



New Zealand's tsunami death toll rises

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Abstract

It has long been understood that New Zealand's death toll from historical tsunamis stood at one person, drowned by the AD1868 Arica (Chile) tsunami when it inundated the Chatham Islands. The evidence for this assumption is reviewed together with other historically documented events that point to dozens of tsunami deaths in New Zealand in the historical period, possibly as high as 37. A brief introduction to the potentially rich data source provided by *pūrākau* (oral histories) indicates that there is a long record extending back several hundred years of catastrophic waves devastating coastal communities. More detailed research of both *pūrākau* and the historical record will undoubtedly reveal more tsunami-related deaths although it is not necessarily the number that is important, but rather that these data provide an enduring reminder of New Zealand's exposure to the hazard. This is not only pertinent to New Zealand but to all Pacific Islands in general. Research has tended to focus on those countries affected by recent large tsunamis at the expense of those with potentially rich oral histories and poorly researched historical data.

Keywords Tsunamis · AD1868 · Deaths · Oral histories · Historical · Prehistoric

1 Introduction

New Zealand sits on the edge of the Pacific Plate and, along with many other circum-Pacific Ocean countries, is exposed to not only the vagaries of its own tectonics but also those of others (Fig. 1). In recent years there have been reminders of the country's exposure with small distantly generated tsunamis arriving on the nation's shores in 2010 (Chile) and 2011 (Tohoku-oki), (Borrero and Greer 2013) and, most notably, the locally generated 14th November 2016 Kaikōura event (Lane et al. 2017; Williams et al. 2018). Fortunately these and many earlier historical tsunamis did not bring the large death tolls experienced elsewhere. However, New Zealand has experienced and will experience tsunami-related deaths. The question is how many and where from?

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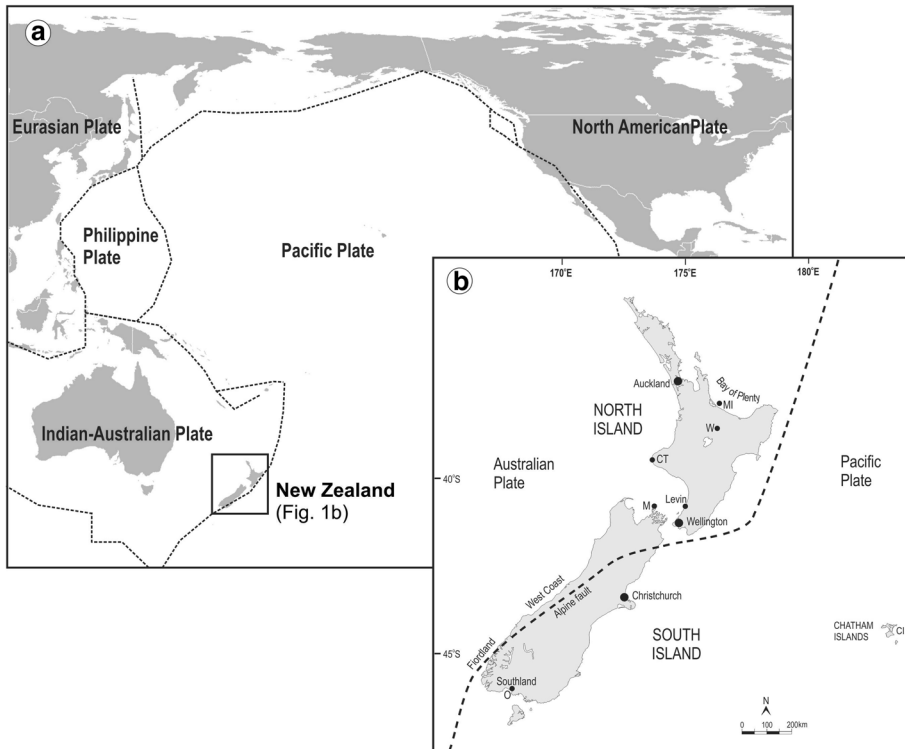


Fig. 1 New Zealand's place in the Pacific region: **a** New Zealand in SW Pacific showing other countries mentioned in the text; **b** New Zealand landmass astride the boundary between the Australian and Pacific Plates (approx.. boundary marked by dashed line) showing locations mentioned in the text (CT, Cape Taranaki; M, Moawhitu; MI, Motiti Island; O, Orepuke; W, Waimangu) and the country's three main cities

This question may seem trivial given that historical research over the past 30 years suggests that the AD1868 Arica (Chile) tsunami caused the only death in New Zealand since European settlement (de Lange and Healy 1986; Nichol et al. 2010; Power (Comp.) 2013). However, this figure seems somewhat low when compared with up to 11 possible tsunami-related deaths in Australia which has significantly less exposure to the hazard than New Zealand (Goff and Chagué-Goff 2015). To cast some light on this disjunct, it is worth considering two key questions.

First, is the historical database complete? The historical record of tsunamis in New Zealand is undoubtedly incomplete and covers less than 200 years (Goff et al. 2010a) and like others throughout the Pacific (Australia: Goff and Chagué-Goff 2014, Pacific Islands: NGDC/WDS 2015); this provides a somewhat limited perspective of the tsunami hazard. However, as more electronic data sources become available, there is an ongoing opportunity to update existing information update existing information and improve the database completeness.

Second, can we use pre-European cultural data to provide a longer-term context of human-tsunami interactions? Relying solely on historical data to inform about tsunami-related deaths is somewhat limiting and is symptomatic of an outdated colonial view that until recently has tended to largely ignore pre-written information (King and Goff 2010).

Māori had been exposed to the tsunami hazard for hundreds of years prior to European arrival and they undoubtedly experienced the effects of tsunami inundation. Their *pūrākau* (oral histories) of past events are therefore an invaluable data source that should not be over-looked and could add an important context to the historical record.

A brief summary is provided of additions to the catalogue of potential historical tsunami-related deaths and of some *pūrākau* to show that appropriate engagement with *tangata whenua* (people of the land) has the potential to greatly enhance our understanding of past (and future) events.

2 Historical events

While New Zealand's historical database appears to be relatively complete, new events are occasionally reported (e.g. Goff and Chagué-Goff 2015) and there are undoubtedly small and/or local events missing, particularly in the early historical period. Here we discuss three events and in each case there is some element of the data that is not entirely clear cut. This does not invalidate the information, but rather indicates that, all things being equal it would be good to find further corroborating evidence. This is not an uncommon situation for early historical records.

2.1 AD1868 Arica (Chile) tsunami—one or more deaths?

The AD1868 tsunami struck on 15th August and is the largest historically documented, distant-sourced event in New Zealand (de Lange and Healy 1986). It was generated by a Magnitude 9.0–9.1 earthquake offshore from the Peru–Chile border. The tsunami arrived at New Zealand's eastern Chatham Islands at about 1 a.m., some 15 h after the earthquake. There were three large waves up to 10 m high that inundated three main areas in the NW, NE, and SE of the main (Chatham) island (de Lange and McSaveney 2009; Power (Comp.) 2013). The first wave is reported to have woken people in the Māori village of Tupurangi, NW Chatham Island (Fig. 1), as water surged through their houses. People fled to higher ground as two larger waves, about ten minutes apart, destroyed the village and two nearby European houses (Anon 1868a, b, c).

The number of deaths caused by this event in New Zealand is somewhat uncertain. In the historical database, de Lange and Healy (1986) refer to more than one Māori and a single European being killed. In a later version of the database though, this was changed to just one death (Fraser 1998). More recently, de Lange and McSaveney (2009) reaffirm that only one Māori drowned. This was probably based upon a report at the time that named the male Māori who died as Makare (Anon 1868d). However, newspaper accounts at the time are misleading and are divided almost equally between a single death (Anon 1868d, e) and more than one (Anon 1868c, 1868f), with some ambiguously referring to “loss of life” or “great loss of life” (e.g. Anon 1868a, 1868f). To add to the confusion, Seymour (1924) later stated quite categorically that the destruction caused by the tsunami was “somewhat exaggerated” and “no native village was destroyed”, implying that there were also no deaths.

Suffice it to say that there is a strong likelihood that more than one person was killed at Tupurangi. Indeed, in recent research, Thomas (2017, 2018) found information indicating that there were somewhere between 23 and 32 fatalities. Thomas (2017, 2018) used participatory, community-based approaches alongside kaupapa Māori principles to investigate tsunami risk to her *turangawaewae* (place where one belongs and has rights to stand

through kinship), Wharekauri (Chatham Islands). This involved a number of activities including a visit to Tupuangi to commemorate the 150th anniversary of the AD1868 tsunami. As part of this visit there was a *kōrero* (discussion) attended by about 30 people during which Māori oral histories were shared by local *kaumatua* (elders) (Kaiser et al. 2020). The village was said to have been occupied by 60–70 people at the time, with three large families being washed away by the tsunami (Thomas et al. 2020).

Some of their bodies were recovered and buried near to the village on high ground, and while the number of 23–32 fatalities is mentioned, this information was purportedly contained in a diary that to date has not been recovered (Thomas 2018). However, in interviews, *tangata whenua* provided information on the number of fatalities, the large size of family groups at that time, where the bodies were buried and, while they had been told the names of these people, they could not recall them (Thomas 2018). It therefore seems entirely reasonable to consider that a large number of fatalities (within the range mentioned) did occur, albeit without knowing the precise figure.

This markedly different death toll to the widely accepted single fatality raises questions about how such information was reported at the time, a point discussed by Thomas (2018). First, the village was isolated and soon after the event many Māori left the island due to homesickness or to escape a measles epidemic and the information may have been lost at that time. Second, there was no reason to pass on the information to the *pākehā* (Europeans) who they invariably did not trust or know. Third, the somewhat racist attitude towards Māori at the time may well have contributed to a lack of information exchange. Fourth, accounts of the tsunami may have been over-shadowed by other events occurring at the time such as the measles epidemic. The mere fact that a single death was recorded was most likely because the person was trying to save a boat belonging to a *pākehā*.

2.2 AD1903 Waimangu Geyser eruption, Rotorua—4 deaths

There are numerous types of volcanic-related tsunami hazards including caldera collapse, flank failure, and pyroclastic flows discharging into the sea. In addition, different types of explosive eruptive unrest such as phreatomagmatic eruptions can also cause tsunamis. Hydrothermal explosions such as geyser eruptions are another type of such unrest but are normally considered insufficiently violent to generate tsunamis (Rouwet et al. 2014). However, in 1900, the world's biggest geyser formed in Rotorua (Fig. 1: W) and proceeded to erupt massive columns of boiling water up to 460 m above the ground, becoming an almost instant tourist attraction. It was named Waimangu or “black water” because of the sediment laden slurry it repeatedly erupted from the ground. The geyser was only active until 1904 with its short life ending following major phreatic activity that disrupted the underground water system (Hunt 2015; Rouwet et al. 2014; Simmons et al. 1993). Waimangu's largest eruption, which most likely represented the start of this major phreatic denouement, occurred on 30th August 1903, at a time when Joseph Warbrick, sisters Kathleen and Ruby Nicholls and David McNaughton were standing at the edge of the geyser. On this occasion, the eruption displaced a massive amount of boiling water that took the form of a 12 ft (~3.5 m) deep “tidal wave” that carried their bodies nearly a mile (1.6 km) NE in the direction of Lake Rotomahana (Anon 2015; Hunt 2015).

This potentially unique phreatic eruption may represent the only known occasion when a wave of this magnitude has been recorded, although it may be a moot point as to whether a geyser can, under normal circumstances, propagate a “real” tsunami.

2.3 AD1905 Local earthquake, Levin—one death

While there are minor variations in this story, there is no disagreement about the person killed. However, the nature of the generating mechanism is less clear. On the 5th March 1905, Ernest Pacey and three friends were fishing by dragging a net through the surf at a beach near Levin (Fig. 1). All four men were in the water at the time when “something like a tidal wave” caused by an earlier earthquake, washed them off their feet. Pacey lost hold of the net and, unable to swim, was taken out to sea and drowned (Anon 1905a, b, c). There are no data available concerning the source or size of the potential generating earthquake which makes it difficult to validate this further, although it is entirely possible that it involved a local fault rupture that was not widely reported.

2.4 Deaths?

Exactly how many more deaths this adds to New Zealand’s historical tsunami death toll is unclear. If one accepts that the AD1903 and AD1905 events were indeed tsunamis, the death toll rises to possibly as high as 37. Was more than one person killed by the AD1868 Arica (Chile) tsunami in the Chatham Islands? It seems to be the case. This is a timely reminder that despite the fact that historical sources such as newspapers and other reports provide exceptionally rich data there is also much to be said for the old adage of ‘don’t believe everything you read in the papers’. However, in this instance, the ambiguity offers an opportunity for researchers to continue to engage more deeply with *tangata whenua* from the Chatham Islands to learn more about the AD1868 event. This also offers opportunities to learn more about earlier events preserved solely through *pūrākau*.

3 Prehistory

Pūrākau offer a window into pre-European New Zealand and even from the few examples outlined below indicate that coastal communities suffered greatly from the vagaries of wave-related hazards.

Until quite recently, a particular *pūrākau* had been tentatively linked to one of the earliest known historically documented tsunamis in the country. The AD1826 Fiordland earthquake and tsunami occurred in the SW South Island region (Begg and Begg 1966; McNab 1909; Taylor 1862), with recent geological work providing evidence for inundation and ship stranding further north along the South Island’s West Coast (Goff 2012; Goff et al. 2004). King and Goff (2006) collated several written accounts of the *pūrākau* which in essence refer to “a great wave (*Tai-koko*) that swept away people of Te-Manu-o-te-Rapuwai travelling along the beach near the Waiiau River” (Beattie 1915). This was near the settlement of Orepuki in Southland (Fig. 1: O), with Saunders (1934) stating that it occurred “just before the landing of the whalers and the sealers” which was inferred to mean the early 1800s (Fraser 1998). However, since there was no mention of this in the early sealers’ records from the area, it is now considered to have happened considerably earlier than AD1826. Notwithstanding this chronological issue, if one assumes that this oral history may be referring to a tsunami, then the “when” is not as important here as the number of

deaths. Based upon the current written information though, all that can be said about this is that there were most likely many fatalities.

The written accounts of numerous *pūrākau* throughout New Zealand embody some apparently remarkably explicit records of catastrophic waves which have resulted in the deaths of many people. For example, following a major storm that blew their canoes off course, a group of Ngai Tara settled at Moawhitu (Greville Harbour) on D'Urville Island (Fig. 1: M). There are several written versions of the following story, but the essential elements are the same. The group lived here until they were all killed by a “tidal wave” in the sixteenth century (Best 1976). An apparent breach of *tapu* (taboo) by a local woman led to the god Tangaroa calling up a *taniwha* (sea monster) in the form of a giant wave (tsunami?). Mitchell and Mitchell (2004) state that the wave was called *Tapu-arero-utuutu* and that it was brought as *utu* (vengeance) against the woman. *Tapu-arero-utuutu* drowned nearly all of the community at Moawhitu, piling the bodies up into the sand dunes. It was eventually vanquished and a part of the tail that was severed by a spear is preserved as a rock offshore (Te Whetu 1953).

Another explicit written description of a *pūrākau* concerning a catastrophic wave is the “coming of the sands”. This relates to a place called Potiki-taua just to the south of Cape Taranaki (Fig. 1: CT). Mango-huruhuru, the old priest, built a large house on low land near the sea while Potiki-roa and his wife had theirs on higher ground further inland. Mango-huruhuru's house had a rocky beach that was unsuitable for canoes and he used his powers to bring sand from Hawaiki by reciting a *karakia* (prayer/chant). When he had finished reciting, a dark cloud full of sand inundated the shore. The women called out “A! The sea rises; the waves and the sand will overwhelm us” and the people were killed where they were standing, buried in the sand along with their houses, their crops and all the surrounding country. The old priest and his youngest daughter were also killed while Potiki-roa and his wife escaped because their home was further inland and on higher ground (Smith 1910). Genealogical estimates place this event around AD1500 (Smith 1910).

Both of the previous written descriptions of *pūrākau* refer to the destruction of coastal communities and significant loss of life, whereas the following one relates very specifically to a single individual. The written version of the *pūrākau* relating to Titipa from Motiti Island in the Bay of Plenty (Fig. 1: MI) can be read as a vivid description of a tsunami. “... the sea grew dark and troubled and angry, and presently a great wave, which gathered strength as it came, swept towards the shore. It advanced over the beach, sweeping Titipa and all his fish before it till with the noise of thunder it struck the cliff on which the people stood... The great wave receded, sucking with it innumerable boulders and the helpless, struggling Titipa. Then another wave, greater than the previous one, came with tremendous force and, sweeping the shore, struck the cliff with a thunderous roar. This was followed by a third which, when it receded, left the beach scoured and bare Titipa and all his fish had disappeared” (Grace 2003).

These *pūrākau* all contain elements that are strongly suggestive of tsunami inundation. The first reports a giant wave sweeping people away, the second has the sea piling up bodies inland, the third has water inundating a community and depositing sand over the low-lying land while those on higher ground survived, and the final one graphically describes three powerful waves. There are many written versions of catastrophic wave-related *pūrākau* from the islands of New Zealand, most of which were gathered by early Victorian ethnographers, and these underscore the potential richness of this data source. For some there is great detail and for others the information is scarce. However, this should not be seen as a reflection of the weakness of an oral history but rather that there is a *pūrākau* for a specific location in the first place. It should be remembered that the nature and extent of

the details of any *pūrākau* does not lie in its written form, but rather in the knowledge of the *tangata whenua*. As such, the knowledge of the existence of a *pūrākau* should be seen as a guide to understand more about the hazards related to a particular area. Indeed, a suite of corroborative evidence has been presented for palaeotsunami inundation around both Cape Taranaki (Goff and Chagué-Goff 2015) and the Bay of Plenty (Goff et al. 2010b; Walters et al. 2006). Equally, the absence of any known oral histories in an area considered to be at risk from tsunamis should encourage researchers to seek answers as to why this is the case (King and Goff 2010).

Perhaps the most important observation here is that to fully understand the messages associated with a *pūrākau* it is imperative to engage with the people who genealogically link to such stories and pay close attention to the politics of representation, in both past recordings and current ways of retelling (King et al. 2018). A failure to do so will undoubtedly misrepresent the true nature of a *pūrākau* and in the context of this paper, do little to advance our understanding of tsunami-related fatalities in New Zealand's past.

This is not just pertinent to New Zealand; there are parallels throughout the Pacific. Not surprisingly, historical (and prehistoric) tsunami research in the Pacific has tended to focus on those countries recently affected by tsunamis. This has served to produce valuable data for the Pacific Islands in general (Goff et al. 2011a, 2020) and more specifically for those such as Samoa (Okal et al. 2011), Wallis and Futuna (Goff et al. 2011b; Lamarche et al. 2010, 2015), New Caledonia (Sahal et al. 2010), the Cook (Goff 2011) and Hawaiian (Chagué-Goff et al. 2012) Islands (Fig. 1a). However, recent research has pointed to the Pacific region and Pacific Islands in particular being far more exposed to local and regional tsunami hazards than previously thought (Goff and Cain 2016; Goff and Terry 2016; Terry and Goff 2013). This highlights the need to better understand historical records, oral histories, and fatalities throughout the Pacific Islands. While New Zealand data have been collated and studied for many years there is still much to be done. Data from other Pacific Island nations on the other hand are rarely in such an advanced state which suggests that there are undoubtedly many unrecorded deaths still to be reported.

4 Conclusions

While deaths recounted in a *pūrākau* do not add to New Zealand's historical tsunami death toll per se (the historical period normally refers to the start of written records), they do provide a deeper time context. First, *pūrākau* indicate that over the past few hundred years, there have probably been many deaths related to catastrophic waves. Second, several of these catastrophic waves have now been identified as tsunamis from the geological record and assigned tentative local or regional sources. Third, *pūrākau* show that the historical record is indeed too short to reflect the true nature of the hazard for New Zealand's coastal communities. Fourth, there is a rich data source of human–environment interactions contained in *pūrākau* and we do an injustice to hazard management in New Zealand if we do not attempt to amalgamate these with geological, archaeological, and historical information.

The historical record is not only short, it is incomplete, but it will continue to be added to with information concerning existing or previously unknown events. New Zealand's death toll from historical tsunamis has risen to dozens of people and possibly as high as 37. It may rise further as more data about past events become available. Whether or not the death toll rises, the historical and prehistoric data contained in the written and oral

histories of the country offer an enduring reminder of New Zealand's exposure to the tsunami hazard.

In the light of recent advances in the study of local and regional tsunami hazards throughout the Pacific region, it seems highly likely that many Pacific Island countries will face a similar, if not greater, increase in the number of tsunami-related deaths once their historical records and oral histories are more thoroughly investigated. This is not simply a numbers game, but rather a recognition of the human cost of living in coastal communities within the Pacific region that serves to inform public awareness and risk reduction.

Availability of data and material Upon request.

Declarations

Conflict of interest The author declares that he has no conflict of interest.

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