



Report on Survey and Diagnosis of Fish Diseases in Europe 2018



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Contents

Introduction.....	5
Production data from FEAP and FIGIS.....	5
Number of fish farms in Europe.....	6
Health categorization of fish farms.....	6
Outbreaks and severity of listed diseases in Europe.....	6
Other fish diseases problems in Europe.....	7
Laboratory examinations.....	7
Reports from the individual European countries.....	9
Austria.....	9
Belgium.....	9
Bosnia and Herzegovina.....	9
Bulgaria.....	10
Croatia.....	12
Cyprus.....	12
Czech Republic.....	13
Denmark.....	17
Estonia.....	17
Faroe Islands.....	18
Finland.....	18
France.....	19
Germany.....	21
Greece.....	26
Hungary.....	27
Iceland.....	29
Ireland.....	29
Italy.....	30
Latvia.....	32
Lithuania.....	33
Malta.....	33
Norway.....	34

Poland.....	35
Portugal	37
Map I	37
Describe the health status for listed fish diseases according to council directive 2006/88/EC, including the perceived status of listed pathogens, and how surveillance is implemented at the national level	38
Romania.....	39
Serbia.....	39
Slovakia.....	40
Slovenia	42
Spain	43
Sweden	44
Switzerland	44
The Netherlands	45
Turkey.....	45
England and Wales	46
Northern Ireland.....	47
Scotland.....	47
Annex 1: Number of fish Farms.....	50
Annex 2: Number of farms placed in the respective categories according to listed diseases.....	51
Annex 3: Outbreaks of listed diseases.....	54
Annex 4: Other Fish diseases problems	58
Annex 4a: Additional information	61
Germany	61
Italy	62
Scotland.....	64
Annex 5: Laboratory data	65
Number of samples tested for VHSV in Europe in 2018.....	65
Number of samples tested for IHNV in Europe in 2018	67
Number of samples tested for ISAV in Europe in 2018.....	69
Number of samples tested for KHV in Europe in 2018.....	71
Number of samples tested for SVCV in Europe in 2018.....	73

Number of samples tested for CEV in Europe in 2018 75
Number of samples tested for IPNV in Europe in 2018 77
Number of samples tested for SAV (SPDV/SDV) in Europe in 2018..... 79
Number of samples tested for Nodavirus in Europe in 2018 81

Introduction

This report is based on the data from the questionnaire on Survey and Diagnosis of the listed fish diseases in Europe (S&D) for 2018. The Questionnaire is provided by the EU Reference Laboratory for Fish and Crustacean Diseases, it is collated annually and is the only comprehensive overview of the disease situation in fish farming in Europe. The information has been made available on the EURL web site (www.eurl-fish-crustacean.eu), where all raw data can be obtained. The questionnaire comprises 4 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 outbreaks 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.
4. A National report describing health and surveillance situation in general. These reports are compiled into one and can be found on the website and in the present booklet.

Production data from FEAP and FIGIS

The data on the European aquaculture production was this year again obtained from the [FIGIS online query](#) system which provided data updated to 2017, data provided by [FEAP](#) were, at the time of preparing the workshop updated to 2016. It was observed during the preparation of the report, that some discrepancies between the two sources were present. This will be discussed at the Annual Workshop. The report does not include information on the number of fish farms, and therefore these data were obtained directly in the questionnaire.

The total fish production in aquaculture in Europe, including Turkey and Norway, increased slightly from 2016 and is now at 2.396.229 t. Among the EU Member states the production has been almost horizontal in the past 10 years with a total production of 693.725 t., while the 4 non-EU countries Iceland, Faroe Islands, Turkey and Norway produce 1.681.619 t and also experienced a minor increase since 2016.

The Atlantic salmon production, accounts for 1.54 mill ton in 2017, and is by far the largest contingency in Europe. The production of large rainbow trout in sea water accounts now for 103.000 t while the production of portion rainbow trout is of about 300.000 t in 2017. Turkey is still the largest contributor of rainbow trout production with 106.000 t. The carp production is mainly in the Eastern part of Continental Europe, the data from FEAP and FIGIS do not overlap, as FIGIS reported that the production of *Cyprinus carpio* was of about 170.000 t, whereas FEAP data reports approximately 50.000 t.. Both the production of sea bream and especially sea bass also increased in the Mediterranean countries with a production of 154.088 t and 178.202 t, respectively. Among other fish species of interest are eel (with 5.938t in 2017 in decline from 2016), sturgeon which is a promising species especially in view of its caviar production has been very stable in the past 10 years (5.662 t) while for the caviar production there are no updated data for 2017.

Turbot production appear in slight increase (11.572t in 2017 and 10.117 in 2016), the production of other “so called” minor species includes halibut (2.144 t), Arctic charr (6.377 t), sole (1.100 t) and meagre (6.200 t).

The production of cleaner fish as lumpfish and wrasse for lice control is increasing significantly. In 2018, 40 million lumpfish and 1,6 million wrasse were produced in Norway; 2,1 million lumpfish juveniles and 3,4 million eggs and larvae were produced in Iceland for export. In Scotland there were 6 sites producing 26 tonnes of lumpfish in 2017, equivalent to 925.000 fish and 4 sites producing 4 tonnes of wrasse with 58,000 fish.

Number of fish farms in Europe

The total number of authorised/licensed fish farms in Europe was reported to be around 30.048 farms, with the largest contingency in Germany with 13.206 farms having a high number of very small production. Norway having by far the largest production in Europe license almost 1.400 farms/sites. An overview of the number in each country can be found in Annex 1.

Health categorization of fish farms

Almost all Member States did reply to the questionnaire and provided very clear and correct answers.

This year in all 13.770 farms with species susceptible to VHS were reported in categorized zones, 12.139 to IHN, 6.519 to ISA and 11.937 farms with cyprinids susceptible to KHV.

76% of the authorised trout farms in Europe are situated in category III zones for VHS and 74% for IHN, with 23% and 24% respectively in Category 1. For both diseases the remaining 1% 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 69% in Category I and 29% 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 in Category II 2%.

In Europe 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 and is not notifiable to the EU (in contrast to OIE where detection of ISAV HPR0 is still notifiable). 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 is now adopted and includes all aquatic animals; in this connection the categorisation system will be simplified and be made more transparent on the other hand more lists will be adopted compared to the present lists of exotic and non-exotic diseases (from present 2 to 5 lists). Annex 2 provides the full list of farms in categorized zones.

Outbreaks and severity of listed diseases in Europe

Only few participants reported that they observed major changes in the epidemiological situations in their respective countries. For **VHS**, 48 new outbreaks were reported in Europe in 2018, the large majority (37) in Germany, importantly a number of confirmed VHSV infection in Belgium (11) and France (1) were subclinical. These ones mostly occurred in put and take lakes.

For **IHN**, 17 new outbreaks were reported. The majority in Finland, as consequence of the epidemics occurred last year. All IHN-positive holding places have been emptied, disinfected and fallowed. A two-year surveillance program has been started or will start this year in three zones and one compartment.

For **ISA** Norway reported 13 new sites with ISAV HPRA in 2018 and reported 14 in 2017. Unfortunately no report was received from the Faroe Islands. ISA was only reported from Norway.

For KHV, 137 outbreaks were reported in 2018. The vast majority (84) in Germany, 31 in UK. The virus was reported from 14 countries in all. Annex 3 provides the full list of reports.

Other fish diseases problems in Europe

A whole range of other disease problems in 2017 were reported:

- In **rainbow trout** the major concerns are flavobacteriosis (RTFS), red mark syndrome, puffy skin, enteric redmouth, and infectious pancreatic necrosis but also, lactococcosis, proliferative kidney disease, ichthyophthiriasis, saprolegniosis. More and more report BKD (bacterial kidney disease) as an increasing problem- possibly due to increased number of RAS in Europe. In Denmark findings and disease outbreaks were linked to PRV-3 in RAS
- In **salmon** farming the major concern is sea lice; after the ectoparasite a number of disease problems cause concerns and includes pancreas disease, heart and skeletal muscle inflammation, cardiomyopathy syndrome, amoebic gill disease and complex gill disease CGD (amoebic gill disease, salmon gill poxvirus, *Paranucleospora theridion* etc.). Ulcers from *Moritella viscosa* and *Aliivibrio*.
- In **Cyprinid** it is primarily CEV, *Aeromonas hydrophila*, CyHV-2 has been detected in the Netherlands in cyprinid imported from China
- In **seabass** and **seabream** it is primarily VNN/VER, tenacibaculosis, *Vibrio harvey*, *Sparicotyle chrysophrii*. *Aeromonas veronii* and *Lernathropus kroyeri* infection. Of a certain significance Red Rash syndrome in gilthead sea bream.

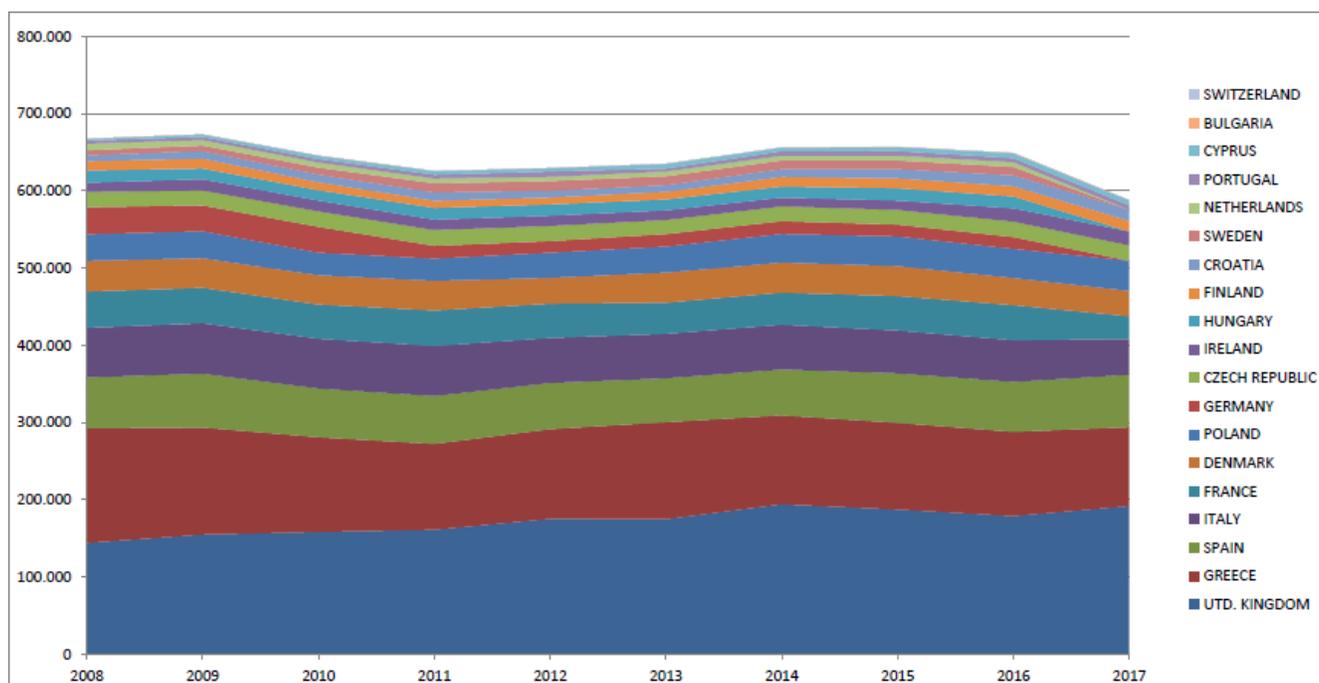
In northern European countries the most common problems in the salmon production are thus sea lice, PD, and AGD, in addition several countries reported finding of Winter Ulcer Disease in salmon caused by *Moritella viscosa* and *Aliivibrio woodanis*. Cardiomyopathy syndrome caused by PMCV is of concern in Norway as is piscine reovirus infection in both Atlantic salmon (PRV-1) and rainbow trout (PRV-3). Complex gill diseases are of raising concern in salmon farming and gill amoeba in freshwater are reported for rainbow trout. In continental Europe it is primarily bacterial diseases like RTFS, ERM and *Aeromonas* infections– but also red mark syndrome is causing severe problems. Parasitic infestations, as Ichthyophthiriasis, is still a very serious problem especially in view of the foreseen prohibition of use of formalin. In Mediterranean countries main health issues are the same as in continental except for lactococcosis in rainbow trout which is more common in Southern Europe. In mariculture nodavirus infection definitely plays an important role and as a bottleneck for especially the seabass production and red rash syndrome is of concern for the Gilthead sea bream.

Laboratory examinations

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 2017 on VHSV, IHNV, ISAV, KHV, SVCV, CEV, IPNV, SAV, and Nodavirus, respectively.

Development of Fish Farming in EU 2008-2017

Data from FEAP



Reports from the individual European countries

Austria

Author/Institute: Eva Lewisch- Vetmeduni Vienna

Aquaculture production: around 2.000t salmonids, 1.000 t carp for consumption and restocking , mainly extensive flow –through ponds (carps) and basins ,a few recirculation systems.

Health status: 11 farms in cat.I declared VHS and IHN free; 1 farm under VHS/IHN surveillance cat.II; all other in cat. III.

Other disease problems: 2 cases highly suspicious for KHV with no pos. confirmation using the approved methods.

Belgium

Author/Institute: F. Liefbrig- CER groupe

Aquaculture production: Salmonid production is located in the South part of Belgium. Cyprinid production in the North part. Few sites for bait fish production. One wellknown farm for sturgeon and caviar production in recirculating system. Development of burbot (*Lota lota*) production.

Health status: Outbreaks of VHS most of the time with very low mortality. Concerning VHS in put and take ponds, the virus has been isolated from fish without any symptoms and mortality.

Other disease problems: As already reported RTFS in all the rainbow trout hatcheries.

Bosnia and Herzegovina

Author/Institute: T. Eterovic - University of Sarajevo, Veterinary Faculty

Aquaculture production: -Bosnia and Herzegovina has a very long tradition in the production of freshwater fish, trout and carp, due to the significant water wealth of seven water basins, a large number of river and mountain lakes and groundwater. Hatcheries and on-growing farms in Bosnia and Herzegovina have numerous and unequal capacities, surface area and annual production. According to the locality and species of fish breeding, fish ponds and on-growing farms are divided into salmonid, cyprinid and marinas. In the aquaculture sector of Bosnia and Herzegovina, the most important fish

species are: trout (rainbow trout and brook trout), carp (carp, grass carp, silver carp), and marine (European bass, gilt-head bream and common dentex) as well as molluscs (mussels and oysters). Most of the trout farms breed rainbow trout, but mixed farms breeding brown, brook and softmouth trout are also widespread. Capacity for production and exploitation of fish in BiH, water resources, hydrological and ecological conditions, physico-chemical properties of watercourses, highly developed technologies such as breeding and fish processing, tradition in fish farming and production as well as constant growth of fish exports represent exceptional preconditions to increase fish production. According to a rough estimate, 65% of trout production in BiH is in the Federation, and 35% in the Republic of Srpska. Nearly all carp production is carried out in the Republic of Srpska. Production of marine species is concentrated in Neum where there are two cage farms with a total area of 0.36 ha. The total usable area of aquaculture installed capacity in BH is about 3,113 ha. The size of fishery exploitation in Bosnia and Herzegovina for trout fish farms is 91,026 m² and for carp fisheries 2,278 ha. The average production of table fish in Bosnia is about 5,000 tons.

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.

Other disease problems: -Concerning other diseases we had experience with furunculosis, vibriosis, BKD and Bacterial gill disease. Of the parasitic diseases common are Gyrodactylus, flagellates and ICH. IPN without clinical signs is constantly present in most of the tested fisheries



Author/Institute: Pety Orozova - National Diagnostic and Research Veterinary Medical Institute

Aquaculture production: The ratio of fresh warm-water to fresh cold water aquaculture is predominated of fresh warm-water species. The most significant production remains that of carps, followed by trout. The species structure of Bulgarian aquaculture industry is determined by both climatic and hydrological conditions in the country and the traditional preference of the population for these species. Over the past 15-20 years is observed a trend of change in the species structure of the cultivated hydrobionts resulting in variety diversification. According to official statistics of the EFA data, as of 31.05.2018 the reported total economic catches of fish and other aquatic organisms amounted to 2 566,85 tons, which is a decrease of 17,4% compared to the first five months of 2017. The catch in the Black Sea is 2 555.25 tonnes, while in the Danube - 11.6 tonnes, with 17.4% and 10.5% less on an annual basis. The reason for these changes might be resulting from one side in the

amended legislation of the Republic of Bulgaria, directed to protection of some species (sturgeon species) by restricting fishery of natural populations, and from other side introduction of modern technologies and equipment, allowing cultivation of non-domestic species (exotic ones), despite of the local natural climatic conditions. As an example of aquaculture production originated and evolved because of the prohibition of the exploitation of natural resources in the country is sturgeon production. The species that have proven their perspective cultivation are pikeperch, perch, tench, huchen (*Hucho hucho*), grey mullets, turbot etc. The tendency that the production of aquaculture in the country to be based mainly on the production of non-native (introduced, alien) species is a durable trend and marks its beginning from the origin of organized fish farming in Bulgaria. The first foreign specie introduced sustainably in the local aquaculture is the Rainbow trout (*Oncorhynchus mykiss*), that is remaining the leader in the production of trout fishes in Bulgaria. Since the end of 70s, an increasing share possess acclimated carp species from the Far-East-Complex (silver carp and bighead carp, black carp and grass carp). It should be noted that, in contrast to other countries, in Bulgaria all mentioned species are only successfully acclimated without occurred naturalization which means that they could not reproduce in wild and could not form their own populations. African Catfish (*Clarias gariepinus*) is grown in recirculation systems. Production of these newly introduced species is small in volume and species are not well known at the local market. Traditionally, coldwater aquaculture in Bulgaria is dominated by the production of rainbow trout, while the amounts produced from the native trout species brown trout (*Salmo trutta*) are minor and mainly intended for restocking of natural water basins in order to maintain and restore natural fish populations. The production of other introduced North - American specie in our country – brook trout (*Salvelinus fontinalis*) has long standing traditions, but it also has a minor share of the total production of Salmonidae. Water resources in Bulgaria are negligible – about 20.1 billion m³. In water resources per capita the country ranks last among those at the Balkan Peninsula. Bulgaria is one of the most water-poor countries in the European Union. Water resources are unevenly distributed throughout the territory of the country. Irrecoverable losses as a result of irrigation and other purposes amounted to 2.52 billion m³. The main part of the river flow – 81.3% is formed on the territory of mountains and hilly parts of the country. The total volume of fresh water storage reservoir in natural lakes is 1% of the aggregate volume. The dam reservoirs are containing 6.66 billion m³ (33% of the potential water resource of the country). Freshwater resources are controlled under the Water Act considering the global change in the flow-forming climatic factors in the region. Waters in Bulgaria are used by authorization unless excluded by law. Permits are issued by the Minister of Environment and Water – for the complex and important dams, and by the mayors for the municipal dams, and in the other cases – by the directors of River Basin Directorates. Warm water fish farms are: ponds, cages and RAS. Cold water fish farms are: raceways, cages and RAS.

Health status: During 2018 were not detected viral outbreaks caused by listed in directive 2006/88/EC pathogens.

Other disease problems: -

Croatia



Author/Institute: Snježana Zrnčić - Croatian Veterinary Institute, Zagreb

Aquaculture production: Warmwater freshwater aquaculture is cultivating common carp, grass carp, bighead and silver carp as well as carfish, pike and pike-perch in small quantities in earthen ponds surface from 0,5 to 100 hectares. Some of the carp farms have their own hatcheries. Coldwater freshwater aquaculture consists of farming rainbow trout and brown trout in concrete raceways. Some of the farms consists of hatchery and on-growing units while other import eggs from USA and Denmark. Marine aquaculture is the most represented activity in Croatia with cultivation of European sea bass, Gilthead sea bream, dentex and meagre in farms with production from of 60 tons to 7.000 tons. Tuna farming is represented by 5 farms that is based on the catching of small tuna in Mediterranean according to ICAAT quotas and feeding them until favourable weight. Almost whole production is sold to Japan.

Health status: National surveillance program consists of clinical inspection of farms twice a year and sampling and sending to the lab, once. All authorized farm are included in surveillance program. Out of 85 samples tested for the presence of VHS, 2 tested positive.

Other disease problems: The main challenges are bacterial diseases in marine aquaculture. The emergent bacteria was in 2017 *Vibrio harveyi* in sea bass producing some mortalities, growth retardation etc. In sea bream it is parasitic infection with *Sparicotyle chrysophrii* with increased mortalities and requirements for frequent bath treatments.

Cyprus



Author/Institute: Veterinary Services

Aquaculture production: In Cyprus there are in operation (licensed) 9 marine open sea cage farms culturing mainly European sea bass and gilthead sea bream, 3 marine hatcheries, 1 land-based shrimp hatchery/farm and 7 small rainbow trout farms. The main marine species commercially cultured are the gilthead sea bream (*Sparus aurata*) and European sea bass (*Dicentrarchus labrax*).

Health status: No data provided for 2017

Other disease problems: No data provided for 2017

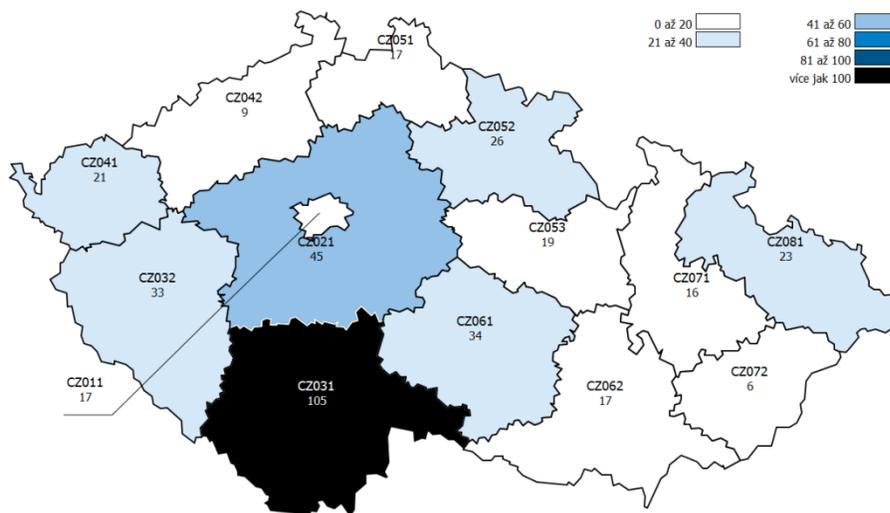
Author/Institute: Tomas Vesely – Veterinary Research institute

Aquaculture production: On the territory of the Czech Republic, there are more than 24 thousand ponds covering the area of about 52 thousand hectares. Annual fish production is roughly 21 000 tons with quite flat trend thereof 51% is exported as live fish. The rest of production is intended for local market. The majority of Czech Republic aquaculture production consists from ponds fish farming. The common carp (*Cyprinus carpio*) is the main fish species kept in these ponds (88% of total production). The salmonids fish farming forms 3,5 % of the total production in the 30 either recirculation systems or in the flow aquaculture farms. The production of herbivorous fish usually forms 6%. The rest of the production forms other fish species (tench, predatory fish). The minor role regarding fish production in the Czech republic holds Czech Anglers Union which manages over 2000 breeding ponds covering area of 2 650 hectares. Annual production of fish breeding ponds and reservoirs is annually nearly 1 200 tons of fish. The need for stock fish for stocking of fisheries is covered mainly from its own production of fish. The trend of RAS aquaculture system is slightly increasing.

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 on the whole territory. The whole territory of the Czech Republic has undetermined health status for KHV except one holding which has status infected. At the national level the Czech Republic performs the monitoring program for VHS, IHN and KHV.

Other disease problems: N.A.

1. Authorised aquaculture production business holdings density map 2017



CZ 010	Capital City Prague
CZ 020	Central Bohemian Region
CZ 031	Southern Bohemian Region
CZ 032	Region of Plzen
CZ 041	Region of Karlovy Vary
CZ 042	Region of Ústí nad Labem
CZ 051	Region of Liberec
CZ 052	Region of Hradec Králové
CZ 053	Region of Pardubice
CZ 061	Region of Vysočina
CZ 062	Southern Moravian Region
CZ 071	Region of Olomouc
CZ 072	Region of Zlín
CZ 080	Moravia-Silesian Region

2. Number of VHS, IHN, KHV outbreaks from 2008 to 2017

	No. of outbreaks VHS	No. of outbreaks IHN	No. of outbreaks KHV
2008	3	0	0
2009	0	0	5
2010	2	1	1
2011	1	1	0
2012	0	0	0
2013	5	0	0
2014	12	4	0
2015	1	0	0
2016	3	0	2
2017	0	0	3
2018	0	0	2

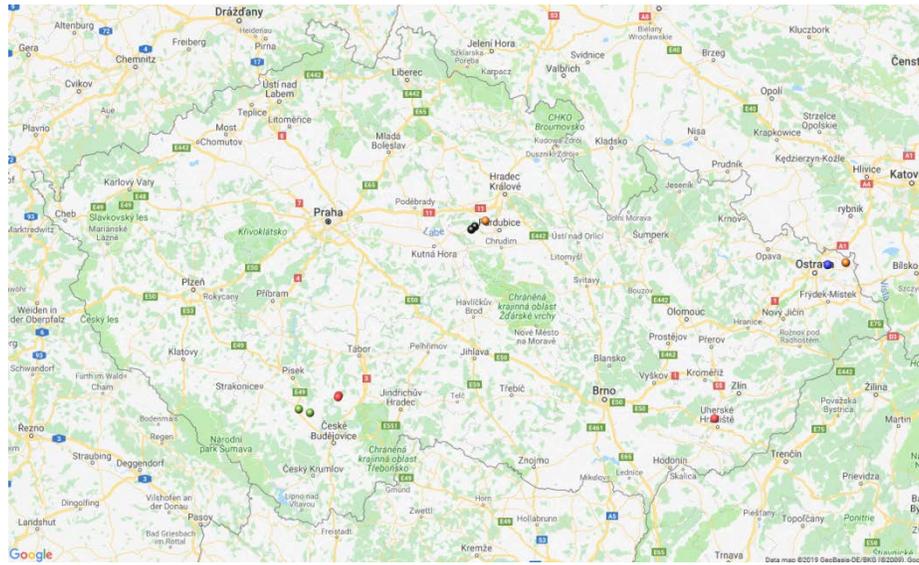
1. VHS, outbreaks map from 2008 to 2018



2. IHN outbreaks map from 2008 to 2018



3. KHV outbreaks map from 2008 to 2018



Denmark



Author/Institute: Morten Fruergaard-Andreasen (FVST) and Niels Jørgen Olesen DTU Aqua

Aquaculture production: In Denmark, there is approximately 223 active farms. The most farmed fish species in Denmark is still rainbow trout. A major part of the production take place in fresh water recirculating farms. Production numbers from 2018 is not available yet, but based on 2017 numbers it is expected to be a total of approximately 48.850 tonnes of which 43.580 tonnes is from rainbow trout . Egg production is still a major production and in 2017 383.950.000 eyed eggs were produced and the numbers are expected to be at least the same in 2018. Minor production focus on Atlantic salmon, pike perch and eel.

Health status: All farms with susceptible species are inspected at least once pr year by 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 terrestrial area is category I for VHS while the marine farms all are category III for VHS. At a national level, Denmark conducts a plan for IPN and SVC. Furthermore some farms have achieved free status for BKD and IPN. The national plan relies on historical data and targeted surveillance.

Other disease problems: In 2018 screening for piscine orthoreovirus 3 (PRV-3) was done in connection to a project. The screening revealed that the virus is widespread in many Danish farms, mainly the production farms. Project on the virus is continuing at the NRL. IPN is still widespread in production farms with occasional disease outbreaks. Among bacterial diseases, rainbow trout fry syndrome caused by *Flavobacterium psychrophilum* and enteric red mouth disease caused by *Yersinia Ruckeri* are considered relevant in the fresh water phase, whereas clinical outbreaks of furunculosis (*Aeromonas salmonicida* subsp. *salmonicida*) can occur in the salt water production of rainbow trout. However, in many of these cases the NRL are not involved and it is difficult to know the real effect of these diseases on Danish aquaculture. Red mark syndrome is still a relevant problem in Danish aquaculture, but the farms are now more experienced in handling the disease outbreaks than last year. Project on rsed mark yndrome is still on-going at the NRL.

Estonia



Author/Institute: Triin Tedersoo Chief specialist on animal health Veterinary and Food Laboratory

Aquaculture production: There were 33 approved fish farms and 25 crustacean farms in Estonia in 2018 for which the cultivation of aquatic organisms is the principally important activity. In Estonia there were in 2018: 17 rainbow trout farms, two carp farms, two eel farms, five sturgeon farms, two arctic char farms, one European perch farm, one African catfish farm and one state-financed farm for cultivation of salmonids for restocking.

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.

Health status: Due to the Implementation Measures of National Infectious Animal Disease Control Programmes in 2018 there were 15 fish farms which took part in surveillance for VHS/IHN (14 fish farms in Category II and 1 fish farm in category I), two fish farms took part in surveillance for KHV (category II). After the IHN outbreaks two rainbow trout farms started with the eradication of the disease (category IV).

Other disease problems: -

Faroe Islands 

Author/Institute: Debes Christiansen

Aquaculture production: A total of 79.000 tons of Atlantic salmon was produced in 2018 in the 24 sea farms with open net cages (10 - 25 at each site) in the Faroese fjørds and straits. This is a slight decrease from 2017

Health status: No outbreaks of the listed fish diseases were recorded in 2018

Other diseases and health related issues: Sea lice infestations and treatment in heated water is the main fish health and welfare issues. Cases of CMS are increasing. For the first time in many years we had outbreaks of BKD. We also experienced increasing problems with AGD. One case of algal bloom killed almost 50% of the fish at a farmin site.

Finland 

Author/Institute: Tuija Kantala – Finnish Food Authority

Aquaculture production: In 2017, 14.6 million kilograms of fish were cultivated for human consumption in Finland. This represented an increase of about 0.2 million kilograms compared to 2016. Some 13.6 million kilograms of the production consisted of rainbow trout, representing over 90 per cent of all the food fish produced in Finland. Also 0.8 million kilograms of European whitefish were produced, which was almost the same as in the three previous years. Additionally, a total of some 0.2 million kilograms of the other species of fish were farmed, including trout, arctic charr, sturgeon, pike perch and eel, were produced. Some half million kilograms of rainbow trout roe were produced for food. In addition to fish consumed as food, fish is also farmed in order to be stocked in natural waters. Some 50 million specimens of fry and crayfish – excluding newly hatched individuals – were produced

for the purposes of stocking and further farming. National aquaculture strategy aims at strong increase in the production by 2022. Farmers are interested in RAS and offshore techniques to get a (environmental) permit for bigger production amounts.

Health status: VHS was last time found in Åland Islands in 2012. Eradication program is going on slowly due to difficulties in synchronized fallowings. Farms are inspected and sampled yearly. KHV or ISA have never been found in Finland. All IHN-positive holding places have been emptied, disinfected and fallowed. Two-year surveillance program has been started or will start this year in the three zones and one compartment. Risk-based surveillance is in place in authorised, VHS/IHN/ISA free farms and also in KHV farms.

Other disease problems: Saprolegniosis of farmed fish is regarded a serious problem, which is difficult to cope with. Especially the broodfish of land-locked salmon, brown trout and coregonids are very sensitive and many fish farms have stopped the farming of them because of the Saprolegnia mortality. All cases of *Renibacterium salmoninarum* were bacterial isolations from subclinical carrier fish. Because the wide occurrence and the volume of the production of fish for stocking, which were infected, the stockings of BKD carrier fish was allowed to certain zones, where it had previously been forbidden. The most important indications for the antibiotic treatments are still *Flavobacterium psychrophilum* and *F. columnare*. These cause clinical disease in fry and fingerlings of several salmonid species (mostly rainbow trout).



Author/Institute: Lénaïg Louboutin -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: Nouvelle-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 (1,900 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 In 2018, VHSV was detected, without any clinical signs, following epidemiological investigations which had put in evidence a link with another farm where VHS had been detected at the end of 2017. Partial sequencing of G gene showed a perfect identity with the isolate 2017. Despite no mortality was observed at all in the infected farm, a high potential of virulence was put in evidence through an in vivo assay performed on rainbow trout from ANSES hatchery. VHSV was detected also in 2 ponds on rainbow trout. Partial sequencing highlighted strong epidemiological link between the various outbreaks, with at least 99% nucleotide identity between isolates.

Surveillance of IHN

Three outbreaks of IHN were detected through targeted surveillance in 2017 in Normandie. Those detections occurred following mortality event or self-inspection, in one farm regularly declared infected by IHNV, and two others belonging to fish farmers owners of known infected fish. Partial G gene sequencing strengthened results of epidemiological investigations.

Surveillance of KHV

Two outbreaks of KHV were reported in 2018. The first case occurred in the East of France, where mortality was observed on koi. The other reported case occurred in the North of France, in a private pond. In the 2 cases, koi were imported from Japan, and transited via Belgium. Two different genotype profiles were obtained for the 2 viruses : Japanese profile and U/I profiles were obtained by genotyping PCR (Bigarre et al, 2009) respectively, for the 2 viruses.

Other disease problems: Several outbreaks of Carp Edema Virus (CEV), located in distant French areas, were reported mostly during spring 2018, when temperature increased after winter period. CEV was detected either in Koi carps or common carps. Partial sequencing enabled to distinguish two lineages, related to the infected host (Koi or common carp). The number of cases seems to be increasing each year (fish farmers and owners are more and more informed about the disease and contact the NRL to perform analysis). Three cases of PRV were also reported on rainbow trout or Atlantic salmon in various farms. Sequencing could be performed and epidemiological data collection could bring more information about its prevalence in French fish farming. PRV and its associated disease (HSMI) are spreading in salmonids farms, year after year. EVEX has been regularly detected on elver after analysis as part of restocking program. Lymphocystis virus was detected in a sea bream farm, and NGS analysis put in evidence co-infection with a papillomavirus.



Aquaculture production:

Lander	Production
Baden-Württemberg:	<p>cultured species: mainly salmonids (rainbow trout, brown trout, char), carp, pike, pike-perch, sturgeon</p> <p>environmental conditions: temperate climate; mainly well water or close-to-well stream water</p> <p>technologies: partially intake of atmospheric oxygen (Flobull, paddle aeration) or technically (liquefied oxygen); partially automatic feeding (also PC-based); degassing by irrigation or aeration; partial use of filters (barrel, biological)</p> <p>salmonids: natural ponds; runways, partially with recirculation; brood houses with runways and round tanks; few egg producers with hatcheries</p> <p>carp: natural ponds; mainly extensive use</p>
Bavaria:	<p>cultured species: mainly carp and rainbow trout</p> <p>environmental conditions:</p> <p>Carp: Approx. 20 000 ha water surface area in Bavaria corresponds to approx. 1/2 of the German aquaculture pond area. Annually 6 000 t of edible carp are produced in Bavaria. In these traditional carp ponds other species are usually kept, e.g. tench, pike, catfish, pike-perch, other cyprinids and smaller fish species. All farms are family-owned with traditional and extensive production in earthen ponds. Since the majority of ponds is supplied by surface waters dry and hot periods, as a result of climate changes, increasingly cause problems. There are also increasing problems with piscivorous predators.</p> <p>Salmonids: Salmon aquaculture is also based on family-owned farms that are dominated by rainbow and brown trout cultures, but also char and grayling are kept. The previously produced 7.000 t of rainbow trout have declined during the last years, and has been partially replace by brown trout and char since the latter are not subject to restrictions regarding containment measures. Climate changes characterized by high temperature periods followed by heavy rainfalls accompanied with floods had also a negative impact on salmonid farming. There is one high-tech circular system for shrimp culture (<i>Litopenaeus vannamei</i>) and two for African catfish (<i>Clarias gariepinus</i>) culture.</p>
Berlin:	No reporting.
Brandenburg:	<p>holdings with susceptible species according to directive 2006/88/EC: ponds (predominantly carp) und runways/ponds (predominantly rainbow trout and other salmonids). Two warm-water facilities use coolant water from coal power stations. All others use surface water. Due to the lack of water some runways do occasionally or permanently use semi-closed circular systems.</p>

Bremen:	No reporting.
Hamburg:	No reporting.
Hesse:	cultured species: rainbow trout and other salmonids, sturgeon, pike-perch environmental conditions: low mountain range, many forests, common well water, rainbow trout technologies: occasionally circular systems; predominantly ponds (river and lake fisheries: Rhine, Main, Weser)
Meckl.-W. Pomerania:	cultured fish species: rainbow trout, sea trout, char, pike, carp, sturgeon, maraene, tench, europ. and African catfish, eel, pike-perch, noble crayfish, burbot, white shrimp (<i>Litopenaeus vannamei</i>) technologies: ponds, concrete and natural runways and ponds, cold and warm water circular systems, net cages
Lower Saxony:	In NI there are 742 fish farms using different production forms. Of these 93 farms are certified; in terms of the amount of production: predominantly rainbow trout; carp and other fish species are extensively cultured (side-line production); in circular systems are kept: eel, europ. and African catfish, pike-perch and ornamental fish.
North Rhine-Westphalia:	predominantly salmonids; flow-through facilities; predominantly in low mountain ranges; low level of mechanization
Rhineland-Palatinate:	cultured species: rainbow trout, brown trout, char, other salmonids, carp, eel, koi, pike-perch, sturgeon, tench, orfe, goldfish, whitefish, roach, gudgeon, stone loach environmental conditions: fresh water, ponds, well water technologies: predominantly hobby holdings; sometimes use of seed fish; mostly private use; fishing ponds; sometimes use of filters and oxygen supply. aquaculture systems: traditional pond farms, predominantly ponds with connection to running natural waters, for certified farms also tanks/ponds
Saarland:	almost only fishing ponds; one salt water circulation system
Saxony:	several aquaculture systems, from traditional carp and trout ponds to closed circular systems; cultured species of economical importance in carp aquaculture: <i>Cyprinus carpio</i> , <i>Tinca tinca</i> , <i>Ctenopharyngodon idella</i> , <i>Acipenser spec.</i> cultured species of economical importance in trout aquaculture: <i>Onchorhynchus mykiss</i> , <i>Salvelinus fontinalis</i> cultured species in closed circular systems: <i>Sander lucioperca</i> , <i>Litopenaeus vannamei</i> , <i>Pangasianodon spec.</i> , <i>Tilapia</i> , <i>Clarias gariepinus</i> , <i>Perca fluviatilis</i>
Saxony-Anhalt:	cultured species: predominantly rainbow trout, carp; also brown trout, char, pike-perch, sturgeon, maraene etc. environmental conditions: rainbow trout and carp in ponds, runways and net cages; middle European climate

	<p>technologies: ponds, runways and net cages supplied by well or surface water; flow through or semi-circular systems; net cages in lakes; warm water circular systems; systems for the supply of oxygen</p> <p>protection from predators: covering with nets, sometimes roofs or indoor ponds</p>
Schleswig-Holstein:	<p>cultured species: salmonids, cyprinids, coregonids, Acipenser spp., percids, noble crayfish, eel, shellfish, oysters etc.</p> <p>environmental conditions: well and surface water</p> <p>technologies: net-cages, earthen ponds, pools, shellfish culture</p> <p>aquaculture systems: open, semi-circular and closed circular systems</p>
Thuringia:	<p>carp: predominantly kept in extensive holdings and for hobby/side-line farming;</p> <p>rainbow trout: cultured in three larger farms with runways; others in extensive holdings and for hobby/side-line farming</p> <p>brown trout and char: kept for hobby/side-line farming or for restocking</p>

Health status:

Lander	Production
Baden-Württemberg:	<p>VHS and IHN with numerous disease free compartments and zones</p> <p>targeted surveillance for VHS and IHN in Cat I and III</p> <p>KHV: all Cat. III, partially active and targeted surveillance</p> <p>ISA: disease free status; usually passive surveillance of farms; for farms keeping salmonids: targeted surveillance</p>
Bavaria:	<p>Fish farms are surveyed by the states veterinary services, by the states fish health service and by three aquaculture cooperatives and Qualified Services.</p>
Berlin:	<p>No reporting.</p>
Brandenburg:	<p>Almost every year outbreaks in salmonid stocks were registered; suspicion of intake due to fish transportation; all certified farms are subject to surveillance by a qualified veterinary service; frequency of surveillance depends on risk assessment. Registered farms are subject to passive surveillance.</p>
Bremen:	<p>No reporting.</p>
Hamburg:	<p>No reporting.</p>

Hesse:	5 farms in Cat. I: targeted surveillance with sampling 1 farm was in Cat V: targeted surveillance with sampling all others in Cat. III: active surveillance (routine controls, sampling); some farms are subject to targeted surveillance (mandatory sampling)
Meckl.-W. Pomerania:	passive surveillance
Lower Saxony:	Health status is depicted under 1.2 of the maps. KHV-I was officially declared in ornamental holdings only (one commercial and 8 non-commercial). Active health surveillance of certified farms is executed by the Veterinary University in Hannover and through Qualified Services. Official surveillance is done by the states veterinary agency. The states diagnostic institute and the Hannover Veterinary University are responsible for the health surveillance (clinical surveillance, laboratory diagnostics) and for the maintenance of the health status I. Surveillance with regard to ISA is passive.
North Rhine-Westphalia:	Most farms are only registered but not categorized; most categorized farms are in Cat. III. Few farms are in Cat I. This depends on the trading structure and the geographical conditions. Veterinary authorities provide a passive or targeted surveillance and are supported by fish health services. In a few cases own controls are provided by local vets. Lack of skilled/trained personal is mentioned.
Rhineland-Palatinate:	Mostly Cat. III; two controls annually through Qualified Services, one control by vet authorities. Official controls according to the risk level, samples are investigated in the states veterinary laboratory. Epidemiological data bases are regularly updated.
Saarland:	No reporting.
Saxony:	9 Cat. I compartments regarding KHV-I, IHN, VHS; Majority of certified holdings are in Cat. III. Surveillance according to directive 2006/88/EC is provided by a qualified service. 1. Within the program of the Saxon States Ministry for Social Affairs and Consumer Protection and the Saxon Animal Disease Insurance for the eradication of fish diseases (except KHV-I) from Nov. 13th of 2013. The program basically includes advice and diagnosis regarding diseases listed under annex IV part II of directive 2006/88/EG of salmonids and the respective prophylactic measures. 2. Within the KHV eradication program amended version of the joint program of the Saxon States Ministry for Social Affairs and Consumer Protection and the Saxon Animal Disease Insurance on the prophylaxis and eradication of koi herpes virus infections (KHV-I) in Saxon Fish Farms came into place (KHV Eradication Program) from April 13th of 2016).
Saxony-Anhalt:	Cat I for VHS, IHN: water system of river Bode with 4 farms (see attachment 1, map), targeted surveillance (clinical control and sampling by states qualified fish health services) in collaboration with the veterinary diagnostic institute where diagnostic is done by European standards; in the lower buffer

	<p>zones wild fish a regularly sampled; only fishes from Cat. I farms are allowed for restocking.</p> <p>Cat. III for VHS, IHN, KHV-I: risk based surveillance by states qualified fish health services. Susceptible species are subject to risk-based surveillance in certified farms at least once per year on notifiable diseases.</p>
Schleswig-Holstein:	<p>Two farms in Cat I: rainbow and brown trout, sturgeon.</p> <p>All other farms in Cat. III.</p> <p>Surveillance by States Vet Authorities in collaboration with Qualified Services attached to the Chamber of Agriculture.</p>
Thuringia:	<p>Inconspicuous. Surveillance is made according to directive 2006/88/EC in collaboration with the fish health services of other German states.</p>

Other disease problems:

Baden-Württemberg:	<p>ERM: Yersinia ruckeri is endemic in some river systems (different Yersinia strains - Hagermann and EX5), affected are mainly rainbow trout of all age classes, diagnostics are done with classical bacteriological methods using active surveillance; in highly affected farms vaccination using immersion or oral delivery (booster) is used.</p> <p>CEV: in koi / other cyprinids, morbidity (multifactorial disease) was mainly recorded in spring, detection by PCR at NRL, Veterinary University Hannover and states veterinary institute.</p> <p>Flavobacteriosis (RTFS): mainly Flavob. psychrophilum; affected was mainly rainbow trout fry during the brood house phase. Diagnostics using classical bacteriological methods; Prophylactic measures: improvement of brood house hygiene, reduction of stocking density, salt immersion, vitamins, disinfection of incoming water. Therapy: antibiotics through feeding.</p> <p>During the summer heat of 2018 problems due to low water levels and high water temperatures, as well as increased parasite and bacterial burden.</p>
Bavaria:	Emerging diseases were infections with SAV (PD) and CEV (KSD).
Berlin:	No reporting.
Brandenburg:	No reporting.
Bremen:	No reporting.
Hamburg:	No reporting.
Hesse:	Flavobacter sp./Flexibacter psychrophilum in rainbow trout fry; diagnostic methods: bacterial culture and MALDI-TOF-MS; no control and prophylactic measures taken.
Meckl.-W. Pomerania:	no other diseases or challenges recorded
Lower Saxony:	Koi sleepy disease (KSD / CEV) was in focus again. Again detection of CEV in connection with morbidity and mortality in koi and edible carp of different

	age classes. Fish farmers were informed and made aware on the potential risk especially in koi holdings. Bathing in sodium chloride solution was suggested to minimize losses.
North Rhine-Westphalia:	No reporting.
Rhineland-Palatinate:	No reporting.
Saarland:	No reporting.
Saxony:	Ichthyophthiriasis in salmonids - hygiene measures;
Saxony-Anhalt:	Yersinia ruckeri prophylaxis: In late summer 2018 no vaccine could be provided by producer. For the non-vaccinated stock increased morbidities are expected until they are sold for consumption. Therapeutic measures are expected. Suggestion: Making stocks of commercial vaccines or, in case of un-available production of stock-specific vaccines. PKD: One hatchery for rainbow trout has not been restocked due to high losses during the recent years. A direct connection between high water temperatures and losses is suggested. No decision on restocking made so far (with other non-susceptible species?) Ichthyophthirius: Increased (sometimes total) losses. Detection of agent by microscopy also through own surveillance. Control through hygiene measures and through decreased stocking densities. Research is suggested regarding closed and semi closed circular systems.
Schleswig-Holstein:	No abnormalities reported.
Thuringia:	PKD in rainbow trout especially in farms connected to larger surface water supplies.



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

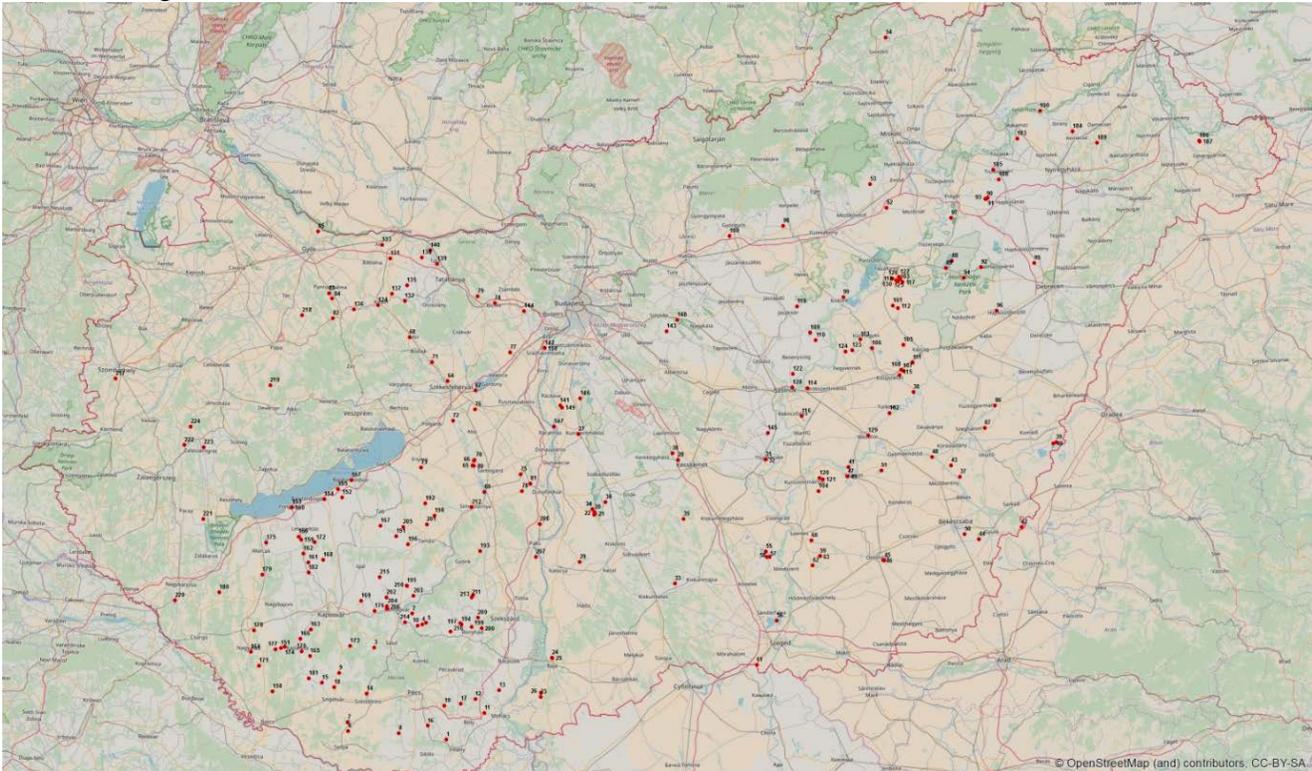
Aquaculture production: Marine farming of mediterranean fish species in cages-mainly dominated by seabream and seabass.

Health status: The health status has not changed since last year. We are applying mainly passive surveillance for the listed diseases.

Other disease problems: The main problems challenging the industry are the monogenean trematode *Sparicotylae chrysophrii* affecting seabream and VNN-virus affecting mainly seabass. I would include as emerging pathogens *Aeromonas veronii* and *Lernathropus kroyeri* both affecting seabass.

Author/Institute: Tamás Attila Juhász 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 Transdanubian Region.



Extensive fish farms are still the main production units in the aquaculture. They produce -83,5% of the whole Hungarian fish production. There are 228 fish farms producing carp. In 2018 production on intensive and extensive farms was 25 407 tons.

The major farmed species is carp. Carp constitute 81.1% of the fish production for consumption.

There are 19 intensive farms in Hungary producing around 16.5 % of the fish production. The fish production by intensive farms was 3969 tons. The African sharptooth catfish and sturgeon are provided by the intensive fish farms. The African catfish provides the 94 % of the intensive fish production.

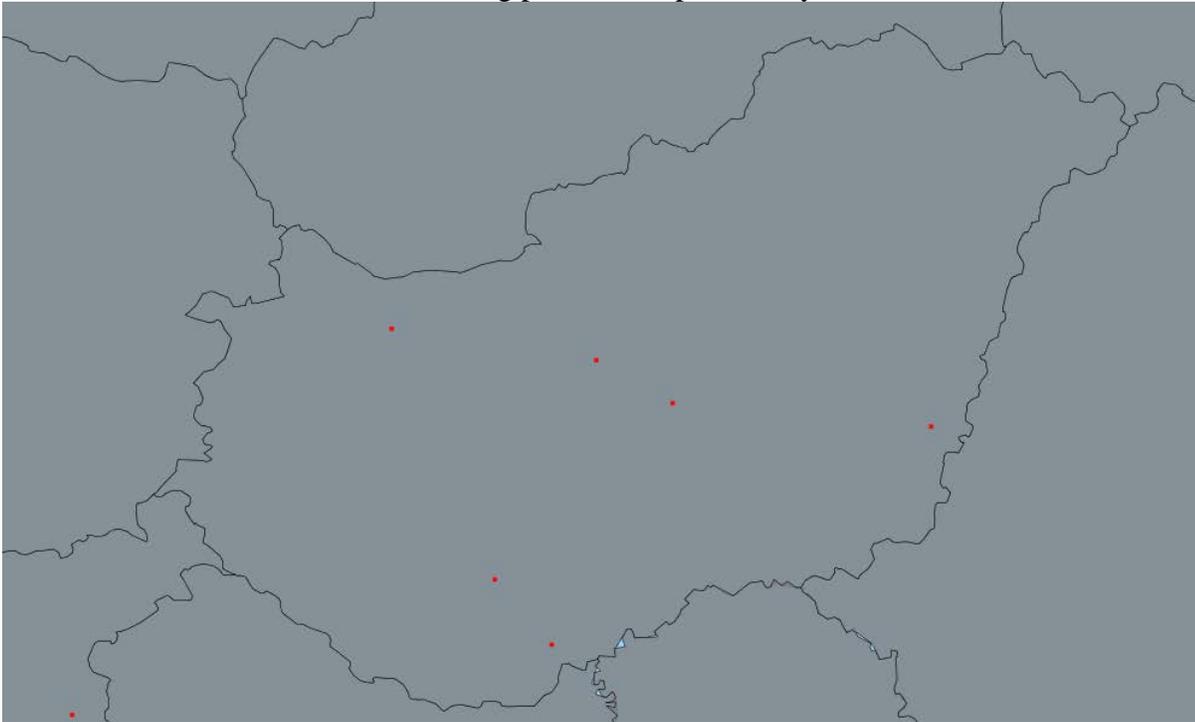
Historically the fish consumption is low in Hungary. It is around 6.4 kg/person/year, an increasing tendency could be observed during the last years (increased 18% during last 5 years). The tax of the fish meat lowered in 2018 to increase the fish consumption.

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, 215 epidemiological units of 189 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.

In 2018 three fish farm and three fishing pond found positive by KHV.



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 monitoring based on risk assessment. In 2018 20 fish farms were sampled.

There are no surveillance and eradication programmes for IHN and VHS but the farms with susceptible species (like trouts and pike) are examined yearly by virological methods. In 2017 23 fish farms were sampled.

Other disease problems: In 2018, the mortalities caused by CEV at spring time and early summer are decreased. 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: Árni Kristmundsson Institute of Experimental Pathology at Keldur NRL Iceland

Aquaculture production: 90% of all fish farms in Iceland are landbased (flow-through system), but the salmon production is mostly increasing in sea-cages the last years. The total production in 2018 was as follows:

Atlantic salmon: 13.448 t.

Arctic char: 4.914 t.

Rainbow trout: 295 t.

Senegal sole: 391 t.

Cod: 29 t.

Total: 19.077 tonnes

Health status: The health status is very promising and no listed diseases have been detected the last years. The fish disease authority is performing targeted surveillance, with focus on the broodfish farms, with intensive samplings for detection of the most serious diseases. For instance, in 2018 there were taken totally 10.817 samples for ISA testing (8 farms), 7.390 for PD/SAV testing, 6.497 for CMS/PMCV testing, 2.425 for IPN testing, 2060 for VHS testing and 1.602 for IHN testing. All results were negative.

Other disease problems: The biggest challenge in the Icelandic aquaculture is Bacterial kidney disease, both in salmon and arctic char. BKD is found to be widespread in the wild salmonids, both in freshwater and seawater. BKD is an important part of the Icelandic national health program and a huge amount of samples are taken in a number of fish farms (in 2018: totally 5.550 samples in 21 farms) - and also from wild salmonids used as broodfish for the rivers (666 samples in 4 farms, out of them 39 positives). Eggs from positive females are destroyed.

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Author/Institute: Neil Ruane, Marine Institute

Aquaculture production: Finfish aquaculture production in Ireland was ca. 20,000 tonnes, of which 19,305 tonnes was Atlantic salmon production all of which is certified organic. Other production in Ireland includes the freshwater rearing of rainbow trout and perch, which takes place mainly in flow

through pond farms and together produced < 1000 tonnes. One farm specialising in the production of ornamental fish including koi carp remained in production.

Health status: Ireland has category I status for listed diseases according to council directive 2006/88/EC i.e. ISA, IHN, VHS and KHV. All farms containing susceptible species are sampled on an annual basis. In addition, under commission decision 2010/221/EU Ireland has additional guarantees for BKD, SVC and infection with *Gyrodactylus salaris*. All farms with susceptible species are sampled on an annual basis. Additionally wild Atlantic salmon from 5 rivers are sampled annually for *G. salaris* surveillance.

Other disease problems: AGD occurred on all but one marine site but was managed with regular freshwater treatments. Although salmonid alphavirus was reported as being detected on most marine salmon sites, there was only one report of mortality due to pancreas disease. There were two reported cases of cardiomyopathy syndrome, two case of rickettsiosis and two cases of winter ulcer disease on marine salmon farms. One case of proliferative kidney disease in a freshwater salmon production unit was reported. For rainbow trout production in freshwater, rainbow trout fry syndrome and enteric redmouth persist on the same farms. For the first time, koi sleepy disease was reported in Ireland in two carp fisheries with significant mortality in both cases.



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

Health status: 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 and marine fish species. According to FEAP production report, in 2016 the output of freshwater farmed fish amounted approximately to 39,200 tonnes, of which rainbow trout and other salmonids (36,300 tonnes) had the major share, followed by sturgeon (1,000 tonnes), European eel (850 tonnes), common carp (700 tonnes) and Black bullhead/American Catfish (350 tonnes). Production of the marine farmed fish amounted approximately to 14,590 tonnes, where seabream (7,600 tonnes) and seabass (6,800 tonnes) were the main farmed species followed by meagre (190 tonnes). Traditional extensive aquaculture is still carried out in the “valli” 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 17 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 disease problems: As in previous years, in 2018 the main problem for Italian aquaculture was the low water supply in summer. The high temperatures associated to the low availability of water caused an increased incidence in rainbow trout farms of bacterial diseases, in particular lactococcosis. In rainbow trout hatcheries, both RTFS and IPN persist as the main infective diseases. Brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) farming is increasing in Italy and furunculosis caused by *A. salmonicida* is the main disease affecting this species. Autologous vaccines are used in some farms. In carp, only one KHV detection in ornamental koi has been made in 2018. An increasing number of CEV detections has been reported. In marine species, the most frequent viral disease detected was VER. The disease mainly affected sea bass but an increasing incidence of the reassortant strains RGNNV/SJNNV in sea bream hatcheries, affecting larval stages only, has been registered. Atypical vibriosis (i.e. *V. ordalii*, *V. harveyi*, *V. alginolyticus*, *V. splendidus*) ranked as the second infective problem for marine species. Increasing reports of *Sparicotyle* infestation in sea bream offshore cages were made.





Author/Institute: Zita Muižniece and Mārcis Ziņģis - Institute "BIOR"

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, sturgeon. There are five governmental fish farms which implement activity of the Fish Resources reproductive state program, mainly producing salmon and sea trout smolts in the framework of national restocking program. Total aquaculture production are about 900 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 disease problems: Additional virological, bacteriological or ichtiopathological investigations are not mandatory in Latvia. The most common bacterial disease problems are Aeromonosis and Pseudomonosis, mainly *Aeromonas hydrophyla*, *sobria* and *uncommon salmonicida*. Factors contributing the clinical diseases are: stress, inadequate welfare and water quality problems. Myxobacteriosis are often clinically diagnosed in salmonids. Some parasitic diseases such as argulosis, philometroidoses, ergasilosis, lerneosis, piscicollis and monogenetic flukes (such as *Gyrodactylus*) 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.

Lithuania



Author/Institute: Darius Nienius-National Food and Veterinary Risk

Aquaculture production: Total amount of aquaculture production in 2018 - 3 720 550 kg. Main farming fish species: carp - 2 918 562 kg; African catfish - 212 750; sturgeon - 124 716; bighead, spotted silver carp - 121 779 kg; trout - 111 202 kg; and other. The main part of aquaculture production is grown in ponds. Ponds are filled with natural stream water. So there are dozens of small closed recirculation aquaculture systems.

Health status: The farm health status system is not implemented.

Other disease problems: Carp Edema Virus (CEV).

Malta



Author/Institute: Benedetto Zangrilli Veterinary and Phytosanitary Regulation Division

Aquaculture production: Two companies farm mostly Gilt-head Bream (*Sparus Aurata*) and eventually Seabass (*Dicentrarchus labrax*). Both farms rear fish in cages at sea. Joveniles are bought from EU hatcheries and feeded with pallet. Four Companies farm blue fin tuna (*Thunnus Thinnus*) caught from wild stocks and fattened inside offshore cages feeding with mackarels and herrings bought frozen.

Health status: passive surveillance is implemented for all farms

Other disease problems: -

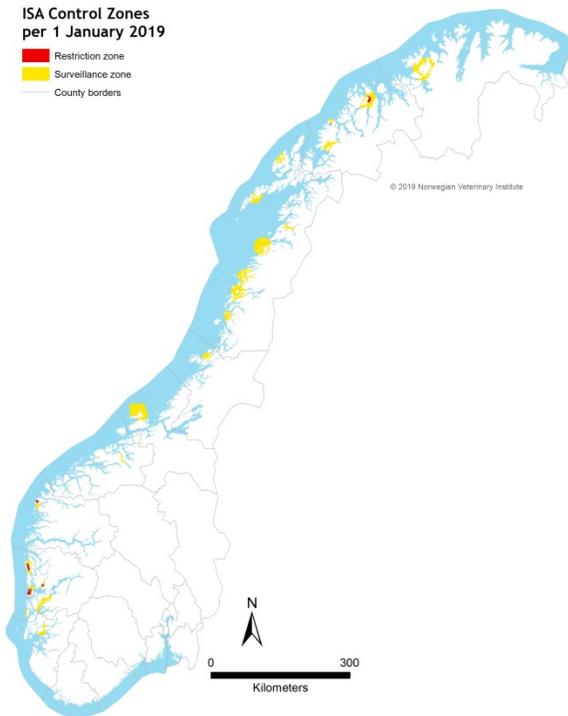


Author/Institute: Norwegian Veterinary Institute

Aquaculture production: There is a growth in the production of cleaner fish, especially lump sucker which is the second largest species produced in number in Norway today. Sea lice treatment is a challenge considering health and welfare.

Health status: The number of outbreaks with Pancreas disease is still high, and some of the outbreaks are probably detected due to extensive surveillance that was implemented in 2017. SAV2 and SAV3 is endemic in geographically distinct areas, but we have had a number of outbreaks caused by SAV2 north of the endemic areas, while SAV3 is detected in the area (mid-Norway) where SAV2 is endemic and vice versa SAV2 is detected in the area (western Norway) where SAV3 is endemic. We have surveillance of ISA in control zones and ISA free segments, and a number of outbreaks were detected in the control zones. We have a risk-based surveillance of VHS and IHN, ie. samples that are submitted for routine diagnostics are selected for testing.

Other disease problems: There is a growing concern about PMCV-infection (CMS).



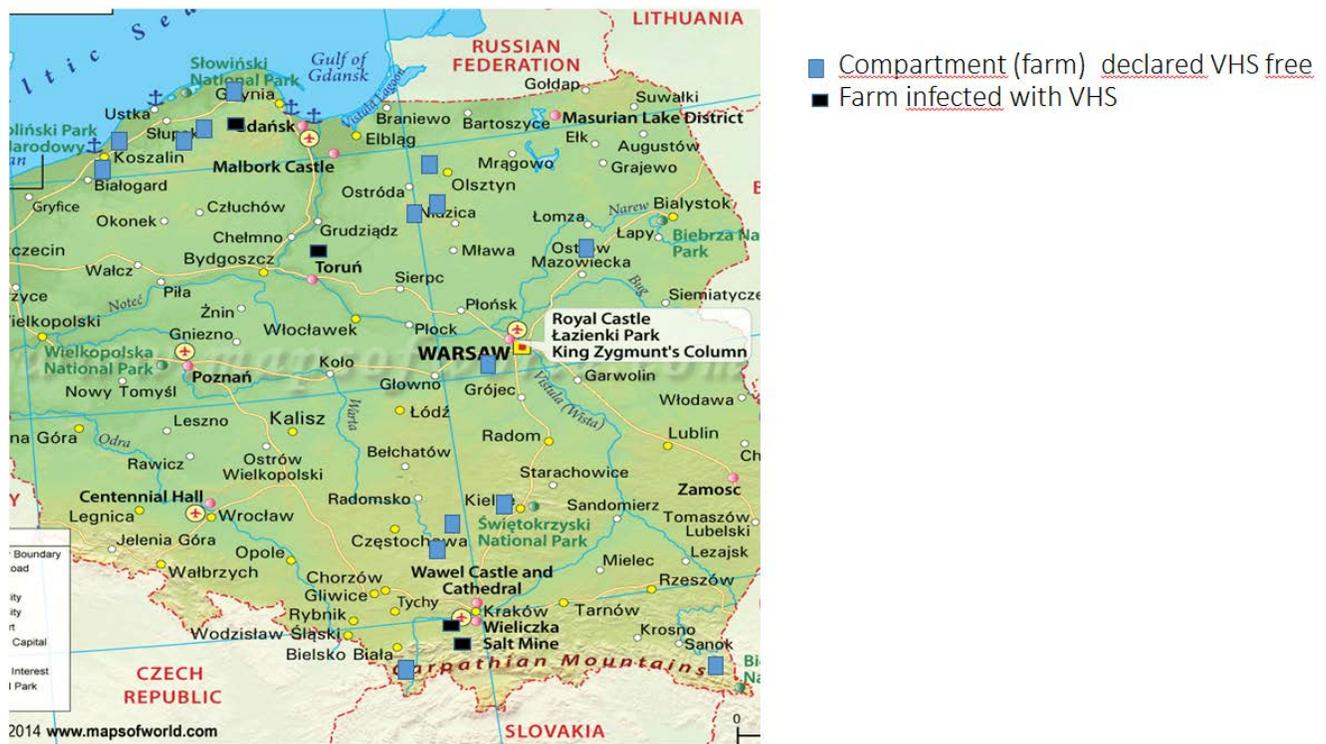


Author/Institute: Marek Matras-Pulawy

Aquaculture production: No significant changes from 2017.

Health status: According to Council directive 2006/88/EC Poland has free health status for ISA and 15 VHS free compartments, 17 IHN free compartments and one KHV free farm, rest of farms have undetermined health status for VHS, IHN a KHV. In 2018 were reported 1 outbreaks of KHV, 4 outbreaks of VHS. At the national level Poland performed the monitoring for VHS, IHN and KHV.

Other diseases and health related issues: In 2018, carp edema virus was detected in 13 common carp and koi farms. The presence of the IPNV and SAV2 has also been confirmed.





- Compartment (farm) declared IHN free
- Farm infected with IHN



- Compartment (farm) declared KHV free
- Farm infected with KHV



Author/Institute: Direção Geral de Alimentação e Veterinária (DGAV)/Instituto Nacional de Investigação Agrária e Veterinária

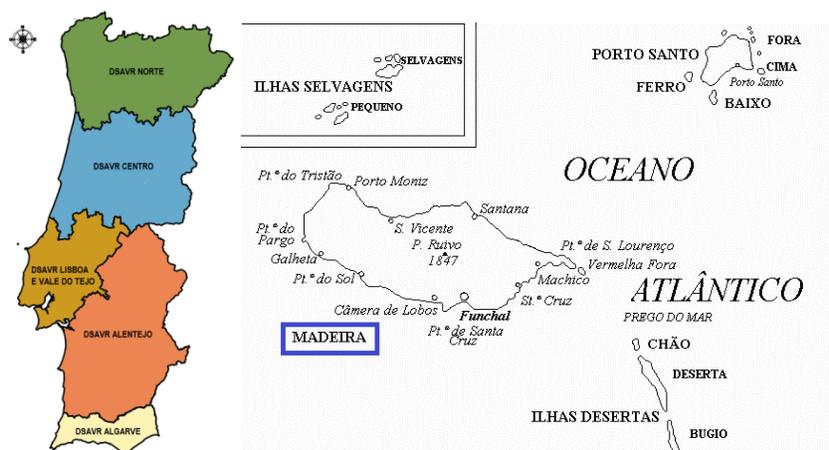
Aquaculture production:

The Table I describes the number of active fish farms per region (Map I), species and system (July 2018)

Table 1

Region	Fish farms (2018)					Total nº
	Trout and carp	Marine fishes (sea bass, gilthead seabream)				
		Intensive	Semi-intense	Extensive	Sole and Turbot *	
	Active	Active	Active	Active		
DSVRN	15	1	1	0	(1)*	17
DSVRC	7	3	18	1	(2)*	29
DSVRLVT	0	0	15	4	0	19
DSVRA	1	1	1	0	0	3
DSVRA g	0	0	6	0	0	6
Açores	0	0			0	0
Madeira	0	2		2		4
Total	23	55				78

Map 1



Describe the health status for listed fish diseases according to council directive 2006/88/EC, including the perceived status of listed pathogens, and how surveillance is implemented at the national level

CATEGORIZATION OF PORTUGUESE FISH FARMS (March/2019)

FISH (Species)	Disease- free status to (VHS/IHN) (Number of fish farms))
Trout	24
Turbot	3 *
FISH (Species)	Surveillance Programme (VHS/IHN)(Number of fish farms)
Trout	2
FISH (Species)	Disease- free status to (KHV) (Number of fish farms)
Carp	1

- ✓ The whole country is declared disease-free (Category I) to (ISA)
 - ❖ Actually one is producing only sole

Thus, by means of an official sanitary surveillance taken annually for the DGAV, 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 never been diagnosed.

Other disease problems: No data submitted

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, pikeperch 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 condition 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 do relating every 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 analyzing for fish listed diseases are carried out by National Reference Laboratory.

Other disease problems: The most frequent diseases in salmonids farms are those that involve the myxobacteria group in fry and in adult stage followed by yersiniosis. In ciprinids ponds bacterial infection with opportunistic agents are prevalent. Diagnosis of bacterial diseases are 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.

Serbia



Author/Institute: Vladimir Radosavljevic- University of Sarajevo

Aquaculture production: No data submitted

Health status: No data submitted

Other disease problems: No data submitted

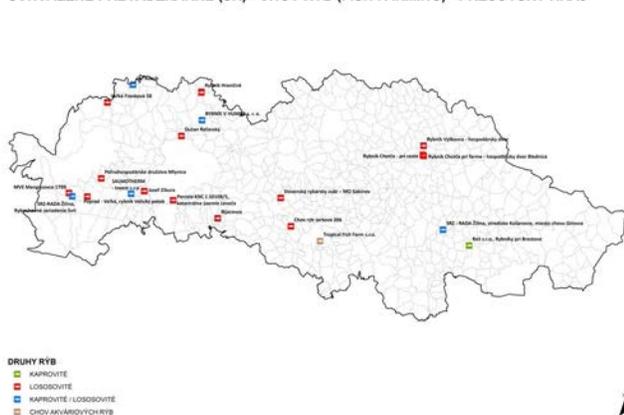
Author/Institute: Miroslava Vankuskova *Veterinary and Food institute Dolný Kubín*

Aquaculture production: The position of the aquaculture sector within the national economy of the SR can be expressed through GDP, where it contributes 0.002%. Despite this relatively low share of the national economy, aquaculture is important, especially in terms of protecting and creating the environment, preserving the original gene pool of fish and the socially beneficial non-productive benefits of the objects used for fish farming - landscaping, flood protection, land retention and rural development. Employment in the sector is 929 employees (0.00075% of all employed Slovaks). Slovakia's aquaculture can be divided into two separate and specific groups (areas): lowland fish farming and trout farming. The farming of salmonid fish is predominantly developed in northern and central Slovakia. On the other hand, the largest pond systems for lowland species are located in climatically favorable conditions of the southern part of eastern Slovakia, western Slovakia and Záhorie..

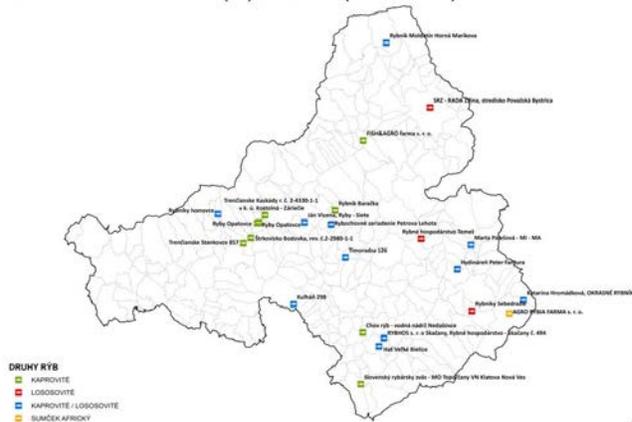
Health status: Health control of registered farms is included in the program for the control and eradication of viral fish diseases. To improve prevention, it is necessary to proceed to a mandatory 100% registration and subsequent veterinary inspection of all fish farms in the Slovak Republic.

Other disease problems: So far we have no other diseases yet, but the situation has changed, because the only center of aquaculture research in Slovakia has been canceled. The absence of systematic monitoring of ichthyofauna causes insufficient monitoring of the ichthyofauna species composition and can lead to loss of native species in flowing waters and the spread of unwanted non-native species and the emergence of new diseases

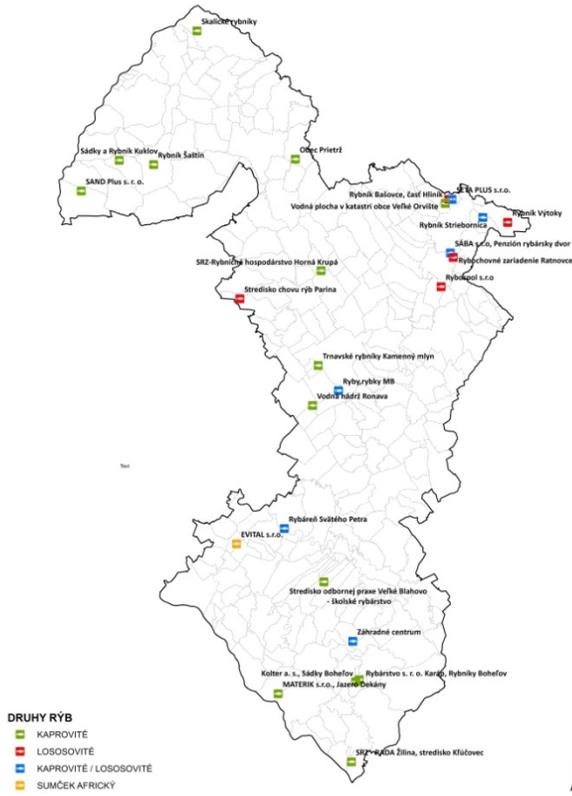
SCHVÁLENÉ PREVÁDZKARNE (SK) - CHOV RÝB (FISH FARMING) - PREŠOVSKÝ KRAJ



SCHVÁLENÉ PREVÁDZKARNE (SK) - CHOV RÝB (FISH FARMING) - TRENČIANSKY KRAJ



**SCHVÁLENÉ PREVÁDZKARNE (SK) - CHOV RÝB (FISH FARMING)
TRNAVSKÝ KRAJ**



SCHVÁLENÉ PREVÁDZKARNE (SK) - CHOV RÝB (FISH FARMING) - ŽILINSKÝ KRAJ



druhy rýb – fish species

kaprovité – carp

lososovité – salmonids

kaprovité/ lososovité – mixed

chov akváriových rýb – aquarium fish

sumček africký - african catfish,

Slovenia



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

Aquaculture production: In Slovenia aquaculture is focused mostly to the production of rainbow trout and carp for human consumption and repopulation of open waters with brown trout, marble trout, brook trout, grayling and some cyprinids. We have one sea fish farm, rearing seabass and seabream. The annual production is 737 tonnes of salmonids and 123 tonnes of cyprinids (source: Statistical office of Slovenia; data from 2017).

Health status: The number of VHS/IHN declared free (Category I) farms/compartments/zones has increased and is now 29 farms. In addition, 6 fish farms/compartments/zones are in the category II (approved surveillance programmes for VHS/IHN free status). Most of farms are officially in the Category III, however in fact these farms are not of unknown health status. Fish farms trading with live fish are for many years annually checked for the presence of IHNV and VHSV with regard the National surveillance programme paid by AFSVSPP (Annual Decree on the systematic monitoring of animal diseases and vaccination). There are no fish farms in Category IV while in the Category V, there are 4 VHSV infected, 22 IHNV infected and 15 KHV infected fish farms.

Other disease problems: See above



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 followed by carp and sturgeon 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 and tilapia.

2) In ponds: the fish live in ponds where they feed off the ecosystem, this technique is used in the rearing of tench and carp ‘

Sea water

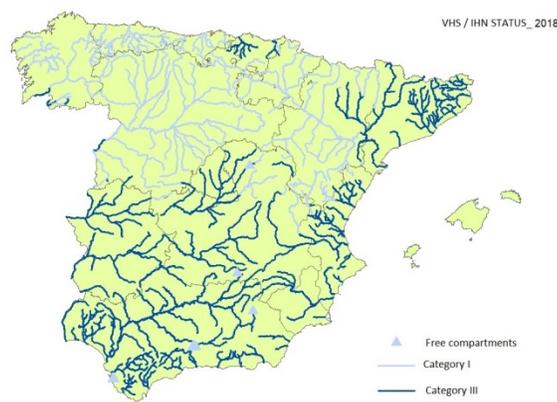
1) Cage systems. Net-pens (cages) can be of different kinds but the principle is the same; every type is based on a natural exchange of water through pens. The most important specie cultivated in this system are: seabass, seabream, tuna, meagre, blackspot.

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 and sole 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 is usually cultured in polyculture with seabream, mullets, eels and meagre.

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. 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 Implementing Decision (EU) (2015/1554) and are coordinated by Central Authority (MAPAMA / Ministry of Agriculture and Fisheries, Food and Environment).

Other disease problems: No data submitted



Sweden

Author/Institute: Charlotte Axén-SVA

Aquaculture production: Mainly RT, second most common species arctic char. A few farms with other species carp, tilapia, african catfish, sturgeon, salmon). Landbased flow-through systems most common for fry and parr production, older fish in cages. Landbased RAS systems for warm water species, sturgeon and salmon.

Health status: Listed salmonid viruses not present in farms. Surveillance according to EU 2015/1554, cell cultures. Farms are categorized into risk classes by the Board of Agriculture. RC 1= two control visits per year, sampling for virus and BKD every year, RC 2=one control visit per year, samping every two years. RC 3= one control visit every second year, sampling only upon suspicion. RC 4 = no control visits or sampling unless there is suspicion

Other disease problems: The two KHV outbreaks occurred in private koi ponds, not in the aquaculture companies. Mortalities were >90 % in affected ponds

Switzerland

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

Aquaculture production: The main aquaculture species in Switzerland produced for human consumption is rainbow trout, mainly in raceway farms. Perch and pike perch are increasingly raised, mainly in recirculation systems. A low number of farms (< 5) have started to produce salmon. Brown trout, char and whitefish are bread for stocking purposes.

Health status: With the exception of IPN, no listed viral disease has been diagnosed in 2018. In some cantons, regular controls of farms are established.

Other disease problems: The status of IPN is under debate, as this disease is not notifiable in the countries surrounding Switzerland. As a major part of eggs and fry are imported, this regularly provokes problems. For this reason, it is planned to delist IPN with the next amendment of the respective legislation. Perch rhabdovirus is a disease of growing concern as it has been demonstrated in farms but also in wild fish for the first time in 2018.

The Netherlands



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

Aquaculture production: The Netherlands has appr. 50 fish farms: indoor 25°C: 13 eel, 10 African catfish, 3 clausse, 2 tilapia, 2 pike perch, indoor, colder: a single turbot-, and sole farm, and a new big yellow tail kingfish farm; out/indoor 8 trout farms. Plus 58 put and take trout fisheries. In total 108 farms, production appr. 8500 ton/year. Data based on list of registered fish holding sites from the Ministry, supplemented with own experience.

Health status: Our country has a passive surveillance on the listed fish diseases of 2006/88/EC. So, only when there is a suspicion, samples are taken for diagnosis and the 2006/88/EC measurements are taken. All trout and one single carp farm(s) are in Cat. III.

Other disease problems: No changes. Again there were no new detections of CEV.

Turkey



Author/Institute: Gulnur Kalayci – NRL Turkey

Aquaculture production: In the aquaculture sector of Turkey, the most important fish species are rainbow trout, carp, European sea bass and sea bream. There are 426 marine fish farms and 1860 freshwater fish farms. Freshwater fish farms production were 104 010 tonnes and marine fish production 172 492 tonnes in 2018.

Health status: During 2018 were not detected viral outbreaks caused by listed in directive 2006/88/EC pathogens. The farm health status (categorization of fish farms) is not implemented. National disease monitoring program is implemented..

Other disease problems: In 2018, IPNV was detected.



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

Aquaculture production: The two main aquaculture sectors in England and Wales in terms of production volume are salmonid species and coarse and ornamental (carp family) fish species. Rainbow trout 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 mainly for restocking, and a small production of Arctic char for the table market. A small number of sites produce juvenile Atlantic salmon 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 mainly produced in extensive earth ponds. There is a small production of common carp for the table. The main species of ornamental fish produced are goldfish and koi carp in a mixture of earth ponds and intensive indoor and outdoor tank systems. More recently a small number of sites have been established for the production of wrasse and lumpsuckers for use as cleaner fish in the Scottish salmon industry.

Health status: England and Wales are recognized as being free from the major listed diseases IHN, VHS and ISA. There were 31 KHV disease outbreaks in England of which 26 were in managed fisheries and 5 in fish importer premises. 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. England has one site currently subject to statutory controls following an outbreak of SVC in 2017. The site was culled, disinfected and fallowed, and is now subject to disease surveillance. 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.

Other disease problems: Overall the health status of farmed fish in England and Wales has shown an improvement in recent years. Important contributory factors include better supplies of water, and lower stocking densities on farms. Major disease concerns in rainbow trout and brown trout farming in England and Wales remain the two skin diseases of unknown aetiology, red mark syndrome (RMS) and puffy skin disease (PSD). A new condition termed cranial maxilla fibrosis has been identified on one rainbow trout farm with almost 100% of stock affected. Research is underway to characterise this condition and identify the aetiological agent. 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.* The protozoan flagellate costia *Ichthyobodo necator* remains an important cause of morbidity and mortality in salmonid hatcheries. Restrictions on the availability of treatments, including the limited availability of antibiotics and vaccines remain a major concern to the salmonid farming sector.

Northern Ireland

Author/Institute: Donna Lyons - Department of Agriculture, Environment and Rural Affairs

Aquaculture production: The finfish sector in Northern Ireland produced approximately 1,250 metric tonnes of finfish, valued at £6.8 million in 2017. Of the 39 authorised aquaculture production businesses, 37 are inland and 2 are marine sites. The main species cultivated is Rainbow trout (*Onchorhynchus mykiss*) produced for the table market and for restocking angling waters. There is also significant production of Atlantic salmon (*Salmo salar*). Brown trout (*Salmo trutta*) and Carp (*Cyprinus carpio*), mainly for restocking, are also produced.

Health status: Northern Ireland has Category I status in respect of the finfish listed diseases. All farms are authorised by DAERA and operate to agreed biosecurity plans. An annual programme of compliance inspection and disease testing is carried out by DAERA. Disease testing is carried out by the Agri-Food and Biosciences Institute (AFBI) on behalf of DAERA, to an agreed Service Level Agreement. The sampling programme includes the testing of finfish farms and wild fisheries for listed diseases and those diseases which Northern Ireland has Article 43 measures in place for.

Other disease problems: Northern Ireland do not currently have any challenges to report in this respect.

Scotland

Author/Institute: Eann Munro-Marine Scotland Science

Aquaculture production: There are 23 businesses operating 44 active sites for the production of rainbow trout. In 2017, 7,637 tonnes of rainbow trout were produced, 6,997 tonnes for the table market and 640 tonnes for restocking angling waters. Of the 44 active sites 28 sites reported production in 2017. Freshwater production accounted for 4,155 tonnes and seawater production the remaining 3,482 tonnes. Freshwater production was from sites operating cages, ponds, raceways, tanks and hatcheries

and seawater production was all from cage site facilities. Over 7.0 million ova were laid down to hatch in 2017 with 6.5 million being imported from foreign sources while the remaining 0.5 million were from Scotland or other GB based fish farms. 46.2 million Atlantic salmon smolts were produced by 24 businesses operating 79 active sites. The principal types of facility used for the production of smolts in freshwater are cages (36 sites) or tanks and raceways (43 sites). Within the tanks and raceways bracket there are also two recirculation units currently in operation. Over 65 million ova were laid down to hatch with 59 million of these ova coming from foreign sources. In 2017, the total production of Atlantic salmon was 189,707 tonnes, the highest ever level of production recorded in Scotland. These fish were produced by 12 businesses operating 226 active sites. Fish production of 189,681 tonnes was from the seawater cage sites (222 sites) while 26 tonnes of production was reported from the seawater tank sites (4 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	11	12	61
Halibut	1	3	*
Lumpsucker	4	6	26
Wrasse	3	4	4

*Production occurred in 2017 but cannot be shown without revealing the figure for an individual business. Lumpsucker and wrasse are produced for use as biological controls for parasites in the marine Atlantic salmon farming industry. There was also very small amounts of brook char and tiger trout produced in Scotland. The majority of trout production takes place in freshwater tanks, ponds and raceways with only 25 tonnes produced in seawater cages. Halibut, wrasse and lumpsuckers are produced in seawater tank sites.

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 GB)

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 disease problems: No change from 2017. Sea lice (*Lepeophtheirus salmonis*) - Atlantic salmon (all seawater stages). Still main issue in seawater. 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 water jets, heated water and freshwater baths). Many sites using cleaner fish (wrasse and lumpsuckers). Complex gill issues - Atlantic salmon (all seawater stages). Some seawater sites are experiencing complex gill issues which also impact on treatments for sea lice as gill health is compromised. Fish are affected by multiple pathogens at the same time such as amoebic gill disease, salmon gill poxvirus, *Paranucleospora theridion* etc.

Annex 1: Number of fish Farms

Country	Total Number of authorized fish farms active in 2018 (farms/sites that were only active in parts of 2018 are also included)
Austria	237
Belgium	100
Bulgaria	631
Cyprus	20
Czech Republic	1768
Denmark	223
Estonia	33 authorized fish farms (24 active in 2018)
Finland	526
France	599
Germany	13.206
Greece	403
Hungary	227
Ireland	71
Italy	832
Latvia	45
Lithuania	84
Malta	6
Netherlands	108
Poland	4108
Portugal	78
Romania	705
Slovakia	118
Slovenia	301
Spain	323
Sweden	190
England and Wales	283
Scotland	388
Northern Ireland	39
Croatia	88
Turkey	Marine farms:426 Freshwater farms:1860 Total number of fish farms:2286
Albania	0
Bosnia and Herzegovina	70
Iceland	51
Norway	1483
Switzerland	365
Faroe Islands	35
Total	30.128

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

Country	Number of farms 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	10	7	1	1	0	1	89	87	114	90	0	0	0	0	1	0	0	0	0
<i>Belgium</i>	1	1	1	1	0	0	0	0	0	0	0	0	5 + 6	0	0	0	3	0	0	0	0
<i>Bosnia and Herzegovina</i>	0	0	0	0	35	35	0	0	0	35	0	0	0	0	0	0	0	0	0	0	2
<i>Bulgaria</i>	0	0	0	0	22	22	0	52	53	53	0	328	0	0	0	0	0	0	0	0	0
<i>Croatia</i>	0	0	0	19	19	20	0	6	0	0	0	0	0	0	0	2	1	0	0	0	0
<i>Cyprus</i>	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
<i>Czech Republic</i>	0	0	249	0	0	0	0	0	1118	214	0	1633	0	0	0	0	0	0	0	1	15
<i>Denmark</i>	187	211	211	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	12
<i>England and Wales</i>	156	156	156	2	0	0	0	0	0	0	0	134	0	0	0	0	0	0	0	0	10 (9 Tilapia and 1 sturgeon only site)
<i>Estonia</i>	1	1	15	0	14	12	0	2	2	2	0	0	0	2	0	0	0	0	0	0	9
<i>Faroe Islands</i>	0	0	0	na	0	0	0	na	34	34	34	na	0	0	0	na	0	0	0	na	0

Country	Number of farms 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>Finland</i>	431	282	306	0	0	8	0	0	0	0	0	21	33	0	0	0	0	0	0	0	Impossible to count
<i>France</i>	282	285	0	0	43	41	0	0	274	273	0	0	0	0	0	0	0	4	0	0	0
<i>Germany</i>	139	134	898	2	11	11	0	0	7.402	7.038	212	5.178	1	0	0	0	17	7	0	49	98
<i>Greece</i>	0	0	0	0	0	0	0	0	62	62	62	7	0	0	0	0	0	0	0	0	333
<i>Hungary</i>	0	0	0	0	0	0	0	189	17	17	0	0	0	0	0	0	0	0	0	0	0
<i>Iceland</i>	3	30	3	0	0	0	0	0	27	0	27	0	0	0	0	0	0	0	0	0	0
<i>Ireland</i>	14	67	69	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
<i>Italy</i>	191	178	542	0	7	5	0	0	350	347	0	117	0	0	0	0	14	13	0	0	184
<i>Latvia</i>	0	0	0	0	0	0	0	0	18	18	0	20	0	0	0	0	0	0	0	0	8
<i>Lithuania</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Malta</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
<i>The Netherlands</i>	0	0	0	0	0	0	0	0	66	66	66	1	0	0	0	0	0	0	0	0	41
<i>Northern Ireland</i>	31	33	33	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Norway</i>	1404	1323	44	0	0	0	116	0	0	0	1162	0	0	0	1	0	0	0	0	0	0

Country	Number of farms 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>Poland</i>	15	17	572	1	0	0	0	0	553	555	0	3534	0	0	0	0	4	0	0	1	0
<i>Portugal</i>	27	27	*	1	2	2	*	0	0	0	*	0	0	0	*	0	0	0	*	0	0
<i>Romania</i>	0	0	189	0	0	0	0	0	289	190	0	446	0	0	0	1	0	0	0	1	33
<i>Scotland</i>	74	363	365	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	1
<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>Slovakia</i>	0	0	0	0	0	0	0	0	71	71	0	66	0	0	0	0	0	0	0	0	0
<i>Slovenia</i>	29	29	162	0	6	6	0	0	123	105	0	124/	0	0	0	0	4	22	0	15	0
<i>Spain</i>	124	101	all	0	0	0	0	0	20	15	0	1	0	0	0	0	0	0	0	0	0
<i>Sweden</i>	169*	169*	168	0	0	0	0	0	0	0	0	3**	0	0	0	0	0	0	0	0	18
<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>Turkey</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3296	3425	4324	39	160	163	116	250	10592	9182	1677	11702	45	2	1	3	44	46	0	67	786

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		
Austria	2	0	4	0	no	no
Belgium	11	0	0	0	Drastic increase of VHS infected farms	With the exception of one outbreak in one farm where the mortality was high, in the other cases, the mortality was very low or absent
Bosnia and Herzegovina	0	0	0	0	No	No
Bulgaria	0	0	0	0	no	no
Croatia	1	0	0	0	Increase, because there were no positive samples in 2017.	There were no notification of clinical signs of the VHS.
Cyprus	0	0	0	0	0	0
Czech Republic	0	0	2	0	In comparison to the previous period there is following situation: Last VHS outbreak was detected in 2016 were confirm 3 outbreaks. In 2018 there was no outbreak of VHS. In comparison to year 2017 there was confirmed two KHV outbreaks. Both outbreaks in Easternbohemian Region (after fulfilling of all measures lay down in Directive 2006/88/ES and in Decision 2015/1554 - regaining undetermined health status) and one continuous status V since 2017 in Region of Zlín (applied only minimum control measures - status infected).	0
Denmark	0	0	1	0	0	0
England and Wales	0	0	31	0	30 sites reported with KHV in 2017 - NO outbreaks on Farms	No Change
Estonia	0	2	0	0	Yes, two rainbow trout farms with IHN outbreaks.	Yes, for the IHN. IHN never has been diagnosed in Estonia.
Faroe Islands	0	0	na	0	Yes: In 2017 we had one farm with an ISA outbreak. In 2018	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		
					no farms had ISA	
Finland	0	5	0	0	Yes, one new put and take pond was found positive for IHNV in 2018. This one outbreak of IHNV started in 2018, whereas the total number of outbreaks that were ongoing in 2018 was five (5).	0
France	1	2	1	0	There is a decrease in the number of fish farm infected and a real motivation of farmers to achieve the free status at national level.	0
Germany	27	6	84	0	<p>Baden-Württemberg: Overall decrease in VHS/IHN.</p> <p>Bavaria: VHS: no changes (2018: 6) IHN: slight increase (2017:4; 2018: 6) KHV: decrease (2017: 15; 2018: 6) ISA: no difference (0)</p> <p>Berlin: No reporting.</p> <p>Brandenburg: no</p> <p>Bremen: No reporting.</p> <p>Hamburg: No reporting.</p> <p>Hesse: Increase in VHS .</p> <p>Mecklenburg-W. Pomerania: no</p> <p>Lower Saxony: Decrease in KHV-I, but still high (hot summer responsible?).</p> <p>North Rhine-Westphalia: Significant increase in VHS infected fish farms. A single fish farm has been identified as source. Before this farm could be identified VHSV was transmitted to many previously free farms.</p> <p>Rhineland-Palatinate: Decrease in VHS. Slight increase in KHV-I.</p> <p>Saarland: increase in VHS (2017: 0, 2018: 2); Decrease in KHV-I (2017: 1, 2018: 0)</p> <p>Saxony: no changes.</p>	<p>Baden-Württemberg: no</p> <p>Bavaria: Decrease in severity regarding IHN.</p> <p>Berlin: No reporting.</p> <p>Brandenburg: no</p> <p>Bremen: No.</p> <p>Hamburg: No .</p> <p>Hesse: no</p> <p>Mecklenburg-W. Pomerania: no</p> <p>Lower Saxony: no</p> <p>North Rhine-Westphalia: no</p> <p>Rhineland-Palatinate: no</p> <p>Saarland: no</p> <p>Saxony: increase in severity regarding KHV-I with mortalities up to 90% and higher.</p> <p>Saxony-Anhalt: no</p> <p>Schleswig-Holstein: no</p> <p>Thuringia: no</p>

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		
					Saxony-Anhalt: decrease in VHS (2017: 3; 2018: 0) and in KHV-I (2017: 4; 2018: 3) Schleswig-Holstein: no Thuringia: Very few outbreaks. Only two KHV-I outbreaks in private garden ponds and garden centre (no epidemiological connection)	
Greece	0	0	0	0	NO	NO
Hungary	0	0	6	0	No	No
Iceland	0	0	0	0	0	0
Ireland	0	0	0	0	No	n/a
Italy	2	0	4	0	no	no
Latvia	0	0	0	0	No	No
Lithuania	0	0	1	0	No	No
Malta	0	0	0	0	no	no
The Netherlands	0	0	12	0	No change	No change
Northern Ireland	0	0	0	0	No change.	N/A
Norway	0	0	0	13	The number of ISA outbreaks is quite stable. It is however remarkable that the number of isolated outbreaks seems to be relativey high. This tendency was also observed in 2017 and contrasts the previous years where some local epidemics dominated.	We have no indications that the severity of ISAV infections is changed.
Poland	4	0	1	0	Decrease in the number of fish farms infected with IHN and increase of fish farms infected with VHS	No
Portugal	0	0	0	0	No	No
Romania	0	0	1	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		
Scotland	0	0	0	0	No change	No change
Serbia	0	0	0	0	0	0
Slovakia	1	0	0	0	no	no
Slovenia	none	1	1	none	No	No
Spain	0	0	0	0	No	No
Sweden	0	0	2	0	Yes. Increase of clinical manifestations of KHV, first outbreaks in approx 10 years. Presence of subclinical infections/carriers unknown	No
Switzerland	0	0	1*	0	There was a slight decrease in VHS cases (from 1 to 0), while for IHN and ISA, the situation was stable. *) In Switzerland, KHV is not a notifiable disease.	No change
Turkey	0	0	0	0	no	no

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	Disease or symptoms	Fish species	Disease or symptoms
Austria	0	0	0	0	0	0	0	0
Belgium	Rainbow trout	Flavobacterium : all the hatcheries are infected	Rainbow trout	PKD important increase in number of outbreaks and severity	0	0	0	0
Bosnia and Herzegovina	Na	Na	Na	Na	Na	Na	Na	Na
Bulgaria	no	No	0	0	0	0	0	0
Croatia	Sea bass	Infection with Vibrio harveyi	Sea bass	Infection with Tenacibaculum sp.	Sea bream	Sparicotyle sp.	Sea bream	Red rash
Cyprus	0	0	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
England and Wales	rainbow trout (Oncorhynchus mykiss)	Red mark syndrome	rainbow trout (Oncorhynchus mykiss)	Puffy skin disease	0	0	0	0
Estonia	No.	0	0	0	0	0	0	0
Faroe Islands	Atlantic salmon	Sea Lice, CMS, AGD, BKD, Vinter ulcers	Lumpsuckers	Pasteurellosis, Tenacibaculum	na	na	na	na
Finland	Rainbow trout	IPNV	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0
Germany	(see annex 4a)							
Greece	SEABASS	VNN/VER	SEABASS	Aeromonas	SEABREAM	Sparicotylae	SEABASS	Lernathropu

COUNTRY	Fish diseases problems other than VHS, IHN, KHV or ISA							
	Fish species	Disease or symptoms	Fish species	Disease or symptoms	Fish species	Disease or symptoms	Fish species	Disease or symptoms
				veronii		chrysophrii		s kroyeri
Hungary	0	0	0	0	0	0	0	0
Iceland	Atlantic salmon (Salmo salar) and Arctic char (Salvelinus alpinus)	1 new outbreak of BKD in 2018.	1 new outbreak of BKD in 2018.	1 new outbreak of BKD in 2018.	1 new outbreak of BKD in 2018.	1 new outbreak of BKD in 2018.	1 new outbreak of BKD in 2018.	1 new outbreak of BKD in 2018.
Ireland	Atlantic salmon	Pancreas disease, cardiomyopathy syndrome	Salmo salar	Amoebic gill disease/gill pathologies	Oncorhynchus mykiss	Rainbow trout fry syndrome, enteric redmouth disease	Cyprinus carpio	Koi sleepy disease
Italy	See ANNEX 4a							
Latvia	Salmonidae	Aeromonosis	Cyprinidae	Aeromonosis	Coregonidae	Aeromonosis	0	0
Lithuania	Carp	Carp Edema Virus DNA was confirmed laboratory in the 30 % of samples taken from aquaculture farms	0	0	Atlantic salmon	A massive mortality of wild Atlantic salmon in the rivers in November 2018. The suspicion of the Ulcerative Dermal Necrosis (UDN) is based on external clinical signs. The disease was not laboratory confirmed due to the lack of diagnostic methodology.	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	Disease or symptoms	Fish species	Disease or symptoms
Malta	Sparus Aurata	Pasteurella spp	0	0	0	0	0	0
The Netherlands	rainbow trout : 2 IPN outbreaks in trout put and take fisheries	typical for trout virus	goldfish (indoor): 6 batches from China positive for CyHV-2	popeye, ascites, mortality	0	0	0	0
North Ireland	N/A No Known Fish Diseases.	0	0	0	0	0	0	0
Norway	Atlantic salmon	PD, HSMB and CMS			Rainbow trout	Flavobacteriosis	0	0
Poland	0	0	0	0	0	0	0	0
Portugal	0	0	0	0	0	0	0	0
Romania	Trout	Yersiniosis, IPN,	0	0	0	0	0	0
Scotland	See Annex 4a							
Serbia	0	0	0	0	0	0	0	0
Slovakia	Carp	Aeromonas hydrophila	0	0	0	0	0	0
Slovenia	salmonids	RTFS, Aeromonas infections	carps	parasites, Aeromonas infections	0	0	0	0
Spain	0	0	0	0	0	0	0	0
Sweden	RT	RTFS	Arctic char/brown trout	ASA	Arctic char	ASS (1 farm with recurrent problems)	0	0
Switzerland	Perch, Pike Perch	Perch Rhabdovirus infection	Rainbow and brown trout	Flavobacteria infection (external and systemic)	0	0	0	0
Turkey	Rainbowtrout	IPN	0	0	0	0	0	0

Annex 4a: Additional information

Germany

Fish Species	Disease or symptom
Baden-Württemberg: rainbow trout rainbow trout rainbow trout	RTFS ERM ichthyophthiriasis
Bavaria: char, brown and lake trout salmonids salmonids salmonids carp	furunculosis flavobacteriosis ichthyophthiriasis PKD sudden mortality, CEV detected
Berlin: no report	
Brandenburg:	
Bremen:	
Hamburg:	
Hesse: salmonids rainbow trout salmonids	Flavobacter sp./ Flexibacter psychrophilum IPN PKD, Ichthyophthirius multifiliis
Mecklenburg-W. Pomerania:	
Lower Saxony: carp/koi trout	CEV, associated with morbidity and mortality detection of SAV and PRV 3 in samples from other states
North Rhine-Westphalia: no report	
Rhineland-Palatinate: rainbow trout	IPNV detected in fish without symptoms
Saarland:	

Saxony: Cyprinus carpio Astacus astacus Salmo salar (fry) Onchorhynchus mykiss Coregonus maraena Arapaima Cyprinus carpio	CEV outbreaks (gill swelling, enophthalmus) crayfish plague lethargy during yolk sack stage, cause unclear (after multiple diagnostic efforts) SAV suspicion Edwardsiella spp. ; exophthalmus, haemorrhages Plesiomonas shigelloides; skin lesions dilepididiosis
Saxony-Anhalt: rainbow trout rainbow trout	high mortalities due to ichthyophthiriasis high mortalities due to bacterial infection together with high water temperatures during summer

Italy

<i>Fish species</i>	<i>Disease or pathogen</i>
Arctic charr (<i>Salvelinus alpinus</i>)	Furunculosis (<i>A. salmonicida</i> subsp. <i>salmonicida</i>)
Brook trout (<i>Salvelinus fontinalis</i>)	Furunculosis (<i>A. salmonicida</i> subsp. <i>salmonicida</i>)
	<i>Lactococcus garvieae</i>
	<i>Renibacterium salmoninarum</i>
Brown trout (<i>Salmo trutta fario</i>)	<i>Aeromonas salmonicida</i>
	Furunculosis (<i>A. salmonicida</i> subsp. <i>salmonicida</i>)
	<i>Pseudomonas fluorescens</i>
	Motile aeromonas (<i>A. hydrophila/caviae/sobria/bestiarium/veronii</i>)
Carp (<i>Cyprinus carpio</i>)	<i>Gyrodactylus</i> spp.
	Motile aeromonas (<i>A. hydrophila/caviae/sobria/bestiarium/veronii</i>)
	<i>Pseudomonas</i> spp.
	<i>Shewanella putrefaciens</i>
Crucian carp (<i>Carassius carassius</i>)	<i>Aeromonas sobria</i>
Eel (<i>Anguilla anguilla</i>)	Motile aeromonas (<i>A. hydrophila/caviae/sobria/bestiarium/veronii</i>)
	<i>Pseudomonas</i> spp.
European catfish (<i>Ameiurus melas</i>)	Motile aeromonas (<i>A. bestiarium/veronii</i>)
	Ranavirus
	<i>Aeromonas sobria</i>
European chub (<i>Squalius cephalus</i>)	Aquareovirus
European sturgeon (beluga) (<i>Huso huso</i>)	<i>Yersinia ruckeri</i>
European whitefish (<i>Coregonus lavaretus</i>)	<i>Ergasilus</i> spp.
Gilt-head seabream (<i>Sparus aurata</i>)	<i>Vibrio</i> spp.
	<i>Vibrio vulnificus</i>

	Vibriosis (<i>V. anguillarum</i> , <i>V. alginolyticus</i> , <i>V. damsela</i> , <i>V. harveyi</i> , <i>V. parahaemolyticus</i>)
	<i>Aeromonas veronii</i>
	<i>Pasteurella</i> spp.
	<i>Pasteurella piscicida</i>
	<i>Ph. damsela</i> subsp. <i>piscicida</i>
	<i>Sparicotyle</i> spp.
	<i>Enteromyxum</i> spp.
	<i>Aeromonas hydrophila</i>
	<i>Edwardsiella tarda</i>
Marble trout (<i>Salmo trutta marmoratus</i>)	<i>Aeromonas</i> spp.
	Motile aeromonas (<i>A. hydrophila/caviae/sobria/bestiarium/veronii</i>)
	<i>Falvobacterium psychrophylum</i>
Perch (<i>Perca fluviatilis</i>)	Motile aeromonas (<i>A. bestiarium/ A. veronii biov. sobria</i>)
	<i>Yersinia ruckeri</i>
	<i>Yersinia ruckeri</i> biotype 1
	<i>Yersinia ruckeri</i> biotype 2
	<i>Tetracapsuloides bryosalmonae</i>
	<i>Gyrodactylus</i> spp.
	<i>Chriseobacterium</i> spp.
	<i>Aeromonas</i> spp.
	<i>Aeromonas salmonicida</i>
	Furunculosis (<i>A. salmonicida</i> subsp. <i>salmonicida</i>)
	Motile aeromonas (<i>A. hydrophila/caviae/sobria/bestiarium/veronii</i>).
	<i>Lactococcus garvieae</i>
Red drum (<i>Sciaenops ocellatus</i>)	Vibriosis (<i>V. damsela</i> , <i>Vibrio</i> sp.)
Russian sturgeon (<i>Acipenser gueldenstaedtii</i>)	Iridovirus
	<i>Yersinia ruckeri</i>
Sea bass (<i>Dicentrarchus labrax</i>)	Vibriosis (<i>V. anguillarum</i> , <i>V. alginolyticus</i> , <i>V. harveyi</i>)
	<i>Vibrio vulnificus</i>
	Motile aeromonas (<i>A. veronii/ A. veronii biov. sobria</i>)
	<i>Aeromonas sobria</i>
	<i>Photobacterium damsela</i> sub. <i>piscicida</i>
	<i>Diplectanum</i> spp.
	<i>Diplectanum aequans</i>
	<i>Pasteurella</i> spp.
	<i>Gyrodactylus</i> spp.
	<i>Listonella anguillarum</i> O1
Sterlet (<i>Acipenser ruthenus</i>)	<i>Aeromonas hydrophila</i>

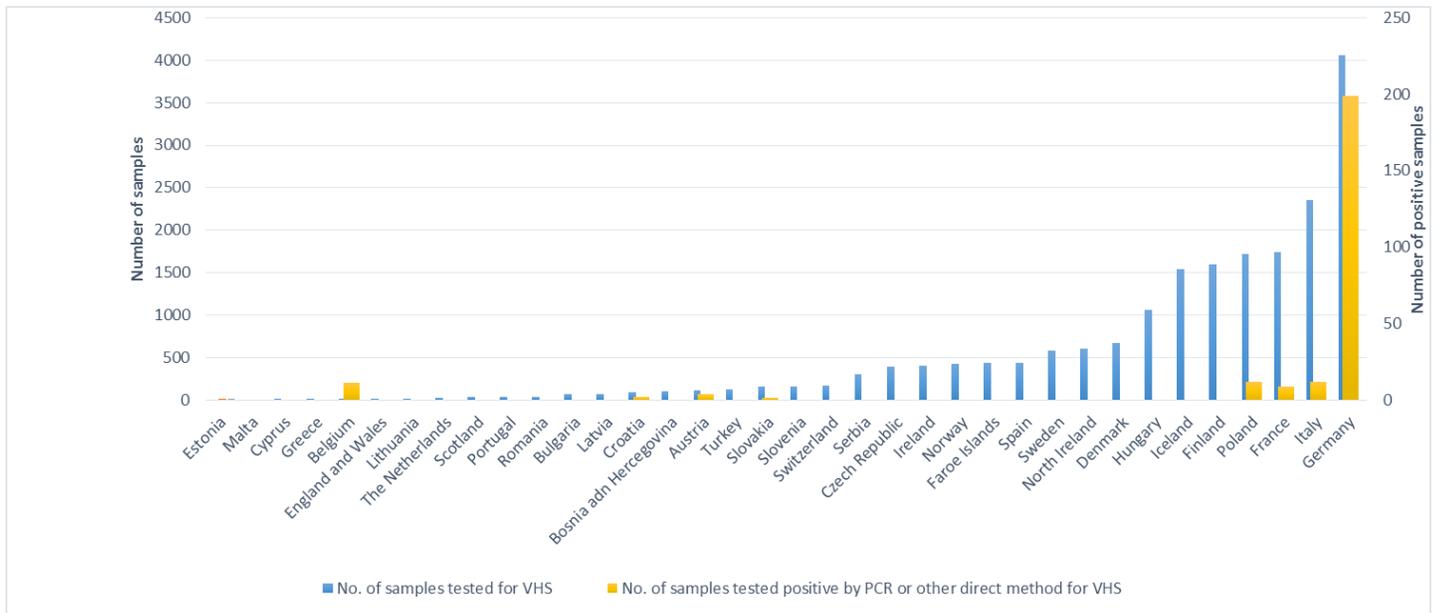
Scotland

<i>Fish species</i>	<i>Disease or pathogen</i>
Atlantic Salmon	Sea lice
Atlantic Salmon	Complex Gill Disease
Lumpfish	Aliivibrio spp., Vibrio anguillarum
Koi carp	Pseudomonas flourescens, Aeromonas spp., Chryseobacterium spp

Annex 5: Laboratory data

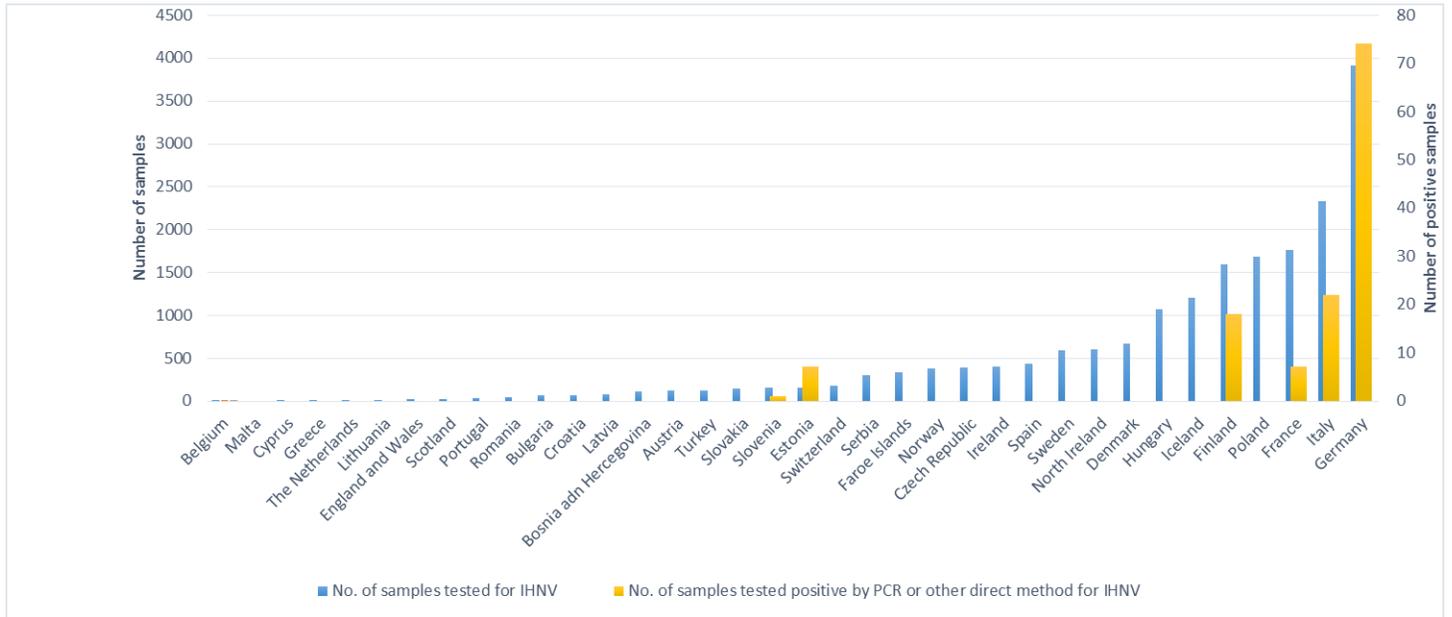
Number of samples tested for VHSV in Europe in 2018

Country	No. of samples tested for VHS	No. of samples tested positive by PCR or other direct method for VHS
Austria	PCR:36 / Cell culture:80	4 pos from 2 outbreaks
Belgium	11	11
Bosnia and Hercegovina	105	0
Bulgaria	63	0
Croatia	85	2
Cyprus	9	0
Czech Republic	387	0
Denmark	665	0
England and Wales	17	0
Estonia	0	0
Faroe Islands	430	0
Finland	1596	0
France	1736	9
Germany	4063	199
Greece	10	0
Hungary	1065	0
Iceland	1539	0
Ireland	397	0
Italy	2348	12
Latvia	73	0
Lithuania	17	0
Malta	0	0
North Ireland	600	0
Norway	426	0
Poland	1716	12
Portugal	35	0
Romania	39	0
Scotland	29 QPCR	0
Serbia	300	0
Slovakia	155	1
Slovenia	159	0
Spain	436	0
Sweden	585	0
Switzerland	172	0
The Netherlands	18	0
Turkey	123	0



Number of samples tested for IHNV in Europe in 2018

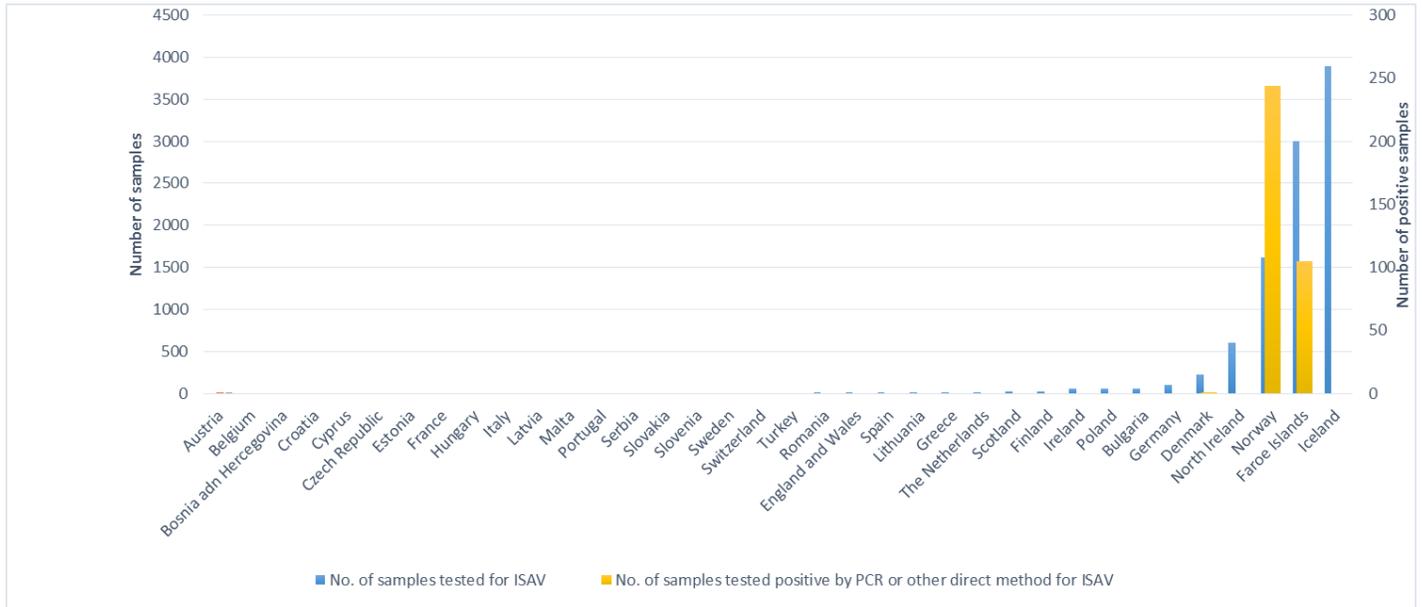
Country	No. of samples tested for IHNV	No. of samples tested positive by PCR or other direct method for IHNV
Austria	PCR: 16 /CC: 80	PCR:0 / CC:0
Belgium	0	0
Bosnia and Hercegovina	105	0
Bulgaria	63	0
Croatia	68	0
Cyprus	9	0
Czech Republic	387	0
Denmark	665	0
England and Wales	17	0
Estonia	155 pooled samples	7 pooled samples
Faroe Islands	333	0
Finland	1596	18
France	1754	7
Germany	3914	74
Greece	10	0
Hungary	1065	0
Iceland	1204	0
Ireland	397	0
Italy	2330	22
Latvia	73	0
Lithuania	13	0
Malta	0	0
North Ireland	600	0
Norway	377	0
Poland	1676	0
Portugal	35	0
Romania	39	0
Scotland	24 QPCR	0
Serbia	300	0
Slovakia	140	0
Slovenia	152	1 positive
Spain	433	0
Sweden	585	0
Switzerland	172	0
The Netherlands	11	0
Turkey	123	0



Number of samples tested for ISAV in Europe in 2018

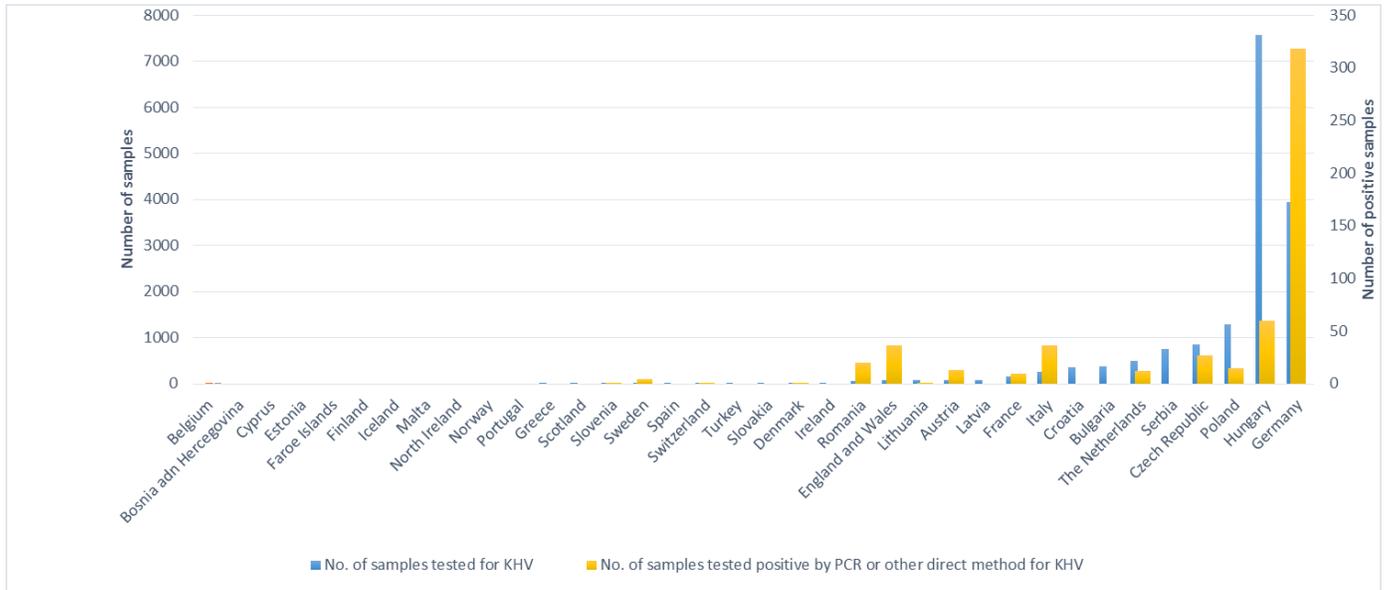
Country	No. of samples tested for ISAV	No. of samples tested positive by PCR or other direct method for ISAV
Austria	0	0
Belgium	0	0
Bosnia and Hercegovina	0	0
Croatia	0	0
Cyprus	0	0
Czech Republic	0	0
Estonia	0	0
France	0	0
Hungary	0	0
Italy	0	0
Latvia	0	0
Malta	0	0
Portugal	0	0
Serbia	0	0
Slovakia	0	0
Slovenia	0	0
Sweden	0	0
Switzerland	0	0
Turkey	0	0
Romania	1	0
England and Wales	2	0
Lithuania	9	0
Spain	10	0
Greece	10	0
The Netherlands	11	0
Scotland	23	0
Finland	25	0
Ireland	60	0
Poland	60	0
Bulgaria	63	0
Germany	105	0
Denmark	226	1
North Ireland	600	0
Norway	1614	244
Faroe Islands	3002	105
Iceland	3891	0

*= HPR0 detection, NOT HPRΔ



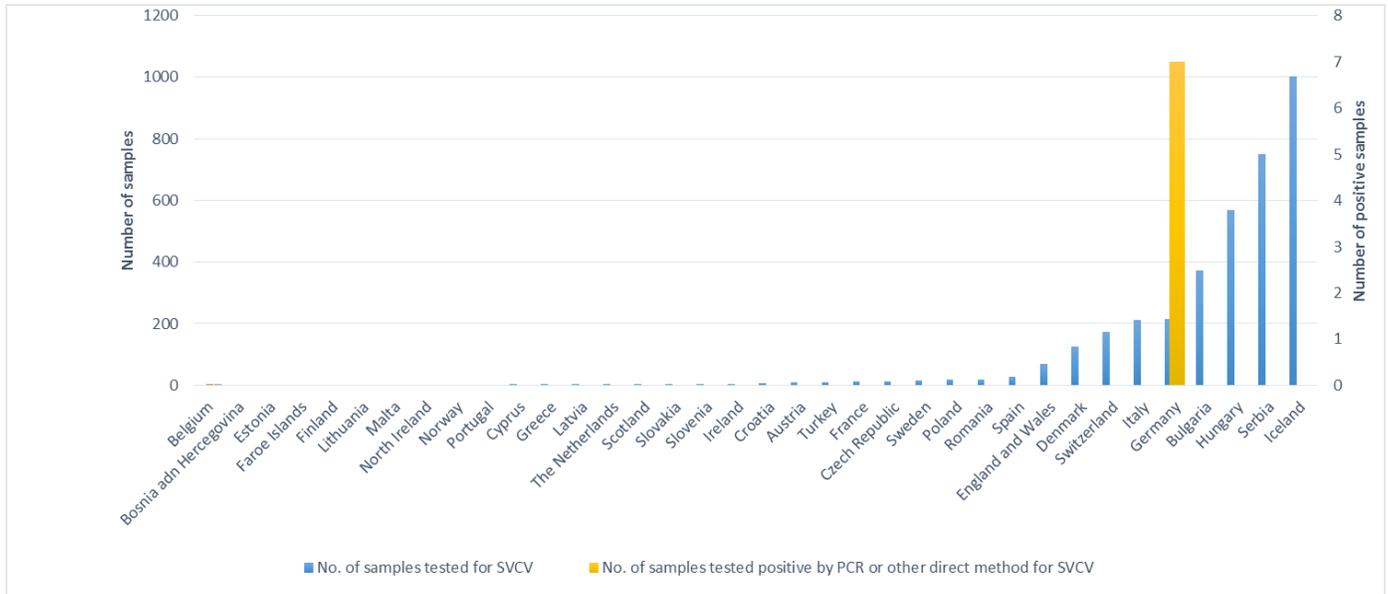
Number of samples tested for KHV in Europe in 2018

Country	No. of samples tested for KHV	No. of samples tested positive by PCR or other direct method for KHV
Austria	74	13 (4 cases)
Belgium	0	0
Bosnia and Hercegovina	0	0
Bulgaria	373	0
Croatia	360	0
Cyprus	0	0
Czech Republic	851	27
Denmark	16	1
England and Wales	69	36
Estonia	0	0
Faroe Islands	0	0
Finland	0	0
France	156	9
Germany	3946	318
Greece	1	0
Hungary	7557	60
Iceland	0	0
Ireland	20	0
Italy	247	36
Latvia	79	0
Lithuania	73	1
Malta	0	0
North Ireland	0	0
Norway	0	0
Poland	1287	15
Portugal	0	0
Romania	64	20
Scotland	1 PCR	0
Serbia	750	0
Slovakia	14	0
Slovenia	3	1 positive
Spain	10	0
Sweden	8	4
Switzerland	10	1
The Netherlands	499	12
Turkey	10	0



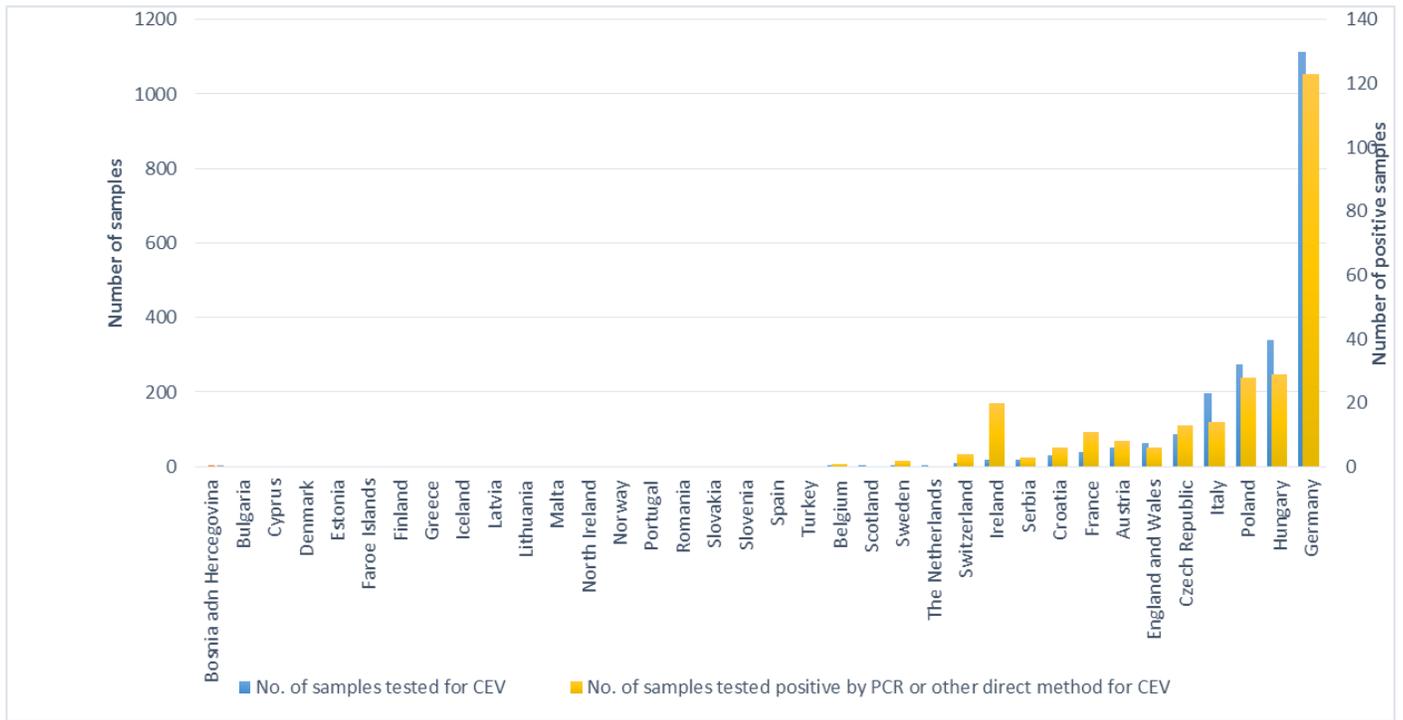
Number of samples tested for SVCV in Europe in 2018

Country	No. of samples tested for SVCV	No. of samples tested positive by PCR or other direct method for SVCV
Austria	PCR:1 / cell culture: 8	0 / CC:0
Belgium	0	0
Bosnia and Hercegovina	0	0
Bulgaria	373	0
Croatia	7	0
Cyprus	1	0
Czech Republic	13	0
Denmark	126	0
England and Wales	70	0
Estonia	0	0
Faroe Islands	0	0
Finland	0	0
France	12	0
Germany	216	7
Greece	1	0
Hungary	570	0
Iceland	1004	0
Ireland	3	0
Italy	213	0
Latvia	1	0
Lithuania	0	0
Malta	0	0
North Ireland	0	0
Norway	0	0
Poland	18	0
Portugal	0	0
Romania	18	0
Scotland	1 (cell culture) + 1 PCR	0
Serbia	750	0
Slovakia	2	0
Slovenia	2	0
Spain	27	0
Sweden	15	0
Switzerland	172	0
The Netherlands	1	0
Turkey	10	0



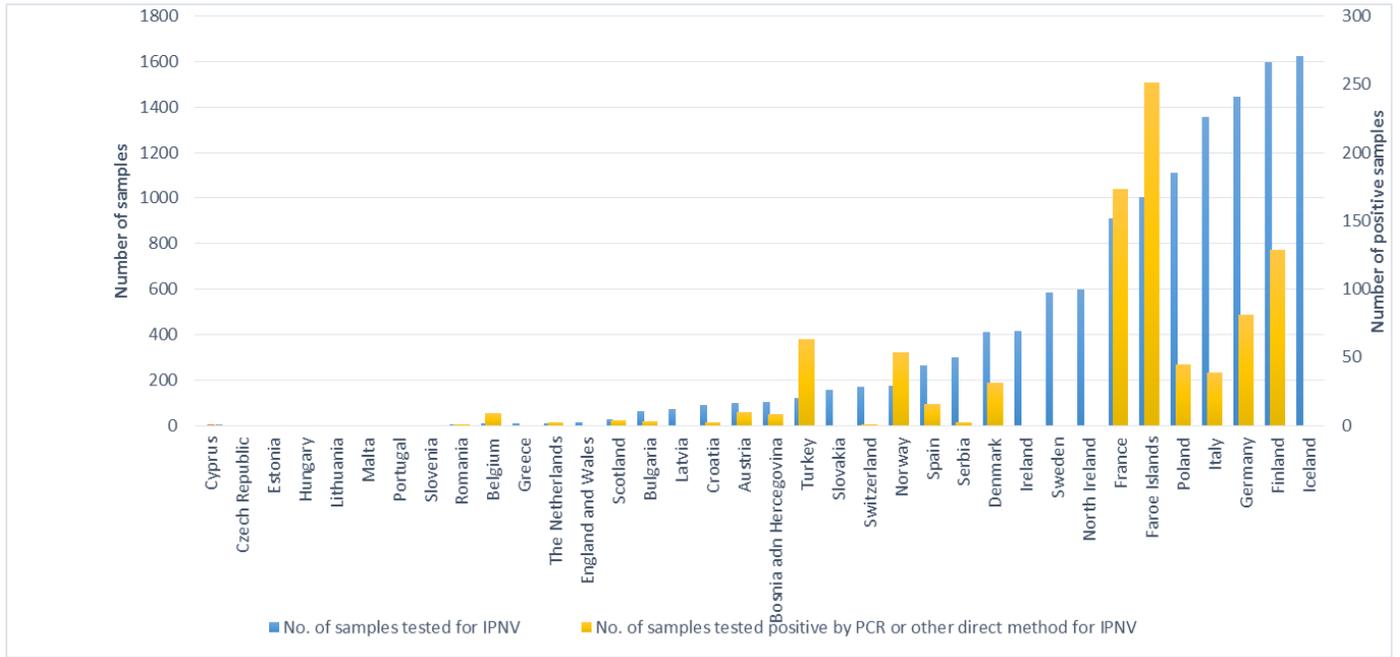
Number of samples tested for CEV in Europe in 2018

Country	No. of samples tested for CEV	No. of samples tested positive by PCR or other direct method for CEV
Austria	53	8
Belgium	1	1
Bosnia and Hercegovina	0	0
Bulgaria	0	0
Croatia	32	6
Cyprus	0	0
Czech Republic	87	13
Denmark	0	0
England and Wales	65	6
Estonia	0	0
Faroe Islands	0	0
Finland	0	0
France	40	11
Germany	1113	123
Greece	0	0
Hungary	341	29
Iceland	0	0
Ireland	20	20
Italy	196	14
Latvia	0	0
Lithuania	0	0
Malta	0	0
North Ireland	0	0
Norway	0	0
Poland	275	28
Portugal	0	0
Romania	0	0
Scotland	1 QPCR	0
Serbia	20	3
Slovakia	0	0
Slovenia	0	0
Spain	0	0
Sweden	2	2
Switzerland	10	4
The Netherlands	4	0
Turkey	0	0



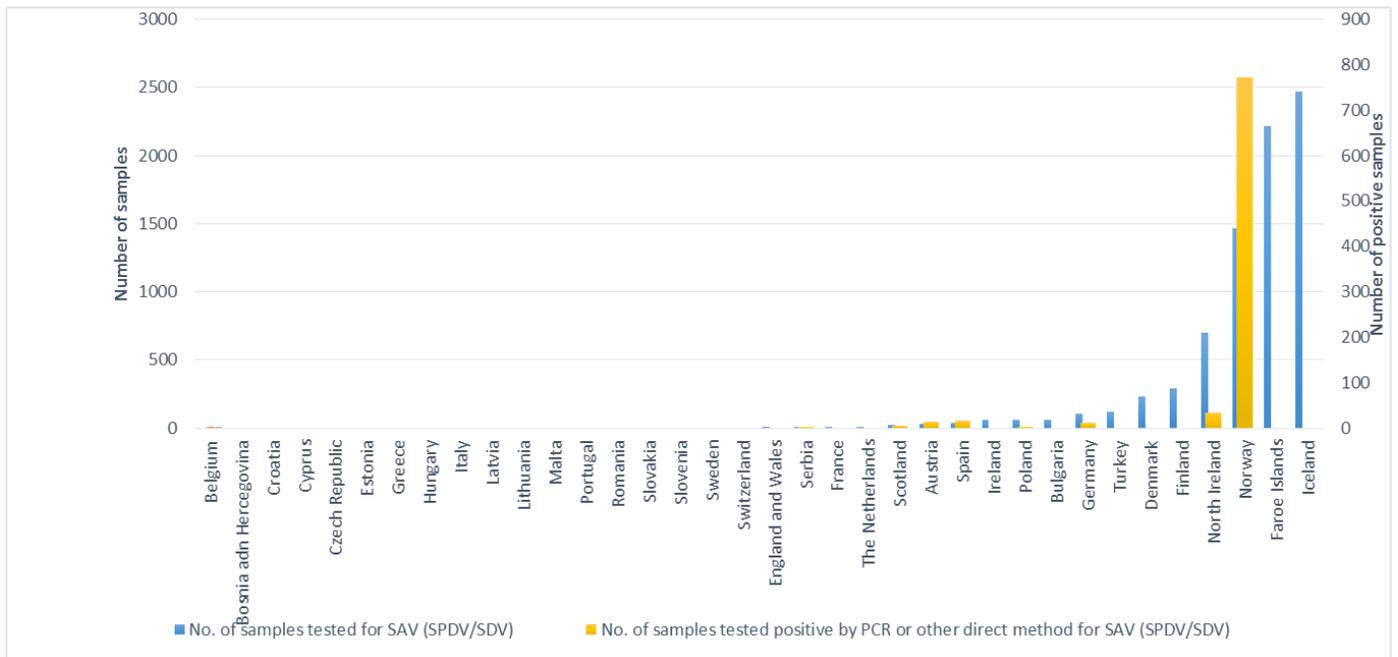
Number of samples tested for IPNV in Europe in 2018

Country	No. of samples tested for IPNV	No. of samples tested positive by PCR or other direct method for IPNV
Austria	PCR:20 /CC:80	PCR:8 (2 cases) / CC:2
Belgium	9	9
Bosnia and Hercegovina	105	8
Bulgaria	63	3
Croatia	92	2
Cyprus	0	0
Czech Republic	0	0
Denmark	409	31
England and Wales	14	0
Estonia	0	0
Faroe Islands	1006	251
Finland	1596	129
France	910	173
Germany	1446	81
Greece	10	0
Hungary	0	0
Iceland	1625	0
Ireland	417	0
Italy	1355	39
Latvia	73	0
Lithuania	0	0
Malta	0	0
North Ireland	600	0
Norway	173	54
Poland	1110	45
Portugal	0	0
Romania	7	1
Scotland	29 QPCR	4
Serbia	300	2
Slovakia	155	0
Slovenia	0	0
Spain	263	16
Sweden	585	0
Switzerland	172	1
The Netherlands	11	2
Turkey	123	63



Number of samples tested for SAV (SPDV/SDV) in Europe in 2018

Country	No. of samples tested for SAV	No. of samples tested positive by PCR or other direct method for SAV
Austria	14	28 (1 case)
Belgium	0	0
Bosnia and Hercegovina	0	0
Bulgaria	63	0
Croatia	0	0
Cyprus	0	0
Czech Republic	0	0
Denmark	235	0
England and Wales	1	0
Estonia	0	0
Faroe Islands	2219	0
Finland	293	0
France	9	0
Germany	106	11
Greece	0	0
Hungary	0	0
Iceland	2469	0
Ireland	60	0
Italy	0	0
Latvia	0	0
Lithuania	0	0
Malta	0	0
North Ireland	701	33
Norway	1468	772
Poland	60	3
Portugal	0	0
Romania	0	0
Scotland	24 QPCR	6
Serbia	4	1
Slovakia	0	0
Slovenia	0	0
Spain	35	16
Sweden	0	0
Switzerland	0	0
The Netherlands	11	0
Turkey	123	0



Number of samples tested for Nodavirus in Europe in 2018

Country	No. of samples tested for Nodavirus	No. of samples tested positive by PCR or other direct method for Nodavirus
Austria	0	0
Belgium	0	0
Bosnia and Hercegovina	0	0
Bulgaria	0	0
Croatia	26	0
Cyprus	0	0
Czech Republic	0	0
Denmark	7	0
England and Wales	0	0
Estonia	0	0
Faroe Islands	0	0
Finland	0	0
France	24	4
Germany	8	0
Greece	25	4
Hungary	0	0
Iceland	0	0
Ireland	0	0
Italy	2624	432
Latvia	0	0
Lithuania	0	0
Malta	0	0
North Ireland	0	0
Norway	56	0
Poland	0	0
Portugal	0	0
Romania	0	0
Scotland	4 QPCR	0
Serbia	0	0
Slovakia	0	0
Slovenia	0	0
Spain	22	3
Sweden	0	0
Switzerland	0	0
The Netherlands	1	0
Turkey	22	0

