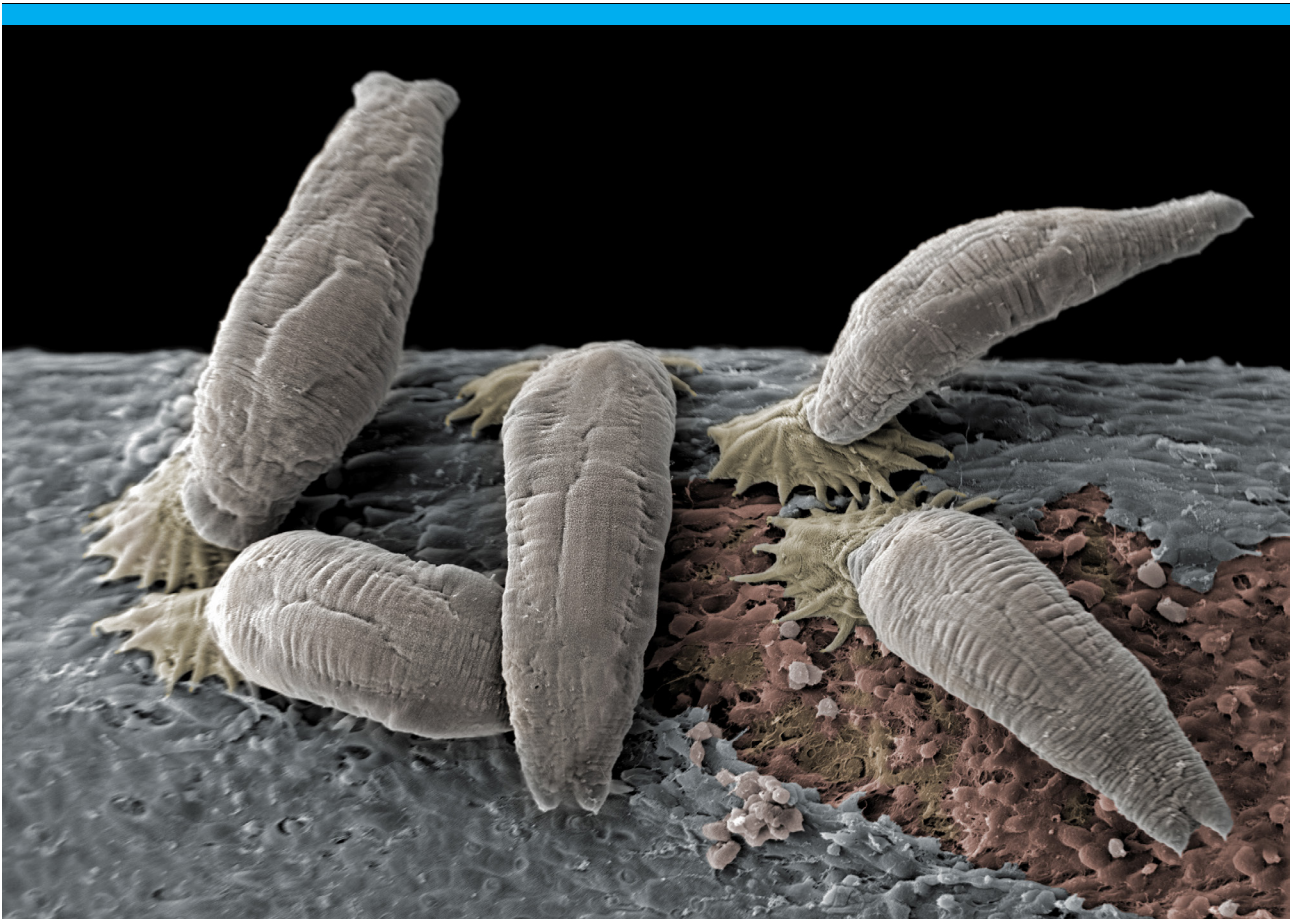


The surveillance programme for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway 2018



Veterinærinstituttet
Norwegian Veterinary Institute



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Summary

In 2018, *Gyrodactylus salaris* was not detected in any of the rivers or fish farms included in the surveillance programme.

Introduction

During the period of 1975 to 2018, pathogenic strains of *Gyrodactylus salaris* have been detected on Atlantic salmon (*Salmo salar*) fingerlings/parr in 50 rivers, 13 hatcheries/farms with Atlantic salmon parr/smolts and 26 hatcheries/farms with rainbow trout (*Oncorhynchus mykiss*). The latest detection was in 2015, in River Kitdalselva, in Troms County, where infected fish were found during a rotenone treatment. In addition, both pathogenic and non-pathogenic strains of *G. salaris* have been found on Arctic char (*Salvelinus alpinus*).

The policy of the Norwegian Authorities is to eradicate *G. salaris* from infected watersheds and farms (Anon 2014). In farms, this is carried out by eliminating the hosts (salmon and rainbow trout). This ensures elimination of the parasite since it lacks specialized free-living stages and does not use intermediate hosts in its life-cycle. In rivers, the eradication is done by rotenone treatment. One exception is the treatment of River Lærdalselva in 2011-2012, where acidified aluminum sulphate was used to eradicate the parasite.

By December 31st 2018, *G. salaris* was confirmed to be eradicated from 32 rivers and from all hatcheries/fish farms. In additional 11 rivers, eradication measures have been completed, but eradication has not yet been confirmed. Thus, at the end of 2018, the parasite is confirmed present in seven 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 ongoing since the early 1980s. The Norwegian Veterinary Institute (NVI) coordinates the surveillance programme and publishes the overall results in annual reports available on the NVI website (www.vetinst.no).

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

Aims

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

The selection of rivers included in the surveillance programme is based on the risk of infection with *G. salaris*. A total of 30 wild Atlantic salmon juveniles are sampled from each river, preferably from three different sites located far apart. In Tana river, 150 salmon are sampled at 15 sites due to the large size of this watercourse. Fingerlings/parr/smolts are caught by means of electrofishing. The fish are killed and then preserved whole in 96% ethanol.

In farms and hatcheries, either 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 NVI where the samples are examined under a stereo microscope at 10 - 15 times magnification. For wild Atlantic salmon, the whole fish surface including the body, head, gills and fins is examined.

When *Gyrodactylus* specimens are detected, a species determination is performed by the NVI in Oslo, which is the OIE (World Organisation for Animal Health) reference laboratory for the disease. The methods used for species identification follow those in the Gyrodactylosis (*G. salaris*) chapter in the OIE Manual of diagnostic tests for aquatic animals.

http://www.oie.int/index.php?id=2439&L=0&htmfile=chapitre_gyrodactylus_salaris.htm

Results and Discussion

Altogether, 2615 specimens from 77 watercourses and 3301 specimens from 97 farms/hatcheries were examined in 2018 (Table 1). A detailed presentation of examined rivers and farms/hatcheries is presented in Appendix A and B.

Table 1. Number of watercourses, farms, hatcheries and fish examined for *Gyrodactylus salaris* in 2018.

County	Watercourses				Farms and hatcheries			
	No.	Fish*	No. of fish examined	Positive	No.	Fish*	No. of fish examined	Positive
Finmark	9	As	446	0	2	As	60	0
Troms	4	As	131	0	6	As	180	0
Nordland	17	As	542	0	18	As	542	0
Trøndelag	10	As	303	0	11	As	330	0
Møre og Romsdal	15	As	450	0	15	As/Rt	520	0
Sogn og Fjordane	4	As	140	0	11	As/Rt	444	0
Hordaland	0	-	-	-	21	As/Rt	763	0
Rogaland	3	As	104	0	9	As/Rt	333	0
Vest-Agder	4	As	144	0	0	-	-	-
Telemark	0	-	-	-	2	As	62	0
Vestfold	3	As	107	0	0	-	-	-
Buskerud	1	As	35	0	0	-	-	-
Oslo	2	As	67	0	0	-	-	-
Akershus	3	As	85	0	1	As	37	0
Østfold	2	As	61	0	1	As	30	0
Total	77		2 615	0	97		3 301	0

* As = Atlantic salmon, Rt = rainbow trout.

In 2018, *G. salaris* was not detected in any of the rivers or fish farms included in the surveillance program.

References

1. Anon (2014). Handlingsplan mot lakseparasitten *Gyrodactylus salaris* for perioden 2014-2016. Miljødirektoratet 2014. 114 s.

Appendix A

Watercourses examined for *G. salaris* in 2018. ND = Not detected, As= Atlantic salmon.

County	Watercourse	Watercourse code	No. of As examined	<i>G. salaris</i>
Akershus	Askerelva	009.1Z	34	ND
Akershus	Sandvikselva	008.Z	35	ND
Akershus	Hølenelva	004.Z	16	ND
Buskerud	Årosvassdraget	009.Z	35	ND
Finmark	Altaelva	212.Z	33	ND
Finmark	Komagelva	239.Z	32	ND
Finmark	Vestre Jakobselv	240.Z	32	ND
Finmark	Neiden	244.Z	35	ND
Finmark	Lakselva	224.Z	33	ND
Finmark	Repparfjordelva	213.Z	34	ND
Finmark	Børselva	225.Z	32	ND
Finmark	Stabburselva	223.Z	35	ND
Finmark	Tana	234.Z	180	ND
Møre og Romsdal	Søya	111.7Z	30	ND
Møre og Romsdal	Surna	112.Z	30	ND
Møre og Romsdal	Eira	104.Z	30	ND
Møre og Romsdal	Tressa	102.6Z	30	ND
Møre og Romsdal	Litleelva	103.51Z	30	ND
Møre og Romsdal	Mittetelva/Visa	104.1Z	30	ND
Møre og Romsdal	Bøvra	112.3Z	30	ND
Møre og Romsdal	Viddalselva/Storelva	111.4Z	30	ND
Møre og Romsdal	Vikeelva	097.721Z	30	ND
Møre og Romsdal	Korsbrekkelva	098.6Z	30	ND
Møre og Romsdal	Norddalselva	099.2Z	30	ND
Møre og Romsdal	Aureelva	097.72Z	30	ND
Møre og Romsdal	Tafjordelva	099.Z	30	ND
Møre og Romsdal	Valldøla	100.Z	30	ND
Møre og Romsdal	Eidsdalselva	099.1Z	30	ND
Nordland	Halsanelva	149.6Z	30	ND
Nordland	Leirelva	153.22Z	30	ND
Nordland	Ranelva	153.3Z	31	ND
Nordland	Hundåla	151.1Z	22	ND
Nordland	Drevja	152.2Z	42	ND
Nordland	Nylandselva	153.1Z	53	ND
Nordland	Dagsvikelva	153.11Z	34	ND
Nordland	Hestdalselva	149.61Z	28	ND
Nordland	Vefsna	151.Z	31	ND
Nordland	Bardalselva	153.6Z	30	ND
Nordland	Sletterelva	156.4Z	30	ND
Nordland	Sannaelva	155.2Z	30	ND
Nordland	Røssåga	155.Z	30	ND
Nordland	Bjerka	155.4Z	30	ND
Nordland	Saltdalselva	163.Z	31	ND
Nordland	Lakselva	162.7Z	30	ND
Nordland	Beiarelva	161.Z	30	ND
Oslo	Akerselva	006.Z	33	ND
Oslo	Lysakerelva	007.Z	34	ND
Rogaland	Suldalslågen	036.Z	40	ND
Rogaland	Figgjo	028.Z	37	ND
Rogaland	Bjerkreimvassdraget	027.Z	27	ND

County	Watercourse	Watercourse code	No. of As examined	<i>G. salaris</i>
Sogn og Fjordane	Årøyvassdraget	077.Z	38	ND
Sogn og Fjordane	Nausta	084.7Z	36	ND
Sogn og Fjordane	Sogndalselva	077.3Z	36	ND
Sogn og Fjordane	Lærdalselva	073.Z	30	ND
Troms	Reisavassdraget	208.Z	31	ND
Troms	Manningselva	206.1Z	33	ND
Troms	Nordkjøselva	198.Z	34	ND
Troms	Måselva	196.Z	33	ND
Trøndelag	Gaula	122.Z	30	ND
Trøndelag	Figga	128.3Z	29	ND
Trøndelag	Steinkjerelva	128.Z	30	ND
Trøndelag	Stordalselva	135.Z	30	ND
Trøndelag	Namsen	139.Z	33	ND
Trøndelag	Årgårdsvassdraget	138.Z	30	ND
Trøndelag	Verdalsvassdraget	127.Z	29	ND
Trøndelag	Stjørdalsvassdraget	124.Z	32	ND
Trøndelag	Orkla	121.Z	29	ND
Trøndelag	Nidelva	123.Z	31	ND
Vest-Agder	Tovdalselva	020.Z	36	ND
Vest-Agder	Otra	021.Z	36	ND
Vest-Agder	Mandalselva	022.Z	36	ND
Vest-Agder	Lygna	024.Z	36	ND
Vestfold	Selvikelva	013.1Z	36	ND
Vestfold	Aulielva	014.Z	35	ND
Vestfold	Numedalslågen	015.Z	36	ND
Østfold	Enningdalselva	001.1Z	37	ND
Østfold	Glomma	002.Z	24	ND

Appendix B

Farms and hatcheries examined for *G. salaris* in 2018. ND = Not detected, As= Atlantic salmon, Rt= Rainbow trout.

County	Farms and hatcheries	Hatchery code	No. of As/Rt examined	<i>G. salaris</i>
Akershus	Hamang Klekkeri	-	37	ND
Finmark	Friarfjorden	13140	30	ND
Finmark	Neptunbruket	29796	30	ND
Hordaland	Alvøen	11579	60	ND
Hordaland	Kvernavika	10287	64	ND
Hordaland	Dale Klekkeri	20089	30	ND
Hordaland	Drageide	12103	31	ND
Hordaland	Sima krafstasjon	-	30	ND
Hordaland	Ospenes	12096	31	ND
Hordaland	Eidestø	12041	30	ND
Hordaland	Tørvikvatnet	13156	30	ND
Hordaland	Skogseidvatnet ii	27956	30	ND
Hordaland	Rydlandsvåg	10076	31	ND
Hordaland	Vosso Klekkeri	-	31	ND
Hordaland	Skålvik	11636	30	ND
Hordaland	Nesfossen	11682	31	ND
Hordaland	Lønningdal iii	14556	28	ND
Hordaland	Bjørsvik	13653	60	ND
Hordaland	Matredal	10156	30	ND
Hordaland	Kvinge S	13482	31	ND
Hordaland	Kjærefjord	12139	31	ND
Hordaland	Dåfjorden	11565	30	ND
Hordaland	Fjon	10060	31	ND
Hordaland	Sundal	12075	63	ND
Møre og Romsdal	Sandåa/Tverråa	10220	30	ND
Møre og Romsdal	Sagosen	12460	30	ND
Møre og Romsdal	Rossåa Settefiskanlegg	-	30	ND
Møre og Romsdal	Sætre	13671	31	ND
Møre og Romsdal	Eresfjord Settefisk	-	30	ND
Møre og Romsdal	Sjølseng	12917	30	ND
Møre og Romsdal	Hønsvikgulen	12898	30	ND
Møre og Romsdal	Opshaugvik Land	18356	62	ND
Møre og Romsdal	Videild	12223	32	ND
Møre og Romsdal	Steinsvik	12222	29	ND
Møre og Romsdal	Urke	12269	30	ND
Møre og Romsdal	Standal Y	12278	30	ND
Møre og Romsdal	Vestrefjorden	10191	30	ND
Møre og Romsdal	Moltustranda	12325	66	ND
Møre og Romsdal	Storelva	12986	30	ND
Nordland	Mo Industripark ii	11065	30	ND
Nordland	Tosbotn	13584	31	ND
Nordland	Leirfjord Kultiveringsanlegg	-	29	ND
Nordland	Grytåga	10948	32	ND
Nordland	Saglifossen	13183	30	ND
Nordland	Nusfjord	11213	30	ND
Nordland	Mølnerodden	11220	30	ND
Nordland	Hustadstranda	11313	31	ND
Nordland	Elvenesstrand	13943	29	ND
Nordland	Mastermovika ii	15315	30	ND
Nordland	Sundsfjord	29316	30	ND

County	Farms and hatcheries	Hatchery code	No. of As/Rt examined	<i>G. salaris</i>
Nordland	Glomfjord I	13188	30	ND
Nordland	Nordland Akva As	26375	30	ND
Nordland	Hopen	10484	30	ND
Nordland	Innhavet	11296	30	ND
Nordland	Forsan	33217	30	ND
Nordland	Holmvåg	13935	30	ND
Nordland	Trollbukta	11264	30	ND
Rogaland	Trosnavåg	11453	31	ND
Rogaland	Hognaland	12964	32	ND
Rogaland	Trovåg	13637	30	ND
Rogaland	Klybbatårnet ssø	13819	30	ND
Rogaland	Ilsvåg (land)	12116	59	ND
Rogaland	Ims ii	11954	30	ND
Rogaland	Eiane	11894	31	ND
Rogaland	Dirdal	10131	30	ND
Rogaland	Tauvågen	11961	60	ND
Sogn og Fjordane	Botnane	13152	60	ND
Sogn og Fjordane	Åreneset	12219	59	ND
Sogn og Fjordane	Midtneset	18336	63	ND
Sogn og Fjordane	Haukå	13486	31	ND
Sogn og Fjordane	Norddal	13713	34	ND
Sogn og Fjordane	Nye Årøy klekkeri	-	36	ND
Sogn og Fjordane	Fortun	-	31	ND
Sogn og Fjordane	Vassbygdi	-	33	ND
Sogn og Fjordane	Lianeset	11745	32	ND
Sogn og Fjordane	Storevatn	13206	32	ND
Sogn og Fjordane	Sørebo	12177	33	ND
Telemark	Eriksrød Kultiveringsanlegg	25466	31	ND
Telemark	Kjølebrønn	12961	31	ND
Troms	Foldvik	11325	30	ND
Troms	Storbukt	10574	30	ND
Troms	Storelva i Berg	11426	30	ND
Troms	Sørfjorden	13946	30	ND
Troms	Storelva, ellevollen	10741	30	ND
Troms	Skardalen	13192	30	ND
Trøndelag	Hopla	10385	30	ND
Trøndelag	Sagelva	12813	30	ND
Trøndelag	Slira	-	30	ND
Trøndelag	Lonet i Naustbukta	12719	30	ND
Trøndelag	Osavatnet	13181	30	ND
Trøndelag	Kongsmoelva	10265	30	ND
Trøndelag	Saltbuodden	13740	30	ND
Trøndelag	Salsbruket	13180	30	ND
Trøndelag	Lauvsnes	12623	30	ND
Trøndelag	Vestseøra	24096	30	ND
Trøndelag	Kaldvella	-	30	ND
Østfold	NGO Fiskeadministrasjon	-	30	ND

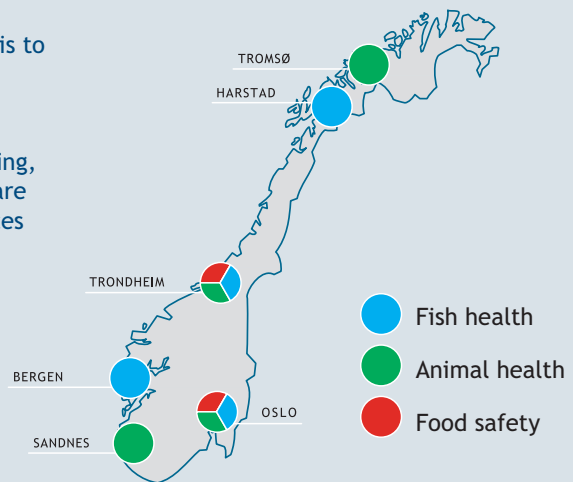
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