Monitoring of the salmon and trout stocks in rivers within project ReBorN (LIFE15 NAT/SE/000892)

Linda Vikström and Oskar Östlin

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Innehåll

Background

One of the project actions is to monitor the stocks of migratory fish (part of action D1) in the ReBorN-LIFE project rivers: Kalixälven, Råneälven, Piteälven, Åbyälven, Byskeälven and Lögdeälven.

As a part of the national salmon monitoring program in Sweden, all salmon rivers are surveyed with electrofishing every year to monitor the salmon recruitment and it is performed by the CAB's in each county. In some tributaries, additional surveys are conducted as part of the national liming program and a denser dataset is therefore available. However, in several other tributaries the monitoring is more sporadic.

In some of the salmon-holding rivers, numbers of migratory spawning fish are also counted, often in connection to a fishway, where the narrow passage allows for the installation of photocell type automatic counters (Table 1). In recent years, attempts have also been made to calculate migratory fish using counters based on advanced echo sounders on wider river sections, such as in Råneälven, in which photocells counters cannot be used.

Table 1. Fish counters within the project rivers.

County (river mouth)	River	Type pf counter	Counter placement	Distance from river mouth
Norrbotten	Kalixälven	VAKI	Jockfall	ca 100 km
Norrbotten	Råneälven	Simsonar	Gunnarsbyn	ca 40 km
Norrbotten	Piteälven	VAKI	Sikfors	ca 20 km
Västerbotten	Åbyälven	VAKI	Hednäs	ca 35 km
Västerbotten	Byskeälven	VAKI	Fällfors	ca 37 km
Västerbotten	Lögdeälven	VAKI	Fällfors	ca 45 km

This report compiles available electrofishing and migration data for the ReBorN LIFE project rivers: Kalixälven, Råneälven, Piteälven, Åbyälven, Byskeälven and Lögdeälven. Reference points in the form juvenile densities (fry / 100 m^2) and the number of spawning salmon and trout have been used to evaluate the stocks of salmon and trout before and after the start of the project.

Method

The number of electrofishing sites varied between years and between the different rivers both in the mainstem and the tributaries.

As the densities of fishes and the number of migratory adult fish vary between years for natural causes, reference points in the form of five-year mean values have been used within the project's main channels (Table 3 and 4). However, for the tributaries there is not sufficient of data to calculate a five-year mean, they are therefore not presented here. The five-year mean value of densities of salmon and trout fry (fry/100m^2) in age-categories 0+ and >0+ (Table 2) are stated in the results.

For more information regarding data collection and methods, see Annex 7.3 "Biological data compilation on salmon and trout status of rivers within ReBorN-LIFE (LIFE15 NAT/SE/000892)" in the Progress Report from 2018.

Table 2. Description of age categories

Age	**0+**	**>0+**
Description	One summer fish	Older than one summer

Data Summary

There are mainly salmon juveniles found in the main channel in all river systems. Since the ReBorN project started, the highest density of salmon juveniles has been found in the river Byskeälven, and lowest in river Råneälven (Table 3.). When comparing the densities of salmon juveniles before (2012-2016) (Table 4) and after (2017-2021) (Table 3), 0+ salmon have decreased in the main channels of almost all rivers while >0+ salmon instead have increased.

The number of migrating salmon have increased in river Kalixälven and Råneälven (Table 3 and Table 4). In river Piteälven, Åbyälven and Byskeälven there has been a slight decrease in number of migrating salmon compared to before (Table 3 and Table 4). There is not sufficient data in the river Lögdeälven to calculate a five-year value of high quality, although the number of migrating salmon and trout in 2021 is considerably higher than before the project started (Table 3).

Table 3. Five-year mean value (2017-2021) of densities of salmon and trout parr (parr/100m$_2$) and number of spawning migrating adult fish in the main channels. No electrofishing data exist from River Piteälven from this time period and no data on migrating trout for River Råneälven. Number of migrating adult fish are preliminary for River Kalix- and Piteälven in 2021. No data was available from river Råneälven 2021, the mean value is therefore from; 2017-2020. *Number of ascending salmon and trout in 2021.

River	Salmon 0+	Salmon >0+	Trout 0+	Trout >0+	Migrating salmon (total)	Migrating trout (total)
Kalixälven	22,7	19,0	0,6	0,4	11936	243
Råneälven	5,0	8,9	0,0	0,0	2640	-
Piteälven	-	-	-	-	1534	1708
Åbyälven	21,1	15,1	0,7	0,8	79	38
Byskeälven	32,6	19,3	0,6	0,8	4669	160
Lögdeälven	11,2	9,2	0,5	0,9	1017*	240*

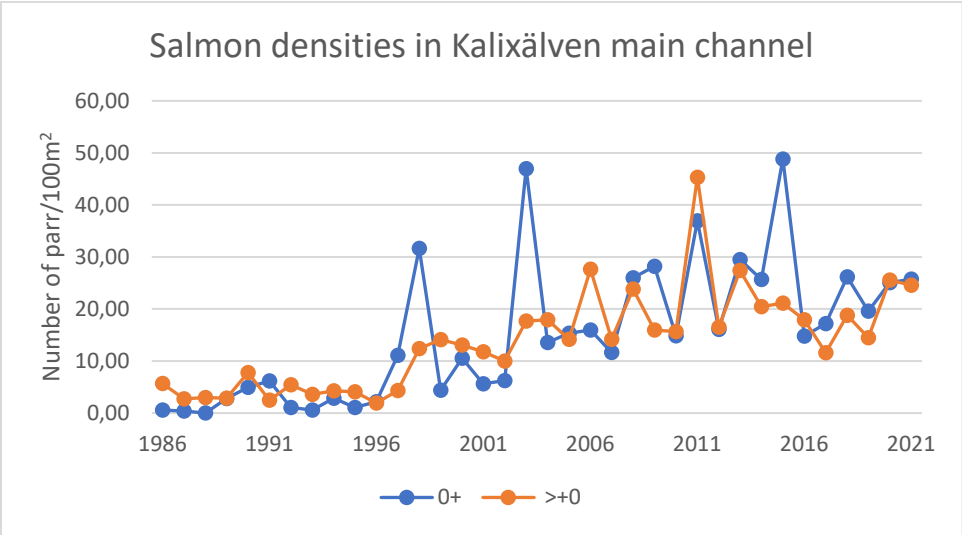
Table 4. Five-year mean value (2012-2016) of densities of salmon and trout parr (parr/100m$_2$) and number of spawning migrating adult fish in the main channels. Electrofishing data from River Piteälven is for 2013-2016 since no survey was conducted in 2012. Migration data are from fish counters of VAKI-type, but in River Råneälven in which an echo sounder (Simsonar) has been installed in 2014-2016. The counter in River Lögdeälven was not in use during 2015 and thus, the mean value is from; 2012-2014 and 2016.

River	Salmon 0+	Salmon >0+	Trout 0+	Trout >0+	Migrating salmon (total)	Migrating trout (total)
Kalixälven	27,0	13,4	0,3	0,3	9513	244
Råneälven	6,6	4,1	0,0	0,03	2071	32
Piteälven	7,8	5,3	0,3	0,5	1603	955
Åbyälven	22,6	13,0	0,7	0,7	106	94
Byskeälven	31,7	17,3	0,8	0,6	4936	103
Lögdeälven	12,6	5,9	0,5	1,1	308	139

Appendix 1 - Electrofishing

Main channel

The graphs show yearly mean density (parr/100m2) for all electrofishing sites for salmon and trout. Blue line = 0+ (one summer old fish). Orange line = > 0+ (fish older than a summer).



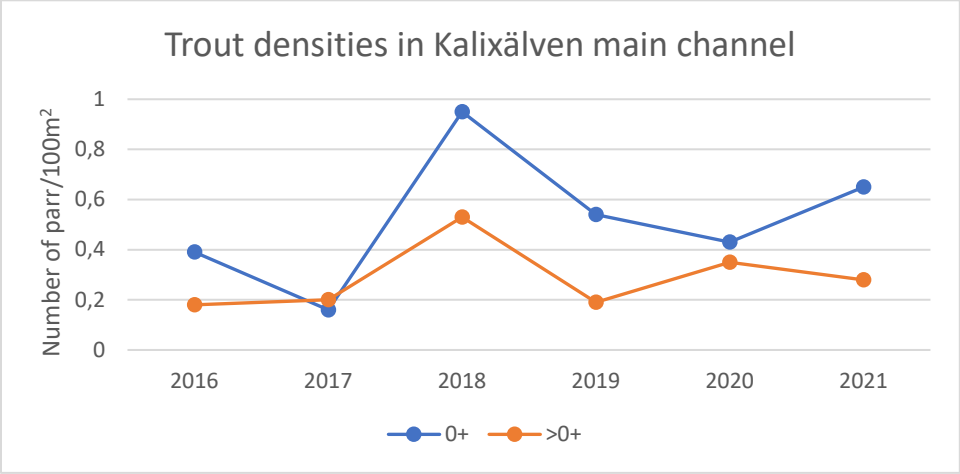


Figure 1. a) Salmon densities in river Kalixälven main channel 1986-2021 and b) trout densities in river Kalixälven main channel 2016-2021.

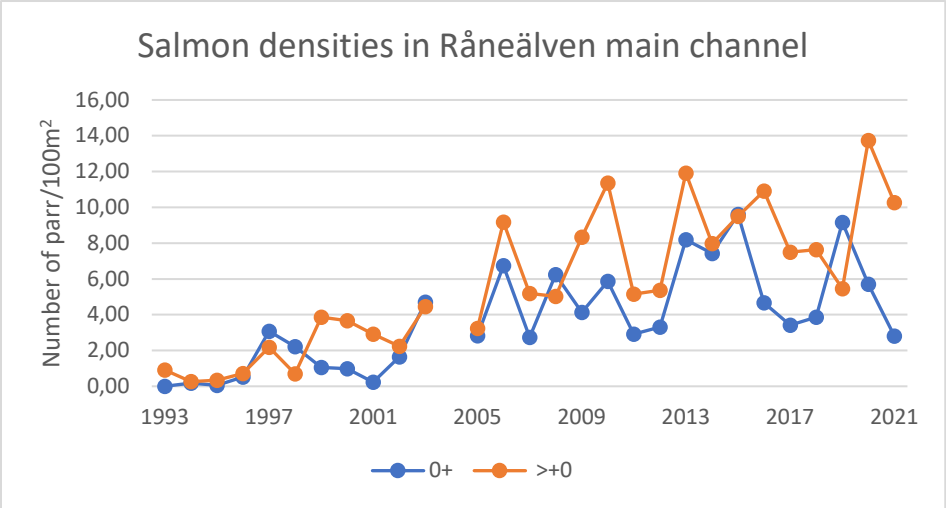


Figure 2. Salmon densities in river Råneälven main channel 1993-2021.

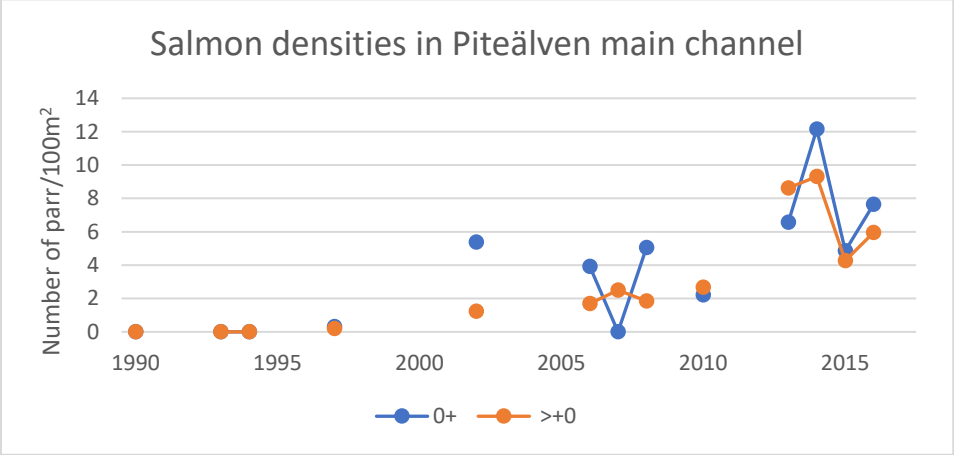


Figure 3. Salmon densities in river Piteälven main channel 1990-2016.

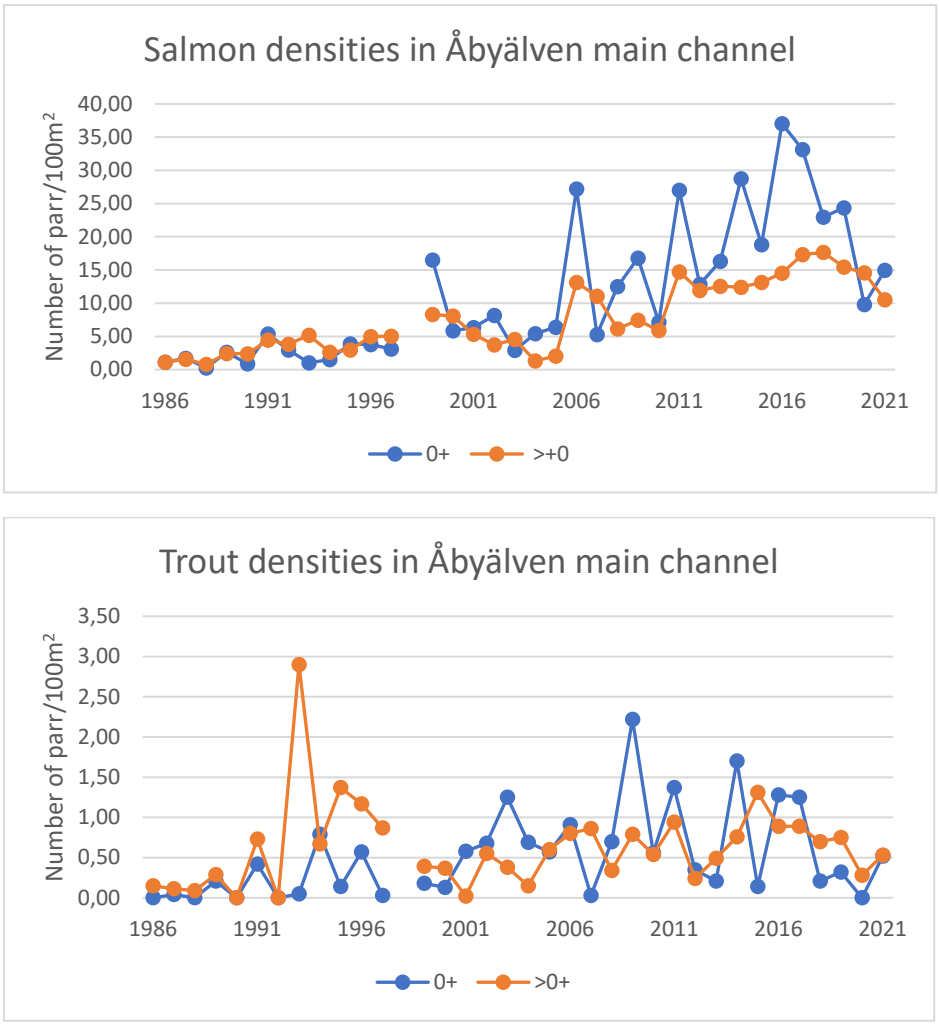


Figure 4. a) Salmon densities in river Åbyälven main channel 1986-2021 and b) trout densities in river Åbyälven main channel 1986-2021.

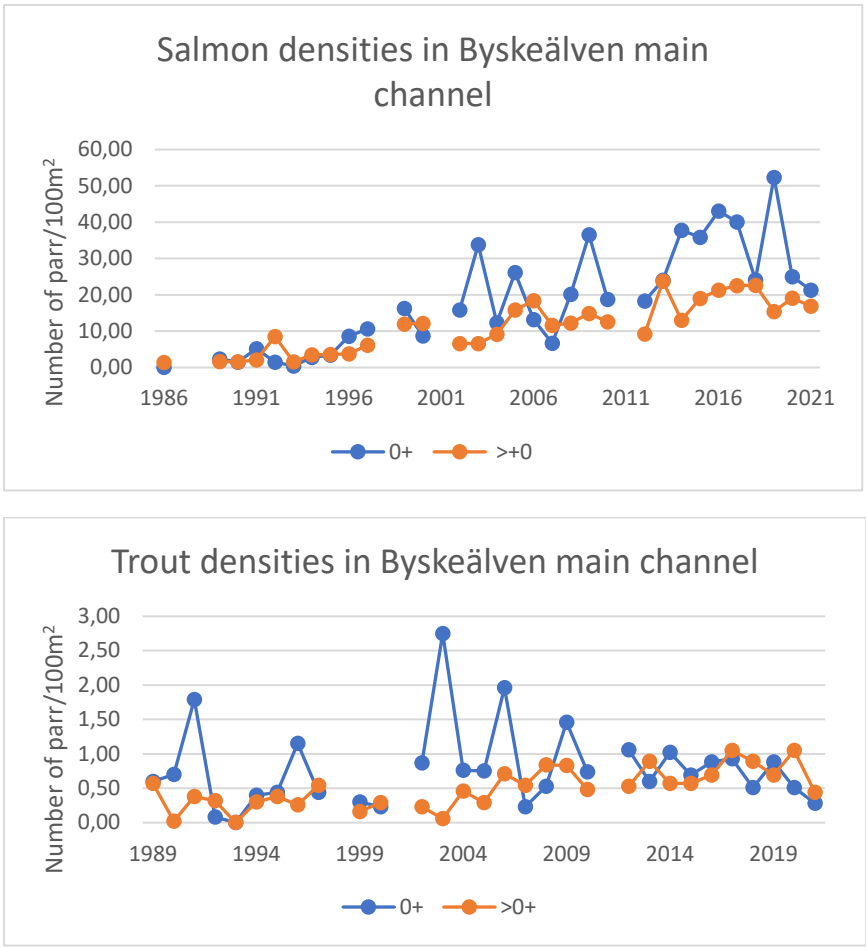
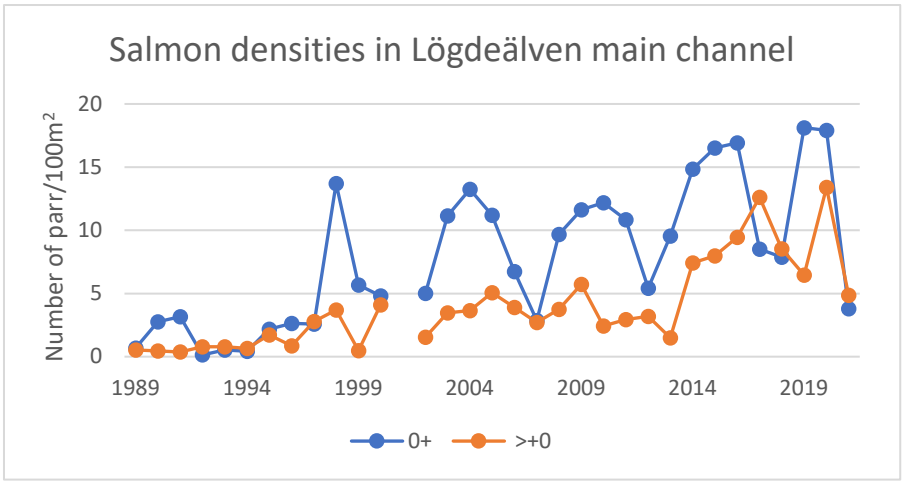


Figure 5. a) Salmon densities in river Byskeälven main channel 1986-2021 and b) trout densities in river Byskeälven main channel 1989-2021.



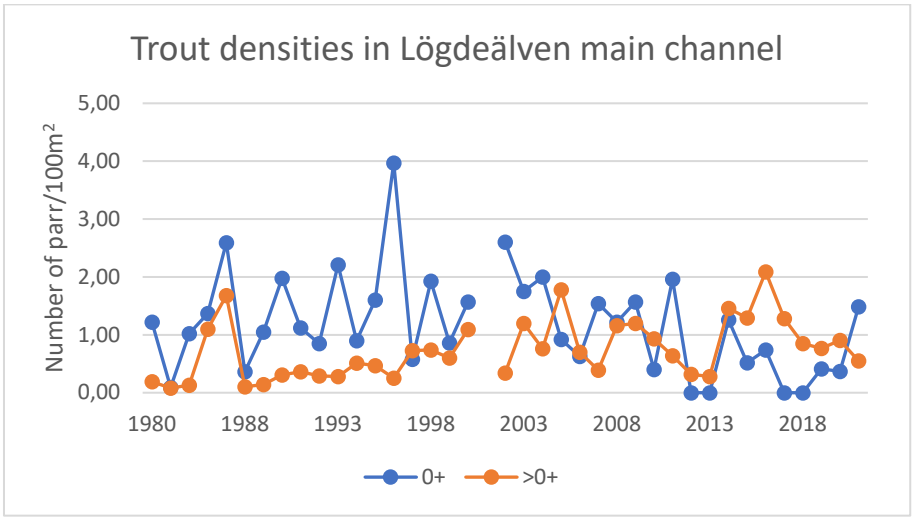


Figure 6. a) Salmon densities in river Lögdeälven main channel 1989-2021 and b) trout densities in river Lögdeälven main channel 1980-2021.

Tributaries

No extensive time series of electrofishing data are available for the tributaries within the project areas of ReBorN. River Råneälven, Byskeälven and Piteälven was the only rivers that had electrofishing data collected during the time period 2017-2021. Data from these rivers are reported for each individual area (estuary) and year (Table 5).

Trout occur to a greater extent in tributaries compared to salmon. Vitbäcken in river Piteälven was the only estuary that had densities of salmon (Table 5).

Table 5. Densities of juvenile salmon and trout (per 100m2) in the tributaries of Råneälven, Byskeälven and Piteälven. 0+ = one summer old fish >0+ = older than 0+.

River	Year	Estuary	X	Y	Species	0+/100m2	>0+/100m2
Råneälven	2017	Abramsån	7350239	1757899	Trout	1,3	0
Byskeälven	2017	Långträskälven	7285900	1646770	Trout	9,3	5,1
Byskeälven	2017	Långträskälven	7285890	1648810	Trout	1	5,5
Piteälven	2017	Vitbäcken	7338057	1692854	Trout	0	0,6
Piteälven	2017	Vitbäcken	7333010	1695516	Trout	0	1,5
Piteälven	2017	Vitbäcken	7319869	1705550	Trout	0	0,5
Piteälven	2017	Vitbäcken	7329268	1697446	Trout	0,4	0,4
Byskeälven	2020	Långträskälven	7285890	1648810	Trout	3,2	3,4
Byskeälven	2020	Långträskälven	7285900	1646770	Trout	6,2	3,9
Råneälven	2020	Rutnajoki	7422450	1713260	Trout	0	0,4
Råneälven	2020	Rutnajoki	7423300	1714350	Trout	0	0,6
Råneälven	2020	Rutnajoki	7422870	1713950	Trout	0	0,4
Piteälven	2020	Vitbäcken	7338057	1692854	Trout	0	0,6
Piteälven	2020	Vitbäcken	7319869	1705550	Salmon	0	0,3
Piteälven	2020	Vitbäcken	7329268	1697446	Trout	0	0,3
Piteälven	2020	Vitbäcken	7333010	1695516	Trout	0	0,4
Råneälven	2021	Rutnajoki	7423300	1714350	Trout	0	0,8

Appendix 2 - Spawning migration

The graphs show data on the number of migratory salmon from counters described in Table 1. Due to the location of the counts in the rivers, the data does not show the total migration. Data is lacking for river Råneälven and river Lögdeälven when it comes to number of ascending trout.

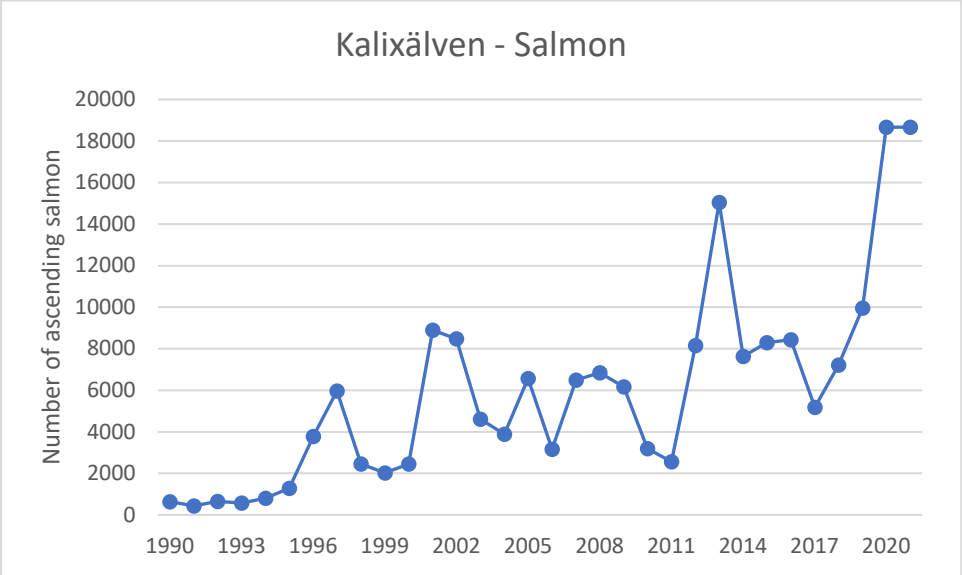


Figure 7. Total number of ascending wild salmon at Jockfall (VAKI-counter), in river Kalixälven 1990-2021.

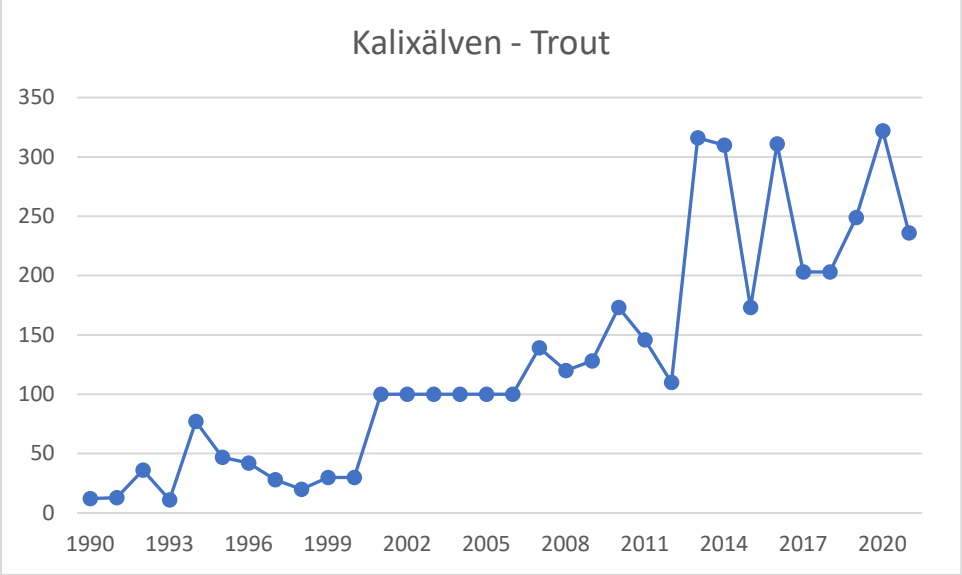


Figure 8. Total number of ascending wild trout at Jockfall (VAKI-counter), in river Kalixälven 1990-2021.

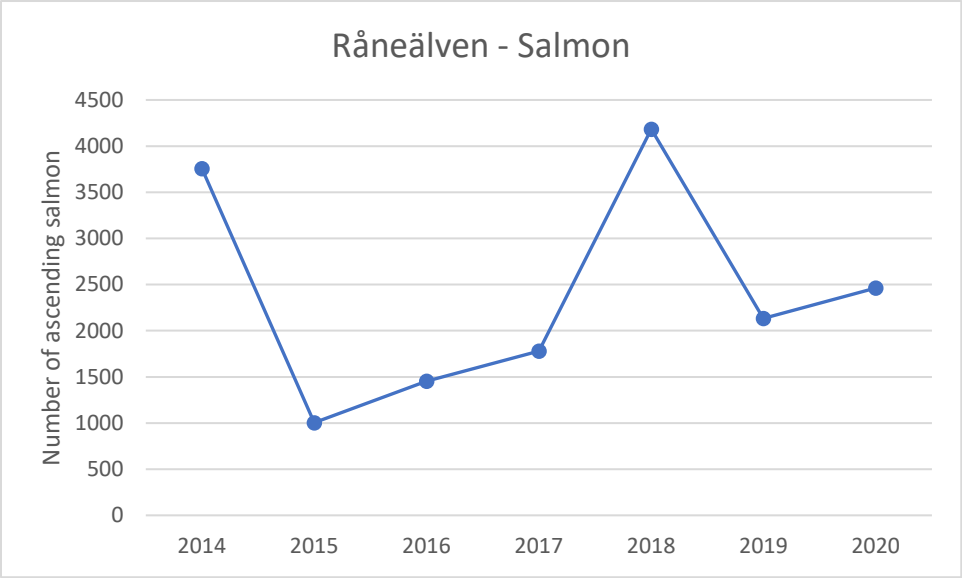


Figure 9. Total number of ascending wild salmon at Gunnarsbyn (Simsonar), in river Råneälven 2014-2020.

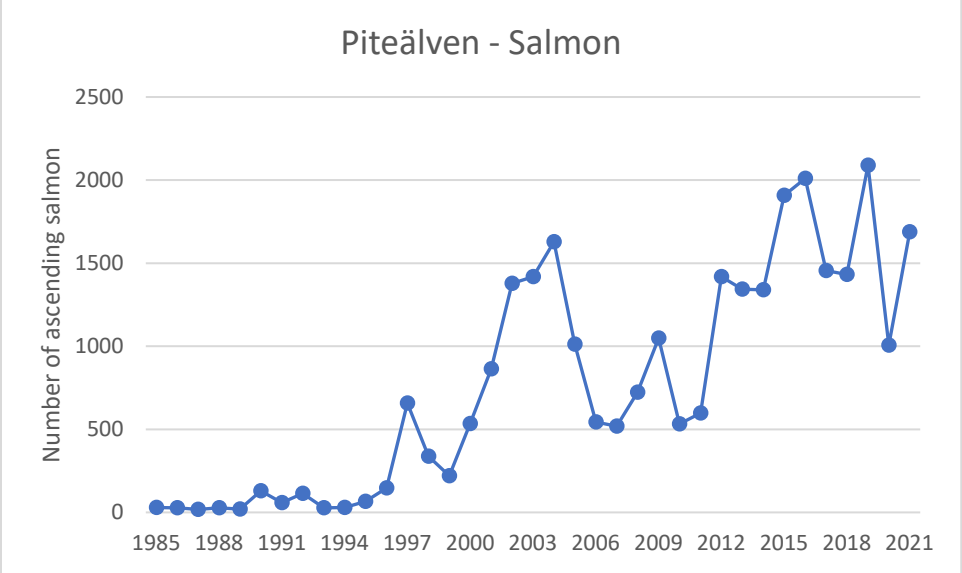


Figure 10. Total number of ascending wild salmon at Sikfors (VAKI-counter), in river Piteälven 1985-2021.

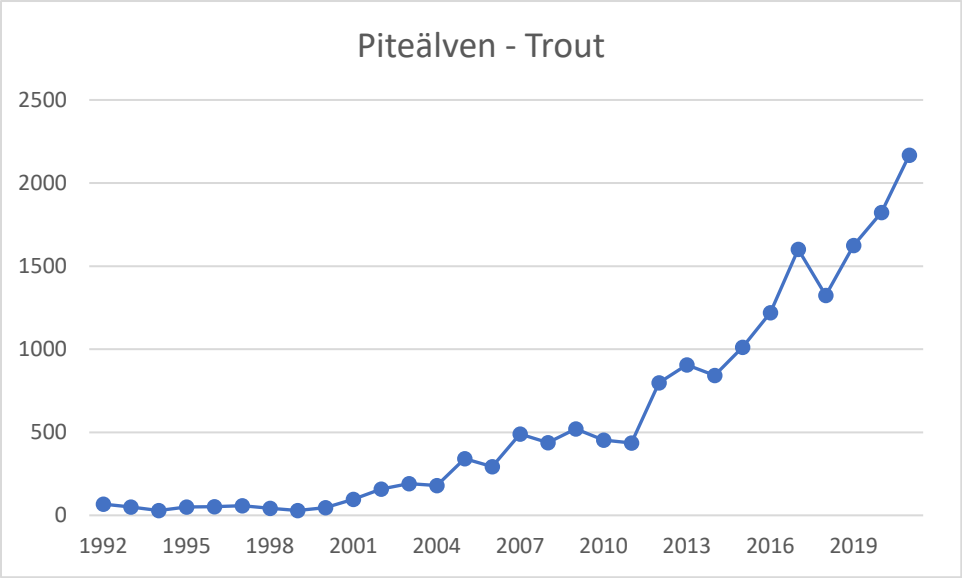


Figure 11. Total number of ascending wild trout at Sikfors (VAKI-counter), in river Piteälven 1985-2021.

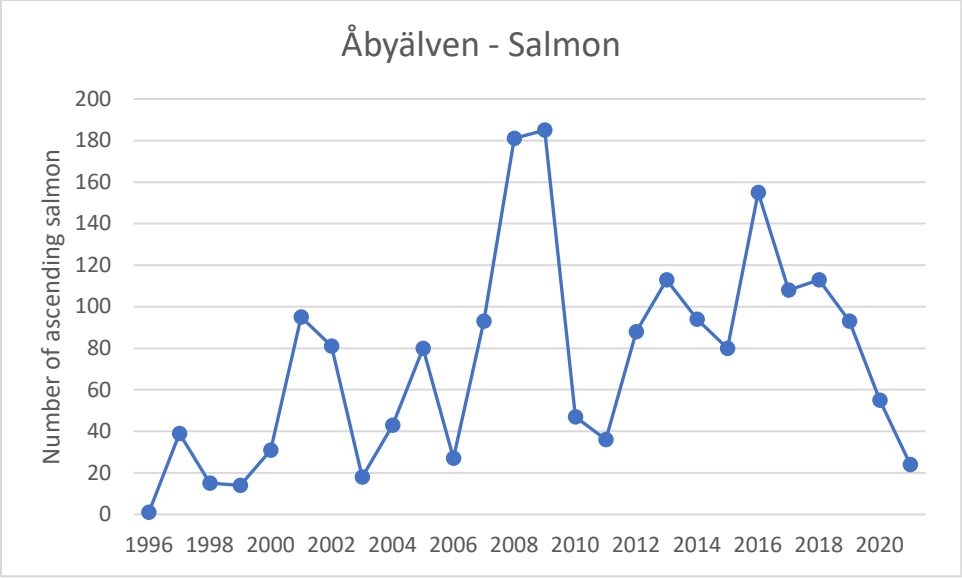


Figure 12. Total number of ascending wild salmon at Hednäs (VAKI-counter), in river Åbyälven 1996-2021.

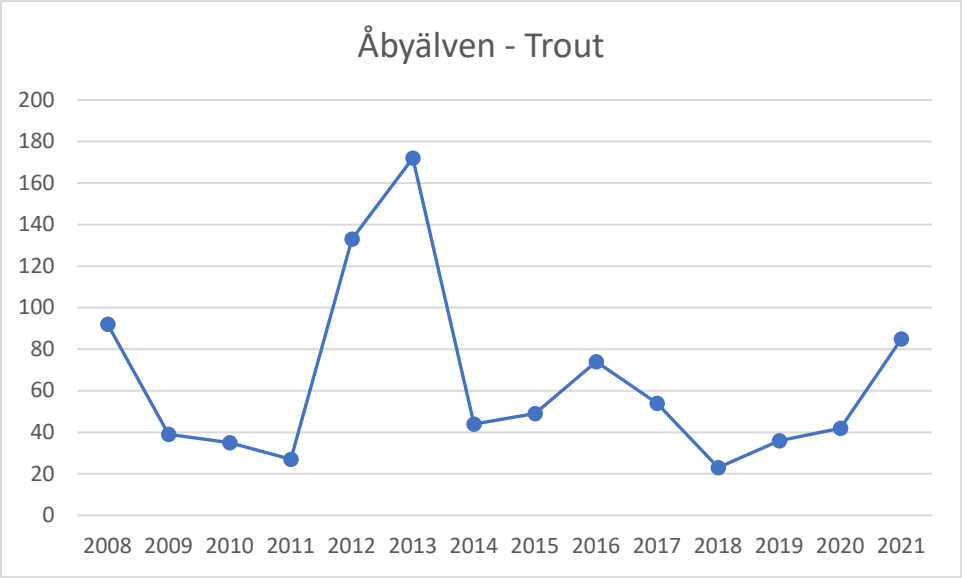


Figure 13. Total number of ascending wild trout at Hednäs (VAKI-counter), in river Åbyälven 2008-2021.

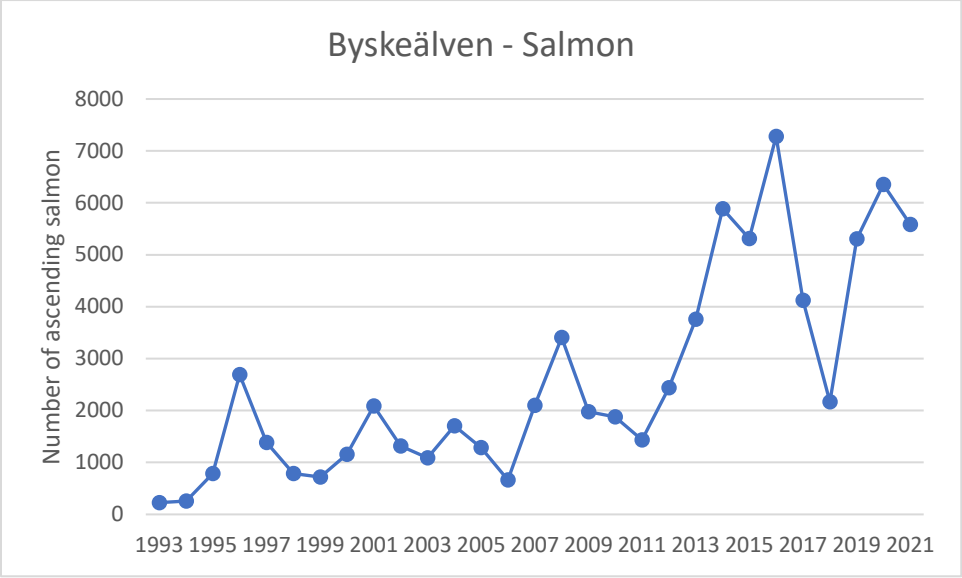


Figure 14. Total number of ascending wild salmon at Fällfors (VAKI-counter), in river Byskeälven 1993-2021.

Discussion

It is hard to say if the projects actions have had a positive effect on salmon and trout recruitment and number of ascending adults in the main channels and tributaries of the project rivers.

River Byskeälven is the only river with a positive trend (five-year mean value) for both 0+ and >0+ salmon (Table 3). Since the project started, 0+ salmon have decreased in the main channels of almost all project rivers while >0+ salmon densities instead have increased (Table 3 and 4). The lack of extensive time series for the tributaries makes it hard to conclude any effects of the project's actions on the recruitment.

Since the start of the ReBorN project, the number of migrating salmon have increased in river Kalixälven and Råneälven (Table 3 and Table 4) while the numbers instead have decreased in river Piteälven, Åbyälven and Byskeälven (Table 3 and Table 4).

As mentioned in the method section, the densities of parr and the number of migratory adult fish can vary between years for natural causes. Factors such as the number of females that spawned the year before and if the conditions in the river were favorable during the summer may for example influence recruitment. There are also methodological factors that can affect the outcome of electrofishing surveys, for example water level and water temperature during the time of electrofishing. Water levels remained on a high level during 2021, making it hard to conduct the surveys in all monitor locals. This might have affected the electrofishing results.

Depending on the location of a fish counter in a river, all or just a part of the total migration is counted. Hence, a large proportion of migrating salmon and trout are spawning below the counter and are therefore not included in the count. The quality and reliability of the echo sounders is under investigation, so data from these must be used with caution.

A generation cycle for salmon and sea trout is about 5-6 years. Thus, monitoring of the effect of restoration on salmon and trout status within the scope of project ReBorN-LIFE cannot be conducted with a high degree of certainty. Follow-up measures, however, continues within the county administrative board's ongoing environmental monitoring program even after the project expires.

This report has been compiled in the frames of the ReBorN LIFE project (LIFE15 NAT/SE/892), which is co-financed from the EU LIFE Programme.