A Biography of Lake Tūtira

The following is a transcript of a talk given by Jonathan West and recorded live on at the National Library of New Zealand on 6 July 2022.

Transcript

Sarah Burgess: Kia ora, and welcome to the New Zealand History podcast channel, where you'll find talks on Aotearoa New Zealand history, culture and society. These talks are organised by Manatū Taonga, the Ministry for Culture and Heritage with the support of the Alexander Turnbull Library. They're recorded live either via Zoom or in person at Te Puna Mātauranga o Aotearoa, the National Library of New Zealand.

Elizabeth Cox: Tēnā koutou, tēnā koutou, tēnā koutou katoa, it's lovely to be here at the National Library. The National Library is such a wonderful host for these events for us and I'm a senior historian at Manatū Taonga and today we're introducing Jonathan West. Jonathan is an environmental historian. His first award-winning book was *The Face of Nature* which was an environmental history of the Otago Peninsula. And this talk that he's going to do today is an extract out of his larger research project, which is called 'Mirrors on the Land: Histories of New Zealand Lakes', in which he's going to study eight or nine – he tells me it fluctuates sometimes – New Zealand lakes and – ah, in order to tell the history of those places and a wider environment history of New Zealand. And Jonathan started that project as a Stout fellow in 2019 and he also got a scholarship – um, an award from the Manatū Taonga History Research Fund Award and he is going to complete it with a Judith Binny Fellowship this year. And the book is going to be published by the Otago University Press. So thanks very much Jonathan, we look forward to it, thank you.

Jonathan West:

Tihei mauri ora!

Kei te mihi nui ki a koe, Kate, ki a koe Elizabeth. Tēnā kōrua.

E te whare e tū nei, te whare o te Tiriti me He Whakaputanga, i awhi nei i a mātou, tēnā koe. Tēnā koutou, i ō tātou tini mate i tēnei marama, tēnei wiki me tēnei rā. Koutou kua whetūrangitia ki te korowai o Ranginui. Haere, haere, haere rā. Kua hoki mai ahau ki te hunga ora.

E rere haere ana ngā mihi ki te mana whenua o te rohe nei, o Te Whanganui a Tara. Tēnā koutou.

Ko wai au? He Pākehā ahau nō Ōtepoti ki te Wai Pounamu. Engari e noho ana au ināianei i Naenae, ki Heretaunga. Ko Jonathan West – Johnny – ahau.

Kei te mahi au ki Te Arawhiti, āe, mo te karauna. Engari ehara au i te kanohi o te Karauna i tēnei kaupapa. He aha te kaupapa? He kōrero e pā ana ki Tūtira – ngā roto, ngā whenua, ngā tangata ki korā. Nō reira, he mihi nui au ki ngā hapū o Tūtira, ngā mana whenua o tērā rohe, Ngāti Kurumōkihi rātou ko Ngāti Tū.

Nō reira, tēnā koutou, tēnā koutou, tēnā koutou katoa.

I'm delighted that Kate and the Ministry of Culture and Heritage and the National Library have reached out, asked me to give this talk. It's a real privilege. I'm very grateful, thank you. I should thank too the supporters of this work, of which the talk is a small fruit, the

Hocken Collections, the Stout Trust, the Ministry of Culture and Heritage and finally and fittingly today, the Judith Binney Trust. Finally, I thank all of you for coming out, including those online, on a winter's day.

Lake Tūtira is my subject today. Lake Tūtira lies in a fold of the broken Hawke's Bay hill country, north of Napier. State Highway 2 skirts its western shore as it winds to Wairoa, so it's accessible, popular. It's a camping place. It attracts trout fishers. Tourists emerge from the tortuous turns of Devil's Elbow, to look out their windows again in some relief. They see Tūtira gleaming, an oasis of quiet beauty. Lovely as it is though, Tūtira is no more than middling. Its streams are piddling.

We boast more impressive lakes. But I was always going to begin my history of Aotearoa's lakes there. As the home of Herbert Guthrie Smith, Tūtira is synonymous with environmental history here. Herbert Guthrie Smith's *Tūtira: the Story of a New Zealand Sheep Station*, was first published a century ago, 1921. Herbert came to Tūtira as a young Englishman in the 1880s to farm sheep and for the rest of his life he observed, with searching intensity, how he and his stock transformed this land and its plants and animals. *Tūtira*, the book, is a fruit, the most comprehensive account written here of environmental change.

One of *Tūtira's* great virtues is its care for the particular, it's, quote, insistence on the cumulative effects of trivialities – and if you've ever read it, it is like an encyclopaedia of detail, anatomising the arrival and spread of the world's species, from golden willows that grew to adorn the lake margins, through a single stout riding switch bought at my request

in ‘83 or ‘84, to weeping willows Herbert transplanted, from cuttings taken from those that grew next to Napoleon’s tomb on Saint Helena – possibly apocryphal, that seemed to happen all around New Zealand – to the stowaways, such as the buttercups, that arrived to thrive on the lake margins, in the saddle cloths of Māori shearers.

To read *Tūtira* is to see the pattern of how together plants, animals and humans wove empire. Herbert insisted that we look closely with him, so that an examination as it were, under the microscope of one sheep station, we would have discovered what is to be found in awe. He claimed in other words, that Tūtira was a microcosm, a lens through which to see all of Aotearoa. Herbert spied out the future too. He awakened comparatively early to the madness of murdering this steep land into sheep country.

Readers have heeded and Tūtira has become a cultural urtext, through which to understand how Aotearoa has been made a new land. But I will focus less on the land today, than on the lake. I take my cue from Herbert’s largely forgotten first book of natural history, *Birds of the Water, Wood and Waste*, a title he came to regret for what he deprecated as ‘field notes of an elementary sort’. But the opening lines are anything but. Let me read.

The lake on Tūtira may be considered the heart of the run. It is the centre of all the station’s life and energy. It was to the lake, Herbert went on, that all the paths, tracks, the roots and roads of people and their animals led and all eyes followed. The lake was constant companion for all those living at Tūtira. Every one of us sees the lake first thing in the morning, clear and shining in the sun, or still wan and clay stained for weeks after the

torrential rains that bring the hillsides of Hawke's Bay down like melting snows off a roof. We see it last thing at night, the moon marking its narrow silver path, or in dark clear weather, the stars reflecting themselves.

In the morning the lake surface mirrored what kind of day is to come, revealed the wind, forecast the prospects of rain. The day's work too was largely done within eyeshot of the lake. So for Herbert, fair weather or foul, daylight or dark, at water level or from the range tops running parallel, the lake is always the prime feature of the landscape. Water animates. It gives land life. If, as often said, rivers and streams are the lands arteries and veins, then lakes are its vital organs. For Herbert, the lake was the land's heart. It captured him from the first.

This is how he described the moment he first entered the valley. Before his eyes lay the whole length of the lake, picturesque in its wooded commentaries and bays. Along its steeps grew breaks of native woodland, brightened of the season with the deep yellow blossoms of kōwhai. The silky leaves of the weeping willows were in their tenderest green, the peach groves sheets of pink. I have looked at this lovely sheet of water a million times since then, but have rarely seen it more fair.

Herbert built his house on a rise to overlook the lake. His grave lies there, beneath a grove of white cherries. He had the deepest affection for the lake's waterbirds, a true twitcher, he took superb photographs won only by great patience.

He closed his opening chapter on the lake by hoping it may not perhaps be thought too lengthy when its birdlife is considered and besides three species of rail, the white heron,

two kinds of shag, bittern, grebe and many species of ocean straggler, every mainland duck except the wood duck has been, during the past 27 years, identified on its surface: the grey duck, the mountain duck, the scaup, the brown teal, the white-eyed duck, the paradise duck and the shoveler.

In his awareness that the lake sustained the life of the land and in his love of the lake too, Herbert knew he was a latecomer, following in the footsteps of Māori. It was their well-worn paths he and his animals followed, to and around the lake. When Herbert arrived as a young man in 1882, Tūtira was, lake and land, all still Māori owned. Herbert leased Tūtira informally and in a rather shambolic arrangement, from members of Ngāti Kurumōkihi, a hapū of Ngāti Kahungunu. The histories of Ngāti Kurumōkihi that Herbert relates in Tūtira, were told to him by the rangatira, Anaru Kune, his son Aperahama and last but not least, as he put it, kaumātua Te Hata-Kani, that wonderful old man. In writing their histories, Guthrie Smith followed them too, as they used the trails to and from Tūtira as threads on which to string our narrative. The lake was the place upon which hapū histories hung.

The hapū knew Tūtira as the land's focal point, or rather they knew Tūtira looked out over the land, for the adjacent little lakes, Waikōpiro and Orakai, the little lakes were named the eyes of Tūtira. Compared with the lake, the land was almost worthless to them. The hapū gained much more food from water than they did from land, especially eels at the lake outlet, but also kākahi, freshwater mussels, beds of which paved the lake shallows and the large freshwater fish, kōkopu. They strung 16 eel weirs in a half mile stretch of the

lake's outlet, the Mahiaruhe Stream. The large wetlands there at the head of the lake were famed for flax.

As Herbert concluded, the glory of the hapū was in their continued occupation of so famous a lake and their possession of so unfailing a food supply of the most highly prized kind. Their whakataukī, then as now, referred to Tūtira as providing ko te waiū o ō tātau tīpuna, the sustenance of our ancestors, for the food and spiritual supper that it gave them. They sang their babies to sleep with this oriori, or lullaby. Forgive me, I'm not going to try and sing a melody that I don't know.

Pinea rawatia ki Tutira ra;
Ki te ue pata, ki te kai rakau.
A ehara e hine i te roto hou;
He roto tawhito tonu no matou ko o nui.

Herbert's translation: 'Let us gather together to Tūtira, where our eel weirs and fruit laden trees and the lake, my little girl, is not a new lake, but an ancient lake possessed by us, by ancestral great ones'. Ngati Kurumōkihi, formerly known as Ngāi Tatara, had several kāinga and pā around the lake and one on it too. They built up Tauranga-kōau as an island pā, from which to defend the lake from those attacking, seeking its resources and they took the name Ngāti Kurumōkihi, meaning those attacked by rafts, mōkihi, following one such defence.

The actions of another attacker show their knowledge of how to manipulate their environment. Te Whatuiāpiti, drawn to Tūtira after eating its eels, judged in the event its

defenders were too strong for him and so decided instead to kill the eels, by diverting the main inflow, the Papakiri Stream, from entering the great marsh that then fed the lake. This, Guthrie Smith was told, made the whole lake pirau, as a frightful stench arose. After Te Whatu departed though, Ngāti Kurumōkihi reconnected the stream and restored their lake.

Scientists say that Māori reshaped the land more permanently by burning off the podocarp forest of the catchment, because over perhaps some 60 years the forest disappeared and bracken and shrubs grew in its place. Iwi do query this, suggesting the fires were likely natural. Whatever the case, erosion into the lake likely increased, but not markedly as bracken is dense, deep-rooted and could largely hold the land.

It is Tūtira's sediments that is the key source of such knowledge about the lake, about the catchment, about the wider Hawke's Bay and even Aotearoa and abroad. Scientists of many stripes have long understood that sediment cores from Tūtira offer unparalleled information about change over time and the lake and the world around it. Lakebeds like Tūtira are the best of nature's archives. They are mirrors on the land, or that they are mirrors on the land is much more than a visual truth. I'm just going to treat these as largely illustrative, but the slide – to the left, you see long cross sections of the sediment cores, showing the different grades of sands and stones and so forth that are found in there, including the tephras which are left by the volcanic eruptions.

You see more visual top here with the black layers, which are the more organic layers with storm layers in between, much thicker than other ash, same sort of thing down here. It

shows how the mud layers where it's cored the storms and the other catastrophic erosion events through earthquakes. All right.

Lake Tūtira's sediments have provided us a continuous, high-resolution record of environmental change. They've revealed climate, recorded weather, captured volcanic eruptions, earthquakes, rates of erosion, changes in the plants and animals around the and in the lake; the cores are documents that we can read to understand the play of atmosphere, land, lake, the elements, water, earth, life and air.

The pollen diagram, on your left, which you will never read at this scale, is simply showing that you can read sediments for pollen, pollen preserves very well, you can identify it down to species level very accurately and you can see through the sediment, the change from forest, all the different podocarp taxa, through bracken and other shrubs and now into all the different exotics. More recently we have been able to use environmental DNA techniques, the Lakes380 project, which I have had some conversations with, is leading this work and they can identify more soft-tissued species which do not have pollen and record what kind of algae are present in the lake over time and map that against the storm sediments.

This is me hanging out with the Lake380 guys for one brief but very fun day, as we took a sediment core of Lake Tūtira, quite a small one and therefore only recording the top few hundred years at max at that level. One of the things I loved about this is it's quite simple. A sediment core is basically a plastic tube that you drop down to the bottom of the lake and then drop it up and down and drop it up and down and it basically hammers itself into

the lakebed, which takes quite a long time. And then you pull it up. It's quite physical work and a long day on the lake getting them.

The lake's sediment is 27 metres thick. Dating wood from the bottom tells us that Tūtira was only formed some 7000 years ago, by a massive earth slide which comes in – you can see it's marked here down the bottom, on the left, landslide complex coming in, between Tūtira and the little lake next to it, Lake Waikōpiro – likely the same earthquake that may have caused the formation of Waikaremoana. The earthquake blocks the valley, dams the valley floor stream. The sediment cores from the sediment since show the way weather and water has shaped the land over the 7000 years after, pulling it off steep slopes, slipping and sliding into the lake.

Erosion, earth flows into Tūtira, have blanketed its bed, reshaped its edges, altered its chemistry and caused dramatic shifts in plant and animal communities. Herbert understood a lot of this. Erosion in all its aspects fascinated him. He very soon saw it as the major problem for land use on this steep, soft rock hill country. He foresaw, 'the country under my regime has been shorn of its fleece. In the time to come it will be flayed of its very skin'.

Hawke's Bay has a generally sunny, dry climate, but it's punctuated by violent cyclonic storms. Herbert provided very graphic descriptions of their effects. Tūtira, indeed after a violent 'buster' as he called them, appears to have been weeping mud. Sometimes a whole hillside will wrinkle and slide like snow melting off a roof. These are pictures of the aftermath of the ANZAC Day storm of 1938, which caused such terrible floods that it

compelled government action, inaugurated soil and water conservation in this country. It deposited a foot of sediment on the lakebed. Fifty years later, Cyclone Bola flayed the land as Herbert had feared, pulling a further three quarters of a million cubic metres of soil into the lake, over half of which is still there.

In 1925 Herbert surveyed the depths of the lake. He rowed for five days, up, down, across the surface, under a midsummer's relentless sun. He was helped by the Archdeacon, later Bishop, Herbert Williams who, while Guthrie Smith rested on his oars, took 357 soundings. These are the little notations all over the lake that you see here, as he dropped an anchored rope down and figured out how deep it was at that point. It's a bathymetry map. Herbert then placed a concrete block as a benchmark for the lake level and in 1963, Patrick Grant, who was then hydrologist for the Hawke's Bay Catchment Board, was inspired by Herbert's example to repeat the exercise – but by jetboat, sensibly.

He found the lake had filled in over a metre. As he pointed out, Tūtira will disappear within 700 years at that rate, fulfilling the future that Herbert foresaw here.

Lakes then genuinely do live in time. They have lives and it is meaningful to tell their biography. This lake will live for perhaps 8000 years, which is a meaningful span of time in human terms, I think. Sediment cores give us a little more precision. They show that grass and grazing this flayed land – here it is pictured in 1945 – bare, has increased erosion tenfold. As Guthrie Smith and his animals reshaped the lake and its catchment's ecology, they reformed Māori relationships with the lake too.

Herbert burnt everything that was dry. He drained everything wet. His cattle and sheep compacted soil, turning it from sponge to slate, crushing the vegetation. In the wake of all this, all manner of new plants erupted, many besides those Herbert sowed and planted himself, flowing in with trade from all parts of the globe, so that by 1940 – Herbert's death – close to half the naturalised plants of New Zealand grew in the immediate vicinity of the lake.

The most significant single change that affected the lake occurred in the 1890s, when Herbert cut his great drain through the large wetland, that then surrounded and protected the lake's northern end. This act which Herbert later came to see as something, an astonishing feat of young hubris and stupidity, dropped the lake immediately two feet and gouged the outlet stream into a deep trench. Without the wetland's filtering effects, soil and nutrients flowed unchecked into the lake. Māori owners fought this, Herbert recalled, some seeking court orders forbidding burning bracken or banning drainage, on the ground it might affect the welfare of the eels. This was nonsensical to a young farmer, Herbert recalled. But I think the older man belatedly saw their wisdom.

He certainly regretted introducing trout, despite the fact he had a lifelong interest as a keen fisherman. He himself carried the first ova up from Napier on his saddle-bow, to try and establish them in the lake in the 1890s. Those efforts failed, but both brown and rainbows have thrived in the lake from the early twentieth century, sustained for many decades by annual releases by the Hawke's Bay Acclimatisation Society – now Fish & Game. Herbert recalled the trouts extraordinary increase, unit, 100, 100,000, as they gorged on native fish and invertebrates, reaching enormous sizes. His regret though

stemmed from their eating out the food of his most beloved scaup, it's the black teal. His work is often a lament, for loss, for destruction. In the 16 years between the first and second editions of that first book, *Birds of the Water*, 1910 to 1927, he documented the disappearance from Tūtira of whio, the blue duck, brown duck, fernbirds, weka, pūkeko – they've come back – as well as reductions, large reductions in almost every other bird, including scaup, tūī, great warblers, kererū, fantails, wax-eyes.

By the second edition's preface he was making predictions. He believed we could protect birds through our forests, by trapping pests and planting – as we still hope we may be able to. But he also predicted that birds would rapidly and almost completely disappear from the farms of New Zealand, for their owners then, quote, would scalp their parents for the sake of two extra blades of cocksfoot. He tried very hard to stave off that future on Tūtira. He took the just to be those who protect their native birds and it was for him a very personal path to his own salvation.

Quote, I have committed crimes in my life, I know, who hasn't? But I believe expiation may have been accomplished during those hours of anguish, kneeling on a waterproof and slowly sinking into the ooze, for he and his wife, Georgina and his daughter, lived with native birds at a degree of intimacy that is quite lost to almost all of us. I guess DOC staff kind of relive a bit of this. They rescued and released a lot of lost and abandoned hatchlings. Barbara would rear them under a hen, until the family could all join in the ceremony of leading them down to the lake and witnessing their first wondering and then ecstatic venture onto open water. And they kept some of these as pets, pūkeko, kererū in particular. There's a wonderful photo of a kererū feeding from Herbert's open mouth, for

example. Having witnessed the intimacies of their lives, he wrote, shooting these species is no longer conceivable.

Tūtira made him famous, very famous, in New Zealand and abroad, amongst largely scientific circles and he also made powerful friends. In 1929 he had the lake and its surrounds made a sanctuary for native and imported game. Protection continued under the Wildlife Act of 1953, which legislation is rather astonishingly still in force. Herbert died in 1940 and by then Tūtira Station, the lease had been reorganised. The Crown had acquired most of the land. Tūtira Station was only 2000 freehold acres beside the lake and, in accordance with his will, it was donated under trust for the recreation and education of the people of New Zealand. And almost all the Hawke's Bay kids will go up to Tūtira at some point.

The sanctuary's creation though, good for the people of New Zealand as it may have been, eclipsed Māori efforts to retain the lake and its resources. Guthrie Smith's otherwise encyclopaedic writing passes over this in complete silence. In fact, as Richard Boast points out, he generally casts what is a cloaking comic haze over his relations with the Māori owners of Tūtira. He would have us, for example, believe they took him to court to dissipate ennui and boredom. Theirs is a tangled history, but in short Herbert and the government believed the Crown had to have the lake. Māori owners said Tūtira was protected by the Treaty, so too their fishing rights in it.

This was back country, inaccessible badlands that the government really had no business trying to acquire, but it did seek to acquire it and quite determinedly after the First World

War, to try and put returned soldiers on it. Having done that, it had to divide the land between the Crown and Māori and that meant deciding who would own the lake. At this point you see a fracturing across different government departments, as they stall and debate tactics. Do they split the lake? Do they wait to try and buy out the last owners and meanwhile protect some eeling rights?

But in the end matters are forced, because the Public Works Department idiotically moves to compulsorily acquire the land at the lake outlet, where Māori camped to stay and go eeling. That forced everyone's hand and the Native Land Court split the lake in 1928 and Māori owners kept only the northern tip, as they do to this day. Those owners tried a final throw of the dice. They offered, if their ownership of Tūtira was recognised, to gift the lake back to the nation, provided their customary rights to fish and fowl were protected. That was ignored.

So Guthrie Smith and the government largely had their way and Tūtira has been managed as a public reserve for recreation, bird watching, trout fishing. Māori owned the outlet, continued eeling there, but for decades the Hawke's Bay Acclimatisation Society and their lone ranger, W.A. Gunn, waged war on those eels, systematically killing as many as possible, blaming them for eating trout and scaup and contemplated how to prevent elvers entering the lake also. As late as the 1980s, the Reserve Management Plans for Tūtira proposed fewer eels.

Fewer eels meant more trout, more birds, so commercial eel licences and harvests were recommended and encouraged and the Reserve Management Plans also contemplated in

recommending trying to buy out what Māori still retained of their link. So it's not especially surprising that Māori resisted, for a very long time, efforts to have their part of the lake included in the wildlife refuge.

Called to consider and judge such behaviour against Treaty principles, it is not surprising that the Waitangi Tribunal issued a range of findings, most of which condemned the Crown's purchasing behaviour, but also found the government tardy. Tardy. Too late. Too late to take action, too late to try and exert environmental control – and other historians, Richard Boast among them, consider the government has simply poorly managed the lake that it so determinedly acquired. These sorts of assessments rest on commentaries about the state of the lake.

In 1940, almost on his deathbed, Guthrie Smith famously asked himself the question that lies at the core of Pākehā environmental history here. Everybody quotes it and I shall follow suit. 'Have I then for 60 years desecrated God's earth and dubbed it improvement?' If you read his *Sorrows and Joys of a New Zealand Naturalist*, the answer there was mostly he didn't really see himself as fit to live. He certainly knew the likely verdict of posterity on pastural farming in this unstable catchment and it is easier today to judge this past, because putting animals on grass has made Lake Tūtira a sick lake and that would really have sickened Herbert Guthrie Smith, who never lived to see this.

Lake Tūtira has been sick for more than 60 years. It suffers advanced nutrification, or nutrient pollution, causing severe toxic algal blooms and sometimes mass fish and eel kills, alongside invasions of noxious water weeds. This one. Despite decades of efforts to solve

these problems, prospects of success are uncertain and in this concluding section to today's talk, I will try and explain why, why are these problems so intractable, because this has lessons for the rest of New Zealand.

I spoke to Laurel Tierney who, while a young woman in the 1970s, spent several years as the first scientist on the scene asked to save the lake. She arrived after our friend, good ranger Gunn, raised the alarm about a range of strange symptoms, the first of which was the spread of this, world's worst noxious water weed, hydrilla, likely escaped from an aquarium – as they still do, so those of you who keep fish, I'd really rather you didn't. This is capable of forming tall underwater forests that choke out all other life. It's sort of the underwater equivalent of pine.

Now there was a thought even then, you could put carp in this lake to eat out the weed and grass carp were eventually introduced, after decades of anxiety and debate and tests and trials, in 2008. This has actually been by and large a great success, certainly in terms of how it's eradicated the weed, although some of the other effects on the lake are a bit harder to judge. Prospects are that this weed now may be fully eradicated, it can kind of rejuvenate from little tubers and they survive for quite a long time, so it's sort of fingers crossed. It wasn't time for the carp, not then.

Laurel was there first to understand what was going on, because Ranger Gunn had seen the first bad algal blooms in 1972 and he'd also found dead fish on the surface. Laurel arrived, she told me, in 1973, a really hot year, a very unusual year. On the surface, she said, the blooms were so thick it looked like khaki and blue/grey paint had been poured in.

She started sampling from spring, diving through the dark to the lake bottom, sinking there into what she told me was a black, gelatinous, decomposed algal goo you just carried on descending through. She said, I never knew if I hit the bottom.

She suffered continuous ear infections, skin rashes. She was always on antibiotics. Lakes like Tūtira stratify in summer. That means they separate into a shallower surface band of warm water, that sits on top of a cold, dense layer where most of the lake is. Laurel was astounded, having arrived in spring, that by early summer the whole of this lower lake was completely devoid of oxygen. It had all been decomposed by bacteria, as they decomposed the vast algal blooms.

That was why fish were being forced to the surface and dying. Anything that couldn't flee died. That first awful summer, Laurel found the Catchment Board, charged with protecting the health of the lake, bewildered, no idea why this was happening. Because she had begun her work just before this worst bloom was happening, they blamed her.

She herself was certain. She watched the planes flying over, including big DC3s and spraying phosphate fertiliser over the whole lake catchment, including sometimes the lake, even right before heavy rain. When the wives and children of Tūtira invited this beautiful, young scientist to come talk to them, they laid on a big country fair. They all lost appetite, as she told them the fertiliser they spread was killing their lake. They had had no idea.

To understand how these nutrients cause Tūtira's intractable algal blooms, we're going to have to delve quickly, deeply, into limnology, the science of lakes. Scientists are fond of

saying that lakes are complex, but Andy Hicks, then scientist at Hawke's Bay Regional Council, gave me a simple hook. A sick lake, he said, keeps itself sick. This happens through self-reinforcing feedback loops. The best known is oxygen, effectively if lakes run out of oxygen, then the chemical bonds between phosphorous in the lake sediments dissolve and the phosphorous is released into the water column. Similar things happen with pH too, as bacteria decompose all the algae, they suck up – they release a lot of carbon dioxide, so you get a very high pH. This is very bad too for everything from trout, eels to bullies and freshwater mussels, because under high pH nitrogen is converted to toxic ammonia gas. So you do end up with a lake that's like a vat of toxic gas, extremely high pH and with no oxygen.

One of the important things to realise is that these nutrients don't disappear. They're not fuel, they just cycle round and round and round. Each gram of phosphorous say can support 500 grams of algae and it doesn't disappear until it's flushed out of the lake. It doesn't burn up. It just goes round and round and round in a never-ending cycle, so that is why sick lakes keep themselves sick – and it's also why Laurel Tierney is so profoundly pessimistic about this lake's prospects. She thinks she should, tongue in cheek, suck the water out and make it a skateboard bowl. Others, Andy Hicks for one, are a bit more optimistic, but we have very little to show for over 50 years effort and we have very few new ideas. In fact, just like the lake, we are recycling the same things that we have tried since the 1970s.

This catchment has been subject to the longest, one of the very earliest – with the exception of Taupō – efforts to change land use and thereby improve water quality, that

we have seen in this country. That is why it is such a useful lesson for efforts that are ongoing now, to do the same elsewhere. I would say it demonstrates just how hard this is, how determined you need to be and how consistent efforts must be. In the 1970s, the Catchment Board was stimulated into action. You only have to tell so many wives that they are killing the lake, that then people have to act. In this case they set up a Technical Committee.

This was a committee unlike other committees. It worked fast and it recommended a complete suite of actions within one year. They were all designed to reduce phosphorous between up to five and nine times, they listened to the science on this. They canvassed all the possible solutions very quickly. These included aerating the water, diverting the main inflow stream – which drained most of the catchment, including all the intensively farmed areas; reforesting the slopes, writing farm management plans and using the chemical alum to precipitate nutrients and lock them into the lakebed. Those are the solutions that have been in play ever since.

They held large public meetings and Tierney and McColl confronted the farmers head on. Soil erosion, run-off of dung, urine and fertiliser was the problem, they were the problem, so solutions had to be about the catchment. They were very blunt. Accepted agricultural practices, McColl told this meeting, had destroyed the high quality of the lake and to undo the damage will not be easy and will depend on the willingness of people and the government to spend time and spend money.

So they proposed two things in essence, one, radical emergency surgery. Rob McColl had calculated that 90 per cent of the nutrients came out of the Papakiri Stream, where the most intensive farming was. That's most of the catchment. So they proposed and this was done, they just diverted that stream away straight into the outlet, so it never reached the lake. It's like a radical heart bypass and it severed the lake from two-thirds of its catchment.

Second, they proposed wholesale land use changes and catchment controls. Switch 80 per cent of what remained of the catchment from farm to forest, retire all the steep slopes, fence, riparian planting along all the lake margins and all the streambeds – bold, visionary thinking, costed, but very bad timing. Farmers had not done much before agricultural subsidies were removed and they all cried poor. Then Cyclone Bola hit, swamped everything they had done, they had to start again. They did start again in the 1990s, when the Hawke's Bay Regional Council bought up steep slopes on the eastern side for a park, to show how this could be done.

They've in essence retired some land and left things to go back to mānuka. They've planted, they're enhancing wetlands. They're hoping to get some money off the mānuka, which is not going well unfortunately. More recently, following settlement of their Treaty claims, Ngāti Kurumōkihi have – which is part of the broader settling group of the Maungaharuru-Tangitū hapū – have regained ownership of most of the lakebed and they are spearheading renewed efforts at rehabilitation. Working with the regional council, they have secured several million dollars of government funding and they have to develop a new plan for the lake and its catchment. So far, they have essentially done what the

1970s plan proposed, but they are pushing in new directions. They are, for example, disinclined to allow Fish & Game such easy access and the hapū have stopped more trout releases, because they are seeking the restoration of tuna, kākahi and other natives. They put a rope ladder up the waterfall, to try and allow elvers to get back in.

They hope to reconnect the Papakiri Stream to help flush the lake, initially at low flows only. That would mirror their achievement of centuries ago, when they reconnected the Papakiri Stream after their enemies' attack and restored the lake. But land use in that catchment has really intensified in the last 40 years and there is a lot more dairy up there and a lot will need to change, before the lake and the land can be fully reunited.

That Technical Committee thought that its proposal to reduce nutrient loads by 90 per cent and so [return] the lake to health, its recommendations have been done for some time. But that lake is not anything like healthy. The summers of 2011, '12, '16 and '17 all saw very bad blooms – which made National Press as here. Perhaps more recently still there are a few encouraging signs. I certainly was there in the summer of 2020 and had a lovely swim and then next year the official swimming ban was lifted.

In sum, Herbert Guthrie Smith spent 60 years transforming this catchment and we have spent just as long trying to fix it. Options are few, prospects uncertain. Rob McColl's words to the people of the community in 1976 still ring true. It will not be easy. It will take time and it will take money. That is the problem we face more generally.

Lakes therefore are more than mirrors on the land. When we look at the state of a lake, we see ourselves. We see a reflection on the health of our community. It's said the past

isn’t dead, it isn’t even past and Tūtira shows that’s as true of lakes as it is of ourselves and lakes, as with people, history has an ongoing, ever-recycling legacy.

What will our legacy be? Will we work together and hold fast to a long-term vision, when there may be no easy wins? Can we? Will we be willing to change land use? Will we be willing to retreat? Limnologist Marc Schallenberg has said to me categorically, no New Zealand lakes with intensively farmed catchments have good water quality, none. We have never before made this work. But then hapū have never been in charge before.

Looking to the future, Andy Hicks tried to turn this around for me. We don’t yet know whether or how intensive farming and good water quality can go together. Never before or, perhaps, not yet. Historians are not qualified to offer hope for the future, but personally I do live in some hope that Ngāti Kurumōkihi will one day decide it is safe and right to return the Papakiri Stream to Tūtira and make the lake and the land and the people whole again. Nō reira, tēnā koutou, tēnā koutou, tēnā koutou katoa.

Sarah Burgess: Thanks for listening to this New Zealand history podcast from Manatū Taonga. Don't forget to subscribe. And if you’re looking for other content about New Zealand history, check out earlier talks in the series. You can find them on your favourite podcast channels. Just search for New Zealand history. Mā te wā.