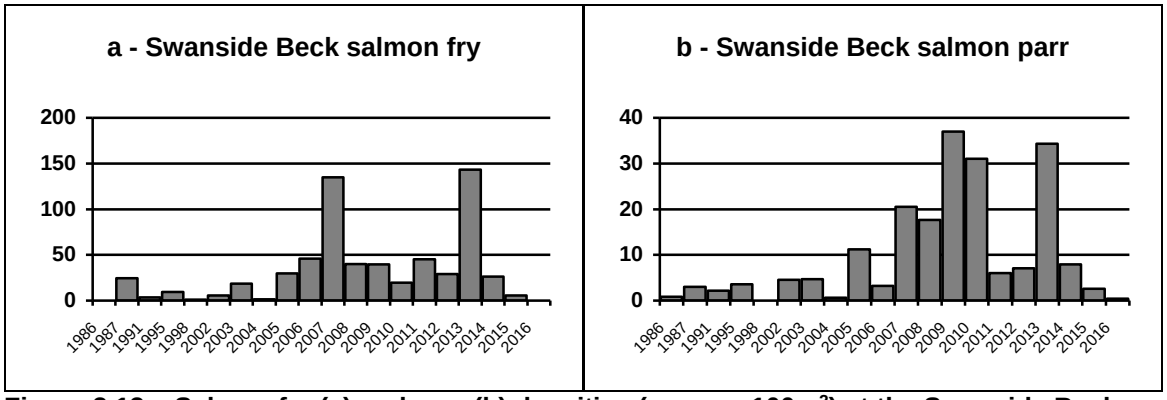

Figure 3.13 – Salmon fry (a) and parr (b) densities (nos per 100m^2) at the Swanside Beck survey site, River Ribble, 1986 – 2016.

The Swanside Beck site produced the lowest number of salmon fry (Fig 3.13a) and parr (Fig 3.13b) in the recent record in 2015 and 2016, with fry being absent in 2016.

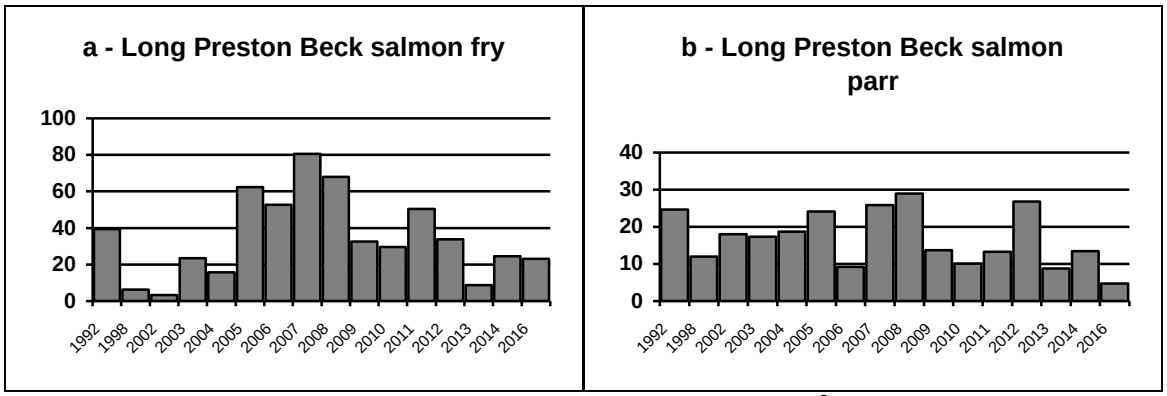

Figure 3.14 – Salmon fry (a) and parr (b) densities (nos per 100m^2) at the Long Preston Beck survey site, River Ribble, 1992 – 2016.

While salmon fry numbers (Fig 3.14a) seem to have maintained a good level in 2016 at the Long Preston Beck site, this site recorded the lowest ever parr number (Fig 3.14b) in 2016.

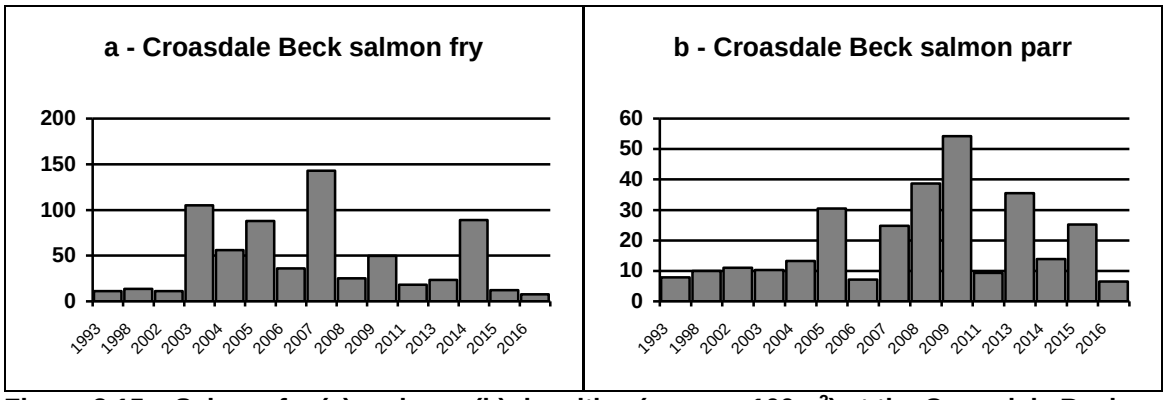

Figure 3.15 – Salmon fry (a) and parr (b) densities (nos per 100m^2) at the Croasdale Beck survey site, River Hodder, 1993 – 2016.

Croasdale Beck is considered one of the more productive salmon spawning and nursery areas in the Hodder catchment, and while fry (Fig 3.15a) and parr numbers (Fig 3.15b) have been low in the past (pre 2003), fry numbers in 2015 and 2016, and parr numbers in 2016 have been amongst the lowest in the recent record for this site.

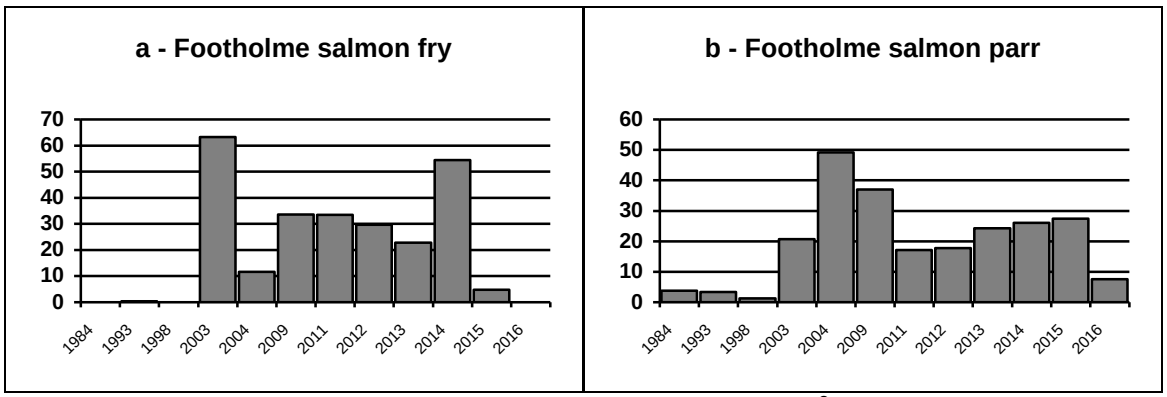

Figure 3.16 – Salmon fry (a) and parr (b) densities (nos per 100m^2) at the Footholme survey site, River Dunsop, 1984 – 2016.

The Footholme site on the River Dunsop, has generally been considered to be a productive site for salmon in the Hodder catchment with good densities of salmon fry (Fig 3.16a) and parr (Fig 3.16b) since 2003. However, very few fry were recorded at this site in 2015 and no fry were recorded at this site in 2016. Parr densities were also markedly reduced in 2016.

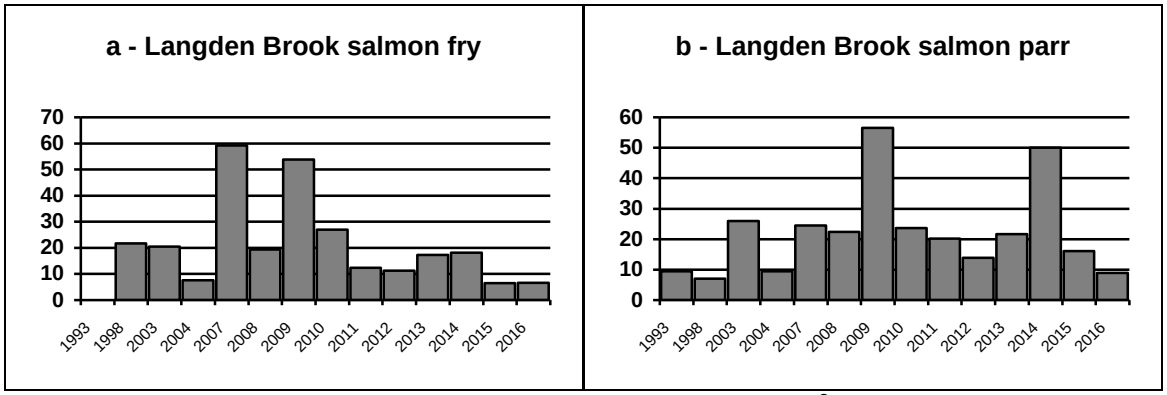

Figure 3.17 – Salmon fry (a) and parr (b) densities (nos per 100m^2) at the Langden Brook survey site, River Hodder, 1993 – 2016.

The Langden Brook site on the Hodder catchment is another regularly monitored area of good fry (Fig 3.17a) and parr (Fig 3.17b) production, but the 2015 and 2016 fry numbers and the 2016 parr numbers are noticeably reduced from recent production standards.

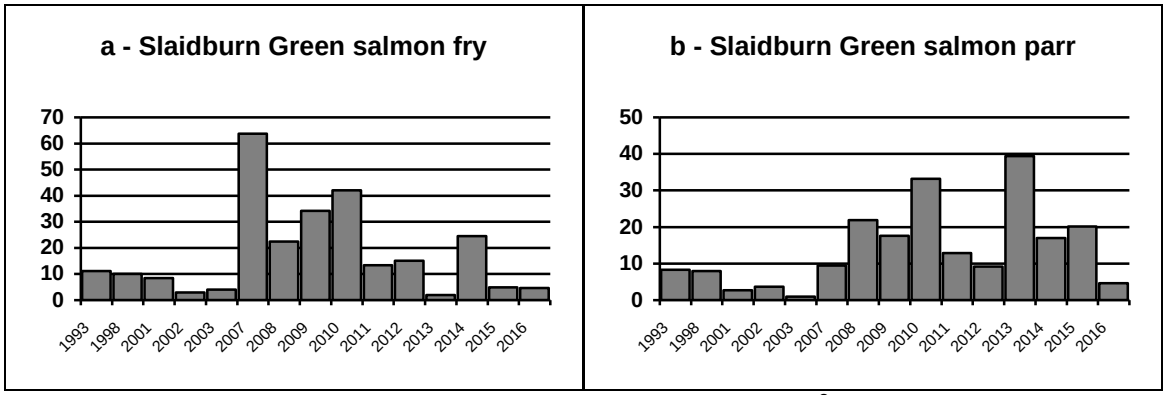

Figure 3.18 – Salmon fry (a) and parr (b) densities (nos per 100m^2) at the Slaidburn Green survey site, River Hodder, 1993 – 2016.

The River Hodder survey site at Slaidburn Green is another typically productive site for both salmon fry (Fig 3.18a) and parr (Fig 3.18b), but fry abundance in 2015 and 2016 were among the lowest recorded in the recent surveys, as were parr numbers in 2016.

For the wider catchment surveys undertaken every 5 to 6 years, the distribution of National Fisheries Classification System (NFCS) grades for survey sites is presented in the tables below separately for salmon fry and salmon parr. (Grade A represents the highest abundance, and E the lowest, with F indicating that age class being absent). The number and location of sites surveyed are not always consistent between surveys.

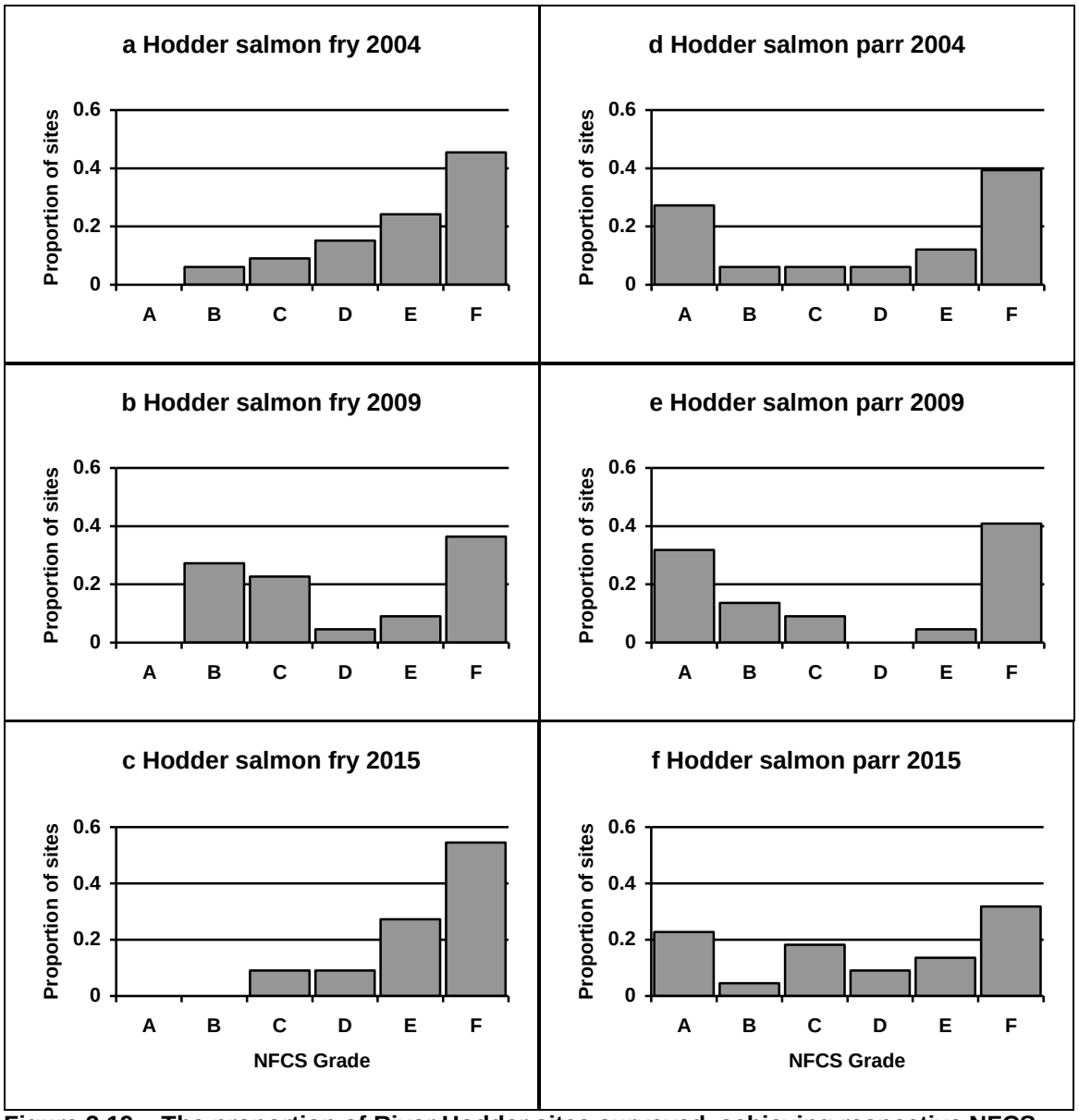

Figure 3.19 – The proportion of River Hodder sites surveyed, achieving respective NFCS grades for salmon fry (a, b, c) and salmon parr (d, e, f) in 2004, 2009 and 2015 surveys.

The 2009 Hodder survey (Fig 3.19b) indicated an improved distribution and abundance of salmon fry from the 2004 survey (Fig 3.19a), with more sites achieving B and C grades and less D, E and F grades in 2009. However, the same 22 sites reported in 2015 (Fig 3.19c) as in 2009 (Fig 3.19b) demonstrated a clear reduction in the distribution and abundance of salmon fry, with less sites achieving B and C grades and more sites achieving E and F grades than in 2009. Of the 22 repeated sites, fry densities decreased at 21, and increased at only 1 site in the 2015 survey.

For salmon parr, less sites are achieving the higher A and B grades in 2015 (Fig 3.19f) than in either of the 2009 (Fig 3.19e) and 2004 (Fig 3.19d) surveys, although less sites are recording an absence of salmon parr in 2015 than previously.

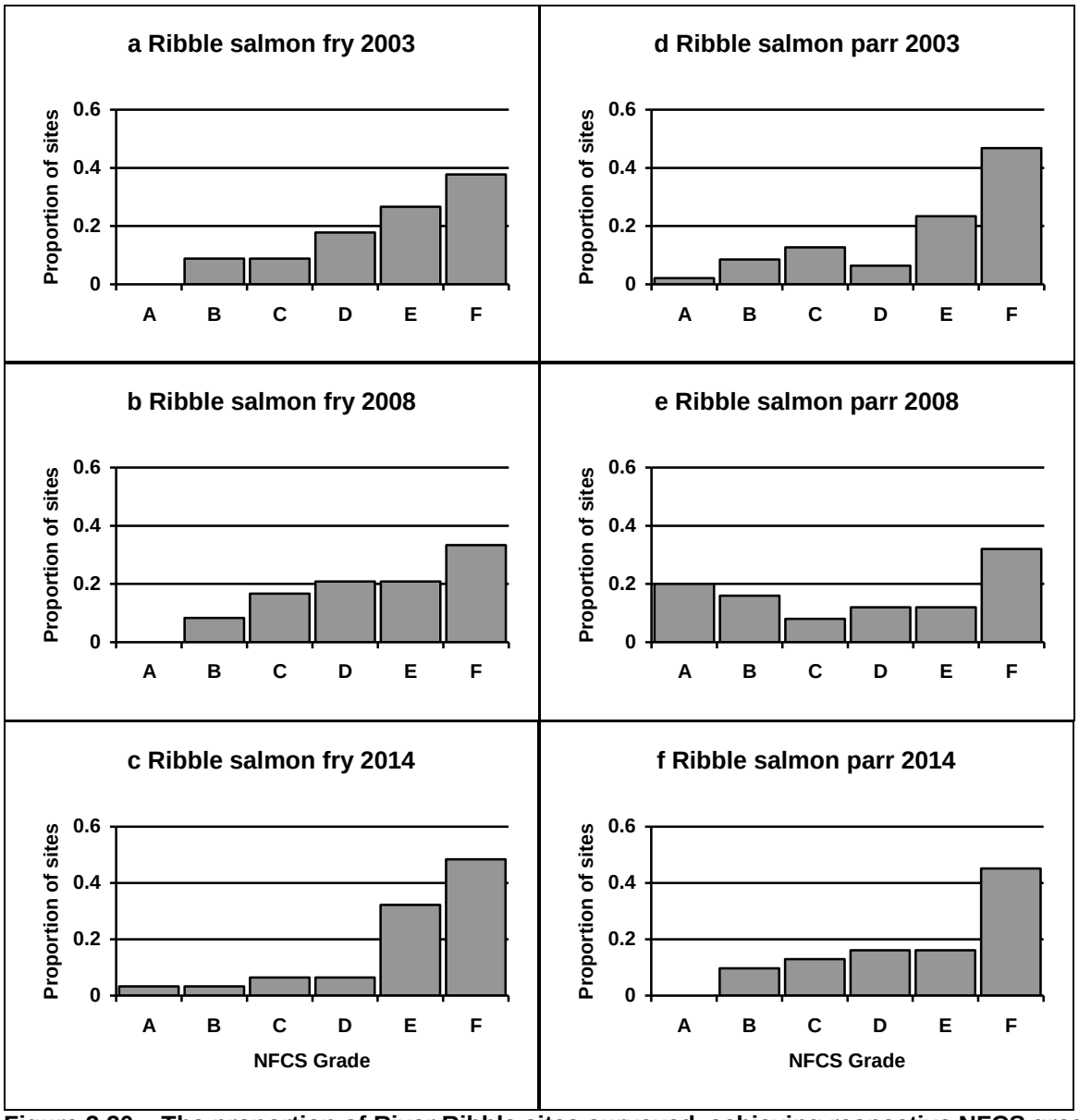

Figure 3.20 – The proportion of River Ribble sites surveyed, achieving respective NFCS grades for salmon fry (a, b, c) and salmon parr (d, e, f) in 2003, 2008 and 2014 surveys.

The distribution and abundance of salmon fry over the last 3 spatial surveys in the Ribble catchment seemed to initially improve slightly from 2003 (Fig 3.20a) to 2008 (Fig 3.20b), with less lower grade sites in the latter survey, but this has deteriorated again with less of the higher grades seen in 2014 (Fig 3.20c) than in the previous 2 surveys, and more lower grade sites again. Similarly for salmon parr, more higher grade sites were recorded in 2008 (Fig 3.20e) compared to 2003 (Fig 3.20d), and with less lower grade sites. However, there were less higher A and B grade sites in 2014 (Fig 3.20f) than there were in both the 2003 and 2008 surveys, and more sites recorded an absence of parr than in 2008.

Overall, the distribution and abundance of salmon fry and parr appears to have generally decreased in both the Ribble and Hodder catchments in the most recent surveys. Also, the period of higher salmon fry and parr abundance generally since 2003 has roughly coincided with the period of higher adult abundance (ref Fig 3.4) and conservation limit compliance (ref Fig 3.19). Conversely, prior to 2003 lower salmon fry and parr numbers have coincided with lower adult abundance (Fig 3.4) and frequent conservation limit failures (Fig 3.19). The recent reduced returns of adults, therefore seems to be reflected in reduced numbers of juveniles in subsequent years.

3.6 Salmon Stock Assessment

During this review, it has been necessary to correct some previous estimates of annual stock assessments (egg deposition) as follows:

- An incorrect proportion of females in the multi-sea-winter part of the salmon stock was applied to previous stock assessments (51.5% instead of 68.7%), resulting in a slight under-estimation of the annual egg deposition. This is corrected here for the current (2015) stock assessment and all preceding assessments.
- The rod exploitation rate that is used to multiply the reported rod catch up to a total stock assessment was originally defined at 29% based on simplistic modelling estimates. This rate is reduced in this review, using basic rod catch and fish counter data, to 20% which is considered to be more realistic but still precautionary. This has the effect of raising all of the annual estimates of egg deposition.

In addition, an error in the assessment of each years salmon stock since 2003 against the Conservation Limit was identified and corrected.

- The original Ribble Conservation Limit of 8.5 million eggs, was re-calculated in 2003 using a lower, more realistic estimate of marine survival, in line with national guidance, giving a new CL of 7.1 million eggs for the Ribble. However, the annual stock assessments continued to be compared and reported against the pre-2003 higher Conservation Limit. Stock assessments presented here are compared against the correct prevailing lower CL of 7.1 million eggs since 2003.

Salmon Conservation Limit (CL) compliance for the River Ribble, according to the corrections identified above, is presented in Figure 3.21. Prior to the change in CL in 2003, egg deposition was generally at or below CL, with 4 failures (1995, 1996, 1997 and 2001) and 4 passes (1998, 1999, 2000 and 2002). The CL was consistently exceeded between 2003 and 2014 although with a clear declining trend since 2004 and the three lowest stock assessments in this period occurring in the last 3 years – 2013 to 2015 inclusive.

The management target for the Ribble since 2003 is 10.82 million eggs. That target has not been achieved in the last 3 years, meaning that the management objective of meeting CL for 4 years out of 5, has not been achieved.

Note that the Ribble Conservation Limit is based on the accessible river habitat of the Ribble and Hodder catchments, including the Calder catchment downstream of the previously impassable Padiham weir – the first impassable barrier on that river. Since the removal of Padiham weir and other upstream barrier improvements, an additional 420,000 square metres of habitat has been made accessible to salmon in recent years. However, natural recolonisation of this habitat has so far been very slow, with only occasional juvenile salmon found in surveys. This additional habitat has not yet been added into the Ribble Conservation Limit calculation. Equally, the Douglas and Darwen catchments are not included in the Ribble CL calculation.

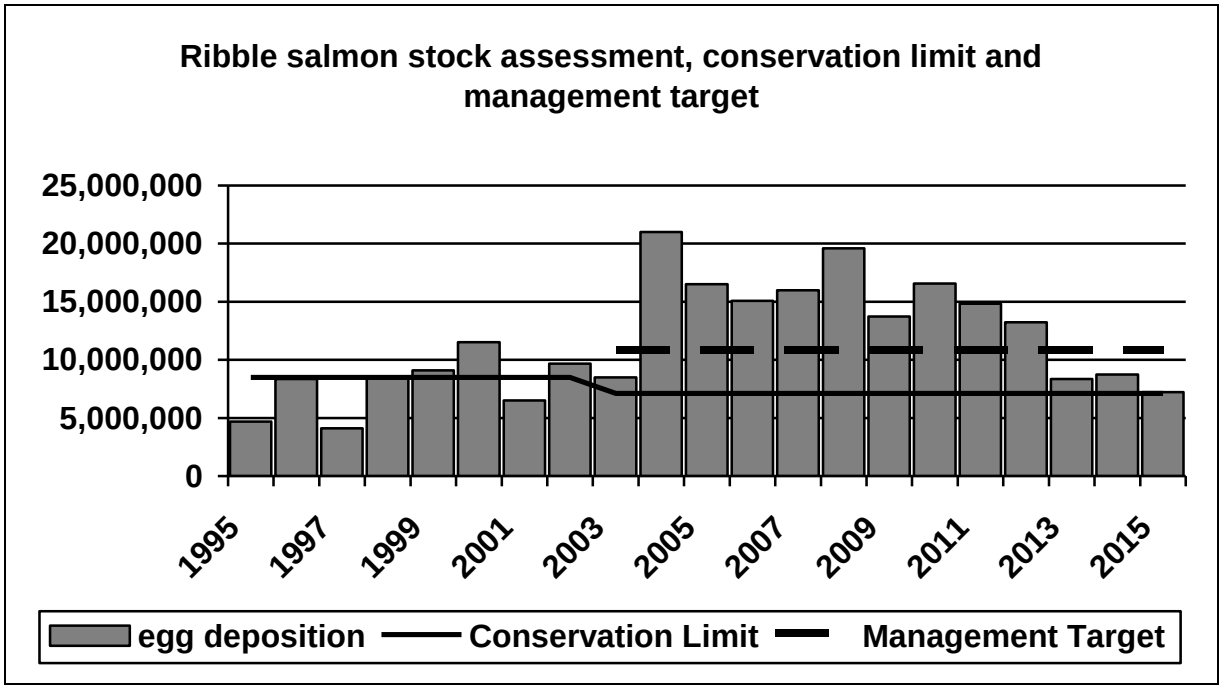

Figure 3.21 – River Ribble annual salmon stock assessment (expressed as egg deposition), Conservation Limit and Management Target.

Note that 2015 stock assessment is based on locally sourced catch returns (total 624 salmon caught) rather than catches declared to EA that were recognised to be approximately 33% lower than local data.

It is evident that the salmon stock on the River Ribble has declined markedly over the last 10 years, most notably occurring in the last 3 years. Importantly it is recognised that the exploitation rate i.e. the proportion of the total salmon run that is caught by rod and line anglers, has a strong bearing on these stock assessments in that declared rod catches are multiplied up by this factor in order to calculate the estimated total stock. Ribble salmon stock assessments were previously based on an estimated exploitation rate of 29% (specific to the Ribble), but this seemed unjustifiably high. Simplistic comparison of Waddow fish counter data with local catch returns from the fisheries upstream of this counter, suggested a lower exploitation rate of under 15% was prevailing, at least for that part of the fishery for the seasons for which catch data and counter data were examined. Recognising that not all of the relevant fisheries supplied their catch data for this comparison, and that the count of salmon was simplistically estimated from the counter data (that does not differentiate between sea trout and salmon), then a revised lower but precautionary exploitation rate of 20% has been applied to Ribble stock assessments for 2015, and also retrospectively, for all stock assessment data presented here.

The formal conservation limit compliance assessment method defines the Ribble salmon stock as “probably at risk” of failure of its management target in 2015, and is also predicted to remain in this same category in 2020 (Fig 3.22) with a clear declining trend in abundance being apparent.

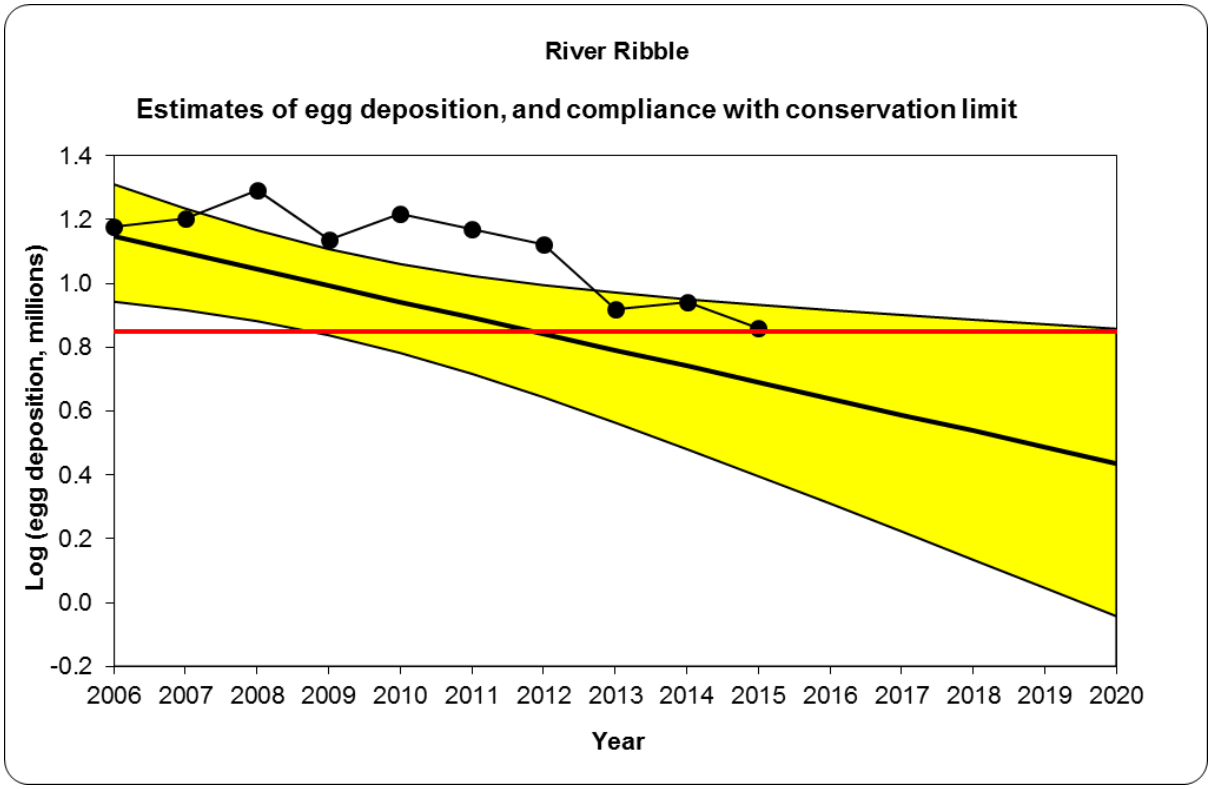

Figure 3.22 – River Ribble salmon conservation limit compliance 2006 – 2015 and predicted compliance to 2020. (based on 20% exploitation rate)

In order to examine the potential consequences of using the lower 15% exploitation rate for Ribble stock assessment and conservation limit compliance, the compliance method has been re-run with this adjusted stock assessment data. Applying a lower estimated exploitation rate of 15% to these stock assessments from 2006 to 2015 does not result in a change to the present or future predicted risk categories – the salmon stock would still be defined as probably at risk now and also in 5 years-time (Figure 3.23). Management actions are therefore recommended in line with Decision Structure guidance for “Probably at risk” stocks. Further examination of likely exploitation rates will continue, but for now, the precautionary 20% exploitation rate will be applied.

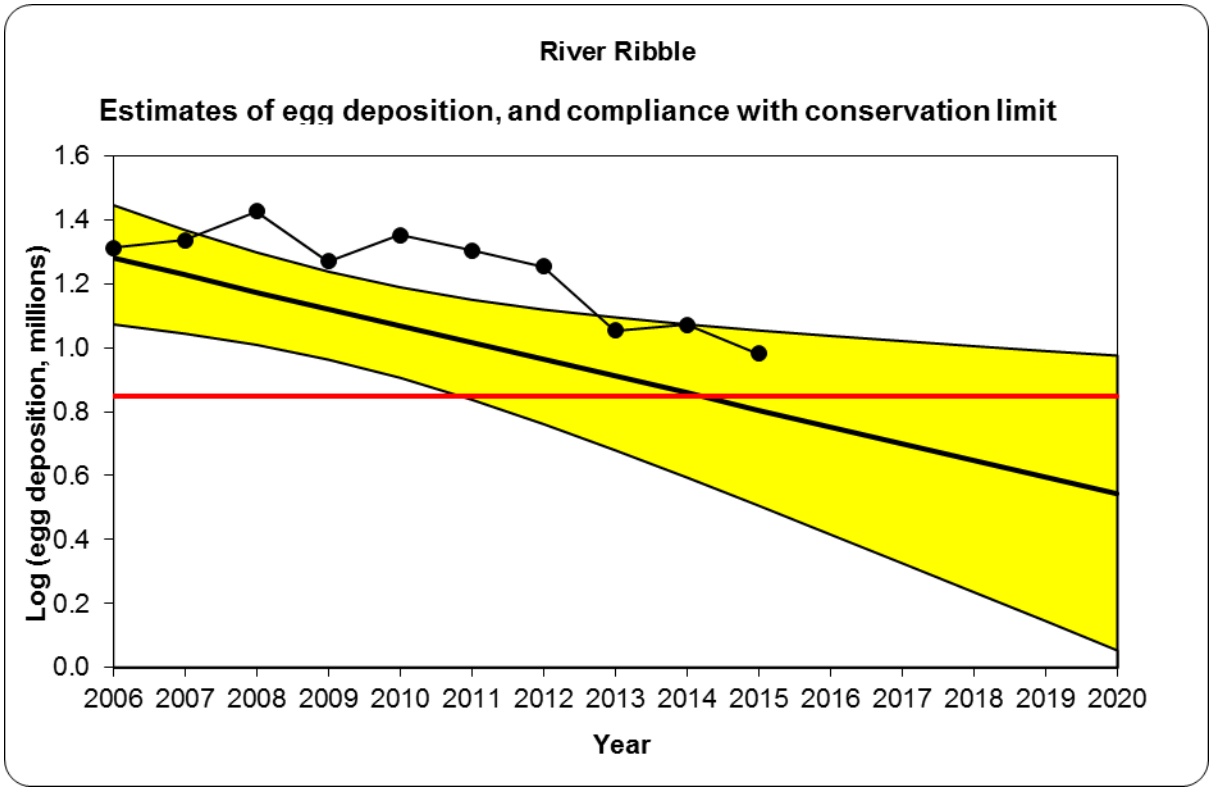

Figure 3.23 – River Ribble salmon conservation limit compliance 2006 – 2015 and predicted compliance to 2020. (based on 15% exploitation rate)

4.0 River Ribble Sea trout stock Net catches

The number of sea trout recorded caught by the net fishery in the estuary is presented in Figure 4.1 below.

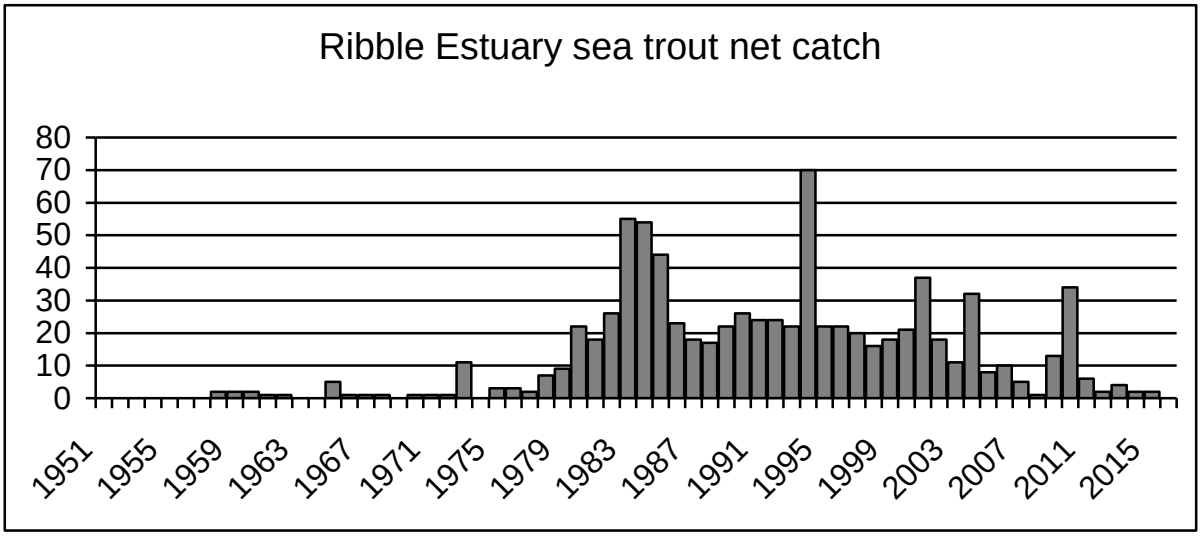

Figure 4.1 – Ribble Estuary annual net catch of sea trout 1951 to 2016.

Overall, relatively few sea trout are taken in this fishery, essentially due to the relatively large mesh size specified for these nets. Prior to 1980, very few sea trout were recorded from the net fishery, with annual reported catches averaging just 2 sea trout per year up to this time. From 1980 to 2010, the total annual catch by the 6 nets averaged 24 sea trout per year (5 licencees in 2009 and 2010), while in the last 6 years (2011 to 2016) the total catch has averaged just over 2 sea trout per year (5 licencees in 2011 and 4 licencees since 2012). The relatively large mesh size of these nets means that only particularly large sea trout are caught in this fishery (averaging 7.5 pounds, range 4-10 pounds), but recent catches do indicate a reduction in the abundance of these larger sea trout in the estuary net catch.

4.2 Rod Catches

The pattern of annual sea trout catches in the rod fishery is presented in Figure 4.2 below.

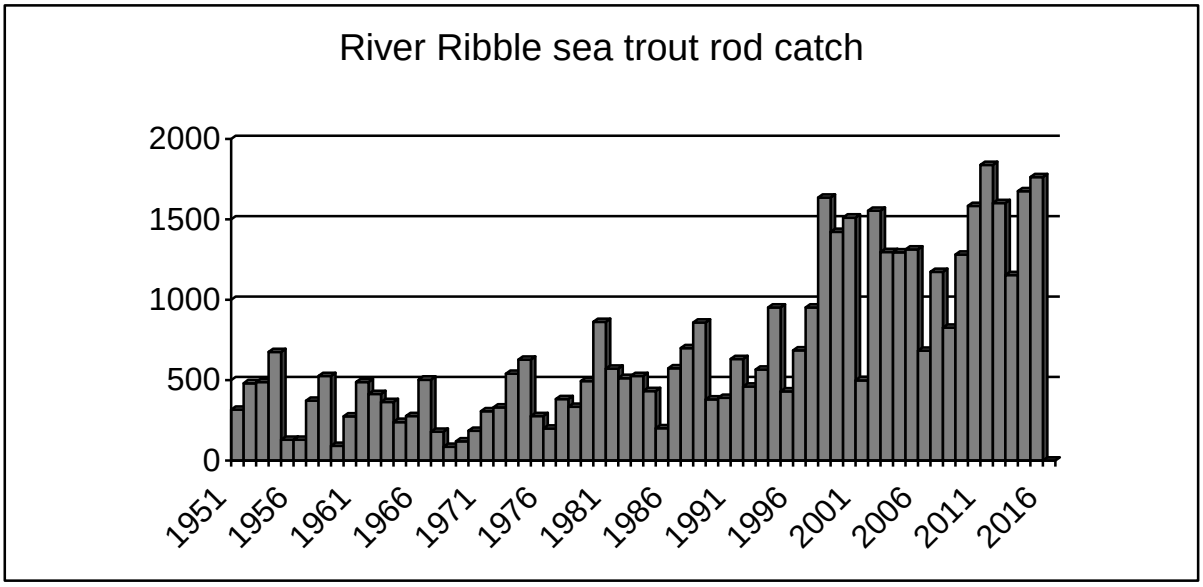

Figure 4.2 – River Ribble annual rod catch of sea trout 1951 to 2015

The catch of sea trout to the rod fishery prior to 1998 averaged just 436 sea trout per year, while after this time the average annual catch has been 1339 sea trout per year. The majority (~60%) of these sea trout reported by the rod fishery are small herling (<1 pound in weight), with fish in the 1 to 4 pound weight bracket making up 36% of the catch and the remaining 4% of the catch being fish over 4 pounds. Importantly, around 87% of the rod catch of sea trout is voluntarily released back to the river, in the absence of any byelaw catch restrictions for this species.

The sea trout stock is assessed in terms of the relative performance of the fishery in terms of catch per unit effort measurements, rather than the performance of the stock per se, measured as a multiple of the rod catch, extrapolated based on an estimated exploitation rate as for salmon. In the most recent 2015 assessment, the Ribble sea trout fishery is classed as Not at Risk, having been in the lower “Probably Not at Risk” category in the last assessment in 2014.

The proportion of the sea trout rod catch that is released alive has increased from around 76% ten years ago to around 87% recently (Figure 4.3).

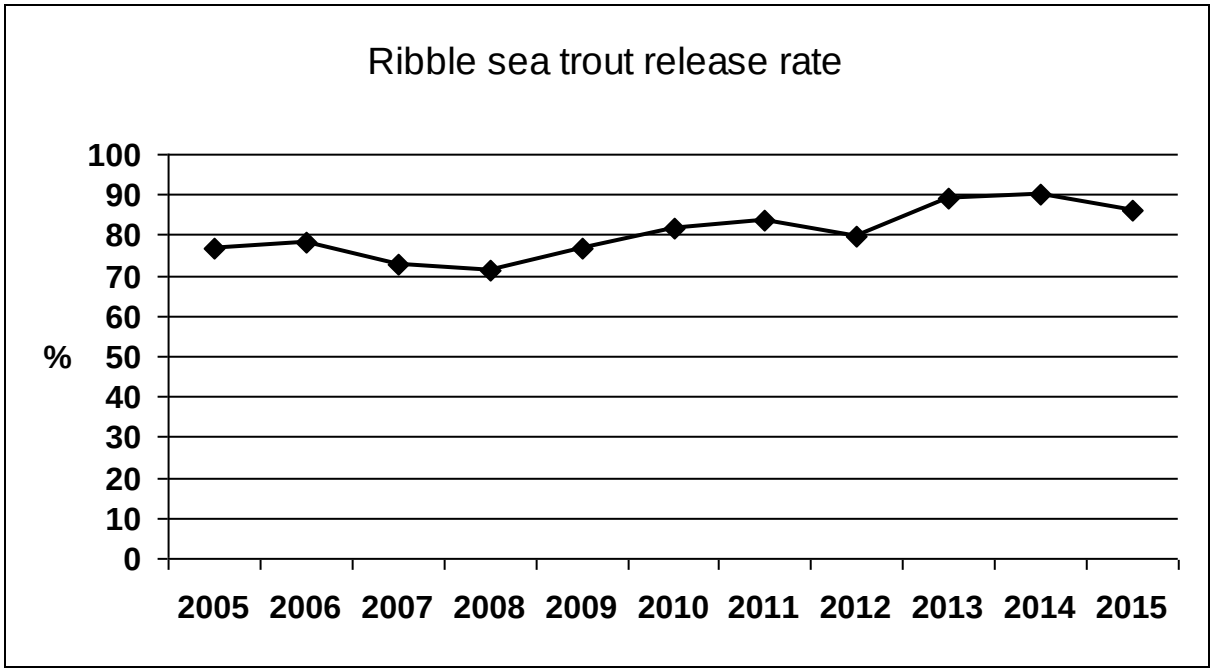

Figure 4.3 – River Ribble annual catch and release rate for sea trout 2005 to 2015.

4.3 Juvenile Monitoring Data

The sites monitored annually on the Ribble catchment, are more representative of salmon spawning and nursery areas, than trout spawning and nursery sites. These sites typically show relatively low abundance and densities of trout fry and parr, and are therefore not analysed in any depth here. The larger number of sites monitored in less frequent spatial surveys, provide a more general picture of changes in juvenile trout abundance, as depicted in the graphs below.

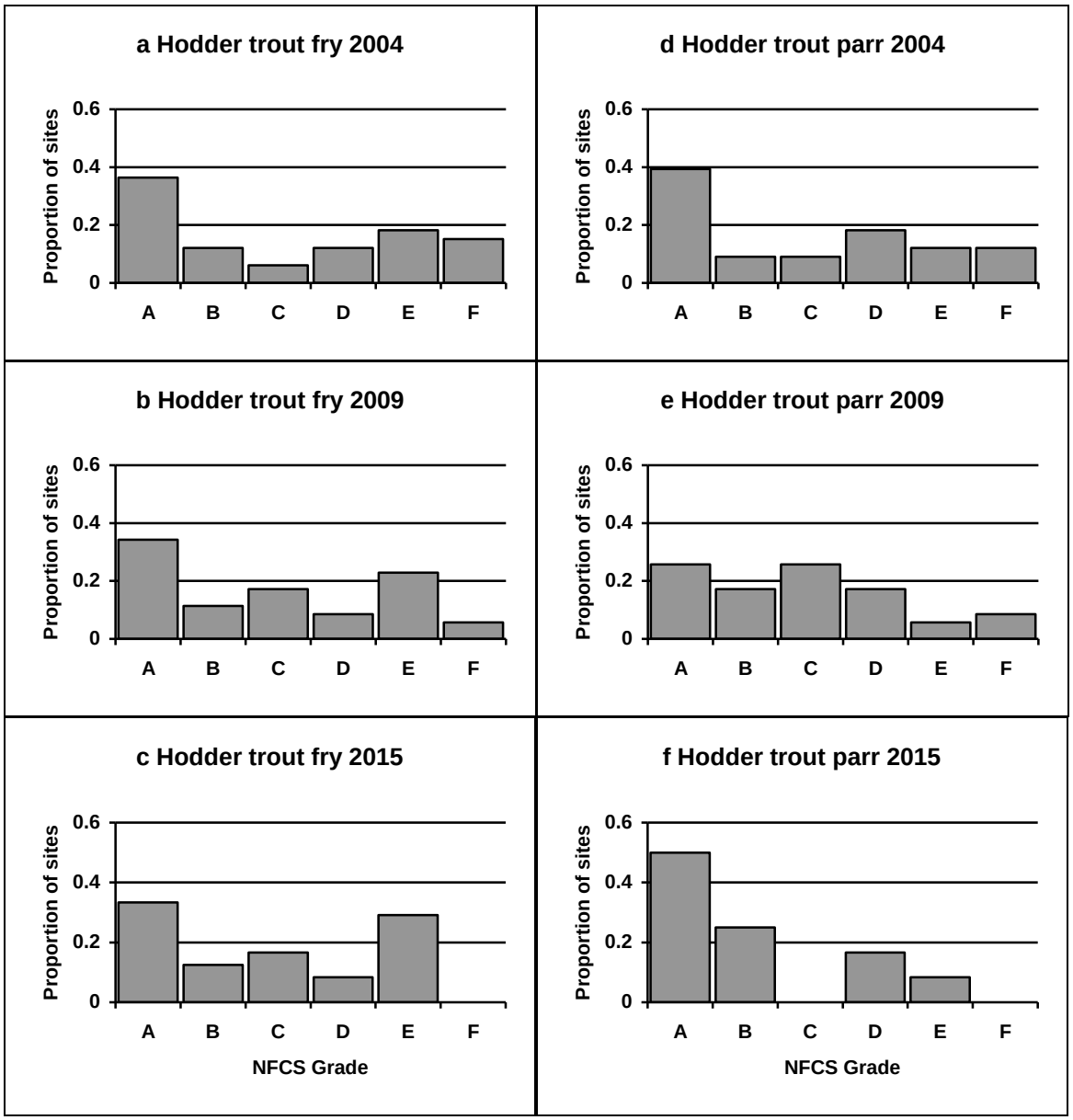

Figure 4.4 – The proportion of River Hodder sites surveyed, achieving respective NFCS grades for trout fry (a, b, c) and trout parr (d, e, f) in 2004, 2009 and 2015 surveys

The spread of trout fry densities in previous Hodder catchment surveys described here as the distribution of National Fisheries Classification System grades (Fig 4.4a-c) is similar broadly across all three surveys.

The spread of trout parr densities/NFCS grades (Fig 4.4d-f) is broadly similar across all three surveys, although a slight improvement in higher grades and reduction in lower grades is suggested in the 2015 survey, compared with the previous two surveys.

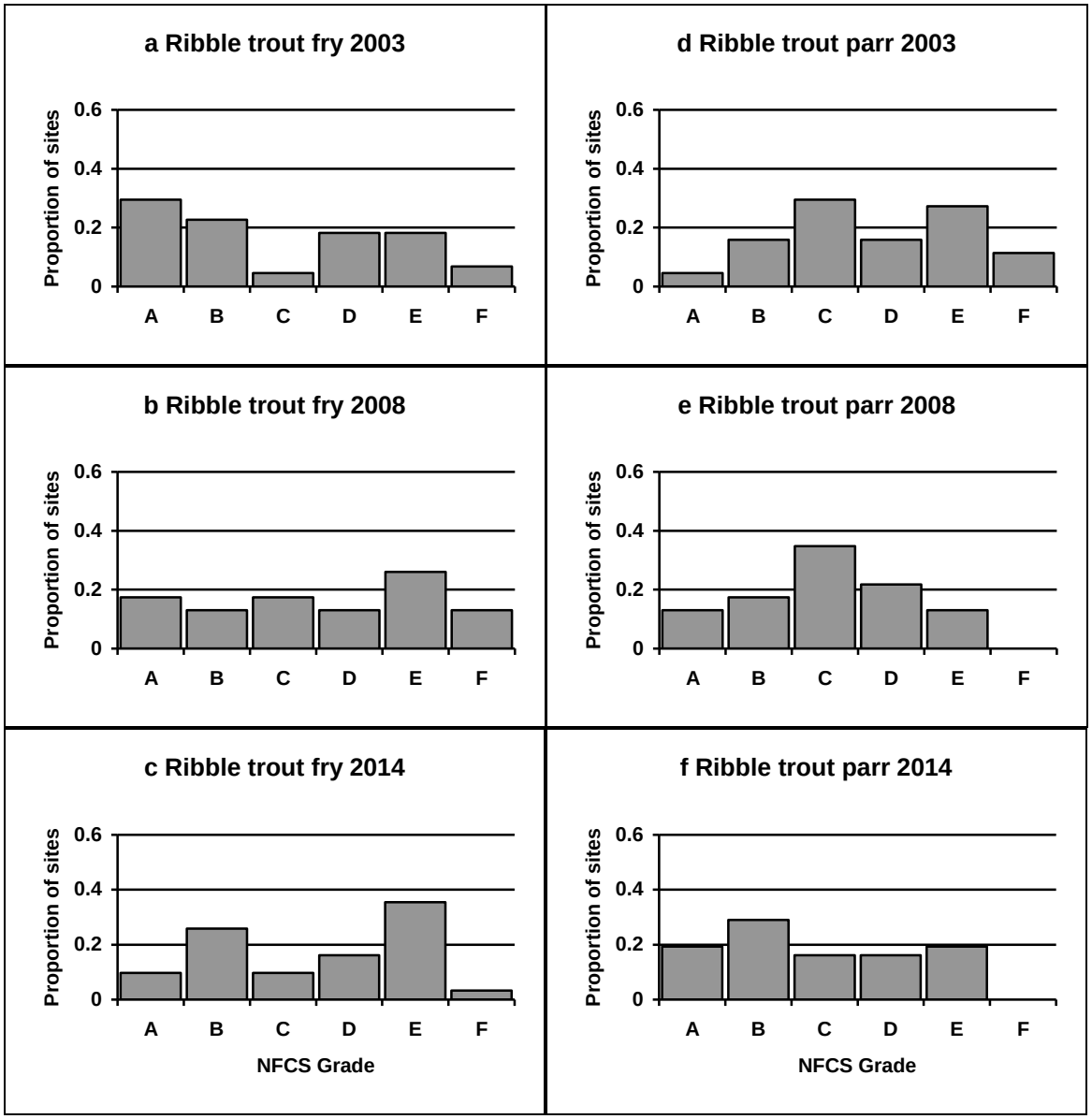

Figure 4.5 - The proportion of River Ribble sites surveyed, achieving respective NFCS grades for trout fry (a, b, c) and trout parr (d, e, f) in 2003, 2008 and 2014 surveys.

The spread of densities and NFCS grades for trout fry from Ribble catchment surveys (Fig 4.5a-c) is broadly similar across all 3 surveys, although there is a suggestion of a slight reduction in the higher densities/grades in the 2008 (Fig 4.5b) and 2014 (Fig 4.5c) surveys, compared to the 2003 survey (Fig 4.5a) and slightly more low grade E sites in 2014 (Fig 4.5c).

Ribble trout parr grades (Fig 4.5d-f) are also broadly similar across all three surveys, although there appear to be slightly more of the higher grades in the most recent 2014 survey (Fig 4.5f), and less of the lower and middle grades compared to the 2003 (Fig 4.5d) and 2008 (Fig 4.5e) surveys.

5 Fisheries Management Options

5.1 Salmon

At the time of preparation and consultation of this Ribble NLO and byelaw review, an initiative is currently underway nationally (for English salmon rivers) to consider options for further reducing the exploitation of salmon as part of the "Salmon Five Point Approach". This Approach, which is being delivered jointly by key angling and fishery organisations, the Environment Agency and with the support of Government, is seeking to restore the abundance, diversity and resilience of salmon stocks throughout England. Options for managing salmon exploitation under this Approach will be informally consulted on during 2017 and may differ from the current approach, as set out in the Environment Agency's "Decision Structure for salmon fishery management in England" that we have followed through this Ribble NLO review.

As identified in Section 3.5 above, the Ribble salmon stock is classified as "Probably at risk" of failing the management target, based on the 2015 stock assessment, and is also predicted to remain in that category in five years-time. As such, our Decision Structure guides us to **"Identify a range of options to ensure sufficient spawning escapement to move to <50% probability of failure (of management target) within five years (Probably not at risk category) while looking to maintain socio-economic benefits where possible."** The combined kill of salmon by both the rod and net fisheries should therefore be reduced from present levels in order to help to improve the status of the stock in the short term. Options to reduce the current level of kill are considered below.

Salmon Option 1 – No change – maintain current fishing restrictions for rod and net fisheries

Given the current and predicted "Probably at risk" status of the Ribble salmon population and the prevailing strong downward trend in abundance, and the apparent recent reduction in juvenile salmon numbers, then simply maintaining the current fishing restrictions for another ten year period does not meet our own Decision Structure guidance and is therefore not considered any further as a viable option.

Salmon Option 2 – Reduce exploitation by rods and nets.

The rod fishery is currently restricted by a 2 salmon per angler per season, time-limited byelaw (which is intended to be replaced in this review). This is additional to the national spring salmon byelaws that prevent the killing of any salmon prior to 16th June, and the North West Regional annual close time byelaw that prevents angling from 1st November to 31st January following. Recent voluntary restraint in the rod fishery has effectively reduced the catch limit to 1 salmon per angler per season.

The net fishery is currently limited to 4 available licences (current Net Limitation Order is a reducing Order down to 2 licences) and restricted to a 3-month season from 1st June to 31st August by national spring salmon byelaws, as well as a weekly close time from 6am Saturday to 6am Monday following that is defined in regional byelaws.

Options to reduce exploitation here could include a combination of the following:

- Reduce the number of net licences available.
- Extending the annual close time for nets.
- Extending the weekly close time for nets.
- Apply a seasonal catch limit to the nets.
- Extending the annual mandatory catch and release period for rods.
- Reduce the season bag limit for rods.
- Fishing method restrictions for rods.
- Adoption of methods for voluntary reduction in catches.

A simple description of the pros and cons associated with each of these options is listed in the table below.

Option	Pro	Con
Reduce net licences	Reduces net fishing effort	Reduction in effort may not deliver the same proportional reduction in catch. Remaining licencees may potentially fish more tides within the available fishing time.
Extend annual net close time	Reduces net fishing effort.	Delivers only modest savings on its own (Fig 3.2, page 8) Licencees may potentially fish more tides within the available fishing time.
Extend weekly net close time	Reduces net fishing effort. This restriction is preferred by the existing netsmen, over other possible restrictions.	The benefit of reducing the available fishing time could be partly negated if the netsmen fished more of the available tides within the reduced fishing period.
Apply catch limit to nets	Reduces kill by nets to an unambiguous limit.	Small potential for additional salmon to be killed beyond the defined limit due to the nature of drift net fishing – if more than 1 salmon is caught at once.
Extend mandatory catch and release period for rods	Reduces kill by rods	Delivers only modest savings on its own.
Reduce season bag limit for rods from 2 to 1 salmon	Reduces kill by rods Preferred measure for rod fisheries.	Delivers only modest savings on its own.
Fishing method restrictions for rods	Improves survival of released fish.	Likely modest benefit of applying this measure on its own in terms of salmon saved, given distribution of catch by method (Figure 3.7, page 12).
Voluntary reduction in number of salmon killed	Voluntary restrictions are more acceptable than mandatory controls. Voluntary restrictions by rods already achieving more than existing mandatory controls.	Voluntary restrictions difficult to apply for net fishery. Voluntary restrictions might not be sufficiently protective.

There is no obvious single management option identified here to markedly reduce the kill of salmon by these fisheries, to help to improve the status of the Ribble salmon stock. A combination of measures will therefore be required to deliver a greater degree of improvement for the Ribble salmon stock.

Salmon Option 3 – Zero kill of salmon – close net fishery and apply mandatory catch and release to the rod fishery.

At the present time, the closure of the net fishery and application of 100% catch and release to the rod fishery is more restrictive than our Decision Structure guidance would indicate. While it is recognised that the Ribble salmon stock is in the probably at risk category now and also in 5 years-time, and on a downward trend, our Decision Structure guidance does not specify an urgent need to achieve zero exploitation in this situation. However, if the prevailing decline were to continue under tighter restrictions than at present, then closure of the net fishery and application of mandatory catch and release for the rod fishery would remain a likely relevant management option.

Angling Trust National Voluntary Catch Restrictions

At the time of preparation and consultation of this Ribble NLO and byelaw review, a national initiative is being promoted by the Angling Trust for English salmon rod fisheries as part of the Salmon Five Point Approach. This catch and release initiative aims to achieve defined high voluntary catch and release rates depending on the risk category of the respective salmon stock. For the Ribble salmon stock, currently in the Probably At Risk category, this initiative defines a minimum catch and release rate of 85% in 2017, and a minimum of 90% in 2018 onwards. The value and contribution of voluntary catch and release as opposed to mandatory catch and release is recognised in this review.

Salmon Preferred Option

On balance, a defined catch limit for the net fishery, coupled with a mandatory 2 salmon per angler per season bag limit and improved voluntary catch and release practices by anglers, are considered the best combination of restrictions, to maintain rod and net fishing interest through the respective available fishing seasons, and maintaining a minimal level of exploitation. The catch limit for the net fishery is to be set at 48 salmon – equating to 2% of the Ribble Conservation Limit, and to be shared equally amongst the licencees. In addition, it is proposed that the new Net Limitation Order be a reducing Order down to 1 available licence, as current licencees retire from the fishery.

5.2 Sea Trout

Sea Trout Option 1 – No change – maintain current fishing restrictions for rod and net fisheries.

The Ribble sea trout fishery is classified as “Not at risk” at present, based on strong recent rod catches and relatively high catch per unit effort. There is no pressing need for any exploitation restrictions for sea trout at the present time. A high level of voluntary catch and release prevails in the rod fishery and should be maintained, as should the low catch in the net fishery.

Sea Trout Option 2 – Reduce exploitation by rods and nets

The status of the sea trout fishery does not immediately warrant a mandatory reduction in exploitation. However, maintaining the existing high level of voluntary catch and release angling and the current low level of net exploitation are both essential.

Sea Trout Option 3 – Zero kill of sea trout – close net fishery and apply mandatory catch and release to the rod fishery.

Closure of the net fishery to protect sea trout is not warranted at the present time. Equally, the application of mandatory catch and release to the rod fishery for sea trout is not warranted at present.

Sea Trout Preferred Option

The preferred option for sea trout at present is maintaining the status quo, with no specific mandatory restrictions necessary, but a continuation of the current voluntary restraint in killing sea trout is expected.

The Decision Structure - Developing fishing controls for salmon fisheries in England and Wales