

# The surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) in Norway 2019



**Veterinærinstituttet**  
Norwegian Veterinary Institute



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## Summary

This surveillance programme has a risk-based approach. The core surveillance activity was the routine clinical inspections on sites with farmed salmonids and analyses of samples collected from diseased fish. Samples from wild salmonids caught in rivers were also included. Viral haemorrhagic septicaemia virus and infectious haematopoietic necrosis virus were not detected at any of the sites tested in the 2019 surveillance programme.

## Introduction

Viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) are two important diseases in salmonid fish caused by rhabdovirus infections (1).

VHS has most frequently been recorded in farmed rainbow trout, but may also cause losses in other wild and farmed fish species, both marine and freshwater (2, 3). Norway obtained disease free status for VHS and IHN in 1994 (4). VHS was diagnosed in farmed rainbow trout in Norway in 2007, and the disease free status was temporarily suspended (5, 6). Measures to eliminate the disease and prevent its spread were immediately taken by the Norwegian Food Safety Authority (NFSA). In 2011, Norway regained its free status.

Outbreaks of IHN have resulted in significant economic losses in farmed rainbow trout and salmon in North America and Europe, and the disease has also had an impact on wild populations of Pacific salmon (7). IHN was detected for the first time in Finland in 2017 and in Estonia in 2018. The disease has never been diagnosed in Norway.

The Norwegian Veterinary Institute (NVI) coordinates the surveillance programme and publishes the overall results in annual reports available on [www.vetinst.no/overvaking/virusykdommer-vhs-ihn-fisk](http://www.vetinst.no/overvaking/virusykdommer-vhs-ihn-fisk). In 2019, all fish samples were analysed at the NVI. The NFSA was continuously updated on the test results at site level through a digital data sharing portal (the EOS-portal).

## Aims

The aim of the programme is to document the absence of VHS virus (VHSV) and IHN virus (IHNV) in farmed salmonids in order to maintain Norway's VHS and IHN free status.

## Materials and methods

The surveillance programme has a risk-based approach (8), where the core surveillance activity was the routine clinical inspections on sites with farmed salmonids carried out by the fish health services (FHS) and laboratory investigation of suspicious samples. The FHS are performing health controls based on the risk of infections, stress and increased mortality (9). In addition, the NFSA sampled sites with farmed rainbow trout to increase the number of samples from this species. Furthermore, the NFSA collected samples from wild pink salmon (*Oncorhynchus gorbuscha*) invading a river in the eastern part of the northernmost county of Norway (Finnmark), as well as wild Atlantic salmon from four different rivers and one hatchery for river restocking. Additionally, samples from lumpfish (*Cyclopterus lumpus*) and Ballan wrasse (*Labrus bergylta* (*Labridae*)) used as cleaner fish at sites with farmed salmonids were examined.

Samples on RNAlater™ submitted to the NVI were processed and analysed for VHSV and IHNV by real-time RT-PCR with VHSV primers and probe from Jonstrup et al. 2013 and IHNV primers and probe modified from Liu et al. 2008, respectively (10, 11).

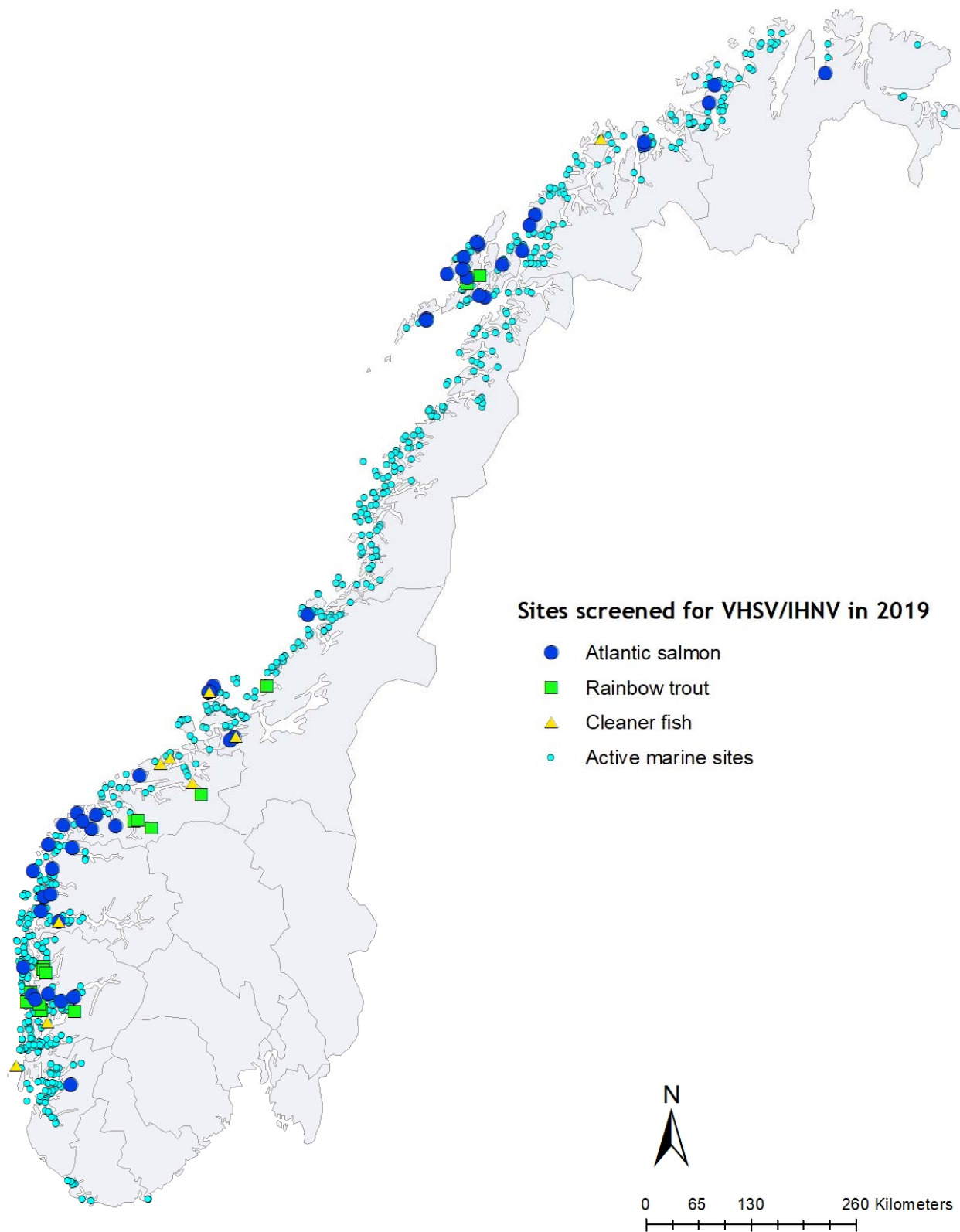
## Results and Discussion

In total, 266 samples from 48 sites with Atlantic salmon, 161 samples from 19 sites with rainbow trout, 60 samples from pink salmon and 22 samples from wild Atlantic salmon were tested for VHSV and IHNV in 2019 (Figure 1). Additionally, 43 samples from cleaner fish were tested for VHSV and 39 samples from cleaner fish were tested for IHNV. All samples were negative.

The performance of the routine clinical inspections in surveillance for freedom from VHS was evaluated in 2016, using a stochastic simulation model (12). Model results indicate that the current surveillance system, based on routine inspections by the FHS, has a high capability for detecting VHS, and that there is a high probability of freedom from VHS in Norwegian marine farmed salmonids (PFree >95%). Sensitivity analysis identified the probabilities that samples are submitted and submitted samples are tested, as the most influential input variables. The model provides a surveillance platform for similar exotic viral infectious diseases in marine salmonid farming in Norway, if they share similar risk factors, e.g. IHN.

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Figure 1. Sites screened for VHSV/IHN in 2019. All marine sites with Atlantic salmon or rainbow trout that have been active for at least three months are also marked. Courtesy to Attila Tarpai.

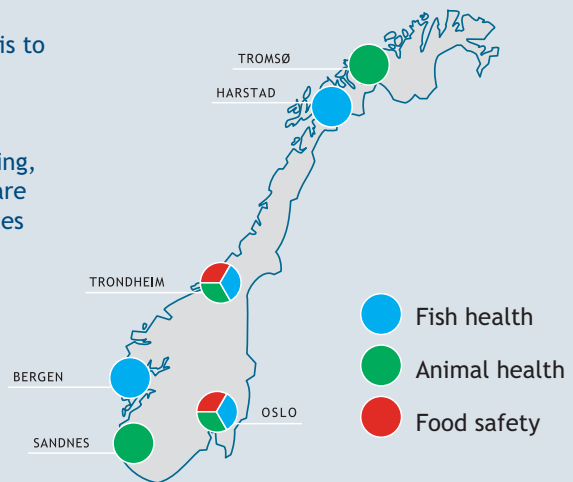
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