# Surveillance program with focus on certain fish diseases involved in disease-free status of Iceland

Sampling plan

**2026**

# Table of content



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# Disease-free status for Iceland

Pursuant to Article 280(1) of Regulation (EU) 2016/429 and Article 84(1) of Delegated Regulation (EU) 2020/689, the before existing disease-free statuses for Iceland were deemed approved in accordance with those Regulations.

## 1. Disease-free statuses currently in force in Icelandic aquaculture

### 1.1. IHN disease-free status – the whole territory of Iceland

As first adopted by the EFTA Surveillance Authority's in College Decision No. 227/04/COL, dated 9 September 2004 and confirmed again under College Decision No. 036/16/COL, dated 9 February 2016.

### 1.2. VHS disease-free status – certain compartments in Iceland

MAST´s application and Declaration of a VHS disease-free status of indipendent compartments in accordance with Council Directive No. 2006/88 was sent to the Authority on 25 November 2015 and entered into force on 2 May 2016.

The declared VHS-free indipendent compartments are the following three farming sites belonging to the Atlantic salmon breeding farm of Benchmark Genetics Iceland hf.: **Vogavík**, **Kalmanstjörn** and **Kollafjörður**.

### 1.3. ISA (HPR-deleted) disease-free status – certain compartments in Iceland

MAST´s application and Declaration of an ISA disease-free status of indipendent compartments in accordance with Council Dir. 2006/88 was sent to the Authority on 22 March 2013 and entered into force on 7 July 2013.

The declared ISA-free (HPR-deleted) indipendent compartments are the following three farming sites belonging to the Atlantic salmon breeding farm of Benchmark Genetics Iceland hf.: **Vogavík**, **Kalmanstjörn** and **Kollafjörður**.



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## 2. The aim of the control program

The purpose of the official surveillance program is to document the absence of IHN in the entire territory of Iceland and to maintain a status free from VHS and from infection with HPR-deleted ISAV in certain indipendent compartments of salmon broodfish farms. Some countries within the EEA (or parts thereof) have been given approval for national measures for Bacterial kidney disease (BKD), in accordance with the Commission Implementing Decision (EU) 2021/260. Targeted surveillance with regular sampling for BKD is an absolute demand for the farming sites within the ISA-free compartments that want to export to countries with these national measures for BKD.

# Introduction

## 3. Materials and methods

All Icelandic fish farms have been included in the official national health control program since 1985. Screening of important virus and bacterial agents causing serious infectious diseases like *Infectious salmon anaemia* (ISA), *Viral haemorrhagic septicaemia* (VHS), *Infectious haematopoietic necrosis* (IHN) and *Bacterial kidney disease* (BKD) have been a big part of the surveillance program since the very beginning. The official surveillance also includes farms raising wild salmonids for restocking of rivers and lakes. This surveillance program has a risk-based approach, but the main focus is put on the broodfish farms. Infections which can be latent and diseases which do not have clear clinical symptoms are monitored by routine sampling.

From 1993 European Union (EU) Directives on disease control measures have been followed. The surveillance is partly by regular on-site health inspections, under the supervision of the Veterinary Officer for Aquatic Animals, and partly by laboratory work conducted at the National Reference Fish Disease Laboratory at Keldur in Reykjavík (NRL). The NRL in Reykjavík has a close inter-laboratory collaboration with the EU Reference Laboratory on virus diseases in Denmark. In addition, a big part of the diagnostic services is performed by the Food and Veterinary Authority, Department of Fish and Animal Diseases in Torshavn, Faroe Islands and to some extent also by PatoGen Analyse A/S in Norway. All used laboratories are approved and accredited by an ILAC accredited agency to ISO 17025.

The sampling and diagnostic methods regarding viral examination are carried out along the lines given in the Commission Delegated Regulation (EU) N° 2020/689, including relevant amendments. Until spring 2009 the diagnostic methods were mainly based on culture on EPC, BF-2 and CHSE-214 cell-lines in the routine screening, in addition with clinical signs, gross pathology and histopathological examination of vital organs. From 1991 to 2025, the ELISA method was used for the detection of BKD (*Renibacterium salmoninarum*). From 2025 onwards, qPCR has been applied, with sequencing used for confirmation. Since 2009 more and more routine samplings from farmed and wild fish are analysed by qPCR technique.



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# Monitoring of certain fish diseases by systemic sampling of farmed and wild fish population in Iceland

## 4. Disease-free status from Infectious haematopoietic necrosis (IHN)

**Territory:** whole territory of Iceland

**Period, date of change of status and/or other comment**: as first adopted by the EFTA Surveillance Authority's in College **Decision No. 227/04/COL**, on 9 September 2004 and confirmed again under College **Decision No. 036/16/COL**, on 9 February 2016.

IHN has never been detected in Iceland. It is a notifiable disease, according to the Icelandic Act no. 25/1993 *on animal diseases and measures to control them*.

Routine targeted samplings have been performed since 1985, both from wild and farmed salmonids. Iceland obtained formally disease-free status for IHN by the fish health authority of the European Union in 2004. Since 2017, IHN samples have also been analyzed by RT-qPCR, in addition to culture on cell-lines (table 1 and 3).

### 4.1. Sampling plan for IHN in 2026

500 samples tested by qPCR and 1.000 samples examined with culturing on cell-lines.

**Table 1.** *Number of samples analyzed for **IHNV (qPCR)**:*

| Year | Number of individuals sampled | Number of farms sampled | Number of negative samples | Number of positive samples |
|---|---|---|---|---|
| **2017** | 22 | 2 | 22 | 0 |
| **2018** | 636 | 3 | 636 | 0 |
| **2019** | 228 | 3 | 228 | 0 |
| **2020** | 481 | 3 | 481 | 0 |
| **2021** | 209 | 3 | 209 | 0 |
| **2022** | 483 | 6 | 483 | 0 |
| **2023** | 583 | 4 | 583 | 0 |
| **2024** | 432 | 3 | 432 | 0 |
| **2025** | 626 | 3 | 626 | 0 |

Diagnostic method: qPCR.
Laboratory: Institute for Experimental Pathology at Keldur in Reykjavik, Iceland and Food & Veterinary Agency, Department of Fish & Animal Diseases in the Faroe Islands.

## 5. Disease-free status from Viral haemorrhagic septicaemia (VHS)

**Territory:** compartments

The declared VHS-free indipendent compart-ments are the following three farming sites belonging to the Atlantic salmon breeding farm of Benchmark Genetics Iceland hf.: Vogavík, Kalmanstjörn and Kollafjörður.

**Period, date of change of status and/or other comment**: MAST´s Declaration of a VHS disease-free status of compartments in accordance with Council Directive No. 2006/88 was sent to the Authority on 25 November 2015 and entered into force on 2 May 2016.



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Pursuant to Article 280(1) of Regulation (EU) 2016/429 and Article 84(1) of Delegated Regulation (EU) 2020/689, the before existing disease-free statuses for Iceland were deemed approved in accordance with those Regulations.

VHS is a notifiable disease, according to the Icelandic Act no. 25/1993 *on animal diseases and measures to control them*. Routine targeted samplings have been performed since 1985.

VHS-virus was for the first time detected in lumpfish of wild origin in Iceland in October 2015. The detection was made in a marine research farm owned by the Icelandic state and had no connection to the salmonid aquaculture. The lumpfish VHS-virus was sequenced by the European Reference Laboratory for Fish Diseases in Denmark and blasted towards other known genotypes. The results showed a totally new appearance of VHSV subtype, most likely a highly host specific and a unique variant for lumpfish.

Iceland obtained formally disease-free status for VHS by the fish health authority of the European Union in 2004. Following the virus detection in the wild lumpfish in 2015 the disease-free status was temporarily suspended. After stamping out of the lumpfish in the respective landbased research farm, Icelandic authorities started up with a new process of achieving VHS-free status. At that time, the authority decided to declare the three indipendent compartments of the broodfish farms breeding Atlantic salmon in the country. This recognition was confirmed on 2 May 2016. Since 2017, VHS samples have also been analyzed by qPCR, in addition to culture on cell-lines (table 2 and 3).

### 5.1. Sampling plan for VHS in 2026

1.000 samples tested by qPCR and 1.000 samples examined with cultured cell-lines.

**Table *2.*** *Number of samples from VHS-free compartments analyzed for* ***VHSV (qPCR)****:*

| Year | Number of individuals sampled | Number of farms sampled | Number of negative samples | Number of positive samples |
|---|---|---|---|---|
| **2017** | 206 | 3 | 206 | 0 |
| **2018** | 743 | 3 | 743 | 0 |
| **2019** | 360 | 3 | 360 | 0 |
| **2020** | 666 | 3 | 666 | 0 |
| **2021** | 270 | 3 | 270 | 0 |
| **2022** | 459 | 3 | 459 | 0 |
| **2023** | 572 | 3 | 572 | 0 |
| **2024** | 657 | 3 | 657 | 0 |
| **2025** | 847 | 3 | 847 | 0 |

Diagnostic method: qPCR.
Laboratory: Institute for Experimental Pathology at Keldur in Reykjavik, Iceland and Food & Veterinary Agency, Department of Fish & Animal Diseases in the Faroe Islands.



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**Table 3.** *Number of samples analyzed for **IHNV** and **VHSV** since 1985 (**cell-culture**):*

| Year | Number of individuals sampled | Number of Farms sampled | Number of positive farms |
|---|---|---|---|
| **1985** | 1.214 | - | 0 |
| **1986** | 5.591 | - | 0 |
| **1987** | 9.121 | - | 0 |
| **1988** | 10.503 | - | 0 |
| **1989** | 4.854 | - | 0 |
| **1990** | 6.831 | - | 0 |
| **1991** | 5.603 | - | 0 |
| **1992** | 2.763 | - | 0 |
| **1993** | 949 | - | 0 |
| **1994** | 610 | 16 | 0 |
| **1995** | 775 | 18 | 0 |
| **1996** | 601 | 17 | 0 |
| **1997** | 945 | 21 | 0 |
| **1998** | 806 | 19 | 0 |
| **1999** | 860 | 17 | 0 |
| **2000** | 696 | 15 | 0 |
| **2001** | 706 | 15 | 0 |
| **2002** | 533 | 12 | 0 |
| **2003** | 885 | 13 | 0 |
| **2004** | 1.109 | 16 | 0 |
| **2005** | 725 | 13 | 0 |
| **2006** | 524 | 13 | 0 |
| **2007** | 669 | 16 | 0 |
| **2008** | 812 | 15 | 0 |
| **2009** | 963 | 15 | 0 |
| **2010** | 1.220 | 13 | 0 |
| **2011** | 310 | 12 | 0 |
| **2012** | 335 | 12 | 0 |
| **2013** | 394 | 12 | 0 |
| **2014** | 432 | 12 | 0 |
| **2015** | 753 | 13 | 1* |
| **2016** | 1.155 | 12 | 0 |
| **2017** | 1.127 | 13 | 0 |
| **2018** | 966 | 12 | 0 |
| **2019** | 1.178 | 13 | 0 |
| **2020** | 1.509 | 11 | 0 |
| **2021** | 1.046 | 13 | 0 |
| **2022** | 935 | 12 | 0 |
| **2023** | 1.002 | 11 | 0 |
| **2024** | 836 | 13 | 0 |
| **2025** | 1034 | 15 | 0 |

* VHS-virus positive lumpfish of wild origin in 1 farm.
Diagnostic method: EPC and BF-2 cell-lines are used routinely.
Laboratory: Institute for Experimental Pathology at Keldur in Reykjavik, Iceland.



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## 6. Disease-free status from infection with highly polymorphic region deleted Infectious salmon anaemia virus (HPR-deleted ISAV)

**Territory:** compartments

The declared ISA-free (ISAV HPR-deleted) indipendent compartments are the following three farming sites belonging to the Atlantic salmon breeding farm of Benchmark Genetics Iceland hf.: Vogavík, Kalmanstjörn and Kollafjörður.

**Period, date of change of status and/or other comment**: MAST´s Declaration of an ISA (HPR-del) disease-free status of compartments in accordance with Council Dir. 2006/88 was sent to the Authority on 22 March 2013 and entered into force on 7 July 2013.

Pursuant to Article 280(1) of Regulation (EU) 2016/429 and Article 84(1) of Delegated Regulation (EU) 2020/689, the before existing disease-free statuses for Iceland were deemed approved in accordance with those Regulations.

Infection with ISAV is listed by the World Organisation for Animal Health (WOAH), and ISAV HPR-deleted (HPR-del) is a notifiable disease within the EU and under Icelandic Act No. 25/1993 *on Animal Diseases and Measures to Control Them.* There are two main types of ISAV; one virulent type with varying pathogenicity associated with ISA outbreaks termed HPR-deleted ISAV (ISAV HPR-del) and the other type regarded as non-pathogenic, causing subclinical infections, termed ISAV HPR0. Positive testing for ISAV-HPR0 is not notifiable according to the EU legislation. The disease was described for the first time in Atlantic salmon (*Salmo salar*) in Norway in 1984 and has since been reported in several countries: UK, USA, Canada, Faroe Island, Chile and now also in Iceland.

ISA (HPR-del) was for the first time detected in a sea-cage farm on the east coast of Iceland in late November 2021. The second outbreak occurred within the same company, but in a neighboring fjord system in May 2022. Infection tracing and sequencing of the virus revealed that the first outbreak was so called primary outbreak, due to a mutation of a local non-pathogen ISAV-HPR0 variant. The virus isolates from the second outbreak were identical to previously sequenced isolates from the first outbreak. The location of the sea-cage farming sites on the east coast is far away from the landbased and closed farm sites belonging to Benchmark Genetics Iceland. There are no contacts or relationship between those two companies. The broodfish sites of Benchmark are located close to the capital city of Reykjavík on the southwest of Iceland, approx. 700 km away from the ISAV detection on the east coast of Iceland (Image 1). The salmon in the affected area was stamped out and for security reasons the fish in the whole fjord system were slaughtered and the area put on at least 90 days fallowing period.

Benchmark Genetics Iceland hf. is the only broodfish farm of origin which is approved for exporting live Atlantic salmon eyed eggs from Iceland. The farm has a history of being free of notifiable virus diseases since founded in 1991. But, with intensive viral screening of the broodstock some few samples have been found to be positive for the non-pathogen ISAV (HPR**0**). It must be emphasized that the Icelandic strain of the HPRO variant has never been detected by sequential examination in other countries, despite extensive export of eyed salmon eggs throughout the world since 1996. However, all eggs and milt from these parents are being destroyed by an official veterinarian for security reasons. In this context, it is worth emphasizing that Benchmark Genetics Iceland´s broodstock sites are being visited almost weekly all year around by a fish health veterinarian in connection with the stripping which gives a possibility



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to monitor the development of fish health in the core establishments distributing eggs to domestic and foreign companies. That close contact to the fish, opening almost every single male and female, gives the authority valuable information about the general health situation at any time.

### 6.1. Sampling plan for ISAV in 2026

1.200 samples tested by qPCR.

**Table *4.*** *Number of samples from the three indipendent compartments of Benchmark Genetics Iceland analyzed for* ***ISAV****:*

| Year | Number of individuals sampled | Number of HPR0 positive samples* | Number of HPR-deleted positive samples |
|---|---|---|---|
| **2011** | 8.206 | 67* | 0 |
| **2012** | 8.230 | 52* | 0 |
| **2013** | 10.777 | 118* | 0 |
| **2014** | 10.310 | 60* | 0 |
| **2015** | 13.566 | 49* | 0 |
| **2016** | 12.794 | 39* | 0 |
| **2017** | 12.396 | 31* | 0 |
| **2018** | 10.246 | 55* | 0 |
| **2019** | 6.793 | 12* | 0 |
| **2020** | 6.491 | 4* | 0 |
| **2021** | 7.681 | 21* | 0 |
| **2022** | 11.722 | 25* | 0 |
| **2023** | 12.063 | 9* | 0 |
| **2024** | 13.253 | 3* | 0 |
| **2025** | 10.733 | 8* | 0 |

* Low/non-pathogen ISAv (HPR0).
Diagnostic method: qPCR.
Laboratory: Institute for Experimental Pathology at Keldur in Reykjavik, Iceland and Food & Veterinary Agency, Department of Fish & Animal Diseases in the Faroe Islands.

## 7. Bacterial kidney disease (BKD)

Bacterial kidney disease, caused by *Renibacterium salmoninarum*, has a sporadic occurrence in Iceland since first diagnosed in 1968.

It is a notifiable disease, according to Act no. 25/1993 *on animal diseases and measures to control them*.

Routine samplings have been performed since 1985. All Atlantic salmon breeding farms in Iceland have been BKD-free since founded. Breeding farms have, in conjunction with the surveillance in ISA-free compartments, also performed intensive targeted surveillance for *R. salmoninarum*. Some countries within the EEA have been given approval for national measures for BKD by the fish health authority of the European Union. In order to export salmon eggs to these countries, targeted surveillance with regular sampling for BKD must be conducted in an ISA-free compartment/zone.

### 7.1. Sampling plan for BKD in 2026

Atlantic salmon in breeding farms: 3.100 samples tested by qPCR.



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**Table 4.** *Number of samples from the three indipendent compartments of Benchmark Genetics Iceland analyzed for* ***BKD:***

| Year | Number of individuals sampled | Number of farms sampled | Number of positive samples |
|---|---|---|---|
| **2011** | 1.447 | 3 | 0 |
| **2012** | 820 | 3 | 0 |
| **2013** | 923 | 3 | 0 |
| **2014** | 1.446 | 3 | 0 |
| **2015** | 1.609 | 3 | 0 |
| **2016** | 702 | 3 | 0 |
| **2017** | 2.336 | 3 | 0 |
| **2018** | 2.114 | 3 | 0 |
| **2019** | 2.612 | 3 | 0 |
| **2020** | 2.769 | 3 | 0 |
| **2021** | 2.199 | 3 | 0 |
| **2022** | 3.322 | 3 | 0 |
| **2023** | 4.063 | 3 | 0 |
| **2024** | 5.462 | 3 | 0 |
| **2025** | 4.630 | 3 | 0 |

Diagnostic method: qPCR.
Laboratory: Institute for Experimental Pathology at Keldur in Reykjavik, Iceland and Food & Veterinary Agency, Department of Fish & Animal Diseases in the Faroe Islands.

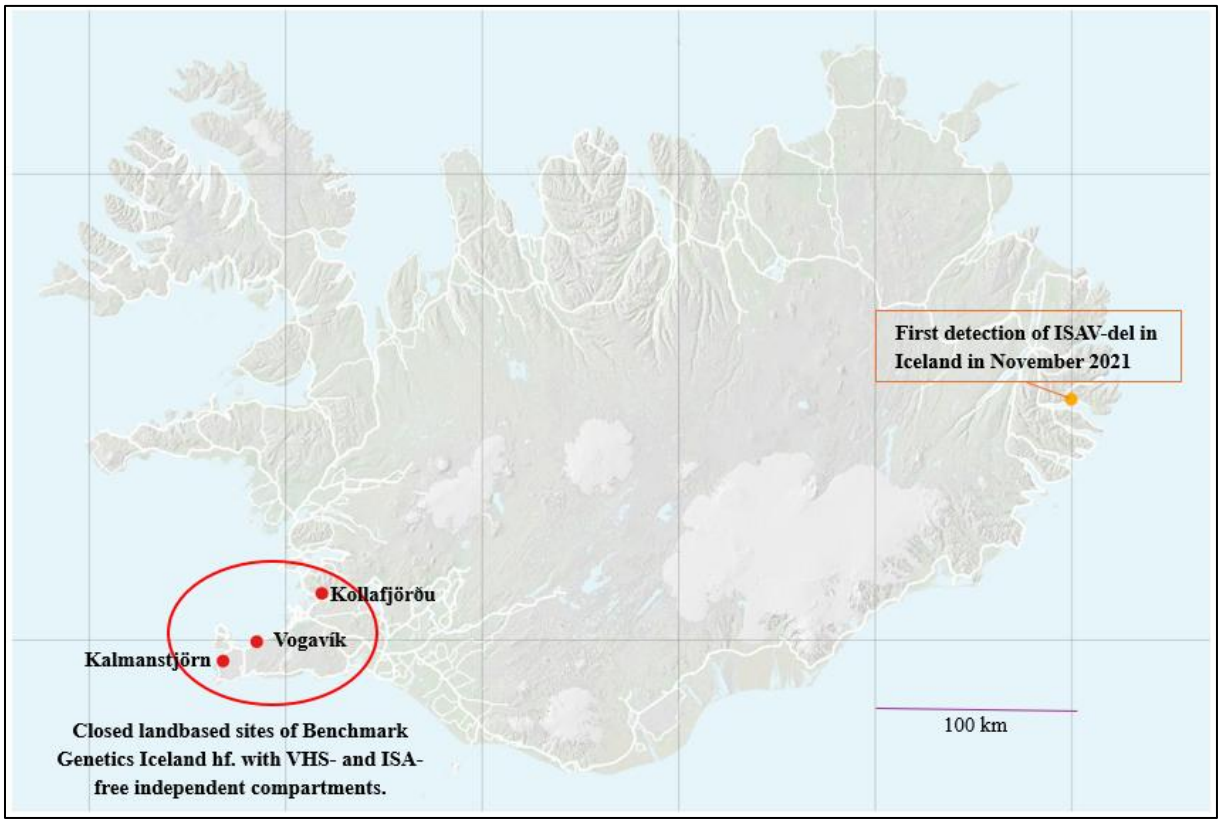


**Image 1.** *Map of Iceland showing the disease-free compartments of Benchmark Genetics Iceland and the fjord where the first ISAV detection occurred.*



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