Kolarctic CBC – Project KO4178; Conserving our Atlantic salmon as a sustainable resource for people in the North; fisheries and conservation in the context of growing threats and a changing environment.

REPORT XVII. Salmon resources in North Norway with special focus in terms of long-term development in the numbers of fishing sites and fishers, fishing methods and salmon catches at sea

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Abstract

Salmon fishing at sea in international waters was more or less unregulated until the year 1984, when the NASCO convention was signed by the countries bordering to North Atlantic Ocean. After the implementation of the convention all salmon fishing was prohibited in international waters, except for an annual quota for Faroese fisheries, that was accepted in annual NASCO meetings. Faroese quota resulted in annual catches of 300-400 tons until the year 1990. After that, the catches have been only at some tens of tons. Another important decision made to protect and increase wild salmon stocks, was the prohibition of driftnet fishery in Norway. This fishery took place mainly in Northern Norway west of Nordkapp, in home waters. Annual reported salmon catches at sea and in the rivers together exceeded 13 000 tons from the end of 1960's to the middle of 1970s'.

In the northern countries Norway, Finland and Russia, the reported salmon catches have declined from appr. 2500 tons in 1960 to 600-800 tons in the last decade.
The number of salmon in the Norwegian catches has been appr. 450 000 fish in the middle of 1980's. Nowadays, they are at appr. 150 000 fish. In Finland, the numbers of salmon in the catches have been appr. 29 000 fish in the early 2000's but has dramatically declined to appr. 3 000 fish in the year 2000. One reason for the sharp decline in the Finnish salmon catches in 2017, was new restrictions in salmon fishery in the River Tana watershed. In the Finnish salmon catches, there are four clear stock fluctuations (peaks) and the last peak was in early 2000's. During the last 20 years there are no clear peaks in the catches in Norway, Finland or Russia.
In Norway, the proportion of salmon catches caught in the rivers has increased from the middle of the 1990's until today and salmon caught at sea has declined in the same period. This decline has taken place due to an increased interest in protecting wild salmon stocks out from the mixed stocks fisheries at sea. Recreational fishery in rivers has increased in the same period.
Four fishing methods were used at sea in Norway until 1988. This was the last year when driftnet fishing was used in the coastal waters. Bend net fishing was initiated in northern Norway in the late 1960's and increased in popularity as the years went by. In the entire Norway, bend net fishing peaked in the 1987. From the end of 1980's, the numbers of bend nets declined and in the year 1997 bend nets were prohibited in Norway, with an exception in Finnmark county. Also, in Finnmark county the numbers of bend nets slowly declined and, in the year 2022 they were prohibited there as well. Bag nets in salmon fishing was taken into use in the middle of 1800's. The numbers of bag nets in Norway were at appr. 4500 in the early 1970's. The numbers declined towards 1980's, simultaneously with the increase of bend nets. From the early 1990's the numbers of bag nets declined until 2010, when the use started to increase slightly. In 2021, the numbers of bend nets and bag nets clearly declined due to the total moratorium of salmon fishing in the area of Tanafjord and in the coastal areas close to Tanafjord.

Numbers of salmon fishing sites in Finnmark were in the middle of 1990 appr. 2000 and in the year 2022 appr. 400. Fishing sites can be on state ground and on the private ground.

Key words:
Atlantic salmon, Salmo salar, Northern Norway, sea salmon fishery

Front page photo:
Eero Niemelä

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1. Introduction

In the CoASal project we present salmon resources measured as the numbers of salmon fishing sites, numbers of fishing gears and fishers, salmon catches at sea in Finnmark. The quality of reported salmon catch data has improved clearly from the years 1993 and 2004 onwards, compared to previous years because of the introduction of obligation for each fisherman to inform about daily salmonid catches in numbers and weight, divided in three size groups. It is generally accepted that catch data is an important factor to inform the status of salmon stocks.

The numbers of salmon caught at sea fluctuates from year to year. The reasons are the natural fluctuations in the stocks ascending into the rivers. Restrictions in salmon fishery at sea and in the rivers have also caused annual changes in the catches. Fishing efforts measured with the numbers of bag-nets and bend-nets as well as the numbers of recreational fishermen and their fishing days, have impacts on the reported catches.

In this salmon catch report we present long-term changes in fishing efforts at sea in Finnmark, like the numbers of fishing sites available, the numbers of bag nets and bend nets used annually and spatially and, the numbers of fishers in the municipalities in Finnmark. The catch data come from SSB (Statistics Norway).

2. Wild salmon resource in North Atlantic; sea and river catches combined.

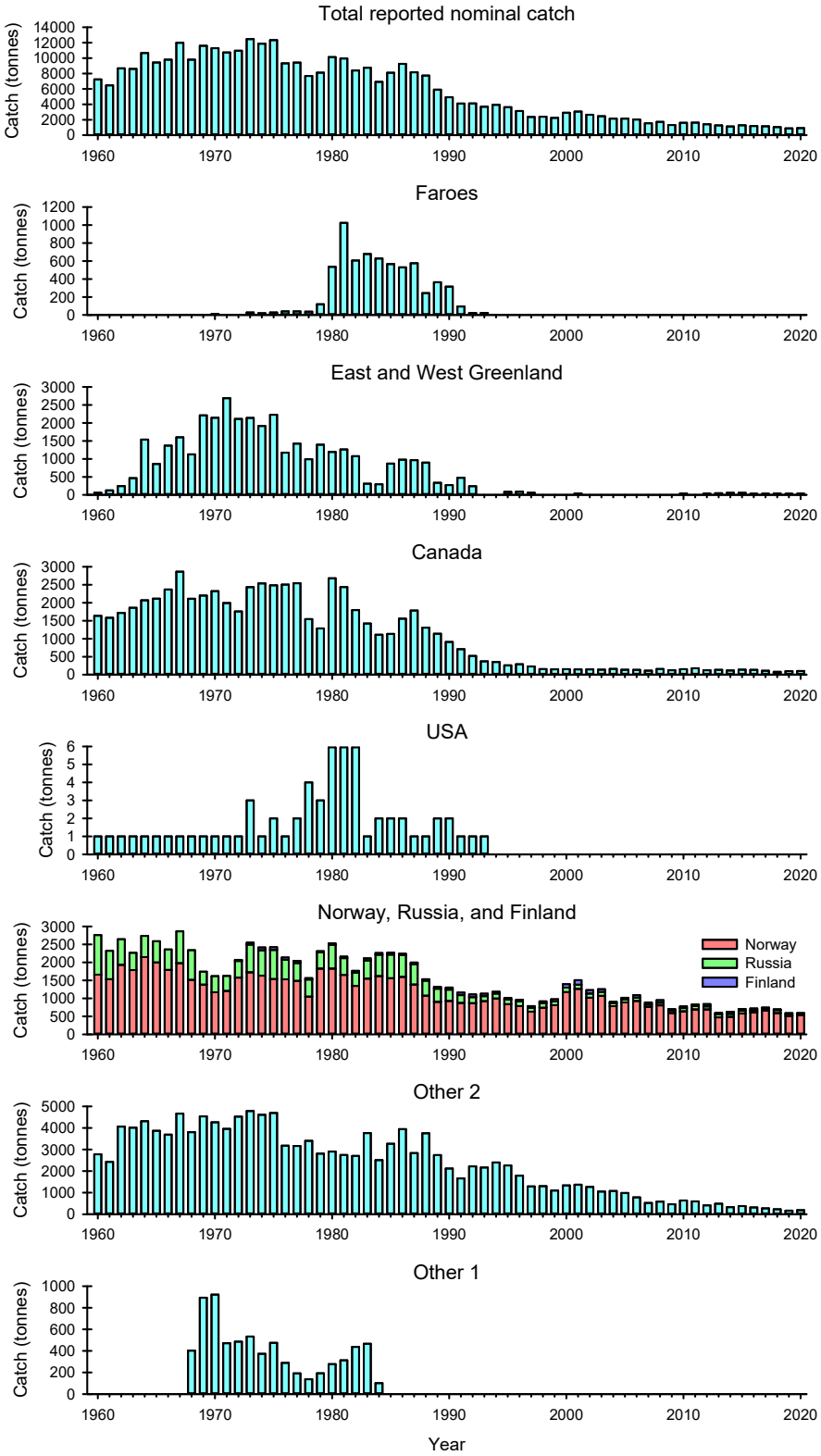

Figure 1. Reported salmon catches in NASCO (North Atlantic Salmon Conservation Organizations) areas. Other 1 and Other 2 are meaning the countries which are not included elsewhere. Other 1: countries fishing salmon in high seas in Atlantic: Catches in Norwegian Sea by Denmark, Sweden, Germany, Norway, Finland (before salmon fishery was closed in the year 1984 by international NASCO convention); Other 2 countries: Iceland (wild and ranched), Sweden (wild and ranched), UK (England and Wales, North Ireland, Scotland), France, Spain, Denmark, Ireland, St Paul and Michelon. Source: ICES 2021

Salmon fishing at sea in international waters was more or less unregulated until the year 1984 when NASCO convention was signed by the countries around the North Atlantic Ocean. After this convention, all salmon fishing was prohibited in international waters, except for an annual quota in the Faroese fisheries. The Faroese quota resulted in the catches of 300-400 tonnes until the year 1990. Another important decision to protect and increase wild salmon stocks was the prohibition of driftnet fishery in Norway. This fishery took place mainly in Northern Norway west from Nordkapp in coastal waters. Annual reported salmon catches at sea and in the rivers together exceeded 13 000 tonnes in the period from the end of 1960's to the middle of 1970s' (Fig. 1).

In Norway, Finland and Russia, the reported salmon catches have declined from appr. 2500 tonnes in 1960 to 600-800 tonnes in the last decade.

Since the middle of 1970's, the total salmon catches have declined steadily. Reasons to this decline are complex. Salmon stocks have weakened due to: overexploitation has lasted for years, mainly without quotas, fishing efforts have been mostly unregulated, salmon parasite *Gyrodactylys salaris* has destroyed many salmon stocks, especially in Norway and recently in Russia, parasites and diseases from salmon cage farming have caused mortality to salmon smolts and adults and escaped salmon from cage farming have weakened wild salmon genes. Many rivers which produced salmon smolts have been destroyed by damming and in many salmon rivers water quality has become polluted. In recent years, an increased sea mortality has been observed, which can be caused by higher sea temperatures. One of the major effects of the declining salmon catches at sea has been large quantity of farmed salmon on the market. Large amounts of farmed salmon around the year on the market have reduced the need to catch wild salmon at sea during the short period in summer when sea salmon fishing is allowed.

3. General description on the salmon catches in Norway, Finland, and Russia

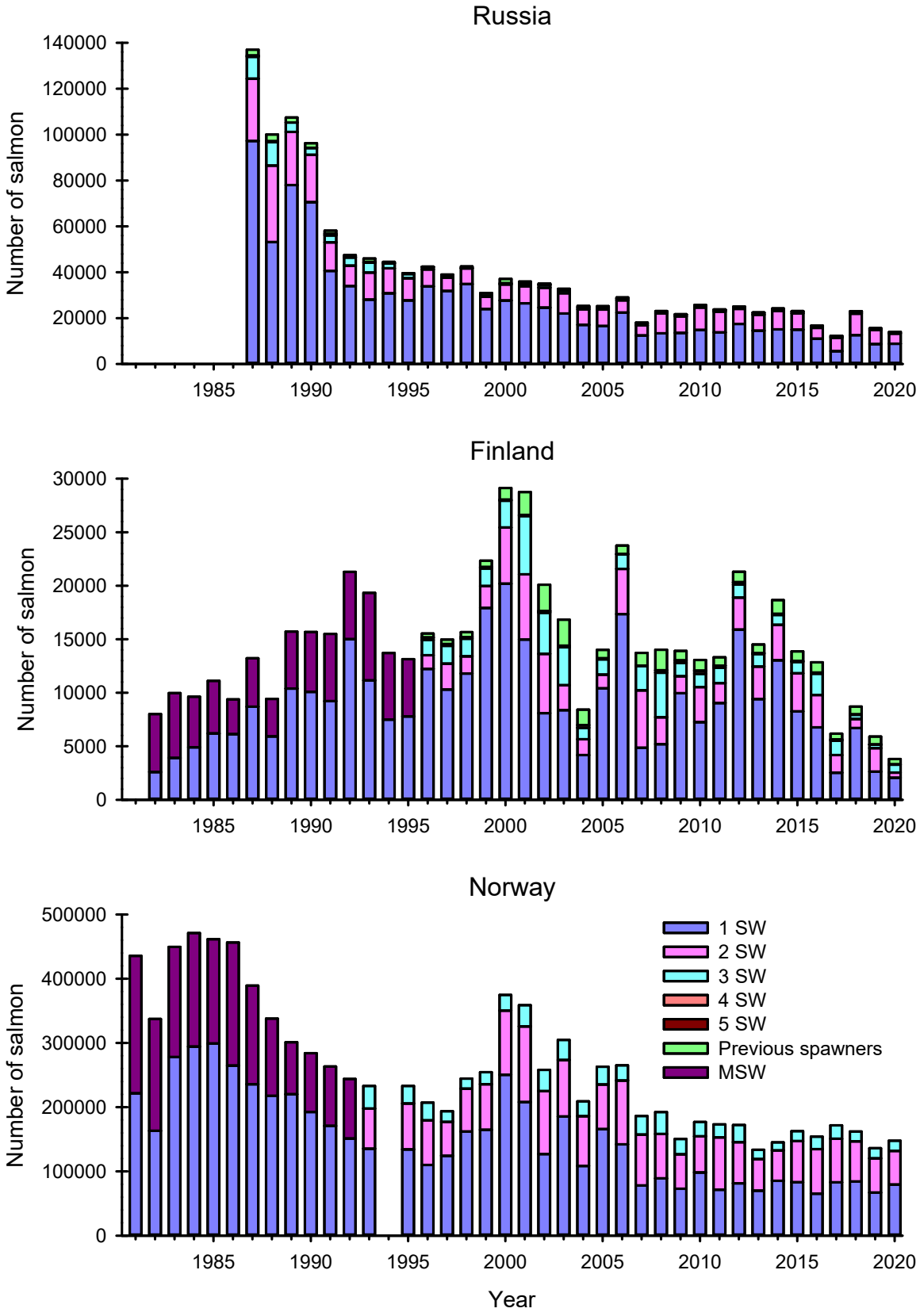

Figure 2. Sea-age distributions in total salmon catches in Norway, Finland and Russia. Source: ICES 2021

Salmon catches in Norway was approx. at 450 000 fish in the middle of 1980's but nowadays they are at approx. 150 000 fish (Fig. 2). In Finland, salmon in the catches have been at approx. 29 000 fish in the early 2000's but has dramatically declined to approx. 3 000 fish in the year 2000. One reason to the sharp declining in the Finnish salmon catch in the year 2017 was new restrictions in salmon fishery in the River Tana watershed. In the Finnish salmon catches, there are four clear stock fluctuations (peaks) and the last peak was early 2000's. During the last 20 years there were no clear peaks in the catches in Norway, Finland and Russia.

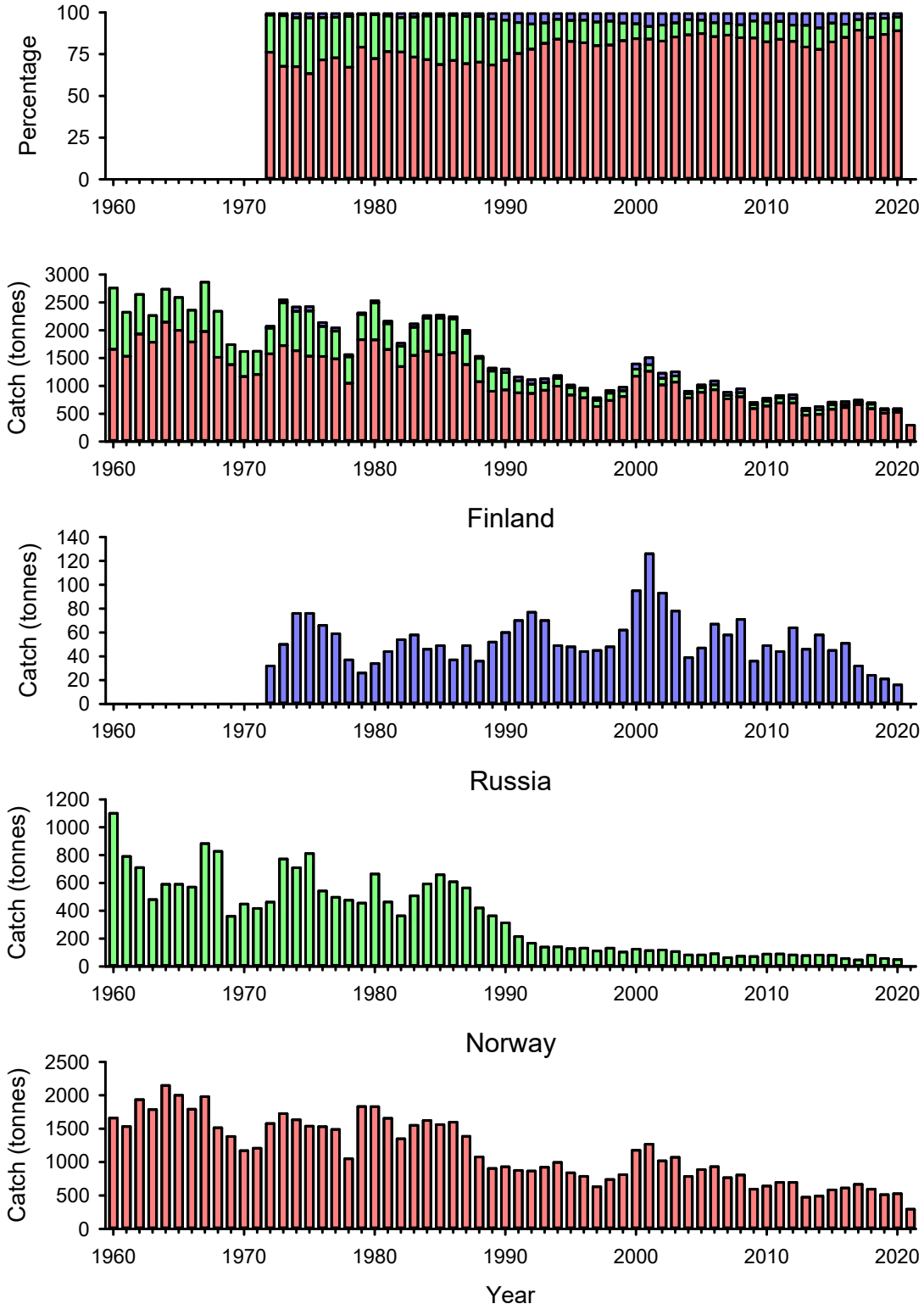

Figure 3. Long-term salmon catches in Norway, Finland and Russia and proportions between the countries. Source: ICES 2021

In Norway, the proportion of salmon catch caught in the rivers has increased from the middle of 1990's to today and salmon caught at sea has declined. This decline has taken place due to the increased interest in protecting wild salmon stocks from the mixed stocks fisheries at sea. Recreational fishery in rivers has increased (measured in the numbers of recreational fishers), which affects the catch distributions (Fig.4). Years ago in Russia and especially in the White Sea area and the Petchora area, there were some estuary salmon fishing. After recreational fishing was legalized in Kola Peninsula rivers in the early 1990's, catches in the rivers became important. After recreational fishery was opened in many of Kola Peninsula rivers, fishery at sea was strongly regulated or even closed in some areas.

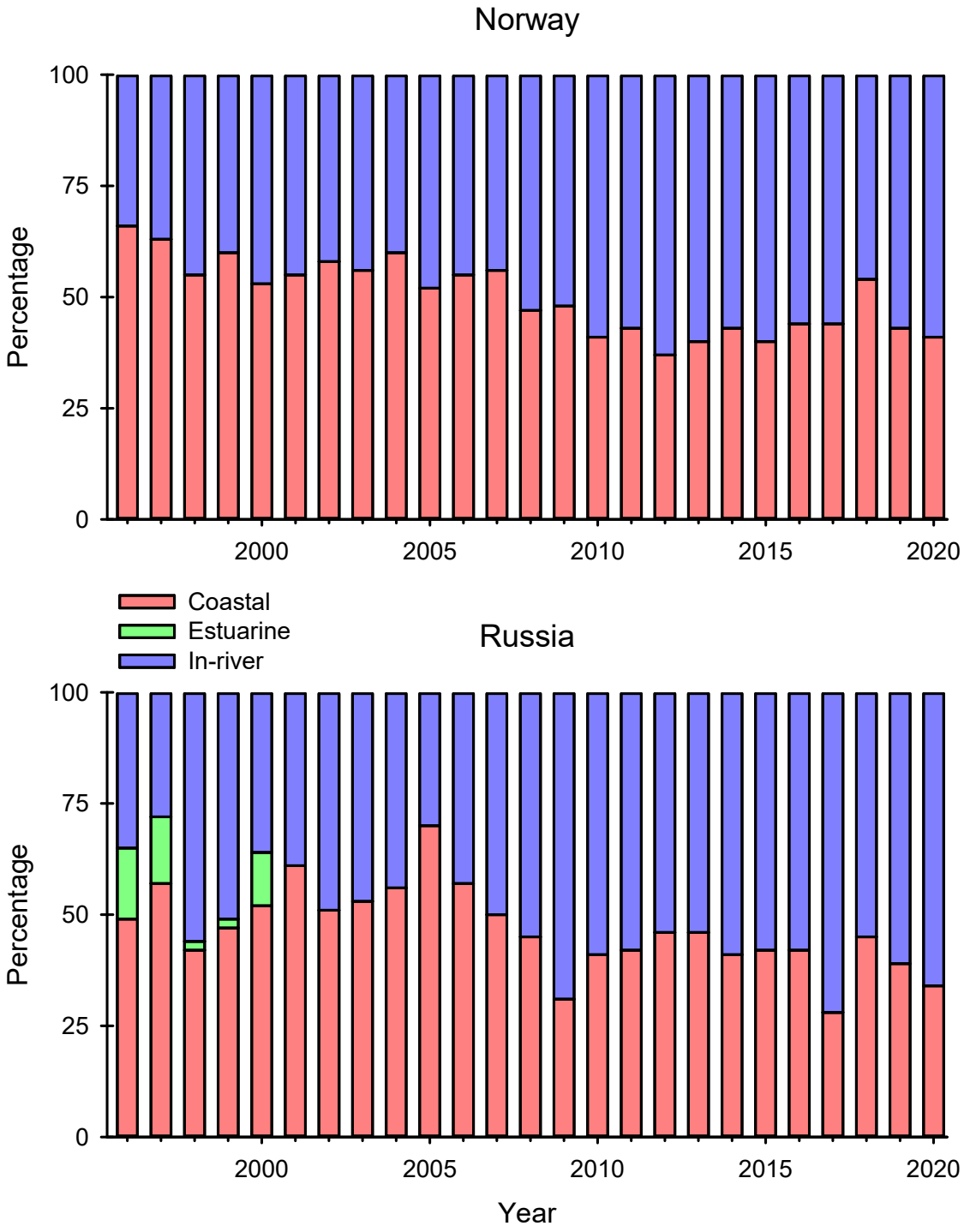

Figure 4. Salmon catch distributions in Norway and Russia between catches in the rivers and at sea in coastal areas and in estuarine areas. Source: ICES 2021

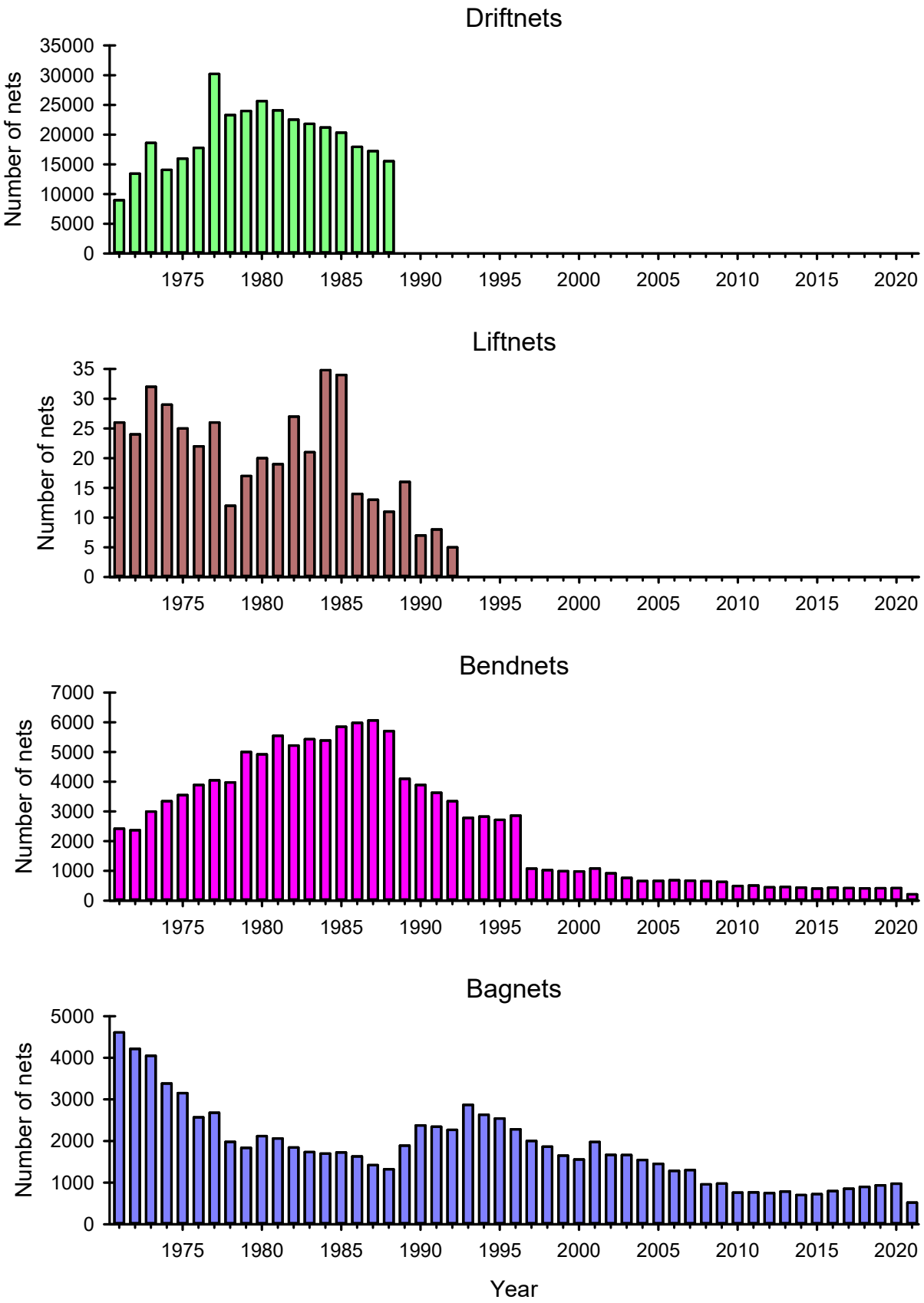

Figure 5. Long-term variations in the annual numbers of fishing gears in Norway. Source: ICES, 2021

Four fishing methods were used at sea in Norway until the year 1988. The year 1988 was the last year when driftnet fishing operated in the coastal waters and mainly in the area west from Nordkapp in Finnmark. Driftnet fishing took place early in the summer, when medium and small sized salmon was on the way to home rivers. Bend net fishing initiated in northern Norway in the late 1960's

increased in the following years. In the entire Norway, bend net fishing peaked in the year 1987 (Fig. 5). From the end of 1980's the numbers of bend nets declined and in the year 1997, bend nets were prohibited in Norway except in Finnmark county. In Finnmark county, the numbers of bend nets slowly declined and were prohibited in 2022. The start of bag nets in salmon fishing took place in the middle of 1800's. The numbers of bag nets in Norway were approx. 4500 in the early 1970's and their numbers declined towards 1980's, simultaneously with the increase of bend nets. From the early 1990's the numbers of bag nets declined towards the year 2010 and after that started to increase slightly. In the year 2021, the numbers of bend nets and bag nets clearly declined due to the total moratorium of salmon fishing in the area of Tanafjord and in the coastal areas close to Tanafjord.

4. Farm production of Atlantic salmon in North Atlantic area

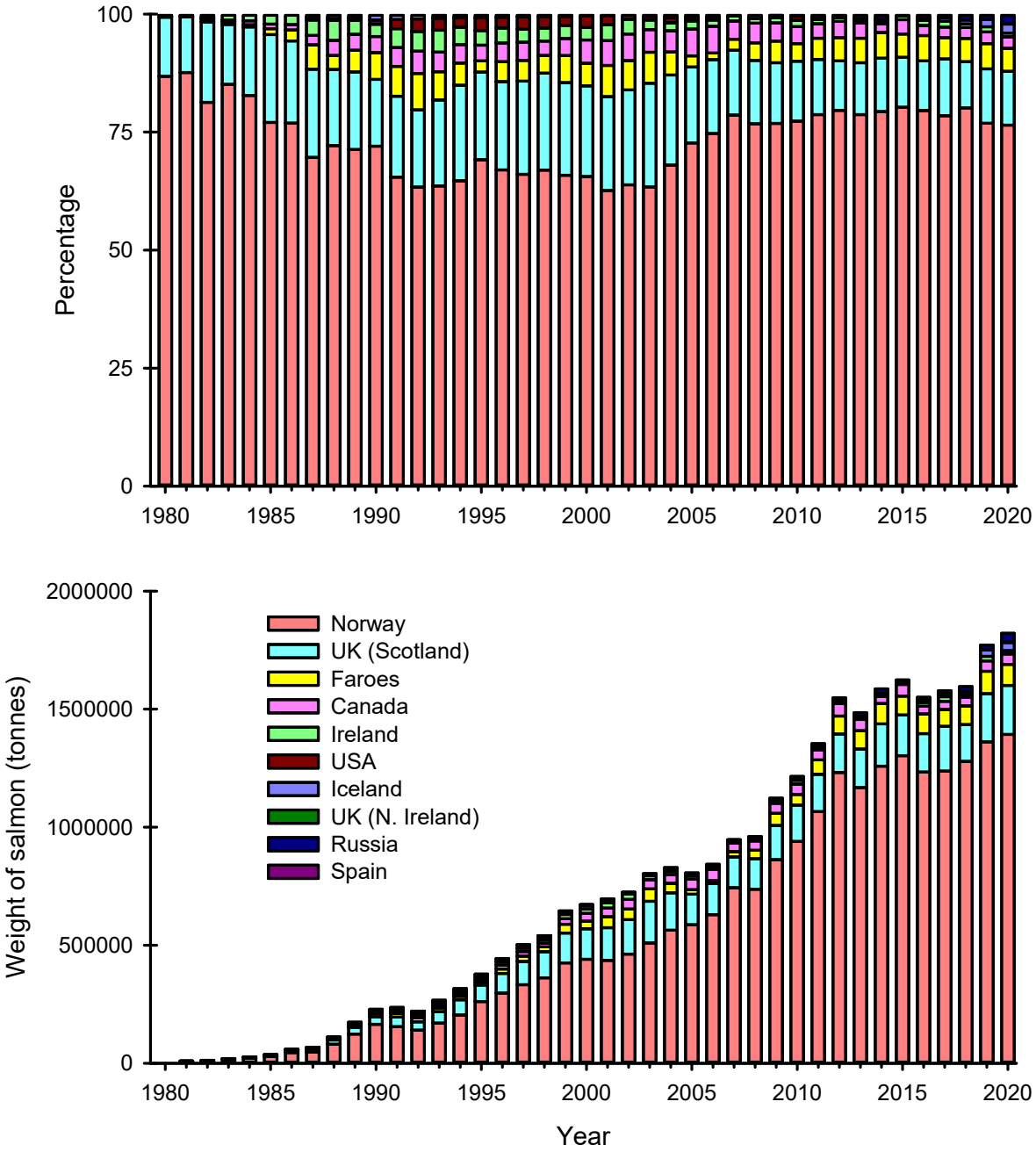

Figure 6. Salmon production at sea in cages. ICES 2021

Salmon farming at sea in North Atlantic has increased during the last 35 years and this increase seems to continue. Norway is the major producer of farmed salmon in Atlantic area (Fig. 6).

5. Salmon fishing effort at sea in Finnmark, Troms and other areas in Norway (numbers of fishing sites, fishers, bag nets and bend nets)

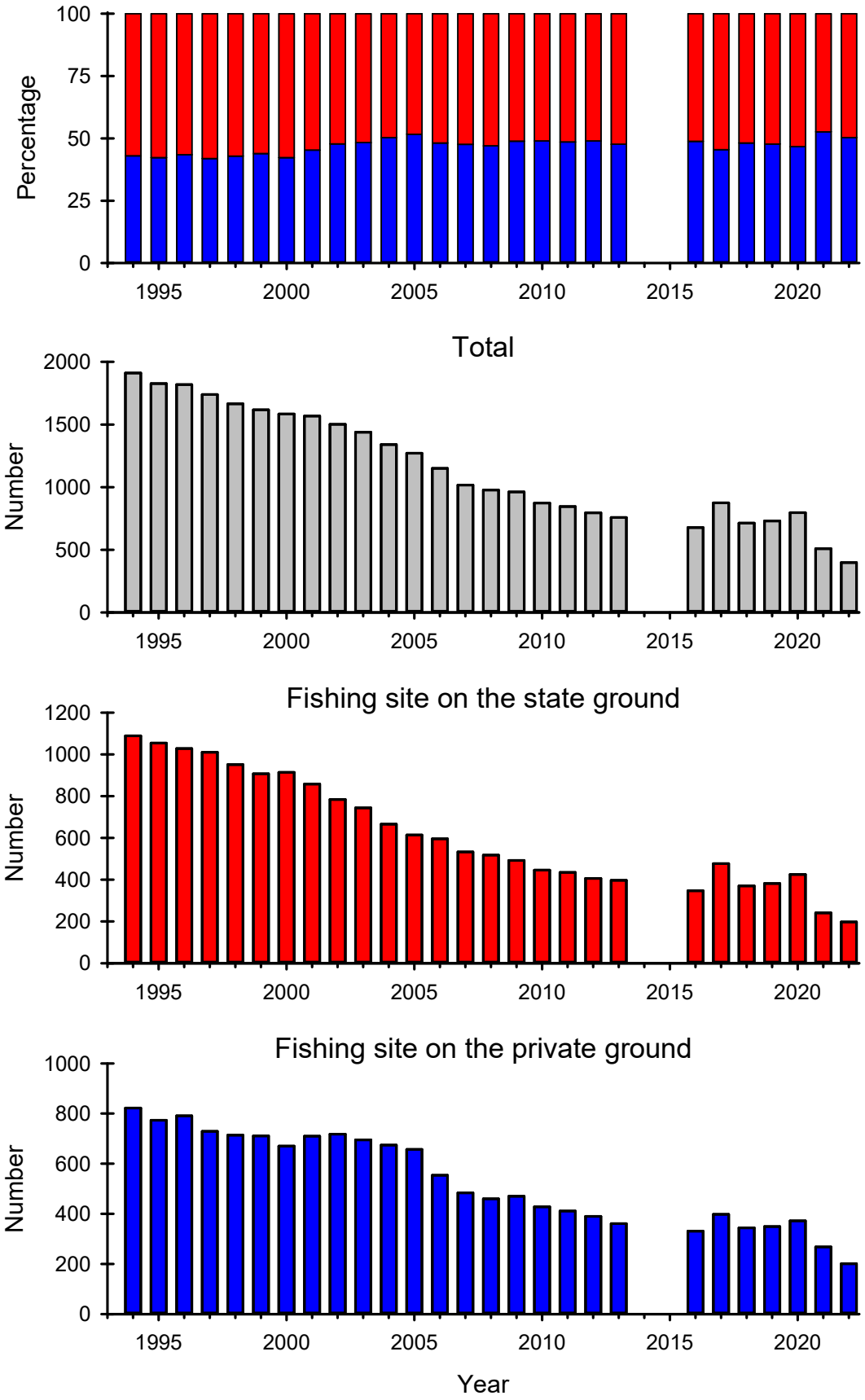

Figure 7. Numbers of registered bag net and bend net fishing sites on the private and state-owned ground in Finnmark. Source. County governor of Troms and Finnmark.

Numbers of salmon fishing sites in Finnmark were in the middle of 1990 at approx. 2000 and in the year 2022 at approx. 400. Fishing sites can be on state ground and on private ground (Fig. 7). In long-term, they divide 50% to 50%. The numbers of fishing sites have declined simultaneously and in the year 2022 they declined clearly due to the salmon fishing moratorium in Tanafjord and areas close to it.

Figures 8 and 9 clearly indicates the long-term decline in the fishing sites that has happened since the middle of 1990's. In some areas, like in the municipalities Gamvik and Berlevåg in Tanafjord and in the municipality Nesseby in Varangerfjord, fishing sites have slightly increased (Figs. 8 and 9).

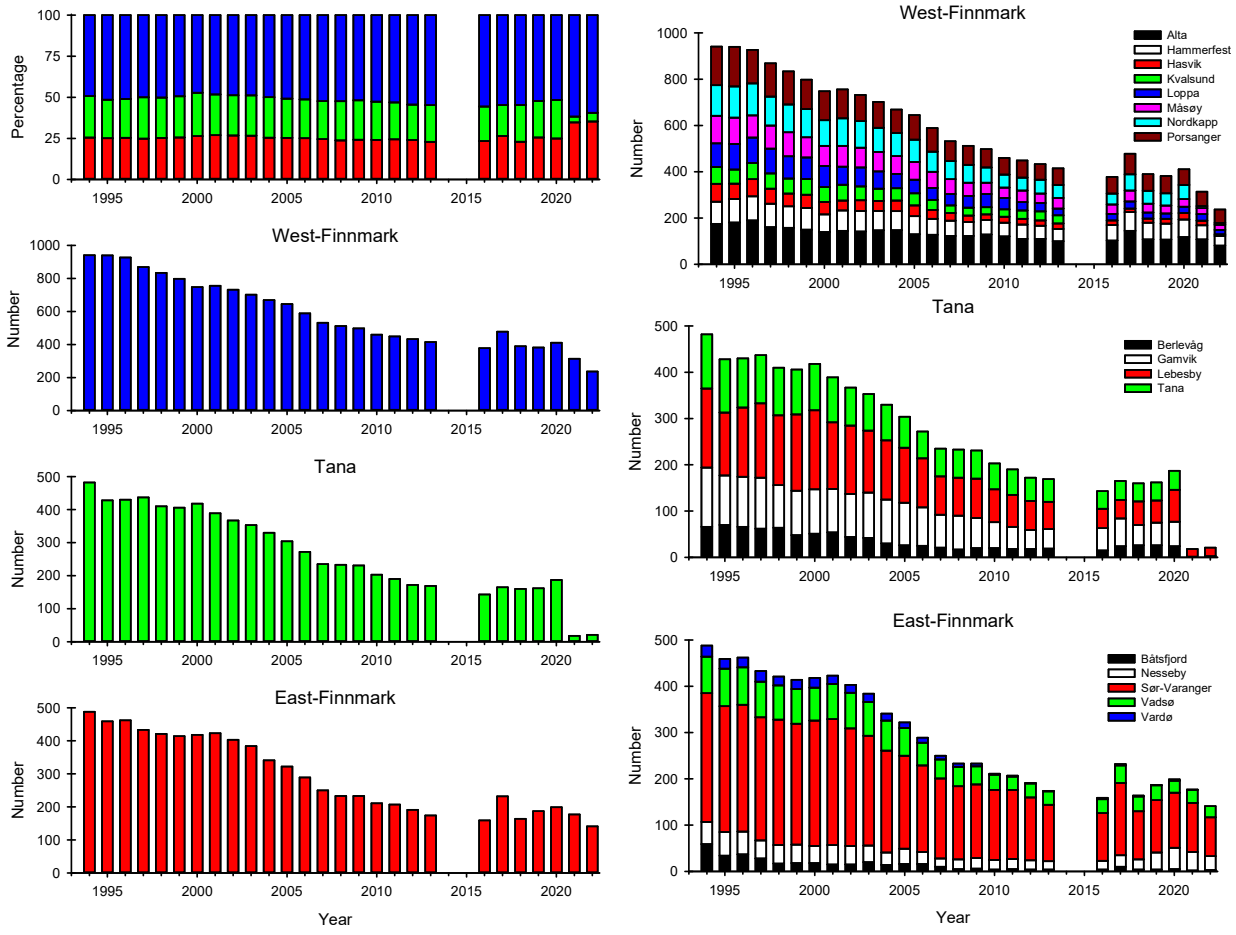

Figure 8. Numbers of fishing sites available in West-Finnmark, Tana area and East-Finnmark.
West-Finnmark includes municipalities Loppa, Hasvik, Alta, Hammerfest, Kvalsund, Måsøy, Nordkapp and Porsanger; Tana includes municipalities Lebesby, Gamvik, Tana and Berlevåg; East- Finnmark includes municipalities Båtsfjord, Vardø, Nesseby, Vadsø and Sør-Varanger. Source. County governor of Troms and Finnmark. Source: County governor of Troms and Finnmark.

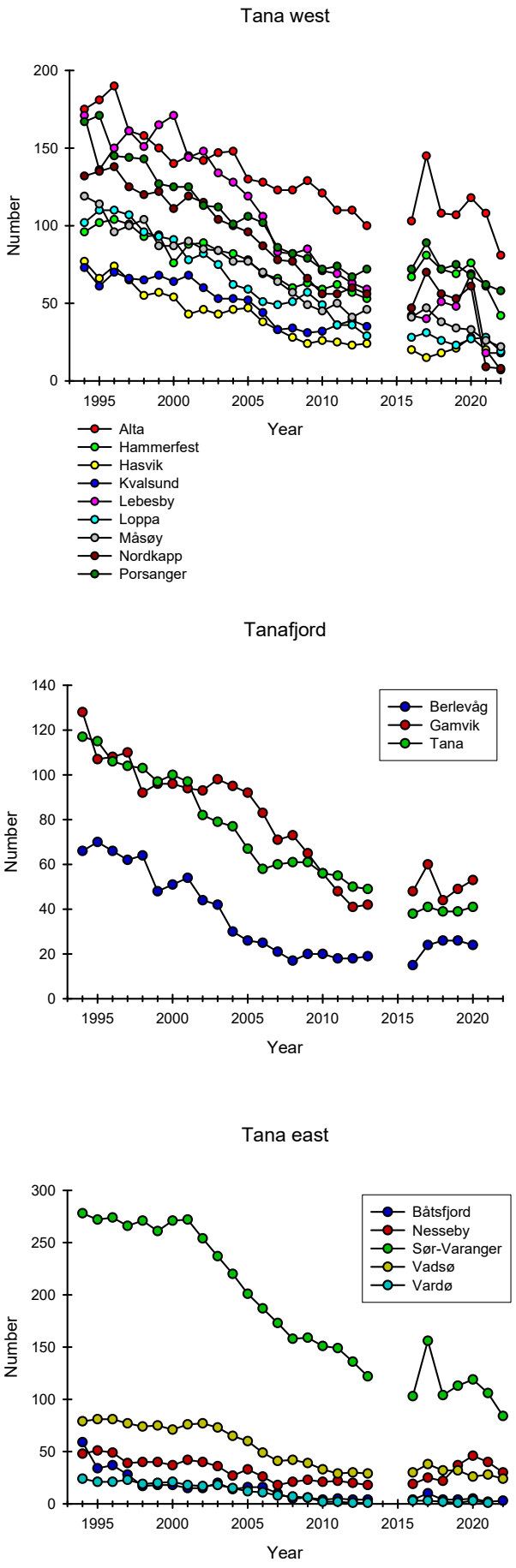

Figure 9. Annual numbers of fishing sites available in each municipality in the eastern area from Tanafjord (lowest figure), in Tanafjord (figure in the middle) and in the area west from Tanafjord (top figure). Source: SSB.

6. Numbers and proportions of bag nets and bend nets in salmon districts and municipalities in Finnmark

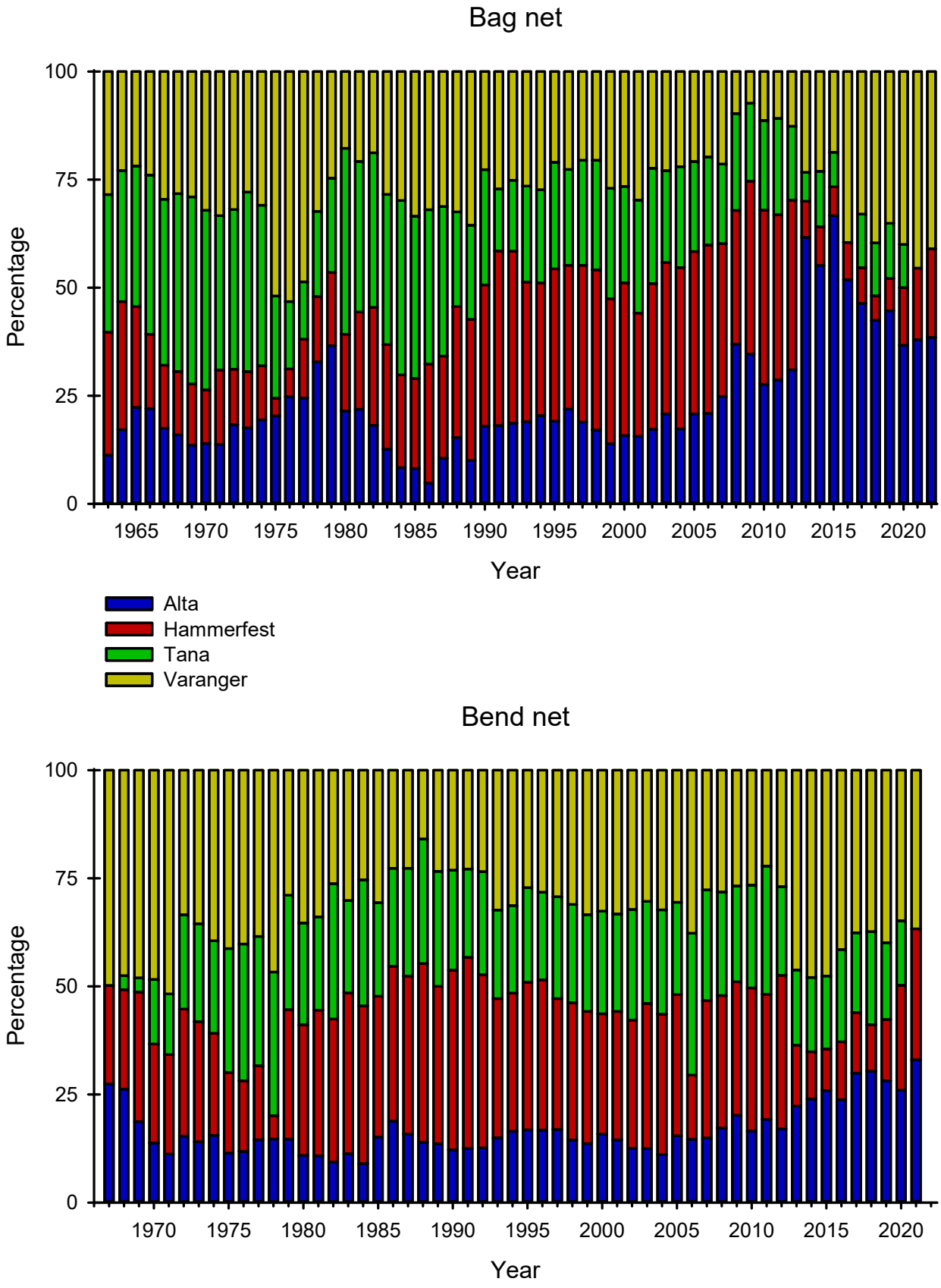

Figure 10. Annual proportions of bag nets and bend nets between four salmon districts in Finnmark. Source. SSB

Figure 10 give overview of the long-term development of the proportions of bag nets and bend nets used in four salmon districts in Finnmark. The proportions of bag nets used in Tana salmon districts has clearly decreased since the year 1963 compared to the proportions in other salmon districts. In Alta and Hammerfest salmon districts, the proportions have increased so much that in the years 2008-2015 around 70-75% of all bag net used in Finnmark are found on this district. During the last ten years, the proportions of bag nets used in Varanger salmon district have clearly increased compared to the proportions in other areas. The annual proportions of bend nets have been quite stable between all the salmon districts during the last 30 years. From the numbers of bend nets almost every year since 1980's appr. 50% have been used in East-Finnmark (Tana and Varanger salmon districts). The highest proportions of bend nets during the last 30 years have been in Hammerfest and Varanger salmon districts.

The numbers of bag nets have declined from the middle of 1960's to late 1970's and then their numbers increased and had a peak in early 1990's, followed by steady decline until the latest years (Figs. 11, 12, 13, 14). In Finnmark the numbers of bend nets have been close to 1 500 in 1970's and thereafter they have declined.

The numbers of drift nets were the highest in Hammerfest salmon district being around 4 000 nets just some years before it was prohibited (Figs. 14 and 15).

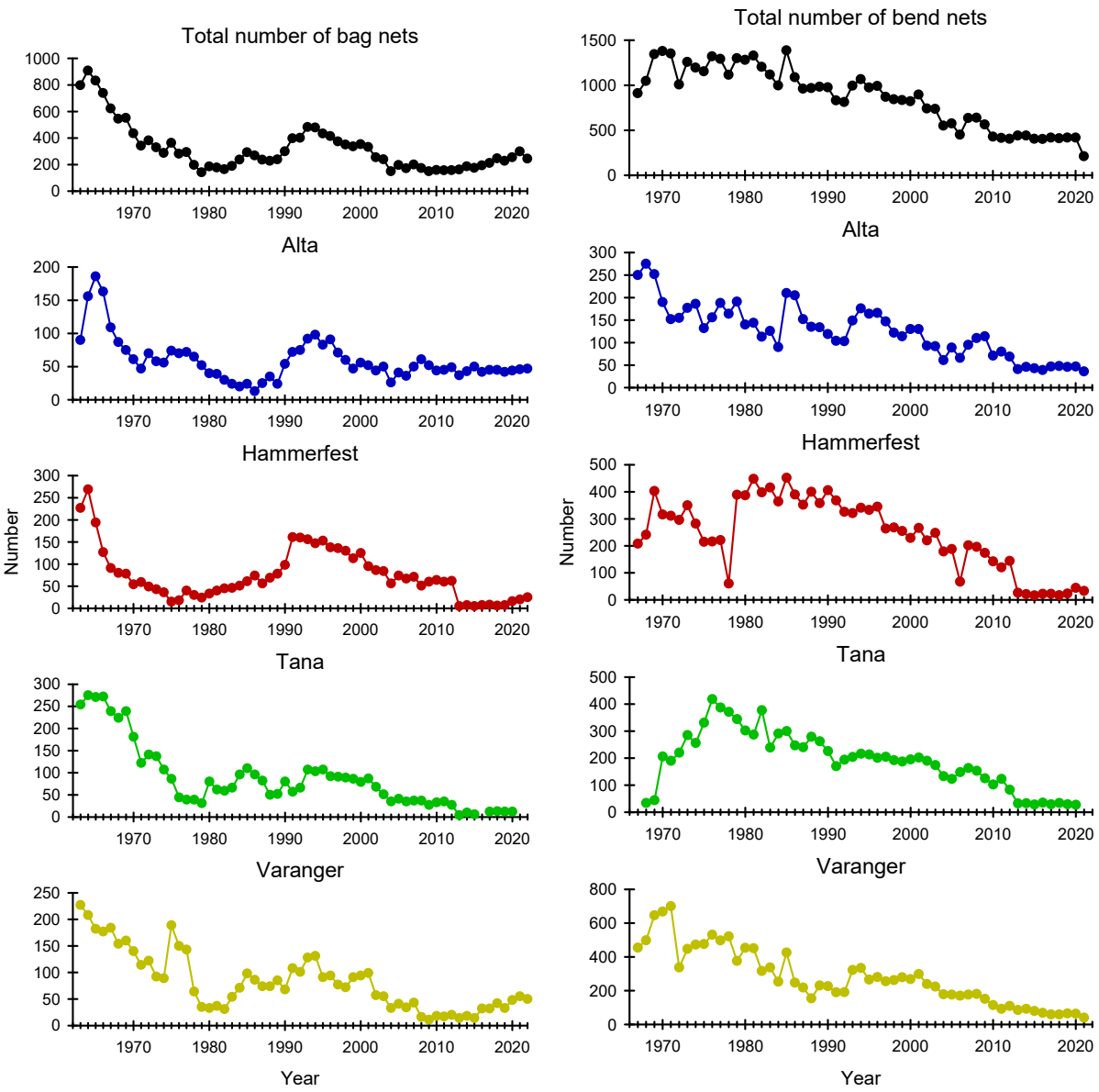

Figure 11. Annual numbers of bag nets (figure on the left) and bend nets (figure on the right) in four salmon districts in Finnmark. Source. SSB

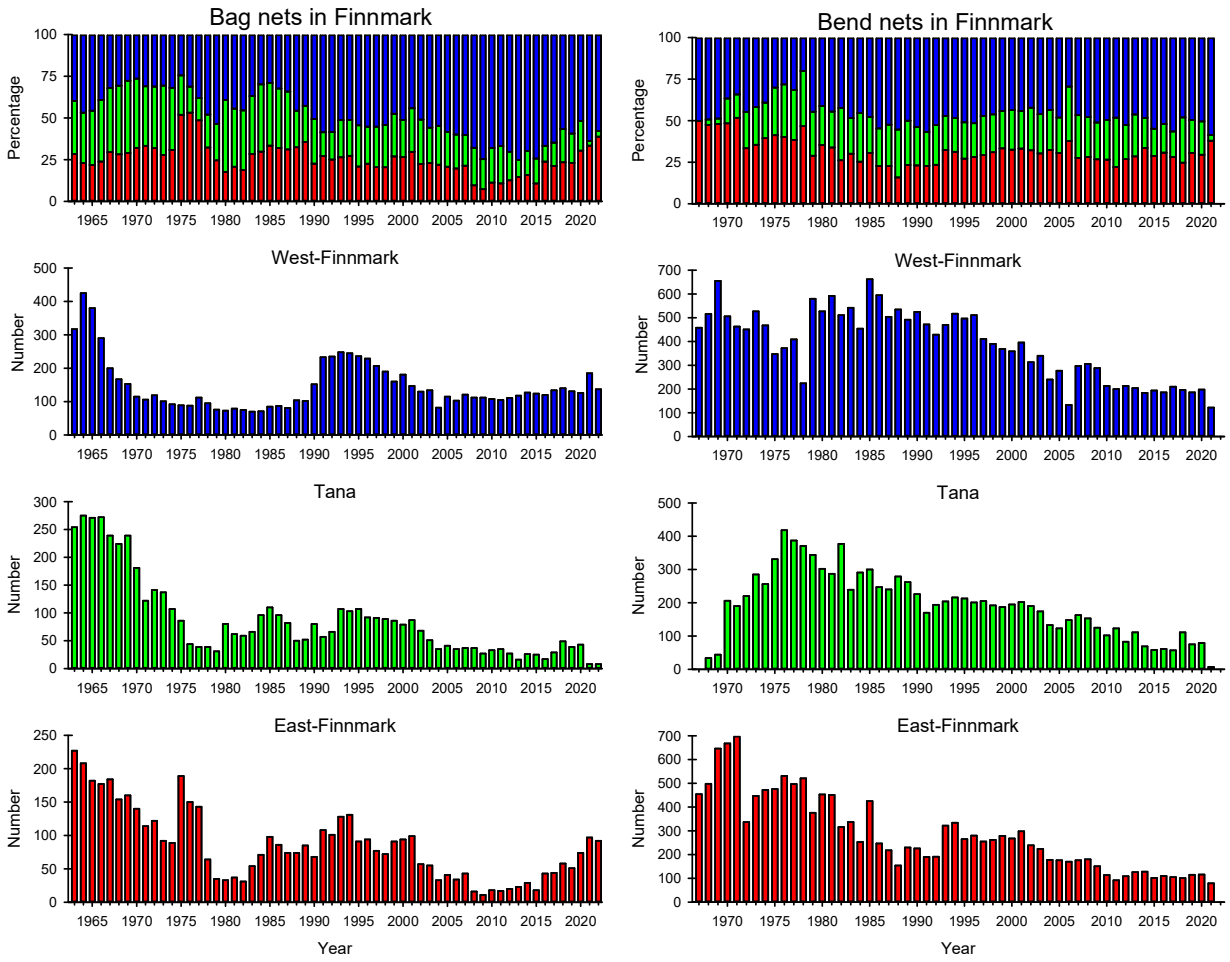

Figure 12. Bag nets (on the left) and bend nets (on the right) in West-Finnmark (municipalities), Tanafjord (municipalities) and East-Finnmark (municipalities).

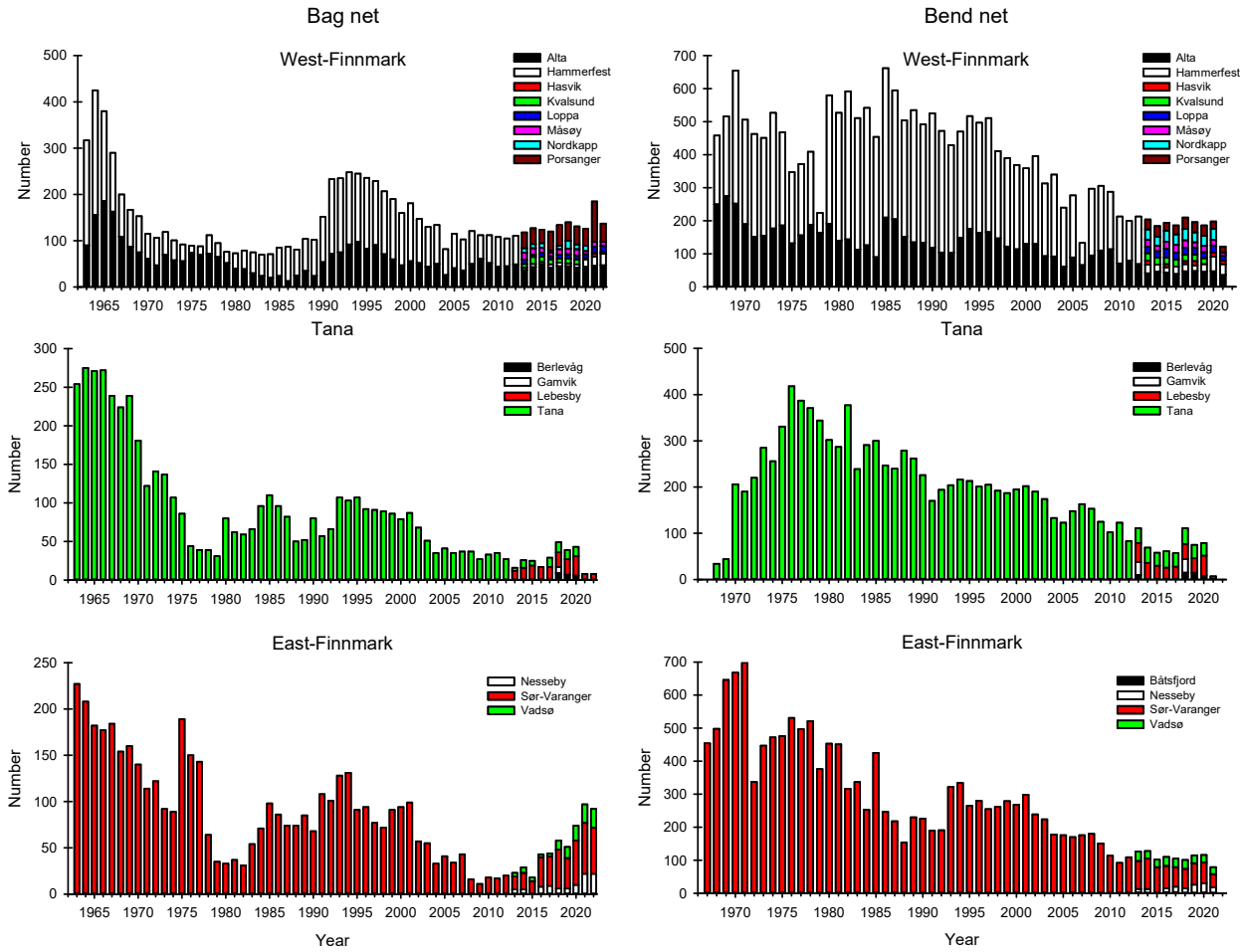

Figure 13. Numbers of bag nets in West-Finnmark area, Tana area and East-Finnmark. Before the year 2013 municipalities are together and since the year 2013 numbers of bag nets are for each municipality.

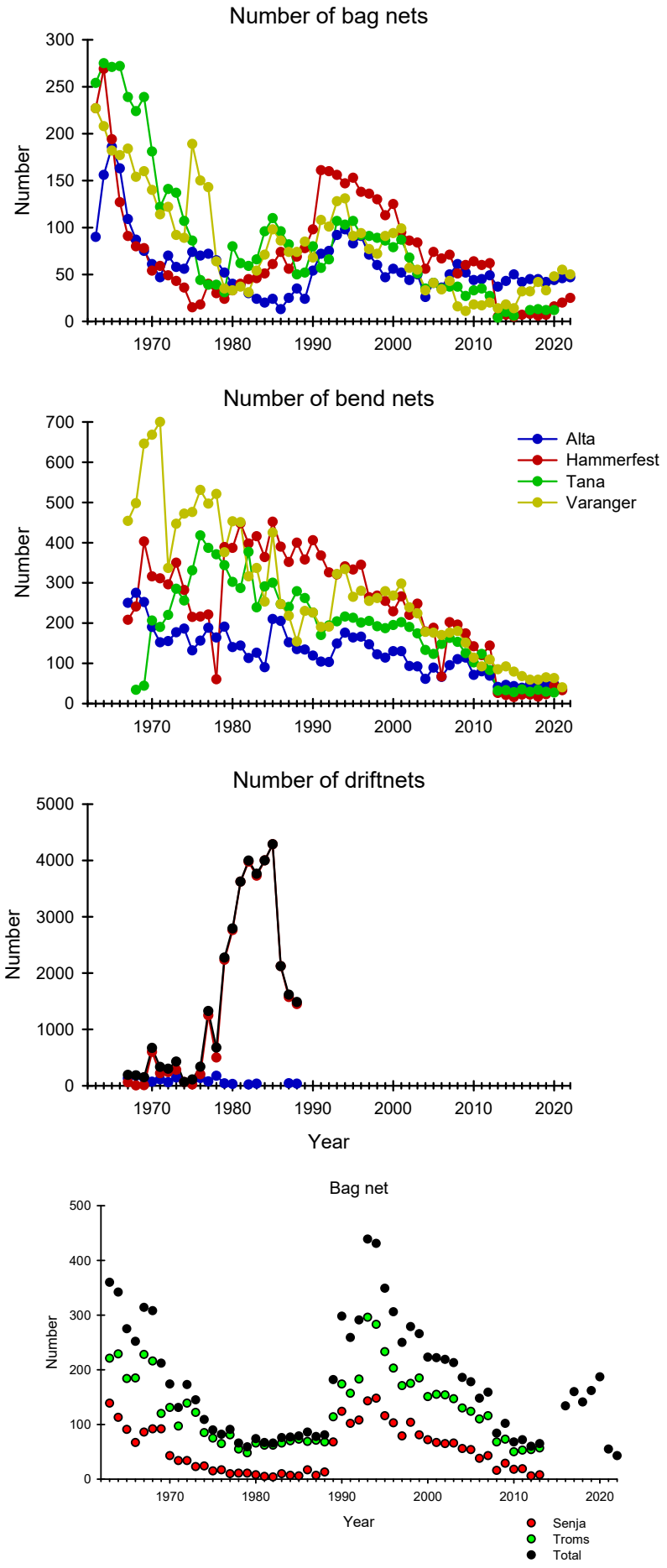

Figure 14. Numbers of bag nets, bend nets and driftnets in four salmon districts in Finnmark and bag nets in in Troms and Senja in Troms County. Source: SSB

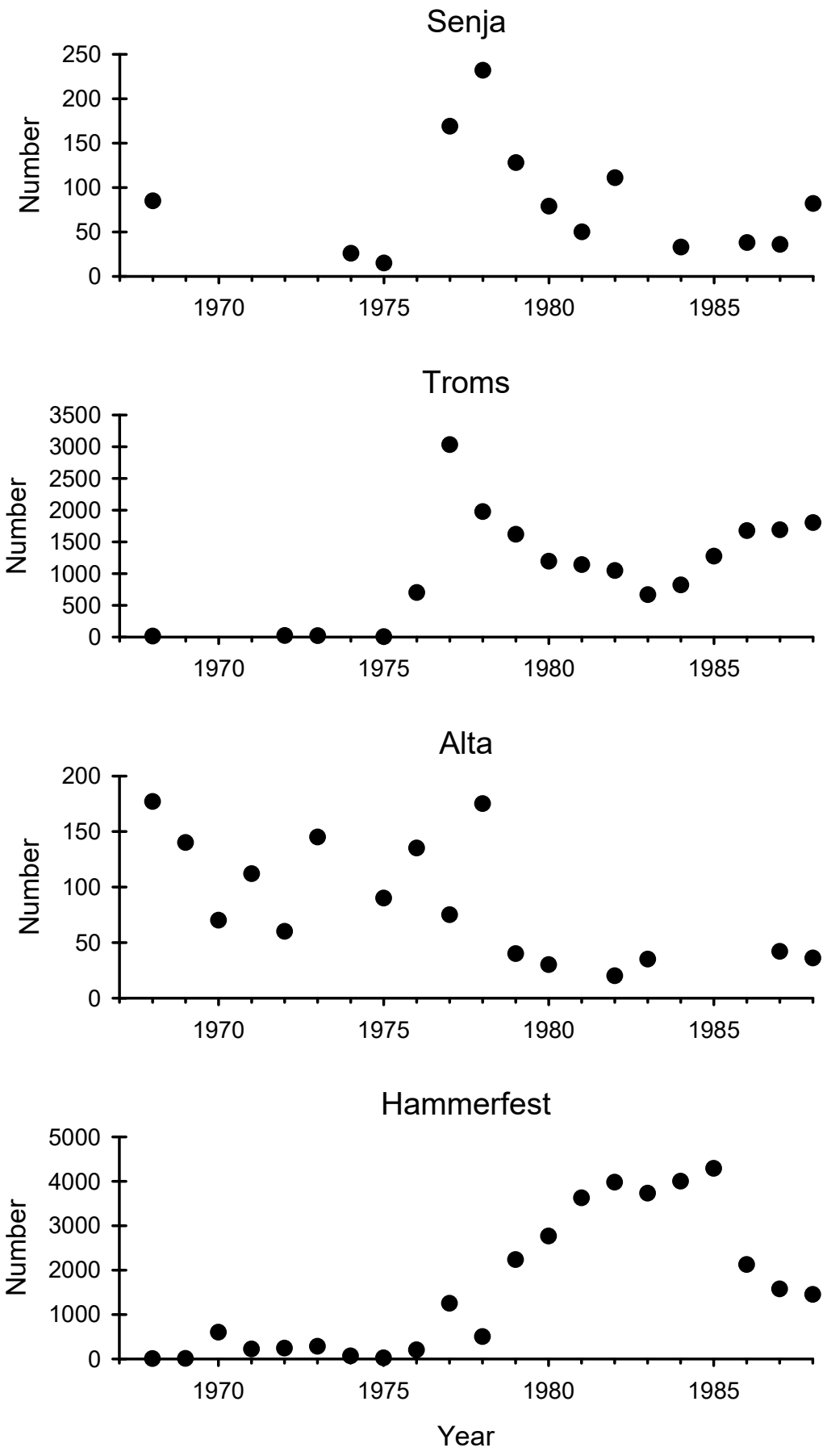

Figure 15. Annual numbers of driftnets in Finnmark and Troms counties. Source: SSB

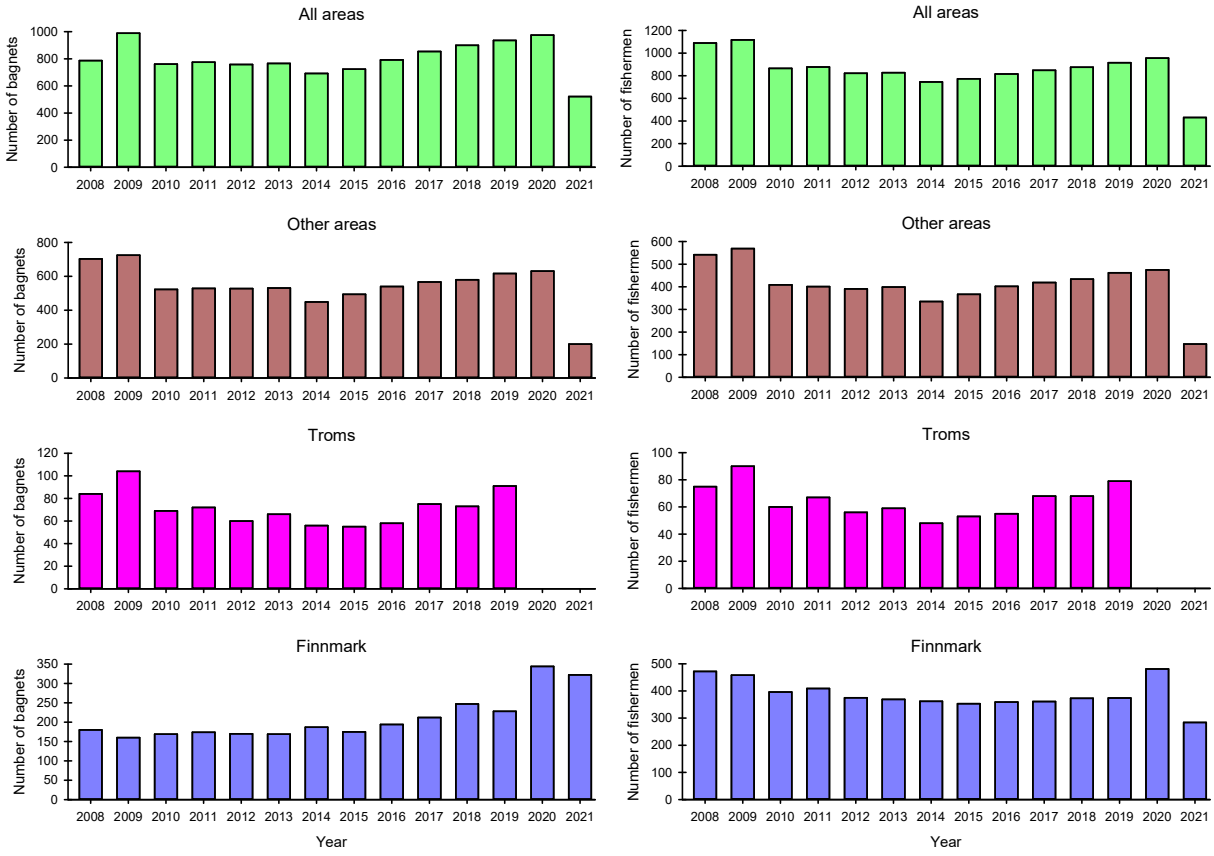

Figure 16. Annual numbers of bag nets (figure on the left) and fishers (figure on the right) in Finnmark, Troms, other areas in Norway and all areas together. In the years 2020 and 2021 Troms and Finnmark and combined into Finnmark figures. Source: SSB

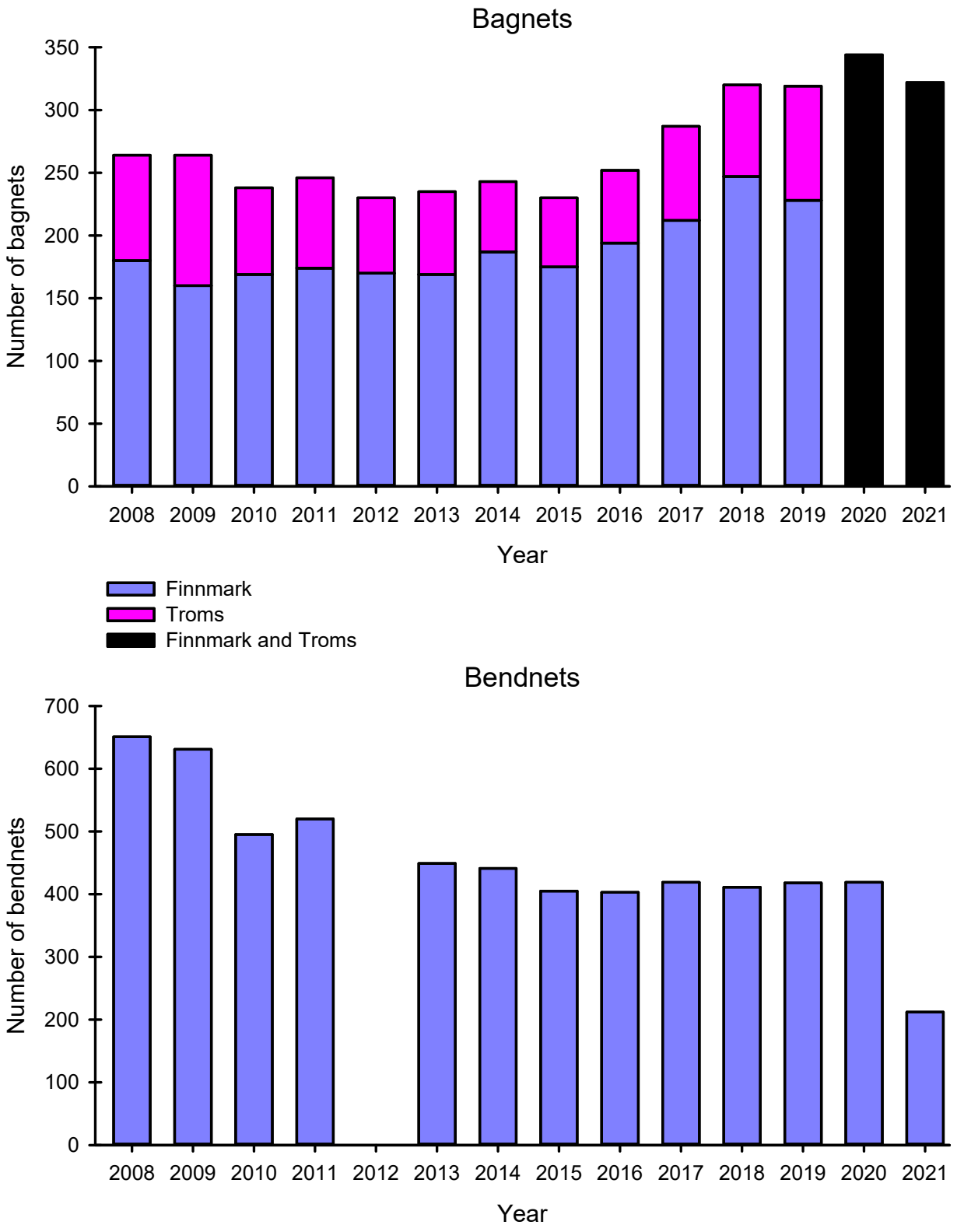

Figure 17. Annual numbers of bag nets in Troms and Finnmark counties and bend nets in Finnmark. In the years 2020 and 2021 Troms and Finnmark and combined in bag nets. Source: SSB

7. Numbers of salmon fishers in Finnmark areas and in Finnmark municipalities

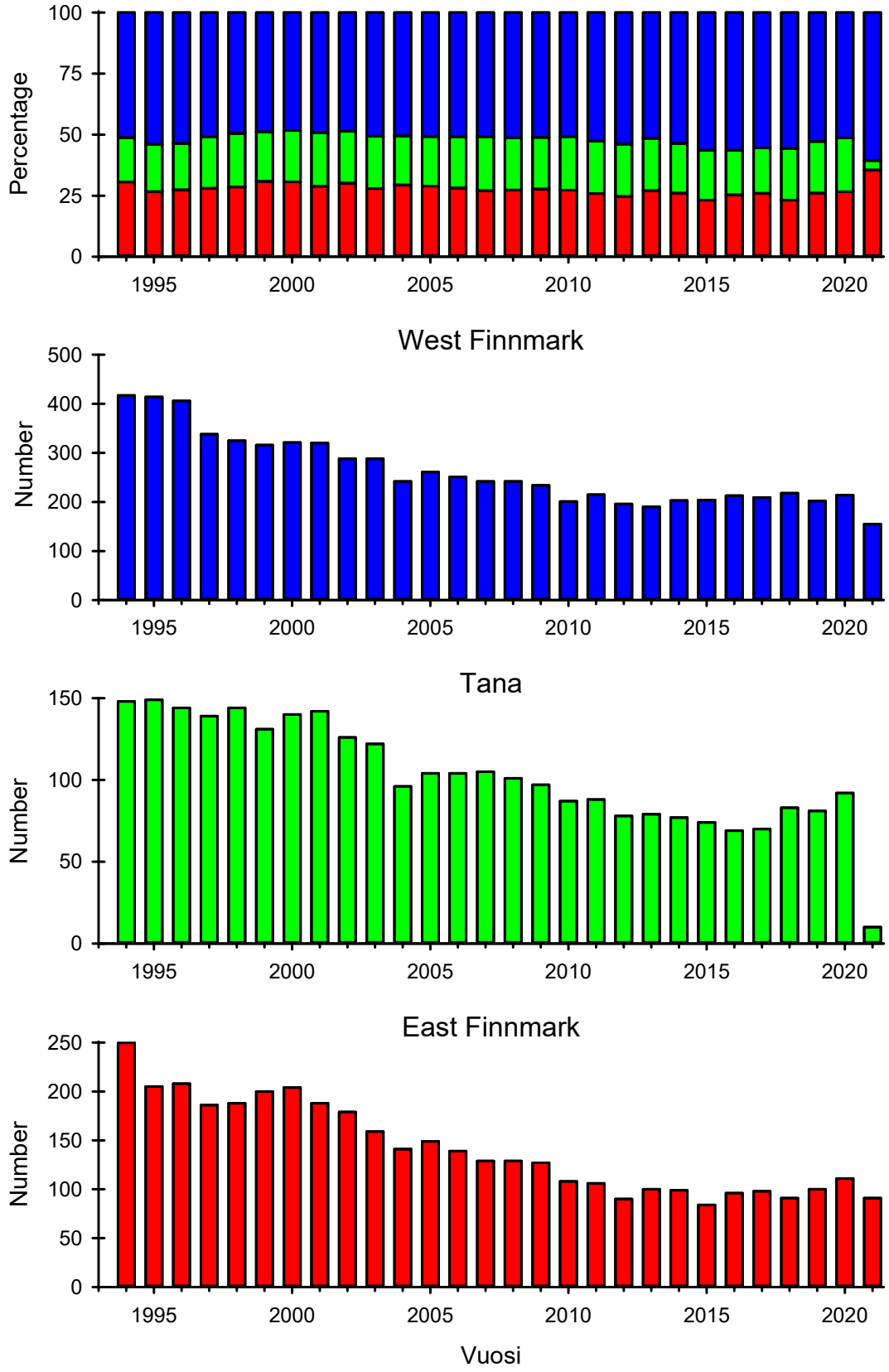

Figure 18. Numbers of salmon fishers in West-Finnmark, Tana area and East-Finnmark. West-Finnmark includes municipalities Loppa, Hasvik, Alta, Hammerfest, Kvalsund, Måsøy, Nordkapp and Porsanger; Tana includes municipalities Lebesby, Gamvik, Tana and Berlevåg; East- Finnmark includes municipalities Båtsfjord, Vardø, Nesseby, Vadsø and Sør-Varanger. Source. County governor of Troms and Finnmark.

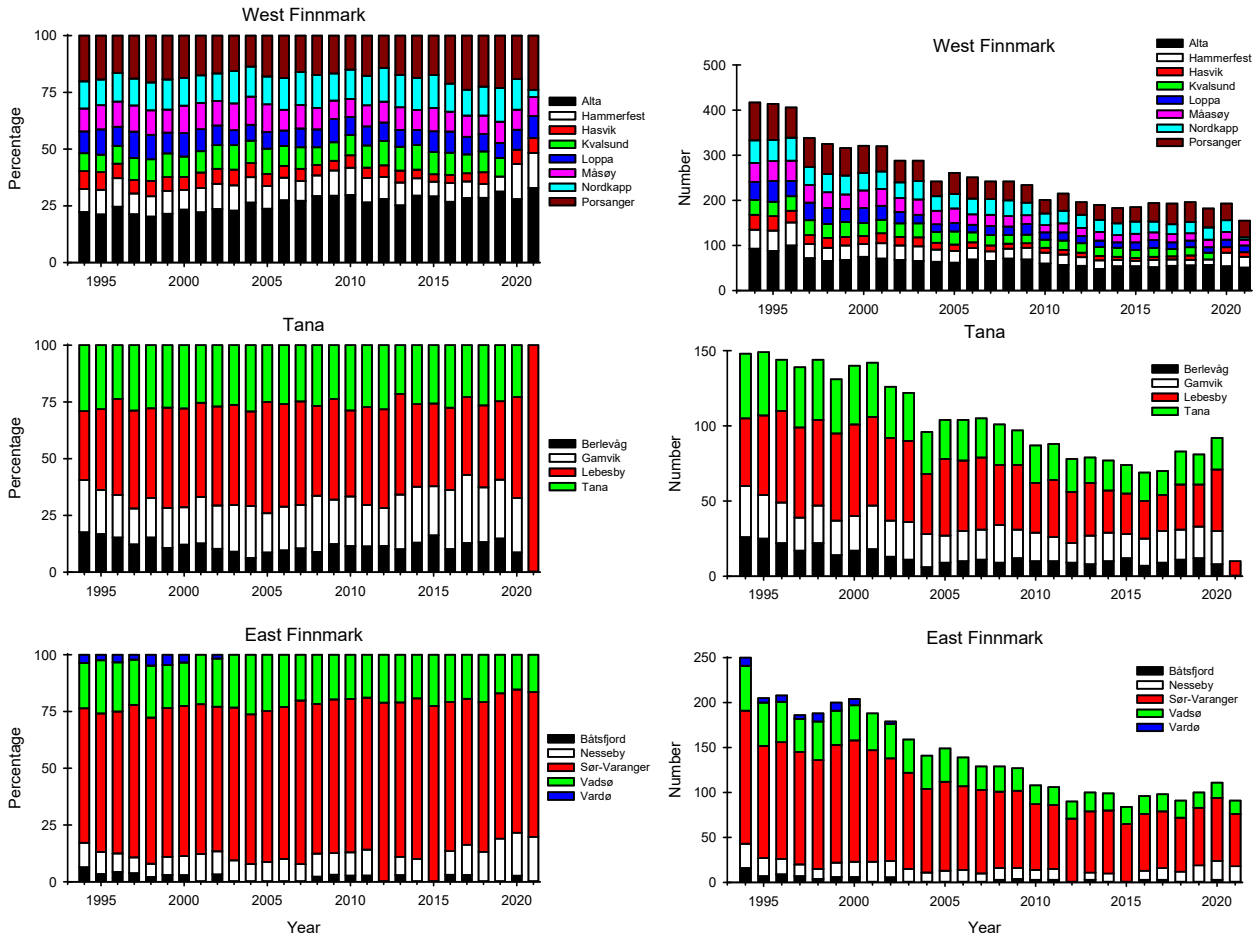

Figure 19. Numbers of salmon fishers in municipalities in West-Finnmark, Tana area and East-Finnmark. Source: County Governor of Troms and Finnmark.

Numbers of salmon fishermen have declined in each municipality in Finnmark along the years simultaneous with the declining of salmon fishing sites (Figs. 18-21).

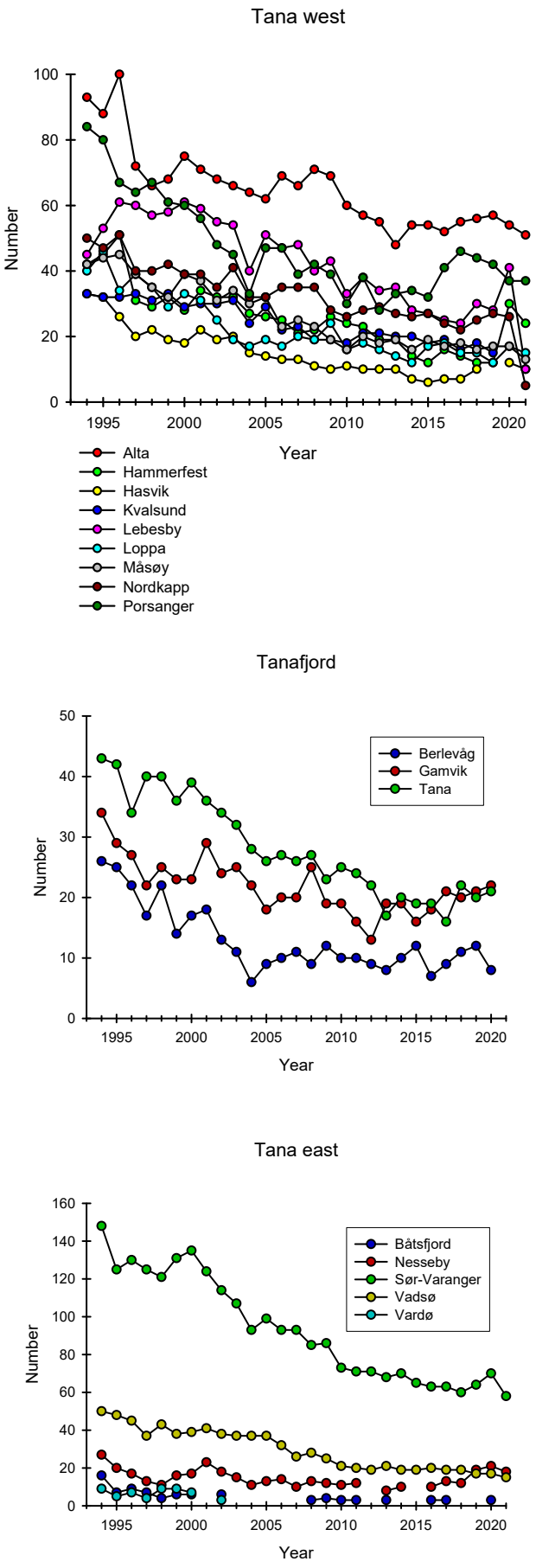

Figure 20. Annual numbers of salmon fishers in municipalities in the area east from Tanafjord (lowest figure), in Tanafjord (figure in the middle) and in the area west from Tanafjord (uppermost figure). Source: SSB.

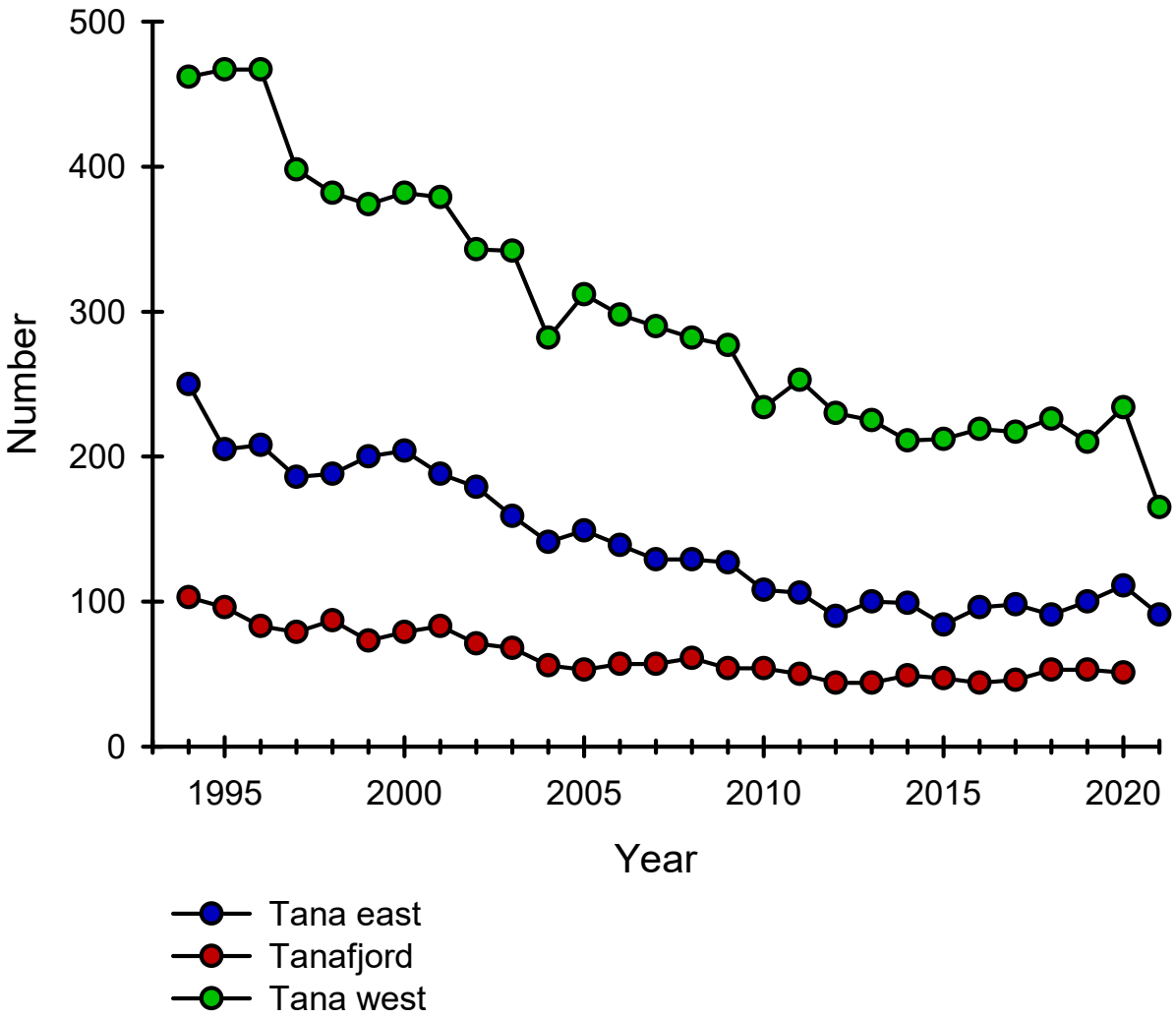

Figure 21. Annual numbers of salmon fishers in the area east of Tanafjord, in Tanafjord and in the area west of Tanafjord. Source: SSB.

8. Total salmon catches caught at sea in three northern counties and in other areas in Norway.

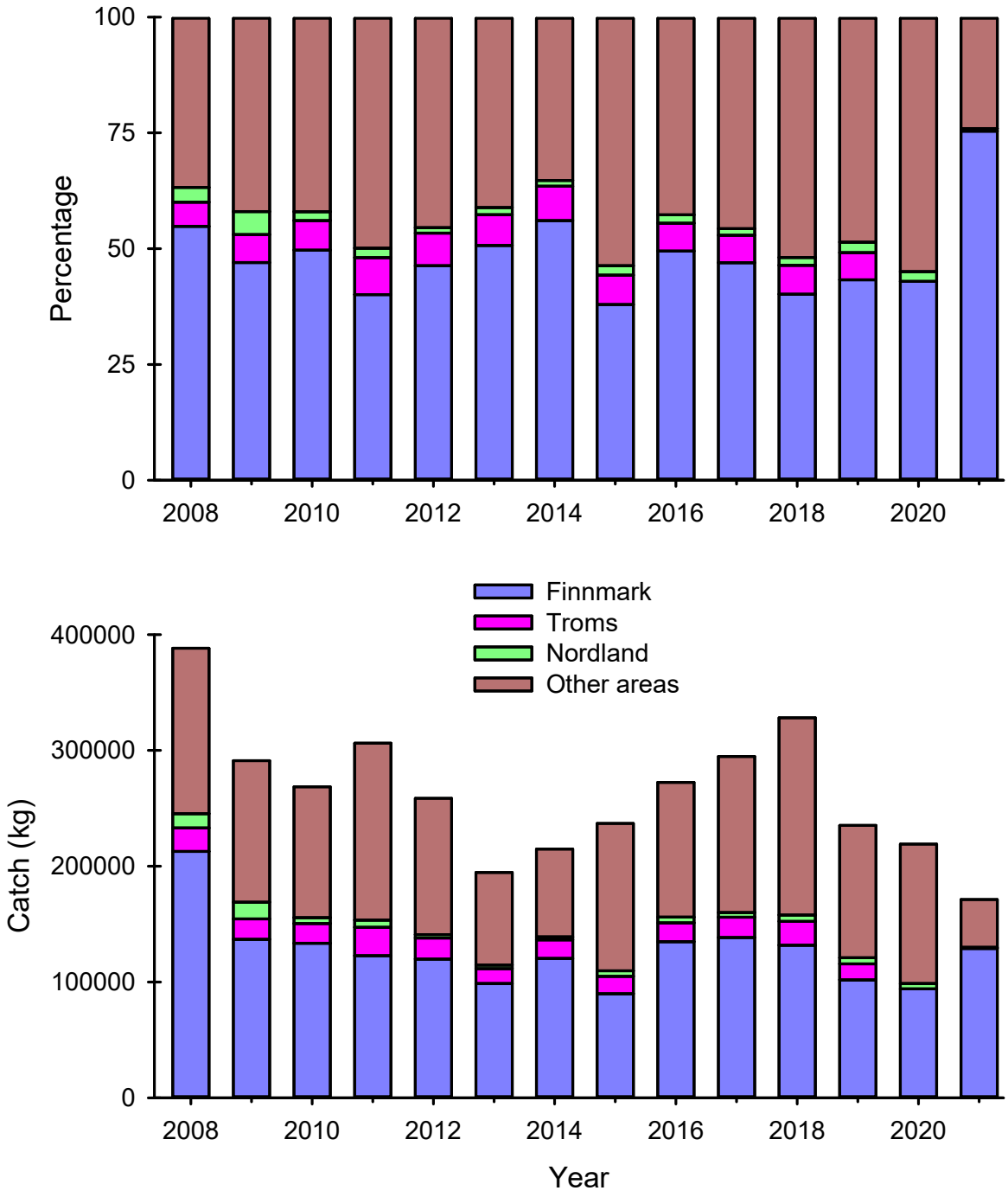

Figure 22. Total salmon catch caught with bag nets and bend nets in three northern counties and in other areas in Norway. Source: SSB.

Finnmark is the most important county in Norway having appr. 50% of the annual catches from bag net and bend net fishery (Fig. 22).

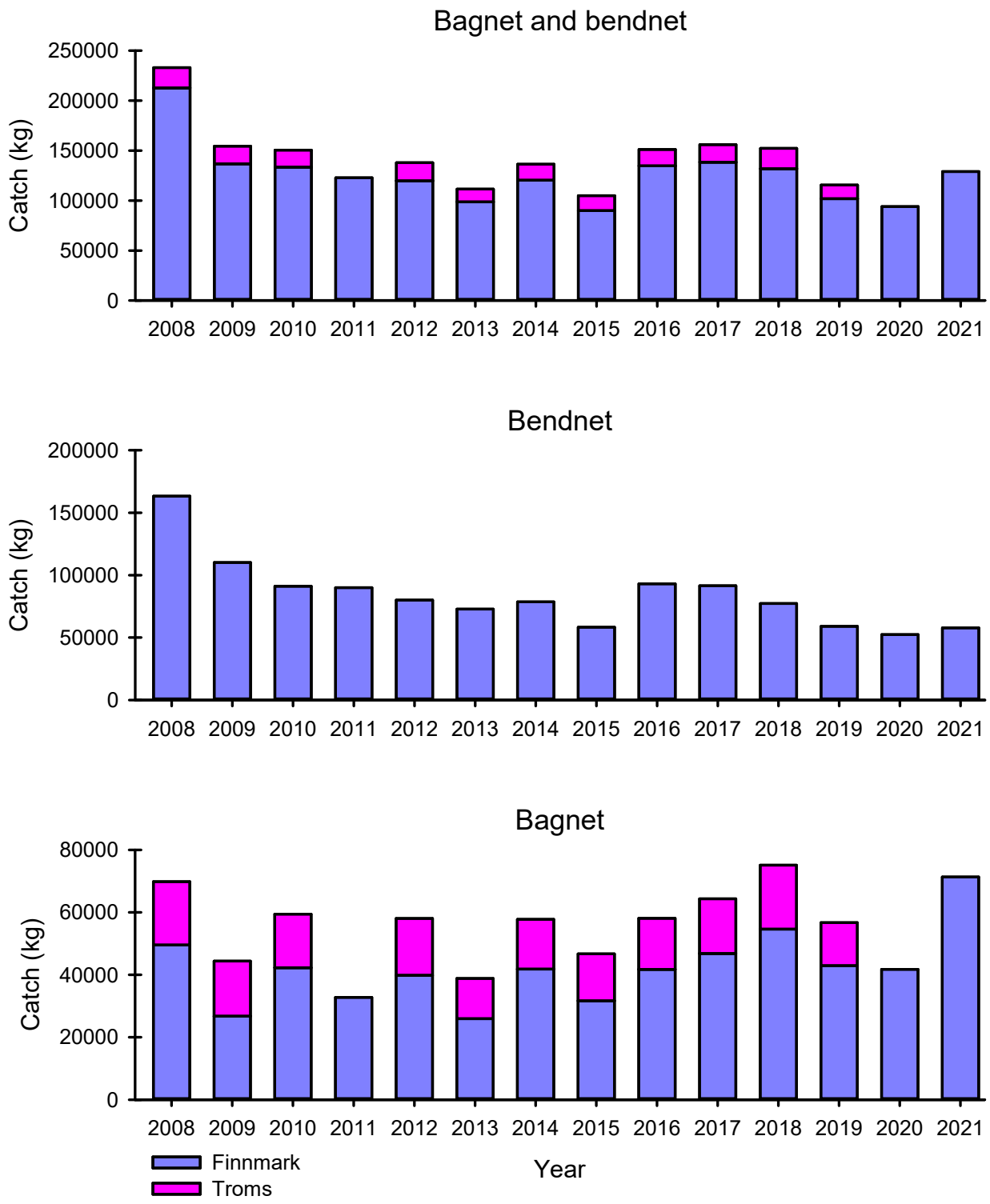

Figure 23. Total salmon catch caught with bag nets in Finnmark and Troms and with bend nets in Finnmark. Source: SSB.

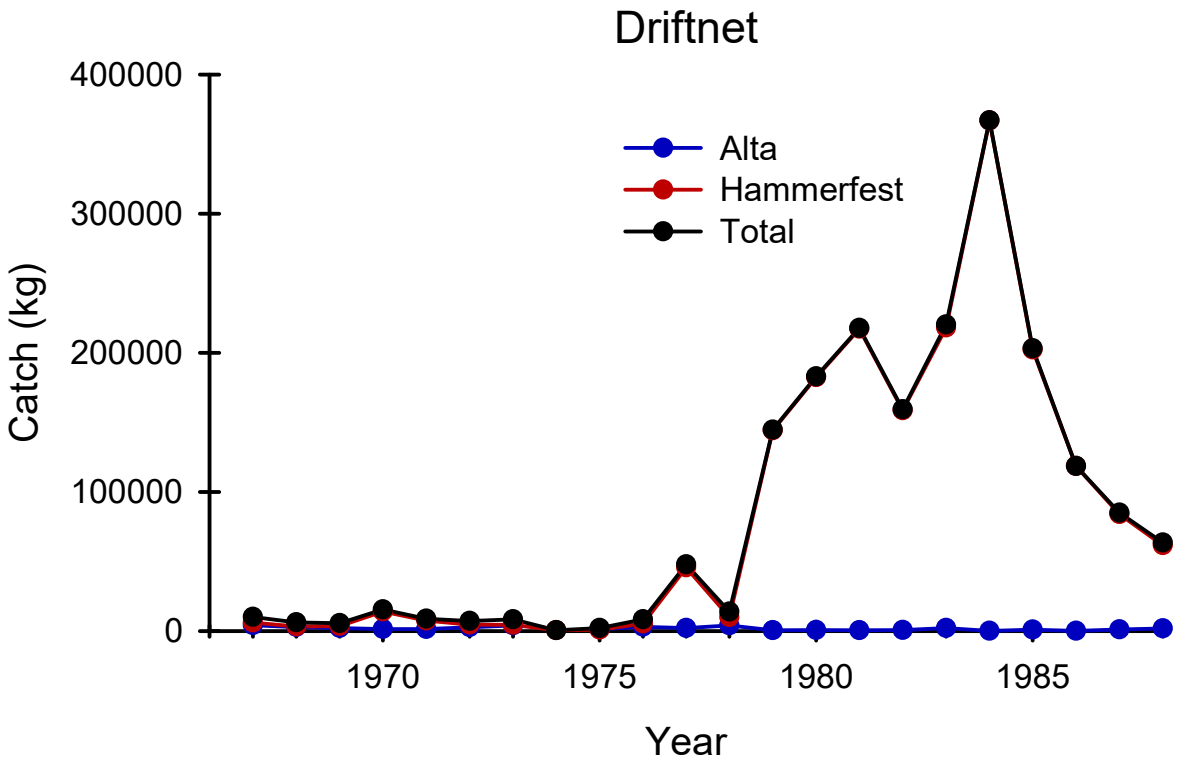

Figure 24. Total annual salmon catches caught with driftnet at sea in Finnmark in the municipalities Alta and Hammerfest. Source: SSB

9. Summary from the salmon catches in the years 1993-2021 divided into size groups at sea and in northern rivers.

Total salmon catches in the whole Norway and separately in Finnmark and in Troms counties have declined since the early 2000's towards the year 2021, without any clear peaks (Figs. 25, 26, 27). Small salmon (>3 kg), made in general up approx. 50% of the catches, based on the numbers of salmon. The proportions of small, medium and large sized salmon have had only very small differences between the years 1993-2021. This indicates that there has not been annually clear differences in the size selection from net fishing methods and in mesh sizes in the nets. In the salmon catches at sea, in terms of weight, medium sized and large sized salmon has almost always made up 75% or more from annual catches in Finnmark county in the years 1993-2021 (Fig. 25). Figure 27 indicates, however, that in the rivers in Finnmark (not Tana and Neiden included) medium size and large size salmon make up smaller proportions, appr. 60%, from the annual catches in terms of weight. In the River Tana, medium size and large size salmon have made approx. 75% from annual catches in term of weight with remarkable annual variations.

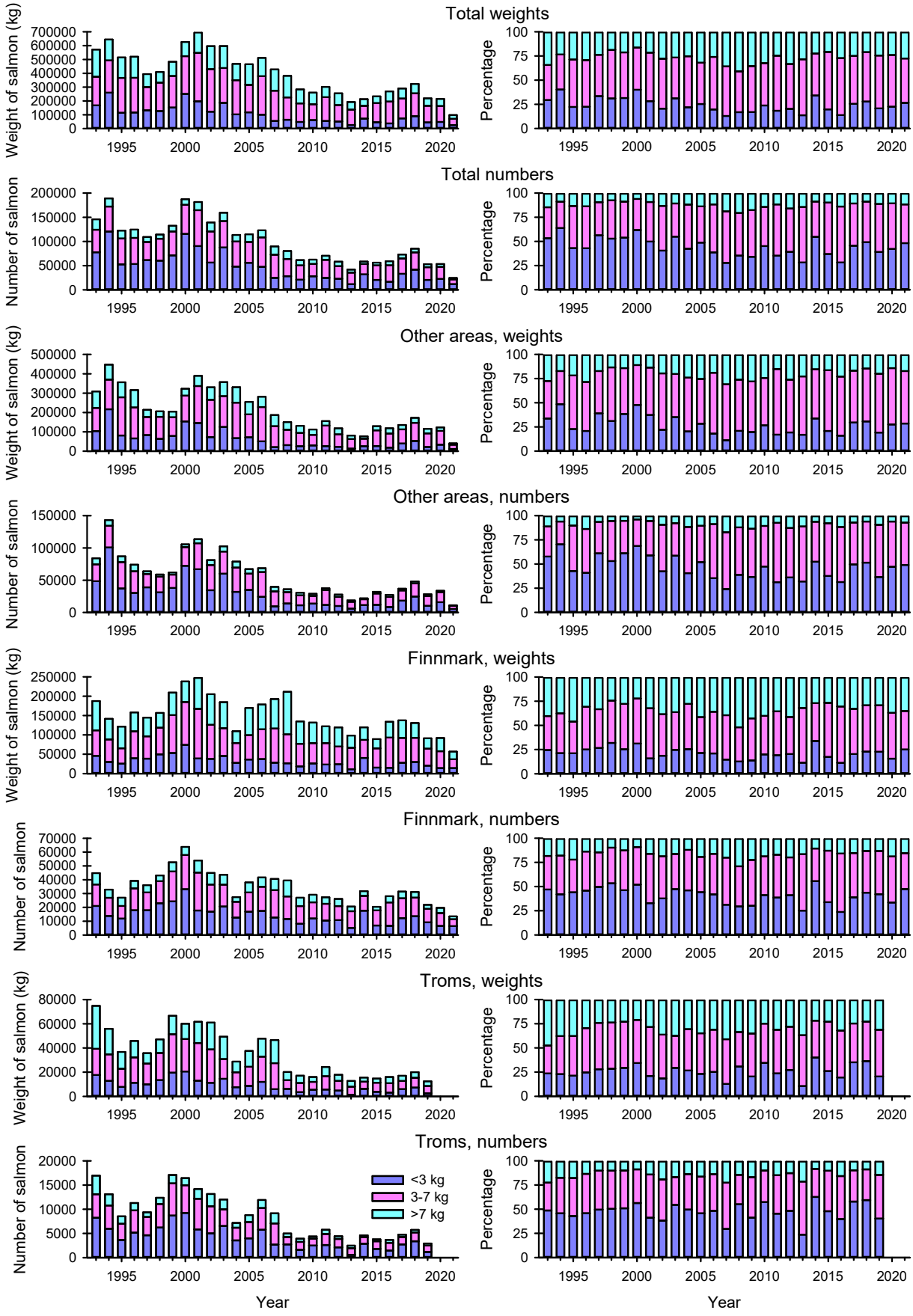

Figure 25. Long-term annual salmon catches in size groups at sea in Norway. Salmon catches in the years 2020 and 2021 in Troms are included in Finnmark catches. Source: SSB.

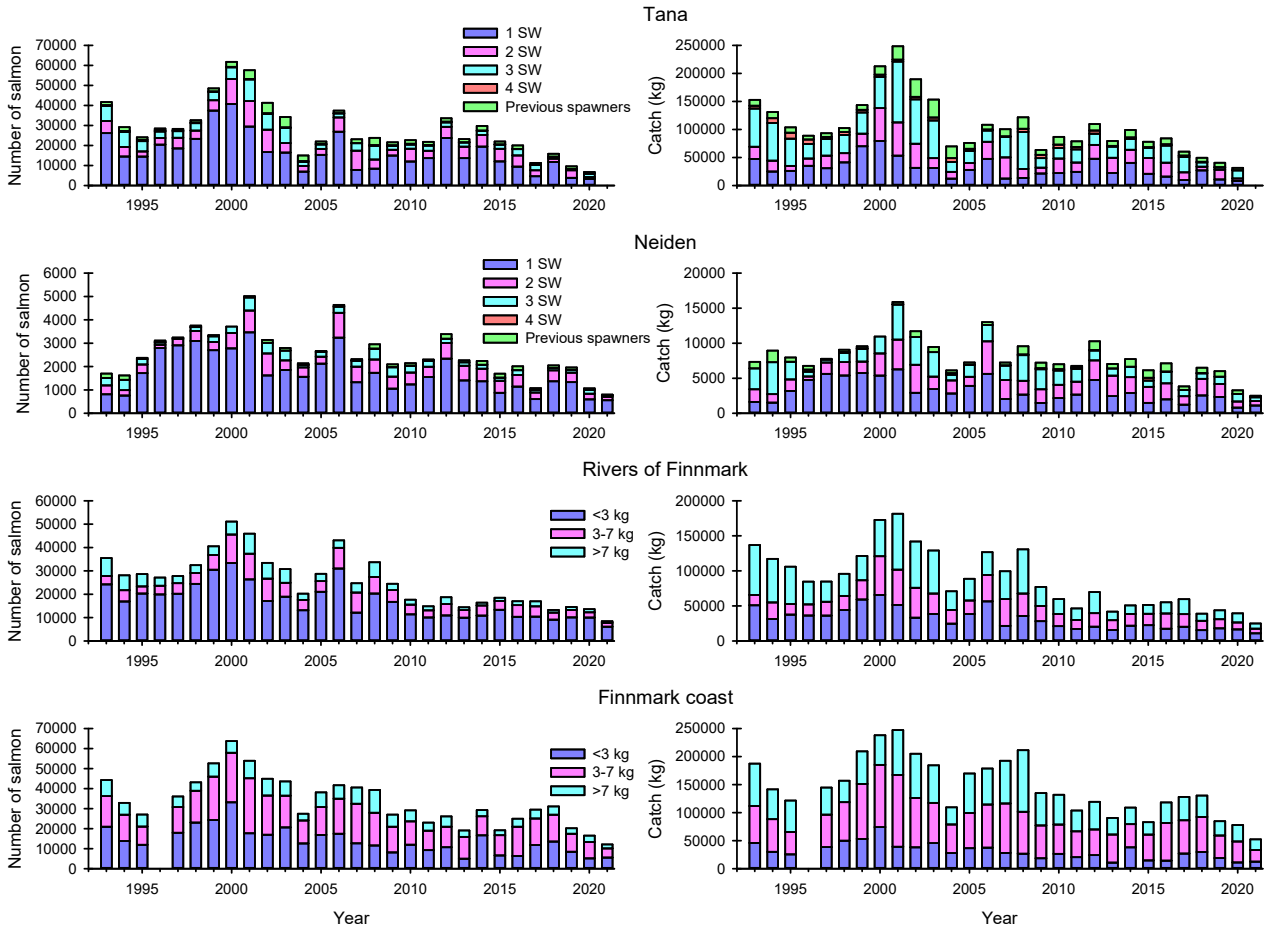

Figure 26. Long-term salmon catches at sea and in the rivers in Finnmark and separately in the rivers Tana and Neiden, Norwegian and Finnish catches combined. Source: SSB, Luke.

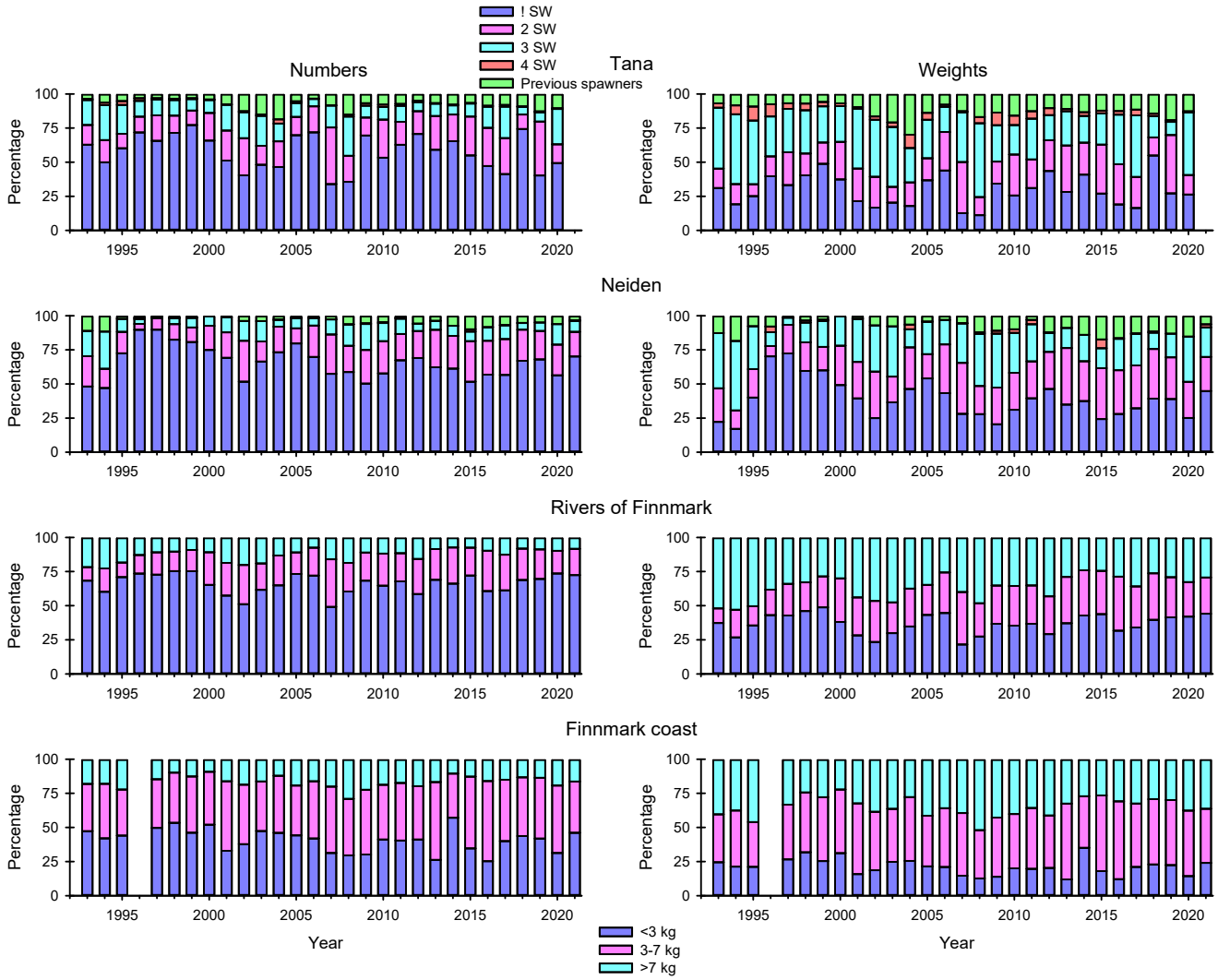

Figure 27. Annual sea-age distributions in the rivers Tana and Neiden Norway and Finland combined and size distributions in other rivers and in the sea fishery in Finnmark. Legend for sea-ages (above the graph the River Tana) is for the rivers Tana and Neiden. Legend for size groups (below the graph Finnmark coast) is for the graphs Rivers in Finnmark and Finnmark coast. Source: SSB, Luke.

Literature

ICES. 2021. Working Group on North Atlantic Salmon (WGNAS). ICES Scientific Reports. 3:29. 407 pp. https://doi.org/10.17895/ices.pub.7923