

Long-term salmon catches at sea and in the rivers in salmon districts in Finnmark and Troms counties for fish below and above 3 kg

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Cover photo: Bag net in Trollfjord/ Tanafjord in the 1970s - Photo Eero Niemelä

This report has been produced with the assistance of the European Union, but the contents can in no way be taken to reflect the views of the European Union.

Abstract

In Kolarctic salmon project we made an overview of the officially reported salmon catches in six salmon district areas in Troms and Finnmark counties. We collected catch data from the last 50 years of the salmon fishery at sea and in the rivers especially of the numbers of salmon below three and above three kilos. Some conclusions are done and reasons from the changes in the catches are explained. More discussion with the old salmon fishermen should be had to explain fluctuations and development of the catches and also changes in the fishery. In Senja salmon district salmon catch at sea has fluctuated between 5 and 15 tons and especially after early 2000s catches have clearly declined down to a couple of tons. In Troms salmon district salmon catch at sea has fluctuated between 10 and 110 tons and especially after early 2000s the catches have clearly declined down to c. 20 tons. Extremely high reported catches just after the mid-1980s were caused by the extensive drift net fishery and partly by the increased bend net fishery. Salmon catches at sea in Alta salmon district have clearly increased since early 1990s and the proportion of catch caught at sea has been quite stable, around 75%, since the early 1990s. Catches at sea have been three-four times larger than catches in the rivers for the past 20 years. In Hammerfest salmon district salmon catches at sea peaked during quite many years from the end of 1970s until the year 1988. The peak consists of the catches in drift net fishery. Since the prohibition of the drift net fishery catches at sea have been more or less stable. Catches in Tana salmon district show a clear regular changes especially when sea and river catches are combined. There have been six clear peaks in salmon catches during the last 50 years. Peaks are following each other with the period of 6-8 years. Sea catches have declined from the mid-1960s to early 1980s and thereafter catches have fluctuated but no clear declining can be found. In Varanger salmon district it can easily be observed that the increased river catches are followed by the declined catches at sea. This development started early 2000s. High stock size in the catches at sea in Varanger paralleled the high stock size found also in Tana district early 2000s.

1. Introduction

In the Kolarctic salmon project application it was stated that the final beneficiaries and/or target groups of all the data collected and reported within this project are ministries, management authorities, national and regional and local authorities (Counties and Municipalities), research institutions, fishers organizations, fishermen (recreational/ professional), international governmental organization (like NASCO, ICES), indigenous peoples, tourism operators, tourists, local people, NGOs and politicians. Therefore in this project it was decided to collect basic data also on the reported salmon catches to illustrate long-term changes and observe possible trends in the catches and catch components which are describing the salmon resources. Knowing and recognizing the status of salmon stocks it is important that management authorities are regulating salmon fishery to attain higher spawning stock levels if needed. In general the reported salmon catches have been considered to represent the size or level of salmon stocks in the rivers. The modern analyzing method of the annual spawning stock estimates and especially for the expected needs of the numbers of spawners (spawning target attainment) highlights the need of exact catch reporting in rivers as well as at sea.

Salmon catch data have been collected in Norway since the end of 19th century and since the year 1993 the catch reporting system has been improved and since the year 2004 the reporting of salmon catches also in the river fishery has been obligatory. The data presented here gives at least the best overview of the long-term changes although the real total salmon catches remains still a mystery because all the fishermen have not reported their catches or the reported catches are smaller than the real catch and it has not been estimated catches for those fishermen who have not sent catch information. The total catches most likely are higher than reported catches.

In the Kolarctic salmon project application it has mentioned *in the "ACTION 2 – BIOLOGICAL AND GENETIC ANALYSES OF COASTAL AND RIVERINE SAMPLES"* and *in the Activity 7: Enter data into existing databases*, and therefore FGFRI and FMFI received catch statistics from SSB (Statistics Norway) for further analysis. Also to fulfill the *Activity 12: Salmon and global climate change* SSB catch data was needed in the evaluation, comparison and description of possible signs on global climate change in relation between historical and new data regarding the salmon catches, abundance and environmental parameters. And to fulfill the *Activity 13: Salmon ecology and different management regimes*, SSB catch data was needed in the description of the salmon ecology (size groups) and salmon resource in project area and also in the description of the development in the salmon fisheries management measures over time. When relating salmon ecology (here size groups) to the development of the coastal and in river salmon fisheries and different management measures it is important to use catch information due to the lack of biological data from catch compositions.

2. Material and methods

Catch data from before the year 1993 used in this report was collected from the annual official reports ((Statistisk Sentralbyrå (SSB), Laks-og Sjøaurefiske; Central Bureau of Statistics of Norway, Salmon and Sea Trout Fisheries)). Catch data from the year 1993 onwards was delivered directly from SSB. Between the years 1969 and 1992 fishermen had to separate their catches in the reports only in terms of weight to salmon below and above three (3) kilos. From the year 1993 onwards fishermen have had to report their catches in terms of numbers and in terms of weight to salmon below 3 kilos, between 3 to 7 kilos and above 7 kilos. In this report we use only the size groups below and above 3 kilos. In Finnmark County there are four salmon districts like Alta (includes municipalities Alta, Loppa), Hammerfest (municipalities Hasvik, Kvalsund, Hammerfest, Måsøy, Nordkapp, Porsanger), Tana (Lebesby, Gamvik, Tana, Berlevåg) and Varanger (Båtsfjord, Vardø, Vadsø, Nesseby, Sør-Varanger). In Troms County there are two salmon districts Senja and Troms.

3. Results and discussion

3.1 Salmon catches in Senja salmon district

In Senja salmon district salmon catch at sea has fluctuated between 5 and 15 tons and especially after early 2000s catches have clearly declined down to a couple of tons (Figure 1). Throughout all the years large salmon (>3 kilos) has dominated in the catches at sea and its proportion has even increased since the beginning of 1990s. In the rivers salmon catches have increased since early 1990s but still being in low levels between 1 and 1.5 tons annually. One reason to the low river catches is that within Senja salmon district there are not so many good salmon producing rivers which could provide high numbers of smolts for good catches in rivers and another reason might be low reporting rate of the catches as an index from high production. In the river catches the proportions of salmon below 3 kilos have largely fluctuated between 25% and 75% but the proportions of larger than 3 kg salmon have, however, increased since mid-1990s. The earlier reported total catches in 1960s between 25 and 35 tons have declined down to 2-3 tons in the recent years. Most of the salmon catch has been caught at sea but during the last few years the proportions caught from rivers has increased (Figure 2). The short fishing time of three weeks together with decreased numbers of bag nets in use at sea in the latest years in July has also affected to the declined sea catches and this declining has resulted partly to the increased river catches in the last four years. The dramatic decline in the sea catches in Senja salmon district area in South Troms has not reflected directly as the expected increase in the river catches within that geographical area although c. 55-70% of salmon caught at sea originated in June and July in the years 2011 and 2012 from the rivers in South Troms. This South Troms area, however, includes many rivers like Målselva which is outside Senja salmon district area and therefore it is understandable that salmon originating from those rivers did not migrate to the rivers which are in Senja salmon district area. The rest of the salmon caught at sea in June and July in South Troms area originated from the rivers in North Troms, Finnmark and Russia and c. 5% of salmon originated from the rivers in Nordland. The occurrence of foreign stocks in the coastal catches was also one explanation why catches increased only slightly in the rivers in Senja salmon district area after regulating the fishery quite heavily. Therefore those stocks originating from foreign areas just passed the Senja coastal areas where the exploitation has declined and is in many ways lower than in 1970s, 1980s and 1990s.

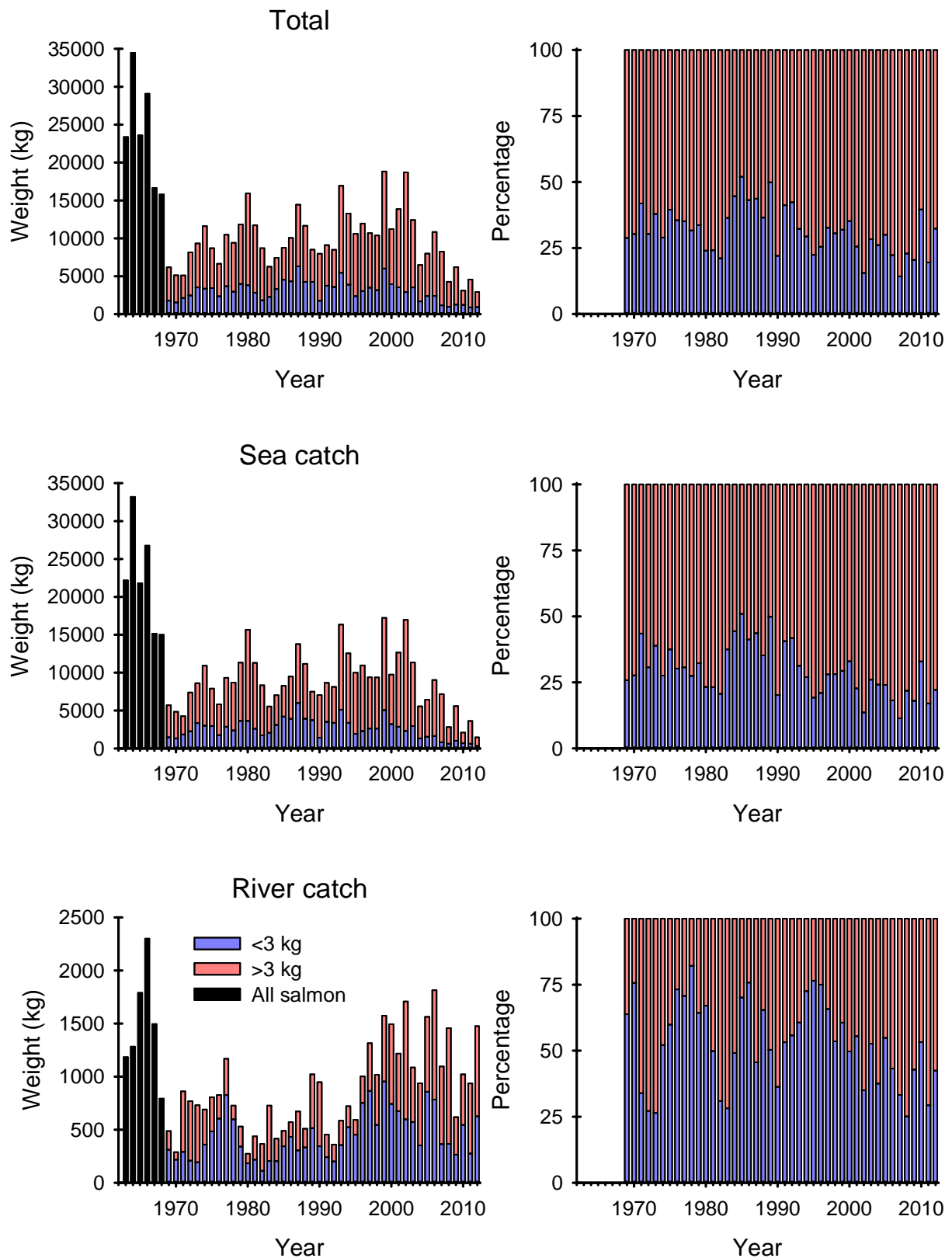


Figure 1. Salmon catches in Senja salmon district in Troms County. Note the differences in the scales for y-axes.

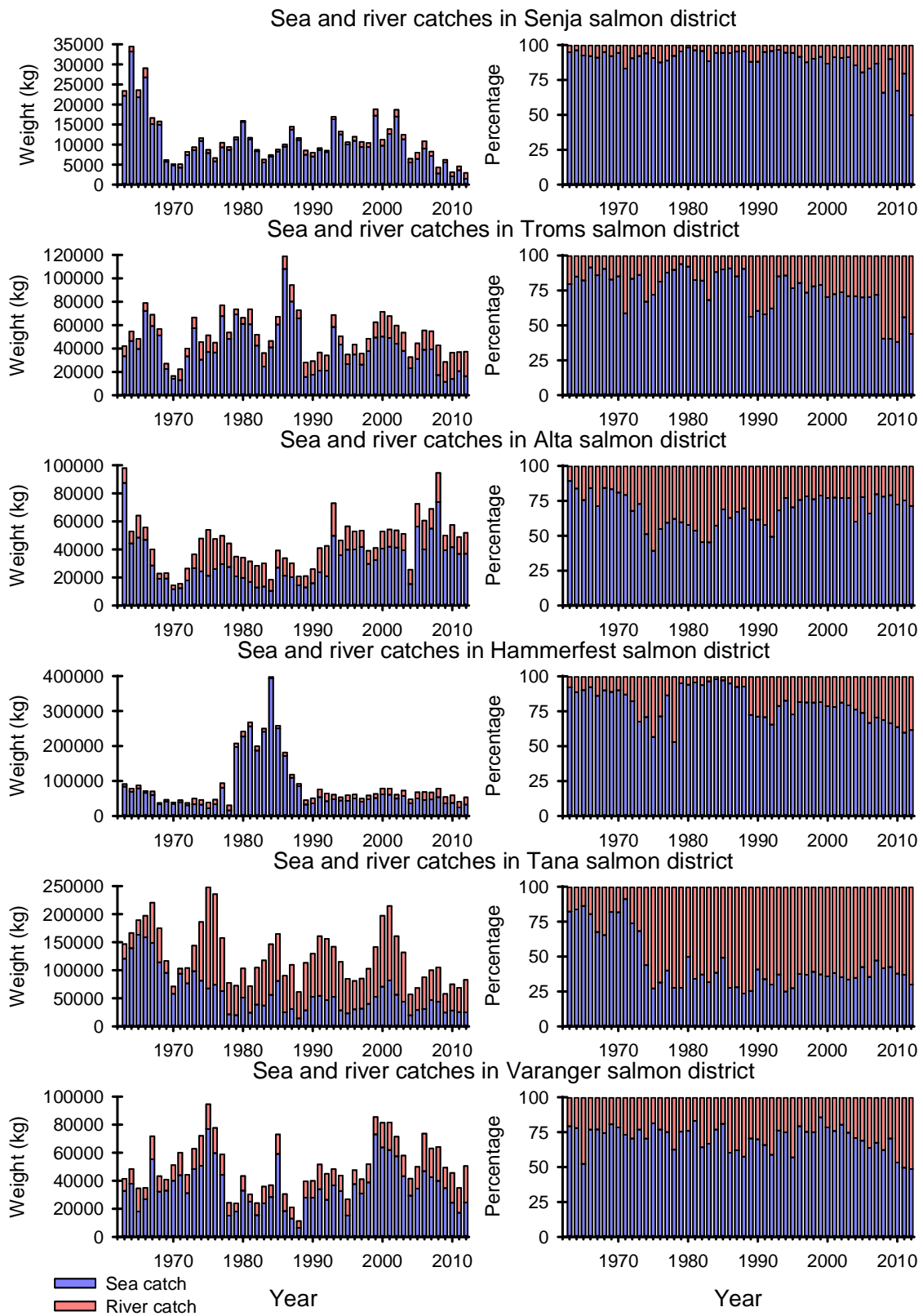


Figure 2. Sea and river catches in salmon districts in Troms and Finnmark counties. Salmon catches from the Finnish side of the rivers Tana (Tana salmon district) and Neiden (Varanger salmon district) are not included. Note the differences in the scales for y-axes.

3.2 Salmon catches in Troms salmon district

In Troms salmon district salmon catch has fluctuated at sea between 10 and 110 tons and especially after early 2000s catches have clearly declined down to c. 20 tons (Figure 3). Extremely high reported catches just after the mid-1980s were caused by the extensive drift net fishery and partly by the increased bend net fishery. In the last few years when driftnet fishery operated some improvement were done in the catch reporting for statistics but catch statistics from driftnet fishery from 1970s has been mentioned to be very incomplete. In the book *Salmon and Sea trout fisheries* (1985) it is mentioned "We suppose that the statistics of drift net fishing, based on the catch journals from 1979, are more complete than the former statistics which were based upon data from the salmon boards". It might be true that catches from the drift net fishery were highly underreported before the ban because for example the reported numbers of drift net was c. 3000 in the year 1977 and the annual numbers of reported drift nets varied between 1000 and 2000 in the years 1978-2008 for Troms area. The reported numbers of bend nets, which were actively used based on the information from fishermen to SSB, were in the year 1980 c. 350 and the numbers increased steadily having peak in the year 1988 with the numbers of c. 900. Drift net fishery was prohibited in 1988 followed by rapid increase of bag nets from c. 80 gears in the year 1988 to c. 300 in the year 1993. Numbers of bend nets decreased then from the early 1990s until to the year 1996 when the use of bend nets was totally prohibited but still in the year 1996 it was reported to be used c. 200 bend nets. In the year 1989 the abundance of salmon smaller than 3 kilos and also salmon larger than 3 kilos declined dramatically in the sea fishery catches because the main fishing method, drift net fishery, which caught those size groups was prohibited. Drift net fishery operated outside the coastal line but not in the very close vicinity of outermost coast or within fjords where bag nets and bend nets can be operate. Why then the prohibition of drift net fishery did not increase immediately catches in bag net and bend net fishery? There must be many reasons but one explanation is over the others. Drift net fishery exploited heavily most probably those stocks inhabiting rivers outside Troms area, especially stocks from Finnmark and Russia, and these stocks migrated in the outermost coastal areas and just outside the coastal line. Of course drift net fishery targeted also on local stocks within the Troms salmon district but the main component in the drift net fishery might have been stocks outside Troms. Therefore the elimination (total moratorium) of drift nets declined dramatically salmon sea catches without transferring the corresponding catch into bag nets and bend nets. After the prohibition of the drift net fishery the fishery with bend nets was still intensive and the proportion of salmon smaller than 3 kilos made high proportion in the sea catches (c. 70%) in the years 1989-1992. This indicates that bend net fishery was also size selective. Afterwards, especially after the year 1997 when bag nets were the only allowed salmon fishing method at sea the proportions of salmon smaller than 3 kilos has made c. 25% of the catches. In the time period since the year 1997 only bag nets have been allowed in the fishery in summer time and this has resulted that the proportion of larger sized salmon has been quite stable in the catches at sea. Salmon catches at sea have declined in Troms area since early 2000s like in the neighboring Senja area. Main reason to these declined catches has been the strongly regulated fishing time which might have affected also to the declined interest to start the fishery. The modern fishery regulations at sea have allowed large and productive female salmon to ascend in higher numbers into Troms rivers. In the latest years, since the middle of 1990s, the abundance and proportions of salmon larger than 3 kilos has clearly increased in the river catches in Troms salmon district (Figure 3). Nowadays the proportions of large salmon have been about the same in river and sea catches according to the collected catch reports. The official fishing time at sea has been in the last years three weeks in Troms County in July allowing salmon

larger than 3 kilos to ascend in higher numbers into their rivers of origin in June. Since the year 2008 salmon catches at sea have made up c. 45% and river catches c. 55% which is a huge difference in the catch distributions between rivers and sea found before the year 2008 and especially in the period 1960s, 1970s, 1980s and 1990s (Figure 2). In Troms salmon district area declining in the sea catches has not directly resulted to the high expected increase of river catches because c. 75% of the sea catches in June and July has origin mainly in the rivers in Finnmark and also a little from Russia. Therefore these foreign stocks have had better survival when migrating through Troms salmon district area and not migrating into the rivers in Troms area. It is noteworthy also to recognize that some amount of salmon caught at sea in Troms salmon district area has origin from the rivers in South Troms County (Senja salmon district area) and from Nordland County.



Photo 1. Mr. Erling Solhøy (on the left) and Mr. Ottar Dyrkorn (on the right) are fishermen from Lofoten area (Photo: PINRO)

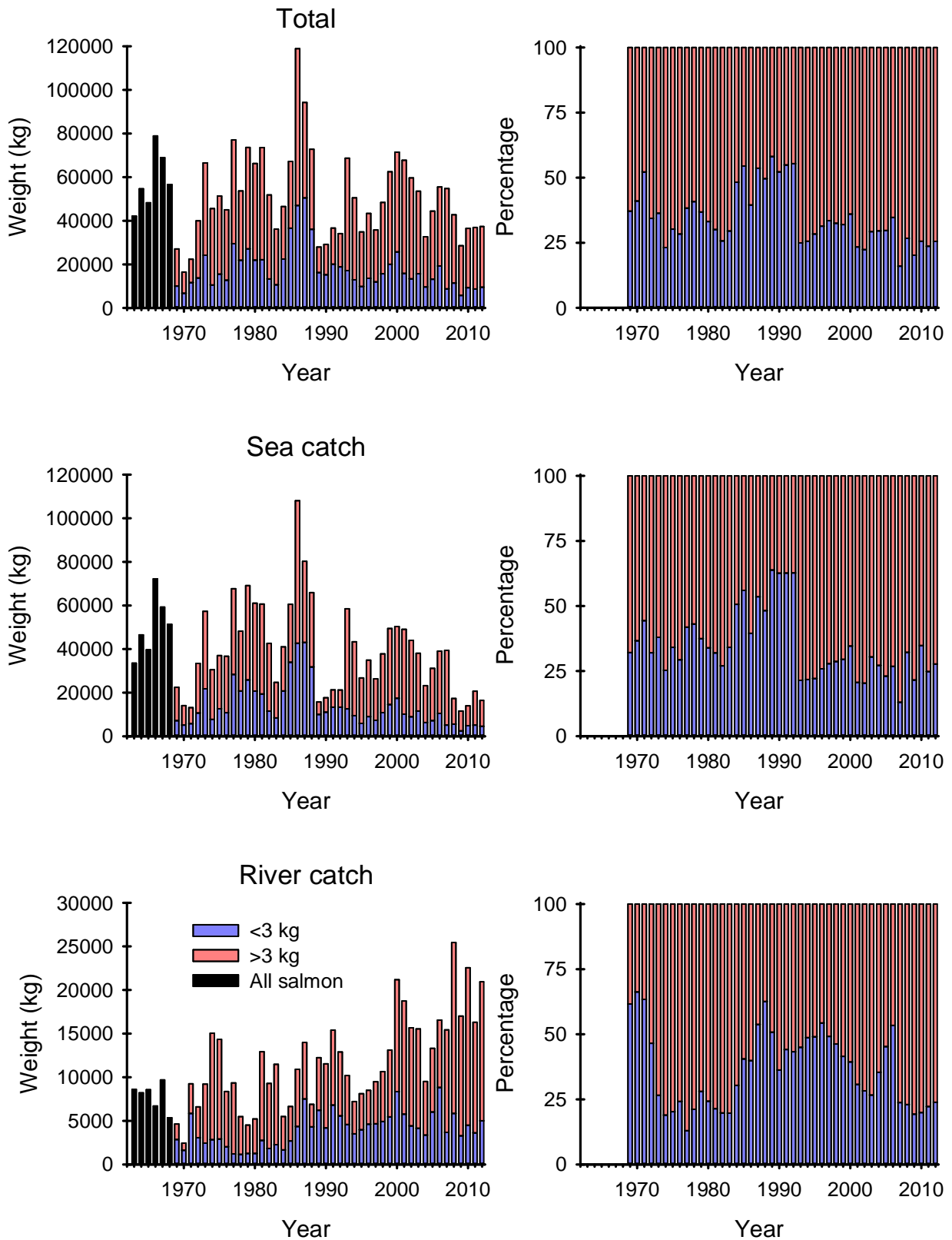


Figure 3. Salmon catches in Trosms salmon district in Trosms County. Note the differences in the scales for y-axes.

3.3 Salmon catches in Alta salmon district

Salmon catches at sea in Alta salmon district have clearly increased since early 1990s (Figure 4) and the proportion of catch caught at sea has been quite stable, around 75%, since the early 1990s (Figure 2). Catches at sea have been three-four times larger than catches in the rivers during the last 20 years. Reasons for the lower sea catches in 1970s and 1980s compared to reported catches during the two following decades might be diverse like low reporting rate in earlier years, high exploitation outside Alta salmon district in earlier decades towards those stocks, which in recent decades have made high proportion in Alta salmon district catches. It is most probable that especially the fishery restrictions in Troms County have resulted to the lower fishing mortality for West Finnmark salmon stocks in Troms and therefore those stocks are now targets to fishery later in Finnmark and in this case especially in Loppa-Alta area. In the preceding chapter it was mentioned that the origin of salmon caught in June and very early July in Troms salmon district has origin mainly from the stocks in Finnmark and Russia and after the end of the fishery in Troms in June and early July those stocks have had possibility to migrate to east and increased there the catches during the last decades at sea in June and July fisheries. The effort in the salmon fishery in Alta salmon district has not increased in terms of changes in the numbers of fishing sites allowable to use. In the municipalities Alta and Loppa the numbers of fishing sites were in the year 1994 122 and 44, respectively, and in the year 2013 the numbers of sites were 60 and 13, respectively. The declining of the salmon fishing sites indicates that those smaller numbers of sites have been more profitable because with smaller numbers of sites fishermen have got higher catches. It might be that all the sites which could be used in earlier years have actually not been used at all for fishery. The numbers of bag nets and bend nets, however, have declined based on the information from fishermen to SSB in Alta salmon district. The proportion of salmon larger than 3 kilos increased after the drift net prohibition more clearly in the river catches than in the catches at sea. The proportion of large salmon in the sea fishery has been higher than in the rivers and its proportion has increased clearly since 2000s. One reason to the increased proportions of salmon larger than 3 kilos in the sea catches might be the occurrence of escaped salmon in the sea fishery because very often escaped salmon are larger than 3 kilos. There are not so clear and regular changes in the annual reported sea catches after the prohibition of drift net fishery. Some clear annual variations can be observed in the river catches especially the high catches in the middle of 1970s, improved catches early 1990s and better catches in the middle of 2000s. Interesting, catches did not increase in rivers early 1980s which was expected to happen as a good recruitment from the high spawning stocks in early and mid-1970s. Most probably drift net fishery targeted to these stocks before they ascended into outer coastal and fjord areas and this can be easily seen from the low catches during the first years of 1980s.

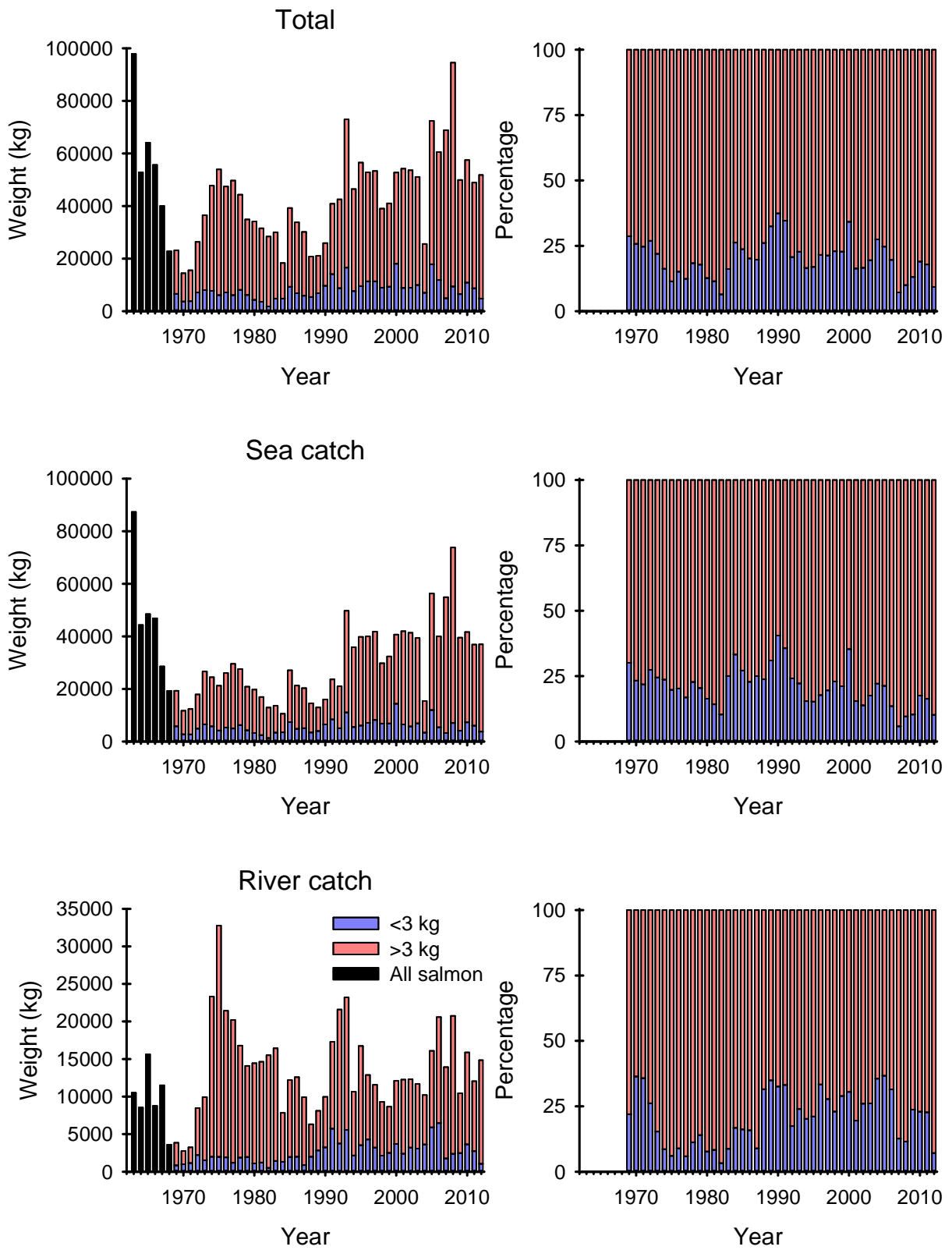


Figure 4. Salmon catches in Alta salmon district in Finnmark County. Note the differences in the scales of y-axes.

3.4 Salmon catches in Hammerfest salmon district

Hammerfest is the salmon district where the effect of drift net fishery can be observed clearly in the sea catches. Although it is generally known that the whole drift net fishery effort and its catches were poorly reported the catches were unbelievably high compared to the sea catches after the prohibition of drift nets in 1988 (Figure 5). The quality of the reporting of drift net catches especially in 1960s and 1970s has been poor but it has been expected that the catches have been high affecting to the low catches in the coastal bag net fishery and later in bend net fishery like into the low catches in the rivers. In Hammerfest salmon district salmon catches at sea peaked during quite many years in the end of 1970s until the year 1988. The peak consists of the catches in drift net fishery. Since the prohibition of the drift net fishery catches at sea have been more or less stable. After the ban of the drift net fishery the proportions of salmon larger than 3 kilos have become larger all the time and larger proportions in the catches at sea contributing c. 75%-80% during the recent years. Salmon catches in the rivers have fluctuated with clear peaks and with increasing catches. The proportions of salmon larger than 3 kg have fluctuated between 40%-80% in the river catches. The proportion of large salmon has all the time increased in the sea catches since mid-1980s. Catches in the rivers have made all the time larger proportion since the ban of drift net fishery (Figure 2).



Photo 2. Fisherman Ansten Mathisen, Havøysund Nordkapp – Finnmark County (Photo: Eero Niemelä)

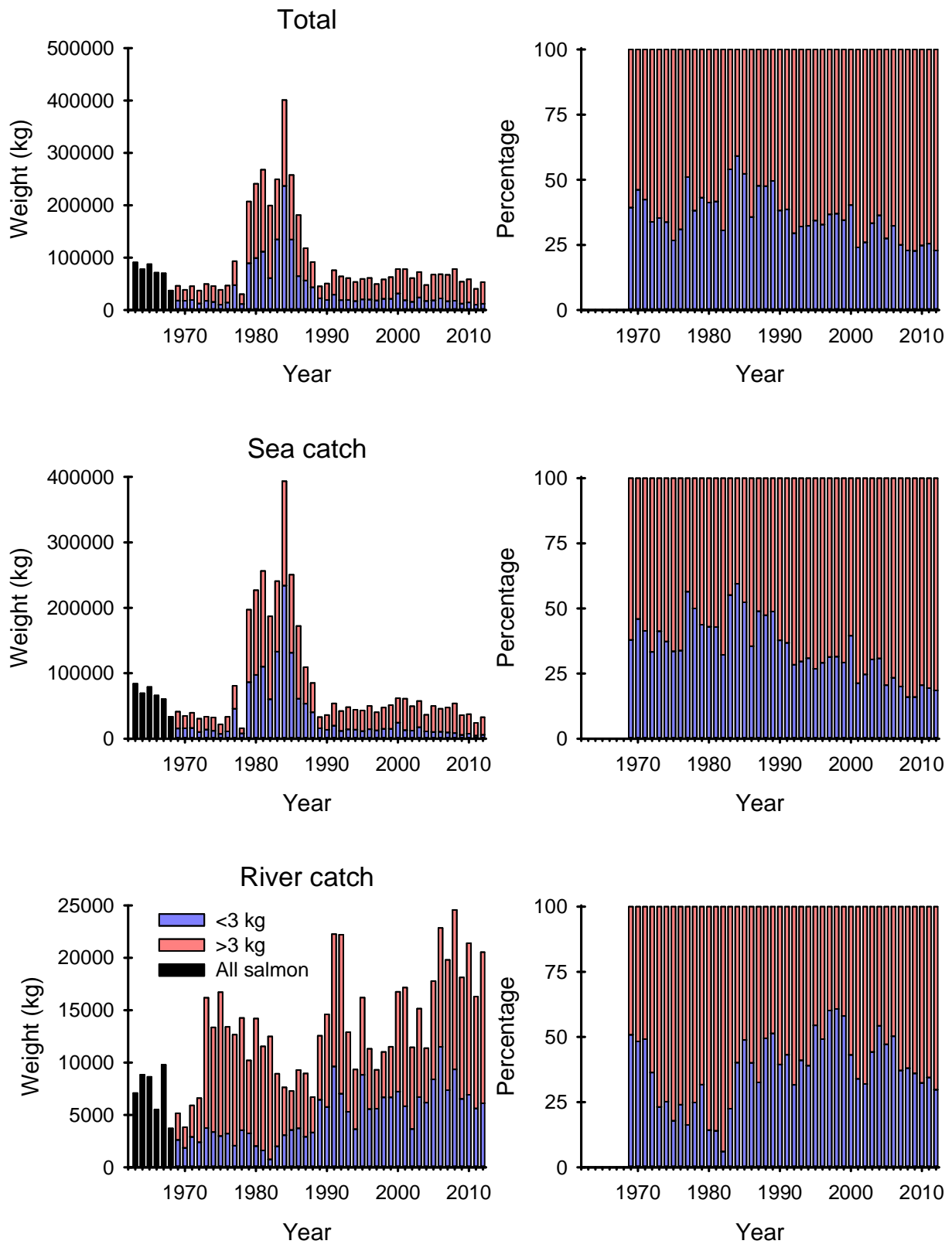


Figure 5. Salmon catches in Hammerfest salmon district in Finnmark County. Note the differences in the scales for y-axes.

3.5 Salmon catches in Tana salmon district

Catches in Tana salmon district show clear regular changes especially when sea and river catches are combined (Figure 6). There have been six clear peaks in salmon catches during the last 50 years. Peaks are following each other with the period of 6-8 years. Sea catches have declined from the mid-1960s to early 1980s and thereafter catches have fluctuated but not any clear declining can be found. The proportion of large salmon is a little smaller in the rivers than at sea. In long-term the proportion of large salmon has increased in the fishery at sea. The weight of large salmon in the catches has declined clearly in the river catches, catches at sea and combined catches during the last 10 years. The effective drift net fishery in the middle and end of 1980s targeted also to the stocks originating from Tana salmon district which can be observed especially as a lacking peak in the river catches in the mid and end of 1980s. High catches in the mid of 1980s were expected due to high spawning escapement in the mid-1970s but most probably drift net fishery targeted strongly on stocks in Tana salmon district. It is possible that also the fishery in the River Tana exploited already in early 1970s too heavy the stocks and partly affected to the lower recruitment early 1980s. Although there has been clear reduction during 40 years in the numbers of bag nets and bend nets at sea in Tana salmon district catches have not declined although during the last 10 years catches have been quite low in the rivers. Sea catches in the Tana salmon district have made 70-90% of the total catch in the years before early 1970s but after the year 1975 river catches have made up to 70% of the total catches in the district (Figure 2). Here we must remember that Finnish salmon catches from the River Tana are not included in the graphics.



Photo 3. Fisherman Reidar Larsen, Tanafjord – Finnmark County (Photo: Eero Niemelä)

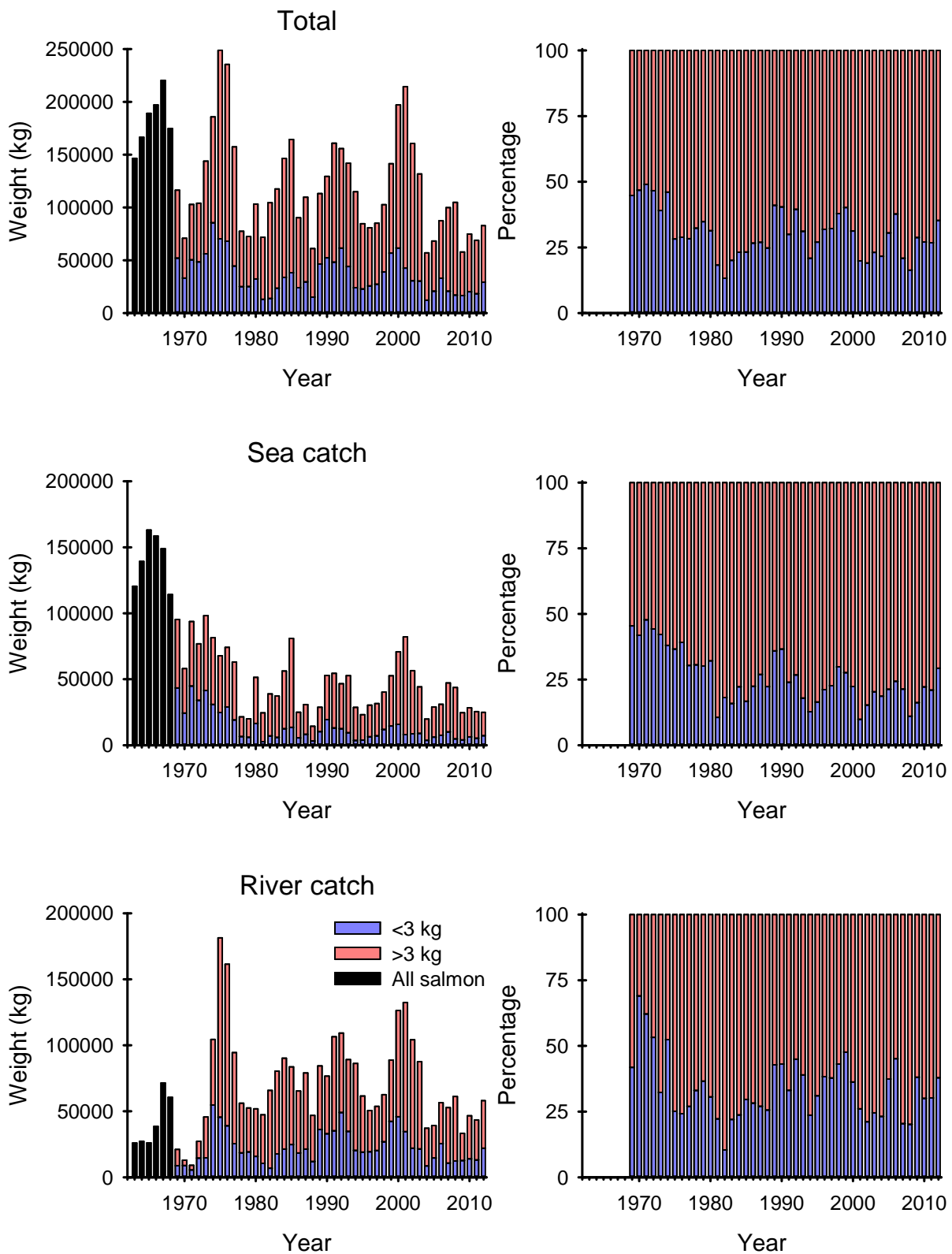


Figure 6. Salmon catches in Tana salmon district in Finnmark County. Catches from Finnish side of the River Tana are not included. Note the differences in the scales for y-axes.

3.6 Salmon catches in Varanger salmon district

From Varanger salmon district data it can easily be observed that the increased river catches are followed by the declined catches at sea (Figure 7). This development started early 2000s. High stock size in the catches at sea in Varanger paralleled the high stock size found also in Tana district early 2000s. Low salmon catches in 1960s in Varanger do not follow the general picture found in other salmon districts. A lot of salmon caught in Varanger originate from rivers in Russia and it is also possible that during that time salmon was exploited too heavily in Russia and stocks might be therefore weak. It is also possible that those Russian stocks were heavily exploited elsewhere in Finnmark with drift nets and also with long line. Later on, in mid-1980s, it is most obvious that low catches at sea are caused by the heavy drift net fishery in West Finnmark and North Troms. Sea fishery is targeting on salmon larger than 3 kilos with the percentage of c. 70% and river fishery with c. 50%. The proportions of catches in the sea fishery have made 75% but from the year 2000 onwards the proportion of river catch has increased clearly being now close to 50%. In long-term, in the years 1963-2012, salmon catches at sea have fluctuated less regularly than in Tana salmon district areas. The numbers of salmon fishermen at sea have declined and the fishing time has been reduced. It might be possible that the earlier catch reports have not been accurate and therefore many fishermen have feeling that catches have clearly declined.



Photo 4. Fisherman Eilif Hansen, Bugøynes Varangerfjord (Photo: Eero Niemelä)

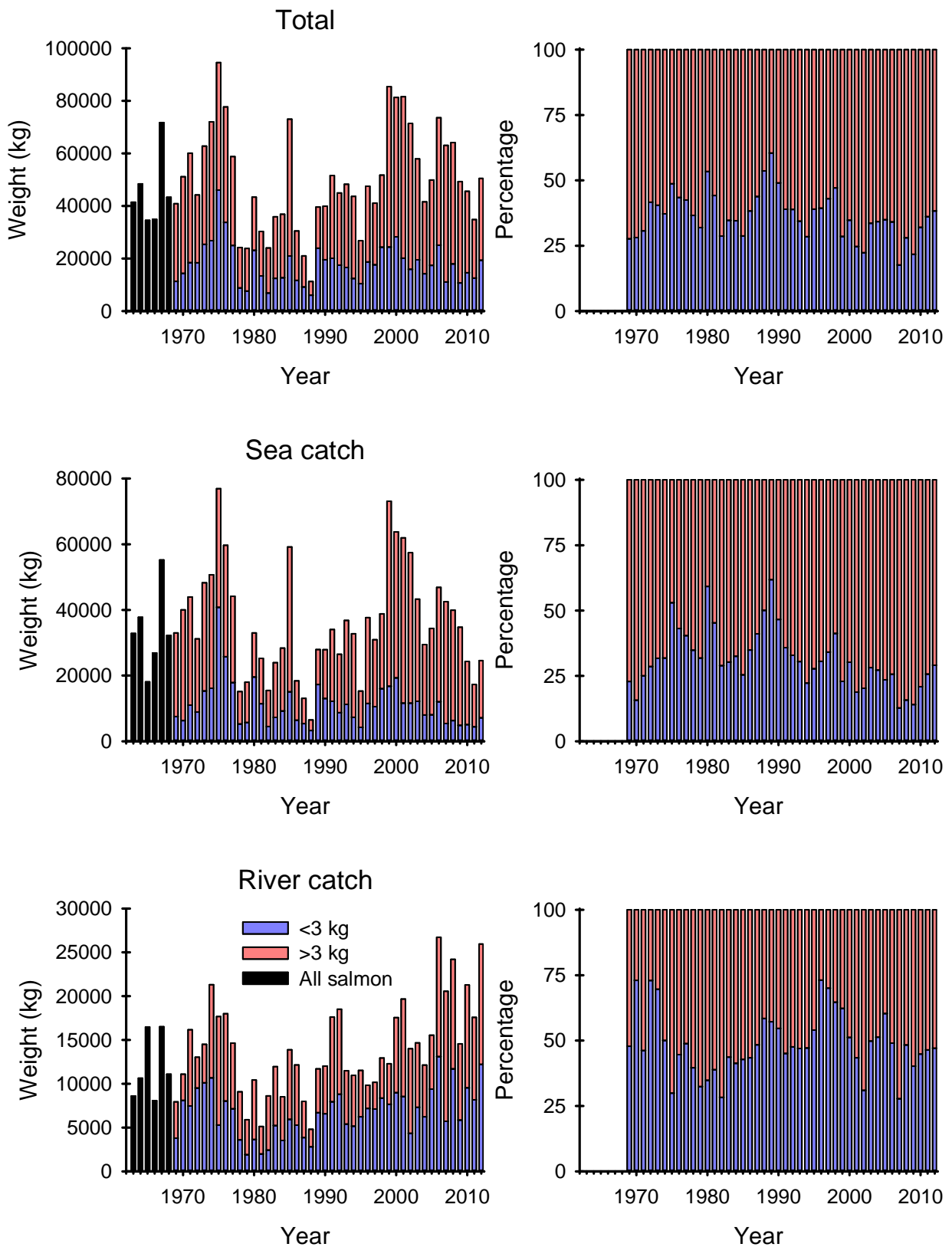


Figure 7. Salmon catches in Varanger salmon district in Finnmark County. Catches from Finnish side of the River Neiden are not included. Note differences in the scales for y-axes.

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Responsibilities in this report: FMFI organized the basic catch data covering the years 1994-2012 from SSB (Statistics Norway), FGFRI gathered the catch data from the yearly salmon catch reports covering the years before the year 1994, produced graphs and drafted text.

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