ASSESSMENT OF THE CULTURAL HEALTH OF TE WAIHORA

Introduction

This section of the report discusses the cultural health of Te Waihora and its catchment.

Summary

- The current health of the lake and river system of Selwyn Te Waihora is not acceptable to Manawhenua.
    - The TLI within the lake is higher than whanau aspirations.
    - There are still whanau who do not use the lake because of its poor state of health.
    - There are streams that whanau want to access and use that suffer from a combination of low flows and poor water quality.

Method

A critical feature of this Report Card is the selection of indicators, which relate directly to the tangata whenua objectives for Te Waihora as articulated in *Mahaanui Iwi Management Plan 2013*[1]. Indicator selection was driven primarily by the knowledge of existing indicators that are already in use by tangata whenua and feasible to monitor, the availability of existing data, the degree to which the indicators are representative of the eco-cultural system of Te Waihora that is valued and used by Ngai Tahu, and the likelihood that the indicators would continue to be monitored in the future. However, the scale that we set out below reflects the **promise** of Whakaora te Waihora.

	This outcome has been achieved.
	Processes are being implemented, work is in progress and there is a likelihood that this outcome will be achieved.
	This outcome has not been achieved. There are processes in place that could realise this objective.
	This outcome has not been achieved. Processes are still being developed that could realise this objective.
	This outcome has not been achieved. There are no processes in place that are likely to realise this objective.
	This cannot be reported on at this time.

Overall cultural assessment

The overall score for the cultural health of the lake in 2015 is compared to the overall score awarded in 2013. The change in overall score reflects the many initiatives that are underway in the catchment and, consistent with the scale above, confirms that while outcomes may not have been achieved, there "are processes in place that could realise this objective".

2013	2015

Each of the 27 indicators is discussed in the paragraphs that follow.

[1] http://mkt.co.nz/mahaanui-iwi-management-plan/

OBJECTIVE	INDICATOR	2013	2015	COMMENT
Ngāi Tahu are **active** co-governors of Te Waihora and its **catchment**.	1. Yes / No to formal co-governance arrangement in place for the catchment as a whole.			The decision on Plan Change 1 to the Land and Water Regional Plan states that *"Ngāi Tahu and CRC have implemented a co-governance agreement for the active management of Te Waihora and its catchment. Whakaora Te Waihora is a long-term relationship agreement and shared commitment between the two parties for the ecological and cultural restoration of the lake, bringing together the tikanga responsibilities of Ngāi Tahu and the statutory responsibilities of the regional council".* • While a formal co-governance body has been established, collaborative processes are in place, and actions are being taken to establish a co-governance regime, two years after agreements being put in place, it remains unclear whether the goal of creating a "governance arrangement … for the catchment as a whole" has been or will be achieved to the satisfaction of Manawhenua, TRONT and Environment Canterbury.
	2. Yes / No to formal long term commitment to Whakaora Te Waihora			• Whakaora Te Waihora is a joint programme between Ngāi Tahu and CRC with a shared commitment to the restoration and rejuvenation of the mauri and ecosystem health of Te Waihora (Lake Ellesmere) so that it continues to provide current and future generations with the sustenance, identity and enjoyment that it has in the past. • Whakaora te Waihora is a practical expression of the commitment of Environment Canterbury, Te Runanga o Ngai Tahu and Te Waihora Management Board to work collaboratively on the restoration of Te Waihora. • At this stage it remains unclear what the long term funding path for Whakaora te Waihora is. Therefore the scoring reflects that "there are processes in place that could realise this objective". At the time of writing this summary, it remained unclear who will fund the Phase 2 work programme for Whakaora Te Waihora – a work programme for 2016-2026. The officer's report to Plan Change 1 stated that "Funding will come from public, private and community sources". The proposed work programme for Stage 2 involves: • Maintaining the current initiatives and supporting new initiatives to restore habitat and achieve biodiversity enhancement from the initial focus catchments into 40 key catchments including significant drains and waipuna/spring heads, primarily through 800 kilometres of riparian planting, predator pest and weed control and instream remediation and enhancement. • Continuing to improve current land practices through extended farm management planning, catchment strategies and broadening support for landowners and catchment communities to implement on-farm improvement measures across the whole lake catchment. • Enhancing lake resilience to absorb legacy impacts by creating significant buffer areas through mid-catchment wetland re-establishment; lake margin protection; and retirement and enhancement of inlets and embayments for fish refugia, macrophyte establishment and mahinga kai. • Implementing lake interventions investigated in Phase 1 for lake level control, nutrient processing and in-lake habitat creation - e.g. phytoplankton and nutrient interaction and salinity tolerance - by moving into the next stages of the design and development of lake opening and closing infrastructure, enhanced channelling, floating wetlands, macrophyte beds and in-lake islands. • Implementing sediment traps, sandwand, and creation of riffle and refugia in streams. • Developing new investigations for solutions to in-lake issues and monitoring of changes to enable, complement and support long-term restoration with a focus on nutrient interactions, salinity effects, aquatic invertebrate balance and operational water modelling.

Land and water management in the catchment effectively provides for the **Treaty partner status** of Ngāi Tahu, and the taonga status of Te Waihora.	**3.** Yes / No to TRONT, Te Waihora Management Board or Ngai Tahu entity being joint holders of the consent for the lake opening.			Environment Canterbury and Te Runanga o Ngai Tahu are joint holders of the resource consent for opening the lake. Consents were renewed in 2014.
	4. Yes / No to TRONT, Te Waihora Management Board or Ngai Tahu entity being the joint consent authority for the catchment			Ngāi Tahu continue to have limited control over activities that affect the lake bed, including the discharge of contaminants and sediment on the lake bed from adjacent land use and tributary inflow[2]. Ngai Tahu is not engaged with Environment Canterbury as the joint consent authority.
	5. Yes / No to Ngai Tahu approval being sought for activities involving the lakebed			Ownership of the Te Waihora lake bed was vested in Te Rūnanga o Ngāi Tahu in 1998 as part of the Ngāi Tahu Settlement. Since 1998, there have been a number of difficulties associated with exercising the rights and obligations resulting from this ownership. For example, as noted above, Ngāi Tahu have had limited control over how particular activities in the wider catchment affect the lake bed. However, as a result of the Selwyn Te Waihora ZIP Addendum decision, a number of Cultural Landscape/Values Management Area have been created. While these zones ensure that Ngai Tahu will be consulted on consents, and be seen as an affected party, this may fall short of the aspiration of whanau. However, the amended scoring recognises the potential improved outcomes for the lake and river from having a Cultural Landscape/Values Management Area.

[2] Mahaanui Iwi Plan 2013

The cultural health of Te Waihora is **restored**, including the restoration of mahinga kai species abundance and diversity to a level to enable customary use.	6. Good health of, and physical access to, mahinga kai sites and places within the Te Waihora catchment is restored, including but not limited to: (a) Muriwai; (b) Greenpark Sands; (c) Pākoau; (d) Kaitōrete; (e) Kaituna kōhanga (f) Waikirikiri; (g) Waiwhio; (h) Halswell River; (i) Ahuriri Reserves; and (j) Yarrs Lagoon.			Assessing this indicator requires consideration of 1) sites; 2) species; and 3) quality of the kai. An assessment in 2014 found that with respect to habitat quality and threats, the sites of Greenpark Sands, Fishermans Point and Taumutu had mixed scores, Drain Rd and Te Korua sites had mediocre scores, and the Halswell River mouth site had the lowest scores[3]. Abundance of taonga species (including mahinga kai) is the ultimate indicator of cultural health[4]. The results of cultural monitoring showed that high averaged scores were awarded to all species that respondents selected to score. It is expected that the amended lake opening regime should ensure that the lake is open crucial life cycle stages. The lake has been open 10 times between 1 Jan 2013 and 30 June 2015[5]. Successful recruitment is thought to be a key factor influencing fishery productivity. Investigations of fisheries recruitment is progressing as part of Whakaora te Waihora. There remains considerable uncertainty with respect to migrations of taonga species. While whanau believe the lake opening will benefit the lake based fishery, it is unclear how much of the catchment will be barrier free and of a condition that enables unimpeded passage (e.g. flows, intermittency etc.). For example Hanmer Drain has 18 weirs (barriers) that limit passage. Whanau have to be confident of the cultural health of the lake and streams, the safety of gathering, have aquatic conditions that mean they are physically able to gather, and have to perceive the conditions of the aquatic environment as fit for customary use. There remain concerns that enriched waters and deteriorating aquatic conditions will not enhance the customary fishery. However, abundance alone is insufficient to ensure cultural health. Enrichment of the lake has adversely impacted the *quality* of customary fisheries, through nuisance algae blooms (including risk of toxic cyanobacteria), and decreased amenity value (e.g. subtle colour effects and more days at low lake level). With respect to mahinga kai gathering from the lake, the lake water is currently turbid with very low clarity (~10 cm visibility), and is brown/green in colour due to wind/wave suspended bed sediment and algae (phytoplankton)[6]. Water colour and clarity continually change depending on weather conditions (and thus sediment re-suspension), and also impacts the success of fishing activity, and the method used to gather[7] The Ecotoxicology study that was undertaken as part of Whakaora te Waihora confirmed that there are some whanau members who no longer gather or consume foods taken from the lake[8]. However, in contrast, a lesser number of individuals who choose to gather kai stated either that there had been appreciable change or improvement in time period. One stated that it seemed that fish (tuna, pātiki and aua) seemed easier to catch, but stated that might be due to gaining more skill as a fisher. Another remarked that food was now safer because there was less discharge of sewage at the site[9]. With respect to specific sites, phase 1 of Whakaora Te Waihora focused on six areas – Kaituna Ki Uta ki Tai, Halswell/Hiritini Ki Uta ki Tai, Waikekewai Ki Uta Ki Tai, improving in-lake habitat, lake opening management and protecting lake shore habitat. Achievements to date include: • Planting of over 100,000 native plants and in conjunction with landowners there were a further 100,000 plants across all three initial focus tributaries in spring of 2014. • Preparation of Farm Environment Plans (FEP) – the area covered by FEPs is around 8,900 ha. • Large scale willow eradication at six key lake margin sites • Recontouring of 15 kilometres of major drains

[3] The working draft of the report "Te Waihora Cultural Monitoring Report March 2014 – October 2014) was made available to the author. It has yet to be finalised and released.

[4] Goodall (2003) Hakatere Cultural Values Report

[5] Griffiths L. Section 2a Lake Level Management Te Waihora / Lake Ellesmere – State of the Lake 2015.

[6] Selwyn Waihora Limit Setting Process: An Overview of Current State in 2012.

7 Pers com from member of Te Waihora Management Board. Also confirmed by evidence of whanau "*There is very little clear water in the shallows of the Lake now, only under certain conditions and never during summer. Some of our customary fishery practices cannot be used now due to very discoloured water".*

[8] Pers com from members of the COMAR assessment teams

[9] The working draft of the report "Te Waihora Cultural Monitoring Report March 2014 – October 2014) was made available to the author. It has yet to be finalised and released.

	7. Mahinga kai species traditionally gathered still found across historic range			In the absence of stock assessments we have relied on the observations of whanau: *there are far less black swans which are a native species. There were previously in excess of 80,000. Now, there are around 8,000. Pressure on land use for breeding areas restricts the ability for cultural gathering of swan eggs.* *Inanga Whitebait runs are nowhere near as good as those that the kaumatua talked about. even during my time on the lake. Timing of openings for whitebait is crucial. In my experience, whitebait will be more inclined to enter the lake with better water quality and perhaps breed in and around the lake* *There are different types of patiki flounder in the lake. Three corner flounders do not usually prosper in the lake throughout their cycle. There are sometimes lots of small ones, but they do not always grow to useful size. The Timaru whites or Greenbacks are not even present in the lake as juveniles. Something is stopping them growing up and then they completely disappear from the system. This did not happen in the past. It is possible that the timing of recruitment for this species is completely missed by the current opening regime which does not cater for lake opening at optimal times for recruitment.*
The **customary rights** of Ngāi Tahu whānui associated with mahinga kai and Te Waihora are protected mō tātou, ā, mō kā uri ā muri ake nei. *The lake is under significant pressure. Access to mahinga kai is being threatened. What remains is so fragile and important. Waihora is a whole system from where I can exercise my customary right to mahinga kai and be engaging with the tribal property. Our customary lake is a right that is being impeded and must be protected.*	8. Satisfaction of whanau that Te Waihora and its tributaries are managed as a customary fishery including but not limited to: (a) A lake opening regime the reflects the needs of the customary fishery; (b) Tributary water quality and quantity that enhances cultural health and mahinga kai, and enables customary use; (c) The use of exclusion zones for commercial fishing / non-commercial fishing areas.			a) Indigenous fish species (e.g. eel, flounder, whitebait) and the customary fisheries associated with them, are tolerant of the current enriched state, and lake openings to the sea, a key factor influencing fishery productivity[10], are predicted to increase. Increased frequency of artificial openings to the sea has a significant benefit for fish migration (autumn openings) and recruitment (spring openings) for indigenous species (e.g. eel, flounder, whitebait). The lake has been open on 10 occasions since January 2013. However, increasing enrichment, are perceived by whanau to have adverse effects on the quality of customary fisheries. Whanau need and want to fish where they have the right to fish. They want to use the methods they are accustomed to using, and know they can fish safely and share the fish gathered safely. At present they are unable to do this to the extent they aspire to. b) As a result of the decision for Plan change 1, which amends the Land and Water Regional Plan, a number of the streams flowing into Te Waihora are to see increased flows. This has the potential to enhance fisheries but whanau fear that there is uncertainty as to whether or not the suite of non-regulatory measures will be sufficient to ensure that it is not nutrient enriched water that enters the lake. *The Section 42A Report described how the water quality and quantity limits proposed in Variation 1 on their own cannot achieve the priority outcomes set in the Selwyn-Waihora Zone Implementation Programme (ZIP) and ZIP Addendum, and that a suite of complementary non-regulatory actions is also needed.Those non-regulatory actions can be broadly described as catchment interventions, lake interventions, monitoring and infrastructure development* (Extract from Plan Change 1 decision). c) In relation to exclusion zones, there are currently zones that are closed to commercial activity • Harts Creek Reserve • The Kaituna Lagoon (is managed as a kohanga) • With respect to eels, reserve areas extend throughout the tributaries including a radius of 1.2km around the mouth of the Irwell, Selwyn, L11, Halswell and Harts Creek. An initiative that may lead to improved outcomes for the lake and river is the creation of Cultural Landscape/Values Management Areas around the lake and a number of rivers flowing into the lake.

[10] Due to recruitment of juveniles from the sea to the lake in spring and sea-ward migration in autumn

	9. Whanau can access sites to gather where they wish, and how they wish.			Access remains a significant issue for whanau: *I have seen rotting piles of water weeds and thick sediment along with dead eels that have suffocated on the banks from drain cleaning exercises, which has made me have to choose a totally different area to harvest from, or to not gather at all.* *I have waded through waste high mud and sediment that lies in places on the bed of our lake and tributary streams, and which has made it almost impossible for me to set nets or access sites for fishing and harvesting.* Over time, on farm interventions, removal of willows, improved riparian management will improve access.
Land and water use in the catchment respects the boundaries, availability and limits of our freshwater resources and the need to protect soil and water resources for future generations.	10. Iwi specific flow preferences identified and provided for in catchment flow regimes.			Prior to plan change 1, whanau were concerned at the current flow regimes and the current water quality. In 2011/ 2012 two teams representing the kaitiaki runanga assessed a number of streams in the catchment. For the majority of streams assessed the current minimum flows were less the flows sought by whanau. Low flows and the duration of low flows are seen as issues that adversely impact the cultural health of waterways[11]. As a result of plan change 1, flows in a number of streams will increase in 2020. However, some whanau remain concerned that initiatives being considered (e.g. Central Plains), although having the potential to augment flows, will bring nutrient enriched and contribute to a further deterioration of the existing aquatic conditions.
	11. Level of extraction (groundwater, surface water)			The Selwyn Te Waihora catchment is currently overallocated, which is a concern of whanau. The section 42 officers report for plan change 1 confirmed that - *Existing authorised takes in the new Selwyn-Waimakariri and Rakaia-Selwyn combined surface and groundwater allocation zones significantly exceed the new allocation limits by 27% and 64% respectively.* Knowing that one of the outcomes of plan change 1 is to address overallocation is a positive step. But some whanau are concerned at the lengthy timeframe to see the issue addressed[12]. There are some catchments, such as the Waikekewai and Prices, where they there will no extractions, which is a positive outcome for whanau. .
	12. No inter-catchment transfers			*Farming has intensified in the area. I have seen first hand the pollution, runoff, sedimentation and drain cleaning that has occurred. Some areas are not fenced, stock are getting access to waterways. Many of the drains and waterways are refuges for various species and are influenced by lake level management at different times of the year. Mechanical removal of sediment from these drains and waterways removes adult and juvenile eels.* Whanau remain concerned at the possibility of further intensification which may be accompanied by inter-catchment transfers. However, with the processes and regulatory provisions that are now in place as a result of plan change 1, there is an expectation that they will be fully consulted at the early stage where a proposal involves inter-catchment transfers.

[11] Recorded by members undertaking assessments as part of the COMAR study,

[12] Statement from COMAR Team member.

Lake management, including lake level management, reflects living with the lake, rather than forcing the lake to live with us. *A significant pressure was the focus on maintaining the lowest possible lake level to maintain productive land use around the lake. This practice has taken place on a continuous basis for decades.*	13. Satisfaction of whanau with lake level management – including openings that allow for: (a) Increased fish recruitment; (b) Higher and fluctuating lake levels; (c) Salinity maintained at a higher level than current regime allows; (d) Longer duration of openings when required for fish values; and (e) Allowing the lake to be tidal for longer periods of time.			The lake is periodically open to the sea and therefore varies in how salty it is. The lake height is currently managed through lake opening/ closing to protect wildlife habitat while recognising the needs of farming. Opening to the sea in the spring and autumn is important for fish passage and recruitment and was considered to be unlikely to support optimal migration and spawning requirements for important species, for example eel and flounder. Spring openings are important for flounder recruitment and autumn opening for flounder and eel migration. The Water Conservation Order (WCO) for the lake has specified a new management regime around opening and closing and modelling suggests that it will significantly increase the number of spring[5] and autumn[6] openings[13]. In 2013 the lake was open for longer periods of 68 days, 47 days and 60 days. The impact of the changed operating regime still needs to be determined.
	14. The investigation of opening the lake at the southern end of Te Koru, in addition to, or instead of, the current site.			Lake opening alternatives were investigated within the Whakaora te Waihora programme. This was accompanied by feedback hui with representatives of Manawhenua. Manawhenua have watched with interest the effect of lake opening regime on the condition of the lake.
	15. Water quality (TLI)			Within the Environment Canterbury Natural Resource Regional Plan (NRRP) the Trophic Level Index (TLI) is set at 6. The current annual TLI is approximately 6.8 mid-lake. This is in the hypertrophic or highly nutrient enriched state. Whanau have been told to expect the lake to become even more nutrient enriched leading to an annual TLI ~ 7.2 and 7.3 respectively (i.e. still hypertrophic) which is likely to result in an increase in the likely frequency of nuisance algal blooms. This is of concern to whanau who, noting the target of 6 in the NRRP, aspire to a TLI more akin to its historic state (in the region of 4 – 5 TLI). However, it must be acknowledged that there are a number of initiatives underway. The scoring has therefore been amended to reflect that "This outcome has not been achieved. Processes are still being developed that could realise this objective".

[13] Selwyn Waihora Limit Setting Process: An Overview of Current State in 2012.

The relationship between land use, groundwater, surface water and Te Waihora is recognised and provided for according to the principle of Ki Uta Ki Tai. *Kaumātua describe Te Waihora as once clear with a shingle bottom, used as a source of drinking water, food and cultural resources[14].*	16. Groundwater quality			• The concentration of nitrate in the groundwater of the Selwyn Waihora area is increasing[15]. • For groundwater that is close to the land surface, it can be vulnerable to contamination from micro-organisms from either grazing animals or waste water disposal. • The risks to the reticulated water supply appear low in general. However the risks to the drinking water supplies from domestic wells are greater, especially where border dyke irrigation is still practiced[16]. Given the number of whanau that live in the catchment, this risk remains of concern.
	17. Quality of drinking water at the marae			Nitrate-N concentrations in groundwater around the lake are kept low by denitrification in anoxic conditions and by dilution by the upward flow of deep, low nitrate-N groundwater[17].The wells around the lake, including those at the Taumutu marae, are not at risk of increased nitrate-N contamination from broad-scale land use change on the plains. Maintaining high quality water for homes around the lake and at the marae is a priority.
	18. % of landuse change			Whanau contend that 'Te Waihora has little protection from the effects of land use on its margins hence the aspiration of manawhenua to be joint consenting authority for the catchment. Activities on the margins of the lake such as grazing, sewage discharge, and run-off have effects on lake health through direct environmental impact, and because they influence the lake level management. For example, the location of lake margin communities compromises the ability to raise lake levels and manage for fishery values. The protection of these communities is given priority over and above the tribal property right over the lakebed. The Te Waihora Management Board refers to this as a 'superimposed priority to keep these settlements dry'[18]. Although Te Waihora continues to be a productive environment, its mauri is severely degraded as a result of a management regime that has consistently prioritised non-Ngāi Tahu values and interests[19]. Land use and tributary management in the wider catchment also contribute significantly to the degraded cultural health of Te Waihora. Located at the "bottom" of the system the lake receives contaminated water from its tributaries. Whanau are concerned the possibility of further land intensification and land use change, and the risk of further enriched waters entering the lake. This indicator will have greater relevance once the impact of the availability of new water for irrigation from Central Plains Water on landsuse can be assessed.

[14] See Mahaanui Iwi Plan 2013
[15] Selwyn Waihora Limit Setting Process: An Overview of Current State in 2012
[16] Selwyn Waihora Limit Setting Process: An Overview of Current State in 2012
[17] Selwyn Waihora Limit Setting Process: An Overview of Current State in 2012
[18] Mahaanui Iwi Plan 2013
[19] Pauling 2007

The cultural health of lowland waterways is **restored**, through the restoration of water quality and quantity and riparian margins.	19. Water quality parameters			Streams flowing into Te Waihora have moderate to high levels of phosphorus except Harts Creek. In addition the drainage network will carry phosphorus to the lake. Concentrations in the Halswell have increased over the last 10 – 20 years. Concentrations in the L11, Boggy Creek and Selwyn (at Coes Ford) have decreased but remain moderate to high. For nitrogen the 'levels of protection for chronic toxicity'[11] indicate what proportion of aquatic life we should expect generally to be protected in current conditions. For all of the lowland sites except Jollies Brook, we currently have less than 80% level of protection, in other words it is likely that some species will not prosper in the streams currently and nitrate tolerant species will dominate. Finally, sediment is a water quality parameter of significance to whanau as it can impact cultural use. Investigations of the potential and efficacy of options to address legacy phosphorus issues in Te Waihora are part of Phase 1 of Whakaora te Waihora. Other scientific work to assess the viability of planting macrophytes in the lake bed and a detailed model of in-lake nutrient processing are progressing. The scoring has therefore been amended to reflect that "This outcome has not been achieved. Processes are still being developed that could realise this objective".
	20. Water quantity parameters			There are two aspects of water quantity to be considered: flows and allocation (see 11 above). The flows in the lowland streams are mainly sourced from groundwater ad are fed by springs that emerge, although some are fed by alpine sources. In 2011/ 2012 two teams representing the kaitiaki runanga assessed a number of streams in the catchment. Low flows and the duration of low flows are seen as issues that adversely impact the cultural health of waterways[20]. *I have experienced the extreme low flows in our streams which impact on the available habitat for our fish, can leave them stranded and which can also result in poor harvests in subsequent years.* The observations of whanau are supported by other technical assessments: *Flows have been impacted by the long term effects of extraction and long term climate variability…. In particular the reduced flows in lowland streams has reduced the habitat available for trout and native fish especially eels…. It is clear to see that flows have decreased and importantly they have decreased below the set minimum flow for Coes Ford in the lower catchment[21].* As a result of plan change 1, flows in many of the stream valued by whanau, will increase. With the commissioning of the Central Plains Water Scheme, their infrastructure will bring alpine water into the Selwyn Te Waihora catchment which it is anticipated will result in the retiring of some groundwater takes and improvement of flows in lowland streams. Other initiatives being trialled include managed aquifer recharge and targeted stream augmentation for environmental benefit. A pilot to introduce water to Boggy Creek has recently been reported[22]. The scoring has therefore been amended to reflect that "This outcome has not been achieved. Processes are still being developed that could realise this objective".

[20] Recorded by members undertaking assessments as part of the COMAR study,

[21] Selwyn Waihora Limit Setting Process: An Overview of Current State in 2012.

[22] The working draft of the report "Te Waihora Cultural Monitoring Report March 2014 – October 2014) was made available to the author. It has yet to be finalised and released.

Wetlands and waipuna are recognised and **protected** as wāhi taonga, and there is an overall net gain of wetlands in the catchment.	21. Area of wetlands (ha) restored as habitat			The current extent of wetland habitat in the catchment is minimal and primarily restricted to the shores of Te Waihora/Lake Ellesmere and scattered remnants throughout the plains and foothills[13], and often occur at the source of streams. The currently modest areas of fringing wetlands around the lake are highly valued. These are restricted in area due to regular lake level control to avoid flooding neighbouring land. Lake level management is important for the success of fringing wetland restoration, so an increase in the frequency of low level periods in summer could be detrimental if the lake opening regime cannot be managed to avoid this. In addition - similar to the case for macrophyte bed re-establishment – fringing wetland restoration could in some areas reduce the amount of wind and wave-generated sediment re-suspension, thus improving water clarity, reducing light limitation and potentially leading to greater phytoplankton growth (e.g. green algae) in those marginal areas as a result of greater nutrient loads which are envisaged in the future. As part of the Whakaora te Waihora, techniques to aid in the restoration of macrophyte beds are being trialled. It is noted that the Zone Committee has received presentations concerning the potential for constructed wetlands around the shores of Waihora[23]. However, there are a number of practical issues to be considered if these initiatives are to be implemented.
	22. Yes / No and number of restoration initiatives spread across the catchment.			There are a number of initiatives across the catchment[24]: • Whakaora te Waihora Programme continues. • Environment Canterbury (via its Immediate Steps Programme) is supporting a number of restoration initiatives. • WET undertakes a number of initiatives that aid restoration. • A number of landowners are initiating projects on their own properties e.g. farmers as part of their farm management plans.
	23. Satisfaction of whanau with the level of protection afforded springs			Because of the loss of access of the catchment, whanau are unsure of the health of some of the larger springs[25]. With respect to springs that emerge in the lake, there is concern that these are adversely impacted by increased sedimentation[26]. It is therefore pleasing to see that an investigation initiated in response to Plan Change 1 was the mapping of springs and wetlands. There are a number of steps that will need to be taken to move from mapping springs to their protection, hence there is no change in the scoring.

[23] Presentation from NIWA staff to the Selwyn Waihora Zone Committee.

[24] The following was extracted from the section 42 officers report that accompanied Plan Change 1. *"As at March 2014, $724,870 had been approved for Immediate Steps Biodiversity projects in the Selwyn Te Waihora Zone. In addition to the funding to CWMS Zones, the CWMS Regional Committee has $240,000 annually to distribute to "regional biodiversity flagship" projects. Te Waihora is one of these flagship projects and the CWMS Regional Committee has allocated $540,000 to Te Waihora over the five years from 2010 to 2016. The funding is used for willow control and planting on public land on lake margins, and for weed control in the LII/Ararira. In addition to the Immediate Steps Biodiversity funding there have been significant contributions by a number of other groups and organisations through funding and staff or volunteer time such as Ngāi Tahu ($28,055), Department of Conservation ($51,160), Te Ara Kākariki: Greenway Canterbury, and individual landowners. Further biodiversity funding is available from CRC to support the Canterbury Biodiversity Strategy. This fund has provided $522,000 to the Selwyn Te Waihora catchment since July 2010. In combination, the $1.8 million allocated to this Zone from the above funding sources represents 38 kilometres of fencing and 70,000 plants (covering 14 hectares)".*

[25] Pers com. From a Taumutu Kaumatua.

[26] Pers com from a member of the COMAR assessment team.

All waterways have healthy, planted riparian margins, and are protected from stock access.	24. *Index of Riparian Condition*			*This measure is unable to be reported at this time.* However it is noted that a project approved under the Co-Governance Agreement between CRC, Te Waihora Management Board and Te Rūnanga o Ngāi Tahu under Phase 1 of Whakaora Te Waihora involves mapping of riparian quality. Further phase 2 of Whakaora te Waihora is targeting 800 kilometres of riparian planting, predator pest and weed control and instream remediation and enhancement.
	25. Kilometres (%) of river/waterway length without stock access			*This measure is unable to be reported at this time.* However as noted above a project approved under the Co-Governance Agreement between CRC, Te Waihora Management Board and Te Rūnanga o Ngāi Tahu under Phase 1 of Whakaora Te Waihora involves mapping of riparian quality. Further phase 2 of Whakaora te Waihora is targeting 800 kilometres of riparian planting, predator pest and weed control and instream remediation and enhancement.
	26. Kilometres (%) and/or hectares of river/waterway length with riparian protection			*This measure is unable to be reported at this time.* However as noted above a project approved under the Co-Governance Agreement between CRC, Te Waihora Management Board and Te Rūnanga o Ngāi Tahu under Phase 1 of Whakaora Te Waihora involves mapping of riparian quality. Further phase 2 of Whakaora te Waihora is targeting 800 kilometres of riparian planting, predator pest and weed control and instream remediation and enhancement.
The discharge of contaminants to the lake and waterways in the catchment is eliminated. *Furthermore, we have dealt with the direct discharge of sewage following the recent earthquakes.*	27. Water quality parameters			Please see the comments for indicators 15 and 16. As noted previously, land use and tributary management in the wider catchment also contribute significantly to the degraded cultural health of Te Waihora. At the bottom of the catchment, Te Waihora is a sink for nutrients and sediment from its large and predominately agriculturally based catchment. Historically, extensive wetlands around the lake margins acted as a nutrient and sediment filter and played an important role in maintaining water quality, but these have been largely drained or degraded. *"We shouldn't be using the word 'nutrients' to describe what is going into our lake. Nutrients are associated with health and well being. What is going into our lake is pollutants and toxins."* Uncle Donald Brown, Te Taumutu Rūnanga. *Furthermore we have dealt with the direct discharge of sewage following the recent earthquakes.* This objective from the iwi plan differs to the objective associated with indicator 19 because the objective is to eliminate discharges. The scoring remains unchanged as the management is currently seeking to reduce the discharges not eliminate them.

Overall assessment of the Cultural Health of the State of the Lake

By averaging all the scores for the 27 indicators, it is possible to determine an overall grade for the cultural health.

2013	2015

The question that arises is how can there be an improvement given the lake remains in a degraded state? In the paragraph that follows we undertake two different analyses:

1. Sorting indicators according to the pressure-state-response categories; and
2. Sorting indicators according to key values of Ngai Tahu.

Pressure-state-response

The P-S-R framework analyses linkages among socioeconomic trends, ecological phenomena and institutional responses. It follows a causal path that goes from driving forces of environmental change (e.g., population growth and density), which lead to pressures on the environment (e.g., increased sewage outflow to coastal waters), which result in changes in the state of the environment (e.g., amounts of organic pollution in coastal waters), which in turn results in environmental and socioeconomic impacts (e.g., changes in recreational value of bathing waters) and elicits institutional responses (e.g., improvement in wastewater treatment).

We sorted the 27 indicators into the categories and then averaged each category. The arrows confirm that there has been a marginal improvement across all categories.

	Indicators in this grouping		2013 score	2015 score
Pressure	Indicator 11 Indicator 12 Indicator 18		This outcome has not been achieved. Processes are still being developed that could realise this objective	This outcome has not been achieved. There are processes in place that could realise this objective. ↗
State	Indicator 6 Indicator 7 Indicator 8 Indicator 9 Indicator 13 Indicator 15 Indicator 16 Indicator 17	Indicator 19 Indicator 20 Indicator 24 Indicator 25 Indicator 26 Indicator 27	This outcome has not been achieved. Processes are still being developed that could realise this objective	This outcome has not been achieved. Processes are still being developed that could realise this objective ↗
Response	Indicator 1 Indicator 2 Indicator 3 Indicator 4 Indicator 5	Indicator 10 Indicator 14 Indicator 21 Indicator 22 Indicator 23	This outcome has not been achieved. There are processes in place that could realise this objective.	This outcome has not been achieved. There are processes in place that could realise this objective. ↗

Ngai Tahu values

We sorted the 27 indicators into the categories and then averaged each category. The arrows confirm that there has been a marginal improvement in two categories, mauri and mahinga kai.

	Indicators in this grouping	2013 score	2015 score
Recognition of Ngai Tahu as rangatira of the lake and surrounds	Indicator 1 Indicator 3 Indicator 4 Indicator 5	This outcome has not been achieved. There are processes in place that could realise this objective.	This outcome has not been achieved. There are processes in place that could realise this objective. ↔
Ability to exercise kaitiakitanga	Indicator 2 Indicator 22 Indicator 23	This outcome has not been achieved. There are processes in place that could realise this objective.	This outcome has not been achieved. There are processes in place that could realise this objective. ↔
Mauri	Indicator 10 Indicator 11 Indicator 12 Indicator 13 Indicator 14 Indicator 15 Indicator 16 Indicator 17 Indicator 18 Indicator 19 Indicator 20 Indicator 21 Indicator 24 Indicator 25 Indicator 26 Indicator 27	This outcome has not been achieved. Processes are still being developed that could realise this objective	This outcome has not been achieved. Processes are still being developed that could realise this objective ↗
Mahinga kai	Indicator 6 Indicator 7 Indicator 8 Indicator 9	This outcome has not been achieved. Processes are still being developed that could realise this objective	This outcome has not been achieved. There are processes in place that could realise this objective. ↗

Conclusion

The change in overall score reflects the many initiatives that are underway in the catchment and, consistent with the scale above, confirms that while outcomes may not have been achieved, there are "processes in place that could realise this objective".

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