NZ LANDCARE TRUST

Pathway *for Pomahaka Project*

Farmer Survey Report

March 2018

The assessment results reported here pertain to the Pathway for Pomahaka Project. The purpose of the project has been is to undertake and support sustainable land and water management practises in order to improve water quality in the Pomahaka River catchment. An initial audience survey was conducted in October 2015 to collect data used to help design the project and to establish baseline levels for subsequent evaluation purposes. Thirty-two land owners were successfully surveyed via face-to-face discussions with project staff. Staffing resources and respondent availability determined the number of surveys that could be completed. A second audience survey was conducted in February 2018 to assess and compare similar factors that were surveyed in 2015. Fifty-nine land owners were successfully surveyed via email in this survey round.

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Farmer Survey Findings and Recommendations

Characteristics of Farmers/Farming Operations

As can be seen from the data presented in the survey data section of this report, the 32 families that were surveyed in 2015 and the 59 families that were surveyed in 2018 have somewhat similar amounts of land (average = 478 versus 542 hectares, 2015/2018 respectively). In addition, they have been farming this land for relatively similar time periods (average = 54.18 versus 48.10 years, 2015/2018 respectively).

In 2015 a little more than half (54.2%) of these farm families used Overseer (a computer modeling tool that Regional Councils use to collect data on farm nutrient levels). In 2018, this figure dropped to 44.1%.

The main reasons in 2018 that those who do not use Overseer elected to not do so is that they simply do not know much about it, have not found a use for it yet, rely on Fonterra or fertilizer companies to do the monitoring, or find the model too hypothetical and do not trust the findings.

When asked what percent of their farm is used for various land uses, 18 farmers (56%) in 2015 reported the average percentage of land devoted to sheep was 72.96%; similarly, in 2018, 30 farmers (51%) reported that 67.43% of their land was in sheep. This was followed by 15 farmers (47%) in 2015 that reported an average of 14.53% of their operation was in beef; similarly, in 2018, 29 farmers (49%) reported that 17.43% of their land was in beef. In 2015, 14 farmers (44%) reported that their dairy operation comprised an average of 80.95% of their operation; similarly in 2018, 24 farmers (41%) reported that 82.58% of their land was in dairy. In 2015, 10 farmers (31%) reported that dairy grazing comprised an average of 18.28% of their operation; in 2018, a similar percentage of farmers (17 or 29%) reported a moderately higher amount of land (comparatively) was devoted to dairy grazing. Few farmers, both in 2015 and 2018, reported that their land use included crops, deer or "other" uses. Complete findings for this issue can be found in the survey data section of this report.

Aside from the moderate drop in the use of Overseer with 2018 respondents, respondents in 2015 and 2018 appear to be similar in terms of the amount of land they farm, how long they have owned the land, and what they do with their farm.

Knowledge, Attitudes and Behaviors of Farmers

The findings below provide guidance on how project resources may be best targeted. Areas where farmers may need additional knowledge/assistance are identified.

As can be seen from the data presented in the survey data section of this report, respondents in 2015 felt they had fairly high knowledge about i) riparian and wetland protection methods, ii) good management practices for reducing soil erosion and runoff, iii) good management practices for wintering livestock, iv) good management practices for effluent management, and v) good management practices for improving water quality (all close to a 4 on a 1 to five scale low to high knowledge). In 2018, these perceived knowledge levels all dropped slightly.

In 2015, respondents felt they had more moderate levels of knowledge pertaining to vi) farming technologies and management systems to reduce nutrient leaching, vii) good management practices for increasing biodiversity of aquatic life and native plants, and viii) water quality limits set for the Pomahaka catchment under ORC Plan Change 6A. Knowledge scores for these issues were still above the scale midpoint of 3. In 2018, these figures dropped slightly, but all of the issues were still above the scale midpoint.

Knowledge of ix) native freshwater fish in the Pomahaka catchment was rated below the scale midpoint both in 2015 and 2018 (2018 was slightly lower than in 2015), indicating less than a moderate level of this topic knowledge persists.

It is interesting to note that there was a drop in perceived knowledge levels across the board in 2018. This could be a function of project participants now knowing more about what they do not know, a motivating factor that may lead participants to seek more information; and/or it could be that early project participants in 2015, the early adopters, were already ahead in their learning curve compared to those that decided to participate at a later date (i.e., a significant proportion of 2018 respondents).

Given these findings, project training priorities should be focused on vi) through ix) above; though this does not negate the need for training on subjects where participants felt they had more knowledge e.g. i) – v), especially if the project finds that self-reported knowledge levels for these topics are possibly inflated as they may have been in 2015. It is important that farmers be adequately informed and that the non-farming public and the media perceive this.

In addition, when asked how much knowledge they have of Overseer, respondents in both 2015 and 2018 rated this issue below the scale midpoint (slightly lower comparatively in 2018), indicating less than a moderate level of knowledge. More work needs to be done to increase farmers' knowledge of Overseer if this is identified as an important project objective.

The same phenomenon was also found when comparing the level of knowledge among 2015 and 2018 respondents regarding initiatives by a) The Pomahaka Sustainable Farming Fund Project, b) The Pomahaka Farmers Water Care Group, c) The Pathway for the Pomahaka Stakeholder Group, and d) The Otago Regional Council Water Plan Change 6A. In 2015 all knowledge levels were reported slightly above the scale midpoint meaning slightly better than moderate knowledge; but in 2018, three of the four (a, c and d.) fell below the scale midpoint reflecting less than a moderate level of knowledge. These four groups continue to be faced with the challenge to increase awareness and knowledge of their efforts. Ideally these

figures would be much higher. Awareness and knowledge are perquisites for farmer involvement.

In 2015, 30.4% of respondents believed that 10 years ago water quality in the catchment was good or very good; 56.5% thought it was of moderate quality; in 2018, these figures dropped to 19.3% and 40.4%, respectively. In 2015, only 16.7% believed water quality was good or very good at present; and 41.7% thought it was moderately good; in 2018, these figures rose to 33.3% and 53.7%, respectively. Optimistically, in 2015, 75.0% of respondents thought water quality would be good to very good in the future (10 years from now); in 2018 this figure was 70.9%.

Perceived severity and susceptibility to a threat is a necessary precursor to doing something about that threat. The increase in positive perceptions about the present state of water quality among 2018 respondents (compared to 2015 respondents) needs to be confirmed scientifically. If these perceptions are borne out by data, then good; if not, then something should be done to correct the farmers' perceptions.

The fact that many 2018 respondents continue to be optimistic about future water quality is a positive finding. Confidence in a person's ability to address a threat and confidence that their actions will have the intended remedial effect are key determinants of successfully rectifying the problem.

When 2018 respondents were asked what they consider to be the most important issues that farms in the catchment need to address in order to improve water quality, the most frequently listed response had to do with sedimentation (listed by 20 respondents). This was followed by fertilizer/nutrient management/budgeting (17), runoff/leaching from animals/fertilizer (14), riparian strip/buffer zone plantings (11), winter management of stock/crop (11), and fencing waterways/keeping stock out of waterways (10). Issues mentioned less frequently can be found listed in the survey data section of this report. Efforts to address these six issues should be priority topics for the project as they should be received with the greatest interest.

When 2018 respondents were asked what they consider to be the most important issues that their farming operation needs to address in order to maintain or improve water quality, the two most frequently mentioned responses had to do with fencing waterways/keeping stock out of waterways and riparian strip/buffer zone plantings (each listed by 15 respondents). This was followed by sedimentation (x11). Issues mentioned less frequently can be found listed in the survey data section of this report. Similar to the recommendation stated above, efforts to address these three issues should be priority topics for the project as they should be received with the greatest interest.

When 2018 respondents were asked what they consider to be the most important benefits of improving water quality, the most frequently mentioned response had to do with recreation improvements; e.g., swimming and fishing (listed by 26 respondents). This was followed by protecting aquatic life/environment (14), sustaining farming for the next generation (13), and improvements in public image/improvements in urban-rural understanding (10). Benefits mentioned less frequently can be found listed in the survey data section of this report. Efforts to motivate farmers into action should stress what farmers consider to be the primary benefits of their efforts.

When 2018 respondents were asked what they consider to be the most important barriers to improving water quality, the most frequently

mentioned response had to do with finances/costs (listed by 20 respondents). This was followed by education/ knowledge of Good Management Practices (GMPs) (17), and farmer attitudes/lack of involvement (15). It is interesting to note that these were the exact same top three perceived barriers listed in the same order in 2015. Barriers mentioned less frequently can be found listed in the survey data section of this report. Project efforts to motivate farmers into action should try to alleviate their concerns about these barriers.

When asked to what degree they had developed plans for their farm that identify areas of environmental concern that affect water quality, 41.7% of 2015 respondents indicated that they had done so to a great or very great degree and 58.3% indicated they had done this to a moderate degree. In 2018, only 26.9% of respondents indicated that they had done so to a great or very great degree and 51.9% indicated they had done this to a moderate degree.

When asked how sophisticated these plans were, 50% of 2015 respondents thought they were well/very well thought out; another 41.7% thought they were moderately well thought out. In 2018, only 33.4% of respondents thought they were well/very well thought out; another 49.0% thought they were moderately well thought out.

Similar to what was stated above concerning a drop in perceived knowledge levels from 2015 to 2018, it is again interesting to note how the reported number of farm environmental plans dropped and how the perceived sophistication of these plans dropped from 2015 to 2018. This could again be a function of project participants now knowing more about what they do not know, a motivating factor that may lead participants to seek more knowledge; and/or it could be that early project participants in 2015, the early adopters, were already ahead in their learning curve compared to those that decided to participate at a later date (a significant proportion of 2018 respondents). Nevertheless, efforts should be made to confirm that 26.9% of the 2018 respondents do in fact have sophisticated plans for protecting the environment. Those farmers that do, could be used as vectors of information (opinion leaders) convincing those that have less sophisticated plans or no plans at all to adopt this practise.

When asked to what degree they monitor the environmental conditions on their farm at present (e.g., rainfall, soils, water quality), 29.2% of 2015 respondents felt they did this to a high or very high degree and about half (54.2%) felt they did this to a moderate degree. In 2018, 30.2% of respondents felt they did this to a high or very high degree and 43.4% felt they did this to a moderate degree. Similar to the recommendation stated above, efforts should be made to identify which of the 30.2% of farmers do in fact monitor the environmental conditions on their farms especially well and those farmers could be enlisted as opinion leaders to help influence other farmers.
When asked how they would rate the environmental conditions on their farm at present, nearly three quarters of the 2015 respondents (72.7%) rated it as good or very good; the remainder rated it as fair. In 2018, the figures dropped; 64.1% of respondents rated it as good or very good, but 34.0% rated it as poor or very poor. Once again, this could be a function of project participants now knowing more about how to realistically assess the conditions on their farms; and/or it could be that early project participants in 2015 were ahead of the curve regarding their ability/motivation to assess environmental conditions on the property and enact remedial measures to address issues.

When 2018 respondents were asked to identify the most important practises they implemented on their farms in the last two years to improve water quality, the most frequently mentioned

responses had to do with riparian zone/creek fencing, mentioned by 25 respondents. This was followed by riparian plantings/buffer strips/bank protection (22), strategic winter grazing/ break fencing (13), improved effluent system/ management (15), and nutrient budgeting (12). Practices mentioned less frequently can be found listed in the survey data section of this report. It is interesting to note that these are the exact same top five practices listed in the same order as reported by farmers in 2015.

In 2015, when respondents were asked how much money they had spent on practices to improve water quality the previous two years, the average response was $43,983 (sd = $61,302), range: $1000 to $200,000 (n= 30). In 2018, respondents reported an average of $25,243 (sd = $42,966), range = $0 to $200,000 (n= 37).

When 2018 respondents were asked what practises they were planning to implement in the next five years to improve water quality the most frequently mentioned response had to do with riparian planting mentioned by 30 respondents. This was followed by fencing of water ways/wetlands (11), and developing environment plans (x10). Practices mentioned less frequently can be found listed in the survey data section of this report.

Preferred Communication Methods and Topics of Information

When 2018 respondents were asked what issues facing water quality in the Pomahaka catchment they would like more information about, the most frequently mentioned issue was information about all GMPs for improving water quality mentioned by eight respondents. This was followed by water quality monitoring information (7), riparian plantings and developing buffer strips (6), GMPs that benefit production and the environment (5), and information on ORC regulations (4). Efforts to provide farmers with information about these issues should be priority for the project as they should be received with the greatest interest. Issues mentioned less frequently can be found listed in the survey data section of this report.

Respondents in 2018 were asked to indicate their preference for several possible methods of communication that could be used to disseminate information about improving land and water management. The project is most apt to be successful if it focuses as much as possible on using the more preferred channels of communication.

One-on-one discussions with technical specialist/scientists, email (and email newsletters), field days involving technical specialist/scientists, group discussions with members of the Pathway for the Pomahaka stakeholder group, and one-on-one discussions with members of the Pathway for the Pomahaka stakeholder group (in priority order) ranked highest with an average preference ratings above 3.65 on a 1 to 5 scale, low to high preference. This was followed by discussions/meetings with local farmers, local field days held by local farmers, newsletters by mail (in priority order), all above 3.5 on a 1 to 5 scale low to high preference. Methods rated less favourably can be found listed in the survey data section of this report.

Perceived Strengths and Weaknesses of Project to Date

When respondents in 2018 were asked what they think have been the main strengths of the project so far, the most frequently mentioned issue was making farmers aware/knowledgeable of obligations/GMPs mentioned by 27respondents. This was followed by farmer-led/collaborative/proactive/volunteer commitments (14), and working together as a community to achieve real results (11). Issues mentioned less frequently can be found listed in the survey data section of this report.

When respondents in 2018 were asked to identify weaknesses of the project, the most frequently mentioned issue was that not everyone that needs to be committed is committed and that it is tough to change attitudes mentioned by 20 respondents. This was followed by the project being under-funded (x5). Relatively few other weaknesses were mentioned. Issues mentioned less frequently can be found listed in the survey data section of this report.

Farmer Survey Data

Characteristics of Farmers/Farming Operations

1. Number of years family has farmed in Pomahaka catchment

2015

N	Minimum	Maximum	Mean	Std. Deviation
31	4	150	54.18	42.75

2018

N	Minimum	Maximum	Mean	Std. Deviation
58	1	151	48.10	42.71

2. Number of hectares farmed

2015

N	Minimum	Maximum	Mean	Std. Deviation
32	201	1770	477.77	302.29

2018

N	Minimum	Maximum	Mean	Std. Deviation
58	15	7741	542.55	1016.56

Note: one outlier of 12,000 hct was removed from analysis.

3. Percentage of farm used for various land uses

(Respondents gave percentages for as many as applied - percentages for each respondent summed to 100%)

2015

	N	Minimum	Maximum	Mean	Std. Deviation
Sheep	18	30	100	72.96	22.11
Beef	15	5	28	14.53	8.51
Deer	1	100	100	100	-
Dairy	14	33.3	100	80.95	25.68
Dairy Grazing	10	5	42	18.28	11.24
Crops	5	8	40	24.10	14.93
Other	3	2	100	44.00	50.48

(Other = silage/bailage, tree planting, forestry)

2018

	N	Minimum	Maximum	Mean	Std. Deviation
Sheep	30	5	100	67.43	24.57
Beef	29	3	50	17.34	12.55
Deer	5	12	100	66.40	44.01
Dairy	24	5	100	82.58	24.44
Dairy Grazing	17	10	100	32.00	25.39
Crops	9	5	50	19.44	17.22
Other	3	8	13	10.33	2.52

(Other = silage/bailage, tree planting, forestry)

4. Currently use Overseer

2015

54% (13) Yes

45.8% (11) No

n=24

2018

44.1% (26) Yes

52.5% (31) No

n=57

5. Reasons for not using Overseer

2018

Don't know much about it (x9)

Too hypothetical/don't trust it (x4)

Haven't found a need to use it yet (x4)

Rely on Fonterra and fertilizer companies (x4)

Not user friendly (x2)

Not suited/celebrated for my type of farm (x2)

Have not got round to it

Not putting on large amounts of urea

Knowledge, Attitudes and Behaviors of Farmers

1. How much knowledge do you think you have concerning the following issues to Pomahaka catchment farmers?

Scale: 1= very low, 2= low, 3 = moderate, 4 = high, 5 = very high

a. Farming technologies and management systems to reduce nutrient leaching
b. Riparian and wetland protection methods
c. Good management practices for reducing soil erosion and runoff
d. Good management practices for wintering livestock
e. Good management practices for effluent management
f. Good management practices for improving water quality
g. Good management practices for increasing biodiversity of aquatic life and native plants
h. Water quality limits set for the Pomahaka catchment under ORC Plan Change 6A
i. Native freshwater fish in the Pomahaka catchment
j. Overseer (a computer modeling tool that Regional Councils use to collect data on farm nutrient levels)

2015

	N	Minimum	Maximum	Mean	Std. Deviation
1a	32	2	5	3.38	.79
1b	32	2	5	3.91	.82
1c	32	3	5	3.91	.57
1d	32	3	5	4.17	.59
1e	32	1	5	3.92	1.23
1f	32	2	5	3.81	.70
1g	32	2	5	3.42	.91
1h	32	2	5	3.55	.96
1i	32	1	5	2.67	1.28
1j	32	1	5	2.61	1.17

2018

	N	Minimum	Maximum	Mean	Std. Deviation
1a	59	1	5	3.27	.901
1b	59	1	5	3.29	.87
1c	59	1	5	3.73	.74
1d	58	1	5	3.84	.91
1e	56	1	5	3.52	1.31
1f	59	2	5	3.51	.82
1g	59	1	5	2.76	.90
1h	59	1	5	2.95	.99
1i	59	1	4	2.36	.78
1j	58	1	5	2.41	1.09

2. How much knowledge do you think you have concerning the following initiatives?

Scale: 1= very low, 2= low, 3 = moderate, 4 = high, 5 = very high

a. The Pathway for the Pomahaka Sustainable Farming Fund project
b. The Pomahaka Farmers Water Care Group
c. The Pathway for the Pomahaka Stakeholder Group
d. The Otago Regional Council Water Plan Change 6A

2015

	N	Minimum	Maximum	Mean	Std. Deviation
Q2a	32	1	5	3.38	1.21
Q2b	32	1	5	3.56	1.16
Q2c	32	1	5	3.31	1.26
Q2d	32	1	5	3.47	.99

2018

	N	Minimum	Maximum	Mean	Std. Deviation
Q2a	59	1	5	2.88	1.08
Q2b	59	1	5	3.25	.98
Q2c	59	1	5	2.63	1.10
Q2d	59	1	5	2.73	1.00

3. How good do you think water quality was in the waterways of the Pomahaka catchment in the past (10 years ago)?

2015

	Scale value	Frequency	Valid Percent
Very good	1	2	8.7
Good	2	5	21.7
Moderate	3	13	56.5
Poor	4	2	8.7
Very poor	5	1	4.3
Total		23	100

N	Minimum	Maximum	Mean	Std. Deviation
27	1	5	2.78	.90

2018

	Scale value	Frequency	Valid Percent
Very good	1	3	5.8
Good	2	7	13.5
Moderate	3	21	40.4
Poor	4	14	26.9
Very poor	5	7	13.5
Total		52	100

N	Minimum	Maximum	Mean	Std. Deviation
52	1	5	3.29	1.05

4. How good do you think water quality is in the waterways of the Pomahaka catchment at present?

2015

	Scale value	Frequency	Valid Percent
Very good	1	1	4.2
Good	2	3	12.5
Moderate	3	10	41.7
Poor	4	8	33.3
Very poor	5	2	8.3
Total		24	100

N	Minimum	Maximum	Mean	Std. Deviation
24	1	5	3.29	.95

2018

	Scale value	Frequency	Valid Percent
Very good	1	2	3.7
Good	2	16	29.6
Moderate	3	29	53.7
Poor	4	6	11.1
Very poor	5	1	1.9
Total		54	100

N	Minimum	Maximum	Mean	Std. Deviation
54	1	5	2.83	1.00

5. How good do you think water quality will be in the waterways of the Pomahaka catchment in the future (10 years from now)?

2015

	Scale value	Frequency	Valid Percent
Very good	1	6	25
Good	2	12	50
Moderate	3	5	20.8
Poor	4		
Very poor	5	24	4.2
Total		32	100

N	Minimum	Maximum	Mean	Std. Deviation
24	1	5	2.00	.93

2018

	Scale value	Frequency	Valid Percent
Very good	1	13	23.6
Good	2	26	47.3
Moderate	3	15	27.3
Poor	4	1	1.8
Very poor	5		
Total		55	100

N	Minimum	Maximum	Mean	Std. Deviation
55	1	4	2.07	.77

6. To what degree have you developed plans for your farm that identify areas of environmental concern that affect water quality, i.e., Farm or Land Environment Plans?

2015

	Scale value	Frequency	Valid Percent
A very great degree	1	1	4.2
Great degree	2	9	37.5
Moderate degree	3	14	58.3
Small degree	4		
Very small degree	5		
Total		24	100

N	Minimum	Maximum	Mean	Std. Deviation
24	1	3	2.54	.59

2018

	Scale value	Frequency	Valid Percent
A very great degree	1	1	1.9
Great degree	2	13	25.0
Moderate degree	3	27	51.9
Small degree	4	7	13.5
Very small degree	5	4	7.7
Total		52	100.0

N	Minimum	Maximum	Mean	Std. Deviation
52	1	5	3.00	.89

7. How sophisticated are these plans?

2015

	Scale value	Frequency	Valid Percent
Very well thought out (i.e., took considerable time/expense to develop and are very well documented/written out)	1	3	12.5
Well thought out	2	9	37.5
Moderately well thought out (i.e., took some time/expense to develop but are not really all that well documented/written out)	3	10	41.7
Poorly thought out	4	1	4.2
Very poorly thought out (i.e., haven't spent much time on this, have a few very rough ideas, but nothing concrete or written out)	5	1	4.2
Total		24	100

N	Minimum	Maximum	Mean	Std. Deviation
24	1	5	2.50	.93

2018

	Scale value	Frequency	Valid Percent
Very well thought out (i.e., took considerable time/expense to develop and are very well documented/written out)	1	1	2.0
Well thought out	2	16	31.4
Moderately well thought out (i.e., took some time/expense to develop but are not really all that well documented/written out)	3	25	49.0
Poorly thought out	4	4	7.8
Very poorly thought out (i.e., haven't spent much time on this, have a few very rough ideas, but nothing concrete or written out)	5	5	9.8
Total		51	100.0

N	Minimum	Maximum	Mean	Std. Deviation
51	1	5	2.92	.93

8. To what degree do you monitor the environmental conditions on your farm at present (e.g., rainfall, soils, water quality)?

2015

	Scale value	Frequency	Valid Percent
A very high degree	1	3	12.5
High degree	2	4	16.7
Moderate degree	3	13	54.2
Low degree	4	4	16.7
Very low degree	5		
Total		24	100

N	Minimum	Maximum	Mean	Std. Deviation
24	1	4	2.75	.90

2018

	Scale value	Frequency	Valid Percent
A very high degree	1	3	5.7
High degree	2	13	24.5
Moderate degree	3	23	43.4
Low degree	4	10	18.9
Very low degree	5	4	7.5
Total		53	100.0

N	Minimum	Maximum	Mean	Std. Deviation
53	1	5	2.99	.99

9. How would you rate the environmental conditions on your farm at present (both physical conditions (rainfall, soils, water quality)?

2015

	Scale value	Frequency	Valid Percent
Very good	1	3	13.6
Good	2	13	59.1
Fair	3	6	27.3
Poor	4		
Very poor	5		
Total			

N	Minimum	Maximum	Mean	Std. Deviation
24	1	3	2.14	.64

2018

	Scale value	Frequency	Valid Percent
Very good	1	7	13.2
Good	2	27	50.9
Fair	3	1	1.9
Poor	4	16	30.2
Very poor	5	2	3.8
Total		53	100.0

N	Minimum	Maximum	Mean	Std. Deviation
53	1	4	2.25	.73

10. **What do you consider to be the most important issues that farmers in the Pomahaka catchment need to address in order to improve water quality? (respondents could list up to five issues)**

Categories of response are listed below (frequency of response)

2018

Sedimentation (x20)
Fertilizer/Nutrient management/budgeting (x17)
Runoff/leaching from animals/fertilizer (x14)
Riparian strip/buffer zone plantings (x11)
Winter management of stock/crops (x11)
Fencing waterways/keeping stock out of waterways (x10)
Effluent management/storage (x9)
Farmers taking ownership of issues (x7)
Water quality testing and sharing findings (x5)
Knowledge of GMPs (good management practices) (x4)
Grazing management (x4)
River management (gravel, obstructions, weed control) (x3)
No-till cultivation/soil protection (x3)
Urine runoff/saturation (x3)
E.coli mitigation (x2)
Leakage from silage pits (x2)
Drainage management (x1)
Need to share information widely (x1)
Cattle access to water (x1)
Funding (x1)
Wetlands management (x1)
Develop environmental plans for farm (x1)

11. **What do you consider to be the most important issues your farming operation needs to address in order to improve water quality? (respondents could list up to five issues)**

Categories of response are listed below (frequency of response)

2018

Fencing waterways/keeping stock out of waterways (x15)
Riparian strip/buffer zone plantings (x15)
Sedimentation (x11)
Fertilizer/Nutrient management/budgeting (x8)
Effluent management/storage (x7)
Runoff/leaching from animals/fertilizer (x5)
Winter management of stock/crops (x5)
Drainage management (x4)
No-till cultivation/soil protection (x3)
Knowledge of GMPs (x3)
Leakage from silage pits (x3)
Adjusting stocking rates (x2)
E.coli mitigation (x2)
Urine runoff/saturation (x2)
Water quality testing (x1)
Farm employee education (x1)
Funding (x1)

12. **In general, be it on your own farm or on other farms in the catchment, what do you consider to be the most important benefits of improving water quality? (respondents could list up to five benefits)**

Categories of response are listed below (frequency of response)

2018

Recreation improvement (swimming, fishing) (x26)
Protect aquatic life/environment (x14)
Sustain farming for next generation (x13)
Public image/improve urban-rural understanding (x10)
Improve drinking water quality (x9)
Clean/green market image (x8)
Farmers' pride in their achievements (x5)
Save money on fertilizer/keep nutrients on farm (x5)
Confidence in GMPs (x4)
Good for everyone/community/those downstream (x3)
Improved aesthetic (x3)
Retain soil (x2)
Compliance with regulations (x2)

13. **In general, be it on your own farm or on other farms in the catchment, what do you consider to be the most important barriers to improving water quality? (respondents could list up to five barriers)**

Categories of response are listed below (frequency of response)

2018

Finances/costs (x20)
Education/knowledge of GMPs (x17)
Farmer attitudes/lack of involvement (x15)
Push for unsustainable increased/intensive production on marginal lands (x6)
Time (x6)
Excessive/improper fertilizer use (x5)
Large amount of fencing required (x3)
Farm worker lack of knowledge (x3)
Too much dairy (x3)
Riparian areas protection (x2)
Winter cropping/management (x2)
Effluent management (x2)
Negative media coverage (x2)
Negative farmer attitudes (x1)
Climate/weather patterns (x1)
Natural barriers (soils, wetlands) (x1)
Mixed messages from government (i.e., productions vs environmental protection) (x1)
Few short-term visible benefits (mostly long-term) (x1)
Loss of production due to buffer strips (x1)
Eroding river banks (x1)
Stock in waterways (x1)
Poor market prices causing farmers to shortcut GMPs (x1)
Nutrient runoff/leaching (x1)

14. **What are the most important practices you have implemented on your farm in the last two years to improve water quality? (respondents could list up to five practices)**

Categories of response are listed below (frequency of response)

2018

Riparian zone/creek fencing (x22)
Riparian plantings/buffer strips/bank protection (x22)
Improved effluent system/management (x15)
Nutrient budgeting (x12)
GMPs for fertilizer application (x8)
Developed farm environmental plan (x8)
Water sampling (x7)
Strategic winter management (x6)
Lowered stocking rates (x5)
Wintering stock off-farm or in shed when wet (x5)
Built settling pond (x3)
Soil bacteria management (x2)
Improved winter cropping/cover maintenance (x2)
Involvement in this project (x2)
Stock water system for paddock (x1)
Strategic paddock selection/grazing per weather (x1)
Develop QE2 covenant for wetlands (x1)
Culverts/bridges (x1)
Change pasture grass mix (x1)
Employee education (x1)
Improve irrigation practices/timing (x1)

15. **Approximately how much money have you spent on these activities in the last two years?**

2015

Mean = $43,983 (sd = $61,302)
Range: $1000 to $200,000
n= 30

2018

Mean = $25,243 (sd = $42,966)
Range = $0 - $200,000
n= 37

16. **What practices are you planning on implementing in the next five years to improve water quality?**

Categories of response are listed below (frequency of response)

2018

Riparian planting (x30)
Fencing of water ways/wetlands (x11)
Develop environment plans (x10)
Improve wintering systems/cropping (x8)
Nutrient budget (x6)
Stock watering systems for paddocks (x5)
Monitor water quality (x4)
Reduce sedimentation (x4)
Continue GMPs (x3)
No till/direct drilling (x3)
Soil testing/monitoring (x3)
Learn more/more education (x2)
Better grazing policy (x2)
Lower stocking rates (x2)
Amend lease agreement to include environmental standards (x1)
Maintain nutrient budget (x1)
Culverts/bridges (x1)
Wetlands protection (x1)
Leave buffer strips (x1)

Preferred Communication Methods and Topics of Information

1. What issues facing water quality in the Pomahaka catchment would you like to more information about?

Categories of response are listed below (frequency of response)

2018

Information about all GMPs for improving water quality (x8)
Water quality monitoring information (x7)
Riparian plantings and developing buffer strips (x6)
GMPs that benefit production and the environment (x5)
Information on ORC regulations (x4)
Fertilizer application/management (x3)
Bank erosion control (x2)
Understanding the science behind water testing results (x1)
Greenhouse gas emissions from farms (x1)
Funding opportunities (x1)
Weed control (x1)
Do riparian plantings help or hinder nutrient loading ? (x1)
Native fish species (x1)
Forestry (x1)

2. Below is a list of the various methods that could be used to disseminate information about improving water quality, reducing soil erosion and increasing aquatic life and native plant biodiversity. Respondents rated their preference for each method using the following scale:

1 = not preferred or very slight preference
2 = slight preference
3 = moderate preference
4 = strong preference
5 = very strong preference

2018

	N	Minimum	Maximum	Mean	Std. Deviation
Email	57	1	5	3.89	.96
Internet	50	1	5	3.10	1.07
Newsletters	46	1	5	3.41	.86
Newsletters by mail	8	2	5	3.50	1.31
Newsletters by email	13	1	5	3.77	1.09
Text message	54	1	5	3.41	1.27
Facebook	51	1	5	2.20	1.33
Printed materials	55	1	5	3.09	.99
Local field days held by local farmers	54	1	5	3.55	1.03
Discussions/meetings with local farmers	53	1	5	3.62	.99
Group discussions with members of the Pathway for the Pomahaka stakeholder group	53	1	5	3.66	1.00
One-on-one discussions with members of the Pathway for the Pomahaka stakeholder group	49	1	5	3.65	.99
Field days involving technical specialist/scientists	52	1	5	3.69	1.00
One-on-one discussions with technical specialist/scientists	48	1	5	3.92	1.05

Perceived Strengths and Weaknesses of Project to Date

1. What do you think have been the main strengths of the project so far?

Making farmers aware/knowledgeable of obligations/GMPs (x27)
Farmer-led, collaborative, proactive, volunteer commitments (x14)
Working together as a community to achieve real results (x11)
Positive public relations/publicity (x7)
Education/Facilitating water testing (x7)
Good leadership (x7)
Group approach to long-term water monitoring (x5)
Empower farmers with an opportunity to learn (x4)
Access to high quality optimistic professional assistance (x3)
Collating and sharing information with everyone (x2)
Facilitate a true understanding of water quality/set real benchmarks (x2)
Education on riparian plantings (x1)
Education on wintering practices (x1)
Field days (x1)

2. What do you think have been the main weaknesses of the project so far?

Not everyone that needs to be is committed/tough to change attitudes (x20)
Under-funded (x5)
No weaknesses (x3)
Takes too long to see results (x3)
Under-supported by local and regional government (x2)
Some information is too little or unclear (x2)
Industry competing and pushing own agenda (x1)
Industry not committed (x1)
Farmers at different stages of learning/late adopters hold early adopters back (x1)
Need to also test for municipal waste discharge (x1)
Need effective way to communicate with absentee landowners (x1)
Need more on sediment/nutrient catchment systems (x1)
Need to promote project successes more (x1)