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Modelling the effect of stock exclusion on *E. coli* in rivers and streams

National Application

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NIWA
Taihoro Nukurangi

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Prepared by:
Annette Semadeni-Davies
Sandy Elliott

with input from Richard Muirhead, AgResearch Ltd.

For any information regarding this report please contact:
Annette Semadeni-Davies
Urban Aquatic Scientist
Urban Aquatic Environments
+64-9-375 4532

National Institute of Water & Atmospheric Research Ltd
Private Bag 99940
Viaduct Harbour
Auckland 1010

Phone +64 9 375 2050

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S. Yalden.	Reviewed by:	Dr Sharleen Yalden
J.P. Moores	Approved for release by:	Jonathan Moores Acting Regional Manager, Auckland

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Executive summary

The Ministry for Primary Industries (MPI) commissioned NIWA, in partnership with AgResearch Ltd, to develop and run a national model for predicting the impacts of fencing for stock exclusion on fresh water quality as indicated by annual median and 95th percentile *E. coli* concentrations. The results of the model will be used to inform economic modelling. The aim of the overall project was to determine the costs and benefits of fencing to exclude different types of stock. A national model would assist in analysing the change in *E. coli* concentrations in freshwater around the country as a result of fencing. The altered E.coli concentrations could also be compared to the national bottom line for *E. coli*, as specified under the National Objectives Framework (NOF; Ministry for the Environment, 2014). This report documents the development of the national *E. coli* model (referred to as the *E. coli* Catchment Load Model; ECLM), including data sources, model calibration and application as well as sources of error and uncertainty.

The ECLM is catchment-scale model which predicts annual in-stream *E. coli* baseflow annual loads as a function of land use, including stock type, and catchment characteristics. The land use data were provided by MPI for this project and were derived from the Land Cover Database (LCDB4; Version 4) and the MPI FarmsOnline database. Dairy farming is further broken into sub-classes relating to dairy platform (i.e., milking cows), dairy runoff (calves, non-milking cows and heifers) on land owned or leased by dairy farmers, and dairy grazing on land owned by a third party. Sheep and beef farming was split into intensive lowland, hill country and high country sub-classes based on reach slope and elevation.

Loads from diffuse sources generated by each reach sub-catchment are calculated as the sum of the area in each land use multiplied by a calibrated yield. The effect of fencing on pastoral land is represented as a load reduction factor (LRF), or removal efficiency, which decreases the estimated yield proportionally for each stock type depending on the level of fencing. The LRFs were determined by AgResearch; their derivation is summarised in Appendix A, with further details provided in Muirhead (2016). Three sets of LRF were provided relating to low, most likely and high removal efficiencies, in order to cover the range of values reported in the literature. The current level of fencing was estimated on the basis of preliminary results from the Landcare Research 2015 Survey of Rural Decision Makers (SRDM). The survey data were provided in three super-regions: Northern North Island (NNI: Northland, Auckland, Waikato, Bay of Plenty, Gisborne), Southern North Island (SNI: Taranaki, Manawatu-Whanganui, Hawkes Bay, Wellington) and the South Island (SI).

The ECLM was calibrated against measured *E. coli* concentrations and estimated loads held in the National River Water Quality Network. The calibration statistics showed a high level of uncertainty in the model which reflects the difficulty in modelling micro-organisms. Sources of model error and uncertainty are discussed in detail in Section 6 of this report and include scaling issues relating to the ECLM spatial and temporal resolution and the representation of heterogeneous model parameters as well as the precision and accuracy of input data.

The ECLM was applied to eight fencing scenarios, these are:

- Scenario 1 – current level of fencing:
- Scenario 2 (status quo) – current level of fencing, with further fencing in regions which either have fencing policy in place or are planning new fencing policies to be in place by 2017;

- Scenarios 3a to 3e (Land and Water Forum progressive) – status quo with su fencing along Water Accord streams on land with an average slope of less than 16°:
  - a. dairy platform;
  - b. dairy runoff on land owned or leased by dairy farmers;
  - c. dairy grazing on land owned by a third party;
  - d. sheep and beef; and
  - e., deer;
- Scenario 4 (Steep Hill Country) – fencing along all streams, including non-Accord streams, accessible to all stock on land with an average slope of less than 28°.

For each scenario and LRF, the effect of fencing on *E. coli* annual median and 95th percentile concentrations was estimated by determining the proportional change in estimated *E. coli* loads determined for each scenario compared to baseline fencing level and then multiplying estimated reach concentrations (Unwin and Larned, 2013) by the same proportional change. The estimated base-flow annual median and 95th percentile concentrations calculated for each scenario and LRF were then assigned to NOF attribute state classes and the length of streams in each class were determined by region and super-region. Key findings for the most likely LRF are listed below:

1. Under Scenario 1, around 80% of non-Accord streams and 90% of Accord streams nationally have median *E. coli* concentrations in NOF Band A. The estimated 95th percentile concentrations suggest that around 65% of Accord streams in the North Island do not meet the minimum acceptable state for full immersion. In the South Island, around 27% of Accord streams have estimated *E. coli* 95th percentile concentrations that do not meet this state.

2. Scenario 2 only affects Auckland, Waikato, Taranaki, Hawke's Bay, Wellington, Marlborough and Canterbury. The effect of this scenario is variable and is dependent on regional land use and stock exclusion policies. The percentage of Accord stream lengths in NOF Band A increases to 84% for NNI, 95% for SNI and to 45% for SI compared to Scenario 1. The stream-length of non-Accord in Band A increases slightly due to the requirement for fencing along these streams in the regions noted above. The 95th percentile concentrations are very similar to those for Scenario 1

3. Since there is little capacity for further exclusion of dairy stock under the SRDM, Scenarios 3a-c have very similar results to Scenario 2. Scenarios 3d and 3e are very similar to each other and see a 4% increase in stream lengths in Band A for NNI and an increase of 1% each for SNI and SI The region most affected by Scenario 3d is Northland which has a 12% increase in stream lengths in with estimated median concentrations in Band A. The proportion of stream lengths in Band A remains virtually unchanged for the 95th percentile concentrations compared to Scenario 2.

4. Scenario 4 results in well over 90% of non-Accord and Accord stream-lengths nationally having estimated median concentrations in Band A. Compared to Scenario 2, the percentage of streams in Band A increases by 20%, 12% and 13% for NNI, SNI and SI respectively for the non-Accord Streams. The equivalent increases for the Accord streams are 10%, 5% and 4% respectively.

   The percentage of stream lengths with an estimated 95th percentile concentration in Bands C and D reduces across the country under this scenario. The length of non-Accord streams in Bands C and D decreases by around 20%, and the length of Accord streams decreases by 10%.

1 Introduction

1.1 Background

The Ministry for Primary Industries (MPI) commissioned NIWA, in partnership with AgResearch, to develop and run a catchment-scale model nationally to predict the effect that stock exclusion (i.e., fencing to restrict stock access to waterways and their riparian margins) may have on water quality. While fencing is also used as a mitigation for other contaminants such as nutrients and sediments, this work focusses on faecal pathogen as indicated by *Escherichia coli (E. coli),* in freshwater. The work is part of a wider study into the environmental and economic effects of the implementation of the National Objectives Framework (NOF) under the National Policy Statement for Freshwater Management (NPS-FM, Ministry for the Environment, 2014).

E. coli is used as an indicator of freshwater faecal contamination as part of risk assessments of pathogen infection and is one of the attributes of the "Human health" water quality value in the NOF. Managing freshwater to this value is compulsory under the NOF and the *E. coli* attribute is assessed against median and 95th percentile concentrations of E.coli in freshwater. The NOF makes the assumption that if *E. coli* are present in freshwater bodies, then other more pathogenic faecal micro-organisms are also likely to be present. In general, higher levels of E.coli would indicate an increasing risk of infection in humans who use freshwater for primary and secondary recreation activities. The NOF bands for *E. coli* annual median and 95th percentile concentrations are given in Table 1-1. The NOF bottom line for secondary non-contact recreation (e.g., kayaking and wading) is an annual median concentration of 1000 organisms / 100 ml, while the minimum acceptable state for full immersion is a 95th percentile concentration of less than 540 organisms / 100 ml.

The key source of faecal contamination in rural freshwater bodies is grazing livestock, although water fowl and other wild or feral animals can be additional sources. *E. coli* from stock enters the stream network via direct deposition of faecal matter into the stream or via indirect pathways including discharges of dairy effluent into streams, surface wash-off in areas of steep terrain, overland flow from excess irrigation water and drainage via artificial drains (Collins et al., 2007; Muirhead, 2015). Cattle in particular are attracted to water both for drinking and thermoregulation. Restricting stock access to water ways, using stream fencing or riparian planting, is therefore a highly effective mitigation strategy (McKergow et al., 2007; Muirhead et al., 2011; Quinn, 2012).

1.2 Project Scope

This project involved developing and running the *E. coli* Catchment Loads Model (ECLM) on a for eight alternative stock exclusion policy scenarios. The scenarios were identified by MPI (with input from MfE) and were developed on the basis of regional policies on stock exclusion and the Land and Water Forum (LAWF, 2015) recommendations for stock exclusion.

The ECLM results will be used to inform an economic model to enable a preliminary cost-benefit analysis to determine the potential impacts of stock exclusion on both economic and non-market values associated with New Zealand's waterways.

Table 1-1: National Objectives Framework attribute table for *E. coli*. Reproduced from Appendix 2 of the National Policy Statement for Freshwater Management (New Zealand Government, 2014).

Value		Human health for recreation	
Freshwater body type		Lakes and rivers	
Attribute		*E. coli*	
Attribute unit		*E. coli* /100ml (number of *E. coli* per hundred millilitres)	
Attribute state	**Numeric attribute state**	**Sampling statistic**	**Narrative Attribute state**
A	≤ 260	Annual median	People are exposed to a very low risk of infection (less than 0.1% risk) from contact with water during activities with occasional immersion and some ingestion of water (such as wading and boating)
		95th percentile	People are exposed to a low risk of infection (up to 1% risk) when undertaking activities likely to involve full immersion
B	> 260 and ≤ 540	Annual median	People are exposed to a low risk of infection (less than 1% risk) from contact with water during activities with occasional immersion and some ingestion of water (such as wading and boating).
		95th percentile	People are exposed to a moderate risk of infection (less than 5% risk) when undertaking activities likely to involve full immersion. 540 / 100ml is the **minimum acceptable state** for activities likely to involve full immersion.
C	> 540 and ≤ 1000	Annual median	People are exposed to a moderate risk of infection (less than 5% risk) from contact with water during activities with occasional immersion and some ingestion of water (such as wading and boating). People are exposed to a high risk of infection (greater than 5% risk) from contact with water during activities likely to involve immersion.
National bottom line	1000	Annual median	
D	>1000	Annual median	People are exposed to a high risk of infection (greater than 5% risk) from contact with water during activities with occasional immersion and some ingestion of water (such as wading and boating).

1.3 Contents of this Report

This report:

1. Summarises the stock exclusion scenarios provided for this project by MPI;
2. Provides an overview of the measured and modelled input data used to develop and calibrate the ECLM including the drainage network, land use and farming practices, and both measured and modelled *E. coli* loads and concentrations;
3. Describes the ECLM including the model's calibration, assumptions and sources of uncertainty;
4. Presents the results of ECLM runs.

While the ECLM was applied at the REC2 reach-scale, the results are presented at a larger scale (i.e. by super-region) due to limitations in the spatial data used to determine the current level of fencing (see Section 3.1.4). The super-regions are: Northern North Island (NNI; Northland, Auckland, Waikato, Bay of Plenty, Gisborne), Southern North Island (SNI; Taranaki, Manawatu-Whanganui, Hawkes Bay, Wellington) and the South Island (SI).

A complementary study was undertaken by AgResearch under sub-contract to NIWA to provide the low, most likely and high *E. coli* removal efficiencies associated with fencing for scenario creation (Muirhead, 2016). This study was primarily based on available literature, and a summary is provided in Appendix A.

2 Stock exclusion scenarios

This study focuses on the effect of fencing to exclude different types of stock and does not consider the effect on *E. coli* of other exclusion methods such as riparian planting. The scenarios were developed by MPI (with input from MfE) and were based on existing or planned regional policies and the LAWF (2015) recommendations for stock exclusion. The scenarios are summarised in Table 2-1 and discussed further below. The modelled length of fenced waterways for each stock type are summarised in Appendix B. The low, most likely and high catchment-scale removal efficiencies for *E. coli* that are associated with fencing were determined by AgResearch and are given in Section 3.2.

Table 2-1: Fencing for stock exclusion scenarios.

Scenario	Description
1 Current	Current level of fencing for stock exclusion for Accord streams (i.e., wider than 1m, less than 30 cm deep, permanently flowing)
2 Status quo	Current level of fencing PLUS regional requirements to be implemented by July 2017
3 LAWF progressive (2015): Applied to Water Accord streams on land with an average slope less than 16°	
3a.	Status quo PLUS exclusion of currently unfenced dairy cattle on dairy platforms by 2017
3b.	Scenario 3a PLUS exclusion of currently unfenced dairy cattle grazing on land owned by dairy farmers by 2020
3c.	Scenario 3b PLUS exclusion of currently unfenced dairy cattle grazing on land owned by a third party by 2025
3d.	Scenario 3c PLUS exclusion of currently unfenced beef cattle
3e.	Scenario 3d PLUS exclusion of currently unfenced deer by 2025 on flat land, and 2030 on rolling land.
4 Steep Hill Country	Scenario 3e PLUS currently unfenced cattle (dairy and beef) and deer excluded from all steep country (slopes up to 28°) by 2017

2.1 Scenario 1: Current level of fencing

The current level of fencing was approximated on the basis of preliminary results from the Landcare Research Survey of Rural Decision Makers 2015 (SRDM; see Section 3.1.4) provided to MPI for this study. Fencing is assumed to apply only to waterways which meet the criteria for fencing from the Sustainable Dairying Water Accord (Dairy Environment Leadership Group, 2013). Under these criteria, an Accord-stream is defined as a freshwater waterway wider than 1 m, deeper than 30cm and permanently flowing. Accord streams are identified for this project using the method outlined in Section 3.1.

2.2 Scenario 2: Status quo

Scenario 2 applies regional policies on stock exclusion beyond the current level of fencing. The policies were identified by LAWF in a desktop review (2015); their review shows that stock access to waterways is generally permitted around the country except in areas prone to bank or bed erosion, or when minimum standards for suspended solids / turbidity or clarity are not being met. Regions which, according to LAWF, either already have specific stock exclusion policies in place or are

planning changes in policy are listed in Table 2-2 along with a summary of the policy and how the scenario was applied in the model.

Two of the regions, Taranaki and Waikato, have policies which are applied to specific locations, these are mapped in Figure 2-1. It should be noted that under the regional policies listed above, several regions, such as Auckland and Taranaki, encourage or require riparian planting rather than fencing in some areas both to improve stream health and for bank armouring as well as stock exclusion. Moreover, stock exclusion is seen by some of the regions as one mitigation practice amongst a range options that could be used to improve water quality. However, this study only considers the effect of fencing.

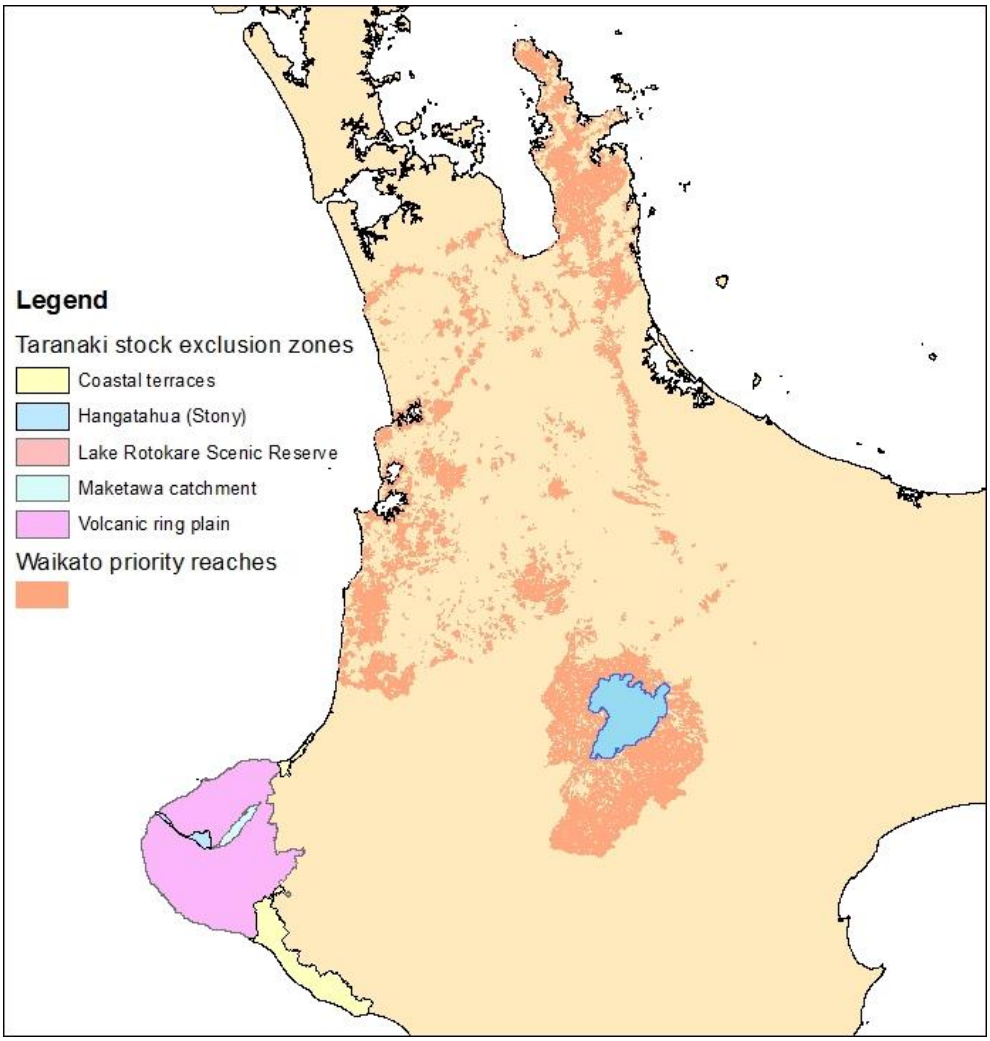

Figure 2-1: Proposed stock exclusion zones for Taranaki and Waikato. Shapefiles supplied for this project by the Taranaki and Waikato Regional Councils.

Table 2-2: Scenario 2 existing or planned regional fencing policies by region.

Regional Authority	Plan document / Source	Applicable requirements for stock exclusion	ECLM application
Auckland Council	Auckland Draft Unitary Plan (2013)n	Exclusion of all stock on intensively farmed land from any lakes, rivers, streams or wetlands, with the exception of intermittent streams, within 5 years of notification. Intermittent streams must have stock exclusion within 10 years of notification. Stock exclusion can be achieved using fences or riparian planting.	Scenario 3e extended to non-Accord streams.
Waikato Regional Council	In preparation	LAWF (2015) reports that all stock is to be excluded from Priority One waterways in Waikato. However this policy is not yet in place and the Waikato Regional Council Collaborative Stakeholder Group is currently assessing a range of mitigation options including stock exclusion as part of the preparation of a new Regional Plan.	Scenario 4 is applied to the priority waterways shown in Figure 2-1, all other reaches are assigned the current level of fencing.
Hawkes Bay Regional Council	Hawke's Bay Resource Mangement Plan (2014) Tukituki River Catchment Plan (2015)	There are no region-wide policy on stock exclusion in Hawke's Bay Instead, rules will be proposed on a catchment by catchment basis (personal communication, Barry Lynch, HBRC). The Tukituki River is the first catchment with a specific stock exclusion plan, this requires stock exclusion along all waterways (lakes, wetlands and rivers whether they are intermittent or permanently flowing) for all stock with the exception to sheep on land with a slope less than 15°.	Asssumed that the Tukituki River Catchemtn requirements are in place across the region. Scenario 3e extended to non-Accord streams.
Gisborne District Council	Proposed Gisborne Proposed Regional Freshwater Plan (2015)	There are no geographically specific plans for stock exclusion under the proposed plan, however exclusion will be required for new intensive farms	Not represented in the model

Regional Authority	Plan document / Source	Applicable requirements for stock exclusion	ECLM application
Taranaki Regional Council	Draft update to the Regional Freshwater Plan (Taranaki Regional Council, 2001)	More restrictive fencing and riparian management regulations are proposed in some parts of Taranaki under the. Intensively farmed stock to be excluded from all waterways on the ring plain and on northern and southern coastal terraces (council Contact Chris Spurdle) . Further restrictions that have not yet been specified, will be required for waterways of outstanding natural value (i.e., the Stony and Maketawa catchments and Lake Rotokare). Other stock (sheep, deer, pigs) are not included in the proposed policy.	The scenario is applied only to the zones mapped in Figure 2-1 and is approximated by Scenario 3d extended to include non-accord streams. All other reaches and are assigned the current level of fencing.
Greater Wellington Regional Council	Proposed Natural Resources Plan for Wellington (2015)[1]	Two stage policy for stock exclusion. Phase one would require fencing along all priority sites including significant wetlands, near water supply intakes and fish and bird habitats within three years of notification. Phase two would exclude all stock except sheep on waterways wider than one metre on lowland properties and wider than three metres on hill country within seven years of notification.	Scenario 3e is extended to include waterways wider than 3m with a slope between 16-28° to approximate Phase two of the policy. Reaches which do not meet these criteria are assigned the current level of fencing.
Marlborough	Resource planning documents in Marlborough[2] are currently under review.	According to LAWF (2015) it is proposed that all stock other than sheep and beef be prohibited from entering or passing across the bed of any river or lake. Intensively farmed beef cattle may also be excluded.	Scenario 3e is extended to include non-Accord streams to approximate the policy on the assumption that dairy and intensively farmed beef are located in lowlands and given that there is only a small percentage area of deer farming in the region.
Environment Canterbury	Canterbury Natural Resources Regional Plan (2011) [3]	All intensively farmed stock to be prohibited from entering any natural waterway. Additionally, cattle, farmed deer or pigs prohibited from entering water ways within one kilometre of a bathing site, drinking water supply intake, salmon or inanga spawning site or within permanently flowing reaches of specified rivers.	Scenario 3e extended to include non-Accord streams on the assumption that intensively farmed stock are located in lowlands. This scenario was also applied to the Waitaki River managed jointly by Environment Canterbury and Otago Regional Council, however, the results for the Waitaki district are separated out from the Canterbury results.

[1] See policy summary at http://www.gw.govt.nz/assets/Plans--Publications/Regional-Plan-Review/Draft-Regional-Plan-docs/Activity-sheets/WGNDOCS-1402559-v1-V2AGlivestockaccesstowaterways.pdf
[2] http://www.marlborough.govt.nz/Your-Council/RMA.aspx
[3] Rule WQL21 in http://ecan.govt.nz/publications/Plans/nrrp-chapter-4-operative-110611.pdf
http://ecan.govt.nz/publications/Plans/stock-exclusion-from-waterways-factsheet.pdf

2.3 Scenario 3a – e: LAWF progressive fencing

The LAWF progressive scenario is based on the LAWF (2015) recommendations on the policy design of a proposed regulatory requirement to exclude dairy cattle from waterways by July 2017. The recommendations see a staged progression of fencing between 2015 and 2025 based on catchment characteristics and stock type and ownership. The LAWF progressive scenarios are listed in Table 2-1 above.

2.4 Scenario 4: Steep Hill Country

The steep hill country scenario sees fencing extended to exclude dairy and beef cattle and deer from all stream reaches on land with a slope less than 28°.

3 Model description

The input data and modelling procedure followed here are summarised in Figure 3-1 and described in the sections below.

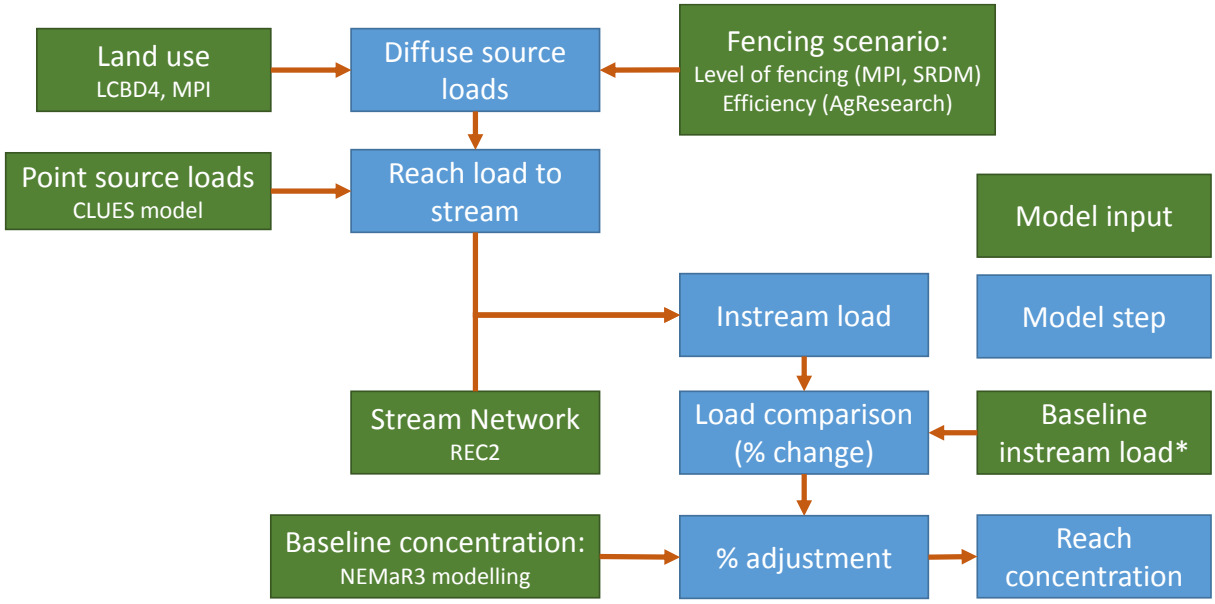

Figure 3-1: Schematic diagram of the model process. Loads and concentrations are calculated for each reach in the REC2 drainage network database. *Baseline instream load modelled using baseline fencing 2010 and most likely LRF.

3.1 Input data

3.1.1 Drainage network

The ECLM operates at the catchment-scale (~10 km^2) and the smallest spatial unit is the REC version 2 (Snelder et al., 2010) river reach and its contributing area, henceforth referred to an REC2 sub-catchment. The REC2 was derived from a digital elevation model with a grid-cell size of 30x30m and 20m contours. A river reach in the REC2 is generally several hundred metres in length. There are some 593,500 reaches in the REC2 database. The combined length of all REC2 reaches in New Zealand is around 400,000 km, of which approximately 168,600 km are accessible to stock.

Data held in the REC2 database that are used in the ECLM are:

- stream length and length of stream in lakes;
- reach sub-catchment area;
- stream order[4];
- estimated mean annual flow rate as determined by Woods, Hendrikx, et al. (2006);

[4] The REC2 uses the Strahler method of assigning stream order. Stream order is a means of indicating the relative size of a stream by the number and order of tributaries. First order streams are headwaters and have no up-stream tributaries. The largest rivers in New Zealand generally have an order of 7 or 8 at their lower reaches.

- mean annual rainfall taken from 1960 – 2006 rainfall normals, spline interpolated from rain gauges across the country; and
- average slope obtained from a digital elevation model (DEM) with a 30x30 m cell grid and 20 m elevation contours.

For reaches that contain a lake outlet, the estimated mean annual overflow from the Catchment Land Use for Environmental Sustainability, CLUES, model (Woods, Elliott, et al., 2006; Semadeni-Davies et al., 2011) database is used to calculate attenuation (or losses) in reservoirs, due to long residence times.

For reporting purposes, reaches in the REC2 database were separated into Water Accord and non-Accord streams. These streams where further separated by slope class. It is assumed that all reaches within the REC2 database are permanently flowing and that waterways with an order of 2 (i.e., streams with upstream tributaries) or more meet the Water Accord. Head-water streams (i.e., first order streams with no tributaries) streams are classed as Accord streams as defined in Section 2 if the estimated width is greater than 1 m. Stream width has been estimated (Booker and Hicks, 2013) from the mean annual flow estimated for each reach. Stream depth is not assessed; instead, it is assumed that streams wider than 1 m will have a depth of at least 30 cm. Around 77% of streams nationally are classed as Accord streams using the method outlined above. The length of streams in each grouping is given by super-region and region in Table 3-1.

3.1.2 Land use

Land use data has been provided for this study by MPI as the percentage breakdown of land use types found in each REC2 reach. The modelled land use classes are:

- Dairy;
- Sheep and beef (intensive, hill and high country);
- Deer;
- All other stock and lifestyle blocks;
- Tussock;
- Forest (scrub, native and exotic forest);
- Arable crops;
- Horticulture;
- Urban; and
- All other land uses including bare soil, water, transport, etc.

The underlying land cover was taken from the Land Cover Database Version 4 (LCDB4) and relates to the year 2012. Since LCDB4 does not differentiate between pasture types, pastoral land cover (i.e, productive grassland) was split into different agricultural land use classes (or stock types) on the basis of the MPI FarmsOnLine[5] geo-spatial database. It is important to note that FarmsOnline was developed for the purpose of biosecurity response which meant that the data had to be adapted for this project.

[5] https://farmsonline.mpi.govt.nz/

Table 3-1: Length (km) of non-Accord and Accord streams grouped by slope class in each super region and region.

Super-region and region	Non-Accord streams				Accord streams				Regional total
	<16°	16 to 28°	>28°	Total	<16°	16 to 28°	>28°	Total	
NNI	17469	3687	233	21389	57853	14224	2954	75030	96419
Auckland	2072	208	6	2285	3974	310	8	4292	6577
Bay of Plenty	1982	818	181	2981	9544	4008	2312	15864	18845
Gisborne	1499	983	9	2491	5549	4195	410	10154	12646
Northland	4215	500	4	4719	12538	1144	17	13699	18418
Waikato	7701	1178	33	8912	26248	4566	208	31021	39933
SNI	14888	6341	289	21518	39567	19637	2029	61234	82752
Hawkes Bay	5661	1315	147	7122	12210	4781	652	17644	24766
Manawatu / Whanganui	6600	3072	96	9768	17191	7962	606	25758	35526
Taranaki	1372	1295	7	2675	6686	4205	71	10963	13637
Wellington	1254	660	40	1953	3480	2689	701	6869	8823
SI	33440	13515	3354	50309	80464	50345	39801	170609	220919
Canterbury	11515	4976	1212	17703	24372	12114	7859	44345	62048
Canterbury / Otago	2646	1309	185	4140	3447	2304	839	6590	10730
Marlborough	815	1980	870	3665	2987	5369	3003	11359	15024
Otago	11359	3101	664	15124	15628	7442	5012	28082	43206
Southland	6221	1256	243	7719	17268	7322	8828	33419	41138
Tasman	769	833	168	1770	3684	5573	3111	12368	14138
West Coast	115	60	13	188	13079	10221	11148	34447	34635
National Total	65796	23543	3877	93216	177884	84206	44784	306874	400090

While nominally relating to current land use, FarmsOnLine contains data that is up to 5-years old and therefore covers the period 2010-2015. For each farm block, FarmsOnline records the primary and secondary land use registered to the owner of that block. Here, only the primary land uses are used. A workflow diagram showing how LCDB4 and Farms Online data were used to derive the land use classes listed above is given in Appendix C. To maintain confidentiality, the FarmsOnline data was extracted at an aggregated level of detail (i.e., by REC2 reach sub-catchment) so that individual properties could not be identified.

Since the scenarios apply different levels of fencing for different types of dairy (dairy platform, diary runoff on land owned or leased by the dairy farmer and third party grazing) farms, the pastoral land use classes derived from FarmsOnline were further split on the basis of unpublished preliminary data from the 2015 Agricultural Production Survey (APS) undertaken by Statistics New Zealand[6]. These

[6] http://www.stats.govt.nz/survey-participants/a-z-of-our-surveys/agricultural-production-survey.aspx

data were aggregated by super-region by MPI and were analysed by AgResearch. The survey gives information on the type and stocking rates for a range of farm enterprises. The dairy land use class was split for each super region into dairy platform and dairy runoff, relative to the proportion of cows and heifers in milk to dairy cattle not in milk. Non-milking dairy cattle (as recorded in the APS data) were used to represent dairy cattle being grazed on land owned by a third party. The proportion of non-milking dairy cattle on sheep and beef farms was used to separate these 'dairy cattle grazing on land owned by a third party' out from the intensive sheep and beef land use class. The proportions of dairy cattle in each dairy class are given in Table 3-2.

Table 3-2: Percentage by super-region of dairy cattle in the dairy and intensive sheep and beef land use classes used to create the LAWF progressive scenarios (3a-3d). APS preliminary data provided by MPI and analysed by AgResearch.

Land use breakdown	Dairy platform			Dairy cattle grazing on land owned or leased by dairy farmers			Dairy cattle grazing on land owned by a third party		
Super-region	NNI	SNI	SI	NNI	SNI	SI	NNI	SNI	SI
Proportion (%) of underlying land use class	91	90	90	9	10	10	8	3	16
Underlying land use class	Dairy			Dairy			Intensive sheep and beef		

3.1.3 Baseline *E. coli* concentrations

E. coli annual median and 95th percentile concentrations were calculated for each reach in the REC1 database using a random forests method approach (a form of multivariate regression) as part of the NEMaR3 programme (Unwin and Larned, 2013). These concentrations were mapped to the equivalent REC2 reaches for this project to provide the baseline concentrations.

The NEMaR3 *E. coli* concentration model was calibrated against concentration data collected from 738 monitoring sites held in the NRWQN. The NRWQN contains data from NIWA monitoring sites as well as sites operated by regional councils and covers the entire country. Data to December 2012 was used in the NEMaR3 analysis with the starting dates for sampling for the different sites being 1 January 2006 or earlier (i.e., at least seven years of data from each site). The estimated concentrations relate to the reference year of 2010. The model was able to explain over 72.3 % of the observed site-to-site variation. The most significant model variables were catchment elevation, percentage intensive pastoral land cover and rainfall variability.

3.1.4 Survey of Rural Decision Makers

Preliminary data from the SRDM were used to determine the level of fencing in 2010 and 2015 in order to create Scenario 1[7]. The level of fencing in 2010 was required as the NEMaR3 estimated *E. coli* concentrations have the baseline year of 2010 and relate to the level of fencing at that time. The SRDM data were provided to MPI by Landcare Research (Contact Pike Brown) for this project. The SRDM is a voluntary survey of land owners and managers which asks questions on a range of socio-economic topics including the type of farm enterprise and the level to which farm practices to improve water quality have been implemented. Of most interest to this project, farmers were asked:

[7] The preliminary results do not include over 1000 responses that were received by Landcare Researcj after the initiation of this project.

- Question 16 – What is the farm primary activity? Enterprises include grazing livestock not owned by the farming business (e.g., dairy support), sheep, beef, dairy, deer, other livestock.
- Question 61 – Are waterways (wider than one meter and deeper than 30 cm) on the farm fenced?
- Question 62 – If there is existing fencing, when were the waterways first fenced? More than 5 years ago; 2-5 years ago; or within the past 2 years.
- Question 63 – If there is existing fencing, what is the approximate percentage of waterways fenced?

While the survey received replies from different farm enterprises around the country, there were too few respondents from some regions to calculate regional statistical summaries and to assure respondent anonymity. For these reasons, the survey results were provided by farm enterprise aggregated into the three super-regions as defined above (i.e., NNI, SNI and SI). These super-regions were used to develop the scenarios and for the reporting of results. The survey results for the questions listed above are summarised in Table 3-3.

The current level of fencing in each super-region was approximated as the product of the percentage of farms with fencing and the approximated percentage of waterways fenced on those farms. The area of each pastoral land use type excluded from streams was assumed to be the same as the proportion of fenced to unfenced streams for each stock type. The level of fencing in 2010 was estimated as the proportion of current fencing that was in place five years ago; in other words, it was assumed that if a farm reported that waterways were first fenced five more than five years ago, then all the fences currently in place were also in place in 2010.

The percentage of farm waterways that are reported to be fenced are plotted in Figure 3-2 by super-region; the mean value for each super region reported in Table 3-3 was calculated in Excel as the sum-product of these data. It can be seen that while the percentage of waterways on dairy farms with fencing is generally high in all the super-regions, there is a greater spread for the other enterprise types, particularly for third party grazing and sheep and beef. It should be noted that there were fewer respondents for deer and other stock than for dairy, third party grazing and sheep and beef.

3.1.5 Point sources

Point sources in the ECLM represent discharges from, for example, dairy factories, meat works, sewage treatment plants and piggeries. The original set of point sources was collated for the CLUES, model (Woods, Elliott, et al., 2006). The loads from some sewage treatment plants were estimated as part of CLUES development on the basis of population. The point sources are updated as and when new data becomes available from regional councils. The most recent update was for the Waikato and Waipa catchments as part of the Healthy Rivers / Wai Ora programme as described for *E. coli* in Semadeni-Davies et al. (2015). Point sources for *E. coli* are listed in Appendix D.

Table 3-3: Survey of Rural Decision Makers preliminary results for the current level of fencing aggregated by super-region. Data supplied by Landcare Research for this project.

Super-Region	Enterprise type	Number of respondents	Percentage of farms with fencing	Mean percentage of waterways on farms that are fenced*	Estimated current level of fencing	Percentage of farms with fencing older than 5 years	Estimated level of fencing in 2010
National summary	Dairy	253	99	96	95	69	65
	Deer	23	94	54	50	87	44
	Grazing	75	92	77	71	68	48
	Other pastoral	26	92	90	83	75	62
	Sheep/Beef	510	76	66	50	70	35
Northern North Island	Dairy	116	100	97	97	62	60
	Deer	5	100	65	65	100	65
	Grazing	24	90	67	60	71	42
	Other pastoral	9	100	96	96	71	68
	Sheep/Beef	95	80	76	60	70	42
Southern North Island	Dairy	56	96	97	93	67	62
	Deer	5	100	54	54	75	40
	Grazing	11	100	89	89	70	62
	Other pastoral	4	100	78	78	100	78
	Sheep/Beef	169	74	59	44	76	33
SI	Dairy	81	100	94	94	79	74
	Deer	13	90	51	46	89	41
	Grazing	40	91	79	72	67	48
	Other pastoral	13	75	83	63	67	42
	Sheep/Beef	246	75	66	49	67	33

*Approximated as the sum-product of the data presented in Figure 3-2

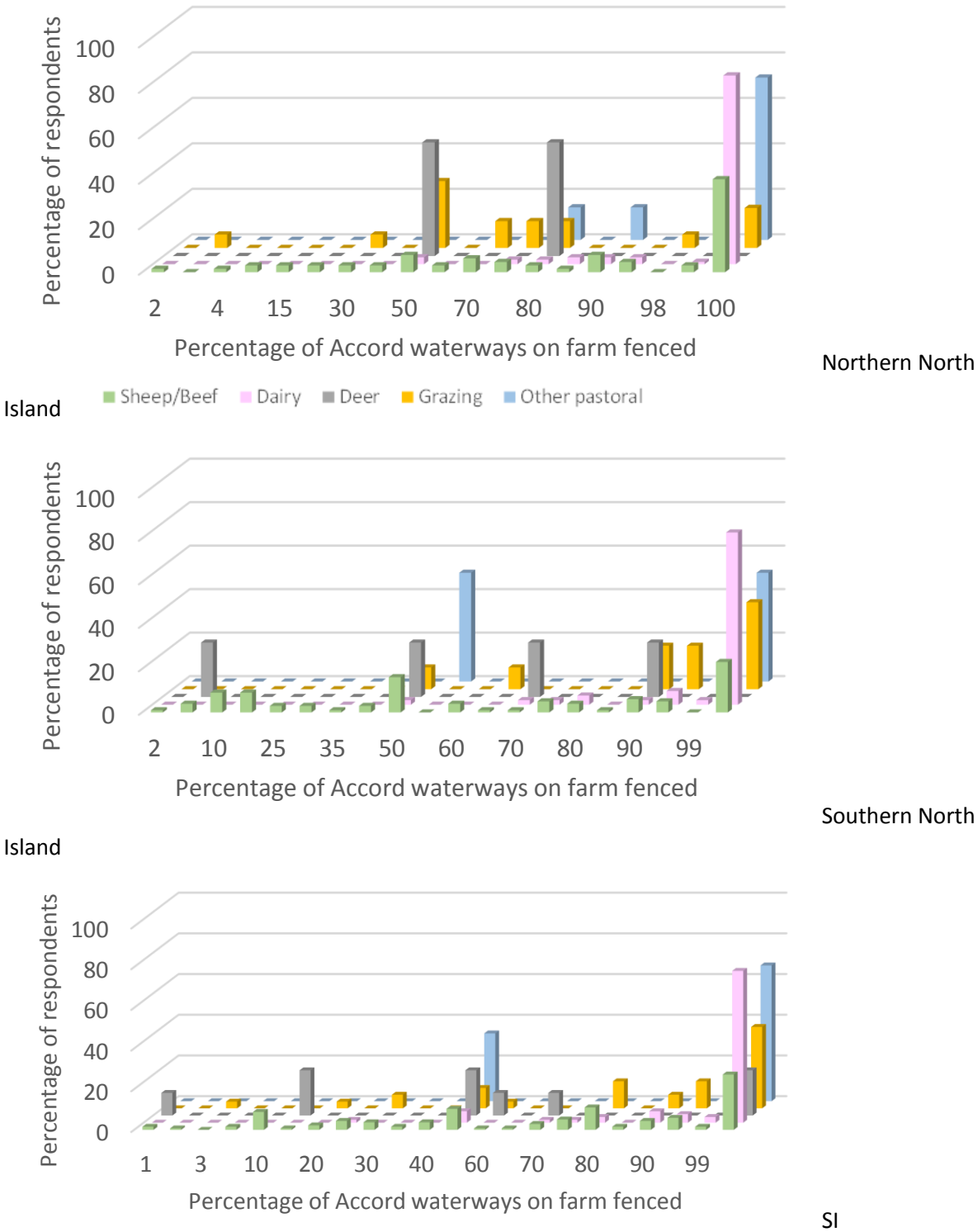

Figure 3-2: Percentage of Accord (wider than 1 m, deeper than 30 cm and permanently flowing) waterways on farms that are fenced by super-region.

3.2 Efficiency of fencing for stock exclusion

The ability of fencing to prevent *E. coli* from pastoral land uses reaching freshwater channels was assessed for this project by AgResearch. The assessment is documented in a separate report (Muirhead, 2016) and is summarised here in Table 3-4 and in Appendix A. The effectiveness of fencing in preventing *E. coli* from pastoral land uses reaching freshwater channels is represented in the model by load reduction factors (LRFs) which vary by stock type and, for sheep and beef, by super-region. The LRFs are the fractions of the *E.coli* load from each stock type that are removed from the total diffuse-source load calculated for each stream reach as described in the following section. Three sets of LRFs are provided in Table 3-4; these relate to low, most likely and high removal efficiencies and are intended to cover the range of efficiencies that could be expected from fencing at the catchment-scale. Note that the LRFs for the sheep and beef land uses do not include the effect of excluding sheep.

Fencing of dairy cattle and deer is typically more effective in reducing the E.coli load reaching waterways than for fencing out cattle on sheep and beef properties. For example, across the northern North Island fencing of dairy cattle and deer would reduce the *E.coli* loads by 86% (at the highest level of effectiveness) while using fences to exclude cattle on sheep and beef properties would reduce *E.coli* loads by 73%.

Table 3-4: Summary data for calculating the fencing load reduction factors by super-region. From AgResearch (supplied for this project by Richard Muirhead) .

Description	NNI			SNI			SI		
	Poor	Most likely	High	Poor	Most likely	High	Poor	Most likely	High
LRFs for fencing dairy cattle and deer	0.15	0.62	0.86	0.15	0.62	0.86	0.15	0.62	0.86
LRFs for fencing cattle only on sheep & beef farms	0.13	0.53	0.73	0.11	0.44	0.61	0.10	0.40	0.55

3.3 Modelling and calibration processes

This section summarises the modelling procedure and calibration. More detail can be found in Appendix E. The ECLM is an Excel version of the SPARROW model (SPAtially Referenced Regression On Watershed attributes) that has been modified and calibrated for baseflow conditions. Baseflow conditions were modelled on the understanding that the bulk of *E. coli* transport occurs following low intensity, high frequency rainfall events and that rivers are more accessible to people and stock during low flow. Loads entering the drainage network from each reach sub-catchment are calculated as the sum of loads from point sources draining to the reach and *E. coli* losses from diffuse sources. The annual input load from diffuse sources in each reach sub-catchment is calculated as a function of land use, slope and rainfall. Once in the stream network, the reach loads are added to the instream load and are routed downstream to the next REC2 reach in the river network. The SPARROW modelling procedure was originally developed by the United States Geological Survey (Smith et al., 1997) and has since been applied and modified in the New Zealand setting with extensive liaison with the developers. SPARROW is a component of the CLUES model.

SPARROW was calibrated for *E. coli* as part of the Clean Water Productive Land (Ministry of Business, Innovation and Employment, MBIE, contract C10X1006) research programme using the SAS statistical package. Calibration compared the loads determined for each of 204 monitoring sites with suitable water quality and flow data held in the NRWQN against the equivalent modelled loads for the reaches where the sites were located. Baseflow loads were estimated for the calibration sites as the product of the median annual concentration (estimated from monthly *E. coli* data) and the median annual flow rate. Once calibrated, the model was recreated as the ECLM in EXCEL for use in this project.

Calibration sought to minimise the Root Mean Square Error (RMSE) calculated for the residuals between the modelled and measured *E. coli* log-transformed baseflow loads for 204 water quality monitoring sites held in the NRWQN for which *E. coli* loads could be determined (i.e., concurrent water quality and flow monitoring). The RMSE is used as a standard statistical metric to measure model performance in many fields, including meteorology, air quality, climate research and agriculture and assumes the errors are unbiased and follow a normal distribution (Chai and Draxler, 2014). The RMSE represents the sample standard deviation of the differences (residuals) between the predicted and observed values –or variance from the regression line.

The final calibration results used to create the ECLM model-build are shown in Table 3-5. The RMSE for the model-build indicates that 68% (or one standard deviation) of the model results are within 0.846×10^{15} organisms per year of the observed annual load. The coefficient of determination (R^2) between the measured and modelled load was 0.809. To normalise the model results for area the measured and modelled generated yields (i.e., load divided by REC subcatchment area) were also compared giving a lower R^2 of 0.619. The calibration results show that there is substantial uncertainty in the model which reflects the difficulty in determining *E. coli* loads, largely due to the high spatial and temporal variability of *E. coli* concentration measurements. Sources of model uncertainty are discussed further in Section 5.

Table 3-5: Calibration results for the SPARROW configuration used to create the ECLM model-build.

Number of observations	Number of calibrated parameters	RMSE	Load R^2	Yield R^2
204	7	0.846	0.809	0.619

The effect of fencing is represented in the ECLM by decreasing the loads from pastoral land uses according to the LRFs described in Section 3.2 and the level of fencing for each scenario. Each scenario was run with low, most likely and high removal efficiencies to cover the variability in the effects of fencing on *E. coli* loadings that can be expected for different catchment locations and characteristics.

3.4 Concentration estimation

For each combination of scenario (i.e., 1 to 4) and LRF (low, most likely and high), the effect of fencing on *E. coli* annual median and 95th percentile concentrations was estimated by determining the proportional change in estimated *E. coli* loads compared to the loads estimated for the baseline fencing level and then multiplying the 2010 NEMaR3 concentration by the same proportional change. The baseline loads relating to the baseline concentrations were calculated by running the model with the MPI provided land use and the 2010 level of fencing assuming the most-likely LRF.

4 Results

The model results are summarised nationally for each scenario, with median annual *E. coli* concentrations in Table 4-1 and 95th percentile annual *E. coli* concentrations in Table 4-3. The results were estimated using the most likely LRF. Each table shows the length of streams in each of the NOF *E. coli* attribute states. This section discusses both the model results expressed within each policy scenario, and the differences between each scenario in sequence. The impact of fencing to exclude stock on *E.coli* concentrations in freshwater is expressed here by examining the change in proportion of streams (at a national scale) that would be classified within each of the NOF bands for risk to 'human health for recreation' (Bands A to D; refer to Table 1-1).

The shaded cells in Table 4-1 indicate that there are reaches with an estimated median annual *E. coli* concentration greater than the NOF national bottom line for secondary contact recreation (i.e., 1000 organisms / 100 ml). Likewise, the shaded cells in Table 4-2 indicate that there are reaches with a 95th percentile concentration greater than the NOF minimum acceptable state (540 organisms / 100 ml) for full immersion, that is, with more than a five percent risk of infection. At the request of MPI, Scenario 2 is used as a baseline scenario for Scenarios 3 a-e and Scenario 4 rather than Scenario 1, as Scenario 2 best represents the likely extent of fencing under existing or planned regional policies.

The length of streams with estimated median concentrations in Band D is negligible for all the scenarios, compared to the total stream length. Under Scenario 1, 88% of stream lengths nationally have estimated median annual concentrations in Band A. However, just under half (48%) of stream lengths do not meet the minimum acceptable state (i.e., in either Bands C or D) for the 95th percentile concentrations for this scenario.

The increase in stream length in Band A between Scenarios 1 and 2 is due solely to changes in fencing in the regions affected by Scenario 2, in all other regions the results are the same as for Scenario 1. Scenario 2 sees an increase in streams with an estimated median concentration in Band A of around 4,260 km nationally, which equates to only a 1% change in affected stream lengths. With regard to the estimated 95th percentile concentrations, the length of streams that do not meet the minimum acceptable state for full immersion is decreased by around 3,700 km compared to Scenario 1, which again equates to a 1% change nationally.

The tables show there is little difference in the model results between Scenario 2 and Scenarios 3a-c in particular; this is partly due to the assumption, based on the SRDM, that up to 96% of dairy cattle nationally has already been excluded from Accord streams. There is little capacity for extra fencing along Accord streams under Scenarios 3a-c. The areas affected by Scenario 2, including areas dominated by dairy farming in Waikato and Taranaki, already have full fencing of dairy stock with access to Accord streams under Scenario 2. The length of streams fenced increases for Scenarios 3d and 3e resulting in an increase of around 6000 km of streams with estimated median concentrations for *E.coli* within Band A compared to Scenario 2. The equivalent increase in stream length within Band A for the estimated 95th percentile concentrations of *E.coli* is 1,100 km. Moreover, there is an associated decrease of around 2000 km nationally in streams lengths that do not met the acceptable state for 95th percentile concentrations compared to Scenario 2.

Scenario 4, (i.e, fencing to exclude all diary and beef cattle and deer from all streams on steeper hill country), sees an additional increase in stream lengths with an estimated median annual concentration of *E.coli* within Band A of 30,658 km compared to Scenario 2. This is an increase of 8% nationally, bringing the total percentage of streams within Band A to 97%. The percentage of

streams that meet the minimum acceptable state for the 95th percentile concentrations increases from 53% estimated for Scenario 2 to 57%.

Table 4-1: Length of streams nationally with estimated median *E. coli* concentrations in each of the NOF bands for each scenario. Concentrations are estimated using the most likely LRF. Stream lengths with a median concentration greater than the national bottom line for secondary recreation are shaded.

NOF Band	Total Stream Length in Band (km)							
	S1	S2	S3a	S3b	S3c	S3d	S3e	S4
Band A: ≤260	353295	357551	358050	358083	358603	363727	363855	388209
Band B: > 260 and ≤ 540	45810	41613	41143	41113	40594	35514	35389	11460
Band C: > 540 and ≤ 1000	968	911	884	879	879	835	832	417
Band D: >1000	16	14	13	13	13	13	13	3

Table 4-2: Length of streams nationally with estimated 95th percentile *E. coli* concentrations in each of the NOF bands for each scenario. Concentrations are estimated using the most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

NOF Band	Total Stream Length in Band (km)							
	S1	S2	S3a	S3b	S3c	S3d	S3e	S4
Band A: ≤260	173837	174876	174963	174969	175005	175975	176018	183612
Band B: > 260 and ≤ 540	34342	37002	37065	37083	37124	37838	37856	43517
Band C: > 540 and ≤ 1000	39317	44447	44501	44504	44525	46522	46574	64586
Band D: >1000	152595	143766	143560	143534	143436	139754	139642	108375

Sections 4.1 to 4.5 provide further details of the results for each scenario. In each section, result tables are given by super-region assuming the most likely LRF, these show the length of non-Accord and Water Accord streams within each of the four NOF *E. coli* attribute states. Two sets of tables are provided relating to the annual median and 95th percentile concentrations estimated for base-flow conditions, respectively. Comparisons with the results estimated using the low and high LRFs are also given for each scenario. Full results are given in the appendices for each LRF by super region (Appendix F) as well as by region (median concentrations, Appendix G; 95th percentile concentrations, Appendix H).

4.1 Scenario 1

Scenario 1 represents the current level of fencing along Accord streams which stands at around 67,000 km nationally. Note that under this scenario, only Accord streams on land with a slope less than 16° are fenced. The model results for the most likely LRF are reported as estimated median concentrations (Table 4-3) and estimated 95th percentile concentrations (Table 4-4). All results are summarised by super-region. The results for the most likely LRF are also mapped by REC2 reach in Figure 4-1.

Table 4-3: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 1, most likely LRF. Stream lengths with a median concentration greater than the national bottom line are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15295	61438	72%	82%
	Band B: > 260 and ≤ 540	5900	12917	28%	17%
	Band C: > 540 and ≤ 1000	194	660	1%	1%
	Band D: >1000		15	0%	0%
SNI	Band A: ≤260	17795	56279	83%	92%
	Band B: > 260 and ≤ 540	3714	4949	17%	8%
	Band C: > 540 and ≤ 1000	10	6	0%	0%
SI	Band A: ≤260	42845	159643	85%	94%
	Band B: > 260 and ≤ 540	7447	10883	15%	6%
	Band C: > 540 and ≤ 1000	17	82	0%	0%
	Band D: >1000		1	0%	0%

Table 4-4: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2938	19360	14%	26%
	Band B: > 260 and ≤ 540	1344	6444	6%	9%
	Band C: > 540 and ≤ 1000	2238	8323	10%	11%
	Band D: >1000	14870	40903	70%	55%
SNI	Band A: ≤260	3440	17274	16%	28%
	Band B: > 260 and ≤ 540	1334	4896	6%	8%
	Band C: > 540 and ≤ 1000	2646	7621	12%	12%
	Band D: >1000	14097	31443	66%	51%
SI	Band A: ≤260	21204	109621	42%	64%
	Band B: > 260 and ≤ 540	4262	16061	8%	9%
	Band C: > 540 and ≤ 1000	5228	13260	10%	8%
	Band D: >1000	19615	31667	39%	19%

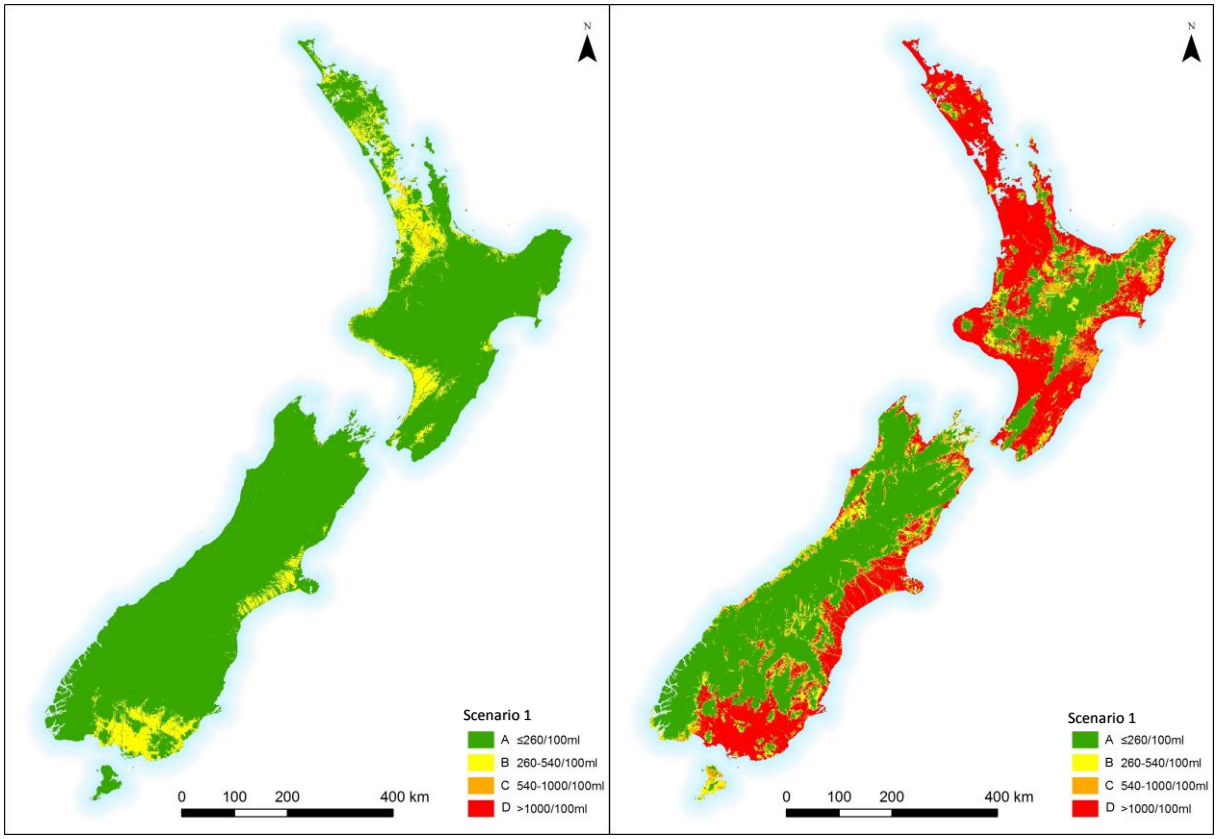

Figure 4-1: Scenario 1: median (left) and 95th percentile (right) attribute states estimated using the most likely LRF.

Under Scenario 1, around 80% of non-Accord stream-lengths and 90% of Accord stream-lengths are estimated to have median *E. coli* concentrations in NOF Band A for the most likely LRF. This amounts to 75,900 km of non-Accord and 277,360 km of Accord stream-lengths nationally. Most regions have more than 90% of Accord stream lengths in Band A; the exceptions are Auckland (52%), Waikato (77%) and Southland (81%). Many of the streams in the Auckland region with the highest concentrations of *E.coli* are urban and are therefore not affected by fencing to exclude stock.

There are comparatively few reaches under this scenario that have estimated median annual concentrations greater than the national bottom line (Band D: >1000). The regions that do have Accord streams in this band are again Auckland (0.9km), Waikato (14.4 km) and Southland (1.4 km). These streams lengths represent less than 1% of the total length of Accord streams in the super-regions and the total length is negligible nationally.

With the low LRF, the percentage of streams estimated to be in Band A decreases by around 10% compared to the most likely LRF. The length of streams with estimated median concentrations greater than the bottom line increases slightly for Southland (1.8 km) and increases five-fold for Waikato (78.9 km), however, the percentage of stream length in this band is still less than 1% for this region. With the high LRF, more than 90% of streams nationally have estimated median concentrations in Band A and the length of streams in this band increases in Auckland and Waikato. The length of streams with an estimated median concentration greater than the bottom line remains the same for Auckland and Southland, and reduces to only 2.4 km for Waikato.

The 95th percentile concentrations estimated with the most likely LRF show that around 65% of Accord streams in the North Island do not meet the minimum acceptable state for full immersion. In the South Island, around 27% of Accord streams have estimated *E. coli* 95th percentile concentrations that do not meet this state. The 95th percentile concentrations estimated with the low LRF see a minor increase in the length of streams above the minimum acceptable state, however, the percentage of streams in Band D increases at the expense of streams in Band C. Similarly, there is a small drop in the length of streams with 95th percentile concentrations that do not meet the minimum acceptable state estimated using the high LRF, however the percentage of streams lengths in Band C increases while the percentage in Band D decrease.

4.2 Scenario 2

Scenario 2 is applied to only those regions which have regional fencing policies that are either already in place or that are planned to be implemented before 2017 (i.e., Auckland, Waikato, Taranaki, Hawke's Bay, Wellington, Marlborough and Canterbury; see Table 2-2). All other regions are assumed to have the current level of fencing (as per Scenario 1). The increase in fencing nationally under Scenario 2 is around 18,000 km. Most of the fencing is along Accord streams, however, there is also a small amount of fencing along non-Accord streams and on land with a slope greater than 16°. This is because some regions (Auckland, Waikato and Hawke's Bay, Canterbury) require fencing along all stream lengths accessible to stock. The results estimated using the most likely LRF are given in Table 4-5 for the median concentrations and Table 4-6 for estimated 95th percentile concentrations and are mapped in Figure 4-2.

Under Scenario 2, 91% of Accord stream-lengths nationally have estimated median annual concentrations in Band A. The change in the regions affected by the scenario varies. For instance, there is only a 20 km estimated increase in Accord stream-lengths in Band A for Marlborough, but this region already had almost all Accord-stream lengths in Band A under Scenario 1. Taranaki has an estimated 96% of Accord stream lengths in Band A compared to 91% estimated for Scenario 1. Auckland has the most dramatic change with an almost 20% increase in the length of accord streams in Band A. However, Auckland (71%) and Waikato (78%) still have the lowest percentage of streams estimated to be in Band A. In the case of Auckland, this is largely because of the high concentration estimated for the city. Auckland and Waikato also have stream reaches with estimated median concentrations that do not meet the national bottom line. In comparison to Scenario 1, the length of streams that do not meet the national bottom line remains at 0.9 km for Auckland but drops by just over 2 km for Waikato from 14.4 km to 12.1 km. The percentage of Accord stream lengths in Band A increases to 84% for NNI, 95% for SNI and to 45% for SI. The stream-length of non-Accord streams in Band A increases by around 1300 km due to the requirement for fencing along these streams in the regions noted above.

With the low LRF, there is very little difference in the results nationally for Scenario 2. The length of Accord streams with estimated median concentrations in Band A increases by 700 km nationally. The length of Accord streams with median concentrations that do not meet the bottom line estimated using the low LRF for Waikato is 78.1 km, which is only slightly less than estimated for Scenario 1 with the low LRF. With the high LRF, most Accord stream lengths in the affected regions have estimated median concentrations in Band A. The exceptions are Auckland and Waikato which have 79% and 86% of stream-lengths with estimated median concentrations in Band A.

Table 4-5: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 2, most likely LRF. Stream lengths with a median concentration greater than the national bottom line are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980	62663	75%	84%
	Band B: > 260 and ≤ 540	5226	11740	24%	16%
	Band C: > 540 and ≤ 1000	182	615	1%	1%
	Band D: >1000		13	0%	0%
SNI	Band A: ≤260	18369	57161	85%	93%
	Band B: > 260 and ≤ 540	3139	4067	15%	7%
	Band C: > 540 and ≤ 1000	10	6	0%	0%
SI	Band A: ≤260	42865	160513	85%	94%
	Band B: > 260 and ≤ 540	7427	10014	15%	6%
	Band C: > 540 and ≤ 1000	17	81	0%	0%
	Band D: >1000		1	0%	0%

Table 4-6: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 2, most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2986	19525	14%	26%
	Band B: > 260 and ≤ 540	1500	6710	7%	9%
	Band C: > 540 and ≤ 1000	2488	8475	12%	11%
	Band D: >1000	14416	40321	67%	54%
SNI	Band A: ≤260	3482	17598	16%	29%
	Band B: > 260 and ≤ 540	2218	5940	10%	10%
	Band C: > 540 and ≤ 1000	3831	9126	18%	15%
	Band D: >1000	11987	28570	56%	47%
SI	Band A: ≤260	21226	110059	42%	65%
	Band B: > 260 and ≤ 540	4397	16238	9%	10%
	Band C: > 540 and ≤ 1000	5346	15181	11%	9%
	Band D: >1000	19340	29132	38%	17%

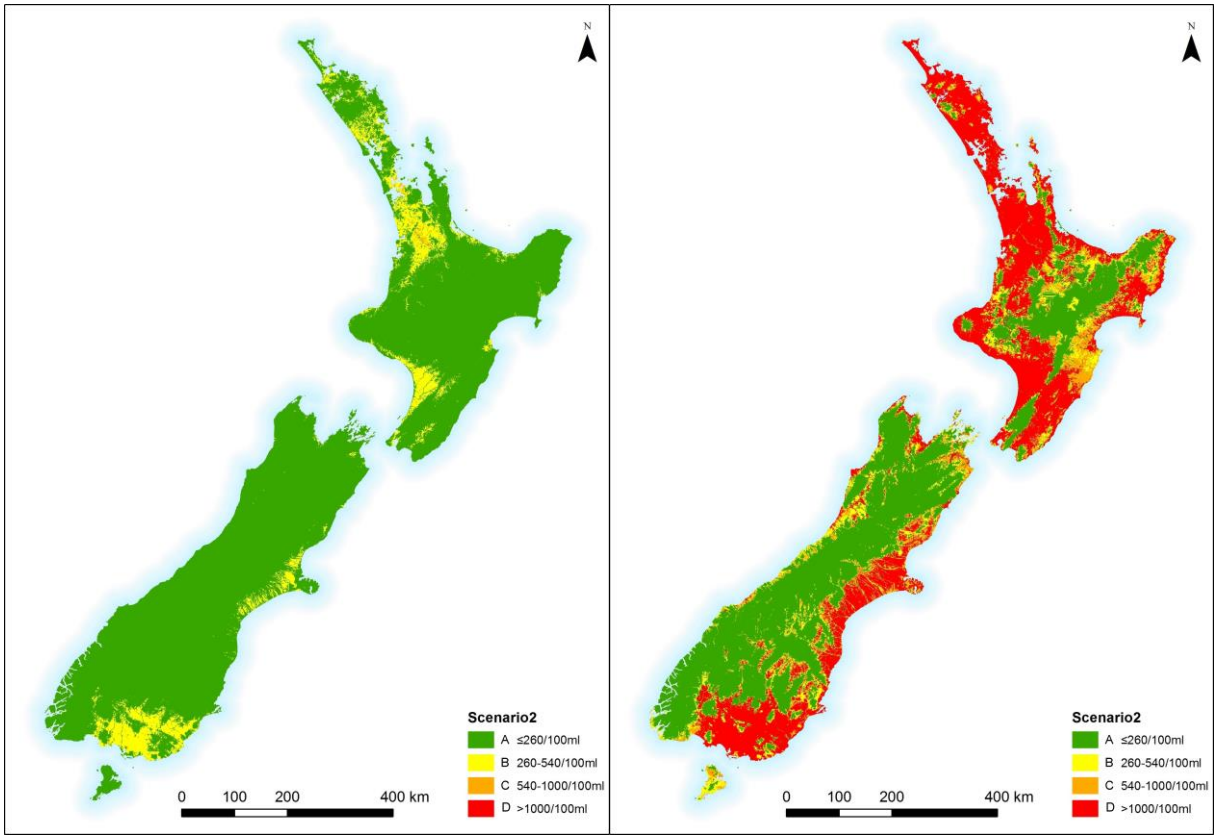

Figure 4-2: Scenario 2: median (left) and 95th percentile (right) attribute states estimated using the most likely LRF.

The 95th percentile concentrations estimated with the most likely LRF are very similar to those for Scenario 1 and suggest that 66% and 63% of Accord streams in the NNI and SSI super-regions would not meet the minimum acceptable state for full immersion. In the South Island, around 27% of streams lengths have estimated *E. coli* 95th percentile concentrations that would not meet this state. However, the length of streams with estimated 95th percentile concentrations in Band D is less than for Scenario 1. Like Scenario 1, there is a minor increase in the length of streams with estimated 95th percentile concentrations that would not meet than the minimum acceptable state for the low LRF. Conversely, there is a small drop in the length of streams with 95th percentile concentrations that would not meet the minimum acceptable state estimated using the high LRF, although the percentage of streams lengths in Band C increases while the percentage in Band D decreases.

4.3 Scenario 3a-c

Scenarios 3a to 3c are for further exclusion of dairy cattle along Accord streams and are built on Scenario 2. This means that the scenarios are only applied to areas that are not fenced in Scenario 2. In accordance with LAWF recommendations, they apply fencing to the unfenced lengths of Accord streams on land with a slope of less than 16° that are accessible to dairy platform (3a), dairy runoff on land owned or leased by the farmer (3b) and dairy grazing on third party land (3c). As has already been stated, since the major milk producing regions of Waikato and Taranaki are affected by Scenario 2 and the remaining lengths of Accord streams accessible to dairy cattle already have upwards of 90% fencing under Scenario 1, there is very little capacity for further stock exclusion under these scenarios. The increased length of fencing nationally under scenarios 3a-c is only 726 km, 77 km and 576 km, respectively. For this reason, the results of all three scenarios are very

similar to the results for Scenario 2. The results for Scenarios 3a – c estimated with the most likely LRF are summarised by super-region in Table 4-7 to 4-12.

Table 4-7: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3a, most likely LRF. Stream lengths with a median concentration greater than the national bottom line are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980	62945	75%	84%
	Band B: > 260 and ≤ 540	5226	11483	24%	15%
	Band C: > 540 and ≤ 1000	182	590	1%	1%
	Band D: >1000		12	0%	0%
SNI	Band A: ≤260	18369	57264	85%	94%
	Band B: > 260 and ≤ 540	3139	3965	15%	6%
	Band C: > 540 and ≤ 1000	10	6	0%	0%
SI	Band A: ≤260	42865	160627	85%	94%
	Band B: > 260 and ≤ 540	7427	9903	15%	6%
	Band C: > 540 and ≤ 1000	17	78	0%	0%
	Band D: >1000		1	0%	0%

Table 4-8: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3a, most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2986	19549	14%	26%
	Band B: > 260 and ≤ 540	1500	6728	7%	9%
	Band C: > 540 and ≤ 1000	2488	8533	12%	11%
	Band D: >1000	14416	40221	67%	54%
SNI	Band A: ≤260	3482	17598	16%	29%
	Band B: > 260 and ≤ 540	2218	5948	10%	10%
	Band C: > 540 and ≤ 1000	3831	9145	18%	15%
	Band D: >1000	11987	28543	56%	47%
SI	Band A: ≤260	21226	110123	42%	65%
	Band B: > 260 and ≤ 540	4397	16275	9%	10%
	Band C: > 540 and ≤ 1000	5345	15160	11%	9%
	Band D: >1000	19341	29052	38%	17%

Table 4-9: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3b, most likely LRF. Stream lengths with a median concentration greater than the national bottom line are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980	62968	75%	84%
	Band B: > 260 and ≤ 540	5226	11463	24%	15%
	Band C: > 540 and ≤ 1000	182	587	1%	1%
	Band D: >1000		12	0%	0%
SNI	Band A: ≤260	18369	57267	85%	94%
	Band B: > 260 and ≤ 540	3139	3961	15%	6%
	Band C: > 540 and ≤ 1000	10	6	0%	0%
SI	Band A: ≤260	42865	160634	85%	94%
	Band B: > 260 and ≤ 540	7427	9897	15%	6%
	Band C: > 540 and ≤ 1000	17	77	0%	0%
	Band D: >1000		1	0%	0%

Table 4-10: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3b, most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2986	19550	14%	26%
	Band B: > 260 and ≤ 540	1500	6731	7%	9%
	Band C: > 540 and ≤ 1000	2488	8542	12%	11%
	Band D: >1000	14416	40207	67%	54%
SNI	Band A: ≤260	3482	17598	16%	29%
	Band B: > 260 and ≤ 540	2218	5949	10%	10%
	Band C: > 540 and ≤ 1000	3831	9146	18%	15%
	Band D: >1000	11987	28541	56%	47%
SI	Band A: ≤260	21226	110127	42%	65%
	Band B: > 260 and ≤ 540	4397	16288	9%	10%
	Band C: > 540 and ≤ 1000	5345	15153	11%	9%
	Band D: >1000	19341	29042	38%	17%

Table 4-11: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3c, most likely LRF. Stream lengths with a median concentration greater than the national bottom line are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980	63246	75%	84%
	Band B: > 260 and ≤ 540	5226	11185	24%	15%
	Band C: > 540 and ≤ 1000	182	587	1%	1%
	Band D: >1000		12	0%	0%
SNI	Band A: ≤260	18369	57272	85%	94%
	Band B: > 260 and ≤ 540	3139	3957	15%	6%
	Band C: > 540 and ≤ 1000	10	6	0%	0%
SI	Band A: ≤260	42865	160872	85%	94%
	Band B: > 260 and ≤ 540	7427	9658	15%	6%
	Band C: > 540 and ≤ 1000	17	77	0%	0%
	Band D: >1000		1	0%	0%

Table 4-12: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3c, most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2986	19568	14%	26%
	Band B: > 260 and ≤ 540	1500	6733	7%	9%
	Band C: > 540 and ≤ 1000	2488	8561	12%	11%
	Band D: >1000	14416	40168	67%	54%
SNI	Band A: ≤260	3482	17598	16%	29%
	Band B: > 260 and ≤ 540	2218	5949	10%	10%
	Band C: > 540 and ≤ 1000	3831	9146	18%	15%
	Band D: >1000	11987	28540	56%	47%
SI	Band A: ≤260	21226	110146	42%	65%
	Band B: > 260 and ≤ 540	4397	16326	9%	10%
	Band C: > 540 and ≤ 1000	5345	15154	11%	9%
	Band D: >1000	19341	28983	38%	17%

4.4 Scenarios 3d-e

The two remaining LAWF progressive scenarios require full fencing for sheep and beef (Scenario 3d) and deer (Scenario 3e) farms along Accord streams on land with an average slope of less than 16°. Scenario 3d sees a further 16,860 km of streams fenced nationally. However the increase in fencing under Scenario 3e is only 260 km; for this reason, the results of the two scenarios are very similar. The results estimated using the most likely LRF are summarised by super-region in Table 4-13 through to Table 4-16. The results for Scenario 3d are discussed further below. The Scenario 3d results by REC2 sub-catchment are mapped for the most likely LRF in Figure 4-3.

Despite the increase in fencing, there is only a slight increase in the proportion of Accord stream-lengths in Band A in most regions. This is largely because the LRFs for sheep and beef are less than those for dairy, and because those regions with regional policies covered in Scenario 2 are largely unaffected by these scenarios. Scenario 3d results in an increase of Accord stream-lengths with estimated median concentrations in Band A of just under 6,000 km nationally compared to Scenario 2. This amounts to a 4% increase in Accord stream lengths in Band A for NNI and an increase of 1% each for SNI and SI. The length of Accord streams with an estimated median concentration in Band D remains the same as in Scenario 2 for Southland (1.5 km), but deceases to 11 km for Waikato[8] which has further fencing in the reaches outside the Priority one zones (see Figure 2-1). The region most affected by Scenario 3d is Northland which has a 12% increase in Accord stream lengths with estimated median concentrations in Band A.

The pattern is similar for the concentrations calculated with the low and high LRFs. Compared with the equivalent results calculated for Scenario 2, the percentage of Accord stream lengths with estimated median concentrations in Band A increases by around 1% for the high LRF and decreases by 2% for the low LRF. In comparison with the concentrations estimated for Scenario 3d with the most likely LRF, the high LRF has between 2-5% more Accord streams with estimated median concentrations in Band A while the low LRF has around 10% fewer Accord stream lengths in Band A.

The proportion of Accord stream lengths in Band A remains virtually unchanged for the 95th percentile concentrations estimated for all three LRFs compared to Scenario 2. Similarly the decrease in the length of Accord streams that do not meet the minimum acceptable state for 95th percentile concentrations differs by around 2000 km nationally for each scenario.

[8] Auckland is not affected by Scenarios 3d and e.

Table 4-13: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3d, most likely LRF. Stream lengths with a median concentration greater than the national bottom line are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980	65761	75%	88%
	Band B: > 260 and ≤ 540	5226	8694	24%	12%
	Band C: > 540 and ≤ 1000	182	564	1%	1%
	Band D: >1000	0	12	0%	0%
SNI	Band A: ≤260	18369	57829	85%	94%
	Band B: > 260 and ≤ 540	3139	3177	15%	5%
	Band C: > 540 and ≤ 1000	10	6	0%	0%
SI	Band A: ≤260	42865	162722	85%	95%
	Band B: > 260 and ≤ 540	7427	7830	15%	5%
	Band C: > 540 and ≤ 1000	17	56	0%	0%
	Band D: >1000	0	1	0%	0%

Table 4-14: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3d, most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2986	19969	14%	27%
	Band B: > 260 and ≤ 540	1500	6963	7%	9%
	Band C: > 540 and ≤ 1000	2488	9752	12%	13%
	Band D: >1000	14416	38347	67%	51%
SNI	Band A: ≤260	3482	17716	16%	29%
	Band B: > 260 and ≤ 540	2218	6167	10%	10%
	Band C: > 540 and ≤ 1000	3831	9766	18%	16%
	Band D: >1000	11987	27585	56%	45%
SI	Band A: ≤260	21226	110598	42%	65%
	Band B: > 260 and ≤ 540	4397	16594	9%	10%
	Band C: > 540 and ≤ 1000	5345	15341	11%	9%
	Band D: >1000	19341	28077	38%	16%

Table 4-15: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3e, most likely LRF. Stream lengths with a median concentration greater than the national bottom line are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980	65783	75%	88%
	Band B: > 260 and ≤ 540	5226	8673	24%	12%
	Band C: > 540 and ≤ 1000	182	563	1%	1%
	Band D: >1000	0	12	0%	0%
SNI	Band A: ≤260	18369	57834	85%	94%
	Band B: > 260 and ≤ 540	3139	3172	15%	5%
	Band C: > 540 and ≤ 1000	10	6	0%	0%
SI	Band A: ≤260	42865	162822	85%	95%
	Band B: > 260 and ≤ 540	7427	7731	15%	5%
	Band C: > 540 and ≤ 1000	17	54	0%	0%
	Band D: >1000	0	1	0%	0%

Table 4-16: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3e, most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2986	19975	14%	27%
	Band B: > 260 and ≤ 540	1500	6974	7%	9%
	Band C: > 540 and ≤ 1000	2488	9772	12%	13%
	Band D: >1000	14416	38309	67%	51%
SNI	Band A: ≤260	3482	17718	16%	29%
	Band B: > 260 and ≤ 540	2218	6167	10%	10%
	Band C: > 540 and ≤ 1000	3831	9772	18%	16%
	Band D: >1000	11987	27578	56%	45%
SI	Band A: ≤260	21226	110631	42%	65%
	Band B: > 260 and ≤ 540	4397	16602	9%	10%
	Band C: > 540 and ≤ 1000	5345	15366	11%	9%
	Band D: >1000	19341	28011	38%	16%

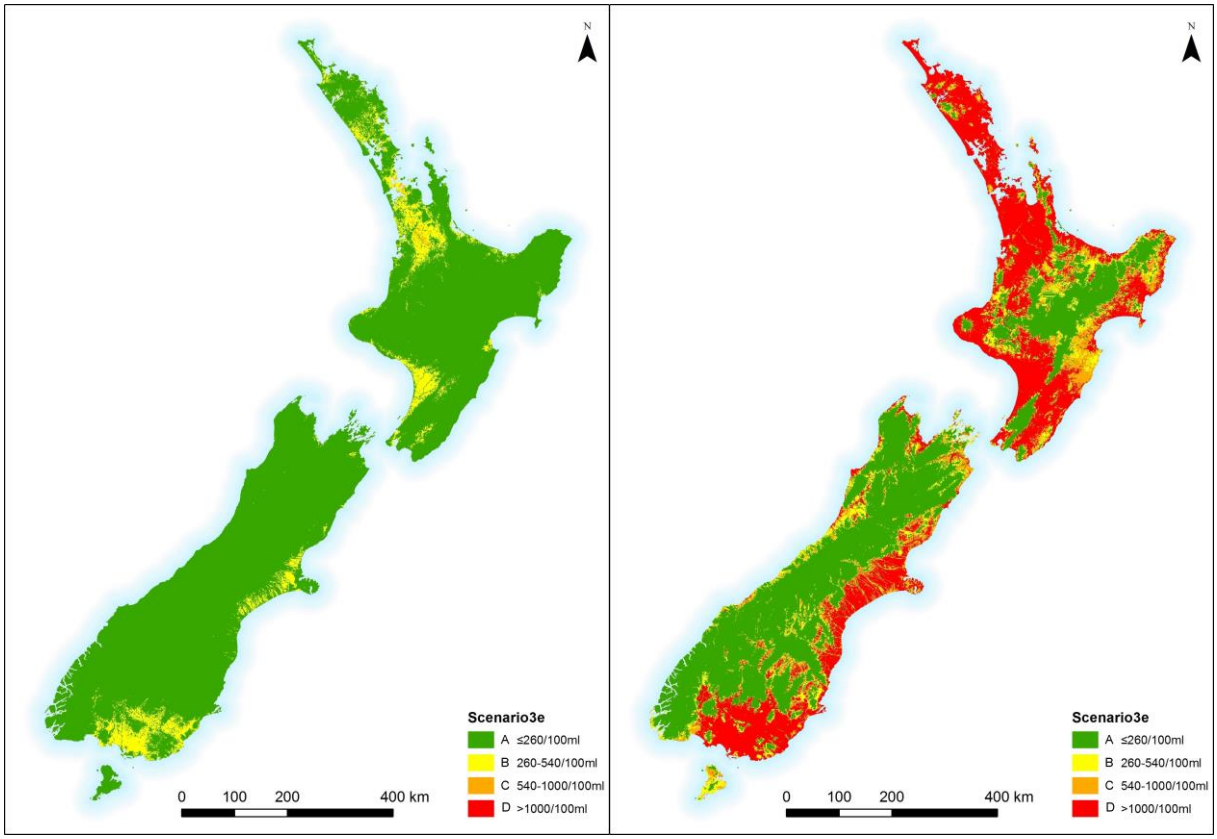

Figure 4-3: Scenario 3d: median (left) and 95th percentile (right) attribute states estimated using the most likely LRF.

4.5 Scenario 4

Scenario 4 requires fencing along all streams, including non-Accord streams, accessible to stock on land with an average slope of less than 28°. The scenario results in an estimated further 70, 300 km of fencing nationally compared to Scenario 2, including 19,600 km of fencing on land with an average slope between 16-28°. The results for this scenario estimated using the most likely LRF are summarised by super region in Table 4-17 and Table 4-18. The Scenario 4 results for the most likely LRF are mapped by REC2 sub-catchment in Figure 4-4.

With the most likely LRF, Scenario 4 results in well over 90% of non-Accord and Accord stream-lengths nationally estimated to have median concentrations in Band A. The increase of stream-lengths within Band A compared to Scenario 2 is approximately 13,300 km for non-Accord streams and 17,350 km for Accord streams. The percentage of stream lengths in Band C is minimal and only 3.8 km of streams remain in Band D. Compared to Scenario 2, the percentage of stream lengths which have estimated median annual concentrations in Band A increases by 20%, 12% and 13% for NNI, SNI and SI, respectively, for the non-Accord Streams. The equivalent increases for the Accord streams are 10%, 5% and 4% respectively. Auckland is the only region under Scenario 4 that does not have at least 90% of streams in Band A, again, this is largely due to the high median *E. coli* concentrations estimated for the city.

With the low LRF, around 86% each of non-Accord and Accord stream-lengths are estimated to have median annual concentrations in Band A, this is an increase of around 2-4% compared to Scenario 2.

With the high LRF, only 2% of non-Accord and 1% of Accord stream lengths, nationally have estimated median concentrations that are not in Band A.

Table 4-17: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 4, most likely LRF. Stream lengths with a median concentration greater than the national bottom line are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	20176	70249	94%	94%
	Band B: > 260 and ≤ 540	1141	4447	5%	6%
	Band C: > 540 and ≤ 1000	72	332	0%	0%
	Band D: >1000		2	0%	0%
SNI	Band A: ≤260	20962	59923	97%	98%
	Band B: > 260 and ≤ 540	555	1311	3%	2%
	Band C: > 540 and ≤ 1000	0	0	0%	0%
SI	Band A: ≤260	49383	167516	98%	98%
	Band B: > 260 and ≤ 540	926	3079	2%	2%
	Band C: > 540 and ≤ 1000	0	12	0%	0%
	Band D: >1000		1.5	0%	0%

Table 4-18: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 4, most likely LRF. Stream lengths with a 95th percentile concentration greater than the minimum acceptable state for full immersion are shaded.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	3343	20854	16%	28%
	Band B: > 260 and ≤ 540	2436	8181	11%	11%
	Band C: > 540 and ≤ 1000	4365	11438	20%	15%
	Band D: >1000	11245	34557	53%	46%
SNI	Band A: ≤260	3759	18807	17%	31%
	Band B: > 260 and ≤ 540	2854	7071	13%	12%
	Band C: > 540 and ≤ 1000	6059	12365	28%	20%
	Band D: >1000	8846	22990	41%	38%
SI	Band A: ≤260	23092	113757	46%	67%
	Band B: > 260 and ≤ 540	6279	16696	12%	10%
	Band C: > 540 and ≤ 1000	10565	19794	21%	12%
	Band D: >1000	10373	20363	21%	12%

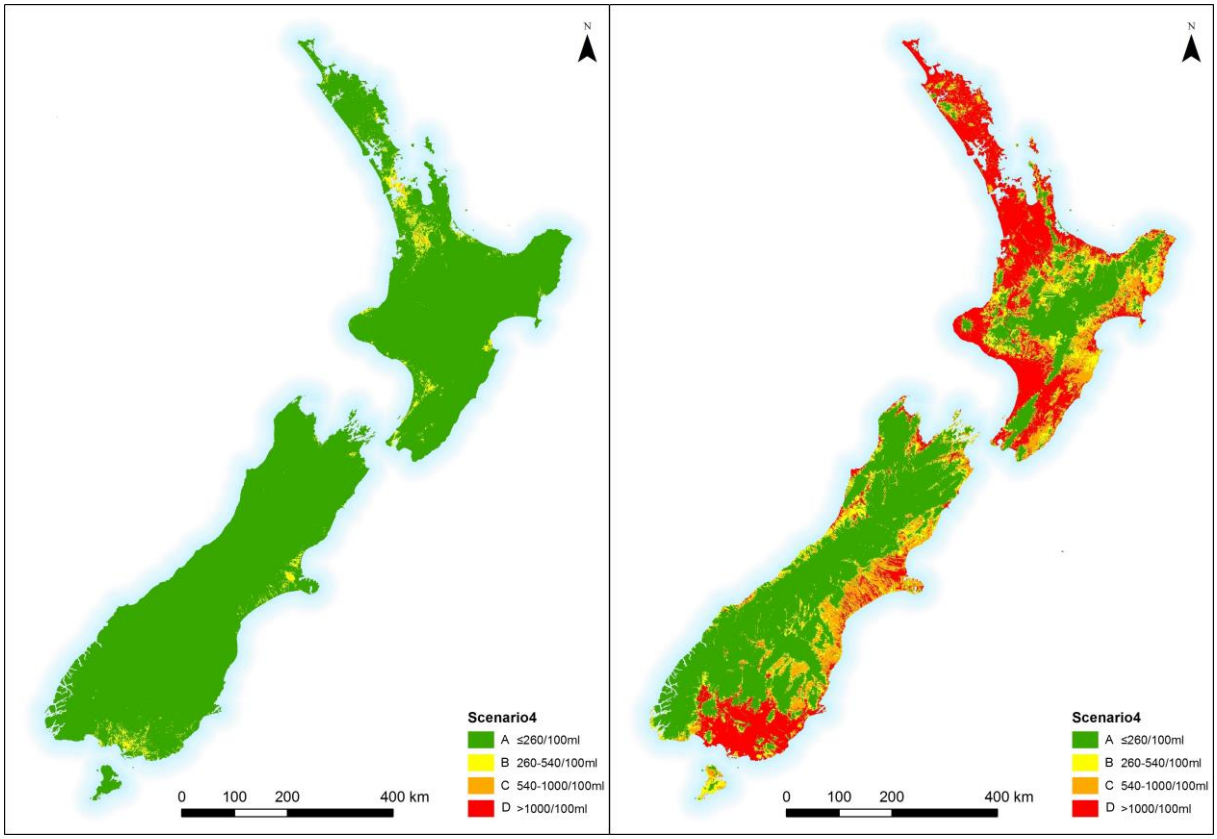

Figure 4-4: Scenario 3d: median (left) and 95th percentile (right) attribute states estimated using the most likely LRF.

The percentage of stream lengths with an estimated 95th percentile concentration in Bands C and D reduces across the country. The length of non-Accord streams in Bands C and D decreases by around 20%, and the length of Accord streams decreases by 10% for all three LRFs compared to the equivalent model runs under Scenario 2.

5 Model uncertainty and errors

The results indicate some very clear trends at a national scale, and have illustrated the changes in *E.coli* concentrations that could occur under different policy scenarios where stock are fenced out from waterways. These results have been generated using an annual catchment-scale spatial model, with a large number of variables from a range of sources. Like all models, the ECLM contains inherent error and uncertainty. In the modelling context, uncertainty refers to the limitations of the model due to, for instance, the choice and representation of model input and outputs; model structure and the simplification of complex physical, chemical and biological processes; and the choice and calibration of model parameters. Model error is separate from uncertainty and can refer to errors in the model code as well as errors in the input, calibration and validation data, due to, for example the accuracy and precision of data capture, data processing methods and storage. Errors and uncertainties within a model propagate at each step in the modelling process such that a small error in input data can snow-ball into a substantial error in model outputs. It is also possible that errors and uncertainties can compensate for each other making it much harder to detect and evaluate them. General discussions on the sources of model errors and uncertainty with respect to decision support tools and eco-hydrological models can be found in, amongst others, Walker et al. (2003); Beven (2006); and Beven and Alcock (2012).

The standard errors reported for the calibrated SPARROW parameters (Section 0) reflect the difficulty in modelling *E. coli* as the yield of microbes from diffuse and point sources is highly variable in time and space (Wilcock, 2006; Muirhead, 2015) making determination of average annual catchment loads and concentrations difficult. The model errors and uncertainty are compounded by potential errors in the input data and assumptions made in processing that data for use in the model. The identified potential sources of uncertainty and error with respect to the ECLM are discussed below.

5.1 Scaling issues

The ECLM is a simple catchment-scale model for estimating annual *E. coli* loads and is therefore subject to smoothing of data inputs which have been averaged over time (e.g., variation in *E. coli* seasonally and due to weather events) and space (e.g., variation due to terrain, soil, slope and other catchment characteristics). In addition, the variation in data availability and data collection from region to region may mean that some regions are not as well represented in model calibration as others.

The smallest spatial unit of the ECLM is the REC2 sub-catchment. Spatial data within each sub-catchment are lumped together and there are no linkages between potentially dependant data types (e.g., slope and land use). Land use within each REC sub-catchment is split into proportional areas while rainfall and slope have been spatially-averaged. This means that, for example, within a reach sub-catchment there can be differences in slope from the stream channel to the sub-catchment boundaries that could influence the location of land use types. A REC2 sub-catchment may have a combination of very flat land with slope of less than 5° on the channel floodplain, but extend to almost rolling country (e.g. 14°) adjacent to the floodplain, or there might be a steep, confined bank on one side of the channel where stock are naturally excluded. Therefore, stock could have access to streams that are not captured by the model assumption that stream access for each stock type is proportional to the percentage coverage of that stock type (see further discussion in Section 5.8).

Annual mean average rainfall is interpolated for each reach from rain gauges located across the country. The representativeness of the rainfall data is highly dependent on the distance to the nearest rain gauge, the length of the rainfall records at each gauge and the complexity of the terrain (personal communication, Dr Andrew Tait, NIWA principal climate scientist). Generally, the rainfall is more reliable for flat to rolling lowlands than in mountainous regions.

Since the ECLM is a steady-state model, the effect of seasonal changes in *E. coli* generation (e.g., over-wintering dairy cattle versus milk production), die-off and transport (summer low flow versus winter peak flows) are not captured by the model. The method of estimating baseflow loads assumes that the median concentrations reflect baseflow conditions (i.e., flows between events and occurring after high frequency, low intensity rainfalls). Adding seasonality would require more complexity in the load model for which there are too few data at some monitoring sites. Likewise, dynamic modelling, which continuously models *E. coli* over shorter time periods (e.,g., daily calculations), may also be possible but would increase the input data needs and model complexity.

5.2 Parameterisation

The ECLM was calibrated to minimise the RMSE between the modelled and measured loads (see below for a discussion on calibration data). A single national set of parameters was calibrated, incorporating each of the model parameters as described in Appendix E. At the regional or catchment level, these parameters may not necessarily reflect the regional characteristics that drive *E. coli* generation and transport. That is, a region that has few monitoring sites with *E. coli* loads available will have less influence on the model calibration that a region with more monitoring sites.

There was very little change in the model results when separate yields for each stock type allowing a single stock yield to be used which reduced the number of calibrated parameters. However, it is likely that dairy cattle will have a higher associated *E. coli* yield than other stock types.

The model was calibrated for the baseline year of 2008 and therefore contains the signal of land use and the level of fencing in that year. The NEMaR3 concentration data has a baseline year of 2010. It was assumed that the two years would have similar levels of fencing and pastoral land use. It is also assumed that the change in land use since 2008/10 will be captured by the use of the land use data provided by MPI. In order to apply the model the current level of fencing, the calibrated yields were adjusted to take into account the change in fencing between 2010 and 2015. These adjusted parameters were used to determine the load for all the scenarios. This adjustment is subject to unquantified errors and uncertainty in both in the estimation of the level of fencing and in the removal efficiencies.

5.3 *E. coli* calibration data

Monthly *E. coli* concentration data held in the NWQRN was used to estimate mean annual loads for calibration. Suitable flow and concentration data required to estimate loads were available from 204 monitoring sites nationally, which is roughly one third of the sites where *E. coli* is monitored. These data are subject to potential errors in sampling and analysis and the methods used vary from region to region.

It is assumed that monthly data are representative of the full range of *E. coli* concentrations at the monitoring sites and that the median *E. coli* concentrations calculated from these data are representative of the median annual concentrations for each site respectively. As pointed out by

Davies-Colley et al. (2011), this is not necessarily the case, highlighting the need for national protocols around the collection of water quality data in order to standardise monitoring and to provide data that is purpose-collected for modelling.

While it is possible that there are trends in the *E. coli* concentration data, the data were not trend adjusted. This is because the evidence for trends is inconsistent around the country and that many sites have short monitoring records such that trends cannot be determined (Unwin and Larned, 2013; Larned et al., 2015).

Baseflow *E. coli* loads for each site were estimated by dividing the median annual concentrations determined from the concentration data by the estimated mean annual flow rate for that site. There is a possibility that this method could skew results to be lower than the actual median loads. The method also assumes that a proportional change in load produces an equivalent proportional change in concentration. This assumption has not been tested.

5.4 *E. coli* concentration calculation

The difference between the loads modelled by the ECLM for the 2010 baseline and other scenarios were used to adjust median and 95th percentile annual concentrations estimated by Unwin and Larned (2013) as part of the NEMaR3 programme for the current level of fencing. These concentrations were estimated for each reach using a regression approach and are themselves subject to model uncertainty and error. Unwin and Larned (2013) state that the concentration model was calibrated against concentration data from 738 monitoring sites and was able to explain over 72.3 % of the observed site-to-site variation.

5.5 Point sources

E. coli point source data used in the model include industrial and municipal waste and effluent from dairy farms. The point sources are variable over time making it difficult to assess mean annual loads. Some sources may have new processes in place to reduce contaminant discharge that may not be reflected in the historical water quality record and cannot be accounted for in a steady-state model. In actuality, while point sources can have a large impact on estimated reach loads, their impact downstream tends to be minor in comparison with *E. coli* loads estimated from diffuse sources.

5.6 Land use and diffuse sources

Land use is a key model driver as the load from diffuse sources is calculated on the basis of the area covered by each land use class and its calibrated source yield. There are issues surrounding the land use data used in the model which could have considerable impacts on the model results.

Land use is represented by 12 land use types, and diffuse loads from these sources are represented in the load models by three calibrated source yields. The models do not include data on certain management practices, for example, irrigation and mitigations other than fencing, which could affect *E. coli* generation from pastoral land use types.

The land use data were derived from a number of sources and relate to different time periods. The ECLM was calibrated to 2008 land use as represented in the CLUES model. The underlying land cover for the 2008 land use comes from LCDB3 while the land cover used for this project was derived from the LCDB4 and relates to 2012. The derivation and interpretation of the underlying land cover data

held in both land cover databases are subject to sampling precision errors and ground-truthing errors.

The productive grasslands land cover classes in LCDB4 were disaggregated into pastoral land use types (dairy, sheep and beef, deer, all other animals) on the basis of the FarmsOnline database which relates to the period 2010-15. FarmsOnline is not a land use database *per se* and was developed for biosecurity applications. Here, the primary land use registered to land owners was used to approximate land use. In some cases, the actual land use may differ from that registered.

Sheep and beef farming was split into three sub-classes (intensive lowland, hill and high country) on the basis of elevation using the same method developed for the CLUES model. Dairy farming was split into dairy platform and dairy runoff on the basis of preliminary results of the 2015 Agricultural Production Survey undertaken by Statistics New Zealand. The data were supplied by MPI, and aggregated by super-region. The same survey was used to further split third party dairy grazing on sheep and beef farms from the intensive sheep and beef land use class. In either case, the means of splitting land use classes can only approximate the true spatial distribution of stock type both within a super-region and for each REC reach.

5.7 Unknown sources

There may be other microbial sources that have not been accounted for in the models. These could include background *E. coli* from natural sources including wild pigs and birds as well as unknown point sources such as such as sewer or pumping station overflows in urban areas. For example, water fowl can contribute significant loads of *E. coli* to freshwater bodies (Wilcock, 2006; Moriarty et al., 2011).

5.8 Current level of fencing

The current level of fencing was estimated based on the preliminary results of the SRDM. The SRDM is a voluntary survey and is subject to bias including self-selection of respondents and response bias (see de Leeuw et al., 2012, for information on survey design and bias). While the survey does include questions on mitigation practices including fencing, its primary purpose is to provide a snapshot of the current rural landscape to give an insight into the future of New Zealand's primary industries. The SRDM is currently the leading source of information on fencing practices, at this level of detail, in New Zealand and is undertaken every 1-2 years by Landcare Research.

Results were provided by super-region and contain no information on the underlying spatial distribution of fencing with respect to regions or catchment characteristics. The assumption was made that only Water Accord streams on land with a slope of less than 16°are currently fenced, however, other considerations, such as elevation or soil type, were not taken into account. The level of fencing was estimated as the product of the number of farms with fencing and the approximate percentage of Accord streams on farms that are fenced. In comparison with dairy farming which is largely restricted to flat-to-rolling countryside, this percentage had higher variability for other stock types. For sheep and beef, this variability may be due to the range of catchment conditions associated with the three sheep and beef classes. There is an argument that fencing would be applied preferentially to intensive sheep and beef located on lowland farms, however, in the absence of data broken down into sheep and beef farm classes, the simplifying assumption was made that the level of fencing determined for sheep and beef should be applied equally to all three classes. It should be noted that high country sheep and beef is found mainly in the 16-28° slope class, which

has provisions for fencing in Scenario 4. Moreover, there are comparatively few high country sheep and beef farms with access to Water Accord streams.

It was also assumed that the length of a particular reach accessible to stock was proportional to the percentage coverage for each stock type in the reach sub-catchment. However, it is likely that some stock types may have greater access than others, particularly if there is a high elevation gradient in the reach sub-catchment which favours dairying and intensive sheep and beef near the stream channel.

Finally, changes in other mitigation practices implemented since 2010 that could affect *E. coli* concentrations were not considered.

6 Summary and conclusions

This report has documented the development and application of a steady-state, national model, referred to as the ECLM, for estimating the annual in-stream load of *E. coli* in New Zealand streams. The ECLM operates at the REC2 reach sub-catchment scale and has been calibrated against measured mean annual *E. coli* loads from water quality monitoring stations included in the NRWQN. For each reach in the REC2, the ECLM estimates *E. coli* median loads for baseflow conditions based on land use, slope and rainfall. Model data sources and calibration as well as sources of error and uncertainty are also identified and discussed.

The ECLM was run for a total of eight scenarios identified by MPI ranging from the current level of fencing to the exclusion of all dairy, beef and deer stock along all streams in reach sub-catchments with a slope less than 28°. Each scenario was run with low, most likely and high removal efficiencies to cover the variability in the effects of fencing on *E. coli* loadings that can be expected for different catchment locations and characteristics. The effect of fencing on *E. coli* annual median and 95th percentile concentrations was estimated by determining the proportional change in estimated *E. coli* loads compared to the loads estimated for the baseline fencing level relating to 2010 and then multiplying the reach concentration estimated by Unwin and Larned (2013) by the same proportional change. The model results were collated by region and super region (NNI, SNI and SI) and by NOF *E. coli* attribute state to determine the length of streams that met the NOF bottom line for *E. coli* median annual concentrations and the minimum acceptable state for 95th percentile concentrations.

The ECLM results will be used to inform an assessment of the costs and benefits of different policies for excluding stock from New Zealand's waterways.

The key finding of this report is that, under the assumptions made about the current level of fencing, which were based on the preliminary results of the SRDM, there is little capacity for further fencing along Accord streams, particularly for dairy farming. For this reason there is little difference in the results calculated for the scenarios for each LRF. With the inclusion of non-Accord streams and streams on land with an average slope between 16 and 28°, the length of streams with median annual *E. coli* concentrations in NOF Band A increased by around 8% for each LRF compared to Scenario 2 which represents the most likely level of fencing for the year 2017. The equivalent increase for the 95th percentile concentrations was 4%. Finally, the model results need to be considered in the context of significant model uncertainty which means that the differences between Scenarios 2 and 3a-c in particular are minimal.

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Appendix A Efficiency of fencing for stock exclusion

The following discussion was provided by AgResearch and summarises the derivation of the LRFs used for modelling. The full derivation of the LRFs is documented in a separate report (Muirhead, 2016).

MPI National Fencing Project Methods Summary
Richard Muirhead
AgResearch
17 November 2015

Effectiveness of fencing as a mitigation

A literature review was conducted to determine the published data on the effectiveness of fencing stock to reduce *E. coli* concentrations in streams for use a national scale fencing project. Initially over 200 literature sources were identified but many were not suitable for this analysis. A total of 16 journal papers were identified as having suitable data. Two papers were on the fencing of deer and the rest were on fencing of beef or dairy cattle. No publications on sheep were found. The percent effectiveness of fencing ranged from zero to 96%. The percentile values of 10%, 50% and 90% were used to indicate the potential effectiveness from poor, most likely and highly effective, respectively. After removing the deer data from the results this resulted in mitigation effectiveness values for dairy or beef cattle of 15, 62 and 86% for poor, most likely and highly effective, respectively. These mitigation effectiveness values can be applied directly to dairy farm milking platforms as we can assume that all stock on these farms are dairy cows. However, these values cannot be directly applied to sheep and beef farms as only a proportion of the stock on these farms are cattle.

Effectiveness of fencing cattle only on sheep and beef farms

The scenarios in the analysis want to investigate the effectiveness of fencing out cattle but not sheep. This creates a challenge in the NZ situation where most dry-stock farms run multiple stock types and cannot be separated in land use databases. To address this we used a modelling approach to determine the relative proportion of *E. coli* expected to be deposited directly in a stream from sheep and dairy cattle. These modelling analyses were based on the approach used in Muirhead et al (2011) adapted by using the sum equation as described in Muirhead and Cave (2014). As mentioned there is no published data on sheep access to streams but we were able to use some unpublished data from AgResearch, Invermay that had just been collected and analysed under the MBIE funded CWPL research programme. We then calculated the relative proportion of the farm-scale *E. coli* load from the cattle as that varied with the sheep to cattle ratios. However, we know that the sheep to cattle ratio increases as we move from north to south.

From the beef+lambnz financial survey data on their website we could calculate the average sheep to cattle ration for each of the 3 super regions. The stocking ratios are summarised in Table 1. Note that the stocking ratios are based on Stock Units (s.u.) which compares stock types based on the amount of feed each animal will consume in a year (Lincoln Technical Manual, 2011). The values used were a sheep = 1 s.u., and a dairy cow = 8 s.u. Note – the literature review did not identify any difference in effectiveness between dairy and beef studies.

Table 1. Summary data for calculating the effectiveness of fencing cattle only on sheep and beef farms.			
Description	**Northern North Island**	**Southern North Island**	**South Island**
Mitigation Effectiveness of dairy farms (100% cattle: poor, most likely and highly effective)	15, 62 and 86%	15, 62 and 86%	15, 62 and 86%
Stock unit Ratios on sheep & beef farms (sheep:cattle)	38:62	59:41	66:34
Proportion of farm-scale *E. coli* load from cattle	0.85	0.71	0.64
Effectiveness of fencing cattle only on sheep & beef farms (poor, most likely and highly effective)	13, 53 and 73%	11, 44, 61%	10, 40 and 55%

Effectiveness for Fencing Deer

There were only 2 papers with 3 data points for the effectiveness of fencing-out deer. These data points were 27, 50 and 92% so we couldn't use the same percentile values to identify poor, most likely and highly effective mitigation values. However, the numbers of deer are very low relative to other stock types and the data from Pike's survey suggest that almost all deer farms are already fenced. Therefore, any data used for deer farms is unlikely to change any outcomes modelled at the super region scale. Furthermore, very few farms will run deer only and will be a mixture of deer, sheep and beef cattle. Hence I suggest we just use the same mitigation effectiveness as for dairy farms for this analysis. This does allow for greater effectiveness of fencing on deer farms relative to sheep and beef farms which is consistent with our understanding of deer behaviour around water ways.

Estimating the proportion of land used for "Dairy Grazing"

Two of the modelling scenarios requested by MPI relate to the fencing of milking cows versus dry-cows and replacement stock on dairy farms and the fencing of diary stock grazing (or wintering) on 3rd party land. None of the land use databases have specific information relating to these activities so we need to estimate the relative proportions of land used for the different categories. To do this we used the 2014 agricultural production survey (APS) results from Statistics New Zealand that MPI provided summarised into results for the 3 super regions.

To estimate the milking versus non-milking land area for the dairying land use we used the stock units ratios to calculate the total number of stock units on dairy land in each region. We then calculated the total number of non-milking dairy stock units and divided by the total to get the relative proportions. We assume that because the stock units are based on feed consumed by the animals that this will provide a relative estimate of the proportion of the total land area used for each activity. The results are summarised in Table 2.

The APS results include specific questions on the number of stock on a property that are not owned by the land owner. We assumed that this data would represent the numbers of animals that were 3rd party grazing. To estimate the proportion of land used for 3rd party grazing we calculated the number of stock units reported for stock not owned by the farm. We did a similar calculation for the total number of stock units on the sheep and beef land and estimated the proportion of land area from the relative stock units. The results are summarised in Table 2.

Table 2. Proportion of land used for "grazing"			
Description	**Northern North Island**	**Southern North Island**	**South Island**
Dairy Land use – Total Stock Units (s.u.)	17,286,998	7,719,445	12,463,399
Dairy Land use – non-milking stock units (s.u.)	1,482,410	758,170	1,233,095
Dairy Land use -proportion of for non-milking stock (%)	9%	10%	10%
Sheep and Beef land use – Total Stock Units (s.u.)	10,604,565	16,533,294	21,020,599
Sheep and Beef Land use – 3rd party grazing Dairy Stock Units (s.u.)	886,694	431,010	3,404,898
Sheep and Beef Land use – Proportion used for 3rd party dairy grazing (%)	8%	3%	16%

However, the APS results showed a relatively large proportion of dairy animals on S&B farms, even including "milking or in calf" cows. It seem illogical to have milking cows on a S&B farm but the official data of the survey is the 30th June which is the middle of winter and hence not in the milking season. Therefore, I assumed that the "milking or in calf" cows on these farms were being wintered on the S&B farm for only 2.5 months of the year. Thus the milking/in calf dairy cattle on these farm were given an effective stock unit of 1.7 on an annual basis. I assumed that all other non-milking dairy stock were on the farm for a full year and hence the full stock unit conversion was used. However, if we assumed that the "milking or in calf" dairy cows on the S&B land were there for the full year the proportion ratios in Table 2 – rounding to the nearest digit – would only change the South Island figure to 14%, the North Island percentages would not change.

Appendix B Length of fenced streams

This appendix gives the modelled length of streams for each stock type grouped by region and slope class.

Scenario 1 – Current level of fencing

Table B-1: Modelled length (km) of fencing by land use and region: Scenario 1, slope class 1 (<16 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	10031.8	992.2	311.9	3616.9	4134.3	94.4	106.2	5456.0
Auckland	436.7	43.2	37.8	438.1	26.7	0.0	3.5	832.2
Bay of Plenty	1716.3	169.7	15.1	175.0	373.2	50.0	58.0	875.6
Gisborne	18.3	1.8	17.4	201.3	1205.6	22.5	1.0	405.9
Northland	1847.4	182.7	149.8	1736.9	231.3	0.3	4.3	1177.4
Waikato	6013.1	594.7	91.9	1065.6	2297.4	21.6	39.3	2164.9
SNI	5180.4	575.6	160.8	2597.2	4837.7	126.1	70.0	2442.7
Hawkes Bay	229.1	25.5	61.9	998.9	1348.6	25.9	19.5	496.5
Manawatu / Whanganui	1711.8	190.2	70.7	1141.9	2865.2	61.5	39.5	1189.5
Taranaki	2890.0	321.1	14.4	232.4	272.2	34.8	8.0	403.9
Wellington	349.5	38.8	13.9	224.0	351.8	3.8	3.0	352.8
SI	6766.2	751.8	1841.2	6714.3	4378.1	928.4	313.2	4644.9
Canterbury	2212.6	245.8	627.6	2254.6	1129.5	261.8	154.8	1825.2
Canterbury / Otago	299.3	33.3	124.2	446.2	260.0	35.6	1.8	193.4
Marlborough	115.8	12.9	79.6	285.9	108.7	82.9	5.0	249.5
Otago	719.3	79.9	405.4	1456.5	1820.6	275.7	27.7	905.0
Southland	1921.0	213.4	559.8	2011.2	815.2	131.0	98.1	707.9
Tasman	341.0	37.9	5.4	119.4	50.2	131.0	11.3	291.4
West Coast	1157.2	128.6	39.1	140.5	193.8	10.4	14.5	472.4
National total	21978.4	2319.6	2313.9	12928.5	13350.1	1148.9	489.3	12543.6

Scenario 2 – Status quo

Table B-2: Modelled length (km) of fencing by land use and region: Scenario 2, slope class 1 (<16 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	10377.6	1026.4	391.8	4530.4	4528.1	98.9	119.8	5456.0
Auckland	661.3	65.4	95.9	1103.2	69.4	0.1	9.7	832.2
Bay of Plenty	1716.3	169.7	15.1	175.0	373.2	50.0	58.0	875.6
Gisborne	18.3	1.8	17.4	201.3	1205.6	22.5	1.0	405.9
Northland	1847.4	182.7	149.8	1736.9	231.3	0.3	4.3	1177.4
Waikato	6134.3	606.7	113.6	1314.0	2648.5	26.1	46.7	2164.9
SNI	6320.9	702.3	231.6	6545.4	9287.6	216.3	133.3	2442.7
Hawkes Bay	358.4	39.8	108.6	3511.7	4670.1	84.4	53.8	496.5
Manawatu / Whanganui	1711.8	190.2	70.7	1141.9	2865.2	61.5	39.5	1189.5
Taranaki	3640.4	404.5	18.1	477.5	296.9	57.0	8.0	403.9
Wellington	377.1	41.9	15.7	506.8	795.8	8.6	5.6	352.8
SI	6957.9	773.1	2214.7	10053.7	6004.2	1371.4	504.5	4644.9
Canterbury	2358.9	262.1	872.9	4582.6	2295.8	532.1	335.7	1825.2
Canterbury / Otago	319.1	35.5	172.8	907.0	528.5	72.5	4.0	193.4
Marlborough	141.5	15.7	159.3	836.6	300.1	218.6	13.2	249.5
Otago	719.3	79.9	405.4	1456.5	1820.6	275.7	27.7	905.0
Southland	1921.0	213.4	559.8	2011.2	815.2	131.0	98.1	707.9
Tasman	341.0	37.9	5.4	119.4	50.2	131.0	11.3	291.4
West Coast	1157.2	128.6	39.1	140.5	193.8	10.4	14.5	472.4
National total	23656.3	2501.8	2838.1	21129.5	19819.9	1686.6	757.5	12543.6

Table B-3: Modelled length (km) of fencing by land use and region: Scenario 2, slope class 2 (16-28 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
Auckland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bay of Plenty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gisborne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waikato	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
SNI	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
Hawkes Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manawatu / Whanganui	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taranaki	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wellington	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
SI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury / Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marlborough	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tasman	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Coast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National total	16.6	1.7	1.5	21.0	199.7	5.9	0.2	0.0

Scenario 3a – LAWF progressive, dairy platform

Table B-4: Modelled length (km) of fencing by land use and region: Scenario 3a, slope class 1 (<16 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	10692.8	1026.4	391.8	4530.4	4528.1	98.9	119.8	5456.0
Auckland	661.3	65.4	95.9	1103.2	69.4	0.1	9.7	832.2
Bay of Plenty	1774.9	169.7	15.1	175.0	373.2	50.0	58.0	875.6
Gisborne	18.9	1.8	17.4	201.3	1205.6	22.5	1.0	405.9
Northland	1910.5	182.7	149.8	1736.9	231.3	0.3	4.3	1177.4
Waikato	6327.3	606.7	113.6	1314.0	2648.5	26.1	46.7	2164.9
SNI	6458.2	702.3	231.6	6545.4	9287.6	216.3	133.3	2442.7
Hawkes Bay	358.4	39.8	108.6	3511.7	4670.1	84.4	53.8	496.5
Manawatu / Whanganui	1846.6	190.2	70.7	1141.9	2865.2	61.5	39.5	1189.5
Taranaki	3672.4	404.5	18.1	477.5	296.9	57.0	8.0	403.9
Wellington	377.1	41.9	15.7	506.8	795.8	8.6	5.6	352.8
SI	7231.5	773.1	2214.7	10053.7	6004.2	1371.4	504.5	4644.9
Canterbury	2358.9	262.1	872.9	4582.6	2295.8	532.1	335.7	1825.2
Canterbury / Otago	319.1	35.5	172.8	907.0	528.5	72.5	4.0	193.4
Marlborough	141.5	15.7	159.3	836.6	300.1	218.6	13.2	249.5
Otago	766.8	79.9	405.4	1456.5	1820.6	275.7	27.7	905.0
Southland	2048.0	213.4	559.8	2011.2	815.2	131.0	98.1	707.9
Tasman	363.5	37.9	5.4	119.4	50.2	131.0	11.3	291.4
West Coast	1233.7	128.6	39.1	140.5	193.8	10.4	14.5	472.4
National total	24382.5	2501.8	2838.1	21129.5	19819.9	1686.6	757.5	12543.6

Table B-5: Modelled length (km) of fencing by land use and region: Scenario 3a, slope class 2 (16-28 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
Auckland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bay of Plenty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gisborne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waikato	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
SNI	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
Hawkes Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manawatu / Whanganui	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taranaki	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wellington	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
SI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury / Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marlborough	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tasman	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Coast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National total	16.6	1.7	1.5	21.0	199.7	5.9	0.2	0.0

Scenario 3b – LAWF progressive, dairy platform and runoff

Table B-6: Modelled length (km) of fencing by land use and region: Scenario 3b, slope class 1 (<16 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	10692.8	1057.5	391.8	4530.4	4528.1	98.9	119.8	5456.0
Auckland	661.3	65.4	95.9	1103.2	69.4	0.1	9.7	832.2
Bay of Plenty	1774.9	175.5	15.1	175.0	373.2	50.0	58.0	875.6
Gisborne	18.9	1.9	17.4	201.3	1205.6	22.5	1.0	405.9
Northland	1910.5	188.9	149.8	1736.9	231.3	0.3	4.3	1177.4
Waikato	6327.3	625.8	113.6	1314.0	2648.5	26.1	46.7	2164.9
SNI	6458.2	717.6	231.6	6545.4	9287.6	216.3	133.3	2442.7
Hawkes Bay	358.4	39.8	108.6	3511.7	4670.1	84.4	53.8	496.5
Manawatu / Whanganui	1846.6	205.2	70.7	1141.9	2865.2	61.5	39.5	1189.5
Taranaki	3672.4	408.0	18.1	477.5	296.9	57.0	8.0	403.9
Wellington	377.1	41.9	15.7	506.8	795.8	8.6	5.6	352.8
SI	7231.5	803.5	2214.7	10053.7	6004.2	1371.4	504.5	4644.9
Canterbury	2358.9	262.1	872.9	4582.6	2295.8	532.1	335.7	1825.2
Canterbury / Otago	319.1	35.5	172.8	907.0	528.5	72.5	4.0	193.4
Marlborough	141.5	15.7	159.3	836.6	300.1	218.6	13.2	249.5
Otago	766.8	85.2	405.4	1456.5	1820.6	275.7	27.7	905.0
Southland	2048.0	227.6	559.8	2011.2	815.2	131.0	98.1	707.9
Tasman	363.5	40.4	5.4	119.4	50.2	131.0	11.3	291.4
West Coast	1233.7	137.1	39.1	140.5	193.8	10.4	14.5	472.4
National total	24382.5	2578.6	2838.1	21129.5	19819.9	1686.6	757.5	12543.6

Table B-7: Modelled length (km) of fencing by land use and region: Scenario 1, slope class 2 (16-28 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
Auckland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bay of Plenty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gisborne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waikato	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
SNI	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
Hawkes Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manawatu / Whanganui	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taranaki	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wellington	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
SI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury / Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marlborough	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tasman	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Coast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National total	16.6	1.7	1.5	21.0	199.7	5.9	0.2	0.0

Scenario 3c – LAWF progressive, dairy platform, runoff and third party grazing

Table B-8: Modelled length (km) of fencing by land use and region: Scenario 3c, slope class 1 (<16 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	10692.8	1057.5	565.4	4530.4	4528.1	98.9	119.8	5456.0
Auckland	661.3	65.4	95.9	1103.2	69.4	0.1	9.7	832.2
Bay of Plenty	1774.9	175.5	25.3	175.0	373.2	50.0	58.0	875.6
Gisborne	18.9	1.9	29.1	201.3	1205.6	22.5	1.0	405.9
Northland	1910.5	188.9	251.3	1736.9	231.3	0.3	4.3	1177.4
Waikato	6327.3	625.8	163.7	1314.0	2648.5	26.1	46.7	2164.9
SNI	6458.2	717.6	239.2	6545.4	9287.6	216.3	133.3	2442.7
Hawkes Bay	358.4	39.8	108.6	3511.7	4670.1	84.4	53.8	496.5
Manawatu / Whanganui	1846.6	205.2	79.9	1141.9	2865.2	61.5	39.5	1189.5
Taranaki	3672.4	408.0	19.0	477.5	296.9	57.0	8.0	403.9
Wellington	377.1	41.9	15.7	506.8	795.8	8.6	5.6	352.8
SI	7231.5	803.5	2609.4	10053.7	6004.2	1371.4	504.5	4644.9
Canterbury	2358.9	262.1	872.9	4582.6	2295.8	532.1	335.7	1825.2
Canterbury / Otago	319.1	35.5	172.8	907.0	528.5	72.5	4.0	193.4
Marlborough	141.5	15.7	159.3	836.6	300.1	218.6	13.2	249.5
Otago	766.8	85.2	563.9	1456.5	1820.6	275.7	27.7	905.0
Southland	2048.0	227.6	778.6	2011.2	815.2	131.0	98.1	707.9
Tasman	363.5	40.4	7.5	119.4	50.2	131.0	11.3	291.4
West Coast	1233.7	137.1	54.4	140.5	193.8	10.4	14.5	472.4
National total	24382.5	2578.6	3413.9	21129.5	19819.9	1686.6	757.5	12543.6

Table B-8: Modelled length (km) of fencing by land use and region: Scenario 3c, slope class 2 (16-28 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
Auckland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bay of Plenty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gisborne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waikato	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
SNI	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
Hawkes Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manawatu / Whanganui	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taranaki	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wellington	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
SI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury / Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marlborough	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tasman	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Coast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National total	16.6	1.7	1.5	21.0	199.7	5.9	0.2	0.0

Scenario 3d – LAWF progressive, all cattle and deer

Table B-9: Modelled length (km) of fencing by land use and region: Scenario 3d, slope class 1 (<16 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	10692.8	1057.5	565.4	6501.8	7053.1	158.6	119.8	5456.0
Auckland	661.3	65.4	95.9	1103.2	69.4	0.1	9.7	832.2
Bay of Plenty	1774.9	175.5	25.3	291.2	621.0	83.1	58.0	875.6
Gisborne	18.9	1.9	29.1	334.9	2006.0	37.5	1.0	405.9
Northland	1910.5	188.9	251.3	2890.0	384.8	0.5	4.3	1177.4
Waikato	6327.3	625.8	163.7	1882.4	3971.8	37.4	46.7	2164.9
SNI	6458.2	717.6	239.2	7732.6	12914.6	314.8	133.3	2442.7
Hawkes Bay	358.4	39.8	108.6	3511.7	4670.1	84.4	53.8	496.5
Manawatu / Whanganui	1846.6	205.2	79.9	2583.5	6482.3	139.2	39.5	1189.5
Taranaki	3672.4	408.0	19.0	614.4	625.0	82.0	8.0	403.9
Wellington	377.1	41.9	15.7	506.8	795.8	8.6	5.6	352.8
SI	7231.5	803.5	2609.4	13902.5	8977.7	1937.3	504.5	4644.9
Canterbury	2358.9	262.1	872.9	4582.6	2295.8	532.1	335.7	1825.2
Canterbury / Otago	319.1	35.5	172.8	907.0	528.5	72.5	4.0	193.4
Marlborough	141.5	15.7	159.3	836.6	300.1	218.6	13.2	249.5
Otago	766.8	85.2	563.9	2960.5	3700.4	560.4	27.7	905.0
Southland	2048.0	227.6	778.6	4087.8	1657.0	266.2	98.1	707.9
Tasman	363.5	40.4	7.5	242.6	102.0	266.3	11.3	291.4
West Coast	1233.7	137.1	54.4	285.5	393.9	21.2	14.5	472.4
National total	24382.5	2578.6	3413.9	28137.0	28945.5	2410.8	757.5	12543.6

Table B-10: Modelled length (km) of fencing by land use and region: Scenario 3d, slope class 2 (16-28 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
Auckland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bay of Plenty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gisborne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waikato	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
SNI	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
Hawkes Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manawatu / Whanganui	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taranaki	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wellington	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
SI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury / Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marlborough	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tasman	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Coast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National total	16.6	1.7	1.5	21.0	199.7	5.9	0.2	0.0

Scenario 3e – LAWF progressive, all cattle and deer

Table B-11: Modelled length (km) of fencing by land use and region: Scenario 3e, slope class 1 (<16 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	10692.8	1057.5	565.4	6501.8	7053.1	158.6	172.2	5456.0
Auckland	661.3	65.4	95.9	1103.2	69.4	0.1	9.7	832.2
Bay of Plenty	1774.9	175.5	25.3	291.2	621.0	83.1	89.2	875.6
Gisborne	18.9	1.9	29.1	334.9	2006.0	37.5	1.6	405.9
Northland	1910.5	188.9	251.3	2890.0	384.8	0.5	6.7	1177.4
Waikato	6327.3	625.8	163.7	1882.4	3971.8	37.4	65.0	2164.9
SNI	6458.2	717.6	239.2	7732.6	12914.6	314.8	163.7	2442.7
Hawkes Bay	358.4	39.8	108.6	3511.7	4670.1	84.4	53.8	496.5
Manawatu / Whanganui	1846.6	205.2	79.9	2583.5	6482.3	139.2	73.4	1189.5
Taranaki	3672.4	408.0	19.0	614.4	625.0	82.0	14.8	403.9
Wellington	377.1	41.9	15.7	506.8	795.8	8.6	5.6	352.8
SI	7231.5	803.5	2609.4	13902.5	8977.7	1937.3	681.7	4644.9
Canterbury	2358.9	262.1	872.9	4582.6	2295.8	532.1	335.7	1825.2
Canterbury / Otago	319.1	35.5	172.8	907.0	528.5	72.5	4.0	193.4
Marlborough	141.5	15.7	159.3	836.6	300.1	218.6	13.2	249.5
Otago	766.8	85.2	563.9	2960.5	3700.4	560.4	60.1	905.0
Southland	2048.0	227.6	778.6	4087.8	1657.0	266.2	212.7	707.9
Tasman	363.5	40.4	7.5	242.6	102.0	266.3	24.6	291.4
West Coast	1233.7	137.1	54.4	285.5	393.9	21.2	31.5	472.4
National total	24382.5	2578.6	3413.9	28137.0	28945.5	2410.8	1017.6	12543.6

Table B-12: Modelled length (km) of fencing by land use and region: Scenario 3e, slope class 2 (16-28 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
Auckland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bay of Plenty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gisborne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waikato	15.2	1.5	1.3	15.3	114.0	1.8	0.0	0.0
SNI	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
Hawkes Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manawatu / Whanganui	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taranaki	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wellington	1.5	0.2	0.2	5.8	85.7	4.0	0.2	0.0
SI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury / Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marlborough	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tasman	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Coast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National total	16.6	1.7	1.5	21.0	199.7	5.9	0.2	0.0

Scenario 4 – Steep hill country

Table B-13: Modelled length (km) of fencing by land use and region: Scenario 4, slope class 1 (<16 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	13574.7	1342.6	703.0	8084.7	9310.7	189.4	223.1	5456.0
Auckland	661.3	65.4	95.9	1103.2	69.4	0.1	9.7	832.2
Bay of Plenty	2132.8	210.9	32.3	370.9	771.9	100.9	104.5	875.6
Gisborne	25.5	2.5	35.4	407.7	2752.5	41.2	2.6	405.9
Northland	2500.3	247.3	333.7	3837.8	505.1	0.5	10.2	1177.4
Waikato	8254.9	816.4	205.7	2365.1	5211.8	46.7	96.2	2164.9
SNI	7269.9	807.8	273.3	8837.7	16366.1	351.7	187.0	2442.7
Hawkes Bay	358.4	39.8	108.6	3511.7	4670.1	84.4	53.8	496.5
Manawatu / Whanganui	2617.6	290.8	122.2	3949.7	9705.4	171.4	105.9	1189.5
Taranaki	3808.6	423.2	21.4	690.7	751.2	86.5	18.3	403.9
Wellington	485.2	53.9	21.2	685.5	1239.4	9.4	9.1	352.8
SI	10031.5	1114.6	4082.8	21693.3	14684.3	2938.5	1050.4	4644.9
Canterbury	3548.6	394.3	1421.9	7465.1	3698.8	668.1	564.2	1825.2
Canterbury / Otago	547.3	60.8	330.7	1735.9	966.6	120.8	8.6	193.4
Marlborough	141.5	15.7	159.3	836.6	300.1	218.6	13.2	249.5
Otago	1229.5	136.6	1002.2	5261.6	6750.2	1154.4	101.1	905.0
Southland	2917.7	324.2	1104.3	5797.7	2441.7	443.5	302.4	707.9
Tasman	393.7	43.7	9.6	308.8	121.3	310.9	28.8	291.4
West Coast	1253.2	139.2	54.8	287.6	405.5	22.2	32.3	472.4
National total	30876.1	3264.9	5059.1	38615.7	40361.1	3479.6	1460.5	12543.6

Table B-14: Modelled length (km) of fencing by land use and region: Scenario 4, slope class 2 (16-28 degrees).

Region	Dairy			Sheep and beef			Deer	Other
	Platform	Runoff	Grazing	Intensive	Hill country	High country		
NNI	94.3	9.3	15.3	176.0	1966.3	72.1	2.2	0.0
Auckland	1.6	0.2	2.2	25.6	14.5	0.0	0.0	0.0
Bay of Plenty	28.0	2.8	1.6	18.2	37.7	32.3	1.5	0.0
Gisborne	1.5	0.2	3.2	36.5	1341.5	32.5	0.0	0.0
Northland	19.0	1.9	4.6	52.4	89.3	0.0	0.0	0.0
Waikato	44.2	4.4	3.8	43.3	483.3	7.3	0.7	0.0
SNI	144.9	16.1	8.7	282.7	5780.1	157.2	35.9	0.0
Hawkes Bay	12.5	1.4	2.6	82.5	1065.0	90.9	6.3	0.0
Manawatu / Whanganui	71.2	7.9	3.5	113.2	3500.6	46.4	15.2	0.0
Taranaki	56.0	6.2	1.9	62.5	834.3	9.3	9.9	0.0
Wellington	5.2	0.6	0.8	24.5	380.2	10.7	4.5	0.0
SI	367.7	40.9	200.2	1068.1	6875.1	2422.6	80.8	0.0
Canterbury	156.1	17.3	88.5	464.7	2858.3	617.0	33.8	0.0
Canterbury / Otago	32.1	3.6	13.5	71.0	890.3	159.6	0.0	0.0
Marlborough	41.0	4.6	67.4	353.7	731.4	701.5	2.1	0.0
Otago	60.4	6.7	20.7	108.7	2061.0	449.8	18.7	0.0
Southland	3.1	0.3	7.9	41.3	291.1	338.8	15.1	0.0
Tasman	47.8	5.3	0.6	20.2	29.7	154.5	10.5	0.0
West Coast	27.2	3.0	1.6	8.5	13.4	1.4	0.6	0.0
National total	606.9	66.3	224.3	1526.9	14621.5	2651.9	118.9	0.0

Appendix C Land use determination work flow

Figure C-1 shows how land cover data from LCDB4 and primary activity data held in MPI's Farms Online database were used to derive the land use classes modelled by the ECLM.

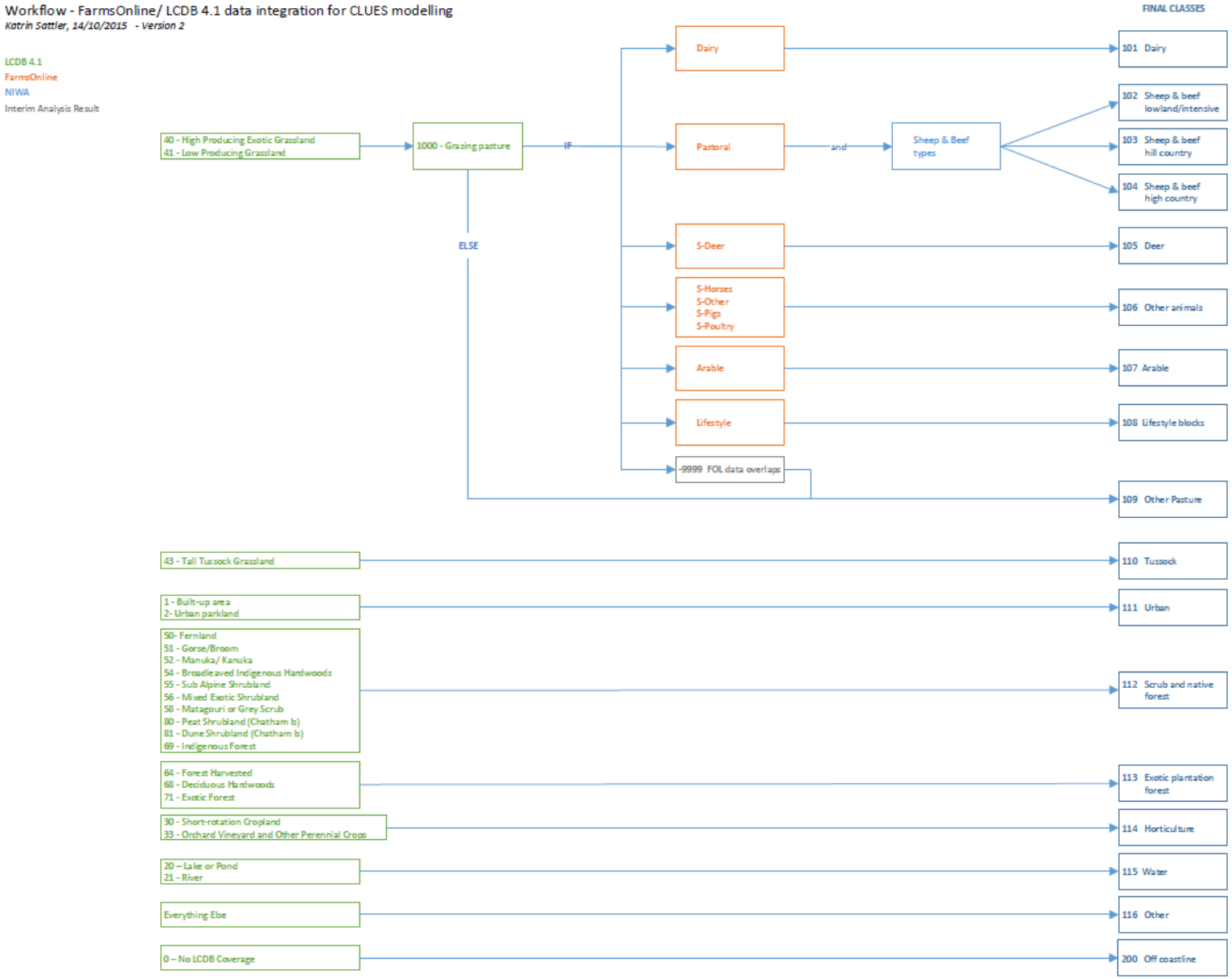

Figure C-1: Land use workflow diagram. Prepared by Katrin Sattler, MPI.

Appendix D Point sources

The point source data used in the ECLM were taken from the CLUES and SPARROW point source data base.

Table D-1: *E. coli* point sources. .

Reach ID	Region	Source type	Organisms (10^{15} per year)
2030849	Auckland	Sewage	0.0027
2032078	Auckland	Sewage	0.0215
2039233	Auckland	Sludges	0.0610
2041686	Auckland	Sewage	0.0141
2044628	Auckland	Piggery	0.1135
3046586	Waikato	Piggery	0.0046
3047348	Waikato	Sewage	0.0840
3047756	Waikato	Rendering	0.0081
3051779	Waikato	Sewage	0.0177
3054561	Waikato	Sewage	0.0326
3057279	Waikato	Sewage	0.0785
3057895	Waikato	Sewage	0.0221
3059055	Waikato	Meatworks	0.0103
3060721	Waikato	Sewage	0.7430
3066095	Waikato	Sewage	0.0219
3067608	Waikato	Piggery	0.0055
3070207	Waikato	Dairy factory	0.0339
3070207	Waikato	Sewage	0.0339
3075608	Waikato	Piggery	0.0017
3076505	Waikato	Dairy factory	0.0002
3076506	Waikato	Sewage	0.0495
3089120	Waikato	Sewage	0.2644
3093674	Waikato	Sewage	0.0652
3101155	Waikato	sewage	0.3023
3103587	Waikato	Wood Processing	0.0147
3158324	Waikato	Sewage	0.0147
4063849	Bay of Plenty	Sewage	0.1904
4065357	Bay of Plenty	Meat	0.0951
4076913	Bay of Plenty	Pulp/Board	0.0190
4076981	Bay of Plenty	Sewage	0.0019
4082138	Bay of Plenty	Sewage	0.0009
4082522	Bay of Plenty	Pulp/paper	0.0098
4084505	Bay of Plenty	Pulp/paper	0.0024
4091345	Bay of Plenty	Sewage	0.0187
4092275	Bay of Plenty	Sewage	0.0005
4117099	Bay of Plenty	Sewage	0.0001
6157389	Taranaki	Meatworks	0.0873
6172269	Taranaki	Sewage	0.0932
6186660	Taranaki	Sewage	0.0666
6191882	Taranaki	Sewage	0.0022
6192810	Taranaki	Meat	0.0300
6193780	Taranaki	Sewage	0.0300
6205434	Taranaki	Sewage	0.1664
6214346	Taranaki	Sewage	0.0075
6214889	Taranaki	Sewage	0.0075
7150643	Manawatu	Sewage	1.1525
7194503	Manawatu	Sewage	0.1116
7196689	Manawatu	Sewage	29.0290
7211096	Manawatu	Sewage	2.1930
7234946	Manawatu	Meatworks	0.0097
7235055	Manawatu		0.5878
7235694	Manawatu	Sewage	13.6262
7237476	Manawatu		0.1466
7241128	Manawatu	Sewage	0.3963
7242154	Manawatu	Sewage	0.1775
7243900	Manawatu	Sewage	0.8764
7247235	Manawatu	Sewage	0.0682
8226039	Hawke's Bay	Sewage	0.0071
8227356	Hawke's Bay	Sewage	0.0146
9252711	Wellington	Sewage	0.0150
9253047	Canterbury	Sewage	0.0149
9256255	Wairarapa	Piggery/MW	0.0027
9257309	Wairarapa	Sewage	0.1134
9258497	Wairarapa	Sewage	0.0907
9259976	Wairarapa	Sewage	0.0076
9260387	Wairarapa	Sewage	0.0547
9260863	Wairarapa	Piggery	0.0109
9262952	Wairarapa	Sewage	0.0024
10019050	Tasman	Sewage	0.0050

Reach ID	Region	Source type	Organisms (10^{15} per year)
11022500	Marlborough	Sewage	0.0075
11024830	Marlborough	Winery/MW	0.0140
12037247	West Coast	Sewage	0.0158
12057082	West Coast	Sewage	0.0050
12071265	West Coast	Sewage	0.0072
12075558	West Coast	Abbatoir	0.0039
13069696	Canterbury	Sewage	0.0416
13076937	Canterbury	Sewage	0.0144
13115777	Canterbury	Sewage	0.0104
13116079	Canterbury	Sewage	0.0250
13116266	Canterbury	Sewage	0.1021
13119371	Canterbury	Sewage/MW	0.0970
13122170	Canterbury	Sewage	0.0033
13127527	Canterbury	Sewage	0.0219
13130360	Canterbury	Sewage	0.0012
13131111	Canterbury	Sewage	0.0216
13131894	Canterbury	Sewage	0.0166
13139644	Canterbury	Sewage	0.0732
13147045	Canterbury	Abbatoir	0.0025
13147877	Canterbury	Sewage	0.0025

Reach ID	Region	Source type	Organisms (10^{15} per year)
14198216	Otago	Sewage	0.0834
14219661	Otago	Sewage	0.0169
14221215	Otago	Sewage	0.3096
14224498	Otago	Sewage	0.0337
14250978	Otago	Sewage	0.0058
14261533	Otago	Sewage	0.0113
14282089	Otago	Sewage	0.2164
14286193	Otago	Sewage	0.0133
14288951	Otago	Sewage	0.0057
14300382	Otago	Sewage	0.0086
14308824	Otago	Sewage	0.0250
14309270	Otago	Tannery	0.1067
15301264	Southland	Sewage	0.4161
15304962	Southland	Sewage	0.0064
15306020	Southland	Meatworks	10.1216
15307918	Southland	MDF pulp mill	0.0007
15312590	Southland	Meatworks	0.0873
15314297	Southland	Meatworks	0.0436
15317281	Southland	Sewage	0.1876

Appendix E Modelling procedure and calibration

This appendix gives detail on the modelling procedure and calibration and is complementary to Section 3.3.

Load calculation

SPARROW calculates annual input loads from each reach sub-catchment and routes these loads down the drainage network. Loads entering the drainage network from each reach sub-catchment are calculated as the sum of loads from point sources draining to the reach and *E. coli* losses from diffuse sources. The load from diffuse sources is calculated as the sum of the area of each diffuse source (i.e., land use type) multiplied by a corresponding source yield (adjusted for surface losses), that is

$$L_l = A_l Y_l \tag{1}$$

where L_l is the diffuse load from land use l, A_l is the area covered by the land use and Y_l is the source yield calibrated for the land use.

For pastoral land uses where there is fencing in place, Equation (1) is adjusted to take into account the difference in yields due to stock exclusion. It is assumed that the proportional area affected by stock exclusion in each REC2 sub-catchment is the same as the proportion of the stream reach that is fenced. The total load from each stock type is the sum of the loads determined for each of the fenced and unfenced portions of the sub-catchment covered by that stock type, that is

$$L_p = A_{fp} Y_{fp} + A_{np} Y_{np} \tag{2}$$

where L_p is the diffuse load from the pastoral land use, A_{fp} is the contributing area covered by the land use for the section of stream that has been fenced, Y_{fp} is the yield reduced by fencing and A_{np} and Y_{np} are the contributing area and yield for the section of stream that not fenced and therefore accessible to the stock type.

The surface decay between the summed diffuse source loads and the drainage network is calculated using a first-order decay term as follows:

$$L_{att} = L_{\text{int}} e^{\left(R_{reach} k_{rain}\right)} \tag{3}$$

Where, for each REC reach sub-catchment, L_{att} is the attenuated load from the diffuse sources entering the drainage network, L_{int} is the initial load summed for the diffuse sources, R_{reach} is the mean annual rainfall anomaly for the reach calculated as the mean rainfall for the country minus the mean rainfall for the reach and k_{rain} is the catchment-wide rainfall delivery coefficient. Here, the mean annual rainfall for each reach is taken from the CLUES model geospatial database.

Once in the drainage network, the *E. coli* load is propagated downstream taking into account losses (i.e., die-off) within the network by multiplying the in-stream load by decay factors which relate to the proportion of the load remaining after attenuation. In-stream losses for each reach are modelled by a first-order decay term calculated as:

$$Att_{stream} = 1 - e^{\left(-k_{time} Q^{k\,flow} Len\right)} \quad (4)$$

where Att_{stream} is the in-stream attenuation factor for the reach, k_{time} is a calibrated time decay coefficient, Q is the mean annual flow for the reach and Len is the channel length. For reaches that contain or are part of a lake, the length of the channel that is within the lake is subtracted from the total reach length.

Losses for reservoirs are calculated for the outlet reach of each reservoir as:

$$Att_{res} = \frac{O_{res}}{\left(O_{res} + k_{res}\right)} \quad (5)$$

where Att_{res} is the attenuation factor for the outlet reach of the lake (as identified in the REC2), O_{res} is the reservoir overflow (m/year) for the outlet reach taken from the SPARROW component of the CLUES model (Elliott et al., 2005) and k_{res} is a calibrated coefficient representing the loss of *E. coli* within the reservoir.

Calibration

SPARROW was calibration for *E. coli* under baseflow conditions was undertaken as part of the Clean Water Productive Land (Ministry of Business, Innovation and Employment, MBIE, contract C10X1006) research programme using the SAS statistical package. Once calibrated, the model was recreated as the ECLM in EXCEL for use in this project. Calibration sought to minimise the Root Mean Square Error (RMSE) calculated for the residuals between the modelled and measured *E. coli* log-transformed baseflow loads for 204 water quality monitoring sites held in the NRWQN for which *E. coli* loads could be determined (i.e., concurrent water quality and flow monitoring). The RMSE is used as a standard statistical metric to measure model performance in many fields, including meteorology, air quality, climate research and agriculture and assumes the errors are unbiased and follow a normal distribution (Chai and Draxler, 2014). The RMSE represents the sample standard deviation of the differences (residuals) between the predicted and observed values –or variance from the regression line. Baseflow loads were estimated as the product of the median annual concentration (estimated from monthly *E. coli* data) and the median annual flow rate.

No trend analysis was carried out for the calibration as the data records are too short for many of the sites. It is noted that the most recent national analysis of water quality trends undertaken for the Ministry for the Environment (MfE; Larned et al., 2015) also did not analyse *E. coli* trends due to a lack of data. Furthermore, while *E. coli* trend analyses for the decade between 2000 and 2010 was undertaken as part of the NEMaR3 modelling (Unwin and Larned, 2013), the results were inconclusive with increasing and decreasing trends often apparent at neighbouring sites in the same region.

Seventeen different configurations of the SPARROW *E. coli* model were tested as part of the calibration process. The final calibration results used to create the ECLM model-build are shown in Table E-1 and the calibrated parameters and their standard errors are given in Table E-2. Calibration compared the loads determined for each of the 204 monitoring sites against the equivalent modelled loads for the reaches where the sites were located. The coefficient of determination (R^2) between the measured and modelled load was 0.809. To normalise the model results for area the measured

and modelled generated yields (i.e., load divided by REC subcatchment area) were also compared giving a lower R^2 of 0.619.

The configuration has three source yields relating to pastoral land use (all stock types); urban; and all other land uses. Other combinations of land use, including separate yields for different stock types, were trialled but these did not significantly improve model fit. Model parameters for reach mean annual temperature and for soil drainage class were similarly trialled and subsequently removed from the baseflow model.

The RMSE for the model-build indicates that 68% (or one standard deviation) of the model results are within 0.846 x 10^{15} organisms per year of the observed annual load. This value and the standard errors for the parameters show that there is substantial uncertainty in the model which reflects the difficulty in determining *E. coli* loads, largely due to the high spatial and temporal variability of *E. coli* concentration measurements. .

Table E-1: Calibration results for the SPARROW configuration used to create the ECLM model-build.

Number of observations	Number of calibrated parameters	RMSE	Load R^2	Yield R^2
204	7	0.846	0.809	0.619

Table E-2: SPARROW calibrated parameters and their associated standard errors.

Parameters optimised	Unit	Calibrated value	Standard error
Source yield Y_l: All stock types	10^{15} organisms/km^2/year	0.0109	0.0028
Source yieldY_l: Urban	10^{15} organisms/km^2/year	0.0148	0.0066
Source yield Y_l: Other land uses	10^{15} organisms/km^2/year	0.0001	0.00005
Rainfall delivery coefficient k_{rain}	dimensionless	0.7131	0.1456
Decay coefficient, k_{time}	/year	0.1079	0.0232
Flow coefficient, k_{flow}	/year	-0.6462	0.0731
Reservoir attenuation coefficient k_{res},	/year	102.4	73.2

Parameter adjustment

Since the SPARROW model was calibrated for the year 2008, the calibrated yields given in Table E-2 implicitly contain the signal from the land use[9] and level of fencing at that time. As there was no clear trend in *E. coli* concentrations reported for the NEMaR3 modelling (Unwin and Larned, 2013), it is assumed that the 2008 calibration yields are also indicative of concentrations relating to the ECLM baseline year 2010. Changes in land use between 2008 and 2015 are accounted for in the ECLM by using the land use data provided by MPI. However, the yields also need to be adjusted for the change in fencing. This was done by splitting the yield for each pastoral land use into a fenced and an unfenced component, so that in Equation (2):

$$Y_p = Y_{np} P_{np} + Y_{np} P_{fp} \quad (6)$$

[9] Derived for the CLUES model

where Y_p is the yield for the pastoral land use and P_{np} and P_{fp} are the proportions of the stream length that are unfenced and fenced for the pastoral land use, respectively. Since the model was calibrated nationally, the proportions of fenced and excluded streams for each stock type were also required at a national scale. These proportions were estimated using the nationally aggregated results of the SRDM (see Table 3-3).

The fenced and unfenced yields are calculated for each LRF as:

$$Y_{fp} = Y_{np}(1 - LRF)$$

and

$$Y_{np} = \frac{Y_p}{P_{np} + (1 - LRF)(1 - P_{np})} \quad (7)$$

The replies to Questions 62 (age of fencing) and 63 (current proportion of waterways fenced) of the SRDM summarised in Table 3-3 were used to approximate the current level of fencing and the level of fencing in 2010. To simplify parameter adjustment, it was was assumed that the level of fencing in 2007 (i.e., Sparrow calibration reference year) was the same as the level of fencing in 2010 (i.e., ECLM baseline year). The adjusted yields derived for the baseline year of 2010 are listed in Table E-3, these yields were applied to all the scenarios. In the case of sheep and beef, which has different LRFs for each super-region, the unfenced yield was determined using the mean LRF for all three super-regions.

Table E-3: Adjusted yields determined for dairy, sheep and beef and deer on the basis of the proportion of fencing in 2010 and low, most likely and high load.

Stock type	Calibrated yield	Unfenced yield	Fenced yield		
			Low	Most likely	High
Dairy	0.0109	0.0182	0.0155	0.0069	0.0026
Sheep and beef (NNI)	0.0109	0.0129	0.0113	0.0061	0.0035
Sheep and beef (SNI)	0.0109	0.0129	0.0115	0.0073	0.0051
Sheep and beef (SI)	0.0109	0.0129	0.0117	0.0078	0.0058
Deer	0.0109	0.0149	0.0127	0.0057	0.0021

Appendix F Estimated median annual and 95th percentile *E.coli* attribute states by super-region

Scenario 1

Median attribute states

Table F-1: Estimated length of streams for each NOF attribute state: Median annual concentration, Scenario 1, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15295.1	51694.0	72%	69%
	Band B: > 260 and ≤ 540	5900.3	20940.2	28%	28%
	Band C: > 540 and ≤ 1000	193.7	2316.4	1%	3%
	Band D: > 1000		79.8	0%	0%
SNI	Band A: ≤260	17794.6	52352.6	83%	85%
	Band B: > 260 and ≤ 540	3713.6	8722.4	17%	14%
	Band C: > 540 and ≤ 1000	9.7	159.1	0%	0%
SI	Band A: ≤260	42845.1	154381.5	85%	90%
	Band B: > 260 and ≤ 540	7447.3	15156.4	15%	9%
	Band C: > 540 and ≤ 1000	16.9	1069.6	0%	1%
	Band D: > 1000		1.8	0%	0%

Table F-2: Estimated length of streams in each NOF attribute state: Median annual concentration, Scenario 1, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15295.1	61438.0	72%	82%
	Band B: > 260 and ≤ 540	5900.3	12917.3	28%	17%
	Band C: > 540 and ≤ 1000	193.7	659.8	1%	1%
	Band D: >1000		15.2	0%	0%
SNI	Band A: ≤260	17794.6	56279.0	83%	92%
	Band B: > 260 and ≤ 540	3713.6	4948.9	17%	8%
	Band C: > 540 and ≤ 1000	9.7	6.1	0%	0%
SI	Band A: ≤260	42845.1	159642.9	85%	94%
	Band B: > 260 and ≤ 540	7447.3	10882.7	15%	6%
	Band C: > 540 and ≤ 1000	16.9	82.2	0%	0%
	Band D: >1000		1.5	0%	0%

Table F-3: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 1, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15295.1	66613.4	72%	89%
	Band B: > 260 and ≤ 540	5900.3	7994.2	28%	11%
	Band C: > 540 and ≤ 1000	193.7	419.5	1%	1%
	Band D: >1000		3.2	0%	0%
SNI	Band A: ≤260	17794.6	57625.3	83%	94%
	Band B: > 260 and ≤ 540	3713.6	3603.4	17%	6%
	Band C: > 540 and ≤ 1000	9.7	5.3	0%	0%
SI	Band A: ≤260	42845.1	162727.2	85%	95%
	Band B: > 260 and ≤ 540	7447.3	7823.8	15%	5%
	Band C: > 540 and ≤ 1000	16.9	56.8	0%	0%
	Band D: >1000		1.5	0%	0%

95th percentile attribute states

Table F-4: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 1, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2937.9	18510.7	14%	25%
	Band B: > 260 and ≤ 540	1343.7	5871.7	6%	8%
	Band C: > 540 and ≤ 1000	2237.4	7038.1	10%	9%
	Band D: >1000	14870.0	43609.9	70%	58%
SNI	Band A: ≤260	3440.0	17054.5	16%	28%
	Band B: > 260 and ≤ 540	1334.3	4606.6	6%	8%
	Band C: > 540 and ≤ 1000	2646.0	6332.1	12%	10%
	Band D: >1000	14097.5	33240.8	66%	54%
SI	Band A: ≤260	21204.2	108615.4	42%	64%
	Band B: > 260 and ≤ 540	4261.8	15222.7	8%	9%
	Band C: > 540 and ≤ 1000	5227.0	11763.4	10%	7%
	Band D: >1000	19616.3	35007.8	39%	21%

Table F-5: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2937.9	19359.9	14%	26%
	Band B: > 260 and ≤ 540	1343.7	6444.3	6%	9%
	Band C: > 540 and ≤ 1000	2237.7	8322.8	10%	11%
	Band D: >1000	14869.7	40903.4	70%	55%
SNI	Band A: ≤260	3440.0	17273.9	16%	28%
	Band B: > 260 and ≤ 540	1334.3	4896.4	6%	8%
	Band C: > 540 and ≤ 1000	2646.0	7621.0	12%	12%
	Band D: >1000	14097.5	31442.7	66%	51%
SI	Band A: ≤260	21204.2	109620.7	42%	64%
	Band B: > 260 and ≤ 540	4261.8	16061.1	8%	9%
	Band C: > 540 and ≤ 1000	5228.3	13260.4	10%	8%
	Band D: >1000	19614.9	31667.1	39%	19%

Table F-6: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 1, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2937.9	20168.0	14%	27%
	Band B: > 260 and ≤ 540	1343.7	7127.9	6%	10%
	Band C: > 540 and ≤ 1000	2237.4	10652.2	10%	14%
	Band D: >1000	14870.0	37082.2	70%	49%
SNI	Band A: ≤260	3440.0	17459.6	16%	29%
	Band B: > 260 and ≤ 540	1334.3	5256.3	6%	9%
	Band C: > 540 and ≤ 1000	2646.0	8712.4	12%	14%
	Band D: >1000	14097.5	29805.8	66%	49%
SI	Band A: ≤260	21204.2	110578.8	42%	65%
	Band B: > 260 and ≤ 540	4261.8	16696.4	8%	10%
	Band C: > 540 and ≤ 1000	5227.0	15130.0	10%	9%
	Band D: >1000	19616.3	28204.1	39%	17%

Scenario 2
Median attribute states

Table F-7: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 2, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15505.3	51905.6	72%	69%
	Band B: > 260 and ≤ 540	5695.3	20778.7	27%	28%
	Band C: > 540 and ≤ 1000	188.4	2266.6	1%	3%
	Band D: >1000		79.4	0%	0%
SNI	Band A: ≤260	17984.9	52612.3	84%	86%
	Band B: > 260 and ≤ 540	3523.3	8481.0	16%	14%
	Band C: > 540 and ≤ 1000	9.7	140.6	0%	0%
SI	Band A: ≤260	42853.7	154602.7	85%	91%
	Band B: > 260 and ≤ 540	7438.6	14939.0	15%	9%
	Band C: > 540 and ≤ 1000	16.9	1065.8	0%	1%
	Band D: >1000		1.8	0%	0%

Table F-8: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 2, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980.4	62662.8	75%	84%
	Band B: > 260 and ≤ 540	5226.3	11739.9	24%	16%
	Band C: > 540 and ≤ 1000	182.4	614.7	1%	1%
	Band D: >1000		12.9	0%	0%
SNI	Band A: ≤260	18368.9	57161.1	85%	93%
	Band B: > 260 and ≤ 540	3139.3	4066.8	15%	7%
	Band C: > 540 and ≤ 1000	9.7	6.1	0%	0%
SI	Band A: ≤260	42865.3	160512.9	85%	94%
	Band B: > 260 and ≤ 540	7427	10013.7	15%	6%
	Band C: > 540 and ≤ 1000	16.9	81.2	0%	0%
	Band D: >1000		1.5	0%	0%

Table F-9: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 2, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	16033.2	67737	75%	90%
	Band B: > 260 and ≤ 540	5173.5	6901.8	24%	9%
	Band C: > 540 and ≤ 1000	182.4	389.1	1%	1%
	Band D: >1000		2.5	0%	0%
SNI	Band A: ≤260	18373.3	58212.0	85%	95%
	Band B: > 260 and ≤ 540	3134.9	3017.1	15%	5%
	Band C: > 540 and ≤ 1000	9.7	4.9	0%	0%
SI	Band A: ≤260	42866.6	163185.6	85%	96%
	Band B: > 260 and ≤ 540	7425.7	7366.6	15%	4%
	Band C: > 540 and ≤ 1000	16.9	55.5	0%	0%
	Band D: >1000		1.5	0%	0%

95th percentile attribute states

Table F-10: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 2, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2945.2	18527.3	14%	25%
	Band B: > 260 and ≤ 540	1351.1	5911.5	6%	8%
	Band C: > 540 and ≤ 1000	2266.4	7094.2	11%	9%
	Band D: >1000	14826.3	43497.3	69%	58%
SNI	Band A: ≤260	3446.1	17108.9	16%	28%
	Band B: > 260 and ≤ 540	1362.5	4656.8	6%	8%
	Band C: > 540 and ≤ 1000	3096.8	6955.0	14%	11%
	Band D: >1000	13612.5	32513.3	63%	53%
SI	Band A: ≤260	21207.2	108680.1	42%	64%
	Band B: > 260 and ≤ 540	4270.5	15259.9	8%	9%
	Band C: > 540 and ≤ 1000	5299.8	11964.1	11%	7%
	Band D: >1000	19531.7	34705.3	39%	20%

Table F-11: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 2, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2985.6	19524.9	14%	26%
	Band B: > 260 and ≤ 540	1499.7	6709.6	7%	9%
	Band C: > 540 and ≤ 1000	2488.0	8474.5	12%	11%
	Band D: >1000	14415.7	40321.3	67%	54%
SNI	Band A: ≤260	3482.3	17597.9	16%	29%
	Band B: > 260 and ≤ 540	2217.6	5940.2	10%	10%
	Band C: > 540 and ≤ 1000	3830.7	9126.1	18%	15%
	Band D: >1000	11987.3	28569.8	56%	47%
SI	Band A: ≤260	21225.8	110059.0	42%	65%
	Band B: > 260 and ≤ 540	4397.4	16237.5	9%	10%
	Band C: > 540 and ≤ 1000	5345.9	15181.1	11%	9%
	Band D: >1000	19340.2	29131.6	38%	17%

Table F-12: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 2, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	3107.9	20653.0	15%	28%
	Band B: > 260 and ≤ 540	1762.9	7529.1	8%	10%
	Band C: > 540 and ≤ 1000	2910.5	11545.0	14%	15%
	Band D: >1000	13607.6	35303.3	64%	47%
SNI	Band A: ≤260	3662.2	18215.4	17%	30%
	Band B: > 260 and ≤ 540	3703.5	8532.7	17%	14%
	Band C: > 540 and ≤ 1000	3173.4	10170.0	15%	17%
	Band D: >1000	10978.7	24316.0	51%	40%
SI	Band A: ≤260	21277.0	111320.8	42%	65%
	Band B: > 260 and ≤ 540	4547.5	17778.5	9%	10%
	Band C: > 540 and ≤ 1000	5158.8	16747.5	10%	10%
	Band D: >1000	19325.9	24762.5	38%	15%

Scenario 3a

Median attribute states

Table F-13: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3a, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15505.3	51934.6	72%	69%
	Band B: > 260 and ≤ 540	5695.3	20774.4	27%	28%
	Band C: > 540 and ≤ 1000	188.4	2242.2	1%	3%
	Band D: >1000		79.1	0%	0%
SNI	Band A: ≤260	17984.9	52630.4	84%	86%
	Band B: > 260 and ≤ 540	3523.3	8480.3	16%	14%
	Band C: > 540 and ≤ 1000	9.7	123.3	0%	0%
SI	Band A: ≤260	42853.7	154620.3	85%	91%
	Band B: > 260 and ≤ 540	7438.6	14960.7	15%	9%
	Band C: > 540 and ≤ 1000	16.9	1026.5	0%	1%
	Band D: >1000		1.8	0%	0%

Table F-14: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3a, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980.4	62945.1	75%	84%
	Band B: > 260 and ≤ 540	5226.3	11482.6	24%	15%
	Band C: > 540 and ≤ 1000	182.4	590.4	1%	1%
	Band D: >1000		12.3	0%	0%
SNI	Band A: ≤260	18368.9	57263.5	85%	94%
	Band B: > 260 and ≤ 540	3139.3	3964.5	15%	6%
	Band C: > 540 and ≤ 1000	9.7	6.0	0%	0%
SI	Band A: ≤260	42865.3	160626.5	85%	94%
	Band B: > 260 and ≤ 540	7427.0	9902.9	15%	6%
	Band C: > 540 and ≤ 1000	16.9	78.3	0%	0%
	Band D: >1000		1.5	0%	0%

Table F-15: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3a, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	16033.2	67892.3	75%	90%
	Band B: > 260 and ≤ 540	5173.5	6756.2	24%	9%
	Band C: > 540 and ≤ 1000	182.4	379.4	1%	1%
	Band D: >1000		2.5	0%	0%
SNI	Band A: ≤260	18373.3	58347.5	85%	95%
	Band B: > 260 and ≤ 540	3134.9	2882.7	15%	5%
	Band C: > 540 and ≤ 1000	9.7	3.8	0%	0%
SI	Band A: ≤260	42866.6	163343.3	85%	96%
	Band B: > 260 and ≤ 540	7425.7	7212.0	15%	4%
	Band C: > 540 and ≤ 1000	16.9	52.5	0%	0%
	Band D: >1000		1.5	0%	0%

95th percentile attribute states

Table 0-16: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3a, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2945.2	18528.4	14%	25%
	Band B: > 260 and ≤ 540	1351.1	5912.4	6%	8%
	Band C: > 540 and ≤ 1000	2266.4	7103.3	11%	9%
	Band D: >1000	14826.3	43486.2	69%	58%
SNI	Band A: ≤260	3446.1	17109.6	16%	28%
	Band B: > 260 and ≤ 540	1362.5	4656.1	6%	8%
	Band C: > 540 and ≤ 1000	3096.8	6956.0	14%	11%
	Band D: >1000	13612.5	32512.3	63%	53%
SI	Band A: ≤260	21207.2	108686.3	42%	64%
	Band B: > 260 and ≤ 540	4270.5	15262.1	8%	9%
	Band C: > 540 and ≤ 1000	5299.8	11962.3	11%	7%
	Band D: >1000	19531.7	34698.7	39%	20%

Table F-17: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3a, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2985.6	19548.8	14%	26%
	Band B: > 260 and ≤ 540	1499.7	6727.8	7%	9%
	Band C: > 540 and ≤ 1000	2487.7	8532.6	12%	11%
	Band D: >1000	14416.0	40221.2	67%	54%
SNI	Band A: ≤260	3482.3	17597.9	16%	29%
	Band B: > 260 and ≤ 540	2217.6	5948.2	10%	10%
	Band C: > 540 and ≤ 1000	3830.7	9145.4	18%	15%
	Band D: >1000	11987.3	28542.5	56%	47%
SI	Band A: ≤260	21225.8	110122.8	42%	65%
	Band B: > 260 and ≤ 540	4397.4	16274.8	9%	10%
	Band C: > 540 and ≤ 1000	5345.1	15159.7	11%	9%
	Band D: >1000	19341.0	29052.0	38%	17%

Table F-18: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3a, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	3107.9	20752.2	15%	28%
	Band B: > 260 and ≤ 540	1762.9	7618.3	8%	10%
	Band C: > 540 and ≤ 1000	2910.2	11848.8	14%	16%
	Band D: >1000	13608.0	34811.1	64%	46%
SNI	Band A: ≤260	3662.2	18221.1	17%	30%
	Band B: > 260 and ≤ 540	3703.5	8557.5	17%	14%
	Band C: > 540 and ≤ 1000	3173.4	10380.8	15%	17%
	Band D: >1000	10978.7	24074.6	51%	39%
SI	Band A: ≤260	21277.0	111555.3	42%	65%
	Band B: > 260 and ≤ 540	4547.5	17747.7	9%	10%
	Band C: > 540 and ≤ 1000	5158.0	16700.9	10%	10%
	Band D: >1000	19326.7	24605.4	38%	14%

Scenario 3b
Median attribute states

Table 0-19: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3b, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15505.3	51935.9	72%	69%
	Band B: > 260 and ≤ 540	5695.3	20774.1	27%	28%
	Band C: > 540 and ≤ 1000	188.4	2241.2	1%	3%
	Band D: >1000		79.1	0%	0%
SNI	Band A: ≤260	17984.9	52630.4	84%	86%
	Band B: > 260 and ≤ 540	3523.3	8480.3	16%	14%
	Band C: > 540 and ≤ 1000	9.7	123.3	0%	0%
SI	Band A: ≤260	42853.7	154620.3	85%	91%
	Band B: > 260 and ≤ 540	7438.6	14962.8	15%	9%
	Band C: > 540 and ≤ 1000	16.9	1024.4	0%	1%
	Band D: >1000		1.8	0%	0%

Table F-20: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3b, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980.4	62968.1	75%	84%
	Band B: > 260 and ≤ 540	5226.3	11463.0	24%	15%
	Band C: > 540 and ≤ 1000	182.4	587.0	1%	1%
	Band D: >1000		12.3	0%	0%
SNI	Band A: ≤260	18368.9	57267.2	85%	94%
	Band B: > 260 and ≤ 540	3139.3	3960.9	15%	6%
	Band C: > 540 and ≤ 1000	9.7	6.0	0%	0%
SI	Band A: ≤260	42865.3	160633.6	85%	94%
	Band B: > 260 and ≤ 540	7427.0	9896.9	15%	6%
	Band C: > 540 and ≤ 1000	16.9	77.2	0%	0%
	Band D: >1000		1.5	0%	0%

Table F-21: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3b, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	16033.2	67902.5	75%	91%
	Band B: > 260 and ≤ 540	5173.5	6746.6	24%	9%
	Band C: > 540 and ≤ 1000	182.4	378.8	1%	1%
	Band D: >1000		2.5	0%	0%
SNI	Band A: ≤260	18373.3	58356.2	85%	95%
	Band B: > 260 and ≤ 540	3134.9	2874.0	15%	5%
	Band C: > 540 and ≤ 1000	9.7	3.8	0%	0%
SI	Band A: ≤260	42866.6	163373.8	85%	96%
	Band B: > 260 and ≤ 540	7425.7	7183.1	15%	4%
	Band C: > 540 and ≤ 1000	16.9	50.9	0%	0%
	Band D: >1000		1.5	0%	0%

95th percentile attribute states

Table F-22: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3b, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2945.2	18528.4	14%	25%
	Band B: > 260 and ≤ 540	1351.1	5913.0	6%	8%
	Band C: > 540 and ≤ 1000	2266.4	7102.7	11%	9%
	Band D: >1000	14826.3	43486.2	69%	58%
SNI	Band A: ≤260	3446.1	17109.6	16%	28%
	Band B: > 260 and ≤ 540	1362.5	4656.1	6%	8%
	Band C: > 540 and ≤ 1000	3096.8	6956.0	14%	11%
	Band D: >1000	13612.5	32512.3	63%	53%
SI	Band A: ≤260	21207.2	108686.4	42%	64%
	Band B: > 260 and ≤ 540	4270.5	15262.5	8%	9%
	Band C: > 540 and ≤ 1000	5299.8	11969.8	11%	7%
	Band D: >1000	19531.7	34690.6	39%	20%

Table F-23: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3b, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2985.6	19550.2	14%	26%
	Band B: > 260 and ≤ 540	1499.7	6731.1	7%	9%
	Band C: > 540 and ≤ 1000	2487.7	8542.1	12%	11%
	Band D: >1000	14416.0	40207.1	67%	54%
SNI	Band A: ≤260	3482.3	17597.9	16%	29%
	Band B: > 260 and ≤ 540	2217.6	5949.4	10%	10%
	Band C: > 540 and ≤ 1000	3830.7	9145.6	18%	15%
	Band D: >1000	11987.3	28541.2	56%	47%
SI	Band A: ≤260	21225.8	110126.8	42%	65%
	Band B: > 260 and ≤ 540	4397.4	16287.8	9%	10%
	Band C: > 540 and ≤ 1000	5345.1	15153.1	11%	9%
	Band D: >1000	19341.0	29041.6	38%	17%

Table F-24: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3b, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	3107.9	20769.3	15%	28%
	Band B: > 260 and ≤ 540	1762.9	7635.2	8%	10%
	Band C: > 540 and ≤ 1000	2910.2	11866.9	14%	16%
	Band D: >1000	13608.0	34759.0	64%	46%
SNI	Band A: ≤260	3662.2	18221.1	17%	30%
	Band B: > 260 and ≤ 540	3703.5	8563.4	17%	14%
	Band C: > 540 and ≤ 1000	3173.4	10404.0	15%	17%
	Band D: >1000	10978.7	24045.6	51%	39%
SI	Band A: ≤260	21277.0	111573.0	42%	65%
	Band B: > 260 and ≤ 540	4547.5	17756.3	9%	10%
	Band C: > 540 and ≤ 1000	5158.0	16677.5	10%	10%
	Band D: >1000	19326.7	24602.4	38%	14%

Scenario 3c

Median attribute states

Table F-25: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3c, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15505.3	51968.8	72%	69%
	Band B: > 260 and ≤ 540	5695.3	20747.1	27%	28%
	Band C: > 540 and ≤ 1000	188.4	2235.3	1%	3%
	Band D: >1000		79.1	0%	0%
SNI	Band A: ≤260	17984.9	52630.4	84%	86%
	Band B: > 260 and ≤ 540	3523.3	8480.3	16%	14%
	Band C: > 540 and ≤ 1000	9.7	123.3	0%	0%
SI	Band A: ≤260	42853.7	154643.5	85%	91%
	Band B: > 260 and ≤ 540	7438.6	14964.2	15%	9%
	Band C: > 540 and ≤ 1000	16.9	999.8	0%	1%
	Band D: >1000		1.8	0%	0%

Table F-26: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3c, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980.4	63245.8	75%	84%
	Band B: > 260 and ≤ 540	5226.3	11185.3	24%	15%
	Band C: > 540 and ≤ 1000	182.4	587.0	1%	1%
	Band D: >1000		12.3	0%	0%
SNI	Band A: ≤260	18368.9	57271.5	85%	94%
	Band B: > 260 and ≤ 540	3139.3	3956.5	15%	6%
	Band C: > 540 and ≤ 1000	9.7	6.0	0%	0%
SI	Band A: ≤260	42865.3	160872.2	85%	94%
	Band B: > 260 and ≤ 540	7427.0	9658.5	15%	6%
	Band C: > 540 and ≤ 1000	16.9	77.1	0%	0%
	Band D: >1000		1.5	0%	0%

Table F-27: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3c, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	16033.2	68144.5	75%	91%
	Band B: > 260 and ≤ 540	5173.5	6505.3	24%	9%
	Band C: > 540 and ≤ 1000	182.4	378.1	1%	1%
	Band D: >1000		2.5	0%	0%
SNI	Band A: ≤260	18373.3	58358.9	85%	95%
	Band B: > 260 and ≤ 540	3134.9	2871.4	15%	5%
	Band C: > 540 and ≤ 1000	9.7	3.8	0%	0%
SI	Band A: ≤260	42866.6	163756.1	85%	96%
	Band B: > 260 and ≤ 540	7425.7	6805.2	15%	4%
	Band C: > 540 and ≤ 1000	16.9	46.5	0%	0%
	Band D: >1000		1.5	0%	0%

95th percentile attribute states

Table F-28: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3c, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2945.2	18530.4	14%	25%
	Band B: > 260 and ≤ 540	1351.1	5920.3	6%	8%
	Band C: > 540 and ≤ 1000	2266.4	7099.3	11%	9%
	Band D: >1000	14826.3	43480.4	69%	58%
SNI	Band A: ≤260	3446.1	17109.6	16%	28%
	Band B: > 260 and ≤ 540	1362.5	4656.1	6%	8%
	Band C: > 540 and ≤ 1000	3096.8	6956.0	14%	11%
	Band D: >1000	13612.5	32512.3	63%	53%
SI	Band A: ≤260	21207.2	108691.6	42%	64%
	Band B: > 260 and ≤ 540	4270.5	15263.2	8%	9%
	Band C: > 540 and ≤ 1000	5299.8	11985.4	11%	7%
	Band D: >1000	19531.7	34669.1	39%	20%

Table F-29: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3c, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2985.6	19567.7	14%	26%
	Band B: > 260 and ≤ 540	1499.7	6732.9	7%	9%
	Band C: > 540 and ≤ 1000	2487.7	8561.3	12%	11%
	Band D: >1000	14416.0	40168.4	67%	54%
SNI	Band A: ≤260	3482.3	17597.9	16%	29%
	Band B: > 260 and ≤ 540	2217.6	5949.4	10%	10%
	Band C: > 540 and ≤ 1000	3830.7	9146.3	18%	15%
	Band D: >1000	11987.3	28540.5	56%	47%
SI	Band A: ≤260	21225.8	110146.3	42%	65%
	Band B: > 260 and ≤ 540	4397.4	16326.1	9%	10%
	Band C: > 540 and ≤ 1000	5345.1	15154.0	11%	9%
	Band D: >1000	19341.0	28982.9	38%	17%

Table 0-30: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3c, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	3107.9	20815.1	15%	28%
	Band B: > 260 and ≤ 540	1762.9	7622.6	8%	10%
	Band C: > 540 and ≤ 1000	2910.2	11948.5	14%	16%
	Band D: >1000	13608.0	34644.2	64%	46%
SNI	Band A: ≤260	3662.2	18221.1	17%	30%
	Band B: > 260 and ≤ 540	3703.5	8563.4	17%	14%
	Band C: > 540 and ≤ 1000	3173.4	10405.2	15%	17%
	Band D: >1000	10978.7	24044.4	51%	39%
SI	Band A: ≤260	21277.0	111614.9	42%	65%
	Band B: > 260 and ≤ 540	4547.5	17800.0	9%	10%
	Band C: > 540 and ≤ 1000	5158.0	16660.5	10%	10%
	Band D: >1000	19326.7	24533.9	38%	14%

Scenario 3d

Median attribute states

Table F-31: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3d, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15505.3	52573.8	72%	70%
	Band B: > 260 and ≤ 540	5695.3	20185.3	27%	27%
	Band C: > 540 and ≤ 1000	188.4	2192.8	1%	3%
	Band D: >1000	0.0	78.5	0%	0%
SNI	Band A: ≤260	17984.9	52870.6	84%	86%
	Band B: > 260 and ≤ 540	3523.3	8201.4	16%	13%
	Band C: > 540 and ≤ 1000	9.7	114.9	0%	0%
SI	Band A: ≤260	42853.7	154931.5	85%	91%
	Band B: > 260 and ≤ 540	7438.6	14772.9	15%	9%
	Band C: > 540 and ≤ 1000	16.9	903.1	0%	1%
	Band D: >1000	0.0	1.8	0%	0%

Table F-32: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3d, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980.4	65760.8	75%	88%
	Band B: > 260 and ≤ 540	5226.3	8694.0	24%	12%
	Band C: > 540 and ≤ 1000	182.4	563.7	1%	1%
	Band D: >1000	0.0	11.9	0%	0%
SNI	Band A: ≤260	18368.9	57829.2	85%	94%
	Band B: > 260 and ≤ 540	3139.3	3177.3	15%	5%
	Band C: > 540 and ≤ 1000	9.7	6.0	0%	0%
SI	Band A: ≤260	42865.3	162721.9	85%	95%
	Band B: > 260 and ≤ 540	7427.0	7829.6	15%	5%
	Band C: > 540 and ≤ 1000	16.9	56.3	0%	0%
	Band D: >1000	0.0	1.5	0%	0%

Table F-33: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3d, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	16033.2	69808.6	75%	93%
	Band B: > 260 and ≤ 540	5173.5	4862.9	24%	6%
	Band C: > 540 and ≤ 1000	182.4	356.5	1%	0%
	Band D: >1000	0.0	2.4	0%	0%
SNI	Band A: ≤260	18373.3	58917.2	85%	96%
	Band B: > 260 and ≤ 540	3134.9	2069.5	15%	3%
	Band C: > 540 and ≤ 1000	9.7	3.0	0%	0%
SI	Band A: ≤260	42866.6	165866.9	85%	97%
	Band B: > 260 and ≤ 540	7425.7	4706.4	15%	3%
	Band C: > 540 and ≤ 1000	16.9	34.4	0%	0%
	Band D: >1000	0.0	1.5	0%	0%

95th percentile attribute states

Table F-34: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3d, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2945.2	18567.1	14%	25%
	Band B: > 260 and ≤ 540	1351.1	5972.0	6%	8%
	Band C: > 540 and ≤ 1000	2266.4	7170.5	11%	10%
	Band D: >1000	14826.3	43320.8	69%	58%
SNI	Band A: ≤260	3446.1	17134.7	16%	28%
	Band B: > 260 and ≤ 540	1362.5	4709.8	6%	8%
	Band C: > 540 and ≤ 1000	3096.8	7014.3	14%	11%
	Band D: >1000	13612.5	32375.3	63%	53%
SI	Band A: ≤260	21207.2	108761.8	42%	64%
	Band B: > 260 and ≤ 540	4270.5	15316.7	8%	9%
	Band C: > 540 and ≤ 1000	5299.8	12038.9	11%	7%
	Band D: >1000	19531.7	34491.9	39%	20%

Table F-35: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3d, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2985.6	19968.6	14%	27%
	Band B: > 260 and ≤ 540	1499.7	6963.0	7%	9%
	Band C: > 540 and ≤ 1000	2487.7	9751.6	12%	13%
	Band D: >1000	14416.0	38347.1	67%	51%
SNI	Band A: ≤260	3482.3	17716.1	16%	29%
	Band B: > 260 and ≤ 540	2217.6	6166.7	10%	10%
	Band C: > 540 and ≤ 1000	3830.7	9765.7	18%	16%
	Band D: >1000	11987.3	27585.5	56%	45%
SI	Band A: ≤260	21225.8	110597.6	42%	65%
	Band B: > 260 and ≤ 540	4397.4	16593.5	9%	10%
	Band C: > 540 and ≤ 1000	5345.1	15341.5	11%	9%
	Band D: >1000	19341.0	28076.7	38%	16%

Table F-36: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3d, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	3107.9	21687.2	15%	29%
	Band B: > 260 and ≤ 540	1762.9	8947.4	8%	12%
	Band C: > 540 and ≤ 1000	2910.2	15180.9	14%	20%
	Band D: >1000	13608.0	29214.8	64%	39%
SNI	Band A: ≤260	3662.2	18496.7	17%	30%
	Band B: > 260 and ≤ 540	3703.5	9018.4	17%	15%
	Band C: > 540 and ≤ 1000	3173.4	11843.3	15%	19%
	Band D: >1000	10978.7	21875.6	51%	36%
SI	Band A: ≤260	21277.0	112389.0	42%	66%
	Band B: > 260 and ≤ 540	4547.5	18170.6	9%	11%
	Band C: > 540 and ≤ 1000	5158.0	16974.9	10%	10%
	Band D: >1000	19326.7	23074.7	38%	14%

Scenario 3e

Median attribute states

Table F-38: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3e, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15505.3	52573.8	72%	70%
	Band B: > 260 and ≤ 540	5695.3	20185.3	27%	27%
	Band C: > 540 and ≤ 1000	188.4	2192.8	1%	3%
	Band D: >1000	0.0	78.5	0%	0%
SNI	Band A: ≤260	17984.9	52870.6	84%	86%
	Band B: > 260 and ≤ 540	3523.3	8201.4	16%	13%
	Band C: > 540 and ≤ 1000	9.7	114.9	0%	0%
SI	Band A: ≤260	42853.7	154931.5	85%	91%
	Band B: > 260 and ≤ 540	7438.6	14772.9	15%	9%
	Band C: > 540 and ≤ 1000	16.9	903.1	0%	1%
	Band D: >1000	0.0	1.8	0%	0%

Table F-39: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3e, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	15980.4	65782.5	75%	88%
	Band B: > 260 and ≤ 540	5226.3	8673.2	24%	12%
	Band C: > 540 and ≤ 1000	182.4	562.7	1%	1%
	Band D: >1000	0.0	11.9	0%	0%
SNI	Band A: ≤260	18368.9	57834.2	85%	94%
	Band B: > 260 and ≤ 540	3139.3	3172.2	15%	5%
	Band C: > 540 and ≤ 1000	9.7	6.0	0%	0%
SI	Band A: ≤260	42865.3	162822.2	85%	95%
	Band B: > 260 and ≤ 540	7427.0	7731.3	15%	5%
	Band C: > 540 and ≤ 1000	16.9	54.4	0%	0%
	Band D: >1000	0.0	1.5	0%	0%

Table F-40: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 3e, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	16033.2	69825.1	75%	93%
	Band B: > 260 and ≤ 540	5173.5	4846.9	24%	6%
	Band C: > 540 and ≤ 1000	182.4	355.9	1%	0%
	Band D: >1000	0.0	2.4	0%	0%
SNI	Band A: ≤260	18373.3	58923.2	85%	96%
	Band B: > 260 and ≤ 540	3134.9	2063.6	15%	3%
	Band C: > 540 and ≤ 1000	9.7	3.0	0%	0%
SI	Band A: ≤260	42866.6	165934.2	85%	97%
	Band B: > 260 and ≤ 540	7425.7	4641.5	15%	3%
	Band C: > 540 and ≤ 1000	16.9	32.1	0%	0%
	Band D: >1000	0.0	1.5	0%	0%

95th percentile attribute states

Table F-41: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3e, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2945.2	18570.5	14%	25%
	Band B: > 260 and ≤ 540	1351.1	5971.9	6%	8%
	Band C: > 540 and ≤ 1000	2266.4	7170.3	11%	10%
	Band D: >1000	14826.3	43317.7	69%	58%
SNI	Band A: ≤260	3446.1	17134.7	16%	28%
	Band B: > 260 and ≤ 540	1362.5	4713.1	6%	8%
	Band C: > 540 and ≤ 1000	3096.8	7011.8	14%	11%
	Band D: >1000	13612.5	32374.4	63%	53%
SI	Band A: ≤260	21207.2	108767.9	42%	64%
	Band B: > 260 and ≤ 540	4270.5	15320.2	8%	9%
	Band C: > 540 and ≤ 1000	5299.8	12035.8	11%	7%
	Band D: >1000	19531.7	34485.4	39%	20%

Table F-41: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3e, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2985.6	19975.2	14%	27%
	Band B: > 260 and ≤ 540	1499.7	6973.7	7%	9%
	Band C: > 540 and ≤ 1000	2487.7	9772.4	12%	13%
	Band D: >1000	14416.0	38309.0	67%	51%
SNI	Band A: ≤260	3482.3	17717.6	16%	29%
	Band B: > 260 and ≤ 540	2217.6	6166.6	10%	10%
	Band C: > 540 and ≤ 1000	3830.7	9772.1	18%	16%
	Band D: >1000	11987.3	27577.7	56%	45%
SI	Band A: ≤260	21225.8	110631.4	42%	65%
	Band B: > 260 and ≤ 540	4397.4	16601.8	9%	10%
	Band C: > 540 and ≤ 1000	5345.1	15365.6	11%	9%
	Band D: >1000	19341.0	28010.5	38%	16%

Table F-42: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 3e, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	3107.9	21722.0	15%	29%
	Band B: > 260 and ≤ 540	1762.9	8981.6	8%	12%
	Band C: > 540 and ≤ 1000	2910.2	15198.0	14%	20%
	Band D: >1000	13608.0	29128.7	64%	39%
SNI	Band A: ≤260	3662.2	18505.9	17%	30%
	Band B: > 260 and ≤ 540	3703.5	9023.4	17%	15%
	Band C: > 540 and ≤ 1000	3173.4	11858.8	15%	19%
	Band D: >1000	10978.7	21845.9	51%	36%
SI	Band A: ≤260	21277.0	112475.0	42%	66%
	Band B: > 260 and ≤ 540	4547.5	18201.4	9%	11%
	Band C: > 540 and ≤ 1000	5158.0	16950.5	10%	10%
	Band D: >1000	19326.7	22982.3	38%	13%

Scenario 4
Median attribute states

Table F-43: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 4, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	16981.5	53372.7	79%	71%
	Band B: > 260 and ≤ 540	4298.3	19600.1	20%	26%
	Band C: > 540 and ≤ 1000	109.3	1989.3	1%	3%
	Band D: >1000		68.3	0%	0%
SNI	Band A: ≤260	18700.8	53345.2	87%	87%
	Band B: > 260 and ≤ 540	2814.3	7782.3	13%	13%
	Band C: > 540 and ≤ 1000	2.8	106.6	0%	0%
SI	Band A: ≤260	44809.8	155983.4	89%	91%
	Band B: > 260 and ≤ 540	5493.8	13879.8	11%	8%
	Band C: > 540 and ≤ 1000	5.6	744.4	0%	0%
	Band D: >1000		1.8	0%	0%

Table F-44: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 4, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	20175.5	70249.2	94%	94%
	Band B: > 260 and ≤ 540	1141.5	4447.2	5%	6%
	Band C: > 540 and ≤ 1000	72.0	331.6	0%	0%
	Band D: >1000		2.3	0%	0%
SNI	Band A: ≤260	20962.1	59923.1	97%	98%
	Band B: > 260 and ≤ 540	555.4	1310.7	3%	2%
	Band C: > 540 and ≤ 1000	0.3	0.3	0%	0%
SI	Band A: ≤260	49382.7	167516.5	98%	98%
	Band B: > 260 and ≤ 540	926.1	3079.3	2%	2%
	Band C: > 540 and ≤ 1000	0.4	12.0	0%	0%
	Band D: >1000		1.5	0%	0%

Table F-45: Estimated length of streams within each NOF attribute state: Median annual concentration, Scenario 4, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	20395.5	72849.8	95%	97%
	Band B: > 260 and ≤ 540	924	1955.5	4%	3%
	Band C: > 540 and ≤ 1000	69.5	223.4	0%	0%
	Band D: >1000		1.7	0%	0%
SNI	Band A: ≤260	21087.8	60636.3	98%	99%
	Band B: > 260 and ≤ 540	429.7	597.7	2%	1%
	Band C: > 540 and ≤ 1000	0.3		0%	0%
SI	Band A: ≤260	49593.2	169722.8	99%	99%
	Band B: > 260 and ≤ 540	715.7	875.7	1%	1%
	Band C: > 540 and ≤ 1000	0.4	9.3	0%	0%

95th percentile attribute states

Table F-37: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 4, low LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	2984.2	18686	14%	25%
	Band B: > 260 and ≤ 540	1409.6	6083.2	7%	8%
	Band C: > 540 and ≤ 1000	2616.3	7443	12%	10%
	Band D: >1000	14378.9	42818.1	67%	57%
SNI	Band A: ≤260	3497.7	17302.6	16%	28%
	Band B: > 260 and ≤ 540	1457.2	4888	7%	8%
	Band C: > 540 and ≤ 1000	3321.2	7241.1	15%	12%
	Band D: >1000	13241.8	31802.3	62%	52%
SI	Band A: ≤260	21544.6	109327.5	43%	64%
	Band B: > 260 and ≤ 540	4342.5	15416.8	9%	9%
	Band C: > 540 and ≤ 1000	6714.9	12462.1	13%	7%
	Band D: >1000	17707.3	33402.8	35%	20%

Table F-47: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 4, most likely LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	3343.3	20853.7	16%	28%
	Band B: > 260 and ≤ 540	2436.1	8180.9	11%	11%
	Band C: > 540 and ≤ 1000	4365.0	11438.3	20%	15%
	Band D: >1000	11244.6	34557.4	53%	46%
SNI	Band A: ≤260	3758.8	18806.8	17%	31%
	Band B: > 260 and ≤ 540	2854.0	7071.4	13%	12%
	Band C: > 540 and ≤ 1000	6058.5	12365.5	28%	20%
	Band D: >1000	8846.5	22990.4	41%	38%
SI	Band A: ≤260	23092.4	113756.9	46%	67%
	Band B: > 260 and ≤ 540	6278.6	16696.0	12%	10%
	Band C: > 540 and ≤ 1000	10565.1	19793.7	21%	12%
	Band D: >1000	10373.1	20362.7	21%	12%

Table F-48: Estimated length of streams within each NOF attribute state: 95th percentile annual concentration, Scenario 4, high LRF.

Super-region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
NNI	Band A: ≤260	4343.9	24169.7	20%	32%
	Band B: > 260 and ≤ 540	5239.7	12145.8	24%	16%
	Band C: > 540 and ≤ 1000	6412.5	20876.3	30%	28%
	Band D: >1000	5392.9	17838.5	25%	24%
SNI	Band A: ≤260	4374.9	20699	20%	34%
	Band B: > 260 and ≤ 540	5770	11468.4	27%	19%
	Band C: > 540 and ≤ 1000	6857.7	16371.7	32%	27%
	Band D: >1000	4515.3	12694.9	21%	21%
SI	Band A: ≤260	25552.5	118016.4	51%	69%
	Band B: > 260 and ≤ 540	9880.4	22448.2	20%	13%
	Band C: > 540 and ≤ 1000	6007.6	14245.9	12%	8%
	Band D: >1000	8868.8	15898.8	18%	9%

Appendix G Estimated median annual *E.coli* attribute states by region

Scenario 1

Table G-1: Estimated length of streams in each *E. coli* attribute state by region: Scenario 1, low LRF.

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1277.6	1762.2	56%	41%
	Band B: > 260 and ≤ 540	947.5	2239.2	41%	52%
	Band C: > 540 and ≤ 1000	60.3	289.8	3%	7%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	14011.0	89%	88%
	Band B: > 260 and ≤ 540	313.3	1813.7	11%	11%
	Band C: > 540 and ≤ 1000		39.6	0%	0%
Gisborne	Band A: ≤260	2423.3	10054.5	97%	99%
	Band B: > 260 and ≤ 540	68.0	99.7	3%	1%
Northland	Band A: ≤260	3425.7	7123.3	73%	52%
	Band B: > 260 and ≤ 540	1293.1	6425.7	27%	47%
	Band C: > 540 and ≤ 1000		149.8	0%	1%
Waikato	Band A: ≤260	5500.7	18742.9	62%	60%
	Band B: > 260 and ≤ 540	3278.4	10361.9	37%	33%
	Band C: > 540 and ≤ 1000	133.4	1837.2	1%	6%
	Band D: >1000		78.9	0%	0%
Hawkes Bay	Band A: ≤260	5491.4	14405.9	97%	98%
	Band B: > 260 and ≤ 540	161.9	309.0	3%	2%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Manawatu / Whanganui	Band A: ≤260	8767.5	24230.9	78%	84%
	Band B: > 260 and ≤ 540	2461.9	4370.4	22%	15%
	Band C: > 540 and ≤ 1000	7.2	85.6	0%	0%
Taranaki	Band A: ≤260	1975.1	7835.9	74%	71%
	Band B: > 260 and ≤ 540	699.5	3057.9	26%	28%
	Band C: > 540 and ≤ 1000		68.9	0%	1%
Wellington	Band A: ≤260	1560.6	5879.9	80%	86%
	Band B: > 260 and ≤ 540	390.2	985.0	20%	14%
	Band C: > 540 and ≤ 1000	2.4	4.6	0%	0%
Canterbury	Band A: ≤260	15786.2	39362.2	89%	89%
	Band B: > 260 and ≤ 540	1908.6	4911.9	11%	11%
	Band C: > 540 and ≤ 1000	8.3	70.5	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6493.8	100%	99%
	Band B: > 260 and ≤ 540	12.2	96.3	0%	1%
Marlborough	Band A: ≤260	3591.3	11253.3	98%	99%
	Band B: > 260 and ≤ 540	73.5	104.7	2%	1%
	Band C: > 540 and ≤ 1000		1.0	0%	0%
Otago	Band A: ≤260	13146.9	25535.4	87%	91%
	Band B: > 260 and ≤ 540	1977.2	2522.8	13%	9%
	Band C: > 540 and ≤ 1000	0.2	23.3	0%	0%
Southland	Band A: ≤260	4269.9	25812.3	55%	77%
	Band B: > 260 and ≤ 540	3440.9	6637.4	45%	20%
	Band C: > 540 and ≤ 1000	8.5	967.1	0%	3%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
	Band D: >1000		1.8	0%	0%
Tasman	Band A: ≤260	1739.9	12099.4	98%	98%
	Band B: > 260 and ≤ 540	30.2	262.8	2%	2%
	Band C: > 540 and ≤ 1000		6.0	0%	0%
West Coast	Band A: ≤260	183.3	33825.1	98%	98%
	Band B: > 260 and ≤ 540	4.7	620.5	2%	2%
	Band C: > 540 and ≤ 1000		1.7	0%	0%

Table G-2: Estimated length of streams in each *E. coli* attribute state by region: Scenario 1, most likely LRF.

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1277.6	2245.6	56%	52%
	Band B: > 260 and ≤ 540	947.5	1869.8	41%	44%
	Band C: > 540 and ≤ 1000	60.3	175.8	3%	4%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15237.8	89%	96%
	Band B: > 260 and ≤ 540	313.3	626.6	11%	4%
Gisborne	Band A: ≤260	2423.3	10106.9	97%	100%
	Band B: > 260 and ≤ 540	68	47.3	3%	0%
Northland	Band A: ≤260	3425.7	10088	73%	74%
	Band B: > 260 and ≤ 540	1293.1	3609.4	27%	26%
	Band C: > 540 and ≤ 1000		1.5	0%	0%
Waikato	Band A: ≤260	5500.7	23759.8	62%	77%
	Band B: > 260 and ≤ 540	3278.4	6764.2	37%	22%
	Band C: > 540 and ≤ 1000	133.4	482.5	1%	2%
	Band D: >1000		14.4	0%	0%
Hawkes Bay	Band A: ≤260	5491.4	14475.4	0.971361	0.98372
	Band B: > 260 and ≤ 540	161.9	239.6	0.028639	0.01628
Manawatu / Whanganui	Band A: ≤260	8767.5	25641.5	0.78026	0.893837
	Band B: > 260 and ≤ 540	2461.9	3040.0	0.219097	0.105973
	Band C: > 540 and ≤ 1000	7.2	5.5	0.000643	0.00019
Taranaki	Band A: ≤260	1975.1	10004.4	74%	91%
	Band B: > 260 and ≤ 540	699.5	958.3	26%	9%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6157.7	80%	90%
	Band B: > 260 and ≤ 540	390.2	711.1	20%	10%
	Band C: > 540 and ≤ 1000	2.4	0.7	0%	0%
Canterbury	Band A: ≤260	15786.2	41843.7	89%	94%
	Band B: > 260 and ≤ 540	1908.6	2497.9	11%	6%
	Band C: > 540 and ≤ 1000	8.3	3.1	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6588.3	100%	100%
	Band B: > 260 and ≤ 540	12.2	1.9	0%	0%
Marlborough	Band A: ≤260	3591.3	11275.1	98%	99%
	Band B: > 260 and ≤ 540	73.5	82.9	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	26089.1	87%	93%
	Band B: > 260 and ≤ 540	1977.2	1992.4	13%	7%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	27121.5	55%	81%
	Band B: > 260 and ≤ 540	3440.9	6217.4	45%	19%
	Band C: > 540 and ≤ 1000	8.5	78.1	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12297.3	98%	99%
	Band B: > 260 and ≤ 540	30.2	70.8	2%	1%
West Coast	Band A: ≤260	183.3	34427.9	98%	100%
	Band B: > 260 and ≤ 540	4.7	19.4	2%	0%

Table G-3: Estimated length of streams in each *E. coli* attribute state by region: Scenario 1, high LRF.

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1277.6	2683.3	56%	63%
	Band B: > 260 and ≤ 540	947.5	1452.9	41%	34%
	Band C: > 540 and ≤ 1000	60.3	155	3%	4%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15531.9	89%	98%
	Band B: > 260 and ≤ 540	313.3	332.5	11%	2%
Gisborne	Band A: ≤260	2423.3	10121.1	97%	100%
	Band B: > 260 and ≤ 540	68	33.1	3%	0%
Northland	Band A: ≤260	3425.7	11926	73%	87%
	Band B: > 260 and ≤ 540	1293.1	1772.3	27%	13%
	Band C: > 540 and ≤ 1000		0.6	0%	0%
Waikato	Band A: ≤260	5500.7	26351.1	62%	85%
	Band B: > 260 and ≤ 540	3278.4	4403.5	37%	14%
	Band C: > 540 and ≤ 1000	133.4	263.9	1%	1%
	Band D: >1000		2.4	0%	0%
Hawkes Bay	Band A: ≤260	5491.4	14506.2	1.0	1.0
	Band B: > 260 and ≤ 540	161.9	208.8	0.0	0.0
Manawatu / Whanganui	Band A: ≤260	8767.5	26293.0	0.8	0.9
	Band B: > 260 and ≤ 540	2461.9	2389.2	0.2	0.1
	Band C: > 540 and ≤ 1000	7.2	4.7	0.0	0.0
Taranaki	Band A: ≤260	1975.1	10465.4	74%	95%
	Band B: > 260 and ≤ 540	699.5	497.3	26%	5%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6360.7	80%	93%
	Band B: > 260 and ≤ 540	390.2	508.1	20%	7%
	Band C: > 540 and ≤ 1000	2.4	0.6	0%	0%
Canterbury	Band A: ≤260	15786.2	42892.4	89%	97%
	Band B: > 260 and ≤ 540	1908.6	1450.4	11%	3%
	Band C: > 540 and ≤ 1000	8.3	1.9	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6590.1	100%	100%
	Band B: > 260 and ≤ 540	12.2		0%	0%
Marlborough	Band A: ≤260	3591.3	11281.8	98%	99%
	Band B: > 260 and ≤ 540	73.5	76.2	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	26522.8	87%	94%
	Band B: > 260 and ≤ 540	1977.2	1558.8	13%	6%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	28679.5	55%	86%
	Band B: > 260 and ≤ 540	3440.9	4683.6	45%	14%
	Band C: > 540 and ≤ 1000	8.5	54	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12317.1	98%	100%
	Band B: > 260 and ≤ 540	30.2	51.1	2%	0%
West Coast	Band A: ≤260	183.3	34443.6	98%	100%
	Band B: > 260 and ≤ 540	4.7	3.7	2%	0%

Scenario 2

Table G-4: Estimated length of streams in each *E. coli* attribute state by region: Scenario 2, low LRF.
Regions affected by Scenario 2 are shaded.

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1414.3	1891.8	62%	44%
	Band B: > 260 and ≤ 540	813.7	2141.1	36%	50%
	Band C: > 540 and ≤ 1000	57.4	258.3	3%	6%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	14011	89%	88%
	Band B: > 260 and ≤ 540	313.3	1813.7	11%	11%
	Band C: > 540 and ≤ 1000		39.6	0%	0%
Gisborne	Band A: ≤260	2423.3	10054.5	97%	99%
	Band B: > 260 and ≤ 540	68	99.7	3%	1%
Northland	Band A: ≤260	3425.7	7123.3	73%	52%
	Band B: > 260 and ≤ 540	1293.1	6425.7	27%	47%
	Band C: > 540 and ≤ 1000		149.8	0%	1%
Waikato	Band A: ≤260	5574.3	18824.9	63%	61%
	Band B: > 260 and ≤ 540	3207.2	10298.5	36%	33%
	Band C: > 540 and ≤ 1000	131	1818.9	1%	6%
	Band D: >1000		78.5	0%	0%
Hawkes Bay	Band A: ≤260	5526.7	14460.5	98%	98%
	Band B: > 260 and ≤ 540	126.6	254.4	2%	2%
Manawatu / Whanganui	Band A: ≤260	8767.5	24230.9	78%	84%
	Band B: > 260 and ≤ 540	2461.9	4370.4	22%	15%
	Band C: > 540 and ≤ 1000	7.2	85.6	0%	0%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Taranaki	Band A: ≤260	2130.1	7978.1	80%	73%
	Band B: > 260 and ≤ 540	544.5	2933.6	20%	27%
	Band C: > 540 and ≤ 1000		50.9	0%	0%
Wellington	Band A: ≤260	1560.6	5942.8	80%	87%
	Band B: > 260 and ≤ 540	390.2	922.6	20%	13%
	Band C: > 540 and ≤ 1000	2.4	4.1	0%	0%
Canterbury	Band A: ≤260	15786.2	39564.9	89%	89%
	Band B: > 260 and ≤ 540	1908.6	4713.1	11%	11%
	Band C: > 540 and ≤ 1000	8.3	66.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6503.4	100%	99%
	Band B: > 260 and ≤ 540	12.2	86.8	0%	1%
Marlborough	Band A: ≤260	3600	11262.3	98%	99%
	Band B: > 260 and ≤ 540	64.8	95.7	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	25535.4	87%	91%
	Band B: > 260 and ≤ 540	1977.2	2522.8	13%	9%
	Band C: > 540 and ≤ 1000	0.2	23.3	0%	0%
Southland	Band A: ≤260	4269.9	25812.3	55%	77%
	Band B: > 260 and ≤ 540	3440.9	6637.4	45%	20%
	Band C: > 540 and ≤ 1000	8.5	967.1	0%	3%
	Band D: >1000		1.8	0%	0%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Tasman	Band A: ≤260	1739.9	12099.4	98%	98%
	Band B: > 260 and ≤ 540	30.2	262.8	2%	2%
	Band C: > 540 and ≤ 1000		6	0%	0%
West Coast	Band A: ≤260	183.3	33825.1	98%	98%
	Band B: > 260 and ≤ 540	4.7	620.5	2%	2%
	Band C: > 540 and ≤ 1000		1.7	0%	0%

Table G-5: Estimated length of streams in each *E. coli* attribute state by region: Scenario 2, most likely LRF.
Regions affected by Scenario 2 are shaded.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1745.3	3040.1	76%	71%
	Band B: > 260 and ≤ 540	484.4	1109.2	21%	26%
	Band C: > 540 and ≤ 1000	55.7	141.9	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15237.8	89%	96%
	Band B: > 260 and ≤ 540	313.3	626.6	11%	4%
Gisborne	Band A: ≤260	2423.3	10106.9	97%	100%
	Band B: > 260 and ≤ 540	68	47.3	3%	0%
Northland	Band A: ≤260	3425.7	10088	73%	74%
	Band B: > 260 and ≤ 540	1293.1	3609.4	27%	26%
	Band C: > 540 and ≤ 1000		1.5	0%	0%
Waikato	Band A: ≤260	5718.3	24190.1	64%	78%
	Band B: > 260 and ≤ 540	3067.4	6347.4	34%	20%
	Band C: > 540 and ≤ 1000	126.7	471.3	1%	2%
	Band D: >1000		12.1	0%	0%
Hawkes Bay	5552.7	14571.1	98%	99%	5552.7
	100.6	143.8	2%	1%	100.6
Manawatu / Whanganui	8767.5	25641.5	78%	89%	8767.5
	2461.9	3040.0	22%	11%	2461.9
	7.2	5.5	0%	0%	7.2
Taranaki	Band A: ≤260	2488.1	10550.8	93%	96%
	Band B: > 260 and ≤ 540	186.5	411.9	7%	4%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6397.7	80%	93%
	Band B: > 260 and ≤ 540	390.2	471.1	20%	7%
	Band C: > 540 and ≤ 1000	2.4	0.7	0%	0%
Canterbury	Band A: ≤260	15786.2	42692.8	89%	96%
	Band B: > 260 and ≤ 540	1908.6	1648.7	11%	4%
	Band C: > 540 and ≤ 1000	8.3	3.1	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6588.3	100%	100%
	Band B: > 260 and ≤ 540	12.2	1.9	0%	0%
Marlborough	Band A: ≤260	3611.6	11296	99%	99%
	Band B: > 260 and ≤ 540	53.3	63	1%	1%
Otago	Band A: ≤260	13146.9	26089.1	87%	93%
	Band B: > 260 and ≤ 540	1977.2	1992.4	13%	7%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	27121.5	55%	81%
	Band B: > 260 and ≤ 540	3440.9	6217.4	45%	19%
	Band C: > 540 and ≤ 1000	8.5	78.1	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12297.3	98%	99%
	Band B: > 260 and ≤ 540	30.2	70.8	2%	1%
West Coast	Band A: ≤260	183.3	34427.9	98%	100%
	Band B: > 260 and ≤ 540	4.7	19.4	2%	0%

Table G-6: Estimated length of streams in each *E. coli* attribute state by region: Scenario 2, high LRF.
Regions affected by Scenario 2 are shaded.

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1791.1	3380.3	78%	79%
	Band B: > 260 and ≤ 540	438.5	784.1	19%	18%
	Band C: > 540 and ≤ 1000	55.7	126.8	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15531.9	89%	98%
	Band B: > 260 and ≤ 540	313.3	332.5	11%	2%
Gisborne	Band A: ≤260	2423.3	10121.1	97%	100%
	Band B: > 260 and ≤ 540	68	33.1	3%	0%
Northland	Band A: ≤260	3425.7	11928	73%	87%
	Band B: > 260 and ≤ 540	1293.1	1770.3	27%	13%
	Band C: > 540 and ≤ 1000		0.6	0%	0%
Waikato	Band A: ≤260	5725.3	26775.7	64%	86%
	Band B: > 260 and ≤ 540	3060.5	3981.9	34%	13%
	Band C: > 540 and ≤ 1000	126.7	261.7	1%	1%
	Band D: >1000		1.6	0%	0%
Hawkes Bay	Band A: ≤260	5553.6	14580.2	98%	99%
	Band B: > 260 and ≤ 540	99.8	134.7	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	26293.0	78%	92%
	Band B: > 260 and ≤ 540	2461.9	2389.2	22%	8%
	Band C: > 540 and ≤ 1000	7.2	4.7	0%	0%
Taranaki	Band A: ≤260	2491.6	10802.7	93%	99%
	Band B: > 260 and ≤ 540	183	160	7%	1%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6536.1	80%	95%
	Band B: > 260 and ≤ 540	390.2	333.1	20%	5%
	Band C: > 540 and ≤ 1000	2.4	0.2	0%	0%
Canterbury	Band A: ≤260	15786.2	43332.1	89%	98%
	Band B: > 260 and ≤ 540	1908.6	1011	11%	2%
	Band C: > 540 and ≤ 1000	8.3	1.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6590.1	100%	100%
	Band B: > 260 and ≤ 540	12.2		0%	0%
Marlborough	Band A: ≤260	3612.9	11300.5	99%	99%
	Band B: > 260 and ≤ 540	51.9	58.5	1%	1%
Otago	Band A: ≤260	13146.9	26522.8	87%	94%
	Band B: > 260 and ≤ 540	1977.2	1558.8	13%	6%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	28679.5	55%	86%
	Band B: > 260 and ≤ 540	3440.9	4683.6	45%	14%
	Band C: > 540 and ≤ 1000	8.5	54	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12317.1	98%	100%
	Band B: > 260 and ≤ 540	30.2	51.1	2%	0%
West Coast	Band A: ≤260	183.3	34443.6	98%	100%
	Band B: > 260 and ≤ 540	4.7	3.7	2%	0%
				0%	0%
				0%	0%

Scenario 3a

Table G-7: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3a, low LRF.

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1414.3	1891.8	62%	44%
	Band B: > 260 and ≤ 540	813.7	2141.1	36%	50%
	Band C: > 540 and ≤ 1000	57.4	258.3	3%	6%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	14018.8	89%	88%
	Band B: > 260 and ≤ 540	313.3	1809.8	11%	11%
	Band C: > 540 and ≤ 1000		35.7	0%	0%
Gisborne	Band A: ≤260	2423.3	10054.5	97%	99%
	Band B: > 260 and ≤ 540	68	99.7	3%	1%
Northland	Band A: ≤260	3425.7	7132	73%	52%
	Band B: > 260 and ≤ 540	1293.1	6420	27%	47%
	Band C: > 540 and ≤ 1000		146.8	0%	1%
Waikato	Band A: ≤260	5574.3	18837.4	63%	61%
	Band B: > 260 and ≤ 540	3207.2	10303.8	36%	33%
	Band C: > 540 and ≤ 1000	131	1801.4	1%	6%
	Band D: >1000		78.3	0%	0%
Hawkes Bay	Band A: ≤260	5526.7	14460.5	98%	98%
	Band B: > 260 and ≤ 540	126.6	254.4	2%	2%
Manawatu / Whanganui	Band A: ≤260	8767.5	24238.2	78%	84%
	Band B: > 260 and ≤ 540	2461.9	4378.0	22%	15%
	Band C: > 540 and ≤ 1000	7.2	70.8	0%	0%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Taranaki	Band A: ≤260	2130.1	7988.9	80%	73%
	Band B: > 260 and ≤ 540	544.5	2925.4	20%	27%
	Band C: > 540 and ≤ 1000		48.4	0%	0%
Wellington	Band A: ≤260	1560.6	5942.8	80%	87%
	Band B: > 260 and ≤ 540	390.2	922.6	20%	13%
	Band C: > 540 and ≤ 1000	2.4	4.1	0%	0%
Canterbury	Band A: ≤260	15786.2	39564.9	89%	89%
	Band B: > 260 and ≤ 540	1908.6	4713.1	11%	11%
	Band C: > 540 and ≤ 1000	8.3	66.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6503.4	100%	99%
	Band B: > 260 and ≤ 540	12.2	86.8	0%	1%
Marlborough	Band A: ≤260	3600	11262.3	98%	99%
	Band B: > 260 and ≤ 540	64.8	95.7	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	25536.8	87%	91%
	Band B: > 260 and ≤ 540	1977.2	2525.1	13%	9%
	Band C: > 540 and ≤ 1000	0.2	19.6	0%	0%
Southland	Band A: ≤260	4269.9	25817.5	55%	77%
	Band B: > 260 and ≤ 540	3440.9	6664.7	45%	20%
	Band C: > 540 and ≤ 1000	8.5	934.6	0%	3%
	Band D: >1000		1.8	0%	0%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Tasman	Band A: ≤260	1739.9	12101.1	98%	98%
	Band B: > 260 and ≤ 540	30.2	264.1	2%	2%
	Band C: > 540 and ≤ 1000		3	0%	0%
West Coast	Band A: ≤260	183.3	33834.3	98%	98%
	Band B: > 260 and ≤ 540	4.7	611.2	2%	2%
	Band C: > 540 and ≤ 1000		1.7	0%	0%

Table G-8: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3a, most likely LRF.

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1745.3	3040.1	76%	71%
	Band B: > 260 and ≤ 540	484.4	1110.3	21%	26%
	Band C: > 540 and ≤ 1000	55.7	140.8	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15286.6	89%	96%
	Band B: > 260 and ≤ 540	313.3	577.8	11%	4%
Gisborne	Band A: ≤260	2423.3	10106.9	97%	100%
	Band B: > 260 and ≤ 540	68	47.3	3%	0%
Northland	Band A: ≤260	3425.7	10183.5	73%	74%
	Band B: > 260 and ≤ 540	1293.1	3514.6	27%	26%
	Band C: > 540 and ≤ 1000		0.7	0%	0%
Waikato	Band A: ≤260	5718.3	24328.1	64%	78%
	Band B: > 260 and ≤ 540	3067.4	6232.5	34%	20%
	Band C: > 540 and ≤ 1000	126.7	448.8	1%	1%
	Band D: >1000		11.4	0%	0%
Hawkes Bay	Band A: ≤260	5552.7	14571.1	98%	99%
	Band B: > 260 and ≤ 540	100.6	143.8	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	25722.0	78%	90%
	Band B: > 260 and ≤ 540	2461.9	2959.6	22%	10%
	Band C: > 540 and ≤ 1000	7.2	5.3	0%	0%
Taranaki	Band A: ≤260	2488.1	10572.6	93%	96%
	Band B: > 260 and ≤ 540	186.5	390.1	7%	4%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6397.7	80%	93%
	Band B: > 260 and ≤ 540	390.2	471.1	20%	7%
	Band C: > 540 and ≤ 1000	2.4	0.7	0%	0%
Canterbury	Band A: ≤260	15786.2	42692.8	89%	96%
	Band B: > 260 and ≤ 540	1908.6	1648.7	11%	4%
	Band C: > 540 and ≤ 1000	8.3	3.1	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6588.3	100%	100%
	Band B: > 260 and ≤ 540	12.2	1.9	0%	0%
Marlborough	Band A: ≤260	3611.6	11296	99%	99%
	Band B: > 260 and ≤ 540	53.3	63	1%	1%
Otago	Band A: ≤260	13146.9	26116.4	87%	93%
	Band B: > 260 and ≤ 540	1977.2	1965.2	13%	7%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	27200.4	55%	81%
	Band B: > 260 and ≤ 540	3440.9	6141.5	45%	18%
	Band C: > 540 and ≤ 1000	8.5	75.2	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12303.1	98%	99%
	Band B: > 260 and ≤ 540	30.2	65.1	2%	1%
West Coast	Band A: ≤260	183.3	34429.7	98%	100%
	Band B: > 260 and ≤ 540	4.7	17.6	2%	0%

Table G-9: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3a, high LRF.

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1791.1	3380.3	78%	79%
	Band B: > 260 and ≤ 540	438.5	784.1	19%	18%
	Band C: > 540 and ≤ 1000	55.7	126.8	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15539	89%	98%
	Band B: > 260 and ≤ 540	313.3	325.3	11%	2%
Gisborne	Band A: ≤260	2423.3	10121.1	97%	100%
	Band B: > 260 and ≤ 540	68	33.1	3%	0%
Northland	Band A: ≤260	3425.7	11978.7	73%	87%
	Band B: > 260 and ≤ 540	1293.1	1719.6	27%	13%
	Band C: > 540 and ≤ 1000		0.6	0%	0%
Waikato	Band A: ≤260	5725.3	26873.1	64%	87%
	Band B: > 260 and ≤ 540	3060.5	3894.2	34%	13%
	Band C: > 540 and ≤ 1000	126.7	251.9	1%	1%
	Band D: >1000		1.6	0%	0%
Hawkes Bay	Band A: ≤260	5553.6	14580.2	98%	99%
	Band B: > 260 and ≤ 540	99.8	134.7	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	26423.1	78%	92%
	Band B: > 260 and ≤ 540	2461.9	2260.3	22%	8%
	Band C: > 540 and ≤ 1000	7.2	3.6	0%	0%
Taranaki	Band A: ≤260	2491.6	10808.2	93%	99%
	Band B: > 260 and ≤ 540	183	154.5	7%	1%

Region	Attribute state (*E.coli* per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6536.1	80%	95%
	Band B: > 260 and ≤ 540	390.2	333.1	20%	5%
	Band C: > 540 and ≤ 1000	2.4	0.2	0%	0%
Canterbury	Band A: ≤260	15786.2	43332.1	89%	98%
	Band B: > 260 and ≤ 540	1908.6	1011	11%	2%
	Band C: > 540 and ≤ 1000	8.3	1.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6590.1	100%	100%
	Band B: > 260 and ≤ 540	12.2		0%	0%
Marlborough	Band A: ≤260	3612.9	11300.5	99%	99%
	Band B: > 260 and ≤ 540	51.9	58.5	1%	1%
Otago	Band A: ≤260	13146.9	26543.4	87%	95%
	Band B: > 260 and ≤ 540	1977.2	1538.2	13%	5%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	28816.3	55%	86%
	Band B: > 260 and ≤ 540	3440.9	4549.7	45%	14%
	Band C: > 540 and ≤ 1000	8.5	51	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12317.3	98%	100%
	Band B: > 260 and ≤ 540	30.2	50.8	2%	0%
West Coast	Band A: ≤260	183.3	34443.6	98%	100%
	Band B: > 260 and ≤ 540	4.7	3.7	2%	0%

Scenario 3b

Table G-10: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3b, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1277.6	1840.2	56%	43%
	Band B: > 260 and ≤ 540	947.5	2199.7	41%	51%
	Band C: > 540 and ≤ 1000	60.3	251.4	3%	6%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	14068.8	89%	89%
	Band B: > 260 and ≤ 540	313.3	1762.6	11%	11%
	Band C: > 540 and ≤ 1000		33.1	0%	0%
Gisborne	Band A: ≤260	2423.3	10066.4	97%	99%
	Band B: > 260 and ≤ 540	68	87.8	3%	1%
Northland	Band A: ≤260	3425.7	7207.3	73%	53%
	Band B: > 260 and ≤ 540	1293.1	6352.7	27%	46%
	Band C: > 540 and ≤ 1000		138.9	0%	1%
Waikato	Band A: ≤260	5500.7	18764.5	62%	60%
	Band B: > 260 and ≤ 540	3278.4	10410.9	37%	34%
	Band C: > 540 and ≤ 1000	133.4	1774.7	1%	6%
	Band D: >1000		70.7	0%	0%
Hawkes Bay	Band A: ≤260	5526.7	14460.5	98%	98%
	Band B: > 260 and ≤ 540	126.6	254.4	2%	2%
Manawatu / Whanganui	Band A: ≤260	8767.5	24238.2	78%	84%
	Band B: > 260 and ≤ 540	2461.9	4378.0	22%	15%
	Band C: > 540 and ≤ 1000	7.2	70.8	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Taranaki	Band A: ≤260	1975.1	7894.2	74%	72%
	Band B: > 260 and ≤ 540	699.5	3024.9	26%	28%
	Band C: > 540 and ≤ 1000		43.6	0%	0%
Wellington	Band A: ≤260	1560.6	5909.2	80%	86%
	Band B: > 260 and ≤ 540	390.2	956.2	20%	14%
	Band C: > 540 and ≤ 1000	2.4	4.1	0%	0%
Canterbury	Band A: ≤260	15786.2	39493.1	89%	89%
	Band B: > 260 and ≤ 540	1908.6	4787.1	11%	11%
	Band C: > 540 and ≤ 1000	8.3	64.4	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6499.2	100%	99%
	Band B: > 260 and ≤ 540	12.2	90.9	0%	1%
Marlborough	Band A: ≤260	3591.3	11253.4	98%	99%
	Band B: > 260 and ≤ 540	73.5	104.6	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	25534.3	87%	91%
	Band B: > 260 and ≤ 540	1977.2	2528.5	13%	9%
	Band C: > 540 and ≤ 1000	0.2	18.8	0%	0%
Southland	Band A: ≤260	4269.9	25825.8	55%	77%
	Band B: > 260 and ≤ 540	3440.9	6683.7	45%	20%
	Band C: > 540 and ≤ 1000	8.5	907.2	0%	3%
	Band D: >1000		1.8	0%	0%
Tasman	Band A: ≤260	1739.9	12144.4	98%	98%
	Band B: > 260 and ≤ 540	30.2	223.8	2%	2%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
West Coast	Band A: ≤260	183.3	33841.8	98%	98%
	Band B: > 260 and ≤ 540	4.7	603.8	2%	2%
	Band C: > 540 and ≤ 1000		1.7	0%	0%

Table G-11: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3b, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1277.6	2266.6	56%	53%
	Band B: > 260 and ≤ 540	947.5	1849	41%	43%
	Band C: > 540 and ≤ 1000	60.3	175.6	3%	4%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15289.9	89%	96%
	Band B: > 260 and ≤ 540	313.3	574.5	11%	4%
Gisborne	Band A: ≤260	2423.3	10109.5	97%	100%
	Band B: > 260 and ≤ 540	68	44.7	3%	0%
Northland	Band A: ≤260	3425.7	10214.5	73%	75%
	Band B: > 260 and ≤ 540	1293.1	3483.7	27%	25%
	Band C: > 540 and ≤ 1000		0.7	0%	0%
Waikato	Band A: ≤260	5500.7	23982.2	62%	77%
	Band B: > 260 and ≤ 540	3278.4	6570.9	37%	21%
	Band C: > 540 and ≤ 1000	133.4	454.2	1%	1%
	Band D: >1000		13.6	0%	0%
Hawkes Bay	Band A: ≤260	5552.7	14571.1	1.0	1.0
	Band B: > 260 and ≤ 540	100.6	143.8	0.0	0.0
Manawatu / Whanganui	Band A: ≤260	8767.5	25725.7	0.8	0.9
	Band B: > 260 and ≤ 540	2461.9	2955.9	0.2	0.1
	Band C: > 540 and ≤ 1000	7.2	5.3	0.0	0.0
Taranaki	Band A: ≤260	1975.1	10163.3	74%	93%
	Band B: > 260 and ≤ 540	699.5	799.4	26%	7%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6206.1	80%	90%
	Band B: > 260 and ≤ 540	390.2	662.7	20%	10%
	Band C: > 540 and ≤ 1000	2.4	0.7	0%	0%
Canterbury	Band A: ≤260	15786.2	42044.8	89%	95%
	Band B: > 260 and ≤ 540	1908.6	2296.7	11%	5%
	Band C: > 540 and ≤ 1000	8.3	3.1	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6588.3	100%	100%
	Band B: > 260 and ≤ 540	12.2	1.9	0%	0%
Marlborough	Band A: ≤260	3591.3	11280	98%	99%
	Band B: > 260 and ≤ 540	73.5	78	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	26124.8	87%	93%
	Band B: > 260 and ≤ 540	1977.2	1956.8	13%	7%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	27213.8	55%	81%
	Band B: > 260 and ≤ 540	3440.9	6129.1	45%	18%
	Band C: > 540 and ≤ 1000	8.5	74.1	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12306.9	98%	100%
	Band B: > 260 and ≤ 540	30.2	61.3	2%	0%
West Coast	Band A: ≤260	183.3	34431.6	98%	100%
	Band B: > 260 and ≤ 540	4.7	15.7	2%	0%

Table G-12: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3b, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1277.6	3357.9	56%	78%
	Band B: > 260 and ≤ 540	947.5	823.2	41%	19%
	Band C: > 540 and ≤ 1000	60.3	110.1	3%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15730.2	89%	99%
	Band B: > 260 and ≤ 540	313.3	134.1	11%	1%
Gisborne	Band A: ≤260	2423.3	10134.4	97%	100%
	Band B: > 260 and ≤ 540	68	19.8	3%	0%
Northland	Band A: ≤260	3425.7	12652	73%	92%
	Band B: > 260 and ≤ 540	1293.1	1046.3	27%	8%
	Band C: > 540 and ≤ 1000		0.5	0%	0%
Waikato	Band A: ≤260	5500.7	27272.9	62%	88%
	Band B: > 260 and ≤ 540	3278.4	3617	37%	12%
	Band C: > 540 and ≤ 1000	133.4	129.4	1%	0%
	Band D: >1000		1.5	0%	0%
Hawkes Bay	Band A: ≤260	5553.6	14580.2	98%	99%
	Band B: > 260 and ≤ 540	99.8	134.7	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	26431.8	78%	92%
	Band B: > 260 and ≤ 540	2461.9	2251.6	22%	8%
	Band C: > 540 and ≤ 1000	7.2	3.6	0%	0%
Taranaki	Band A: ≤260	1975.1	10646.9	74%	97%
	Band B: > 260 and ≤ 540	699.5	315.8	26%	3%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6535.1	80%	95%
	Band B: > 260 and ≤ 540	390.2	334.1	20%	5%
	Band C: > 540 and ≤ 1000	2.4	0.2	0%	0%
Canterbury	Band A: ≤260	15786.2	43402.8	89%	98%
	Band B: > 260 and ≤ 540	1908.6	940.3	11%	2%
	Band C: > 540 and ≤ 1000	8.3	1.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6590.1	100%	100%
	Band B: > 260 and ≤ 540	12.2		0%	0%
Marlborough	Band A: ≤260	3591.3	11307.8	98%	100%
	Band B: > 260 and ≤ 540	73.5	51.2	2%	0%
Otago	Band A: ≤260	13146.9	26624.6	87%	95%
	Band B: > 260 and ≤ 540	1977.2	1456.9	13%	5%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	29045.7	55%	87%
	Band B: > 260 and ≤ 540	3440.9	4328.1	45%	13%
	Band C: > 540 and ≤ 1000	8.5	43.2	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12361.4	98%	100%
	Band B: > 260 and ≤ 540	30.2	6.7	2%	0%
West Coast	Band A: ≤260	183.3	34446.5	98%	100%
	Band B: > 260 and ≤ 540	4.7	0.8	2%	0%

Scenario 3c

Table G-13: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3c, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1414.3	1891.8	62%	44%
	Band B: > 260 and ≤ 540	813.7	2141.1	36%	50%
	Band C: > 540 and ≤ 1000	57.4	258.3	3%	6%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	14018.9	89%	88%
	Band B: > 260 and ≤ 540	313.3	1809.8	11%	11%
	Band C: > 540 and ≤ 1000		35.7	0%	0%
Gisborne	Band A: ≤260	2423.3	10054.7	97%	99%
	Band B: > 260 and ≤ 540	68	99.4	3%	1%
Northland	Band A: ≤260	3425.7	7163.9	73%	52%
	Band B: > 260 and ≤ 540	1293.1	6390.8	27%	47%
	Band C: > 540 and ≤ 1000		144.2	0%	1%
Waikato	Band A: ≤260	5574.3	18839.4	63%	61%
	Band B: > 260 and ≤ 540	3207.2	10306	36%	33%
	Band C: > 540 and ≤ 1000	131	1797.2	1%	6%
	Band D: >1000		78.3	0%	0%
Hawkes Bay	Band A: ≤260	5526.7	14460.5	98%	98%
	Band B: > 260 and ≤ 540	126.6	254.4	2%	2%
Manawatu / Whanganui	Band A: ≤260	8767.5	24238.2	78%	84%
	Band B: > 260 and ≤ 540	2461.9	4378.0	22%	15%
	Band C: > 540 and ≤ 1000	7.2	70.8	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Taranaki	Band A: ≤260	2130.1	7988.9	80%	73%
	Band B: > 260 and ≤ 540	544.5	2925.4	20%	27%
	Band C: > 540 and ≤ 1000		48.4	0%	0%
Wellington	Band A: ≤260	1560.6	5942.8	80%	87%
	Band B: > 260 and ≤ 540	390.2	922.6	20%	13%
	Band C: > 540 and ≤ 1000	2.4	4.1	0%	0%
Canterbury	Band A: ≤260	15786.2	39564.9	89%	89%
	Band B: > 260 and ≤ 540	1908.6	4713.1	11%	11%
	Band C: > 540 and ≤ 1000	8.3	66.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6503.4	100%	99%
	Band B: > 260 and ≤ 540	12.2	86.8	0%	1%
Marlborough	Band A: ≤260	3600	11262.3	98%	99%
	Band B: > 260 and ≤ 540	64.8	95.7	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	25549.4	87%	91%
	Band B: > 260 and ≤ 540	1977.2	2512.5	13%	9%
	Band C: > 540 and ≤ 1000	0.2	19.6	0%	0%
Southland	Band A: ≤260	4269.9	25827.4	55%	77%
	Band B: > 260 and ≤ 540	3440.9	6681.5	45%	20%
	Band C: > 540 and ≤ 1000	8.5	907.9	0%	3%
	Band D: >1000		1.8	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Tasman	Band A: ≤260	1739.9	12101.8	98%	98%
	Band B: > 260 and ≤ 540	30.2	263.4	2%	2%
	Band C: > 540 and ≤ 1000		3	0%	0%
West Coast	Band A: ≤260	183.3	33834.4	98%	98%
	Band B: > 260 and ≤ 540	4.7	611.2	2%	2%
	Band C: > 540 and ≤ 1000		1.7	0%	0%

Table G-14: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3c, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1745.3	3040.1	76%	71%
	Band B: > 260 and ≤ 540	484.4	1110.3	21%	26%
	Band C: > 540 and ≤ 1000	55.7	140.8	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15290.1	89%	96%
	Band B: > 260 and ≤ 540	313.3	574.3	11%	4%
Gisborne	Band A: ≤260	2423.3	10108.1	97%	100%
	Band B: > 260 and ≤ 540	68	46.1	3%	0%
Northland	Band A: ≤260	3425.7	10422	73%	76%
	Band B: > 260 and ≤ 540	1293.1	3276.1	27%	24%
	Band C: > 540 and ≤ 1000		0.7	0%	0%
Waikato	Band A: ≤260	5718.3	24385.5	64%	79%
	Band B: > 260 and ≤ 540	3067.4	6178.5	34%	20%
	Band C: > 540 and ≤ 1000	126.7	445.4	1%	1%
	Band D: >1000		11.4	0%	0%
Hawkes Bay	Band A: ≤260	5552.7	14571.1	98%	99%
	Band B: > 260 and ≤ 540	100.6	143.8	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	25730.1	78%	90%
	Band B: > 260 and ≤ 540	2461.9	2951.6	22%	10%
	Band C: > 540 and ≤ 1000	7.2	5.3	0%	0%
Taranaki	Band A: ≤260	2488.1	10572.6	93%	96%
	Band B: > 260 and ≤ 540	186.5	390.1	7%	4%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6397.7	80%	93%
	Band B: > 260 and ≤ 540	390.2	471.1	20%	7%
	Band C: > 540 and ≤ 1000	2.4	0.7	0%	0%
Canterbury	Band A: ≤260	15786.2	42692.8	89%	96%
	Band B: > 260 and ≤ 540	1908.6	1648.7	11%	4%
	Band C: > 540 and ≤ 1000	8.3	3.1	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6588.3	100%	100%
	Band B: > 260 and ≤ 540	12.2	1.9	0%	0%
Marlborough	Band A: ≤260	3611.6	11296	99%	99%
	Band B: > 260 and ≤ 540	53.3	63	1%	1%
Otago	Band A: ≤260	13146.9	26182.5	87%	93%
	Band B: > 260 and ≤ 540	1977.2	1899	13%	7%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	27377.3	55%	82%
	Band B: > 260 and ≤ 540	3440.9	5965.7	45%	18%
	Band C: > 540 and ≤ 1000	8.5	74	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12303.7	98%	99%
	Band B: > 260 and ≤ 540	30.2	64.4	2%	1%
West Coast	Band A: ≤260	183.3	34431.6	98%	100%
	Band B: > 260 and ≤ 540	4.7	15.7	2%	0%

Table G-15: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3c, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1791.1	3380.3	78%	79%
	Band B: > 260 and ≤ 540	438.5	784.4	19%	18%
	Band C: > 540 and ≤ 1000	55.7	126.5	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15540.8	89%	98%
	Band B: > 260 and ≤ 540	313.3	323.5	11%	2%
Gisborne	Band A: ≤260	2423.3	10121.1	97%	100%
	Band B: > 260 and ≤ 540	68	33.1	3%	0%
Northland	Band A: ≤260	3425.7	12187.2	73%	89%
	Band B: > 260 and ≤ 540	1293.1	1511.1	27%	11%
	Band C: > 540 and ≤ 1000		0.6	0%	0%
Waikato	Band A: ≤260	5725.3	26915	64%	87%
	Band B: > 260 and ≤ 540	3060.5	3853.2	34%	12%
	Band C: > 540 and ≤ 1000	126.7	251.1	1%	1%
	Band D: >1000		1.6	0%	0%
Hawkes Bay	Band A: ≤260	5553.6	14580.2	98%	99%
	Band B: > 260 and ≤ 540	99.8	134.7	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	26434.1	78%	92%
	Band B: > 260 and ≤ 540	2461.9	2249.3	22%	8%
	Band C: > 540 and ≤ 1000	7.2	3.6	0%	0%
Taranaki	Band A: ≤260	2491.6	10808.5	93%	99%
	Band B: > 260 and ≤ 540	183	154.3	7%	1%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6536.1	80%	95%
	Band B: > 260 and ≤ 540	390.2	333.1	20%	5%
	Band C: > 540 and ≤ 1000	2.4	0.2	0%	0%
Canterbury	Band A: ≤260	15786.2	43332.1	89%	98%
	Band B: > 260 and ≤ 540	1908.6	1011	11%	2%
	Band C: > 540 and ≤ 1000	8.3	1.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6590.1	100%	100%
	Band B: > 260 and ≤ 540	12.2		0%	0%
Marlborough	Band A: ≤260	3612.9	11300.5	99%	99%
	Band B: > 260 and ≤ 540	51.9	58.5	1%	1%
Otago	Band A: ≤260	13146.9	26647	87%	95%
	Band B: > 260 and ≤ 540	1977.2	1434.6	13%	5%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	29125.5	55%	87%
	Band B: > 260 and ≤ 540	3440.9	4246.6	45%	13%
	Band C: > 540 and ≤ 1000	8.5	44.9	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12317.3	98%	100%
	Band B: > 260 and ≤ 540	30.2	50.8	2%	0%
West Coast	Band A: ≤260	183.3	34443.6	98%	100%
	Band B: > 260 and ≤ 540	4.7	3.7	2%	0%

Scenario 3d

Table G-16: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3d, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1414.3	1891.8	62%	44%
	Band B: > 260 and ≤ 540	813.7	2141.1	36%	50%
	Band C: > 540 and ≤ 1000	57.4	258.3	3%	6%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	14076.5	89%	89%
	Band B: > 260 and ≤ 540	313.3	1752.9	11%	11%
	Band C: > 540 and ≤ 1000		35	0%	0%
Gisborne	Band A: ≤260	2423.3	10061	97%	99%
	Band B: > 260 and ≤ 540	68	93.2	3%	1%
Northland	Band A: ≤260	3425.7	7416.5	73%	54%
	Band B: > 260 and ≤ 540	1293.1	6155.1	27%	45%
	Band C: > 540 and ≤ 1000		127.2	0%	1%
Waikato	Band A: ≤260	5574.3	19115.5	63%	62%
	Band B: > 260 and ≤ 540	3207.2	10054.5	36%	32%
	Band C: > 540 and ≤ 1000	131	1773.3	1%	6%
	Band D: >1000		77.6	0%	0%
Hawkes Bay	Band A: ≤260	5526.7	14460.5	98%	98%
	Band B: > 260 and ≤ 540	126.6	254.4	2%	2%
Manawatu / Whanganui	Band A: ≤260	8767.5	24415.2	78%	85%
	Band B: > 260 and ≤ 540	2461.9	4162.2	22%	15%
	Band C: > 540 and ≤ 1000	7.2	62.4	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Taranaki	Band A: ≤260	2130.1	8046.3	80%	73%
	Band B: > 260 and ≤ 540	544.5	2868	20%	26%
	Band C: > 540 and ≤ 1000		48.4	0%	0%
Wellington	Band A: ≤260	1560.6	5942.8	80%	87%
	Band B: > 260 and ≤ 540	390.2	922.6	20%	13%
	Band C: > 540 and ≤ 1000	2.4	4.1	0%	0%
Canterbury	Band A: ≤260	15786.2	39564.9	89%	89%
	Band B: > 260 and ≤ 540	1908.6	4713.1	11%	11%
	Band C: > 540 and ≤ 1000	8.3	66.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6503.4	100%	99%
	Band B: > 260 and ≤ 540	12.2	86.8	0%	1%
Marlborough	Band A: ≤260	3600	11262.3	98%	99%
	Band B: > 260 and ≤ 540	64.8	95.7	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	25622	87%	91%
	Band B: > 260 and ≤ 540	1977.2	2439.9	13%	9%
	Band C: > 540 and ≤ 1000	0.2	19.6	0%	0%
Southland	Band A: ≤260	4269.9	25973.8	55%	78%
	Band B: > 260 and ≤ 540	3440.9	6626.2	45%	20%
	Band C: > 540 and ≤ 1000	8.5	816.7	0%	2%
	Band D: >1000		1.8	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Tasman	Band A: ≤260	1739.9	12115.4	98%	98%
	Band B: > 260 and ≤ 540	30.2	249.8	2%	2%
	Band C: > 540 and ≤ 1000		3	0%	0%
West Coast	Band A: ≤260	183.3	33865	98%	98%
	Band B: > 260 and ≤ 540	4.7	580.5	2%	2%
	Band C: > 540 and ≤ 1000		1.7	0%	0%

Table G-17: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3d, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1745.3	3040.7	76%	71%
	Band B: > 260 and ≤ 540	484.4	1110	21%	26%
	Band C: > 540 and ≤ 1000	55.7	140.4	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15384.7	89%	97%
	Band B: > 260 and ≤ 540	313.3	479.6	11%	3%
Gisborne	Band A: ≤260	2423.3	10115.9	97%	100%
	Band B: > 260 and ≤ 540	68	38.3	3%	0%
Northland	Band A: ≤260	3425.7	11703	73%	85%
	Band B: > 260 and ≤ 540	1293.1	1995.2	27%	15%
	Band C: > 540 and ≤ 1000		0.6	0%	0%
Waikato	Band A: ≤260	5718.3	25516.4	64%	82%
	Band B: > 260 and ≤ 540	3067.4	5070.9	34%	16%
	Band C: > 540 and ≤ 1000	126.7	422.6	1%	1%
	Band D: >1000		11.1	0%	0%
Hawkes Bay	Band A: ≤260	5552.7	14571.1	98%	99%
	Band B: > 260 and ≤ 540	100.6	143.8	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	26217.8	78%	91%
	Band B: > 260 and ≤ 540	2461.9	2242.2	22%	8%
	Band C: > 540 and ≤ 1000	7.2	5.3	0%	0%
Taranaki	Band A: ≤260	2488.1	10639.1	93%	97%
	Band B: > 260 and ≤ 540	186.5	323.6	7%	3%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6401.2	80%	93%
	Band B: > 260 and ≤ 540	390.2	467.6	20%	7%
	Band C: > 540 and ≤ 1000	2.4	0.7	0%	0%
Canterbury	Band A: ≤260	15786.2	42692.8	89%	96%
	Band B: > 260 and ≤ 540	1908.6	1648.7	11%	4%
	Band C: > 540 and ≤ 1000	8.3	3.1	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6588.3	100%	100%
	Band B: > 260 and ≤ 540	12.2	1.9	0%	0%
Marlborough	Band A: ≤260	3611.6	11296	99%	99%
	Band B: > 260 and ≤ 540	53.3	63	1%	1%
Otago	Band A: ≤260	13146.9	26643	87%	95%
	Band B: > 260 and ≤ 540	1977.2	1438.6	13%	5%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	28749.7	55%	86%
	Band B: > 260 and ≤ 540	3440.9	4614.1	45%	14%
	Band C: > 540 and ≤ 1000	8.5	53.1	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12311.5	98%	100%
	Band B: > 260 and ≤ 540	30.2	56.6	2%	0%
West Coast	Band A: ≤260	183.3	34440.6	98%	100%
	Band B: > 260 and ≤ 540	4.7	6.7	2%	0%

Table G-18: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3d, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1791.1	3380.4	78%	79%
	Band B: > 260 and ≤ 540	438.5	785.8	19%	18%
	Band C: > 540 and ≤ 1000	55.7	125	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15581.3	89%	98%
	Band B: > 260 and ≤ 540	313.3	283.1	11%	2%
Gisborne	Band A: ≤260	2423.3	10128.4	97%	100%
	Band B: > 260 and ≤ 540	68	25.7	3%	0%
Northland	Band A: ≤260	3425.7	12844.7	73%	94%
	Band B: > 260 and ≤ 540	1293.1	853.5	27%	6%
	Band C: > 540 and ≤ 1000		0.6	0%	0%
Waikato	Band A: ≤260	5725.3	27873.8	64%	90%
	Band B: > 260 and ≤ 540	3060.5	2914.7	34%	9%
	Band C: > 540 and ≤ 1000	126.7	230.9	1%	1%
	Band D: >1000		1.5	0%	0%
Hawkes Bay	Band A: ≤260	6979.6	17474	98%	99%
	Band B: > 260 and ≤ 540	142.5	169.6	2%	1%
Manawatu / Whanganui	Band A: ≤260	8129.5	24763.2	83%	96%
	Band B: > 260 and ≤ 540	1631.8	992.2	17%	4%
	Band C: > 540 and ≤ 1000	6.7	2.8	0%	0%
Taranaki	Band A: ≤260	2491.6	10833.5	93%	99%
	Band B: > 260 and ≤ 540	183	129.2	7%	1%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6537.9	80%	95%
	Band B: > 260 and ≤ 540	390.2	331.3	20%	5%
	Band C: > 540 and ≤ 1000	2.4	0.2	0%	0%
Canterbury	Band A: ≤260	15786.2	43332.1	89%	98%
	Band B: > 260 and ≤ 540	1908.6	1011	11%	2%
	Band C: > 540 and ≤ 1000	8.3	1.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6590.1	100%	100%
	Band B: > 260 and ≤ 540	12.2		0%	0%
Marlborough	Band A: ≤260	3612.9	11300.5	99%	99%
	Band B: > 260 and ≤ 540	51.9	58.5	1%	1%
Otago	Band A: ≤260	13146.9	27103.5	87%	97%
	Band B: > 260 and ≤ 540	1977.2	978.1	13%	3%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	30773.6	55%	92%
	Band B: > 260 and ≤ 540	3440.9	2610.5	45%	8%
	Band C: > 540 and ≤ 1000	8.5	32.9	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12321.7	98%	100%
	Band B: > 260 and ≤ 540	30.2	46.4	2%	0%
West Coast	Band A: ≤260	183.3	34445.3	98%	100%
	Band B: > 260 and ≤ 540	4.7	2	2%	0%

Scenario 3e

Table G-19: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3e, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1414.3	1891.8	62%	44%
	Band B: > 260 and ≤ 540	813.7	2141.1	36%	50%
	Band C: > 540 and ≤ 1000	57.4	258.3	3%	6%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	14086.8	89%	89%
	Band B: > 260 and ≤ 540	313.3	1742.6	11%	11%
	Band C: > 540 and ≤ 1000		35	0%	0%
Gisborne	Band A: ≤260	2423.3	10062.3	97%	99%
	Band B: > 260 and ≤ 540	68	91.9	3%	1%
Northland	Band A: ≤260	3425.7	7416.9	73%	54%
	Band B: > 260 and ≤ 540	1293.1	6154.7	27%	45%
	Band C: > 540 and ≤ 1000		127.2	0%	1%
Waikato	Band A: ≤260	5574.3	19116	63%	62%
	Band B: > 260 and ≤ 540	3207.2	10055	36%	32%
	Band C: > 540 and ≤ 1000	131	1772.3	1%	6%
	Band D: >1000		77.6	0%	0%
Hawkes Bay	Band A: ≤260	6346.7	16301.7	89%	92%
	Band B: > 260 and ≤ 540	775.4	1329.9	11%	8%
	Band C: > 540 and ≤ 1000		12	0%	0%
Manawatu / Whanganui	Band A: ≤260	8129.5	22671.1	83%	88%
	Band B: > 260 and ≤ 540	1631.8	3036.3	17%	12%
	Band C: > 540 and ≤ 1000	6.7	50.9	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Taranaki	Band A: ≤260	2130.1	8046.5	80%	73%
	Band B: > 260 and ≤ 540	544.5	2867.8	20%	26%
	Band C: > 540 and ≤ 1000		48.4	0%	0%
Wellington	Band A: ≤260	1560.6	5942.8	80%	87%
	Band B: > 260 and ≤ 540	390.2	922.6	20%	13%
	Band C: > 540 and ≤ 1000	2.4	4.1	0%	0%
Canterbury	Band A: ≤260	15786.2	39564.9	89%	89%
	Band B: > 260 and ≤ 540	1908.6	4713.1	11%	11%
	Band C: > 540 and ≤ 1000	8.3	66.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6503.4	100%	99%
	Band B: > 260 and ≤ 540	12.2	86.8	0%	1%
Marlborough	Band A: ≤260	3600	11262.3	98%	99%
	Band B: > 260 and ≤ 540	64.8	95.7	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13146.9	25622	87%	91%
	Band B: > 260 and ≤ 540	1977.2	2439.9	13%	9%
	Band C: > 540 and ≤ 1000	0.2	19.6	0%	0%
Southland	Band A: ≤260	4269.9	25990.5	55%	78%
	Band B: > 260 and ≤ 540	3440.9	6615.1	45%	20%
	Band C: > 540 and ≤ 1000	8.5	811.1	0%	2%
	Band D: >1000		1.8	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Tasman	Band A: ≤260	1739.9	12121	98%	98%
	Band B: > 260 and ≤ 540	30.2	244.2	2%	2%
	Band C: > 540 and ≤ 1000		3	0%	0%
West Coast	Band A: ≤260	183.3	33867.5	98%	98%
	Band B: > 260 and ≤ 540	4.7	578.1	2%	2%
	Band C: > 540 and ≤ 1000		1.7	0%	0%

Table G-20: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3e, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1745.3	3040.7	76%	71%
	Band B: > 260 and ≤ 540	484.4	1110	21%	26%
	Band C: > 540 and ≤ 1000	55.7	140.4	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15390.4	89%	97%
	Band B: > 260 and ≤ 540	313.3	474	11%	3%
Gisborne	Band A: ≤260	2423.3	10119.6	97%	100%
	Band B: > 260 and ≤ 540	68	34.5	3%	0%
Northland	Band A: ≤260	3425.7	11707.1	73%	85%
	Band B: > 260 and ≤ 540	1293.1	1991.2	27%	15%
	Band C: > 540 and ≤ 1000		0.6	0%	0%
Waikato	Band A: ≤260	5718.3	25524.7	64%	82%
	Band B: > 260 and ≤ 540	3067.4	5063.5	34%	16%
	Band C: > 540 and ≤ 1000	126.7	421.6	1%	1%
	Band D: >1000		11.1	0%	0%
Hawkes Bay	Band A: ≤260	5552.7	14571.1	98%	99%
	Band B: > 260 and ≤ 540	100.6	143.8	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	26220.5	78%	91%
	Band B: > 260 and ≤ 540	2461.9	2239.5	22%	8%
	Band C: > 540 and ≤ 1000	7.2	5.3	0%	0%
Taranaki	Band A: ≤260	2488.1	10641.4	93%	97%
	Band B: > 260 and ≤ 540	186.5	321.4	7%	3%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6401.2	80%	93%
	Band B: > 260 and ≤ 540	390.2	467.6	20%	7%
	Band C: > 540 and ≤ 1000	2.4	0.7	0%	0%
Canterbury	Band A: ≤260	15786.2	42692.8	89%	96%
	Band B: > 260 and ≤ 540	1908.6	1648.7	11%	4%
	Band C: > 540 and ≤ 1000	8.3	3.1	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6588.3	100%	100%
	Band B: > 260 and ≤ 540	12.2	1.9	0%	0%
Marlborough	Band A: ≤260	3611.6	11296	99%	99%
	Band B: > 260 and ≤ 540	53.3	63	1%	1%
Otago	Band A: ≤260	13146.9	26645	87%	95%
	Band B: > 260 and ≤ 540	1977.2	1436.6	13%	5%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	28847.3	55%	86%
	Band B: > 260 and ≤ 540	3440.9	4518.5	45%	14%
	Band C: > 540 and ≤ 1000	8.5	51.2	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12312.2	98%	100%
	Band B: > 260 and ≤ 540	30.2	55.9	2%	0%
West Coast	Band A: ≤260	183.3	34440.6	98%	100%
	Band B: > 260 and ≤ 540	4.7	6.7	2%	0%

Table G-21: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3e, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1791.1	3380.4	78%	79%
	Band B: > 260 and ≤ 540	438.5	785.8	19%	18%
	Band C: > 540 and ≤ 1000	55.7	125	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2667.8	15584.5	89%	98%
	Band B: > 260 and ≤ 540	313.3	279.9	11%	2%
Gisborne	Band A: ≤260	2423.3	10128.4	97%	100%
	Band B: > 260 and ≤ 540	68	25.7	3%	0%
Northland	Band A: ≤260	3425.7	12852.2	73%	94%
	Band B: > 260 and ≤ 540	1293.1	846.1	27%	6%
	Band C: > 540 and ≤ 1000		0.6	0%	0%
Waikato	Band A: ≤260	5725.3	27879.6	64%	90%
	Band B: > 260 and ≤ 540	3060.5	2909.4	34%	9%
	Band C: > 540 and ≤ 1000	126.7	230.4	1%	1%
	Band D: >1000		1.5	0%	0%
Hawkes Bay	Band A: ≤260	5553.6	14580.2	98%	99%
	Band B: > 260 and ≤ 540	99.8	134.7	2%	1%
Manawatu / Whanganui	Band A: ≤260	8767.5	26971.6	78%	94%
	Band B: > 260 and ≤ 540	2461.9	1468.3	22%	5%
	Band C: > 540 and ≤ 1000	7.2	2.8	0%	0%
Taranaki	Band A: ≤260	2491.6	10833.5	93%	99%
	Band B: > 260 and ≤ 540	183	129.2	7%	1%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1560.6	6537.9	80%	95%
	Band B: > 260 and ≤ 540	390.2	331.3	20%	5%
	Band C: > 540 and ≤ 1000	2.4	0.2	0%	0%
Canterbury	Band A: ≤260	15786.2	43332.1	89%	98%
	Band B: > 260 and ≤ 540	1908.6	1011	11%	2%
	Band C: > 540 and ≤ 1000	8.3	1.6	0%	0%
Canterbury / Otago	Band A: ≤260	4127.6	6590.1	100%	100%
	Band B: > 260 and ≤ 540	12.2		0%	0%
Marlborough	Band A: ≤260	3612.9	11300.5	99%	99%
	Band B: > 260 and ≤ 540	51.9	58.5	1%	1%
Otago	Band A: ≤260	13146.9	27106.7	87%	97%
	Band B: > 260 and ≤ 540	1977.2	974.8	13%	3%
	Band C: > 540 and ≤ 1000	0.2		0%	0%
Southland	Band A: ≤260	4269.9	30837.7	55%	92%
	Band B: > 260 and ≤ 540	3440.9	2548.8	45%	8%
	Band C: > 540 and ≤ 1000	8.5	30.5	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1739.9	12321.7	98%	100%
	Band B: > 260 and ≤ 540	30.2	46.4	2%	0%
West Coast	Band A: ≤260	183.3	34445.3	98%	100%
	Band B: > 260 and ≤ 540	4.7	2	2%	0%

Scenario 4

Table G-22: Estimated length of streams in each *E. coli* attribute state by region: Scenario 4, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1415.5	1899.3	62%	44%
	Band B: > 260 and ≤ 540	812.5	2133.6	36%	50%
	Band C: > 540 and ≤ 1000	57.4	258.3	3%	6%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2757.1	14164.1	92%	89%
	Band B: > 260 and ≤ 540	224	1667.1	8%	11%
	Band C: > 540 and ≤ 1000		33.1	0%	0%
Gisborne	Band A: ≤260	2431.7	10075.8	98%	99%
	Band B: > 260 and ≤ 540	59.7	78.3	2%	1%
Northland	Band A: ≤260	3917.8	7704.6	83%	56%
	Band B: > 260 and ≤ 540	801	5881.8	17%	43%
	Band C: > 540 and ≤ 1000		112.4	0%	1%
Waikato	Band A: ≤260	6459.4	19528.8	72%	63%
	Band B: > 260 and ≤ 540	2401.1	9839.2	27%	32%
	Band C: > 540 and ≤ 1000	51.9	1585.5	1%	5%
	Band D: >1000		67.4	0%	0%
Hawkes Bay	Band A: ≤260	5526.7	14461.7	98%	98%
	Band B: > 260 and ≤ 540	126.6	253.2	2%	2%
Manawatu / Whanganui	Band A: ≤260	9340.4	24761.9	83%	86%
	Band B: > 260 and ≤ 540	1893.5	3870.3	17%	13%
	Band C: > 540 and ≤ 1000	2.8	54.8	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Taranaki	Band A: ≤260	2194.7	8120.5	82%	74%
	Band B: > 260 and ≤ 540	480	2793.9	18%	25%
	Band C: > 540 and ≤ 1000		48.4	0%	0%
Wellington	Band A: ≤260	1639	6001.1	84%	87%
	Band B: > 260 and ≤ 540	314.2	864.9	16%	13%
	Band C: > 540 and ≤ 1000		3.4	0%	0%
Canterbury	Band A: ≤260	16470.3	40003.2	93%	90%
	Band B: > 260 and ≤ 540	1232.7	4286	7%	10%
	Band C: > 540 and ≤ 1000		55.5	0%	0%
Canterbury / Otago	Band A: ≤260	4139.8	6543.1	100%	99%
	Band B: > 260 and ≤ 540		47.1	0%	1%
Marlborough	Band A: ≤260	3600	11268.1	98%	99%
	Band B: > 260 and ≤ 540	64.8	89.9	2%	1%
	Band C: > 540 and ≤ 1000		1	0%	0%
Otago	Band A: ≤260	13721	25870.1	91%	92%
	Band B: > 260 and ≤ 540	1403.3	2193.5	9%	8%
	Band C: > 540 and ≤ 1000		18	0%	0%
Southland	Band A: ≤260	4944.1	26295.5	64%	79%
	Band B: > 260 and ≤ 540	2769.6	6455.2	36%	19%
	Band C: > 540 and ≤ 1000	5.6	666.1	0%	2%
	Band D: >1000		1.8	0%	0%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Tasman	Band A: ≤260	1746.8	12135.5	99%	98%
	Band B: > 260 and ≤ 540	23.2	230.6	1%	2%
	Band C: > 540 and ≤ 1000		2	0%	0%
West Coast	Band A: ≤260	187.6	33868	100%	98%
	Band B: > 260 and ≤ 540	0.3	577.5	0%	2%
	Band C: > 540 and ≤ 1000		1.7	0%	0%

Table G-23: Estimated length of streams in each *E. coli* attribute state by region: Scenario 4, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1746.7	3052.3	76%	71%
	Band B: > 260 and ≤ 540	482.9	1100.5	21%	26%
	Band C: > 540 and ≤ 1000	55.7	138.4	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2890.8	15541.0	97%	98%
	Band B: > 260 and ≤ 540	90.3	323.4	3%	2%
	Band C: > 540 and ≤ 1000	2440.1	10128.5	98%	100%
Gisborne	Band A: ≤260	51.3	25.6	2%	0%
	Band B: > 260 and ≤ 540	4611.8	13098.0	98%	96%
Northland	Band A: ≤260	107.0	600.8	2%	4%
	Band B: > 260 and ≤ 540		0.1	0%	0%
	Band C: > 540 and ≤ 1000	8486.1	28429.4	95%	92%
Waikato	Band A: ≤260	410.0	2396.9	5%	8%
	Band B: > 260 and ≤ 540	16.4	193.1	0%	1%
	Band C: > 540 and ≤ 1000		1.5	0%	0%
	Band D: >1000	5552.7	14571.7	98%	99%
Hawkes Bay	Band A: ≤260	100.6	143.2	2%	1%
	Band B: > 260 and ≤ 540	10942.7	28001.2	97%	98%
Manawatu / Whanganui	Band A: ≤260	293.6	685.6	3%	2%
	Band B: > 260 and ≤ 540	0.3	0.3	0%	0%
	Band C: > 540 and ≤ 1000	2631.1	10735.5	98%	98%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Taranaki	Band A: ≤260	43.6	227.2	2%	2%
	Band B: > 260 and ≤ 540	1835.6	6614.7	94%	96%
	Band C: > 540 and ≤ 1000	117.6	254.7	6%	4%
Wellington	Band A: ≤260	17113.4	43638.5	97%	98%
	Band B: > 260 and ≤ 540	589.6	705.9	3%	2%
	Band C: > 540 and ≤ 1000		0.3	0%	0%
Canterbury	Band A: ≤260	4139.8	6590.1	100%	100%
	Band B: > 260 and ≤ 540	3611.6	11301.1	99%	99%
	Band C: > 540 and ≤ 1000	53.3	58.0	1%	1%
Canterbury / Otago	Band A: ≤260	15069.9	27874.2	100%	99%
	Band B: > 260 and ≤ 540	54.4	207.4	0%	1%
Marlborough	Band A: ≤260	7508.6	31349.1	97%	94%
	Band B: > 260 and ≤ 540	210.4	2056.3	3%	6%
Otago	Band A: ≤260	0.4	11.7	0%	0%
	Band B: > 260 and ≤ 540		1.5	0%	0%
	Band C: > 540 and ≤ 1000	1751.6	12321.6	99%	100%
Southland	Band A: ≤260	18.5	46.5	1%	0%
	Band B: > 260 and ≤ 540	187.9	34442.0	100%	100%
	Band C: > 540 and ≤ 1000		5.3	0%	0%
	Band D: >1000	1746.7	3052.3	76%	71%
Tasman	Band A: ≤260	482.9	1100.5	21%	26%
	Band B: > 260 and ≤ 540	55.7	138.4	2%	3%
West Coast	Band A: ≤260		0.9	0%	0%
	Band B: > 260 and ≤ 540	2890.8	15541.0	97%	98%

Table G-24: Estimated length of streams in each *E. coli* attribute state by region: Scenario 4, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	1792.6	3389.4	78%	79%
	Band B: > 260 and ≤ 540	437.1	777.2	19%	18%
	Band C: > 540 and ≤ 1000	55.7	124.6	2%	3%
	Band D: >1000		0.9	0%	0%
Bay of Plenty	Band A: ≤260	2895.2	15662.6	97%	99%
	Band B: > 260 and ≤ 540	85.9	201.8	3%	1%
Gisborne	Band A: ≤260	2440.3	10133.7	98%	100%
	Band B: > 260 and ≤ 540	51.1	20.5	2%	0%
Northland	Band A: ≤260	4639.4	13476.7	98%	98%
	Band B: > 260 and ≤ 540	79.4	222.1	2%	2%
	Band C: > 540 and ≤ 1000		0.1	0%	0%
Waikato	Band A: ≤260	8628.1	30187.4	97%	97%
	Band B: > 260 and ≤ 540	270.5	734	3%	2%
	Band C: > 540 and ≤ 1000	13.8	98.7	0%	0%
	Band D: >1000		0.8	0%	0%
Hawkes Bay	Band A: ≤260	5553.6	14580.2	98%	99%
	Band B: > 260 and ≤ 540	99.8	134.7	2%	1%
Manawatu / Whanganui	Band A: ≤260	11039.2	28489.5	98%	99%
	Band B: > 260 and ≤ 540	197.2	197.5	2%	1%
	Band C: > 540 and ≤ 1000	0.3		0%	0%
Taranaki	Band A: ≤260	2638.9	10877.6	99%	99%
	Band B: > 260 and ≤ 540	35.7	85.1	1%	1%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Wellington	Band A: ≤260	1856.1	6689.1	95%	97%
	Band B: > 260 and ≤ 540	97.1	180.4	5%	3%
Canterbury	Band A: ≤260	17193.5	43850.8	97%	99%
	Band B: > 260 and ≤ 540	509.6	493.9	3%	1%
Canterbury / Otago	Band A: ≤260	4139.8	6590.1	100%	100%
Marlborough	Band A: ≤260	3612.9	11301.1	99%	99%
	Band B: > 260 and ≤ 540	51.9	58	1%	1%
Otago	Band A: ≤260	15093	28043.2	100%	100%
	Band B: > 260 and ≤ 540	31.3	38.4	0%	0%
Southland	Band A: ≤260	7613.6	33158.7	99%	99%
	Band B: > 260 and ≤ 540	105.4	249.1	1%	1%
	Band C: > 540 and ≤ 1000	0.4	9.3	0%	0%
	Band D: >1000		1.5	0%	0%
Tasman	Band A: ≤260	1752.5	12333.6	99%	100%
	Band B: > 260 and ≤ 540	17.6	34.5	1%	0%
West Coast	Band A: ≤260	187.9	34445.3	100%	100%
	Band B: > 260 and ≤ 540		2	0%	0%

Appendix H Estimated 95th percentile *E.coli* attribute states by region

Scenario 1

Table H-1: Estimated length of streams in each *E. coli* attribute state by region: Scenario 1, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	103.6	173.1	5%	4%
	Band D: >1000	2124.7	3987.4	93%	93%
Bay of Plenty	Band A: ≤260	1098.5	7325.7	37%	46%
	Band B: > 260 and ≤ 540	386.7	1934.1	13%	12%
	Band C: > 540 and ≤ 1000	391.5	1569.2	13%	10%
	Band D: >1000	1104.3	5035.3	37%	32%
Gisborne	Band A: ≤260	244.2	2419.6	10%	24%
	Band B: > 260 and ≤ 540	229.3	1309.8	9%	13%
	Band C: > 540 and ≤ 1000	583.4	1950.3	23%	19%
	Band D: >1000	1434.4	4474.4	58%	44%
Northland	Band A: ≤260	123.1	542.6	3%	4%
	Band B: > 260 and ≤ 540	100.8	364.0	2%	3%
	Band C: > 540 and ≤ 1000	305.0	775.1	6%	6%
	Band D: >1000	4190.0	12017.2	89%	88%
Waikato	Band A: ≤260	1456.6	8138.0	16%	26%
	Band B: > 260 and ≤ 540	585.3	2216.9	7%	7%
	Band C: > 540 and ≤ 1000	853.9	2570.4	10%	8%
	Band D: >1000	6016.7	18095.6	68%	58%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	890.4	4521.0	16%	31%
	Band B: > 260 and ≤ 540	223.7	1187.3	4%	8%
	Band C: > 540 and ≤ 1000	1376.8	2598.0	24%	18%
	Band D: >1000	3162.5	6408.6	56%	44%
Manawatu / Whanganui	Band A: ≤260	1813.0	8154.3	16%	28%
	Band B: > 260 and ≤ 540	554.1	1647.8	5%	6%
	Band C: > 540 and ≤ 1000	859.0	1971.3	8%	7%
	Band D: >1000	8010.7	16913.6	71%	59%
Taranaki	Band A: ≤260	455.3	1822.1	17%	17%
	Band B: > 260 and ≤ 540	403.0	1236.6	15%	11%
	Band C: > 540 and ≤ 1000	210.4	1051.3	8%	10%
	Band D: >1000	1606.0	6852.7	60%	63%
Wellington	Band A: ≤260	281.4	2557.1	14%	37%
	Band B: > 260 and ≤ 540	153.6	535.0	8%	8%
	Band C: > 540 and ≤ 1000	199.9	711.5	10%	10%
	Band D: >1000	1318.3	3065.8	67%	45%
Canterbury	Band A: ≤260	6789.2	25320.2	38%	57%
	Band B: > 260 and ≤ 540	1276.2	3491.3	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	3381.3	13%	8%
	Band D: >1000	7390.5	12151.8	42%	27%
Canterbury / Otago	Band A: ≤260	2198.3	4108.4	53%	62%
	Band B: > 260 and ≤ 540	381.9	725.8	9%	11%
	Band C: > 540 and ≤ 1000	377.3	541.4	9%	8%
	Band D: >1000	1182.3	1214.5	29%	18%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2146.3	8171.5	59%	72%
	Band B: > 260 and ≤ 540	483.0	1242.5	13%	11%
	Band C: > 540 and ≤ 1000	505.2	976.4	14%	9%
	Band D: >1000	530.4	968.6	14%	9%
Otago	Band A: ≤260	7259.1	17230.7	48%	61%
	Band B: > 260 and ≤ 540	1307.2	2417.4	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	1980.2	9%	7%
	Band D: >1000	5146.9	6453.3	34%	23%
Southland	Band A: ≤260	1829.7	18981.6	24%	57%
	Band B: > 260 and ≤ 540	542.9	2168.9	7%	6%
	Band C: > 540 and ≤ 1000	485.7	1698.6	6%	5%
	Band D: >1000	4861.0	10569.4	63%	32%
Tasman	Band A: ≤260	914.9	9326.1	52%	75%
	Band B: > 260 and ≤ 540	228.7	1138.2	13%	9%
	Band C: > 540 and ≤ 1000	179.9	588.6	10%	5%
	Band D: >1000	446.6	1315.2	25%	11%
West Coast	Band A: ≤260	66.7	25476.9	35%	74%
	Band B: > 260 and ≤ 540	42.1	4038.4	22%	12%
	Band C: > 540 and ≤ 1000	20.5	2597.0	11%	8%
	Band D: >1000	58.6	2335.0	31%	7%

Table H-2: Estimated length of streams in each *E. coli* attribute state by region: Scenario 1, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	103.6	180.6	5%	4%
	Band D: >1000	2124.7	3979.8	93%	93%
Bay of Plenty	Band A: ≤260	1098.5	7652.6	37%	48%
	Band B: > 260 and ≤ 540	386.7	2070.7	13%	13%
	Band C: > 540 and ≤ 1000	391.5	2051.1	13%	13%
	Band D: >1000	1104.3	4090	37%	26%
Gisborne	Band A: ≤260	244.2	2486.5	10%	24%
	Band B: > 260 and ≤ 540	229.3	1427.4	9%	14%
	Band C: > 540 and ≤ 1000	583.8	2294.9	23%	23%
	Band D: >1000	1434.1	3945.4	58%	39%
Northland	Band A: ≤260	123.1	559.5	3%	4%
	Band B: > 260 and ≤ 540	100.8	395.5	2%	3%
	Band C: > 540 and ≤ 1000	305	984.3	6%	7%
	Band D: >1000	4190	11759.6	89%	86%
Waikato	Band A: ≤260	1456.6	8576.6	16%	28%
	Band B: > 260 and ≤ 540	585.3	2503.9	7%	8%
	Band C: > 540 and ≤ 1000	853.9	2811.9	10%	9%
	Band D: >1000	6016.7	17128.6	68%	55%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	890.4	4620.8	16%	31%
	Band B: > 260 and ≤ 540	223.7	1221.5	4%	8%
	Band C: > 540 and ≤ 1000	1376.8	3423.6	24%	23%
	Band D: >1000	3162.5	5449.1	56%	37%
Manawatu / Whanganui	Band A: ≤260	1813.0	8220.9	16%	29%
	Band B: > 260 and ≤ 540	554.1	1753.8	5%	6%
	Band C: > 540 and ≤ 1000	859.0	2195.9	8%	8%
	Band D: >1000	8010.7	16516.4	71%	58%
Taranaki	Band A: ≤260	455.3	1862.8	17%	17%
	Band B: > 260 and ≤ 540	403	1340.9	15%	12%
	Band C: > 540 and ≤ 1000	210.4	1187.5	8%	11%
	Band D: >1000	1606	6571.5	60%	60%
Wellington	Band A: ≤260	281.4	2569.4	14%	37%
	Band B: > 260 and ≤ 540	153.6	580.3	8%	8%
	Band C: > 540 and ≤ 1000	199.9	813.9	10%	12%
	Band D: >1000	1318.3	2905.8	67%	42%
Canterbury	Band A: ≤260	6789.2	25575.1	38%	58%
	Band B: > 260 and ≤ 540	1276.2	3668	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	4365.8	13%	10%
	Band D: >1000	7390.5	10735.8	42%	24%
Canterbury / Otago	Band A: ≤260	2198.3	4198.9	53%	64%
	Band B: > 260 and ≤ 540	381.9	715.9	9%	11%
	Band C: > 540 and ≤ 1000	377.3	570	9%	9%
	Band D: >1000	1182.3	1105.3	29%	17%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2146.3	8209.9	59%	72%
	Band B: > 260 and ≤ 540	483	1305.3	13%	11%
	Band C: > 540 and ≤ 1000	505.2	1088.2	14%	10%
	Band D: >1000	530.4	755.6	14%	7%
Otago	Band A: ≤260	7259.1	17342.5	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2510	9%	9%
	Band C: > 540 and ≤ 1000	1412	2175.1	9%	8%
	Band D: >1000	5146.1	6054	34%	22%
Southland	Band A: ≤260	1829.7	19068.4	24%	57%
	Band B: > 260 and ≤ 540	542.9	2229.1	7%	7%
	Band C: > 540 and ≤ 1000	486.3	1760.6	6%	5%
	Band D: >1000	4860.4	10360.4	63%	31%
Tasman	Band A: ≤260	914.9	9476.1	52%	77%
	Band B: > 260 and ≤ 540	228.7	1092.6	13%	9%
	Band C: > 540 and ≤ 1000	179.9	619.7	10%	5%
	Band D: >1000	446.6	1179.8	25%	10%
West Coast	Band A: ≤260	66.7	25749.9	35%	75%
	Band B: > 260 and ≤ 540	42.1	4540	22%	13%
	Band C: > 540 and ≤ 1000	20.5	2681	11%	8%
	Band D: >1000	58.6	1476.3	31%	4%

Table H-3: Estimated length of streams in each *E. coli* attribute state by region: Scenario 1, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	48.1	2%	1%
	Band C: > 540 and ≤ 1000	103.6	248.7	5%	6%
	Band D: >1000	2124.7	3910.5	93%	91%
Bay of Plenty	Band A: ≤260	1098.5	7983.9	37%	50%
	Band B: > 260 and ≤ 540	386.7	2277.4	13%	14%
	Band C: > 540 and ≤ 1000	391.5	2545.6	13%	16%
	Band D: >1000	1104.3	3057.5	37%	19%
Gisborne	Band A: ≤260	244.2	2537.3	10%	25%
	Band B: > 260 and ≤ 540	229.3	1504.1	9%	15%
	Band C: > 540 and ≤ 1000	583.4	2644.9	23%	26%
	Band D: >1000	1434.4	3467.8	58%	34%
Northland	Band A: ≤260	123.1	579.6	3%	4%
	Band B: > 260 and ≤ 540	100.8	528.7	2%	4%
	Band C: > 540 and ≤ 1000	305	1503.1	6%	11%
	Band D: >1000	4190	11087.5	89%	81%
Waikato	Band A: ≤260	1456.6	8982.4	16%	29%
	Band B: > 260 and ≤ 540	585.3	2769.6	7%	9%
	Band C: > 540 and ≤ 1000	853.9	3709.9	10%	12%
	Band D: >1000	6016.7	15558.9	68%	50%
Hawkes Bay	Band A: ≤260	890.4	4660.0	16%	32%
	Band B: > 260 and ≤ 540	223.7	1346.5	4%	9%
	Band C: > 540 and ≤ 1000	1376.8	3717.8	24%	25%
	Band D: >1000	3162.5	4990.6	56%	34%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Manawatu / Whanganui	Band A: ≤260	1813.0	8260.6	16%	29%
	Band B: > 260 and ≤ 540	554.1	1854.3	5%	6%
	Band C: > 540 and ≤ 1000	859.0	2413.2	8%	8%
	Band D: >1000	8010.7	16159.0	71%	56%
Taranaki	Band A: ≤260	455.3	1954.9	17%	18%
	Band B: > 260 and ≤ 540	403	1455.5	15%	13%
	Band C: > 540 and ≤ 1000	210.4	1656.2	8%	15%
	Band D: >1000	1606	5896.1	60%	54%
Wellington	Band A: ≤260	281.4	2584.1	14%	38%
	Band B: > 260 and ≤ 540	153.6	600	8%	9%
	Band C: > 540 and ≤ 1000	199.9	925.3	10%	13%
	Band D: >1000	1318.3	2760.1	67%	40%
Canterbury	Band A: ≤260	6789.2	25749.9	38%	58%
	Band B: > 260 and ≤ 540	1276.2	3818.8	7%	9%
	Band C: > 540 and ≤ 1000	2247.2	6239.2	13%	14%
	Band D: >1000	7390.5	8536.7	42%	19%
Canterbury / Otago	Band A: ≤260	2198.3	4235.8	53%	64%
	Band B: > 260 and ≤ 540	381.9	735.4	9%	11%
	Band C: > 540 and ≤ 1000	377.3	654.8	9%	10%
	Band D: >1000	1182.3	964.1	29%	15%
Marlborough	Band A: ≤260	2146.3	8255.2	59%	73%
	Band B: > 260 and ≤ 540	483	1316.4	13%	12%
	Band C: > 540 and ≤ 1000	505.2	1144.7	14%	10%
	Band D: >1000	530.4	642.7	14%	6%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Otago	Band A: ≤260	7259.1	17432.1	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2571.9	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2283.6	9%	8%
	Band D: >1000	5146.9	5794	34%	21%
Southland	Band A: ≤260	1829.7	19120.5	24%	57%
	Band B: > 260 and ≤ 540	542.9	2273.2	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1824.4	6%	5%
	Band D: >1000	4861	10200.4	63%	31%
Tasman	Band A: ≤260	914.9	9592.7	52%	78%
	Band B: > 260 and ≤ 540	228.7	1063.6	13%	9%
	Band C: > 540 and ≤ 1000	179.9	676.9	10%	5%
	Band D: >1000	446.6	1035	25%	8%
West Coast	Band A: ≤260	66.7	26192.6	35%	76%
	Band B: > 260 and ≤ 540	42.1	4917.2	22%	14%
	Band C: > 540 and ≤ 1000	20.5	2306.3	11%	7%
	Band D: >1000	58.6	1031.2	31%	3%

Scenario 2

Table H-4: Estimated length of streams in each *E. coli* attribute state by region: Scenario 2, low LRF.
Regions affected by Scenario 2 are shaded.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	104.1	174.3	5%	4%
	Band D: >1000	2124.1	3986.2	93%	93%
Bay of Plenty	Band A: ≤260	1098.5	7325.7	37%	46%
	Band B: > 260 and ≤ 540	386.7	1934.1	13%	12%
	Band C: > 540 and ≤ 1000	391.5	1569.2	13%	10%
	Band D: >1000	1104.3	5035.3	37%	32%
Gisborne	Band A: ≤260	244.2	2419.6	10%	24%
	Band B: > 260 and ≤ 540	229.3	1310.1	9%	13%
	Band C: > 540 and ≤ 1000	583.4	1950	23%	19%
	Band D: >1000	1434.4	4474.4	58%	44%
Northland	Band A: ≤260	123.1	542.6	3%	4%
	Band B: > 260 and ≤ 540	100.8	364	2%	3%
	Band C: > 540 and ≤ 1000	305	775.1	6%	6%
	Band D: >1000	4190	12017.2	89%	88%
Waikato	Band A: ≤260	1464	8154.7	16%	26%
	Band B: > 260 and ≤ 540	592.7	2256.4	7%	7%
	Band C: > 540 and ≤ 1000	882.3	2625.5	10%	8%
	Band D: >1000	5973.5	17984.3	67%	58%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	896.4	4564.5	16%	31%
	Band B: > 260 and ≤ 540	251.9	1218.5	4%	8%
	Band C: > 540 and ≤ 1000	1827.5	3188.2	32%	22%
	Band D: >1000	2677.5	5743.8	47%	39%
Manawatu / Whanganui	Band A: ≤260	1813.0	8154.3	16%	28%
	Band B: > 260 and ≤ 540	554.1	1647.8	5%	6%
	Band C: > 540 and ≤ 1000	859.0	1971.3	8%	7%
	Band D: >1000	8010.7	16913.6	71%	59%
Taranaki	Band A: ≤260	455.3	1822.1	17%	17%
	Band B: > 260 and ≤ 540	403	1247.1	15%	11%
	Band C: > 540 and ≤ 1000	210.4	1056.8	8%	10%
	Band D: >1000	1606	6836.6	60%	62%
Wellington	Band A: ≤260	281.4	2568	14%	37%
	Band B: > 260 and ≤ 540	153.6	543.5	8%	8%
	Band C: > 540 and ≤ 1000	199.9	738.7	10%	11%
	Band D: >1000	1318.3	3019.3	67%	44%
Canterbury	Band A: ≤260	6789.2	25362.1	38%	57%
	Band B: > 260 and ≤ 540	1276.2	3525.1	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	3492.1	13%	8%
	Band D: >1000	7390.5	11965.4	42%	27%
Canterbury / Otago	Band A: ≤260	2198.3	4124.8	53%	63%
	Band B: > 260 and ≤ 540	381.9	721	9%	11%
	Band C: > 540 and ≤ 1000	377.3	544.2	9%	8%
	Band D: >1000	1182.3	1200.2	29%	18%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2149.3	8177.8	59%	72%
	Band B: > 260 and ≤ 540	491.6	1249.2	13%	11%
	Band C: > 540 and ≤ 1000	578	1065.2	16%	9%
	Band D: >1000	445.9	866.8	12%	8%
Otago	Band A: ≤260	7259.1	17230.9	48%	61%
	Band B: > 260 and ≤ 540	1307.2	2419.1	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	1978.3	9%	7%
	Band D: >1000	5146.9	6453.3	34%	23%
Southland	Band A: ≤260	1829.7	18981.6	24%	57%
	Band B: > 260 and ≤ 540	542.9	2168.9	7%	6%
	Band C: > 540 and ≤ 1000	485.7	1698.6	6%	5%
	Band D: >1000	4861	10569.4	63%	32%
Tasman	Band A: ≤260	914.9	9326.1	52%	75%
	Band B: > 260 and ≤ 540	228.7	1138.2	13%	9%
	Band C: > 540 and ≤ 1000	179.9	588.6	10%	5%
	Band D: >1000	446.6	1315.2	25%	11%
West Coast	Band A: ≤260	66.7	25476.9	35%	74%
	Band B: > 260 and ≤ 540	42.1	4038.4	22%	12%
	Band C: > 540 and ≤ 1000	20.5	2597	11%	8%
	Band D: >1000	58.6	2335	31%	7%

Table H-5: Estimated length of streams in each *E. coli* attribute state by region: Scenario 2, most likely LRF.
Regions affected by Scenario 2 are shaded.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	42.8	48.6	2%	1%
	Band C: > 540 and ≤ 1000	287.8	262.8	13%	6%
	Band D: >1000	1939.3	3895.9	85%	91%
Bay of Plenty	Band A: ≤260	1098.5	7652.6	37%	48%
	Band B: > 260 and ≤ 540	386.7	2070.7	13%	13%
	Band C: > 540 and ≤ 1000	391.5	2051.1	13%	13%
	Band D: >1000	1104.3	4090	37%	26%
Gisborne	Band A: ≤260	244.2	2486.5	10%	24%
	Band B: > 260 and ≤ 540	229.3	1427.4	9%	14%
	Band C: > 540 and ≤ 1000	583.8	2296.7	23%	23%
	Band D: >1000	1434.1	3943.6	58%	39%
Northland	Band A: ≤260	123.1	559.5	3%	4%
	Band B: > 260 and ≤ 540	100.8	395.5	2%	3%
	Band C: > 540 and ≤ 1000	305	984.3	6%	7%
	Band D: >1000	4190	11759.6	89%	86%
Waikato	Band A: ≤260	1504.4	8741.6	17%	28%
	Band B: > 260 and ≤ 540	740.1	2767.5	8%	9%
	Band C: > 540 and ≤ 1000	919.9	2879.6	10%	9%
	Band D: >1000	5748.1	16632.3	64%	54%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	929.5	4887.0	16%	33%
	Band B: > 260 and ≤ 540	1105.7	2173.3	20%	15%
	Band C: > 540 and ≤ 1000	2533.5	4684.3	45%	32%
	Band D: >1000	1084.7	2970.3	19%	20%
Manawatu / Whanganui	Band A: ≤260	1813.0	8220.9	16%	29%
	Band B: > 260 and ≤ 540	554.1	1753.8	5%	6%
	Band C: > 540 and ≤ 1000	859.0	2195.9	8%	8%
	Band D: >1000	8010.7	16516.4	71%	58%
Taranaki	Band A: ≤260	458.4	1881.6	17%	17%
	Band B: > 260 and ≤ 540	404.2	1366.5	15%	12%
	Band C: > 540 and ≤ 1000	238.4	1204.4	9%	11%
	Band D: >1000	1573.6	6510.2	59%	59%
Wellington	Band A: ≤260	281.4	2608.4	14%	38%
	Band B: > 260 and ≤ 540	153.6	646.6	8%	9%
	Band C: > 540 and ≤ 1000	199.9	1041.4	10%	15%
	Band D: >1000	1318.3	2573	67%	37%
Canterbury	Band A: ≤260	6789.2	25901.4	38%	58%
	Band B: > 260 and ≤ 540	1276.2	3734.4	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	6053.5	13%	14%
	Band D: >1000	7390.5	8655.4	42%	20%
Canterbury / Otago	Band A: ≤260	2198.3	4250.7	53%	65%
	Band B: > 260 and ≤ 540	381.9	746.2	9%	11%
	Band C: > 540 and ≤ 1000	377.3	630	9%	10%
	Band D: >1000	1182.3	963.2	29%	15%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2167.9	8266.5	59%	73%
	Band B: > 260 and ≤ 540	618.6	1379	17%	12%
	Band C: > 540 and ≤ 1000	623.3	1267.7	17%	11%
	Band D: >1000	255.1	445.7	7%	4%
Otago	Band A: ≤260	7259.1	17346	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2516.1	9%	9%
	Band C: > 540 and ≤ 1000	1412	2168.6	9%	8%
	Band D: >1000	5146.1	6050.8	34%	22%
Southland	Band A: ≤260	1829.7	19068.4	24%	57%
	Band B: > 260 and ≤ 540	542.9	2229.1	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1760.6	6%	5%
	Band D: >1000	4861	10360.4	63%	31%
Tasman	Band A: ≤260	914.9	9476.1	52%	77%
	Band B: > 260 and ≤ 540	228.7	1092.6	13%	9%
	Band C: > 540 and ≤ 1000	179.9	619.7	10%	5%
	Band D: >1000	446.6	1179.8	25%	10%
West Coast	Band A: ≤260	66.7	25749.9	35%	75%
	Band B: > 260 and ≤ 540	42.1	4540	22%	13%
	Band C: > 540 and ≤ 1000	20.5	2681	11%	8%
	Band D: >1000	58.6	1476.3	31%	4%

Table H-6: Estimated length of streams in each *E. coli* attribute state by region: Scenario 2, high LRF.
Regions affected by Scenario 2 are shaded.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	16.1	85.9	1%	2%
	Band B: > 260 and ≤ 540	214.2	108.9	9%	3%
	Band C: > 540 and ≤ 1000	638.6	980.8	28%	23%
	Band D: >1000	1416.5	3116.5	62%	73%
Bay of Plenty	Band A: ≤260	1098.5	7983.9	37%	50%
	Band B: > 260 and ≤ 540	386.7	2277.4	13%	14%
	Band C: > 540 and ≤ 1000	391.5	2545.6	13%	16%
	Band D: >1000	1104.3	3057.5	37%	19%
Gisborne	Band A: ≤260	244.2	2537.3	10%	25%
	Band B: > 260 and ≤ 540	229.3	1504.1	9%	15%
	Band C: > 540 and ≤ 1000	583.8	2646.6	23%	26%
	Band D: >1000	1434.1	3466.1	58%	34%
Northland	Band A: ≤260	123.1	579.6	3%	4%
	Band B: > 260 and ≤ 540	100.8	528.7	2%	4%
	Band C: > 540 and ≤ 1000	305	1503.1	6%	11%
	Band D: >1000	4190	11087.5	89%	81%
Waikato	Band A: ≤260	1626	9466.3	18%	31%
	Band B: > 260 and ≤ 540	832	3109.9	9%	10%
	Band C: > 540 and ≤ 1000	991.7	3869	11%	12%
	Band D: >1000	5462.8	14575.7	61%	47%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	1107.8	5271.4	20%	36%
	Band B: > 260 and ≤ 540	2281.0	4181.0	40%	28%
	Band C: > 540 and ≤ 1000	1571.4	3527.7	28%	24%
	Band D: >1000	693.1	1734.8	12%	12%
Manawatu / Whanganui	Band A: ≤260	1813.0	8260.6	16%	29%
	Band B: > 260 and ≤ 540	554.1	1854.3	5%	6%
	Band C: > 540 and ≤ 1000	859.0	2413.2	8%	8%
	Band D: >1000	8010.7	16159.0	71%	56%
Taranaki	Band A: ≤260	460	2034.4	17%	19%
	Band B: > 260 and ≤ 540	714.9	1698.7	27%	15%
	Band C: > 540 and ≤ 1000	543.1	2938.9	20%	27%
	Band D: >1000	956.6	4290.7	36%	39%
Wellington	Band A: ≤260	281.4	2649	14%	39%
	Band B: > 260 and ≤ 540	153.6	798.7	8%	12%
	Band C: > 540 and ≤ 1000	199.9	1290.2	10%	19%
	Band D: >1000	1318.3	2131.5	67%	31%
Canterbury	Band A: ≤260	6789.2	26311.4	38%	59%
	Band B: > 260 and ≤ 540	1276.2	4603.5	7%	10%
	Band C: > 540 and ≤ 1000	2247.2	7830.9	13%	18%
	Band D: >1000	7390.5	5598.8	42%	13%
Canterbury / Otago	Band A: ≤260	2198.3	4311.8	53%	65%
	Band B: > 260 and ≤ 540	381.9	788	9%	12%
	Band C: > 540 and ≤ 1000	377.3	737.2	9%	11%
	Band D: >1000	1182.3	753.1	29%	11%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2219.1	8357.9	61%	74%
	Band B: > 260 and ≤ 540	768.6	1560.7	21%	14%
	Band C: > 540 and ≤ 1000	436.2	1087.4	12%	10%
	Band D: >1000	240.9	352.9	7%	3%
Otago	Band A: ≤260	7259.1	17433.9	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2572.2	9%	9%
	Band C: > 540 and ≤ 1000	1412	2284.3	9%	8%
	Band D: >1000	5146.1	5791.2	34%	21%
Southland	Band A: ≤260	1829.7	19120.5	24%	57%
	Band B: > 260 and ≤ 540	542.9	2273.2	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1824.4	6%	5%
	Band D: >1000	4861	10200.4	63%	31%
Tasman	Band A: ≤260	914.9	9592.7	52%	78%
	Band B: > 260 and ≤ 540	228.7	1063.6	13%	9%
	Band C: > 540 and ≤ 1000	179.9	676.9	10%	5%
	Band D: >1000	446.6	1035	25%	8%
West Coast	Band A: ≤260	66.7	26192.6	35%	76%
	Band B: > 260 and ≤ 540	42.1	4917.2	22%	14%
	Band C: > 540 and ≤ 1000	20.5	2306.3	11%	7%
	Band D: >1000	58.6	1031.2	31%	3%

Scenario 3a

Table H-7: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3a, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	104.1	174.3	5%	4%
	Band D: >1000	2124.1	3986.2	93%	93%
Bay of Plenty	Band A: ≤260	1098.5	7326.4	37%	46%
	Band B: > 260 and ≤ 540	386.7	1933.5	13%	12%
	Band C: > 540 and ≤ 1000	391.5	1574.9	13%	10%
	Band D: >1000	1104.3	5029.6	37%	32%
Gisborne	Band A: ≤260	244.2	2419.6	10%	24%
	Band B: > 260 and ≤ 540	229.3	1310.1	9%	13%
	Band C: > 540 and ≤ 1000	583.4	1950	23%	19%
	Band D: >1000	1434.4	4474.4	58%	44%
Northland	Band A: ≤260	123.1	542.6	3%	4%
	Band B: > 260 and ≤ 540	100.8	364	2%	3%
	Band C: > 540 and ≤ 1000	305	775.9	6%	6%
	Band D: >1000	4190	12016.4	89%	88%
Waikato	Band A: ≤260	1464	8155.1	16%	26%
	Band B: > 260 and ≤ 540	592.7	2258	7%	7%
	Band C: > 540 and ≤ 1000	882.3	2628.1	10%	8%
	Band D: >1000	5973.5	17979.7	67%	58%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	896.4	4564.5	16%	31%
	Band B: > 260 and ≤ 540	251.9	1218.5	4%	8%
	Band C: > 540 and ≤ 1000	1827.5	3188.2	32%	22%
	Band D: >1000	2677.5	5743.8	47%	39%
Manawatu / Whanganui	Band A: ≤260	1813.0	8155.0	16%	28%
	Band B: > 260 and ≤ 540	554.1	1647.1	5%	6%
	Band C: > 540 and ≤ 1000	859.0	1972.3	8%	7%
	Band D: >1000	8010.7	16912.6	71%	59%
Taranaki	Band A: ≤260	455.3	1822.1	17%	17%
	Band B: > 260 and ≤ 540	403	1247.1	15%	11%
	Band C: > 540 and ≤ 1000	210.4	1056.8	8%	10%
	Band D: >1000	1606	6836.6	60%	62%
Wellington	Band A: ≤260	281.4	2568	14%	37%
	Band B: > 260 and ≤ 540	153.6	543.5	8%	8%
	Band C: > 540 and ≤ 1000	199.9	738.7	10%	11%
	Band D: >1000	1318.3	3019.3	67%	44%
Canterbury	Band A: ≤260	6789.2	25362.1	38%	57%
	Band B: > 260 and ≤ 540	1276.2	3525.1	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	3492.1	13%	8%
	Band D: >1000	7390.5	11965.4	42%	27%
Canterbury / Otago	Band A: ≤260	2198.3	4124.8	53%	63%
	Band B: > 260 and ≤ 540	381.9	721	9%	11%
	Band C: > 540 and ≤ 1000	377.3	544.2	9%	8%
	Band D: >1000	1182.3	1200.2	29%	18%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2149.3	8177.8	59%	72%
	Band B: > 260 and ≤ 540	491.6	1249.2	13%	11%
	Band C: > 540 and ≤ 1000	578	1065.2	16%	9%
	Band D: >1000	445.9	866.8	12%	8%
Otago	Band A: ≤260	7259.1	17230.9	48%	61%
	Band B: > 260 and ≤ 540	1307.2	2419.5	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	1977.9	9%	7%
	Band D: >1000	5146.9	6453.3	34%	23%
Southland	Band A: ≤260	1829.7	18981.6	24%	57%
	Band B: > 260 and ≤ 540	542.9	2168.9	7%	6%
	Band C: > 540 and ≤ 1000	485.7	1699.7	6%	5%
	Band D: >1000	4861	10568.4	63%	32%
Tasman	Band A: ≤260	914.9	9329	52%	75%
	Band B: > 260 and ≤ 540	228.7	1135.4	13%	9%
	Band C: > 540 and ≤ 1000	179.9	590	10%	5%
	Band D: >1000	446.6	1313.8	25%	11%
West Coast	Band A: ≤260	66.7	25480.2	35%	74%
	Band B: > 260 and ≤ 540	42.1	4043	22%	12%
	Band C: > 540 and ≤ 1000	20.5	2593.1	11%	8%
	Band D: >1000	58.6	2331	31%	7%

Table H-8: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3a, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	42.8	48.6	2%	1%
	Band C: > 540 and ≤ 1000	287.8	262.8	13%	6%
	Band D: >1000	1939.3	3895.9	85%	91%
Bay of Plenty	Band A: ≤260	1098.5	7663.3	37%	48%
	Band B: > 260 and ≤ 540	386.7	2079.1	13%	13%
	Band C: > 540 and ≤ 1000	391.5	2092.5	13%	13%
	Band D: >1000	1104.3	4029.5	37%	25%
Gisborne	Band A: ≤260	244.2	2486.5	10%	24%
	Band B: > 260 and ≤ 540	229.3	1427.4	9%	14%
	Band C: > 540 and ≤ 1000	583.4	2296.7	23%	23%
	Band D: >1000	1434.4	3943.6	58%	39%
Northland	Band A: ≤260	123.1	559.5	3%	4%
	Band B: > 260 and ≤ 540	100.8	398.8	2%	3%
	Band C: > 540 and ≤ 1000	305	989.9	6%	7%
	Band D: >1000	4190	11750.7	89%	86%
Waikato	Band A: ≤260	1504.4	8754.7	17%	28%
	Band B: > 260 and ≤ 540	740.1	2773.9	8%	9%
	Band C: > 540 and ≤ 1000	919.9	2890.6	10%	9%
	Band D: >1000	5748.1	16601.6	64%	54%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	929.5	4887.0	16%	33%
	Band B: > 260 and ≤ 540	1105.7	2173.3	20%	15%
	Band C: > 540 and ≤ 1000	2533.5	4684.3	45%	32%
	Band D: >1000	1084.7	2970.3	19%	20%
Manawatu / Whanganui	Band A: ≤260	1813.0	8220.9	16%	29%
	Band B: > 260 and ≤ 540	554.1	1758.7	5%	6%
	Band C: > 540 and ≤ 1000	859.0	2215.8	8%	8%
	Band D: >1000	8010.7	16491.6	71%	57%
Taranaki	Band A: ≤260	458.4	1881.6	17%	17%
	Band B: > 260 and ≤ 540	404.2	1369.6	15%	12%
	Band C: > 540 and ≤ 1000	238.4	1203.9	9%	11%
	Band D: >1000	1573.6	6507.6	59%	59%
Wellington	Band A: ≤260	281.4	2608.4	14%	38%
	Band B: > 260 and ≤ 540	153.6	646.6	8%	9%
	Band C: > 540 and ≤ 1000	199.9	1041.4	10%	15%
	Band D: >1000	1318.3	2573	67%	37%
Canterbury	Band A: ≤260	6789.2	25901.4	38%	58%
	Band B: > 260 and ≤ 540	1276.2	3734.4	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	6053.5	13%	14%
	Band D: >1000	7390.5	8655.4	42%	20%
Canterbury / Otago	Band A: ≤260	2198.3	4250.7	53%	65%
	Band B: > 260 and ≤ 540	381.9	746.2	9%	11%
	Band C: > 540 and ≤ 1000	377.3	630	9%	10%
	Band D: >1000	1182.3	963.2	29%	15%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2167.9	8266.5	59%	73%
	Band B: > 260 and ≤ 540	618.6	1379	17%	12%
	Band C: > 540 and ≤ 1000	623.3	1267.7	17%	11%
	Band D: >1000	255.1	445.7	7%	4%
Otago	Band A: ≤260	7259.1	17346.3	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2516.6	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2172.9	9%	8%
	Band D: >1000	5146.9	6045.8	34%	22%
Southland	Band A: ≤260	1829.7	19068.4	24%	57%
	Band B: > 260 and ≤ 540	542.9	2232.2	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1768.2	6%	5%
	Band D: >1000	4861	10349.7	63%	31%
Tasman	Band A: ≤260	914.9	9486.5	52%	77%
	Band B: > 260 and ≤ 540	228.7	1085.9	13%	9%
	Band C: > 540 and ≤ 1000	179.9	626.2	10%	5%
	Band D: >1000	446.6	1169.6	25%	9%
West Coast	Band A: ≤260	66.7	25803.1	35%	75%
	Band B: > 260 and ≤ 540	42.1	4580.6	22%	13%
	Band C: > 540 and ≤ 1000	20.5	2641.2	11%	8%
	Band D: >1000	58.6	1422.5	31%	4%

Table H-9: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3a, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	16.1	85.9	1%	2%
	Band B: > 260 and ≤ 540	214.2	108.9	9%	3%
	Band C: > 540 and ≤ 1000	638.6	980.8	28%	23%
	Band D: >1000	1416.5	3116.5	62%	73%
Bay of Plenty	Band A: ≤260	1098.5	8039.7	37%	51%
	Band B: > 260 and ≤ 540	386.7	2307.6	13%	15%
	Band C: > 540 and ≤ 1000	391.5	2528.6	13%	16%
	Band D: >1000	1104.3	2988.4	37%	19%
Gisborne	Band A: ≤260	244.2	2537.3	10%	25%
	Band B: > 260 and ≤ 540	229.3	1504.1	9%	15%
	Band C: > 540 and ≤ 1000	583.4	2646.9	23%	26%
	Band D: >1000	1434.4	3465.9	58%	34%
Northland	Band A: ≤260	123.1	585	3%	4%
	Band B: > 260 and ≤ 540	100.8	569.2	2%	4%
	Band C: > 540 and ≤ 1000	305	1559.8	6%	11%
	Band D: >1000	4190	10984.8	89%	80%
Waikato	Band A: ≤260	1626	9504.2	18%	31%
	Band B: > 260 and ≤ 540	832	3128.5	9%	10%
	Band C: > 540 and ≤ 1000	991.7	4132.7	11%	13%
	Band D: >1000	5462.8	14255.5	61%	46%
Hawkes Bay	Band A: ≤260	1107.8	5271.4	20%	36%
	Band B: > 260 and ≤ 540	2281.0	4181.0	40%	28%
	Band C: > 540 and ≤ 1000	1571.4	3528.0	28%	24%
	Band D: >1000	693.1	1734.6	12%	12%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Manawatu / Whanganui	Band A: ≤260	1813.0	8264.4	16%	29%
	Band B: > 260 and ≤ 540	554.1	1870.1	5%	7%
	Band C: > 540 and ≤ 1000	859.0	2541.4	8%	9%
	Band D: >1000	8010.7	16011.0	71%	56%
Taranaki	Band A: ≤260	460	2036.3	17%	19%
	Band B: > 260 and ≤ 540	714.9	1707.7	27%	16%
	Band C: > 540 and ≤ 1000	543.1	3021.2	20%	28%
	Band D: >1000	956.6	4197.5	36%	38%
Wellington	Band A: ≤260	281.4	2649	14%	39%
	Band B: > 260 and ≤ 540	153.6	798.7	8%	12%
	Band C: > 540 and ≤ 1000	199.9	1290.2	10%	19%
	Band D: >1000	1318.3	2131.5	67%	31%
Canterbury	Band A: ≤260	6789.2	26311.4	38%	59%
	Band B: > 260 and ≤ 540	1276.2	4603.5	7%	10%
	Band C: > 540 and ≤ 1000	2247.2	7830.9	13%	18%
	Band D: >1000	7390.5	5598.8	42%	13%
Canterbury / Otago	Band A: ≤260	2198.3	4311.8	53%	65%
	Band B: > 260 and ≤ 540	381.9	788	9%	12%
	Band C: > 540 and ≤ 1000	377.3	737.2	9%	11%
	Band D: >1000	1182.3	753.1	29%	11%
Marlborough	Band A: ≤260	2219.1	8357.9	61%	74%
	Band B: > 260 and ≤ 540	768.6	1560.7	21%	14%
	Band C: > 540 and ≤ 1000	436.2	1087.4	12%	10%
	Band D: >1000	240.9	352.9	7%	3%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Otago	Band A: ≤260	7259.1	17434.9	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2576.7	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2286.5	9%	8%
	Band D: >1000	5146.9	5783.4	34%	21%
Southland	Band A: ≤260	1829.7	19125.4	24%	57%
	Band B: > 260 and ≤ 540	542.9	2282.1	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1837.6	6%	5%
	Band D: >1000	4861	10173.4	63%	30%
Tasman	Band A: ≤260	914.9	9611.4	52%	78%
	Band B: > 260 and ≤ 540	228.7	1076.2	13%	9%
	Band C: > 540 and ≤ 1000	179.9	689.9	10%	6%
	Band D: >1000	446.6	990.7	25%	8%
West Coast	Band A: ≤260	66.7	26402.4	35%	77%
	Band B: > 260 and ≤ 540	42.1	4860.4	22%	14%
	Band C: > 540 and ≤ 1000	20.5	2231.3	11%	6%
	Band D: >1000	58.6	953.2	31%	3%

Scenario 3b

Table H-10: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3b, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	104.1	174.3	5%	4%
	Band D: >1000	2124.1	3986.2	93%	93%
Bay of Plenty	Band A: ≤260	1098.5	7326.4	37%	46%
	Band B: > 260 and ≤ 540	386.7	1933.5	13%	12%
	Band C: > 540 and ≤ 1000	391.5	1574.9	13%	10%
	Band D: >1000	1104.3	5029.6	37%	32%
Gisborne	Band A: ≤260	244.2	2419.6	10%	24%
	Band B: > 260 and ≤ 540	229.3	1310.1	9%	13%
	Band C: > 540 and ≤ 1000	583.4	1950	23%	19%
	Band D: >1000	1434.4	4474.4	58%	44%
Northland	Band A: ≤260	123.1	542.6	3%	4%
	Band B: > 260 and ≤ 540	100.8	364	2%	3%
	Band C: > 540 and ≤ 1000	305	775.9	6%	6%
	Band D: >1000	4190	12016.4	89%	88%
Waikato	Band A: ≤260	1464	8155.1	16%	26%
	Band B: > 260 and ≤ 540	592.7	2258.6	7%	7%
	Band C: > 540 and ≤ 1000	882.3	2627.6	10%	8%
	Band D: >1000	5973.5	17979.7	67%	58%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	896.4	4564.5	16%	31%
	Band B: > 260 and ≤ 540	251.9	1218.5	4%	8%
	Band C: > 540 and ≤ 1000	1827.5	3188.2	32%	22%
	Band D: >1000	2677.5	5743.8	47%	39%
Manawatu / Whanganui	Band A: ≤260	1813.0	8155.0	16%	28%
	Band B: > 260 and ≤ 540	554.1	1647.1	5%	6%
	Band C: > 540 and ≤ 1000	859.0	1972.3	8%	7%
	Band D: >1000	8010.7	16912.6	71%	59%
Taranaki	Band A: ≤260	455.3	1822.1	17%	17%
	Band B: > 260 and ≤ 540	403	1247.1	15%	11%
	Band C: > 540 and ≤ 1000	210.4	1056.8	8%	10%
	Band D: >1000	1606	6836.6	60%	62%
Wellington	Band A: ≤260	281.4	2568	14%	37%
	Band B: > 260 and ≤ 540	153.6	543.5	8%	8%
	Band C: > 540 and ≤ 1000	199.9	738.7	10%	11%
	Band D: >1000	1318.3	3019.3	67%	44%
Canterbury	Band A: ≤260	6789.2	25362.1	38%	57%
	Band B: > 260 and ≤ 540	1276.2	3525.1	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	3492.1	13%	8%
	Band D: >1000	7390.5	11965.4	42%	27%
Canterbury / Otago	Band A: ≤260	2198.3	4124.8	53%	63%
	Band B: > 260 and ≤ 540	381.9	721	9%	11%
	Band C: > 540 and ≤ 1000	377.3	544.2	9%	8%
	Band D: >1000	1182.3	1200.2	29%	18%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2149.3	8177.8	59%	72%
	Band B: > 260 and ≤ 540	491.6	1249.2	13%	11%
	Band C: > 540 and ≤ 1000	578	1065.2	16%	9%
	Band D: >1000	445.9	866.8	12%	8%
Otago	Band A: ≤260	7259.1	17230.9	48%	61%
	Band B: > 260 and ≤ 540	1307.2	2419.5	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	1977.9	9%	7%
	Band D: >1000	5146.9	6453.3	34%	23%
Southland	Band A: ≤260	1829.7	18981.6	24%	57%
	Band B: > 260 and ≤ 540	542.9	2168.9	7%	6%
	Band C: > 540 and ≤ 1000	485.7	1699.7	6%	5%
	Band D: >1000	4861	10568.4	63%	32%
Tasman	Band A: ≤260	914.9	9329	52%	75%
	Band B: > 260 and ≤ 540	228.7	1135.4	13%	9%
	Band C: > 540 and ≤ 1000	179.9	590	10%	5%
	Band D: >1000	446.6	1313.8	25%	11%
West Coast	Band A: ≤260	66.7	25480.3	35%	74%
	Band B: > 260 and ≤ 540	42.1	4043.5	22%	12%
	Band C: > 540 and ≤ 1000	20.5	2600.6	11%	8%
	Band D: >1000	58.6	2322.8	31%	7%

Table H-11: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3b, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	42.8	48.6	2%	1%
	Band C: > 540 and ≤ 1000	287.8	262.8	13%	6%
	Band D: >1000	1939.3	3895.9	85%	91%
Bay of Plenty	Band A: ≤260	1098.5	7664.2	37%	48%
	Band B: > 260 and ≤ 540	386.7	2081.8	13%	13%
	Band C: > 540 and ≤ 1000	391.5	2098.7	13%	13%
	Band D: >1000	1104.3	4019.6	37%	25%
Gisborne	Band A: ≤260	244.2	2486.5	10%	24%
	Band B: > 260 and ≤ 540	229.3	1427.4	9%	14%
	Band C: > 540 and ≤ 1000	583.4	2297	23%	23%
	Band D: >1000	1434.4	3943.3	58%	39%
Northland	Band A: ≤260	123.1	559.5	3%	4%
	Band B: > 260 and ≤ 540	100.8	398.8	2%	3%
	Band C: > 540 and ≤ 1000	305	992.9	6%	7%
	Band D: >1000	4190	11747.7	89%	86%
Waikato	Band A: ≤260	1504.4	8755.2	17%	28%
	Band B: > 260 and ≤ 540	740.1	2774.5	8%	9%
	Band C: > 540 and ≤ 1000	919.9	2890.7	10%	9%
	Band D: >1000	5748.1	16600.5	64%	54%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	929.5	4887.0	16%	33%
	Band B: > 260 and ≤ 540	1105.7	2173.3	20%	15%
	Band C: > 540 and ≤ 1000	2533.5	4684.3	45%	32%
	Band D: >1000	1084.7	2970.3	19%	20%
Manawatu / Whanganui	Band A: ≤260	1813.0	8220.9	16%	29%
	Band B: > 260 and ≤ 540	554.1	1758.7	5%	6%
	Band C: > 540 and ≤ 1000	859.0	2216.9	8%	8%
	Band D: >1000	8010.7	16490.6	71%	57%
Taranaki	Band A: ≤260	458.4	1881.6	17%	17%
	Band B: > 260 and ≤ 540	404.2	1370.8	15%	13%
	Band C: > 540 and ≤ 1000	238.4	1203	9%	11%
	Band D: >1000	1573.6	6507.3	59%	59%
Wellington	Band A: ≤260	281.4	2608.4	14%	38%
	Band B: > 260 and ≤ 540	153.6	646.6	8%	9%
	Band C: > 540 and ≤ 1000	199.9	1041.4	10%	15%
	Band D: >1000	1318.3	2573	67%	37%
Canterbury	Band A: ≤260	6789.2	25901.4	38%	58%
	Band B: > 260 and ≤ 540	1276.2	3734.4	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	6053.5	13%	14%
	Band D: >1000	7390.5	8655.4	42%	20%
Canterbury / Otago	Band A: ≤260	2198.3	4250.7	53%	65%
	Band B: > 260 and ≤ 540	381.9	746.2	9%	11%
	Band C: > 540 and ≤ 1000	377.3	630	9%	10%
	Band D: >1000	1182.3	963.2	29%	15%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2167.9	8266.5	59%	73%
	Band B: > 260 and ≤ 540	618.6	1379	17%	12%
	Band C: > 540 and ≤ 1000	623.3	1267.7	17%	11%
	Band D: >1000	255.1	445.7	7%	4%
Otago	Band A: ≤260	7259.1	17346.3	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2516.6	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2178	9%	8%
	Band D: >1000	5146.9	6040.7	34%	22%
Southland	Band A: ≤260	1829.7	19068.4	24%	57%
	Band B: > 260 and ≤ 540	542.9	2232.2	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1769.7	6%	5%
	Band D: >1000	4861	10348.3	63%	31%
Tasman	Band A: ≤260	914.9	9487	52%	77%
	Band B: > 260 and ≤ 540	228.7	1086.2	13%	9%
	Band C: > 540 and ≤ 1000	179.9	628.3	10%	5%
	Band D: >1000	446.6	1166.7	25%	9%
West Coast	Band A: ≤260	66.7	25806.5	35%	75%
	Band B: > 260 and ≤ 540	42.1	4593.3	22%	13%
	Band C: > 540 and ≤ 1000	20.5	2625.9	11%	8%
	Band D: >1000	58.6	1421.5	31%	4%

Table H-12: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3b, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	16.1	85.9	1%	2%
	Band B: > 260 and ≤ 540	214.2	108.9	9%	3%
	Band C: > 540 and ≤ 1000	638.6	980.8	28%	23%
	Band D: >1000	1416.5	3116.5	62%	73%
Bay of Plenty	Band A: ≤260	1098.5	8046.6	37%	51%
	Band B: > 260 and ≤ 540	386.7	2311.6	13%	15%
	Band C: > 540 and ≤ 1000	391.5	2524.6	13%	16%
	Band D: >1000	1104.3	2981.7	37%	19%
Gisborne	Band A: ≤260	244.2	2537.6	10%	25%
	Band B: > 260 and ≤ 540	229.3	1503.8	9%	15%
	Band C: > 540 and ≤ 1000	583.4	2646.9	23%	26%
	Band D: >1000	1434.4	3465.9	58%	34%
Northland	Band A: ≤260	123.1	587	3%	4%
	Band B: > 260 and ≤ 540	100.8	578.6	2%	4%
	Band C: > 540 and ≤ 1000	305	1566.2	6%	11%
	Band D: >1000	4190	10967	89%	80%
Waikato	Band A: ≤260	1626	9512.2	18%	31%
	Band B: > 260 and ≤ 540	832	3132.3	9%	10%
	Band C: > 540 and ≤ 1000	991.7	4148.5	11%	13%
	Band D: >1000	5462.8	14227.9	61%	46%
Hawkes Bay	Band A: ≤260	1107.8	5271.4	20%	36%
	Band B: > 260 and ≤ 540	2281.0	4181.0	40%	28%
	Band C: > 540 and ≤ 1000	1571.4	3528.0	28%	24%
	Band D: >1000	693.1	1734.6	12%	12%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Manawatu / Whanganui	Band A: ≤260	1813.0	8264.4	16%	29%
	Band B: > 260 and ≤ 540	554.1	1872.6	5%	7%
	Band C: > 540 and ≤ 1000	859.0	2556.0	8%	9%
	Band D: >1000	8010.7	15993.9	71%	56%
Taranaki	Band A: ≤260	460	2036.3	17%	19%
	Band B: > 260 and ≤ 540	714.9	1711.1	27%	16%
	Band C: > 540 and ≤ 1000	543.1	3029.8	20%	28%
	Band D: >1000	956.6	4185.6	36%	38%
Wellington	Band A: ≤260	281.4	2649	14%	39%
	Band B: > 260 and ≤ 540	153.6	798.7	8%	12%
	Band C: > 540 and ≤ 1000	199.9	1290.2	10%	19%
	Band D: >1000	1318.3	2131.5	67%	31%
Canterbury	Band A: ≤260	6789.2	26311.4	38%	59%
	Band B: > 260 and ≤ 540	1276.2	4603.5	7%	10%
	Band C: > 540 and ≤ 1000	2247.2	7830.9	13%	18%
	Band D: >1000	7390.5	5598.8	42%	13%
Canterbury / Otago	Band A: ≤260	2198.3	4311.8	53%	65%
	Band B: > 260 and ≤ 540	381.9	788	9%	12%
	Band C: > 540 and ≤ 1000	377.3	737.2	9%	11%
	Band D: >1000	1182.3	753.1	29%	11%
Marlborough	Band A: ≤260	2219.1	8357.9	61%	74%
	Band B: > 260 and ≤ 540	768.6	1560.7	21%	14%
	Band C: > 540 and ≤ 1000	436.2	1087.4	12%	10%
	Band D: >1000	240.9	352.9	7%	3%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Otago	Band A: ≤260	7259.1	17434.9	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2576.7	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2286.5	9%	8%
	Band D: >1000	5146.9	5783.4	34%	21%
Southland	Band A: ≤260	1829.7	19125.4	24%	57%
	Band B: > 260 and ≤ 540	542.9	2283.3	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1837.5	6%	5%
	Band D: >1000	4861	10172.3	63%	30%
Tasman	Band A: ≤260	914.9	9613.8	52%	78%
	Band B: > 260 and ≤ 540	228.7	1078.5	13%	9%
	Band C: > 540 and ≤ 1000	179.9	685.1	10%	6%
	Band D: >1000	446.6	990.7	25%	8%
West Coast	Band A: ≤260	66.7	26417.7	35%	77%
	Band B: > 260 and ≤ 540	42.1	4865.5	22%	14%
	Band C: > 540 and ≤ 1000	20.5	2212.8	11%	6%
	Band D: >1000	58.6	951.2	31%	3%

Scenario 3c

Table H-13: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3c, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	104.1	174.3	5%	4%
	Band D: >1000	2124.1	3986.2	93%	93%
Bay of Plenty	Band A: ≤260	1098.5	7326.4	37%	46%
	Band B: > 260 and ≤ 540	386.7	1933.5	13%	12%
	Band C: > 540 and ≤ 1000	391.5	1577.4	13%	10%
	Band D: >1000	1104.3	5027.1	37%	32%
Gisborne	Band A: ≤260	244.2	2419.6	10%	24%
	Band B: > 260 and ≤ 540	229.3	1310.5	9%	13%
	Band C: > 540 and ≤ 1000	583.4	1949.7	23%	19%
	Band D: >1000	1434.4	4474.4	58%	44%
Northland	Band A: ≤260	123.1	542.6	3%	4%
	Band B: > 260 and ≤ 540	100.8	364	2%	3%
	Band C: > 540 and ≤ 1000	305	777	6%	6%
	Band D: >1000	4190	12015.3	89%	88%
Waikato	Band A: ≤260	1464	8157.1	16%	26%
	Band B: > 260 and ≤ 540	592.7	2265.5	7%	7%
	Band C: > 540 and ≤ 1000	882.3	2620.9	10%	8%
	Band D: >1000	5973.5	17977.4	67%	58%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	896.4	4564.5	16%	31%
	Band B: > 260 and ≤ 540	251.9	1218.5	4%	8%
	Band C: > 540 and ≤ 1000	1827.5	3188.2	32%	22%
	Band D: >1000	2677.5	5743.8	47%	39%
Manawatu / Whanganui	Band A: ≤260	1813.0	8155.0	16%	28%
	Band B: > 260 and ≤ 540	554.1	1647.1	5%	6%
	Band C: > 540 and ≤ 1000	859.0	1972.3	8%	7%
	Band D: >1000	8010.7	16912.6	71%	59%
Taranaki	Band A: ≤260	455.3	1822.1	17%	17%
	Band B: > 260 and ≤ 540	403	1247.1	15%	11%
	Band C: > 540 and ≤ 1000	210.4	1056.8	8%	10%
	Band D: >1000	1606	6836.6	60%	62%
Wellington	Band A: ≤260	281.4	2568	14%	37%
	Band B: > 260 and ≤ 540	153.6	543.5	8%	8%
	Band C: > 540 and ≤ 1000	199.9	738.7	10%	11%
	Band D: >1000	1318.3	3019.3	67%	44%
Canterbury	Band A: ≤260	6789.2	25362.1	38%	57%
	Band B: > 260 and ≤ 540	1276.2	3525.1	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	3492.1	13%	8%
	Band D: >1000	7390.5	11965.4	42%	27%
Canterbury / Otago	Band A: ≤260	2198.3	4124.8	53%	63%
	Band B: > 260 and ≤ 540	381.9	721	9%	11%
	Band C: > 540 and ≤ 1000	377.3	544.2	9%	8%
	Band D: >1000	1182.3	1200.2	29%	18%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2149.3	8177.8	59%	72%
	Band B: > 260 and ≤ 540	491.6	1249.2	13%	11%
	Band C: > 540 and ≤ 1000	578	1065.2	16%	9%
	Band D: >1000	445.9	866.8	12%	8%
Otago	Band A: ≤260	7259.1	17232	48%	61%
	Band B: > 260 and ≤ 540	1307.2	2422.6	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	1983.8	9%	7%
	Band D: >1000	5146.9	6443.2	34%	23%
Southland	Band A: ≤260	1829.7	18985.6	24%	57%
	Band B: > 260 and ≤ 540	542.9	2165.1	7%	6%
	Band C: > 540 and ≤ 1000	485.7	1701.5	6%	5%
	Band D: >1000	4861	10566.3	63%	32%
Tasman	Band A: ≤260	914.9	9329	52%	75%
	Band B: > 260 and ≤ 540	228.7	1135.4	13%	9%
	Band C: > 540 and ≤ 1000	179.9	590.5	10%	5%
	Band D: >1000	446.6	1313.3	25%	11%
West Coast	Band A: ≤260	66.7	25480.3	35%	74%
	Band B: > 260 and ≤ 540	42.1	4044.9	22%	12%
	Band C: > 540 and ≤ 1000	20.5	2608.1	11%	8%
	Band D: >1000	58.6	2314	31%	7%

Table H-14: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3c, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	42.8	48.6	2%	1%
	Band C: > 540 and ≤ 1000	287.8	262.8	13%	6%
	Band D: >1000	1939.3	3895.9	85%	91%
Bay of Plenty	Band A: ≤260	1098.5	7669.2	37%	48%
	Band B: > 260 and ≤ 540	386.7	2081.4	13%	13%
	Band C: > 540 and ≤ 1000	391.5	2104.2	13%	13%
	Band D: >1000	1104.3	4009.6	37%	25%
Gisborne	Band A: ≤260	244.2	2486.5	10%	24%
	Band B: > 260 and ≤ 540	229.3	1429	9%	14%
	Band C: > 540 and ≤ 1000	583.4	2303.6	23%	23%
	Band D: >1000	1434.4	3935	58%	39%
Northland	Band A: ≤260	123.1	559.5	3%	4%
	Band B: > 260 and ≤ 540	100.8	400.3	2%	3%
	Band C: > 540 and ≤ 1000	305	1003.7	6%	7%
	Band D: >1000	4190	11735.4	89%	86%
Waikato	Band A: ≤260	1504.4	8767.8	17%	28%
	Band B: > 260 and ≤ 540	740.1	2773.7	8%	9%
	Band C: > 540 and ≤ 1000	919.9	2887	10%	9%
	Band D: >1000	5748.1	16592.5	64%	53%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	929.5	4887.0	16%	33%
	Band B: > 260 and ≤ 540	1105.7	2173.3	20%	15%
	Band C: > 540 and ≤ 1000	2533.5	4684.6	45%	32%
	Band D: >1000	1084.7	2970.0	19%	20%
Manawatu / Whanganui	Band A: ≤260	1813.0	8220.9	16%	29%
	Band B: > 260 and ≤ 540	554.1	1758.7	5%	6%
	Band C: > 540 and ≤ 1000	859.0	2216.9	8%	8%
	Band D: >1000	8010.7	16490.6	71%	57%
Taranaki	Band A: ≤260	458.4	1881.6	17%	17%
	Band B: > 260 and ≤ 540	404.2	1370.8	15%	13%
	Band C: > 540 and ≤ 1000	238.4	1203.4	9%	11%
	Band D: >1000	1573.6	6506.9	59%	59%
Wellington	Band A: ≤260	281.4	2608.4	14%	38%
	Band B: > 260 and ≤ 540	153.6	646.6	8%	9%
	Band C: > 540 and ≤ 1000	199.9	1041.4	10%	15%
	Band D: >1000	1318.3	2573	67%	37%
Canterbury	Band A: ≤260	6789.2	25901.4	38%	58%
	Band B: > 260 and ≤ 540	1276.2	3734.4	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	6053.5	13%	14%
	Band D: >1000	7390.5	8655.4	42%	20%
Canterbury / Otago	Band A: ≤260	2198.3	4250.7	53%	65%
	Band B: > 260 and ≤ 540	381.9	746.2	9%	11%
	Band C: > 540 and ≤ 1000	377.3	630	9%	10%
	Band D: >1000	1182.3	963.2	29%	15%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2167.9	8266.5	59%	73%
	Band B: > 260 and ≤ 540	618.6	1379	17%	12%
	Band C: > 540 and ≤ 1000	623.3	1267.7	17%	11%
	Band D: >1000	255.1	445.7	7%	4%
Otago	Band A: ≤260	7259.1	17352.7	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2525.4	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2187.6	9%	8%
	Band D: >1000	5146.9	6015.9	34%	21%
Southland	Band A: ≤260	1829.7	19077.3	24%	57%
	Band B: > 260 and ≤ 540	542.9	2247.3	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1773.2	6%	5%
	Band D: >1000	4861	10320.7	63%	31%
Tasman	Band A: ≤260	914.9	9487.3	52%	77%
	Band B: > 260 and ≤ 540	228.7	1085.9	13%	9%
	Band C: > 540 and ≤ 1000	179.9	630.8	10%	5%
	Band D: >1000	446.6	1164.2	25%	9%
West Coast	Band A: ≤260	66.7	25810.4	35%	75%
	Band B: > 260 and ≤ 540	42.1	4608	22%	13%
	Band C: > 540 and ≤ 1000	20.5	2611.2	11%	8%
	Band D: >1000	58.6	1417.7	31%	4%

Table H-15: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3c, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	16.1	85.9	1%	2%
	Band B: > 260 and ≤ 540	214.2	108.9	9%	3%
	Band C: > 540 and ≤ 1000	638.6	980.8	28%	23%
	Band D: >1000	1416.5	3116.5	62%	73%
Bay of Plenty	Band A: ≤260	1098.5	8051.9	37%	51%
	Band B: > 260 and ≤ 540	386.7	2315.5	13%	15%
	Band C: > 540 and ≤ 1000	391.5	2527.2	13%	16%
	Band D: >1000	1104.3	2969.8	37%	19%
Gisborne	Band A: ≤260	244.2	2538.8	10%	25%
	Band B: > 260 and ≤ 540	229.3	1506.7	9%	15%
	Band C: > 540 and ≤ 1000	583.4	2656.8	23%	26%
	Band D: >1000	1434.4	3451.8	58%	34%
Northland	Band A: ≤260	123.1	589.2	3%	4%
	Band B: > 260 and ≤ 540	100.8	582.2	2%	4%
	Band C: > 540 and ≤ 1000	305	1632.4	6%	12%
	Band D: >1000	4190	10895	89%	80%
Waikato	Band A: ≤260	1626	9549.3	18%	31%
	Band B: > 260 and ≤ 540	832	3109.3	9%	10%
	Band C: > 540 and ≤ 1000	991.7	4151.3	11%	13%
	Band D: >1000	5462.8	14211	61%	46%
Hawkes Bay	Band A: ≤260	1107.8	5271.4	0.20	0.36
	Band B: > 260 and ≤ 540	2281.0	4181.0	0.40	0.28
	Band C: > 540 and ≤ 1000	1571.4	3528.0	0.28	0.24
	Band D: >1000	693.1	1734.6	0.12	0.12

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Manawatu / Whanganui	Band A: ≤260	1813.0	8264.4	0.16	0.29
	Band B: > 260 and ≤ 540	554.1	1872.6	0.05	0.07
	Band C: > 540 and ≤ 1000	859.0	2557.2	0.08	0.09
	Band D: >1000	8010.7	15992.8	0.71	0.56
Taranaki	Band A: ≤260	460	2036.3	17%	19%
	Band B: > 260 and ≤ 540	714.9	1711.1	27%	16%
	Band C: > 540 and ≤ 1000	543.1	3029.8	20%	28%
	Band D: >1000	956.6	4185.6	36%	38%
Wellington	Band A: ≤260	281.4	2649	14%	39%
	Band B: > 260 and ≤ 540	153.6	798.7	8%	12%
	Band C: > 540 and ≤ 1000	199.9	1290.2	10%	19%
	Band D: >1000	1318.3	2131.5	67%	31%
Canterbury	Band A: ≤260	6789.2	26311.4	38%	59%
	Band B: > 260 and ≤ 540	1276.2	4603.5	7%	10%
	Band C: > 540 and ≤ 1000	2247.2	7830.9	13%	18%
	Band D: >1000	7390.5	5598.8	42%	13%
Canterbury / Otago	Band A: ≤260	2198.3	4311.8	53%	65%
	Band B: > 260 and ≤ 540	381.9	788	9%	12%
	Band C: > 540 and ≤ 1000	377.3	737.2	9%	11%
	Band D: >1000	1182.3	753.1	29%	11%
Marlborough	Band A: ≤260	2219.1	8357.9	61%	74%
	Band B: > 260 and ≤ 540	768.6	1560.7	21%	14%
	Band C: > 540 and ≤ 1000	436.2	1087.4	12%	10%
	Band D: >1000	240.9	352.9	7%	3%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Otago	Band A: ≤260	7259.1	17447.8	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2593.8	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2279.7	9%	8%
	Band D: >1000	5146.9	5760.3	34%	21%
Southland	Band A: ≤260	1829.7	19143.9	24%	57%
	Band B: > 260 and ≤ 540	542.9	2291.7	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1835.2	6%	5%
	Band D: >1000	4861	10147.8	63%	30%
Tasman	Band A: ≤260	914.9	9613.9	52%	78%
	Band B: > 260 and ≤ 540	228.7	1078.7	13%	9%
	Band C: > 540 and ≤ 1000	179.9	690.5	10%	6%
	Band D: >1000	446.6	985	25%	8%
West Coast	Band A: ≤260	66.7	26428.1	35%	77%
	Band B: > 260 and ≤ 540	42.1	4883.6	22%	14%
	Band C: > 540 and ≤ 1000	20.5	2199.6	11%	6%
	Band D: >1000	58.6	935.9	31%	3%

Scenario 3d

Table H-16: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3d, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	104.1	174.3	5%	4%
	Band D: >1000	2124.1	3986.2	93%	93%
Bay of Plenty	Band A: ≤260	1098.5	7336	37%	46%
	Band B: > 260 and ≤ 540	386.7	1943.1	13%	12%
	Band C: > 540 and ≤ 1000	391.5	1584.9	13%	10%
	Band D: >1000	1104.3	5000.3	37%	32%
Gisborne	Band A: ≤260	244.2	2431	10%	24%
	Band B: > 260 and ≤ 540	229.3	1325.2	9%	13%
	Band C: > 540 and ≤ 1000	583.4	1992.5	23%	20%
	Band D: >1000	1434.4	4405.5	58%	43%
Northland	Band A: ≤260	123.1	545.9	3%	4%
	Band B: > 260 and ≤ 540	100.8	366.5	2%	3%
	Band C: > 540 and ≤ 1000	305	789.1	6%	6%
	Band D: >1000	4190	11997.4	89%	88%
Waikato	Band A: ≤260	1464	8169.4	16%	26%
	Band B: > 260 and ≤ 540	592.7	2290.3	7%	7%
	Band C: > 540 and ≤ 1000	882.3	2629.7	10%	8%
	Band D: >1000	5973.5	17931.5	67%	58%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	896.4	4565.2	16%	31%
	Band B: > 260 and ≤ 540	251.9	1219.4	4%	8%
	Band C: > 540 and ≤ 1000	1827.5	3186.9	32%	22%
	Band D: >1000	2677.5	5743.4	47%	39%
Manawatu / Whanganui	Band A: ≤260	1813.0	8179.0	19%	32%
	Band B: > 260 and ≤ 540	554.1	1688.3	6%	7%
	Band C: > 540 and ≤ 1000	859.0	2015.3	9%	8%
	Band D: >1000	8010.7	16804.4	82%	65%
Taranaki	Band A: ≤260	455.3	1822.5	17%	17%
	Band B: > 260 and ≤ 540	403	1258.6	15%	11%
	Band C: > 540 and ≤ 1000	210.4	1058.5	8%	10%
	Band D: >1000	1606	6823.1	60%	62%
Wellington	Band A: ≤260	281.4	2568	14%	37%
	Band B: > 260 and ≤ 540	153.6	543.5	8%	8%
	Band C: > 540 and ≤ 1000	199.9	753.6	10%	11%
	Band D: >1000	1318.3	3004.3	67%	44%
Canterbury	Band A: ≤260	6789.2	25362.1	38%	57%
	Band B: > 260 and ≤ 540	1276.2	3525.1	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	3492.1	13%	8%
	Band D: >1000	7390.5	11965.4	42%	27%
Canterbury / Otago	Band A: ≤260	2198.3	4124.8	53%	63%
	Band B: > 260 and ≤ 540	381.9	721	9%	11%
	Band C: > 540 and ≤ 1000	377.3	544.2	9%	8%
	Band D: >1000	1182.3	1200.2	29%	18%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2149.3	8177.8	59%	72%
	Band B: > 260 and ≤ 540	491.6	1249.2	13%	11%
	Band C: > 540 and ≤ 1000	578	1065.2	16%	9%
	Band D: >1000	445.9	866.8	12%	8%
Otago	Band A: ≤260	7259.1	17258.4	48%	61%
	Band B: > 260 and ≤ 540	1307.2	2443.7	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2020.8	9%	7%
	Band D: >1000	5146.9	6358.7	34%	23%
Southland	Band A: ≤260	1829.7	18998.9	24%	57%
	Band B: > 260 and ≤ 540	542.9	2177.7	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1727.2	6%	5%
	Band D: >1000	4861	10514.7	63%	31%
Tasman	Band A: ≤260	914.9	9347.8	52%	76%
	Band B: > 260 and ≤ 540	228.7	1128.9	13%	9%
	Band C: > 540 and ≤ 1000	179.9	589.8	10%	5%
	Band D: >1000	446.6	1301.6	25%	11%
West Coast	Band A: ≤260	66.7	25492.1	35%	74%
	Band B: > 260 and ≤ 540	42.1	4071.1	22%	12%
	Band C: > 540 and ≤ 1000	20.5	2599.6	11%	8%
	Band D: >1000	58.6	2284.5	31%	7%

Table H-17: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3d, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	42.8	48.6	2%	1%
	Band C: > 540 and ≤ 1000	287.8	262.8	13%	6%
	Band D: >1000	1939.3	3895.9	85%	91%
Bay of Plenty	Band A: ≤260	1098.5	7767.3	37%	49%
	Band B: > 260 and ≤ 540	386.7	2103.7	13%	13%
	Band C: > 540 and ≤ 1000	391.5	2282.9	13%	14%
	Band D: >1000	1104.3	3710.5	37%	23%
Gisborne	Band A: ≤260	244.2	2583.6	10%	25%
	Band B: > 260 and ≤ 540	229.3	1593.6	9%	16%
	Band C: > 540 and ≤ 1000	583.4	2875	23%	28%
	Band D: >1000	1434.4	3102	58%	31%
Northland	Band A: ≤260	123.1	584.4	3%	4%
	Band B: > 260 and ≤ 540	100.8	447.8	2%	3%
	Band C: > 540 and ≤ 1000	305	1225.1	6%	9%
	Band D: >1000	4190	11441.6	89%	84%
Waikato	Band A: ≤260	1504.4	8948.5	17%	29%
	Band B: > 260 and ≤ 540	740.1	2769.4	8%	9%
	Band C: > 540 and ≤ 1000	919.9	3105.7	10%	10%
	Band D: >1000	5748.1	16197.2	64%	52%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	929.5	4887.0	16%	33%
	Band B: > 260 and ≤ 540	1105.7	2175.2	20%	15%
	Band C: > 540 and ≤ 1000	2533.5	4693.5	45%	32%
	Band D: >1000	1084.7	2959.2	19%	20%
Manawatu / Whanganui	Band A: ≤260	1813.0	8336.6	19%	32%
	Band B: > 260 and ≤ 540	554.1	1935.0	6%	8%
	Band C: > 540 and ≤ 1000	859.0	2791.0	9%	11%
	Band D: >1000	8010.7	15624.4	82%	61%
Taranaki	Band A: ≤260	458.4	1884	17%	17%
	Band B: > 260 and ≤ 540	404.2	1407.4	15%	13%
	Band C: > 540 and ≤ 1000	238.4	1231	9%	11%
	Band D: >1000	1573.6	6440.3	59%	59%
Wellington	Band A: ≤260	281.4	2608.4	14%	38%
	Band B: > 260 and ≤ 540	153.6	649.2	8%	9%
	Band C: > 540 and ≤ 1000	199.9	1050.2	10%	15%
	Band D: >1000	1318.3	2561.6	67%	37%
Canterbury	Band A: ≤260	6789.2	25901.4	38%	58%
	Band B: > 260 and ≤ 540	1276.2	3734.6	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	6053.3	13%	14%
	Band D: >1000	7390.5	8655.4	42%	20%
Canterbury / Otago	Band A: ≤260	2198.3	4250.7	53%	65%
	Band B: > 260 and ≤ 540	381.9	746.2	9%	11%
	Band C: > 540 and ≤ 1000	377.3	630	9%	10%
	Band D: >1000	1182.3	963.2	29%	15%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2167.9	8266.5	59%	73%
	Band B: > 260 and ≤ 540	618.6	1379	17%	12%
	Band C: > 540 and ≤ 1000	623.3	1267.7	17%	11%
	Band D: >1000	255.1	445.7	7%	4%
Otago	Band A: ≤260	7259.1	17519.9	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2638.4	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2355.2	9%	8%
	Band D: >1000	5146.9	5568	34%	20%
Southland	Band A: ≤260	1829.7	19180.3	24%	57%
	Band B: > 260 and ≤ 540	542.9	2308.2	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1842.6	6%	6%
	Band D: >1000	4861	10087.5	63%	30%
Tasman	Band A: ≤260	914.9	9587.7	52%	78%
	Band B: > 260 and ≤ 540	228.7	1032.6	13%	8%
	Band C: > 540 and ≤ 1000	179.9	693.7	10%	6%
	Band D: >1000	446.6	1054.2	25%	9%
West Coast	Band A: ≤260	66.7	25891.1	35%	75%
	Band B: > 260 and ≤ 540	42.1	4754.5	22%	14%
	Band C: > 540 and ≤ 1000	20.5	2499	11%	7%
	Band D: >1000	58.6	1302.7	31%	4%

Table H-18: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3d, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	16.1	85.9	1%	2%
	Band B: > 260 and ≤ 540	214.2	108.9	9%	3%
	Band C: > 540 and ≤ 1000	638.6	980.8	28%	23%
	Band D: >1000	1416.5	3116.5	62%	73%
Bay of Plenty	Band A: ≤260	1098.5	8263.5	37%	52%
	Band B: > 260 and ≤ 540	386.7	2635	13%	17%
	Band C: > 540 and ≤ 1000	391.5	2575.6	13%	16%
	Band D: >1000	1104.3	2390.3	37%	15%
Gisborne	Band A: ≤260	244.2	2770.8	10%	27%
	Band B: > 260 and ≤ 540	229.3	2183.8	9%	22%
	Band C: > 540 and ≤ 1000	583.4	2956.1	23%	29%
	Band D: >1000	1434.4	2243.6	58%	22%
Northland	Band A: ≤260	123.1	652.1	3%	5%
	Band B: > 260 and ≤ 540	100.8	775.7	2%	6%
	Band C: > 540 and ≤ 1000	305	3166.9	6%	23%
	Band D: >1000	4190	9104.1	89%	66%
Waikato	Band A: ≤260	1626	9914.9	18%	32%
	Band B: > 260 and ≤ 540	832	3244	9%	10%
	Band C: > 540 and ≤ 1000	991.7	5501.6	11%	18%
	Band D: >1000	5462.8	12360.4	61%	40%
Hawkes Bay	Band A: ≤260	1107.8	5272.5	20%	36%
	Band B: > 260 and ≤ 540	2281.0	4181.9	40%	28%
	Band C: > 540 and ≤ 1000	1571.4	3538.0	28%	24%
	Band D: >1000	693.1	1722.6	12%	12%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Manawatu / Whanganui	Band A: ≤260	1813.0	8528.5	19%	33%
	Band B: > 260 and ≤ 540	554.1	2270.1	6%	9%
	Band C: > 540 and ≤ 1000	859.0	3818.1	9%	15%
	Band D: >1000	8010.7	14070.3	82%	55%
Taranaki	Band A: ≤260	460	2046.8	17%	19%
	Band B: > 260 and ≤ 540	714.9	1766.1	27%	16%
	Band C: > 540 and ≤ 1000	543.1	3193.9	20%	29%
	Band D: >1000	956.6	3955.9	36%	36%
Wellington	Band A: ≤260	281.4	2649	14%	39%
	Band B: > 260 and ≤ 540	153.6	800.4	8%	12%
	Band C: > 540 and ≤ 1000	199.9	1293.3	10%	19%
	Band D: >1000	1318.3	2126.8	67%	31%
Canterbury	Band A: ≤260	6789.2	26311.4	38%	59%
	Band B: > 260 and ≤ 540	1276.2	4603.5	7%	10%
	Band C: > 540 and ≤ 1000	2247.2	7831	13%	18%
	Band D: >1000	7390.5	5598.7	42%	13%
Canterbury / Otago	Band A: ≤260	2198.3	4311.8	53%	65%
	Band B: > 260 and ≤ 540	381.9	788	9%	12%
	Band C: > 540 and ≤ 1000	377.3	737.4	9%	11%
	Band D: >1000	1182.3	752.9	29%	11%
Marlborough	Band A: ≤260	2219.1	8357.9	61%	74%
	Band B: > 260 and ≤ 540	768.6	1560.7	21%	14%
	Band C: > 540 and ≤ 1000	436.2	1087.4	12%	10%
	Band D: >1000	240.9	352.9	7%	3%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Otago	Band A: ≤260	7259.1	17697.5	48%	63%
	Band B: > 260 and ≤ 540	1307.2	2742.5	9%	10%
	Band C: > 540 and ≤ 1000	1411.2	2529.3	9%	9%
	Band D: >1000	5146.9	5112.3	34%	18%
Southland	Band A: ≤260	1829.7	19341.9	24%	58%
	Band B: > 260 and ≤ 540	542.9	2409.6	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1968.3	6%	6%
	Band D: >1000	4861	9698.8	63%	29%
Tasman	Band A: ≤260	914.9	9730.3	52%	79%
	Band B: > 260 and ≤ 540	228.7	1079.3	13%	9%
	Band C: > 540 and ≤ 1000	179.9	732.9	10%	6%
	Band D: >1000	446.6	825.6	25%	7%
West Coast	Band A: ≤260	66.7	26638.1	35%	77%
	Band B: > 260 and ≤ 540	42.1	4987	22%	14%
	Band C: > 540 and ≤ 1000	20.5	2088.6	11%	6%
	Band D: >1000	58.6	733.5	31%	2%

Scenario 3e

Table H-19: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3e, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	104.1	174.3	5%	4%
	Band D: >1000	2124.1	3986.2	93%	93%
Bay of Plenty	Band A: ≤260	1098.5	7337	37%	46%
	Band B: > 260 and ≤ 540	386.7	1944.8	13%	12%
	Band C: > 540 and ≤ 1000	391.5	1585.1	13%	10%
	Band D: >1000	1104.3	4997.4	37%	32%
Gisborne	Band A: ≤260	244.2	2431	10%	24%
	Band B: > 260 and ≤ 540	229.3	1325.2	9%	13%
	Band C: > 540 and ≤ 1000	583.4	1992.5	23%	20%
	Band D: >1000	1434.4	4405.5	58%	43%
Northland	Band A: ≤260	123.1	545.9	3%	4%
	Band B: > 260 and ≤ 540	100.8	366.5	2%	3%
	Band C: > 540 and ≤ 1000	305	789.1	6%	6%
	Band D: >1000	4190	11997.4	89%	88%
Waikato	Band A: ≤260	1464	8171.9	16%	26%
	Band B: > 260 and ≤ 540	592.7	2288.5	7%	7%
	Band C: > 540 and ≤ 1000	882.3	2629.3	10%	8%
	Band D: >1000	5973.5	17931.2	67%	58%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	896.4	4565.2	16%	31%
	Band B: > 260 and ≤ 540	251.9	1219.4	4%	8%
	Band C: > 540 and ≤ 1000	1827.5	3186.9	32%	22%
	Band D: >1000	2677.5	5743.4	47%	39%
Manawatu / Whanganui	Band A: ≤260	1813.0	8179.0	19%	32%
	Band B: > 260 and ≤ 540	554.1	1691.7	6%	7%
	Band C: > 540 and ≤ 1000	859.0	2011.9	9%	8%
	Band D: >1000	8010.7	16804.4	82%	65%
Taranaki	Band A: ≤260	455.3	1822.5	17%	17%
	Band B: > 260 and ≤ 540	403	1258.6	15%	11%
	Band C: > 540 and ≤ 1000	210.4	1059.3	8%	10%
	Band D: >1000	1606	6822.3	60%	62%
Wellington	Band A: ≤260	281.4	2568	14%	37%
	Band B: > 260 and ≤ 540	153.6	543.5	8%	8%
	Band C: > 540 and ≤ 1000	199.9	753.6	10%	11%
	Band D: >1000	1318.3	3004.3	67%	44%
Canterbury	Band A: ≤260	6789.2	25362.1	38%	57%
	Band B: > 260 and ≤ 540	1276.2	3525.1	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	3492.1	13%	8%
	Band D: >1000	7390.5	11965.4	42%	27%
Canterbury / Otago	Band A: ≤260	2198.3	4124.8	53%	63%
	Band B: > 260 and ≤ 540	381.9	721	9%	11%
	Band C: > 540 and ≤ 1000	377.3	544.2	9%	8%
	Band D: >1000	1182.3	1200.2	29%	18%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2149.3	8177.8	59%	72%
	Band B: > 260 and ≤ 540	491.6	1249.2	13%	11%
	Band C: > 540 and ≤ 1000	578	1065.2	16%	9%
	Band D: >1000	445.9	866.8	12%	8%
Otago	Band A: ≤260	7259.1	17260.6	48%	61%
	Band B: > 260 and ≤ 540	1307.2	2443.4	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2018.9	9%	7%
	Band D: >1000	5146.9	6358.7	34%	23%
Southland	Band A: ≤260	1829.7	19001.4	24%	57%
	Band B: > 260 and ≤ 540	542.9	2176.1	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1729.4	6%	5%
	Band D: >1000	4861	10511.6	63%	31%
Tasman	Band A: ≤260	914.9	9349.2	52%	76%
	Band B: > 260 and ≤ 540	228.7	1127.6	13%	9%
	Band C: > 540 and ≤ 1000	179.9	590.2	10%	5%
	Band D: >1000	446.6	1301.1	25%	11%
West Coast	Band A: ≤260	66.7	25492.1	35%	74%
	Band B: > 260 and ≤ 540	42.1	4077.8	22%	12%
	Band C: > 540 and ≤ 1000	20.5	2595.7	11%	8%
	Band D: >1000	58.6	2281.7	31%	7%

Table H-20: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3e, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	42.8	48.6	2%	1%
	Band C: > 540 and ≤ 1000	287.8	262.8	13%	6%
	Band D: >1000	1939.3	3895.9	85%	91%
Bay of Plenty	Band A: ≤260	1098.5	7769.7	37%	49%
	Band B: > 260 and ≤ 540	386.7	2112	13%	13%
	Band C: > 540 and ≤ 1000	391.5	2300.9	13%	15%
	Band D: >1000	1104.3	3681.8	37%	23%
Gisborne	Band A: ≤260	244.2	2583.6	10%	25%
	Band B: > 260 and ≤ 540	229.3	1593.6	9%	16%
	Band C: > 540 and ≤ 1000	583.4	2876.7	23%	28%
	Band D: >1000	1434.4	3100.2	58%	31%
Northland	Band A: ≤260	123.1	584.4	3%	4%
	Band B: > 260 and ≤ 540	100.8	447.8	2%	3%
	Band C: > 540 and ≤ 1000	305	1226.2	6%	9%
	Band D: >1000	4190	11440.5	89%	84%
Waikato	Band A: ≤260	1504.4	8952.8	17%	29%
	Band B: > 260 and ≤ 540	740.1	2771.8	8%	9%
	Band C: > 540 and ≤ 1000	919.9	3105.8	10%	10%
	Band D: >1000	5748.1	16190.5	64%	52%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	929.5	4887.0	16%	33%
	Band B: > 260 and ≤ 540	1105.7	2175.2	20%	15%
	Band C: > 540 and ≤ 1000	2533.5	4693.5	45%	32%
	Band D: >1000	1084.7	2959.2	19%	20%
Manawatu / Whanganui	Band A: ≤260	1813.0	8338.2	19%	32%
	Band B: > 260 and ≤ 540	554.1	1934.0	6%	8%
	Band C: > 540 and ≤ 1000	859.0	2796.6	9%	11%
	Band D: >1000	8010.7	15618.2	82%	61%
Taranaki	Band A: ≤260	458.4	1884	17%	17%
	Band B: > 260 and ≤ 540	404.2	1408.3	15%	13%
	Band C: > 540 and ≤ 1000	238.4	1231.7	9%	11%
	Band D: >1000	1573.6	6438.7	59%	59%
Wellington	Band A: ≤260	281.4	2608.4	14%	38%
	Band B: > 260 and ≤ 540	153.6	649.2	8%	9%
	Band C: > 540 and ≤ 1000	199.9	1050.2	10%	15%
	Band D: >1000	1318.3	2561.6	67%	37%
Canterbury	Band A: ≤260	6789.2	25901.4	38%	58%
	Band B: > 260 and ≤ 540	1276.2	3734.6	7%	8%
	Band C: > 540 and ≤ 1000	2247.2	6053.3	13%	14%
	Band D: >1000	7390.5	8655.4	42%	20%
Canterbury / Otago	Band A: ≤260	2198.3	4250.7	53%	65%
	Band B: > 260 and ≤ 540	381.9	746.2	9%	11%
	Band C: > 540 and ≤ 1000	377.3	630	9%	10%
	Band D: >1000	1182.3	963.2	29%	15%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2167.9	8266.5	59%	73%
	Band B: > 260 and ≤ 540	618.6	1379	17%	12%
	Band C: > 540 and ≤ 1000	623.3	1267.7	17%	11%
	Band D: >1000	255.1	445.7	7%	4%
Otago	Band A: ≤260	7259.1	17523.8	48%	62%
	Band B: > 260 and ≤ 540	1307.2	2640.7	9%	9%
	Band C: > 540 and ≤ 1000	1411.2	2359	9%	8%
	Band D: >1000	5146.9	5558.1	34%	20%
Southland	Band A: ≤260	1829.7	19195.1	24%	57%
	Band B: > 260 and ≤ 540	542.9	2311.3	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1846	6%	6%
	Band D: >1000	4861	10066.2	63%	30%
Tasman	Band A: ≤260	914.9	9590.6	52%	78%
	Band B: > 260 and ≤ 540	228.7	1029.8	13%	8%
	Band C: > 540 and ≤ 1000	179.9	705	10%	6%
	Band D: >1000	446.6	1042.7	25%	8%
West Coast	Band A: ≤260	66.7	25903.2	35%	75%
	Band B: > 260 and ≤ 540	42.1	4760.2	22%	14%
	Band C: > 540 and ≤ 1000	20.5	2504.7	11%	7%
	Band D: >1000	58.6	1279.2	31%	4%

Table H-21: Estimated length of streams in each *E. coli* attribute state by region: Scenario 3e, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	16.1	85.9	1%	2%
	Band B: > 260 and ≤ 540	214.2	108.9	9%	3%
	Band C: > 540 and ≤ 1000	638.6	980.8	28%	23%
	Band D: >1000	1416.5	3116.5	62%	73%
Bay of Plenty	Band A: ≤260	1098.5	8281.4	37%	52%
	Band B: > 260 and ≤ 540	386.7	2674.3	13%	17%
	Band C: > 540 and ≤ 1000	391.5	2587.4	13%	16%
	Band D: >1000	1104.3	2321.3	37%	15%
Gisborne	Band A: ≤260	244.2	2770.8	10%	27%
	Band B: > 260 and ≤ 540	229.3	2185.6	9%	22%
	Band C: > 540 and ≤ 1000	583.4	2955.7	23%	29%
	Band D: >1000	1434.4	2242.2	58%	22%
Northland	Band A: ≤260	123.1	652.1	3%	5%
	Band B: > 260 and ≤ 540	100.8	778.2	2%	6%
	Band C: > 540 and ≤ 1000	305	3165.6	6%	23%
	Band D: >1000	4190	9103	89%	66%
Waikato	Band A: ≤260	1626	9931.8	18%	32%
	Band B: > 260 and ≤ 540	832	3234.7	9%	10%
	Band C: > 540 and ≤ 1000	991.7	5508.6	11%	18%
	Band D: >1000	5462.8	12345.7	61%	40%
Hawkes Bay	Band A: ≤260	1107.8	5272.5	20%	36%
	Band B: > 260 and ≤ 540	2281.0	4181.9	40%	28%
	Band C: > 540 and ≤ 1000	1571.4	3538.0	28%	24%
	Band D: >1000	693.1	1722.6	12%	12%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Manawatu / Whanganui	Band A: ≤260	1813.0	8536.5	19%	33%
	Band B: > 260 and ≤ 540	554.1	2272.2	6%	9%
	Band C: > 540 and ≤ 1000	859.0	3829.2	9%	15%
	Band D: >1000	8010.7	14049.1	82%	55%
Taranaki	Band A: ≤260	460	2047.9	17%	19%
	Band B: > 260 and ≤ 540	714.9	1768.9	27%	16%
	Band C: > 540 and ≤ 1000	543.1	3198.5	20%	29%
	Band D: >1000	956.6	3947.5	36%	36%
Wellington	Band A: ≤260	281.4	2649	14%	39%
	Band B: > 260 and ≤ 540	153.6	800.4	8%	12%
	Band C: > 540 and ≤ 1000	199.9	1293.3	10%	19%
	Band D: >1000	1318.3	2126.8	67%	31%
Canterbury	Band A: ≤260	6789.2	26311.4	38%	59%
	Band B: > 260 and ≤ 540	1276.2	4603.5	7%	10%
	Band C: > 540 and ≤ 1000	2247.2	7831	13%	18%
	Band D: >1000	7390.5	5598.7	42%	13%
Canterbury / Otago	Band A: ≤260	2198.3	4311.8	53%	65%
	Band B: > 260 and ≤ 540	381.9	788	9%	12%
	Band C: > 540 and ≤ 1000	377.3	737.4	9%	11%
	Band D: >1000	1182.3	752.9	29%	11%
Marlborough	Band A: ≤260	2219.1	8357.9	61%	74%
	Band B: > 260 and ≤ 540	768.6	1560.7	21%	14%
	Band C: > 540 and ≤ 1000	436.2	1087.4	12%	10%
	Band D: >1000	240.9	352.9	7%	3%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Otago	Band A: ≤260	7259.1	17702.8	48%	63%
	Band B: > 260 and ≤ 540	1307.2	2745.5	9%	10%
	Band C: > 540 and ≤ 1000	1411.2	2529.6	9%	9%
	Band D: >1000	5146.9	5103.7	34%	18%
Southland	Band A: ≤260	1829.7	19370.8	24%	58%
	Band B: > 260 and ≤ 540	542.9	2419.6	7%	7%
	Band C: > 540 and ≤ 1000	485.7	1986.4	6%	6%
	Band D: >1000	4861	9641.7	63%	29%
Tasman	Band A: ≤260	914.9	9737	52%	79%
	Band B: > 260 and ≤ 540	228.7	1082.4	13%	9%
	Band C: > 540 and ≤ 1000	179.9	733.1	10%	6%
	Band D: >1000	446.6	815.7	25%	7%
West Coast	Band A: ≤260	66.7	26683.3	35%	77%
	Band B: > 260 and ≤ 540	42.1	5001.7	22%	15%
	Band C: > 540 and ≤ 1000	20.5	2045.7	11%	6%
	Band D: >1000	58.6	716.6	31%	2%

Scenario 4

Table H-19: Estimated length of streams in each *E. coli* attribute state by region: Scenario 4, low LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	84.8	1%	2%
	Band B: > 260 and ≤ 540	41.7	46.8	2%	1%
	Band C: > 540 and ≤ 1000	108.7	178.9	5%	4%
	Band D: >1000	2119.6	3981.6	93%	93%
Bay of Plenty	Band A: ≤260	1102.7	7366.8	37%	46%
	Band B: > 260 and ≤ 540	405.2	1964.5	14%	12%
	Band C: > 540 and ≤ 1000	471.6	1604.4	16%	10%
	Band D: >1000	1001.5	4928.7	34%	31%
Gisborne	Band A: ≤260	255.6	2480.4	10%	24%
	Band B: > 260 and ≤ 540	255	1393.9	10%	14%
	Band C: > 540 and ≤ 1000	796.4	2159.1	32%	21%
	Band D: >1000	1184.4	4120.7	48%	41%
Northland	Band A: ≤260	123.1	547.9	3%	4%
	Band B: > 260 and ≤ 540	104.5	375.6	2%	3%
	Band C: > 540 and ≤ 1000	343.9	827.6	7%	6%
	Band D: >1000	4147.4	11947.8	88%	87%
Waikato	Band A: ≤260	1487.5	8206.2	17%	26%
	Band B: > 260 and ≤ 540	603.2	2302.3	7%	7%
	Band C: > 540 and ≤ 1000	895.8	2673.1	10%	9%
	Band D: >1000	5925.9	17839.3	66%	58%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	901.2	4609.9	16%	31%
	Band B: > 260 and ≤ 540	260.9	1224.5	5%	8%
	Band C: > 540 and ≤ 1000	1863.1	3247.8	33%	22%
	Band D: >1000	2628.2	5632.7	46%	38%
Manawatu / Whanganui	Band A: ≤260	1847.9	8250.9	16%	29%
	Band B: > 260 and ≤ 540	616.8	1776.7	5%	6%
	Band C: > 540 and ≤ 1000	978.6	2122.5	9%	7%
	Band D: >1000	7793.4	16536.9	69%	58%
Taranaki	Band A: ≤260	461.1	1864.5	17%	17%
	Band B: > 260 and ≤ 540	418.9	1318.1	16%	12%
	Band C: > 540 and ≤ 1000	211.5	1064.2	8%	10%
	Band D: >1000	1583.3	6716	59%	61%
Wellington	Band A: ≤260	287.5	2577.2	15%	38%
	Band B: > 260 and ≤ 540	160.7	568.8	8%	8%
	Band C: > 540 and ≤ 1000	268	806.7	14%	12%
	Band D: >1000	1236.9	2916.7	63%	42%
Canterbury	Band A: ≤260	6905.2	25603.5	39%	58%
	Band B: > 260 and ≤ 540	1333.5	3542.3	8%	8%
	Band C: > 540 and ≤ 1000	3144.6	3881.7	18%	9%
	Band D: >1000	6319.8	11317.2	36%	26%
Canterbury / Otago	Band A: ≤260	2249.9	4187.7	54%	64%
	Band B: > 260 and ≤ 540	375.9	701.7	9%	11%
	Band C: > 540 and ≤ 1000	490.7	564.1	12%	9%
	Band D: >1000	1023.3	1136.7	25%	17%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2161.8	8238.3	59%	73%
	Band B: > 260 and ≤ 540	510.1	1291	14%	11%
	Band C: > 540 and ≤ 1000	564.5	1021.9	15%	9%
	Band D: >1000	428.4	807.8	12%	7%
Otago	Band A: ≤260	7384.1	17346.4	49%	62%
	Band B: > 260 and ≤ 540	1303.8	2497.7	9%	9%
	Band C: > 540 and ≤ 1000	1791.6	2109.5	12%	8%
	Band D: >1000	4644.7	6128	31%	22%
Southland	Band A: ≤260	1854.7	19029.4	24%	57%
	Band B: > 260 and ≤ 540	544.8	2193.8	7%	7%
	Band C: > 540 and ≤ 1000	506	1723.7	7%	5%
	Band D: >1000	4813.8	10471.7	62%	31%
Tasman	Band A: ≤260	921.3	9407.1	52%	76%
	Band B: > 260 and ≤ 540	228.1	1095.2	13%	9%
	Band C: > 540 and ≤ 1000	199.9	595.2	11%	5%
	Band D: >1000	420.8	1270.7	24%	10%
West Coast	Band A: ≤260	67.6	25515.3	36%	74%
	Band B: > 260 and ≤ 540	46.3	4095.2	25%	12%
	Band C: > 540 and ≤ 1000	17.6	2566.1	9%	7%
	Band D: >1000	56.4	2270.8	30%	7%

Table H-23: Estimated length of streams in each *E. coli* attribute state by region: Scenario 4, most likely LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	15.4	86.9	1%	2%
	Band B: > 260 and ≤ 540	49.9	51.3	2%	1%
	Band C: > 540 and ≤ 1000	307.3	288.2	13%	7%
	Band D: >1000	1912.8	3865.7	84%	90%
Bay of Plenty	Band A: ≤260	1137.3	7978.3	38%	50%
	Band B: > 260 and ≤ 540	658.4	2222.4	22%	14%
	Band C: > 540 and ≤ 1000	620.4	2490.6	21%	16%
	Band D: >1000	565.0	3173.1	19%	20%
Gisborne	Band A: ≤260	325.5	2927.1	13%	29%
	Band B: > 260 and ≤ 540	742.5	2375.0	30%	23%
	Band C: > 540 and ≤ 1000	1084.6	3531.7	44%	35%
	Band D: >1000	338.7	1320.3	14%	13%
Northland	Band A: ≤260	136.8	617.9	3%	5%
	Band B: > 260 and ≤ 540	163.4	548.2	3%	4%
	Band C: > 540 and ≤ 1000	1068.7	1746.8	23%	13%
	Band D: >1000	3349.9	10785.9	71%	79%
Waikato	Band A: ≤260	1728.4	9243.5	19%	30%
	Band B: > 260 and ≤ 540	821.8	2983.9	9%	10%
	Band C: > 540 and ≤ 1000	1284.0	3381.1	14%	11%
	Band D: >1000	5078.2	15412.4	57%	50%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Hawkes Bay	Band A: ≤260	961.1	5098.2	17%	35%
	Band B: > 260 and ≤ 540	1197.0	2326.2	21%	16%
	Band C: > 540 and ≤ 1000	2677.9	5031.0	47%	34%
	Band D: >1000	817.3	2259.4	14%	15%
Manawatu / Whanganui	Band A: ≤260	1969.6	8878.1	18%	31%
	Band B: > 260 and ≤ 540	974.3	2299.5	9%	8%
	Band C: > 540 and ≤ 1000	2428.9	4496.1	22%	16%
	Band D: >1000	5864.0	13013.3	52%	45%
Taranaki	Band A: ≤260	512.5	2121.1	19%	19%
	Band B: > 260 and ≤ 540	473.9	1686.2	18%	15%
	Band C: > 540 and ≤ 1000	293.2	1440.1	11%	13%
	Band D: >1000	1395.0	5715.4	52%	52%
Wellington	Band A: ≤260	315.6	2709.3	16%	39%
	Band B: > 260 and ≤ 540	208.9	759.5	11%	11%
	Band C: > 540 and ≤ 1000	658.6	1398.3	34%	20%
	Band D: >1000	770.2	2002.3	39%	29%
Canterbury	Band A: ≤260	7435.5	27178.8	42%	61%
	Band B: > 260 and ≤ 540	2804.0	4045.1	16%	9%
	Band C: > 540 and ≤ 1000	5844.8	9665.7	33%	22%
	Band D: >1000	1618.7	3455.1	9%	8%
Canterbury / Otago	Band A: ≤260	2416.0	4481.9	58%	68%
	Band B: > 260 and ≤ 540	536.0	770.2	13%	12%
	Band C: > 540 and ≤ 1000	1000.7	1107.0	24%	17%
	Band D: >1000	187.1	230.9	5%	4%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Marlborough	Band A: ≤260	2311.6	8656.9	63%	76%
	Band B: > 260 and ≤ 540	644.2	1356.4	18%	12%
	Band C: > 540 and ≤ 1000	523.2	1063.6	14%	9%
	Band D: >1000	185.7	282.1	5%	2%
Otago	Band A: ≤260	7947.9	18147.0	53%	65%
	Band B: > 260 and ≤ 540	1380.3	2610.3	9%	9%
	Band C: > 540 and ≤ 1000	2305.9	2778.0	15%	10%
	Band D: >1000	3490.2	4546.2	23%	16%
Southland	Band A: ≤260	1930.9	19367.0	25%	58%
	Band B: > 260 and ≤ 540	622.5	2329.4	8%	7%
	Band C: > 540 and ≤ 1000	570.0	1970.8	7%	6%
	Band D: >1000	4595.9	9751.2	60%	29%
Tasman	Band A: ≤260	975.7	9864.4	55%	80%
	Band B: > 260 and ≤ 540	239.3	887.4	14%	7%
	Band C: > 540 and ≤ 1000	285.8	758.7	16%	6%
	Band D: >1000	269.3	857.7	15%	7%
West Coast	Band A: ≤260	74.8	26060.8	40%	76%
	Band B: > 260 and ≤ 540	52.3	4697.1	28%	14%
	Band C: > 540 and ≤ 1000	34.7	2449.9	18%	7%
	Band D: >1000	26.2	1239.5	14%	4%

Table H-24: Estimated length of streams in each *E. coli* attribute state by region: Scenario 4, high LRF.

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Auckland	Band A: ≤260	18.5	90	1%	2%
	Band B: > 260 and ≤ 540	236.3	135.6	10%	3%
	Band C: > 540 and ≤ 1000	652.4	1039.1	29%	24%
	Band D: >1000	1378.1	3027.4	60%	71%
Bay of Plenty	Band A: ≤260	1425.3	8800.2	48%	55%
	Band B: > 260 and ≤ 540	758.3	3013.9	25%	19%
	Band C: > 540 and ≤ 1000	443.1	2446.6	15%	15%
	Band D: >1000	354.3	1603.6	12%	10%
Gisborne	Band A: ≤260	608.3	3809.1	24%	38%
	Band B: > 260 and ≤ 540	1270.3	3848.5	51%	38%
	Band C: > 540 and ≤ 1000	366.9	1985.5	15%	20%
	Band D: >1000	245.9	511.1	10%	5%
Northland	Band A: ≤260	203	756.3	4%	6%
	Band B: > 260 and ≤ 540	942.9	1327.1	20%	10%
	Band C: > 540 and ≤ 1000	1847.6	6026.6	39%	44%
	Band D: >1000	1725.3	5588.8	37%	41%
Waikato	Band A: ≤260	2088.8	10714.2	23%	35%
	Band B: > 260 and ≤ 540	2031.9	3820.5	23%	12%
	Band C: > 540 and ≤ 1000	3102.5	9378.5	35%	30%
	Band D: >1000	1689.3	7107.6	19%	23%
Hawkes Bay	Band A: ≤260	1176.9	5753.6	21%	39%
	Band B: > 260 and ≤ 540	2476.0	4522.1	44%	31%
	Band C: > 540 and ≤ 1000	1636.9	3709.0	29%	25%
	Band D: >1000	363.4	730.2	6%	5%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Manawatu / Whanganui	Band A: ≤260	2267.2	9562.2	20%	33%
	Band B: > 260 and ≤ 540	1890.9	3445.0	17%	12%
	Band C: > 540 and ≤ 1000	3783.2	7358.7	34%	26%
	Band D: >1000	3295.5	8321.1	29%	29%
Taranaki	Band A: ≤260	579	2545	22%	23%
	Band B: > 260 and ≤ 540	873.8	2213.6	33%	20%
	Band C: > 540 and ≤ 1000	802.8	3751.5	30%	34%
	Band D: >1000	419	2452.6	16%	22%
Wellington	Band A: ≤260	351.7	2838.2	18%	41%
	Band B: > 260 and ≤ 540	529.3	1287.7	27%	19%
	Band C: > 540 and ≤ 1000	634.8	1552.5	32%	23%
	Band D: >1000	437.4	1191	22%	17%
Canterbury	Band A: ≤260	8919.9	28722.4	50%	65%
	Band B: > 260 and ≤ 540	5196	8479.6	29%	19%
	Band C: > 540 and ≤ 1000	2304.8	5654	13%	13%
	Band D: >1000	1282.4	1488.7	7%	3%
Canterbury / Otago	Band A: ≤260	2677.5	4797.4	65%	73%
	Band B: > 260 and ≤ 540	802.6	1100.6	19%	17%
	Band C: > 540 and ≤ 1000	573.6	629.1	14%	10%
	Band D: >1000	86.1	63	2%	1%
Marlborough	Band A: ≤260	2462.7	9011.1	67%	79%
	Band B: > 260 and ≤ 540	745.2	1524.6	20%	13%
	Band C: > 540 and ≤ 1000	295.4	610.4	8%	5%
	Band D: >1000	161.5	212.9	4%	2%

Region	Attribute state (E.coli per 100 mL)	Length of streams in class (km)		Percentage of streams in class	
		non-Accord	Accord	non-Accord	Accord
Otago	Band A: ≤260	8380.7	18791.6	55%	67%
	Band B: > 260 and ≤ 540	2094.7	3053	14%	11%
	Band C: > 540 and ≤ 1000	1679.6	2321.6	11%	8%
	Band D: >1000	2969.3	3915.4	20%	14%
Southland	Band A: ≤260	2012.9	19596.2	26%	59%
	Band B: > 260 and ≤ 540	678.4	2510	9%	8%
	Band C: > 540 and ≤ 1000	871.3	2312.6	11%	7%
	Band D: >1000	4156.8	8999.7	54%	27%
Tasman	Band A: ≤260	1009.6	10142.1	57%	82%
	Band B: > 260 and ≤ 540	294.9	913.7	17%	7%
	Band C: > 540 and ≤ 1000	263.7	762.6	15%	6%
	Band D: >1000	201.9	549.7	11%	4%
West Coast	Band A: ≤260	89.2	26955.6	47%	78%
	Band B: > 260 and ≤ 540	68.7	4866.6	37%	14%
	Band C: > 540 and ≤ 1000	19.2	1955.7	10%	6%
	Band D: >1000	10.8	669.4	6%	2%