2016/24 Wetland health monitoring

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For the latest available results go to the GW environmental data hub. Reports for previous years can be found in the GW document library.

Overview

Wetlands are defined as “permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions” (RMA). It is estimated that only 2.3% of the original wetland extent remains in the Wellington region (Ausseil et al. 2003).

The National Policy Statement for Freshwater Management 2020 requires that “there is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.” Greater Wellington’s (GW) Natural Resources Plan (NRP) contains policies and rules and methods intended to achieve this protection and improve the health of the regions remaining wetlands.

GW also has a Key Native Ecosystem (KNE) programme which aims to improve ecological outcomes at selected high value ecological sites, which includes 47 of the region’s wetlands.

The aim of the State of the Environment Wetland Health Monitoring Programme is to monitor the state and trend of wetlands in the region to determine the effectiveness of GW policies and interventions through the KNE programme and other wetland management programmes.

Monitoring objectives

The work described here aims to monitor:

1. the state and trend of wetland health in the Wellington region,
2. the effectiveness of the Natural Resources Plan (NRP) policies, rules and methods, and
3. the outcomes of management at selected wetland sites.

Monitoring networks

The 150 wetlands included in the programme are a selection of the 211 wetlands scheduled in the proposed Natural Resources Plan. It includes all 14 wetlands that are designated “Outstanding”, 47 “Significant” wetlands which are managed by the KNE programme and a random selection of the remaining “Significant” wetlands spread across the five whaitua catchment (main river catchments).

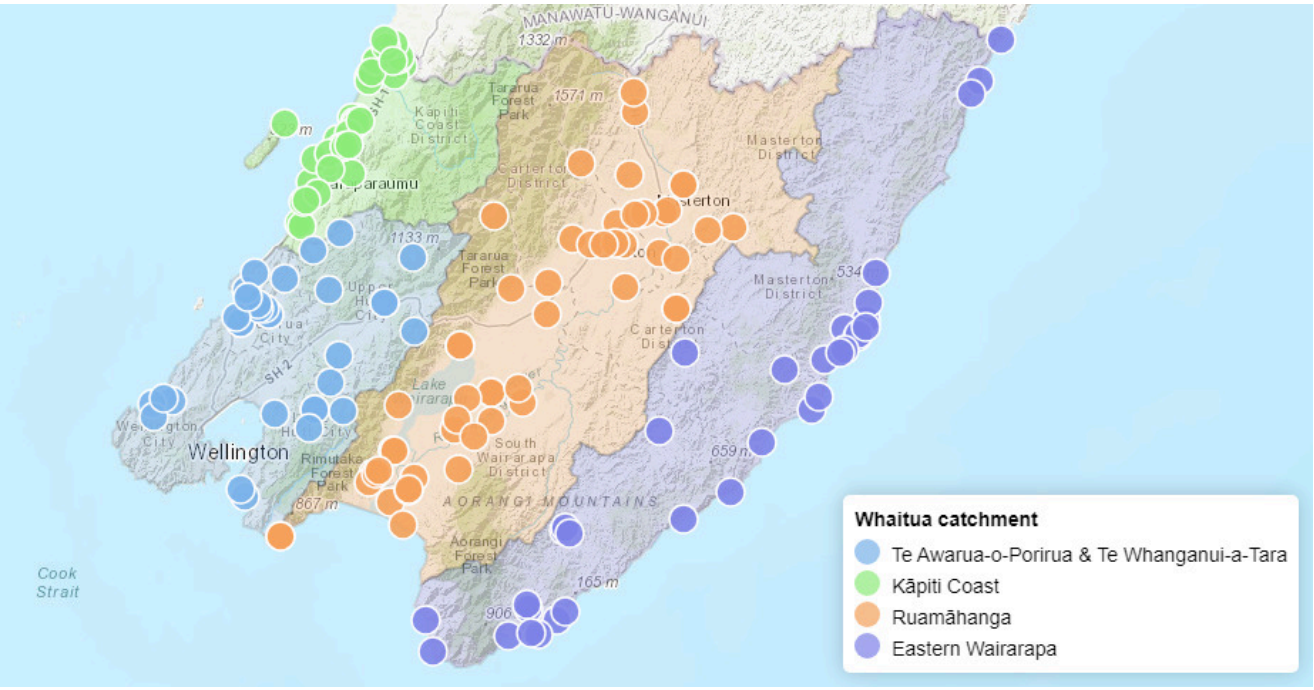


Figure 1: Currently surveyed wetland sites coloured by whaitua.

Table 1: A wetland health survey of 30 sites is carried out during summer each year, with some sites resampled to assess change, and new wetland sites added to increase coverage. Faunal surveys are carried out each year in spring at a small number of the sites surveyed.

		Health		Fauna	
Whaitua catchment	**Year**	**Total**	**KNE**	**Total**	**KNE**
Kāpiti Coast	2018	30	16	1	1
	2021	7	–	2	–
	2023	27	–	6	1
Te Awarua-o-Porirua & Te Whanganui-a-Tara	2019	30	6	6	3
	2021	1	–	–	–
Ruamāhanga	2017	30	4	3	1
	2021	19	1	3	–
	2022	30	4	4	2
Eastern Wairarapa	2020	30	7	5	1
	2021	3	2	–	–

Methods

Wetland health

Wetland monitoring followed Clarkson et al. (2003), with adaptations from Clarkson et al. (2013a & 2013b). The following indices/attributes were surveyed:

- Wetland Condition Index
- Wetland Pressure Index
- Vegetation composition

The Wetland Condition Index is a composite index that uses indicators of the following components of wetland health:

- Hydrologic integrity
- Physiochemical parameters
- Ecosystem intactness
- Browsing/predation/harvesting
- Dominance of native plants

Assessments were made at both the wetland scale and at a more detailed plot level. A Wetland Pressure Index was also scored at the landscape scale for each wetland.

The vegetation composition was sampled in 5m x 5m plots randomly located off a sampling grid in all plant communities covering > 20% of the terrestrial area of the wetland.

Wetland faunal survey

Sampling of birds and fish was conducted in spring. Gee-minnow traps (3mm mesh) and finemesh fyke nets with exclusion chambers were set overnight and retrieved at first light to minimise hypoxia risk. Up to five fyke nets and 10 Gee-minnow traps were deployed at each site where accessibility allowed. Species, numbers and size classes were recorded for fish. All fish were released alive at their capture location.

Wetland birds were surveyed from the margins of each wetland using playback calls for spotless and marsh crake. Surveys were conducted between 3pm and midnight, and in the morning starting 1 hour after midnight. Listening for bittern calls took place between 3am and 1 hour after sunrise. Recording devices were also left at each wetland for 4-6 weeks and were pre-set to record bird call for 4 hours at dusk and 2 hours before dawn. Species, number and location were recorded for wetland birds.

Wetland health results

Wetland health monitoring data are summarised for each whaitua catchment (main river catchment) in the Greater Wellington (GW) region. These summarise are presented in the following section by maps that show whaitua catchment outlines filled by the colours described in the bottom right legend box. The circles and arrows over each whaitua catchment represent changes in wetlands that have been surveyed across multiple years. “KNE only” maps filter whaitua catchment summaries to only include wetlands managed under the GW Key Native Ecosystem (KNE) programme. Data tables are available in Appendix 1 and methodology is described in the previous section.

All data summaries are derived for each wetland plot, averaged across the wetland, then averaged across the whaitua catchment. Change assessments in each whaitua catchment consider the absolute and percentage change of each summary statistic for only the wetlands that have had been surveyed across multiple years. Since only some wetlands in each whaitua catchment are scheduled to be resampled, the summaries from the previous and latest surveys may not always match the absolute change values. Increases greater than +10% and decreases greater than -10% are presented by up and down arrows respectively. Changes less than plus or minus 10% are depicted by the horizontal right arrows, and a filled circle is used when there were no wetlands resurveyed to be used for the change assessment.

Vegetation composition

Vegetation composition is assessed by marking out 5 by 5 metre plots within each vegetation type in a wetland. All species are identified and classified as “Indigenous” (endemic or non-endemic) and “Exotic”. Two key summaries of vegetation composition are presented:

- **Indigenous species dominance**: percent of total species recorded that are indigenous.
- **Indigenous cover dominance**: percent of total vegetated area covered by indigenous species.

Indigenous species dominance

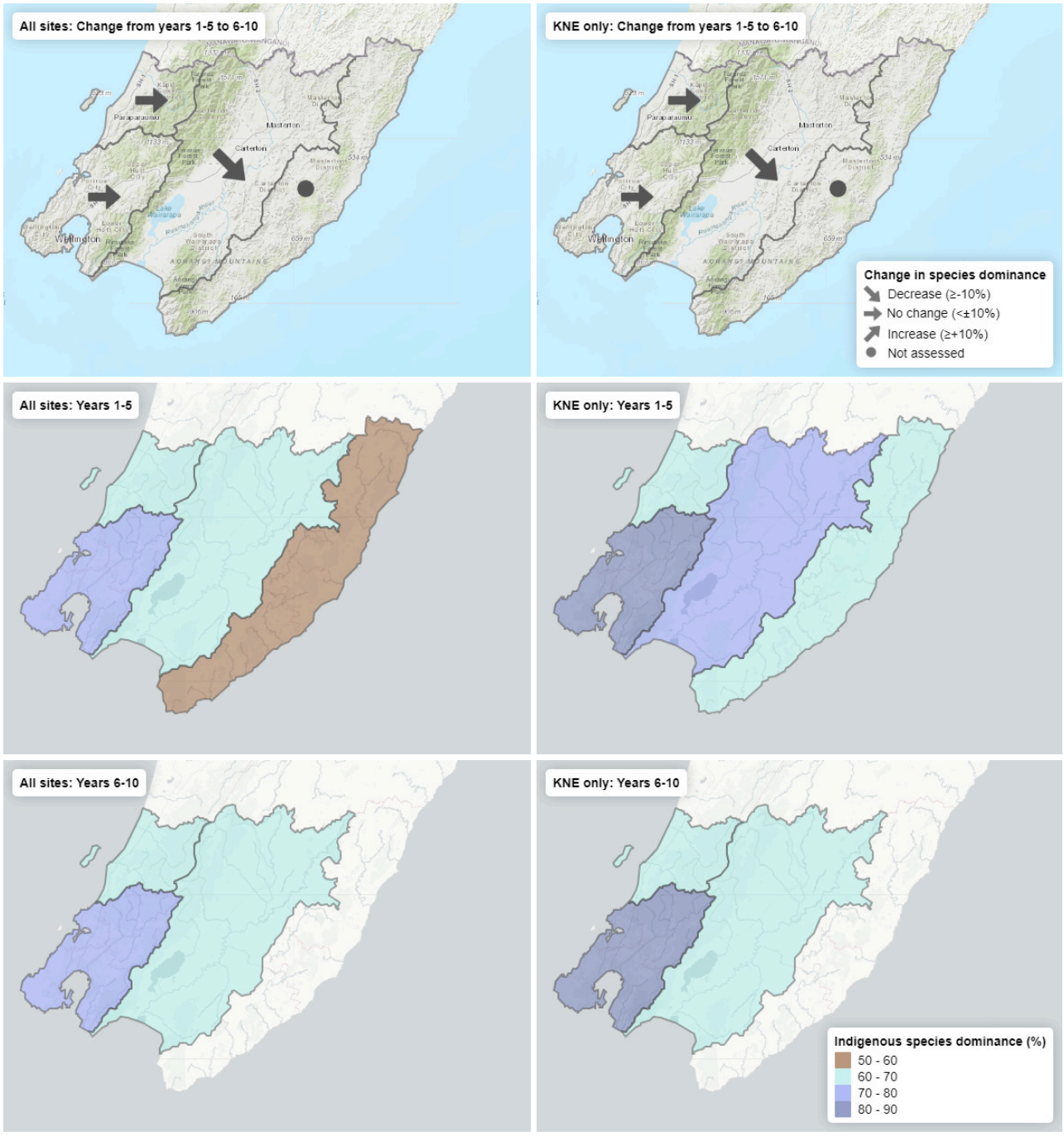


Figure 2: Indigenous species dominance results for each survey and change comparisons between resampled sites.

Indigenous species dominance

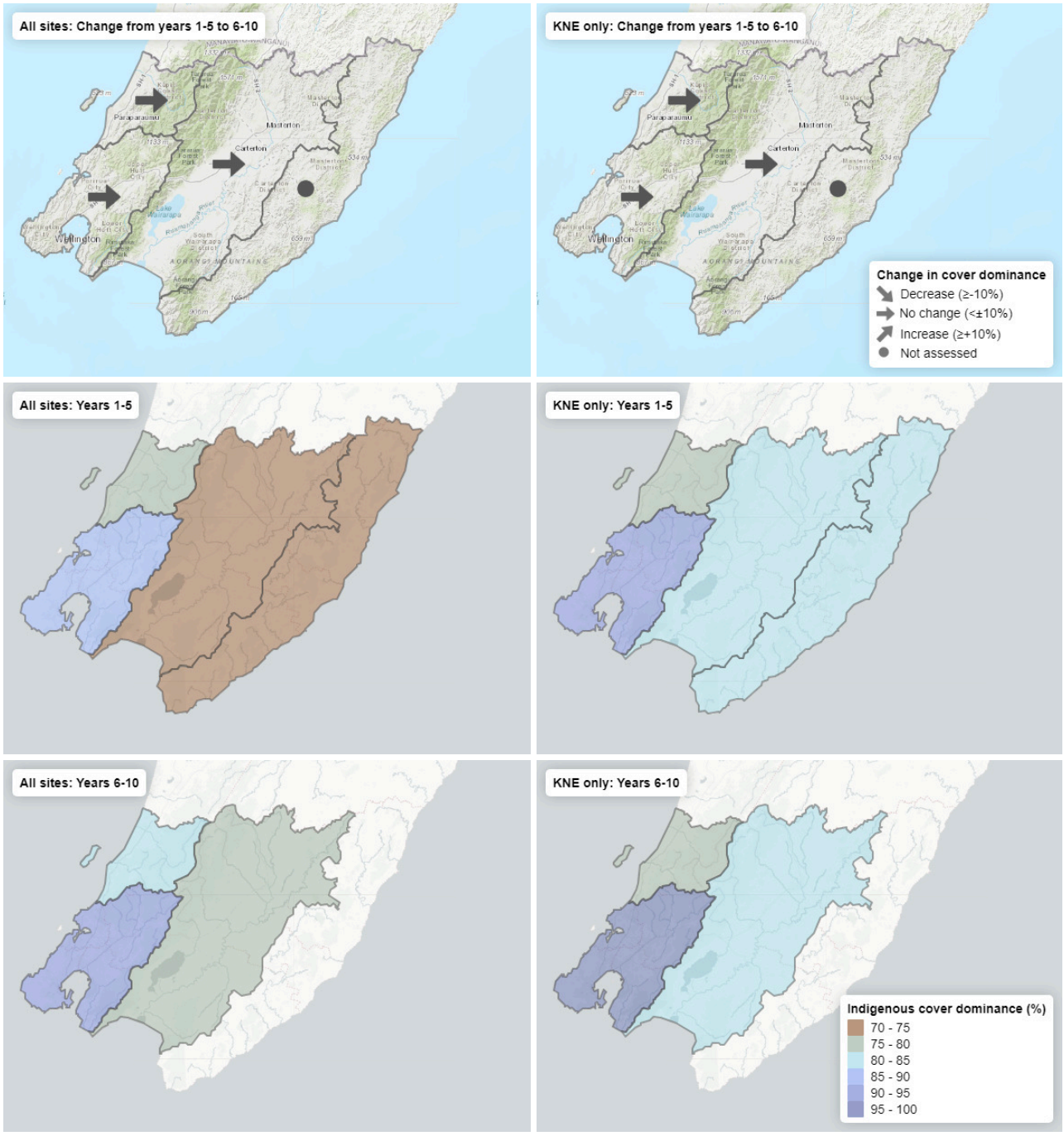


Figure 3: Indigenous cover dominance results for each survey and change comparisons between resampled sites.

Wetland condition

The Wetland Condition Index (WCI) is a composite index that assesses the current state of the wetland with respect to the hydrologic integrity, physicochemical conditions of the water, intactness of the ecosystem, impacts of predation, browsing and harvesting, and the dominance of native plant species in the wetland. Each of these condition components given a score from 0 (worst condition) to 5 (best condition), and the **Overall WCI** is the sum of all condition components with a highest possible score of 25.

Overall WCI

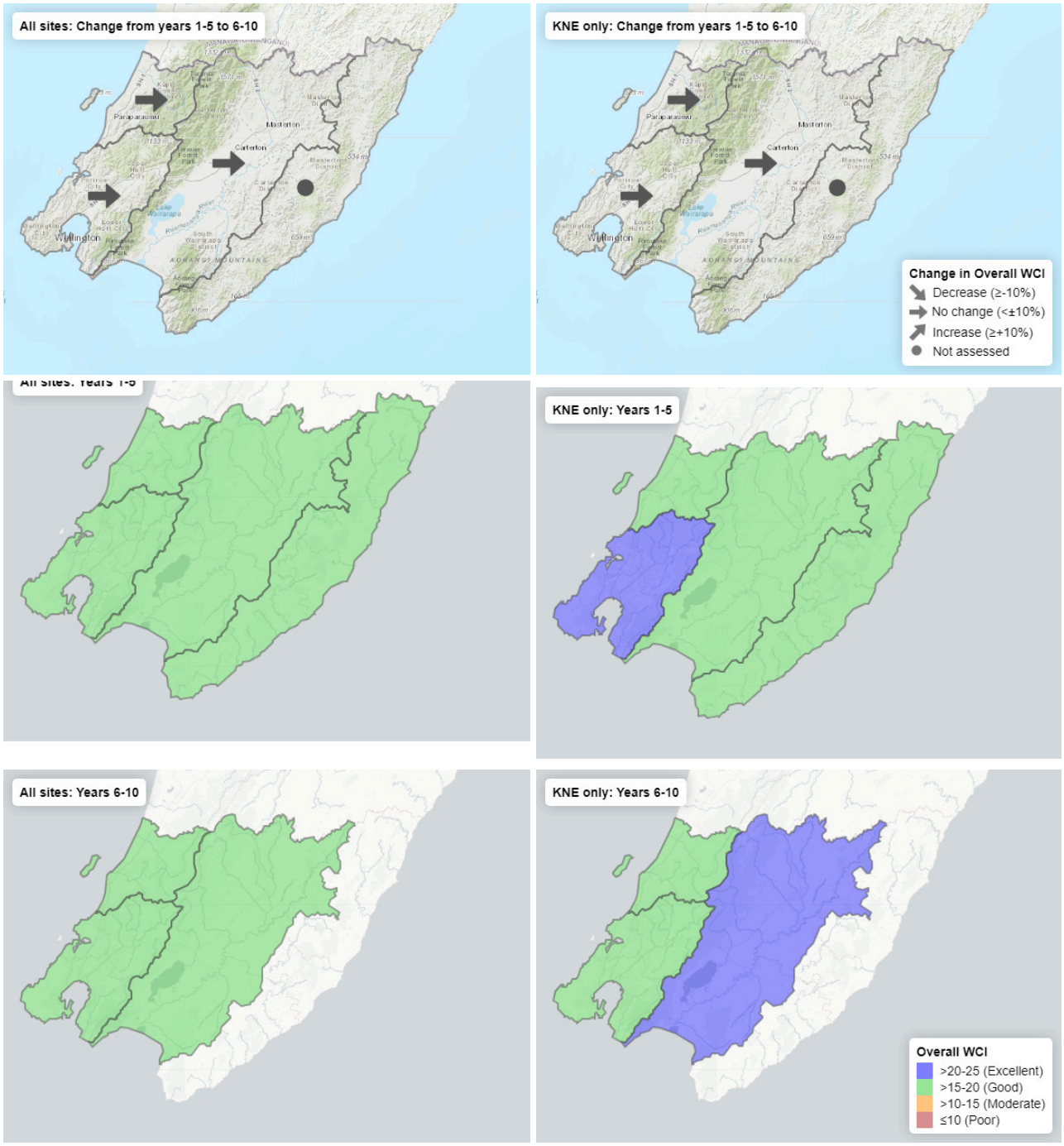


Figure 4: Overall WCI results for each survey and change comparisons between resampled sites.

Hydrological integrity

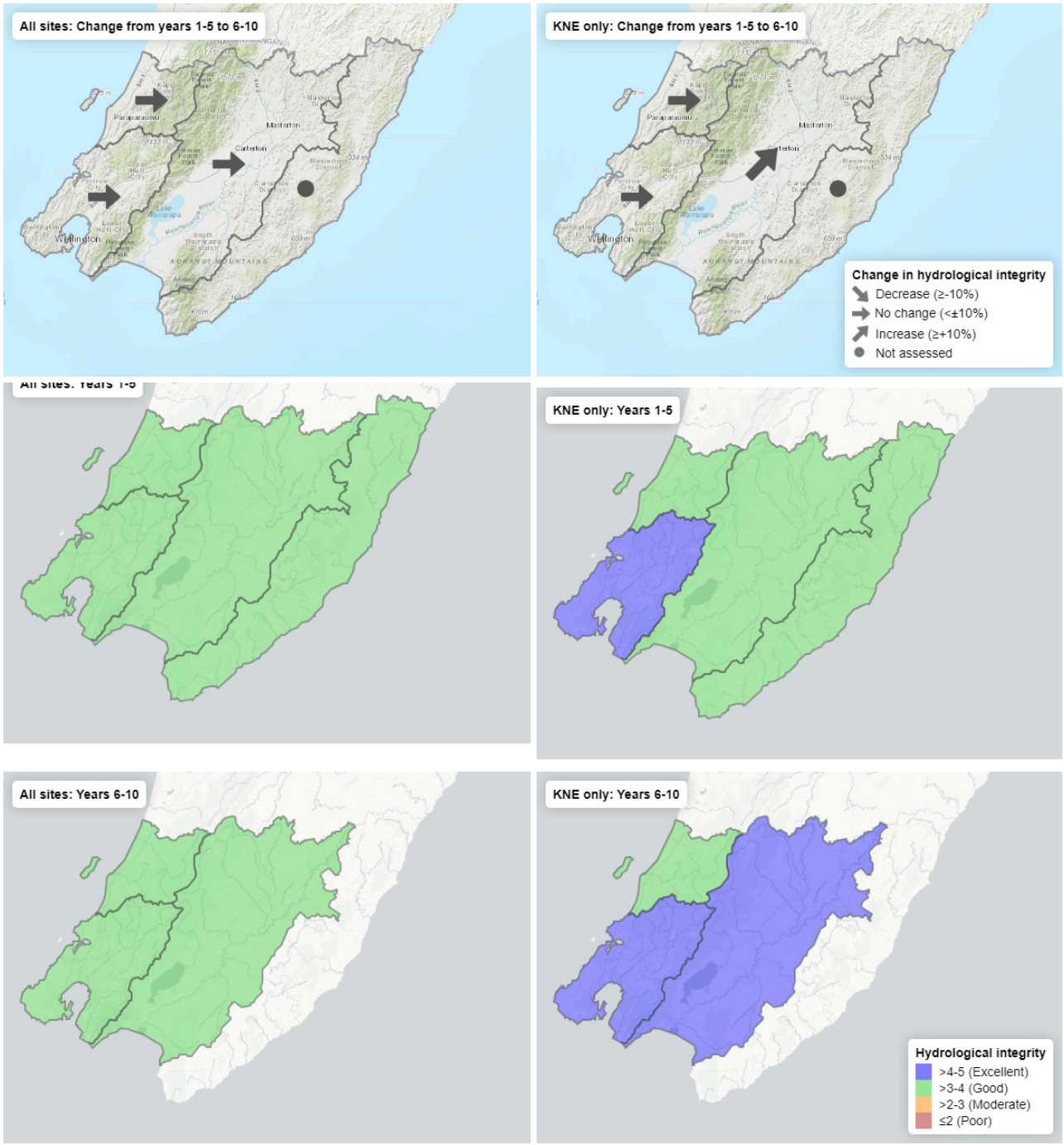


Figure 5: Hydrological integrity results for each survey and change comparisons between resampled sites.

Physicochemical parameters

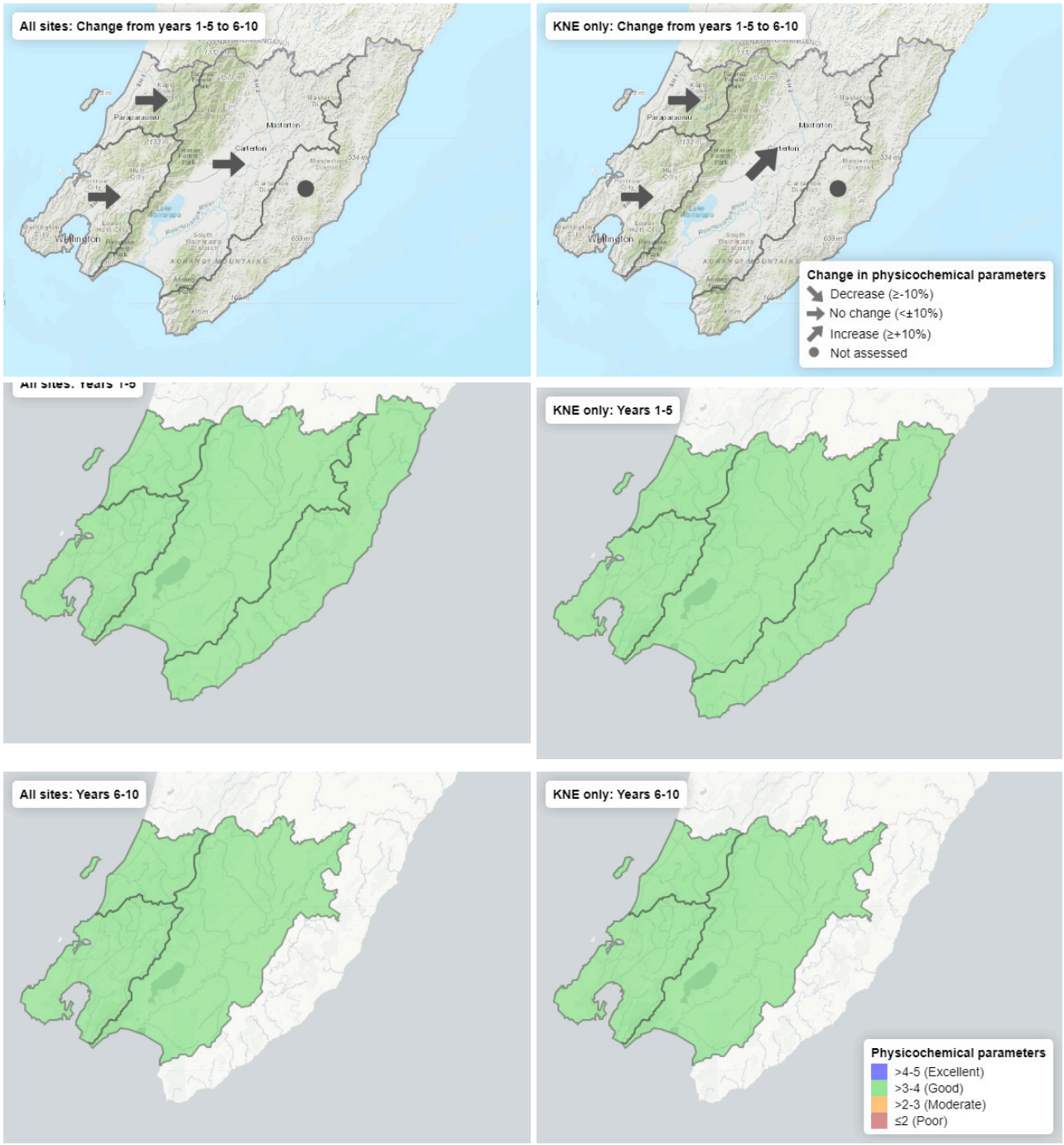


Figure 6: Physicochemical parameters results for each survey and change comparisons between resampled sites.

Ecosystem intactness

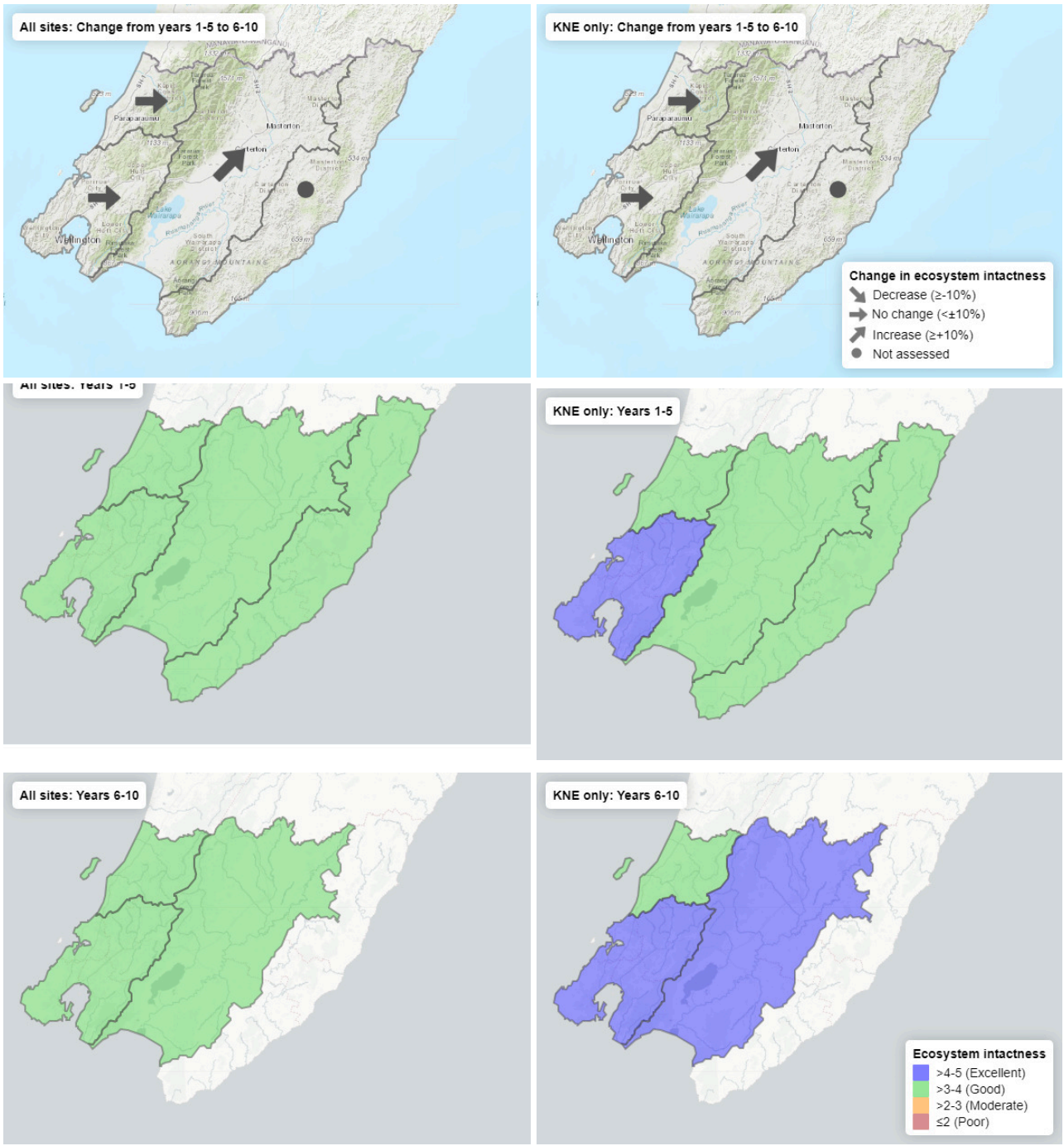


Figure 7: Ecosystem intactness results for each survey and change comparisons between resampled sites.

Browsing & predation

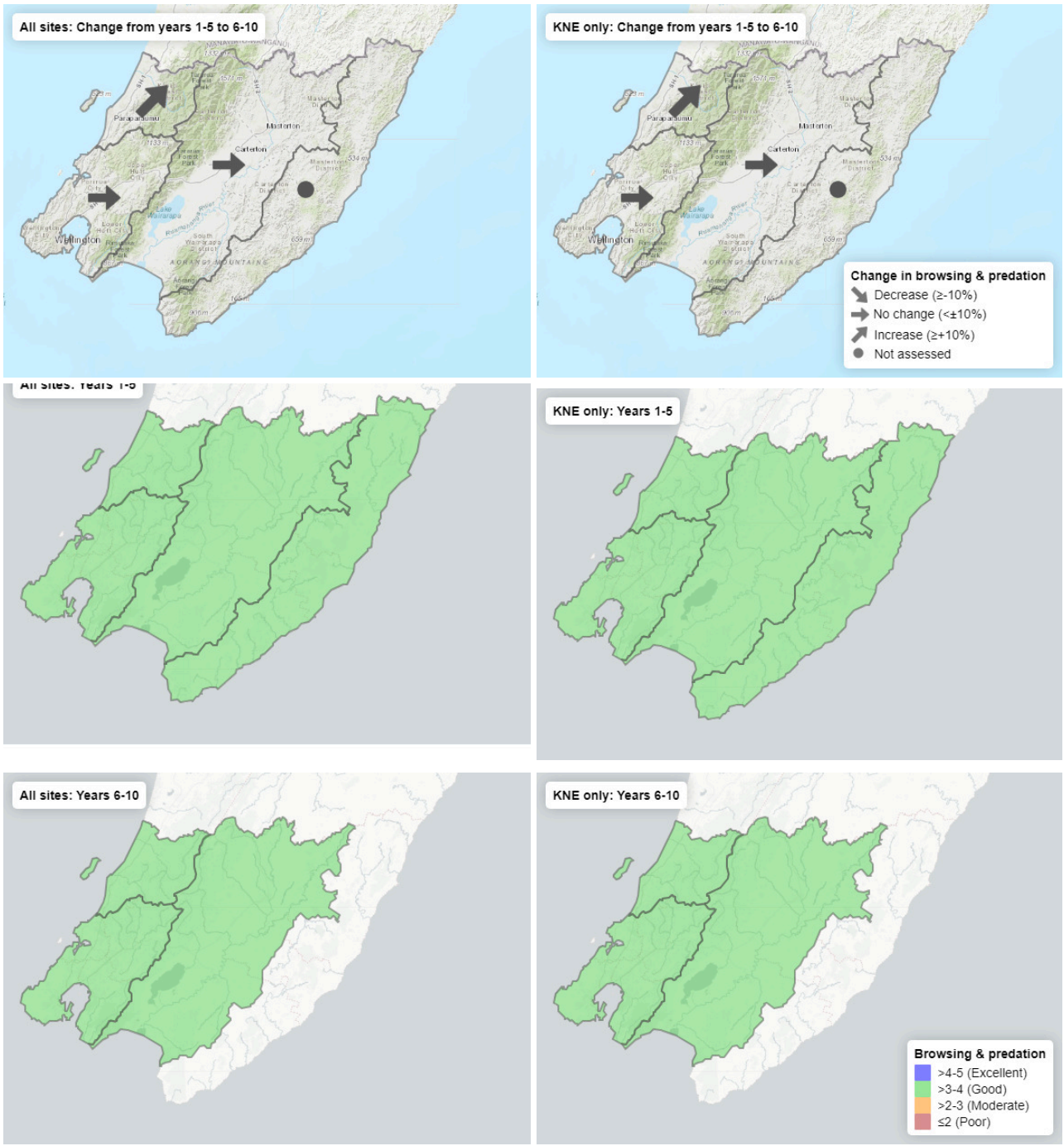


Figure 8: Browsing & predation results for each survey and change comparisons between resampled sites.

Dominance of native plants

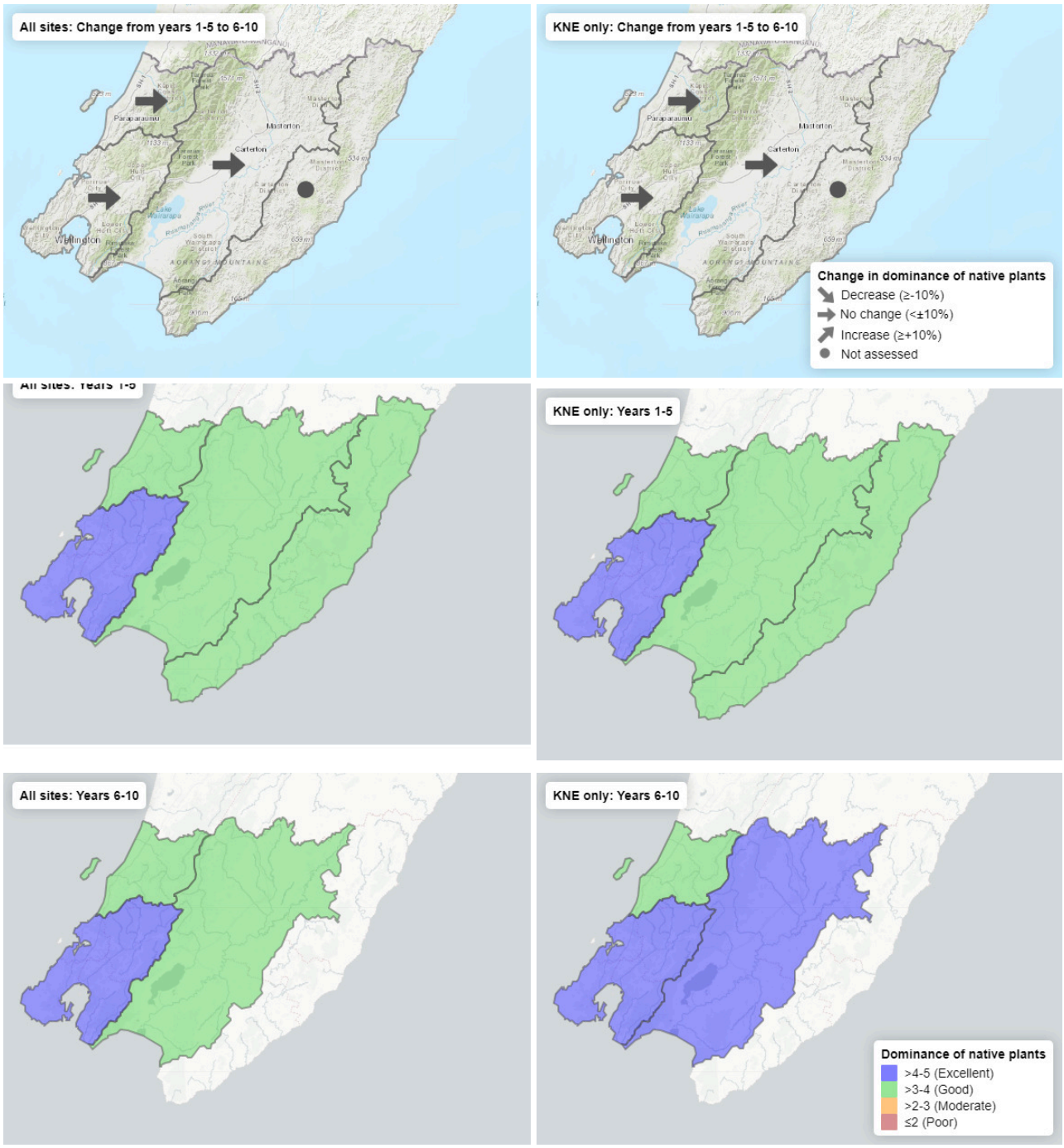


Figure 9: Dominance of native plants results for each survey and change comparisons between resampled sites.

Wetland pressures

The Wetland Pressure Index (WPI) is a composite index that assesses the pressures imposed on wetlands by the surrounding landscape. Each pressure component is given a score from 0 (no pressure) to 5 (highest pressure), and the **Overall WPI** is the sum of all pressure components with a highest possible score of 30. Thus, higher WPI scores reflect higher stress and potential threats in landscape around the wetland.

Overall WPI

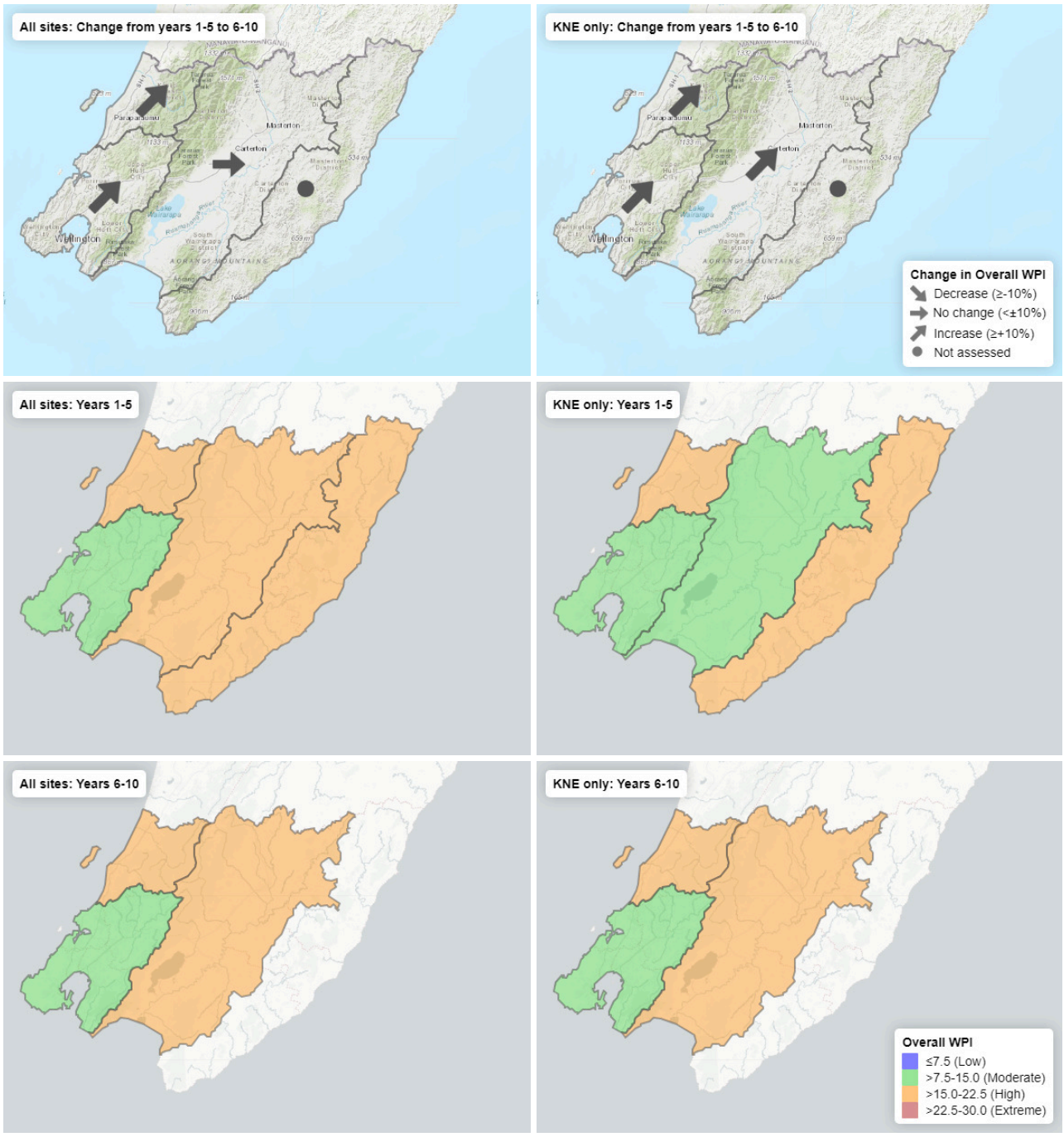


Figure 10: Overall WPI results for each survey and change comparisons between resampled sites.

Modifications to catchment hydrology

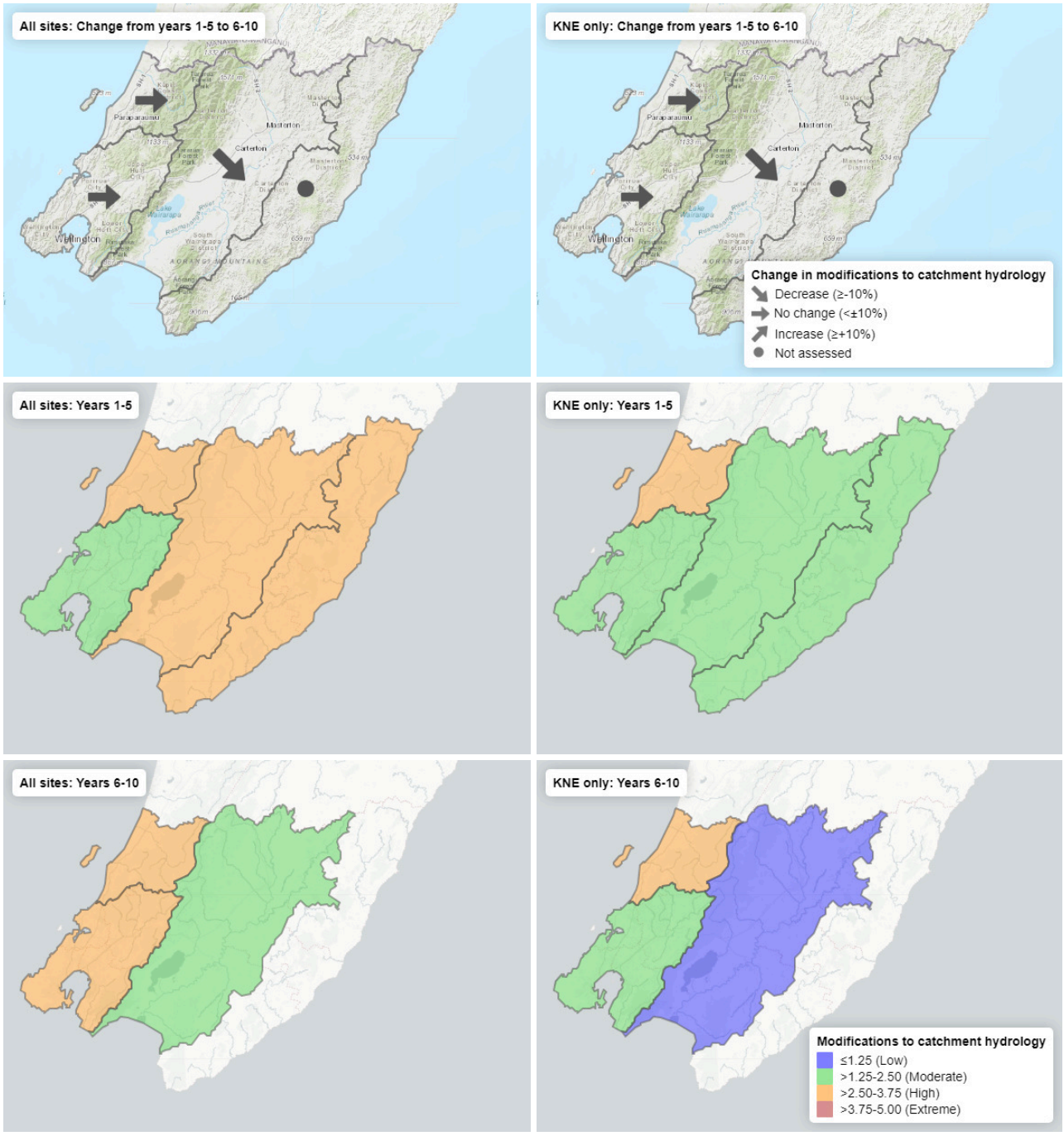


Figure 11: Modifications to catchment hydrology results for each survey and change comparisons between resampled sites.

Catchment water quality

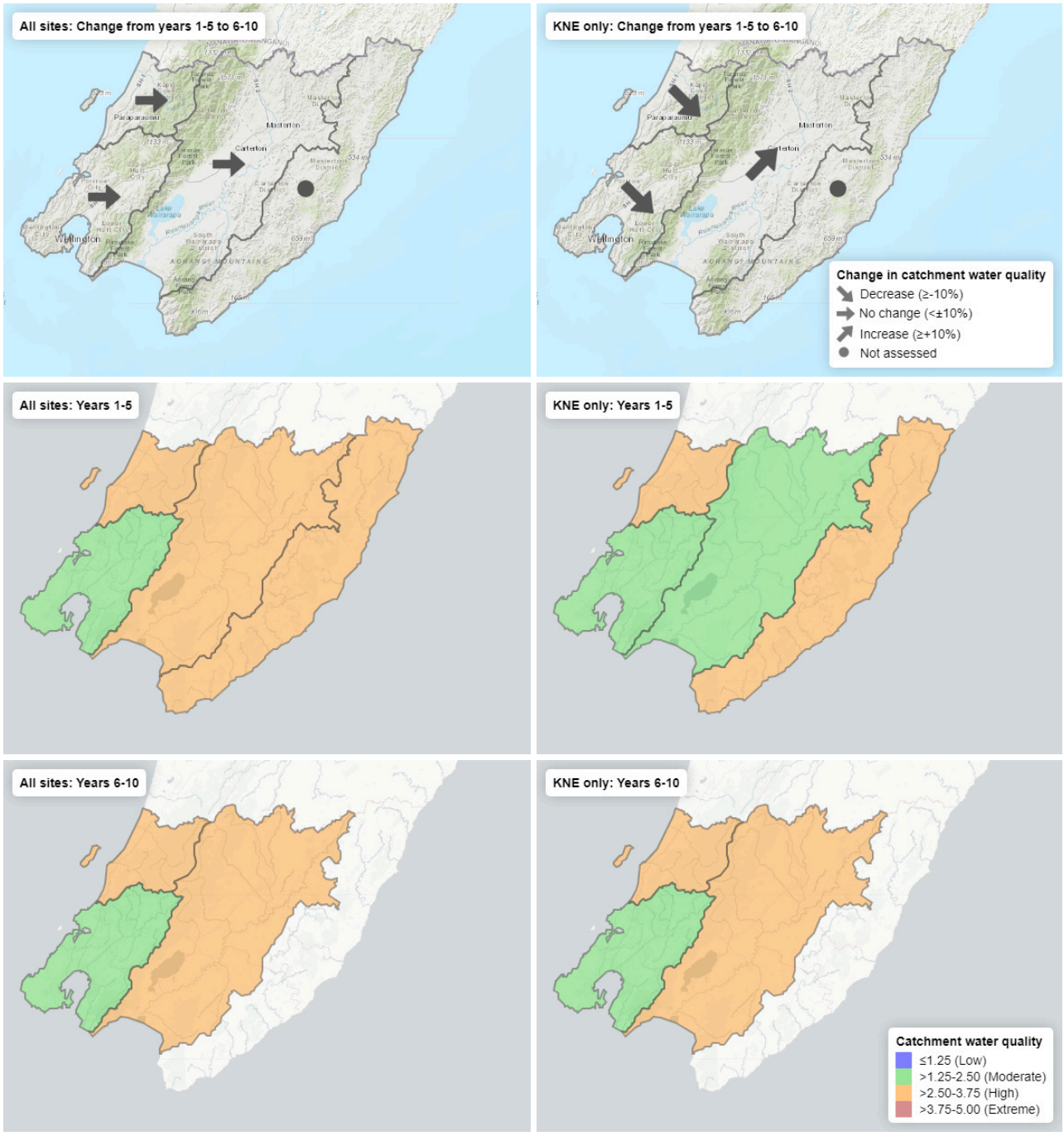


Figure 12: Catchment water quality results for each survey and change comparisons between resampled sites.

Animal access / grazing

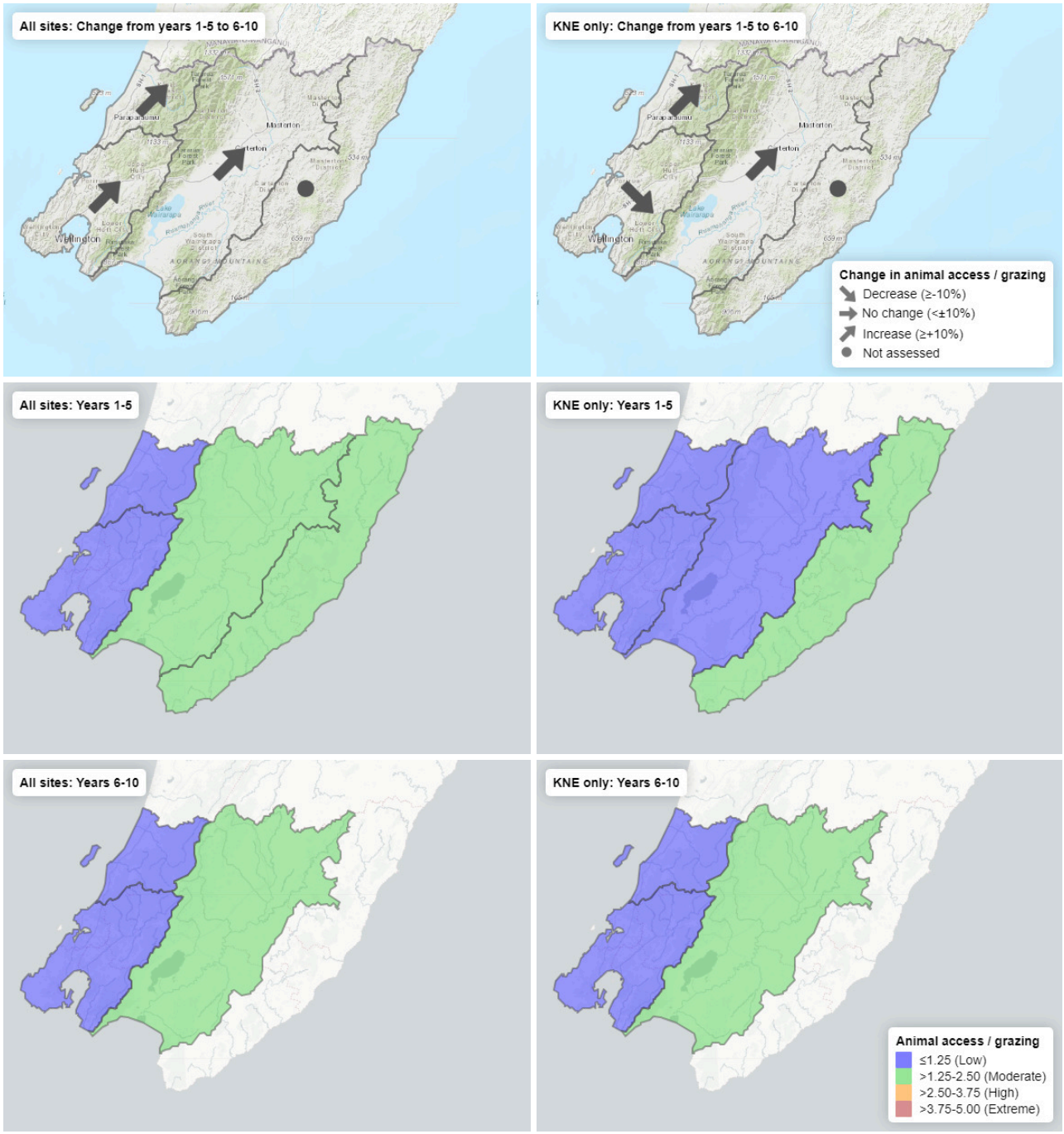


Figure 13: Animal access / grazing results for each survey and change comparisons between resampled sites.

Key undesirable species

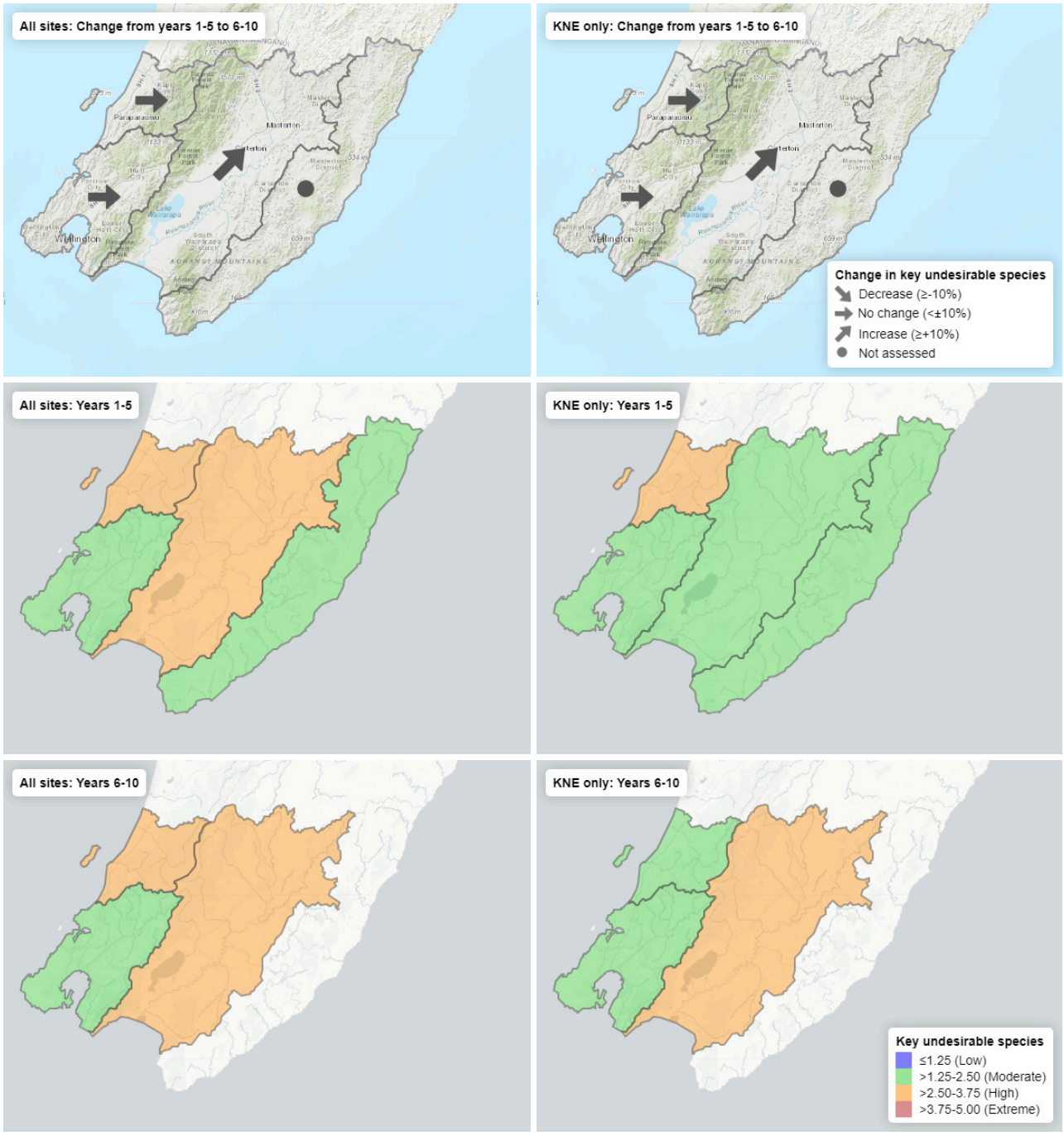


Figure 14: Key undesirable species results for each survey and change comparisons between resampled sites.

Introduced vegetation

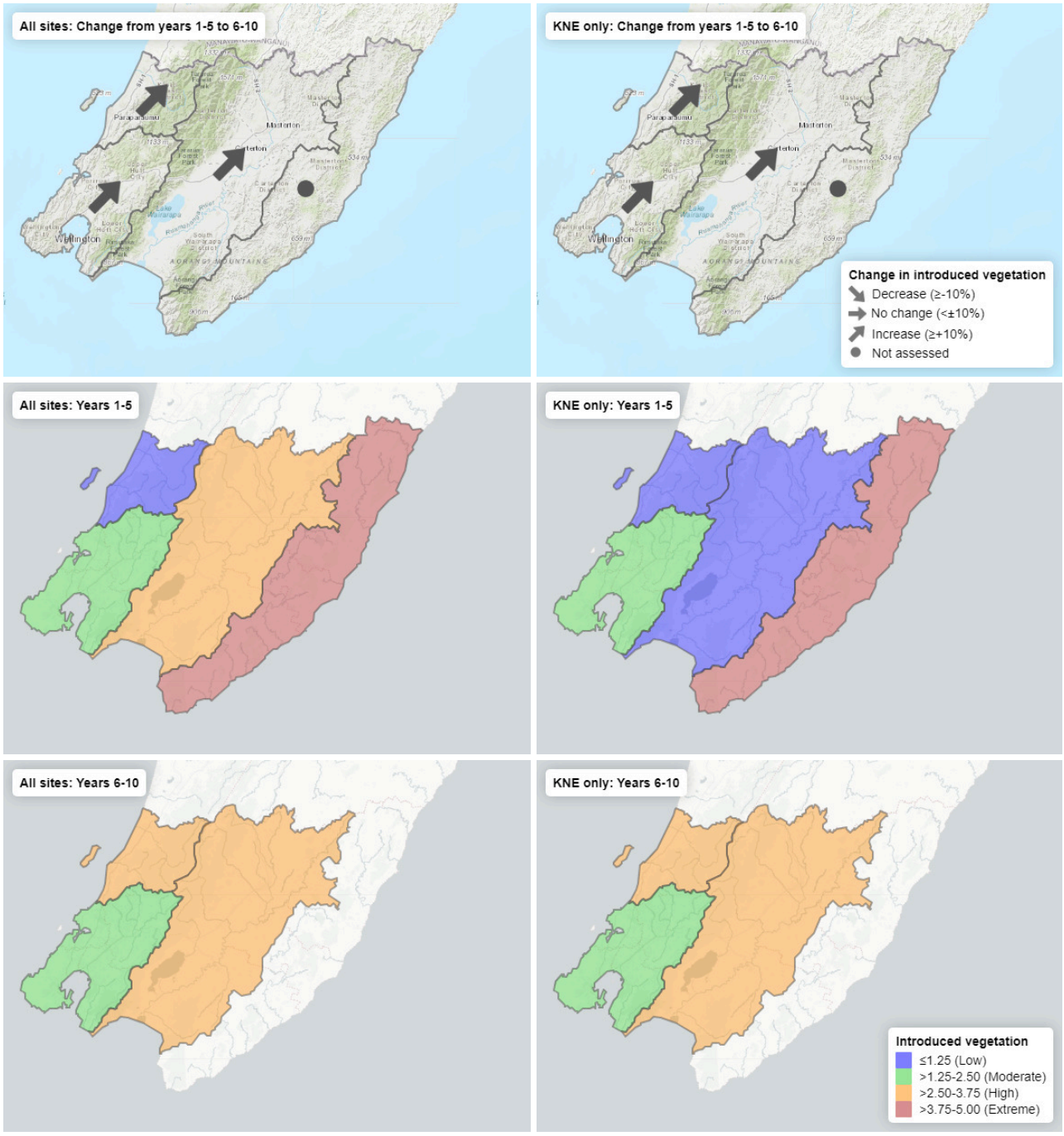


Figure 15: Introduced vegetation results for each survey and change comparisons between resampled sites.

Presence of pests

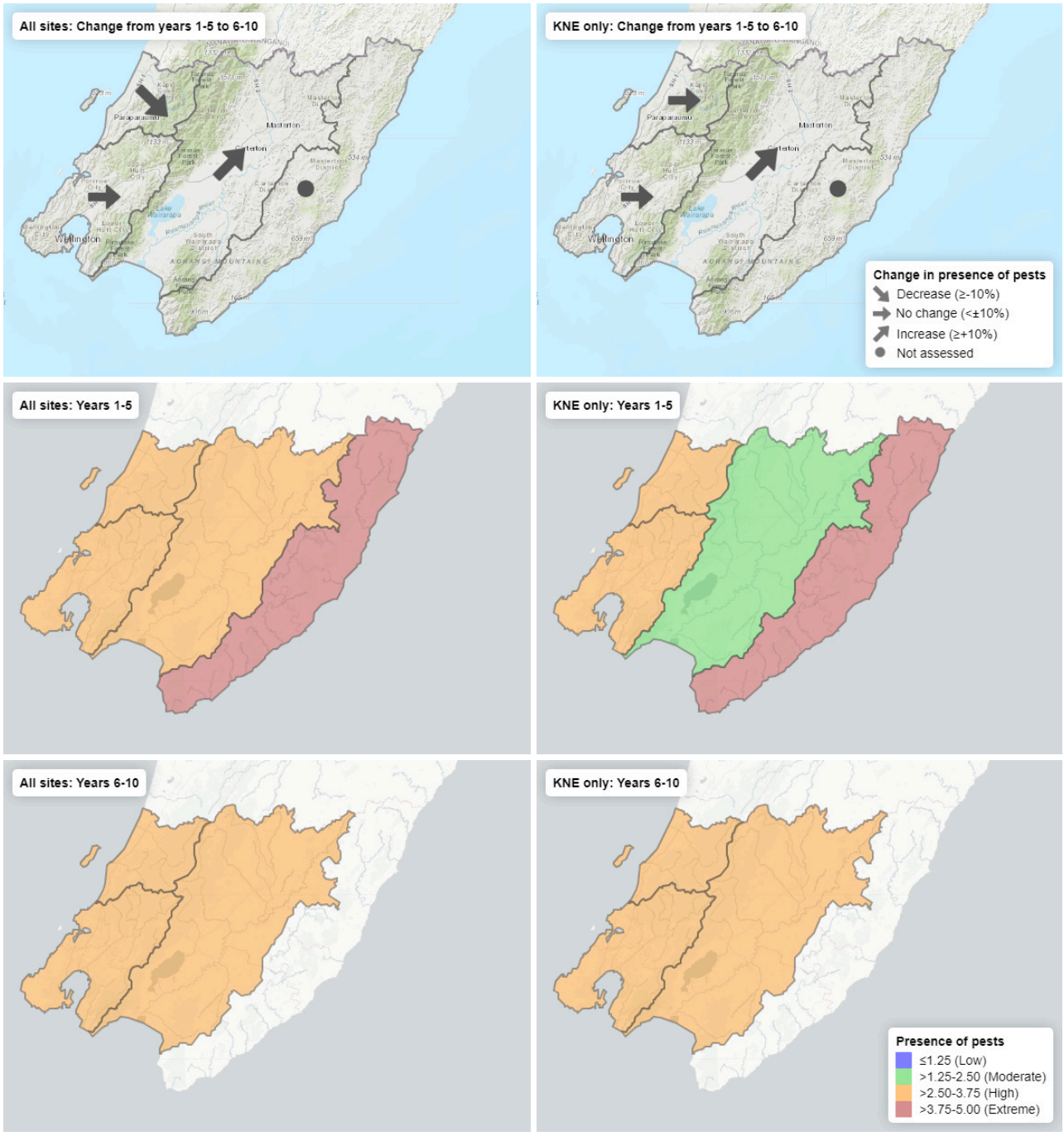


Figure 16: Presence of pest results for each survey and change comparisons between resampled sites.

Faunal survey results

The wetland health monitoring programme conducts surveys of all fish present and the abundance of "target" birds in spring each year. Target birds surveyed for include the mātātā (fernbird), matuku (bittern), koitareke (marsh crake), and pūweto (spotless crake). The wetland faunal survey methods has more technical information on these surveys.

Table 2: The total number of individual birds observed in each whaitua catchment survey. Please note that each year may include a different selection and number of sites.

			Kāpiti Coast		Te Awarua-o-Porirua & Te Whanganui-a-Tara		Ruamāhanga		Eastern Wairarapa
Species	**Sites**	**2018**	**2021**	**2023**	**2019**	**2024**	**2017**	**2022**	**2020**
Koitareke	All sites	1	0	0	0	0	0	0	0
	KNE only	1	0	0	0	0	0	0	0
Mātātā	All sites	0	0	0	0	9	0	0	0
	KNE only	0	0	0	0	9	0	0	0
Matuku	All sites	0	2	0	0	0	0	0	0
	KNE only	0	0	0	0	0	0	0	0
Pūweto	All sites	62	17	37	27	18	12	8	5
	KNE only	62	0	11	27	18	4	7	1
# sites	All sites	8	10	10	10	8	9	10	8
	KNE only	4	4	4	6	4	4	5	4

Different symbology is used to denote the fish survey method used in the following tables. **x**: No fish species recorded; : Fish species observed by spotlighting; : Fish species caught by fishing; : Fish species detected by eDNA (environmental DNA) sampling. Note the eDNA method of sampling can detect traces of fish DNA from upstream water bodies and thus is only a suggestive measure of that fish's presence in the wetland surveyed.

Table 3: Fish species detected by different methods in each whaitua catchment survey (fish species 1-4). As above, please note that each year may include a different selection and number of sites.

			Kāpiti Coast		Te Awarua-o-Porirua & Te Whanganui-a-Tara			Ruamāhanga		Eastern Wairarapa
Species	**Sites**	**2018**	**2021**	**2023**	**2019**	**2024**	**2017**	**2021**	**2022**	**2020**
Banded kōkopu	All	x	x				x	x		x
	KNE	x	x	x	x	x	x	x	x	x
Bluegill bully	All	x	x		x	x	x	x	x	x
	KNE	x	x	x	x	x	x	x	x	x
Brown mudfish	All				x	x				x
	KNE		x	x	x	x	x	x	x	x
Brown trout	All	x	x	x		x	x	x		x
	KNE	x	x	x	x	x	x	x	x	x
Trout	All	x	x	x	x	x	x	x		x
	KNE	x	x	x	x	x	x	x	x	x

Table 4: Fish species detected by different methods in each whaitua catchment survey (fish species 5-9).

		Kāpiti Coast			Te Awarua-o-Porirua & Te Whanganui-a-Tara		Ruamāhanga			Eastern Wairarapa
Species	**Sites**	**2018**	**2021**	**2023**	**2019**	**2024**	**2017**	**2021**	**2022**	**2020**
Common bully	All						x			x
	KNE		x	x	x	x	x	x	x	x
Common or crans bully	All	x	x	x	x	x	x	x		x
	KNE	x	x	x	x	x	x	x	x	x
Cran's/dinah's bully	All	x	x		x	x	x	x	x	x
	KNE	x	x	x	x	x	x	x	x	x
Dwarf galaxias	All	x	x	x		x	x	x	x	x
	KNE	x	x	x	x	x	x	x	x	x
Estuarine triplefin	All	x	x	x		x	x	x	x	x
	KNE	x	x	x	x	x	x	x	x	x
Trout	All	x	x	x	x	x	x	x		x
	KNE	x	x	x	x	x	x	x	x	x

Table 5: Fish species detected by different methods in each whaitua catchment survey (fish species 10-14).

			Kāpiti Coast		Te Awarua-o-Porirua & Te Whanganui-a-Tara		Ruamāhanga			Eastern Wairarapa
Species	**Sites**	**2018**	**2021**	**2023**	**2019**	**2024**	**2017**	**2021**	**2022**	**2020**
Giant bully	All	x	x			x	x	x	x	x
	KNE	x	x	x	x	x	x	x	x	x
Giant kokopu	All	x	x	x	x		x	x	x	x
	KNE	x	x	x	x	x	x	x	x	x
Goldfish	All	x	x		x	x	x	x		x
	KNE	x	x	x	x	x	x	x		x
Īnanga	All						x	x	x	
	KNE		x	x	x	x	x	x	x	x
Kōura	All	x	x	x	x	x		x	x	x
	KNE	x	x	x	x	x		x	x	x
Trout	All	x	x	x	x	x	x	x		x
	KNE	x	x	x	x	x	x	x	x	x

Table 6: Fish species detected by different methods in each whaitua catchment survey (fish species 15-19).

			Kāpiti Coast		Te Awarua-o-Porirua & Te Whanganui-a-Tara			Ruamāhanga		Eastern Wairarapa
Species	**Sites**	**2018**	**2021**	**2023**	**2019**	**2024**	**2017**	**2021**	**2022**	**2020**
Longfin eel	All		x				x			x
	KNE		x	x	x	x	x	x		x
Perch	All	x	x	x	x	x	x	x		x
	KNE	x	x	x	x	x	x	x		x
Redfin bully	All	x	x	x			x	x	x	x
	KNE	x	x	x	x	x	x	x	x	x
Rudd	All	x	x		x	x		x	x	x
	KNE	x	x	x	x	x	x	x	x	x
Shortfin eel	All									
	KNE		x	x	x	x		x		x
Trout	All	x	x	x	x	x	x	x		x
	KNE	x	x	x	x	x	x	x	x	x

Species descriptions

Table 7: Species included in the survey results (all species 1-8). For more information on their conservation status, see the Department of Conservation New Zealand Threat Classification System (NZTCS).

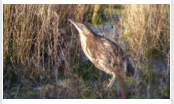
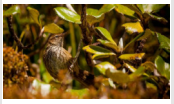
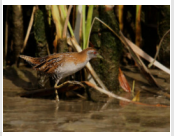
Fauna (conservation status)	**Description**	**Photo (see desc. links for attributions)**
Matuku (threatened - nationally critical)	Matuku (*Botaurus poiciloptilus*), the Australasian bittern, are mainly found in New Zealand wetlands of Northland, Waikato, East Coast of the North Island, and the West Coast of the South Island. Matuku are important to Māori and appear in language as part of legends, stories, early pictures and metaphor. They are a potential indicator of wetland health because they are dependent on the presence of high quality and ecologically diverse habitats and rich food supplies. [more info]	
Mātātā (north and south island: at risk - declining. stewart island: threatened - nationally vulnerable. codfish and snares islands: at risk - naturally uncommon.)	Mātātā (*Poodytes punctatus*), the fernbird, inhabit wetlands throughout New Zealand and are rarely seen because of their secretive behaviour and excellent camouflage. They are a potential indicator of wetland health because they are dependent on the presence of high quality and ecologically diverse habitats and rich food supplies. [more info]	
Koitareke (at risk - relict)	Koitareke (*Porzana pusilla affinis*), the marsh crake, is one of the most secretive New Zealand birds, largely because it inhabits dense wetland vegetation, rarely ventures into the open and usually only calls at dusk and through the night. They are a potential indicator of wetland health because they are dependent on the presence of high quality and ecologically diverse habitats and rich food supplies. [more info]	
Pūweto (at risk - relict)	Pūweto (*Porzana tabuensis plumbea*), the spotless crake, is a cryptic bird of freshwater wetlands throughout North Island and much of South Island. This small dark coloured rail (about half the size of a common blackbird) is very secretive and relatively infrequently seen. They are a potential indicator of wetland health because they are dependent on the presence of high quality and ecologically diverse habitats and rich food supplies. [more info]	
Banded kōkopu (not threatened)	Kōkopu (*Galaxias fasciatus*) are found mostly in the small pools within boulder streams that flow through native forests. They are widespread, moving well inland (between 550 and 180 kilometres from the coast). They are very strong climbers and can ascend obstacles such as waterfalls. These three adults are probably around 20 centimetres long. As juveniles, when they are caught as whitebait, banded kōkopu are about a quarter of this length and have a golden tinge. [more info]	
Brown mudfish (at risk - declining)	Brown mudfish (*Neochanna apoda*) usually grow to 10-12 cm in length, but can grow as large as 17.5 cm. They have thick skin with no scales and vary in colour from mottled light brown to almost black. [more info]	
Brown trout (not threatened)	The brown trout (*Salmo trutta*) is the most widespread and common introduced fish in New Zealand waters, occurring virtually everywhere in New Zealand south of Auckland. Brown trout are primarily a freshwater species, but can spend time in the sea. [more info]	

Table 8: Species included in the survey results (all species 9-16).

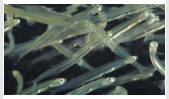
Fauna (conservation status)	**Description**	**Photo (see desc. links for attributions)**
Dwarf galaxias (at risk - declining)	Dwarf galaxias (*Galaxias divergens*) are a slender fish with a small head and blunt snout. Colour ranges from amber to olive green with dark brown blotches on the sides and back. The underside is silvery. River species require good riparian cover, streamside shade and logs and/or boulders instream. [more info]	
Estuarine triplefin (not threatened)	The estuarine triplefin (*Forsterygion nigripenne*) can be found in tidal marshes and estuaries from the intertidal zone to about twelve metres deep. Often associated with red algae. Sometimes it can be found in the lower reaches of rivers and streams. The sides of the fish are mottled and lack the horizontal stripes of other Triplefins. [more info]	
Giant bully (not threatened)	The giant bully (*Gobiomorphus cotidianus*) is a dark-coloured fish that prefers lowland waterways especially estuaries and is almost always found beneath cover, only to emerge at night to feed. It can grow over 15 cm long. It is presumed that giant bullies have a marine phase in their life cycle, but this is not known for sure. [more info]	
Goldfish (not threatened)	Goldfish (*Carassius auratus*) generally live in still waters (ponds and lakes), but also inhabit slow flowing rivers and streams. Their distribution is widespread in the North Island and more restricted in the South, but recent surveys have found goldfish in Nelson, central Otago, Southland and the West Coast. [more info]	
Īnanga (at risk - declining)	Īnanga (*Galaxias maculatus*) are the most common native fish species caught as whitebait. Migratory galaxiids. Īnanga have an unusual lifecycle. They begin life as eggs laid in vegetation beside streams in late summer and autumn. When the eggs hatch, they are carried downstream as larvae and spend the next six months at sea. In the spring they migrate upstream as whitebait and grow into adult fish. [more info]	
Kōura (paranephrops zealandicus: at risk - declining. paranephrops sp., paranephrops planifrons: not threatened)	Kōura (*Paranephrops zealandicus, Paranephrops sp., Paranephrops planifrons*), freshwater crayfish, are dark green and mottled like the stones it lives amongst on stream bottoms. Kōura have a special part to play in our freshwater lakes and streams. They are native animals and recycle some of the leftover materials by their scavenging, therefore helping to clean up our streams and lakes in their own small way. Populations are decreasing in some areas as they are subject to habitat modification, land intensification, and increased predation - particularly for human consumption. [more info]	
Longfin eel (at risk - declining)	Longfin eels (*Anguilla dieffenbachii*) can only be found in New Zealand and, while still relatively common, longfin eels face significant threats from fishing, habitat loss and pollution. Changes caused by hydro development, drainage and irrigation schemes and river diversions affect eels by reducing their habitat and the water available for aquatic life. Culverts and dams can also impact on eels by preventing their migration. Additionally, sewage and effluent from meat works and pulp and paper plants discharged into rivers can remove large quantities of oxygen from the water. The result of this oxygen depletion is that the fish will either die or move away. [more info]	
Perch (not threatened)	Perch (*Perca fluviatilis*) are an introduced species that prefer slow-flowing and still water habitats. They are strictly carnivorous and adults feed mainly on other fish. Perch have been shown to reduce the abundance of common bullies in lakes. They also reduce īnanga, smelt and kōura in lakes where they have been introduced. At high densities, small fish predominate and can cause toxic cyanobacterial blooms. [more info]	

Table 9: Species included in the survey results (all species 17-21).

Fauna (conservation status)	**Description**	**Photo (see desc. links for attributions)**
Redfin bully (at risk - declining)	The redfin bully (*Gobiomorphus huttoni*) is distinguished from other bullies by having diagonal cheek stripes and grow up to 12 cm long. Male redfin bullies are our most colourful native fish, with bright orange-red fins. Like other bully species, the male guards the nest before the larvae get washed out to sea and migrate back to freshwater as small juveniles. [more info]	
Rudd (not threatened)	Rudd (*Scardinius erythrophthalmus*) were first introduced into New Zealand illegally in 1967 when juvenile rudd were ordered into the country through a private consignment. These fish were reared to maturity and bred to produce young. Due to their fast breeding, rudd can quickly outnumber native fish in a stream and take over a waterway; potentially affecting populations of native fish and plants, and degrading water quality [more info]	
Shortfin eel (not threatened)	The shortfin eel (*Anguilla australis*) is found in New Zealand, Australia and some Pacific Islands. They live mostly in lowland areas and are relatively pollution tolerant as opposed to the native longfin eel. [more info]	
Upland bully (not threatened)	The upland bully (*Gobiomorphus aff. breviceps*) is stockily built with a large head They grow to about 8 cm long and can be found in a variety of habitats. The upland bully does not undertake a migration. [more info]	

Resources

Useful links

Greater Wellington Natural Resources Plan

GW wetlands overview

Types of wetlands in the Wellington region

Identifying a wetland

Resource Management Act (RMA)

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Appendix 1: Data tables

All data summaries are derived for each wetland plot, averaged across the wetland, then averaged across the whaitua catchment (with minimum and maximum site scores shown in brackets after the average). Note abbreviations WCI (wetland condition index) and WPI (wetland pressure index).

Table A1.1: Vegetation composition results.

Whaitua catchment	Programme	Survey cycle	Year/s	No. sites	Indigenous species dominance	Indigenous cover dominance	Total richness
Kāpiti Coast	All sites	Change	2018-2021 to 2023	27	+1.11 (+1.6%)	+4.20 (+5.4%)	+0.75 (+6.6%)
Kāpiti Coast	All sites	1-5	2018-2021	37	68.8 (16.7-100.0)	78.1 (5.8-100.0)	11.4 (5.0-22.0)
Kāpiti Coast	All sites	6-10	2023	27	68.3 (30.0-100.0)	80.6 (27.8-100.0)	11.1 (2.0-21.0)
Kāpiti Coast	KNE sites	Change	2018 to 2023	14	+3.74 (+5.6%)	+2.59 (+3.3%)	+0.86 (+7.6%)
Kāpiti Coast	KNE sites	1-5	2018	16	67.3 (45.5-100.0)	77.5 (45.5-100.0)	11.2 (8.0-18.0)
Kāpiti Coast	KNE sites	6-10	2023	14	70.0 (45.3-100.0)	78.5 (27.8-100.0)	11.7 (4.3-21.0)
Te Awarua-o-Porirua & Te Whanganui-a-Tara	All sites	Change	2019-2021 to 2024	24	+1.47 (+1.9%)	+2.57 (+3.0%)	+2.24 (+22.2%)
Te Awarua-o-Porirua & Te Whanganui-a-Tara	All sites	1-5	2019-2021	31	75.8 (20.0-100.0)	86.1 (37.4-100.0)	10.1 (1.0-23.0)
Te Awarua-o-Porirua & Te Whanganui-a-Tara	All sites	6-10	2024	24	78.0 (11.1-100.0)	90.3 (48.3-100.0)	12.8 (1.0-24.0)
Te Awarua-o-Porirua & Te Whanganui-a-Tara	KNE sites	Change	2019 to 2024	7	+0.43 (+0.5%)	+3.47 (+3.7%)	+0.27 (+2.5%)
Te Awarua-o-Porirua & Te Whanganui-a-Tara	KNE sites	1-5	2019	7	86.8 (75.2-100.0)	92.8 (85.6-100.0)	11.0 (2.0-18.0)
Te Awarua-o-Porirua & Te Whanganui-a-Tara	KNE sites	6-10	2024	7	87.2 (77.2-100.0)	96.3 (92.4-100.0)	11.3 (3.0-21.0)
Ruamāhanga	All sites	Change	2017-2021 to 2022	28	-7.30 (-11.6%)	-1.75 (-2.5%)	+2.54 (+19.5%)
Ruamāhanga	All sites	1-5	2017-2021	48	62.9 (8.3-100.0)	70.2 (4.1-100.0)	13.1 (3.0-23.5)
Ruamāhanga	All sites	6-10	2022	28	64.2 (7.7-100.0)	75.8 (6.8-100.0)	15.2 (5.0-28.0)
Ruamāhanga	KNE sites	Change	2017-2021 to 2022	4	-10.70 (-14.4%)	-5.80 (-7.1%)	+6.25 (+46.3%)
Ruamāhanga	KNE sites	1-5	2017-2021	5	74.1 (42.9-100.0)	82.2 (56.1-100.0)	13.5 (4.0-18.5)
Ruamāhanga	KNE sites	6-10	2022	4	68.8 (31.8-97.9)	82.9 (41.3-100.0)	18.5 (6.0-28.0)
Eastern Wairarapa	All sites	1-5	2020-2021	33	55.9 (22.2-100.0)	70.9 (17.9-100.0)	10.2 (3.0-17.5)

Table A1.2: Wetland condition index overall and subcomponent scores in the **Kāpiti Coast** whaitua catchment.

Programme	Survey cycle	Year/s	No. sites	Overall WCI	Hydrological integrity	Physicochemical parameters	Ecosystem intactness	Browsing & predation	Dominance of native plants
All sites	Change	2018-2021 to 2023	27	+0.67 (+4.0%)	-0.02 (-0.5%)	+0.11 (+3.3%)	-0.08 (-2.3%)	+0.37 (+10.4%)	+0.29 (+8.7%)
All sites	1-5	2018-2021	37	17.0 (13.5-22.7)	3.2 (2.0-4.7)	3.5 (2.5-4.5)	3.4 (2.5-5.0)	3.5 (2.3-4.8)	3.4 (1.7-4.7)
All sites	6-10	2023	27	17.2 (13.7-20.8)	3.0 (1.7-4.2)	3.6 (2.5-5.0)	3.1 (2.3-4.2)	3.8 (2.9-4.5)	3.6 (2.5-4.7)
KNE sites	Change	2018 to 2023	14	+0.56 (+3.3%)	+0.08 (+2.6%)	-0.08 (-2.2%)	-0.08 (-2.5%)	+0.36 (+10.3%)	+0.29 (+8.5%)
KNE sites	1-5	2018	16	16.7 (13.5-19.7)	3.0 (2.3-4.0)	3.6 (2.5-4.5)	3.3 (2.7-3.7)	3.5 (2.3-4.4)	3.4 (1.7-4.3)
KNE sites	6-10	2023	14	17.4 (13.7-20.8)	3.1 (1.7-4.0)	3.5 (2.5-4.5)	3.3 (2.7-3.7)	3.9 (2.9-4.5)	3.6 (2.7-4.5)

Table A1.3: Wetland condition index overall and subcomponent scores in the **Te Awarua-o-Porirua & Te Whanganui-a-Tara** whaitua catchment.

Programme	Survey cycle	Year/s	No. sites	Overall WCI	Hydrological integrity	Physicochemical parameters	Ecosystem intactness	Browsing & predation	Dominance of native plants
All sites	Change	2019-2021 to 2024	23	+0.21 (+1.1%)	+0.02 (+0.6%)	+0.02 (+0.4%)	+0.09 (+2.3%)	+0.10 (+2.7%)	-0.02 (-0.4%)
All sites	1-5	2019-2021	31	18.9 (15.0-24.0)	3.7 (2.0-5.0)	3.7 (2.0-5.0)	3.7 (2.7-5.0)	3.7 (3.0-4.4)	4.0 (2.7-5.0)
All sites	6-10	2024	23	19.3 (7.7-22.8)	3.7 (2.0-4.7)	3.7 (1.5-5.0)	3.9 (1.3-4.8)	3.9 (1.5-4.5)	4.1 (1.3-5.0)
KNE sites	Change	2019 to 2024	7	-0.98 (-4.8%)	-0.17 (-4.0%)	-0.21 (-5.4%)	-0.19 (-4.5%)	-0.20 (-5.0%)	-0.22 (-5.1%)
KNE sites	1-5	2019	7	20.6 (18.1-22.9)	4.2 (3.5-4.7)	4.0 (3.0-5.0)	4.2 (3.7-5.0)	3.9 (3.6-4.0)	4.3 (3.7-4.6)
KNE sites	6-10	2024	7	19.6 (7.7-22.8)	4.0 (2.0-4.7)	3.8 (1.5-5.0)	4.0 (1.3-4.8)	3.7 (1.5-4.5)	4.1 (1.3-4.8)

Table A1.4: Wetland condition index overall and subcomponent scores in the **Ruamāhanga** whaitua catchment.

Programme	Survey cycle	Year/s	No. sites	Overall WCI	Hydrological integrity	Physicochemical parameters	Ecosystem intactness	Browsing & predation	Dominance of native plants
All sites	Change	2017-2021 to 2022	30	+0.84 (+5.1%)	+0.20 (+6.1%)	+0.16 (+5.0%)	+0.44 (+12.6%)	+0.13 (+4.0%)	-0.09 (-3.0%)
All sites	1-5	2017-2021	49	16.6 (10.3-23.2)	3.3 (0.7-5.0)	3.3 (1.5-4.5)	3.5 (1.3-4.7)	3.3 (1.7-4.5)	3.2 (1.0-5.0)
All sites	6-10	2022	30	17.4 (12.9-22.5)	3.5 (2.0-5.0)	3.4 (2.5-4.5)	3.8 (2.0-5.0)	3.5 (2.3-4.5)	3.3 (1.0-5.0)
KNE sites	Change	2017-2021 to 2022	4	+1.25 (+6.6%)	+0.42 (+11.0%)	+0.44 (+12.3%)	+0.42 (+11.2%)	+0.06 (+1.6%)	-0.08 (-2.1%)
KNE sites	1-5	2017-2021	5	18.9 (16.8-21.3)	3.8 (2.3-5.0)	3.6 (3.0-4.5)	3.7 (3.3-4.3)	3.9 (3.2-4.3)	3.9 (3.0-4.7)
KNE sites	6-10	2022	4	20.2 (18.8-22.5)	4.2 (3.7-5.0)	3.8 (3.5-4.0)	4.3 (3.7-5.0)	3.9 (3.5-4.5)	4.1 (4.0-4.3)

Table A1.5: Wetland condition index overall and subcomponent scores in the **Eastern Wairarapa** whaitua catchment.

Programme	Survey cycle	Year/s	No. sites	Overall WCI	Hydrological integrity	Physicochemical parameters	Ecosystem intactness	Browsing & predation	Dominance of native plants
All sites	1-5	2020-2021	33	16.7 (13.3-20.7)	3.6 (2.9-4.7)	3.3 (2.8-4.0)	3.5 (2.7-5.0)	3.1 (2.4-3.8)	3.3 (1.3-4.0)
KNE sites	1-5	2020-2021	9	17.2 (15.1-20.7)	3.8 (3.0-4.7)	3.3 (2.9-4.0)	3.7 (2.7-5.0)	3.2 (2.4-3.5)	3.2 (2.0-4.0)

Table A1.6: Wetland pressure index overall and subcomponent scores in the **Kāpiti Coast** whaitua catchment.

Programme	Survey cycle	Year/s	No. sites	Overall WPI	Modifications to catchment hydrology	Catchment water quality	Animal access / grazing	Key undesirable species	Introduced vegetation	Presence of pests
All sites	Change	2018-2021 to 2023	27	+2.26 (+13.5%)	+0.02 (+0.6%)	-0.26 (-8.8%)	+0.20 (+25.5%)	-0.02 (-0.7%)	+2.70 (+217.5%)	-0.37 (-11.3%)
All sites	1-5	2018-2021	37	16.7 (5.0-21.0)	3.3 (1.0-5.0)	3.0 (1.0-4.0)	0.8 (0.0-3.0)	2.6 (0.0-5.0)	1.2 (0.0-4.0)	3.3 (0.0-4.0)
All sites	6-10	2023	27	19.6 (14.0-24.5)	3.7 (2.0-5.0)	2.9 (2.0-4.0)	1.1 (0.0-3.0)	2.7 (2.0-4.0)	3.3 (2.0-4.0)	3.0 (2.0-4.0)
KNE sites	Change	2018 to 2023	14	+2.11 (+12.3%)	+0.00 (+0.0%)	-0.36 (-11.2%)	+0.14 (+16.3%)	-0.04 (-1.4%)	+2.64 (+352.4%)	-0.25 (-7.8%)
KNE sites	1-5	2018	16	17.2 (14.0-20.0)	3.6 (2.0-5.0)	3.2 (2.0-4.0)	0.9 (0.0-2.0)	2.6 (2.0-5.0)	0.8 (0.0-4.0)	3.2 (2.5-4.0)
KNE sites	6-10	2023	14	19.1 (14.0-23.0)	3.6 (2.0-5.0)	2.9 (2.0-4.0)	1.1 (0.0-3.0)	2.5 (2.0-4.0)	3.2 (2.0-4.0)	2.9 (2.0-4.0)

Table A1.7: Wetland pressure index overall and subcomponent scores in the **Te Awarua-o-Porirua & Te Whanganui-a-Tara** whaitua catchment.

Programme	Survey cycle	Year/s	No. sites	Overall WPI	Modifications to catchment hydrology	Catchment water quality	Animal access / grazing	Key undesirable species	Introduced vegetation	Presence of pests
All sites	Change	2019-2021 to 2024	23		+0.13 (+5.4%)	-0.02 (-0.9%)	+0.22 (+20.7%)	+0.10 (+4.6%)		-0.30 (-9.4%)
All sites	Change	2019-2021 to 2024	24	+1.83 (+13.8%)					+0.50 (+25.0%)	
All sites	1-5	2019-2021	31	13.3 (6.0-19.0)	2.5 (0.0-4.5)	2.3 (0.0-4.0)	1.0 (0.0-4.0)	2.2 (0.0-4.0)	2.0 (0.0-4.0)	3.2 (2.5-4.0)
All sites	6-10	2024	23		2.7 (1.0-4.5)	2.3 (0.0-4.0)	0.9 (0.0-3.0)	2.3 (1.0-3.5)		2.8 (1.0-4.0)
All sites	6-10	2024	24	14.7 (0.0-22.5)					2.5 (0.0-4.0)	
KNE sites	Change	2019 to 2024	7	+1.77 (+15.9%)	+0.01 (+0.8%)	-0.43 (-22.2%)	-0.29 (-28.6%)	-0.17 (-8.2%)	+0.57 (+40.0%)	-0.21 (-7.3%)
KNE sites	1-5	2019	7	11.2 (6.0-17.5)	1.8 (1.0-3.0)	1.9 (1.0-3.5)	1.0 (0.0-2.0)	2.1 (1.0-3.0)	1.4 (0.0-4.0)	2.9 (2.5-3.5)
KNE sites	6-10	2024	7	12.9 (7.0-19.5)	1.8 (1.0-4.0)	1.5 (1.0-3.0)	0.7 (0.0-2.0)	1.9 (1.0-3.0)	2.0 (1.0-4.0)	2.7 (1.0-3.0)

Table A1.8: Wetland pressure index overall and subcomponent scores in the **Ruamāhanga** whaitua catchment.

Programme	Survey cycle	Year/s	No. sites	Overall WPI	Modifications to catchment hydrology	Catchment water quality	Animal access / grazing	Key undesirable species	Introduced vegetation	Presence of pests
All sites	Change	2017-2021 to 2022	30	+0.93 (+5.1%)	-0.72 (-25.5%)	+0.02 (+0.6%)	+0.45 (+35.9%)	+0.37 (+14.1%)	+1.67 (+64.8%)	+0.42 (+12.2%)
All sites	1-5	2017-2021	49	18.3 (6.0-30.0)	2.8 (0.0-5.0)	3.0 (0.0-5.0)	1.3 (0.0-5.0)	2.6 (0.0-5.0)	2.6 (0.0-5.0)	3.4 (2.0-5.0)
All sites	6-10	2022	30	18.6 (11.0-26.0)	2.2 (0.0-4.0)	3.0 (1.0-4.0)	1.6 (0.0-5.0)	2.9 (2.0-3.0)	3.4 (0.0-4.0)	3.4 (2.0-5.0)
KNE sites	Change	2017-2021 to 2022	4	+5.38 (+43.0%)	-1.00 (-50.0%)	+0.75 (+31.3%)	+0.75 (+125.0%)	+1.50 (+93.8%)	+2.50 (+312.5%)	+0.62 (+25.0%)
KNE sites	1-5	2017-2021	5	12.5 (7.0-17.0)	2.0 (0.0-3.0)	2.4 (1.0-3.0)	0.6 (0.0-3.0)	1.6 (1.0-2.0)	0.8 (0.0-3.0)	2.5 (2.0-3.0)
KNE sites	6-10	2022	4	18.0 (15.0-20.0)	1.3 (1.0-2.0)	3.3 (2.0-4.0)	1.5 (1.0-2.0)	3.0 (3.0-3.0)	2.8 (1.0-4.0)	3.0 (3.0-3.0)

Table A1.9: Wetland pressure index overall and subcomponent scores in the **Eastern Wairarapa** whaitua catchment.

Programme	Survey cycle	Year/s	No. sites	Overall WPI	Modifications to catchment hydrology	Catchment water quality	Animal access / grazing	Key undesirable species	Introduced vegetation	Presence of pests
All sites	1-5	2020-2021	33	18.4 (13.0-22.0)	2.7 (0.0-4.0)	2.8 (1.0-3.5)	2.4 (0.0-5.0)	2.5 (1.5-4.0)	3.9 (3.0-5.0)	3.8 (2.0-5.0)
KNE sites	1-5	2020-2021	9	17.8 (14.0-20.5)	2.3 (0.0-3.0)	2.7 (1.0-3.5)	2.1 (0.0-5.0)	2.5 (2.0-3.5)	3.9 (3.0-4.0)	3.8 (3.0-5.0)