CAWTHRON

REPORT NO. 3859

INVENTORY OF FRESHWATER FISH FARMS AND ASSOCIATED BIOSECURITY MEASURES APPLIED BY REGIONAL AND UNITARY COUNCILS

INVENTORY OF FRESHWATER FISH FARMS AND ASSOCIATED BIOSECURITY MEASURES APPLIED BY REGIONAL AND UNITARY COUNCILS

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EXECUTIVE SUMMARY

In 2022, the Department of Conservation (DOC) commissioned Cawthron Institute (Cawthron) to undertake a review and inventory of current freshwater fish farms, their location, species being reared, the farm system operating, any discharge method to freshwaters, treatment of any discharges and any biosecurity measures being applied.

This exercise involved surveying regional and unitary council planners and resource consent departments / sections, as well as a central government stakeholder, Fisheries New Zealand – Ministry for Primary Industries (MPI). An email survey of council and central government stakeholders was conducted between June and September 2022. A questionnaire was produced by Cawthron, which after internal Cawthron ethics approval, was sent to each council. A copy of this was also sent to MPI. The survey sought further information on consent conditions and monitoring requirements related to ecological management, as part of holding a freshwater fish farm resource consent.

A total of 16 consents and / or consent conditions associated with freshwater fish farms were sourced from council survey respondents. Consent conditions mostly pertained to effluent characteristics, discharge rates, and receiving water quality outside of the mixing zone of the discharge. In terms of discharges to freshwaters, the most common parameters to be cited for monitoring were biological oxygen demand (BOD), temperature, nitrate levels, dissolved oxygen, and water clarity. Of the consents reviewed, none had explicit biosecurity monitoring requirements as regards any discharges to the environment, while four had biosecurity discharge treatment in the form of filtration. Details of the filtration processes themselves were scarce.

There are several key information gaps. Staff from several different councils expressed a lack of knowledge of biosecurity requirements and their need to seek advice on biosecurity issues. There was a disparity between the number of freshwater fish farms acknowledged by councils in their respective regions and the number provided by MPI for the purpose of this report. While there could be confusion with definitions of freshwater fish farming / aquaculture, there is the potential that councils may not recognise certain freshwater fish culture facilities as coming under their remit, such as ornamental fishponds including goldfish. Some council respondents also appeared unsure as to which freshwater species were currently being farmed in previously consented farms that may have cycled through farming different freshwater species during their existence. Some council respondents were also unsure if previously consented farms were ongoing concerns or had ceased trading.

Monitoring of ecological effects from freshwater fish farms as part of resource consent requirements has focused on managing water quality and water quantity. Monitoring has not focused on biosecurity. Recommendations made in this report include design of standardised monitoring approaches for assessing farm biosecurity risks and that biosecurity treatment and monitoring of discharges should be a core requirement of freshwater fish farm consent conditions, when resource consents are being considered by councils.

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1. INTRODUCTION

The New Zealand Government's Aquaculture Strategy to 2025 aims to grow the aquaculture sector sustainably, with resilience objectives including strengthening biosecurity management (www.mpi.govt.nz/dmsdocument/15895-The-Governments-Aquaculture-Strategy-to-2025). In 2022, the Department of Conservation (DOC) commissioned Cawthron Institute (Cawthron) to undertake a review and inventory of current freshwater fish farms, their location, species being reared, the farm system operating, any discharge method to freshwaters, treatment of any discharges and any biosecurity measures being applied. This exercise involved surveying regional and unitary council planners and resource consent departments / sections, as well as a central government stakeholder, Fisheries New Zealand – Ministry for Primary Industries (MPI). An email survey of council and central government stakeholders was conducted between June and September 2022. A questionnaire was produced by Cawthron, which after scrutiny and internal Cawthron ethics approval, was sent to each council. A copy of this was also sent to MPI. This report is expected to provide a baseline of current biosecurity measures being required by regional and unitary councils, during the resource consenting process for freshwater fish farms.

2. SCOPE

For purposes of this study, councils were given a purposely wide definition of 'freshwater fish farming' in the questionnaire to include the farming of freshwater fish, freshwater shellfish, freshwater invertebrates such as crayfish and freshwater aquatic plants. It includes animals which have a freshwater phase such as salmon. Councils were also asked about any activities related to the culture of ornamental or 'hobby' fish such as goldfish. Mussel and oyster farms, and finfish sea cages below mean high-water springs, were not included. The scope of the survey of councils included 11 regional councils[1] and five unitary authorities[2]. MPI were also sent the same questionnaire for general summary responses, under their remit. The questionnaire and accompanying letter sent to the 16 councils (and MPI for their information / feedback) are included in Appendix 1. Because of ethics considerations, responses from councils refer only to general location of farms in each region and names and individual farms are not identified. A map of licensed freshwater fish farm distribution in New Zealand was obtained from MPI. This is included in this report and intended for this internal DOC report only. This map should not be reproduced or referred to in publicly available documents / reports. Cawthron has signed a confidentially deed with

[1] Environment Bay of Plenty, Environment Canterbury, Environment Southland, Environment Waikato, Greater Wellington Regional Council, Hawke's Bay Regional Council, Horizons Regional Council, Northland Regional Council, Otago Regional Council, Taranaki Regional Council and West Coast Regional Council.
[2] Auckland Council, Gisborne District Council, Marlborough District Council, Nelson City Council and Tasman District Council.

MPI to that effect. If DOC wish to reproduce this map or refer to it in a public forum, MPI should be contacted directly.

3. METHODS

The questionnaire on freshwater fish farms asked the relevant council planner / resource consent officers for responses concerning farm location, species being reared, the farm system operating, any discharge method to freshwaters, treatment of any discharges and any biosecurity measures being applied. It also asked how many freshwater fish farm applications the council typically received in a 3-year period. Councils were also asked to provide a copy of consents for any freshwater fish farms in their region, and any associated monitoring reports provided by the consent holders. In addition to answers provided in the questionnaire, consents and monitoring reports were individually searched for ecological consent and / or monitoring conditions required of the consent holders and all this information was collated, with the results presented in Section 4.

MPI were presented with the same questionnaire sent to councils and asked for their summary responses. These results are also presented in Section 4.

After taking guidance from the Cawthron biosecurity team, a broad and explicit definition of freshwater fish farming was provided to council staff to elicit the greatest 'all-inclusive' response as regards applications / consents that would come under this definition and to minimise the risk of council staff inadvertently not providing information they might not consider strictly relevant. The letter sent to councils thus had the following explanatory clause:

> For purposes of this study, "freshwater fish farming" includes the farming of freshwater fish, freshwater shellfish, freshwater invertebrates such as crayfish and freshwater aquatic plants, including animals which have a freshwater phase such as salmon. We are also interested in any activities related to the culture of ornamental or 'hobby' fish such as goldfish.

The survey consisted of 4 questions and an accompanying letter explaining the basis of the report that would be produced, the ethics safeguards and privacy assurances from Cawthron (Appendix 1).

4. RESULTS

This section presents the results of the survey questionnaire for regional and unitary councils, as well as MPI. It also presents details of resource consent conditions for discharge treatments from farms and any biosecurity measures imposed on farms via consent conditions. I have also quoted the general views and opinions of council participants where these have been volunteered but have purposely not identified the officer or council involved. It should be noted that any such quotes from individuals do not necessarily represent the views of their wider organisations.

4.1. Councils

A total of 15[3] out of 16 invited councils participated in the survey. This included eleven regional councils and three unitary authorities. At the time of writing only Auckland Council had not responded to the survey.

Survey results are tabulated and presented under each survey question (Tables 1 and 2). Table 1 addresses the types and biosecurity consent conditions of freshwater fish farms currently licensed in each council's region. While individual farms are not named and exact location not provided, biosecurity measures being applied to consent conditions for discharges from individual farms are provided in Table 1. Table 1 only includes farms which councils believe are ongoing working farms that had progressed beyond the consenting process. Several councils confirmed certain farms that had been consented but never progressed to becoming actual businesses, due to lack of funding, changing business priorities of applicants, or other reasons. Table 2 addresses the general biosecurity and consent conditions that council planning and consenting officers state they seek or will seek for current and future applications concerning freshwater fish farms.

[3] Bay of Plenty Regional Council, Environment Canterbury, Environment Southland, Environment Waikato, Nelson City Council, Gisborne District Council, Greater Wellington Regional Council, Hawkes Bay Regional Council, Marlborough District Council, Northland Regional Council, Otago Regional Council, Tasman District Council, Horizons Regional Council, Taranaki Regional Council and West Coast Regional Council.

Table 1. Council responses to questions on current freshwater fish farming in their region, including species farmed and systems used, number of applications for farms being received by councils and specific biosecurity and monitoring measures being currently applied in licences as regards to conditions for farms and/or discharge of effluent (see also Table 2). The table covers only current ongoing farm enterprises and does not include farms that are no longer in business or where farm enterprises failed to be established after initial consenting process. Farms in each council region are identified by number and corresponding number in the final column are the summarised relevant monitoring / biosecurity treatment conditions for that farm.

Council	How much, which species, and what type of freshwater fish farm occurs in your region ?	How many applications has council received for freshwater fish farms in past 3 years ?	What specific biosecurity measures are applied to consent and monitoring conditions for farms and/or discharges of farm effluent to environment ?
Greater Wellington Regional Council	No freshwater fish farms in region.	None	Not applicable
Environment Southland	None that hold resource consents or that council is aware of.	None	Not applicable
West Coast Regional Council	One freshwater farm currently in operation. (1) Salmon. Enclosed tank system which has consented creek diversion to supply incoming water and discharge same volume.	1-2	(1) Aerated wastewater treatment system of discharge. Discharge of contaminants (excess fish food and waste) to land where they may enter river via seepage from a settling pond system. Water samples taken above and below discharge point and monitored for water quality parameters including pH, BOD, suspended solids and ammonia. No discharge water to contain chemicals used for sterilisation or disinfection.
Northland Regional Council	No freshwater farms – only NIWA Bream Bay Marine Research Centre.	None	Not applicable as no freshwater farms. Bream Bay facility has biosecurity management plan which deals with marine pest risk assessment for facility itself and discharges to marine coastal waters.
Environment Canterbury	Details for 11 marine farms provided. Search link for other consents provided (see (1)). (1) Goldfish. Pond / enclosed tank system.	No response (but see(1))	(1) No discharge from farm itself listed. Only consent is for human sewage tank effluent, presumably from toilet facilities.
Taranaki Regional Council	No freshwater farms.	None	Not applicable.
Marlborough District Council	One freshwater farm in operation.	1-2	

Council	How much, which species, and what type of freshwater fish farm occurs in your region ?	How many applications has council received for freshwater fish farms in past 3 years ?	What specific biosecurity measures are applied to consent and monitoring conditions for farms and/or discharges of farm effluent to environment ?
	(1) Unknown at present, possibly a trout hatchery, previously chinook salmon and/or Koura.		(1) Discharge consent conditions are concerned with water quality parameters (BOD, nitrates etc.), not biosecurity.
Bay of Plenty Regional Council	No freshwater farms.	None.	Not applicable.
Waikato Regional Council	Two freshwater farms. (1) Goldfish. Pond system. (2) Freshwater Prawn. Pond system.	1-2	 (1) None. No discharge to receiving environment identified. (2) Discharge to river. No biosecurity conditions. Consent conditions are concerned with water quality parameters not biosecurity.
Otago Regional Council	Seven freshwater farms / facilities. (1) Crayfish. Pond system and dams / weirs within watercourses. (2) Salmon. Tanks and raceways. (3) Salmon. Tanks. (4) Salmon. Raceway (5) Salmon. Ponds. (6) Salmon. Raceway. (7) Brown trout hatchery. Shed, tank and series of small outdoor ponds.	None.	 (1) No known outflow from ponds and no biosecurity treatment for crayfish farms located in dams / weirs. (2) No biosecurity treatment referred to. (3) Farm not yet commenced. Prior to exercise of consent, consent holder must install backflow prevention device to ensure effluent / contaminants cannot return to water source. (4) No biosecurity treatment referred to. (5) Discharge filtered and treated with bio-filter. (6) No biosecurity treatment referred to. (7) No biosecurity treatment referred to.

Council	How much, which species, and what type of freshwater fish farm occurs in your region ?	How many applications has council received for freshwater fish farms in past 3 years ?	What specific biosecurity measures are applied to consent and monitoring conditions for farms and/or discharges of farm effluent to environment ?
Tasman District Council	Two freshwater farms. (1) Salmon. Ponds. (2) Salmon. Ponds.	None.	(1) No biosecurity measures for discharges to river. Consent conditions for monitoring are concerned with water quality parameters as opposed to biosecurity. (2) Settling pond and bypass channel discharges to river. No biosecurity measures for discharges to river. Consent conditions for monitoring are concerned with water quality parameters as opposed to biosecurity.
Gisborne District Council	Two freshwater farms. (1) Goldfish. Tanks / ponds (2) Crayfish. Tanks / ponds.	1-2	(1) Filtration. Process water filtered between tanks to remove contaminants, fish eggs and fish parts prior to discharge to land. Discharge to river during dry weather prevented by filtration to land, but potential risk during high flows. Consent conditions principally concerned with monitoring water quality parameters, as opposed to biosecurity. (2) Filtration. Filtration through vegetated swale before discharge to river. Consent conditions principally concerned with monitoring water quality parameters, as opposed to biosecurity.
Horizons Regional Council	None that hold resource consents or that council is aware of.	None.	Not applicable.
Hawke's Bay Regional Council	None that hold resource consents or that council is aware of.	None.	Not applicable.
Nelson City Council	None that hold resource consents or that council is aware of.	None.	Not applicable.
Auckland Council	Responded positively but failed to provide data despite repeated requests (possibly still pending)	No response.	No response

Table 2. Council responses to questions on biosecurity and consent conditions for current and future applications for freshwater farms.

Council	**What specific biosecurity measures (if any) related to aquatic animal disease, pests or escapes from farms, are applied to consent and monitoring conditions for farms and / or discharges of effluent from farms to river / lake / sea / land**
Greater Wellington Regional Council	No response to question.
Environment Southland	Direct quote to the response was *Not sure. Would probably seek advice from our Biosecurity team, other regional council consent teams, MPI or consultants with aquaculture background*.
West Coast Regional Council	Salmon farm required discharge effluent to be sampled for water quality parameters and a failed whitebait farm project required whitebait to be farmed in secured tanks within a building.
Northland Regional Council	No response for freshwater farms. Biosecurity plan referred to for NIWA marine research facility which discharges to coastal waters.
Environment Canterbury	No response to question.
Taranaki Regional Council	No response to question.
Marlborough District Council	Direct quote to the response was *None – the restrictions imposed on the consent conditions are primarily concerned with water quality rather than biosecurity*.
Bay of Plenty Regional Council	Direct quote to the response was *None we don't have any consented so haven't had to consider this*.
Waikato Regional Council	Direct quote to the response was *WRC Council staff did not have specific comments on this point. Our marine and inland waters resource officers noted these types of applications are rare*.
Otago Regional Council	Reference is made to a salmon farm that had not been consented by 28/09/2022 but for which a condition requires the Consent holder to install a backflow prevention device to ensure water and / or contaminants not returning to the water source.
Tasman District Council	Direct quote was 'None'.
Gisborne District Council	Direct quote was *the information provided in the ministry for Primary Industries (MPI)* '*Aquaculture Biosecurity Handbook' has been adopted, a pest management plan, a contingency plan and an overall environmental management plan was required as part of the consent*.
Horizons Regional Council	No response to question.
Hawke's Bay Regional Council	No response to question.
Nelson City Council	No response to question.
Auckland Council	No response to question.

4.2. Ministry for Primary Industries

An identical questionnaire to that sent to councils was also sent to MPI and I received a response on 26 August 2022 from a Senior Fisheries Analyst, Aquaculture & Fisheries Permitting Verifications & Operations at Fisheries New Zealand. Questions and MPI responses are detailed below verbatim.

Statement made by MPI before completing questionnaire

We license both land-based freshwater and marine farms. Only farms that operate a freshwater system or have a freshwater species listed on their licence are included in the response below.

Also note that the locations only cover certain activities and species. There are others that we have no oversight on, for example, Fish & Game New Zealand trout and salmon hatcheries, some research institutes, and universities not selling what they grow and some commercial operators growing the likes of goldfish and other certain freshwater and tropical species (vertebrates, invertebrates, aquatic plants etc) that we do not licence as they do not appear on the Notice Specifying Fish Species Which May Be Farmed (2020) (Notice No. MPI 1134) - 2020-go1484 - New Zealand Gazette

(1) **Current freshwater fish farm location**

Licensed freshwater farms are distributed throughout New Zealand. From Northland to Southland. I have attached a map that provides an indication of location. (Note, the map referred to in this particular MPI response is not included, at the later request of MPI. MPI subsequently provided a map for the purpose of the current report and this is provided at the end of section 4.1).

(2) **Species being reared**

The answer to question 3 provides the species that are known to be farmed. However not all species may be at a commercial level just yet. Several research facilities are licensed and able to farm any species listed on the Notice Specifying Fish Species Which May Be Farmed (2020) (Notice No. MPI 1134) - 2020-go1484 - New Zealand Gazette

(3) **System operating**

canal pens (salmon),
earthen dug ponds (koura, grass carp),
concrete raceways (salmon),
earthen raceways (koura)
Recirculating Aquaculture Systems (RAS) (giant kokopu, salmon, spirulina, algae)

(4) **Discharge method and treatment of discharge** (presumably from resource consent)

Fisheries New Zealand has limited information about the water discharge treatments as this is normally left to councils to administer under resource consents. What we do know is the treatments vary between farms from no treatment before discharge, passing water through wetland systems before entering natural waterways to mechanical treatments such as filtration, ozone and chlorination. Noting that some farms are within waterways (hydro canals and the remainder are located near waterways and extract and discharge to rivers or are not directly connected to waterways such as koura ponds and RAS.

(5) **Any biosecurity measures being applied**

This also varies between farms. Every licensed land based farm is required under their fish-farm licence to:

"maintain and implement a biosecurity plan for the farm. The plan must set out protocols, preventative measures, treatments, and contingencies. The plan must be reviewed at least annually and updated accordingly".

However, there is no standard of what must be in the plan as the onus is currently on the licensee to develop the plan. MPI does provide guidance to support farmers develop their plan Protecting aquaculture from biosecurity risks | Biosecurity | NZ Government (mpi.govt.nz).

MPI is undertaking work to strengthen biosecurity management on all farms. This will likely result in all farms being required to implement biosecurity plans that will be monitored and audited against an agreed standard.

4.2.1. MPI Map of Freshwater Aquaculture Farms Across New Zealand

On 8 September 2022, MPI made a map available via a time-limited link, for the sole purpose of completion of this report (Figure 1). This shows the location of freshwater aquaculture farms across New Zealand.

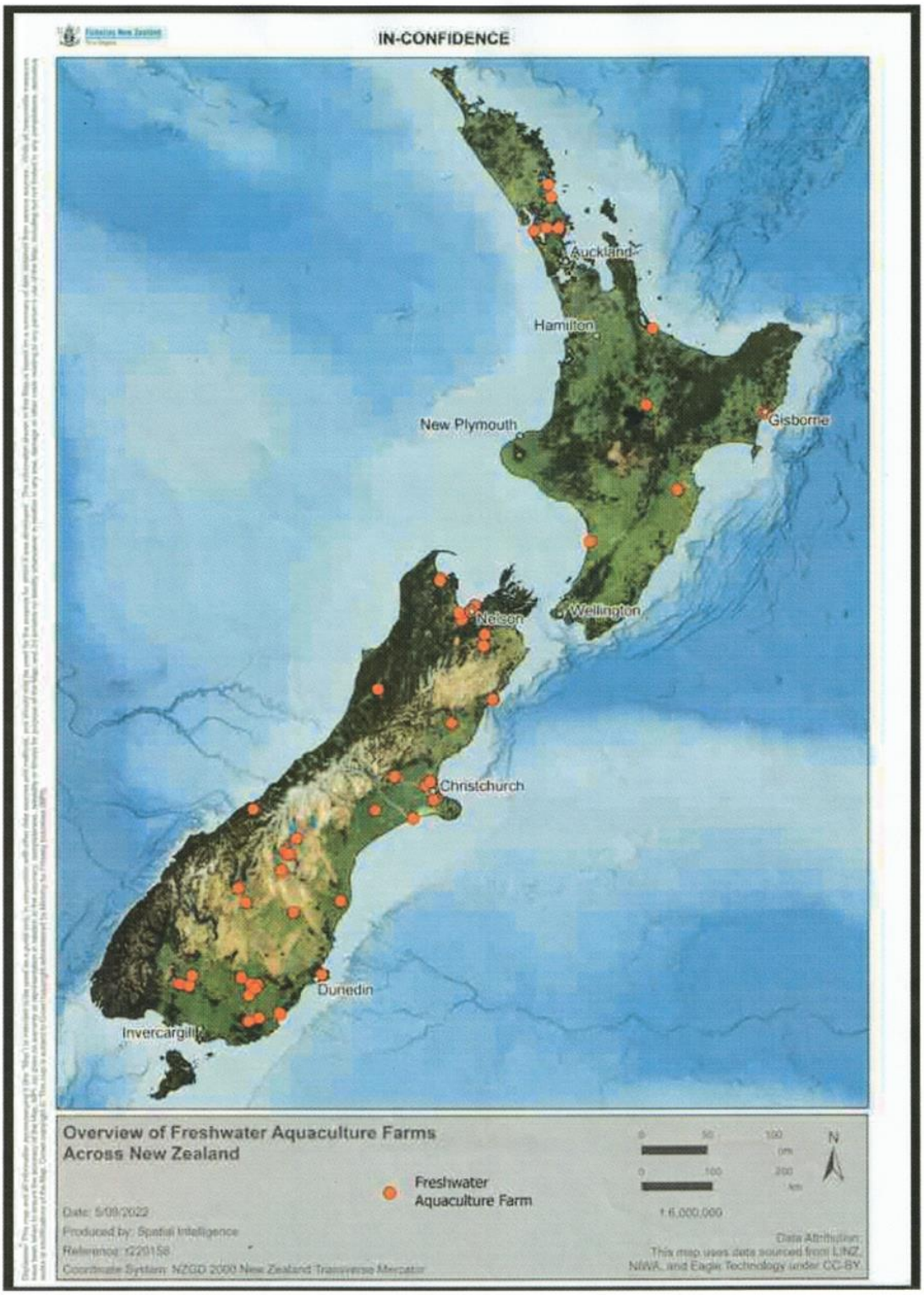

Figure 1. Overview of freshwater aquaculture farms across New Zealand. Access to map was provided to Cawthron Institute on 8 September 2022 and map is reproduced to standard / quality as downloaded.

The map was made available only after Cawthron had signed a confidentially agreement. Parts of the email which accompanied the link are quoted below verbatim:

> The Freshwater farms map has been classified as In-Confidence and is being released to Cawthron and Department of Conservation (DOC) for the purpose of project 18128 to *undertake a review and inventory of current freshwater fish farm location, species being reared, the system operating, the discharge method, the treatment of the discharge and biosecurity measures being applied.*
>
> The confidentiality deed between Cawthron and MPI applies to this map, to which you signed the appendix.
>
> DOC will receive the map via your project report, they are able to receive it for the legislative purpose under section 26ZM of the Conservation Act 1987. Please cite MPI as the source of the map within your report.
>
> The map must be deleted after project completion (email address supplied to The Cawthron Institute which must be contacted once deletion completed).
>
> PLEASE NOTE the map is NOT in a suitable format for release outside of DOC and Cawthron.

4.3. Consent conditions, monitoring and discharge treatment requirements

The survey sought further information on consent conditions and monitoring requirements related to ecological management, as part of holding a freshwater fish farm resource consent. A total of 16 consents and / or consent conditions associated with freshwater fish farms were sourced from council survey respondents (or council portal links to such consents), from which typical consent conditions and monitoring requirements were summarised in Table 1. Consent conditions mostly pertained to effluent characteristics, discharge rates, and receiving water quality outside of the mixing zone of the discharge. In terms of discharges to freshwaters, the most common parameters to be cited for monitoring were biological oxygen demand (BOD), temperature, nitrogen concentration (ammoniacal-N), dissolved oxygen, and water clarity (either colour or clarity). Several consents, typically for reticulating or diversion channel freshwater systems, had conditions for maximum allowable rates of water taking.

Of the freshwater fish farm consents reviewed, none had explicit biosecurity monitoring requirements as concerning any direct discharges of effluent to the

environment, while four had biosecurity discharge treatment in the form of filtration. Arguably these filtration treatments were principally concerned with reducing suspended solid loads, one does refer to filtration preventing fish eggs and fish parts being discharged in effluent. Details of the filtration processes themselves were scarce.

5. KNOWLEDGE GAPS

There are several key information gaps. Several different council staff in planning / consenting departments expressed a lack of knowledge of biosecurity requirements and the need to seek advice on biosecurity issues. The map provided by MPI (Figure 1) presents an overview of freshwater aquaculture farms and provides the general location of over 40 freshwater aquaculture farms, which is more than double the number provided by councils for this report. Some councils stated they had no freshwater fish farms currently in their region, whereas farms appear in these regions in the MPI map. The reasons for this apparent disparity might be worth exploring. These could be potentially related to several farms ceasing trading, records (MPI and or council) not being updated or farms not progressing after the consent stage due to lack of funding (this was mentioned by council staff on two separate occasions in email responses accompanying the questionnaire).

There could also be the problem of definition. The MPI refers to ‘freshwater aquaculture farms’ in its map. Although a very broad definition of freshwater farming was used purposely for a non-specialist audience in the questionnaires sent to councils, it seems evident many planners do not recognise aquaculture research facilities and freshwater fish culture facilities such as ornamental fishponds rearing goldfish as coming under this definition or in some cases, their legal remit. For instance, in the Nelson region, several ‘aquaculture farms’ are located in the Nelson region according to MPI (Figure 1), whereas the council considers there are no existing farms, no farm applications and no consents related to farms. This is concerning as non-commercial aquaculture shares many of the biosecurity risks of commercial fish farming. It should also be noted that non-commercial fish farms are potentially under-represented in this inventory, as there may be circumstances where they may not be required by legislation to obtain a permit from MPI and in some cases, no requirement for a consent from councils. Respondents from several councils also appeared unsure as to which freshwater species were currently being farmed in consented farms that may have cycled through farming different freshwater species during their existence. In addition, several councils confirmed that some previously consented farms never progressed beyond the planning stage, to working viable farms. Reasons for this included insufficient or lack of funding and changing business priorities of applicants. It is unclear whether this information is then relayed back to government agencies.

Monitoring of ecological effects from freshwater fish farms as part of resource consent requirements has predominantly focused on managing water quality and water quantity. Monitoring was not focused on biosecurity. This omission may reflect a lack of understanding and appreciation of potential biosecurity or disease risks for New Zealand freshwater fish species. None of the council respondents referred to freshwater fish farm licence conditions and council feedback was limited to resource consent conditions. It is assumed more specific biosecurity requirements may have been included in individual farm licences.

6. RECOMMENDATIONS

- Further work should be conducted around designing standardised monitoring approaches for assessing biosecurity and disease risks associated with farms, focusing initially on the main freshwater species presently being cultured in New Zealand.
- Biosecurity treatment and monitoring of discharges should be a core requirement of freshwater fish farm consent conditions. Unitary and regional councils should consider biosecurity requirements in every freshwater fish farm application, as a matter of course.
- Improved communications between councils and government departments on the application process on individual fish farms and thereafter if consented farms actually materialise as working businesses and also if working farms change the species farmed or even, eventually, cease trading.
- The definitions of freshwater farming and aquaculture are outlined clearly to councils and planning departments in particular. Associated with this, the scope of farming / aquaculture in biosecurity terms should include species such as ornamental goldfish, even if these are, so far, not legally covered by current fish farm regulations.

7. ACKNOWLEDGEMENTS

I thank the many council survey participants for contributing their time, knowledge, and perspectives to this report. I also thank the MPI for help in collating this report and providing a national map of freshwater fish farm location.

8. REFERENCES

The New Zealand Government Aquaculture Strategy. New Zealand Government. 20 pp. The Government's Aquaculture Strategy to 2025 (mpi.govt.nz).

9. APPENDIX

Appendix 1. Questionnaire for councils

Letter Accompanying Questionnaire for Councils regarding Freshwater Fish Farms

Dear Sir/Madam,

Freshwater fish farm survey for councils

The Cawthron Institute has been contracted by the Department of Conservation (DOC) to provide an inventory of freshwater fish farms. Information from this study will help DOC to provide guidance to councils and to MPI on consent conditions to manage biosecurity risks and other issues associated with fish farms.

Attached is a questionnaire regarding freshwater fish farms. For purposes of this study, "freshwater fish farming" includes the farming of freshwater fish, freshwater shellfish, freshwater invertebrates such as crayfish and freshwater aquatic plants, including animals which have a freshwater phase such as salmon. We are also interested in any activities related to the culture of ornamental or 'hobby' fish such as goldfish.

We are seeking responses from all councils that have freshwater aquaculture activities in their regions, as well as from the Ministry of Primary Industries.

We would appreciate your participation in this survey, to enable us to get a complete picture of freshwater fish farming in New Zealand.

The questionnaire has 4 questions and should take less than 15 minutes to complete. We would greatly appreciate your response by 30 September 2022.

The information you provide will be presented in aggregate and individual farm information will not be identified. If you provide a response that we would like to include in our report with the identify of your council, we will ask your permission before doing so. All detailed responses will be accessible only to the project leader, Dr Calum MacNeil, and an internal Cawthron reviewer. Any non-public information will be held by us for no more than one year after completion of this study (this will only be held for this period for the sole purpose of addressing 'follow-up' questions from DOC).

All information you provide is voluntary, and you can withdraw your consent at any stage. For more information about this survey, please contact Calum MacNeil (calum.macneil@cawthron.org.nz) at the Cawthron Institute.

Regards,

Calum MacNeil,
Freshwater Ecologist, The Cawthron Institute
Mobile: 0272920167

Questionnaire for Councils regarding Freshwater Fish Farms

The first set of questions relates to your council's planning framework around freshwater fish farm activities.

1. How much, which species, and what type of freshwater fish farm occurs in your region?

Farm #	**Type of system** (e.g. recirculating systems; open ponds; tanks)	**Species farmed**	**Any discharge treatment** (including chemical treatment, screening, disinfection, including any biosecurity measures to stop disease, pests etc.)	**Receiving environment** (land, river, sea, etc)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

2. How many applications for freshwater fish farms has your council received in the past three years (you may provide an estimate if this information is not readily to hand)?

☐ None ☐ 1-2 ☐ 3-10 ☐ +10

3. What specific biosecurity measures (if any) related to aquatic animal disease, pests or escapes from farms, are applied to consent and monitoring conditions for farms and/or discharges of effluent from farms to river/lake/sea/land.

4. Other comments?

We would also appreciate if you could provide a copy of consents for any freshwater fish farms in your region, and any monitoring reports provided by the consent holders.

Please indicate below if your council can provide copies of:
□ resource consents?
□ consent monitoring reports?

Many thanks for completing this survey. Your contribution is very much appreciated.