

Reconstructing a 140-Year Historiography of Misinterpretation: A Forensic Reassessment of the Tarawera Eruption and the Pink and White Terraces

A. Rex Bunn

Les absents ont toujours tort.

(Those who are absent are always wrong.)

Philippe Néricault Destouches (1680–1754) *L'Obstacle imprévu* (1717), acte 1, scène 6.

1.0 Introduction

In the late nineteenth century, the Pink and White Terraces lying under the Tarawera massif, became a global tourist phenomenon. From 1870, ship-loads of tourists from the UK, Europe and America made the sea journey to New Zealand to visit these wonders. This first tourist boom gave the colony significant export earnings and promoted it and Māori culture to the world. The colony fell into grief after the 1886 Tarawera eruption, with the burial of the colony's greatest tourism assets. The Māori landowners were forced into a century-long diaspora. For many, the dream that one day the Terraces may return remains alive.

This study arises from long-term independent investigation into the historiography of the 1886 Tarawera eruption and the Pink and White Terraces. Its conclusions are grounded in primary documentation and reproducible spatial and textual analyses, allowing readers to assess both the evidentiary basis of the argument and its departures from prior interpretations. To avoid presentism, historical accounts are interpreted within the observational limits and assumptions of their time.

The first scientist to make a geological survey of New Zealand and to study Mount Tarawera and the Pink and White Terraces was Ferdinand Hochstetter (1829–1884). On his thirtieth birthday in 1859, he awoke from his bracken bed on the uncomfortably hot Puai Islet, immersed in the steaming-fog, to the avian dawn chorus, which drowned out the “hissing, gurgling, muttering, moaning, sighing” night sounds of Lake Rotomahana, a small, unremarkable lake in the centre of the North Island of New Zealand. He had saved his last day at Rotomahana for the best —Tarata, the White Terrace, wonder of the world. He would die two years before the 1886 eruption. His 1859 survey provides the only reliable pre-eruption spatial record of the Rotomahana Basin with its terraces. Figure I shows Hochstetter in later life.



Fig. 1. Portrait of Ferdinand Hochstetter, by Alexandre Quinet (1837–1900), Wikipedia Commons.

In Appendix I, the belief that Hochstetter predicted the 1886 Tarawera eruption is clarified. A second prediction appears in the account of the Tūhourangi tōhunga Tuhoto-Ariki (c. 1780–1886), who, shortly before the eruption, interpreted environmental signs — including seismic unrest, hydrothermal changes, and a (phantom) canoe — as omens of catastrophe. Where Hochstetter's conclusions derived from European geology, Tuhoto-Ariki's arose from mātauranga Māori and long experience of the landscape.

The early Māori eyewitness perspective that the Pink and White Terraces survived was displaced by an institutional scientific consensus, a process that intensified after the 1907 Tohunga Suppression Act, and later, with Alfred Warbrick's (1860–1940) death during WWII. Thus, the tradition of privileging Pakeha over Māori perspectives began early and persisted for decades. Together, these perspectives frame a dual evidentiary record that persists throughout the historiography. Figure 2 shows Tuhoto-Ariki in Elisabeth Pullman's (1836–1900) pre-eruption photograph.

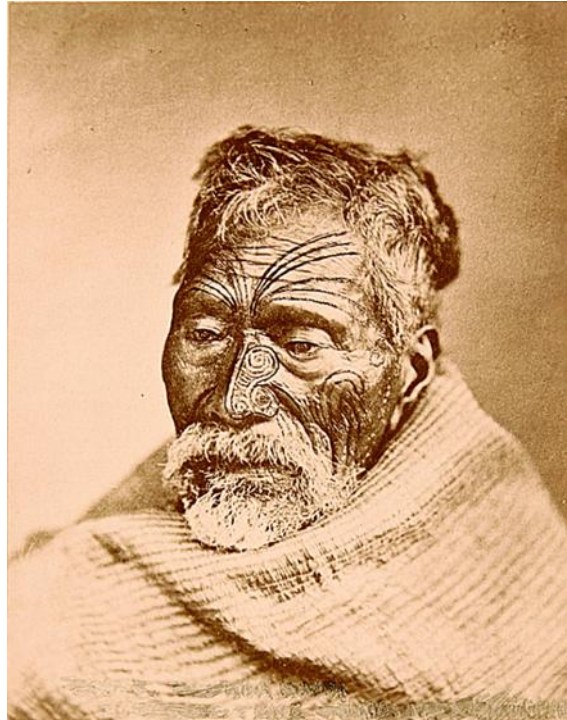


Fig. 2. Tuhoto-Ariki, the Tūhourangi tōhunga (Photograph by Pullman, courtesy of World Museum, Vienna). His moko was retouched on this print.

In the general histories of New Zealand, the Tarawera eruption has only passing mention, for example, that by George Rusden (1819–1903). In the 1895 edition of *History of New Zealand*, Rusden relegates the Tarawera eruption to a footnote, describing it as having “demolished the coveted sites.” The entry is misdated to 1894 and framed in aesthetic rather than geological terms, suggesting that by the mid-1890s the “destruction” narrative had been adopted uncritically into historical writing.

This paper examines how the scientific understanding of the eruption and the fate of the terraces developed across five generations of scholarship. It advances three claims. First, the destruction narrative originated in rapid Victorian institutional closure under conditions of extreme uncertainty. Second, it persisted through cartographic error, citation inertia, and institutional authority. Third, modern science reproduced this narrative without re-testing the underlying spatial evidence.

The Tarawera eruption presented similar difficulties to those of Krakatoa in 1883. In each case, the communications technology of the period enabled the global population to quickly learn of the eruptions. However, “the limited, and only slowly unfolding, geological knowledge [...] did not give the audience an explanation of the events that was sufficient to soothe their fears” (Winchester 5). The Tarawera case illustrates a broader pattern in disaster historiography: once established, such narratives may be reinforced not by new evidence, but by repetition and authority (Kuhn).

The conclusion reached by early investigators — that the terraces had been destroyed — was understandable given the radically altered landscape and limited access to the Rotomahana Basin. This study does not seek to criticise those initial interpretations. Rather, it examines how that provisional conclusion became solidified within scientific and historical literature, and why it remained largely unchallenged for more than a century.

1.1 The eruption

At 1:30 am on 10 June 1886, Mount Tarawera erupted with catastrophic violence. Within hours, the Pink and White Terraces — Te Tarata and Otukapuarangi— had seemingly vanished. At least 172 people died (Bunn 2025b). The Rotomahana Basin was transformed into a cratered landscape largely devoid of landmarks. No geologist or photographer witnessed the eruption. One artist, Ina Haszard (1870–1953), witnessed it. She survived, and later, Charles Blomfield (1848–1926) painted Figure 3, based on Ina and her mother's descriptions with their perspective from Waitangi (Williams 96).



Fig. 3. Charles Blomfield's painting of the 1886 eruption of Mount Tarawera based on eyewitness Ina Haszard c. 1887 (Wiki Commons).

For the 1936 eruption semicentennial, Ina painted her recollection in Figure 4. Her perspective was probably from Te Mu. She painted the first eruption phase from Wahanga peak. This places her at 1.30 AM–2.00 AM. She includes fireballs and the black cloud over the Tarawera massif. She also placed three canoes on Lake Tarawera at that time, yet no waterborne survivors are recorded (Bunn 2025b). Two canoes are heading from the Moura Narrows to Waitangi or perhaps Kariri. The third, skirting Moura Shallows, appears to be on course for Punaromia, following the waterborne escape route from the southern settlements (Bunn 2025b). Blomfield also included a canoe. Given the evidence herein of toxic gas as a contributing cause of the Moura casualties, it is possible these canoes held no live crew. Five days elapsed before a boat ventured onto the lake, and by then no floating canoes were seen. Several damaged and sunken canoes were reported after the eruption (Payton 353).



**Fig. 4. Mount Tarawera in eruption, Ina Hobbs (nee Haszard) 1935 (Wiki Commons).
The author enhanced the age-darkened image to restore its original appearance.**

What followed was not only a geological event but a historiographical one: the rapid formation and long persistence of a scientific narrative under conditions where the evidentiary base was fragmentary and mixed.

1.2 Historiography

The historiography of the Tarawera eruption follows a recognisable sequence: initial observational chaos, rapid provisional explanation, institutional stabilisation, and generational transmission. Across five generations, the dominant narrative — that the terraces were destroyed and (somehow simultaneously), submerged beneath Lake Rotomahana — was reproduced and elaborated, often without renewed examination of the spatial evidence on which it depended (Kuhn, Ansell, Barnard).

This study reconstructs that evidentiary record using primary sources, nineteenth-century cartography, mātauranga Māori, and forensic landscape analysis. It argues that the persistence of the destruction narrative reflects processes of institutional consolidation as much as the progressive resolution of scientific uncertainty.

The paper proceeds through five generations. Generation One (1886–1900) examines the immediate institutional response and its lack of justification. Generation Two (1901–1940) traces the entrenchment of the narrative despite contrary cartographic evidence. Generation Three (1941–1980) identifies a prolonged hiatus in which the question was neither resolved nor revisited. Generation Four (1981–2010) analyses the resurgence of scientific interest that occurred without re-examination of the foundational assumptions. Generation Five (2011–present) evaluates the GNS Science claim as the most recent expression of the long-standing pattern.

Running through all five generations is a persistent counter-narrative maintained by the Tūhourangi and Ngāti Rangitihi, whose knowledge of the landscape and its transformation

was consistently marginalised within institutional science. The central contention of this paper is that the terraces question was prematurely closed — and that this closure shaped the historiography that followed.

2.0 Generation One: The Victorian Failure, 1886–1900

The historiography of the Tarawera eruption begins with Māori eyewitness testimony. On E+1 (eruption day 10 June + one day), an unnamed traveller reached Rotorua and reported that “the terraces are uninjured, but that Lake Rotomahana had subsided and is now a body of mingled fire and water.” This account, relayed by government interpreter Benjamin Edwards (c. 1844–1902) and published nationally within days, constitutes the earliest statement on the eruption and the Terraces. A second Māori observer, Ranawha, independently reported that the lake had drained and that the terraces were likely intact. These early testimonies were consistent with pre-eruption spatial knowledge and later reconstruction. They were not incorporated into the institutional record. Figure 5 shows the first private boat rescue party on E+4 at Te Wairoa. See Appendix II for details.



Fig. 5. The rescue party on E+4. Rear, C. Taylor, Arthur Warbrick, E. Insley, A. Black. (Absent Captain Mair and J. Hector). Sitting, Alfred Warbrick, Ben Edwards, E Harrow. Photograph probably taken at Wairoa on E+ 3–4 while waiting for Mair and Hector. (Alfred Warbrick 1934).

The official field response began with Percy Smith (1840–1922) of the General Survey Office, who reached a vantage point on E+4 but did not access the Basin. His parliamentary report of E+9 acknowledged uncertainty: “exact localities cannot at present be identified.” Nevertheless, he proposed locations for the terraces based on his misinterpretation of the altered landscape. This initial spatial error — confusing key topographic features — became

foundational. In subsequent reports, Smith adjusted his terrace locations without acknowledging the discrepancy, effectively normalising uncertainty as fact (Bunn 2026). See Appendix III for details.

Sir James Hector (1843–1907), representing the New Zealand Geological Survey (NZGS), had also arrived, but he failed to directly observe the crater. His parliamentary report, delivered under time pressure, was criticised in Australia and New Zealand but carried institutional authority (Griffiths 118). At this stage, the scientific establishment operated with limited field access, minimal data, and overlapping professional networks in which reports were rapidly circulated, harmonised, and amplified.

The critical cartographic step occurred not in the field but in Wellington. Alpha Harding (1856–1945), a survey-office delineator who had not visited the site, prepared a draft map (Plan No. 3) incorporating an earlier, error-prone lake outline. This map displaced both terraces and contradicted Smith’s own field observations. Despite these inconsistencies, Harding’s plan provided the first apparent spatial precision and became embedded in official reporting. A desk-derived reconstruction thus supplanted field uncertainty and established the cartographic framework for subsequent interpretation.

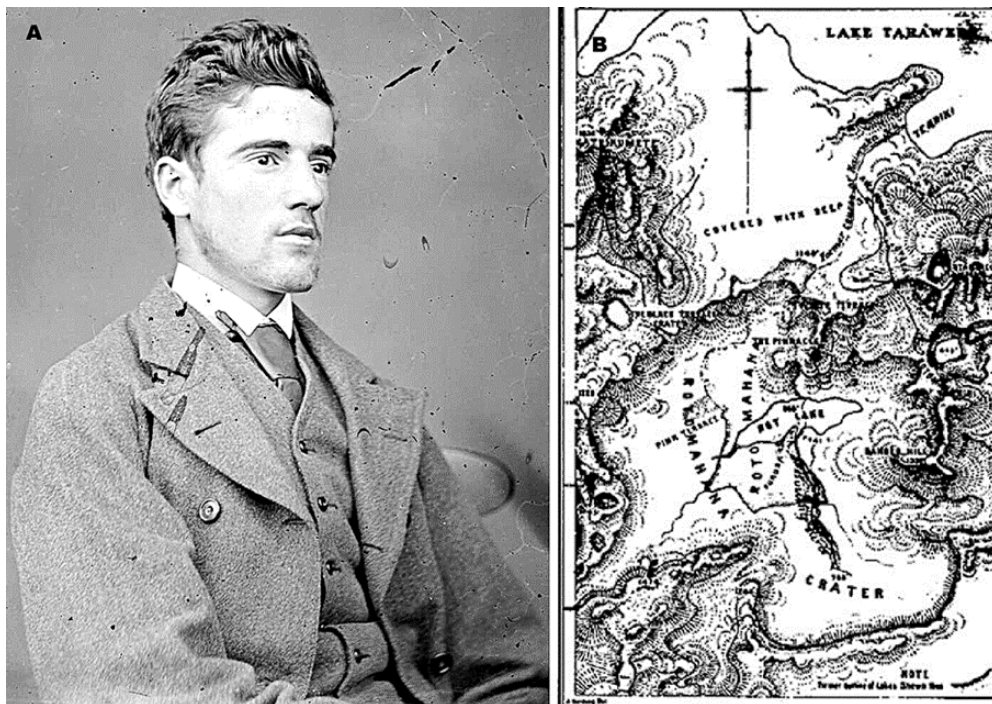


Fig. 6. *Portrait of Alpha Bennick Harding*, c. 1874. Photograph by William Harding. National Library of New Zealand, Wellington. Digital image, NDHA delivery ID IE3179606. Harding, the delineator, is shown in Figure 6A. B. Harding's Plan No. 3, a draft plan, showing his invented Lake Rotomahana location (General Survey Office).

University scientists reinforced this framework, while wrangling. Frederick Hutton was the professor of biology at Canterbury College (1836–1905). His 1887 analysis focused on eruption mechanics and was critical of Hector (Hutton 1887, 189). He, in turn, was criticised by geologist and journalist John Hardcastle (1847–1927) (Hardcastle). Algernon Thomas (1857–1937) was professor of natural science at the Auckland University College. His 1888

report, regarded as definitive, adopted the General Survey Office mapping without independent spatial verification (Thomas). His reliance on institutional data illustrates the structural dependency of university science on government survey infrastructure. Private doubt did not translate into public correction.

The NZGS was dismantled in 1893, leaving New Zealand without an active geological survey for nearly a decade. That explains Smith's authority — there was no institution capable of reviewing or challenging his parliamentary report claims. When James Bell (1877–1934) restarted the New Zealand Geological Survey in 1904–5, the opportunity briefly existed for a reassessment of the Tarawera record, but Bell's 1906 report did not revisit the Terraces question (Bell 377).

Meanwhile, the media played a decisive consolidating role. Early reporting (E+1–5) remained cautious, reflecting uncertainty and incorporating Māori testimony that the terraces may have survived. By E+9–10, following Smith's parliamentary report, the narrative shifted decisively: the terraces were described as lost. No substantive change to the evidence had taken place; the weight of institutional authority shifted, given Smith's first (incorrect) guess.

Against this consolidation stood Alfred Warbrick (1860–1940) of the Ngāti Rangitihi, an experienced observer who maintained, from 1886 until his death, that the terraces were buried rather than destroyed (Nikora). His sustained dissent was marginalised within a colonial framework that privileged official European authority over Māori and mixed-race testimony. This marginalisation was not incidental but structural: alternative evidence existed but was not admitted into the authoritative record.

By 1900, the terraces question had been effectively closed. The conclusion of destruction rested on uncertain field observations, an internally inconsistent cartographic reconstruction, and the exclusion of contradictory testimony. It had not been tested against pre-eruption survey data, nor subjected to systematic spatial verification. What entered the twentieth century was not a resolved question, but an entrenched assumption — one maintained by institutional authority rather than by the weight of empirical evidence.

3.0 Generation Two: Consolidation and Cartographic Authority, 1901–1940

By the early twentieth century, the conclusion that the Pink and White Terraces had been destroyed was embedded within scientific and popular understanding. This transition did not result from new field evidence, but from the firming of earlier assumptions within cartographic and institutional frameworks.

Possibly the most influential expressions of this consolidation were the 1905 and 1912 textbooks from Patrick Marshall (1869–1950), professor of geology at Otago University. His interest in volcanology and his later presidency of the Australasian Association for the Advancement of Science gave him an international reputation. His texts effectively standardised the location and presumed fate of the terraces for subsequent generations. Marshall had almost certainly not visited Tarawera before the eruption and did not undertake a new spatial analysis of the Rotomahana Basin. Instead, he relied on existing survey-office cartography derived from the Harding plan, reproducing its positional errors while presenting

them with increased technical authority. In doing so, he transformed an uncertain reconstruction into an apparently resolved geography.

As with Thomas, he appeared to be of two minds on the matter of the survival of the White Terrace (Payton 355). In 1905, he first stated the eruption “devastated the adjacent area, and blew up the Pink and White Terraces” (Marshall 1905, 15). However, in 1912, he was equivocal: “The sites of the Pink and White Terraces were thickly covered with fragmentary matter [...] they must have been totally destroyed” (Marshall 1912, 109). Yet, there was no evidence for his supposition — if destroyed and buried, where was the visible evidence of destruction? More tellingly, in Figure 7, he differed from Harding by superimposing the northern end of old Lake Rotomahana on the crater rim, indicating that the Tarata spring may lie buried on land (for the White Terrace lay on the northern end of the old lake as recorded and mapped by Hochstetter). That left open the question of what lay under the ejecta on the crater rim. The Rotorua geologist James Healy (1910–1994), noted that the present lake shore still follows the crater rim here (Healy 1975a).



Fig. 7. Patrick Marshall, 'Map of the Rotomahana District,' 1912 detail. The red arrow shows Marshall's old-lake north end abutting the crater rim, on today's lake shore. (Marshall 1912).

Coincidentally, Marshall placed his old lake tip close to where Warbrick, Bunn & Nolden and Hochstetter also place the Tarata spring. Warbrick mapped the White Terrace location in Figure 8.



Fig. 8. Alfred Warbrick, 'Map of the Rotorua lakes,' 1934 detail. The red circle shows Warbrick's White Terrace site "X" on today's lake shore, where spatial evidence triangulates the Tarata spring location (Warbrick).

Marshall's work illustrates the ambivalence he shared with Thomas and also the mechanism by which cartographic representations acquire historical weight independent of their empirical basis. Once mapped, the terraces' supposed locations became fixed points within scientific discourse, cited and reproduced without re-examination of their origin. The authority of the map displaced the field uncertainty. This process was reinforced through institutional transmission. Geological and educational publications adopted Marshall's framework, embedding it within textbooks, museum displays, and public interpretation. Over time, repetition substituted for verification. The terraces were not relocated; they were assumed.

Notably, this period did not produce significant new observational data capable of resolving the terraces' fate. Instead, it marks a phase in which the question was effectively removed from active inquiry. The absence of contradiction was interpreted as confirmation, and the narrative hardened accordingly.

Countervailing evidence persisted but remained marginal. As Generation Two advanced into the new century, the mātauranga Māori assessment that the terrace locations survived, receded, and the official paradigm gradually overcame their elders' 1886 view. This schism was intensified by the Tohunga Suppression Act of 1907, which sent Māori intellectual life underground. A sophisticated, millennia-old knowledge system — encompassing medicine, botany, astronomy, environmental observation, genealogy, spiritual practice and oral history — was threatened by the act (New Zealand Legislation). It was not repealed until 1962. The Act's intention was "a palliative device to assuage public fears about disturbing millennial movements and new and uncertain medical technologies. The Act was also passed to allay Pākehā fears about Māori attempts to claw back some of the political power" (Stephens 438).

The consequences in Rotorua were irreversible. Oral knowledge held by tōhunga who declined to transmit it — or who died before doing so, or faced imprisonment, or who simply lost the social authority and political power that gave the knowledge meaning — were gone. Many tōhunga declined to pass on their karakia, leaving Māori without much of their traditional base. Today, that act might be declared a "crime against humanity". The deliberate destruction of the cultural and intellectual foundations of a people, through the machinery of the state, fits the spirit of what became a crime. Tuhoto-Ariki, as a tōhunga ahurewa of the highest order, embodied what the Act sought to erase. That he died friendless in a Pākehā hospital in 1886, and that the Act followed twenty-one years later, helps explain the Māori experience in Generation Two and later in Three.

Thus, earlier Māori testimony and alternative spatial interpretations were not integrated into the dominant framework. Nor was Hochstetter's 1859 survey applied to test the inherited cartography. The shortcoming in the evidence identified in Generation One was left unaddressed. This was accentuated during WWII with the passing of their media celebrity, Alfred Warbrick. From 1886, he had continued his media campaign, calling for government action to expose the buried terraces.

Up to 1935, and probably later, visitors to Waimangu would be told by Warbrick's guides that the Pink and White Terraces were not destroyed in the crater, but lay buried under "sand-hills, bare and scoured" on the lake shore where "sand and mud cover the ruins of the White and Pink Terraces once so wonderful" (Herz 223). The early Rotomahana guides possessed an intimate knowledge of the pre- and post-eruption landscape. Their observations represent a form of spatial expertise complementing formal survey evidence. By 1940 then, the destruction narrative had become received knowledge.

4.0 Generation Three: The Long Hiatus, 1941–1980

The 40-year hiatus that descended on the Tarawera and Terraces question between the death of Warbrick in 1940 and the stirrings of centennial interest in the late 1970s reflected the institutional consolidation of the Smith paradigm, the marginalisation of mātauranga Māori in mid-century New Zealand intellectual life and the disappearance of the last eyewitnesses: "Absorption through intermarriage and cultural assimilation became the new narrative of Māori cultural decline" (Kukutai 37).

4.1 The Loss of Living Memory

The 1936 semi-centennial press supplements had assembled surviving witnesses for their final testimony. Within a decade or so, the living memory of the pre-eruption landscape was gone. No formal oral history project recorded the testimony of the Tūhourangi and Ngāti Rangitihi elders who carried the knowledge of the pre-eruption landscape. The exception was Rotorua historian Cecil Watt (1902–1971), who informally collected oral history from Rotorua kaumātua after WWII and later mentored historian Don Stafford (1927–2010). After his death, Watt's files were thoughtfully archived at the New Zealand Archaeological Association (NZAA) by Ken Moore. This material is selective and partial, and was not in the public domain but, when recently published with Hochstetter's survey and forensic cartography (Weizman 18), it helped identify 87 Lake Tarawera sites: many lost from the public record (Bunn 2025b). The Tūhourangi and Ngāti Rangitihi kaumātua held something

no institution possessed: topographic knowledge of a landscape that no longer existed on the record. Without Watt's diligence, the historical record would have remained fractured. Ngāti Rangitihī kaumātua today greatly appreciate the restoration of Watt's research to their historical record, particularly when reinforced by Hochstetter's survey bearings and coordinates (pers. comm. Ken Raureti, 19 August 2025).

4.2 Mid-century literature

Mid-twentieth-century opinion within the tourism industry continued to reflect the ambivalence and Māori scepticism over the Terraces. The post-WWII period saw official and private sector publications concerning the Rotomahana Basin. In 1950, the Government Tourist Bureau published maps of the Rotorua region, including the locations of the Pink and White Terraces in Figure 9. These sites match the locations given by Alfred Warbrick in 1936 and by today's terrestrial surveying (Bunn 2023, 2024; Bunn and Nolden 2023). This map continued in production with the terrace locations until at least 1966. The map was co-produced with the Lands & Survey Dept., indicating that this branch of government too, considered that the Terraces may lay buried on land.



Fig. 9. White arrows mark the map's Pink and White Terrace sites on land, reproducing almost exactly Alfred Warbrick's 1936 Pink and White Terraces' locations. They also match the locations from modern surveying. (Sightseeing map of Rotorua, detail. New Zealand Dept. of Tourist & Publicity and Lands & Survey Dept, 1950).

The local opinions within Rotorua tourism continued i.e. as to where the terraces were buried on land or exploded, as in Figure 10 (Smith 1950, 6).

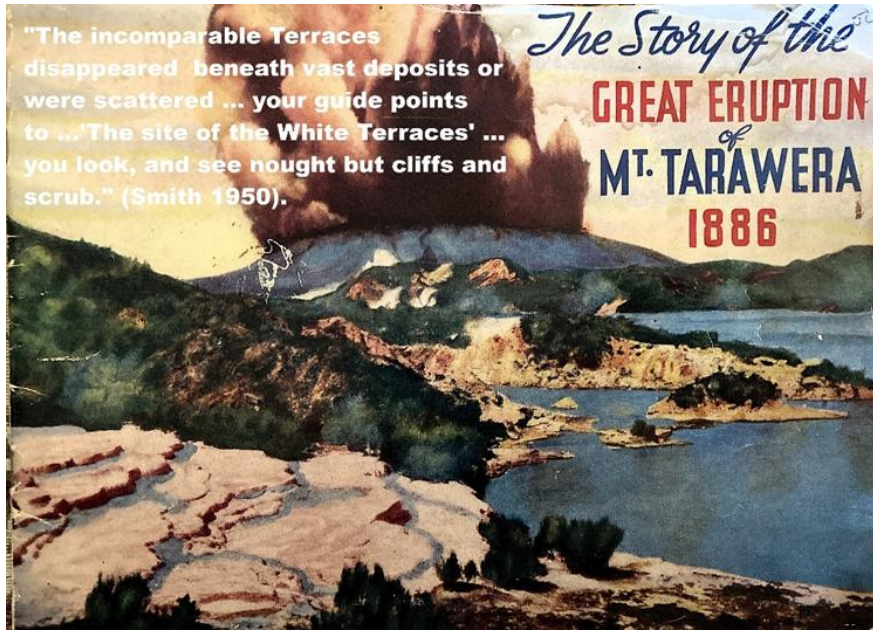


Fig. 10. Buried Village tourist book c. 1951 detail with advice on the Pink and White Terraces status. (Smith 1950, 6).

In 1960, Frank Gee, for the Rotorua Anglers Association, published the first edition of *Rotorua Trout*. This grew into eight editions of the *Rotorua Trout Fishing Guide*, which remains in print. The association “produced the first Rotorua Trout Fishing Guide in 1965 [...] The 8th edition, published in August 2016 [...] containing 104 pages of up-to-date information on the fishable lakes and waterways [...] [and] A brief history of the Rotorua lakes fishery” (Rotorua Anglers). Gee reported on the eruption and the Terraces: “A lingering belief among some ‘old-timers’ was that the terraces were merely drowned by the new lake which quickly formed, but geologists are generally agreed that the terraces were shattered and blown away by the eruption” (114).

In 1961, in Figures 11 and 12, physicist Ron Keam (1932–2019) began a series of lay books perpetuating the destruction narrative, leading the author to re-term the Smith paradigm, the Smith-Keam paradigm (Keam 1961, 1978).

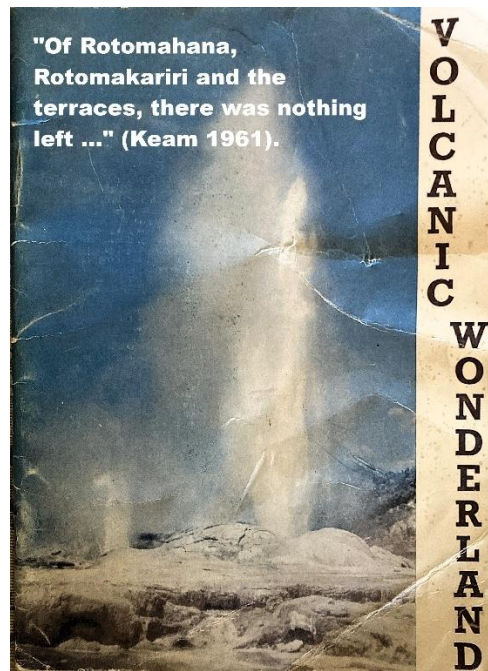


Fig. 11. Keam's 1961 Volcanic Wonderland book.

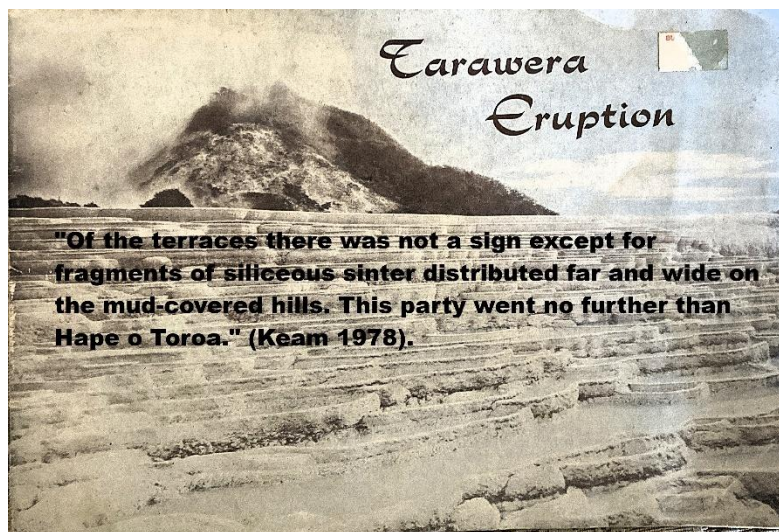


Fig. 12. Keam's 1961–1978 Tarawera Eruption book.

In the mid-century, Harding's map was transformed into simple images for lay readers. Mid-20th-century illustrations provide an example of narrative stabilisation through visual media. In Figure 13 the syndicated illustrations of Ross Gore (1904–1981) and later Dennis Knight Turner (1924–2011) depicted the eruption as destroying the Pink and White Terraces. Their wide circulation ensured repeated exposure (Gore 43). The pattern is consistent with the "diffusion process" later introduced by Everett Rogers (1931–2004) in which mass communication channels diffuse the adoption of new ideas (Rogers 74).

What happened to the narrative about the terraces is consistent with diffusion processes observed in other domains, where repetition can normalise a claim independently of its evidentiary status, as in this case. Once established, such a framework exhibits the characteristics of a “paradigm”, introduced by Thomas Kuhn in 1962, in which anomalies are accommodated rather than prompting revision.

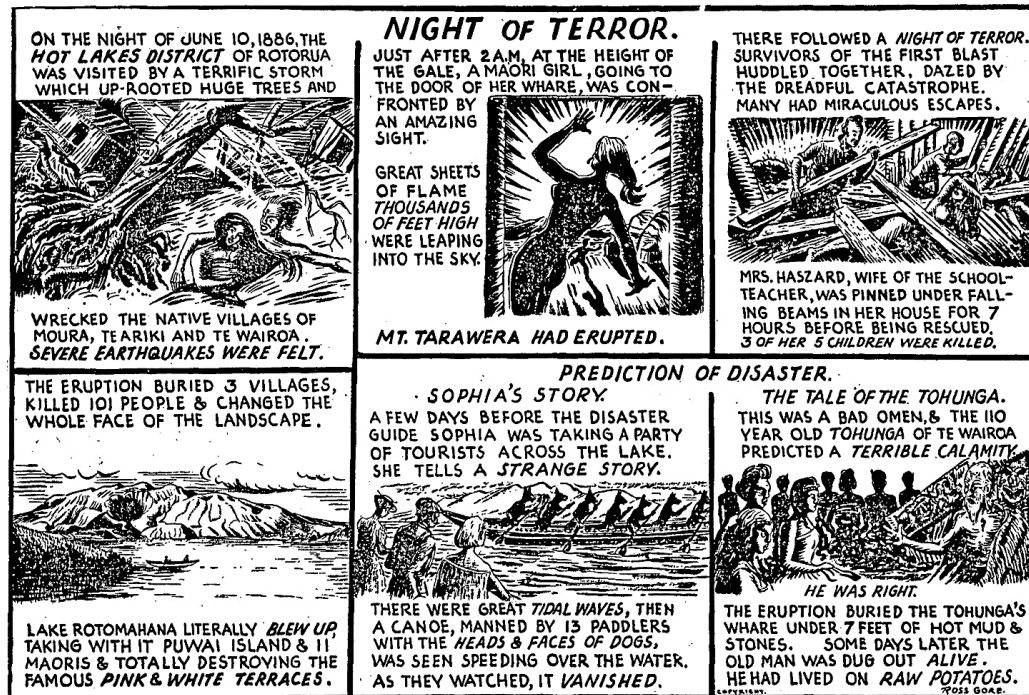


Fig. 13. Night of Terror in “It happened in New Zealand” by R. Gore, page 43. Courtesy of State Library Victoria.

4.3 Mid-century science

The mid-century scientific literature on Tarawera was characterised by productive activity in volcanology that conspicuously skirted the Terraces question. In that small, tightly-networked scientific community, the Terraces question had perhaps acquired a quality that made it professionally unrewarding to revisit. It was settled. To reopen it was to imply that Smith, Thomas, Bell, and the succeeding generations had all been wrong. In a community where the same people collaborated, reviewed and co-authored, the reputational exposure of such a challenge was prohibitive.

Paradigm stability, as Thomas Kuhn observed, is not merely intellectual inertia. It is social organisation. Scientific knowledge is sustained within communities that share methods, assumptions, and standards of proof. As Kuhn noted: “a paradigm is what the members of a scientific community share,” and such shared commitments necessarily constrain what can be recognised as valid observation or inference. In the Rotomahana case, this dynamic is visible across succeeding generations. Once an interpretive framework for the fate of the Pink and White Terraces was institutionalised, it was reproduced through professional networks,

publications, and authority structures. Apparent stability in the literature thus reflects the persistence of a socially organised consensus, resistant to contrary evidence.

Some of the most significant scientific work of this period was by geologist J. W. Cole on the eruption history at Tarawera (Cole 1966, 1970). Yet, in his 1966 thesis, there is no text mention of the Pink and White Terraces. In his thesis, Figure 29, and in his 1970 article, Figure 12, there is his sketched version of the leading German cartographer August Petermann's (1822–1878) faulted map of Lake Rotomahana. This map is mislabelled as if by Hochstetter and is superimposed on the Rotomahana crater in a position loosely following Bell, who copied Harding (Petermann 1864). The result is that both Terraces are misplaced south. When his old-lake overlay is corrected with Hochstetter's survey and mapping, Cole's White Terrace lies closer to Marshall's location along the northern shoreline, as now triangulated.

Cole was followed by Ian Nairn's analysis of the Rotomahana Basin rift system. In 1979, Nairn published his estimate of the old Lake Rotomahana position. He positioned it east of Cole and closer to Thomas's location, slightly south of the current surveyed location (Nairn 1979, 364; Bunn and Nolden 2023). Nairn demonstrated that his canonical eruption geometry — the pattern of fissures, vents, and surge directions mapped across the basin — was incapable of accounting for the destruction of the White Terrace at its now-surveyed location. In 2012, GNS agreed at least, with this logic “the Pink Terraces are still there, and, apparently, intact [...] because they were far enough from the rift not to get blown to bits or collapse into it. A follow-up study in 2012 confirmed that” (Winner).

In Figure 14, Nairn plotted the Rotomahana Basin cratering, vents, rift and surges. Hochstetter's survey location for the Terrace spring is shown (blue triangle), and the nearest vents at Star Hill and the rift are each at least a kilometre away (yellow rays). The en echelon fissures ran east-west and so did not cross the White Terrace site. Nearly all eruption surges travelled westward. The rift itself, Nairn advised the author in 2014, would have been only about a metre wide — since a wider rupture would have produced seismic damage at Rotorua far in excess of what was recorded (pers. comm. I. Nairn 2 April 2014).

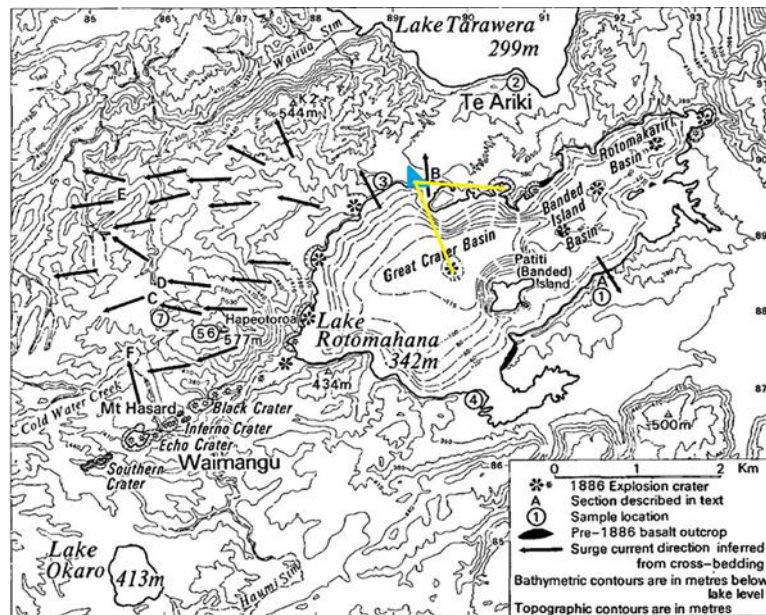


Fig. 14. Rotomahana basin craters, vents, rift and surges. The White Terrace spring (blue triangle) and distances to the rift and to Star Hill vent (yellow rays). (I. Nairn 1979 and 1988, used with permission and reproduced from Bunn 2020a with annotation).

The implications of this geometry for the Terraces question were not drawn in the mid-century literature. They could not be, because the Terraces question was not being asked.

4.3 Missed Opportunities

Perhaps as a result of the long hiatus, the centenary of Hochstetter's 1859 survey passed without any attempt to consult it to establish pre-eruption baseline data for the Terraces locations. This unique terrestrial survey lay in a European archive, while Harding's 1886 desk-drawn Plan No. 3 continued as the spatial foundation for a destruction narrative that it was never qualified to support. It is ironic that the instrument most capable of resolving the Terraces question had been available since 1859, was not secret or inaccessible. It was not consulted until 2016 when Sascha Nolden passed photographs of the diary to the author. Earlier, in 2008, Nolden held the sesquicentennial Hochstetter Exhibition at the Auckland Central Library, featured pages from Hochstetter's diary, and highlighted him as a founding father of New Zealand geology (Bunn and Nolden 2016).

Ron Keam told me that he once wrote to an Austrian museum about the diary, but received no reply and gave up. That is the only known, earlier New Zealand attempt. In 1959, perhaps because of the centenary, Keam sketched a draft, large-scale map of old Lake Rotomahana. He never completed it or published it, until it was pressed into use by GNS to support their 2011 claim. As a counterfactual, had Keam accessed Hochstetter's archive during his studies in Europe, he would likely have reconstructed the 1859 survey, anticipating by half a century the reconstruction undertaken from 2016 by Bunn and Nolden, who georeferenced Hochstetter's maps using ground control points to locate the Terrace locations (Bunn and Nolden 2016, 2017, 2023).

4.4 Mātauranga Māori Through the Long Hiatus

The 40 years of the Long Hiatus were, for the Tūhourangi and Ngāti Rangitihi communities, a period of profound dislocation. Through it, the mātauranga Māori knowledge of the Terraces locations was held within the communities rather than publicly asserted. Warbrick's death removed its most effective advocate. The institutional science community was not listening. In these circumstances, the Tūhourangi and Ngāti Rangitihi knowledge holders maintained their mātauranga Māori within the community rather than submit it to an academic culture that had dismissed it. This was not a withdrawal (Tūhourangi Tribal Authority 2026a, Te Mana o Ngāti Rangitihi Trust n.d.). It was a form of preservation to which only Watt was privy (Tauranga Historical Society 5).

4.5 The Close of Generation Three

By 1980, the Long Hiatus had lasted four decades. The living memory of the pre-eruption landscape was gone. The mātauranga Māori counter-narrative had been driven inward. The popular literature calcified the destruction narrative. Hochstetter's survey remained unconsulted. Keam, preparing for what would be his 1988 opus “Tarawera”, acknowledged what the hiatus had obscured: “what has always been needed is a survey of the area as it was before the eruption” (Keam 1988, 338). He was correct. He knew of the survey, but seemingly made no further effort to repatriate it, even while studying in Europe.

5.0 Generation Four: Revival Without Re-examination, 1981–2010

Scientific interest in the Tarawera eruption and the Pink and White Terraces revived in the late twentieth century, driven by advances in topography, volcanology, geophysics, and underwater survey technology. This renewed attention created the conditions for reassessment. However, in practice, it largely reproduced the framework established in earlier generations. Research during this period focused on the physical processes of the eruption and the morphology of the Rotomahana Basin, rather than on re-evaluating the Terraces' pre-eruption locations. The central assumption of destruction was thus operationalised rather than tested.

The centennial of the 1886 eruption produced significant cultural and scholarly events. Nairn wrote about the eruption for *The Tarawera Eruption Centennial Exhibition 1886–1986* in Figure 15, an article which remains the finest lay account (Perry 201–206). He made no comment of the Terraces. Keam's 1988 opus *Tarawera* integrated historical accounts in a lay work of scholarly achievement. It became the standard reference for a generation. What Keam could not do was return to the spatial foundations of the destruction narrative and test them. He declared in 1988 that the debate had been settled by Smith's 1887 audit. This, as subsequent research demonstrated, was not the case (Bunn 2026).

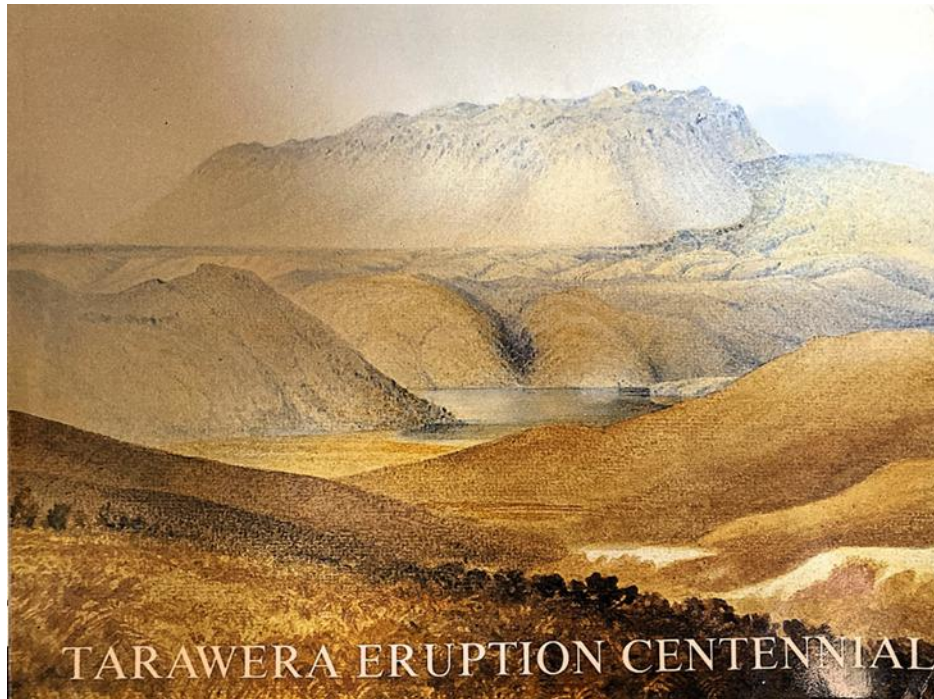


Fig. 15. Mount Tarawera, from the Landing place, near Rotomahana, 1866. J. Kinder. (Rotorua District Council, Tarawera Centennial book cover).

Despite the availability of improved analytical tools, there was no attempt to reconcile the accepted terrace locations with Hochstetter's newly-available survey diary. Nor was there a sustained effort to integrate Māori spatial knowledge into the scientific analysis of the basin. Instead, the period is characterised by methodological advancement within a stable paradigm. New data were interpreted in ways consistent with the established narrative, rather than used to interrogate it. This represents a continuation of the historiographical inertia: the expectation of destruction shaped the questions and the interpretation of results.

By 2010, the terraces remained officially classified as destroyed. The revival of scientific interest had not resolved the underlying evidentiary issues identified in earlier generations. Rather, it had extended the lifespan of the existing narrative by embedding it within increasingly sophisticated but uncritical investigative frameworks.

6.0 Generation Five: The 2011 Claim and Its Consequences (2011–Present)

In 2011, the destruction paradigm was, at last, challenged. A joint American–New Zealand team led by Cornel de Ronde of the Institute of Geological and Nuclear Sciences Limited (GNS Science) announced that the Pink Terrace had been identified on the floor of Lake Rotomahana. The claim was amplified across global media and later extended to the White Terrace. A problem unresolved since 1886 appeared settled. In fact, the evidentiary question remained open; only its published status had changed.

6.1 The Anatomy of the 2011 Claim

The 2011 American–New Zealand team employed underwater photography and sonar mapping to produce limited imagery only. However, the image interpretation preceded validation. A pink rock photographed on the lake floor was presented publicly within days as

evidence of the Pink Terrace — first at a local meeting, then globally — years before any peer-reviewed publication.

This sequence is significant. The claim entered public discourse prior to independent scrutiny, and contrary to the guidance of journals such as *Nature*, which advise against such pre-publicity. Institutional authority effectively substituted for the evidentiary filtering that peer review provides. Subsequent statements reinforced the claim, asserting that “The terraces were never destroyed’ ... ‘They never went anywhere” (Winner). This position explicitly rejects the orthodox destruction model, while remaining inconsistent with the established survey-based terrace locations. The 2011 claim did not resolve the problem of the Terraces’ locations; it formalised a long-standing interpretive framework, transforming it from a provisional reconstruction into an institutional consensus without independent verification. When reviewed publication followed in 2016, it appeared behind a paywall and largely retracted the 2011–2015 claims, instead claiming that the Terraces were destroyed (De Ronde 2016).

For such a momentous 2011 finding, a reasonable person might expect more evidence before publication, including for example laboratory analysis and comparison with known terrace samples. None was offered. This is surprising for such a claim in the Taupō Volcanic Zone with its history of multiple eruptions and with the 1886 eruption being a “pure basalt exception [...] where basalt magma, richer in iron and magnesium [...] forming red or black scoria” (Nairn in Perry 202). Pink rocks and ground are not an unusual occurrence in New Zealand’s Taupō Volcanic Zone (Rowe et al 2025). For example, a volcanic rock later impregnated with silica may resemble terrace sinter on underwater photography, where the water is turbid and colour balance might be poor.

6.2 Cartographic Inheritance

The 2011 sonar technology was modern; the spatial framework was not. Identification of terrace candidates required prior assumptions about their location, derived, through the transmission traced in this paper — largely from nineteenth-century cartography.

The pre-eruption survey that could have provided an independent baseline was not consulted. By contrast, reconstruction of Hochstetter’s 1859 survey, recovered from field notebooks and his survey Folio, places the Tarata spring on land along the present shoreline. This position is consistent with accounts by Hochstetter, Warbrick and Payton, with equivocal support from Thomas and Marshall, and is incompatible with the GNS company’s lake-floor claim. The camera and sonar were deployed where the paradigm indicated. It did not independently determine the location.

6.3 Private vs. Public Assessments

Interviews conducted in 2014 suggest that the public consensus did not reflect the private assessment within the expert community. Nairn, long regarded as an authority on the eruption, declined to endorse the 2011 GNS claim when asked directly (pers. comm. I. Nairn 2 April 2014). His response was non-committal rather than affirmative. In a tightly networked field, such demurral functions as a form of constrained dissent, indicating that private assessment may diverge from public consensus.

Ted Lloyd, Rotorua's retired geologist, for 30 years undertook surveys of hot springs and geysers across the Taupō Volcanic Zone and was Keam's co-author. The author asked him the same question: "Did de Ronde discover the Pink and White Terraces?" Lloyd was sceptical (pers. comm. E. Lloyd, 6 May 2014; Bunn, 2020a). Together, these interviews establish something the published literature of Generation Five could not record: that within the inner circle of the Smith-Keam paradigm authorities, the 2011 GNS claim did not command the private assent that its public reception implied. In 2017, the Royal Society of New Zealand's blind reviewer no. 2, similarly questioned whether the GNS claim rested on evidence or speculation (Bunn 2017a).

6.4 Peer Review or Not

When the 2011 GNS findings were published in 2016 in the *Journal of Volcanology and Geothermal Research*, the editorial structure exhibited substantial overlap. The lead investigator de Ronde served as sole editor, lead author and co-author across multiple papers, with most contributions arising from a closely associated research network. One paper was accepted within two days of submission (De Ronde et al, 2016a).

Such structures may not perhaps, invalidate individual results, but they define the conditions under which consensus forms. Similar patterns recur in earlier phases of the historiography, where authors exercised effective control over both production and validation of their own interpretations.

6.5 The Hochstetter Paradigm and the unravelling of consensus

Generation Five marks a methodological rupture in the inherited narrative through the reintroduction of primary survey data to reconstruct the Terraces' survey geometry. Beginning with the collaborative analyses of the author and Nolden, this phase pivots on the reconstruction of Hochstetter's 1859 survey (Bunn and Nolden 2023). The survey bearings were reconstructed from Hochstetter's 1859 field notebooks, maps and 1860 survey Folio, with today's topography, using ground control points, together with georeferencing. Generation Five thus restores an empirically testable spatial framework absent from the 1886– literature. The resulting "Hochstetter paradigm" contradicts both the initial 2011–2015 GNS company claim that the Pink and White Terraces lay on the lake floor, more or less intact, and their post-2016 posture, that the Pink and White Terraces were destroyed and now lie submerged within the post-1886 lake basin. Instead, the survey evidence indicates that the original White Terrace spring location exists on land and is potentially recoverable. In historiographical terms, this represents a transition from authority-dependent inference to evidence-based reconstruction.

6.6 Institutional Response

The institutional response to the publication of Hochstetter's survey was to defend the Smith-Keam paradigm. Public statements rejected the alternative hypotheses without engaging directly with the underlying survey evidence. This position was reaffirmed by de Ronde, who stated that: "We've re-examined all of our findings from several years ago and have concluded that it is untenable that the Terraces could be buried on land next to Lake Rotomahana" (*GNS Science* 2018).

Editorial decisions further constrained debate. After publication of the Hochstetter survey reconstruction, a GNS reply defending the 2011 claim was accepted, while the Bunn rejoinder was declined and had to be published elsewhere. The pattern is consistent with earlier phases of the historiography: institutional authority was asserted in place of evidentiary engagement.

The controversy played out across multiple journals in a sequence that itself warrants attention. In 2016, GNS published their destruction-hypothesis papers in the *Journal of Volcanology and Geothermal Research (JVGR)*, an Elsevier journal with a specialist international geoscience readership and a paywall. Later that year, Bunn and Nolden published their third iteration of the reconstructed Hochstetter survey in the open-access *Journal of New Zealand Studies (JNZS)*, a humanities-oriented journal published by Victoria University. In June 2017, a more developed fourth iteration appeared in the *Journal of the Royal Society of New Zealand (JRSNZ)*. This paper achieved the highest Altmetrics score of any *JRSNZ* article and held that position for several years (with a current score of 843). In July 2018, de Ronde, Tontini and Keam published their rebuttal — "Where are the Pink and White Terraces of Lake Rotomahana?" — in the same journal. This article currently carries an Altmetrics score of 122. When Bunn sought a rejoinder in the *JRSNZ*, the opportunity was declined and it was subsequently published in *Surveying+Spatial* (pers. comm. Ewan Fordyce Aug 21, 2018; Bunn 2020b), a professional surveying journal. In 2023, Bunn and Nolden published the 1860 survey Folio iteration in the *Journal of Humanities and Social Sciences (JHSS)*. Readers tracking the full exchange must therefore navigate across five journals — *JVGR*, *JNZS*, *JRSNZ*, *Surveying+Spatial* and *JHSS*— over seven years from 2016 to 2023. The asymmetry in the Altmetrics scores is telling: the reconstructed Hochstetter survey attracted far greater scholarly attention and public interest than the institutional rebuttal, yet it was the rejoinder defending that reconstruction — not the GNS rebuttal — that was denied a hearing in the journal.

6.7 The Absence of Sinter

No confirmed post-eruption Terrace sinter exists. If the terraces had been destroyed and dispersed, such material should be recoverable across the Rotomahana Basin and ejecta field. It is not (Bunn 2025a).

Contemporary observations reinforce this absence. Warbrick reported no such material in decades of post-eruption presence. The absence of sinter is more consistent with terrace burial, not fragmentation. An example (pre-eruption) of what has always been missing is in Figure 16.



Fig 16. Verified Pink Terrace sample. The image is lightly colour-balanced to more accurately reflect Seward's description of the sample's more pinkish hue (photograph by T. Seward, used with permission).

6.8 Mātauranga Māori

Initial endorsement of the 2011 GNS claim by Tūhourangi kaumātua reflected the weight of institutional authority rather than the loss of indigenous knowledge. That endorsement was later withdrawn in 2017 when the Tūhourangi kaumātua Anaru Rangiheuea was interviewed and declared he no longer thought anyone would find the Pink and White Terraces (Guy).

Subsequent engagement indicates that mātauranga Māori regarding the terraces persisted through the hiatus. A Ngāti Rangitihi kaumātua, reviewing the author's 2025 paper on Tarawera eruption survivors, remarked that he could not put it down — a response that speaks to the paper's fidelity for the history his community has carried, and has not seen accurately reflected in the scientific literature, for 140 years (Bunn 2025b). The 2014 Tūhourangi and Ngāti Rangitihi group, who began the journey to the Pink and White Terraces, are pictured in Figure 17.



Fig. 17. The Tūhourangi and Ngāti Rangitihi kaumātua, who took up the challenge of the Pink and White Terraces recovery in 2014. Left to right: Rangitihi Pene (now Chairman of Ngā Kohinga Whakairo o Hinemihi), Manutai Schuster (Tūhourangi Tribal Authority trustee), the author, and Col. Leith Comer (Retd) (now chairman of Te Mana o Ngāti Rangitihi Trust).

6.9 The Close of Generation Five

By 2026, the Generation Five Terrace record remains fractured. The 2011–2015 GNS claim was unequivocal: “The terraces were never destroyed [...] They never went anywhere” (GNS 2011; Winner 2012). Yet, in 2016, this was retracted: “we believe that the majority of both the Pink and White Terraces were destroyed during the eruption” (de Ronde 2016).

In parallel, the Hochstetter survey had been digitally repatriated, reconstructed and validated across multiple peer-reviewed iterations (Bunn and Nolden, 2016–2023). A six-point White Terrace spring triangulation — Hochstetter (1859, 1860), Warbrick (1886), Payton (1888), Bunn and Nolden (2016–2023) and (Bunn 2024) with private support from Thomas — converges on a single location: the northern shore of Lake Rotomahana, and on land. The established-paradigm eruption geometry provides no mechanism for destruction at this site, and the absence of post-eruption sinter across the basin remains unaddressed.

As noted, senior figures within the old paradigm, including Nairn and Lloyd, failed to endorse the 2011 GNS claim, while Tūhourangi kaumātua Anaru Rangiheuea later withdrew his support. GNS has since withdrawn from the scholarly debate. A reasonable person would almost certainly find the converging evidence is impossible to reconcile with the destruction model. Recent syntheses of the 1886 eruption continue to omit engagement with the Terraces question and its primary sources, perpetuating a persistent disciplinary blind spot (Rowe et al. 2021).

A striking feature of the Tarawera eruption is how long it took to identify what drove it, and why that question remained unsettled for so long. From Hector's 1886 classification of the event as hydrothermal, an explanatory frame was established that proved resistant to later anomalous evidence. Subsequent generations did not so much overturn this view as work around it, alternately qualifying or selectively reinterpreting the evidence. The result was a prolonged ambiguity in which the eruption's driver was variously cast as hydrothermal, phreatomagmatic, or magmatic, without decisive resolution. Only with modern analyses has a coherent synthesis emerged. Tarawera was: "one of the few basaltic plinian-style [sic] eruptions known, as well as one of the few plinian eruptions [...] from a fissure" (Rowe et al 2021, 20). The historiographic point is that the persistence of uncertainty reflects less a lack of data than the stabilising effect of early interpretive commitments, which shaped the questions asked — and not asked — for over a century.

Perhaps the greatest opportunity lost by this generation was Kean's unique Tarawera and Pink and White Terraces collection. On his death, it was broken up at auction into 296 lots which fetched \$NZ505,000. In other countries, the national library or museum would have obtained such a unique collection of national significance (*Art+Object* 2019). Hochstetter's family recently donated the Hochstetter Collection Basel to the Natural History Museum Vienna, where Hochstetter had been the founding director. The keynote address at the gala Vienna event on April 30, 2016 (Hochstetter's birthday), was appropriately delivered by Dr. Sascha Nolden, who curated the Hochstetter Collection Basel from New Zealand (Natural History Museum 2016). An opportunity seized by Rangitihi Pene in Appendix VI, is the repatriation of Hinemihi from England, where since 1892 she has rested in the grounds of a stately home.

6.10 The inter-generational summation

The historiography of the 1886 eruption is not one of progressive resolution of competing interpretations. It exhibits a recurring pattern: claims advanced under institutional authority, counter-evidence marginalised, and conclusions stabilised through self-validating processes.

Generation One established the template, with Smith's 1887 report grounded in an erroneous map (Bunn 2026). Generation Two entrenched it. Generation Three produced a prolonged hiatus in which key survey evidence remained unexamined. Generation Four created the appearance of resolution without revisiting spatial foundations. Generation Five extended the pattern with modern technology but with a similar structure: pre-publication claims, constrained peer review, and limited right of reply. Across all five generations, the mechanism remained consistent, even as its technical form evolved. There is also the legacy of the 1907 act. Even today in Rotorua, one does not meet a *tōhunga*. They exist and can be recognised by the respect shown to them by others.

The recurrent pattern is institutional rather than individual, and comprises three elements:

First, the substitution of authority for evidence. At critical junctures, institutional claims closed questions that the evidence had not. This occurred in 1887, 1988, and 2018, under differing scientific regimes but similar conditions.

Second, the marginalisation of inconvenient evidence. Key observations — from early Māori witnesses, Warbrick, and later independent analysts — were consistently peripheral to

institutional conclusions. This marginalisation was structural, reflecting the dynamics of a small, closely networked community.

Third, a self-validating publication apparatus. From nineteenth-century parliamentary reporting to modern special issues, the separation between authorship and validation was often limited. While perhaps not invalidating individual studies, such structures shape how consensus forms and persists. This pattern is not unique to Tarawera. Subsequent eruptions, including the 2019 Whakaari / White Island eruption, exhibit continuing tensions between institutional authority, evidential transparency and public accountability (Cas). The pattern is tabulated in Appendix V.

7.0 Conclusion

This Tarawera eruption historiography has argued that the 1886 eruption did not conclusively determine the fate of the Pink and White Terraces, but that the investigation was prematurely closed under conditions of considerable uncertainty. That closure, originating in early institutional responses, was consolidated through cartographic reconstruction, reinforced by citation and authority, and reproduced across five generations of scholarship without proper re-examination of the underlying spatial evidence.

The destruction narrative did not persist because it was repeatedly verified, but because it was never effectively retested. Initial errors — particularly in spatial interpretation and cartographic representation — were not corrected but formalised, acquiring authority through repetition and institutional endorsement. Over time, this process displaced contradictory testimony and alternative analyses, including those grounded in mātauranga Māori and in the pre-eruption survey record.

The historiography also illustrates a broader pattern in the development of scientific knowledge following catastrophic events. Provisional explanations, formed rapidly in response to incomplete data, may stabilise into enduring frameworks that resist later scrutiny. Once embedded within institutional practice, such frameworks shape the conclusions, the questions considered legitimate and the methods used to address them. The persistence of the Terraces narrative reflects this dynamic. Across successive generations, advances in methods and technology were applied within an inherited conceptual structure rather than used to interrogate it. The result was not the progressive resolution of uncertainty, but its containment.

Reconsideration of the Terraces question requires a return to first principles: the integration of primary nineteenth-century survey data, critical evaluation of the inherited cartography, and the inclusion of Māori spatial knowledge, long excluded from the scientific record. Such an approach does not guarantee a definitive resolution, but it restores the question to the status of an open problem grounded in evidence rather than assumption.

More broadly, this case underscores the need for reflection in historical and scientific practice. Where foundational interpretations have been accepted without sustained scrutiny of evidence, the possibility remains that they rest on unexamined premises. The task is not to replace one narrative with another, but to re-establish the conditions under which competing interpretations can be tested.

The Pink and White Terraces were a geological phenomenon and subject to a long-lived historiographical construction. Understanding how that construction arose, and why it persisted, is a necessary step toward resolving the question it prematurely closed. The absent, as it turns out, were most likely right all along.

Acknowledgments

The author acknowledges the collaboration with Sascha Nolden, who enabled this Rotomahana research. Rangitahi Pene has assisted the research since 2014, and contributed the section on Hinemihi (Appendix VI), including Figure A12. All sources were independently verified by the author. The research methodology, interpretations, findings, conclusions, and critical perspectives are those of the author.

Appendices

Appendix I: Eruption predictions by Hochstetter and Tuhoto-Ariki

This appendix examines two independent knowledge systems that generated eruption predictions in 1886.

Hochstetter's claimed prediction

Hochstetter is reputed to have forecast the volcanic eruption at Tarawera in 1859. However, there is no specific claim in his publications. The first modern citation is by Smith in c. 1950:

"Hochstetter foreshadowed events thus: "I am of the opinion that this whole portion of the mountain up to Te Kopihia fountain,-- being as it seems, thoroughly decomposed by hot vapour— will some day cause a sudden catastrophe by falling in and covering the Rotoreka plain with a flood of hot mud" (Smith c. 1950, 3).

This quotation was traced to a July 1886 newspaper article, in which Hochstetter was camping at Paeroa. He was 20 km from the Tarawera massif. The article ends: "The Natives would not permit him to ascend the Tarawera range, but in the face of the later eruption, the above prediction is an important one." (*Otago Witness*, 2 July 1886).

The statement is better understood as a retrospective attribution rather than a documented forecast. At most, Hochstetter identified instability in hydrothermally altered terrain — a reasonable geological inference, but not a specific eruption prediction. He may have formed a similar judgement when surveying the Rotomahana Basin in the following days.

Tuhoto-Ariki's observation and warning

A second eruption prediction was made, on May 31 1886, ten days before the eruption (E-10), by the Tūhourangi tōhunga Tuhoto-Ariki (c. 1780–1886), after reports of a phantom canoe on the lake (possibly a Fata Morgana). The context was a series of deaths in the Te Wairoa settlement for which chief Āporo Te Wharekāniwha had blamed Tuhoto-Ariki. On being consulted about the canoe sighting, the tōhunga remarked: *He tohu tera, ara ka horo katoa tenei takiwa* (It is an omen; it is a sign and warning that all this region will be

overwhelmed). While Hochstetter relied on European geological survey experience for his forecast, Tuhoto-Ariki relied on mātauranga Māori training and a century of experience in the region. There were signs of the impending eruption that volcanologists would recognise, e.g. increased earthquakes and spring activity, seiches in Lake Tarawera, the canoe mirage and the autoignition of Whatapoho. Discoloured lake water and an earlier fish-kill had also been reported.

Location and status of Tuhoto-Ariki's whare

Alfred Warbrick said of Tuhoto-Ariki that he “lived by himself on the brow of the hill overlooking the lake” (Warbrick 61). Arthur Vogan (1859–1930) stated that his home “stood apart from the rest of the houses & huts, at the head of a charming glen, that [...] visitors used to descend to reach the boats, on their way to see the world-famed Terraces” (Vogan, in Keam 1988, 405). Tuhoto-Ariki was no ascete: he smoked tobacco in a pipe and had a pet dog, which, by scratching a hole in his thatched roof, may have provided air for Tuhoto-Ariki to survive for the four days he was entombed by the eruption. From these eye-witnesses, Tuhoto-Ariki's home lies between Te Wairoa Falls and the head of the Wairoa Stream gully, on the north side, above the bridge. Elevation profiling shows Tuhoto-Ariki could have viewed the Wahanga eruption from there, across Parawhaiti Hill.

The whare identified as his in the Buried Village does not match Warbrick's and Vogan's descriptions. It is almost certainly not Tuhoto-Ariki's home-site. He was an aristocrat. The excavated whare long-promoted by the Buried Village lies next to the smithy — the noisiest place in the village. Also, that site has no lake view. Instead, Tuhoto-Ariki would select a quiet, prestigious home-site, allowing for contemplation and retreats, when he relocated from Mokoia Island. None of the Buried Village excavations lies in the proposed area. His home likely remains buried, but otherwise is as he left it on 14 June 1886. The true site likely remains unexcavated within the proposed area and should be treated as culturally sensitive, under Tūhourangi oversight.

The likely reason for the confusion lies with the history of the Buried Village excavations, beginning in 1931. The author recalls the 2018 manager explaining that he employed archaeologist Brigid Gallagher (ex-Time Team) to order excavations in the village, something that hadn't been done previously (pers. comm. M. Gibbons 2018). Vogan's manuscript was published in 1988 by Keam. The whare was claimed by the Buried Village from 1962 to belong to Tuhoto-Ariki (Keam 1978, 47), 26 years before Vogan's papers were first published. Thus, the whare next to the Smithy is either a replica or a mistake. Also, placenames vary over time in Rotorua tourism. In the nineteenth century, the terrace of the Kereru geyser was called the Black Terrace (the true Black Terrace lies at Rotomahana). By 1956, in Figure A1, the name became “Pidgeon Wings”.



Fig. A1. The Black Terrace at Whakarewarewa, renamed Pidgeon Wings by 1956 (Bunn).

Survival, death, and medical interpretation

As the only trained observer in the proximity to witness the eruption, Tuhoto-Ariki unfortunately left no record, save for interviews with Warbrick and hospital visits by Rev. Alfred Fairbrother (*fl.* 1886). Fairbrother enquired as to his survival: “He said he prayed earnestly and continuously to be delivered. Mr Fairbrother asked him if it was to the Atua of the Maori, but he said no, to the Atua (God) of the Pakehas. [...] Mr Fairbrother changed his clothes for him and made him comfortable, the natives refusing any assistance” (*Wanganui Herald*, 16 June 1886, 2).

The oft-quoted story about Tuhoto-Ariki dying because his hair was cut reflects the Medical Superintendent Dr Ginders’ hospital policy. When a heavily soiled patient is admitted after such trauma, any hospital would remove clothing and wash the patient. Lice were common in both Pākehā and Māori communities. Vogan intimates that Tuhoto-Ariki was infested. Disinfection and body hair removal were routine treatments for lice. Disinfection could involve topical cresol, naphthalene, sulphur, mercury, petroleum or petrolatum, alone or with oil or vinegar. Due to adverse drug reactions, these methods have long been abandoned. If Tuhoto-Ariki died as a result of hospital intervention, it was more likely to have been from side effects of the treatment and from fasting for much of June 10–July 1, rather than from the shaving of body hair. Supporting this contention, in Elisabeth Pullman’s (1836–1900) pre-eruption photograph of Tuhoto-Ariki in Figure 2, he has short hair, similar to his June 20 1886 photograph. A contributing cause of death was PTSD. He experienced the eruption trauma and entombment, had been ostracised by his iwi for causing the eruption and then, for miraculously surviving four days entombed. Now he might cause a second eruption. He was friendless in a Pākehā world.

Under the International Classification of Diseases (ICD-11), the *Immediate* cause of death would have been cardio-respiratory failure (for we all die when our hearts stop). The *Intermediate* cause was likely dehydration, starvation, hypothermia and adverse drug reactions. The *Underlying* causes were injuries, exposure and PTSD. *Contributing conditions* were age (~106 years), psychogenic decline following tapu violation (shaving) and any pre-existing conditions.

From surviving reports of him, we see Tuhoto-Ariki as a fit centenarian *Tōhunga ahurewa*, the highest order of priesthood. From Chief Āporo's criticism over an April-May, enteric fever outbreak, Tuhoto-Ariki likely had medical training and was a *Tōhunga rongoā*. From his eruption prediction, he may also have been a *Tōhunga matakite*, a seer. He was indeed a polymath (Hiroa 1970, 475).

Dual knowledge systems in the eruption record

Hochstetter and Tuhoto-Ariki represent two distinct ways of knowing, within the Tarawera eruption record:

- a) European geological inference, grounded in survey and theory
- b) Māori environmental knowledge, grounded in observation, experience, and cultural interpretation

This duality persists throughout the historiography. Early Māori assessments — that the terraces survived outside the crater — were later displaced by institutional scientific consensus, despite the proximity and observational expertise of local guides. The coexistence and subsequent divergence of these knowledge systems form a central dynamic in the interpretation of the Tarawera eruption and its aftermath.

Recovery

The parlous state of the Māori population by 1886 was aggravated at Tarawera, given the wealth of the Tūhourangi and Ngāti Rangitihi from the Terraces income. The shock of the eruption, the mortality and evacuation from Tarawera were intensified by the recognition that their lifestyle had ended. Their immediate observation, that one or both Terrace locations survived outside the crater, was tempered by the loss of their tourism infrastructure. Within a year, however, tourists began to return as in Figure A2 (Warbrick 1934, 90). Most notably in Figure A2, the Pink Terrace is shown buried on land with tourists walking over it.



Fig. A2. A post-eruption postcard depicting tourists at Rotomahana (Tuck & Sons no. 7891, Bunn).

1886, the annus horribilis

Despite the windfall tourist income, the Tūhourangi were to endure an *annus horribilis* in 1886, starting with an outbreak of enteric fever. This contagious disease is transmitted via faeces-contaminated water, had a 10–30%+ mortality rate and in 1886, lacked treatment. It is not presentist to note that any public health officer then or now would first investigate the Te Wairoa water supply and sewage. The pumice soils in the region are porous, and sub-soil drainage transports pathogens. This remains a modern-day issue. At Te Wairoa, water was drawn by bucket from the Wairoa Stream. The hotels may have had water tanks, but the lack of eave guttering suggests that rainwater collection was unlikely, increasing reliance on the Wairoa Stream as the primary water source and transmitter of pathogens (Bunn 2023e). Māori residents washed and laundered in the stream. Sewage was on-site disposal by pits, and garbage by middens.

There were some 13 funerals over April–June. Chief Āporo Te Wharekāniwha was the last to die on 23 May. These shocked the community and required expensive funerals, where 70–80 mourners would attend, and tourism cash flow was low (Payton 329). Ironically, Tuhoto-Ariki's home was near the stream and was likely one of those that contributed to the river pollution. The stream entry on Lake Rotokakahi was likely clean, given the small number of residents at Kaiteriria on the far end of that lake. A counterfactual of the Tarawera eruption has the endless funerals bringing residents from lake settlements to Te Wairoa, where they sheltered and survived.

The 1886 eruption mortality was ascribed to volcanic surges, ash-fall and building collapse until last year, when forensic geography showed the mass casualty event at Moura was likely caused by toxic gas (Bunn 2025b). In 1910, James Park (1857–1946) reported consistent symptoms in the eruption survivors, that he associated with CO (carbon monoxide) exposure:

The effect produced on those witnessing this grand display of plutonic force at short range was diverse. At first, some became hysterical, but in time all relapsed into a subdued mood of

indifference followed by a stupefying languor. It is not improbable that the stupor was caused by the presence of carbon monoxide in the gaseous emanations of the craters. (Park 172).

This was an astute diagnosis as victims of volcanic gas — whether in 1886 or in the 2019 Whakaari/White Island eruption — can experience delayed multi-gas toxicity symptoms. Carbon monoxide (CO), carbon dioxide (CO₂) and hydrogen sulphide (H₂S) cause central nervous system depression. Combined CO+CO₂+H₂S would accentuate this, making for a difficult clinical diagnosis. This is now termed Delayed Neuropsychiatric Syndrome (DNS), but in 1886, in Rotorua, the diagnosis was unlikely to be made. Thus, the true human toll of the Tarawera eruption was significantly greater than the historical record suggests, with delayed mortality from respiratory and cardiovascular disease.

The Tūhourangi were also troubled that their tourism may have led them into social misconduct with the eruption as punishment. Tuhoto-Ariki's warning became top of mind, where it remains. Only in 2015 did the Tūhourangi begin returning to their ancestral lands and rebuilding their tourism operations at the Tarawera Trail and later as co-owners of Waimangu Volcanic Valley with the Ngāti Rangitihi.¹

Appendix II: The private rescue efforts

This appendix examines the structure and attribution of early rescue efforts following the eruption.

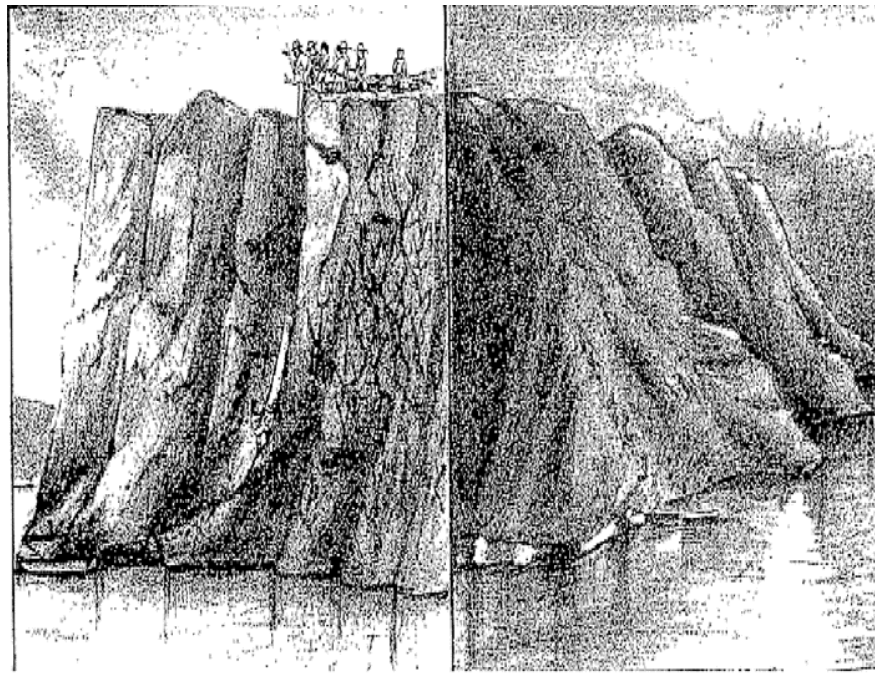
The Edwards-Warbrick rescue initiative

Benjamin Edwards, government Interpreter and ex-Colour-Sergeant of the 1st Waikato Militia, with Alfred Warbrick organised the first rescue mission, a private Lake Tarawera boat search and rescue on E+4–5. Edwards, a powerful man, is pictured in Figure 5 with the crew members. He occupies the centre seat. The boat mission was illustrated by Edwards in Figures A3 and A4. He was also the jury foreman at the Haszard inquest on E+2 (which shows he was not at Rotomahana on E+1–2).

The inquest was conducted by Resident Magistrate and Native Officer Herbert Brabant (1838–1919), who prioritised the inquest for six European deaths, over the rescue mission for ≥172 Māori casualties (Bunn 2025b). There was no inquest for the Māori dead, nor any government search and rescue. Similarly, there was no government search and rescue mission for the White Island survivors of the 2019 eruption: “None of the survivors was rescued by the official emergency services (NEMA, BoPCDEMG, Police, Defence Force). In fact, those organisations did not even try.” (Cas 13).

¹ In 2014, and again in 2018, Bunn was advised that a section of the Tūhourangi were against the exploration of the Terraces, lest it cause another eruption. In 2014 and again in 2017, the vote went in favour, but I doubt it will again. A recent attempt to drill the White Terrace location was declined, and the lake now appears closed.

In 1886 and again in 2019, search and rescue missions were left to the private sector, which in 1886, made a dozen attempts to reach the lake settlements over 11–14 June (Keam 1988, 245–247). In 2019, four private helicopters and a private tourist vessel went to White Island on E+0. The Royal New Zealand Navy stayed in port for several days (Cas 11).



Launching of Boats. – WARBRICK'S BOATING PARTY – Abandoning Boats. 'The road to Wairoa'

Fig. A3. The Edwards-Warbrick Rescue Party launching their boats (Ben Edwards, Otago Witness, Issue 1806, 2 July 1886, Page 9, (Supplement)).

Figures A3 and A4 were compiled and published without crediting Edwards, who was the only artist, in the only boat on the lake at that time. Keam attributed them to a W. Blomfield, but the latter was visiting the Rotomahana crater that day. William Blomfield (1866–1938) was the reporter who fabricated an account of his narrow escape at the crater (*Te Aroha News*, 26 June 1886, 2). The media gave the credit for the rescue mission to Captain Gilbert Mair, NZC (1843–1923), who begged Edwards for a berth at the last minute, as did Hector, who delayed the mission for 24 hours and then changed his mind. The misattribution reflects a broader pattern in which Edwards' role has been diminished or obscured in subsequent accounts. Warbrick, a shipwright and co-organiser, made the damaged boat seaworthy and arranged portage. Captain Mair outranked Colour-Sergeant Edwards, who thus surrendered the tiller. Mixed-race individuals faced a glass ceiling in colonial society (Baucke 289). The demotion however, enabled Edwards to provide us with the valuable artwork.

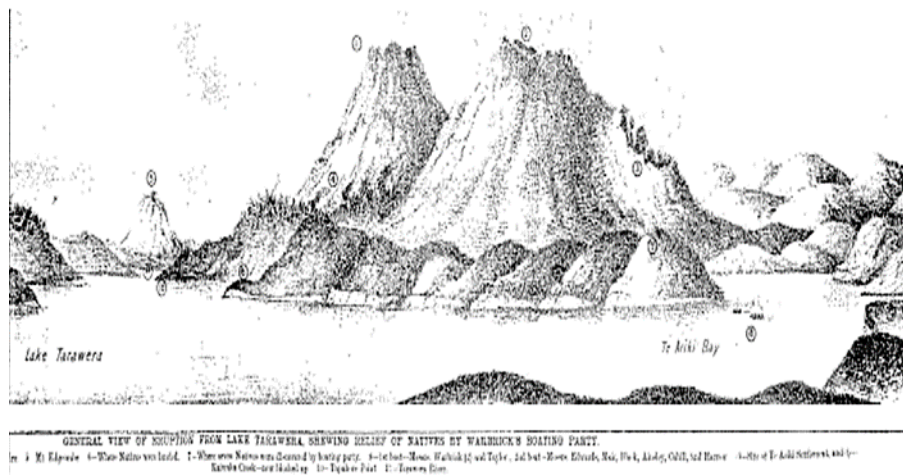


Fig. A4 View of eruption from Lake Tarawera, shewing relief of natives by the Edwards-Warbrick boat party. (Ben Edwards, *Otago Witness*, Issue 1806, 2 July 1886, p. 9 S(Supplement)).

The Edwards report was made three days before the first official representative reached the crater. In Figure A5, Edwards is pictured in later life.



Fig. A5. Ben Edwards in later life (courtesy C. Mann).

Appendix III: Topographic errors led to mistakes at Rotomahana.

This appendix resolves a topographic error affecting interpretations of the terraces' elevation.

Misidentification of post-eruption landforms

Percy Smith in 1886 misread the post-eruption topography, confusing the new Star Hill with the pre-eruption Steaming Ranges, and so misplaced the White Terrace (Bunn 2026). The mistake was almost certainly caused by pareidolia and the more imposing Star Hill in Figure A6. The author made the same mistake when first navigating the lake.



Fig. A6. 2016 Star Hill panorama on azimuth 59° with Tarawera massif behind (courtesy Ingrid Fisher).

Propagation of elevation error in modern interpretations

A related error persists in modern geological interpretations: the assumption that the elevation — and thus the present vertical position of the White Terrace — can be derived from the pre-eruption levels of Lakes Tarawera and Rotomahana. This approach is problematic. Lake levels are inherently variable and therefore provide an unstable reference datum. Nevertheless, this assumption has been embedded in the literature since at least 2016, when Keam estimated the inter-lake difference at 1–2 m without any evidential basis (Kear 2016). The persistence of this estimate illustrates how initial approximations can stabilise into accepted values in the absence of critical re-evaluation.

Reconstruction of Rotomahana altimetry from nineteenth-century sources

In fact, there was adequate information in the Victorian literature to obtain the needed data. Given the limitations of early photography and the Rotomahana site difficulties, period artwork often assists. In this case, artwork helped solve the mystery of the old Lake Rotomahana altimetry and thus of the buried White Terrace depth today.

An award-winning artist who painted in the Rotorua region examined Figure A7. Her advice is that the artist's line of sight is at approximately the elevation of Pukekio Hill (at 10 o'clock). This hilltop is ~ 360 m a.s.l. Lake Tarawera at that time lay at 290–292 m a.s.l. The artwork title and the perspective show that the artist Rev John Kinder was close to the Kaiwaka Stream entry at $303 \pm 1\text{--}2$ m a.s.l. and slightly elevated, probably on a knoll. For

this perspective and sight-line, the artist must have stood at a similar elevation as the hill, i.e. ~ 340–360 m. This was 50–70 m above Lake Tarawera.

A reasonable person viewing Figure A7 (or Figure 15) would dismiss the claim that Kinder was only a few meters above Lake Tarawera. Were Kinder that low, his sightline would look up at Pukekiore Hill, when he is clearly looking across at the hill. Yet, earth scientists have accepted Keam’s guess since 2016, a guess refuted by the artwork evidence, by eyewitnesses and by the latest altimetry (Bunn 2022).

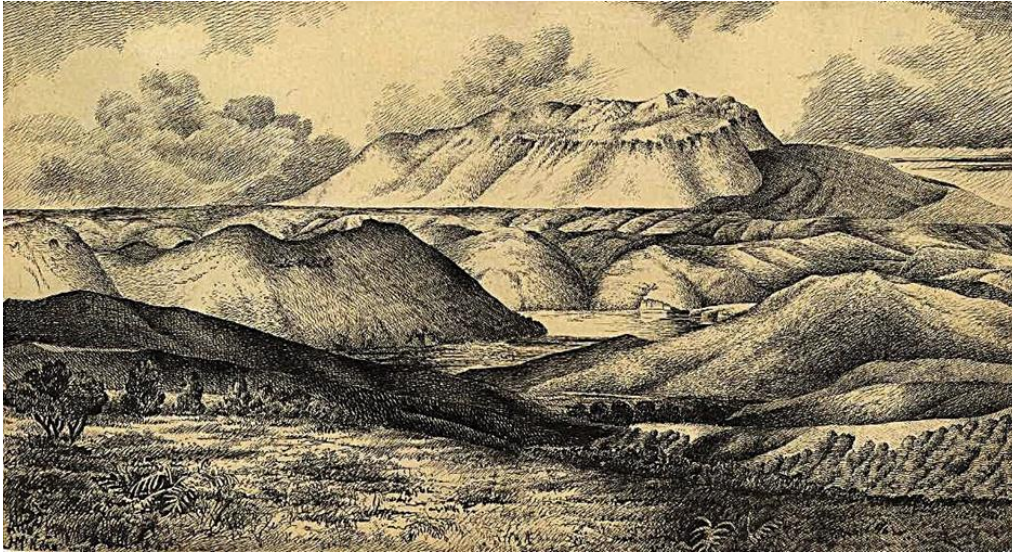


Fig. A7. Tarawera Mountain, from above Te Ariki—On road to Rotomahana, an engraving from Kinder 1864 (Alexander Turnbull Library).

There were sufficient nineteenth-century sources to establish the altimetry for Lake Rotomahana. Percy Smith and others reported the inter-lake difference was 40’ or 12 m. Sources agreed the channel connecting the lakes was a mile long. In 1883, George Stewart (1832–1920) provided times for the journey up and down the Kaiwaka Channel, linking the lakes:

Ladies and invalids only are expected to go up this river in the canoe, as it is a laborious journey for the pullers, and every additional pound weight tells; the distance is about a mile. ... As a rule, all the tourists come back in the canoe, the return journey being accomplished in ten minutes, as against half an hour on the up trip. (Stewart 27).

Stewart’s measurements, combined with Smith’s descent and channel distance, plus Hochstetter’s maps, enable a hydraulic analysis of the Kaiwaka Channel, confirming the altimetry of the old Lake Rotomahana and the Terraces (Bunn 2022). The findings are summarised in Table A1.

Table A1. Kaiwaka Channel: Hydraulic analysis of the Kaiwaka Channel

<u>Parameter</u>	<u>Value</u>	<u>Notes</u>
Channel length (L)	~1609 m	Measured reach
Elevation drop (Δh)	~12.2 m (40 ft)	Pre-eruption estimate
Slope (S)	~0.0076 (0.76%)	Steep for a small channel
Downstream drift time	~10 min	Current only

Upstream poling time	~30 min	Against current
Mean velocity (v)	~0.4–0.5 m/s	Reach-averaged
Local rapid velocity	~0.8–1.5 m/s	Constricted mid-section
Channel width	~2.5–4 m	Variable
Mean depth	~0.5–0.8 m	Shallow, with pools
Cross-section area (A)	~1.5–2.5 m ²	Channel area
Discharge (Q)	~0.72 m ³ /s	Best-constrained estimate
Flow character	Non-uniform	Slow reaches + short rapid

The Kaiwaka Channel was a narrow, fast-flowing, rocky-bottomed stream where a middle reach near the Awaporohe stream junction steepened the gradient, while adjoining reaches were shallow and slower-flowing. The derived discharge (~0.72 m³/s) and flow characteristics are internally consistent and plausible for a narrow, shallow, rocky channel. Importantly, these parameters support an elevation difference of approximately 12 m, not the 1–2 m suggested in later literature.

This resolves a key uncertainty in Terrace localisation. The use of variable lake levels as a reference is replaced by a hydraulic solution grounded in contemporary observation.

Appendix IV: Recent cartographic advances with eruption landmarks

This appendix corrects an early survey error made by the author and affecting the reconstruction of two Tarawera landmarks. The Tarawera cartography contains historical errors. The topographic map of New Zealand did not distinguish the peak of Tarawera Mountain until the 2020s, and then it did not name it. The author identified the peak in 2020 from Hochstetter's survey mapping in Figure A8. The mountain has the smallest plateau of the three comprising the Tarawera Massif. Tarawera Peak lies a little south on its plateau at 1050 m, close to Koa Peak in Figures A8 and A9.

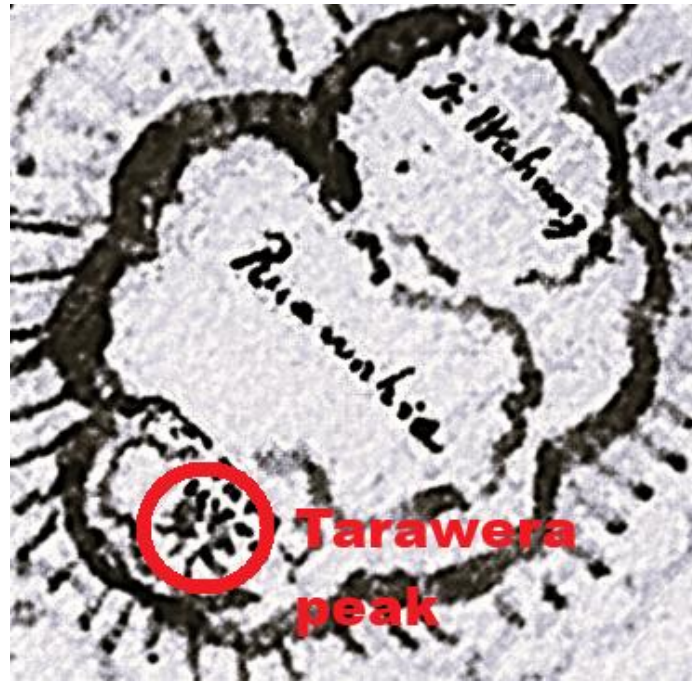


Fig. A8. Detail of general map of the lakes district - as seen from Station 20 (Hochstetter Collection Basel HCB 3.5.6).

The errors are partly due to the Māori history of the region, broken by the eruption and by the Māori diaspora. The Tūhourangi became refugees in their own country and have refrained from re-applying many placenames around the Rotomahana Basin.

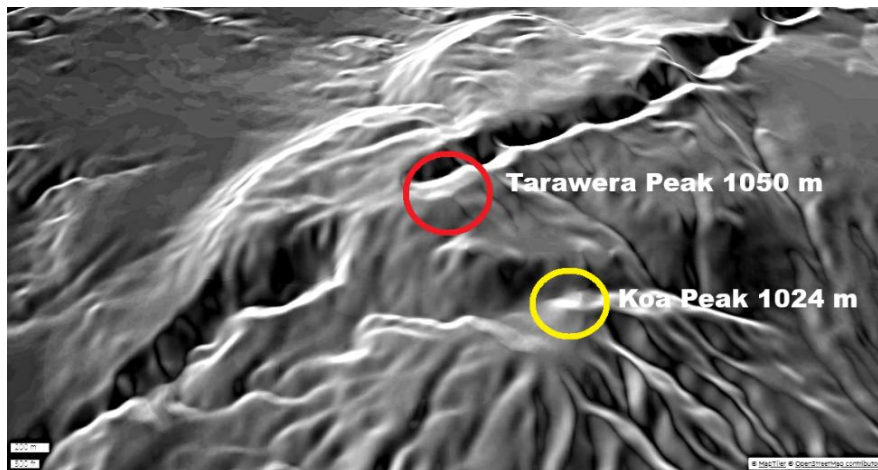


Fig. A9. Detail of Tarawera Massif LiDAR. Sourced from the LINZ Data Service. (<https://data.linz.govt.nz/layer/121859-new-zealand-lidar-1m-dem/>) CC 4.0.

Locating Hochstetter's landmarks on Tarawera initially proved difficult due to the altered landform. Also, there was a vexing transposition error with two key bearings in the diary. This took several iterations to resolve, and the solution is first published herein.

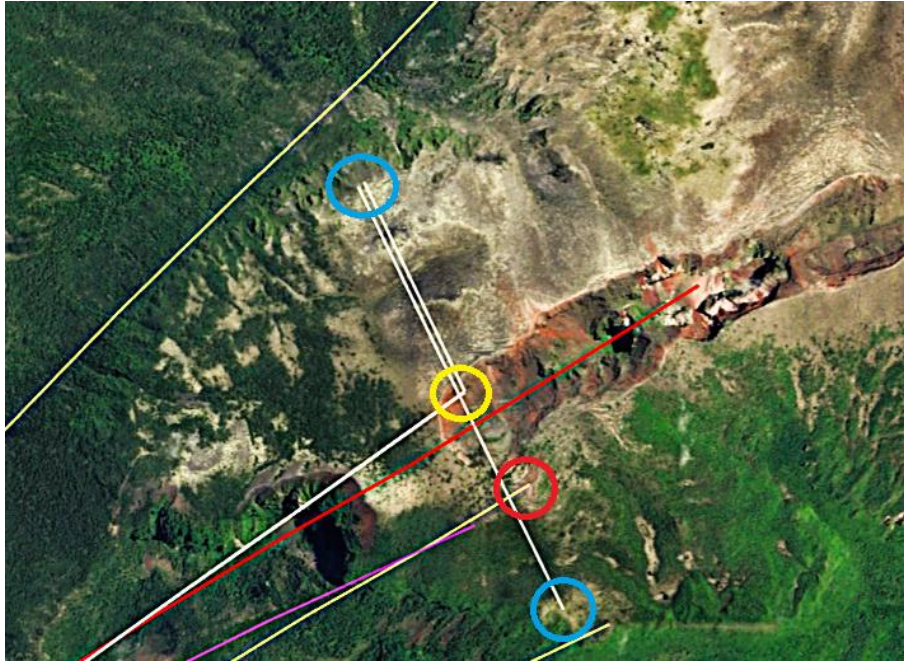


Fig. A10. Mount Tarawera plateau. Blue circles mark the transposed edges. The red circle marks Mount Tarawera. The yellow circle marks the mean bearing. (Google Earth).

The known transposition error in Hochstetter's survey diary for the Tarawera plateaux edges was resolved with his 1860 survey Folio. Petermann's delineator, Armin Welcker (1840–1888) in Gotha, encountered a comparable problem on Motiti Island with Hochstetter's data. He solved it by constructing a mean (average) from the two transposed edge bearings. A simple and elegant solution that the author applied at Tarawera. Figure A10 shows how it applies to Mount Tarawera (marked by a red circle). The north and south re-entrants define the small plateau. The central white ray joins the edges of the upper mountain plateaux at the (originally transposed) blue circles. The mean bearing site is marked by the yellow circle. The reciprocal bearing from there, of 233.62° , intersects the Station 21 locus, resolving the discrepancy and restoring internal consistency to the survey. This represents a simple but decisive correction, aligning Hochstetter's field data with present-day topography.

Appendix V: Historiographic effort comparison

This appendix analyses patterns of investigative effort within the Tarawera historiography.

Table A2 compares ten investigators active between 1886 and 2026, using measures of research duration, publications, and related outputs. From these, composite metrics (including weighted output and research density) are derived. While simplified, the dataset is sufficient to reveal systematic differences in investigative effort that are not apparent from the narrative historiography.

Table A2. An historiographic performance comparison.

	Historiographic performance comparison					
Investigator	Active years	Books	Papers	Media exposure	Weighted score*	Publishing density**
Percy Smith	24	1	6	10-20	15	0.6
Alfred Warbrick	51	1	5	15-25	13	0.3
Alpha Harding	1	0	1	0	2	2.0
Ron Keam	57	4	4	10-20	20	0.4
Bunn & Nolden	12	3	21	5	51	4.3
Herb Fitzgerald	10	1	0	1	3	0.3
Bill Keir	6	0	1	2	2	0.3
GNS et al	7	0	4	15-25	8	1.1
NIWA	1	0	1	2	2	2.0
Hook & Carey	1	0	1	1	2	2.0
*Weighted score: book = 3 and a paper = 2.						
**Publishing density: score ÷ years active years.						
Media exposure is excluded.						
Only attributable publications were counted.						

Time on the job versus output density

A clear distinction emerges between long-duration investigators and short-term contributors. This accentuates the public versus private sector schism found in researchers (Bunn 2024).

Figures such as Warbrick, Keam, and Nairn devoted extended periods — often decades — to the region. Warbrick alone is estimated to have made approximately 1,800 ascents of the Tarawera massif. By contrast, later contributors, including institutional and externally funded teams, typically engaged in brief, project-based investigations, often producing a single output within approximately one year. This contrast highlights a divergence between experience depth (long-term immersion, field knowledge) and output density (short-term publication productivity)

Learning curve and knowledge acquisition

The evidence suggests a substantial learning curve exists in Tarawera research. Based on field and desk experience, a period of approximately five to seven years appears necessary to acquire sufficient familiarity with the terrain, sources, and historiography to produce reliable interpretations. Shorter engagements are prone to: misidentification of landforms, over-reliance on secondary sources and premature closure around initial hypotheses.

Implications for historiography

The historiography of Tarawera is shaped not only by evidence but by patterns of investigative effort. Long-term investigators contribute continuity, spatial expertise, and iterative refinement. Short-term investigations, while sometimes technically sophisticated, risk introducing discontinuities and reinforcing provisional interpretations. The result is a

field in which narratives persist through repetition and authority, while contrary evidence may be intermittently rediscovered but not consolidated.

Appendix VI: Hinemihi, the return of the Te Wairoa Meeting House in 2027

Another eruption legacy is unfolding this year. Hinemihi, the famous meeting house of Te Wairoa, in which 45 residents survived the eruption is returning to New Zealand (Bunn 2025b). She survived the eruption and after the diaspora, was purchased by the outgoing Governor of New Zealand, William Hillier Onslow, the 4th Earl of Onslow (1853–1911). Lord Onslow served as the Governor of New Zealand from 1889 to 1892. He purchased the house in 1892 for £50 from the Tūhourangi, who had relocated to Whakarewarewa. He had the house dismantled and shipped to his ancestral estate, Clandon Park, in Surrey, England.

Background material for this appendix draws on unpublished notes supplied by Rangitihi Pene, Chairman of Ngā Kohinga Whakairo o Hinemihi.

Ngā Kohinga Whakairo o Hinemihi is a Ngāti Hinemihi-mandated group tasked with the return of carvings originally made in 1880 and sold in 1892 to Lord Onslow. The meeting house, formerly located at Te Wairoa, was subsequently relocated to England, where it remains. Since 2019, negotiations have been underway with the National Trust for the return of 29 carvings.

According to Pene, agreement has now been reached on a timetable for exchange, with a target date of June 2027. This requires the prior completion and shipment of replacement carvings from Aotearoa, New Zealand. The project includes the production of 29 carvings, along with 33 tukutuku panels and kōwhaiwhai, at an estimated cost of NZD400,000, of which approximately NZD250,000 has been secured. The work is being undertaken in collaboration with associated groups, including Te Matu o Hinemihi and several UK-based Māori and Pasifika organisations (Rangitihi Pene, pers. comm., 13 March 2026).

When completed, the exchange will involve the opening of a newly constructed whareniui at Clandon Park, followed by the return of the original carvings to New Zealand. This ongoing process represents a significant cultural and historical extension of the eruption's legacy. It also illustrates, in parallel with the scientific record examined in this paper, how early events of 1886 have been continually reinterpreted, reframed, and renegotiated across generations — producing not a fixed historical account, but an evolving legacy shaped by institutional, cultural, and evidential change.

In Figure A11, Hinemihi is shown before the eruption, likely including Tuhoto-Ariki, the Ngāti Hinemihi tōhunga of Te Wairoa.



Fig. A11. An 1880 group in the porch of the whareniui 'Hinemihi', before the eruption of Mount Tarawera. The old man sitting alone, on the right, is very likely Tuhoto-Ariki, the Ngāti Hinemihi tōhunga of Te Wairoa. (Photograph by Bartlett, courtesy Hocken Collection).

In Figure A12, members of the August 2019 Hinemihi mission are shown at the current UK location of the meeting house.



Fig. A12. Members of the August 2019 Hinemihi mission to Clandon Park, England, to negotiate the repatriation of Hinemihi. Lead negotiator Rangitihi Pene is standing on the right (image courtesy of Rangitihi Pene).

The recent availability of LINZ LiDAR has disclosed the original Hinemihi foundations in Figure A13.



Figure. A13. The site of Hinemihi shown in Figure A13 enables her return home onto her pre-eruption foundations (LINZ, Bunn).

This seems a fitting note on which to end this historiography of the 1886 Tarawera eruption— with her repatriation onto her original foundations.

Taken together, these appendices show that the Tarawera record is shaped as much by knowledge systems, institutional behaviour and methodological error as by the eruption itself.

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