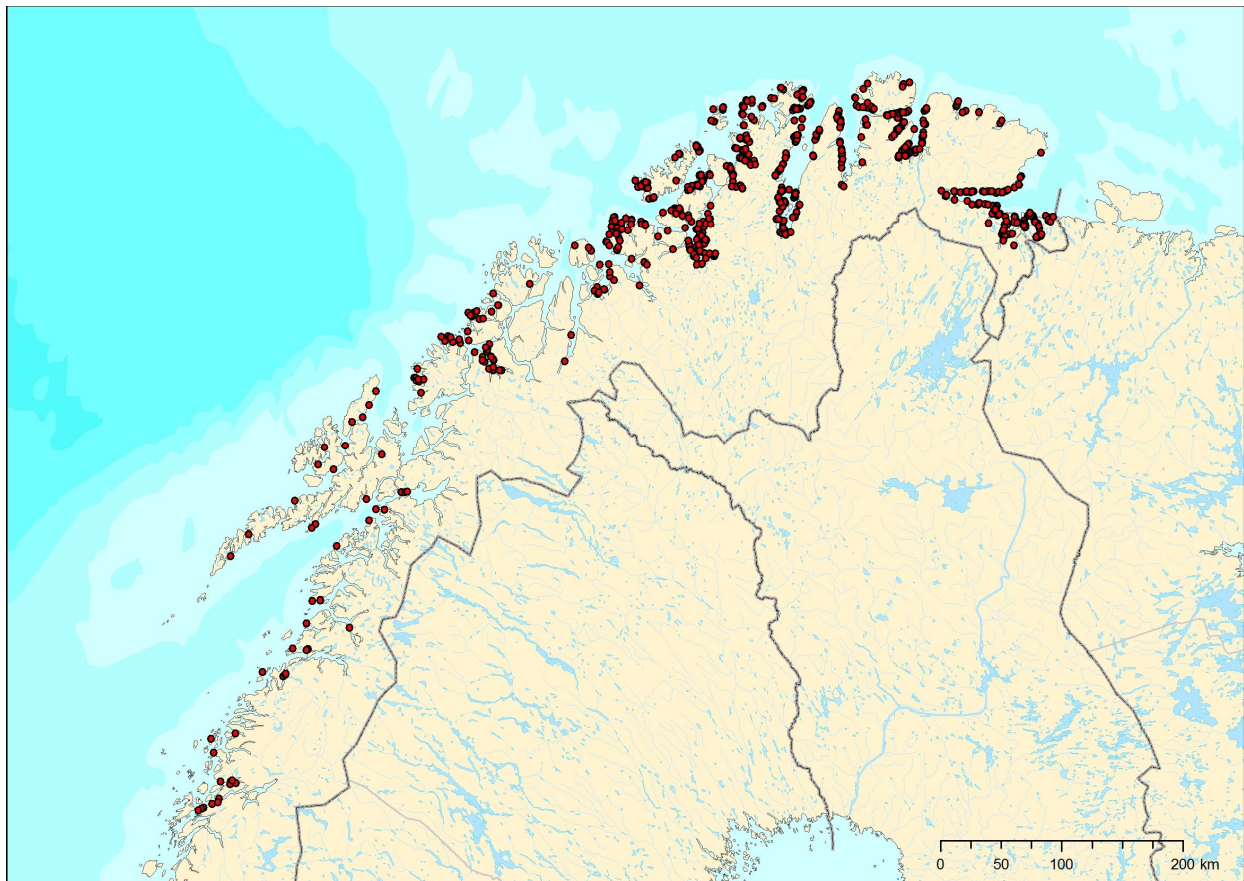


Numbers of fishing gears used in Kolarctic salmon project area, numbers of allowed sites for salmon fishing and numbers of salmon fishermen in Finnmark; development until the year 2013

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Cover page figure: Registered salmon fishing sites in North-Norway which were available for fishing in the season 2013 for both bag nets and bend nets. Note: the numbers of sites was the maximum possible but in practice some/ a number of sites were not used. Source: Lakseregister.

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Abstract

In Kolarctic salmon project we made an overview of the fishing efforts based on the data from SSB (Statistics Norway). Fishing effort is presented in terms of numbers of bag nets and bend nets and also in terms of the numbers of fishermen. It is also presented the numbers of registered salmon fishing sites which are also describing the long-term development in the salmon fishery. We have used salmon districts in Finnmark and Troms when describing the long-term development in the numbers of fishing gears. More detailed figures are presented on the salmon fishing effort in the municipalities in Finnmark. Some historical data on the bag net fishing sites in Finnmark, Troms and Nordland in the years 1948-1950 are also included as reference points. All the data is presented in graphics to better understand the long-term changes and possible trends.

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 fishing efforts to illustrate long-term changes and observe possible trends.

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.

2. Material and methods

Effort data used in this report before the year 1993 was collected from the annual official reports ((Statistisk Sentralbyrå (SSB), Laks-og Sjøaurefiske; Central Bureau of Statistics of Norway, Salmon and Sea Trout Fisheries)). Effort data from the year 1993 onwards was delivered from SSB (Statistics Norway). The coordinates of salmon fishing sites for the year 2013 in the counties Finnmark, Troms and Nordland are from "Lakseregister". 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).

3. Results

3.1 Registered numbers of fishing sites in the year 2013 in Finnmark, Troms and Nordland and historical overview from the long-term development

In the Kolarctic salmon project area there were in Nordland, Troms and Finnmark counties 49, 92 and 757, respectively, fishing sites available for fishing (Figure 1). These numbers indicate the registered numbers of salmon fishing sites but all of those sites most probably have not been used.

In Finnmark there were 757 registered fishing sites available to use for salmon fishing in the year 2013 and out from those sites 397 are registered for bag net fishing, 242 sites for bag net or bend net fishing and 118 sites for bend net fishing (Figure 2). In the figure 3 sites are combined independent from the fishing gear and it indicates that most of the registered sites are in sheltered fjords and only in West-Finnmark sites can be also in the outermost coastal areas as well as in the large fjords. Figure 4 indicates the registered salmon fishing sites which were valid in the year 2007 but quite many from those sites especially in the outermost coastal areas were not used at all. Salmon fishing activity has moved from the outer coastal areas to more sheltered fjord areas, which can be seen from the figures 3 and 4. Figure 5 indicates the numbers and locations of salmon bag net fishing sites in Finnmark in the years 1948-1950 according to Berg (1964). Bag net fishing in the coastal areas soon after the Second World War was intensive due to the high price of salmon which activated fishermen for salmon fishing. Secondly new materials in the bag nets made the fishing easier and more effective. Incomes from the salmon catches were important for salmon fishing families in the end of 1940s', in 1950s' and 1960s' and even in 1970s' which increased salmon fishing activity. Figure 6 indicates clearly the spatial distributions of bag nets in Tanafjord and Varangerfjord and old salmon fishermen have told that distances between bag nets were not more than 300-400 meters and in the best areas 200-300 meters.



Photo 1. Bend net in Finnmark County, 2011/ 2012. Photo Eero Niemelä



Figure 1. Registered salmon fishing sites in North-Norway which were available for fishing in the season 2013 for bag nets and bend nets. Note: the numbers of sites was the maximum possible but in practice some sites were not used. Source: Lakseregister.

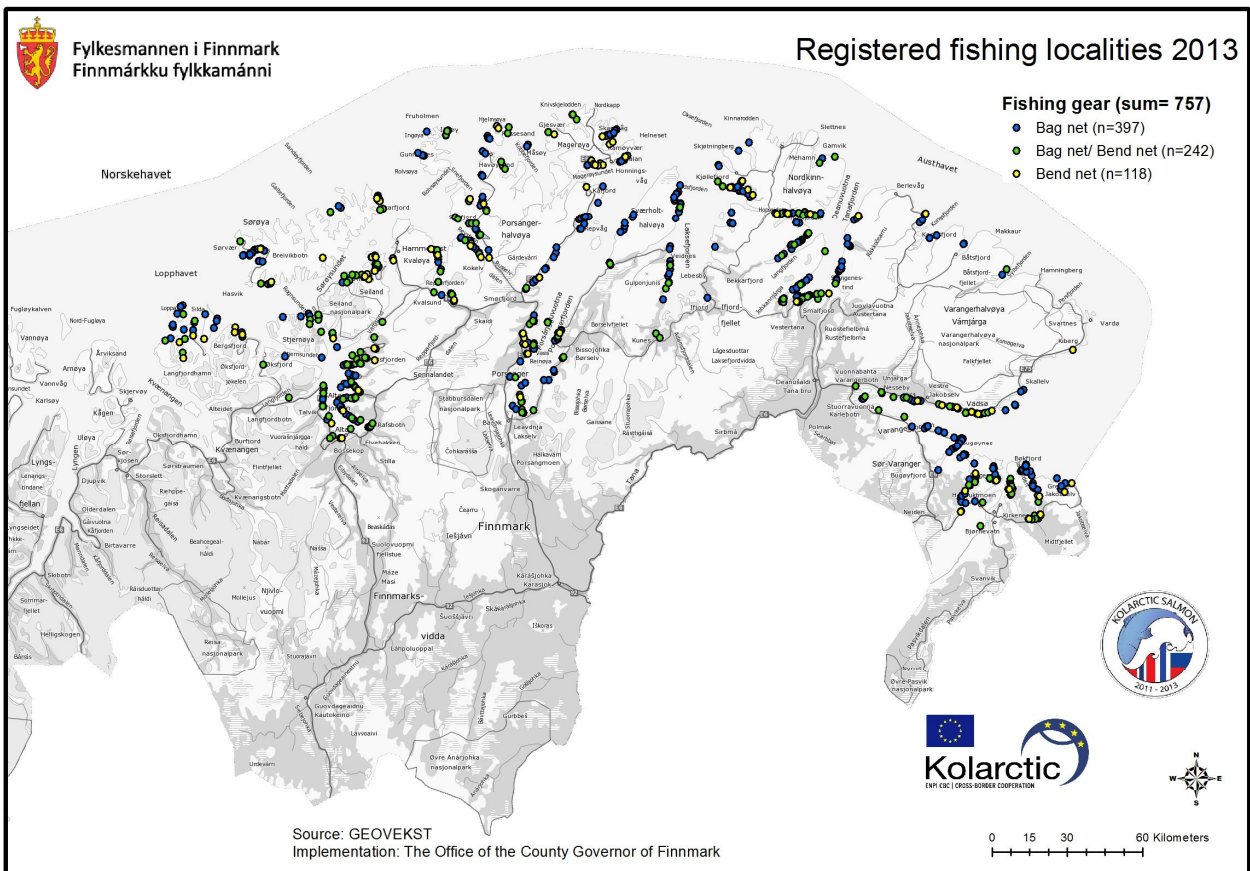


Figure 2. Registered salmon fishing sites which were available for fishing in the season 2013 for bag nets and bend nets. Note: the numbers of sites was the maximum possible but in practice some sites were not used. Source: Lakseregister.

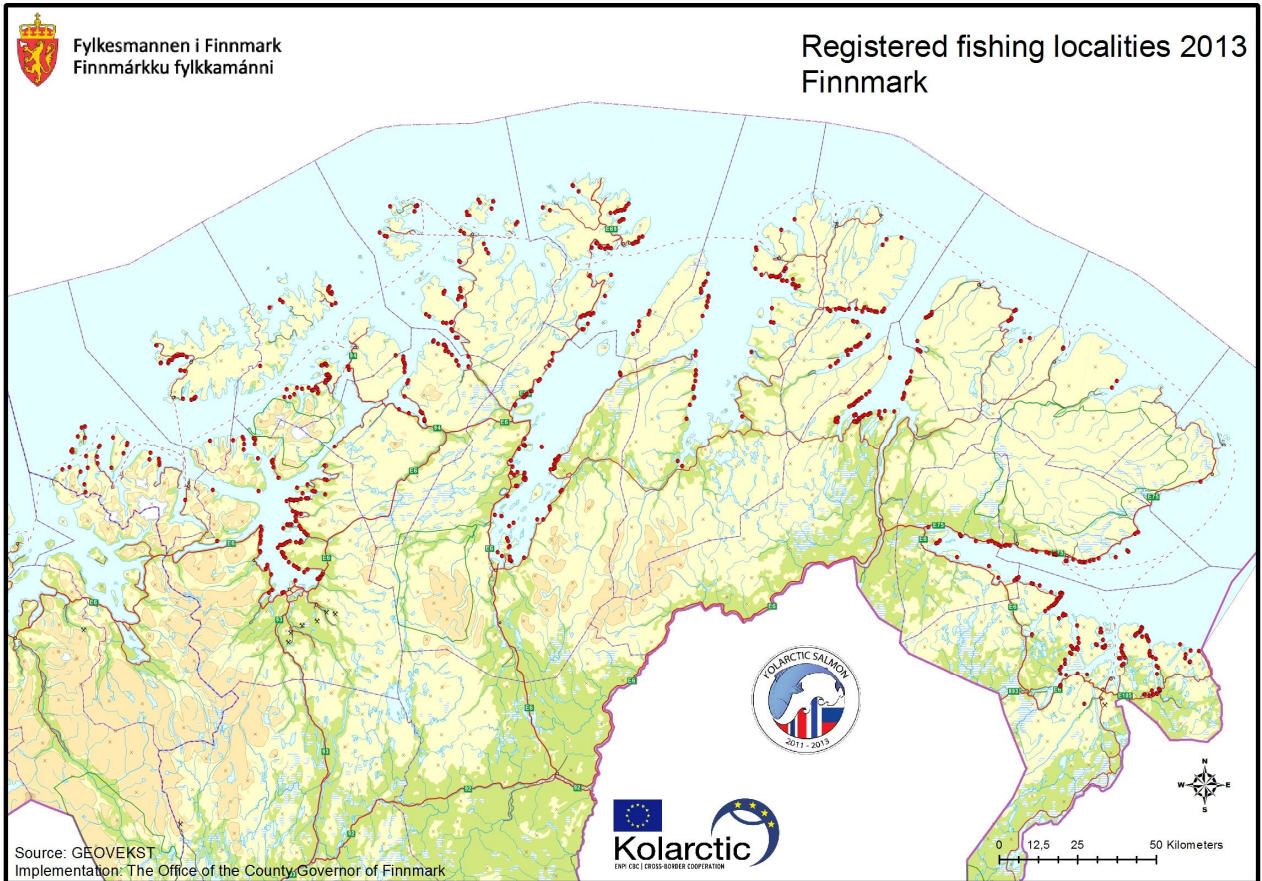


Figure 3. Registered salmon fishing sites which were available for fishing in the season 2013. Note: the numbers of sites was the maximum possible but in practice some sites were not used. Source: Lakseregister.

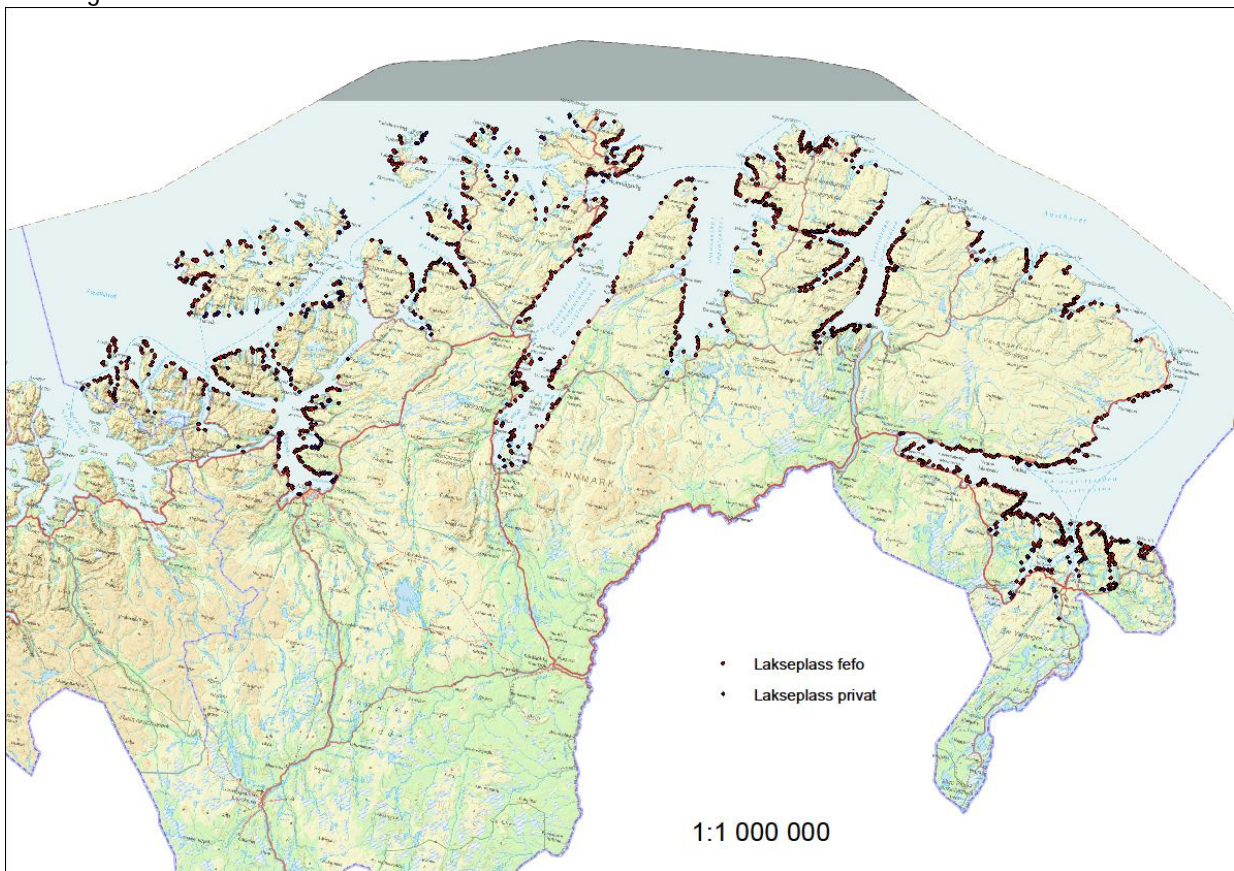


Figure 4. Registered salmon fishing sites which were available for fishing in the season 2007. Many of the sites were not used. The map presents the sites belonging to the Finnmark estate (Lakseplass fefo) or to private persons (Lakseplass privat).

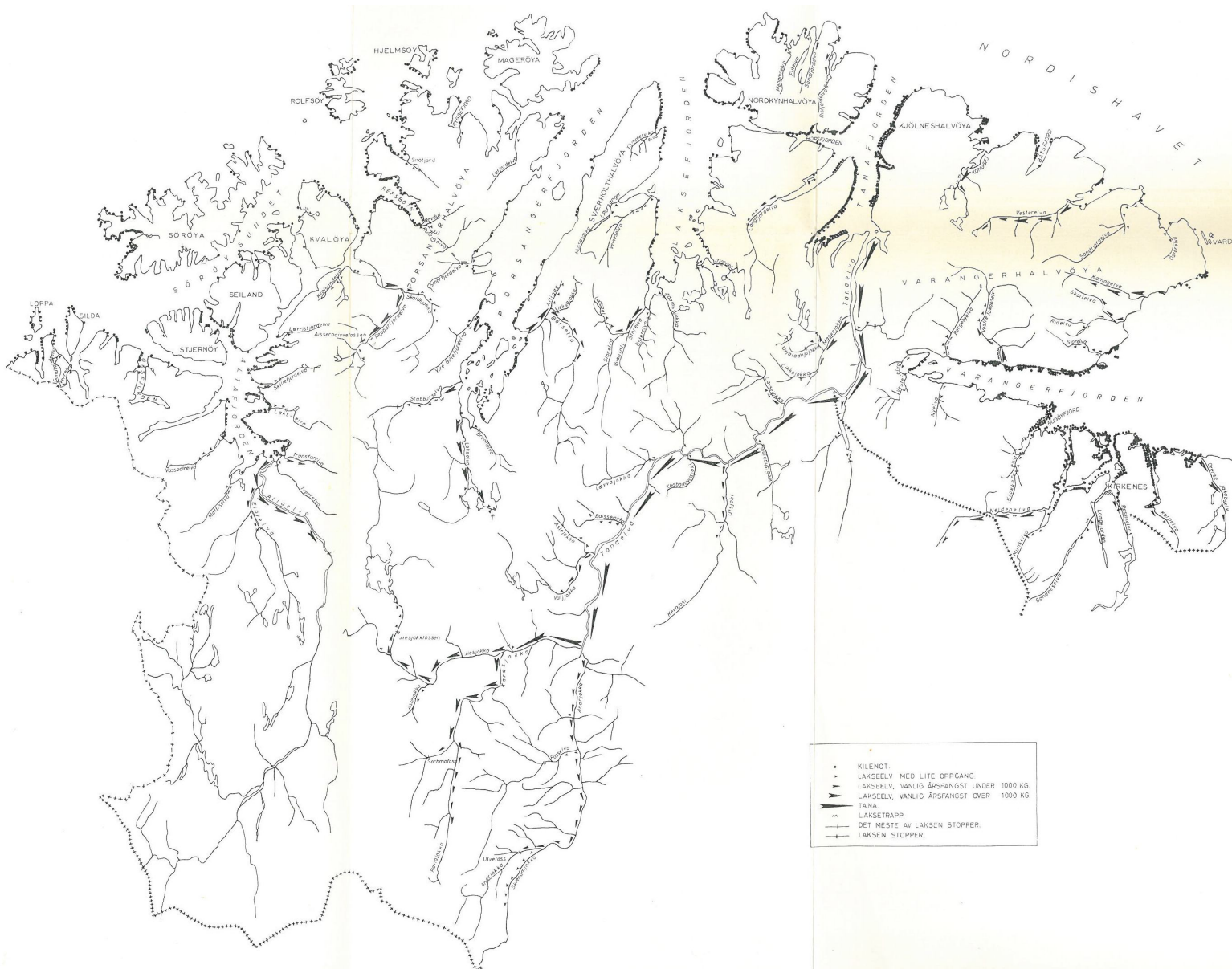


Figure 5. Salmon fishing sites in Finnmark which were used for bag net fishing in the years 1948-1950. Source: Magnus Berg 1964.

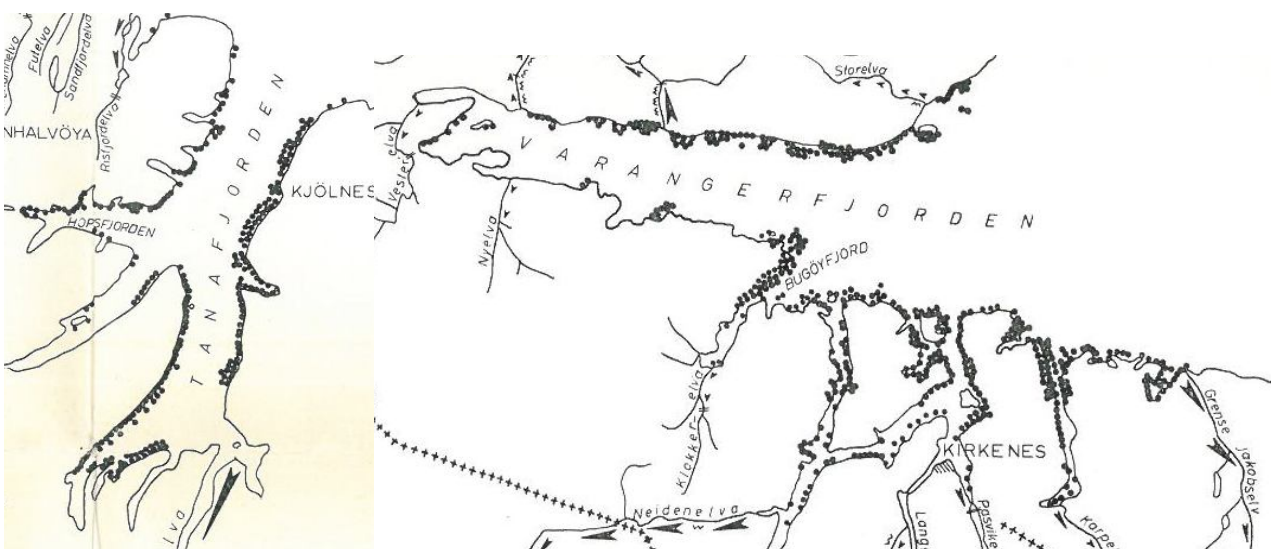


Figure 6. Enlarged figure from the figure 5 with salmon fishing sites used in Tanafjord (figure on the left) and in Varangerfjord (figure on the right) for bag net fishing in the years 1948-1950. Source: Magnus Berg 1964.

Registered fishing sites in Troms County in the year 2013 and sites which were used in the years 1948-1950 in bag net fishery have in general the same spatial distribution (Figure 7 and 8). Most of the sites were in the northern coast of the Senja and Kvaløya island as well as in Malangen fjord in the years 1948-1950 as well as in the year 2013. Local knowledge confirms that salmon on its way to the rivers of origin is migrating from the sea to coast in the areas between the islands Senja and Kvaløya and then migrating from there mainly northwards. Another area in Troms County where salmon bag net fishery is active is in the easternmost coastal area just before Finnmark County.

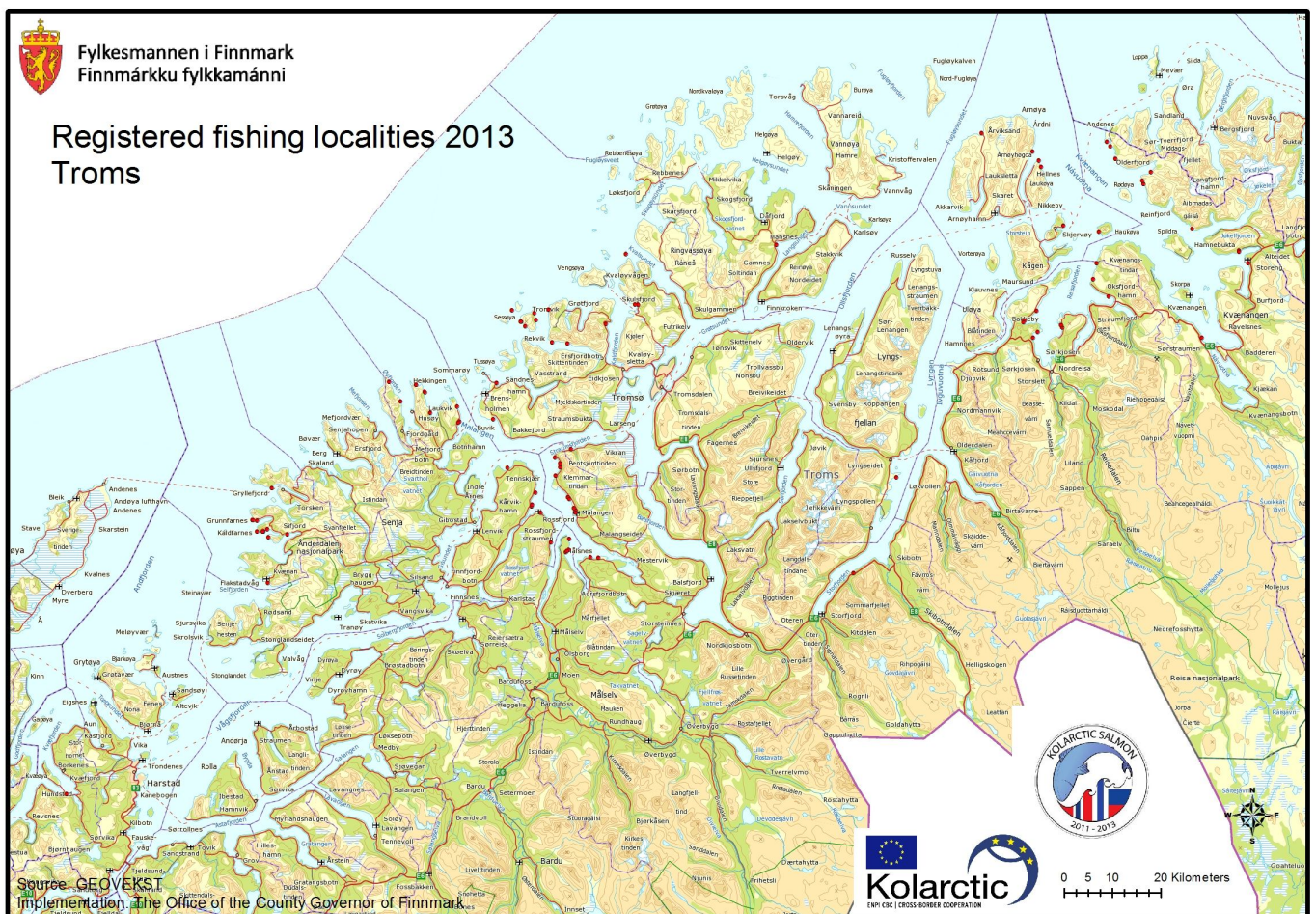


Figure 7. Registered salmon fishing sites in Troms County which were available for fishing in the season 2013 for bag nets. Note: the numbers of sites was the maximum possible but in practice some sites were not used. Source: Lakseregister.

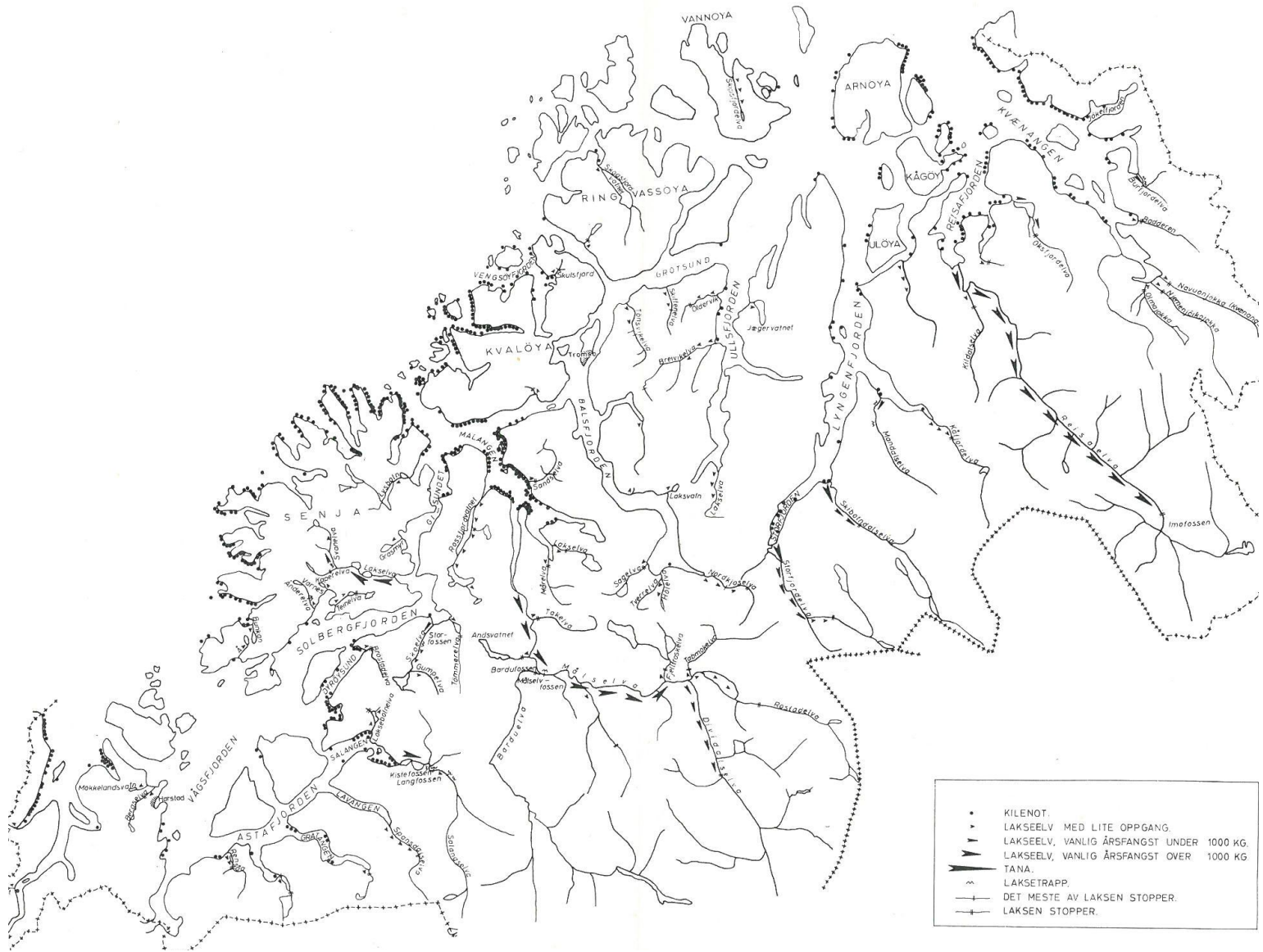


Figure 8. Salmon fishing sites in Troms County which were used for bag net fishing in the years 1948-1950. Source: Magnus Berg 1964.

In Nordland County the registered numbers of bag nets was in the year 2013 49 fishing sites. The number of bag net fishing sites in the year 1948-1950 was high and they were concentrated in the particular places (Figure 9, 10, 11).

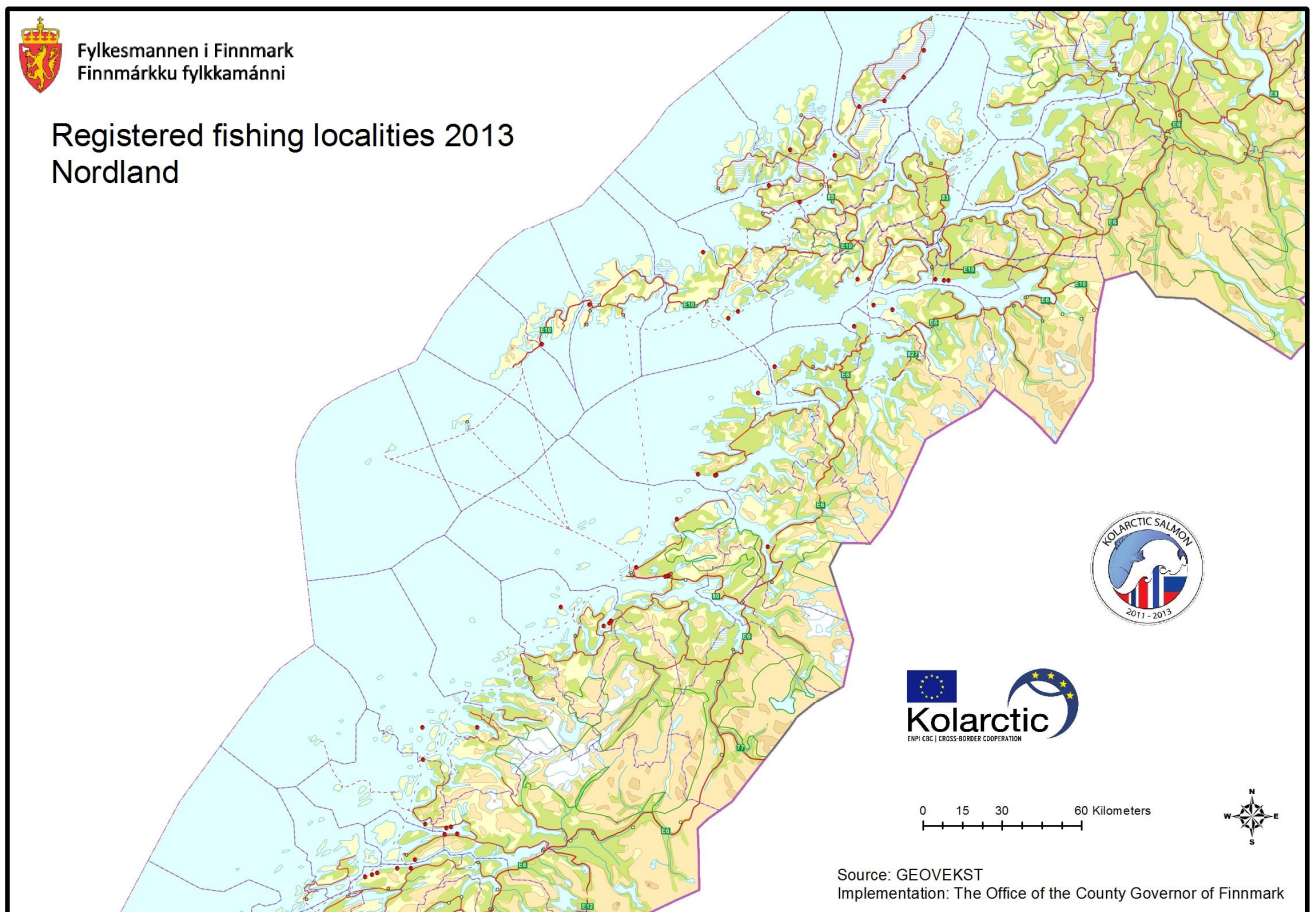


Figure 9. Registered salmon fishing sites in Nordland County which were available for fishing in the season 2013 for bag nets. Note: the numbers of sites was the maximum possible but in practice some sites were not used. Source: Lakseregister.



Figure 10. Salmon fishing sites in North Nordland which were used for bag net fishing in the years 1948-1950. Source: Magnus Berg 1964.

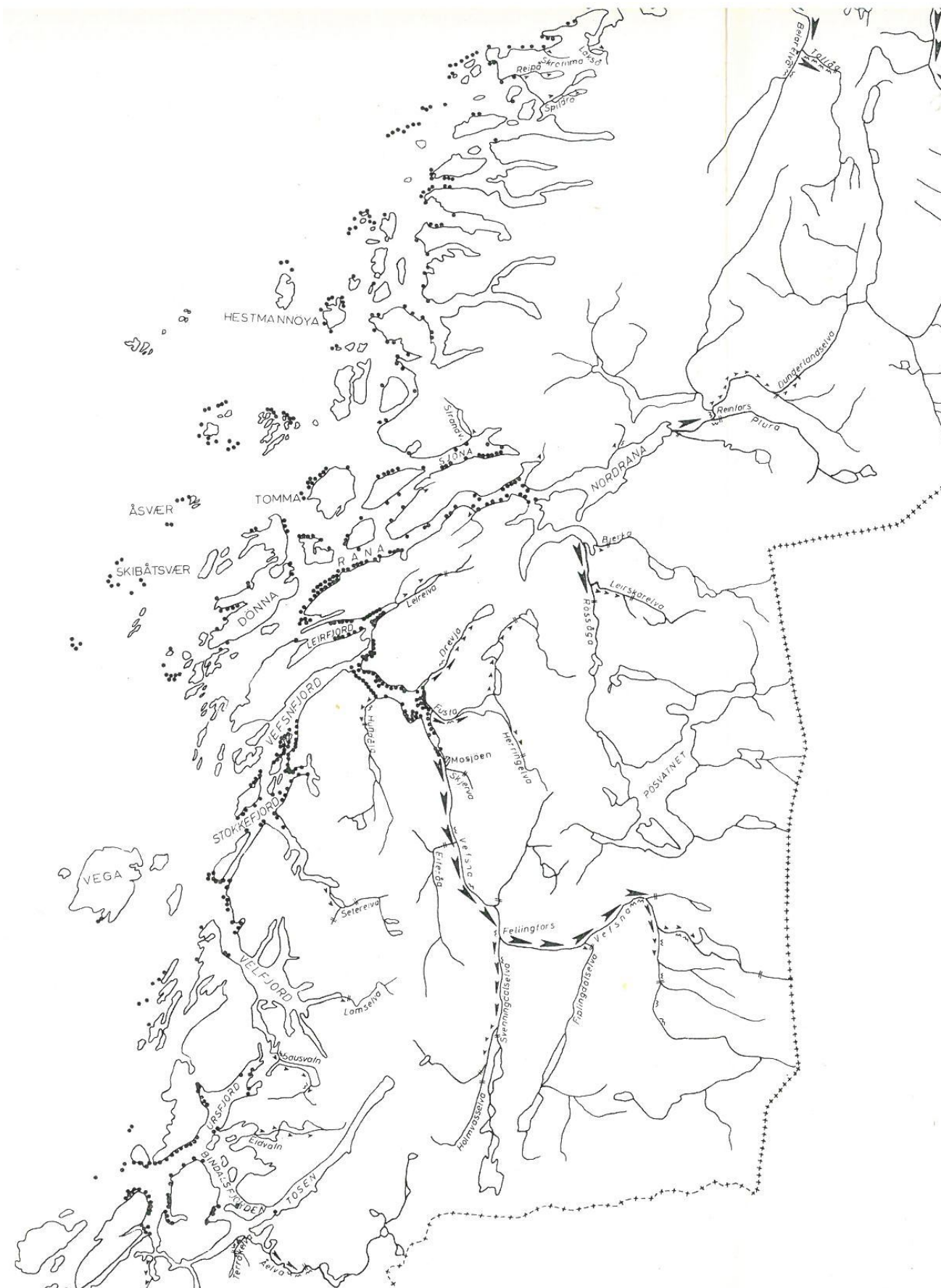


Figure 11. Salmon fishing sites in South Nordland which were used for bag net fishing in the years 1948-1950. Source: Magnus Berg 1964.

3.2 The numbers of bag nets and bend nets used in long-term in the salmon districts in Finnmark

The fishing effort informed with the total numbers of bend nets and bag nets used in 1960s for salmon fishing has been high and salmon fishermen used altogether 1400-1800 gears annually in Finnmark (Figure 12). Bend net was a new innovation in Finnmark in early 1960s and soon it became popular. The numbers of bag nets and bend nets indicate declining trends in all salmon districts. Some increase here and there in the annual numbers of bend nets is indicating higher stock abundance which activated salmon fishermen to start fishing with bend nets which fishing method is more practical and easy to use compared to the use of ordinary bag net. It is interesting to note that the numbers of bag nets declined sharply of the mid-1960s towards the end of 1970s and one of the main reasons must be the use of bend nets. Another reason can be the effective use of drift nets in West Finnmark and North Troms until the year 1988. Drift net fishery selected such size group of salmon which was the main size group in bag net fishery and it is understandable that interest to use bag nets declined with the low abundance of small sized salmon in the fjords and in the coastal areas. After the total moratorium of the drift net fishery in Norway small and median sized salmon was once again possible to catch with bag nets and therefore their numbers suddenly increased in Alta and Hammerfest salmon districts after the year 1989. The prohibition of drift net fishery increased also the numbers of bag nets in Tana and Varanger salmon districts but the increase was not as clear as in West Finnmark. It can be possible that the activated bag net fishery in Alta and Hammerfest salmon districts targeted heavily into those stocks which were migrating to the rivers in East Finnmark and in Russia and therefore the abundance of those stocks did not increase so much in Tana and Varanger salmon district areas to active the bag net fishery. All in all, the numbers of bag nets used in salmon fishery in the entire Finnmark County have been stable the last nine years and the numbers of bend nets have been stable the last four years. The numbers of bag nets and bend nets in the four salmon districts in Finnmark have not developed in the last years on the same way; the numbers of bag nets in Tana district have declined, in Varanger and Hammerfest district they have slightly increased, in Alta district they have been stable.

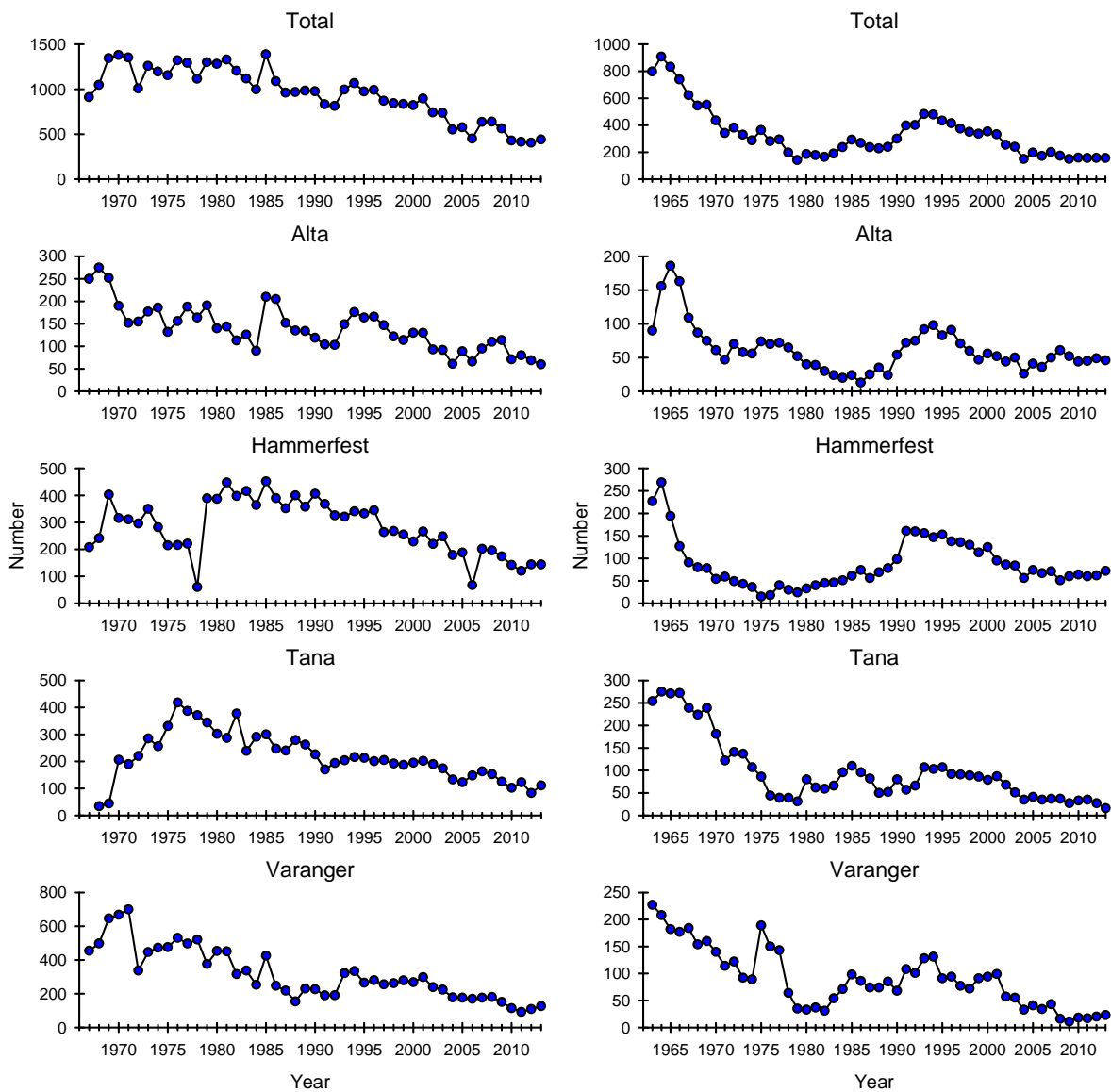


Figure 12. Numbers of bend nets (on the left) and bag net (on the right) in Finnmark within four salmon districts. Data is based on the fishermen's information to SSB when they have annually reported their salmon catches. Data until the year 1993 has been collected of the annual reports published by SSB.

Figure 13 is giving an 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 Varanger and Tana salmon districts has clearly decreased since the mid-1980s and especially since the beginning of 2000s. Of all bag nets used in Finnmark 75% have been in Alta and Hammerfest salmon districts in the recent years. The annual proportions of bend nets have been quite stable between all the salmon districts during the last 30 years. Of the numbers of bend nets 50% have been used in East Finnmark (Tana and Varanger salmon districts). The highest proportions of bend nets have been in Hammerfest and Varanger salmon districts during the last 30 years.

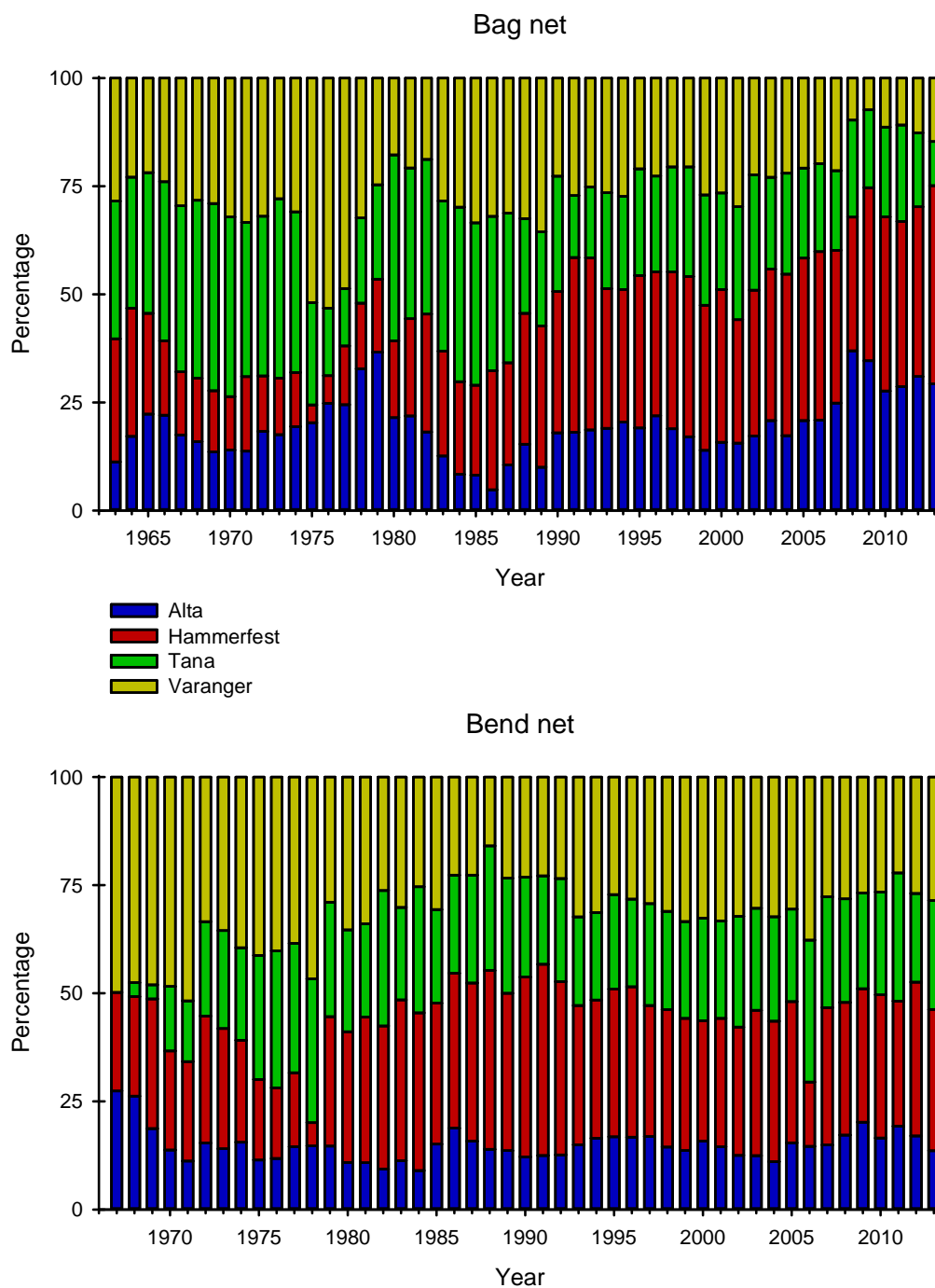


Figure 13. Annual proportions of bag nets and bend nets between four salmon areas in Finnmark. Data is based on the information of fishermen to SSB.

Figure 14 gives a summary of all the fishing gears used in Finnmark during 50 years for bag nets and during 45 years for bend nets. The general trend seems to be declining trends in the numbers of bag nets and bend nets used in salmon fishery although during the last years the numbers of bag nets in the entire Finnmark have stayed unchanged. Drift net fishery took place in Finnmark, especially in West Finnmark, lasting c. 20 years and it was extremely effective during the last 10 years before the total moratorium. In drift net fishery it was used more than 4000 nets annually in the years 1982-1985. Information and catch reports of the "historical" salmon long-line fishery is scarce but that method is known to be used outside the coastal line.

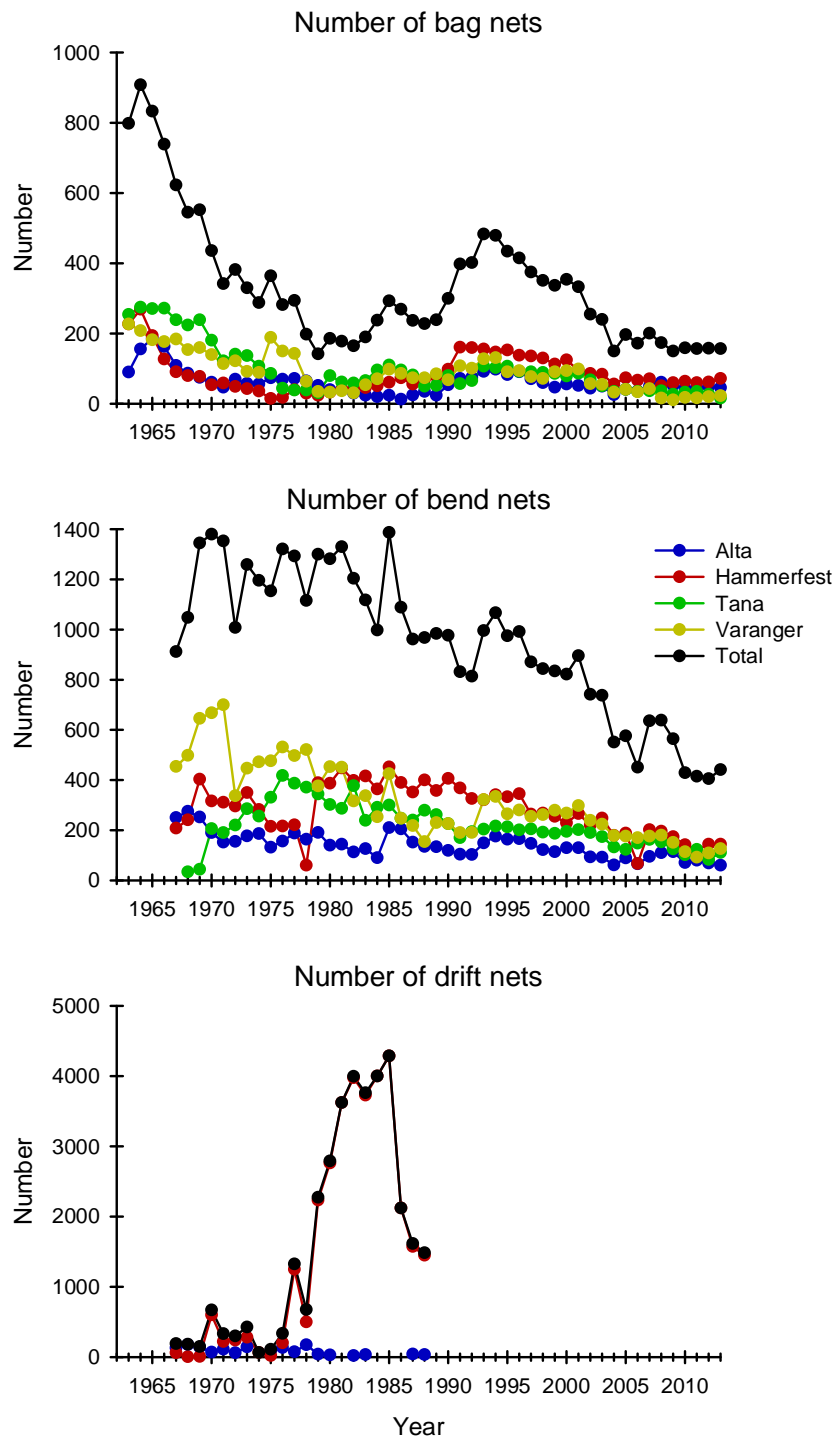


Figure 14. Annual numbers of bag nets, bend nets and their total numbers and the numbers of drift nets in Finnmark. Data is based on the information of fishermen to SSB.

In Troms County the numbers of bag nets have been higher in Troms salmon district than in Senja salmon district over the period of the year 1963 onwards (Figure 15). The highest numbers of bag nets which were actively used for salmon fishing were c. 430 nets in early 1990s. The numbers of bag nets declined of early 1960s towards the end of 1970s and stayed thereafter stable until the year 1988. In the year 1989 the numbers of bag nets started to increase until the year 1994 and after that year their numbers have once again declined. In Senja salmon district there has been only few salmon fishermen in the latest years. The total numbers of bend nets developed on the opposite way compared to the development of bag nets of the early 1960s to the year 1988. The numbers of bend nets increased and the numbers of bag nets decreased in the period between 1960s and 1980s and one reason for that might be the low abundance of small sized salmon in bag nets which were the main size group in the drift net fishery. The use of bend nets was prohibited for salmon fishery of the year 1997 onwards during the official fishing time.

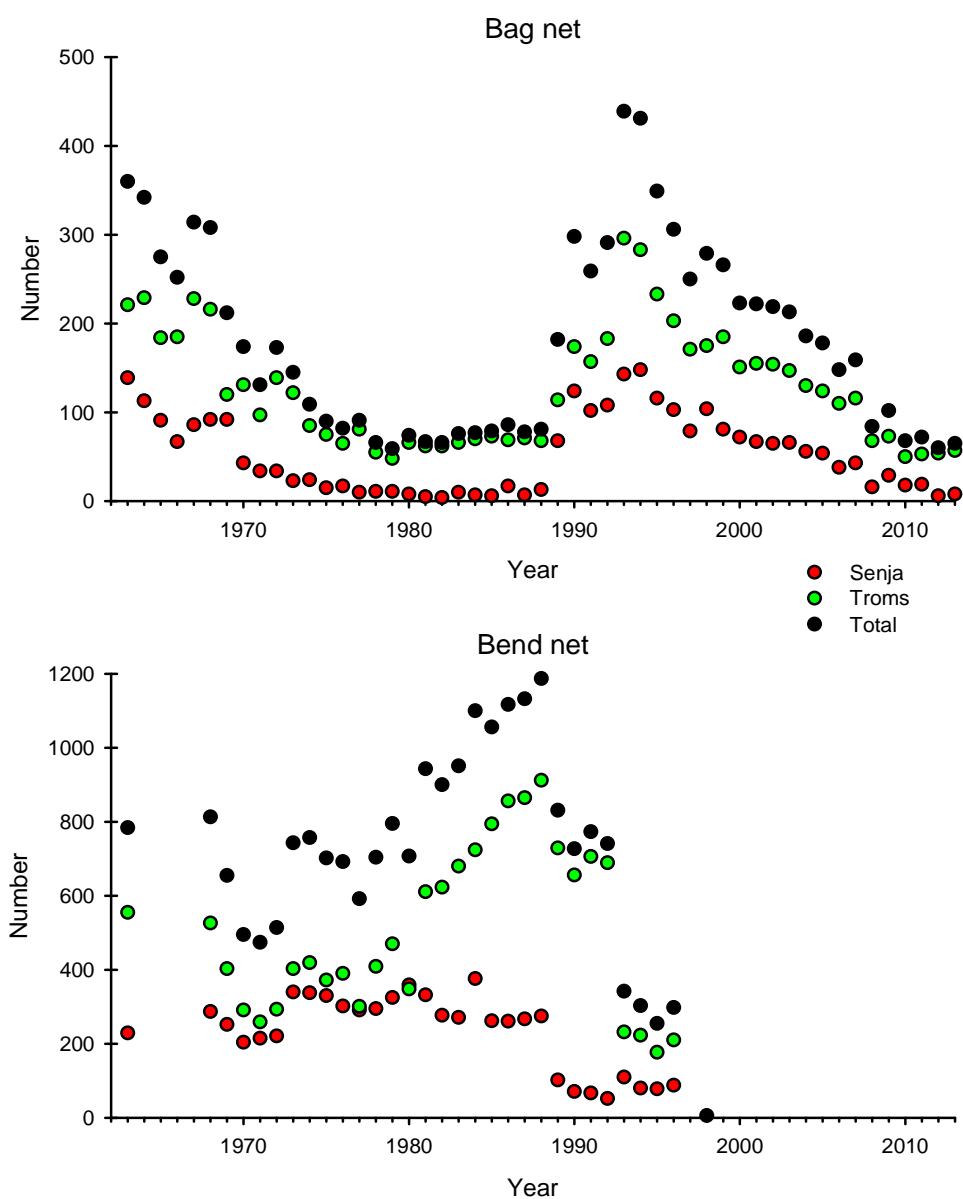


Figure 15. The numbers of bag nets and bend nets used in Senja and Troms salmon districts in Troms County. Data is based on the information of fishermen to SSB.

Figure 16 illustrates the total exploitation of drift net fishery in Finnmark and Troms counties in terms of the numbers of nets used for that fishery. The highest exploitation took place in Troms salmon district with the maximum numbers of nets of 3000 and in Hammerfest salmon district with the numbers of nets of 4000. The numbers of drift nets in late 1960s and 1970s are incomplete.

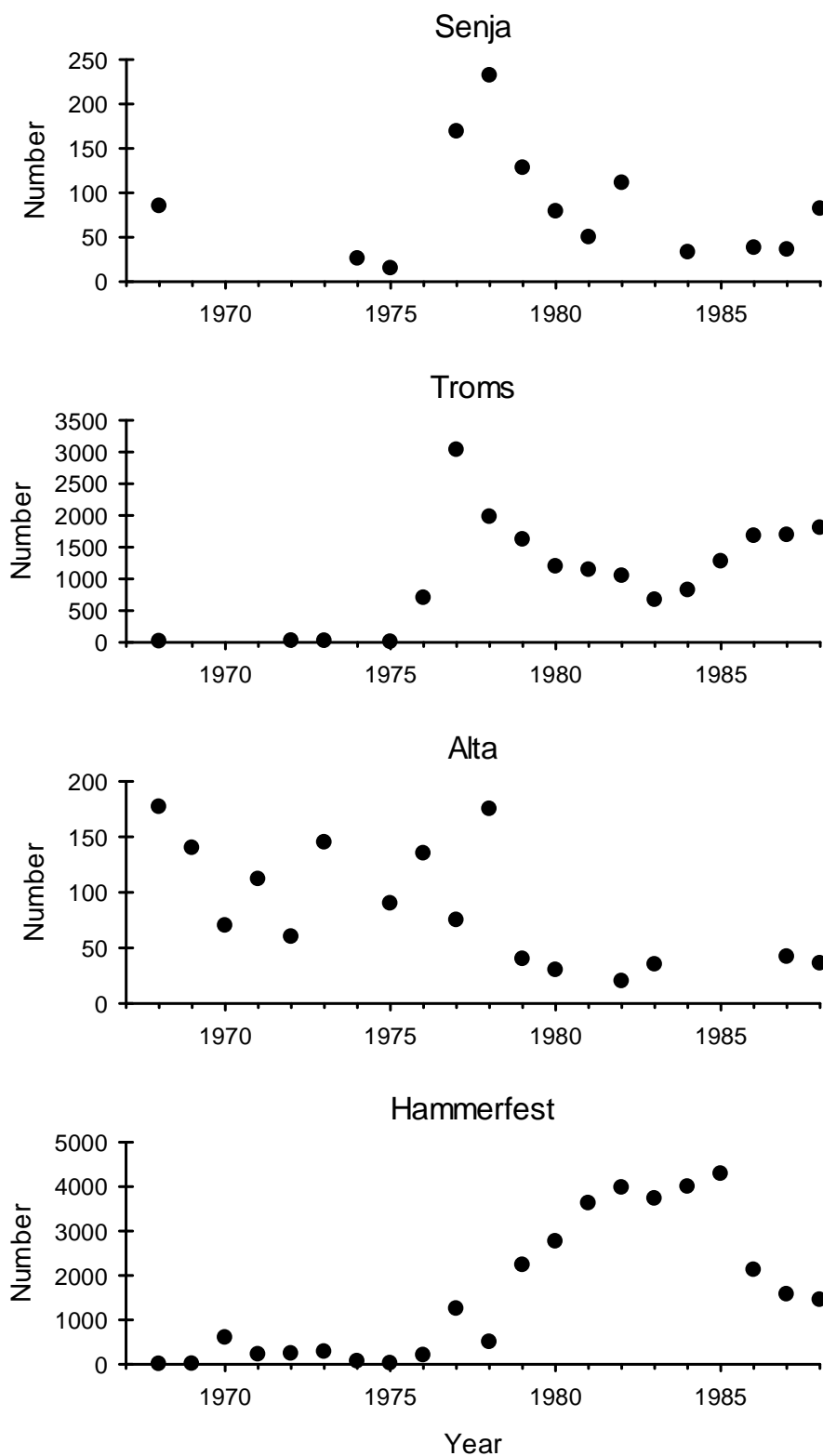


Figure 16. Annual numbers of drift nets in Finnmark County (Alta and Hammerfest salmon districts) and in Troms County (Senja and Troms salmon districts). Data is based on the information of fishermen to SSB.

3.3 Numbers of registered fishing sites and numbers of salmon fishermen in municipalities in Finnmark

In Finnmark salmon fishing sites are on the private ground and state's ground. There has been a slight increase in proportion of fishing sites on private ground (Figure 17). Almost half of the sites are on state's ground. The numbers of salmon fishing sites have declined more on state's ground than in private ground. In the year 1994 the total number of salmon fishing sites in Finnmark was 1911 (822 sites on the private ground, 1089 sites on the state's ground) and the total numbers have declined to 758 in the year 2013 (361 sites on the private ground, 397 sites on the state's ground). The numbers of registered fishing sites on the private ground started to decline clearly of the year 2005 onwards.

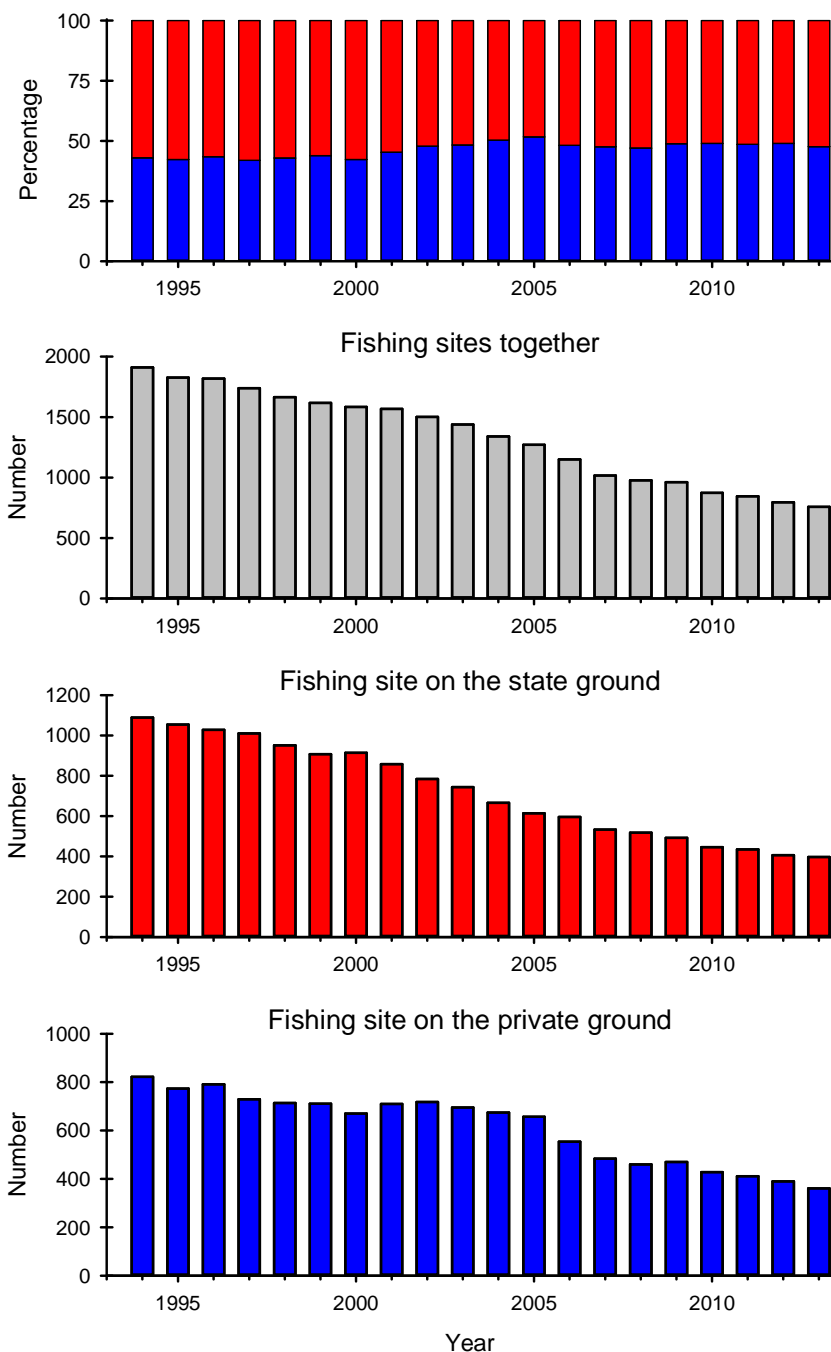


Figure 17. Numbers of registered fishing sites in Finnmark includes fishing for bag nets and bend nets. Source: Office of the County Governor of Finnmark.

The proportions of registered salmon fishing sites have stayed stable since the year 1994 between West Finnmark, Tana and East Finnmark (Figure 18) indicating that the numbers of fishing sites have declined about the same way. In the numbers of fishing sites, however, the decline has been slightly sharper in Tana and East Finnmark than in West Finnmark. More than half of the registered salmon fishing sites are in West Finnmark nowadays.

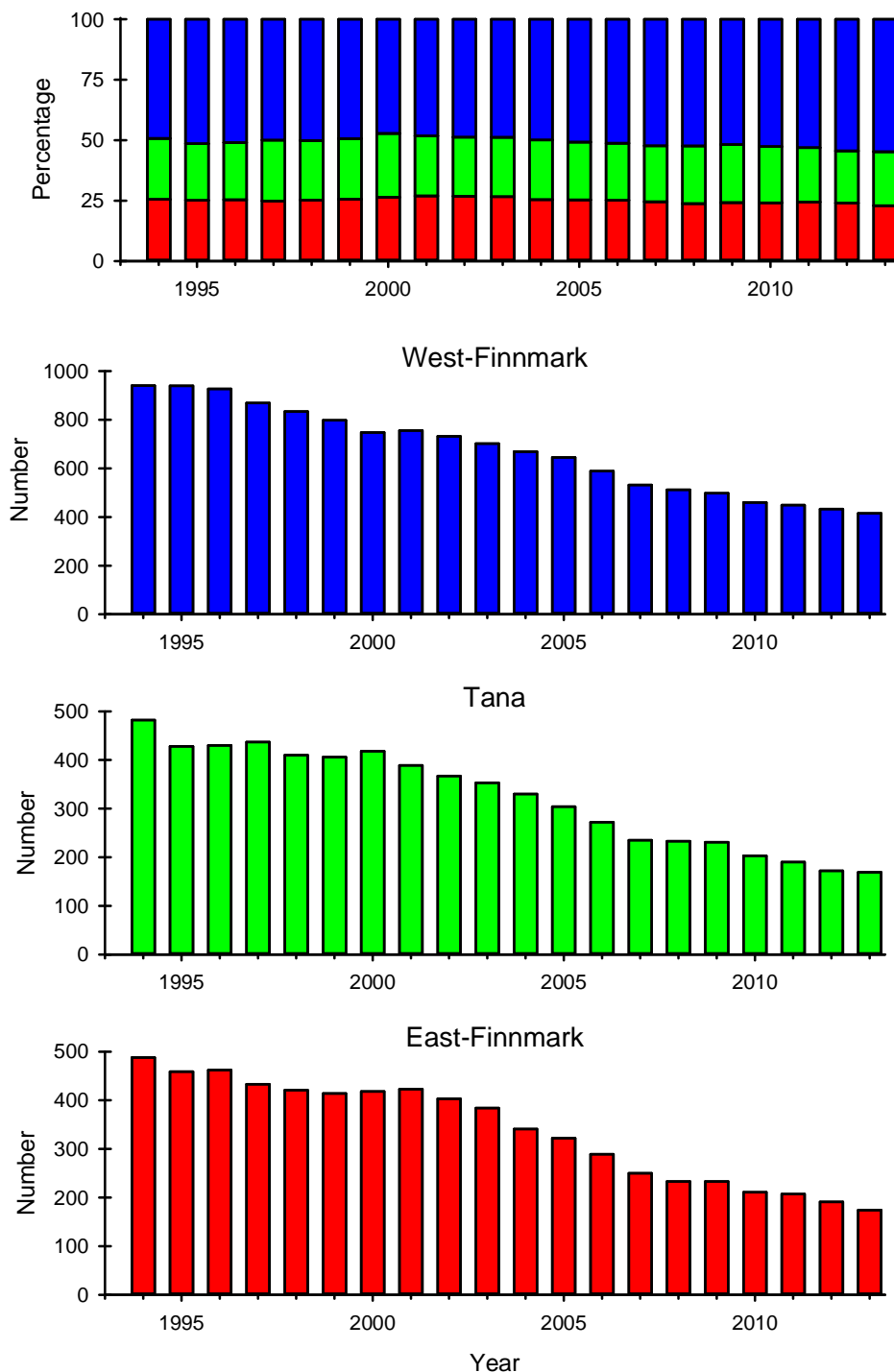


Figure 18. Numbers of fishing sites available in West Finnmark, Tana and East Finnmark. West Finnmark includes municipalities Alta, Hammerfest, Hasvik, Kvalsund, Loppa, Måsøy, Nordkapp and Porsanger; Tana includes municipalities Berlevåg, Gamvik, Lebesby and Tana; East Finnmark includes municipalities Båtsfjord, Nesseby, Sør-Varanger, Vadsø and Vardø. Source: Office of the County Governor of Finnmark.

Figure 19 illustrates the development of the numbers of registered salmon fishing sites in municipalities for the areas of West Finnmark, Tana and East Finnmark. The largest numbers of registered fishing sites in West Finnmark are in the municipalities Alta and Porsanger, in Tana area the largest number of fishing sites is in Lebesby municipality and in East-Finnmark the highest number of registered fishing sites is in Sør-Varanger municipality. In the municipalities like Båtsfjord and Vardø the numbers of fishing sites have been very low in recent years.

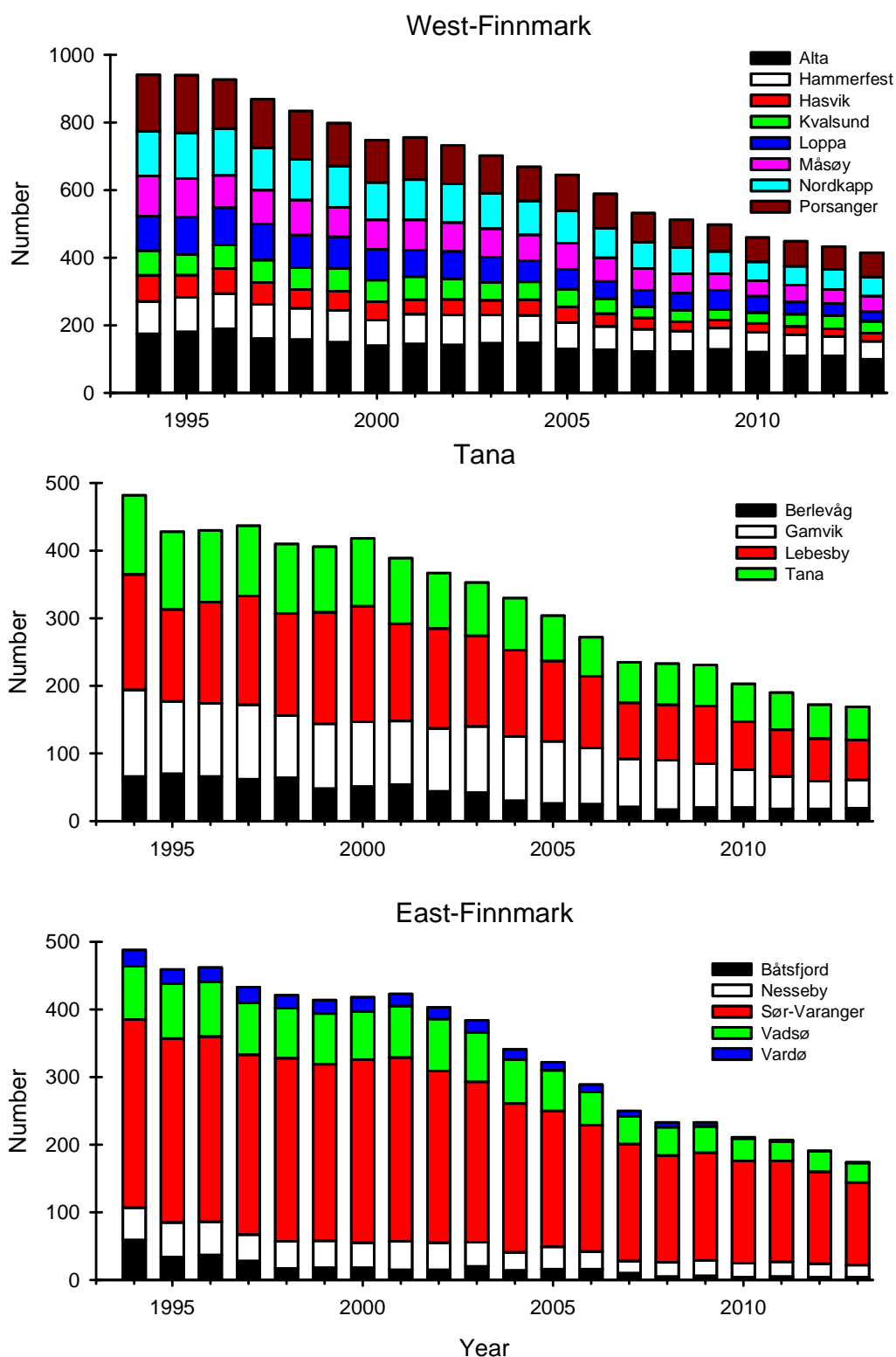


Figure 19. Numbers of fishing sites available in Finnmark in each municipality. Source: Office of the County Governor of Finnmark.

The numbers of registered fishing sites as well as the numbers of salmon fishermen have declined in three different areas in Finnmark during the last twenty years (Figure 20). In the year 1994 the number of salmon fishermen was in the area west of the Tanafjord c. 460 persons, in Tanafjord c. 100 persons and in the area east of the Tanafjord c. 250 persons. The numbers of salmon fishermen were twenty years later c. half of the persons fishing salmon in the year 1994.

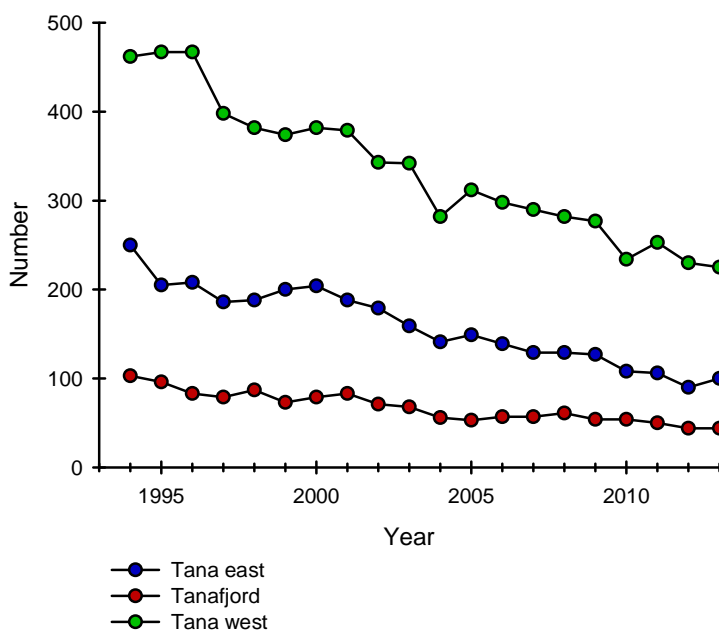
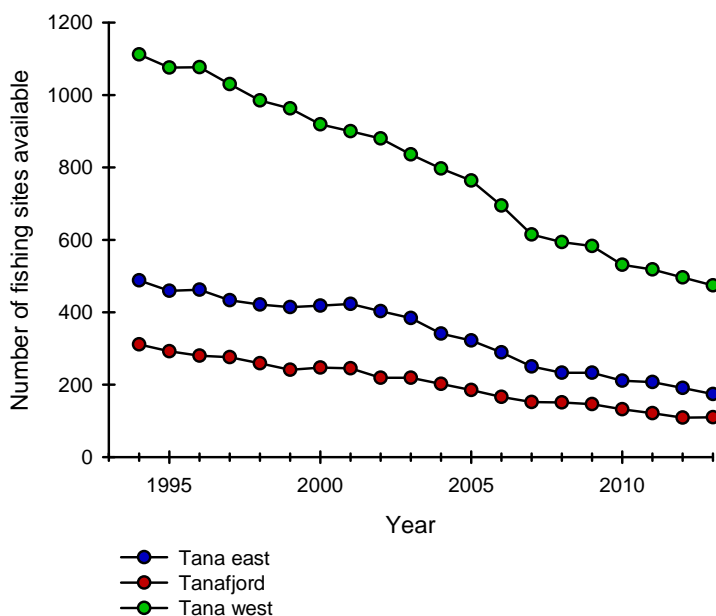


Figure 20. Numbers of registered fishing sites available (on the left) (Source: Office of the County Governor of Finnmark) and numbers of fishermen (on the right) in Finnmark (Source: SSB) who have reported catches. Tana west includes municipalities Alta, Hammerfest, Hasvik, Kvalsund, Loppa, Måsøy, Nordkapp, Porsanger and Lebesby; Tanafjord includes municipalities Berlevåg, Gamvik, and Tana; Tana east includes municipalities Båtsfjord, Nesseby, Sør-Varanger, Vadsø and Vardø.

Figures 21, 22 and 23 are illustrating the long-term declining trends in the numbers of registered salmon fishing sites in the municipalities in the areas west of Tanafjord, in Tanafjord and in the area east of Tanafjord and the numbers of fishermen for each municipality. All over in the municipalities the fishing effort has declined as well as the numbers of active salmon fishermen.

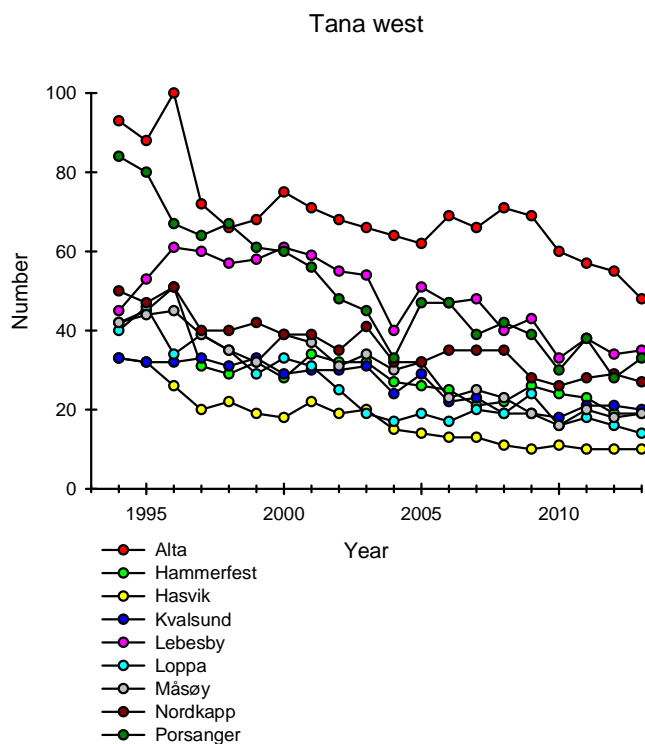
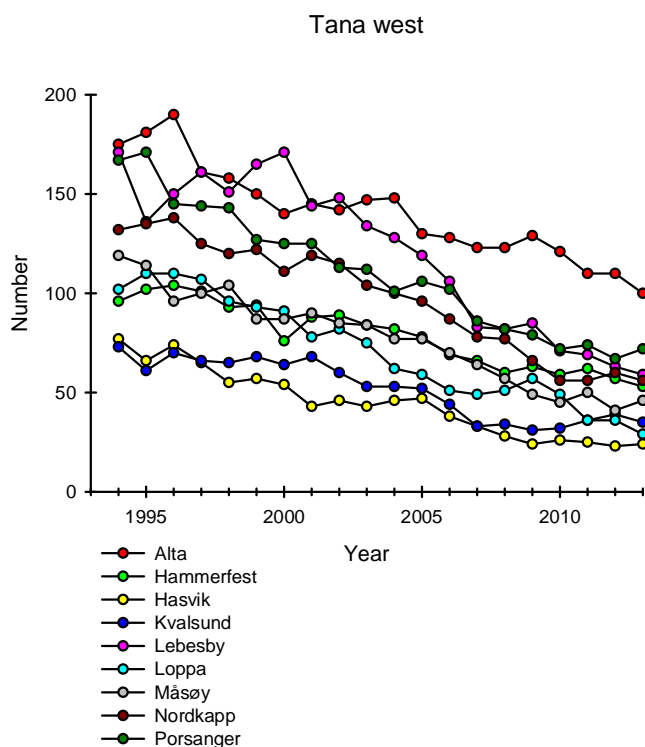


Figure 21. Numbers of fishing sites available (on the left) (Source: Office of the County Governor of Finnmark) and numbers of fishermen (on the right) in the area west of Tanafjord (Source: SSB) who have reported catches.

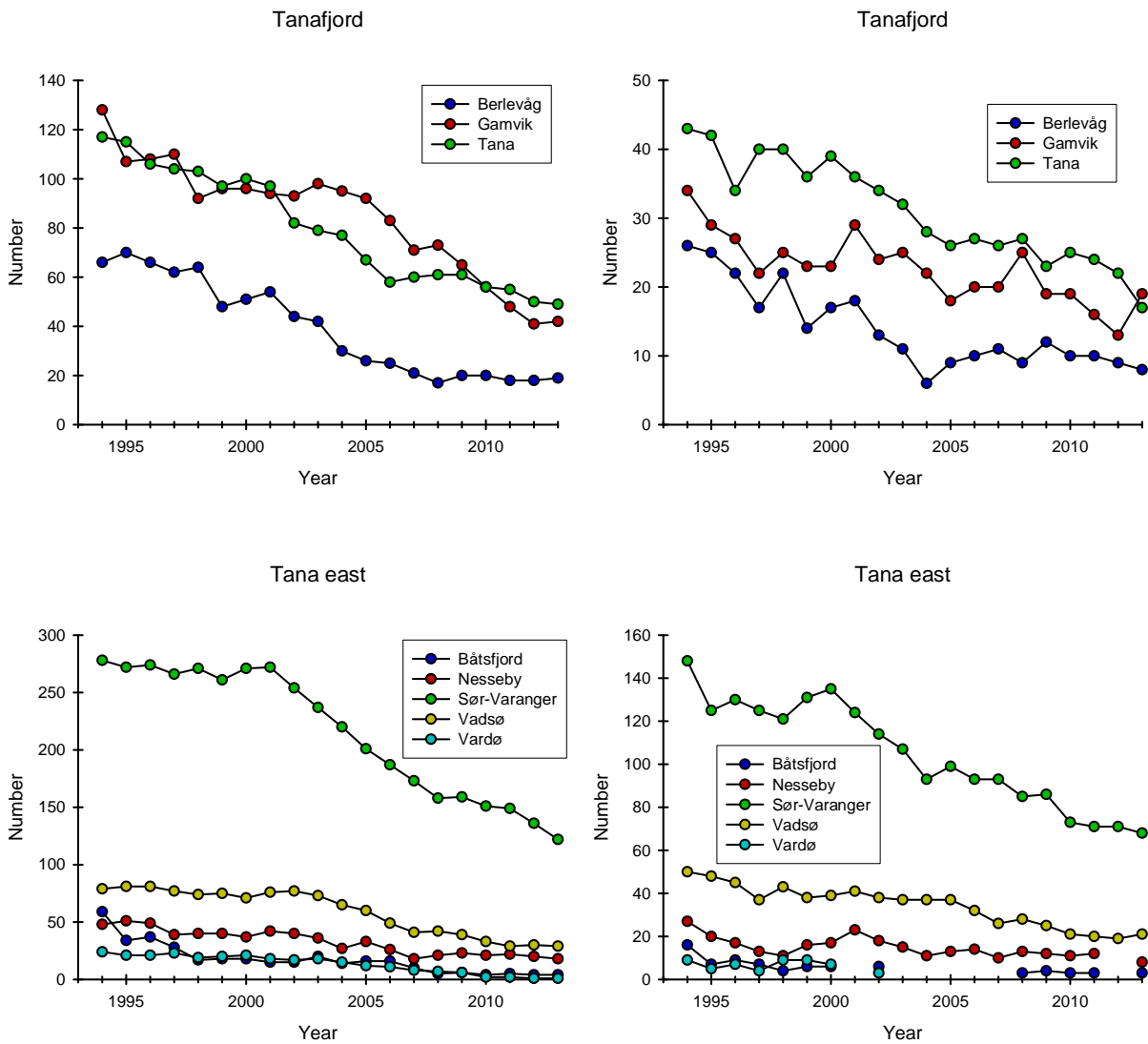


Figure 22. Numbers of fishing sites available (on the left) (Source: Office of the County Governor of Finnmark) and numbers of fishermen (on the right) in Tanafjord (above) and in the area east of Tanafjord (below). Source: SSB.

Proportions of fishermen fishing salmon in West Finnmark, Tana or East Finnmark have stayed unchanged over twenty years (Figure 23). More than half of the fishermen are fishing in West Finnmark. In all three areas the numbers of fishermen have declined and in the year 2013 the numbers of fishermen were about half of the numbers in the year 1994. The declining in the numbers of salmon fishermen indicates that there has not been new recruitment for that profession after old salmon fishermen have stopped. The decline has started already in the year 2002 in Tana area and in East Finnmark. It looks like the numbers of salmon fishermen are still declining in the coming years.

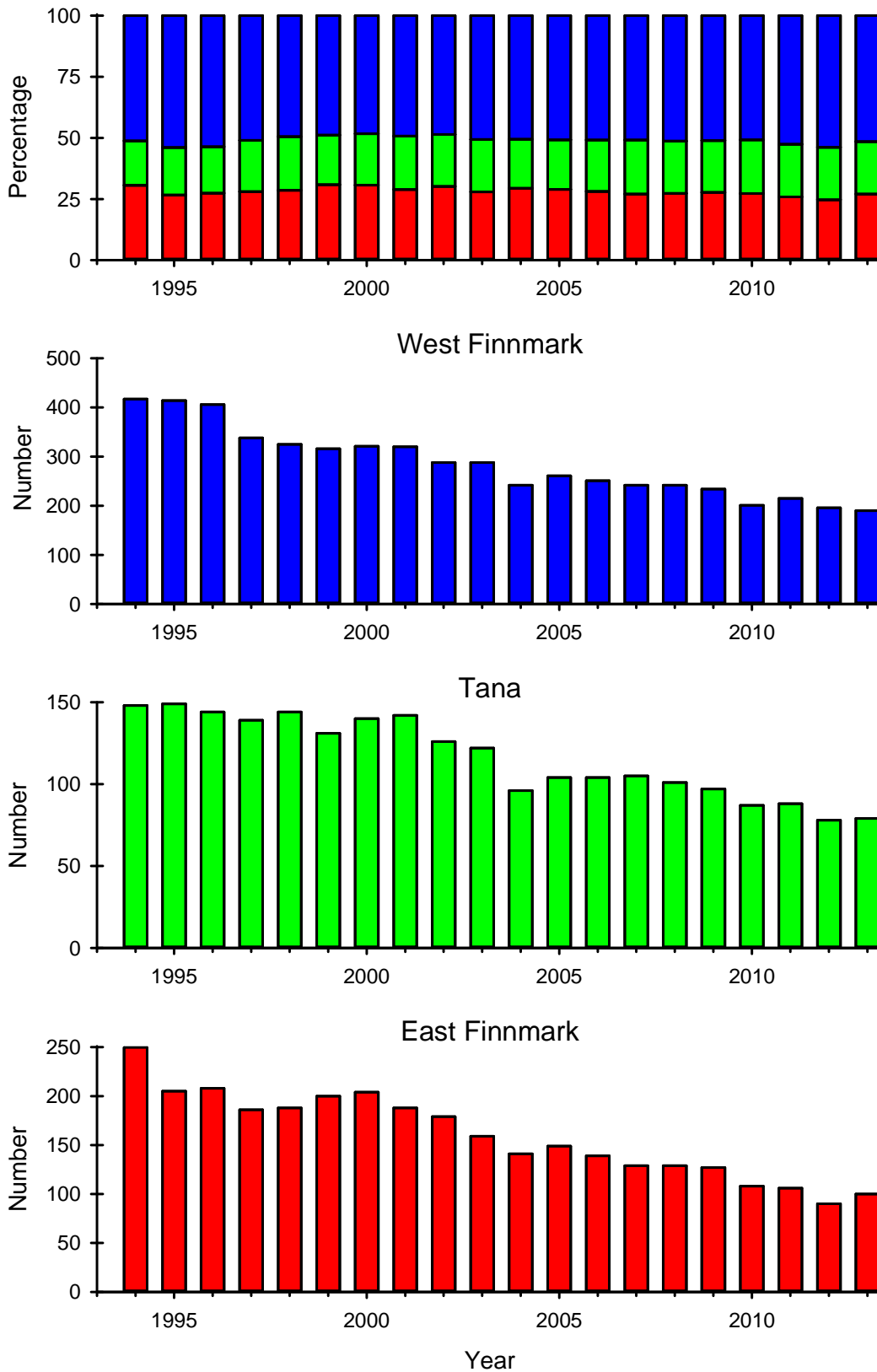


Figure 23. Numbers of salmon fishermen in Finnmark. West-Finnmark includes municipalities Alta, Hammerfest, Hasvik, Kvalsund, Loppa, Måsøy, Nordkapp and Porsanger; Tana includes municipalities Berlevåg, Gamvik, Lebesby and Tana; East- Finnmark includes municipalities Båtsfjord, Nesseby, Sør-Varanger, Vadsø and Vardø. Source: SSB.

The highest proportions of fishermen in West Finnmark were fishing in Alta and Porsanger municipalities, in Tana area in Lebesby municipality and in East Finnmark in Sør-Varanger municipality (Figure 24).

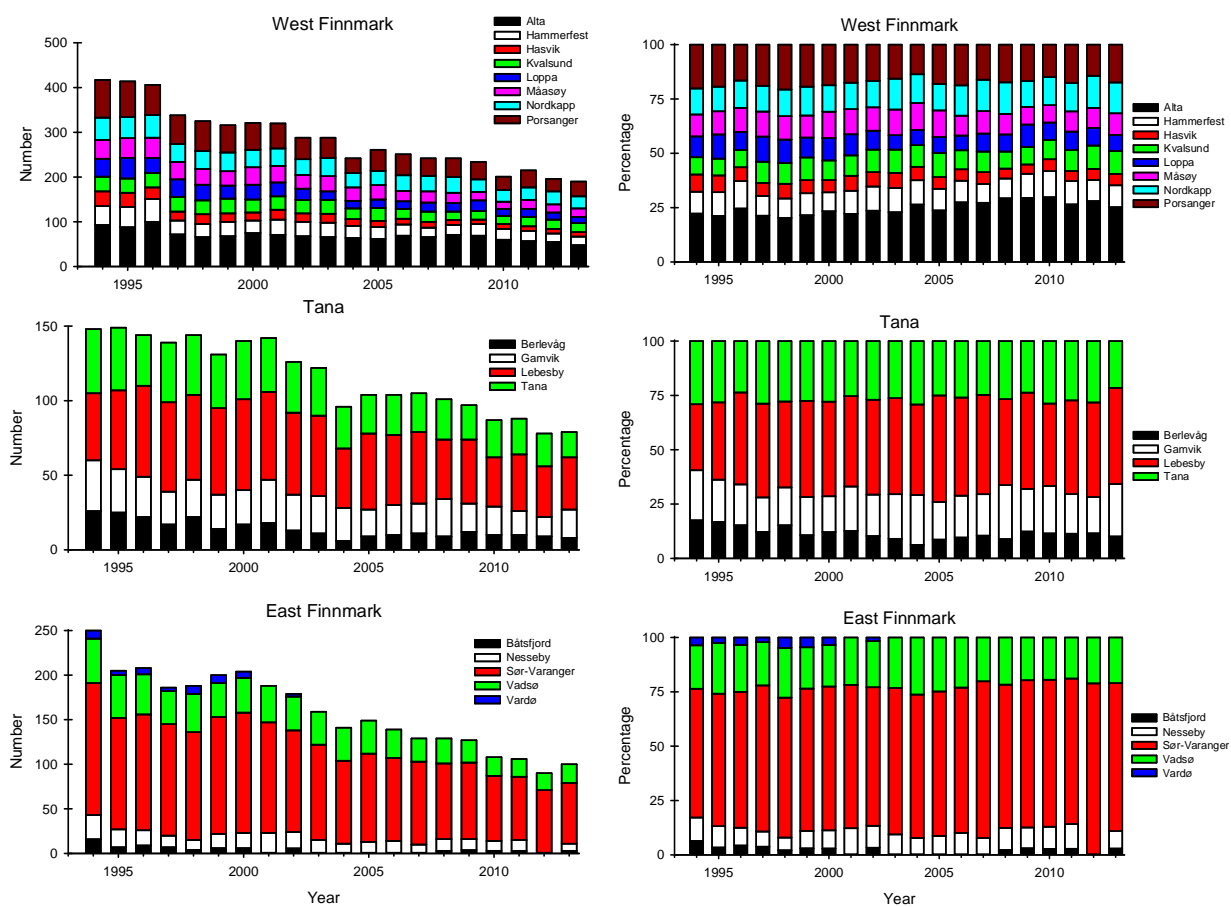


Figure 24. Numbers and percentages of fishermen in municipalities in Finnmark. Source: SSB

Acknowledgements

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Responsibilities in this report: FMFI organized the basic data covering the years 1994-2012 of SSB (Statistics Norway), Lakseregister in Norway delivered the coordinates for registered fishing sites, FGFRI gathered the numbers of fishing gears of the yearly salmon catch reports covering the years before the year 1994, produced graphs and drafted text.

Lead Partner and partners of the Kolarctic ENPI CBC EU Kolarctic salmon project KO197 will thank warmly SSB (Statistics Norway/Anne Turi Baklien) for the good cooperation during the research period.

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