

The surveillance programme to map the occurrence of *Gyrodactylus salaris* in the Drammenselva catchment in 2014 - 2015



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The surveillance programme to map the occurrence of *Gyrodactylus salaris* in the Drammenselva catchment in 2014 - 2015

Sigurd Hytterød, Tor Atle Mo, Haakon Hansen

***Gyrodactylus salaris* was not detected in Arctic charr in the surveillance for this parasite in Lake Tyrifjorden 2014 and 2015.**

Introduction

During the period from 1975 to 2015 pathogenic strains of *Gyrodactylus salaris* were detected on Atlantic salmon (*Salmo salar*) fingerlings/parr in 50 rivers, in 13 hatcheries/farms with Atlantic salmon parr/smolts and in 26 hatcheries/farms with rainbow trout (*Oncorhynchus mykiss*) (Hytterød et al., 2016). In addition, both pathogenic and non-pathogenic strains of *G. salaris* have been found on Arctic charr (*Salvelinus alpinus*).

In the 1980s *G. salaris* was introduced to several watercourses upstream the River Drammenselva, Buskerud County. In 1986 and 1987, *G. salaris* was detected on rainbow trout in two fish farms in Lake Tyrifjorden (Mo, 1988), a lake draining to the River Drammenselva. All fish in both farms were eradicated in spring 1987, but later the same year, *G. salaris* was found on juvenile Atlantic salmon in the River Drammenselva, probably due to spread via infected rainbow trout from Lake Tyrifjorden.

The policy of the Norwegian Authorities is to eradicate *G. salaris* from infected watersheds and farms. Treatment against *G. salaris* has reduced the number of infected rivers in Norway, and by the end of 2015, the parasite is confirmed present in only 7 rivers (Hytterød et al., 2016). Three of these rivers, Drammenselva, Lierelva and Sandeelva, are allocated in a defined infection region called the Drammenselva Region.

According to an action plan against *G. salaris* in Norway (Anon 2014), the Norwegian Authorities has appointed an expert group to evaluate all potential measures to eradicate *G. salaris* from infected rivers in the Drammenselva Region. This work is scheduled to end in 2017. Before eradication measures can be implemented, the potential occurrence of *G. salaris* in the Drammenselva catchment need to be mapped.

The introduced rainbow trout, known as susceptible to *G. salaris* (Bakke et al., 1991), is considered extinct from Lake Tyrifjorden (Lund 2007). However, the lake has a population of Arctic charr, a species describes as a potential permanent host to *G. salaris* (Bakke et al 1996, Robertsen et al, 2006). The fact that *G. salaris* has been detected on Arctic charr in landlocked lakes without other known susceptible hosts present (Robertsen et al., 2006, Hytterød et al., 2011), highlights the importance of mapping the occurrence of this parasite in previously infected lakes holding populations of Arctic charr. This study reports the results from surveillance for *G. salaris* on Arctic charr in Lake Tyrifjorden in 2014 and 2015.

Aim

The aim of this study was to assess the potential occurrence of a *G. salaris* infection on Arctic charr in Lake Tyrifjorden. The current study is a part of a larger project, aiming to map the occurrence of a *G. salaris* infection in the whole watercourse upstream anadromous parts of River Drammenselva. This work is considered essential to the further planning of measures against *G. salaris* in the region.

Materials and methods

To exclude the presence of *G. salaris* with an acceptable degree of certainty in lakes previously infected with *G. salaris*, and with a stock of Arctic charr, a surveillance involving the screening of a large number of fish is required. This is due to the likely low prevalence and intensity of *G. salaris* infections in Arctic charr (Mo et al., in prep, Robertsen et al., 2006). Thus, the project was designed with a sample size of approximately 500 fish, evenly distributed on 5 different locations in the fjord.

Arctic charr was caught by gillnets (mesh size 35 to 39 mm) at 1.5-40 meters depth in autumn 2014 and 2015. NVI was responsible for the sampling, but local fishermen were commissioned to carry out the actual fieldwork. Live fish was removed from the nets and killed by a blow to the head. All fins from fish larger than 25 cm fork length were clipped and preserved in 96% ethanol. Fish smaller than 25 cm, was preserved whole in 96% ethanol.

The *Gyrodactylus* examination was conducted at NVI by use of a stereo microscope at 10-15 times magnification. Single *Gyrodactylus* specimens was collected from the fish skin by a micro pipette, and stored in 96% ethanol before species determination was performed by molecular methods. A maximum of 5 *Gyrodactylus* specimens were sampled from each fish/fin for species determination. To maximize the likelihood of detecting *G. salaris* among the identified *Gyrodactylus* specimens, at least one individual parasite was determined to species level in every *Gyrodactylus* positive fish/fin.

Results

Altogether, 388 charr from 8 different locations in the lake were collected in 2014 and 2015 (Table 1). A total of 1382 *Gyrodactylus* specimens were found and 655 of them were diagnosed. *G. salaris* was not detected.

Table 1. Number of fish caught and examined for *Gyrodactylus salaris* at different locations in Lake Tyrifjorden in 2014 and 2015.

Location	Species	No. of fish examined			Detected <i>G. salaris</i>
		2014	2015	2014 + 2015	
Sylling	Arctic charr	-	44	44	0
Svartøyene	Arctic charr	94	70	164	0
Frognøya	Arctic charr	6	11	17	0
Neslandet/Sønsterud	Arctic charr	-	43	43	0
Sønsterud/Vefserud	Arctic charr	-	23	23	0
Vefserud	Arctic charr	-	15	15	0
Neslandet	Arctic charr	35	24	59	0
Toverud	Arctic charr	-	23	23	0
SUM	Arctic charr	135	253	388	0

Conclusion

G. salaris was not detected in any of 388 the Arctic charr sampled from 8 locations in Lake Tyrifjorden. Although, the preferred number of Arctic charr were not caught, the examination of 388 fish is considered sufficient to conclude that *G. salaris* is not present on Arctic charr in Lake Tyrifjorden.

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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 Institute has its main laboratory in Oslo, with regional laboratories in Sandnes, Bergen, Trondheim, Harstad and Tromsø, with about 330 employees in total.

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