

# Report on Survey and Diagnosis of Fish Diseases in Europe 2015

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## Introduction

This report is based on the data from the questionnaire on Survey and Diagnosis of the listed fish diseases in Europe for 2015.

These questionnaires have been conducted every year since 1995! It was therefore considered if it should continue the same way or be changed into alternative and more appropriate forms for collating the necessary data. The questionnaires did provide a lot of important data, but during all the years it was our hope to finally being able to obtain and present an exact picture of the fish diseases situation in Europe. This has unfortunately failed as the number of de-facto KHV, VHS or IHN infected farms in continental Europe is still unknown. We have therefore taken the consequences this year and reduced the questionnaire considerably by removing many questions and just retaining a limited number of the most important questions.

In supplement to the shortened questionnaire we asked each NRL to give us a written report on 1) the aquaculture production, 2) the health status as regard the listed diseases and 3) other diseases in the respective countries. Most of the countries replied with very comprehensive reports giving a direct access to information from each country. All the National reports have thus been collated and are presented in this document.

The general data on aquaculture production in Europe have this year been taken from "[European aquaculture production report 2005-2014](#)" Prepared by the FEAP secretariat August 2015 from where it can be downloaded. As this report does not include number of active fish farms in each country these numbers were asked for and can be seen in Annex 1. The Number of farms placed in category I-V according to non-exotic listed diseases has been collated as well and is given in Annex 2. And the number of disease outbreaks and respective comments is given in Annex 3.

The Questionnaire on Surveillance and Diagnosis (S&D) which is collated annually is the only comprehensive overview of the disease situation in aquaculture in Europe. The information has been made available on the EURL web site ([www.eurl-fish.eu](http://www.eurl-fish.eu)), where all raw data can be obtained. The S&D have changed significantly since last year. The reason for this is that we have realised that it is not possible to obtain an exact knowledge on the de facto prevalence, spreading and severity of the listed non-exotic fish diseases in Europe. The questionnaire, however, still comprise 3 parts:

1. General data on aquaculture fish production: Number of fish farms, and the health categorization according to Council Directive 2006/88/EC, and information on national surveillance programmes.
2. Epidemiological data on the disease situation in each Member State with focus on the listed diseases (information on number of out breaks and increase or decrease in number of infected farms and severity of outbreaks) but also including other diseases of interest.
3. Laboratory data from the NRLs and other laboratories, including the numbers of samples examined, and diagnoses of fish diseases made.

## Production data from FEAP

The data on the European aquaculture production was this year obtained from the "European aquaculture production report 2005-2014" Prepared by the FEAP secretariat August 2015. We validated the data against the FIGIS database and concluded that they were almost identical except for the common carp production estimated by FEAP to be only 1/3 of the production data we obtained from FIGIS. The report does not include information

on the number of fish farms, and therefore these data were obtained directly in the questionnaire. The report only provides data until 2014. The total fish production in aquaculture in Europe increased again in 2014 after a decrease in 2013. The increase however is almost only due to increases in non-EU Member states. Among the Member states the production has been almost horizontal in the past 10 years. In 2014 the Atlantic salmon production, account for 1.55 mill ton against 1.43 mill ton in 2013, and is by far the largest contingency in Europe. The rainbow trout production is again below 400 000 t after steady increases in the previous years. The decrease is primarily due to reduced production of table size rainbow trout. After several years of increased production Turkey have experienced a significant reduction in 2014. The carp production is still mainly in the Eastern part of Continental Europe and is very stable with 57.000 t produced in all. Both the production of sea bream and especially sea bass also increased in the Mediterranean countries with a production of 146.000 t and 148.000 t, respectively. Among other fish species of interest are pike-perch (increase to 573t), eel (increase to 6.507 t from 4.017t in 2013), sturgeon (increase to 2.795t), turbot (decrease from 12.676t to 9.891t in 2013 and increase again to 10.787 in 2014), and halibut (1.600 t) the cod production have almost collapsed from 22.729t in 2009 to 3.310t in 2013. The production of cleaner fish as lumpfish for lice control is increasing significantly but the total production is not that easy to retrieve due to the many species involved in this industry. Pike-perch have still not yet obtained the expected impact, a large farm in Denmark started in 2015 might give promises of an increase of this production in future, the sturgeon production is still on growing and more attention regarding health management will be given to this species- ( see program for the 20<sup>th</sup> Annual Workshop).

### **Health categorization of fish farms:**

Many countries provided very clear and correct answers and almost all Member States did reply to the questionnaire when compared to the previous year's providing a rather complete overview of the status of fish health categorization in Europe. There was a significant increase in the reported number of farms in categorized zones and compartments (From 8.505 in 2012 to 14.508 in 2015 for VHS and from 7.360 in 2012 to 12.130 in 2015 for KHV!) this was especially due to Germany who successfully included almost all their farms in categorized zones.

76% of the authorised trout farms in Europe are situated in category III zones for VHS and 74% for IHN, with 21% and 23% respectively in Category 1. For both diseases the remaining 3% of the farms are situated in category II, IV or V. In all countries except Norway almost all salmonid farms are in Category I for ISA with 64% in Category I and 35% in category III. Only very few carp farms are approved KHV free in Category I (1%) and almost all are placed in Category III (97%) or nor categorized.

There are still several different views on how categorisation shall be performed, e.g. should VHS free marine rainbow trout farms be placed in Category III or I? considering the risk of infection with VHSV from the marine environment.

Commission Decision 2015-1554 provide the guidelines for obtaining disease-free health statuses with regard to ISA and to contain infection with HPR deleted ISAV, saying that detection of Isavirus HPR0 will not compromise the health status of a fish farm. Some Member states do not include small registered APBs in the categorisation (e.g. hobby farms) but according to 2006/88/EC Annex III health categorisation comprise all APBs in the Member states, zones and compartments for each category. Only fish species listed as susceptible for the given listed disease shall be included in the categorization. Therefore important aquaculture species as sea bass, sea bream, meagre, eel and pike-perch are not included in the European health surveillance for specific diseases.

The new Animal Health Law has now been adopted and includes all aquatic animals; in this connection the categorisation system might be simplified and be made more transparent.

## Outbreaks and severity of listed diseases in Europe

Concerning the epidemiological data on the non-exotic diseases a moderate increase in the number of VHS infected farms were observed in Austria, Belgium, Bavaria, Rhineland-Palatine, Saxony, and Thuringia, whereas a decrease was observed in Czech Republic, no reports of changed severity of VHS was given except for pike infections in Austria. VHSV is regularly isolated from wild marine fish species, but it was anyway a big surprise and worrying that it appeared in wild caught lumpsuckers in Iceland, in brood fish that were caught for breeding of lumpsuckers as cleaner fish in the salmon industry. The isolate belong to VHSV genotype IV in a putative new subgroup.

For IHN an increase in number of infected farms were observed in Italy, Bavaria, and Baden-Württemberg. In Italy the severity of IHN seem to increase while a decrease in impact of IHN was observed in Baden-Württemberg.

For ISA Norway reported an increase in number of affected farms. The reason may be that infected smolts from one hatchery were transferred to three sea locations before the infection was detected. ISA was not seen outside Norway in 2015.

Concerning KHV Germany reported increases in number of infected farms in Bavaria, Lower Saxony, Rhineland-Palatina, and Saxony-Anhaltinia and a decrease Saxony. No other information on KHV in Europe were given.

## Other fish diseases problems in EU

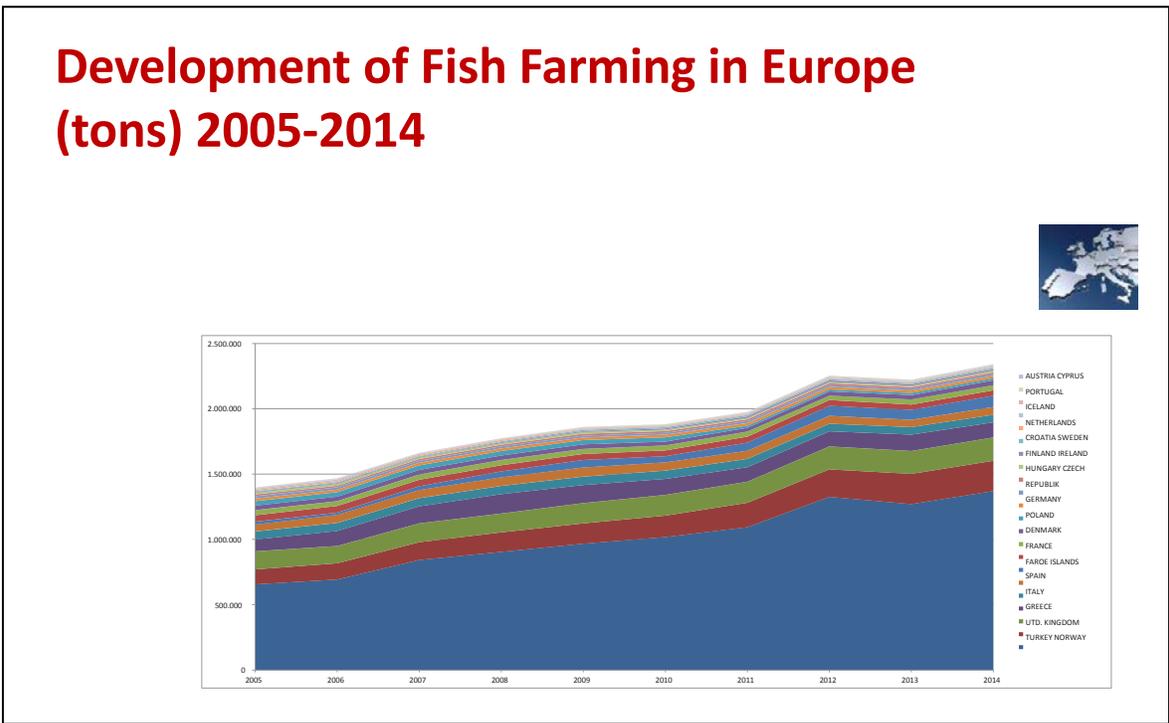
A whole range of other disease problems 2015 were reported:

- In rainbow trout the major concerns are flavobacteriosis (RTFS), enteric redmouth, and infectious pancreatic necrosis but also, lactococcosis, bacterial kidney disease, proliferative kidney disease, ichthyophthiasis, and furunculosis (especially in brown trout).
- In salmon farming it is sea lice, pancreatic disease, heart and skeletal muscle inflammation, cardiomyopathy syndrome, amoebic gill disease, and moritella.
- In cleaner fish it is primarily vibriosis and *A. salmonicida* infection giving problems
- In seabass and seabream it is primarily VER, Photobacteriosis, and Vibriosis (Annex 3)

In northern European countries the most common problems in the salmon production are thus sea lice, PD, and AGD, in addition several countries reported finding of Winter Ulcer Disease in salmon caused by *Moritella viscosa*. In continental Europe it is primarily bacterial diseases like ERM and Aeromonas infections, AGD and RTFS – but parasite infestations as Ich is still a very serious problem especially in view of the foreseen prohibition of use of formalin, while problems in the Mediterranean countries are the same as in continental except for Lactococcosis wich is more common in Southern Europe and Nodavirus infection in mariculture which definitely plays an important role and as a bottleneck for especially the seabass production.

There are very large differences between countries on how many samples are tested on cell cultures, ranging from < 100 to several thousands. Annex 5 provide the total number of laboratory examinations conducted in Europe in 2015 on VHSV, IHNV, ISAV, KHV, SVCV, CEV, IPNV, SAV, and Nodavirus, respectively

Total production of fish in aquaculture in Europe 2005 to 2014 (“European aquaculture production report 2005-2014”)



## Reports from the individual European countries



**Author/Institute:** Oskar Schachner

**Aquaculture production:** About 1.000 t carps, 2.000 t trout for consumption and restocking, mainly extensive flow –through ponds (carps) and basins, few single recirculation systems

**Health status:** 10 farms in category I declared VHSV- & IHNV-free, 1 farm in category II under VHSV-& IHNV surveillance, 74 trout farms and 38 carp farms in category III; Some stagnation of implementation, increasing contact avoidance of fish farmers.

Other disease problems: Inapparent *Tetracapsuloides bryosalmonis* manifestation in brown trout and single rainbow trout in open rivers



**Author/Institute:** CER Groupe, F.Lieffrig

**Aquaculture production:** In the Southern part of the country: mainly salmonid production in ponds and/or raceway. One sturgeon farm in recirculation system for caviar production. Development of grayling production. In the North part, mainly cyprinid production in ponds. Development of different RAS for pike-perch production.

**Health status:** In Southern part, all the salmonid fish farms are inspected twice a year and 30 fish are sampled for VHS and IHN research. If virus is isolated: stamping out. All the farms with 2 exceptions are recognized as being not infected. In North part, no mandatory control.



**Author/Institute:** Eterović Toni, Veterinary faculty in Sarajevo, Laboratory for Virology and Serology

**Aquaculture production:** Bosnia and Herzegovina is mostly mountainous country and is rich in rivers and clean water, and therefore possesses a huge potential for the development of aquaculture. Our country has, with its 21 km of coast, also access to the Adriatic Sea. Aquaculture in Bosnia and Herzegovina is mainly based on trout and carp farming and on the coast smaller production of sea bream and molluscs. Most of the trout farms breed rainbow trout, but mixed farms breeding brown, brook and softmouth trout are also widespread.

**Health status:** Annual monitoring program includes testing of all breeding salmonid farms for IHN and VHS salmonid farms and SVC in cyprinid farms. Fattening farms without breeding are not included in the surveillance. Because of the complicated government structure, farms are controlled by different levels of

government, and surveillance fully covers only farms dedicated for fish export. Import of spawn is not included under strict surveillance program. At the national level Bosnia and Herzegovina is classified as IHN/VHS free country.



**Author/Institute:** No information

### **Aquaculture production**

**Health status:**



**Author/Institute:** CROATIAN VETERINARY INSTITUTE, ZAGREB

**Aquaculture production:** Croatian aquaculture comprises freshwater species: salmonid aquaculture with rainbow trout (*Onchorhynchus mykiss*) and brown trout (*Salmo trutta m fario*) in mountain region. All farms are situated on the river sources. Fish are cultivated in raceways with annual production of 378 tons

Carps are cultivated in ponds from 0,5 to several hundred hectares in polyculture with other warmwater freshwater species in semi extensive mode of cultivation. Total annual amount is 3.808 tons

The most important branch of aquaculture is cultivation of European sea bass (*Dicentrarchus labrax*) with annual production of 3.500 tons and Gilthead sea bream (*Sparus aurata*) with annual production of 3.800 tons. Both species are cultivated in rectangular or circular cages of different sizes. There are 32 marine fish farms with production from 50 tons to 6.000 tons.

There are three tuna (*Thunnus thynnus*) farms where tunas are caught around Mediterranean area according to quotas determined by ICCAT (International commission for Conservation of Atlantic tunas) and put into cages for fattening.

**Health status:** The Ministry of Agriculture is issuing the “Decree on the measures of animal health protection against infectious and parasite diseases” where monitoring programs are determined. There were three monitoring programs in 2015 regarding fish diseases; surveillance of VHS/IHN, KHV and SVC. Regarding listed diseases there was still one farm where eradication program was not successful.

### **Other diseases and health related issues:**

The most import health issues that challenge Croatian aquaculture production are those related to marine fish production. The main problems are connected to bacterial diseases due to lack of vaccination procedures and vaccines mainly against tenacibaculosis and *Vibrio harveyi* infection. Another problem is related to ectoparasites namely *Ceratothoe oestroides* and *Lernanthropus kroyeri*. There are no authorised drugs against those parasitic diseases and farmers are trying to solve those problems using the drugs which are in use for salmonid sea lice.



**Author/Institute:** Veterinary Services

**Aquaculture production:** In 2015, there were in operation three marine fish hatcheries, one inland shrimp hatchery/ grow-out unit and nine private offshore cage grow-out units culturing mainly sea bass and sea bream. Additionally, there were in operation seven small fresh water aquaculture units, culturing mainly rainbow trout. Aquaculture production of table size in 2015 is estimated at about 6,292 tons with a value of approximately €32,7 million. Out of this production about 3,513 tons with a value of €15,5 million were exported. The fry production for 2015 reached about 34,3 million at a value of approximately €6.8 million. The total value of aquaculture production in 2015 is estimated at €39.5 million.

Additionally, aquaculture provides with a direct full employment to about 400 people and additionally contributes significantly in the creation of employment opportunities to other ancillary occupations.

It has to be noted that all aquaculture activities are carried out on an intensive bases.

**Health status:** There is an officially free status in Cyprus for the listed diseases of VHS and IHN according to council directive 2006/88/EC. The surveillance program is implemented on the 50% of the fish farms of each year.

**Other diseases and health related issues:**



**Author/Institute:** MVDr. Marie Vágnerová/State veterinary administration of the Czech Republic and Tomas Vesely (NRL, CEV note)

**Aquaculture production:** In the Czech Republic aquaculture production consist from ponds fish farming, salmonids fish farming and farming in fishing grounds.

The main part of the production is pond fish farming. Common carp (*Cyprinus carpio*) is the main fish species kept in these ponds (87% of total production). The salmonids fish farming forms 4 % of the production and production of herbivorous fish usually forms 5%. The rest of the production forms other fish species (tench, predatory fish).

The Czech pond fish farming has a long tradition and plays production role, role in drainage swampy areas and the important ecological and antliflooding role. On the territory of the Czech Republic, there are more than 24 thousand ponds (mostly artificial built in the 15th and 16th century) covering the area of about 51 thousand hectares.

Salmonid fish farming in the Czech Republic is in the recirculation systems or in the flow systems.

Farming in fishing grounds consists of river systems and maintaining fish communities in the localities, where recreational fishing is done by angling. In Czech Republic is proclaimed more than 2000 fishing grounds of the area approximately 42,000 hectares.

**Health status:** According to Council directive 2006/88/EC the Czech Republic has free health status for ISA and undetermined health status for VHS, IHN a KHV. At the national level the Czech Republic performs the monitoring program for VHS, IHN and KHV.

**Other diseases and health related issues:**

CEV was detected in one locality affected with mortality of carp. There was also demonstrated presence of SVCV same time.



**Author/Institute:** Henrik Korsholm DFVA, Niels Jørgen Olesen and Niccolò Vendramin DTU Veterinary

**Aquaculture production:** In Denmark there are approximately 250 active farms. 50% of these produce more than 100 t. per year.

The most farmed fish species in Denmark is rainbow trout. Approximately ½ of the production takes place in freshwater RAS (recirculating aquaculture systems) and aim to produce table size Rainbow trout. At the same time the seasonal production of large RT in Sea water for flesh and roe is developing and is expected to increase from 10.000 t presently produced.

Minor production of eel.

The knowledge and know how on recirculating systems has contributed to the startup of projects for producing for Atlantic salmon (up to 5.000 t), pike perch (1.000 t) and kingfish (up to 3.000 t).

**Health status:** All farms with susceptible species are inspected once per year by the veterinary authority. Samples for targeted surveillance are delivered to the NRL that perform accredited analysis for certifying freedom of listed diseases. All of Denmark is category I for IHN and ISA. From 31-12-2013 the whole continental area is category I for VHS while the marine environments all are category III for VHS.

At a national level Denmark conducts a plan for IPN, BKD and SVC freedom. The national plan relies on historical data and targeted surveillance.

**Other diseases and health related issues:**

With the exception of IPN for certain sites, no viral disease are detected in farmed fish.

Among bacterial diseases, rainbow trout fry syndrome caused by *Flavobacterium Psychrophilum* and Enteric Red Mouth caused by *Yersinia ruckerii* are considered relevant in freshwater phase, whereas clinical outbreaks

of furunculosis can occur in the saltwater production of rainbow trout. Of current interest is Red Mark Syndrome in Rainbow trout, with still unknown etiology. In 2015 Pike fry rhabdovirus was detected for the first time in farmed pike fry (*Esox Lucius*)

Estonia



**Author/Institute:** Olga Piirik Chief Specialist Animal Health Office Veterinary and Food Board

**Aquaculture production:** In 2015 there were 33 approved fish farms and 22 crustacean farms in Estonia for which the cultivation of aquatic organisms was the principally important activity (see Table 1 –Estonian approved fish farms in 2015). 22 rainbow trout farms (by location), three carp farms, two eel farms, five sturgeon farms, two arctic char farms, one European perch farm, one African catfish farm and two state-financed farms for the cultivation of salmonids for restocking operated in Estonia in 2015.

Aquatic organisms were produced in ponds, raceways and recirculation systems. Net pens were used only in fresh water, in a power plant effluent water channel.

Estonia's aquaculture production sales volume was about 870 tons in 2014, where the rainbow trout is the main fish species (80 % of fish production sales).

Estonian aquaculture is characterised by high fragmentation into many small-scale enterprises, different products and different production methods.

Some farms are simultaneously engaged in several areas, such as commercial fish farming, angling tourism and farming of fish for restocking purposes. Commercial fish farming comprises the most important part economically and is dominated by large red-flesh rainbow trout production. There are numerous owners of small ponds who farm fish or crayfish for fun or to obtain additional income and develop angling tourism. Also, juvenile fish are farmed for the purpose of restocking natural bodies of water.

There are over 60 fishing tourism enterprises in Estonia that buy fish from fish farms and offer angling services in their ponds. These enterprises fall into two categories: those that focus on quick servicing of passing tourists; and those that offer fishing opportunities alongside other farm tourism services. Estonia has plenty of small-scale fish farmers (over 200) whose production capacity is just a couple of hundred kilos or a few tonnes, but some of them have been registered as fish farming businesses. The number of fish farms changes rapidly, even within a single year, as some farms go out of business, while others begin construction activities but have yet to sell their production.

**Health status:** Due to the Implementation Measures of National Infectious Animal Disease Control Programmes in 2015 there were 16 fish farms which took part in surveillance for VHS/IHN (15 fish farms in Category II and 1 fish farm in category I), two fish farms took part in surveillance for KHV (category II).

**Other diseases and health related issues:**

Bacterial diseases – *Aeromonas spp.* Red mouth disease (*Yersinia ruckeri*) is suspected as a reason of abnormal mortality of juveniles of rainbow trout (University of Life Sciences).

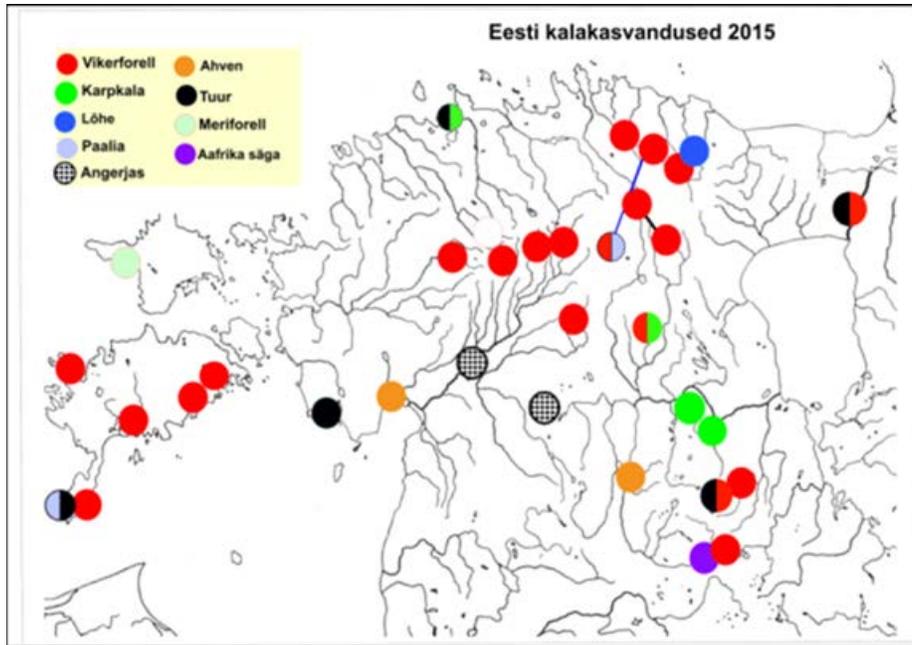


Table 1 Estonian approved fish farms in 2015.

Fish species in the table:

- |                  |                   |                    |
|------------------|-------------------|--------------------|
| 1) Rainbow trout | 4) Arctic char    | 7) Sturgeon        |
| 2) Carp          | 5) Eel            | 8) Brown trout     |
| 3) Salmon        | 6) European perch | 9) African catfish |

## Faroe Islands

**Author/Institute:** No information

**Aquaculture production:**

**Health status:**

**Other diseases and health related issues:**

## Finland

**Author/Institute:** Finnish Food Safety Authority Evira

**Aquaculture production:** In 2014, some 13.3 million kilograms of fish were cultivated for human consumption in Finland. This represented a decrease of some 0.3 million kilograms compared to 2013.

Some 12.4 million kilograms of rainbow trout were produced in 2014, representing over 90 per cent of all the edible fish produced in Finland. A little under 0.9 million kilograms of European whitefish were produced, representing a decrease of some 0.3 million kilograms compared to 2013.

A total of some 0.1 million kilograms of the other species of fish being farmed, including trout, arctic charr, sturgeon and pike perch, were produced.

Some 0.4 million kilograms of rainbow trout roe were produced for food.

As much as 86 per cent of the edible fish produced in Finland was bred in coastal areas.

In addition to fish consumed as food, fish is also farmed in order to be stocked in natural waters. Some 56 million specimens of fry and crayfish – excluding newly hatched individuals – were produced for the purposes of stocking and additional farming.

In 2014, a total of 322 fish farming businesses operated in Finland. These businesses included 446 functional fish farms or natural-food pond holdings.

RAS farms are getting more popular in Finland.

**Health status:** Finland has free status for IHN, ISA and SVC for the whole country, for VHS the whole country excluding Åland Islands, for IPN (genogroup 5) and SAV for continental area and for *G. salaris* for Northern Lapland. All the farms are in category III for KHV and WSD.

EHN, EUS, SVCV, IHN, KHV or ISAV has never been diagnosed in Finland. Also, 2015 was the third year in a row when no VHSV infections were detected in Åland Islands.

We have risk based surveillance system including inspections in all authorized farms (active surveillance) and regular sampling (targeted surveillance) for VHS, IHN, ISA, SAV, IPN and BKD in certain farms cultivating sensitive species. Sampling for *G. salaris* surveillance is carried out yearly in northern river catchments and in the one and only farm in *G. salaris* protection area. We do not have specific health surveillance meant in directive article 10. Communal veterinarians carry out both: official visits (article 7) and health surveillance (article 10). One visit comprises both purposes.

#### **Other diseases and health related issues:**

In 2015, infectious pancreatic necrosis virus (IPNV) was detected in 25 fish farms located both in the inland and the coastal area of Finland. The number of virus isolations was higher than compared to the previous couple of years. Most of the IPNV isolations were performed during risk based disease surveillance from fish with no signs of disease. In the few cases where mortalities were observed at the farm and the fish demonstrated typical histopathological changes associated with IPN, a bacterial infection was always found in addition to the IPNV infection.

The greatest number of bacterial infections leading to antibiotic treatment of farmed fish are infections caused by *Flavobacterium psychrophilum* and *F. columnare*. The situation has been similar for years. The infections are common in the fingerling production of rainbow trout in the inland waters of the country. So far the results of the sensitivity tests of the causative agents have been calming and resistance to the used antibiotics, oxytetracycline

and florfenicol, has been rare. The use of vaccines against *F. psychrophilum* has not gained wide use in the industry.

Other bacterial infections found in 2015 were *Aeromonas salmonicida* (both subsp *salmonicida* and atypical strains), *Yersinia ruckeri* (biotype 2 in the brackish water of the Baltic Sea coast of Finland and Åland Islands causing disease; biotype 1 in whole country and causing rarely disease), *Pseudomonas anguilliseptica* and *Vibrio anguillarum* causing a few clinical cases in the brackish water of the Baltic Sea coast of Finland and Åland Islands. Only 3 farms were diagnosed to have *Renibacterium salmoninarum* in 2015, all were subclinical cases. There is a voluntary program to combat BKD, which is paid by the farms belonging to it.

During the recent years *saprolegniosis* has caused great mortalities both at certain farms and wild fish in the country.



**Author/Institute:** ANSES Unité Pathologies Virales des Poissons

**Aquaculture production:** In France, the trout farming dominates production of continental fish farms with about 35,000 tons produced each year (Ministère de l'Agriculture, 2013). Rainbow trout represents 95% of this production. A total of 600 sites are active and correspond to 400 companies. Half of the production is carried out by two regions: Aquitaine and Brittany. The main part of this production (80%) is destined to human alimentation, the balance consisting of live fish for restocking rivers and recreational fishing.

The French marine fish farming consists of about sixty companies which produce about 9,000 tons of fish, more particularly sea bass (4,300 tons), sea bream (1900 tons) and salmon (1,500 tons), mainly intended to be exported. Sturgeon farming (200 tons) has been increasing in the past years, and might grow again in the future.

The pond fish farms, whose business is harder to identify, produce about 12,000 tons of which 9000 tons consist of live fish for restocking rivers and lakes.

**Health status:** The following listed fish diseases: VHS, IHN, and KHV are present on French territory, but free-disease zones are recognized, and to achieve or maintain disease-free health status with regard to VHS and IHN, fish farms are subject to surveillance programs.

#### *Surveillance of VHS*

Two outbreaks of VHS in rainbow trout were reported in 2015 in the framework of outbreak surveillance, one in the East and the other in South of France. The first outbreak occurred in a farm frequently found as infected by VHSV (previous infections reported in 2011 and 2014). Partial sequencing of G gene showed a strong identity with the isolate responsible for immediately previous outbreak (99.3%), highly suggesting an epidemiological link. The incriminated farm was not located in a free-disease area. After each confirmed case, the fish farm underwent fallowing, and local veterinarian services try to improve health and sanitary practices.

The second case of VHS occurred on *salmo salar* and, as it appeared atypical, triggered technical and scientific support given by NRL (assisted by the EURL) to authorities. Sequencing followed by phylogenetic analysis

showed the incriminated isolate shared 99.9% identity with a strain isolated in 1991 also in *salmo salar* and with an older one, from 1971, used by French laboratories as positive control for cell culture analysis.

#### *Surveillance of IHN*

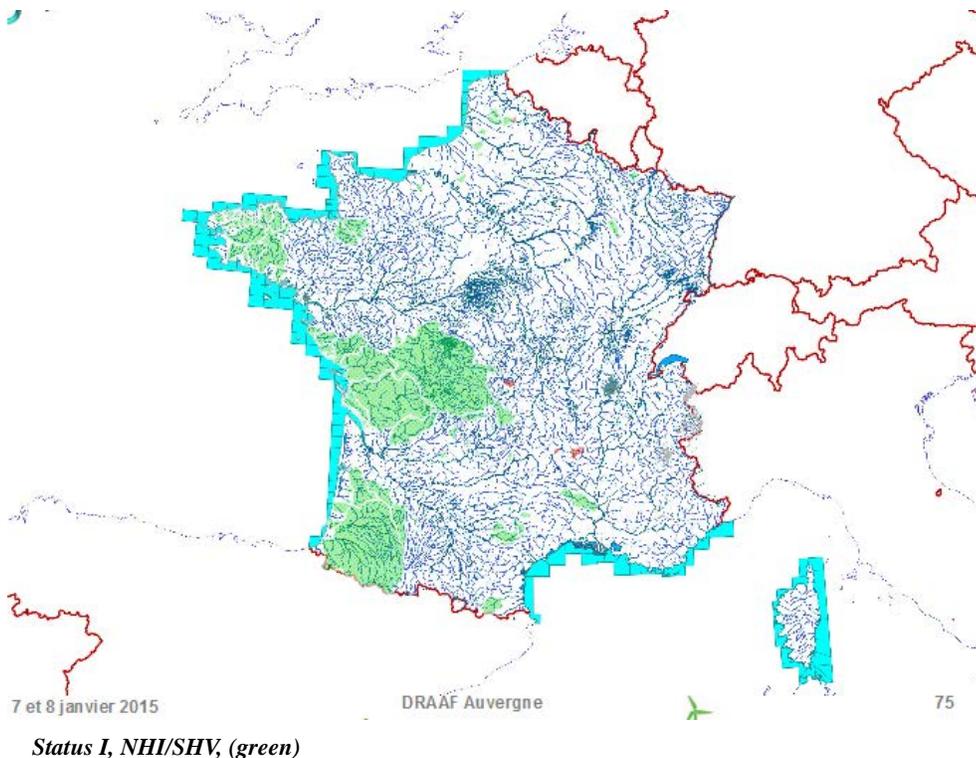
One outbreak of IHN was detected through targeted surveillance in 2015, in the Seine-Maritime *département*. This outbreak was highlighted following self-inspection. The incriminated farm, located in a non-free disease zone, was already under sanitary measures for almost 15 years.

#### **Other diseases and health related issues:**

Several outbreaks of Carp Edema Virus (CEV), located in distant French areas, were reported mostly during spring 2015, when temperature increased after winter period. CEV was detected either in Koi carps or common carps. Partial sequencing allowed to distinguish two lineages, related to the infected host (Koi or common carp).

One outbreak of Piscine Reovirus occurred in a *Salmo trutta* farm. High mortality was described, and it has been the first time this virus has been detected in France. Phylogenetic analysis showed high homology (98%) with a Norwegian isolate recently identified which had caused an outbreak on rainbow trout. Epidemiological data collection could bring more information about Reovirus prevalence in French fish farming.

Betanodaviruses (NNV) was detected in samples of wild grouper and farmed sea bass in Corsica. These viruses are strongly related to viruses found in livestock in 2012 in Greece and Spain, but differ from a virus isolated in Corsica in 1998.





**Author/Institute:** Uwe Fischer, FLI

Summarized information from 15 German Federal States

- no data on this particular questionnaire received from NRW
- no remarkable fish farming in Berlin, Bremen, Hamburg

**Aquaculture production:**

**Farmed species:** mainly salmonids (mostly rainbow trout, but also brown trout, sea trout, chars) and carp  
To a lesser extent : pike, pike-perch, sturgeon, grayling, huchen, tench, sheatfish, other cyprinids, maraena whitefish;  
Burbot and eel (northern Germany);  
African sharptooth catfish (BB);  
Sea bass, sea bream, yellowtail amberjack (SL);  
Cichlids (Sa)

**Environment:** middle European climate; pre-alpine, mountainous and lowland conditions;

**Water:** wells (with relatively constant temperature of 8-11°C), close-to-well streams, rivers, lakes and sea (including brackish); temperature differences between winter and summer of 2 - 26°; sometimes reduced water supply during summer with high iron concentrations (BB, NS)

**Technologies:** both natural and technical intake of air and oxygen  
mostly automatic feeding;  
few filters installed;  
few cold and warm water (e.g. sturgeons, Mediterranean fishes) recirculation systems with modern control systems;  
protection from predators (electric fences, nets); net cages

**Salmonids:** natural and concrete ponds/ditches; few recirculation systems; hatcheries with ditches or round tanks

**Carp:** mostly natural ponds and extensive aquaculture;  
far more than half of German carp pond area located in Bavaria and Saxony  
important as cultural heritage since 14<sup>th</sup> century, touristic area, natural conservation

### Health status:

VHS and IHN: numerous disease-free compartments and zones regarding VHS and IHN; targeted surveillance in Cat. I and in Cat. III, few VHS-positive tested commercial fishing ponds; special surveillance program in SaAh (no latently infected farms discovered)

KHV-I: mostly Cat. III, partially active and targeted surveillance; few carp farms applied for Cat I (Sa); Less cases of KHV-I reported among common carp during last years

ISA: disease free, passive surveillance; salmon farms: targeted surveillance (Germany: disease-free status)

Training for qualified health services mostly harmonized but under responsibility of federal states, can be private or state fish health service.

### Other diseases and health related issues:

ERM: endemic in some river systems (Hagerman and EX5 strains), esp. rbt of all age classes affected; diagnostics: classical/molecular diagnostics and MALDI-TOF-MS; active surveillance; vaccination in highly affected farms using immersion vaccines and oral booster

KSD (caused by CEV): multifactorial disease especially in spring; centralized diagnostic surveillance (FLI, TiHo); discussion on future listing; public awareness and differential diagnosis from KHV-I

Flavobacteriosis (RTFS): esp. *Flav. psychrophilum* in rbt larvae (hatcheries); diagnostics by bacteriology from organ material (mod. Anacker-Ordal-agar, 3-5 days at 15°C) and MALDI-TOF-MS prophylaxis: hatchery management, reduced population densities, hyperosmotic baths, disinfection of supplied water, vitamins, bath vaccination; therapy: fluorfenicol orally

PKD: reported from Ba and Th, particularly in farms supplied by streams (possible reasons: climate warming; pollution); esp. fingerlings affected; prophylaxis: transfer of fish from hatcheries into ponds during autumn (lower water temperature) when parasite load is low

Furunculosis: only mentioned in Sa and SaAh, affecting salmonid fingerlings, vaccination projects going on; targeted (resistogram) therapy using antibiotics

Cryptocaryon irritans: sea bass (SL), diagnostics by histology/microscopy, stamping out after non-successful treatment, final disinfection by ozone, peracetic acid

Amoebic gill disease: reported from Th, treatment with hyperosmotic bath. No further problems in northern Germany (MV, NSa) than KSD

Greece



**Author/Institute:** Dr Athanasios Prapas/VETERINARY CENTER OF ATHENS

**Aquaculture production:** In Greece the main farmed species are seabass (*Dicentrarchus labrax*) and seabream (*Sparus aurata*). Both are marine species and the farming system is floating cages. There is also a small production of meagre (*Argyrosomus regius*) and red seabream (*Pagrus major*). The fresh water production is mainly represented by rainbow trout (*Oncorhynchus mykiss*) which is cultured in raceways.

**Health status:** The health status concerning the listed diseases is Category III that is “not known to be infected”. At the national level the authorities are implementing surveillance (active & passive) and sampling in the framework of articles 7 and 10 of the Directive.

#### **Other diseases and health related issues:**

The disease that primarily threatens the seabass farming is the Nodavirus infection which is a recurrent summer disease affecting all year classes and causing significant mortalities with a severe impact on the economic viability. The disease is diagnosed by several methods (clinical diagnosis, cell culture, RT-PCR etc.) and there is no treatment available. Only preventive measures such as screening of broodstock and fry by Elisa and PCR respectively are effective to a certain degree. Lately there are some experimental vaccines under testing. For seabream the most challenging disease situation is Microcotylosis due to *Sparicotylae chrysophryi* infestation. The disease affects all year classes but the most severe mortalities are observed at the juvenile stage which is the most susceptible. The preventive measures are mainly focusing on the implementation of antiparasitic baths at certain time periods according to the life cycle of the parasite.

Hungary



**Author/Institute:** NRL Fish Hungary , NFCSO VDD

**Aquaculture production:** The geographical, water and climate conditions in Hungary are suitable for traditional pond fish husbandry and in some cases for intensive fish production. Fish farms are mainly situated on the northern and southern part of the Great Hungarian Plain and on the south Trans Danubian Region.

Extensive fish farms are still the main production units in the aquaculture. They produce- 70 % of the whole Hungarian fish production. There are 229 fish farms producing carp. In 2015 production on intensive and extensive farms was 21.807 tons.

The major farmed species is carp. Carp constitute 67% of the fish production for consumption.

There are 17 intensive farms in Hungary producing around 14 % of the fish production. The fish production by intensive farms was 3.036 tons. The African catfish and sturgeon are provided by the intensive fish farms. The African catfish provides the 89 % of the intensive fish production.

There are 4 trout farms using fresh water flow system in Hungary.

Historically the fish consumption is low in Hungary. It is around 5 kg/person/year, an increasing tendency could be observed during the last year.

**Health status:** Hungary has implemented an approved targeted surveillance program for KHV (whole territory of Hungary) in accordance with Commission Decision 2010/171/EU.

The sampling process at farms is supervised by the district veterinary officer. The farms producing fish only for consumption are not involved in the surveillance program. Put and take fisheries are also excluded. Last year, 194 epidemiological units of 170 fish farms were sampled.

Sampling of wild fish from natural waters is carried out in spring. All farms located within the 20 km wide zone alongside of the country border have to send samples/fish twice a year.

Due to the 2009/177/EC, the whole territory of Hungary is declared disease-free of infectious salmon anaemia (ISA).

According to Annex I to Decision 2010/221/EU, the whole territory is free of SVC (due to 2010/761/EU). Hungary continues SVC monitoring with random selected farms.

There are no surveillance and eradication programs for IHN and VHS but the farms with susceptible species (like trout and pike) are examined yearly by virological methods.

#### **Other diseases and health related issues:**

In 2015, the main cause of increased mortalities was water quality (mainly environmental hypoxia). In some cases, industrial poisoning of water led to fish mortality. Protozoan infections (*Trichodina* spp., *Ichthyobodo necator*, *Ichthyophthirius multifiliis* *Chilodonella* spp.) monogenean parasites (*Dactylogyrus*, spp., *Gyrodactylus* spp.) and bacterial dermatopathies (*Aeromonas* spp.) were in the background of economic losses in many cases.

The most examined fish species was carp.

One of the major problems in aquaculture industry is the availability of very few- authorized medicines.



**Author/Institute:** Icelandic Food and Veterinary Authority

**Aquaculture production:** The Aquaculture in Iceland has been a small scale industry since the 1980s. Conditions for fish farming are regarded as good in Iceland, thanks to unpolluted seas and an abundance of clear spring water for aquaculture. Most of the farms are land-based but sea-based farms are increasing the last years.

Economical geothermal water for heating is exploited in hatcheries and hydroelectric power utilized for pumping and other usages on farms.

### TOTAL PRODUCTION IN ICELANDIC AQUACULTURE, 2011 - 2015

	2015	2014	2013	2012	2011
Atlantic salmon:	3.260	3.965	3.018	2.923	1.083
Arctic char:	3.937	3.471	3.215	3.089	3.021
Rainbow trout:	728	603	113	422	226
Tilapia:	0,6	0,5	0,8	0,3	2,5
Halibut:	0	0	0,2	13	33
Turbot:	0	0	58	28	20
Cod:	74	310	482	893	877
Abalone:	0,01	0	0	0	0
Blue mussel:	44	38	49	63	46
<b>Total:</b>	<b>8.334</b>	<b>8.387</b>	<b>6.936</b>	<b>7.431</b>	<b>5.309</b>

### Health status:

Fish health status in Icelandic aquaculture:

The general fish health status in Icelandic aquaculture is favourable. The main reasons for that, in our opinion, is the geographical isolation of the country, strict import policy, secure water supply for the farms and effective fish health surveillance. Icelandic hatcheries rearing fingerlings to the smolt stage are using "pathogen free" ground water without any presence of wild fish and the land based on-rearing farms have all access to filtered sea-water from bore holes. The brood stocks are kept in secure land based farms the whole live cycle.

All infectious diseases of concern in the aquaculture industry are of bacterial origin. **There has never been detected any clinical viral fish disease at all and no clinical symptoms have ever been seen that could indicate that type of disease up to date.**

Iceland was approved as VHS-free country in 2004 but on 19 October 2015 VHSV was detected for the very first time in routine screening of wild caught lumpfish. The fish were supposed to be used as parents for "cleaner fish" juveniles used against salmon louse in sea-cage farming. Until the lethal samplings were performed, the wild brood fish were kept for a few weeks in a closed land based facility owned by the Marine Research Institute. The fish never showed any clinical symptoms. After detection and confirmation of the virus with RT-PCR at the European Union Reference Laboratory for Fish Diseases in Denmark all lumpfish at the farm were killed and destroyed for security reasons. The sequence has been trimmed and blasted towards the other known genotypes. Interestingly it appears that the lumpfish VHSV cluster in a separate new group in GIV, maybe as a new GIVd? Therefore, the finding might more reflect a totally new appearance of VHSV and not an introduction of VHSV from e.g. USA or Canada.

#### Fish health surveillance:

All Icelandic fish farms have been included in the official national health control programme since 1985. The surveillance also includes farms dealing with wild salmonids. 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 Fish Diseases, and partly by laboratory work conducted at the National Fish Disease Laboratory at Keldur in Reykjavík, which has a close co-operation with the EU Reference Laboratory on virus diseases in Denmark. The Icelandic authority is also using diagnostic services given by the Food, Veterinary- and Environmental Agency, Department of Fish and Animal Diseases in Torshavn, Faroe Islands and to some extent the National Veterinary Institute in Oslo, Norway and PatoGen Analyse A/S in Ålesund, Norway.

#### Other diseases and health related issues:

Nothing special to report.



**Author/Institute:** Neil Ruane, Marine Institute

**Aquaculture production:** Atlantic salmon (FW smolt production + marine sea cage rearing): 10,000t  
Rainbow trout (FW production): 1,000t  
Perch (FW production): <50t

**Health status:** Free from all diseases listed under 2006/88/EC.

Active surveillance of all sites annually.

#### Other diseases and health related issues:

Marine Atlantic salmon farming is challenged by sea lice, amoebic gill disease and pancreas disease. Sea lice levels are monitored monthly by the regulatory authorities (more frequently by the farms themselves) and treatments triggered if lice levels rise above a set threshold. The use of wrasse and lumpsuckers as biological controls for sea lice have started to increase in 2015. PD is controlled through vaccination and AGD by freshwater treatments (a small number of peroxide treatments are also used). Ongoing issues with gill health remain, the underlying causes are unknown but phytoplankton and zooplankton are believed to play a role.

FW rainbow trout and perch farms have issues mostly with production diseases and water quality. Rainbow trout fry syndrome has occurred on a small number of trout farms.



**Author/Institute:** Arcangeli G.; Toffan A; Manfrin A.; Dalla Pozza A.

**Aquaculture production:** Shellfish (65%) and finfish farming (35%) represent the national aquaculture sector. 60% of the Italian production sites are located in the north, 18% in the center and 22% in the south. Finfish farming is divided into freshwater fish species and marine species. The output of freshwater farmed fish amounts approximately to 43,000 tonnes, of which rainbow trout (38,800 tonnes) has the major share, followed by sturgeon (2,000 tonnes), European eel (1,200 tonnes), common carp (700 tonnes) and Blackbull head/American Catfish (600 tonnes). Production of the marine farmed fish amounts approximately to 16,500 tonnes, where seabream (8,900 tonnes) and seabass (7,300 tonnes) are the main farmed species followed by meagre (250 tonnes). Traditional extensive aquaculture is still carried out in the “valley” which are brackish lagoons, especially in the North-Eastern regions. More modern aquaculture techniques for freshwater and marine species include intensive farms in raceways or ponds and cage systems in the sea, respectively.

**Health status:** In Italy the first eradication program started in the late ‘70s for VHS as a voluntary campaign and only in the regions where trout farming was more widespread. In 1992 voluntary eradication programs in line with the European legislation (91/67/CE) were put in place on a national level. In 2008 the eradication campaigns were further implemented following the EU Council Directive 2006/88/EC. Despite the long history of implementation of eradication programs, IHNV and VHSV are still persistent in Italy, causing recurrent disease outbreaks. In Italy at present there are 15 VHS and 13 IHN infected farms. Italy is declared free for ISAV and no detection of exotic disease listed in Annex IV according to EU Council Directive 2006/88/EC has been made so far.

#### **Other diseases and health related issues:**

In 2015 in Italy the main problem for aquaculture was the low water supply in summer (in some farms a 50% reduction of the water inlet was registered). The high temperatures associated to the low availability of water caused an increased incidence of bacterial diseases (in particular lactococcosis) and gill problems in rainbow trout farms. A safe and efficient commercial vaccine is available against lactococcosis; however, in some cases fish were either not vaccinated or vaccination was delayed, therefore the disease caused a high mortality rate.

In rainbow trout hatcheries, both RTFS and IPN persist as the main infective diseases, while in on-growing farms red mouth diseases outbreaks have been detected. The latter are caused by *Yersinia ruckerii* biotype 2 and occurred in vaccinated farms due to the lack of vaccine cross protection.

A new outbreak of IHN was registered in autumn. It involved 3 trout farms and 2 ponds epidemiologically connected. The ponds were fallowed and the 3 farms are still continuing with the eradication process.

In brook trout and brown trout farms, severe outbreaks of furunculosis, always related to limited freshwater supply, have been registered.

In marine species, the most important viral disease in 2015 was VER. The disease severely affected sea bass farms, favoured by the hot summer temperatures, but extended its host range also to sea bream (only larval stages). *Photobacterium* spp. ranked as the second infective problem for sea bream followed by vibriosis (especially atypical *Vibrio*) i.e. *V. ordalii*, *V. harveyi*, *V. splendidus*) in sea bass. Parasitic problems were registered in inland sea bass farms only.



Latvia



**Author/Institute:** Mārtiņš Seržants - Food and Veterinary Service and Mārcis Ziņģis - Institute "BIOR", Aquaculture, research and education center

**Aquaculture production:** Aquaculture in Latvia produced only freshwater fish species in large artificial ponds (up to 400 ha surface), through-flow facilities and recirculation facilities. Main produced species in aquaculture are carp, rainbow trout, cat fish, and sturgeon. There are five governmental fish farms for producing salmon and sea trout smolts in the framework of national restocking program for salmon and sea trout. Total aquaculture production is about 700 tons per year.

**Health status:** Each aquaculture animal establishment shall conclude a contract with veterinarian, according to which vet ensures the veterinary surveillance of aquaculture animals. In the case of suspicion farmer is obliged to inform veterinarian about mortality of aquatic animals and veterinarian must investigate cause of mortality or

inform FVS what will ensure epidemiological investigation. FVS veterinary inspectors are visiting farms annually to ensure the welfare and health status of fish. Within the framework of State infections disease surveillance plan, all aquaculture farms which distribute fry and fishes for further growing and restocking shall be sampled and tested for VHS, IHN and KHV annually. Laboratory surveillance program are performed for the IHN, VHS and KHV since year 2005. According to COUNCIL DIRECTIVE 2006/88/EC Annex IV part II (non-exotic fish disease list), aquaculture farms belong to the category 3 (Not known to be infected, but not subject to surveillance program for achieving disease free status).

**Other diseases and health related issues:**

Additional virological, bacteriological or ichtiopathological investigations are not mandatory in Latvia. The most common bacterial disease problems are Aeromonosis, mainly *Aeromonas hydrophyla*, *sobria* and *salmonicida*. Factors contributing the clinical diseases are: stress, inadequate welfare and water quality problems. Myxobacteriosis are often diagnosed in salmonids. Some parasitic diseases such as argulosis, philometroidoses and piscicolosis are presented in ponds. The protozoa parasites, *chilodonella*, *trichodina* and less frequently *ichtiophthirius* are diagnosed often in through-flow facilities. These diseases usually affect young fish. The general protection measures should be used for disease control: prevention, sanitation of ponds and fish treatment. Various chemical and disinfection substances are the most common medical treatment products against ectoparasites, antibiotics- against microbial diseases.



**Author/Institute:** State Food and Veterinary Service

**Aquaculture production:** There are fish breeding, aquaculture animal keeping, and incubation establishments. The key species that are kept are: pike, crucian carp, tench, grass carp, wels catfish, European whitefish, sturgeon, African sharptooth catfish, rainbow trout, zander, etc. Fish are farmed in ponds and in private water bodies, closed in farms with recirculating systems.

**Health status:** Lithuania doesn't have health status for listed fish disease according to council directive 2006/88/EC. By order of Director the SFVS annually adopts an official veterinary monitoring plan for contagious animal diseases with the indication of the numbers of samples to be collected by territorial SFVSs at aquaculture establishments for non-exotic diseases (VHS, IHN, ISA and KHV). Territorial SFVSs regularly check aquaculture establishments, samples are collected in view of the risk of infection and spread of diseases posed by aquaculture production and processing establishments.

**Other diseases and health related issues:**

Establishments perform self-control analyses; virusological, bacteriological and chemical analyses as well as analyses for parasitoses are performed with fish samples at the National Food and Veterinary Risk Assessment Institute.

**Author/Institute:** Norwegian Veterinary Institute

**Aquaculture production:** In 2015 1.234.200 tons of salmon and 71.600 tons of rainbow trout were produced in Norway. About 4.000 tons of wild caught cod transferred to and held in cages until slaughtering, 1.700 tons of halibut, 2-300 tons of turbot and 5-600 tons of char. In addition it was produced about 10 mill. lumpsucker and 400-500 000 wrasse.

Regarding salmonids most of the production is in the traditional way with land based hatcheries and open net pens at the sea sites. Most of the hatcheries built the last years use RAS technologies. The use of floating semi closed containments at sea sites is still in an early phase.

To stimulate development of new and more sustainable production methods the Norwegian government has made the opportunity to apply for special development licenses.

**Health status:** Surveillance is risk based and performed by the Norwegian Food Safety Authority (NFSA) and the private fish health services which is mandatory in all Norwegian fish farms, both in hatcheries and grow out sites. Anybody who gets the suspicion or knowledge about listed diseases in aquatic animals in Norway is committed to warn the NFSA.

The last couple of years we have had a cluster of ISA outbreaks in Lofoten and Vesterålen. The NFSA has intensified the surveillance in the area from the autumn 2015 and for the next two years to get the area free from the disease.

Norway has national surveillance programs including VHS and IHN.

#### **Other diseases and health related issues:**

Since the production of other species than salmonids is on a very low level, our most important disease problems are in the salmon industry. Though we have challenges with the production of wrasse and lumpsucker.

The sea-lice situation is a challenge because the demands to keep the level of sea lice very low to protect wild salmon and sea trout, lead to a high frequency of de-licing with welfare challenges and resistance of the pharmaceuticals used. Use of cleaner fish, coordinated fallowing, mechanical methods to remove the lice and new innovations are needed to fight the problem.

Pancreatic disease (salmonid alphavirus, SAV) is still the most important virus disease at sea locations in Norway. There are two different epidemics with SAV3 and SAV2, respectively. The authorities are at the moment making new regulations.

Heart- and Skeletal Muscle disease (HSMB) are not a listed disease in Norway anymore, and that may be the reason why not so many samples as earlier are sent to the Veterinary Institute the last year.

Amoebic gill disease (*Paramoeba perurans*) is diagnosed in more locations in 2015 than in 2014, but the severity of the cases have been less.

The increased use of cleaner fish gives great health challenges because of lack of knowledge about these species. There is also a surveillance program including both wild and cultured salmon regarding *Gyrodactylus salaris*.

North of Trøndelag there is an ongoing surveillance program on SAV in the purpose to keep this part of Norway free from SAV.

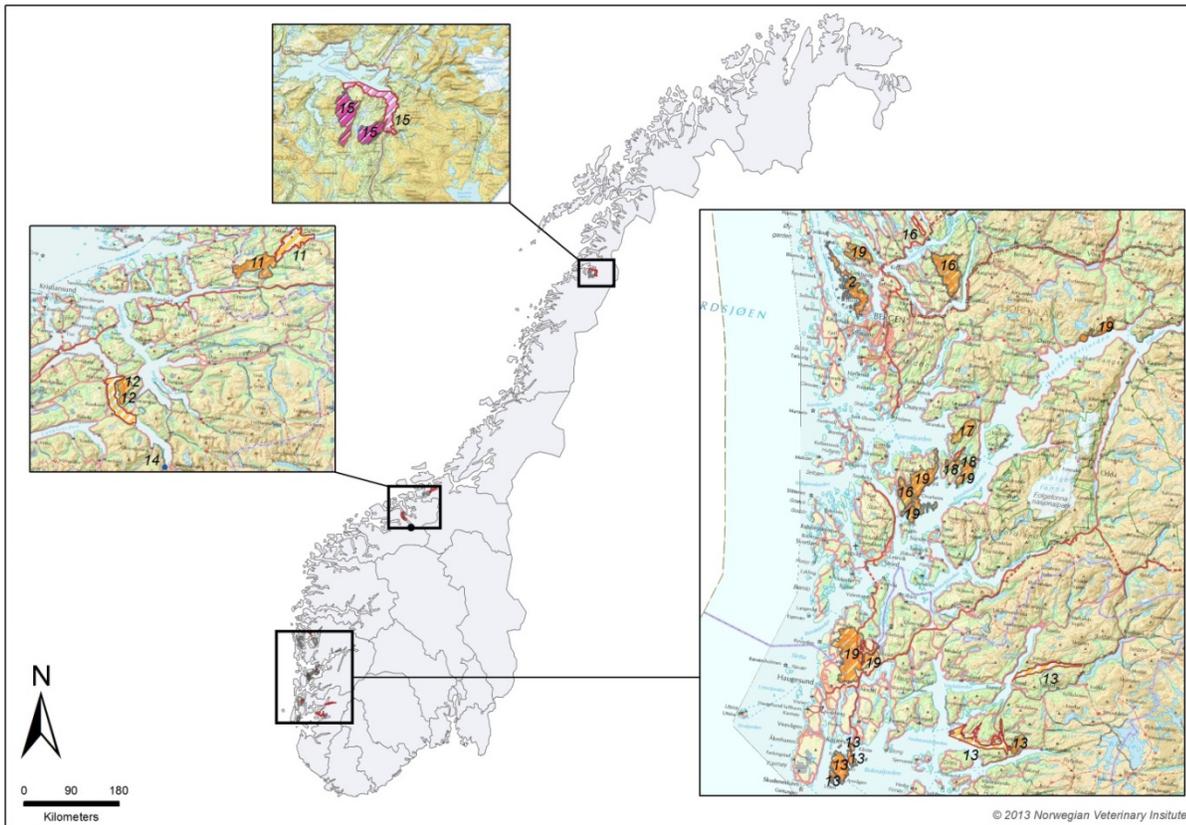
Regarding listing of diseases: Infection with SAV is already a listed disease in Norway. The measures against the disease is however not the same throughout the country. Infection with PRV was earlier a listed disease in

Norway, but because of lack of good measures against the disease it was taken away from our national list a few years ago.

Infection with PMCV does not fulfil the measures set for listing a disease at the moment.

In 2015 PRV-Om was found in 65 locations with rainbow trout, six of these were new confirmations, but no disease were diagnosed. In 2016 NFSA in collaboration with the Norwegian Veterinary Institute will implement a surveillance program including both salmon and rainbow trout in areas where the virus has been detected earlier.

#### Cases/presence of ISA in Norway 2015



**Author/Institute:** NO INFORMATION

**Aquaculture production:**

**Health status:**

**Other diseases and health related issues:**



Region	Fishfarms ( 2015)					Total nº
	Trout and carp	Marine fishes				
		Intensive	Semi-intense	Extensive	Sole and Turbot *	
	Active	Active	Active	Active		
DSVRN	15	1	1	0	(1)	17
DSVRC	8	3	18	1	(2)*	30
DSVRLVT	0	0	15	4	0	19
DSVRA	1	1	1	0	0	3
DSVRAlg	0	1	6	0	0	7
Açores	0	0			0	0
Madeira	0	2				2
Total	24	53				78

\*Included in the marine fishfarms

**Health status:** Portugal, under official control, has been in place targeted surveillance plans for Viral Haemorrhagic Septicaemia (VHS), Infectious Haematopoietic Necrosis (IHN), and for Koi Herpes Virus (KHV) Disease according to the new Directive 2006/88/EC of 24 of October, (*on animal health requirements for aquaculture animals and products thereof and on the prevention and control of certain diseases in aquatic animals*), and the Decree-Law nº152/ 2009, the Portuguese legislation in force. The official control also encloses a Passive Surveillance that notifies the occurrence or the suspicion of a listed disease, or observed increased mortality. Thus, by means of an official sanitary surveillance,taken annually for the Direção Geral de Alimentação e Veterinária (DGAV) and the Instituto Nacional de Investigação Agrária e Veterinária (INIAV), in the species of culture with the highest production in the Portuguese market, one confirms that diseases that are required by law to notify, have not been diagnosed.

Since 2008, several compartments (trouts, turbot and carps) obtained the disease- free status for listed diseases (VHS/IHN/KHV): [www.dgav.pt](http://www.dgav.pt)

#### CATEGORIZATION OF FISH FARMS (March/2016)

FISH (Species)	Disease- free status for (VHS/IHN) (Number of fish farms))
Trout	21
Turbot	3
FISH (Species)	Surveillance Programme (VHS/IHN)(Number of fish farms)
Trout	3
FISH (Species)	Disease- free status for (KHV) (Number Number of fish farms)
Carp	1

#### Other diseases and health related issues:



#### Romania

**Author/Institute:** Costea Mihaela /Institute for Diagnosis and Animal Health

**Aquaculture production:** Aquaculture production in Romania consists mainly from salmonid, cyprinid and sturgeon species. In aquacultured species of Salmonids rainbow trout prevails, followed by brown trout. A particularity of Romanian aquaculture is breeding of common carp together with Asiatic species of carp, crucian carp, pike, pike-perch and European catfish. Farming systems for salmonids and sturgeon are both land based system as tanks, with rarely recycling systems in high control enclosed system and water-based systems (cages and pens). For cyprinids are land-based systems with rainfed ponds, irrigated or flow-through systems). Environmental conditions are specific for trout, sturgeon and cyprinids species rearing, as well as for pike, pikeperch and European catfish.

**Health status:** According the Council Directive 2006/88/EC, the health status of fish listed diseases in Romania is category III for VHS, IHN and KHV and category I for ISA, according of Commission Decision 177/2009.

The surveillance of fish listed diseases is based on active surveillance.

Details about who and what have to be done in relation to all fish diseases are mentioned in the Surveillance Programme that are approved by National Sanitary Veterinary and Food Safety Authority.

Inspection, examination and sampling of aquatic animals are performed by county veterinary services and samples analysing for fish listed diseases are carried out by National Reference Laboratory.

#### Other diseases and health related issues:

The most frequent diseases in salmonids farms are those that involve the myxobacteria group like RTFS in fry and bacterial gill diseases or cold water diseases in adult stage followed by yersiniosis. In cyprinids ponds bacterial infection with opportunistic agents are prevalent.

Diagnosis of bacterial diseases is performed by bacteriological exams. Control and prevention measures put in place to mitigate the impact of bacterial diseases on production are: disinfection, reducing of stress from manipulation, decreasing density of population, treatments with antimicrobial substances, optimization of rearing condition .



**Author/Institute: Vladimir Radosavljevic**

Aquaculture production: Fish are produced in carp and trout fish farms (over 95%), to a smaller extent in cages, enclosed or partitioned natural or manmade aquatic ecosystems. Aquaria fish culture is mainly low scale, with a small number of specialized breeders and one public aquarium.

In Serbia freshwater species cultured are: common carp, white and gray bighead, wells, pike perch, rainbow trout and to a lesser degree Northern pike, tench, brown trout, beluga, Russian starlet.

There is 13 500 – 14 000 ha of fish farms in Serbia, with 99.9% of carp farms and 0.1% of trout farms. The total fish production in recent years is between 10 000 and 15 000 tons with 70 to 75% of consumable fish.

All three types of production systems are present: extensive, semi-intensive and intensive. Extensive production is sporadic and is present only at a few carp production units, mostly not economic for semi-intensive production due to remoteness from other production units or neglect. The principal type of production (75 – 80%) is semi-intensive production of cyprinids, with common carp as the main species. Common carp is present with more than 80% of the total production in warm water fish farms. The traditional (old) type of feeding is slowly changing. Cereals are more often, at over 50% of production surfaces, totally or partially replaced by complete, pelleted and even more extruded feed. This has resulted in an increase of production per surface unit in recent years. Intensive production systems in carp culture are less present, at a small number of earthen ponds with aeration systems, mainly for fish fry production, and in cages.

However, rainbow trout, the only salmonid species cultured for consumption, is exclusively produced in intensive systems at trout farms in Serbia.

The number of people involved full-time in fish production in Serbia is about 1100 and approximately 400 seasonal workers that are hired mainly prior to harvest. With the rising of standard and returning to traditional habits during religious fasting, as well as with a slow increase of “healthy food” supporters, fish consumption has a growing trend. However, although fish production is increasing in recent years, the country’s production and open-water capture fishery barely represent a quarter of the total needs of inhabitants. This results in increase of import, mainly marine and frizzed fish, but also freshwater fish.

Open-water capture fishery is performed in Serbia’s fishing waters. They are represented by 66 000 km of water currents (rivers and streams), flood plains, backwaters, 50 lakes, 150 reservoir lakes and around 30 000 km of

canal systems, hydromeliorative systems, as well as all other waters with fish. All fishing waters are divided into 6 fishing regions (Serbia – Vojvodina, Serbia – West, Serbia – South West, Serbia - South, Serbia – East, Serbia – Center) since year 2007. Sports fishing is obtainable at all regions but commercial fishery is allowed only at two regions (Serbia – Vojvodina, Serbia – west), and in rivers Tisa, Sava and Danube. The amount of captured fish is between 2000 and 3000 tons in the few past years.

**Health status:** Serbia has a national legislation as basis for their surveillance and disease control in aquatic animals, as well as regulations listing notifiable diseases of concern. In addition to national legislation, Serbia has accepted the principles laid down in the Directive 2006/88/EC as regards animal health requirements for aquaculture animals and products thereof. The monitoring and surveillance for fish diseases in Serbia has mainly been based on the testing procedures given in the EU Commission Decision 2001/183/EC while for the bacterial and parasitic diseases, standard diagnostic procedures for such diseases has been used for screening purposes.

Serbia runs a surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) based on EU regulations and a monitoring programme for infectious pancreatic necrosis (IPN), spring viraemia of carp (SVC) and bacterial kidney disease (BKD) takes place in Serbia on a national level.

The surveillance for viral diseases has been based on the testing procedures given in the EU Directive 2006/88/EC. Fish farms are inspected clinically and samples for virological examinations are collected from the fish farms each year to document freedom for IHN, IPN and VHS. The examination procedures given in the OIE Diagnostic Manual for Aquatic Animal Diseases / EU Diagnostic Manuals are the basis for examinations

The Veterinary Authorities is responsible for the implementation of measures that will be used in order to control a given notifiable disease. The implementation involves both central and regional veterinary officers. If disease is diagnosed, stamping out procedures followed by cleaning, disinfection and fallowing will be carried out. Prevention may be achieved by avoiding introduction of disease free eggs and/or fish into disease free farms as well as using protected water supply (e.g. spring-, borehole water). An infected farm may restock after fallowing if no signs of infection appear after a sanitation programme has been carried out. In Serbia affected farm(s) will have to pay themselves for any measures imposed by the authorities for the time being, because no compensation is granted. Health certificates and/or transportation documents is needed in connection with deliveries of live fish for stocking into grow out farms and restocking into rivers. The records of findings are kept by the responsible authorities, both regionally and centrally. The diagnostic laboratories also keep the necessary documentation on the examinations carried out. Furthermore all farms have to keep records on events in the farms that can be requested by Competent Responsible Authority.

**Infectious pancreatic necrosis (ZNG/IPN)** - The disease was first noticed in Serbia in 1989 and did not emerge until 2007, when the disease was confirmed at trout farm in Mačva district, in diseased rainbow trout, derived from imported fertilized eggs. All rainbow trout outbreaks were experienced during the juvenile stage. The disease is almost certainly under-diagnosed and therefore under-reported.

**Viral Hemorrhagic Septicaemia (VHS)** - All salmonid aquaculture facilities have been tested for VHS-virus every year as part of a national surveillance programme. The virus has not yet been detected. Serbia has therefore been considered a VHS-virus free zone.

**Infectious Hematopoietic Necrosis (IHN)** - All salmonid aquaculture facilities have been tested for IHN-virus every year as part of a national surveillance programme. The virus has not yet been detected. Serbia has therefore been considered an IHN-virus free zone.

**Koi Herpes Virus (KHV)** - Since 2010 all cyprinid aquaculture facilities have been tested for KHV-virus every year as part of a national surveillance programme. The virus has not yet been detected. Serbia has therefore been considered a KHV-virus free zone.

**Other diseases and health related issues:**

**European Catfish Virus (ECV)** - The disease was first noticed in Serbia in 2008 and it is diagnosed every year since then in brown bullhead (*Ameiurus nebulosus*) and black bullhead (*Ameiurus melas*).

**Sleeping Disease (SD)** - The disease was first noticed in Serbia 2014.

**Red mark syndrome (RMS)** - The disease was first noticed in Serbia in 2008 and it is diagnosed every year since.



**Author/Institute:** Veterinary and Food institute Dolný Kubín

**Aquaculture production:** Aquaculture production fish for market was in 2014 – 1 235 tonnes. The most commonly farmed species of fish are: common carp (255 tonnes), rainbow trout (326 tonnes), brook trout, gold fish and others.

Most types of farms are ponds, small ponds, cages, hatcheries and nurseries, concrete and plastic tanks, recirculating systems and others.

**Health status:** The health status of fish is monitored at the national level under “Plan veterinary prevention and protection of the national territory of the Slovak Republic “. Plan was implemented according to council directive 2006/88/EC.

**Other diseases and health related issues:**

Now we haven't problems of other diseases in our country.



**Author/Institute:** Vlasta Jencic / National Veterinary Institute, Veterinary Faculty University of Ljubljana

**Aquaculture production:** In Slovenia there are 161 salmonid and 148 cyprinid fish farms. The majority of them have low production capacity. The annual production is approx. 795 tonnes of salmonid and approx. 148 tons of cyprinids, mostly carp (source: Statistical office of Slovenia; data from 2014). Beside production of rainbow

trout and carp for human consumption, also brown trout, marble trout, brook trout, grayling and common carp are produced for the repopulation of open waters.

Along the Adriatic coast, we have one fish farm producing sea bass

**Health status:** According to national legislation, which fully transposes Directive 2006/88/EC, all fish farms in Slovenia are registered. Register of fish farms is available on the website of the Administration of the Republic of Slovenia for Food Safety, Veterinary Sector and Plant Protection - AFSVSPP, which is the competent authority.

([http://www.uvhvvr.gov.si/en/registers\\_and\\_lists/establishments\\_in\\_the\\_veterinary\\_field/](http://www.uvhvvr.gov.si/en/registers_and_lists/establishments_in_the_veterinary_field/)).

Fish farms trading with live fish and producing fish for human consumption (above 3 tonnes per year) have to be authorised. Register of authorised fish farms is available on the AFSVSPP website ([http://www.uvhvvr.gov.si/en/registers\\_and\\_lists/establishments\\_in\\_the\\_veterinary\\_field/](http://www.uvhvvr.gov.si/en/registers_and_lists/establishments_in_the_veterinary_field/)).

According to the risk of disease introduction and disease spreading, fish farms are categorised to low, middle and high risk level and with regard to Annex III, Part B of Directive 2006/88/EC visited by veterinarians of the National Veterinary Institute and official veterinarians of the AFSVSPP regional offices.

There are 14 fish farms declared VHS/IHN free (Category I) and 4 farms are in the category II (approved surveillance programmes for VHS/IHN free status). The majority of fish farms are in the Category III. With regard that all salmonid fish farms trading with live fish are annually checked for the presence of IHNV and VHSV for many years (Annual Decree on the systematic monitoring of animal diseases and vaccination) we could say that those fish farms in Category III are not of unknown health status. This surveillance is a part of the National surveillance programme paid by AFSVSPP. There are no fish farms in Category IV and in Category V, there are 5 VHS infected, 17 IHN infected and 13 KHV infected fish farms.

**Other diseases and health related issues:** The entire system of the veterinary service for fish is concentrated at the National Veterinary Institute, Veterinary Faculty, University of Ljubljana (NVI). Three veterinarians for fish diseases work in three regional units and are authorised for the implementation of the tasks of the Directive 2006/88/EC. In addition to the Directive 2006/88/EC they sample fish for the National Programme and for the diagnostic purposes. They treat fish, educate fish farmers, give them advice and are involved in eradication programmes.

The laboratory diagnostic (necropsy, histology, virology, bacteriology, and parasitology) is carried out at the Institute for Health Care of Wildlife, Honeybee and Fish and at the Institute for Microbiology of the Veterinary Faculty University of Ljubljana. National Reference laboratory for Fish diseases is qualified for all diagnostics procedures required by the OIE and the Directive 2006/88/EC.

The main fish health problems in Slovene aquaculture are bacterial infections and parasitic infestations. Both, in salmonid and in carp production *Aeromonas* infections are common, while in trout farming currently RTFS is one of the most significant health problems.



**Author/Institute:** Pilar Fernández Somalo /Central Veterinary Laboratory (MAGRAMA)

**Aquaculture production:** Spain has a wide variety of hydrological resources, where aquaculture is possible either in continental, brackish as well as sea water. Different aquaculture system can be found:

In continental water

- 1) Tanks are located beside a river. These tanks are usually rectangular and concrete made out, operating on two techniques:
  - a) Flow-through, an open system where river water flows through the units via a race. The rainbow trout is the most important specie produced by this system (15,112 t) followed by carp (66 t) and sturgeon (35 t)
  - b) The recirculation, a closed system that consists of circulating water in the tanks and recycling it via pumping and processing units, are used in the rearing of eel (350 t) and tilapia(10 t).
- 2) In ponds: the fish live in ponds where they feed off the ecosystem, this technique is used in the rearing of tench (21 t) and carp (2 t)

Sea water

- 1) **Cage systems.** Net-pens (cages) can be of different kinds but the principle is the same; every type is based on a natural exchange of water through pens. The most important specie cultivated in this system are:, seabass (16,132 t), seabream (15,715 t), tuna (3,088 t), meagre 1,090 t), blackspot (172t)
- 2) **Onshore tanks.** Square or circular cement tanks are used, with open-circuit pumped seawater. Aeration or oxygenation systems are normally used to maintain the water at oxygen saturation. Turbot (7,767 t) and sole (799 t) are reared in this system
- 3) **Esteros.** the principle of *esteros* in southern Spain is as follow: fish were allowed to enter lagoons, after which the entrance was closed off, trapping them inside. The trapped fish fed naturally until they were harvested. In this system seabass (783 t) is usually cultured in polyculture with seabream (626 t), mullets (174 t), eels (11 t) and meagre (10 t)

**Note:** Production data from 2014

**Health status:** Spain is a country free of ISA. Around 90% of fish farm with susceptible species to VHS and INH are located on free zones for these diseases, according with annex V, part II of council directive 2006/88/EC and also the basin of main rivers on the northern half of Spain is considered as officially free, since the source of water to the estuary. This information is showed through the follow link. <http://rasve.magrama.es/Publica/Programas/NORMATIVA%20Y%20PROGRAMAS/PROGRAMAS/ACUICULTURA/ZONAS%20Y%20COMPARTIMENTOS%20LIBRES%20DE%20SVH%20Y%20NHI.PDF>

In the frame of official surveillance for these diseases the competent authorities of Community Autonomies (CCAA) have developed specific surveillance programs in accordance with the sampling plans and diagnostic methods laid down in Commission Decision (2001/183/EC) and are coordinated by Central Authority.

The inspection programs for each aquaculture production business (APB) include, at least, one annual inspection with sampling for the majority of the farms (90%). All of APBs with sensible species to these diseases are categorized for risk, but as every year they carry out one inspection, they all reach the maximum level of control foreseen in the Council Directive 2006/88/EC.

### Other diseases and health related issues:

There are no official surveillance programs or eradication programs in Spain for any of the diseases included in the Decision Commission 2010/221/UE: (SVC, renibacteriosis, IPN and *Gyrodactylus salaris* Infection. Nevertheless, in some CCAA with numerous fish farms with sensible specie to IPN they carry out an active surveillance of this disease taking advantage of the sampling activities carried out, in order to achieve or maintain approved status for VHS and/or IHN.

Some fish farms carry out an active surveillance implemented by the “Animal Health Association” to control SVC, renibacteriosis and *Gyrodactylus salaris* Infection.

Some of the most important diseases that could produce important economic impact in fish farm are:

#### Marine Environment:

- Infection with Nodavirus in farms with seabream and seabass
- Infection with. *Pasteurella spp* and *Pseudomonas anguilliseptica* in farms with seabream and seabass
- Infection with parasites as *Enteromyxum spp.*, *Cryptocaryon irritans* and *Amyloodinium ocellatum*, ) in farms with seabream and seabass
- Infection with *Vibrio angillarum* in farms with seabream and seabass
- Petequial rash syndrome , in farms with seabream
- Winter Syndrome in farms with seabream
- Infection with *Philasterides dicentrarchi* and *Aeromonas salmonicida* in turbot Infection with *Yesinia ruckeri*

#### Fresh water environment, in farms with trout

- RTFS (*Flavobacterium psychrophilum*)
- ERM (*Yersinia ruckeri*)
- Lactococcosis (*Lactococcus garvieae*)
- Forunculosis (*Aeromonas salmonicida*)



Sweden



**Author/Institute:** Charlotte Axén/SVA

**Aquaculture production:** Flow through systems, mainly land based for fry/fingerling production and cages in lakes or rivers for production of older fish. Some land based farms for production of older fish. Main species rainbow trout, followed by arctic char. Brown trout and Salmon mainly farmed for re-stocking, whitefish only for re-stocking. New farms with RAS for perch, sander, tilapia, Clarias, sturgeon and other foreign species are starting to establish

**Health status:** None of the listed diseases present in Swedish Aquaculture farms. One case of VHS genotype 1b in (wild) Baltic cod in 2015.

Surveillance is done through the official control programme, with sampling of 30 fish once a year, every other year or just on suspicion according to the Board of Agriculture risk classification of each specific production site. Surveillance is done for virus (IHN, VHS, IPN, EHN and in a few farms SVC) and BKD. In addition, all brood stock females for production of re-stocking fish are tested for BKD and viruses. KHV is done on imported fish and upon request from farmers.

BKD analysis is done in individual fish by ELISA of kidney tissue samples, and positive cases are confirmed by PCR. Regular virus samples are pooled for 10 fish before cultivation. Cultures with CPE are diagnosed by ELISA followed by SN-test (SVC) or RT-PCR (conv PCR and sequencing if necessary). KHV is analysed for individual fish (pools of gill and kidney swabs)

#### **Other diseases and health related issues:**

*Flavobacterium psychrophilum* is a common health problem in fingerlings, mainly rainbow trout.

Yersiniosis and ASS/Furunculosis usually appear in one or two farms each year.

Cultivation on blood and Tyros agar. Species is verified by MALDI-TOF, or by biochemical testing when it comes to *Aeromonas* since MALDI-TOF cannot distinguish well between different *Aeromonas* species. Antibiotic resistance is tested by SVAs own Vetmic Aquatic panel.

Recently, our Antibiotics department compiled data on AB resistance in *F. psychrophilum* and found that there has been an increased resistance against oxolinic acid and tetracyclins (ABs we do not use against this bacteria) in the last ten years. We are not sure what has caused this, and are currently looking into it. I think we would like to bring this up to see if there are other countries that have seen the same thing.

Switzerland



**Author/Institute:** Thomas Wahli, Centre for Fish and Wildlife Health

**Aquaculture production:** The main species produced is rainbow trout. Farms are either fed by spring or river water. Parts of the farms produce organic fish. Further species produced are sturgeon (semi recirculation

systems) and perch (recirculation systems). Parts of the sturgeon and perch farms rely on geothermal water. There is an increase in small scale facilities producing pike perch, mainly promoted as an auxiliary income for farmers (not fish farmers). Mostly these small scale facilities are run as recirculation systems. At present it is too early to assess whether this new production will be successful.

Brown trout for restocking purposes are produced in governmental farms or on behalf of cantonal fisheries authorities in small farms run by fishermen associations.

**Health status:** The system of disease free zones or farms is not applied in Switzerland. Further, actually there is no active surveillance of fish farms. Since 2010 all farms have to be registered by the cantonal authorities. However, a nationwide database based on merging of all cantonal data with regular updates has not yet been established.

However, in case of a suspect of a notifiable disease, farmers, vets and diagnostic laboratories have to notify the competent authorities (passive surveillance). In case of proven presence of VHSV or IHNV, an immediate stamping out of all stocks of the respective facility is performed. In case of INPV, farmers are allowed to sell slaughtered stocks before sanitation of the facility. In all cases farms have to be sanitized. In contrast to the EU, KHV is not notifiable in Switzerland, mainly due to the fact, that there is no carp farming in the country.

#### **Other diseases and health related issues:**

A major problem are infections by *Flavobacterium* (mainly *F. psychrophilum*) both of gills / skin and systemic (RTFS). Further problems, although in a limited number of cases, arise from *Yersinia ruckeri* (ERM) (mainly in organic farms) and *Aeromonas salmonicida* (Furunculosis). In Switzerland, to date no vaccines for these bacterial diseases are registered. Species affected are rainbow trout and brown trout.

In the last years two new diseases have been detected: Sleeping disease (SAV 2) in one farm repeatedly and perch rhabdo virus infection (in one farm once). If spreading, these two diseases might cause considerable problems.

A further new disease detected in one single farm in this year, was Francisellosis in Tilapia (*F. noatunensis* spp. *orientalis*)

No particular preventive measures are established for any of the diseases.

IPN is an infection of major discussions at present. The disease is notifiable in Switzerland but not in the surrounding countries. As many farmers are importing fish from these countries and do not specifically request for freedom of IPNV, they might run into problems when the virus is detected later on in their facility. Actually, there are no major losses caused by the infection. Therefore farmers claim to delist IPN, while mainly cantonal fisheries authorities vote for maintaining IPN as a listed disease to protect wild stocks.

**The Netherlands**



**Author/Institute:** Dr. Olga Haenen, Central Veterinary Institute, part of Wageningen UR

**Aquaculture production:** The year production in Dutch fish culture 2013 was over 6.500 ton fish, with a total volume >33.5 billion euro (source: [nevevi.nl](http://nevevi.nl)). In total, 37 fish culturists were active, please see the table below. They refresh part of the water in case of recirculation, and the water is discarded to the central drainage/sewage pipe.

2013	Number of fish farms	Production (Tons/year)	Type of aquaculture
<b>Fish species</b>			
European eel	15	2885	Indoor, recirculation, 25°C
Claesse (hybrid of catfish)	1	1700	Indoor, recirculation, 25°C
African catfish	8	1400	Indoor, recirculation, 25°C
Turbot	2	100	Indoor, recirculation, 11°C
Pikeperch	4	150	Indoor, recirculation, 15°C?
Yellow tail kingfish	1	60	Indoor, flow through, 11°C
Sturgeon	2	120	Indoor, recirculation, 15°C?
Tilapia	2	50	Indoor, recirculation, 25°C
Trout (mostly rainbow-), registered	2 (of 8)	70	Indoor, flow through, and ponds, 11°C
Common carp a.o. cyprinids, pike etc. for angling	1	?	Indoor, recirculation/flow through, and ponds, 10-22°C
<b>Total</b>	<b>38</b>	<b>6535</b>	

Apart from these fish culture farms, there is import of live full grown rainbow trout from Denmark a.o., with health certificate, which are stocked into put-and-take fisheries for angling purposes. There are April 2016 in total **8 trout culture farms** (of which **6 also put-and-take fisheries**) **plus 58 put-and-take fisheries**, mostly all with rainbow trout. **In total in NL: 102 fish farms**

**Health status: VHSV and IHNV:** all trout farms are in status III (2006/88/EC). The Netherlands practices a passive surveillance regarding notifiable fish diseases. Dutch trout farmers are officially not planning to reach a disease free status for their farms in the nearby future.

**VHSV** has been present since decades. It was detected in NL by Dr. R. Bootsma in the seventies, and since the eighties it has been detected at trout farms *Oncorhynchus mykiss* in 1987 (M. Cieslak et al. 2016, submitted: type Ic), 1992 (Cieslak: type Ia), and in 2011 (Cieslak: type Ia), related to disease outbreaks.

**IHNV** has been detected in NL for the first time in spring 2008, and last detections were in November 2011. Since November 2011, the IHN-positive farms were revisited twice by the Veterinary Authority, and each time 30 trout were taken for viral testing, which were all virus negative. Therefore, then the infected farms moved from Category V to Category III. There are no free zones or compartments regarding IHNV or VHSV in the Netherlands. We had one single free farm in the past, but this farm was later infected with IHNV and is now in status III. Although all Dutch IHNV-positive cases occurred within the temperature range given by the OIE (2014b)(from 3–8 °C up to 15–18 °C) at three rainbow trout farms, asymptomatic IHNV detection was seen. Please see for further details: [Haenen et al., 2016, doi:10.1111/jfd.12434](https://doi.org/10.1111/jfd.12434)

Haenen O.L.M., H. Schuetze, M. Cieslak, S. Oldenburg, M.A.H. Spierenburg, I. Roozenburg-Hengst, M. Voorbergen-Laarman, M.Y. Engelsma and N.J. Olesen, 2016. First evidence of Infectious Hematopoietic Necrosis Virus (IHNV) in the Netherlands. J. Fish Dis., doi:10.1111/jfd.12434 1-9.

**KHV disease:** KHV has been detected since decades in NL in many koi each year from private closed ponds. In Oct 2009 also found in a carp mortality in open water in W-NL. No stamping out was done. No monitoring is done.

**ISA:** No ISAV has ever been detected in the very scarce cases, that salmon has been submitted to our laboratory in the Netherlands.

**EHN:** an exotic disease, EHNV was never detected in NL.

#### Other diseases and health related issues:

We carry out full diagnosis, which means necropsy, parasitology, bacteriology and virology, with various qPCR tests for fish viruses, and MALDI-TOF for bacterial identification. Our National Reference Laboratory for Fish Diseases is specialized in viral diseases of cyprinids, e.g. Koi Herpes Virus (KHV) disease, Carp Edema Virus (CEV) disease, and the goldfish herpesvirus CyHV-2, various bacterial and viral eel diseases, and in *Vibrio* species, which may cause bacterial disease in fish, and of which some may be zoonotic (harmful to man). Yearly the results are reported to the Ministry of Economic Affairs, and in popular or peer reviewed papers, apart from oral presentations, courses and workshops.

Yearly, we receive approximately 530 batches of fish or individual samples of fish for diagnosis: 430 batches for import testing for KHV, and 100 batches/samples related to disease cases.

Diagnoses vary, from (multi) ectoparasite infections with secondary opportunistic bacteria to atypical *Aeromonas salmonicida*, CEV, KHV, CyHV-1, sometimes SVCV in wild carp and pond koi (only CEV and KHV), and eel viruses EVE, EVEX and/or AngHV-1 in cultured eel, and CyHV-2 in import goldfish and wild gibel carp (Haenen et al., 2016), and *Mycobacterium marinum* in ornamental tropical fish. We had a *Vibrio vulnificus* cluster of outbreaks in the 2007-2009, including a zoonosis in the eel farmer (Haenen et al., 2014).

There is no active monitoring of fish diseases in the Netherlands. Therefore, we have no real idea what diseases are present currently in the field, apart from in the diagnostic delivered samples.

- Haenen, O., K. Way, B. Gorgoglione, T. Ito, R. Paley, L. Bigarré and T. Waltzek, 2016. Workshop “Novel viral infections threatening Cyprinid fish”. Bull. Eur. Ass. Fish Pathol. 36(1): 11-23.  
Haenen OLM, van Zanten E, Jansen R, Roozenburg I, Engelsma MY, Dijkstra A, Boers SA, Voorbergen-Laarman M, and Möller AVM (2014). *Vibrio vulnificus* outbreaks in Dutch eel farms since 1996, strain diversity and impact. Dis Aquat Org 108: 201-209



**Author/Institute:** No information

**Aquaculture production:**

**Health status:**

## Other diseases and health related issues

### England and Wales



**Author/Institute:** Kevin Denham/ Centre for Environment, Fisheries and Aquaculture Science (Cefas)

**Aquaculture production:** Fin fish farming in England and Wales is diverse and dominated by small and medium scale enterprises. The two main sectors in terms of production volume are salmonid species and coarse and ornamental (carp family) fish species.

Rainbow trout *Oncorhynchus mykiss* is the main species of salmonid produced, all of which is currently farmed in freshwater mainly using traditional flow through earth pond, raceway or tank systems. There are a small number of sites that use cage systems suspended in freshwater lakes. Rainbow trout are produced for the table market and for restocking angling waters. There is also a significant production of brown trout *Salmo trutta* mainly for restocking, and a small but increasing production of Arctic char *Salvelinus alpinus* for the table market. A small number of sites produce juvenile Atlantic salmon *Salmo salar* for stock enhancement programmes and for the marine aquaculture industry in Scotland.

The other major sector is the production of coarse fish species primarily for stocking into angling waters and dominated by common carp *Cyprinus carpio* mainly produced in extensive earth ponds. There is some production of other species such as barbel *Barbus barbus*, roach *Rutilus rutilus* and chub *Leuciscus cephalus* for stocking angling waters, and a small production of common carp for the table. The main species of ornamental fish produced are goldfish *Carassius auratus* and koi carp *Cyprinus carpio* in a mixture of earth ponds and intensive indoor and outdoor tank systems.

There has been a steady increase in new authorized aquaculture production businesses in England and Wales over recent years. In 2015 the FHI undertook 83 pre-authorisation inspections of fish farms. The main increase has been in coarse fish farms and in small scale multi-trophic recirculation aquaculture systems farming species such as tilapia and carp, alongside plants such as salad crops and herbs.

**Health status:** England and Wales are recognized as being free from the major listed diseases IHN, VHS and ISA.

As far as KHV disease is concerned the aquaculture sector appears to be free from this disease. However outbreaks of KHV disease occur in common carp in managed fisheries when water temperatures are conducive to the expression of clinical disease. In 2015 there were 10 outbreaks of KHV disease in England and 1 outbreak in Wales. Infected fisheries are subject to statutory controls.

In addition England and Wales are free from the diseases gyrodactylosis caused by *Gyrodactylus salaris*, and spring viraemia of carp (SVC) which are controlled under Article 43 of Council Directive 2006/88/EC.

Each aquaculture production business (APB) in England and Wales is subject to a minimum of an annual compliance and disease surveillance inspection by the official service, the Cefas Fish Health Inspectorate. APB's that farm mixed species (e.g. salmonids and carp) receive additional disease surveillance inspections at a

time appropriate to the clinical expression of the diseases subject to control. Surveillance programmes are risk based and APB's that are assessed as higher risk or have poor statutory compliance are subject to a higher level of surveillance. Passive surveillance systems have also been implemented through veterinarians, fish farmers, fish health consultants and fishery managers.

An active targeted surveillance programme for listed diseases and diseases controlled under Article 43 measures is in place for imported live fish. This programme detected SVC in fish imported from a third country in 2015. The import programme has found SVC in imported fish in 4 instances in the past 8 years.

#### **Other diseases and health related issues:**

In recent years the major disease concerns in rainbow trout and brown trout farming in England and Wales have been associated with two skin diseases of unknown aetiology, red mark syndrome (RMS) and puffy skin disease (PSD).

Both of these conditions have emerged in the past 10 years or so, have separate and distinct clinical expression, cause low mortality in affected fish but are of considerable economic importance as a result of unsightly lesions causing rejection at processing (or in fish for restocking), and culling of affected animals. Earlier studies found RMS reported in 41 % and PSD in 37% of rainbow trout farms. The conditions generally become evident in partially grown fish and those near harvesting. Antibiotic therapies can reduce the incidence of RMS in farmed trout but use is complicated by the long withdrawal periods. RMS can spontaneously resolve in older fish, but PSD tends to be more persistent and has been recorded in fish stocked into managed fisheries from affected farms. An epidemiological study is underway in England and Wales to investigate the current incidence of both conditions and identify potential causative agents.

Other diseases that are recognized by fish health professionals as important in rainbow trout production in England and Wales are rainbow trout fry syndrome (RTFS), caused by the bacterium *Flavobacterium psychrophilum*; white spot disease, caused by the ectoparasite *Ichthyophthirius multifiliis*; enteric redmouth disease (ERM), caused by the bacterium *Yersinia ruckeri*; proliferative kidney disease caused by the myxozoan parasite *Tetracapsuloides bryosalmonae* and bacterial gill disease (BGD) caused by *Flavobacterium* spp. Restrictions on the availability of treatments, including the limited availability of antibiotics and vaccines, and potential further constraints on the use of formalin are of major concern to the salmonid farming sector.

In addition furunculosis caused by *Aeromonas salmonicida* is re-emerging in brown trout farming due to the absence of a suitable vaccine.

There have been an increase in reports of wild adult Atlantic salmon and sea trout in rivers with extensive lesions across the head and body as a result infection with the oomycete fungus *Saprolegnia parasitica*. These infections in wild salmonids in freshwater, appear to be cyclical in nature and are often exacerbated by environmental events such as low water flows in rivers.

In carp production the major concerns are ectoparasitic infestations such as white spot *Ichthyophthirius multifiliis*, and costia *Ichthyobodo necator*, and the emergence of viral conditions which primarily affect carp in managed fisheries such as carp edema-like virus and the cyprinid herpesviruses. The FHI provides advice on the application of biosecurity measures risk mitigation to reduce the spread of these diseases.

## Northern Ireland



**Author/Institute:** Donna Lyons

**Aquaculture production:** There are 41 authorised fin fish farms, in Northern Ireland covering 39 inland and 2 marine sites. The main species cultivated are Atlantic salmon (*Salmo salar*), Rainbow trout (*Oncorhynchus mykiss*) and Brown trout (*Salmo trutta*).

In 2014, the aquaculture sector in Northern Ireland produced over 1,100 metric tonnes of finfish, valued at £5.1 million.

**Health status:** Northern Ireland has a high fish health status and is declared disease free from a number of listed diseases, including freedom from VHS, IHN, ISA and KHV. A surveillance programme, which includes annual disease testing from fish farms and wild stocks, routine inspection of fish imports by the Fish Health Inspectorate (FHI) and an annual inspection of fish farms by the FHI is implemented.

**Other diseases and health related issues:** There are currently no other diseases or health related issues affecting or challenging the aquaculture industry in Northern Ireland.

## UK – Scotland



**Author/Institute:** Marine Scotland Science

**Aquaculture production:** There are 24 businesses operating 46 active sites for the production of rainbow trout. In 2014, 5,882 tonnes of rainbow trout were produced, 5,328 tonnes for the table market and 554 tonnes for restocking angling waters. Of the 46 active sites 31 sites reported production in 2014. Freshwater production accounted for 3,973 tonnes and seawater production the remaining 1,909 tonnes. Freshwater production was from sites operating cages, ponds, raceways, tanks and hatcheries and seawater production was all from cage site facilities. Over 11 million ova were laid down to hatch in 2014 with 10 million being imported from foreign sources while the remaining 1 million were from Scotland or other GB based fish farms.

Over 45 million Atlantic salmon smolts were produced by 26 businesses operating 96 active sites. The principal types of facility used for the production of smolts in freshwater are cages (41 sites) or tanks and raceways (55 sites). Within the tanks and raceways bracket there are also two recirculation units currently in operation. Over 70 million ova were laid down to hatch with 54 million of these ova coming from foreign sources.

In 2014, the total production of Atlantic salmon was 179,022 tonnes. These fish were produced by 18 businesses operating 260 active sites. All fish production was from the seawater cage sites (257 sites) and no production was reported from the seawater tank sites (3 sites) currently in operation. Most seawater tank capacity has been re-deployed for the production of other species or salmon broodstock.

As well as Atlantic salmon and rainbow trout the Scottish aquaculture industry also produces a small quantity of brown/sea trout, halibut, lumpsuckers and wrasse.

Species Farmed	Number of Businesses	Number of active Sites	Production (Tonnage)
Sea/Brown Trout	13	17	48
Halibut	2	4	66
Lumpsucker	4	4	5
Wrasse	3	3	0.1

Lumpersuckers and wrasse are produced for use as biological controls for parasites in the marine Atlantic salmon farming industry. There were also very small amounts of cod, brook charr, carp, sheepshead minnow, tiger trout, tilapia and turbot produced in Scotland. The majority of trout production takes place in freshwater tanks, ponds and raceways with only 7 tonnes produced in seawater cages. Halibut, wrasse and lumpsuckers are mainly produced in seawater tank sites with one seawater cage site carrying out halibut production.

**Health status:** The status of Scotland (as part of the Great Britain zone under the UK Member State) with regard to the listed fish diseases is as follows:

EHN – Category I (Exotic to the EU)

VHS – Category I

IHN – Category I

KHV – Category III (no detection in Scotland, status for whole of UK)

ISA (HPR deleted) – Category I

Fish health inspectors carry out statutory inspection and testing programmes on fish farms throughout Scotland to:

- maintain the approved status of Great Britain as a disease-free area for ISA, VHS and IHN
- prevent the spread of listed diseases, through epizootic investigations and application of movement restrictions
- fulfil the monitoring required in support of the national measures for the control of SVC and *Gyrodactylus salaris*
- fulfil the monitoring required in support of the domestic controls for bacterial kidney disease
- enable detection of emerging diseases of fish

To meet the statutory requirement for maintenance of areas listed as free from listed diseases, we inspect all farms holding susceptible species as part of a risk-based active surveillance programme. The frequency of visits to individual farms is based upon the level of risk of disease emergence, or spread that they pose. Those farms posing the highest risk are visited every year, medium risk every second year and low risk every three years. Having areas listed as disease-free and national controls mean that only fish of equivalent health status can be imported into Great Britain, thereby safeguarding the health of our stocks.

In addition, passive surveillance is carried out between scheduled farm inspections by contacting sites, and also from the receipt of information from industry and health experts in the course of their work. Inspections and sampling are carried out on notification of the suspicion of listed or emerging diseases at a farm. Passive surveillance also allows an assessment to be undertaken on the current production status of a farm and on the most appropriate surveillance frequency for the farm.

If a farm is suspected or confirmed as being infected with a listed disease, surveillance is increased. The Fish Health Inspectorate is responsible for overseeing the withdrawal of fish from sites confirmed with a listed disease and the cleaning and disinfection of equipment on site. We will not allow infected farms to be re-stocked until the recommended fallow period has been completed.

If during a site inspection an inspector observes sick, moribund or abnormally behaving on a farm, then diagnostic samples may be taken. The purpose of these samples is to rule out the presence of a listed disease, or to identify other non-listed pathogens, including emerging diseases.

#### **Other diseases and health related issues:**

The status of Scotland (as part of the Great Britain zone under the UK Member State) with regard to the fish diseases controlled under national measures (article 43, Directive 2006/88/EC) is as follows:

- *Gyrodactylus salaris* – Category I
- SVC – Category I
- BKD (Clinical expression) - National control programme (3 rainbow trout farm sites with movement restrictions in place)

Sites are inspected as part of the risk-based active surveillance programme (active surveillance). If during a site inspection an inspector observes sick, moribund or abnormally behaving on a farm, then diagnostic samples may be taken. If a farm is suspected or confirmed as being infected with a disease controlled under national measures, movement controls are placed on the farm to prevent further spread of the disease and the farm will be fallowed before restocking. Movement restrictions will be placed on a farm if clinical BKD is confirmed, but movements of fish without clinical signs may be allowed following a risk assessment.

No other fish diseases are currently subject to statutory control measures. Diseases currently challenging the aquaculture industry include the following:

- Sea lice (*Lepeophtheirus salmonis*) - Atlantic salmon (all seawater stages). On site monitoring by farm staff. Prophylactic treatments or as required when level rise above the suggested criteria for treatment (bath treatments, in-feed, mechanical removal using brushes or water jets etc.). Many sites using cleaner fish (wrasse and lumpsuckers).
- Amoebic Gill Disease (*Paramoeba perurans*) - Atlantic salmon (all seawater stages). On site monitoring by farm staff, bath treatments as required.
- Atypical furunculosis (*Aeromonas salmonicida*) - Observed in wrasse used as biological control method for sea lice cohabiting with Atlantic salmon.
- Salmonid alphavirus - Atlantic salmon (all seawater stages) and rainbow trout (freshwater)
- Red Mark Syndrome – Rainbow trout (freshwater, grower stage)
- Enteric redmouth (*Yersinia ruckeri*) – Rainbow trout (freshwater)
- Infectious pancreatic necrosis (IPNV) - Atlantic salmon (all seawater stages) and rainbow trout (freshwater)
- Cardiomyopathy Syndrome (CMS) - Atlantic salmon (seawater stages)
- Heart and skeletal muscle inflammation (HSMI) - Atlantic salmon (seawater stages)

## Annex 1

### Number of fish Farms

<b>Total Number of fish farms authorized or active in 2015</b>			
Only farms/sites that were active in 2015 or part of 2015 are included			
Austria	125	Italy	768
Albania	0	Kosovos	125
Belgium	101	Latvia	160
Bosnia and Herzegovina	70	Lithuania	85
Bulgaria	562	Netherlands	102
Cyprus	20	Northern Ireland	41
Czech Republic	1.641	Norway	1.219
Croatia	83	Poland	4.416
Denmark	257	Portugal	78
Estonia	24	Rep. of Macedonia	125
England and Wales	309	Romania	625
Faroe Islands	125	Scotland	416
Finland	594	Serbia	110
France	1.701	Slovakia	160
Germany	14.626	Slovenia	300
Greece	416	Spain	249
Hungary	236	Sweden	200
Iceland	53	Switzerland	357
Ireland	54	Turkey	2.377
<b>Total</b>			<b>32.910</b>



## Annex 2: Number of farms in country placed in the respective categories according to listed diseases

	Number of farms in country placed in the respective categories according to listed diseases																				Number of farms not in any category
	Category I Declared disease-free				Category II Subject to a surveillance programme				Category III Not known to be infected but not subject to surveillance programme for achieving disease free status				Category IV Known to be infected but subject to an eradication programme				Category V Known to be infected. Subject to minimum control measures				
	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	
<i>Austria</i>	10	10	0	0	1	1	0	0	74	74	0	38	0	0	0	0	2	1	0	0	
<i>Belgium</i>	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	99
<i>Bulgaria</i>	11	30	30	104	0	0	0	0	67	48	48	0	0	0	0	0	0	0	0	0	0
<i>Cyprus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Czech Republic</i>	0	0	215	0	0	0	0	0	1006	186	0	1500	0	0	0	0	1	0	0	0	15
<i>Denmark</i>	198	228	228	0	0	0	0	0	30	0	0	6	0	0	0	0	0	0	0	0	0
<i>Estonia</i>	1	1	16	0	15	15	0	2	1	1	0	1	0	0	0	0	0	0	0	0	6
<i>Finland</i>	453	252	268	0	0	0	0	0	0	0	0	22	28	0	0	0	0	0	0	0	0
<i>France</i>	254	201	0	0	41	39	0	0	171	127	0	0	0	0	0	0	0	5	0	0	0
<i>Germany</i>	83	71	647	0	0	0	0	0	8179	7920	297	5708	0	0	0	0	15	7	4	28	74
<i>Greece</i>	0	0	0	0	0	0	0	0	64	64	64	7	0	0	0	0	0	0	0	0	345
<i>Hungary</i>	0	0	0	0	19	0	0	170	19	19	0	0	0	0	0	0	0	0	0	0	11
<i>Ireland</i>	53	53	53	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Number of farms in country placed in the respective categories according to listed diseases																				Number of farms not in any category
	Category I Declared disease-free				Category II Subject to a surveillance programme				Category III Not known to be infected but not subject to surveillance programme for achieving disease free status				Category IV Known to be infected but subject to an eradication programme				Category V Known to be infected. Subject to minimum control measures				
	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	
<i>Italy</i>	168	166	499		8	8	0	0	332	312	0	98	0	0	0	0	12	13	0	0	182
<i>Latvia</i>	0	0	0	0	0	0	0	0	80	80	0	80	0	0	0	0	0	0	0	0	30
<i>Lithuania</i>	0	0	0	0	32	19	14	27	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Netherlands</i>	0	0	0	0	0	0	0	0	66	66	66	1	0	0	0	0	0	0	0	0	0
<i>Poland</i>	16	18	0	1	0	0	0	0	574	582	0	3480	0	0	0	0	11	1	0	2	332
<i>Portugal</i>	21	21	0	1	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Romania</i>	0	0	158	0	0	0	0	0	217	160	0	437	0	0	0	0	0	0	0	0	27
<i>Slovakia</i>	0	0	0	0	94	85	0	23	3	12	0	78	0	0	0	0	0	0	0	0	0
<i>Slovenia</i>	14	14	0	0	4	4	0	0	158	128	0	142	0	0	0	0	5	17	0	13	3
<i>Spain</i>	126	102	123	0	0	0	0	0	12	8	0	1	0	0	0	0	0	0	0	0	127
<i>Sweden</i>	153	153	153	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
<i>England and Wales</i>	186	186	0	2	0	0	0	0	0	0	0	119	0	0	0	0	0	0	0	0	12
<i>Scotland</i>	74	398	402	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2
<i>Northern Ireland</i>	37	37	37	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Number of farms in country placed in the respective categories according to listed diseases																				Number of farms not in any category
	Category I Declared disease-free				Category II Subject to a surveillance programme				Category III Not known to be infected but not subject to surveillance programme for achieving disease free status				Category IV Known to be infected but subject to an eradication programme				Category V Known to be infected. Subject to minimum control measures				
	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	VHS	IHN	ISA	KHV	
<i>Croatia</i>	0	0	0	24	31	27	0	0	0	0	27	0	4	4	0	0	0	1	0	0	0
<i>Turkey</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Albania</i>																					
<i>Bosnia and Herzegovina</i>	0	0	0	0	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
<i>Iceland</i>	0	24	3	0	0	0	0	0	14	0	21	0	0	0	0	0	0	0	0	0	0
<i>Norway</i>	1219	1108	49	0	0	0	8	0	0	0	1059	0	0	0	8	0	0	0	0	0	0
<i>Switzerland</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Faroe Islands</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Kosovos</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Serbia</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Rep. of Macedonia</i>	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	3.083	3.074	2.881	140	278	231	22	222	11.067	9.787	1.582	11.725	32	4	8	0	48	47	4	43	1.267

### Annex 3 Outbreaks of listed diseases

COUNTRY	2.1 Number of outbreaks				2.2 Is there a general increase or decrease in the severity of infections with listed diseases compared to previous years? If yes please specify:	2.3 Is there an increase or decrease in the number of fish farms infected with listed diseases compared to previous years? Yes/No If yes please specify:
	VHS	IHN	KHV	ISA		
<b>Austria</b>	8 (1 Pike / 7 RT)	0	2 (1 Koi carp 1 carp)	0	increase of VHSV- outbreaks decrease of IHNV (no case)	increase of VHSV-severity at pikes
<b>Belgium</b>	3	1	0	0	2 sites previously non infected have been contaminated by VHS and stamped out	0
<b>Bulgaria</b>	NO	NO	NO	NO	NO	NO
<b>Cyprus</b>	0	0	0	0	Not applicable	No
<b>Czech Republic</b>	1	0	0	0	In the last year the number of fish farm positive for VHS or IHN has decreased compared to previous years. 10 outbreaks of VHS, 2 outbreaks of IHN and 2 outbreaks with VHS and IHN have occurred in the 2014. There was only one outbreak of VHS in 2015. The VHS outbreak was identified in relation to the notification of clinical signs and increased mortality. Two suspicion of presence of salmonids disease were not confirmed in 2015.	no
<b>Denmark</b>	0	0	0	0	no	no
<b>Estonia</b>	0	0	0	0	No.	No.
<b>Finland</b>	0	0	0	0	no	no

COUNTRY	2.1 Number of outbreaks				2.2 Is there a general increase or decrease in the severity of infections with listed diseases compared to previous years? If yes please specify:	2.3 Is there an increase or decrease in the number of fish farms infected with listed diseases compared to previous years? Yes/No If yes please specify:
	VHS	IHN	KHV	ISA		
France	0	0	0	0	0	0
Germany	26	21	67	0	Baden-Württemberg: increase in IHN Bavaria: low increase in all diseases Lower Saxony: increase in KHV-I Rhineland-Palatina: low increase in KHV-I; VHS, IHN new outbreaks after absence Saxony: low increase in VHS; decrease in KHV-I for common carp Saxony-Anhaltinia: increase in KHV-I among Koi carp Thuringia: firts case of VHS since 2009	Baden-Württemberg: decrease of severity in IHN outbrakes, some without clinical signs
Greece	0	0	0	0	NO	NO
Hungary	0	0	0	0	No	No
Ireland	0	0	0	0	No change.	No.
Italy	3	9	0	0	Increase of IHNV	0
Latvia	0	0	0	0	No	No
Lithuania	0	0	0	0	No	No
Netherlands	0	0	12 of 48 cases	0	No change, given the low numbers of KHV in closed facilities.	No change.

COUNTRY	2.1 Number of outbreaks				2.2 Is there a general increase or decrease in the severity of infections with listed diseases compared to previous years? If yes please specify:	2.3 Is there an increase or decrease in the number of fish farms infected with listed diseases compared to previous years? Yes/No If yes please specify:
	VHS	IHN	KHV	ISA		
<b>Poland</b>	11	1	2	0	0	0
<b>Portugal</b>	0	0	0	0	No	No
<b>Romania</b>	0	0	1	0	NO	NO
<b>Slovakia</b>	179	159	31	0	No	No
<b>Slovenia</b>	0	1	0	0	No	No
<b>Spain</b>	0	0	0	0	NO	NO
<b>Sweden</b>	0/1	0	0	0	Yes. Two new farms with IPNab (previously one farm was infected). One of the farms classified as an inland farm, but we believe that it might be mis-classified since a brook connects the lake to river Kalixälven (coastal zone), but we do not know if there are barriers prohibiting migration in the brook or not. However, the Board of Agriculture chose not to look into this since the farm is closing down	Not applicable
<b>England and Wales</b>	0	0	14	0	Previous year there were 23 confirmed KHV positives and one SVC positive (from an imported consignment)	0
<b>Scotland</b>	0	0	0	0	No change	No change
<b>Northern Ireland</b>	0	0	0	0	No change- no disease outbreaks.	No change- no disease outbreaks.

COUNTRY	2.1 Number of outbreaks				2.2 Is there a general increase or decrease in the severity of infections with listed diseases compared to previous years? If yes please specify:	2.3 Is there an increase or decrease in the number of fish farms infected with listed diseases compared to previous years? Yes/No If yes please specify:
	VHS	IHN	KHV	ISA		
<b>Croatia</b>	0	1	0	0	Yes, there is a decrease in number of infected farms. In 2014 there were 4 farms infected with VHS, 4 with IHN. Totally there were 6 infected farms out of which there were 3 farms with coinfection VHS and IHN, single farm with VHS and single with IHN.	n/a
<b>Turkey</b>	0	0	0	0	0	0
<b>Albania</b>	0	0	0	0	0	0
<b>Bosnia and Herzegovina</b>	0	0	0	0	No	No
<b>Iceland</b>	1	0	0	0	No (just the one case with VHSV in wild caught lumpfish in a small trial farm. All fish were slaughtered and destroyed in Oct. 2015 and no positives have been found since).	No
<b>Norway</b>	0	0	0	15	It looks like an increase in ISA outbreaks, The reason may be that infected smolts from one hatchery were transferred to four sea locations before the infection was detected.	0
<b>Switzerland</b>	1	2	0	0	Both in 2015 and 2014 one farm was found to have fish with VHSV (different farm in different parts of the country). In 2014 in one farm IHNV was detected, in 2015 the virus was found in two farms (again different farms).	No change in pathogenicity of the viruses was recorded
<b>Serbia</b>	0	0	0	0	NO	NO
<b>Rep. of Macedonia</b>	0	0	0	0	#VALUE!	0

## Annex 4 Other Fish diseases problems

COUNTRY	Fish diseases problems other than VHS, IHN, KHV or ISA							
	Fish species	disease or symptoms	Fish species	disease or symptoms	Fish species	symptoms	Fish species	disease or symptoms
Austria	Brown trout, Char	furunculosis	Koi carp	CEV	Rainbow trout	AGD	0	0
Belgium	RT	PKD	Brown trout and RT fry and fingerlings	White spot	RT	RTFS	0	0
Bulgaria	RAINBOW TROUT	IPN	0	Yersinia ruckeri ; Renibacterium salmoninarum	CARP	Aeromonas hydrophila	0	0
Cyprus	Sea bass	VNN (Nodavirus)	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0
Finland	See National report (word document)	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0
Germany	rainbow trout/salmonids	Flavo/RTFS (hatcheries) Baden-Württemberg, Bavaria; Hesse	Salvelinus	Saprolegniosis Baden-Württemberg:	rainbow trout/salmonids	ERM Baden-Württemberg; Bavaria; Meck-WP;	carp (common and Koi)	Koi sleepy disease Baden-Württemberg; Lower Saxony

COUNTRY	Fish diseases problems other than VHS, IHN, KHV or ISA							
	Fish species	disease or symptoms	Fish species	disease or symptoms	Fish species	symptoms	Fish species	disease or symptoms
Greece	SEABASS	VNN/VER	SEABREAM	Microcotylosis	SEABASS	Lernathropus croyeri infestation	SEABREAM	Rash syndrome
Hungary	0	0	0	0	0	0	0	0
Ireland	Atlantic salmon	Amoebic gill disease	Atlantic salmon	Pancreas disease	Atlantic salmon	Winter ulcer disease	0	0
Italy	Rainbow trout	Yersinia ruckerii biotype 2, Lactococcus garviae, RTFS	Other salmonids	Forunculosis	Marine species	VER, Photobacteriosis, Vibriosis	0	0
Latvia	Cyprinidae	Aeromonosis	Salmonidae	Aeromonosis	Acipenseridae	Aeromonosis	Coregonidae, Percidae	Aeromonosis
Lithuania	0	0	0	0	0	0	0	0
Netherlands	Cyprinus carpio, wild common carp	CEV infection: sleepy disease, high mortality (Keith Way et al., in prep.)	Carassius auratus gibelio, wild gibel carp	CyHV-2 high titre infection and disease: severe haemorrhages, skin loosens, gill inflammation with hypertrophy (Haenen et al.2016)	Anguilla anguilla, European eel at eel farms	EVE (2x), EVEX (1x), and AngHV-2 (6x): haemorrhages, mortality	0	0
Poland	0	0	0	0	0	0	0	0
Portugal	N/A	N/A	0	0	0	0	0	0

COUNTRY	Fish diseases problems other than VHS, IHN, KHV or ISA							
	Fish species	disease or symptoms	Fish species	disease or symptoms	Fish species	symptoms	Fish species	disease or symptoms
Romania	rainbow trout	yersiniosis, furunculosis	rainbow trout	myxobacteriosis	rainbow trout	IPN	0	0
Slovakia	Carp	SVCV 1 x	0	0	0	0	0	0
Slovenia	Rainbow trout	RTFS, Aeromonas infections, Yersiniosis	Other salmonids	Furunculosis	Carp	Aeromonas infections, parasites	0	0
Spain	Trout	RTFS	Trout	Furunculosis	Trout	ERM	Sea bream	Nodavirus
Sweden	rainbow trout/arctic char	BKD	rainbow trout	IPNab	rainbow trout	Flavobacterium psychrophilum	rainbow trout	furunculosis and yersiniosis (one or a few cases/year)
England and Wales	Rainbow trout/brown trout	Puffy skin disease	Rainbow trout	Red mark syndrome	Rainbow trout	Unknown aetiology- 3 sites large scale mortality associated with dorsal skin lesions	0	0
Scotland	Atlantic salmon	As listed in 3.2. Also sea lice	Rainbow trout	As listed in 3.2.	Wrasse	Vibrio spp and A salmonicida	lumpsuckers	Vibrio spp
Northern Ireland	N/A	No known diseases.	0	0	0	0	0	0
Croatia	Rainbow trout	RTFS	Carp	Carp erythrodermatitis, Swimbladder	0	0	Marine fish	Vibriosis, Tenacibaculosis, ectoparasites

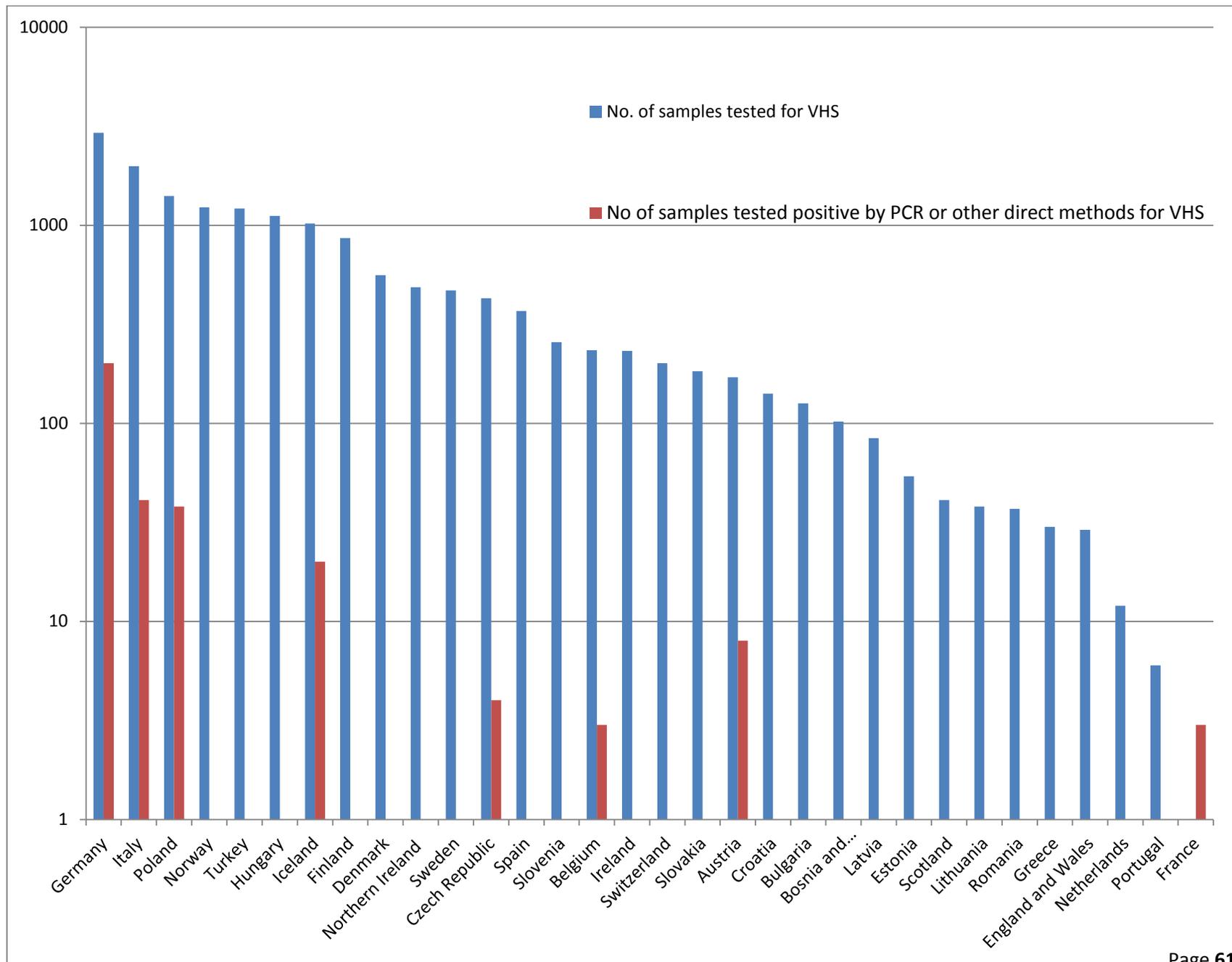
COUNTRY	Fish diseases problems other than VHS, IHN, KHV or ISA							
	Fish species	disease or symptoms	Fish species	disease or symptoms	Fish species	symptoms	Fish species	disease or symptoms
				inflammation, ectoparasites				
Turkey	Rainbowtrout	IPNV	0	0	0	0	0	0
Albania	0	0	0	0	0	0	0	0
Bosnia and Herzegovina	Salmonidae, trout	IPN, with clinical signs on several farms	0	0	0	0	0	0
Iceland	0	All infectious diseases of concern in the aquaculture industry in Iceland so far are of bacterial origin (except the one case with VHS in wild lumpfish). There has been some increase in detection of bacterias causing skin ulcers (Flavobacterium and Tenacibaculum	0	0	0	0	0	0

COUNTRY	Fish diseases problems other than VHS, IHN, KHV or ISA							
	Fish species	disease or symptoms	Fish species	disease or symptoms	Fish species	symptoms	Fish species	disease or symptoms
Norway	Salmon	Sea lice, pancreatic disease, heart and skeletal muscle inflammation, cardiomyopathy syndrome, amoebic gill disease, Moritella	Rainbow trout	Pancreatic disease, Flavobacterium psychrophilum, Vibrio anguillarum,	0	0	0	0
Switzerland	Rainbow trout	RTFS, ERM, bacterial gill disease, IPN	Brown trout	PKD (wild fish), Bacterial gill disease	0	0	0	0
Faroe Islands	Brown trout, Char	furunculosis	Koi carp	CEV	Rainbow trout	AGD	0	0
Kosovos	Brown trout, Char	furunculosis	Koi carp	CEV	Rainbow trout	AGD	0	0
Serbia	Rainbow trout	IPN	Cyprinus carpio	motile aeromonad septicaemia	Rainbow trout	BKD	0	0
Rep. of Macedonia	0	4	0	3	#VALUE!	0	#VALUE!	0

## Annex 5 Laboratory data

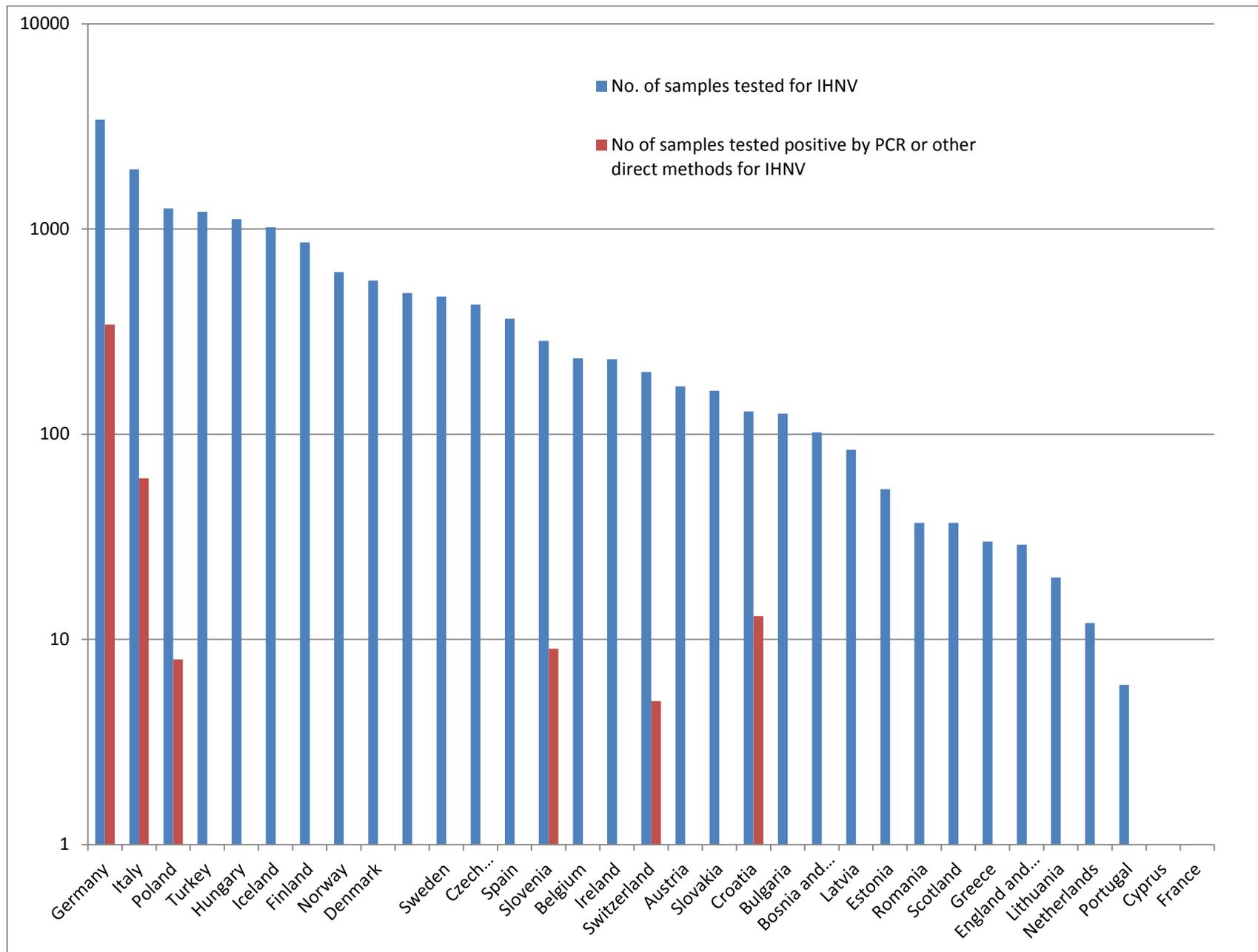
### No. of samples tested for VHSV in EUROPE in 2015

Country	No. of samples tested for VHSV	No of samples tested positive by PCR or other direct methods for VHSV
Germany	2928	201
Italy	1985	41
Poland	1403	38
Norway	1231	
Turkey	1215	
Hungary	1115	
Iceland	1020	20
Finland	861	
Denmark	559	
Northern Ireland	487	
Sweden	469	1
Czech Republic	428	4
Spain	369	
Slovenia	257	
Belgium	234	3
Ireland	232	
Switzerland	201	1
Slovakia	183	
Austria	171	8
Croatia	141	
Bulgaria	126	
Bosnia and Herzegovina	102	
Latvia	84	
Estonia	54	
Scotland	41	
Lithuania	38	
Romania	37	
Greece	30	
England and Wales	29	
Netherlands	12	
Portugal	6	
France		3
Cyprus		
Faroe Islands		
Kosovos		
Albania		
Rep. of Macedonia		



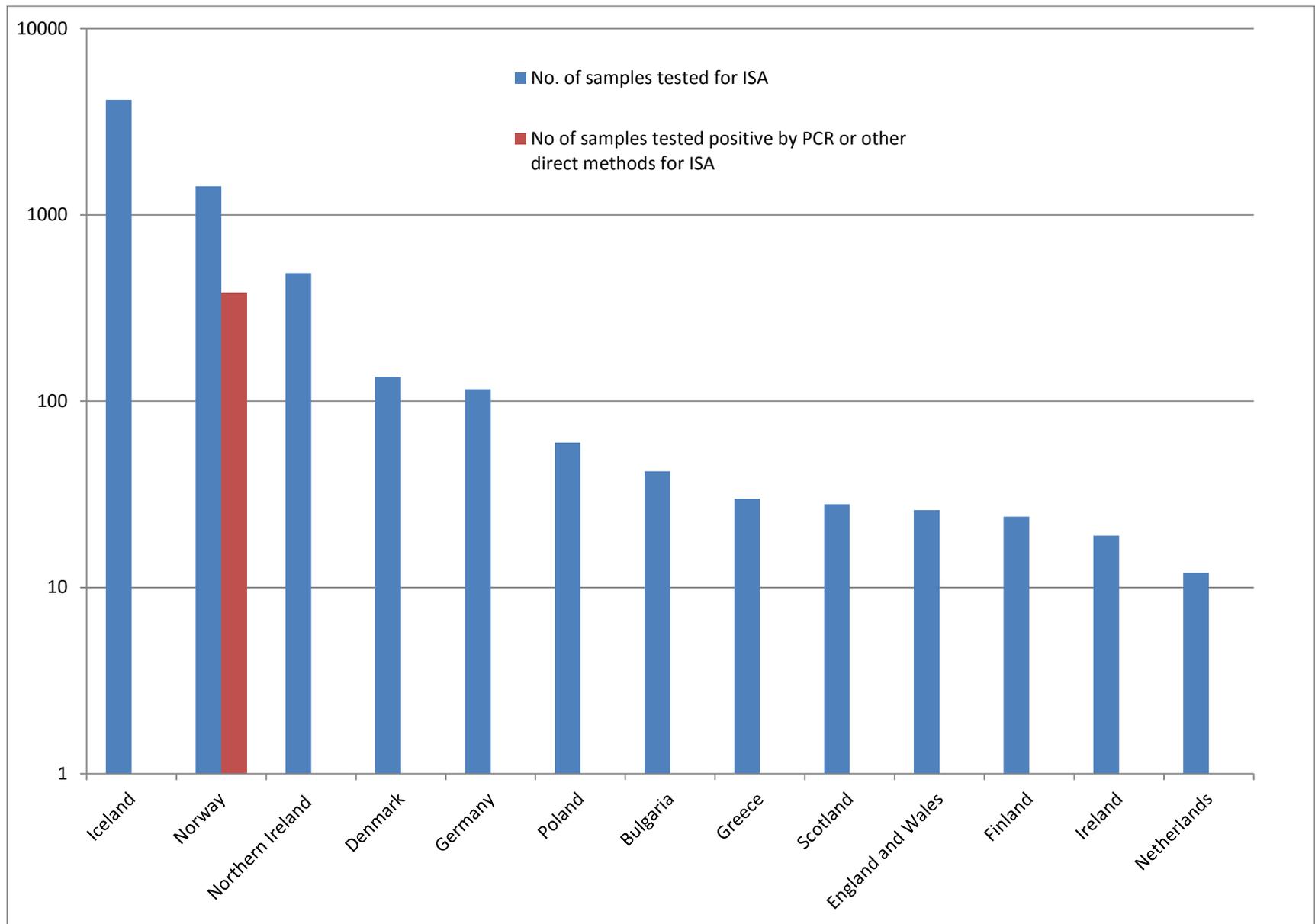
## No. of samples tested for IHNV in EUROPE in 2015

Country	No. of samples tested for IHNV	No of samples tested positive by PCR or other direct methods for IHNV
Germany	3417	342
Italy	1954	61
Poland	1259	8
Turkey	1215	
Hungary	1115	
Iceland	1020	
Finland	861	
Norway	616	
Denmark	560	
Northern Ireland	487	
Sweden	469	
Czech Republic	428	
Spain	365	
Slovenia	285	9
Belgium	234	1
Ireland	232	
Switzerland	201	5
Austria	171	
Slovakia	163	
Croatia	129	13
Bulgaria	126	
Bosnia and Herzegovina	102	
Latvia	84	
Estonia	54	
Romania	37	
Scotland	37	
Greece	30	
England and Wales	29	
Lithuania	20	
Netherlands	12	
Portugal	6	
Cyprus		
France		1
Faroe Islands		
Kosovos		
Albania		
Rep. of Macedonia		



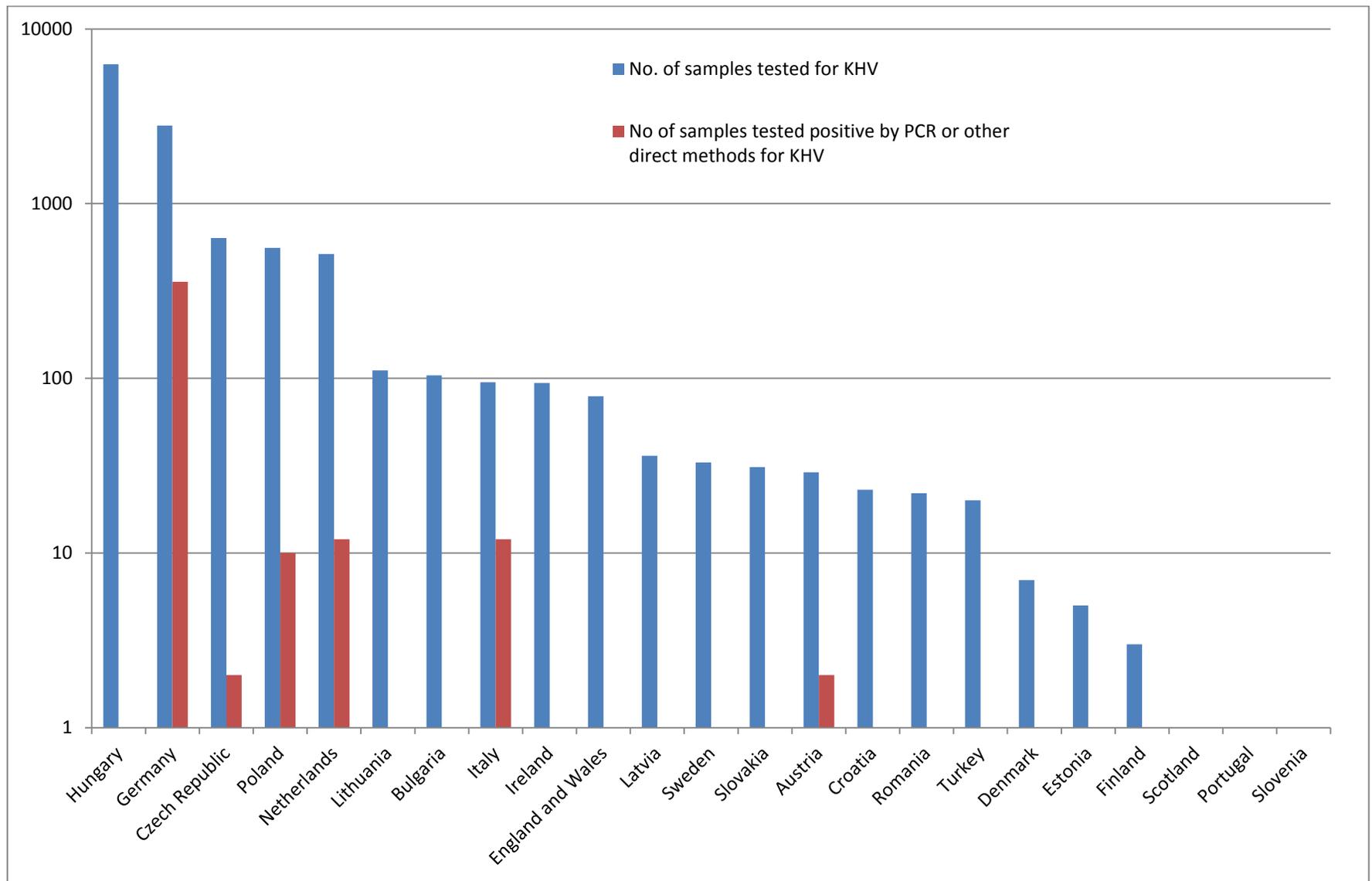
## No. of samples tested for ISAV in EUROPE in 2015

Country	No. of samples tested for ISAV	No of samples tested positive by PCR or other direct methods for ISAV
Iceland	4140	
Norway	1425	383
Northern Ireland	487	
Denmark	135	
Poland	60	
Bulgaria	42	
Greece	30	
Scotland	28	
England and Wales	26	
Finland	24	
Ireland	19	
Netherlands	12	
Germany	116	
Austria		
Belgium		
Cyprus		
Czech Republic		
Estonia		
France		
Hungary		
Italy		
Latvia		
Lithuania		
Portugal		
Romania		
Slovakia		
Slovenia		
Spain		
Croatia		
Turkey		
Bosnia and Herzegovina		
Switzerland		
Kosovos		
Albania		
Rep. of Macedonia		
Sweden		
Faroe Islands		



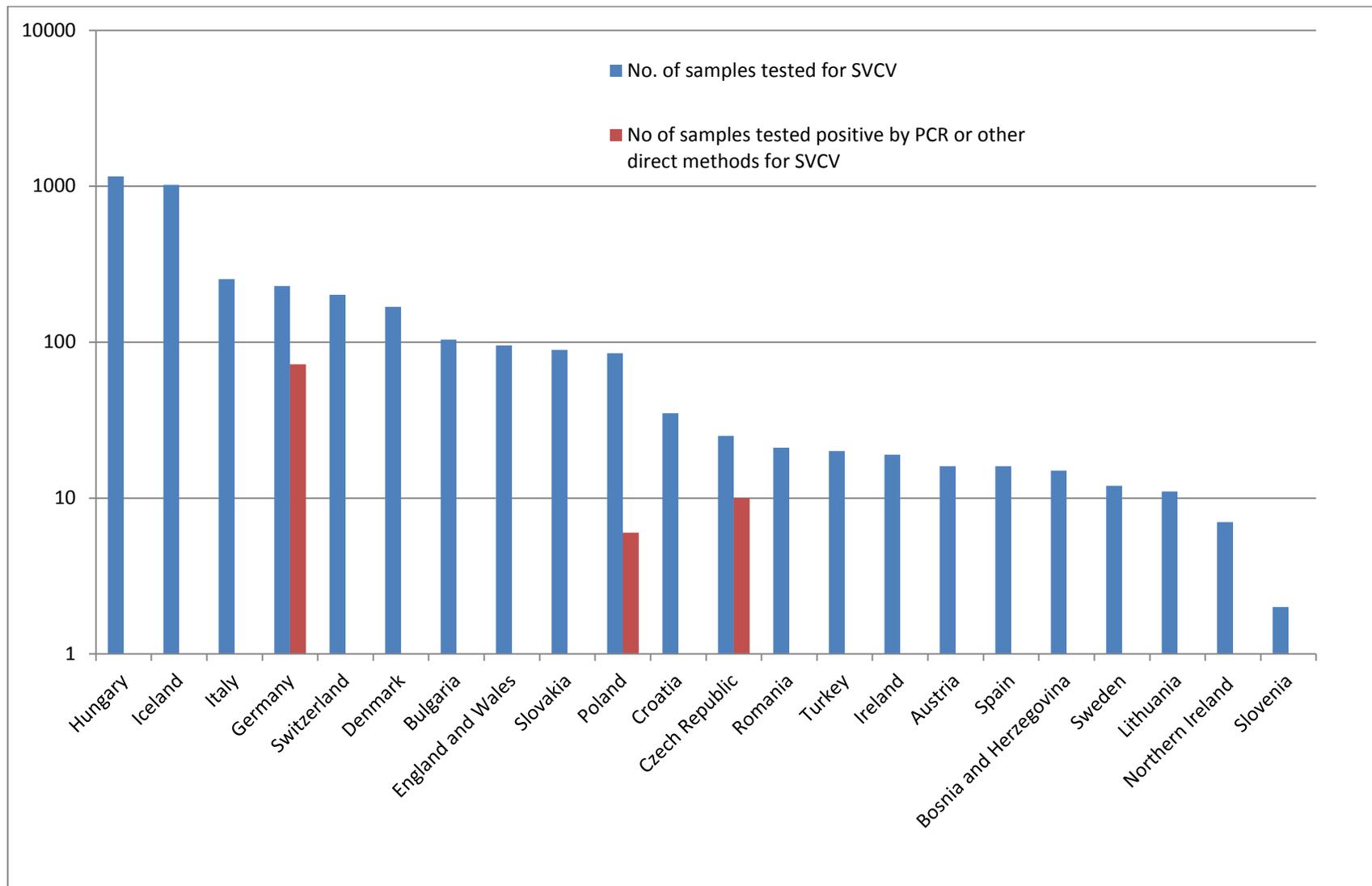
## No. of samples tested for KHV in EUROPE in 2015

Country	No. of samples tested for KHV	No of samples tested positive by PCR or other direct methods for KHV
Hungary	6275	
Germany	2797	357
Czech Republic	635	2
Poland	559	10
Netherlands	515	12
Lithuania	111	
Bulgaria	104	
Italy	95	12
Ireland	94	
England and Wales	79	20 KHV*
Latvia	36	
Sweden	33	
Slovakia	31	
Austria	29	2
Croatia	23	
Romania	22	1
Turkey	20	
Denmark	7	
Estonia	5	
Finland	3	
Scotland	1	
Portugal	1	
Slovenia	1	
Belgium		
Cyprus		
France		
Greece		
Spain		
Northern Ireland		
Bosnia and Herzegovina		
Iceland		
Norway		
Faroe Islands		
Kosovos		
Albania		
Rep. of Macedonia		
Switzerland		



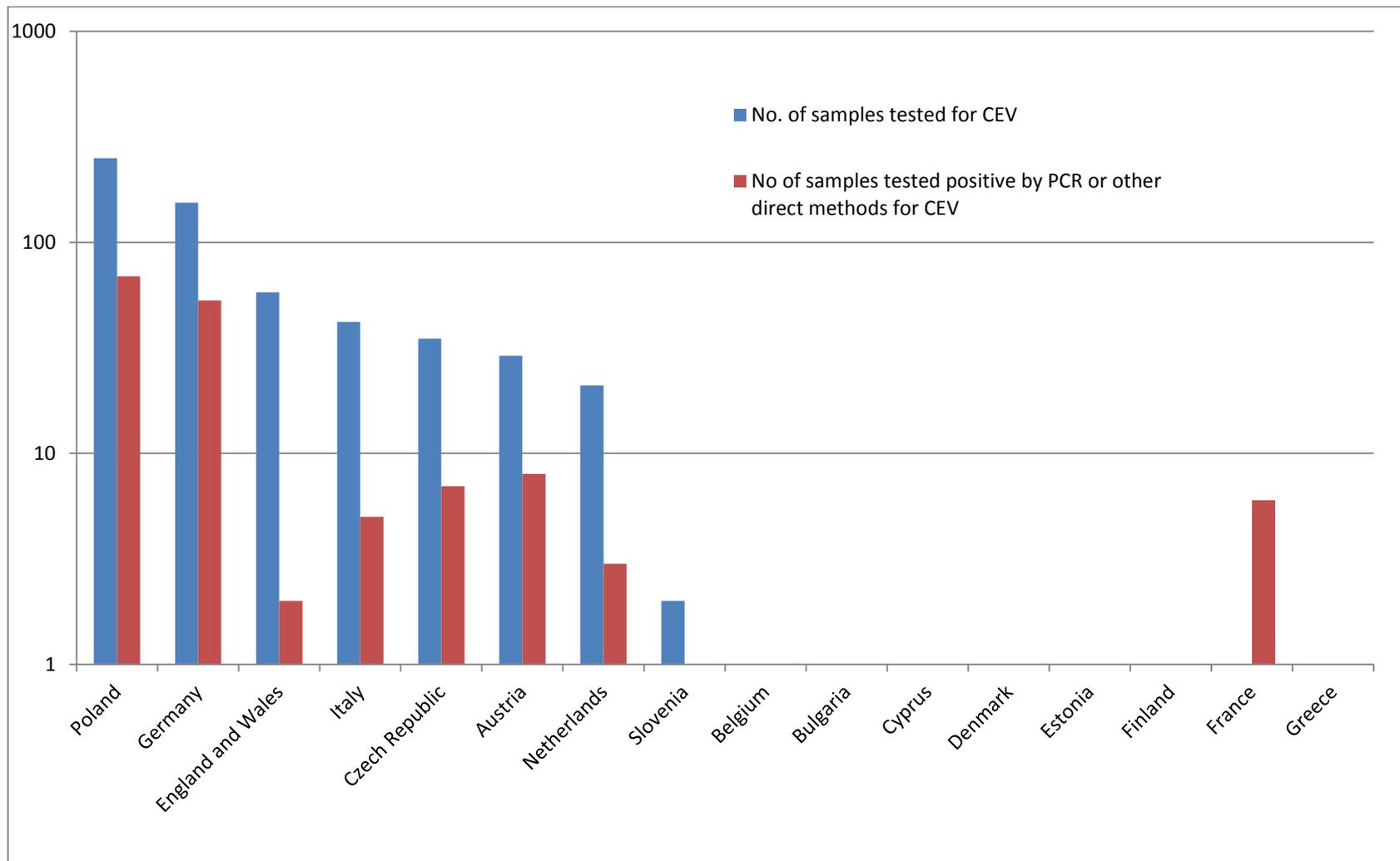
## No. of samples tested for SVCV in EUROPE in 2015

Country	No. of samples tested for SVCV	No of samples tested positive by PCR or other direct methods for SVCV
Hungary	1158	
Iceland	1020	
Italy	254	
Germany	229	72
Switzerland	201	
Denmark	168	
Bulgaria	104	
England and Wales	95	
Slovakia	89	1
Poland	85	6
Croatia	35	
Czech Republic	25	10
Romania	21	
Turkey	20	
Ireland	19	
Austria	16	
Spain	16	
Bosnia and Herzegovina	15	
Sweden	12	
Lithuania	11	
Northern Ireland	7	
Slovenia	2	
Scotland	1	
Portugal	1	
Belgium		
Cyprus		
Estonia		
Finland		
France		
Greece		
Latvia		
Netherlands		
Norway		
Faroe Islands		
Kosovos		
Albania		
Rep. of Macedonia		



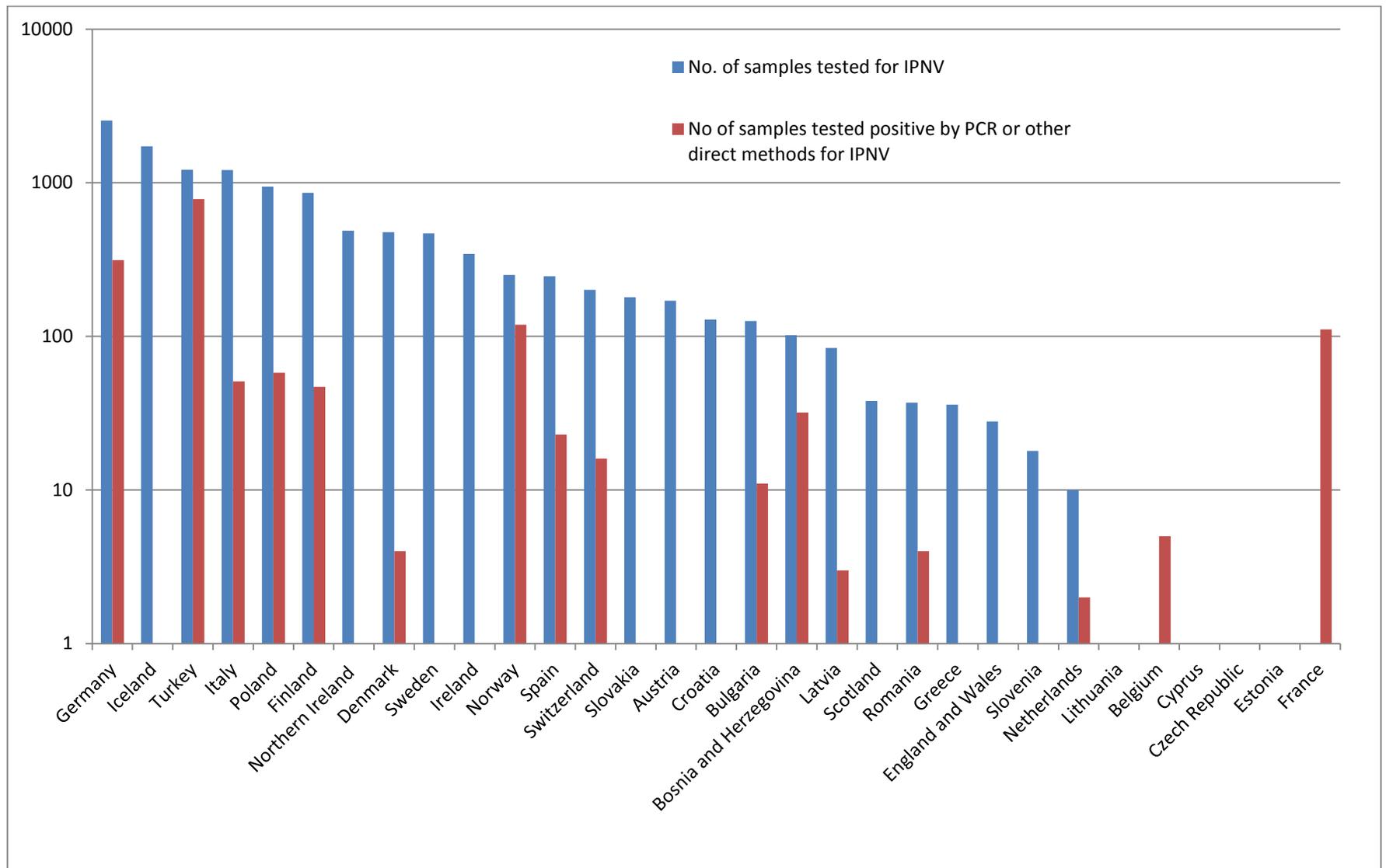
## No. of samples tested for CEV in EUROPE in 2015

Country	No. of samples tested for CEV	No of samples tested positive by PCR or other direct methods for CEV
Poland	250	69
Germany	154	53
England and Wales	58	2
Italy	42	5
Czech Republic	35	7
Austria	29	8
Netherlands	21	3
Slovenia	2	
Belgium		
Bulgaria		
Cyprus		
Denmark		
Estonia		
Finland		
France		6
Greece		
Hungary		
Ireland		
Latvia		
Lithuania		
Portugal		
Romania		
Slovakia		
Spain		
Scotland		
Northern Ireland		
Croatia		
Turkey		
Bosnia and Herzegovina		
Iceland		
Norway		
Switzerland		
Faroe Islands		
Kosovos		
Albania		
Rep. of Macedonia		
Sweden		



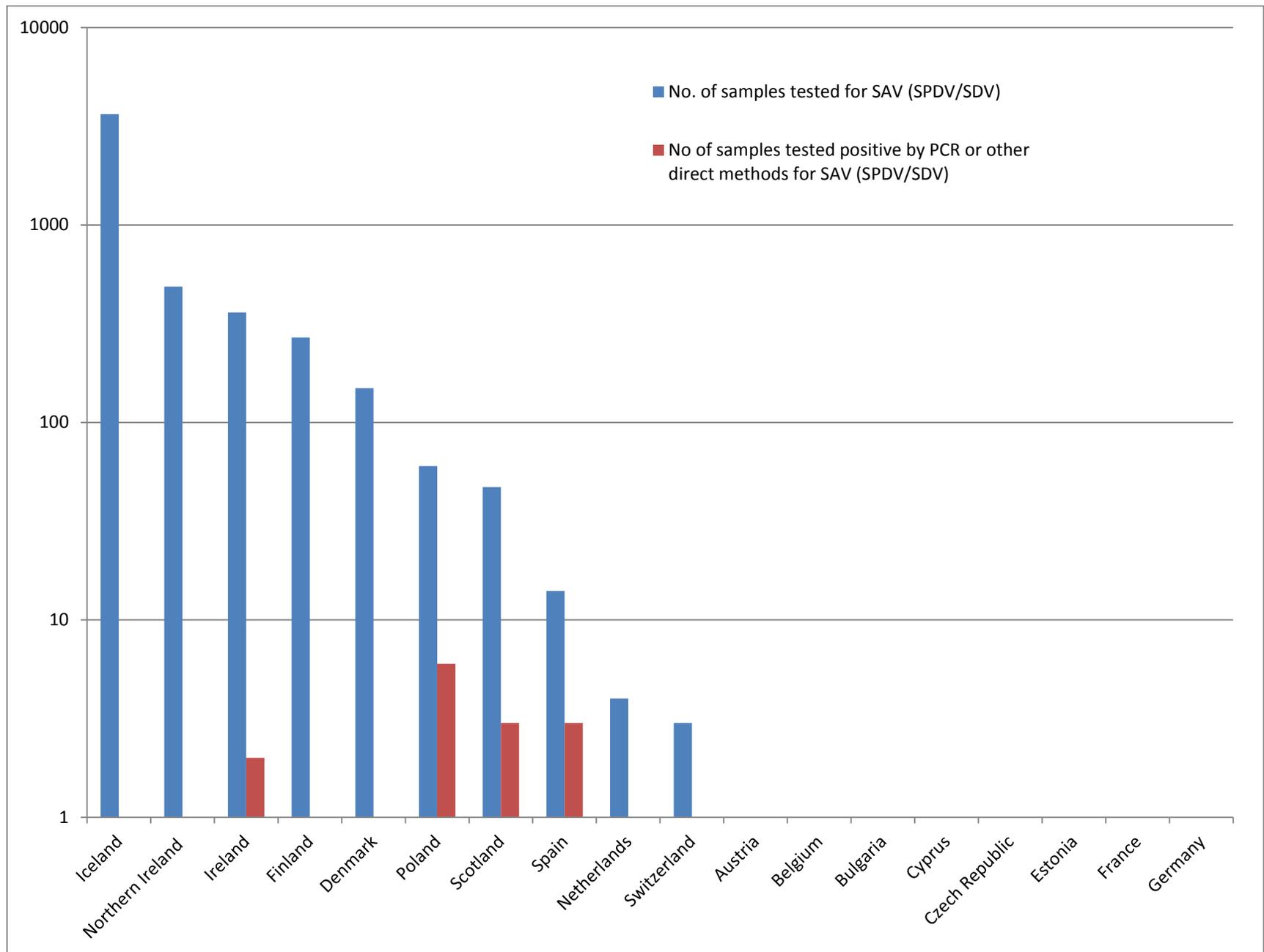
## No. of samples tested for IPNV in EUROPE in 2015

Country	No. of samples tested for IPNV	No of samples tested positive by PCR or other direct methods for IPNV
Former Yugoslav Republic of Macedonia		
Germany	2545	314
Iceland	1726	
Turkey	1215	785
Italy	1212	51
Poland	943	58
Finland	861	47
Northern Ireland	487	
Denmark	478	4
Sweden	469	3/0
Ireland	344	
Norway	251	119
Spain	247	23
Switzerland	201	16
Slovakia	180	
Austria	171	1
Croatia	129	
Bulgaria	126	11
Bosnia and Herzegovina	102	32
Latvia	84	3
Scotland	38	1
Romania	37	4
Greece	36	
England and Wales	28	1
Slovenia	18	
Netherlands	10	2
Lithuania	1	
Belgium		5
Cyprus		
Czech Republic		
Estonia		
France		111
Hungary		
Portugal		
Kosovos		
Albania		
Rep. of Macedonia		
Faroe Islands		



## No. of samples tested for SAV (SPDV/SDV) in EUROPE in 2015

Country	No. of samples tested for SAV (SPDV/SDV)	No of samples tested positive by PCR or other direct methods for SAV (SPDV/SDV)
Iceland	3640	
Northern Ireland	487	
Ireland	360	2
Finland	269	
Denmark	149	
Poland	60	6
Scotland	47	3
Spain	14	3
Netherlands	4	
Switzerland	3	
Austria		
Belgium		
Bulgaria		
Cyprus		
Czech Republic		
Estonia		
France		
Germany		1
Greece		
Hungary		
Italy		
Latvia		
Lithuania		
Portugal		
Romania		
Slovakia		
Slovenia		
Croatia		
Turkey		
Bosnia and Herzegovina		
Norway		
Faroe Islands		
Sweden		
England and Wales	-	-
Former Yugoslav Republic of Macedonia		



## No. of samples tested for Nodavirus in EUROPE in 2015

Country	No. of samples tested for Nodavirus	No of samples tested positive by PCR or other direct methods for Nodavirus
Italy	1928	404
Turkey	1250	
Norway	67	
Croatia	53	7
Greece	39	11
Spain	20	
Netherlands	4	
Cyprus	3	3
Austria		
Belgium		
Bulgaria		
Czech Republic		
Denmark		
Estonia		
Finland		
France		6
Germany		
Hungary		
Ireland		
Latvia		
Lithuania		
Poland		
Portugal		
Romania		
Slovakia		
Slovenia		
Scotland		
Northern Ireland		
Bosnia and Herzegovina		
Iceland		
Switzerland		
Faroe Islands		
Kosovos		
Albania		
Rep. of Macedonia		
Sweden		ND
England and Wales		-
Serbia		

