Ruamahanga River at Waihenga
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS

Ruamāhanga Whaitua Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.

Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

Ruamahanga River at Waihenga has an upstream catchment area of ~236,089 ha. The catchment is 8.0% dairy/dairy support, 19.0% native bush, 54.2% sheep and beef and 0.6% arable. The remaining area (18.2%) is a variety of 'other' land uses including lifestyle, mixed, horticulture and urban of which no mitigations are applied. Land retirement of 271 ha of mature trees (>10 years) or 0.11% of the catchment at a rate of ~4.3 ha/yr since 2017 occurs by 2080, and 5,759 ha of pole planted land or 2.4% of the catchment at a planting rate of ~91.5 ha/yr from 2017 is mature by 2080 and contributing to reduced SSC loads. Stock exclusion and nearly 100% land treatment of the upstream waste water treatment plants (WWTP- Masterton, Carterton and Greytown) also contributes to reduced SSC loads, with the combined mitigations decreasing 50th and 95th SSC percentiles up to 20.4% and 21.7% by BAU 2080.

Silver and Gold scenarios lead to a significant increase in pole planting peaking at 26,491 ha of mature trees by 2080 (11.2% of the catchment). This is equivalent to space planting upstream of this reporting point at a rate of ~420.5 ha/yr from 2017. Land retirement also rises to 10,637 ha (4.5% of catchment at a rate of 168.8 ha/yr from 2017). Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. Coupled with 100% land treatment of the three upstream WWTP's, these combined effects decrease Silver and Gold median and 95th percentiles by 41.4% and 43.1%, respectively in 2080.

Location

Ruamahanga River at Waihenga

Ruamahanga River at Waihenga

Huangarua River at Ponatahi Bridge

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	13451 (5.7%)	5413 (2.3%)	1487 (0.6)	128058 (54.2%)	44818 (19.0%)	42862 (18.2%)	236089

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	107	271	0	5272	10637	0	10637	10637
Pole Planting	0	926	5759	0	8787	26491	0	8792	26491

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.
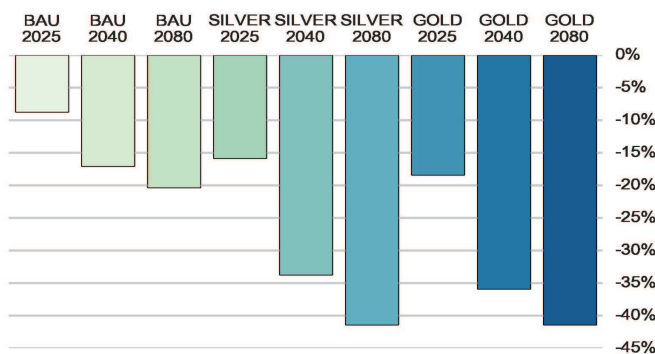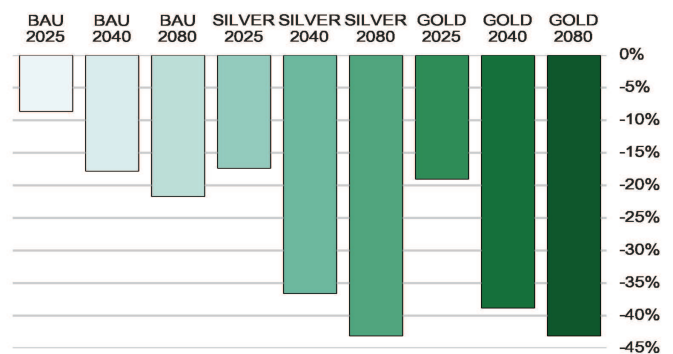
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	21.2	19.3	17.5	16.8	17.8	14.0	12.4	17.3	13.6	12.4
95th Percentile (mg/L)	324.9	297.0	267.1	254.6	268.6	206.2	185.0	263.2	199.0	185.0
Median (% change from Baseline)		-8.7%	-17.1%	-20.4%	-15.8%	-33.7%	-41.4%	-18.4%	-35.9%	-41.4%
95th Percentile (% change from Baseline)		-8.6%	-17.8%	-21.7%	-17.3%	-36.6%	-43.1%	-19.0%	-38.8%	-43.1%

Median (% change from Baseline)

95th Percentile (% change from Baseline)

Ruamahanga River at Wardells
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS

Ruamāhanga Whaitua Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.
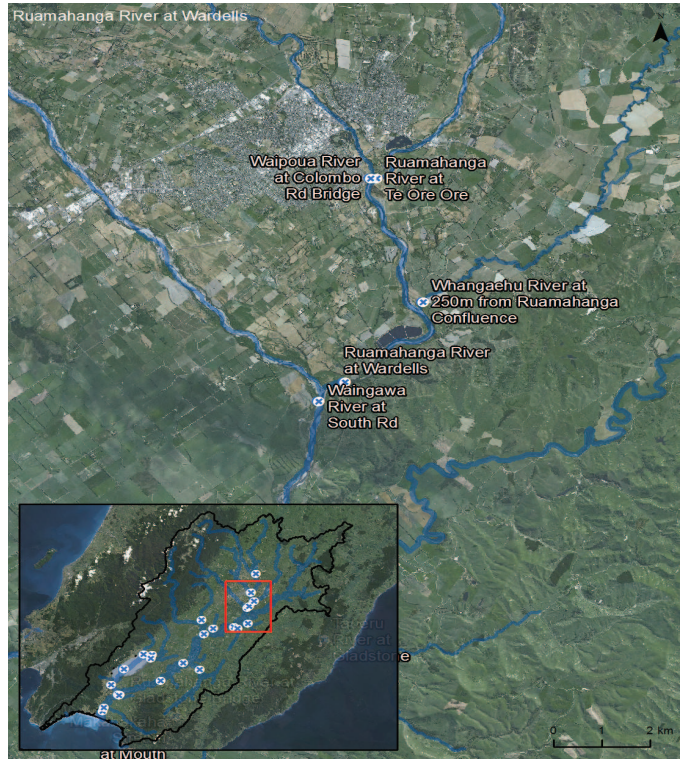
Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

Ruamahanga River at Wardells has an upstream catchment area of ~64,284 ha. The catchment is 6.0% dairy/dairy support, 16.0% native bush, 59.9% sheep and beef and 0.3% arable. The remaining area (17.9%) is a variety of 'other' land uses including lifestyle, mixed, horticulture and urban of which no mitigations are applied. Land retirement of 158 ha of mature trees (>10 years) occurs by 2080 (0.25% of the catchment at a rate of ~2.5 ha/yr since 2017) while 580 ha of pole planted land is mature by 2080 and contributing to reduced loads (0.9% of the catchment at a rate of 9.2 ha/yr from 2017). Stock exclusion and nearly 100% land treatment of the Masterton Waste Water Treatment Plant also contributes to reduced SSC loads, with the combined mitigations decreasing 50th and 95th SSC percentiles up to 13.5% and 15.9% by BAU 2080.

Silver and Gold scenarios lead to a significant increase in pole planting, peaking at 5,914 ha of mature trees by 2080 (9.2% of the catchment). This is equivalent to space planting upstream of this reporting point at a rate of ~93.9 ha/yr from 2017. Land retirement also rises to 3,008 ha (4.7% of catchment at a rate of 47.7 ha/yr). Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. Coupled with 100% land treatment at Masterton WWTP, these combined effects on a catchment dominated by farming landuses results in decreases of Silver and Gold median and 95th SSC percentiles by 37.8% and 42.3%, respectively in 2080.

Location

Ruamahanga River at Wardells

Waipoua River at Colombo Rd Bridge — Ruamahanga River at Te Ore Ore

Whangaehu River at 250m from Ruamahanga Confluence

Ruamahanga River at Wardells

Waingawa River at South Rd

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	2322 (3.6%)	1518 (2.4%)	161 (0.3)	38490 (59.9%)	10298 (16.0%)	11495 (17.9%)	64284

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	0	158	0	1241	3008	0	3008	3008
Pole Planting	0	49	580	0	2444	5914	0	2444	5914

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.
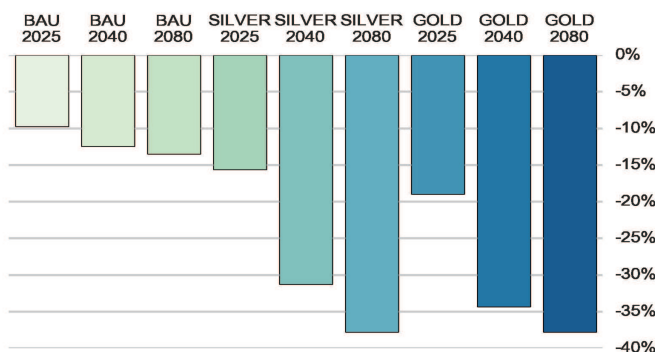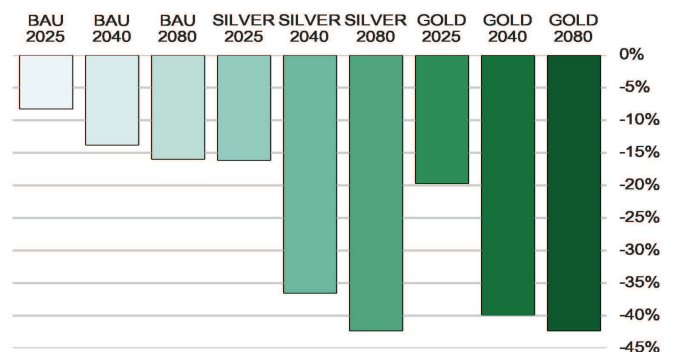
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	13.7	12.4	12.0	11.8	11.6	9.4	8.5	11.1	9.0	8.5
95th Percentile (mg/L)	280.0	256.9	241.5	235.4	234.8	177.8	161.7	224.9	168.3	161.7
Median (% change from Baseline)		-9.7%	-12.5%	-13.5%	-15.6%	-31.2%	-37.8%	-19.0%	-34.3%	-37.8%
95th Percentile (% change from Baseline)		-8.2%	-13.8%	-15.9%	-16.1%	-36.5%	-42.3%	-19.7%	-39.9%	-42.3%

Median (% change from Baseline)

95th Percentile (% change from Baseline)

Tauanui River at Mouth
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS®

Ruamāhanga
Whaitua
Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.
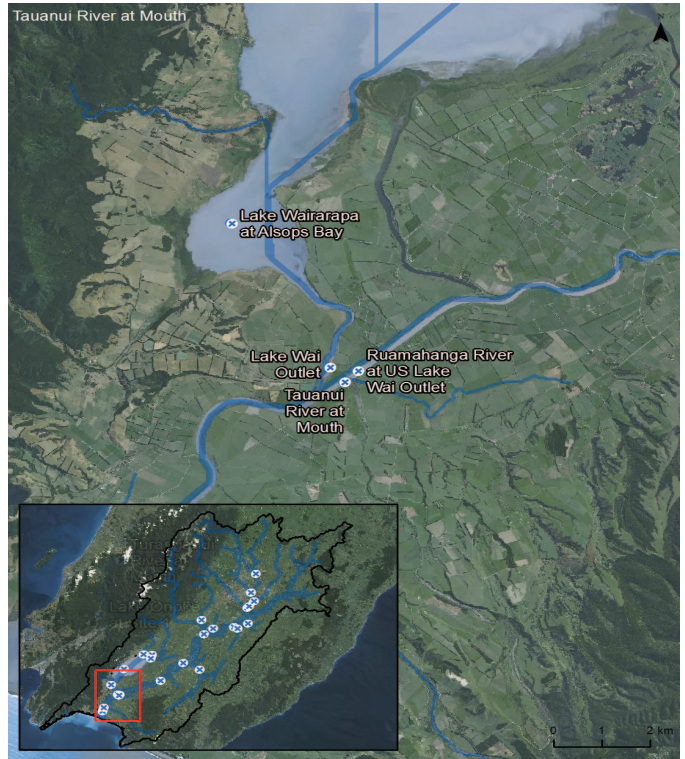
Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

Tauanui River Mouth has an upstream catchment area of ~4,155 ha. The catchment is largely native bush (61.0%), with some sheep and beef (14.9%) and no dairy/dairy support. The remaining area (24.1%) is a variety of 'other' land uses including lifestyle, sheep and mixed of which no mitigations are applied. In BAU 2080 there is no land retirement or pole planting in the catchment. Stock exclusion is the only mitigations reducing SSC loads, resulting in a decrease in the 50th and 95th SSC percentiles in this catchment by up to 14.7% and 15.0%, respectively, by BAU 2080.

In Silver and Gold scenarios, pole planting peaks at 159 ha or 4% of the catchment, equivalent to a planting rate of ~ 2.5 ha/yr from 2017, and the amount of retired land increases to 8 ha or 0.2% of the catchment, equivalent to a retirement rate of ~0.1 ha/yr from 2017. Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. These combined effects on a catchment with mixed native bush and farming landuses results in decreases in the Silver and Gold median and 95th percentiles of up to ~44%, simulated in both scenarios by 2080.

Location

Tauanui River at Mouth

Lake Wairarapa at Alsops Bay

Lake Wai Outlet

Ruamahanga River at US Lake Wai Outlet

Tauanui River at Mouth

0 1 2 km

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	-	-	-	617 (14.9%)	2535 (61.0%)	1003 (24.1%)	4155

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	0	0	0	5	8	0	8	8
Pole Planting	0	0	0	0	3	159	0	3	159

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.
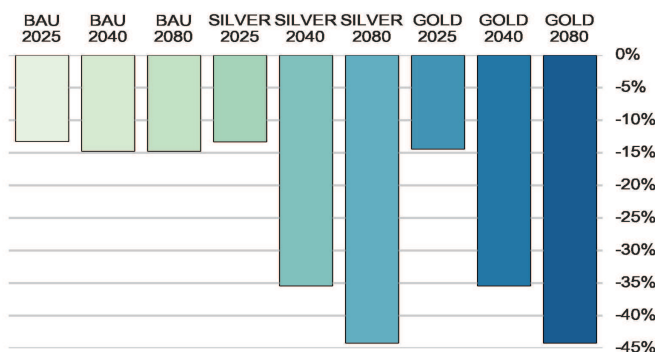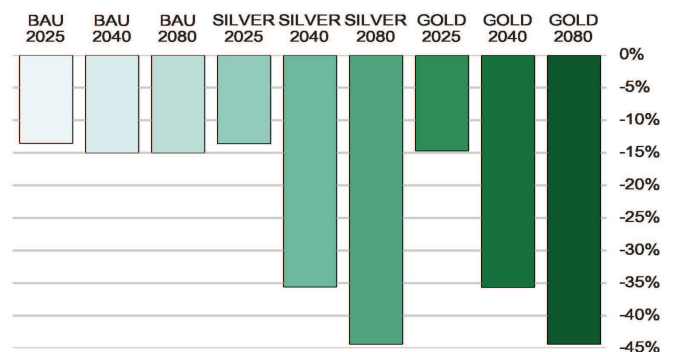
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.4	0.4
95th Percentile (mg/L)	64.1	55.4	54.5	54.5	55.4	41.3	35.7	54.7	41.3	35.7
Median (% change from Baseline)		-13.2%	-14.7%	-14.7%	-13.3%	-35.4%	-44.2%	-14.4%	-35.4%	-44.2%
95th Percentile (% change from Baseline)		-13.5%	-15.0%	-15.0%	-13.5%	-35.6%	-44.4%	-14.7%	-35.6%	-44.4%

Median (% change from Baseline)

95th Percentile (% change from Baseline)

Taueru River at Gladstone
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS

Ruamāhanga
Whaitua
Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.

Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

The Taueru River at Gladstone has an upstream catchment area of ~49,244 ha. The catchment is 1.1% dairy/dairy support, 0.5% native bush, 80.5% sheep and beef and 1.2% arable. The remaining area (16.7%) are all 'other' land uses including lifestyle, plantation forestry, mixed and horticulture of which no mitigations are applied. No land retirement occurs in BAU, while 2,241 ha of pole planted land is mature by 2080 and contributing to reduced loads (4.5% of catchment at a rate of 35.6 ha/yr from 2017). Stock exclusion also contributes to reduced SSC loads, with the combined mitigations decreasing 50th and 95th SSC percentiles up to 36.7% and 36.6% by BAU 2080.

Silver and Gold scenarios lead to a significant increase in pole planting, peaking at 8,198 ha of mature trees by 2080 (16.6% of the catchment). This is equivalent to space planting upstream of this reporting point at a rate of ~130 ha/yr from 2017. Land retirement also rises to 3,310 ha (6.7% of catchment at a rate of 52.5 ha/yr). Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. These combined effects on a catchment dominated by farming landuses results in decreases of the Silver and Gold median and 95th percentiles of up to 67.4% and 67.5%, respectively in 2080.
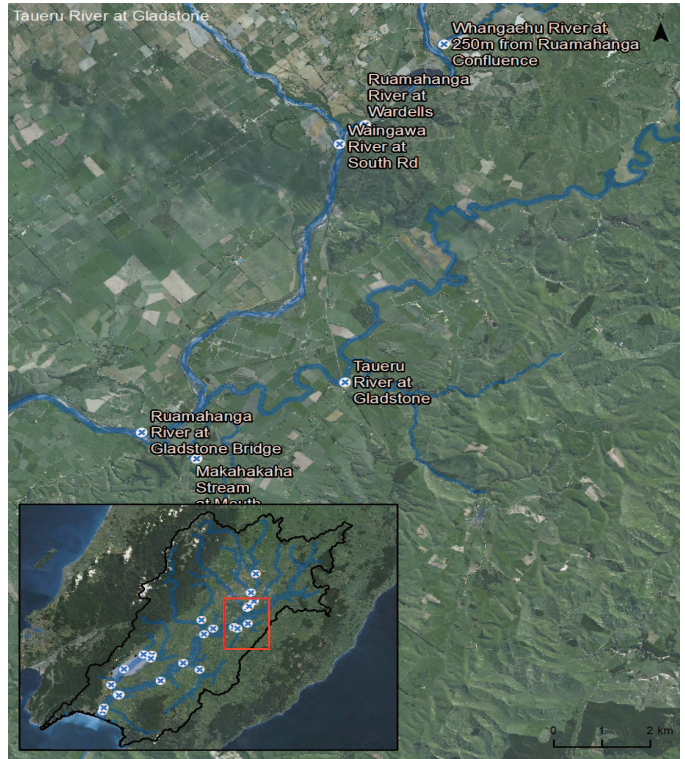
Location

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	298 (0.6%)	246 (0.5%)	587 (1.2)	39655 (80.5%)	242 (0.5%)	8217 (16.7%)	49244

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	0	0	0	1213	3310	0	3310	3310
Pole Planting	0	658	2241	0	1414	8198	0	1414	8198

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.

Disclaimer: This fact sheet should be read in conjunction with the report "IZ090000_RP_Rua_Scenarios_Ecological Health_Rev1", which provides further details on the scenario modelling, mitigations, assumptions and limitations. The results presented are based off modelling outputs and may not be an exact match to the observed data, which is dependent on the flow and water quality calibration achieved at various modelling sites.
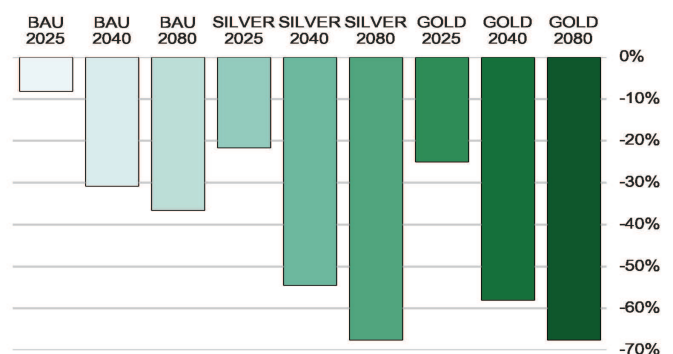
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	43.5	39.9	29.8	27.5	34.3	19.9	14.2	32.6	18.5	14.2
95th Percentile (mg/L)	821.1	754.6	568.6	520.8	643.8	373.8	267.2	615.7	345.1	267.1
Median (% change from Baseline)		-8.4%	-31.6%	-36.7%	-21.3%	-54.2%	-67.4%	-25.1%	-57.6%	-67.4%
95th Percentile (% change from Baseline)		-8.1%	-30.7%	-36.6%	-21.6%	-54.5%	-67.5%	-25.0%	-58.0%	-67.5%

Median (% change from Baseline)
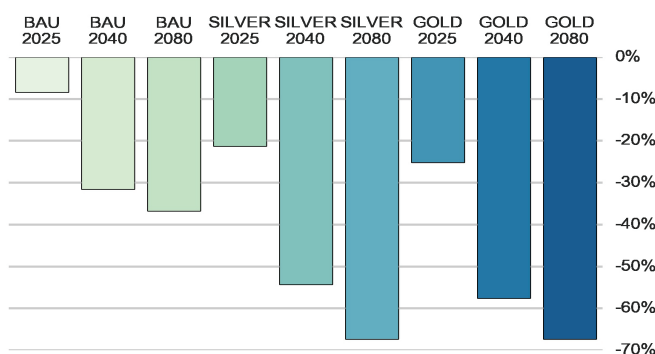
95th Percentile (% change from Baseline)

Tauherenikau River at Websters
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS®

Ruamāhanga Whaitua Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.
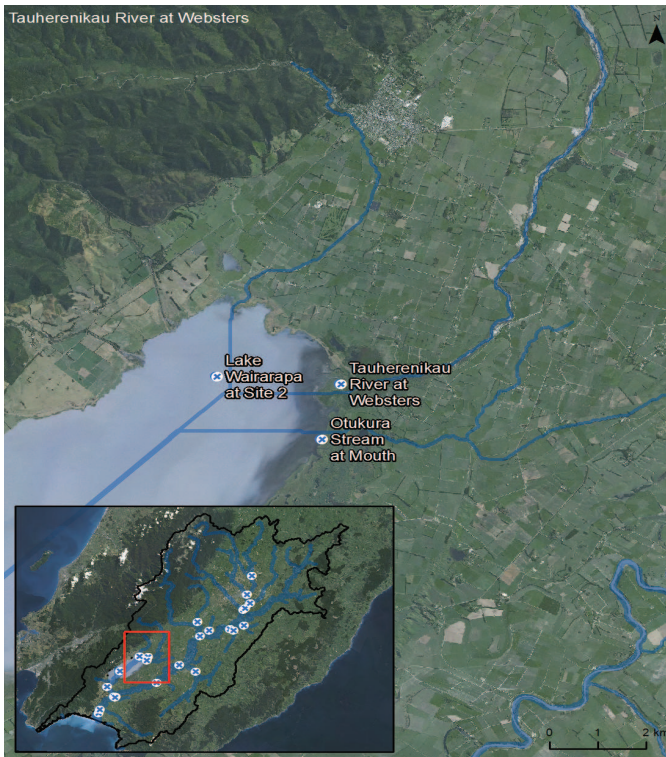
Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

Tauherenikau River at Websters has an upstream catchment area of ~14,481 ha. The catchment is largely native bush (77.7%) with some sheep and beef (6.5%) and dairy/dairy support (4.7%). The remaining area (11.0%) is a variety of 'other' land uses including lifestyle and mixed which no mitigations are applied. During BAU 2080, no land is retired and 34 ha of pole planting is >15 years old and considered to reduce SSC loads. Stock exclusion also contributes to reduced SSC loads, and with the combined mitigations there is a decrease in the 50th and 95th SSC percentiles in this catchment by up to 12.7% and 13.1%, respectively, by BAU 2080.

In Silver and Gold scenarios pole planting increases and peaks at 530 ha or 3.7% of the catchment, equivalent to a planting rate of ~ 8.5 ha/yr since 2017, but no land is retired. Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. In a catchment dominated by native bush where no mitigation is applied, the effects of the combined mitigations on sheep and beef and dairy landuses results in minor simulated decreases in the Silver and Gold median and 95th percentiles up to 13.6% and 14.0%, in both scenarios by 2080.

Location

Tauherenikau River at Websters

Lake Wairarapa at Site 2

Tauherenikau River at Websters

Otukura Stream at Mouth

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	267 (1.8%)	419 (2.9%)	-	944 (6.5%)	11255 (77.7%)	1596 (11.0%)	14481

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	0	0	0	0	0	0	0	0
Pole Planting	0	0	34	0	473	530	0	473	530

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.

Disclaimer: This fact sheet should be read in conjunction with the report "IZ090000_RP_Rua_Scenarios_Ecological Health_Rev1", which provides further details on the scenario modelling, mitigations, assumptions and limitations. The results presented are based off modelling outputs and may not be an exact match to the observed data, which is dependent on the flow and water quality calibration achieved at various modelling sites.
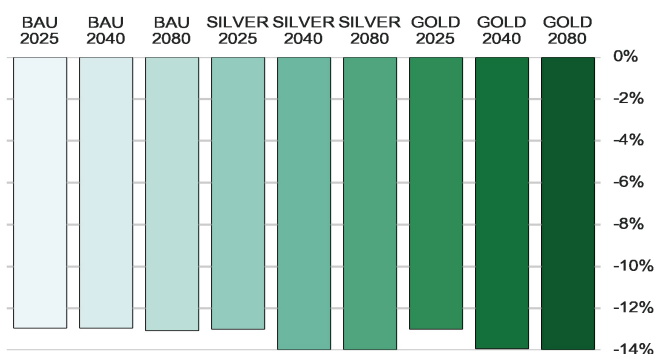
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	6.4	5.6	5.6	5.6	5.6	5.5	5.5	5.6	5.5	5.5
95th Percentile (mg/L)	133.7	116.4	116.4	116.2	116.3	115.0	115.0	116.3	115.1	115.0
Median (% change from Baseline)		-12.6%	-12.6%	-12.7%	-12.7%	-13.6%	-13.6%	-12.7%	-13.6%	-13.6%
95th Percentile (% change from Baseline)		-12.9%	-12.9%	-13.1%	-13.0%	-14.0%	-14.0%	-13.0%	-13.9%	-14.0%

Median (% change from Baseline)
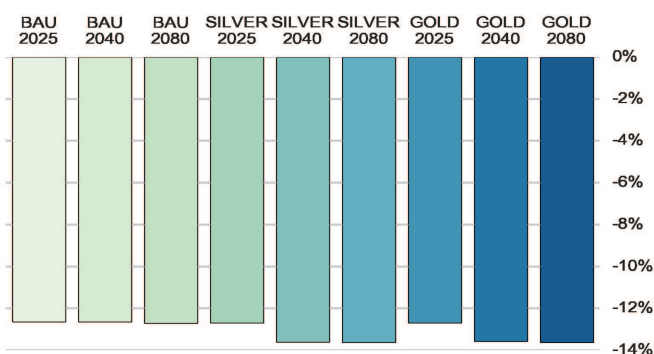
95th Percentile (% change from Baseline)

Turanganui River at Mouth
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS

Ruamāhanga
Whaitua
Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.

Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

Turanganui River Mouth has an upstream catchment area of ~6,740 ha. The majority of the catchment is native bush (51.8%), with some sheep and beef (26.8%) and dairy and dairy support (4.5%). The remaining area (16.9%) is a variety of 'other' land uses including lifestyle and mixed of which no mitigations are applied. During BAU 2080, limited land retirement is mature (~67 ha) and only 99 ha of mature pole planting is present, equivalent to ~1.5 ha/yr from 2017. Stock exclusion also contributes to reduced SSC loads, and with the combined mitigations there is a decrease in both the 50th and 95th SSC percentiles by up to 18.1% by BAU 2080.

In Silver and Gold scenarios, pole planting increases and retired land decreases slightly compared to BAU. Pole planting peaks at 831 ha or 12.3% of the catchment, equivalent to a planting rate of ~13.2 ha/yr since 2017, and retired land peaks at 131 ha or 1.9% of the catchment, equivalent to a rate of ~2 ha/yr since 2017. Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. In a catchment of primarily native bush, the effects of the combined mitigations, primarily pole planting and retirement, results in a noticeable decrease of both the Silver and Gold median and 95th percentiles of up to 61.5% simulated by 2080.

Location

Turanganui River at Mouth

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	260 (3.9%)	38 (0.6%)	-	1810 (26.8%)	3491 (51.8%)	1141 (16.9%)	6740

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	67	67	0	123	131	0	131	131
Pole Planting	0	70	99	0	739	831	0	739	831

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.
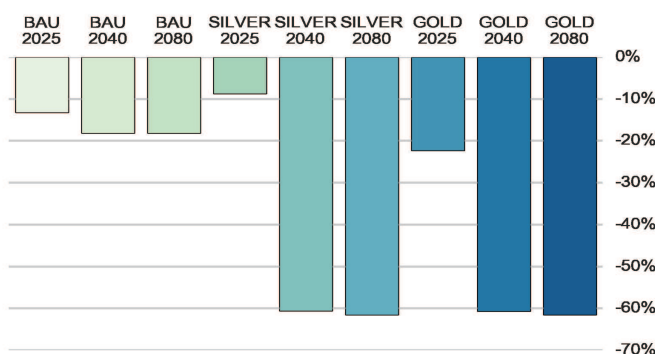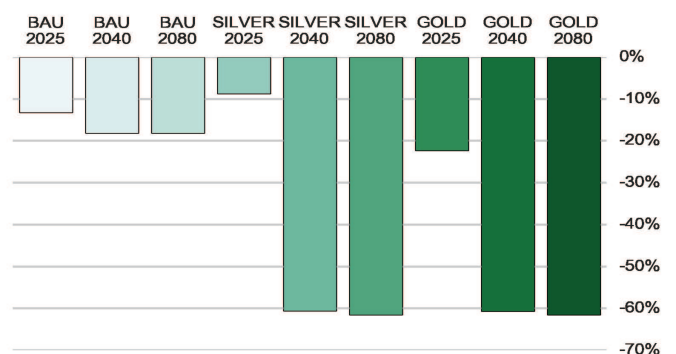
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	1.4	1.2	1.1	1.1	1.3	0.5	0.5	1.1	0.5	0.5
95th Percentile (mg/L)	104.2	90.4	85.3	85.3	95.1	41.1	40.1	81.0	41.0	40.1
Median (% change from Baseline)		-13.2%	-18.1%	-18.1%	-8.7%	-60.5%	-61.5%	-22.3%	-60.7%	-61.5%
95th Percentile (% change from Baseline)		-13.2%	-18.1%	-18.1%	-8.7%	-60.5%	-61.5%	-22.3%	-60.7%	-61.5%

Median (% change from Baseline)

95th Percentile (% change from Baseline)

Waingawa River at South Rd
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS

Ruamāhanga Whaitua Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.

Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

Waingawa River at South Road has an upstream catchment area of ~14,969 ha. The catchment is primarily native bush (65.8%), with some sheep and beef (16.0%) and dairy and dairy support (2.3%). The remaining area (15.9%) is a variety of 'other' land uses including lifestyle and mixed of which no mitigations are applied. By BAU 2080, mature land retired (>10 years old) is ~7 ha, while 324 ha of mature pole planted land (~2% of the catchment at a rate of 5.1 ha/yr from 2017) will be contributing to reduced SSC loads. Coupled with stock exclusion, combined mitigations lead to a decrease in the 50th and 95th SSC percentiles by up to 10.5% and 11.1%, respectively, by BAU 2080.

In Silver and Gold scenarios, there is a considerable increase in pole planting but a decrease in retired land compared to BAU. Land retirement is minimal, ~5 ha while pole planting covers 2,488 ha or 5.3% of the catchment, equivalent to a planting rate of ~14.2 ha/yr from 2017. Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. In a catchment of primarily native bush, the effects of the combined mitigations on dairy and sheep and beef land uses results in only a marginal decrease of the Silver and Gold median and 95th SSC percentiles of up to 14.6% and 15.2%, respectively, simulated by 2080.
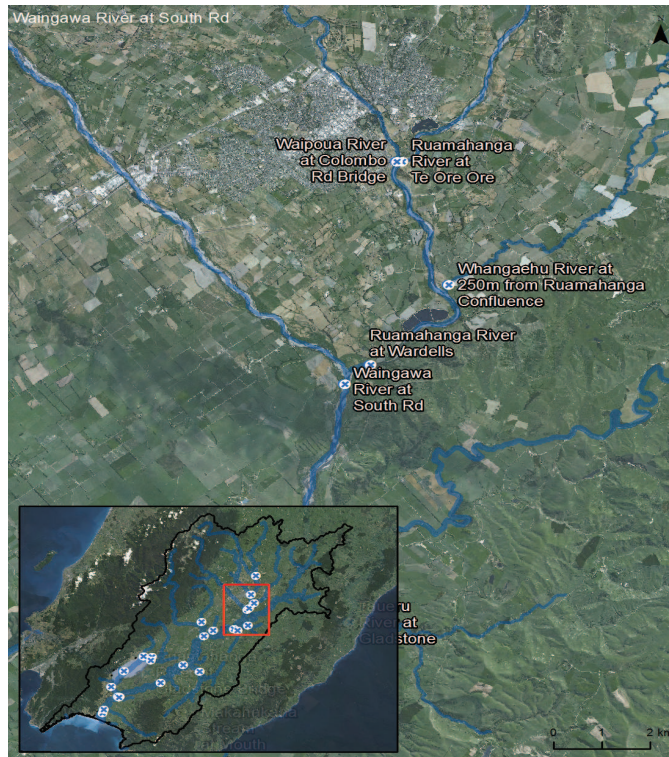
Location

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	215 (1.4%)	127 (0.9%)	-	2389 (16.0%)	9856 (65.8%)	2382 (15.9%)	14969

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	0	7	0	0	5	0	5	5
Pole Planting	0	0	324	0	1529	2488	0	1529	2488

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.
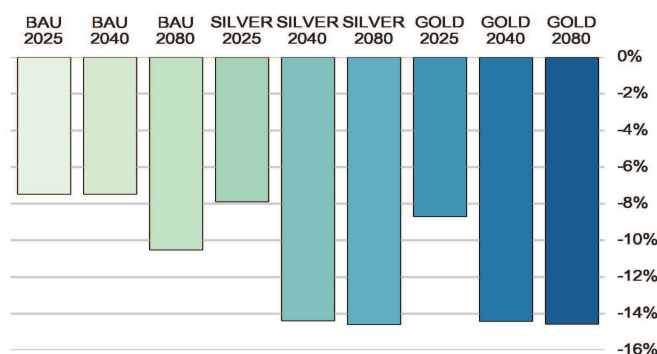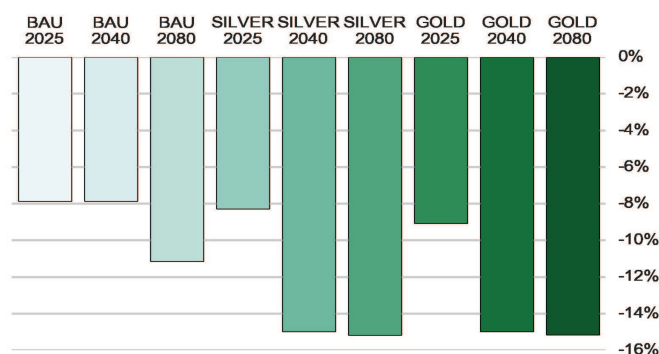
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	18.1	16.8	16.8	16.2	16.7	15.5	15.5	16.5	15.5	15.5
95th Percentile (mg/L)	253.2	233.3	233.3	225.0	232.3	215.3	214.8	230.3	215.3	214.8
Median (% change from Baseline)		-7.5%	-7.5%	-10.5%	-7.9%	-14.4%	-14.6%	-8.7%	-14.4%	-14.6%
95th Percentile (% change from Baseline)		-7.9%	-7.9%	-11.1%	-8.3%	-15.0%	-15.2%	-9.1%	-15.0%	-15.2%

Median (% change from Baseline)

95th Percentile (% change from Baseline)

Waiohine River at Bicknells
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS®

Ruamāhanga
Whaitua
Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.

Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

The Waiohine River at Bicknells is a reporting site slightly upstream of the confluence with the Ruamahanga River. The upstream catchment area is ~39,320 ha. The catchment is 18.0% dairy/dairy support, 60.1% native bush, 9.1% sheep and beef and 0.6% arable. The remaining area (12.1%) are all 'other' land uses including lifestyle, mixed, urban and horticulture of which no mitigations are applied. No land retirement occurs in this catchment in all scenarios, while 872 ha of pole planted land is mature in BAU by 2080 and contributing to reduced loads (2.2% of catchment at a rate of 13.8 ha/yr from 2017). Stock exclusion and land treatment of up to 85% of the upstream Carterton Waste Water Treatment Plant (WWTP) also contributes to reduced SSC loads, with the combined mitigations decreasing 50th and 95th SSC percentiles up to 12.6% and 11.8% by BAU 2080.

Silver and Gold scenarios lead to a significant increase in pole planting, peaking at 2,629 ha of mature trees by 2080 (6.7% of the catchment). This is equivalent to space planting upstream of this reporting point at a rate of ~41.7 ha/yr from 2017. Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of ~5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. Coupled with 100% land treatment of the Carterton WWTP, these combined effects decrease Silver and Gold median and 95th percentiles by 15.3% and 15.6%, respectively in 2080. The significant native bush catchment area and lower sediment loads means mitigations have less effect at this site.

Location

Waiohine River at Bicknells

Mangatarere
River at SH2

Parkvale
Stream
at weir

Waiohine
River at
Bicknells

0 1 2 km

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	6070 (15.4%)	1036 (2.6%)	227 (0.6)	3595 (9.1%)	23641 (60.1%)	4750 (12.1%)	39320

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	0	0	0	0	0	0	0	0
Pole Planting	0	2	872	0	1599	2629	0	1599	2629

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.
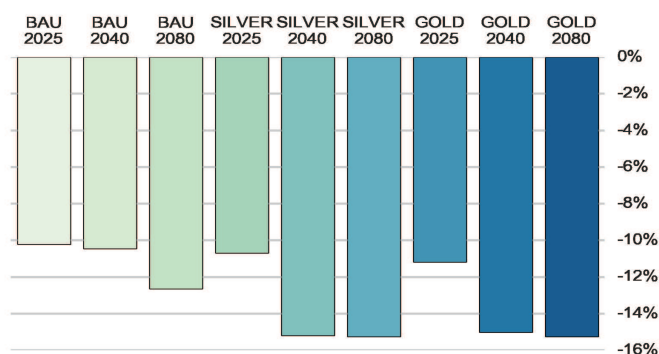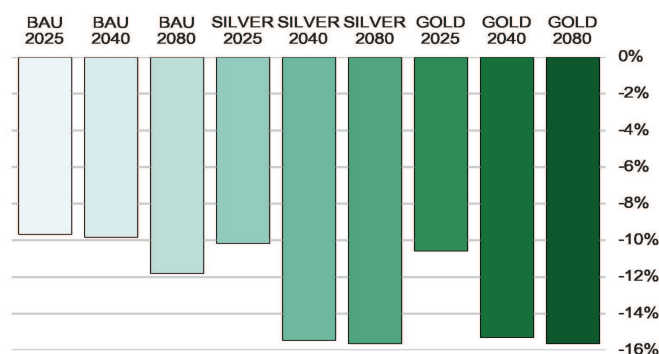
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	7.6	6.8	6.8	6.6	6.8	6.5	6.5	6.8	6.5	6.5
95th Percentile (mg/L)	167.6	151.4	151.1	147.8	150.6	141.7	141.4	149.9	141.9	141.4
Median (% change from Baseline)		-10.2%	-10.4%	-12.6%	-10.7%	-15.2%	-15.3%	-11.2%	-15.0%	-15.3%
95th Percentile (% change from Baseline)		-9.7%	-9.8%	-11.8%	-10.2%	-15.5%	-15.6%	-10.6%	-15.3%	-15.6%

Median (% change from Baseline)

95th Percentile (% change from Baseline)

Waipoua River at Colombo Rd Bridge
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS®

Ruamāhanga
Whaitua
Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.

Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

The Waipoua River at Colombo Road Bridge is a reporting site in the upper Ruamahanga, with an upstream catchment area is ~17,542 ha. The catchment is 4.8% dairy/dairy support, 16.1% native bush, 56.5% sheep and beef and 0.6% arable. The remaining area (22%) are all 'other' land uses including lifestyle, mixed, urban and horticulture of which no mitigations are applied. 105 ha of land (0.6% of catchment at a rate of 1.7 ha/yr from 2017) is retired and mature (>10 years old), while 301 ha of pole planted land is mature and contributing to reduced loads in this catchment by BAU 2080 (1.7% of catchment at a rate of 4.8 ha/yr from 2017). Stock exclusion also contributes to reduced SSC loads, with the combined mitigations decreasing 50th and 95th SSC percentiles up to 24.1% and 23.2% by BAU 2080.

Silver and Gold scenarios lead to an increase in pole planting, peaking at 1,548 ha of mature trees by 2080 (8.8% of the catchment). This is equivalent to space planting upstream of this reporting point at a rate of ~24.6 ha/yr from 2017. Land retirement has also increased to 454 ha (2.5% of the catchment at a rate of 7.2 ha/yr). Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. These combined effects decrease Silver and Gold median and 95th percentiles by 48.5% and 47.8%, respectively in 2080. The significant farming catchment (>60% of area) meant mitigations have greater effect on simulated SSC load at this site.

Location
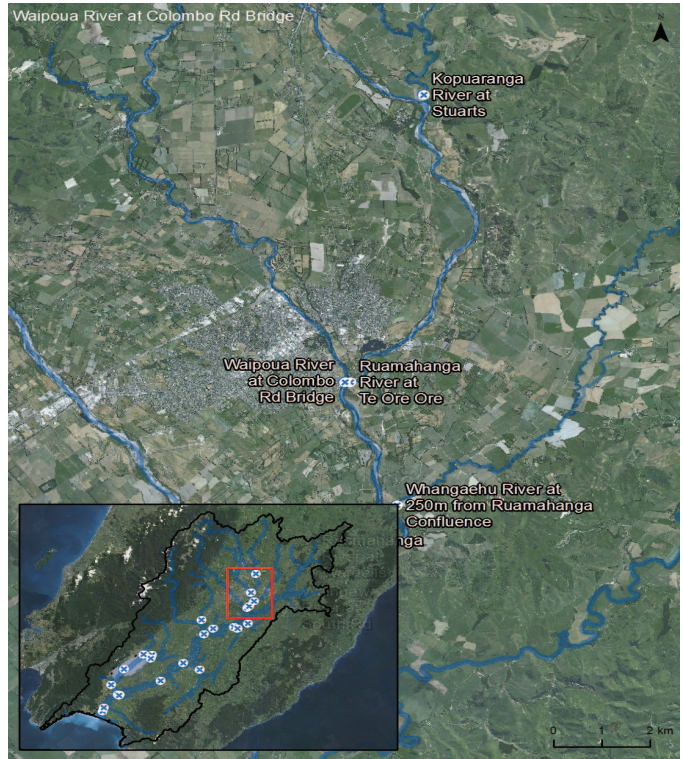
Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	173 (1.0%)	670 (3.8%)	113 (0.6)	9862 (56.5%)	2802 (16.1%)	3832 (22.0%)	17452

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	0	105	0	314	454	0	454	454
Pole Planting	0	8	301	0	914	1548	0	914	1548

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.
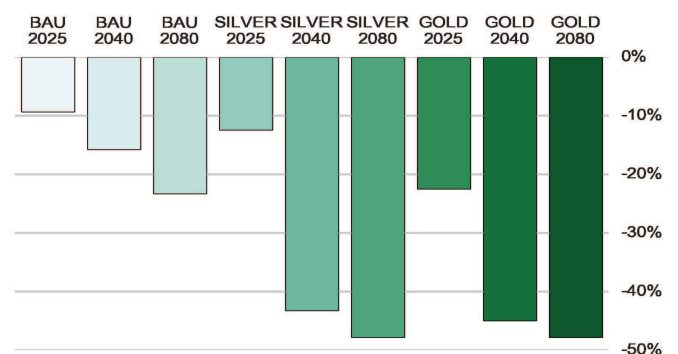
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	3.0	2.7	2.5	2.3	2.6	1.7	1.5	2.3	1.6	1.5
95th Percentile (mg/L)	141.1	128.0	118.9	108.3	123.6	80.1	73.7	109.4	77.7	73.7
Median (% change from Baseline)		-9.8%	-16.5%	-24.1%	-12.8%	-44.2%	-48.5%	-22.7%	-45.6%	-48.6%
95th Percentile (% change from Baseline)		-9.3%	-15.8%	-23.2%	-12.4%	-43.2%	-47.8%	-22.5%	-44.9%	-47.8%

Median (% change from Baseline)
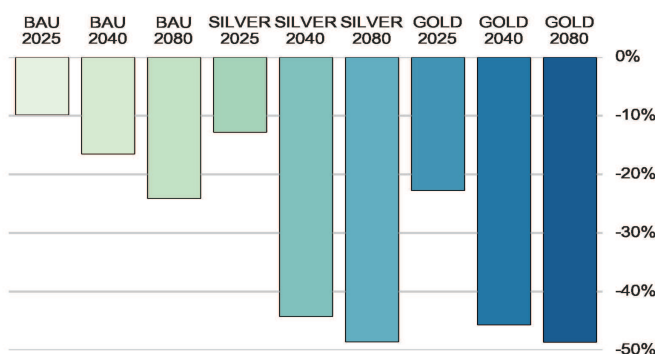
95th Percentile (% change from Baseline)

Whangaehu River at 250m from Ruamahanga Confluence
Suspended Sediment Concentration (SSC)
Revision 1 DRAFT
Date: 2017-11-10

JACOBS

Ruamāhanga Whaitua Committee

Introduction

This fact sheet presents results generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. Suspended Sediment Concentration (SSC) has no limit setting criteria defined in the National Policy Statement for Freshwater Management 2014 (amended 2017), however is required to be considered in relation to ecosystem health.
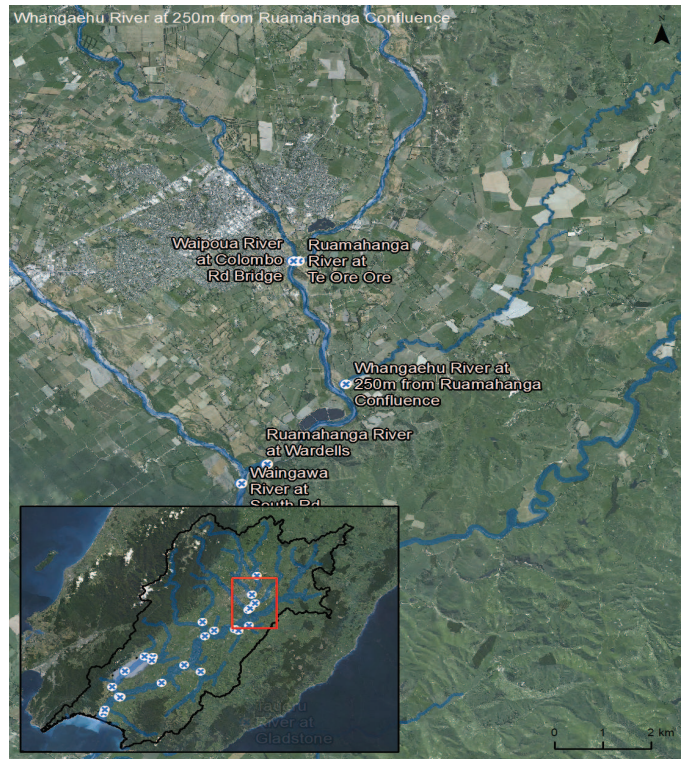
Summary

See Table 1, 2, and 3 for reference to the statistics presented in the summary below.

The mitigations applied in scenario modelling have various influences on sediment loads generated from SedNetNZ. Retiring land results in changes of landuse classes to 'native bush', with a large decrease in sediment load. Pole planting reduces erosion on the SedNetNZ hillslope layer at the relevant landuse by 70% when trees are mature (>15 years old). Stock exclusion and riparian planting result in an ~80% reduction in sediment load generated from a net bank erosion layer in SedNetNZ. This reduction has been applied at tier 1 (rather than tier 3) in modelling, with the effects of this captured in BAU, Gold and Silver.

The Whangaehu River at 250m from Confluence has an upstream catchment area of ~14,578 ha. The catchment is primarily sheep and beef (70.9%), with some dairy and dairy support (8.4%) and no native bush. The remaining area (20.4%) is a variety of 'other' land uses including lifestyle, mixed, forestry and arable of which limited mitigations are applied. In BAU 2080, no land is retired while 274 ha of land is pole planted and mature (representing ~2% of the catchment), equivalent to a planting rate of ~4.3 ha/yr from 2017. Stock exclusion also contributes to reduced SSC loads, and with the combined mitigations there is a decrease in the 50th and 95th SSC percentiles by up to 11.4% and 28.7%, respectively, by BAU 2080.

In Silver and Gold scenarios, there is a significant increase in land retirement and pole planting in the catchment. Land retirement is up to 1,286 ha or 8.8% of the catchment, equivalent to a rate of ~20.5 ha/yr from 2017, and pole planting peaks at 1,750 ha or 12% of the catchment, equivalent to a planting rate of ~ 27.7 ha/yr from 2017. Tier 2 mitigations such as constructed wetlands lead to further decreases in SSC load of 5.8–6.4% on dairy landuses, and 20.7% on sheep and beef. These combined effects on a catchment dominated by farming landuses results in significant decreases of the Silver and Gold median and 95th percentiles of up to 74.1% and 66.6%, respectively, simulated by 2080.

Location

Whangaehu River at 250m from Ruamahanga Confluence

Waipoua River at Colombo Rd Bridge

Ruamahanga River at Te Ore Ore

Whangaehu River at 250m from Ruamahanga Confluence

Ruamahanga River at Wardells

Waingawa River at South Rd

River at Gladstone

Scenario Input Data

Table 1. Current landuse area in ha (% of total)

	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Baseline Landuse	915 (6.3%)	299 (2.1%)	45 (0.3)	10335 (70.9%)	5 (0.0%)	2979 (20.4%)	14578

Table 2. Mitigation (area in ha)

Mitigation*	BAU 2025	BAU 2040	BAU 2080	Silver 2025	Silver 2040	Silver 2080	Gold 2025	Gold 2040	Gold 2080
Retirement	0	0	0	0	452	1286	0	1286	1286
Pole Planting	0	37	274	0	512	1750	0	512	1750

*Retirement is effective for SSC at >10 years. Pole planting is effective at >15 years. Area given here is not reflective of the total area planted in the catchment.
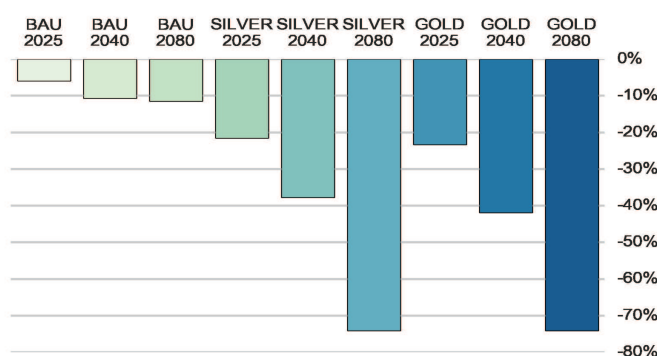
Scenario Results

Table 3. Water quality statistics

Statistic	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Median (mg/L)	3.4	3.2	3.1	3.0	2.7	2.1	0.9	2.6	2.0	0.9
95th Percentile (mg/L)	394.0	370.0	300.5	281.0	299.4	173.6	131.7	300.7	153.8	131.7
Median (% change from Baseline)		-6.0%	-10.6%	-11.4%	-21.6%	-37.8%	-74.1%	-23.3%	-41.9%	-74.1%
95th Percentile (% change from Baseline)		-6.1%	-23.7%	-28.7%	-24.0%	-55.9%	-66.6%	-23.7%	-61.0%	-66.6%

Median (% change from Baseline)

95th Percentile (% change from Baseline)