

# Incidence of escaped farmed salmon at sea in the northernmost wild Atlantic salmon distribution area in Europe



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Rivers in northernmost Europe support some of the world's largest wild Atlantic salmon (*Salmo salar*) stocks and resources. Annual landings of salmon in the coastal, estuarine and in-river fisheries in northern Norway, Finland and Russia account for up to 50% of the total harvest of the wild salmon in the North Atlantic. In Norway annual landings of salmon in the coastal fisheries varies between 250-700 tonnes, there is no coastal fishery for salmon in the Barents Sea of the Russian Federation. In the White Sea area, a small coastal estuary fishery operates with annual quotas c. 35 tonnes. The coastal salmon fishery in the three northernmost counties of Norway: Nordland, Troms and Finnmark (Figure 1), has for the past two decades landed annually c. 450 tonnes of salmon which is more than 50% of the total coastal catch in Norway. While the salmon fishery conducted off the coast of these counties has long cultural traditions, the fishery has been under debate during the past decade, due to the complexities involved in the management of mixed stock fisheries.

During the last decade, farming of Atlantic salmon along the Norwegian coast has increased to a production of nearly one million tonnes in 2010. Marine farming of Atlantic salmon is also developing rapidly in the Barents Sea area of the western Kola Peninsula, Russia. In Murmansk region the production of farmed salmon was 8 500 tonnes in 2011. Escapes of farmed salmon from sea-cages are known to occur. Reported numbers of escaped farmed salmon in Norway show large annual variations. For example, 921 000 farmed salmon were reported to have escaped in 2006, while in 2011 the number was 365 000. No reports of the numbers of escaped farmed salmon are available for the Russian Federation. The salmon aquaculture industry continues to grow and expand to more northern coastal areas. Potential for negative genetic and other impacts on wild salmon stocks are acknowledged also in this area and it is important to uncover spatial and temporal marine distribution of the farmed salmon in the coastal areas as well as their health status.



**Photo.** Cage culture along the Finnmark coast.

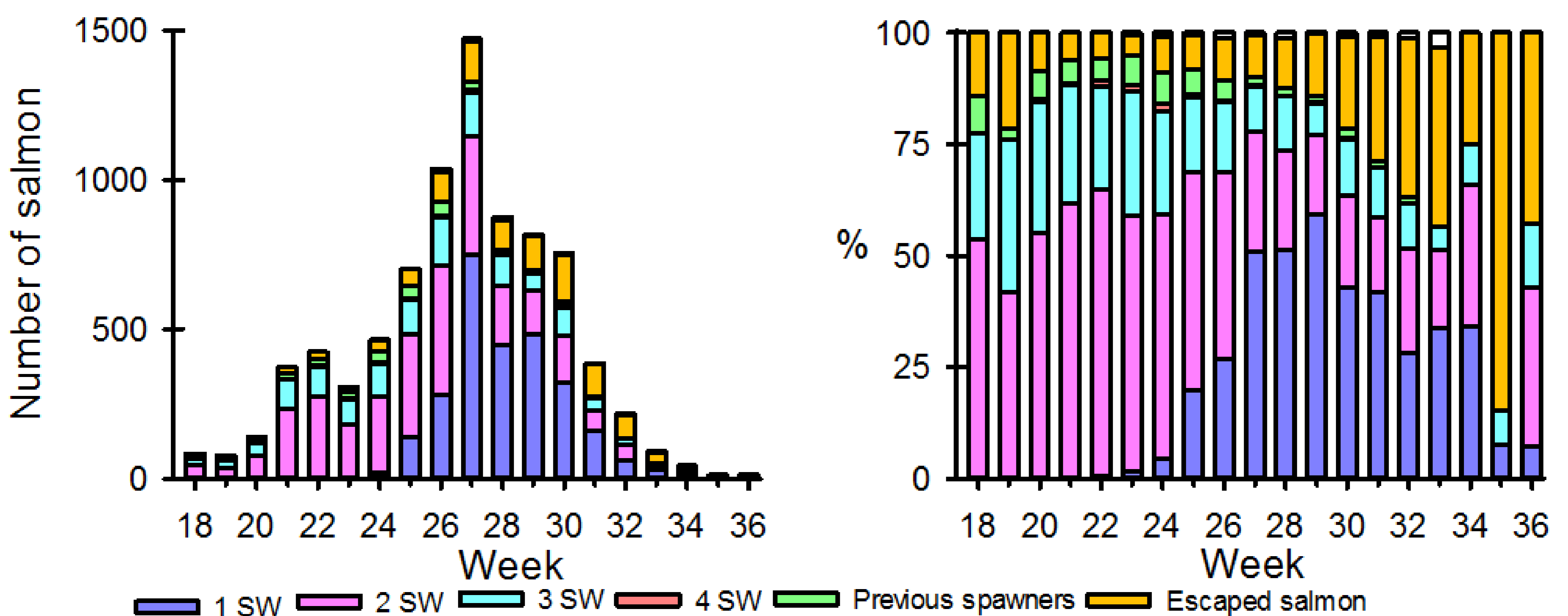
**Figure 1.** Map showing the sampling area in Norway.

During the first year of the Kolarctic salmon project, a total of 8 300 Atlantic salmon were captured between 2 May and 8 September 2011, by 38 local fishermen operating along the Northern Norwegian coast. Basic biological data were recorded from all captured fish, the numbers of adult sea lice were counted and scale samples were collected. The scales were used for age determination and to verify whether the fish were escaped farmed or wild salmon.



## Results

- Of the 8 300 salmon sampled, 7 221 (87%) were wild and 1 079 fish (13%) were escaped farmed salmon.
- Approximately half of the escaped farmed salmon in the catches were correctly identified and reported by fishermen (on the basis of external characteristics of the fish) with the remaining escaped farmed salmon being identified subsequently on the basis of scale analysis.
- Escaped farmed salmon occurred in catches throughout the sampling period (May-September) and in all areas (Figure 2). The proportion of escaped farmed salmon in the total catches was 27% in Nordland, 15% in Troms and 10% in Finnmark.
- The proportions of escaped farmed salmon in the total catches were 9% in May, 8% in June, 13% in July, 32% in August and 53% in September.
- The abundance of sea lice increased from May to September on both wild and escaped farmed salmon. The abundance of sea lice was higher on escaped farmed salmon.
- The highest average number of lice recorded was on salmon caught in Nordland; this region has the biggest production of farmed salmon among the three regions.
- The mean weights of escaped farmed salmon (females 5.6 kg, males 4.9 kg) were greater than the mean weights of wild salmon (females 5.0 kg, males 3.3 kg).
- Male salmon occurred more frequently (59%) in catches of escaped farmed salmon than in the wild salmon catches (48%).



**Figure 2.** The number and percentages of wild and escaped farmed salmon in the weekly catches in the three northernmost counties of Norway, May to September 2011.

## Conclusions

- Our results indicate that escaped farmed salmon occur throughout the coastal and fjord areas sampled and during the entire migratory period of wild salmon.
- Results also indicate that the number of escaped farmed salmon increased towards the autumn being highest after the closure of the ordinary coastal fishing season (June-July).
- Our results indicate that identifying escaped farmed salmon from external characteristics only will result underestimating their numbers by approximately 50%.
- At present the official catch reporting from the coastal salmon fishery in Norway does not differentiate between wild and escaped farmed salmon, leading to a wrong impression on the status of the wild salmon stocks.
- We recommend that escaped farmed salmon are identified and reported in future.

The results of this study can be used to inform new management measures for the fishery aimed at increasing the harvest of escaped farmed salmon through season adjustments and areas fished.