

## The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway 2014

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# The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway 2014

Sigurd Hytterød, Maria Lie Linaker, Haakon Hansen, Tor Atle Mo, Saraya Tavornpanich

**In 2014, *Gyrodactylus salaris* was detected in one river, the river Rana in Nordland County. The parasite was not detected in farms with Atlantic salmon or rainbow trout.**

## Introduction

During the period of 1975 to 2014 pathogenic strains of *Gyrodactylus salaris* have been detected on Atlantic salmon (*Salmo salar*) fingerlings/parr in 49 rivers, 13 hatcheries/farms with Atlantic salmon parr/smolts and 26 hatcheries/farms with rainbow trout (*Oncorhynchus mykiss*). In addition, both pathogenic and non-pathogenic strains of *G. salaris* have been found on Arctic charr (*Salvelinus alpinus*).

The policy of the Norwegian Authorities is to eradicate *G. salaris* from infected watersheds and farms. In farms, the eradication procedure is carried out by eliminating the hosts (salmon and rainbow trout). This ensures elimination of the parasite because it lacks specialized free-living stages and do not need intermediate hosts in its life-cycle. In rivers, the eradication procedure is carried out by treatment with rotenone, a poison that kills all the fish hosts. In addition, the use of acidified aluminium sulphate has been used with good results in the river Lærdalselva. In contrast to rotenone, aluminium sulphate will kill the parasite but not the fish host.

By December 31st 2013, *G. salaris* was confirmed eradicated from 22 rivers and from all hatcheries/fish farms. The eradication has not yet been confirmed for 17 additional rivers. Thus, at the end of 2014, the parasite was present or suspected to be present in 10 Norwegian rivers.

*G. salaris* is a notifiable (List 3) disease in Norway and it is listed as "Other significant disease" in the World Organisation for Animal Health (OIE). Surveillance of *G. salaris* has been performed in Norwegian salmon rivers since late 1970s. The Norwegian Veterinary Institute (NVI) coordinates the surveillance programme and publishes the overall results in monthly and annual reports available on the NVI website ([www.vetinst.no](http://www.vetinst.no)). Surveillance is not performed in infected rivers or farms.

The Norwegian Food Safety Authority is responsible for the sampling in fish farms. NVI is responsible for the sampling in the rivers but County Environmental Departments and other institutions/companies are commissioned to do the actual sampling. NVI is responsible for examination of all the fish samples and the species identification of the parasites if *Gyrodactylus* is detected.

## Aim

The surveillance programme aims to document the freedom of *G. salaris* in Norwegian farms and rivers, and to detect and trace any spread of the parasite to new river systems or fish farms (or to rivers and farms declared free from infection).

## Materials and methods

At least 30 wild Atlantic salmon are sampled from each river. Fingerlings/parr/smolts are caught by means of electrofishing. In some of the large rivers, sampling is done at different locations far apart. The fish are killed and then preserved as whole in 96 % ethanol. At least 30 Atlantic salmon or 60 rainbow trout are sampled by seine net in each farm. The fish are killed, and all fins (except adipose fin) are cut off and preserved in 96 % ethanol.

All the samples are sent to the Norwegian Veterinary Institute in Harstad where the samples are examined under a stereo microscope at 10 - 15 times magnification. For wild Atlantic salmon the whole surface including the body, head and fins are examined, while fins only are examined for farmed fish.

When *Gyrodactylus* specimens are found, these are sent to the Norwegian Veterinary Institute in Oslo (the OIE reference laboratory for the disease) for species determination. The methods used for species identification follows those in the Gyrodactylosis (*Gyrodactylus salaris*) chapter in the Manual of diagnostic tests for aquatic animals from the World Organisation for Animal Health (OIE) ([http://www.oie.int/fileadmin/Home/eng/Health\\_standards/aahm/current/2.3.03\\_GYRO.pdf](http://www.oie.int/fileadmin/Home/eng/Health_standards/aahm/current/2.3.03_GYRO.pdf))

## Results

Altogether, 2381 specimens from 68 rivers and 2943 specimens from 85 farms were examined in 2014 (Tables 1 and 2). *Gyrodactylus salaris* was detected in one river in 2014, the river Rana, in Nordland County. River Rana was declared free from the parasite in 2009. In 2014 *G. salaris* was not detected in any farms included in the surveillance program.

**Table 1.** Number of rivers and number of fish examined for *Gyrodactylus salaris* in 2014

County	No. of rivers	Species	No. of fish examined	Detections
Finnmark	10	Atlantic salmon	428	0
Troms	7	Atlantic salmon	242	0
Nordland	5	Atlantic salmon	154	1
Nord-Trøndelag	5	Atlantic salmon	149	0
Sør-Trøndelag	7	Atlantic salmon	211	0
Møre og Romsdal	4	Atlantic salmon	141	0
Sogn og Fjordane	3	Atlantic salmon	122	0
Hordaland	3	Atlantic salmon	90	0
Rogaland	7	Atlantic salmon	205	0
Vest-Agder	5	Atlantic salmon	185	0
Aust-Agder	2	Atlantic salmon	59	0
Telemark	2	Atlantic salmon	75	0
Vestfold	2	Atlantic salmon	110	0
Buskerud	1	Atlantic salmon	35	0
Oslo	1	Atlantic salmon	36	0
Akershus	2	Atlantic salmon	72	0
Østfold	2	Atlantic salmon	67	0
<b>Total</b>	<b>68</b>		<b>2381</b>	<b>1</b>

**Table 2.** Number of fish farms and number of fish examined for *Gyrodactylus salaris* in 2014

County	No. of farms	Species	No. of fish examined	Detections
Finnmark	3	Atlantic salmon,	120	0
Troms	7	Atlantic salmon	210	0
Nordland	15	Atlantic salmon, rainbow trout	510	0
Nord-Trøndelag	7	Atlantic salmon	210	0
Sør-Trøndelag	1	Atlantic salmon	30	0
Møre og Romsdal	9	Atlantic salmon, rainbow trout	300	0
Sogn og Fjordane	10	Atlantic salmon, rainbow trout	360	0
Hordaland	19	Atlantic salmon, rainbow trout	723	0
Rogaland	8	Atlantic salmon	240	0
Telemark	2	Atlantic salmon	60	0
Vestfold	1	Atlantic salmon	30	0
Buskerud	1	Atlantic salmon	30	0
Oppland	2	Rainbow trout	120	0
<b>Total</b>	<b>85</b>		<b>2943</b>	<b>0</b>

## Conclusion

In 2014 *Gyrodactylus salaris* was detected in one river in the surveillance program, the river Rana in Nordland County.



The Norwegian Veterinary Institute (NVI) is a nationwide research institute in the fields of animal health, fish health, and food safety. The primary mission of the NVI is to give research-based independent advisory support to ministries and governing authorities. Preparedness, diagnostics, surveillance, reference functions, risk assessments, and advisory and educational functions are the most important areas of operation.

The Norwegian Veterinary Institute has its main laboratory in Oslo, with regional laboratories in Sandnes, Bergen, Trondheim, Harstad og Tromsø, with about 360 employees in total.

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Norwegian Veterinary Institute

The Norwegian Food Safety Authority (NFSA) is a governmental body whose aim is to ensure through regulations and controls that food and drinking water are as safe and healthy as possible for consumers and to promote plant, fish and animal health and ethical farming of fish and animals. We encourage environmentally friendly production and we also regulate and control cosmetics, veterinary medicines and animal health personnel. The NFSA drafts and provides information on legislation, performs risk-based inspections, monitors food safety, plant, fish and animal health, draws up contingency plans and provides updates on developments in our field of competence.

The NFSA comprises three administrative levels, and has some 1300 employees.

The NFSA advises and reports to the Ministry of Agriculture and Food, the Ministry of Fisheries and Coastal Affairs and the Ministry of Health and Care Services.

[www.mattilsynet.no](http://www.mattilsynet.no)

