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The surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) in Norway 2022

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Content

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 2022.

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 (NFSA). In 2011, the relevant fjord 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. The virus has never been detected in Norway, but the recent detections in Denmark and Finland are worrying.

The Norwegian Veterinary Institute (NVI) coordinates the surveillance programme and publishes the overall results in annual reports available on VHS og IHN hos fisk (vetinst.no). All samples are analysed at the NVI. The results are continuously updated at site level through a digital data-sharing portal (the EOS-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 suspicious samples. The FHP are performing health controls based on the risk of infections, stress and increased mortality (9).

In addition, the NFSA sampled rainbow trout at marine sites to increase the number of samples from this species as well as rainbow trout in freshwater sites from Innlandet county and brown trout (*Salmo trutta*) from sites in the most southern part of Norway. A small number of samples from lumpfish (*Cyclopterus lumpus*) and ballan wrasse (*Labrus bergylta*) used as cleaner fish for biological delousing farmed salmonids were also examined. 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 displayed 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	258	258	51
Rainbow trout, marine sites	150	150	18
Rainbow trout, freshwater sites	210	210	7
Brown trout	70	70	3
Lumpfish	30	30	3
Ballan wrasse	3	3	1
	721	**721**	**81**

Samples on RNAlater™ submitted to the NVI were routinely 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 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 2022.

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 that 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.

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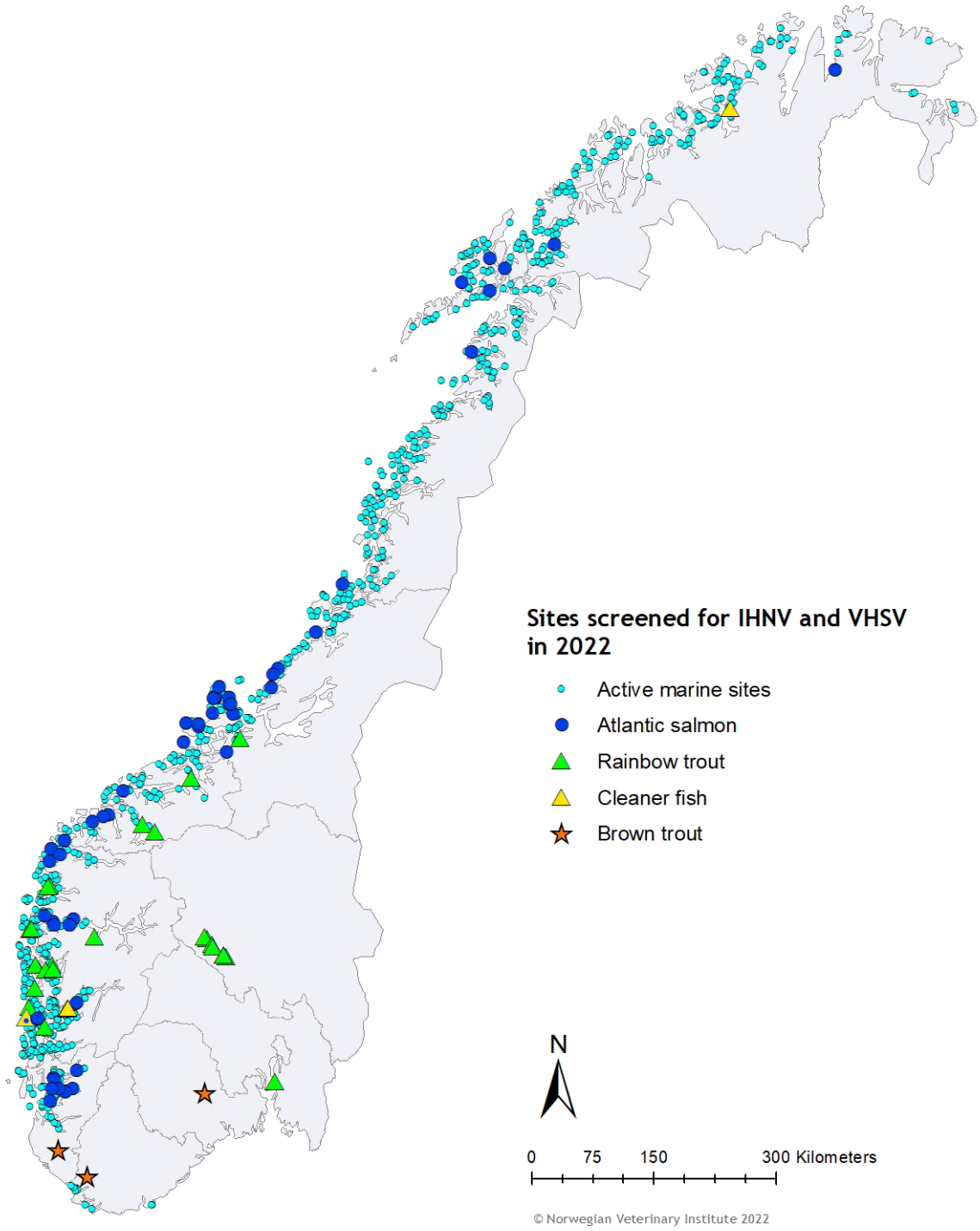
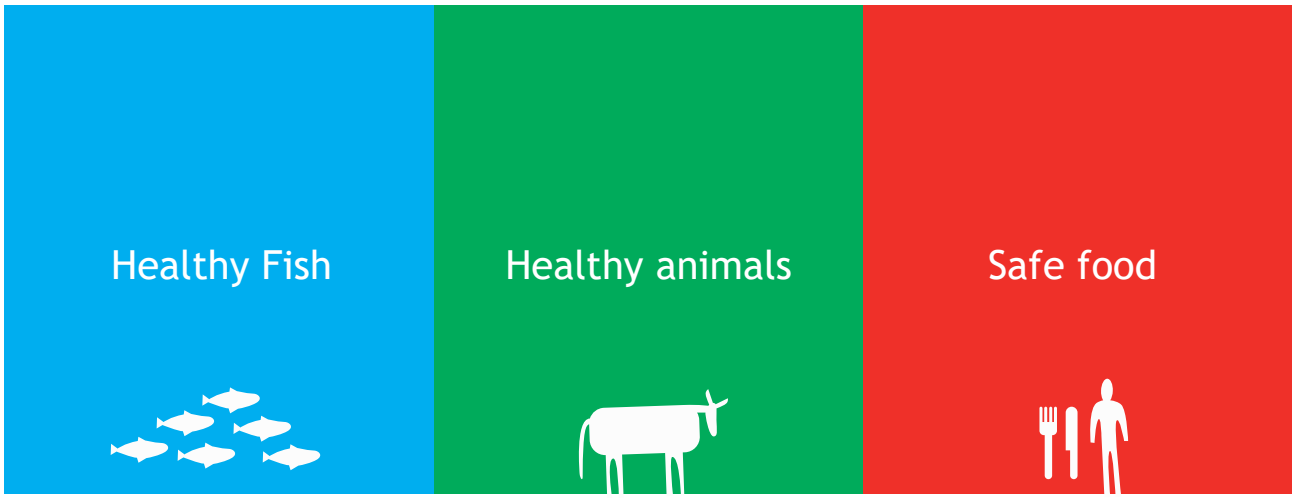


***Figure 1**: Sites screened for VHSV and IHNV in 2022. All marine sites with Atlantic salmon or rainbow trout that have been active for at least three months are also marked. Courtesy to Attila Tarpai.*



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