

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

Haakon Hansen

Kari Norheim

Tor Atle Mo

Britt Bang Jensen



*Scientific editors Hege Hellberg and Ståle Sviland
Norwegian Veterinary Institute*



**Surveillance and control programmes for terrestrial and aquatic animals in Norway.
Annual report 2010**

Editors

Ståle Sviland and Hege Hellberg

Publisher

Norwegian Veterinary Institute
PO Box 750 Sentrum
N-0106 Oslo
Norway

Fax: + 47 23 21 60 01

Tel: + 47 23 21 60 00

E-mail: postmottak@vetinst.no

www.vetinst.no

Front page photo: Processed from Colourbox

ISSN 1503-1454

Example of citation:

Hansen H, Norheim K, Mo TA, Jensen BB. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. In: Sviland S, Hellberg H (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2010. Oslo: Norwegian Veterinary Institute; 2011. ISSN 1503-1454.

© Norwegian Veterinary Institute

Any use of the present data should include specific reference to this report.

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

Haakon Hansen, Kari Norheim, Tor Atle Mo, Britt Bang Jensen

In 2010, Gyrodactylus salaris was detected in two new salmon rivers. No Atlantic salmon or rainbow trout farms were found infected.

Introduction

During the period of 1975 to 2009, pathogenic strains of *Gyrodactylus salaris* have been detected on Atlantic salmon (*Salmo salar*) fingerlings/parr in 46 rivers, 13 hatcheries/farms with Atlantic salmon parr/smolts and 26 hatcheries/farms with rainbow trout (*Oncorhynchus mykiss*). In addition, a non-pathogenic strain of *G. salaris* has been found on Arctic charr (*Salvelinus alpinus*) in several lakes. The policy of the Norwegian Authorities is to eradicate *G. salaris* from infected rivers and farms. In farms, the eradication procedure is carried out by eliminating the hosts (salmon and rainbow trout) and thereby eliminating 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 is under development. In contrast to rotenone, aluminium sulphate will kill the parasite but not the fish host. By December 31 2010, *G. salaris* was confirmed eradicated from 21 rivers and from all hatcheries/fish farms. The eradication has not yet been confirmed for three additional rivers. Thus, at the end of 2010, the parasite was present or suspected to be present in 22 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 (1, 2, 3, 4, 5, 6, 7, 8, 9). Surveillance is not performed in infected rivers or farms.

The Norwegian Food Safety Authority is responsible for the sampling in fish farms. The National 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 surveillance programme aims to detect and trace any spread of *Gyrodactylus salaris* to new river systems or fish farms (or to rivers and farms cleared of 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 National Veterinary Institute in Harstad where the samples are examined for are examined under a stereo microscope at 10 - 15 times magnification. The whole surface including body, head and fins are examined for wild Atlantic salmon while fins only are examined for farmed fish.

When *Gyrodactylus* specimens are found, these are sent to the National 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/2010/2.3.03_Gyrodactylosis.pdf).

Results

Altogether, 3,573 specimens from 105 rivers and 2,790 specimens from 86 farms were examined in 2010 (Tables 1 and 2). No new infections with *G. salaris* were detected in any river or farm in samples included in the surveillance program. However, *G. salaris*, was detected in Dagsvikelva and Nylandselva, Nordland County in samples not included in the surveillance program. These two rivers are located within a region (Vefsna) with several infected rivers.

Conclusion

During 2010, *G. salaris* extended its range to two new rivers within a region with several other infected rivers.

Table 1. Number of rivers and number of fish examined for *Gyrodactylus salaris* in 2010

County	No. of rivers	Species	No. of fish examined	Detections
	4	Atlantic salmon	255	0
	7	Atlantic salmon	300	0
	12	Atlantic salmon	387	2*
Nord-Trøndelag	10	Atlantic salmon	284	0
Sør-Trøndelag	7	Atlantic salmon	222	0
Møre og Romsdal	23	Atlantic salmon	750	0
Sogn og Fjordane	13	Atlantic salmon	390	0
Hordaland	3	Atlantic salmon	84	0
Rogaland	7	Atlantic salmon	211	0
Vest-Agder	5	Atlantic salmon	161	0
Aust-Agder	2	Atlantic salmon	67	0
Telemark	2	Atlantic salmon	69	0
Vestfold	3	Atlantic salmon	101	0
Buskerud	1	Atlantic salmon	74	0
Akershus	3	Atlantic salmon	121	0
Oslo	1	Atlantic salmon	33	0
Østfold	2	Atlantic salmon	64	0
Total	105		3573	0

* Detected in samples not included in the surveillance program.

Table 2. Number of fish farms and number of fish examined for *Gyrodactylus salaris* in 2010

County	No. of farms	Species	No. of fish examined	Detections
	2	Atlantic salmon	60	0
	6	Atlantic salmon	180	0
	12	Atlantic salmon	360	0
Nord-Trøndelag	5	Atlantic salmon	150	0
Sør-Trøndelag	3	Atlantic salmon	90	0
Møre og Romsdal	12	Atlantic salmon	360	0
Sogn og Fjordane	11	Atlantic salmon, rainbow trout	360	0
Hordaland	21	Atlantic salmon, rainbow trout	780	0
Rogaland	8	Atlantic salmon, rainbow trout	270	0
Vest-Agder	1	Atlantic salmon	30	0
Aust-Agder	0	-	-	-
Telemark	2	Atlantic salmon	60	0
Buskerud	1	Atlantic salmon	30	0
Oppland	1	Rainbow trout	60	0
Total	86		2790	0

Table 3. Rejections in the *Gyrodactylus salaris* surveillance programme in farms due to sample quality or quality in 2010

County	No. of farms	Species
Nordland	2	Atlantic salmon, rainbow trout
Sør-Trøndelag	1	Rainbow trout
Møre og Romsdal	1	Atlantic salmon
Total	4	

References

1. Mo TA, Norheim K. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. In: Fredriksen B, Mørk T (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2001. Oslo: National Veterinary Institute; 2002. p. 155-9.
2. Mo TA, Norheim K. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. In: Heier BT (editor). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2002. Oslo: National Veterinary Institute; 2003. p. 137-41.
3. Mo TA, Norheim K. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. In: Mørk T, Hellberg H (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2003. Oslo: National Veterinary Institute; 2004. p. 135-7.
4. Mo TA, Norheim K. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. In: Mørk T, Hellberg H (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2004. Oslo: National Veterinary Institute; 2005. p. 137-9.
5. Mo TA, Norheim K. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. In: Brun E, Hellberg H, Mørk T, Jordsmyr HM (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2005. Oslo: National Veterinary Institute; 2006. p. 134-7.
6. Mo TA, Norheim K, Jansen PA. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. In: Brun E, Hellberg H, Mørk T, Jordsmyr HM (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2006. Oslo: National Veterinary Institute; 2007. p. 143-5.
7. Mo TA, Norheim K, Jansen PA. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. In: Brun E, Jordsmyr HM, Hellberg H, Mørk T (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2007. Oslo: National Veterinary Institute; 2008. p. 145-8.
8. Mo TA, Kristensen A-M, Norheim K, Jansen PA. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. Annual report 2008. In: Brun E, Jordsmyr HM, Hellberg H, Mørk T (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Oslo: National Veterinary Institute; 2010.
9. Mo TA, Kristensen A-M, Hansen H, Norheim K, Jensen BB. The surveillance and control programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway. Annual report 2009. In: Karlsson A-C, Jordsmyr HM, Hellberg H, Sviland S (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Oslo: National Veterinary Institute; 2010.

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.

www.vetinst.no



Veterinærinstituttet
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

