



**North-East Atlantic Commission**

***Report of the Meeting of the Working Group on  
Gyrodactylus salaris in the North-East  
Atlantic Commission Area***

**NEA(23)09**

Agenda item: 7

***Report of the Meeting of the Working Group on Gyrodactylus salaris in the  
North-East Atlantic Commission Area***

**Purpose**

The purpose of this paper is to present the Report of the Meeting of the Working Group on *Gyrodactylus salaris* in the North-East Atlantic Commission Area, which met in Edinburgh in October 2022, and to seek decisions on its recommendations. The paper also notes the recommendations related to *Gyrodactylus salaris* in the ‘Report of the Third NASCO Performance Review’.

**Decisions**

The North-East Atlantic Commission (NEA) may wish to agree to the recommendations of the Working Group that:

- the next meeting of the Working Group should take place in 2025;
- Contingency Plans be presented at the next meeting of the Working Group;
- strong efforts should be made to encourage NEA Parties / jurisdictions that have not previously or recently been involved, to participate in future meetings;
- Iceland be invited, as an observer, to the Working Group’s next meeting; and
- the Commission adopt the revisions to the Road Map as shown in document GSWG(22)13 (Annex 13).

The Commission may wish to note the following recommendations of the Working Group as best practice and encourage Parties / jurisdictions to take these into account:

- any positive detections of *Gyrodactylus salaris* (GS) in an area previously free of the parasite must immediately be reported to the Competent Authorities of the jurisdiction and not be investigated through a non-designated laboratory. Samples should be available for investigation by the Competent Authority;
- salmon restoration programmes should consider the threat posed by GS and undertake appropriate surveillance and mitigation measures;
- where possible, only 1+ or older juvenile salmon are used for sampling; and
- the use of chlorine be considered in the development of Contingency Plans as a potential eradication method if GS becomes established. However, chlorine should not be considered as an initial treatment in response to an outbreak where fast action is necessary.

The Commission may also wish to consider the recommendation of the External Performance Review Panel, [CNL\(23\)17](#), related to GS. Recommendation 27, states:

*‘The Panel recommends that NASCO should consider the following actions to prevent the spread of G. salaris and its eradication:*

- a) *replace the title of the Road Map with wording that better reflects the seriousness and urgency of the situation (e.g. Action Plan) and its action-oriented content (e.g. measures to be taken instead of merely co-operation in that regard);*

- b) *integrate all the recommendations made by the GSWG at its 2022 meeting; and*
- c) *revise the Terms of Reference of the GSWG to give it a more action-oriented mandate, including making specific recommendations for measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced, rather than merely developing recommendations to enhance co-operation in that regard.'*

## **Background**

*Gyrodactylus salaris* (GS) is a parasite that poses a great risk to Atlantic salmon populations. Mortality of salmon parr in some Norwegian rivers, due to GS, has been as high as 98 %. While Atlantic salmon is the parasite's preferred host, it is also found on other species such as farmed rainbow trout, grayling and Arctic char. However, it has a much lower impact on these species and may not be detected without careful monitoring and surveillance. According to a [recent report](#), the Norwegian Authorities have so far spent more than NOK 1 billion (approx. £78 million on 29 March 2023; exchange rate from [www.xe.com](http://www.xe.com)) on research, monitoring and combating GS.

In 2004, the NEA organized a workshop to discuss the need to minimise the threat posed by GS to Atlantic salmon, [NEA\(04\)3](#). The Workshop developed recommendations and, following further work, these were collated into a 'Road Map' outlining responsibilities and a timeframe for action. In 2018, a revised and simplified version of the 'Road Map to enhance information exchange and cooperation on monitoring, research and measures to prevent the spread of GS and eradicate it if introduced', [NEA\(18\)08](#), was adopted.

At its 2021 Annual Meeting, the NEA agreed that the Working Group should meet in 2022, with the following Terms of Reference:

- provide a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite *Gyrodactylus salaris*;
- review progress in relation to the recommendations contained in the Commission's '[Road Map](#)' including progress with the development and testing of contingency plans; and
- develop recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced.

The full Report of the Meeting of the Working Group on *Gyrodactylus salaris* in the North-East Atlantic Commission Area in 2022, is provided below.

Secretariat  
Edinburgh  
3 April 2023

## GSWG(22)16

### *Report of the Meeting of the Working Group on Gyrodactylus salaris in the North-East Atlantic Commission Area*

*NASCO Headquarters, Rutland Square, Edinburgh, Scotland*

*26 and 27 October 2022*

#### **1. Opening of the Meeting**

- 1.1 The Chair, Haakon Hansen (Norwegian Veterinary Institute), opened the meeting.
- 1.2 It was noted that *Gyrodactylus salaris* (GS) is a parasite which poses a great risk to Atlantic salmon populations. Mortality of salmon parr in some Norwegian rivers, due to GS, has been as high as 98%. While Atlantic salmon is the parasite's preferred host, it is also found on other species such as farmed rainbow trout, grayling and Arctic char. However, it has a much lower impact on these species and may not be detected without careful monitoring and surveillance. According to a [recent report](#) the Norwegian Authorities have so far spent 'more than NOK 1 billion on research, monitoring and combating *G. salaris*'<sup>1</sup>.
- 1.3 A list of participants is contained in Annex 1.

#### **2. Adoption of the Agenda**

- 2.1 The Working Group agreed to remove item 4(a) of the Draft Agenda. The Working Group adopted its Agenda, GSWG(22)09 (Annex 2).

#### **3. Consideration of the Terms of Reference**

- 3.1 The Working Group considered its Terms of Reference (ToRs) as agreed by the North-East Atlantic Commission (NEA) in 2021. These request that the Working Group undertakes the following tasks:
  - provide a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite *Gyrodactylus salaris*;
  - review progress in relation to the recommendations contained in the Commission's '[Road Map](#)' including progress with the development and testing of contingency plans; and
  - develop recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced.
- 3.2 The Chair advised that the report of the meeting and its recommendations would be considered by the NEA at its Annual Meeting in June 2023.
  - the Working Group recommended that its next meeting should take place in 2025.

<sup>1</sup> Mo, T.A., Holthe, E. Andersen, O. 2022. Have the authorities succeeded in their battle against *Gyrodactylus salaris*? [NINA Report 2157](#). Norwegian Institute for Nature Research.

#### **4. Research, Monitoring, Control and Eradication Programmes for the parasite *Gyrodactylus salaris***

4.1 Information on each Party's / jurisdiction's work on GS was presented and discussed. The papers and presentations are Annexed to this report:

- EU – Finland (GSWG(22)04 – Annex 3);
- EU – Ireland (GSWG(22)08 – Annex 4);
- EU – Sweden (GSWG(22)05 – Annex 5);
- Norway (GSWG(22)11 – Annex 6);
- UK – England and Wales (GSWG(22)15 – Annex 7);
- UK – Northern Ireland (GSWG(22)06 – Annex 8); and
- UK – Scotland (GSWG(22)07 – Annex 9).

4.2 A presentation was given by Asle Moen (Norwegian Veterinary Institute, Norway) on the 'Eradication of *Gyrodactylus salaris* in the Driva Region Using Chlorine and Rotenone – Results and Experiences from the Treatment in August 2022', GSWG(22)10 (Annex 10). The Working Group was advised that trials using chlorine to treat GS had been successful and would be expanded. While this was a more complex method, and is not suitable for all rivers, it was very promising. Rotenone kills the host fish as well as the parasite, whereas chlorine is effective at killing the parasite without damaging the host. However, extra time is required for the complex planning of chlorine treatment. Therefore, it should not be used as an initial treatment in response to an outbreak where fast action is necessary to prevent the spread of GS. In these cases, rotenone would be more appropriate. Concerns were raised about the level of chlorine required. The Chair advised that the chlorine levels used were much lower than the levels allowed in drinking water.

4.3 A presentation on an 'Investigation of suspicion of *Gyrodactylus salaris* in the UK' was given by Edmund Peeler (Cefas, England) (GSWG(22)12 – Annex 11).

4.4 The Working Group noted the expansion of the unregulated use of molecular tools, in particular eDNA, by non-governmental laboratories. It noted the time and financial resources required for the follow-up investigation in this instance. The Group reiterated that GS is a listed disease in each of the Parties and jurisdictions present at the meeting. All detections must, therefore, be reported immediately to the relevant fish health authorities. GS can spread very rapidly so reporting must be immediate, and the positive sample should be provided to the competent authorities for further testing. The Group noted that England and Wales had since developed recommendations for universities and others investigating listed diseases and this would be published in due course.

#### **5. Progress in Relation to the Recommendations Contained in the Commission's 'Road Map', NEA(18)08**

5.1 In 2004, the NEA organized a Workshop to discuss the need to minimise the threat posed by GS to Atlantic salmon, [NEA\(04\)3](#). The Workshop developed recommendations which were collated into a Road Map outlining responsibilities and a timeframe for action. A revised and simplified version of the 'Road Map to enhance information exchange and cooperation on monitoring, research and measures to prevent the spread of GS and eradicate it if introduced', [NEA\(18\)08](#), (referred to as the Road

Map) was agreed in 2018. The Working Group noted that the Proposed Actions contained in the Road Map were good practice for the prevention of all disease introductions, not just GS.

- 5.2 The Road Map contains 11 recommendations and related proposed actions. The members of the Working Group provided updates on the work of their Party / jurisdiction through the papers and presentations referred to in paragraph 4.1. The Secretariat provided an update on those recommendations / proposed actions directed toward the NEA itself or the Secretariat, GSWG(22)03 (Annex 12).
- 5.3 The Working Group considered the information provided on each of the recommendations and proposed actions in the Road Map. Those that required action are detailed below. The Working Group agreed recommendations to the NEA during discussion of the Road Map which, if accepted, would enhance co-operation in relation to GS. These recommendations are detailed below and collated in Section 6.
- 5.4 Some revisions to the Road Map were recommended. These are shown in Annex 13, GSWG(22)13.

#### ***Consideration of Proposed Actions in the Road Map***

- 5.5 The Working Group felt that Proposed Action 1g) was the most important and urgent aspect of the Road Map. It states that ‘NEAC Parties and their relevant jurisdictions should have contingency plans in place for treatment, containment or eradication.’ The Group was concerned by the lack of progress with regards to the development, publication and testing of contingency plans.
- 5.6 Proposed Action 2c) also related to contingency plans. It states that ‘Contingency plans developed by NEAC Parties and their relevant jurisdictions should be made available to the Working Group at its next meeting with the view to sharing information on approaches and challenges. The plans should be made available on the websites of the Competent Authorities with links to them from the NASCO website.’
  - the Working Group agreed that links to contingency plans should be forwarded to the Secretariat and posted on the NASCO website;
  - the Working Group recommended that contingency plans be presented at its next meeting.
- 5.7 The Working Group considered that Proposed Action 1c) was not necessary. It states that ‘The risk of *G. salaris* introduction through the processing of fish carcasses should be assessed and, where appropriate, mitigated through control of processing.’ The Working Group noted that the likelihood of *G. salaris* introduction and establishment via importation of carcasses is likely to be negligible. The Working Group noted that guidance in the World Organisation for Animal Health (WOAH) Diagnostic Manual recommends for all listed diseases that the risk of exotic pathogen introduction with importation of aquatic animals or their products for processing be assessed and if justified, mitigation measures implemented.
  - the Group recommended that Proposed Action 1c) be removed from the Road Map.
- 5.8 The Working Group considered Proposed Action 1d), which recommended that ‘Physical barriers to fish migration should be considered as a measure to prevent the spread of *G. salaris* within a catchment and to uninfected catchments’. The Working Group recognised that the closing of existing barriers may be a useful tool in a

contingency plan if an outbreak were to occur. It did not feel that physical barriers were an appropriate prevention method in uninfected catchments.

- the Group recommended that Proposed Action 1d) be removed from the Road Map.

5.9 The Working Group was unclear what was expected under Proposed Action 4a).

- it recommended that the wording be amended to:

*'Existing monitoring programmes on salmonids in the wild and in aquaculture environments undertaken by NEAC Parties and their relevant jurisdictions should be retained and expanded as necessary. ~~They should provide genetic data for all Gyrodactylus species isolated during monitoring. Reports on these programmes should be provided to the Working Group at their next meeting~~ If requested, information from monitoring should be made available to the Working Group for consideration at its next meeting'* (strike through text is proposed to be deleted, underline text is proposed to be added).

5.10 The Working Group noted that, in accordance with Proposed Action 4b), NEA Parties / jurisdictions that had not previously been involved in the work of the Group had been asked to contribute information. However, no information was received. The Group agreed that participation was particularly important for those Parties / jurisdictions in which GS may be present, or are in close proximity to another Party / jurisdiction with infected rivers.

- the Group recommended that strong efforts be made to encourage NEA Parties / jurisdictions that have not previously or recently been involved, to participate in future meetings.

5.11 The Group discussed the situation in Iceland with regards to GS. It noted that very strict measures are in place in Iceland on the importation of susceptible species. The Group agreed that it would be interested to receive more information on this.

- the Working Group recommended that Iceland should be invited, as an observer, to its next meeting.

5.12 The Working Group considered Proposed Action 5a) in the Road Map which states that 'The NEAC Parties and their relevant jurisdictions should conduct applied research to inform the effective management of *G. salaris*...' (underline added). The Group expressed concern that research was not being conducted in several jurisdictions. This was either due to lack of funding or lack of the presence of the parasite. The Group questioned the relevance of the word 'applied' in the Proposed Action.

- the Group recommended that the word 'applied' be removed from Proposed Action 5a) in the Road Map.

5.13 The Working Group considered Proposed Action 7a), which states:

*'NEAC Parties and their relevant jurisdictions should develop publicity material on the threat of the parasite to wild Atlantic salmon and specify measures to prevent its spread; strategies for the effective dissemination of this material should be developed particularly with regard to targeting high risk groups. Existing material should be reviewed and updated as appropriate in the light of current knowledge. The NASCO Secretariat should develop standard text as a basis for such publicity material.'*

- the Group recommended that the final sentence of Proposed Action 7a) be removed. Although it recognised the importance of such publicity material, the Group did not feel that the Secretariat was well placed to develop standard text;
  - the Group asked that Parties / jurisdictions provide links to their publicity material to the Secretariat. This would be uploaded to the NASCO website, in line with Proposed Action 7b).
- 5.14 The Working Group considered Proposed Action 9. It noted that the Office International des Epizooties (OIE) had adopted the name [World Organisation for Animal Health \(WOAH\)](#).
- the Group recommended that ‘OIE’ be change to ‘WOAH’ in the Road Map.
- 5.15 Additionally, the Working Group discussed sampling brown trout for the presence of GS where a sufficient number of salmon are not available for sampling. Several jurisdictions have adopted this practice, as brown trout are listed in the WOAH Diagnostic Manual as a susceptible species. However, concern was expressed that this could lead to false confidence in the absence of GS. It was noted that empirical evidence from experimental trials suggests that the levels of infection in brown trout make them an unsuitable target for surveillance.

## **6. Recommendations for Enhanced Co-Operation on Measures to Prevent the Further Spread of the Parasite and for its Eradication in Areas where it has been Introduced**

- 6.1 The Working Group received two invitations related to enhanced co-operation:
- Asle Moen (Norwegian Veterinary Institute, Norway) invited participants to Norway to see the eradication work being undertaken; and
  - Edmund Peeler (Cefas, England) invited participants to England to find out more about a non-lethal sampling method using hydrogen peroxide baths.
- 6.2 In their consideration of the Road Map, the Working Group made a number of recommendations. These are explained in Section 5 above and collated here. The Working Group recommends to the North-East Atlantic Commission that:
- a) Contingency Plans be presented at its next meeting;
  - b) Proposed Action 1c) be removed from the Road Map;
  - c) Proposed Action 1d) be removed from the Road Map;
  - d) the wording of Proposed Action 4a) be amended;
  - e) strong efforts should be made to encourage NEA Parties / jurisdictions that have not previously or recently been involved, to participate in future meetings;
  - f) Iceland be invited, as an observer, to the Working Group’s next meeting;
  - g) the word ‘applied’ be removed from Proposed Action 5a);
  - h) the final sentence of Proposed Action 7a) be removed; and
  - i) ‘OIE’ be change to ‘WOAH’ throughout the Road Map.
- 6.3 A Road Map showing these recommendations (in tracked changes) can be found in GSWG(22)13 (Annex 13).

## **Other Recommendations**

- 6.4 As discussed in paragraph 4.4, the Working Group recognised the increasing unregulated use of molecular tools, in particular eDNA, by non-governmental laboratories.
- the Working Group recommended that any positive detections of GS in an area previously free of the parasite must immediately be reported to the Competent Authorities of the jurisdiction and not be investigated through a non-designated laboratory. Samples should be available for investigation by the Competent Authority.
- 6.5 The Working Group noted that GS can be spread through introductions of species other than Atlantic salmon. It acknowledged the great efforts to restore salmon populations in, for example, Denmark, France and in the transboundary Rhine catchment. The Group expressed concern that these efforts could be jeopardised by the spread of GS.
- the Working Group recommended that salmon restoration programmes should consider the threat posed by GS and undertake appropriate surveillance and mitigation measures.
- 6.6 The Working Group recommended that, where possible, only 1+ or older juvenile salmon are used for sampling. These fish are more likely to be infected if GS is present. This would be in line with section 3.1 from the WOAHS Diagnostic Manual which states that ‘In the absence of clinical signs, sampling of wild Atlantic salmon populations should target year class 1+ and 2+ as these are more likely of being infected than 0+ parr.’
- 6.7 The Working Group recommended that the use of chlorine be considered in the development of Contingency Plans as a potential eradication method if GS becomes established. However, chlorine should not be considered as an initial treatment in response to an outbreak where fast action is necessary. In these cases, rotenone would be more appropriate.

## **7. Other Business**

- 7.1 There was no other business.

## **8. Report of the Meeting**

- 8.1 The Working Group agreed a report of its meeting.

## **9. Close of the Meeting**

- 9.1 The Chair thanked the participants for their contributions and closed the meeting.



**List of Participants**

Vickie Curtis, Marine Scotland – Science, Scotland

Hampus Hällbom, National Veterinary Institute, Sweden

Haakon Hansen (Chair), Norwegian Veterinary Institute, Norway

David Mercer, Inland Fisheries Marine and Fisheries Group, Northern Ireland

Michael Millane, Inland Fisheries Ireland, Ireland

Asle Moen, Norwegian Veterinary Institute, Norway

Edmund Peeler, Cefas, England

Neil Purvis, Marine Scotland – Science, Scotland

Marjukka Rask, Finnish Food Authority, Finland

David Stone, Cefas, England

Ken Whelan, Atlantic Salmon Trust, NGO

Wendy Kenyon, Assistant Secretary, NASCO

Louise Forero, Publications and Information Officer, NASCO

**GSWG(22)09**

***Meeting of the Working Group on Gyrodactylus salaris in the North-East  
Atlantic Commission Area***

***NASCO Headquarters, Rutland Square, Edinburgh, Scotland***

***26 and 27 October 2022***

***Agenda***

1. Opening of the Meeting
2. Adoption of the Agenda
3. Consideration of the Terms of Reference
4. Research, Monitoring, Control and Eradication Programmes for the parasite *G. salaris*
5. Progress in Relation to the Recommendations Contained in the Commission's 'Road Map', [NEA\(18\)08](#)
6. Recommendations for Enhanced Co-Operation on Measures to Prevent the Further Spread of the Parasite and for its Eradication in Areas where it has been Introduced
7. Other Business
8. Report of the Meeting
9. Close of the Meeting

***G. salaris Update Paper (Tabled by EU - Finland)******Template for the Provision of Information to the Working Group on G. salaris***

The Terms of Reference (ToRs) for the 2022 Meeting of the Working Group on *G. salaris* are as follows:

1. Provide a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite *G. salaris*;
2. Review progress in relation to the recommendations contained in the Commission's '[Road Map](#)' including progress with the development and testing of contingency plans; and
3. Develop recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced.

This template allows Parties / jurisdictions to provide information in response to each of the above ToRs, including on the recommendations in the Road Map, [NEA\(18\)08](#). Only those recommendations that relate to Parties / jurisdictions are included.

The information provided will be annexed to the Report of the Meeting, which will be posted on the NASCO website.

Some recommendations may not be relevant to your Party / jurisdiction, but please complete the template as best you can and return it to the Secretariat **by 20 October 2022**.

**ToR 1:** Provide a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite *G. salaris*

*Please provide any information you wish to share on research on, and monitoring, control and eradication programmes for G. salaris:*

#### Monitoring

The spread of *Gyrodactylus salaris* to Northern Lapland is monitored by regular sampling (Table 1). *Gyrodactylus salaris* has not been found in the protected zone in Northern Lapland since 1995 when an infection was detected in a now defunct rainbow trout farm located in the buffer zone. Samples from Northern Lapland are collected yearly.

Table 1. *G. salaris* monitoring programme samples from Northern Finland in last 10 years.

Water catchment	Tenojoki (Tana) <sup>1)</sup>	Näätämöjoki (Neiden) <sup>1)</sup>	Paatsjoki (Påsvik) <sup>1)</sup>	Paatsjoki farmed fish		Tuulomajoki <sup>1)</sup>	Tornionjoki <sup>1)</sup>
	Salmon	Salmon	Grayling	Brown trout	Charr	Grayling	Salmon
2012	100	120	15	0	100	0	240
2013	100	120	15	0	120	30	240
2014	100	120	15	0	120	30	240
2015	100	120	15	0	120	0	240
2016	101	120	15	0	120	10	232
2017	30	120	15	0	60	0	-
2018	99	120	15	60	0	22	226
2019	101	118	15	0	60	31	-
2020	103	121	15	0	66	32	240
2021	103	120	15	0	64	30	-

<sup>1)</sup> Samples from wild fish

## Research

The occurrence of *G. salaris* in the River Tornionjoki was investigated in a study on 2000–2004 (Anttila et al. 2008). Infection of salmon parr (*Salmo salar*) was common in the uppermost reach of the river system but decreased downstream and was rare in the lowermost reach. In order to monitor the situation in River Tornionjoki samples are still collected at least every 2nd year (Table 1).

Finnish Food Authority was planning to participate in the project GyroSTOP (Detect and stop the spread of *Gyrodactylus salaris* on the North Calotte) where the aim was to take into use eDNA methods in detecting *G. salaris* from water samples and to obtain new information on the distribution of the parasite in Norway, Finland and Russia. The lead partner in the project is NVI (Norwegian Veterinary Institute). In addition to Finnish Food Authority, the Kola Science Center of the Russian Academy of Sciences is a participant in the project. The project was funded in 2020, but due to restrictions caused by the Covid19 situation, the starting of the project was postponed to 2021-2022. In 2022, the starting of the project has been postponed again due to the war in Ukraine and the consecutive restrictions in transferring project funds to the Russian partner.

Finnish Food Authority monitored health of pink salmon in the Teno and Näätämö river basins in 2021. Monitoring of *G. salaris* was part of the health survey. *G. salaris* was not detected in the pink salmon studied.

**ToR 2:** Review progress in relation to the recommendations contained in the Commission's 'Road Map' including progress with the development and testing of contingency plans.

*The recommendations relevant to Parties / jurisdictions are set out below.*

1. a)	Appropriate steps should be taken to prevent the spread of <i>G. salaris</i> on fishing equipment, boats, etc. by use of approved disinfection methods.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

In Finland the Teno and Nääämö river basins are disease-free and the Paatsjoki, Tuulomajoki and Uutuanjoki river basins are part of the buffer zone. Boats, canoes, fishing equipment and boots transferred from other parts of Finland must be dry or disinfected before their use in these watercourses. Disinfection for fishing equipment is organized by authorities and private operators in Lapland.

It is forbidden to transfer bait fish from other parts of Finland to the free and buffer zones and it is also forbidden to transfer bait fish between these watercourses. In the protected area, gutting of the fish originating from other Finnish watercourses is forbidden, as well as introducing gutting waste to waters of River Tenojoki, Nääämöjoki, Paatsjoki, Uutuanjoki and Tuulomajoki watercourses. The recommendation is implemented in Finnish legislation and in the River Teno/Tana fisheries agreement between Finland and Norway and R. Teno common fishing rule.

1. b)	All movements of live fish should be recorded so that movements can be traced in the event of an outbreak of <i>G. salaris</i> .
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*Please provide information on your Parties' / jurisdiction's progress on this:*

In Finland operators must keep record of fish movements to and from fish farms. The stocking of fish must be reported to the register.

It is forbidden to transfer live fish from other parts of Finland to the free and buffer zones. There has been no transfer of fish or eggs to the disease-free area since 2004.

1. c)	The risk of <i>G. salaris</i> introduction through the processing of fish carcasses should be assessed and, where appropriate, mitigated through control of processing
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Transfer restrictions apply to ungutted fish.

1. d)	Physical barriers to fish migration should be considered as a measure to prevent the spread of <i>G. salaris</i> within a catchment and to uninfected catchments.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Preliminary report for the contingency plan for river Tenojoki included the assessment of using physical barriers to prevent spread of *G. salaris* (Koski, 2013). At least in the main channel of River Tenojoki or its most important tributaries building of physical barriers wouldn't be possible.

1. e)	Where possible, routine breaks in production and disinfection on rainbow trout and salmon freshwater aquaculture sites should be implemented as part of a control programme in infected areas.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

*G. salaris* is not a listed disease in Finnish non-free areas, as *G. salaris* occurs naturally in the Baltic-Sea catchment area. There are no areas under eradication.

1. f)	Permission to stock fish into infected river catchments should be based on an assessment of the increased risk of transmission of the parasite to non-infected rivers (e.g. through migration and other routes)
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*Please provide information on your Parties' / jurisdiction's progress on this:*

It is forbidden to transfer live fish from other parts of Finland to the free and buffer zones. In the other river catchments, there are no restrictions concerning *G. salaris*. Fish stocking is also controlled by the authorities in fishery. According to national Fishing Act, fish-stocking into a catchment area has to be accepted in a plan for sustainable management, made by a Fisheries region<sup>2)</sup>.

<sup>2)</sup>Fisheries regions are public corporations whose purpose is to develop fishery in their region and to promote the collaboration of their members for the organisation of the sustainable management of fish resources.

1. g)	NEAC Parties and their relevant jurisdictions should have contingency plans in place for treatment, containment or eradication. These plans should be developed in consultation with stakeholders. A legal base for the use of rotenone or other treatments, containment and eradication measures should be put in place. Contingency plans should be tested periodically and updated as required
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***Please provide a link to your Parties' / jurisdiction's contingency plan:***

*Please provide any other relevant information on this:*

Preliminary report for the contingency plan for river Tenojoki was made in Finland in 2013 (Koski, 2013). Koski concluded that in the event of a *G. salaris* infection in the river Teno, there would not be possibilities for the total eradication of the parasite. An attempt to conserve the genetic material to live gene banks would probably be the option of choice in such case. Koski, however, proposed the commencement of contingency planning with Norway. In a contingency plan the possibility of keeping certain parts of the water system free of the infection and compensatory restocking programs should be analysed. In the long run, a more resistant stock of the River Teno salmon would presumably be needed for the restoration of the salmon population and fishing. So far the concrete effort has been put on the prevention. A project preparing a contingency plan together with Norway has been discussed but contingency planning has not progressed. The contingency planning would need funding.

Link to preliminary report "The protection of Rivers Teno and Näätämö against *Gyrodactylus salaris*": [https://www.ruokavirasto.fi/globalassets/tietoa-meista/julkaisut/julkaisusarjat/julkaisuja/elaimet/eviran\\_julkaisu\\_1\\_2013.pdf](https://www.ruokavirasto.fi/globalassets/tietoa-meista/julkaisut/julkaisusarjat/julkaisuja/elaimet/eviran_julkaisu_1_2013.pdf)

1. h)	NEAC Parties and their relevant jurisdictions should endeavour to ensure that adequate resources are available for the implementation of measures to contain and eradicate <i>G. salaris</i> .
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*Please provide information on your Parties' / jurisdiction's progress on this:*

According to preliminary report for the contingency plan for river Tenojoki, total eradication of *G. salaris* wouldn't be possible. The contingency planning would help to assess the amount of resources.

3.	The Working Group should review new developments with regard to monitoring for, and detection of, <i>G. salaris</i> , and develop recommendations for their inclusion in international guidelines
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*Please provide information on your Parties' / jurisdiction's progress on this:*

4. a)	Existing monitoring programmes on salmonids in the wild and in aquaculture environments undertaken by NEAC Parties and their relevant jurisdictions should be retained and expanded as necessary. They should provide genetic data for all <i>Gyrodactylus</i> species isolated during monitoring. Reports on these programmes should be provided to the Working Group at their next meeting.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

*Gyrodactylus salaris* has not been found in the protected zone in Northern Lapland since 1995 but monitoring programme has been continued. There has not been changes in the control programme of *G. salaris* in Finland in recent years.

The occurrence of *G. salaris* in the River Tornionjoki was investigated in a study on 2000–2004 (Anttila et al. 2008). The situation in the River Tornionjoki is monitored at least every 2nd year. Samples from the other parts of Finland (Baltic sea catchment area) are occasionally examined due to export demands etc.

5. a)	<p>The NEAC Parties and their relevant jurisdictions should conduct applied research to inform the effective management of <i>G. salaris</i>, particularly the following:</p> <ul style="list-style-type: none"> <li>- the distribution and genetics of <i>G. salaris</i>;</li> <li>- the effects of salmon genetics on susceptibility to <i>G. salaris</i>;</li> <li>- the effect of environmental factors on pathogenicity;</li> <li>- to clarify the classification of <i>G. salaris</i> and <i>G. thymalli</i> and then develop a reliable method to distinguish between pathogenic and non-pathogenic strains;</li> <li>- general biology and mechanisms of spread of the parasite;</li> <li>- effect of environmental parameters and ecology on the distribution of <i>G. salaris</i>;</li> <li>- detection and diagnostic methods for <i>G. salaris</i>;</li> <li>- new environmental friendly treatment methods in rivers and lakes, e.g. acid aluminum and chloride.</li> </ul>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

eDNA methods in detecting *G. salaris* from water samples might be an option to monitor *G. salaris*. The method should be tested and validated first but the starting of the funded eDNA

project has been postponed. Also, general guidelines on the interpretation of eDNA test results as well as consecutive actions that would result from *G. salaris* positive eDNA test results are needed.

7. a) &	NEAC Parties and their relevant jurisdictions should develop publicity material on the threat of the parasite to wild Atlantic salmon and specify measures to prevent its spread; strategies for the effective dissemination of this material should be developed particularly with regard
7. b)	to targeting high risk groups. Existing material should be reviewed and updated as appropriate in the light of current knowledge. The NASCO Secretariat should develop standard text as a basis for such publicity material.
	This material should be made available on the web sites and promoted on the social media platforms of the Competent Authorities and NASCO with a view to highlighting the serious risks posed by the spread of the parasite.

*Please provide information on your Parties' / jurisdiction's progress on this:*

There are road signs, posters and brochures in place to inform tourists in the protected area.

*G. salaris* disinfection station network exist in the northernmost Finland, and staff at fishing-licence sales points for disinfection gets yearly training concerning *G. Salaris* and its prevention. Information is also provided on the internet:

<https://www.ruokavirasto.fi/en/farmers/animal-husbandry/animal-health-and-diseases/animal-diseases/fish/salmon-parasite-gyrodactylus-salaris/>

<https://www.ely-keskus.fi/kalastus-tenojoella>

8.	Relevant NEAC Parties and their relevant jurisdictions should seek to ensure continuity in the provisions related to <i>G. salaris</i> in current EU animal health legislation (Regulation 2016/429) which should be retained, in particular with regard to additional guarantees.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

9.	NEAC Parties and their relevant jurisdictions should implement the diagnostic standards in the OIE Manual of Diagnostic Tests for Aquatic Animals.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Finnish Food Authority has molecular methods for detection and identification of *G. salaris*. The methods are not currently according to the OIE Manual, however, planning for the updating of the methods has already started.

10. a)	Trade in disinfected eggs is preferable to trade in live susceptible fish species. However, where movements of live susceptible fish species are approved, NEAC Parties and their relevant jurisdictions should ensure that trade in live susceptible fish species only takes place between areas of equal <i>G. salaris</i> status or from a higher to lower status area
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*Please provide information on your Parties' / jurisdiction's progress on this:*



Transfer of live fish or undisinfected eggs is forbidden from other parts of Finland to the the protected (free) and buffer zones. In the other river catchments, there are no restrictions concerning *G. salaris*.

10. b)	NEAC Parties and their relevant jurisdictions should ensure the health status of the traded live susceptible fish species and/or their eggs, and the competence of the certifying Authority.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

11.	NEAC Parties and their relevant jurisdictions with shared catchments or having catchments in close proximity should implement appropriate mechanisms for cooperation, including the establishment and strengthening of inter-country working groups and the development of common contingency plans to control and eradicate <i>G. salaris</i> .
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Finnish Food Authority is planning on applying Interreg Aurora funding in collaboration with the Finnish Centre for Economic Development and the Environment and Norwegian partners. The project is yet in a planning stage, but the idea is to include the following:

- updating public information and instructions on the disinfection of fishing gear, jet skis and other equipment before using them in the protected zone
- preparing contingency plan
- introducing eDNA method for the detection of *G. salaris* and utilizing the method in the collection of data on the distribution of the parasite

**ToR 3: Develop recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced**

*Please provide any information you wish to share on co-operation (including international, national or regional co-operation) on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced*

**Please provide any other information you feel would be beneficial to the Working Group**

## GSWG(22)08

***Briefing paper on Gyrodactylus salaris  
(Tabled by EU – Ireland)*****Scope**

NASCO have requested that Ireland provide a briefing paper for the 2022 meeting of the Working Group on *Gyrodactylus salaris* in the North-East Atlantic Commission Area. The paper should provide country-specific details of the following: *monitoring and control programmes and distribution of the parasite; ongoing and planned research; and measures being taken to prevent the spread of the parasite and eradicate it where it has been introduced.*

**1 Background**

*Gyrodactylus salaris* is listed as a notifiable disease in Ireland and legislation is in place preventing the transfer of live fish capable of carrying the parasite to or within Irish waters. The parasite is not listed in Council Directive 2006/88/EC, which has been applied since 1 August 2008, and replaces the previous fish health regime under Directive 91/67/EEC. However, Ireland retained additional guarantees under Decision 2004/453/EC in respect of *G. salaris* and can continue to control imports and suspected or confirmed outbreaks under the European Communities (Health of Aquaculture Animals and Products Regulations) 2008. These additional guarantees have been recognised as “national measures” under Article 43 of Council Directive 2006/88/EC. This has been reflected in Commission Decision 2010/221/EU, which replaces Commission Decision 2004/453/EC.

**2 Distribution of *Gyrodactylus salaris* in Ireland**

*Gyrodactylus salaris* has not been recorded on the island of Ireland to date.

**3 Monitoring and control programmes *Gyrodactylus salaris* in Ireland**

Since 2005, wild salmon parr from selected river systems in Ireland are examined annually for the presence of *G. salaris* (Appendix 1, Table 1). This monitoring is undertaken in conjunction with the catchment-wide electrofishing programme managed by Inland Fisheries Ireland (IFI) with sample analyses undertaken by the Fish Health Unit (FHU) of the Marine Institute (MI). In a more general context, the MI are responsible for investigating unexplained abnormal or significant fish mortalities encountered in Ireland which may be a result of fish disease, while IFI have statutory responsibility for wild salmonid fisheries in Ireland.

**4 Ongoing and planned research**

There is no ongoing or presently planned research on *G. salaris* in Ireland, with the exception of the ongoing annual monitoring programme.

**5 Measures being taken to prevent the spread of the parasite and eradicate it where it has been introduced.**

A detailed contingency plan for dealing with any outbreak of *G. salaris* in Ireland was produced in 2017 by the FHU with input from IFI and other stakeholders with statutory interests in salmonids. This plan has been forwarded to the NASCO Secretariat and is currently being updated with a new version likely to be issued in early 2023.

The plan sets out in detail the operational responsibilities and actions to be taken in the event of a suspected outbreak of gyrodactylosis and includes the following:

The plan sets out in detail the operational responsibilities and actions to be taken in the event of a suspected outbreak of gyrodactylosis and includes the following:

- The convening of the National Disease Strategy Group (NDSG) to activate and oversee the implementation of the contingency plan. The group will comprise senior representatives from relevant Government Departments and State Bodies including IFI and MI as well as expert national and international veterinary scientists;
- The establishment of National Control Centre (NCC) overseen by the NDSG for the purposes of co-ordinating control / eradication measures. The NCC will include representatives of the FHU, IFI, Departmental veterinary inspectors, the cross-border Loughs Agency and relevant representation from Northern Ireland.
- A communications strategy.
- Detailed actions to be implemented on the suspicion or confirmation of a gyrodactylosis outbreak.
- Sampling, testing and fish disposal protocols.
- Containment, eradication and treatment options.

In addition to the contingency plan, IFI and MI have co-produced and widely circulated awareness literature to highlight the issue of *Gyrodactylus* among stakeholders and advise on biosecurity measures that can be taken to minimise the risk of introduction of the parasite to Ireland (e.g. *A Guide to Protecting Freshwater Fish Stocks in Ireland from the Parasite Gyrodactylus salaris* <https://tinyurl.com/5bcmtnkf>). In addition, both state bodies host information in this regard on their respective websites.

## **6 Annual reporting to NASCO NEAC on roadmap NEA(18)08**

Parties and jurisdictions of the North-East Atlantic Commission of NASCO are encouraged to report on progress in relation to the 11 recommendations in the ‘Road Map’ to enhance information exchange and co-operation on monitoring, research and measures to prevent the spread of *Gyrodactylus salaris* and eradicate it if introduced, as agreed by the Commission in 2018, NEA(18)08. EU (Ireland) provides updates in this regard in advance of the annual meetings of the North-East Atlantic Commission. The most recent such update can be accessed at (pages 7-20) [https://nasco.int/wp-content/uploads/2022/06/NEA2211\\_Risk-of-Transmission-of-G.salaris-in-the-North-East-Atlantic-Commission-Area-Tabled-by-the-European-Union.pdf](https://nasco.int/wp-content/uploads/2022/06/NEA2211_Risk-of-Transmission-of-G.salaris-in-the-North-East-Atlantic-Commission-Area-Tabled-by-the-European-Union.pdf)

## Appendix 1

**Table 1** Irish river systems sampled for the presence of *G. salaris* (2005 – 2022).

Catchment	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Avoca (Aughrim)										X								
Ballynahinch																X		
Barrow (Greese)					X													
Barrow (Poulmounty)			X							X								
Boyne trib.									X									
Bride						X									X			
Bunowen															X			
Corrib (Abbert)						X		X										
Corrib (Cong)														X				
Corrib (Owenriff)														X			X	
Cloonee															X			
Colligan															X			
Crana																		X
Dawros																	X	
Dunkellin						X										X		
Eanymore						X												
Emlagh							X											
Erne										X								
Erne (Aughnacliffe)				X														
Erne (Bunnoe)			X															
Erne (Burrin)			X															
Erne (Swanlinbar)			X															
Erriff						X	X						X	X	X	X	X	X
Feale					X				X									
Garavogue						X												
Glen							x											
Inny																		X
Laune										X			X					
Leannan							X				X			X		X	X	X
Lee		X																
Liffey																	X	
Maine											X		X					
Moy								X										
Mulkear (Bilboa)					X													
Munster Blackwater										X	X	X	X	X				
Munster Blackwater (Araglin)								X										
Munster Blackwater (Finnow)								X				X						
Munster Blackwater (Owentaraglin)																		X
Nore																	X	
Owenascaul																X		
Owennacurra																X		
Owenboliska						X												
Owenea														X				X
Owentocker																		X
Owenwee							X											

Catchment	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Screebe		X	X					X										
Shannon (Brosna)			X						X									
Shannon (Carrigahorig)		X								X								
Shannon (Little Brosna)			X															
Shannon (Lower)															X			
Slaney (Derry)	X																	
Suir											X							
Suir (Aherlow)	X																	
Swilly																X		
Tullaghobegley									X									
Waterville (Currane)													X					

## GSWG(22)05

**G. salaris Update Paper (Tabled by EU – Sweden)****Swedish surveillance of *Gyrodactylus salaris* in 2021****INTRODUCTION**

*Gyrodactylus salaris* is considered endemic in Swedish rivers emptying into the Baltic Sea and does not cause substantial damage in Baltic salmon (*Salmo salar*) parr. The Atlantic salmon (also *S. salar*), is more sensitive to *Gyrodactylus* infection and the parasite can have serious effects on the parr populations, as has happened in Norway. The first time the parasite was identified in Swedish rivers emptying into the Atlantic Ocean was in 1989 (Säveån, tributary to Göta älv). Since then, the infection has spread to several rivers along the Swedish west coast, all south of Göta älv. Only six rivers, all north of Göta älv, are still considered free from *Gyrodactylus salaris*. The parasite infections have not been as detrimental on the Swedish Atlantic salmon as it has been on the Norwegian wild salmon stocks, but the infection is monitored every year.

**Sampling locations**

The sampling is carried out by The Swedish Anglers Association, region West. Sampling is done in seven water systems on the west coast, namely Örekilsälven (three premises), Anråsån (one premises), Säveån (one premises), Kungsbacka-ån (three premises), Rolfsån (three premises), Himleån (two premises) and Ätran (five premises). The Anråsån is sampled every two years and the remaining watercourses every year.

**Sampling**

Salmon parr are caught using electro fishing. The length, width and fished area of the sampling point as well as water and air temperature, water and river bottom properties are noted in a sampling protocol. Collected parr are euthanized, weighed, measured, and preserved in 95% ethanol.

**Analyses**

Presence of *Gyrodactylus* sp. is investigated at 40 x magnification. The number of parasites around and on the dorsal fin and the pectoral fins are registered in the sampling protocol. If *Gyrodactylus* sp. is found in a sampling point that is considered free from *G. salaris*, the parasites are sent for morphological and genetic analyses (species and haplotype) at the Norwegian veterinary institute (NVI). Genetic analysis is performed using conventional PCR and sequencing of the internal transcribed spacer region (ITS) and the cytochrome oxidase 1 gene (CO1) according to the [OIE Aquatic manual](#).

**RESULTS****Presence of *Gyrodactylus* sp. in sampled rivers**

*Gyrodactylus* sp. were found on juvenile salmon in all rivers south of Säveån, while Säveån and Örekilsälven were negative. A total of 65 (45%) salmon fry were infected with *Gyrodactylus* sp. The total prevalence was thus lower than in 2020 (59%, Wilcoxon rank sum test  $Z=2.66$ ,  $p<0.01$ ). The highest prevalence was found in Kungsbackaån, where 94% of all

juvenile salmon were infected, and the lowest prevalence was found in Ätran/Högvadsån. The prevalence in Ätran/Högvadsån had decreased compared to 2020 (66% in 2020 vs. 20% in 2021,  $Z=4.55$ ,  $p<0.001$ ). In Himleån, the prevalence had visibly decreased, with a p-value just above the significance level (100% in 2020 vs. 62% in 2021,  $Z=1.93$ ,  $p=0.053$ ). In Kungsbackaån, Rolfsån and Himleån, the prevalence was 100% in one to two out of three premises sampled. Premises without proven infection were found in Örekilsälven and Sävån, Ätran and Rolfsån (Table 1).

**Table 1.** Results from electro fishing of salmon parr for the presence of *Gyrodactylus* sp. in seven Swedish west coast rivers 2020 and 2021.

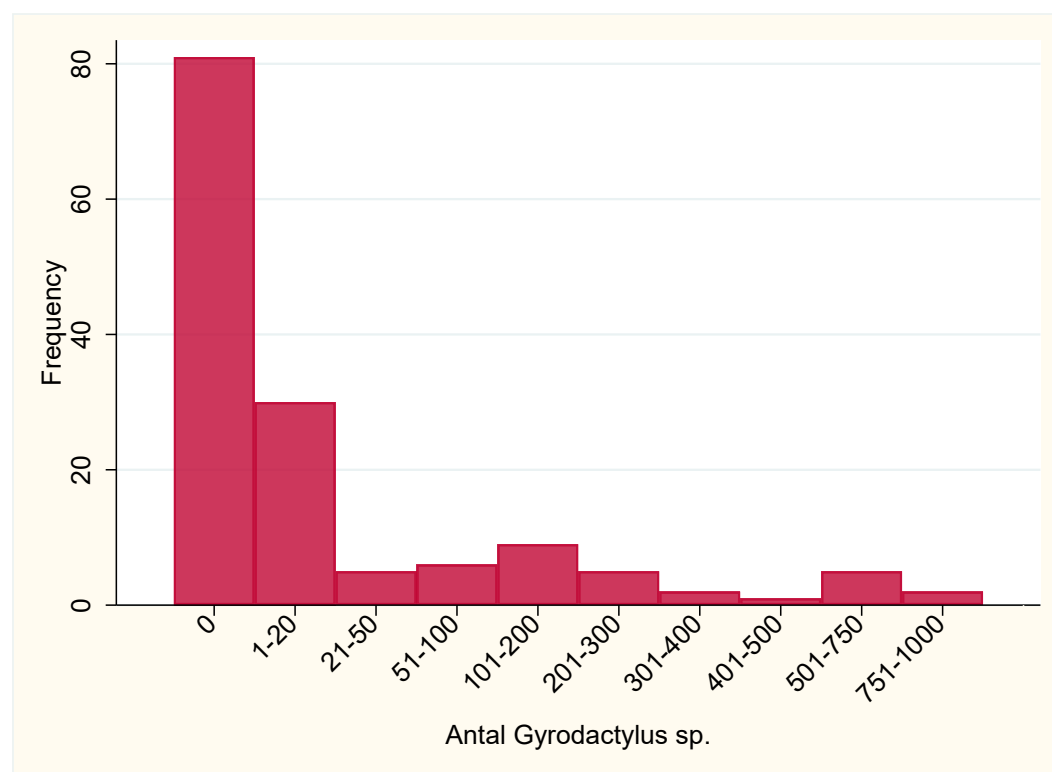
River Sampling point	Date	No of parr	lenght (cm) median (min, max)	weight (g) median (min, max)	<i>Gyrodactylus</i> sp. 2021		<i>Gyrodactylus</i> sp. 2020	
					Infected parr No (%)	No of parasites, median <sup>1</sup> (min, max)	Infected parr Antal (%)	No of parasites median <sup>1</sup> (min, max)
<b>Örekilsälven</b>	4/5	23	9.0 (5.8, 14.7)	8.6 (3.0, 85.0)	0	-	1 (5)	0 (5)
Munkedalsälven		8	-	-	0	-	0	-
Skäret		6	12.1 (5.8, 14.7)	15.3 (4.9, 85.0)	0	-	1 (17)	0 (0, 5)
Stenhöljan		9	8.8 (7.1, 14.0)	5.3 (3.0, 15.0)	0	-	0	
<b>Anråsån</b>								
Kvarndalen		<i>Not sampled in 2021</i>					0 (0)	-
<b>Sävån</b>								
Jonsreds fabriker		<i>Not sampled in 2021</i>					3 (19)	0 (0, 2)
Kåhögbron	28/4	16	11.1 (8.8, 12.5)	11.0 (5.1, 16.0)	0	-	<i>Not sampled in 2020</i>	
<b>Kungsbackaån</b>	22/4	31	8.7 (6.2, 15.0)	5.2 (1.8, 36.5)	29 (94)	64 (2, 801)	30 (100)	46 (3, 1030)
Alafors		17	9.0 (6.2, 14.2)	5.3 (2.0, 21.0)	16 (94)	13 (0, 283)	11 (100)	25 (5, 407)
Hovgården Nordån		6	7.5 (6.5, 8.1)	3.2 (1.8, 4.0)	6 (100)	201 (5, 660)	10 (100)	56 (3, 522)
Ålgårdsbacka		8	12.9 (7.0, 15.0)	21.2 (2.7, 36.5)	7 (88)	328.5 (0, 801)	9 (100)	43 (4, 1030)
<b>Rolfsån</b>	27/4	28	8.9 (5.8, 13.0)	4.9 (1.4, 19.0)	19 (68)	86 (1, 626)	16 (64)	179 (1, 1880)
Bosgården		9	10.2 (8.2, 13.0)	9.7 (4.9, 19.0)	9 (100)	92 (2, 626)	6 (100)	302.5 (25, 1880)
Fälån		10	8.5 (5.8, 9.1)	4.4 (1.4, 5.8)	10 (100)	13.5 (1, 365)	9 (100)	173 (43, 1161)
Island pool		9	8.0 (7.5, 9.6)	4.0 (3.1, 6.5)	0 (0)	-	1 (10)	0 (0, 1)
<b>Himleån</b>	19/4	13	12.9 (10.5, 15.0)	18.6 (9.3, 25.6)	8 (62)	73.5 (3, 850)	15 (100)	49 (1, 699)
Göingegården		11	12.9 (10.5, 15.0)	18.6 (9.3, 25.6)	8 (73)	7 (0, 245)	9 (100)	139 (7, 699)
Ön i Rolfstorp		2	13.8 (12.8, 14.8)	18.8 (15.9, 21.7)	2 (100)	435 (20, 850)	6 (100)	22 (1, 49)
<b>Ätran/Högvadsån</b>	9/12	35	7.2 (6.4, 12.9)	3.6 (1.6, 15.2)	7 (20)	1 (1, 28)	53 (66)	8 (1, 830)
<b>n</b>								
Fageredsån		6	7.2 (6.9, 11.3)	3.5 (2.2, 8.9)	4 (67)	3 (0, 28)	8 (75)	3.5 (0, 68)
Hjärtaredsån		<i>Not sampled in 2021</i>					0 (0)	-
Nydala kvarn		4	8.0 (6.6, 12.9)	3.6 (2.7, 15.2)	0	-	16 (89)	0 (0, 799)
Kogstorp		4	8.0 (7.1, 9.5)	4.1 (2.9, 7.1)	1 (25)	0 (0, 1)	<i>Ej provtagen 2020</i>	

Sumpafallet	17	7.2 (6.6, 12.5)	3.8 (2.4, 14.5)	2 (12)	0 (0, 1)	24 (71) ; (0, 830)
Århult	4	6.9 (6.4, 10.2)	2.4 (1.6, 8.5)	0	-	5 (45) ; (0, 25)
<b>Totalt</b>	<b>146</b>	<b>9.0 (5.8, 15.0)</b>	<b>5.5 (1.6, 85.0)</b>	<b>65 (45)</b>	<b>0 (0, 850)</b>	<b>118 ; (0, 1 880)</b> <b>(59)</b>

<sup>1</sup> The median value from each local includes all sampled individuals while the median value for each river only includes infected individuals.

The number of detected *Gyrodactylus* sp. per infected individual ranged from 1 to 850, with a median value of 0 parasites per juvenile salmon (**Table 1, Figure 1**). The maximum number of detected *Gyrodactylus* sp. had visibly decreased on all infected premises. In 2020 >1000 worms were counted on some salmon parr from Kungsbackaån and Rolfsån. The highest number of haptorworms in 2021 (850) was found on a salmon parr in Rolfstorp, Himleån (**Table 1**). Thirty (46%) of the infected parr had a maximum of 20 *Gyrodactylus* sp. (**Figure 1**), which is on the same level as 2020, when 45% had a maximum of 20 *Gyrodactylus* sp. Highest median value for number of *Gyrodactylus* sp. per parr was found in Rolfsån, with an average of 86 haptorworms per infected parr. The difference compared to Kungsbackaån and Himleån was smaller than in 2020, when both of these rivers had higher median values in 2021, while Rolfsån's median value had decreased since 2020 (**Table 1**). The median amount of *Gyrodactylus* sp. per infected parr was also significantly lower in 2021 compared to 2020 in Rolfsån (median 179 in 2020 vs. 86 in 2021,  $Z=2.00$ ,  $p<0.05$ ) and in Ätran/Högvadsån (median 8 in 2020 vs. 1 in 2021,  $Z= 2.20$ ,  $p<0.05$ ). There was no significant size difference between uninfected and infected salmon fry (for length  $Z=-1.50$ ,  $p>0.05$ , for weight  $Z= -1.32$ ,  $p>0.05$ ).

**Figure 1.** Number of *Gyrodactylus* sp. per salmon parr in seven Swedish west coast rivers 2021.



### Morphologic and genetic analyses

No morphologic or genetic analyses were carried out in 2021 as no haptorworms were detected in premises considered free of *Gyrodactylus salaris*.



## DISCUSSION

*Gyrodactylus salaris* has so far not been detected in Swedish rivers that open into the Atlantic/North Sea north of the Göta älv. However, this status becomes somewhat uncertain as only two rivers north of the Göta älv are sampled. Since there is a risk of *G. salaris* spreading to Norwegian salmon rivers in the Oslofjord if the parasite moves north along the west coast, a decision was therefore made before 2022 to expand the sampling in the buffer zone and include two sampling points in Strömsån, which sits right on the Norwegian border. In the 2020 surveillance, one parr in Örekilsälven was infected with *Gyrodactylus* sp. However, this species was determined to be *G. derjavinoidea*, and in the 2021 samplings, no parr in Örekilsälven were infected. The prevalence had decreased in Himleån and Ätran/Högvadsån, while Rolfsån and Kungsbackaån had a prevalence in the same region as 2020. In Bosgården and Fälån in Rolfsån, *G. salaris* was first detected in 2020. The prevalence was then 100% and the situation in 2021 was identical, while the prevalence in the third location (Island pool) is still low (0% in 2021, 10% in 2020).

The number of haptor worms per infected parr had decreased significantly in 2021 compared to 2020 in Rolfsån and Ätran/Högvadsån. Although the amount of haptorworms per infected salmon fry has decreased in Rolfsån, the infection pressure is still assessed as very high. The same goes for Kungsbackaån and Himleån. In Ätran the infection pressure is estimated to be lower than in 2020, when in addition to a reduced prevalence and reduction in the median value of the number of haptorworms per infected salmon fry, there is also a visibly drastic reduction in the maximum number of haptorworms from 830 in 2020 to 28 in 2021.

## SLUTSATS

Örekilsälven can still be considered free of *G. salaris*. The infection pressure in Kungsbackaån, Rolfsån and Himleån, which are relatively newly infected (2010s), is very high, while the infection pressure in Ätran (infected in the early 1990s) seems to be decreasing.

## GSWG(22)11

***Briefing paper on Gyrodactylus salaris, Norway 2022*****Scope**

Briefing paper from Norway to NASCO for the 2022 meeting of the Working Group on *Gyrodactylus salaris* in the North-East Atlantic Commission Area. The paper covers country-specific details of the following: *monitoring and control programmes and distribution of the parasite; ongoing and planned research; and measures being taken to prevent the spread of the parasite and eradicate it where it has been introduced.*

**1 Background**

*Gyrodactylus salaris* is listed as a notifiable disease in Norway. The legislation is preventing the transfer of live fish capable of carrying the parasite to or within Norwegian areas. Norway has approved national measures in respect of *G. salaris* in order to prevent the introduction and control the spread of *G. salaris*. These national measures to protect the health status in Norway have been recognised in accordance with Article 226(3) of Regulation (EU) 2016/429. The approval of national measures, Commission Decision No 203/21/COL, has been adopted by EFTA Surveillance Authority, 16 July 2021. The Decision recognises certain areas of Norway free from infection with *G. salaris*. The Decision further approves Norway's eradication programme for those areas of Norway which remain infected with *G. salaris*.

**2 Distribution of *Gyrodactylus salaris* in Norway**

With the exception of the water catchment areas listed below, Norway is free from infection with *G. salaris*:

- Skibotnelva, Signaldalselva and Kitdalselva (in Troms county).
  - To be declared free November 2022.
- Leirelva, Ranelva, Drevja, Fusta, Vefsna, Hundåla, Halsanelva, Hestdalselva, Dagsvikelva and Nylandselva (in Nordland county).
  - All the listed rivers are in the the infection region and are free for infection with *G. salaris*, with an exception for Fusta river and the lakes above. The post treatment surveillance programme is ongoing for the lakes where arctic char were found infected and therefore undergo surveillance. The plan is that these lakes will be declared free in 2023, and this completes the post-treatment surveillance program also for the whole region.
- Batnfjordselva, Driva, Litledalselva and Usma (Øksendalselva) (in Møre og Romsdal county)
  - Treatment ongoing (see below)
- Drammenselva and Lierelva (in Viken county) - Vesleelva (Sandelva) and Selvikvassdraget (Vestfold and Telemark county)
  - Treatment not started, but planning is ongoing.

### 3 Monitoring and control programmes *Gyrodactylus salaris* in Norway

The Norwegian Veterinary Institute (NVI) coordinates the control programmes for *G. salaris* on behalf of the Norwegian Food Safety Authority (NFSA) and publishes the overall results in annual reports.

The surveillance program for *Gyrodactylus salaris* in Atlantic salmon and rainbow trout in Norway 2021:

[Gyrodactylus salaris - overvåkingsprogram i settefiskanlegg og elver \\* \(vetinst.no\)](#)

Each aquaculture establishment with susceptible species in fresh water (both commercial farms and hatcheries for restocking) is examined every second year. The eradication programme covers some areas in Norway where aquaculture establishments are located. *G. salaris* was not detected in any of the examined samples from susceptible species in fresh water farms (both commercial farms and hatcheries for restocking of watercourses) and rivers in the areas free from the infection in 2021. The last detection of infection with *G. salaris* in Norway was 06 December 2019 in river Selvikvassdraget, Vestfold and Telemark county, where *G. salaris* parasites were found on salmon analysed as part of the surveillance programme. Based on epidemiological mapping *G. salaris* was probably introduced to Selvikvassdraget from the near by Sandelva which was known to be infected.

The post-treatment surveillance programme for *Gyrodactylus salaris* in Norway 2021:

[Gyrodactylus salaris - friskmelding \\* \(vetinst.no\)](#)

The post-treatment surveillance programme for *G. salaris* aims to document the absence of the parasite in previously infested rivers after the treatment is completed. This documentation provides the basis for the Norwegian Food Safety Authority to declare the salmon population free from infection of *G. salaris*. Declaring a river free from *G. salaris* requires examination of salmon juveniles sampled over a time period of a minimum of five years after the eradication is carried out. This time is based on smolt age of four years, adding one year safety margin. In rivers with higher smolt age, the time to ascertain freedom from infection is increased proportionally.

No new watercourses were declared free from infection with *G. salaris* in 2021. The post-treatment programme covering Skibotnelva, Signaldalselva and Kitdalselva (in Troms county) will be finalized during November 2022. On the condition that all *G. salaris* is not detected in any of the samples examined in 2022, the water catchment area will be declared as free from *G. salaris* this year.

The Fustavassdraget watercourse, which contains Fustavatnet, Mjåvatnet and Ømmervatnet, is included in the post-treatment surveillance and *G. salaris* was not detected in 2021.

The surveillance programme to document absence of Atlantic salmon (*Salmo salar*) and *G. salaris* in the River Drammenselva upstream of Hellefossen in Norway 2021:

[Gyrodactylus salaris – kartlegging i Drammensregionen \\* \(vetinst.no\)](#)

The aim of the surveillance programme in the river Drammenselva is to document if the Atlantic salmon population, and subsequently the *G. salaris* population, is reduced and eventually eradication upstream of Hellefossen after the closure of the fish ladder. The surveillance thus aims to document if the decision to close the ladder has had the intended effect. The lower population size of Atlantic salmon above Hellefossen compared to 2020, as indicated by both electrofishing and e-DNA monitoring, corresponds well to the fact that a large proportion of the smolt left in the river as 2+ in 2021. The results from e-DNA analyses

and the combined electrofishing and parasitological examination corresponded well both in 2020 and 2021.

Six hatcheries for restocking are located within the water catchment area and in addition nine commercial establishments. The commercial farms, within the stretches upstream migration of salmon, are tested for *G. salaris* every year. Fish samples from six of these farms were analyzed with negative results in 2021.

#### **4 Ongoing and planned surveillance**

By 31 December 2021 *Gyrodactylus salaris* is still confirmed present in eight Norwegian river systems.

Decision is made for the treatment performed in 2022 of Batnfjordselva, Driva, Litledalselva and Usma (Øksendalselva) (in Møre og Romsdal county). One hatchery for restocking is located within the watercourse, to maintain the wild population in the region after the treatment during 2022.

Drammenselva and Lierelva (in Viken county) and Vesleelva (Sandelva) and Selvikvassdraget (in Vestfold and Telemark county) are covered by a surveillance programme to document the health status regarding *G. salaris* in advance of a forthcoming treatment.

#### **5 Measures being taken to prevent the spread of the parasite and eradicate it where it has been introduced.**

A detailed contingency plan for dealing with any outbreak of *G. salaris* in Norway was fulfilled in 2021 by the Norwegian Food Safety Authority (NFSA) and submitted to EFTA Surveillance Authority 29 April 2021.

The plan sets out in detail the operational responsibilities and actions to be taken in the event of a suspected outbreak of *G. salaris* including sampling, testing, containment, eradication and treatment options.

In addition to the contingency plan, NFSA together with the Norwegian Veterinary Institute produced and circulated public awareness information to prevent introduction and the spread of *G. salaris*.

#### International collaboration

Since the meeting in 2018, an international meeting was arranged in Murmansk, Russia where issues as the situation in the North Calotte was discussed. The meeting was part BarentsVet of a series of meetings supported by the Barents secretariat. These meetings discuss the zoonotic situation in the Barents regions and aims to stop the spreading of infectious diseases, both aquatic and terrestrial, across the country borders.

Finland has taken initiatives to coordinate the Norwegian and Finnish GS contingency plans for the WCs Tana and Neiden. The NFSA appreciate this initiative and will, together with the Norwegian Veterinary Institute (NVI), start collaborating on this issue within short.

In addition, NFSA is contributing to the funding of the Kolarctic – CBC-project GyroStop – “Detect and stop the spread of *Gyrodactylus salaris* on the North Calotte”, that aims to assess the distribution and spreading of GS on the North Calotte and on measures to detect and stop this spread. This project was stopped in February 2022 due to the conflict in Ukraine.

Norway, by NFSA and NEA, plans to take initiatives to meetings with Swedish governmental bodies about the issues:

- WCs and catchment areas common for Sweden and Norway. Especially related to the GS zones Skibotn, Rana and Vefsna, with reference to the OIE Aquatic Code, chapter 10.3. that

states: “If a zone extends over more than one country, it can only be declared as a zone free from infection with GS if all the relevant competent authorities confirm that all relevant conditions have been met.”

- Measures in West Coast of Sweden, north of the current distribution, ie. north of Gothenburg.

## **7 Annual reporting to NASCO NEAC on Contingency Plan for Norway**

Measures to prevent the spread of *Gyrodactylus salaris* and eradicate any introduction of the parasite are described in The Contingency Plan for the NFSA. April 2021 Norway submitted national measures concerning *G. salaris* to EFTA Surveillance Authority including the finalized contingency plan. The information in the annual report for *G. salaris* 2020 covered to a large extent also the years 2015 – 2019. Based on the received documentation EFTA Surveillance Authority adopted the approval of national measures of Norway designed to limit the impact of *G. salaris* on 16 July 2021. EFTA Surveillance Authority stated: “*The Decision No 203/21/COL recognises certain areas of Norway as free from infection with Gyrodactylus salaris. The Decision further approves Norway’s eradication programme for those areas of Norway which remain infected with Gyrodactylus salaris.*”

## GSWG(22)15

**Briefing Paper on *Gyrodactylus salaris*****(Tabled by UK – England and Wales)****Scope**

This paper is a briefing note presented on behalf of England and Wales for the NASCO Working Group on *Gyrodactylus salaris* in the North-East Atlantic Commission Area. The paper provides country-specific details of the monitoring and control programmes currently in place.

**Legislative controls and Monitoring Programmes**

At present, the UK is recognised as being free from *G. salaris* and as such the parasite is considered exotic to the country. The national controls implemented under the Aquatic Animal Health (England and Wales) Regulations 2009 mean that any suspicion of infection or mortality resulting from infection with *G. salaris* must be reported to the Fish Health Inspectorate (FHI). Failure to inform the FHI of any suspicion of *G. salaris* is an offence under the regulations.

The Cefas FHI carries out monitoring for *G. salaris* in England and Wales through a rolling programme of sampling covering all river catchments which contain salmon. Within England and Wales, there are eighty rivers that support salmon, although not all currently host large populations. Each of the catchments is sampled approximately every five years where possible. The fish sampled are usually approximately 15 cm in length and a total of 30 fish are sampled where possible. Generally, a sample of 30 salmon are required although where the numbers of salmon are too low to obtain this sample size, trout and grayling may be taken as a substitute.

**Diagnostic methods**

In 2016 the Cefas FHI introduced the use of a novel non-destructive method that involves the immersion of fish in a weak hydrogen peroxide solution (560 ppm for 3 minutes) which removes the gyrodactylids whilst leaving the fish unharmed. The parasites can then be recovered for analysis whilst the live fish are returned to the river; increasing the number of fish that can be sampled from each river catchment and increasing the harvest of gyrodactylids that can be screened. The technique was incorporated into Defra's (England and Wales) national aquatic animal disease contingency plans.

From 2017-2019, individual gyrodactylids collected using the non-destructive sampling method were identified by ITS sequence analysis.

DNA was extracted from individual specimens in a 96 well format using either the DNA investigator kit (Qiagen) and the BioRobot Universal or the Qiacube HT DNA tissue kit and the Qiacube HT BioRobot according to the manufacturers protocol. Conventional PCR was performed using the *Gyrodactylus*- specific ITS primers described in the OIE diagnostic manual. After purification using a MinElute 96 UF PCR purification kit (Qiagen), PCR products were sequenced in both directions using an ABI Prism BigDye v 3.1 Terminator Cycle Sequencing kit (Applied Biosystems) and the same primers as used for the amplification. Sequence data were analysed on a ABI Prism 3500xl genetic analyser. The species were then identified for each individual gyrodactylid specimen by comparing the consensus sequence to

the published sequences on GenBank/EMBL sequence data base using the Basic Local Alignment Search Tool (BLAST). Where the ITS sequence indicated a *G. salaris*/*G. thymalli* parasite, confirmation of the *G. salaris*/*G. thymalli* lineage was determined by amplification and sequencing of an informative region of the COI gene.

Due to the Covid-19 restrictions the sampling programme was suspended during 2020 and was reinstated in 2022. The procedure has since been modified, and an initial screen was performed on approximately a quarter of the material collected a filter in the non-destructive methods using the real-time qPCR assays described by Collins *et. al.* (2010), and this was followed by screening up to 26 individuals from the remaining material to confirm the results from the initial screen. Where the ITS real-time qPCR results indicated the presence of *G. salaris*/*G. thymalli* parasites, confirmation of the *G. salaris*/*G. thymalli* lineage was determined by amplification and sequencing of an informative region of the COI gene.

Briefly, starting with 50ml of ethanol containing gyrodactylids washed off the filters following non-lethal sampling of salmonids the gyrodactylids were isolated by centrifugation at 3000g for 30 minutes. The pellet was resuspended 5ml G2 buffer (Qiagen) plus 50ul proteinase K (PK) and incubate overnight at 56C. and DNA was extracted from a 200ul using the EZ-1 xl BioRobot and the DNA tissue Kit. The DNA was eluted in 200ul. We have previously demonstrated that this approach has the capacity to detect <5 parasites in the 50ml of ethanol.

The individual parasites are transferred to 450ul ATL (Qiagen) plus PK in 1.5ml micro centrifuge tubes and incubate overnight at 56C. DNA was extracted from 200ul of the digested material using the Qiacube HT BioRobot and the DNA tissue kit. The DNA was eluted in 200ul.

### **Contingency plans**

A contingency planning exercise for a national surveillance programme to establish the distribution of *G. salaris* following an incursion in England and Wales, *Operation Russian-doll*, was conducted between September and November 2021. The primary objectives of the exercise were to: (i) determine an effective method to co-ordinate multi agency sampling for *G. salaris*; (ii) raise awareness of the threat of the parasite to wild salmon stocks among Environment Agency (EA), Natural Resources Wales (NRW) and Cefas personnel and (iii) provide essential training and an understanding of what would be required in a joint agency response to an incursion. The exercise involved the daily maintenance of an on-line sampling scheduler by EA and NRW field coordinators, and the Cefas laboratory diagnostic team. Scheduling was informed by the real-time field team and FH inspector availability, and prevailing weather conditions, i.e. factors that would influence the likelihood that required numbers of fish and parasites could be collected. Over the course of the exercise (45 days) fieldwork was planned for the collection 404 gyrodactylid samples, and diagnostic testing was scheduled for all 80 principal salmon rivers in England & Wales and a further 4 river catchments that had received live fish movements in the previous 12 months (e.g. farmed fish trade, fishery restocking, stock enhancement).

The exercise was successful in providing an estimate of resources that would need to be committed by operational partners to complete a national survey for *G. salaris* and the time it would take to determine how far the parasite had spread. It also highlighted factors likely to delay planned field work and identified potential bottlenecks. Lessons learnt are being incorporated into Defra's (England and Wales) national aquatic animal disease contingency plans.

## Research

A framework for scoring and ranking river catchments has been developed to inform their prioritisation for sampling and diagnostic testing during an outbreak of *G. salaris*. The aim is to provide a transparent method to balance the interests of different stakeholder groups (e.g. fish farmers and anglers) in directing work to establish the infection status of rivers if *G. salaris* were to be identified in England & Wales. A range of parameters for which data is readily available, at a catchment-level, has been identified and grouped into model under four *themes* (risk of introduction and spread; importance to aquaculture; importance to angling; ecological value). Values for weights that can be applied to adjust the input of parameters within themes and the relative importance of the themes themselves will be informed by an expert opinion exercise to be conducted in 2023.

An R Shiny GIS application is being developed to enable the Cefas Fish Health Inspectorate to generate primary incident maps and build scenario runs from outputs from the Fish Health Database (Starfish) and the live fish movements reporting service on [FHI Online](#) (an action from Operation Russian-doll, 2021). The application produces the spatial information and maps (for example maps showing farm locations, sites of fish introduction for restocking and EA/NRW survey locations) allowing the user to plan sampling programmes for *G. salaris*. At present the app is at a development demonstration level.

**Table 1** Species of Gyrodactylids found during FHI sampling 2019-22. Individual counts for the *G. truttae* and *G. derjavinoidea*s are currently not available for 2022.

Year	Catchment/ Sample ID	Species sampled			Real-time PCR (Ct value)	Gyrodactylids identified based on partial ITS1 (No. of individuals)
		Atlantic salmon	Grayling	Brown Trout		
2019	Medway River 37916		16	16		<i>G. thymalli</i> (7) <i>G. truttae</i> (18) <i>G. derjavinoidea</i> (47) <i>G. Gracilihamatus</i> (1) <i>G. Gasterostei</i> (1) ND (17)
	Tamar River 38286	12		18		<i>G. truttae</i> (36) <i>G. derjavinoidea</i> (39) ND (21)
	Lynher River 38306			30		<i>G. truttae</i> (86) <i>G. derjavinoidea</i> (6)
	Plym River 38287	25		5		<i>G. truttae</i> (13) <i>G. derjavinoidea</i> (48) ND (35)
	Trent River 38288		30			<i>G. thymalli</i> (82) ND (14)



	Piddle River 38359	12		18		<i>G. truttae</i> (65) <i>G. derjavinoidea</i> (20) <i>G. albolacustris</i> (1) <i>G. rogatensis</i> (1)
	Wye River 38382	5		8		No gyrodactylids
<b>2021</b>	40722	6		27	<i>Gs negative</i> <i>G. truttae</i> (23&25) <i>G. derjavinoidea</i> (25&26)	
	41245				<i>Gs negative</i> <i>G. truttae</i> (-ve&32) <i>G. derjavinoidea</i> (25&24)	
	41470	29		13	<i>Gs negative</i> <i>G. truttae</i> (-ve) <i>G. derjavinoidea</i> (22&28)	
	41471	4		27	<i>Gs negative</i> <i>G. truttae</i> (-ve) <i>G. derjavinoidea</i> (-ve &24)	
	41472	30			<i>Gs negative</i> <i>G. truttae</i> (-ve) <i>G. derjavinoidea</i> (23)	
	41473	6		14	<i>Gs negative</i> <i>G. truttae</i> (-ve) <i>G. derjavinoidea</i> (-ve &24)	
<b>2022</b>	43164	20		19	<i>Gs negative</i> <i>G. truttae</i> (-ve &37) <i>G. derjavinoidea</i> (38&33)	<i>G. derjavinoidea</i> (2) <i>G. gasterostei</i> (4) <i>G. albolacustris</i> (2) ND(3)
	43319	30			<i>Gs negative</i> <i>G. truttae</i> (-ve&32) <i>G. derjavinoidea</i> (21)	<i>G. truttae</i> (2) <i>G. derjavinoidea</i> (2)

43322	30			<i>Gs negative</i> <i>G. truttae</i> (38) <i>G.</i> <i>derjavinoidea</i> (36)	<i>G. derjavinoidea</i> (1) ND (1)
43329	51			<i>Gs negative</i> <i>G. truttae</i> (44) <i>G.</i> <i>derjavinoidea</i> (17)	<i>G. derjavinoidea</i> (26)
43367	6		29	<i>Gs negative</i> <i>G. truttae</i> (22&18) <i>G.</i> <i>derjavinoidea</i> (26& 21)	<i>G. truttae</i> (17) <i>G. derjavinoidea</i> (12)
43234	31			<i>Gs negative</i> <i>G. truttae</i> (38) <i>G.</i> <i>derjavinoidea</i> (26)	<i>G. derjavinoidea</i> (25) ND (1)
43235	32			<i>Gs negative</i> <i>G. truttae</i> (23) <i>G.</i> <i>derjavinoidea</i> (18)	<i>G. truttae</i> (2) <i>G. derjavinoidea</i> (23) <i>G. gasterostei</i> (1)
43236	30			<i>Gs negative</i> <i>G. truttae</i> (-ve) <i>G.</i> <i>derjavinoidea</i> (34)	<i>G. derjavinoidea</i> (1) ND(1)
43237	19 14			<i>Gs negative</i> <i>G. truttae</i> (-ve) <i>G.</i> <i>erjavinoidea</i> (26&3 6)	<i>G. derjavinoidea</i> (3)
43320	30			<i>Gs negative</i> <i>G. truttae</i> (-ve) <i>G. derjavinoidea</i> (- ve)	No gyrodactylids
43321	40			<i>Gs negative</i> <i>G. truttae</i> (33) <i>G. derjavinoidea</i> (25)	<i>G. truttae</i> (2) <i>G. derjavinoidea</i> (9)

## GSWG(22)06

***G. salaris Update Paper (Tabled by UK – Northern Ireland)******Template for the Provision of Information to the Working Group on G. salaris***

The Terms of Reference (ToRs) for the 2022 Meeting of the Working Group on *G. salaris* are as follows:

1. Provide a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite *G. salaris*;
2. Review progress in relation to the recommendations contained in the Commission's '[Road Map](#)' including progress with the development and testing of contingency plans; and
3. Develop recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced.

This template allows Parties / jurisdictions to provide information in response to each of the above ToRs, including on the recommendations in the Road Map, [NEA\(18\)08](#). Only those recommendations that relate to Parties / jurisdictions are included.

The information provided will be annexed to the Report of the Meeting, which will be posted on the NASCO website.

Some recommendations may not be relevant to your Party / jurisdiction, but please complete the template as best you can and return it to the Secretariat **by 20 October 2022**.

**ToR 1:** Provide a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite *G. salaris*

*Please provide any information you wish to share on research on, and monitoring, control and eradication programmes for G. salaris:*

Northern Ireland is free from *G. salaris* and has adopted national measures approved as per EU 2021/260. This allows control of movement into Northern Ireland of susceptible species in that they must originate from MS (or parts) free from disease and that they must be accompanied by an official certificate covering health guarantees.

In order to ensure continued disease freedom surveillance samples of 30 fish are taken from 10-12 farms and 8 rivers annually. Samples are analysed at AFBI by skin scrape, microscopic examination and PCR testing. All results since testing began in 2007 have been negative.

**ToR 2:** Review progress in relation to the recommendations contained in the Commission's '[Road Map](#)' including progress with the development and testing of contingency plans.

*The recommendations relevant to Parties / jurisdictions are set out below.*

- |       |                                                                                                                                                         |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. a) | Appropriate steps should be taken to prevent the spread of <i>G. salaris</i> on fishing equipment, boats, etc. by use of approved disinfection methods. |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

*Please provide information on your Parties' / jurisdiction's progress on this:*

Excerpt from the DAERA contingency plan: ‘DAERA will produce / distribute posters/leaflets alerting local river users to the outbreak and providing advice on precautionary measures they can take to avoid or prevent the spread of GS. These will be posted at key river sites by DAERA and Loughs Agency Fishery Officers, as appropriate. Up to date information will be provided on the current GS situation on the DAERA and Loughs Agency websites as required.’

1. b)	All movements of live fish should be recorded so that movements can be traced in the event of an outbreak of <i>G. salaris</i> .
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*Please provide information on your Parties’ / jurisdiction’s progress on this:*

For internal moves operators must notify DAERA of their intention to move a consignment of live fish. An inspector will issue a permit to accompany the consignment. Movements into and out of Northern Ireland are accompanied by an animal health certificate (intratrade or export). Operators must keep records of such movements per the Animal Health Law.

1. c)	The risk of <i>G. salaris</i> introduction through the processing of fish carcasses should be assessed and, where appropriate, mitigated through control of processing
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*Please provide information on your Parties’ / jurisdiction’s progress on this:*

*N/A , no processing facilities in NI*

1. d)	Physical barriers to fish migration should be considered as a measure to prevent the spread of <i>G. salaris</i> within a catchment and to uninfected catchments.
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*Please provide information on your Parties’ / jurisdiction’s progress on this:*

*N/A*

1. e)	Where possible, routine breaks in production and disinfection on rainbow trout and salmon freshwater aquaculture sites should be implemented as part of a control programme in infected areas.
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*Please provide information on your Parties’ / jurisdiction’s progress on this:*

*N/A*

1. f)	Permission to stock fish into infected river catchments should be based on an assessment of the increased risk of transmission of the parasite to non-infected rivers (e.g. through migration and other routes)
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*Please provide information on your Parties’ / jurisdiction’s progress on this:*

*N/A – (authorisation is required before stocking is allowed as normal business.)*

1. g)	NEAC Parties and their relevant jurisdictions should have contingency plans in place for treatment, containment or eradication. These plans should be developed in consultation with stakeholders. A legal base for the use of rotenone or other treatments, containment and eradication measures should be put in place. Contingency plans should be tested periodically and updated as required
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***Please provide a link to your Parties’ / jurisdiction’s contingency plan:***

The DAERA contingency plan for GS is in draft form and not yet published on the DAERA website.

*Please provide any other relevant information on this:*

A contingency exercise was conducted earlier this year to test DAERA's response to an outbreak of IHN. Many of the lessons learned from that exercise and the action points to be implemented will be applicable to the GS contingency plan

1. h)	NEAC Parties and their relevant jurisdictions should endeavour to ensure that adequate resources are available for the implementation of measures to contain and eradicate <i>G. salaris</i> .
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Human resources would be sought from other work areas in the first instance in the event of a positive test . No formal arrangements are in place with outside bodies.

3.	The Working Group should review new developments with regard to monitoring for, and detection of, <i>G. salaris</i> , and develop recommendations for their inclusion in international guidelines
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*Please provide information on your Parties' / jurisdiction's progress on this:*

None

4. a)	Existing monitoring programmes on salmonids in the wild and in aquaculture environments undertaken by NEAC Parties and their relevant jurisdictions should be retained and expanded as necessary. They should provide genetic data for all <i>Gyrodactylus</i> species isolated during monitoring. Reports on these programmes should be provided to the Working Group at their next meeting.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

The Gyrodactylis sequencing test is not available in AFBI.

5. a)	<p>The NEAC Parties and their relevant jurisdictions should conduct applied research to inform the effective management of <i>G. salaris</i>, particularly the following:</p> <ul style="list-style-type: none"> <li>- the distribution and genetics of <i>G. salaris</i>;</li> <li>- the effects of salmon genetics on susceptibility to <i>G. salaris</i>;</li> <li>- the effect of environmental factors on pathogenicity;</li> <li>- to clarify the classification of <i>G. salaris</i> and <i>G. thymalli</i> and then develop a reliable method to distinguish between pathogenic and non-pathogenic strains;</li> <li>- general biology and mechanisms of spread of the parasite;</li> <li>- effect of environmental parameters and ecology on the distribution of <i>G. salaris</i>;</li> <li>- detection and diagnostic methods for <i>G. salaris</i>;</li> <li>- new environmental friendly treatment methods in rivers and lakes, e.g. acid aluminum and chloride.</li> </ul>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

N/A

7. a) & 7. b)	NEAC Parties and their relevant jurisdictions should develop publicity material on the threat of the parasite to wild Atlantic salmon and specify measures to prevent its spread; strategies for the effective dissemination of this material should be developed particularly with regard to targeting high risk groups. Existing material should be reviewed and updated as appropriate in the light of current knowledge. The NASCO Secretariat should develop standard text as a basis for such publicity material.
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	This material should be made available on the web sites and promoted on the social media platforms of the Competent Authorities and NASCO with a view to highlighting the serious risks posed by the spread of the parasite.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Publicity material exists to prevent the spread of invasives and is available on Government websites. Any new material on GS can be added and angling clubs / fishery owners made aware.

8.	Relevant NEAC Parties and their relevant jurisdictions should seek to ensure continuity in the provisions related to <i>G. salaris</i> in current EU animal health legislation (Regulation 2016/429) which should be retained, in particular with regard to additional guarantees.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Animal Health Law Regulation (EU) 2016/429 is applicable in Northern Ireland

National Measures are applied as per EU 2021/260

9.	NEAC Parties and their relevant jurisdictions should implement the diagnostic standards in the OIE Manual of Diagnostic Tests for Aquatic Animals.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

AFBI follow the OIE aquatic manual (Chapter 2.3.3) for surveillance of Gryodactylid species on farmed and wild salmonids.

10. a)	Trade in disinfected eggs is preferable to trade in live susceptible fish species. However, where movements of live susceptible fish species are approved, NEAC Parties and their relevant jurisdictions should ensure that trade in live susceptible fish species only takes place between areas of equal <i>G. salaris</i> status or from a higher to lower status area
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Movements are controlled. No movements in allowed from countries not GS free

10. b)	NEAC Parties and their relevant jurisdictions should ensure the health status of the traded live susceptible fish species and/or their eggs, and the competence of the certifying Authority.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

EU model certificates are required

11.	NEAC Parties and their relevant jurisdictions with shared catchments or having catchments in close proximity should implement appropriate mechanisms for cooperation, including the establishment and strengthening of inter-country working groups and the development of common contingency plans to control and eradicate <i>G. salaris</i> .
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*Please provide information on your Parties' / jurisdiction's progress on this:*

DAERA is aware of the need to co-operate with Ireland as there are a number of shared catchments.

<b>ToR 3:</b> Develop recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced
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*Please provide any information you wish to share on co-operation (including international, national or regional co-operation) on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced*

N/A

**Please provide any other information you feel would be beneficial to the Working Group**

## GSWG(22)07

**G. salaris Update Paper (Tabled by UK – Scotland)****Template for the Provision of Information to the Working Group on G. salaris**

The Terms of Reference (ToRs) for the 2022 Meeting of the Working Group on *G. salaris* are as follows:

4. Provide a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite *G. salaris*;
5. Review progress in relation to the recommendations contained in the Commission's '[Road Map](#)' including progress with the development and testing of contingency plans; and
6. Develop recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced.

This template allows Parties / jurisdictions to provide information in response to each of the above ToRs, including on the recommendations in the Road Map, [NEA\(18\)08](#). Only those recommendations that relate to Parties / jurisdictions are included.

The information provided will be annexed to the Report of the Meeting, which will be posted on the NASCO website.

Some recommendations may not be relevant to your Party / jurisdiction, but please complete the template as best you can and return it to the Secretariat **by 20 October 2022**.

**ToR 1:** Provide a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite *G. salaris*

*Please provide any information you wish to share on research on, and monitoring, control and eradication programmes for G. salaris:*

An update paper on this area is provided to supplement the contribution from Scotland. This details the monitoring which has taken place. As Scotland is recognised as a territory which is free from Gs no control or eradication programmes are in place. Measures exist to help prevent the introduction of the parasite through the trade in live aquatic animals. At present Marine Scotland is not undertaking any active research with respect to Gs.

**ToR 2:** Review progress in relation to the recommendations contained in the Commission's '[Road Map](#)' including progress with the development and testing of contingency plans.

*The recommendations relevant to Parties / jurisdictions are set out below.*

- |       |                                                                                                                                                         |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. a) | Appropriate steps should be taken to prevent the spread of <i>G. salaris</i> on fishing equipment, boats, etc. by use of approved disinfection methods. |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

*Please provide information on your Parties' / jurisdiction's progress on this:*



Actions are taken by wild fishery stakeholders – detailed at paragraph 3.6 of the supporting paper (annexed).

1. b)	All movements of live fish should be recorded so that movements can be traced in the event of an outbreak of <i>G. salaris</i> .
-------	----------------------------------------------------------------------------------------------------------------------------------

*Please provide information on your Parties' / jurisdiction's progress on this:*

All movements of live fish from Aquaculture Production Businesses (APBs) are required to be maintained by law as detailed within the authorisation conditions in accordance with the Aquatic Animal Health (Scotland) Regulations 2009. APBs include all fish farm sites as well as wild fish hatcheries moving stocks between catchments.

1. c)	The risk of <i>G. salaris</i> introduction through the processing of fish carcasses should be assessed and, where appropriate, mitigated through control of processing
-------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------

*Please provide information on your Parties' / jurisdiction's progress on this:*

No action taken on this aspect within the reporting period.

1. d)	Physical barriers to fish migration should be considered as a measure to prevent the spread of <i>G. salaris</i> within a catchment and to uninfected catchments.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

N/A – No evidence of Gs within Scotland.

1. e)	Where possible, routine breaks in production and disinfection on rainbow trout and salmon freshwater aquaculture sites should be implemented as part of a control programme in infected areas.
-------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

*Please provide information on your Parties' / jurisdiction's progress on this:*

N/A – No infected areas within Scotland.

1. f)	Permission to stock fish into infected river catchments should be based on an assessment of the increased risk of transmission of the parasite to non-infected rivers (e.g. through migration and other routes)
-------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

*Please provide information on your Parties' / jurisdiction's progress on this:*

N/A – No infected areas within Scotland.

1. g)	NEAC Parties and their relevant jurisdictions should have contingency plans in place for treatment, containment or eradication. These plans should be developed in consultation with stakeholders. A legal base for the use of rotenone or other treatments, containment and eradication measures should be put in place. Contingency plans should be tested periodically and updated as required
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***Please provide a link to your Parties' / jurisdiction's contingency plan:***

<https://www.gov.scot/Topics/marine/Fish-Shellfish/18364/18610/previous/gswg/Gyrocontingency>

*Please provide any other relevant information on this:*

Further detail provided through supporting paper – paragraph 3.7, 3.8 and 3.9 (annexed). The Contingency Plan is subject to review and that process has started.

1. h)	NEAC Parties and their relevant jurisdictions should endeavour to ensure that adequate resources are available for the implementation of measures to contain and eradicate <i>G. salaris</i> .
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Marine Scotland has an established Fish Health Inspectorate and diagnostic capacity which together forms the National Disease Control Centre (NDCC). Scottish Government policy colleagues provide the function of the Disease Strategy Group (DSG). Together the NDCC and the DSG provide the operational and strategic response to any outbreak or detection of Gs. Contingency procedures identify potential assistance from stakeholders particularly in terms of sampling and eradication.

3.	The Working Group should review new developments with regard to monitoring for, and detection of, <i>G. salaris</i> , and develop recommendations for their inclusion in international guidelines
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*Please provide information on your Parties' / jurisdiction's progress on this:*

No action on this in relation new developments for monitoring or detection within the time period of this update. Procedures adopted in Scotland reflect the current standards as detailed through WOA. H.

4. a)	Existing monitoring programmes on salmonids in the wild and in aquaculture environments undertaken by NEAC Parties and their relevant jurisdictions should be retained and expanded as necessary. They should provide genetic data for all <i>Gyrodactylus</i> species isolated during monitoring. Reports on these programmes should be provided to the Working Group at their next meeting.
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Active and passive surveillance programmes remain in place as described within the supporting paper. No targeted screening or sampling for Gs is undertaken. Sampling is only conducted where diagnostic samples are collected or in response to issues / suspicions raised.

5. a)	<p>The NEAC Parties and their relevant jurisdictions should conduct applied research to inform the effective management of <i>G. salaris</i>, particularly the following:</p> <ul style="list-style-type: none"> <li>- the distribution and genetics of <i>G. salaris</i>;</li> <li>- the effects of salmon genetics on susceptibility to <i>G. salaris</i>;</li> <li>- the effect of environmental factors on pathogenicity;</li> <li>- to clarify the classification of <i>G. salaris</i> and <i>G. thymalli</i> and then develop a reliable method to distinguish between pathogenic and non-pathogenic strains;</li> <li>- general biology and mechanisms of spread of the parasite;</li> <li>- effect of environmental parameters and ecology on the distribution of <i>G. salaris</i>;</li> <li>- detection and diagnostic methods for <i>G. salaris</i>;</li> <li>- new environmental friendly treatment methods in rivers and lakes, e.g. acid aluminum and chloride.</li> </ul>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

No research is being undertaken by Marine Scotland on these areas at present.

7. a) &	NEAC Parties and their relevant jurisdictions should develop publicity material on the threat of the parasite to wild Atlantic salmon and specify measures to prevent its spread; strategies for the effective dissemination of this material should be developed particularly with regard
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7. b)	<p>to targeting high risk groups. Existing material should be reviewed and updated as appropriate in the light of current knowledge. The NASCO Secretariat should develop standard text as a basis for such publicity material.</p> <p>This material should be made available on the web sites and promoted on the social media platforms of the Competent Authorities and NASCO with a view to highlighting the serious risks posed by the spread of the parasite.</p>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Update provided at the last meeting. No further development. Home and Dry campaign material still in existence but no active update.

8.	<p>Relevant NEAC Parties and their relevant jurisdictions should seek to ensure continuity in the provisions related to <i>G. salaris</i> in current EU animal health legislation (Regulation 2016/429) which should be retained, in particular with regard to additional guarantees.</p>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Update provided through supporting paper – paragraphs 3.1 and 3.2 (annexed). Aquatic Animal Health (Scotland) Regulations 2009 amended to recognise Scotland's territory being free from Gs.

9.	<p>NEAC Parties and their relevant jurisdictions should implement the diagnostic standards in the OIE Manual of Diagnostic Tests for Aquatic Animals.</p>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

WOAH standards are embedded within MS diagnostic process – paragraphs 1.12 and 3.4 of the supporting paper (annexed).

10. a)	<p>Trade in disinfected eggs is preferable to trade in live susceptible fish species. However, where movements of live susceptible fish species are approved, NEAC Parties and their relevant jurisdictions should ensure that trade in live susceptible fish species only takes place between areas of equal <i>G. salaris</i> status or from a higher to lower status area</p>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Established and implemented as part of Scotland's trade control measures.

10. b)	<p>NEAC Parties and their relevant jurisdictions should ensure the health status of the traded live susceptible fish species and/or their eggs, and the competence of the certifying Authority.</p>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Established and implemented as part of Scotland's trade control measures.

11.	<p>NEAC Parties and their relevant jurisdictions with shared catchments or having catchments in close proximity should implement appropriate mechanisms for cooperation, including the establishment and strengthening of inter-country working groups and the development of common contingency plans to control and eradicate <i>G. salaris</i>.</p>
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*Please provide information on your Parties' / jurisdiction's progress on this:*

Cross border issues are identified and established within the Gs Contingency Plan. Agreements are in place with Defra and Cefas concerning operations and disease control measures with respect to the rivers Tweed and the Boarder Esk.

<p><b>ToR 3:</b> Develop recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced</p>
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*Please provide any information you wish to share on co-operation (including international, national or regional co-operation) on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced*

N/A – No infected areas within Scotland.

**Please provide any other information you feel would be beneficial to the Working Group**

A supporting paper is annexed and follows the style and content of previous submissions. A power point presentation is also provided based upon the supporting paper and this document.

## ***Gyrodactylus salaris* update paper – contribution from Marine Scotland**

Neil Purvis – neil.purvis@gov.scot

### **Update for 2021 and 2022 (up to 30 September)**

#### **1. Monitoring and distribution of gyrodactylids**

1.1 Annex 1 provides sampling data for the years 2021 to 2022 (to 30 September) concerning the activity undertaken in Scotland by the Competent Authority<sup>1</sup> in relation to sampling and sample analysis to determine the presence or absence of gyrodactylid species. The structure of this data set reflects historical reports and previous contributions made from Scotland.

1.2 The surveillance undertaken continues to support Scotland's disease free status with respect to *Gyrodactylus salaris* (Gs), as part of the GB health zone<sup>2</sup>. No evidence of the parasite has been detected over the sampling period from 01 January 2021 to 30 September 2022.

#### Surveillance

1.3 Since reporting in 2021 (for the period 2018-2020 inclusive) there have been no changes associated with the surveillance methodologies employed. A risk based surveillance programme across the aquaculture sites within Scotland is undertaken which reflects the requirements of retained EU legislation – Decision 2008/896 which provides guidelines on risk based surveillance.

1.4 Passive surveillance and intelligence led initiatives are additional components of Scotland's aquatic animal health surveillance activity.

1.5 There is no targeted surveillance (the screening of healthy fish populations) for Gs but analysis of samples is undertaken through diagnostic investigations conducted either as a result of risk based surveillance in the case of farmed fish, or through intelligence initiatives, as an output from passive surveillance, in the case of farmed fish and fisheries<sup>3</sup>.

1.6 Further description and details of the surveillance being employed has been provided previously e.g. through GSWG(17) Annex 7.

#### Population surveys

1.7 Surveys of juvenile populations were undertaken in 2021 as part of an on-going programme as reported within GSWG(17) Annex 7. It is recognised that, whilst this

<sup>1</sup> Marine Scotland performs the role of Competent Authority for Scotland on behalf of the Scottish Ministers

<sup>2</sup> The 'GB health zone' comprises the territory of Great Britain which includes the countries of England, Wales and Scotland

<sup>3</sup> 'Fisheries' in this context refers to both wild fish populations and put-and-take / sport fisheries and these are differentiated where required throughout the report

activity is not actively searching for the presence of Gs, it does give an assessment, to a certain extent, of the ecological health of wild salmonid populations in any given area. Where repeated and structured surveys are undertaken this provides a reliable indicator of a problem, e.g. a lack of juvenile salmon populations in an area where they were previously plentiful.

- 1.8 New structures have been developed for coordinated local sampling of fish to complement the salmon conservation regulations<sup>4</sup> and assess pressures on salmon stocks. This programme could provide a structured and robust warning system with respect to the presence of Gs, assuming rapid and anomalous changes to juvenile densities would arise in affected catchments or regions.

#### Diagnostic capability and activity

- 1.9 Marine Scotland Science (MSS) is the Scottish National Reference Laboratory for fish, mollusc and crustacean diseases.
- 1.10 The primary diagnostic methods employed in relation to Gs detection and confirmation, rely solely upon molecular techniques and include a real-time PCR multiplex assay, followed by DNA sequencing. This represents the standard diagnostic practice in relation to the diagnosis of gyrodactylids by MSS.
- 1.11 Morphological capabilities have been maintained and could be reintroduced in the future if required.
- 1.12 With regards to the detection of Gs, the diagnostic methods employed by MSS satisfies the recommended methodology detailed within the WOAHP Manual of Diagnostic Tests for Aquatic Animals (2022).

#### **Impact of COVID-19**

- 1.13 The on-going global COVID-19 pandemic has had an impact upon the surveillance, population survey and diagnostic activity conducted during 2021. Despite these restrictions risk assessment and appropriate operational procedures established in 2020 were and implemented to allow elements of this work to continue when restrictions permitted.
- 1.14 In terms of surveillance, during 2020 all high risk aquaculture sites were inspected along with a lower than planned proportion of medium and low risk sites. Passive surveillance initiatives were increased with respect to both farmed and wild aquatic animals. In 2021 all stocked freshwater aquaculture sites which were due an inspection were inspected with the exception of one wild fish hatchery which was delayed until early 2022. This included 17 (10 medium and 7 low risk) sites which were unable to be inspected during 2020. Surveillance in 2022 has returned to pre-pandemic schedules.

<sup>4</sup><http://www.gov.scot/Topics/marine/Salmon-Trout-Coarse/fishreform/licence>

<https://www.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Monitoring/ElectrofishingProgramme>

1.15 Diagnostic capability and capacity has been maintained throughout the pandemic.

## **2. On-going and planned research concerning *G. salaris***

2.1 At present MSS is not actively involved in any scientific research work concerning Gs. Despite this, the organisation maintains knowledge of developments in this area through national and international discussions and contact with other research parties through attendance at conferences and meetings involving the scientific community and national reference laboratories.

## **3. Measures taken to prevent spread and to eradicate**

### **International initiatives**

#### Trade restrictions

3.1 Trade restrictions, as detailed within GSWG(17) Annex 7, remain in place. These are detailed below in paragraph 3.2.

3.2 Scotland (as part of the GB health zone), has recognised disease freedom with respect to Gs. Following EU exit, trade restrictions were maintained via Regulation 1251/2008 which was retained and amended accordingly. The restrictions in place assist in preventing the import of Gs through commercial activity involving the trade in live aquatic animals. With respect to Gs, imports are permitted only where they are accompanied by a health certificate confirming that the animals:

- a) originate from an area free from Gs, or
- b) they have been held immediately prior to dispatch in saltwater for a designated period<sup>5</sup>, or
- c) in the case eggs they have been disinfected prior to dispatch

3.3 These measures assist in protecting Scotland from the introduction of the parasite through commercial activity associated with live aquatic animal trade.

3.4 Scotland also supports the United Kingdom as a member of WOAHP, by providing comments on the Aquatic Code and Aquatic Manual. These documents cover international recommended standards and practices with respect to specific pathogens, including Gs. Areas covered include:

- trade in and movements of aquatic animals and aquatic animal products
- health status including disease freedom
- biological and aetiological characteristics of pathogens
- surveillance, sampling and diagnostic techniques and procedures

<sup>5</sup> The certificate requires a minimum of 25ppt saltwater for at least 14 days

## **National and regional initiatives**

### 'Home & Dry' campaign

- 3.5 The Scottish Government's 'Home & Dry' campaign involving the dissemination of leaflets, information and advice remains in place where such information has been requested.

### Actions taken by wild fishery stakeholders

- 3.6 As detailed within the 2017 report (GSWG(17) Annex 7) wild fishery stakeholders continue to undertake measures aimed at preventing the introduction of the parasite within Scotland. These include:
- ensuring disinfection of fishing equipment by action or certificate prior to use
  - providing equipment to visiting anglers, to avoid potentially infected equipment being used
  - educating anglers in best practice in relation to the risks of aquatic animal disease
  - developing catchment and river contingency plans in the event of an outbreak of Gs
  - mapping and surveying of catchments to facilitate with eradication if required

### Contingency Planning

- 3.7 Scottish Government has developed and maintains generic contingency plans to deal with outbreaks of listed disease in accordance with Council Directive 2006/88/EC. In the event of an outbreak, operational and strategic responses will be undertaken by Marine Scotland with a view to containing and eradicating disease where possible.
- 3.8 In recognition of the additional challenges posed by Gs, in terms of the potential impacts on wild fish, discrete contingency plans have been developed to deal with an outbreak of the parasite in Scotland. Part of the contingency procedure recognises the extensive expertise and experiences within Norway in terms of containing and eradicating. Agreements have been established to utilise this expertise should the need arise.
- 3.9 Scottish contingency plans for Gs are currently in their 4th edition and were last revised in March 2011. A review of the Gs plan was commenced in September 2022 with the aim of completing the process by the end of March 2023. The review will update plan in relation to structural and organisational changes, legislation, scientific and diagnostic updates, stakeholder involvement and agreements and MoUs in place.



## Annex 1 of Supporting Paper- Gyrodactylid sampling in Scotland 2021 and 2022 (to 30 September) conducted by MSS

### Overview

No *G. salaris* were identified.

Total No. of cases: 9

No. of farm cases: 1

No. of wild cases: 8

Total No. of fisheries<sup>6</sup> sampled: 0

Total No. of fish examined: 173

Total No. of farmed fish examined: 5

Total No. of wild fish examined: 168

Total No. of fishery fish examined: 0

No. of +ve farm cases: 0

No. of +ve wild cases: 1

No. of +ve fisheries cases: 0

### Breakdown of sampling for gyrodactylids

#### Farmed fish sampling

Year	Fish species	Cases	No. sampled per case	Region	Result	Parasite species
2021	Atlantic salmon	1	5		-ve	

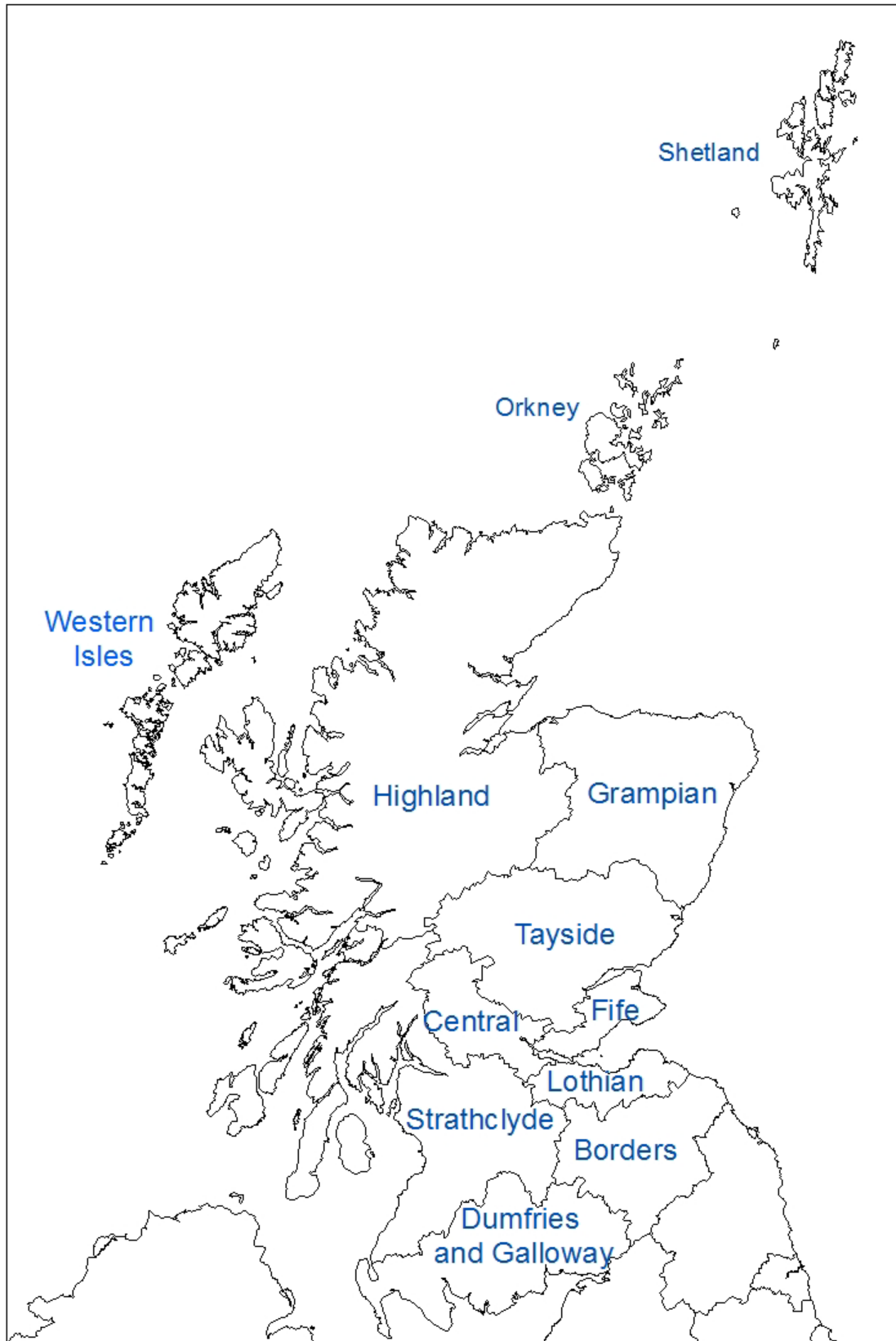
<sup>6</sup> Fishery / fisheries within this section refers to put-and-take / sport fisheries and excludes wild fisheries

Wild fish sampling

<b>Year</b>	<b>Fish species</b>	<b>Cases</b>	<b>No. sampled per case</b>	<b>Region</b>	<b>Result</b>	<b>Parasite species</b>
2021	Atlantic salmon	5	1	Grampian	-ve	
			152	Highland	+ve	<i>G.d</i>
			1	Tayside	-ve	
			5	Highland	-ve	
			2	Highland	-ve	
2022	Atlantic salmon	3	1	Grampian	-ve	
			5	Highland	-ve	
			1	Highland	-ve	

*G. d* = *Gyrodactylus derjavinoides*

## Annex 2 of Supporting Paper- Map identifying the regions of Scotland



GSWG(22)10

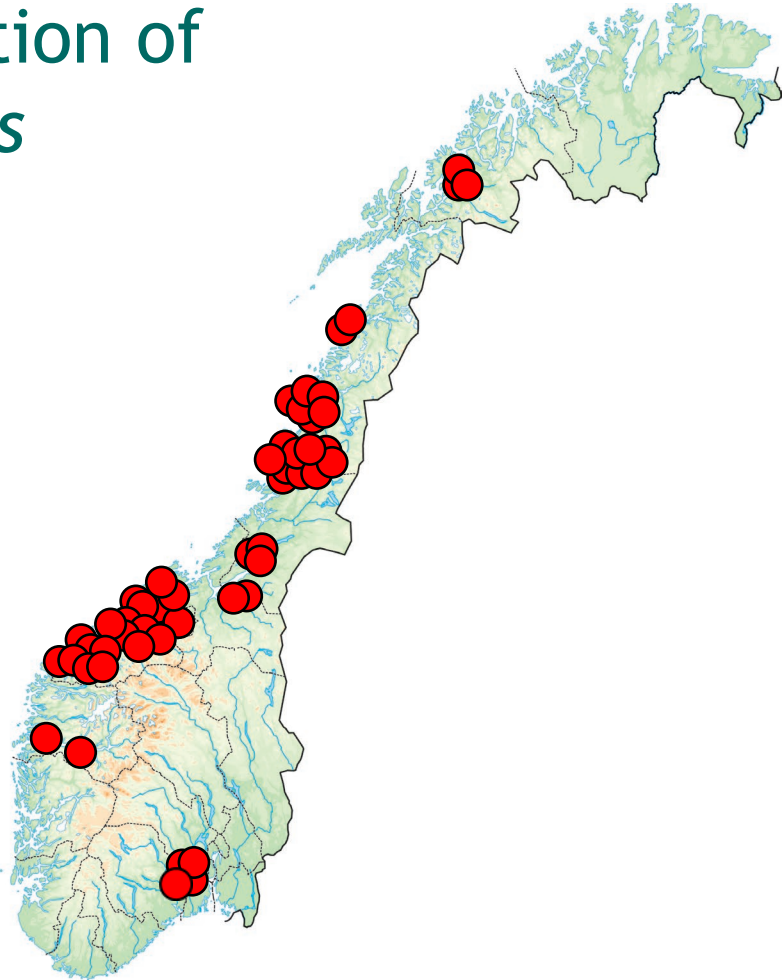
*Gyrodactylus salaris*  
Eradication measures in Norwegian rivers

Information from the Norwegian Environment Agency



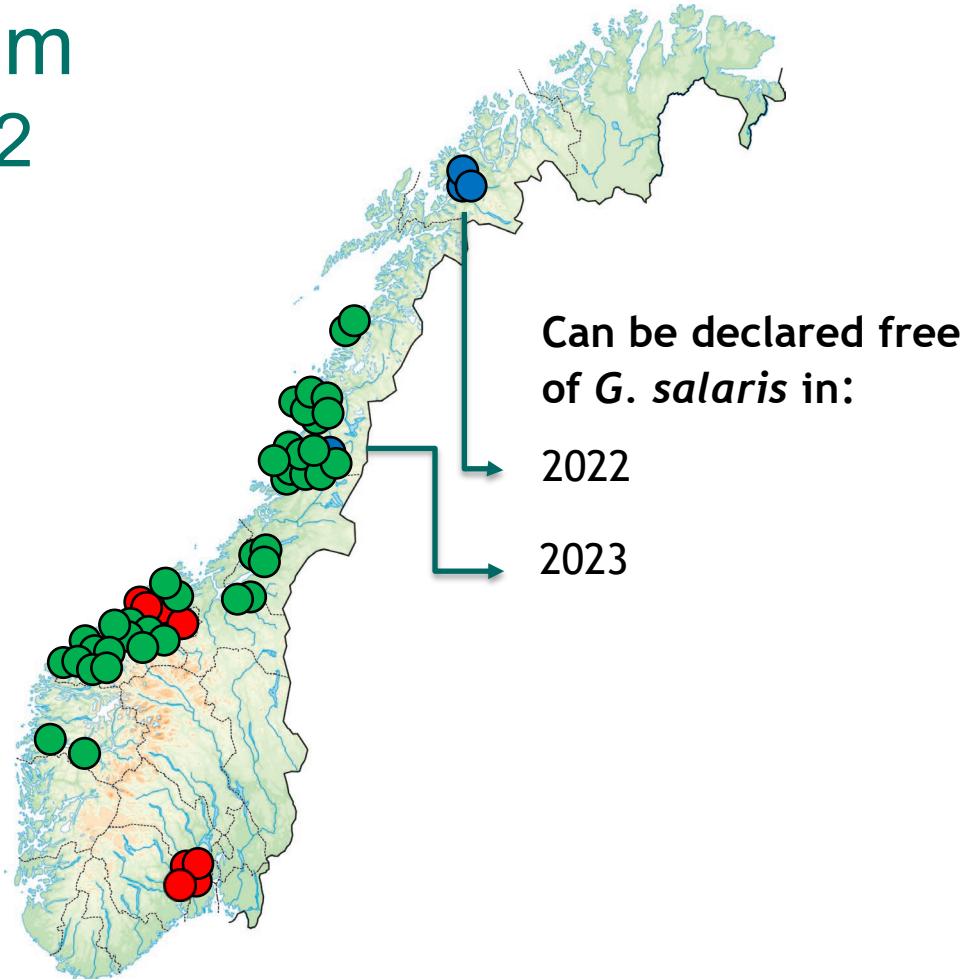
# Rivers with proven infection of *Gyrodactylus salaris*

A total of 51 rivers in 17 regions



# Eradication program Status October 2022

- Treated and successfully eradicated (39)
- Treated, the result are still not confirmed (4)
- Still infected (8)



# Methods of eradication



## Rotenone treatment

- Effective, used in 42 of the 43 treated rivers
- Long experience
- Kills all fish and parts of the benthic fauna
- Requires significant conservation and re-establishment of various fish species



## Acidic aluminum

- Developed over a 10-year period (2000-2010)
- Used as a method in the river Lærdalselva in 2011-2012 with successful result
- Very demanding method
- The fish survive



## The use of chlorine

- This method is under development (5 years)
- Great potential
- The fish survive
- Used for first time in river Driva and river Litledalselva in 2022

# NINA Report 2157

## Have the authorities succeeded in their battle against *Gyrodactylus salaris*?

May 2022



Norwegian Institute for Nature Research





# Two main conclusions

The benefits for Norwegian society, both ecologically and economically, are many times greater than the spending so far. In infected watercourses, salmon stocks were on the verge of extinction and ecological interaction was changing. Without control, the parasite would have spread gradually to new salmon rivers where the same catastrophic outcome had to be expected.

The Norwegian authorities' long-term work to halt the spread of *G. salaris* and to eradicate it in infected rivers is thus a great and unique success, both nationally and internationally. The work of eradicating *G. salaris* from Norwegian salmon rivers is in the final phase and in a few years, *G. salaris* can hopefully be removed from the list of threats to Norwegian Atlantic salmon.

# Driva region



Batnfjordselva

Usma

Sunndalsøra

Fish barrier

Fish barrier

Litledalselva

Oppdal

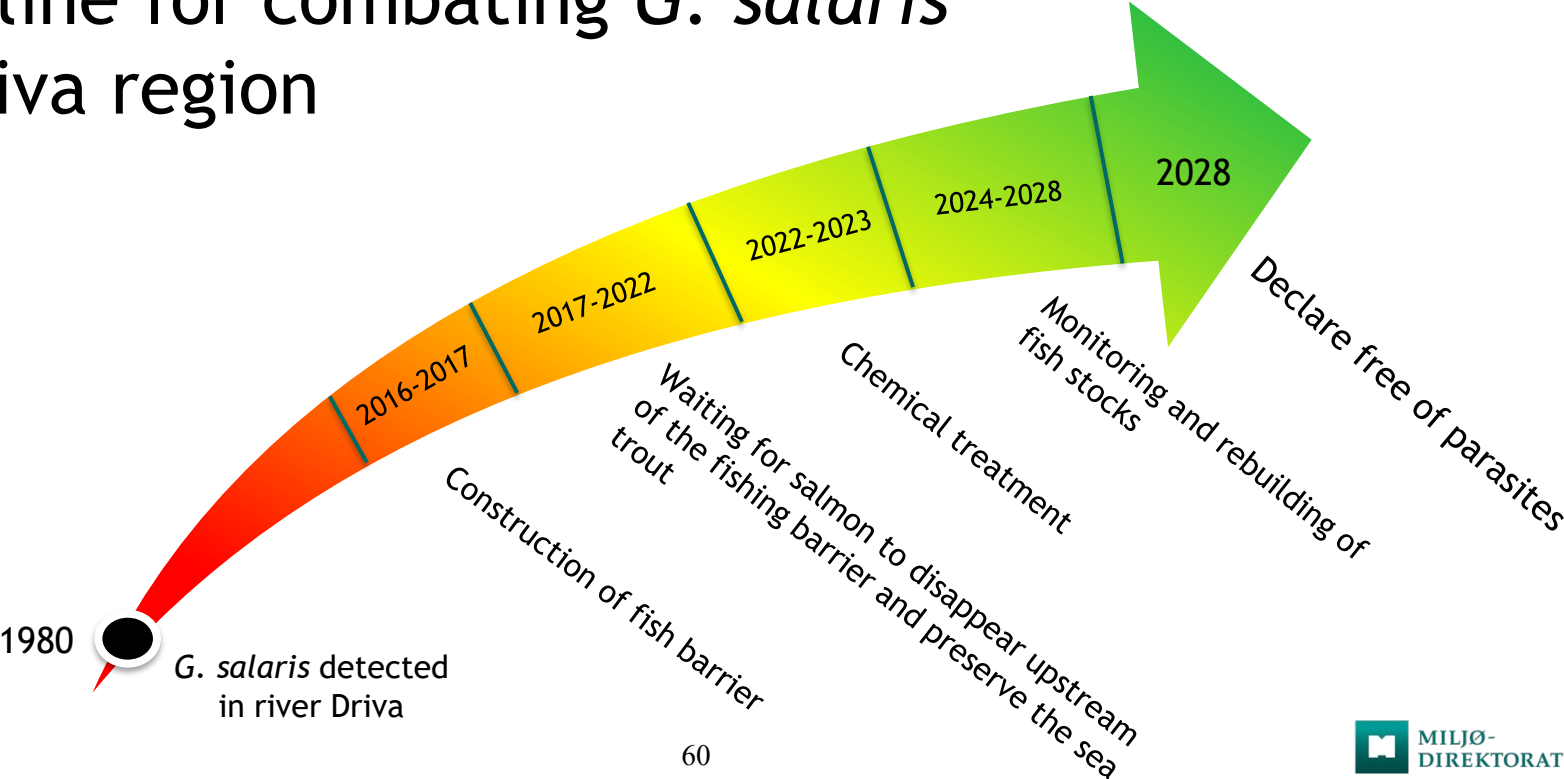
Driva

# Fish barrier in river Driva





# Timeline for combating *G. salaris* in Driva region

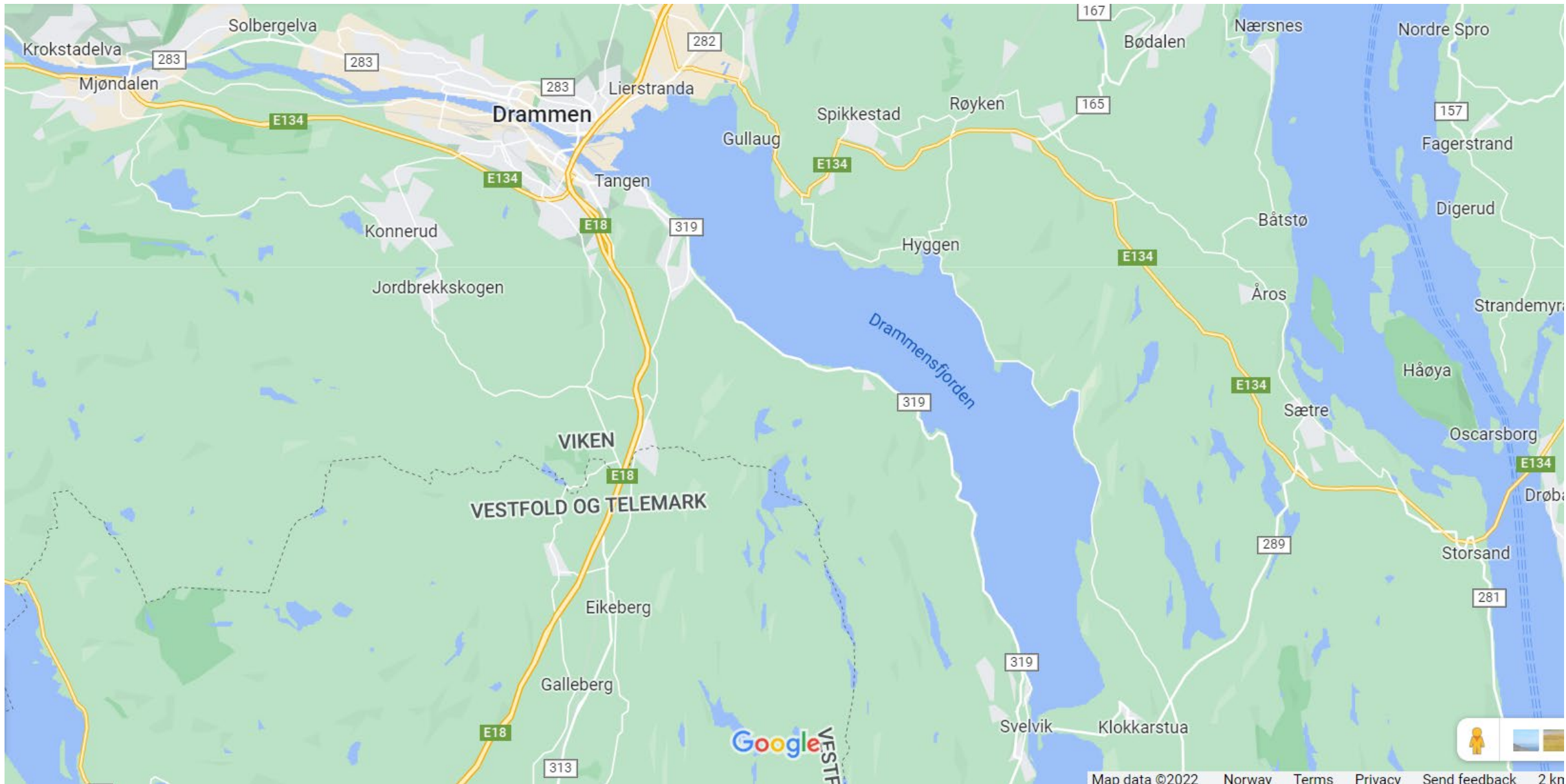


# Drammen-region











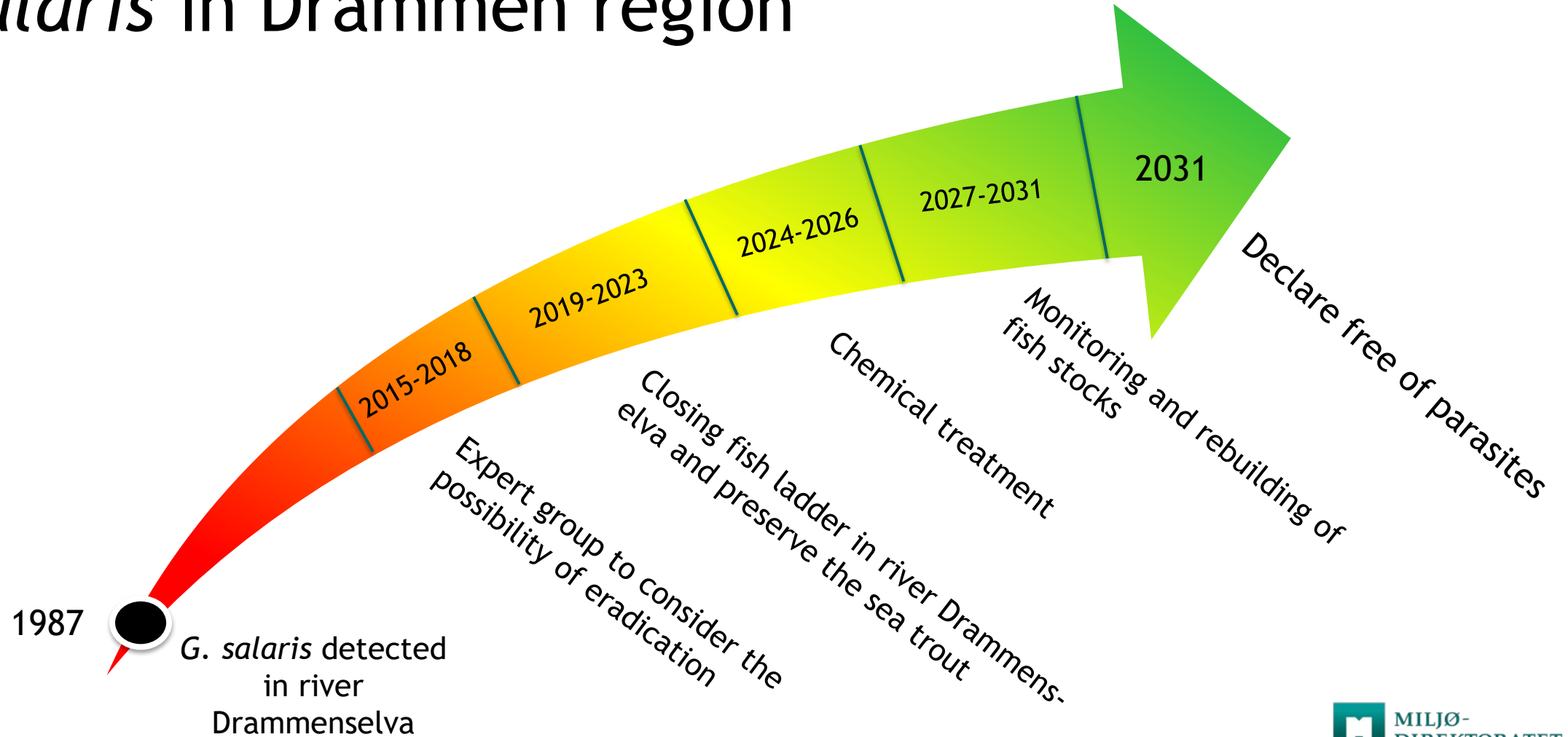


# Priority tasks in this region

-  Carry out investigations to see whether the brackish water area is a problem for the eradication, and eventually how to solve the problem.
-  Start the mapping work to identify any other problems related to the eradication of the parasite.
-  After the closing of the fish ladder, conservation work for sea trout is carried out in the same way as described for river Driva.
-  Test whether the chlorine method can be used in the river Drammenselva.



# Tentative timeline for combating *G. salaris* in Drammen region



# Risk zones for getting new infections from other countries

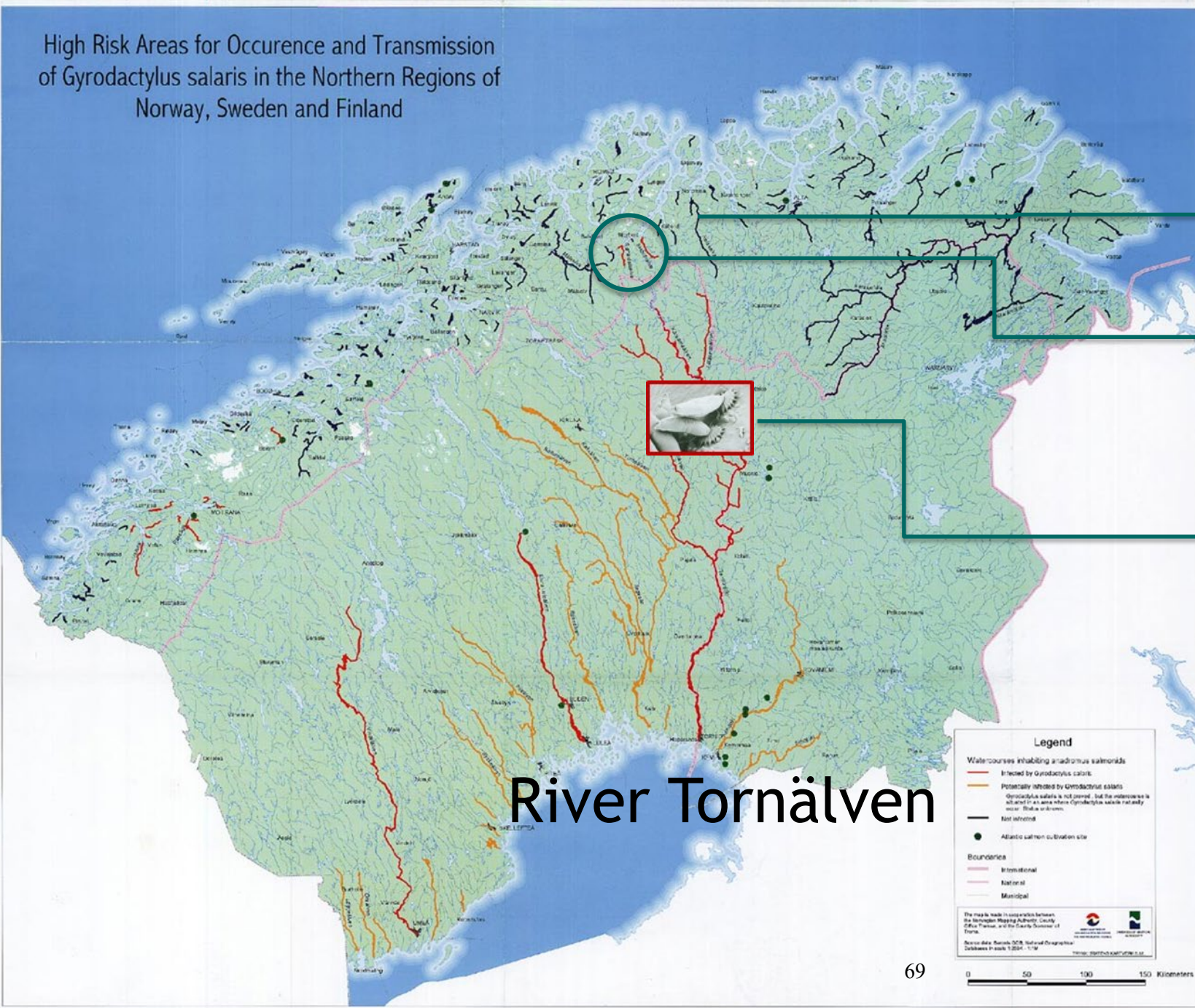
- The Swedish west coast
- River Tornälven
- River Tuloma

# The Swedish west coast

16 *Gyrodactylus*-infected rivers between Gothenburg and Helsingborg



# High Risk Areas for Occurrence and Transmission of *Gyrodactylus salaris* in the Northern Regions of Norway, Sweden and Finland



River Reisaelva

Skibotn-regionen

River Torneälven

River Tornälven

**Legend**

- Water-courses inhabiting *g-rodionus salmonis*
- Infected by *Gyrodactylus salaris*
- Potentially infected by *Gyrodactylus salaris*
- Gyrodactylus salaris* is not present, but the watercourse is situated in an area where *Gyrodactylus salaris* occurs naturally
- Not infected
- Atlantic salmon cultivation site

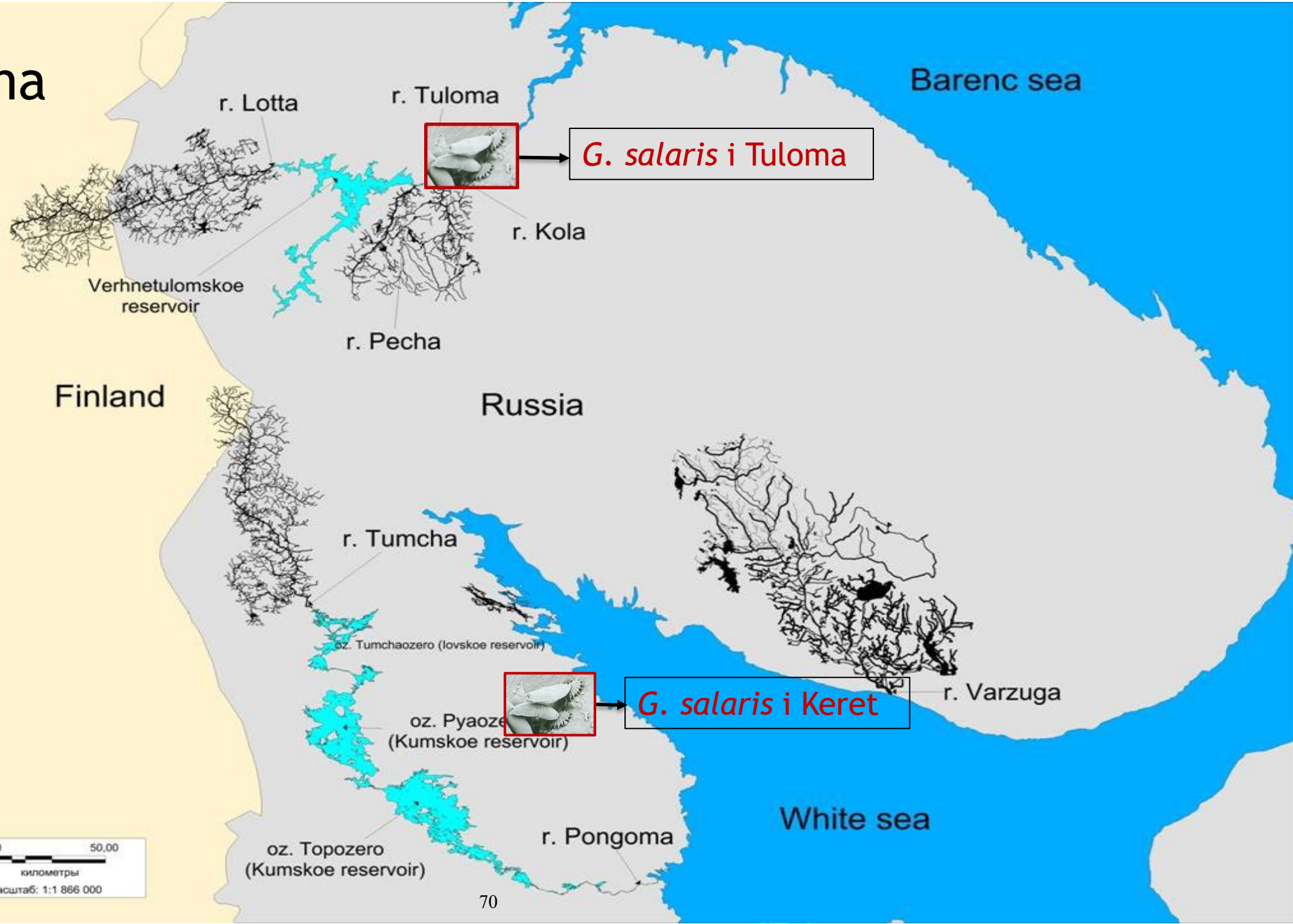
**Boundaries**

- International
- National
- Municipal

The map is made in cooperation between the Norwegian Mapping Authority, County of Jämtland, and the County Council of Jämtland.

Source data: Rensås, 2008; National Geographic Database; 1:250,000, 1:100,000

# River Tuloma

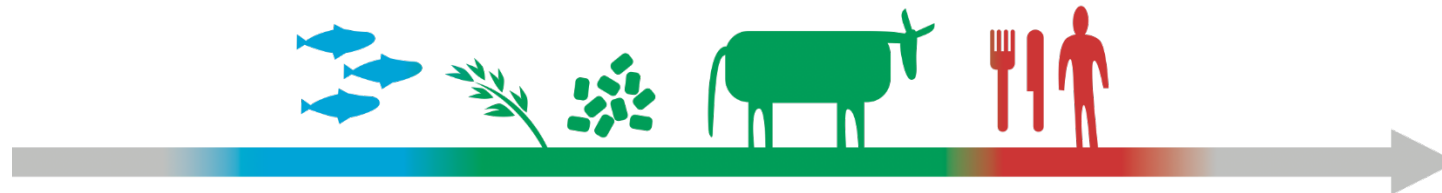




# Eradication of *Gyrodactylus salaris* in Driva river

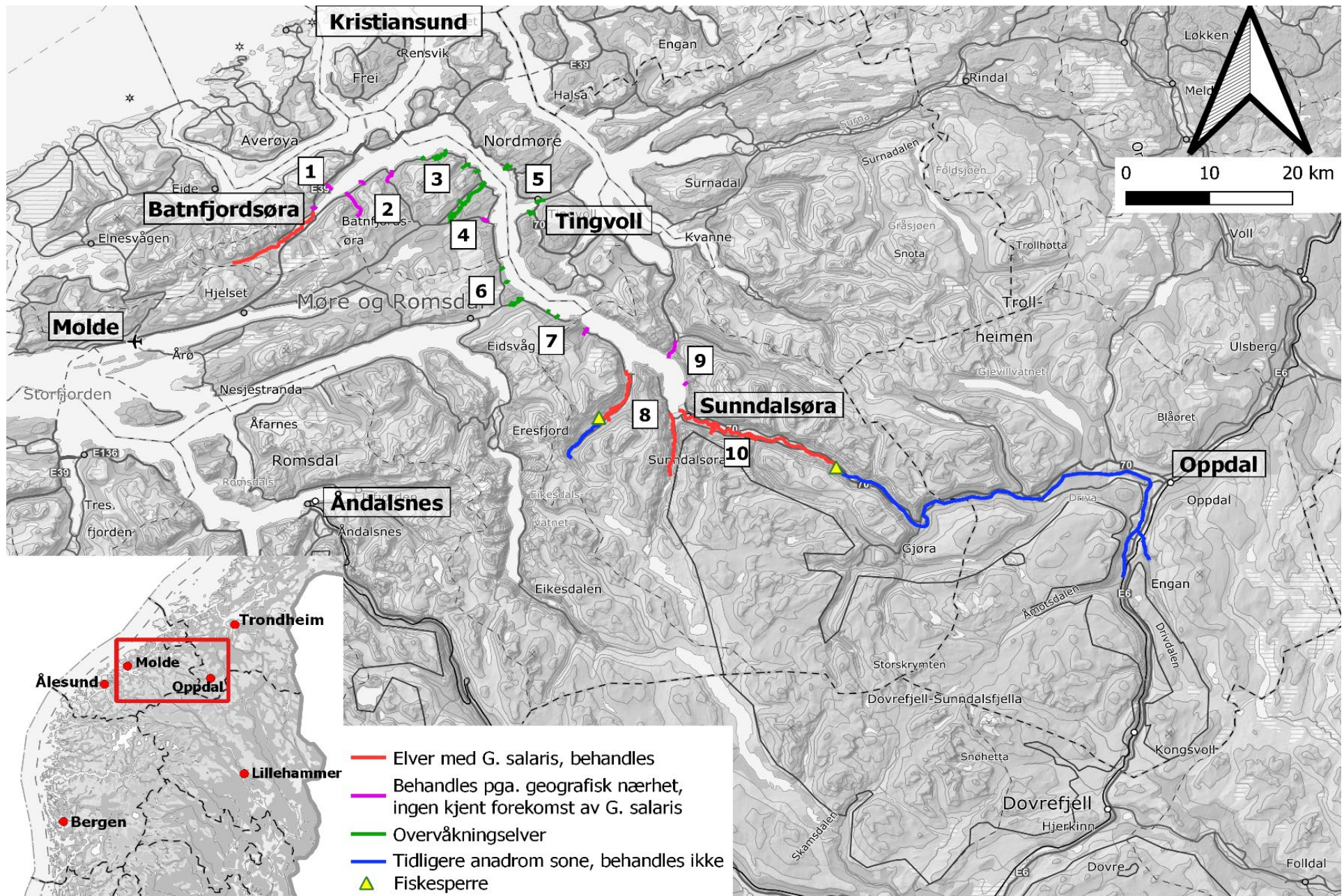
NASCO 2022

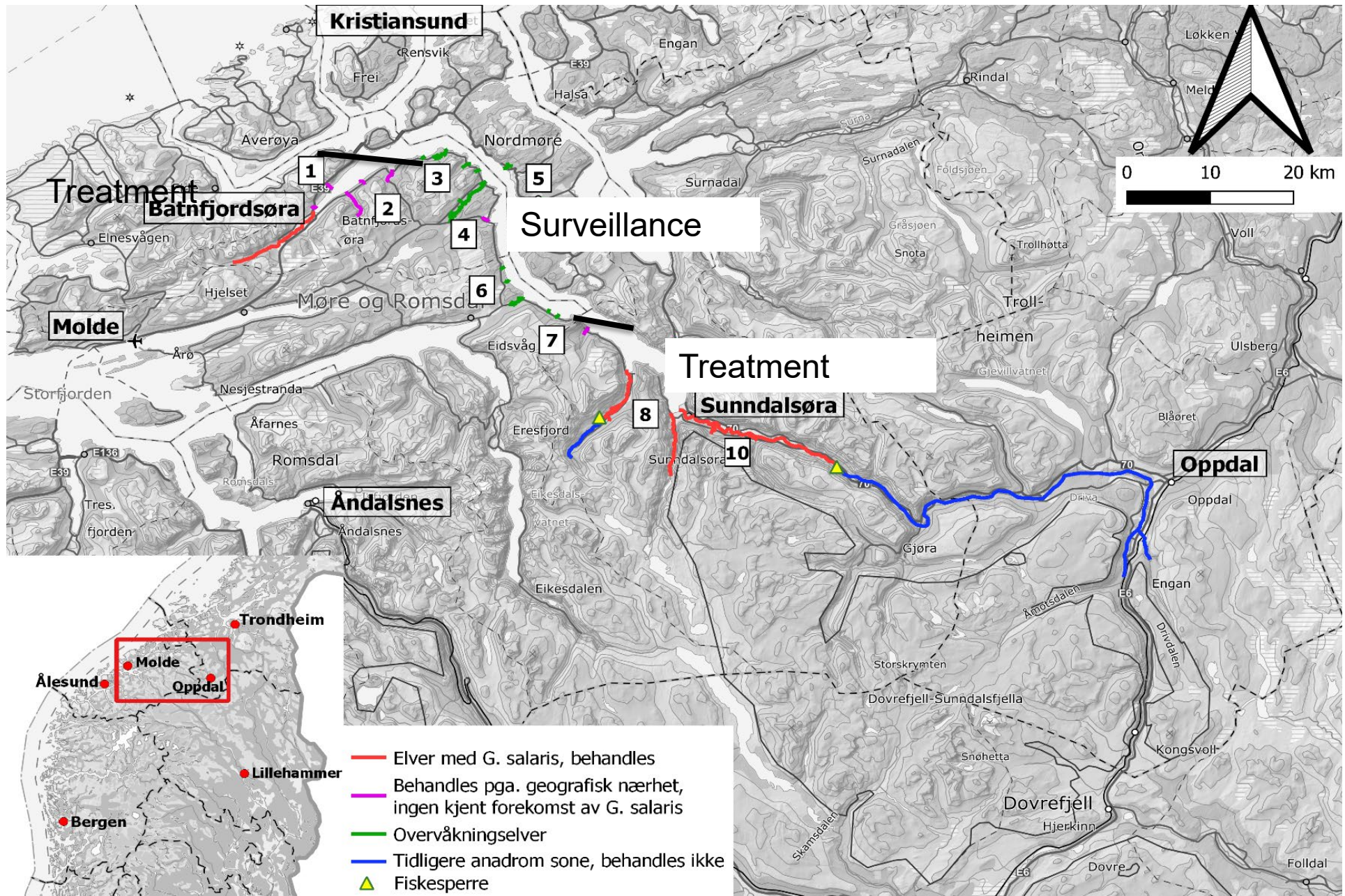
Asle Moen, Head of section  
Norwegian Veterinary Institute (VI), Environmental Restoration and Management



# Organization

- Norwegian Environment Agency, County Governors, Norwegian Food Safety Authority
- VI leads and coordinate the treatment
- Norwegian Institute for Water research (NIVA), Norwegian Institute for Nature Research (NINA) and VI(Gyroklor) are responsible for the Chlorine treatment





# Main stations Chlorine



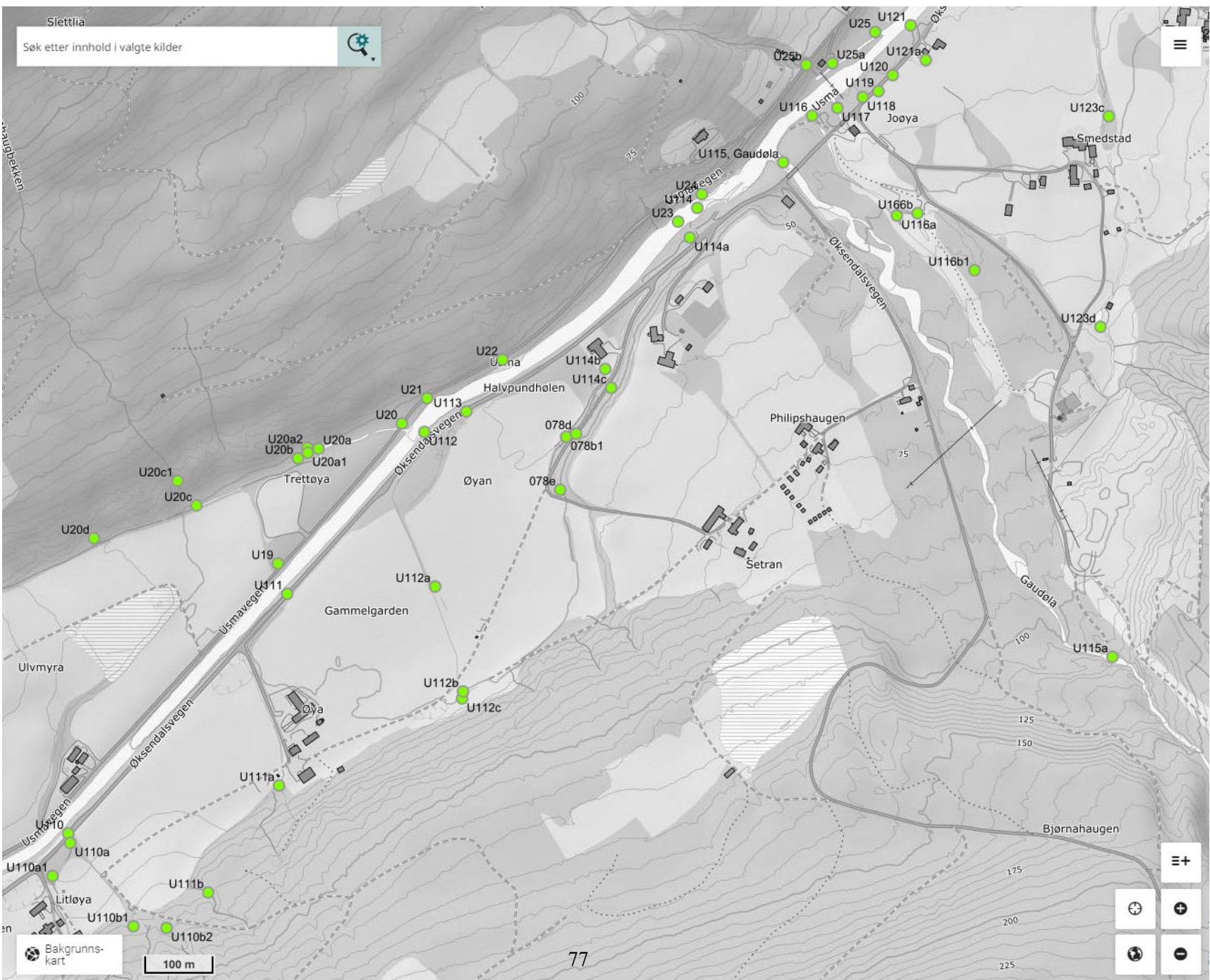
Approximately 23 km

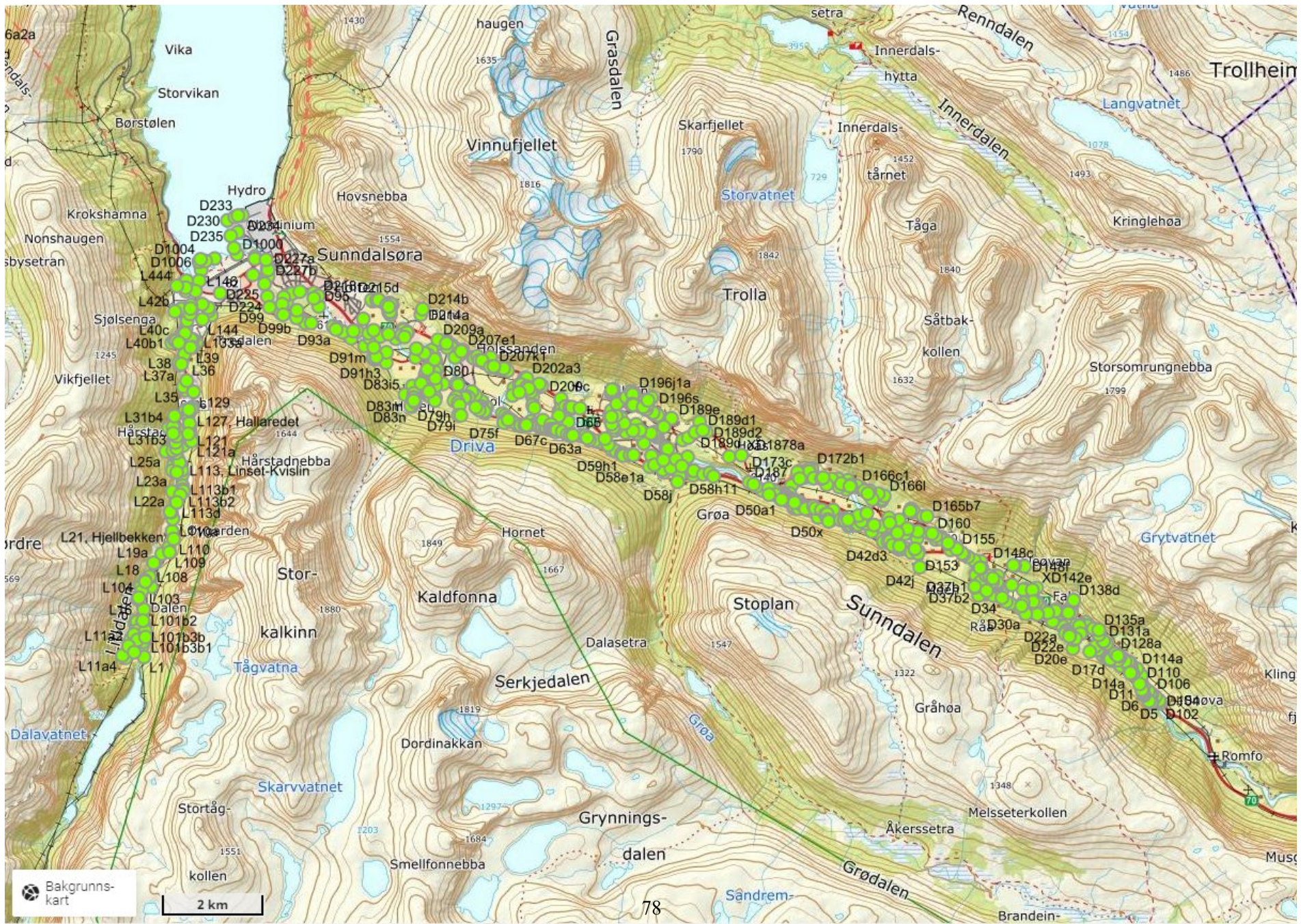


# Rotenone in «Chlorine rivers»

- Ponds, wetlands
- Tiny streams
- Some bigger streams, due to complexity
- Double treatment



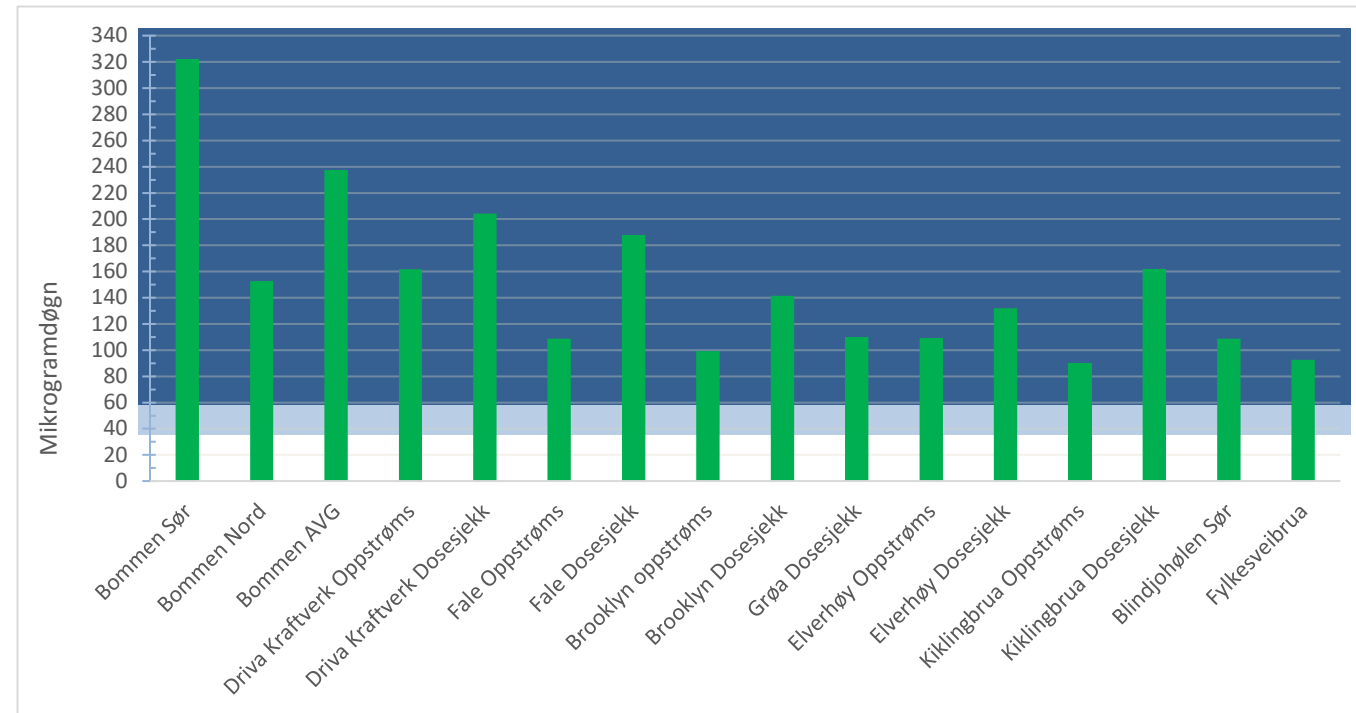






# Results Water chemistry

- Main river
- Tributaries



*Thank you for listening*



**Veterinærinstituttet**  
— *Norwegian Veterinary Institute*

## GSWG(22)12

***Investigation of suspicion of Gyrodactylus salaris in the UK***

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On March 2, 2021 Cefas was notified of a possible PCR positive result for *Gyrodactylus salaris* (Gs). A University had been commissioned to investigate the presence of Gs due to concerns about low numbers of Atlantic salmon in River X. In 2016, Cefas has extensively sampled salmonids in River X for Gs because the population was historically low (the parasite was not found). Water samples were taken from 10 sites on the river; environmental DNA from 4 samples had tested positive for Gs by PCR. However, the analysis by the University had not discriminated Gs from another gyrodactylid species, *Gyrodactylus thymalli* (Gt). The host species for Gt is the grayling (*Thymallus thymallus*), which is believed to be absent from River X. The finding amounted to suspicion of Gs and an investigation was undertaken. Salmonid fish were obtained from a salmon hatchery (producing juveniles for restocking) and from three locations on the river (by electrofishing). Parasites were collected using a non-lethal bath treatment and filtration recovery method (Thrush et al, 2021). A number of parasites were individually analysed by real-time PCR. Further analysis was made of material sedimented from the ethanol used to rinse the filter paper (the ‘general sample’). All results were negative for Gs (and Gt). It is not possible to conclusively demonstrate the absence of a parasite from a defined population. Instead estimates of confidence that a parasite is absent are based on a calculation of the probability of achieving negative results if the parasite is present at (or above) a predetermined level, the design prevalence. The design prevalence is the minimum level at which the parasite should exist if present. The evidence of freedom from Gs rests primarily on the sampling of salmon. Based on the 53 wild salmon sampled, it can be concluded with more than 99% confidence no salmon in the River X are infected (assuming that if present more than 10% of salmon would be infected). Secondly, the negative results from testing 73 individual gyrodactylid parasites provides more than 97% confidence that Gs is absent (assuming that, if present, it would compromise 5% or more of all gyrodactylids on salmon). Negative results from the brown trout populations and PCR testing of the ‘general sample’ provide further evidence of freedom from Gs. The lack of remaining material kept by the University prevented Cefas from establishing whether Gt had been detected by the University. Recommendations to avoid some of the pitfalls that can arise from unaccredited laboratories undertaking research that may result in suspicion of listed aquatic animal diseases were developed. Specifically, Universities and others undertaking investigations for listed diseases should inform Cefas in advance.

## GSWG(22)03

*Update from the Secretariat on the Implementation of the Road Map***Background**

The Working Group on *G. salaris* has been asked to review progress in relation to the recommendations contained in the Commission's 'Road Map' to enhance information exchange and co-operation on monitoring, research and measures to prevent the spread of *G. salaris* and eradicate it if introduced', [NEA\(18\)08](#).

Many of the recommendations in the Road Map relate specifically to the members of the North-East Atlantic Commission, who have been asked to report on those recommendations separately. However, several of the recommendations are directed towards the Commission itself or the Secretariat. This paper provides an update on those.

**Update**

**Recommendation 2a:** The North-East Atlantic Commission (NEAC) should retain an item on *G. salaris* on the agendas for its annual meetings. This would facilitate reports by its Parties and their relevant jurisdictions and by the Working Group on measures to prevent the further spread of the parasite and to eradicate it in areas where it has been introduced and on other aspects of this 'Road Map'.

An item on *G. salaris* has been retained on the Agenda for the NEAC Annual Meeting each year since the adoption of the Road Map in 2018.

The Commission has received updates from its members on activities in relation to the parasite, and from the Working Group, under this Agenda item.

**Recommendation 2b:** The Working Group on *G. salaris* in the North-East Atlantic Commission Area should meet again in 2018 and then every 3 years thereafter, or more frequently if circumstances require, to provide a forum for more detailed information exchange and review of progress in implementing this 'Road Map'.

The Working Group on *G. salaris* met in 2018, 2021 and will meet again in 2022, as agreed by the Commission at its 2021 Annual Meeting.

**Recommendation 2c:** Contingency plans developed by NEAC Parties and their relevant jurisdictions should be made available to the Working Group at its next meeting with the view to sharing information on approaches and challenges. The plans should be made available on the websites of the Competent Authorities with links to them from the NASCO website.

EU – Ireland has forwarded a copy of its contingency plan for *G. salaris* to the Secretariat, but as this is not yet available on the website of the competent authorities it has not been uploaded to the NASCO website.

The Norwegian [contingency plan](#) has also been provided (in Norwegian) and is linked to from the [NASCO website](#).

**Recommendation 4b:** Information should be requested from all NEAC Parties and their relevant jurisdictions which have wild Atlantic salmon but which have not participated in the Working Group to date.

The Secretariat contacted each Head of Delegation in the North-East Atlantic Commission to ask them to confirm their representatives on the Working Group in 2022. No new Parties / jurisdictions indicated that they wished to participate in 2022.

Denmark (in respect of the Faroe Islands and Greenland) – Faroe Islands and the EU have been asked if they wish to provide updates from any jurisdictions that will not attend the meeting.

**Recommendation 4c:** NEAC Parties and their relevant jurisdictions should identify *G. salaris* as an impact factor in the NASCO river database for those rivers infected by the parasite.

The [NASCO Rivers Database](#) displays salmon rivers on the interactive map including their stock status. The information included in the Rivers Database was provided in response to a request made in 2017, prior to the adoption of the Road Map.

At the Annual Meeting in 2022, the Council of NASCO agreed that the Rivers Database would be further developed to become the ‘Wild Atlantic Salmon Atlas’, [CNL\(22\)53](#). The Secretariat will ensure that this recommendation is fed into the Steering Committee as the ‘Wild Atlantic Salmon Atlas’ is built.

**Recommendation 4d:** The NASCO Secretariat should make a request to OIE reference laboratory for *G. salaris* seeking information on the distribution of *G. salaris* in countries that have wild and / or farmed susceptible species, but which do not have wild Atlantic salmon.

Haakon Hansen is the World Organisation for Animal Health (WOAH -formerly OIE) Reference Expert for *G. salaris* and the WOAH Reference Laboratory for *G. salaris* is the Norwegian Veterinary Institute.

Haakon has advised that this paper contains the distribution in all countries, including the most recent detection in Northern Russia:

- Paladini, G., Shinn, A.P., Taylor, N.G.H. et al. Geographical distribution of *Gyrodactylus salaris* Malmberg, 1957 (Monogenea, Gyrodactylidae). Parasites Vectors 14, 34 (2021). <https://doi.org/10.1186/s13071-020-04504-5>

He has also provided this paper, which gives full details on the latest Russian detection:

- Hansen H, Ieshko E, Rusch JC, Samokhvalov I, Melnik V, Mugue N, Sokolov S, Parshukov A (2022) *Gyrodactylus salaris* Malmberg, 1957 (Monogenea, Gyrodactylidae) spreads further – a consequence of rainbow trout farming in Northern Russia. Aquatic Invasions Volume 17, issue 2: 224–237, <http://dx.doi.org/10.3391/ai.2022.17.2.06>

**Recommendation 5b:** The Working Group should keep research requirements and monitoring needs under review and report regularly to the NEAC.

The Terms of Reference for the 2021 meeting of the Working Group tasked the Group with providing ‘a forum for exchange of information among the Parties / jurisdictions on research on, and monitoring, control and eradication programmes for, the parasite’ and developing ‘recommendations for enhanced co-operation on measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced’. The Group’s report, [NEA\(21\)05](#), was considered by the Commission at its 2021 Annual Meeting.

The Terms of Reference for the 2022 meeting are identical to the 2021 Terms of Reference.

**Recommendation 6:** NEAC Parties and their relevant jurisdictions should only support any future proposal to synonymise *G. salaris* and *G. thymalli* if, in parallel, OIE standards and national legislation recognize the different pathogenicity and host predilection of these two species.

In 2020 the North-East Atlantic Commission considered a paper from the Chair of the Working Group, [NEA\(20\)06](#), which concluded that what was formerly *G. thymalli* (parasites from grayling) would not be diagnosed as *G. salaris* by WOAH (formerly OIE), and that the synonymisation will, therefore, have no practical consequences for NASCO Parties / jurisdictions.

**Recommendation 7a:** NEAC Parties and their relevant jurisdictions should develop publicity material on the threat of the parasite to wild Atlantic salmon and specify measures to prevent its spread; strategies for the effective dissemination of this material should be developed particularly with regard to targeting high risk groups. Existing material should be reviewed and updated as

appropriate in the light of current knowledge. The NASCO Secretariat should develop standard text as a basis for such publicity material.

Publicity material has been provided by Norway and EU-Ireland and can be accessed on the [NASCO website](#). Standard text as a basis for such publicity material will be discussed at the meeting.

**Recommendation 7b:** This material should be made available on the web sites and promoted on the social media platforms of the Competent Authorities and NASCO with a view to highlighting the serious risks posed by the spread of the parasite.

The material provided under 7a above is available on the [NASCO website](#) and has been shared on the NASCO twitter feed.

## GSWG(22)13

***Proposed Changes to the ‘Road Map’ to enhance information exchange and cooperation on monitoring, research and measures to prevent the spread of *G. salaris* and eradicate it if introduced***

Recommendation	Proposed Action
<b>1. Preventive measures and contingency planning.</b>	<p>a) Appropriate steps should be taken to prevent the spread of <i>G. salaris</i> on fishing equipment, boats, etc. by use of approved disinfection methods.</p> <p>b) All movements of live fish should be recorded so that movements can be traced in the event of an outbreak of <i>G. salaris</i>.</p> <p>c) <del>The risk of <i>G. salaris</i> introduction through the processing of fish carcasses should be assessed and, where appropriate, mitigated through control of processing.</del></p> <p>d) <del>Physical barriers to fish migration should be considered as a measure to prevent the spread of <i>G. salaris</i> within a catchment and to uninfected catchments.</del></p> <p>e) Where possible, routine breaks in production and disinfection on rainbow trout and salmon freshwater aquaculture sites should be implemented as part of a control programme in infected areas.</p> <p>f) Permission to stock fish into infected river catchments should be based on an assessment of the increased risk of transmission of the parasite to non-infected rivers (e.g. through migration and other routes).</p> <p>g) <u>North-East Atlantic Commission (NEAC)</u> Parties and their relevant jurisdictions should have contingency plans in place for treatment, containment or eradication. These plans should be developed in consultation with stakeholders. A legal base for the use of rotenone or other treatments, containment and eradication measures should be put in place. Contingency plans should be tested periodically and updated as required.</p> <p>h) NEAC Parties and their relevant jurisdictions should endeavour to ensure that adequate resources are available for the implementation of measures to contain and eradicate <i>G. salaris</i>.</p>
<b>2. Cooperation on management.</b>	<p>a) The <del>North-East Atlantic Commission (NEAC)</del> should retain an item on <i>G. salaris</i> on the agendas for its annual meetings. This would facilitate reports by its Parties and their relevant jurisdictions and by the Working Group on measures to prevent the further spread of the parasite and to eradicate it in areas where it has been introduced and on other aspects of this ‘Road Map’.</p>

	<p>b) The Working Group on <i>G. salaris</i> in the <del>North-East Atlantic Commission</del>NEAC Area should meet again in 2018 and then every 3 years thereafter, or more frequently if circumstances require, to provide a forum for more detailed information exchange and review of progress in implementing this ‘Road Map’.</p> <p>c) Contingency plans developed by NEAC Parties and their relevant jurisdictions should be made available to the Working Group at its next meeting with the view to sharing information on approaches and challenges. The plans should be made available on the websites of the Competent Authorities with links to them from the NASCO website.</p>
<b>3. Monitoring methods for use in watercourses, lakes and in aquaculture.</b>	The Working Group should review new developments with regard to monitoring for, and detection of, <i>G. salaris</i> , and develop recommendations for their inclusion in international guidelines.
<b>4. Distribution of <i>G. salaris</i> in the NEAC area and adjacent areas.</b>	<p>a) Existing monitoring programmes on salmonids in the wild and in aquaculture environments undertaken by NEAC Parties and their relevant jurisdictions should be retained and expanded as necessary. <u>If requested, information from monitoring should be made available to the Working Group for consideration at its next meeting. They should provide genetic data for all <i>Gyrodactylus</i> species isolated during monitoring. Reports on these programmes should be provided to the Working Group at their next meeting.</u></p> <p>b) Information should be requested from all NEAC Parties and their relevant jurisdictions which have wild Atlantic salmon but which have not participated in the Working Group to date.</p> <p>c) NEAC Parties and their relevant jurisdictions should identify <i>G. salaris</i> as an impact factor in the NASCO river database for those rivers infected by the parasite.</p> <p>d) The NASCO Secretariat should make a request to the <del>OIE</del>World Organisation for Animal Health (WOAH) reference laboratory for <i>G. salaris</i> seeking information on the distribution of <i>G. salaris</i> in countries that have wild and/or farmed susceptible species, but which do not have wild Atlantic salmon.</p>
<b>5. Research to inform the effective management of <i>G. salaris</i>.</b>	<p>a) The NEAC Parties and their relevant jurisdictions should conduct <del>applied</del>research to inform the effective management of <i>G. salaris</i>, particularly the following:</p> <ul style="list-style-type: none"> <li>- the distribution and genetics of <i>G. salaris</i>;</li> <li>- the effects of salmon genetics on susceptibility to <i>G. salaris</i>;</li> <li>- the effect of environmental factors on pathogenicity;</li> <li>- to clarify the classification of <i>G. salaris</i> and <i>G. thymalli</i> and then develop a reliable method to distinguish between pathogenic and non-pathogenic strains;</li> <li>- general biology and mechanisms of spread of the parasite;</li> <li>- effect of environmental parameters and ecology on the distribution of <i>G. salaris</i>;</li> <li>- detection and diagnostic methods for <i>G. salaris</i>;</li> </ul>



	<ul style="list-style-type: none"> <li>- new environmental friendly treatment methods in rivers and lakes, e.g. acid aluminum and chloride.</li> <li>b) The Working Group should keep research requirements and monitoring needs under review and report regularly to the NEAC.</li> </ul>
<b>6. Classification of <i>Gyrodactylus</i> species.</b>	NEAC Parties and their relevant jurisdictions should only support any future proposal to synonymise <i>G. salaris</i> and <i>G. thymalli</i> if, in parallel, <del>OIE-WOAH</del> standards and national legislation recognize the different pathogenicity and host predilection of these two species.
<b>7. Publicity, education, and awareness.</b>	<ul style="list-style-type: none"> <li>a) NEAC Parties and their relevant jurisdictions should develop publicity material on the threat of the parasite to wild Atlantic salmon and specify measures to prevent its spread; strategies for the effective dissemination of this material should be developed particularly with regard to targeting high risk groups. Existing material should be reviewed and updated as appropriate in the light of current knowledge. <del>The NASCO Secretariat should develop standard text as a basis for such publicity material.</del></li> <li>b) This material should be made available on the web sites and promoted on the social media platforms of the Competent Authorities and NASCO with a view to highlighting the serious risks posed by the spread of the parasite.</li> </ul>
<b>8. Continuity of current measures in the EU Animal Health Law.</b>	Relevant NEAC Parties and their relevant jurisdictions should seek to ensure continuity in the provisions related to <i>G. salaris</i> in current EU animal health legislation (Regulation 2016/429) which should be retained, in particular with regard to additional guarantees.
<b>9. Criteria for diagnosis and establishing <i>G. salaris</i>-free zones.</b>	NEAC Parties and their relevant jurisdictions should implement the diagnostic standards in the <del>OIE-WOAH</del> Manual of Diagnostic Tests for Aquatic Animals.
<b>10. Trade in live susceptible fish species.</b>	<ul style="list-style-type: none"> <li>a) Trade in disinfected eggs is preferable to trade in live susceptible fish species. However, where movements of live susceptible fish species are approved, NEAC Parties and their relevant jurisdictions should ensure that trade in live susceptible fish species only takes place between areas of equal <i>G. salaris</i> status or from a higher to lower status area.</li> <li>b) NEAC Parties and their relevant jurisdictions should ensure the health status of the traded live susceptible fish species and/or their eggs, and the competence of the certifying Authority.</li> </ul>
<b>11. Shared catchments.</b>	NEAC Parties and their relevant jurisdictions with shared catchments or having catchments in close proximity should implement appropriate mechanisms for cooperation, including the establishment and strengthening of inter-country working groups and the development of common contingency plans to control and eradicate <i>G. salaris</i> .