# STAGE DE FIN D'ÉTUDES

NORCE

# Impact of trap placement variation on smolt migration understanding: Optimizing capture efficiency and reducing monitoring costs

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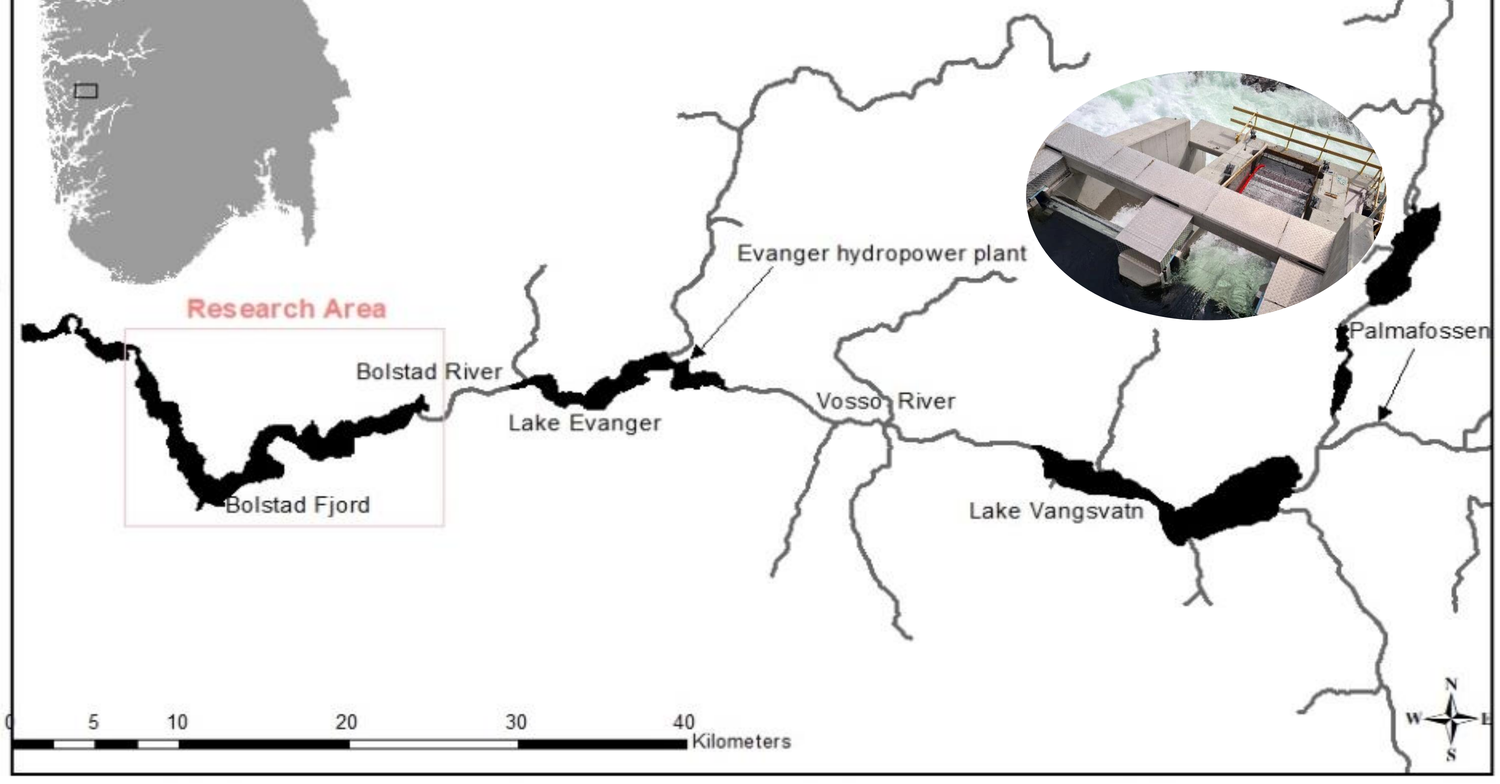
## Context

Norway's deep-rooted maritime heritage and its extensive coastline have historically centered on fishing, with a particular emphasis on salmon, which holds a significant place in its cultural fabric (Hjellnes et al., 2020)[1]. The Atlantic salmon, being an anadromous species, undergoes a diverse array of habitat transitions throughout its life cycle, with critical bottlenecks at various life stages that significantly diminish population numbers. These bottlenecks, already impactful in their own right, are exacerbated by the addition of human-induced pressures. The economic decline of rural fishing communities during the late 1960s and early 1970s prompted the emergence of salmon farming as a means of livelihood, transforming former fishermen into fish farmers (Liu et al., 2011)[2]. Nevertheless, the decline in wild salmon populations is not solely attributable to the expansion of aquaculture; it is also linked to a range of other anthropogenic activities that directly or indirectly impact the environment. These include issues like acid rain, hydropower development, physical disturbances such as road construction and flood mitigation, as well as the environmental consequences of aquaculture practices.
That's why, since 2001, the LFI teams have been working to preserve the Atlantic salmon population of the Vosso River, which historically was one of the richest in Norway.

## Materials & Methods

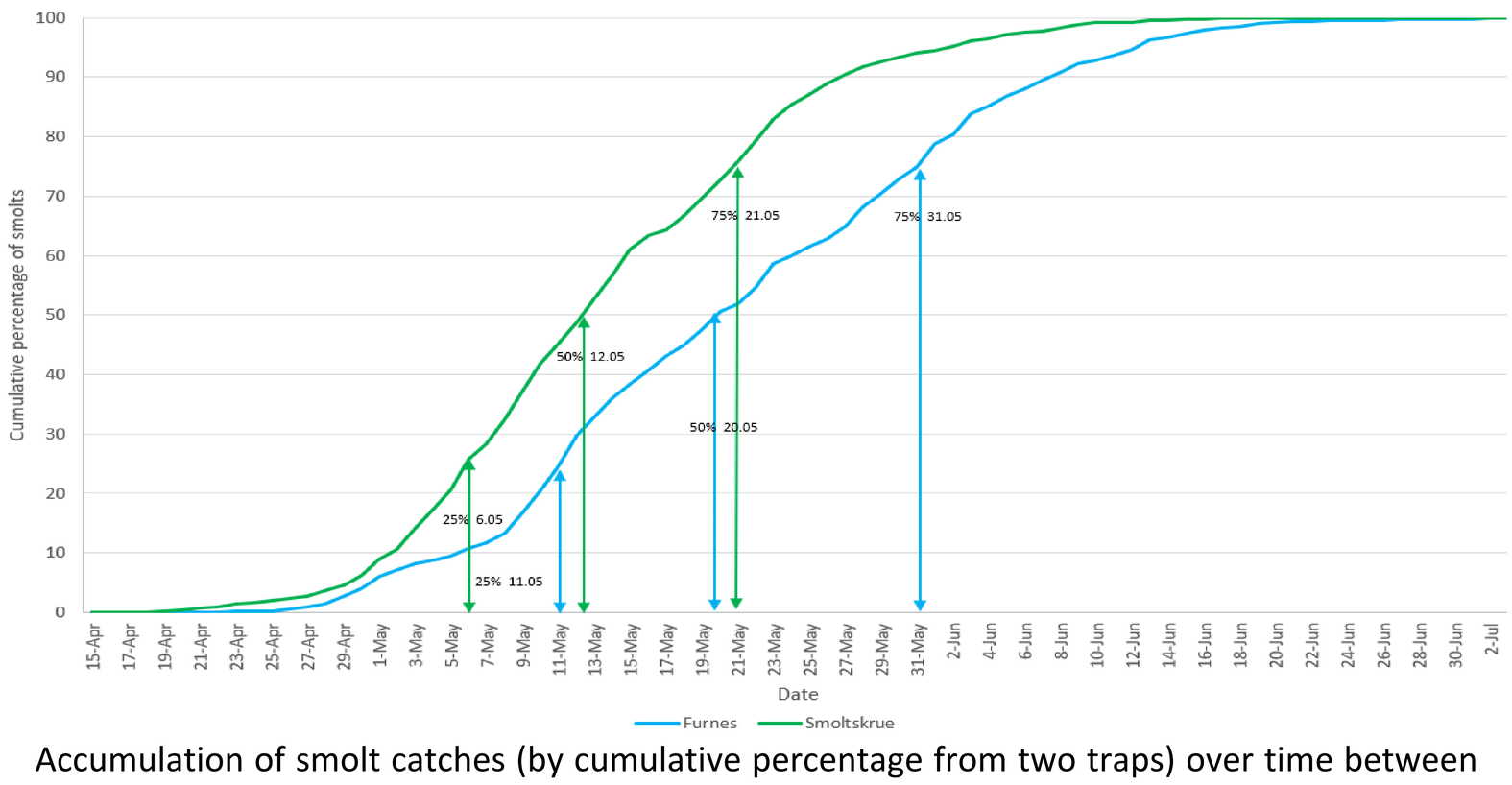
As has been the case since 2001, the smolt trapping campaign in the Bolstad Fjord in Vestland County, Norway, took place from May to June. This year, a total of 9 traps were set up in the research area to capture as many smolts from the Vosso River as possible, before being tagged and released into the sea (6 trapnets, one trap at the Palmafossen dam, the Smoltscrew, and a prototype called "Nora"). After the traps installation in May, they were checked every morning to quickly tag the smolts. The 12mm PIT tags allowed us to identify them in the case of captures upon their return to the river for spawning.




Location of the study area (red) and the various parts of the watershed (black)

## Results

This year, we experienced the second-best year in terms of total catches since 2001 with 1355 smolts. However, it was also the eighth-worst year in catches, with only 3.91 smolts captured per day per trap, which sharply contrasts with the historical average of 7.86 smolts per day per trap since 2001.
We observed that the capture interval at Furnes, located 6 km downstream from the trap, is approximately twice as long as that observed in the river itself when 50% of the smolts were caught.
Despite our understanding of certain aspects of smolt behavior, such as the influence of flow on migration and the length of time spent in the river, other aspects remain unexplored. This underscores the need to continue research in this field.
Utilizing previously collected data to optimize trap usage appears crucial, as it can lead to significant cost savings despite certain campaigns incurring higher costs, such as this year.
Adopting a strategic approach to trap placement can result in more efficient and cost-effective management of smolt populations.




Accumulation of smolt catches (by cumulative percentage from two traps) over time between 15-04-23 and 02-07-23.

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