

The post-treatment surveillance programme to ascertain freedom from infection with *Gyrodactylus salaris* in Atlantic salmon

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In 2013, Gyrodactylus salaris was not detected in any of the rivers included in this program.

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) and thereby eliminating the parasite because *G. salaris* 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 aluminum sulphate has been used with good results as the main chemical in the river Lærdalselva. However, it is still too early to conclude whether the river is free from *G. salaris*. In contrast to rotenone, aluminum sulphate will kill the parasite but not the fish host. As of 31th December 2013, *G. salaris* was confirmed eradicated from 20 rivers and from all hatcheries/fish farms. Successful eradication has yet to be confirmed for 14 additional rivers. Thus, at the end of 2013, the parasite was present or suspected to be present in 14 Norwegian rivers.

G. salaris is a notifiable (List 3) disease in Norway and it is listed as "Other significant disease" by the World Organisation for Animal Health (OIE). Surveillance of *G. salaris* aiming to declare freedom from the parasite in treated rivers has been performed in Norway since early 1980s.

The Norwegian Veterinary Institute (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 post-treatment control programme to ascertain freedom from infection with *Gyrodactylus salaris* in Atlantic salmon, aims to document freedom of the parasite in previously infested rivers after implementation of eradication measures. The documentation provides the basis for declaring the salmon populations free from infection. Freedom from infection is declared by the Norwegian Food Safety Authority.

Materials and methods

Wild Atlantic salmon juveniles are sampled along the whole anadromous part of the river. The program recommends sampling of at least 10 salmon juveniles near the river outlet to the sea, and further 10 salmon at every second kilometer, all the way up to the migration barrier in the main river and in tributaries as well. Thus, the total number of sampled fish is dependent of the anadromous length of the river system. Fingerlings/parr/smolts are caught by means of electrofishing. The fish are killed and then preserved as whole in 96 % ethanol.

All the fish samples are sent to the NVI in Oslo (the OIE reference laboratory for the disease) where the whole surface including body, head and fins are examined under a stereo microscope at 10 - 15 times magnification. When *Gyrodactylus* specimens are detected, species determination is performed by morphology and molecular methods. 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).

Results

Altogether, 1105 specimens from 9 rivers were examined in 2013 (Table 1). There were no new infections with *G. salaris* detected in any samples from rivers included in the program.

Table 1. Number of rivers and number of Atlantic salmon examined for *Gyrodactylus salaris* in 2013

County	No. of rivers	No. of fish examined	Detections
Nordland	5	250	0
Nord-Trøndelag	3	440	0
Sogn og Fjordane	1	415	0
Total	9	1105	0

Conclusion

In 2013, *G. salaris* was not detected in any of the rivers included in the surveillance program to ascertain freedom from infection with *Gyrodactylus salaris* in Atlantic salmon in Norway.

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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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.

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