

# The surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) in Norway 2018



**Veterinærinstituttet**  
Norwegian Veterinary Institute



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### Commissioned by

Norwegian Food Safety Authority



ISSN 1894-5678

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Design Cover: Reine Linjer

Photo front page: Rudolf Svendsen

## Summary

This surveillance programme has a risk-based approach. The core surveillance activity was the routine clinical inspections on farmed salmonid sites and analyses of samples collected from diseased fish. Viral haemorrhagic septicaemia virus and infectious haematopoietic necrosis virus were not detected at any of the sites tested in the 2018 surveillance.

## 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 the NVI website ([www.vetinst.no](http://www.vetinst.no)). In 2018, 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 salmonides 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 farmed salmonid sites carried out by the fish health services (FHS) and laboratory investigation of suspicious samples. The FHS are performing risk-based health control on the ground of risk for infections, stress and increased mortality (9).

In 2018, the surveillance programme for IHN and VHS included laboratory investigation of relevant samples from active sites with both rainbow trout and salmon. Additionally, samples from lumpfish and Ballan wrasse used as cleaner fish were examined for VHSV.

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).

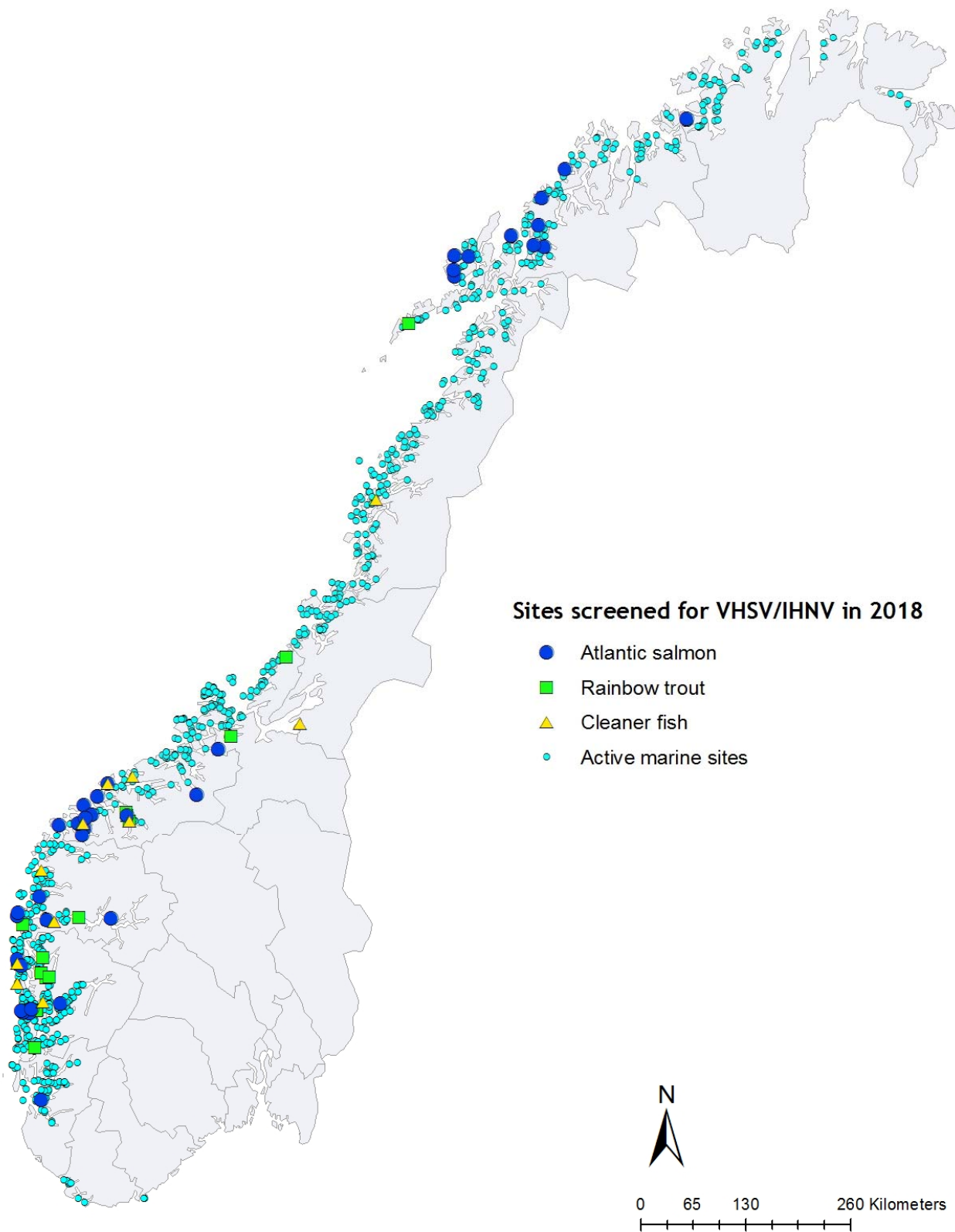
## Results and Discussion

In total, 200 samples from 38 sites with Atlantic salmon and 133 samples from 16 sites with rainbow trout were tested for VHSV in 2018, while 205 samples from 39 sites with Atlantic salmon and 133 samples from 16 sites with rainbow trout were tested for IHNV (Figure 1). Additionally, 69 samples from 11 sites with lumpfish and Ballan wrasse (cleaner fish) were tested for VHSV, and 26 samples from three sites with lumpfish 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.

## References

1. Anonymous. Diseases of Fish. In: Manual of diagnostic tests for aquatic animals 2018. Part 2, Paris: Office International des Epizooties; 2018.
2. Elsayed E, Faisal M, Thomas M, Whelan G, Batts W, Winton J. Isolation of viral haemorrhagic septicaemia virus from muskellunge, *Esox masquinongy* (Mitchill), in Lake St. Clair, Michigan, USA reveals a new sublineage of the North American genotype. *J Fish Dis* 2006; 29: 611-19.
3. Lumsden JS, Morrison B, Yason C, Russell S, Young K, Yazdanpanah A, Huber P, Al-Hussiney L, Stone D, Way K. Mortality event in freshwater drum *Aplodinotus grunniens* from Lake Ontario, Canada, associated with viral haemorrhagic septicaemia virus, Type IV. *Dis Aquat Org* 2007; 76: 99-111.
4. EFTA Surveillance Authority Decision No. 71/94/COL of June 1994.
5. Dale OB, Ørpetveit I, Lyngstad TM, Kahns S, Skall HF, Olesen NJ, Dannevig BH. Outbreak of viral haemorrhagic septicaemia (VHS) in seawater-farmed rainbow trout in Norway caused by VHS virus genotype III. *Dis Aquat Org* 2009; 85: 93-103.
6. EFTA Surveillance Authority Decision No. 302/08/COL of May 2008.
7. Dixon P, Paley R, Alegria-Moran R, Oidtmann B. Epidemiological characteristics of infectious hematopoietic necrosis virus (IHNV): a review. *Vet Res* 2016; 47: 63.
8. Lyngstad TM, Tavornpanich S, Viljugrein H, Hellberg H, Brun E. Evaluation of the surveillance and control programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN). Norwegian Veterinary Institute Report series • 15 - 2010.
9. Ministry of Trade Industry and Fisheries, 2008. Forskrift om drift av akvakulturanlegg (akvakulturdriftsforskriften). Lovdata, available from: <http://lovdata.no/dokument/SF/forskrift/2008-06-17-822> (accessed 12.05.2019).
10. Jonstrup SP, Kahns S, Skall HF, Boutrup TS, Olesen NJ. Development and validation of a novel Taqman-based real-time RT-PCR assay suitable for demonstrating freedom from viral haemorrhagic septicaemia virus. *J Fish Dis* 2013; 36: 9-23.
11. Liu Z, Teng Y, Liu H, Jiang Y, Xie X, Li H, Lv J, Gao L, He J, Shi X, Tian F, Yang J, Xie C. Simultaneous detection of three fish rhabdoviruses using multiplex real-time quantitative RT-PCR assay. *J Virol Methods* 2008; 149: 103-109.
12. Lyngstad TM, Hellberg H, Viljugrein H, Bang Jensen B, Brun E, Sergeant E, Tavornpanich S. Routine clinical inspections in Norwegian marine salmonid sites: A key role in surveillance for freedom from pathogenic viral haemorrhagic septicaemia (VHS). *Prev Vet Med* 2016; 124: 85-95.



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Figure 1. Sites screened for VHSV/IHN in 2018. 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.

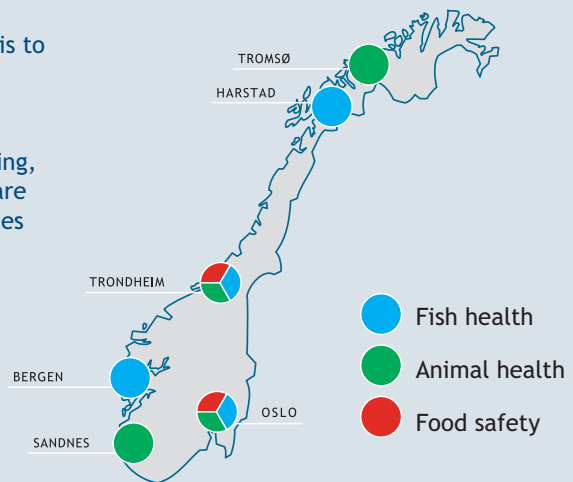
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