

Rapport 25 – 2025



The surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) in Norway 2024

## REPORT 25/2025 The surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) in Norway 2024

#### Authors

Torfinn Moldal, Kaia Haugbro Dybdahl, and Hege Løkslett

#### Suggested citation

Moldal, Torfinn, Dybdahl, Kaia Haugbro, Løkslett, Hege. The surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) in Norway 2024. Surveillance program report. Veterinærinstituttet 2025 © Norwegian Veterinary Institute, copy permitted with citation

#### Quality controlled by

Ingunn Sommerset, Director of Aquatic Animal Health and Welfare, Norwegian Veterinary Institute

#### Commissioned by

Norwegian Food Safety Authority



#### Published

2025 on www.vetinst.no ISSN 1890-3290 (electronic edition) © Norwegian Veterinary Institute 2025

#### Colophon

Cover photo: Rudolf Svendsen www.vetinst.no

# Content

Sammendrag	3
Summary	3
ntroduction	3
Aim	3
Vaterials and methods	4
Results and Discussion	4
Acknowledgements	5
References	5

## Sammendrag

Overvåkingsprogrammet har en risikobasert tilnærming. Kjerneaktiviteten er rutinemessige kliniske inspeksjoner på lokaliteter med oppdrett av atlantisk laks og regnbueørret og undersøkelser av prøver tatt fra syke fisk. Prøver fra rensefisk samt regnbueørret og brunørret fra ferskvannslokaliteter er også inkludert. Viral hemoragisk septikemivirus og infeksiøst hematopoetisk nekrosevirus ble ikke påvist i noen av prøvene som ble undersøkt i 2024.

## Summary

This surveillance programme has a risk-based approach. The core surveillance activity is the routine clinical inspections on sites with farmed salmonids and analyses of samples collected from diseased fish. Samples from cleaner fish as well as rainbow trout and brown trout from freshwater sites are also included. Viral haemorrhagic septicaemia virus and infectious haematopoietic necrosis virus were not detected in any of the samples tested in the 2024.

## 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 (*Oncorhynchus mykiss*), 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 for the established containment area was temporarily suspended (5, 6). Measures to eliminate the disease and prevent its spread were immediately taken by the Norwegian Food Safety Authority. In 2011, the containment area regained its free status.

Outbreaks of IHN have caused significant economic losses in farmed rainbow trout as well as Atlantic and Pacific salmon in North America and Europe, and the disease has an impact on wild populations of Pacific salmon (7). IHN-virus (IHNV) was detected for the first time in Finland in 2017 and in Estonia in 2018. In 2021, IHNV was detected at 11 sites in Denmark and subsequently at sites in Åland in Finland due to imports from Denmark. Denmark gave up the free-status for IHN in December 2021, and several new outbreaks were reported in the country in 2022, while one outbreak was reported in Denmark in 2023. The virus has never been detected in Norway, but the recent detections in Denmark and Finland are worrying.

The Norwegian Veterinary Institute coordinates the surveillance programme and performs the analyses. The results are continuously updated at site level through a digital data-sharing portal (the EOS-portal). Staff in the Norwegian Food Safety Authority has access to the portal.

## Aim

The aim of the programme is to document the absence or any emergence of VHS-virus (VHSV) and IHN-virus (IHNV) in salmonids in Norway.

## Materials and methods

The surveillance programme has a risk-based approach (8), where the core surveillance activity is the routine clinical inspections on sites with farmed Atlantic salmon (*Salmo salar*) and rainbow trout (*Oncorhynchus mykiss*) carried out by the fish health personnel (FHP) and laboratory investigation of diseased fish. The FHP are performing health controls based on the risk of infections, stress and increased mortality (9). Samples for the surveillance programme were selected among those that were received at the Norwegian Veterinary Institute for diagnostics and surveillance for other diseases as infectious salmon anaemia and pancreas disease. In general, five samples from Atlantic salmon and ten samples from rainbow trout at each site were analysed.

In addition, the Norwegian Food Safety Authority sampled rainbow trout and brown trout (*Salmo trutta*) at freshwater sites in the southeast of Norway exclusively for the surveillance programme. Furthermore, a small number of samples from ballan wrasse (*Labrus bergylta*), used as cleaner fish for biological delousing farmed salmonids, were included. The number of samples that were analysed for IHNV and VHSV, as well as the number of sites from where the samples originated, are outlined for each species in Table 1. The geographical location of the sites are shown in Figure 1.

Table 1. The number of samples that were analysed for IHNV and VHSV as well as the number of sites from where the samples originated.

Species	IHNV	VHSV	Sites
Atlantic salmon	364	364	71
Rainbow trout, marine sites	147	147	15
Rainbow trout, freshwater sites	60	60	2
Brown trout, freshwater sites	90	90	3
Ballan wrasse	4	4	1
	665	665	

Samples on RNAlaterTM submitted to the NVI were routinely processed and analysed for VHSV and IHNV by realtime RT-PCR with VHSV primers and probe from Jonstrup et al. (2013) and IHNV primers and probes modified from Liu et al. (2008), Cuenca et al. (2020) and Hoferer et al. (2019), respectively (10-14).

## **Results and Discussion**

VHSV and IHNV were not detected in any of the samples in the surveillance program in 2024.

The performance of the routine clinical inspections in surveillance for freedom from VHS was evaluated in 2016, using a stochastic simulation model (15). Model results indicate that the current surveillance system, based on routine inspections by the FHP, 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 of samples actually are submitted and that 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.

## Acknowledgements

The authors would like to thank the fish health personnel and the Norwegian Food Safety Authority for sampling farmed salmonids and ballan wrasse and staff at the Norwegian Veterinary Institute for performing the analyses with excellence.

# References

- 1. WOAH, 2023. Aquatic Manual Online Access WOAH World Organisation for Animal Health (Accessed 14.04.2025).
- 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: 611-619.
- 3. Lumsden JS, Morrison B, Yason C, Russell S, Young K, Yazdanpanah A, Huber P, Al-Hussinee L, Stone D, Way K. Mortality event in freshwater drum Aplodinotus grunniens from Lake Ontari, 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.
- 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). Report 15/2010, Norwegian Veterinary Institute.
- 9. Ministry of Trade Industry and Fisheries, 2008. <u>Forskrift om drift av akvakulturanlegg (akvakulturdriftsforskriften) Lovdata</u> (accessed 14.04.2025).
- 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 heamorragic sepcaemia 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. Cuenca A, Vendramin N, Olesen NJ. Analytical validation of one-step realtime RT-PCR for detection of infectious hematopoietic necrosis virus (IHNV). Bull Eur Ass Fish Path 2020; 40: 261-272.
- 13. Hoferer M, Akimkin V, Skrypski J, Schütze H, Sting R. Improvement of a diagnostic procedure in surveillance of the listed fish diseases IHN and VHS. J Fish Dis 2019; 42: 559-572.
- 14. Cuenca A, Vendramin N, Olesen NJ. DIAGNOSTIC METHODS AND PROCEDURES FOR THE SURVEILLANCE AND CONFIRMATION OF INFECTION WITH VHSV AND IHNV v2021.2. Available from Diagnostic Manuals EURL Fish & Crustacean Diseases (eurl-fish-crustacean.eu) (accessed 14.04.2025).
- 15. 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.

# Health and well-being for animals and people



Ås • Sandnes • Bergen • Trondheim • Harstad • Tromsø

postmottak@vetinst.no vetinst.no