

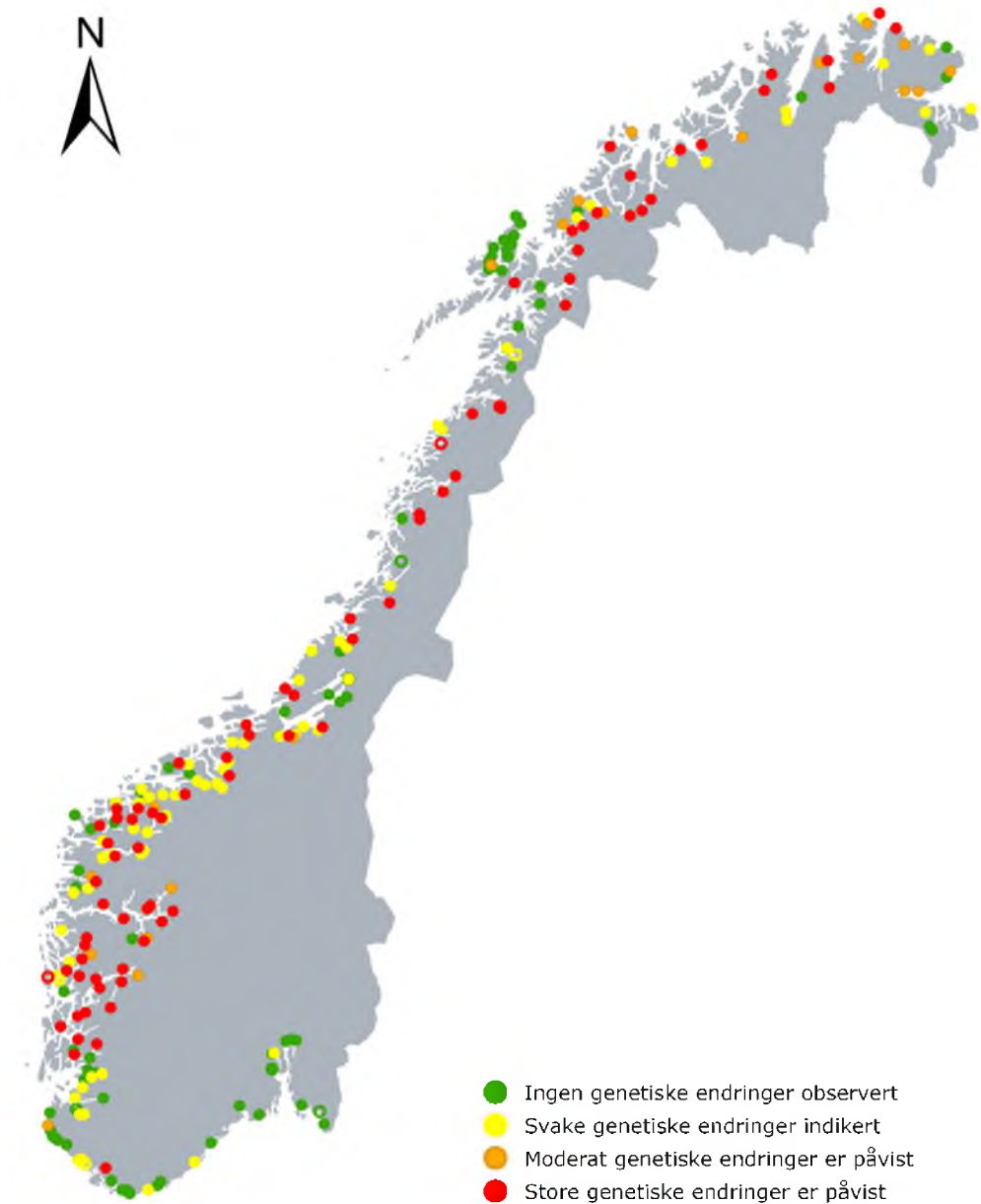


Genetic introgression of escaped farmed to wild Atlantic salmon

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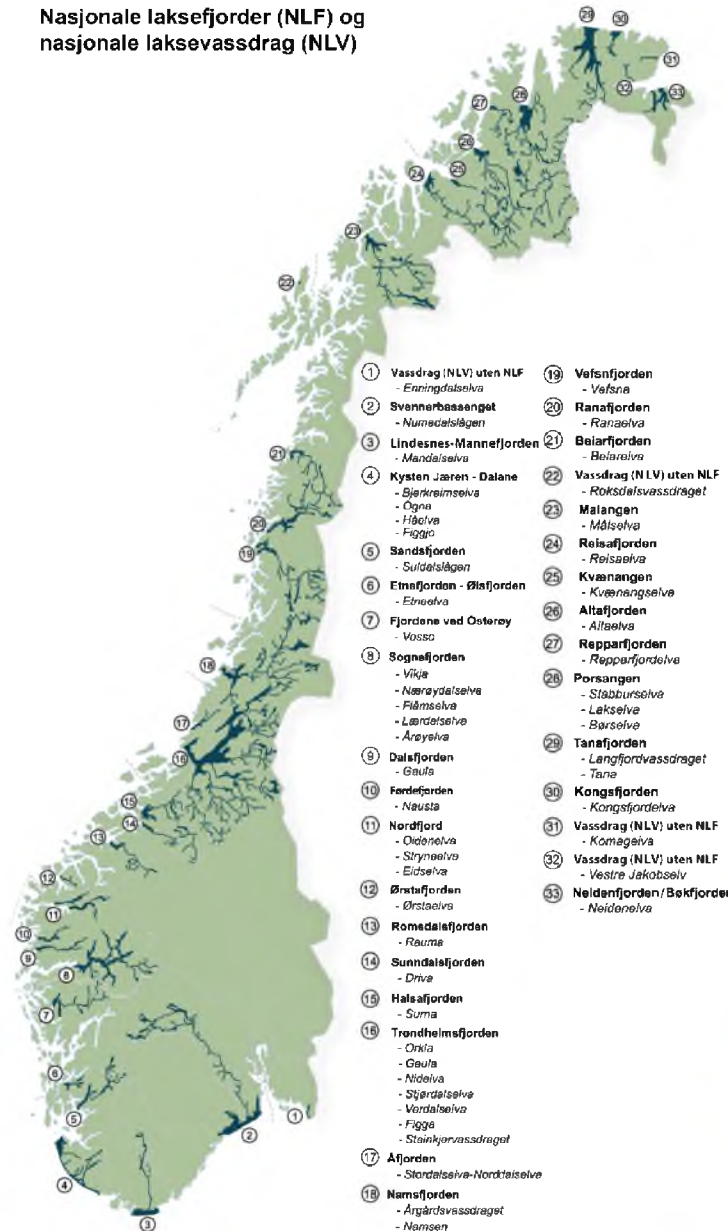
Genetic introgression

- 250 wild populations studied
- From **no genetic change** detected (in South-East)
- To **more than 10% genetic introgression (farmed ancestry)** in wild populations (West coast)
- DNA extracted from scales
- 65,000 salmon analysed (adult)
- Assignment of each individual to either wild or farmed



- 33 National Salmon Fjords and 52 National Salmon Rivers
- Genetic status in National Salmon Rivers resemble rest of Norwegian rivers

Nasjonale laksefjorder (NLF) og nasjonale laksevassdrag (NLV)



Kilde: Direktoratet for naturforvaltning, 2010
www.miljostatus.no



Consequences – growth and life history

- Faster growth rate
- Younger age at out-migration
- Younger sea age at maturity (but not in all places)
- Faster «pace of life»
- Precocious males may increase introgression



Photo: Rune Muladal

Consequences – behaviour and survival

- Less fear
- Lower survival in river and ocean
- Earlier time for outmigration; later return migration
- Higher straying rate
- Salmon(escapees) in trout creeks



Photo: Bjørn Ove Johnsen, NINA

Consequences – productivity

- Experimental release of 22 farmed salmon and 18 native wild salmon above fish trap in River Imsa
- Smolt production reduced by 30% relative to typical smolt production per egg laid
- Irish experiments concluded: *that interaction of farm with wild salmon results in lowered fitness, with repeated escapes causing cumulative fitness depression and potentially an extinction vortex in vulnerable populations.*
- Aquaculture moves salmon genotypes across natural borders



Conclusions

- Two thirds of Atlantic salmon populations in Norway are affected by genetic introgression from escaped farmed salmon
- High introgression is found in several National Salmon Rivers, including the River Namsen
- No wild salmon population is protected from genetic introgression, but distance from fish farms and large wild populations help
- Affected populations show changes in growth and life history, lower survival and reduced productivity

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