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Fission, Fusion and Syncretism: Linguistic and Environmental Changes amongst the Tangkic People of the Southern Gulf of Carpentaria, Northern Australia

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Abstract

A revised model of Tangkic linguistic and cultural history is developed based on a reanalysis of relationships between six Tangkic languages in the southern Gulf of Carpentaria and drawing on recent archaeological and environmental studies. Bayesian phylogenetic analysis of Tangkic basic vocabulary was employed to infer the topology of the Tangkic family tree and define structural branching events. Contrary to previous models suggesting progressive colonisation and fissioning from mainland sources, the data support hypotheses that the modern configuration of Tangkic owes its form to pulses of outward movement from Mornington Island followed by subsequent linguistic divergence in both grammar and lexicon of the varieties. We also speculate that an extreme environmental event (c.800-400 BP) may have flooded low-lying coastal areas resulting in abandonment of some areas, a relatively short co-residence involving cultural and linguistic syncretism between neighbouring groups and then recolonization.

1. Introduction[1]

Linguistic research in the southern Gulf of Carpentaria region has focused on the Tangkic family of languages spoken on the Wellesley Islands and adjacent mainland (O'Grady et al. 1966; Keen 1983; Hale 1973; Klokeid 1976; McConvell 1981; Blake 1990, 1991; Evans 1985, 1990, 1995a,b, 2005, this volume; Round 2009, 2010, 2011, 2013, 2014, forthc.). Since Evans (1985), it has been clear that the Tangkic family comprises two main historical branches, represented by Lardil (Northern Tangkic), and by Yangkaal, Kayardild, Ganggalida, Nguburindi and Yangarella (Southern Tangkic) (Figure 1). A map of the territories of these and other neighbouring language groups is presented in Figure 2, based on the ethnographic research of the 20th century.

[1] When Bruce Rigsby arrived as the first Chair in Anthropology at the University of Queensland (UQ) in 1975, he joined Paul Memmott's PhD supervision team, helping construct a model of changing Lardil properties of place through the contact period. This was to kindle in Memmott a lifelong commitment to cultural change research, which came to one level of resolution much later in Native Title expert witness work, again mentored by Rigsby. Upon completion of his PhD, Erich Round took up a lectureship position in linguistics at UQ in 2011 where he also received mentorship from Rigsby, some 35 years after Rigsby had begun to mentor Memmott. Sean Ulm had also been mentored by Bruce Rigsby from the late 1980s, first as an undergraduate and then honours student in Bruce's department at UQ, with Bruce providing Ulm's first introduction to anthropology.

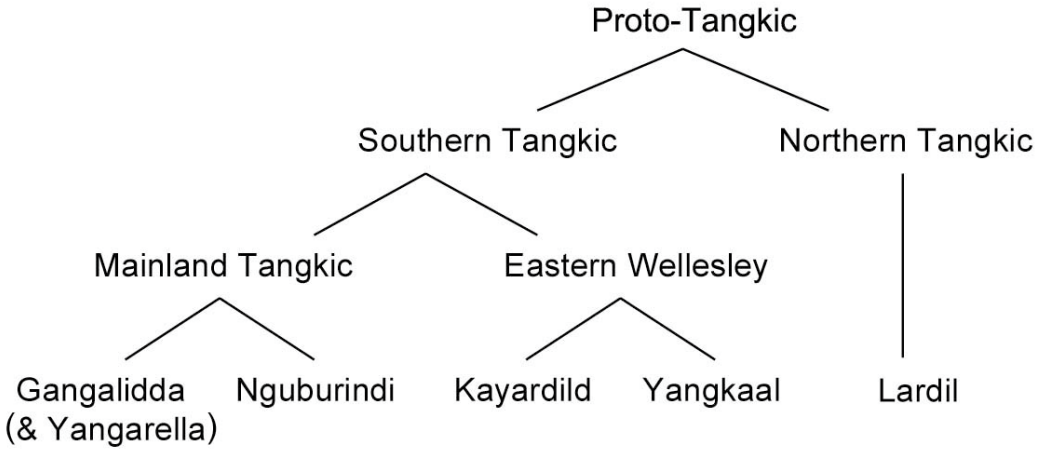

Figure 1. Phylogenetic tree of the Tangkic languages (after Evans 1995a:12). Note that Evans considered Yangarella to be a dialect of Gangalidda.

Initially, linguists had assumed that the history of the Tangkic languages was one of successive fissioning events followed predominantly by independent development of the respective languages (Evans 2005). Such fissioning included the movement of the original Northern Tangkic group to Mornington Island while a Southern Tangkic group remained on the mainland; the break-up some time later of the Southern Tangkic group; and eventually the fissioning of the Yangkaal-Kayardild language into two distinct geographical dialects, as the Kaiadilt people moved to Bentinck Island. Evans (2005) suggested this happened in the last 1000 years. However, preliminary archaeological results reported by Ulm et al. (2010) suggested that colonisation of Bentinck Island occurred before the last millennium. This original view of fission and insularity has been challenged by recent findings, which have led us to an increasingly sophisticated appreciation of the dynamic nature of the region's environments and peoples.

In this paper we use new linguistic, archaeological and environmental data to outline a hypothetical model of changing linguistic and territorial arrangements across the Wellesley region over the last several thousand years. Rather than the earlier model that involves an initial proto-Tangkic group occupying a local niche and then systematically branching out (fissioning processes) to gradually evolve into five or six language groups occupying separate territories, we propose a more complex process that starts with the proto-Tangkic on Mornington Island and involves a combination of processes of fission, fusion and syncretism of language groups in the context of environmental changes. This hypothesis aims to correlate a Tangkic model of linguistic change and associated cultural change with available archaeological, geomorphological and climate change models.

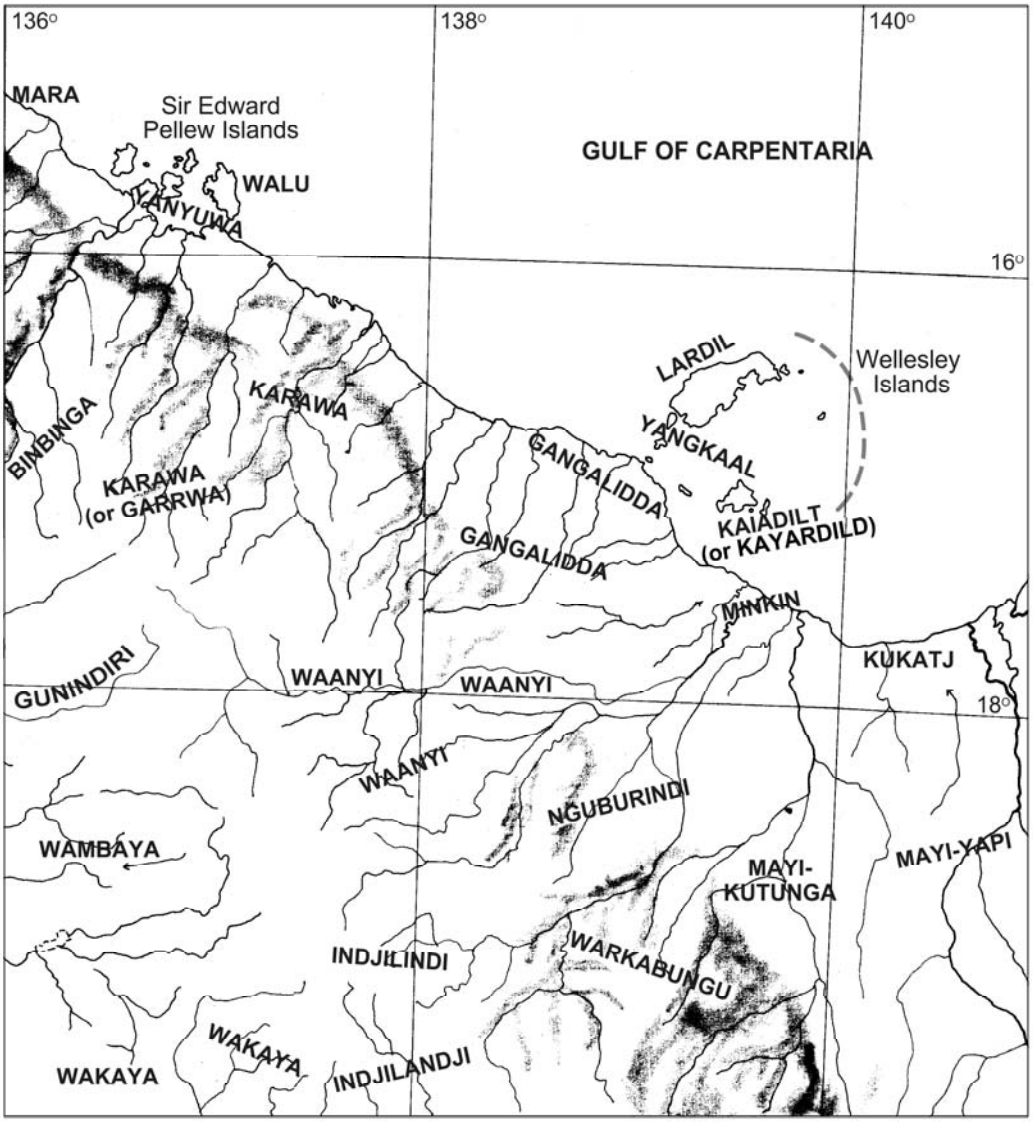

Figure 2. Map of language groups in the Wellesley and wider southern Gulf of Carpentaria region as per anthropological research in the late 20th century (Map by Aboriginal Environments Research Centre, University of Queensland). Note that the Yangarella had been dismissed as a long extinct group at this time.

3. Background

3.1. Environmental Background

The 15 islands of the Wellesley Islands are dominated by Mornington Island (c.650km^2) in the north, the largest island in the group (Figure 2). A maximum open water crossing of only 3.5km is required to reach Mornington from the mainland, with clear intervisibility between the intervening stepping-stone islands. Bentinck Island (c.150km^2) at the southeast of the archipelago requires a longer minimum open water voyage of 10.5km, with poor intervisibility between Bentinck and the mainland. Oral histories suggest that travel was rare between Bentinck and the mainland, with some people making the return voyage 3-4 times in a lifetime (Evans 2005:14). Indeed, historical accounts of two crossings to Allen Island on the route to the mainland 10.5km west of Bentinck indicate that this journey could be extremely hazardous, with up to 75% of travellers drowned en route (Tindale 1962a; cf. Memmott 1982). These accounts indicate the

limitations in carrying capacity of the watercraft (hibiscus logs lashed with grass string), as in each account the raft was heavily overloaded. However, these voyaging accounts have also been used to argue for the poor seafaring capabilities of historically-recorded watercraft in the Gulf region, mitigating against regular offshore voyaging between distant islands, at least in the recent past, although the loss of boat-building knowledge cannot be ruled out (Fitzpatrick et al. 2007). Direct contact between Mornington and Bentinck, involving a 30km+ open water crossing, was extremely rare, occurring only by accident according to oral accounts (e.g. Roughsey 1971a:95-96).

For much of the late Pleistocene, the present-day Gulf of Carpentaria was part of a broad low-lying savannah corridor linking the continents of Australia and New Guinea. Physiographically, the region was dominated by a large freshwater lake known as Lake Carpentaria fed by rivers from both northern Australia and southern Papua New Guinea. At this time the Wellesley Islands were a series of low hills several hundred kilometres inland on the margin of an expanded Australian arid zone. Around 19,000 years ago, sea-levels began to rise with a rapid period of transgression in the terminal Pleistocene (Hanebuth et al. 2009). The great width and low gradient of the continental shelf in the Gulf of Carpentaria meant that sea-level rise shifted the coastline by more than 1,000km (Sullivan 1996). As Mulvaney and Kamminga (1999:121) note, this would have created an intertidal zone up to several kilometres wide, dramatically impacting on the structure of coastal resources.

Between c.40,000 and c.12,200 years ago Lake Carpentaria was fully freshwater, reaching its maximum extent of c.190,000 km^2 around 14,000 years ago. The first marine incursion was the breech of the Arafura Sill with sea-level rise at c.12,200 years ago, connecting Lake Carpentaria and the Arafura Sea (Reeves et al. 2007, 2008). Full marine conditions were established by 10,500 years ago, prior to the breeching of Torres Strait around 8,000 years ago (Chivas et al. 2001; Reeves et al. 2007, 2008; Torgersen et al. 1983).

By the early Holocene the coastline would have been close to its present position around much of the Gulf of Carpentaria. Sea-levels peaked +2.5m above current sea-levels around 6,400 years ago before falling to current levels in the last 2,000 years (Lewis et al. 2013). The Wellesley Islands would have been created between 6,000 and 5,000 years ago with rising sea-levels. At the time of creation, the Wellesley Islands were more isolated from the mainland than today owing to a combination of higher sea-levels and a more distant mainland shoreline as coastal progradation had not yet initiated. The fall in sea-level after 6,400 years ago would have expanded the surface areas of the islands and intertidal zones and reduced the distance between islands and the mainland. Some offshore islands would have been incorporated into the mainland as the coast prograded (Robins et al. 1998:118-119).

3.2. Overview of current Wellesley Region archaeological evidence

The Wellesleys comprise numerous large islands capable of sustaining groups of people of various population densities. Furthermore there are abundant reefs, rock platforms and smaller islands that were likely used as temporary specialised hunting camps, while people exploited the reefs, deeper water and sea-grass beds. Only a small area of these islands has so far been archaeologically surveyed and sampled. Bentinck, Sweers, Fowler, Albinia, Douglas and Bessie Islands have been subject to intensive archaeological survey, sampling and dating (Ulm et al. 2010). On Mornington Island, only the Sandalwood River catchment on the central north coast has been subject to systematic study (Rosendahl 2014a, 2014b). Critically, there are no data available for the islands between Mornington/Bentinck and the adjacent mainland coast. Stone-walled tidal fishtraps are a widespread feature of the archaeological record of the Wellesley Islands, with fishtrap complexes on Bentinck Island occurring on average every 900m along the shoreline (Memmott et al. 2008; Rowland and Ulm 2011), though no chronological information is available for this site type.

In an effort to broadly characterise the archaeological record of the study area, summed probability analysis was undertaken of 162 radiocarbon ages available from 123 archaeological sites from the South Wellesley Islands (Bentinck, Sweers, Fowler and Albinia), Mornington Island and the adjacent mainland (Figure 3). The summed probability distribution can be used as a proxy for the probability and amplitude of occupation in a particular period of time (Rick 1987; Ulm and Hall 1996). These results conform with broader northern Australian patterns demonstrating a marked increase in archaeological records over the last 2000 years (Williams et al. 2010). Williams et al. (submitted) have associated the latter pattern with climatic amelioration caused by pervasive La Niña conditions (higher rainfall), creating the conditions for population expansion and intensified logistical mobility and technological innovation. Around 750 years ago Williams et al. (submitted) document a sharp decline in foraging territory coincident with the establishment of modern El Niño Southern Oscillation (ENSO) frequency in Australia.

For Mornington Island, although numerous archaeological sites have been documented during site recording exercises (e.g. Robins 1982, 1983), few have more than basic details available and the most intensive studies are limited to a c.27km^2 area centred on the Sandalwood River catchment (Rosendahl et al. 2014a, 2014b, submitted). In this area, Memmott et al. (2006:38, 39) reported basal dates of c.5000-5500 BP from Wurdukanhan as "the oldest date yet obtained for any archaeological site on the coast of the southern Gulf of Carpentaria." These dates were used to argue for "a relatively lengthy occupation since at least the mid-Holocene". However, a re-analysis of this material by Rosendahl et al. (in press) demonstrates that these mid-Holocene features are natural rather than anthropogenic in origin. The oldest reliable dated cultural site on Mornington Island is Site 101, a shell scatter dating to 3059 cal BP (Rosendahl 2014a). Some of the earliest dated sites on Mornington Island are shell mounds dating to between c.2000 and 3000 years ago, including the Junction and Gutta-Percha sites (Rosendahl et al. 2014a, 2014b). Construction of shell mounds on the Sandalwood River continues into the recent past. Over half of the Mornington Island dates fall into the last 1000 years. Some 27 radiocarbon dates are available for Mornington Island (Figure 3b), with the summed probability of this small dataset showing occupation by 3500 cal BP, amplified archaeological signals centred on 1600 cal BP and 950 cal BP, before a major increase from 300 years ago.

The ongoing work in the South Wellesleys by Ulm et al. (2010) identifies a faint human presence commencing shortly before 3000 BP, with strong evidence for permanent occupation in at least the past millennia (Figure 3c).

The earliest hint of occupation on Bentinck Island occurs at 3483 cal BP at Jarrkamindiyarrb on the south-east coast. However, a continuous occupation signal does not commence before c.2000 years ago with a range of sites in use by 1500 years ago across Bentinck and Sweers Islands. Use of the small islands of Fowler and Albinia dates to the last 1000 and 200 years respectively. There is a distinct acceleration in representation of dates from 700 years ago, and especially in the last 300 years. Over half the dates from the South Wellesley Islands have median calibrated ages in the last 300 years. It is difficult to be more precise owing to uncertainty in the marine reservoir correction for the region and variations in the calibration curve for the last 200 years (Ulm et al. in prep.).

The dataset is still small (128 radiocarbon dates) and it is unclear as to the nature of the earlier occupation and whether it represents permanent occupation since c.2000 cal BP or if there have been multiple colonisation attempts with an early, low intensity visitation (Ulm et al. 2010:43). Regardless, the chronological patterning suggests a gradual increase in use of the Wellesley Islands since c.3000 cal BP, with an increase in use of the smaller islands from c.2000 cal BP and permanent use, likely implying increased fissioning of the Wellesley community, in the past 1000 years.

For the mainland coastline adjacent to the Wellesley Islands, only seven dates from three sites are available. The earliest date is 1346 cal BP from Gunamula and the most recent 262 cal BP from the same site (Robins et al. 1998). In fact, there are no other dated mainland sites within 200km of these sites. Since only three

sites contribute to the summed probability distribution for the mainland coast, insights are limited (See Figure 3d.)

The graphic summary of current archaeological data in Figure 3 clearly implies that the higher elevated island of Mornington was the first to be occupied in the Wellesley archipelago.

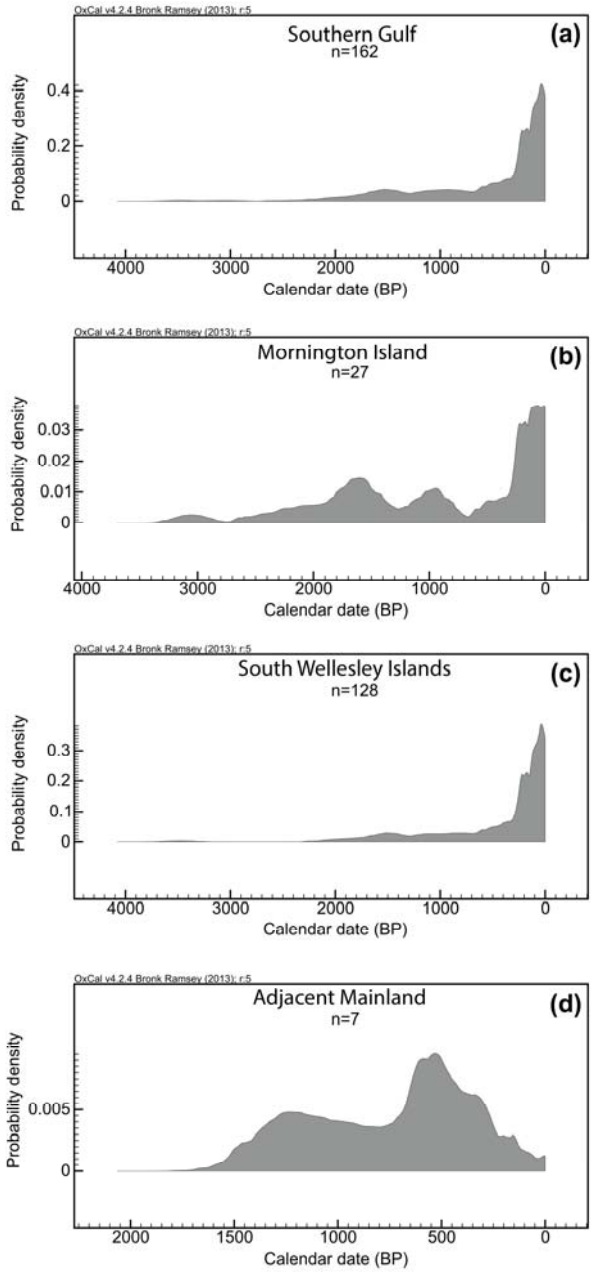

Figure 3. Summed probability plot of all calibrated radiocarbon ages (n=162) available. (a) combined southern Gulf (Wellesley Islands and adjacent mainland); (b) Mornington Island; (c) South Wellesley Islands (Bentinck, Sweers, Fowler and Albinia Islands); and (d) adjacent mainland. Note that two aberrant charcoal dates (Wk-23667 and Wk-23668) from Mornington Island are excluded (see Rosendahl 2012). Radiocarbon dates were calibrated into calendar years using OxCal (v.4.2.4) (Bronk Ramsey 2013) and the Marine13 calibration dataset (Reimer et al. 2013) using a local □R of -49±102 (Ulm et al. in prep).

4. A revised hypothesis of Tangkic linguistic history

Bayesian phylogenetic analysis of Tangkic basic vocabulary has offered new insights into the structure of the Tangkic family tree, and serendipitous findings in archival recordings and linguistic fieldnotes from the 1960s and 1970s have suggested that the poorly-attested Yangarella language may not have been a dialect of Gangalidda as previously assumed, but more closely related to Nguburindi, Yangkaal and Kayardild. For reasons of space, we limit our discussion here to outlining the hypothesis, and labelling key historical events in this new model, e.g, '2nd Fission', to which we shall refer later in the paper. For additional linguistic evidence see Round (in prep.) and Round and Memmott (2014).

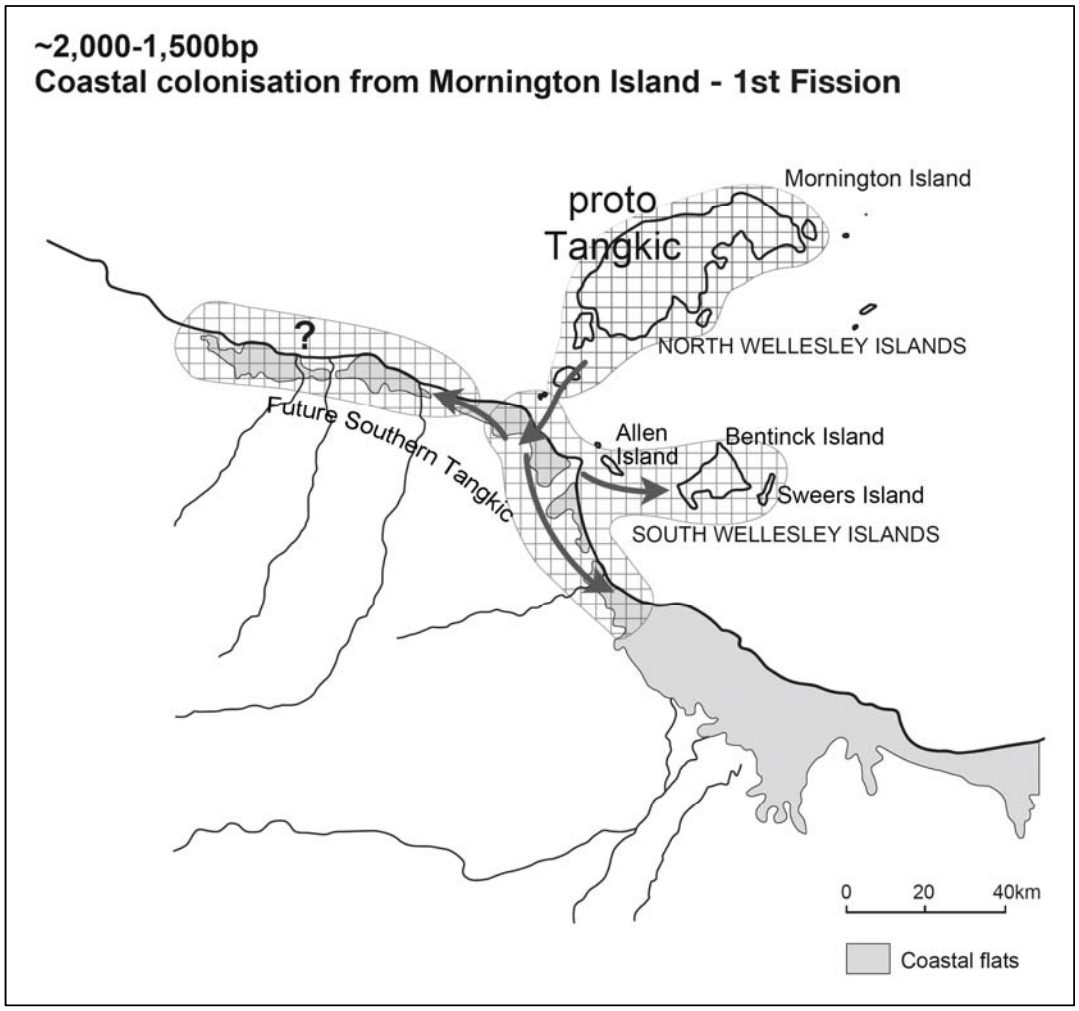

Figure 4. When sea-levels stabilised c.2000 BP, speakers of proto-Tangkic already occupied Mornington Island. Given their coastally-adapted tool-kit lexicon, it is likely they had been there for many centuries or even millennia previously. At c.2000-1500 BP temporary visits to the coastal mainland and South Wellesley Islands intensified, leading to colonisation and then fission into a Northern Tangkic group on Mornington and the Southern Tangkic colonists on the adjacent mainland and intervening islands (1st Fission). (Note: all dates based on linguistic evidence are highly approximate).

Bayesian phylogenetic methods (O'Brien et al. 2013) were used to estimate the topology of the Tangkic linguistic family from basic vocabulary data, and to gain a very broad estimate of the antiquity of branching events in the Tangkic family tree (Round and Memmott 2014). Combining the range of dates suggested by linguistic analysis with the available archaeological evidence, we hypothesise that the first Tangkic fission (1st Fission), into the Northern and Southern Tangkic branches was around 2,000 BP. On the balance of evidence, this was likely due to movements not northwards onto Mornington Island (cf. Evans 2005), but southwards out of Mornington and onto the mainland and South Wellesleys coastal zone. This zone had expanded in land area following recent stabilisation of sea-levels and subsequent progradation (Robins et al. 1998) and was receiving increased annual rainfall (Petherick et al. 2013), likely making water available for a lengthening period of the year, and thus was ripe for exploitation by the coastally-focused, raft-faring proto-Tangkic people of Mornington (see Figure 4).

Significant levels of subsequent linguistic divergence in both grammar and lexicon of the Mornington versus the mainland varieties of Tangkic indicate that after the initial Tangkic fission changes proceeded largely independently, and we hypothesise that expansion onto the mainland was followed by a period of relative insularity of the two branches (Northern and Southern Tangkic) lasting as much as a thousand years. Later, c.1000 years ago, after the Northern and the Southern varieties of Tangkic had diverged into separate languages, we hypothesize that a second wave of expansion occurred outwards from Mornington (2nd Fission). Genealogically, the language carried southwards by this second expansion would have been a Northern variety, with strong affinities to the ancestor of Lardil. We will refer to this southwards-moving language as the 'hypothesized Northern Tangkic-offshoot language', or 'HOL'. All evidence for HOL is deduced indirectly from its inferred interaction with the other, genealogically Southern, languages of the mainland, which we discuss presently. We hypothesize that speakers of HOL moved onto the mainland coastal areas, spreading from Denham and Forsyth Islands just south of Mornington, probably along the coast to the northwest as far as Yanyuwa country, and to the southeast along the coast and up the Nicholson River, and most likely spreading also to Bentinck Island (see Figure 5).

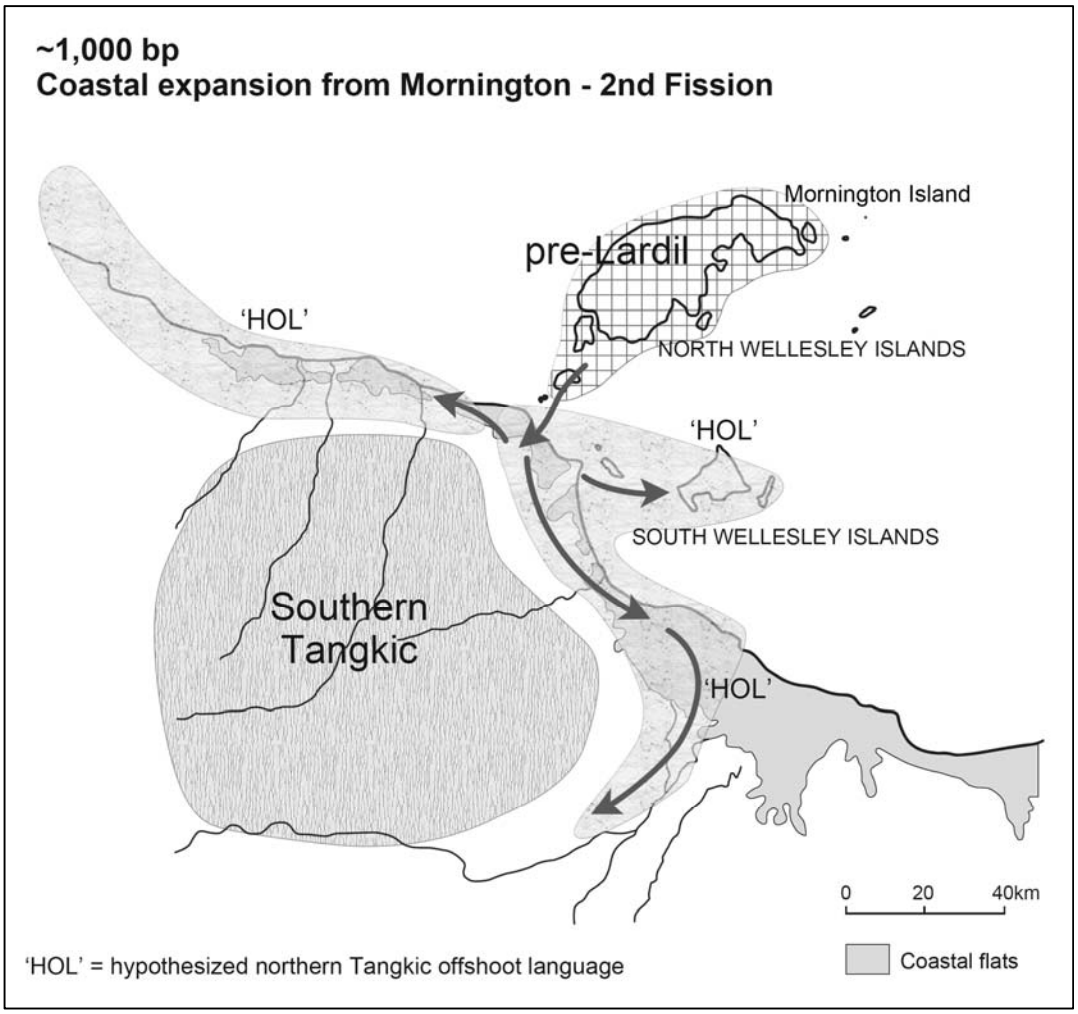

Figure 5. At c.1000 BP a second wave of colonisation from Mornington leads to fission into two northern sister groups: pre-Lardil and a 'hypothesized Northern Tangkic-offshoot language' (HOL) (2nd Fission).

Around 800-400 years ago, we speculate that the environmentally vulnerable low-lying territory occupied by the speakers of HOL was impacted by a severe environmental event, which caused depopulation and abandonment of country for some time.[2] The HOL communities of the far northwest were decimated, and their territory was later acquired by Garrwan speakers who expanded northward from an inland base, and who in folklore remember a lost tribe (the 'Nyangga', Furby & Furby 1977) whom they replaced. Further south, we speculate that surviving HOL speakers sought refuge with the mainland Southern Tangkic people, leading to a linguistic-cultural process of syncretism. In linguistic terms, the outcome resembled other, distinctive cases of intense language contact which Ross (1996, 2007) has termed 'metatypy', in which one language becomes grammatically, but not lexically, like another. In the Tangkic case, there is phylogenetic evidence that the very substantial grammatical differences between modern Gangalidda and Kayardild, for example, arose between their ancestors during a time interval so short that change as usual is implausible. Moreover, there is good evidence that Kayardild, and likely the modern languages stretching from Denham Island to the Nicholson, had a common ancestor which at some point became markedly more 'Northern' in

[2] As a topic of future research, we need to search for paleoenvironmental or archaeological evidence for this as well as cultural markers. A conundrum in mounting such an argument is that Bentinck is one of the most low-lying of all areas in the Wellesleys, but is most intensively occupied 800-400 years ago (see Figure 3). A key problem is that archaeological chronologies are not highly resolved to detect and define short-term events <100 years in duration.

its grammar. Thus, we hypothesize that when the surviving HOL speakers sought refuge with speakers of the Southern Tangkic language, a metatypized variety of Southern Tangkic either arose, or if it existed already, gained rapid uptake, and subsequently was carried back to the HOL territories some time later (see Figure 6); eventually HOL itself was entirely relinquished by its former speakers, and so left no direct, modern descendants. The metatypized Southern language variety, which had thus arisen and diverged markedly in grammar, yet barely at all in vocabulary, from the Southern Tangkic tongue later became Yangkaal-Kayardild and Yangarella-Nguburindi (3rd Fission) — languages which we collectively refer to as Eastern Tangkic. The more purely Southern, unmetatypized mainland language continued on, largely unaffected by this event in a gradual development process, to become Gangalidda.

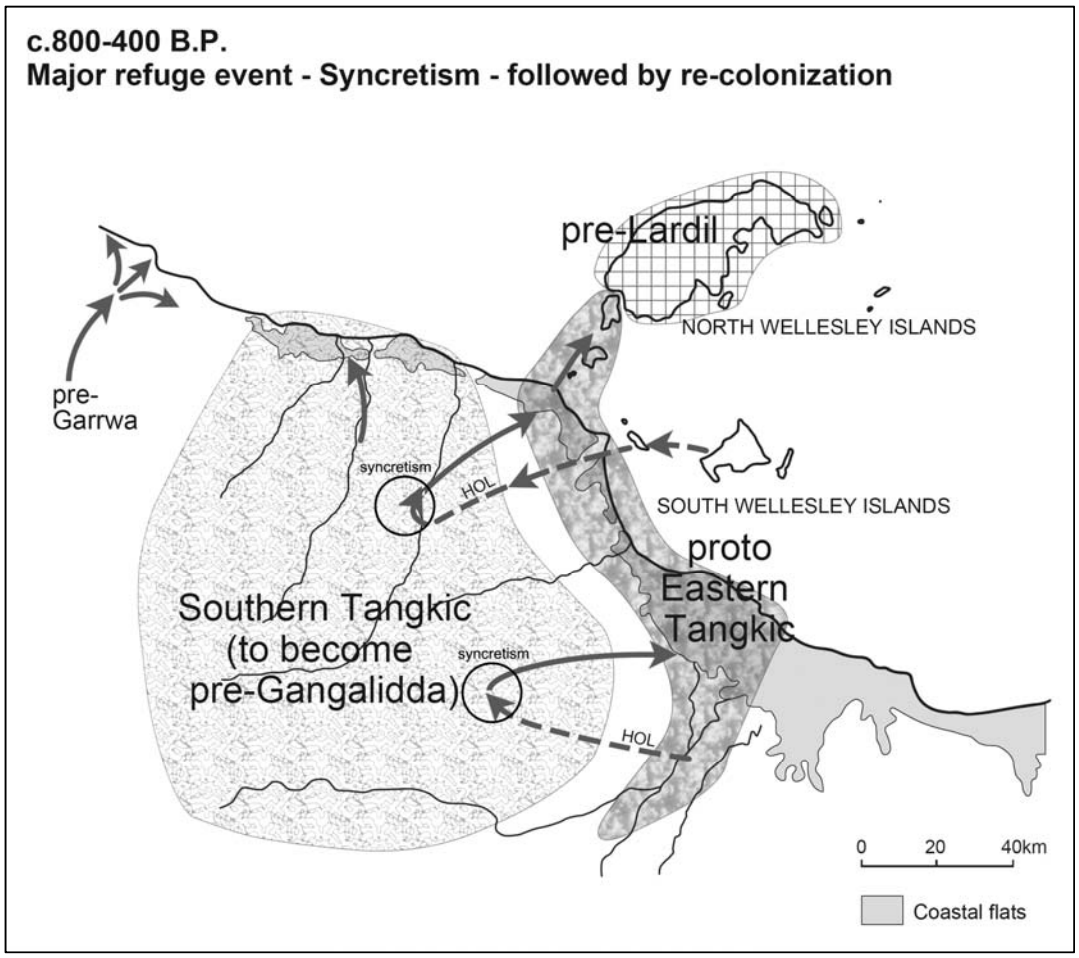

Figure 6. At c.800-400 BP an extreme climatic event floods the HOL low-lying coastal areas rendering them uninhabitable. The northwestern coastal HOL are decimated, and their territory taken by pre-Garrawa speaking people. Other surviving HOL seek inland refuge with the Southern Tangkic Group (a cultural-linguistic 'syncretism' process occurs). A distinct, variety of the Southern language emerges which we call proto-Eastern Tangkic. When freshwater wells and ecosystems recover in their coastal country the HOL people re-colonise it, but now speak and identify with proto-Eastern Tangkic, and this language is carried on.

Linguistic research has emphasized an important role for the 'emblematic' status of metatypized linguistic codes for their speakers (Ross 2001, 2007). Linguistically for this reason, and anthropologically in light of the 'middlemen' role (cf §7) of the modern Yangkaal people who descended from the original Eastern Tangkic group, we hypothesize that this refuge event was a defining moment for the Eastern Tangkic group, a period when a culturally and linguistically Northern-derived group acquired strong bonds with the Southern Tangkic peoples in addition to and in complement to their original Northern Tangkic heritage.

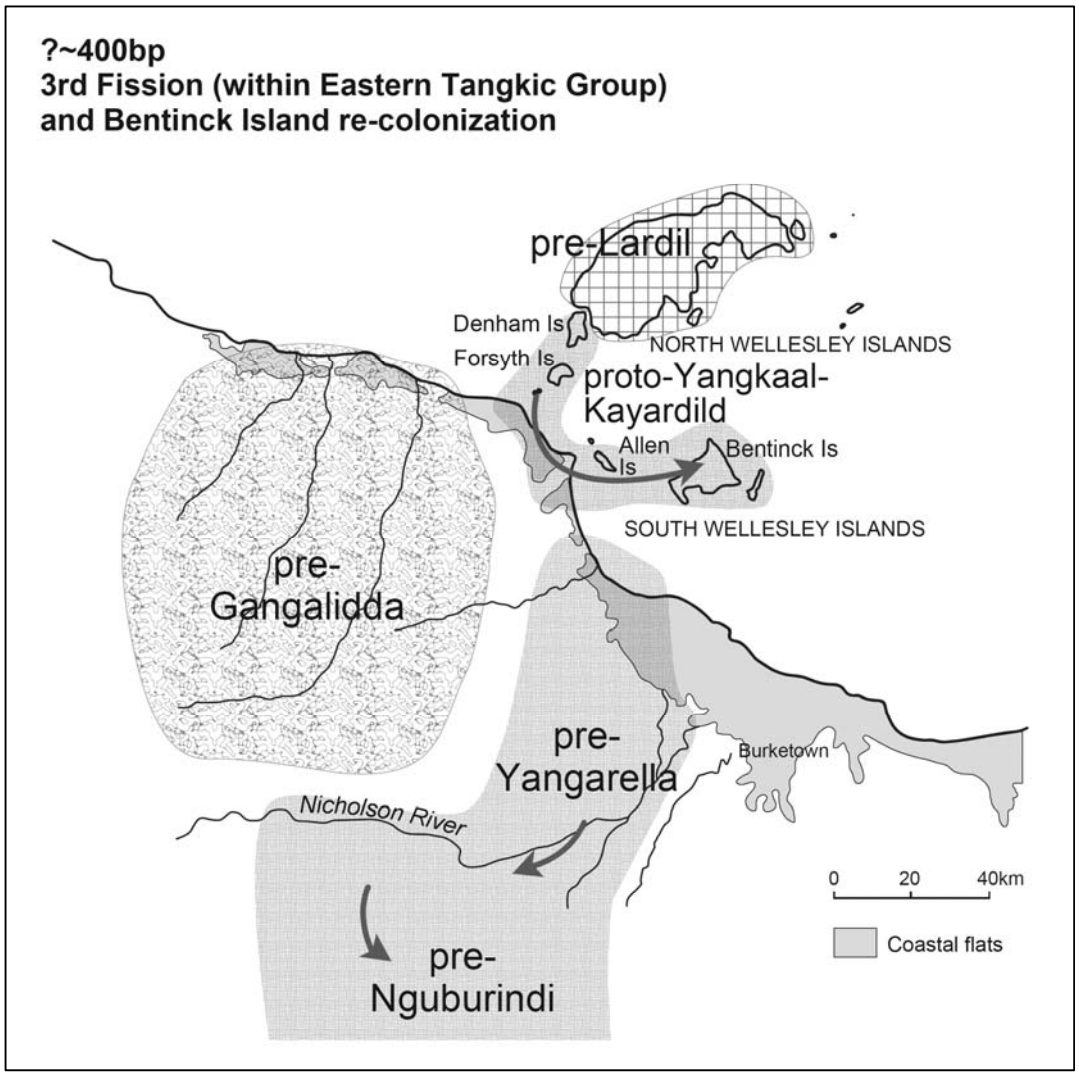

Figure 7. Over time the Eastern Tangkic group divides into a Denham-Forsyth-Bentinck group speaking proto-Yangkaal-Kayardild and the Yangerella-Nguburindi group occupying the south-east coast and up the Nicholson River (3rd Fission). These two subdivide further (4th Fission) as the four modern groups of Yangkaal, Kayardild, Yangerella and Nguburindi. The inland Southern Tangkic Group persist, to become the modern Gangalidda Group.

In sum, we speculate that around 800-400 years ago a period of environmental instability and unpredicatability redefined the recent linguistic, cultural and territorial map on the mainland. Coastal territory in the northwest shifted from Tangkic ownership to Garrwan; the Eastern Tangkic language, ancestor of Yangkaal-Kayardild and Yangarella-Nguburindi came into existence as a language distinct from pre-Gangalidda; and the rise of the Eastern Tangkic peoples as cultural 'middle men', with ties to both Mornington and the interior mainland, was set in train. If our environmental hypothesis is correct, then

Bentinck Island, if it was permanently inhabited, may well have been abandoned for some time too, later to be resettled by the Yangkaal-Kayardild group (Figure 7), which most likely remained tightly knit, with a flow of people to and from Bentinck Island, until it eventually underwent complete fission (4th Fission) for reasons which are not clear to us, perhaps a century or two later.

To summarize the preceding changes, our redrawn Tangkic phylogenetic tree looks as in Figure 9.

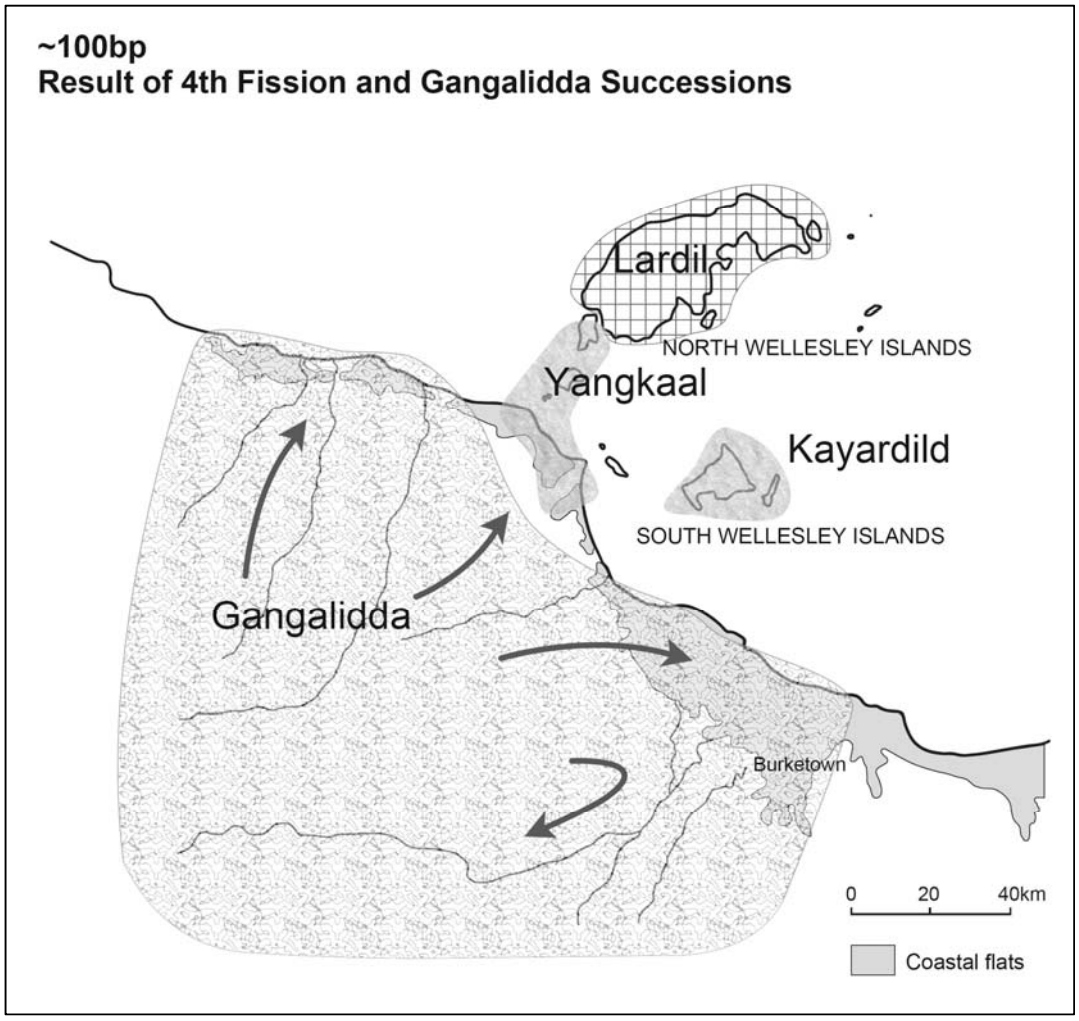

Figure 8. After early contact massacres by Europeans coming west from Burketown, the Yangerella and Nguburindi are decimated and a modern succession occurs at c.100 BP of the Gangalidda into their coastal territory, accompanied by fusion of remnant families and re-badging as Gangalidda (Fusion)[3]. By this time, the Kayardild had evolved their own distinctive identity and insularity (4th Fission).

[3] We make no attempt here to factor in the possible impacts of Macassan visitations that may have also contributed to population decline (Memmott 1982, Oertle et al. 2014), an analysis that remains as a topic for future research.

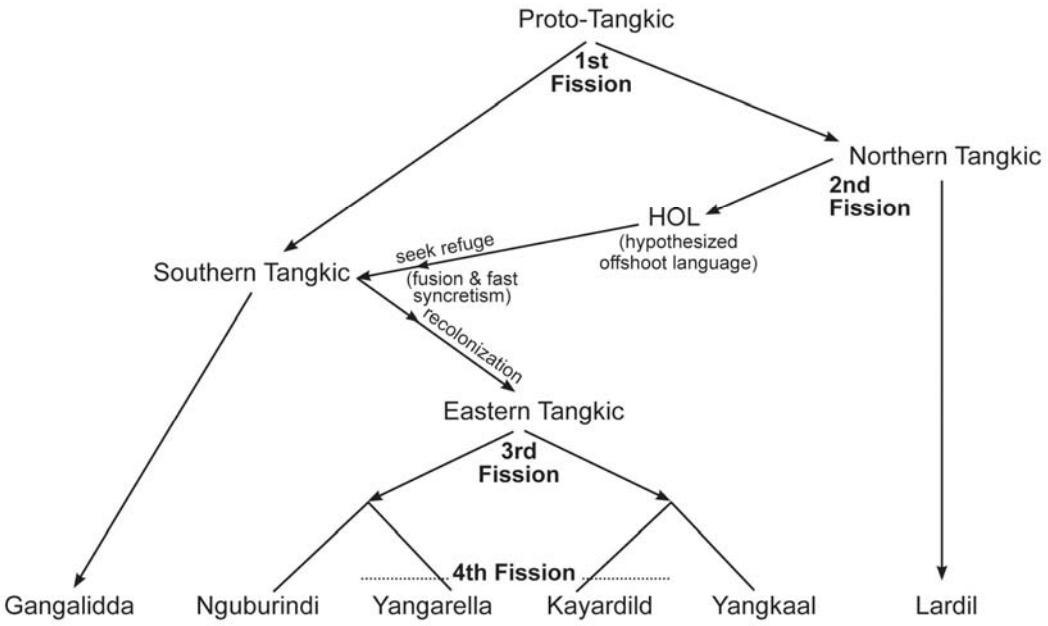

Figure 9. Revised phylogenetic tree of the Tangkic languages according to our hypothesis. Note that the vertical dimension, representing time, is not to scale.

5. Fission and territorialization

The above hypothesis involves processes of group fission, fusion, and a type of linguistic-cultural event which we term 'syncretism'. Fissions are reflected in the linguistic record through a period of shared language development before the fission, and independent changes afterwards. Fusions lead to the merger of previously distinct linguistic groups and are expected to be difficult to detect linguistically, as one language is all but replaced by another. Syncretism involves no permanent merger of group identities, but rather an interaction which brings about a marked cultural, and in this case linguistic, alignment between two groups. Unlike fusion, the outcome is still two distinct groups, but groups who are markedly more similar than previously. We discuss these processes further to understand how they may have played out on the land and sea and partly reflected in the linguistic evidence.

In our model, four processes of fission occurred as groups split to seek new territories to exploit and settle, or occupied areas that were formerly territorialized by other groups; and a process of syncretism occurred as groups who had been separated territorially for long periods of time were forced to re-integrate, at least temporarily, owing to periods of environmental deterioration which rendered the territory of one group uninhabitable.

McNiven (1999) elaborated on concepts of fission as a process in modelling regionalisation in the Great Sandy Region on the eastern Australian mid-coast since the mid-Holocene (see David 1991; David and Cole 1990; Hall and Bowen 1989). He defined regionalisation as "a process whereby social groups segment or fission into smaller social groups with separate and smaller territories. These smaller groups become more localised in their activities trending towards cultural exclusivity" (McNiven 1999:157-158). McNiven defined archaeological correlates for fissioning in terms of increasing localisation of settlement and subsistence patterns and resource use, particularly stone procurement, and the emergence of identity-conscious place-marking strategies such as earthen circles (bora rings) and cemeteries in the last 1,000 years. He argued that marine stone arrangements in central coastal Queensland were also linked to this recent phase

of regionalisation "whereby newly established residential groups intensify use of local resources and inscribe their social identity into landscapes through place-marking strategies that include formal ritual sites" (McNiven 2003:339).

Based on a review of international hunter-gatherer literature, McNiven (1999:157,158) argued that fissioning processes usually result from local population pressures, occurring "when social groupings are at a size threshold which threatens socio-political harmony and/or economic viability" (see also Binford 2001). McNiven generated a number of reasons for fissioning based on these two broad causal categories, including simple population increase, demographic restructuring involving increase in number of adults, social tension and conflict, resource deterioration, changes in intra-group dynamics associated with ceremonies, inter-group politics and diffusion of cultural traits. McNiven's (1999) analysis would then suggest that Mornington was the 'heartland' of the Tangkic world from which breakaway groups left to "take up new territories". In the case of the process of the major refuge event and its syncretism (Figure 7), in our current analysis we focus on resource deterioration as a likely critical catalyst (although other causal factors warrant more in-depth treatment), whereby a reduction in the resource productivity of the local country occurred due to some environmental change, such as prolonged periods of environmental uncertainty following an extreme climate event or series of events.

In terms of new socio-territorial groups forming, our linguistic model has identified four likely major fissions. However, identifying archaeological signatures of an island or country succession or the arrival of a new group is difficult, particularly if the outgoing and incoming groups employ similar subsistence technologies and settlement patterns. One archaeological signifier which we have reported earlier (Memmott et al. 2008) is the greater abundance and reliance on stone wall fish traps in Yangkaal and Kaiadilt territories, reflecting a process of resource intensification in these lower islands as compared to the lower frequency of such traps on Mornington Island, a process well theorized in the broader hunter-gatherer literature (Binford 1983).

There are three salient points we present here on fission processes.

5.1. The role of Allen Island as a staging point for migration to Bentinck Island

In terms of the recurring fission events of groups moving out from the North Wellesley Islands and adjacent mainland coast to Bentinck Island, the small intervening Allen Island clearly had a geographic role as a staging point for travel to and from Bentinck Island, and its territorial control is a salient factor (see location on map in Figure 8). The use of Allen Island as a 'jumping-off' point suggests the coastal mainland groups had territorial control of Allen Island. Tindale provided a useful view of one of his informants on this matter:

> "Don told me there was a tradition that Allen Island was part of the mainland until a big sea cut it off. Even today it was possible after extremely low tides once or twice a year to walk across in shallow water no more than up to the knees. The Forsyth Island people consider that Allen Island is still a part of their country." (Tindale Journal, Friday, 17 May 1963:77).

Presumably this was Don Robertson, a man of mixed mainland descent (Waanyi-Garrwa) and the spouse of Yangkaal woman Rosie (born c.1905).

However, given that in the linguistic model, the Yangkaal-Kayardild group of Forsyth-Denham Islands was that in which fissions occurred following visitation to and occupation of Bentinck Island, there is a likelihood that Allen Island at times belonged to this group. An outcome of the Wellesley Native Title Claim in the late 1990s was that all three surrounding language groups, the Yangkaal, Kaiadilt and Ganggalida made a strong claim to the waters around this island (and implicitly on the island itself). It was agreed that for the purpose of the claim these seas would be claimed as a shared area and the judge found accordingly (Cooper 2004).

Tindale (1962b) was able to record seven place names on Allen Island from his Kaiadilt informants. Neither of the other two groups who asserted rights in Allen Island during the Native Title Claim (Yangkaal & Ganggalida) were able to provide such a detailed geography, although this could be because of knowledge loss arising from their greater intensity of cultural contact than the Kaiadilt. However, an alternate argument could be that it was a vital staging point for departure across a substantial sea crossing to Bentinck Island, and in addition a sound geographic knowledge of Allen Island was vital in the case of a forced retreat from Bentinck due to failure or inadequacy of resources.

5.2. Relevant findings on fission from the Western Desert

Tindale (1974:70) speculated on the impact of a series of successive good seasons on demography in the Western Desert:

> "It is important therefore to realize that with a cycle of good seasons, lasting for a generation or more, a large population increase may occur in a tribe. It is difficult to obtain exact data on such increases, but the genealogies of desert families often show that during an active fertility period of around twenty years a woman may at full potential be able successfully to rear six or seven children … even allowing that some infants born too quickly on the heels of previous ones must be killed, since there is no effective way of rearing two children simultaneously, under the conditions of their life."

And he wrote on the impact of good seasons followed by poor seasons:

> "At the beginning of such a cycle of favorable years, life is easy. There is an easing of the burden of travel and food search, the pressure on food resources is slight, and the principal causes of intertribal friction, namely quarrels over infringements of territory, are less likely" (Tindale 1974:70).

As well as speculating on groups returning from Bentinck Island due to socio-environmental pressures, we could also speculate that the original migrations to Bentinck Island (1st Fission, 2nd Fission, 3rd Fission) were catalyzed by socio-environmental pressures in the North Wellesley Island. Tindale (1974:71) thus wrote in relation to desert people:

> "This seems likely then to be a continuing state of affairs in desert areas with the "surplus" population being forced to redistribute itself continually into any favorable niches not yet fully occupied."

5.3. Comparison with post-contact fissions and successions following local depopulations

Here we point to contemporary Native Title evidence on succession to country following the colonial impacts in the wider region to discuss what might have happened at times of demographic decline. A consistent, well-documented contact pattern in north-west Queensland was population decimation in the latter half of the 19th century caused by introduced infectious diseases, hostility by colonizing pastoralists, and para-military annihilation by the Mounted Native Police (Memmott 1979:243; Trigger 1992; Dymock 1993).

A relevant case in point are the two Tangkic language groups, the Nguburindi and the Minkin whose members are absent in contemporary Native Title claims and which has recently demanded explanation in the Federal Court. The Minkin country[4] has been claimed by the Gangalidda and the Nguburindi country has been partly claimed by the Waanyi. The Waanyi Claim also encroaches into country held by the Indjilindji[5] and Warkabungu to the south and these two former territories have also been partly claimed by the Indjilandji from the south. The depletion of these four language groups due to massacres and diseases occurred during the period 1860-1920. There is some (albeit limited) evidence that remnant individuals and families married into the remaining dominant groups who were less severely depleted and then re-badged their identity in subsequent generations. This may not have been so difficult due to a longitudinal pattern of language group exogamy resulting in individuals having affiliation with grandparents belonging to different language groups.

6. Fusion of new groups following initial fission event

Here we make some comparisons of these Tangkic phenomena with Tindale's (1974) desert data. It might at first seem inappropriate to compare the phenomenon of Aboriginal islanders' insularity in the sea with isolation amongst desert peoples, but in fact there is a basis of comparison between small islands losing their freshwater supplies due to either prolonged droughts or inundation by tidal surges (or both), and stretches of desert also undergoing prolonged drought with failing and unreliable water sources. There is also the comparative factor of relatively long distances of sea to traverse that can become dangerous with an inclement change of weather, which is comparable to groups retreating from failing mountain rockholes across wide tracts of waterless desert to known watered country. Tindale documented interesting examples in the Western Desert bloc, based on (non-recurring) participants' accounts, that bear comparison with the South Wellesley contexts. These constitute some of the few empirical Australian data that document the human responses to incoming groups requesting what amounts to a process of fusion, whether it be long-term or possibly short-term resulting in another fission.

Processes of fusion would have occurred according to our model as remnant groups split away from their own groups due to population pressure and/or resource failure and joined or re-joined stronger and relatively stabilized groups in more productive and/or reliable environments. Tindale identified the possibility of two basic types of drought refuge from his desert research, the first being "the peripheral refuge shared by more than one people" and thus involving a host group, and the second being a "central refuge shared with no

[4] Another Tangkic Group not shown on our maps, but in the vicinity of Burketown.

[5] The Indjilindji were on the upper Gregory River and a distinctly different language group to the Indjilandji on the upper Georgina basin.

others, to which retreat was possible, but from which there was no likelihood of escape [until rains]" (Tindale 1974:68). A third possibility was a division of choice between those staying and those going:

> "In several accounts of enforced migrational movements ... there seems to have been some form of schism among the people on the verge of being forced to move. Some elected to remain in their territory and others left. Sometimes this involved the breaking-up of the initially migrating group into family or horde-sized groups. These then usually lost touch with the others and might in fact never meet with them again, referring to them in after years as if they were in fact still at the places where they were left behind" (Tindale 1974:70,71).

Here there is a hypothetical comparison between those colonizers who chose to stay on the higher parts of Bentinck Island and trust that the resources would be perennial even in poor seasons, and those who decided not to take such a risk and thus chose to make the return crossing to Allen Island and re-join the coastal mainland groups (see Figure 7). One can imagine something of the tensions of such a return trip following a series of drought years in the Wellesleys when water sources were declining and then possibly exacerbated by a flood or tidal surge. Thus Tindale (1974:70) writes of the 'horde' of the Nana people of the Western Desert in August 1935:

> "[We] were able to witness and film the arrival of the [incoming] Nana unheralded, except for smoke fires in the west. We were able to see the partly ritual defense [by the host group] of the water against invasion. We saw the decline of anger, the exchange of kinship identities, the airing of the grievances occasioned by the alleged "theft" of a woman by a Nana man during contact a generation earlier, and the ritual handing over of a wooden container of water to the newcomers by Katabulka, a man who claimed Warupuju Soak as in his hordal territory."

It is thus more appropriate to conceptualize migration as being caused by not simply environmental impacts but by socio-environmental impacts due to pressure between families and clans for competition in resource harvesting. In the case of the Wellesley Islands, conflicts may have occurred both within the original island groups and between the migrating group and the hosts of the country in which they arrive, whether it be island or mainland country. It is plausible that the above circumstances are what caused the eventual fission of Yangkaal and Kayardild (4th fission):

> "Such cycles of good seasons are apt to occur in some areas and may persist for relatively long periods. When they come to an end there is either a population crash or an enforced migration. This move may end either in discovery of a territory previously ravaged by drought but now in the beginning of a period of cyclic improvement, in which case it is likely to be underpopulated or deserted, or a conflict occurs with people whose territory is being invaded … The outcome of such conflicts vary" (Tindale 1974:70).

One type of outcome was the need for male leaders to secure the safety of their incoming group by gifts of their women to the host group. As Tindale (1974:70) reported, "the Wanman men had to buy temporary respite for themselves by giving women in marriage".

A particular case for consideration in our linguistic model here is the retreat of some of the HOL group to seek refuge with the Southern Tangkic group after a series of environmental events (e.g. major tidal inundations) remaining with them for perhaps up to ten or so years until their coastal wells and terrestrial and marine vegetation resources had recovered (and the associated populations of fish, dugong and turtle), then returning to their country with the syncretized language we spoke of earlier, Eastern Tangkic, which combines the lexical resources of Southern Tangkic with many grammatical patterns of the HOL language. (See Figure 7.)

7. Understanding territorial and demographic vulnerability from extreme flood events and the need for flood refuge – more recent ethnographic evidence

In addressing the problems of understanding island colonization and population dynamics leading to linguistic change, it is necessary to better consider the impacts of extreme marine impacts on freshwater and food resources. In this section we carry out a closer consideration of the impacts of the sea-level changes and other extreme climatic events on the colonization attempts of coastal areas undergoing critical environmental changes with both resource losses and gains. Resource losses could result in reduced use and/or temporary or permanent abandonment of territory (2nd Fission; the syncretism process) whilst progradation of shorelines and their gradual vegetation could result in territorialisation of new areas (1st Fission).

Let us consider the case of the Yangkaal who we know occupied Denham and Forsyth Islands at the time of first contact with the British (1800s). During the decades just prior to the arrival of missionaries in 1914, we also know that the Yangkaal were trading brokers[6] who controlled trade between the mainland and Mornington Island despite the disproportionate sizes of their respective territories (Memmott 2010:82-86). The market was in the economic favour of the Yangkaal 'middlemen' by a ratio of about 1 to 6[7]. Participation in inter-tribal initiations by Yangkaal with both the Lardil on Mornington Island and the Gangalidda on the mainland generated mutual social relationships, tribal inter-marriages, and behavioural obligations based on subsection, totemic and kinship classifications (Memmott et al 2014).

Despite their strength as middlemen traders, oral and written accounts of a Yangkaal flood incident show that the Yangkaal were critically vulnerable to abnormal floods due to the low elevation of their islands. These floods could have occurred from a combination of prolonged above-average regional rainfall (several metres over a few days) combined with a spring tide, or alternatively (or in addition) tidal surges associated with cyclones. It should be noted here that under normal wet season conditions, the combination of tides and rainfall run-off causes inundation of the saltpans with a mix of salt and freshwater and that all creeks and rivers emit strong flows of freshwater. The Macassans had noted this to be more than a local phenomenon but a regional one in the southern Gulf by naming the local seas as 'Je'ne Tattunggenga' the Upside Down Water (MacKnight 1969:185; p.c. to P.M. 8/1/80**).** Evidence suggests that during the more extensive inundations when saltwater polluted the normally reliable freshwater wells in the swales and sand platforms,

[6] This role may be akin to that of 'subsistence middlemen' in Melanesia (for example, there is linguistic evidence that skin terms passed into Lardil via Yangkaal, rather than directly from Yanyuwa or Garrwa). The capitals involved in transactions with the Yangkaal middlemen were thus both economic commodities and socio-political capitals, a critical point established in the anthropological literature by Sahlins (1972:227-314) for Melanesian trading systems. We are not able in this paper to follow the line of analysis in Melanesian cases of differentiating between categories of trade systems such as open and closed, subsistence mode, reciprocity, redistribution (middlemen trading versus central place redistribution) etc (Refrew 1975; Allen 1984), however we hope to pursue such an analysis in a future paper.

[7] Circa five clans of Yangkaal from Forsyth and Denham Islands could meet in the order of up to circa 30 clans of Lardil people (Memmott 1979:249, 257, Fig.37, 39).

the Forsyth and Denham Islanders sought refuge with their neighbours on higher ground until the next seasonal rains replenished their freshwater wells and restored vital ecosystems. The Yangkaal had two possible ways to retreat – either to the mainland or to Mornington Island; the latter was probably easier for most, being relatively close to Denham and Forsyth Islands, and with high ground at Gununa beside the Appel Channel which extends along an elevated spine down the centre of the Island[8].

Maintaining close social relations (including through marriage) with both neighbouring groups was essential. After each such flood they would have to overcome a shortage of terrestrial food and cope with reduced and polluted freshwater supplies. The role of the stone-wall fish traps became particularly important to ensure reliable food. Under normal conditions their role as trade intermediaries was lucrative, as the Lardil, who were territorially established but distanced from the mainland, needed their services. However their services created socioeconomic capital that needed to be re-paid to the Yangkaal in such critical times as extreme flood events. Tindale was the first to attempt analyses of flood incidences.

Here we revisit Tindale's pioneering work with renewed interest not only in his modelling of Wellesley flood events with loss of freshwater sources but also his comparative work with desert groups undergoing seasons of abundance and drought. Tindale became very interested in an oral history account of a major tidal surge that caused an extreme flooding of Yangkaal islands in the late 19th century. In 1963, he wrote in his field journal:

> "Speaking of the flood tide which drowned the whole of Forsyth Island old Jimmy Waldron [Walden], who is at least 70 years of age, and could be 10 years older, said he was a small baby when it happened [c1883-1893] and he was saved by being held on a raft by his mother who tied it to the top of a tree. The flood tide was there for the whole of a day and went down the same night ... The same tide covered the present [Mission] airstrip[9] with water. The people camped at the camp here sought refuge on the Mission sandhills [on Mornington Island] which remained above water." (Tindale Journal, 22 June 1963:253-254).

This was of course before the Mission was established but the 'Mission Sandhills' to which he refers, are at Gununa on the Lardil side of the Appel Channel. Elsewhere Tindale (1974:72) says the raft was tied to the top of a mangrove forest and that:

> "The people afterward sought shelter on Mornington Island and were given shelter by the Lardiil until their home islands could be used again. After such unusual happenings the water

[8] Considering the relative elevation of the contemporary Wellesley Islands, spot elevation analysis indicates that most of Forsyth Island lies below the 5m level whilst most of Denham is in the 6 to 7m range. Once crossing the Appel Channel from Denham to Mornington Island, much higher ground is readily available and as one travels inland most land is above the 20m contour. To reach equivalent high ground on the mainland, a Forsyth Islander would have to raft across via Pains Island (5m high) and Bayley Island (5-6m) and then upon reaching the vicinity of Bayley Point, travel inland either 15km up Cliffdale Creek or 10km up Syrell Creek to reach high land at the 18 to 20m level. If a fast flood was encroaching it would seem more expedient to head for Mornington knowing that safety lay directly opposite the north-east end of Denham if relations were friendly with the local clan.

[9] This airstrip was on Denham Island, completed in 1934 prior to the construction of the contemporary airstrip on Mornington Island (Memmott 1979:260).

table becomes loaded with salty water which disappears only after a rainy season again fills the sand with fresh water."

This implies a wait of an entire seasonal year before permanent return to homeland. Tindale states the flood was induced by an extraordinary storm and estimates the time as 1880 in this account. Tindale also recorded an account by a northern Lardil man, William:

> "the great tidal flood which drowned Forsyth Island and much of the low-land of Mornington Island. It was when his father was still unmarried and his father and mother were still alive when it happened, (therefore perhaps between 1875 and 1880). No one on Mornington Island was drowned but they all took refuge on the high point west of the present mission. The flood tide took place in daytime and it went down again by night time. People then had to find rain water on the high ground [on Mornington Island] because they were thirsty. People came from Forsyth Island and there was a fight because the people of Sydney Island were blamed for causing the flood tide of sea water" (Tindale Journal, 23 June 1963:261).

> "The people of Sydney Island who were believed to have caused the tide by making magic at a place in their country … placed themselves on high ground on the main [Mornington] island near Sydney Island" (Tindale Journal, 22 June 1963:253-254).

The time span from all of Tindale's recorded accounts is between 1875 and 1893. However, there is some further evidence that Tindale missed. A separate account of this incident was written by Lardil author and artist, Dick Roughsey (hitherto unpublished) whose patriclan was one of the estate owners on Sydney Island or *Langunganji* where the Flood Story Place was located:

> "Long time ago, long before the first missionary came to the Island, my father told me of a big flood that almost drownded [sic] the island [Sydney Island, *Langunganji*] … My father wasn't born then, he told us, but this is a story that has been passed down, he might have been a small boy then, but it was his own tribe. His father was a young man then, and it was he who told him the Story ... So one day there came a big flood, it almost covered the island, only one part of it was showing, it was a high sand hill, with a big cave on it ... It was on this hill his parents stayed, and few other members of his tribe" (Roughsey 1971a).

One of the authors (PM) has mapped this flood-time refuge camp, known as *Dingkilmiya*. Dick recounts that a messenger was sent around Mornington Island denying that the *Langunganji* people made the flood even though they believed they had the capacity at their Flood Story Place, and inquiring as to who made it. The *Langunganji* made floods in a ritual involving a painted up swimmer placing white ochre in a series of underwater cavities in a reef at a place called Pijinaja (Roughsey 1971b:65). The flood-making place was but one of over 86 Lardil sacred sites that were increase ritual centres for biological, meteorological and planetary phenomena (Memmott 1998).

Roughsey's account goes on to explain how the Sydney Island-based clan leader *Warrenbi* intercepted a Yangkaal scout seeking information on the flood and speared him; followed a moon later by the defeat of a Yangkaal raiding party seeking revenge for the alleged flood-making. Roughsey (1971A) also gave informative detail on the height of the flood. "I have been told that the Forsayth [sic] tribes were up on the high trees, with their families, some got drowned and that was why they blamed the Sydney Island mob for that flood, although none of them made it." This would put the flood several metres high above ground level on Forsyth Island at least.

Unfortunately Tindale does not provide any definitive evidence to support the timing of the incident or the sea-level height reached. Tindale does provide data for a more recent tidal flood. The Mornington Mission experienced an exceptionally high spring tide in late Feburary 1948, whose height was noted in a government hydrology report (Gloe and Weller 1949:17,18). Working from their datum, Tindale estimated that this tide was 3.6 m (12 feet) above normal high tide level (Tindale Journal, 14 May 1960; Tindale 1962B:292-293).

Roughsey (1971A) also obtained an account of the same late 19th century flood impacting on the Kaiadilt in the South Wellesley Islands: "This flood or tidal wave, took so many lives, on Bentick Island, when asking the men from there [in the 1960s at the Mission], one chap, Percy Loogootha[10], said that he and his mob were safe on high ground, but nother lot he said bin die, or drown."

Roughsey (1971a) added: "We are being feared by all the tribes around the island and also on the mainland [for their flood making abilities]. As a young lad I saw three sack of clothing, food and tobaccy [tobacco] sent to my family from the tribes at Burketown. With it was sent a message stick, asking my family not to make any more flood." This indicates the strength of religious beliefs throughout the region and the valued productivity and perceived potency of such increase rituals which were carried out at particular "story place" sites (Aboriginal English) for all manner of species.[11] But this appeasement practice also suggests that such large tidal floods were recurring events that had resulted in this cultural institution of flood-making.

A search of old Queensland newspapers reveals a series of floods from this period that impacted on the newly-founded pastoral runs. These reports could possibly refer to the above incident although they pertain to a slightly earlier time period than Tindale's data suggests, but they do give an indication of the scale of impact of such extreme weather events. Some examples:

> "Some stations were 4 feet under water, and nearly everything was swept away, whilst one man was drowned. Very heavy losses of sheep -one owner lost 3,000, another 2,000 … Some of the stations further down have been swept away, rations and all" (*Cleveland Bay Express* 13 March 1869).

[10] Note that it is unlikely that Percy Loogootha was alive at the time. His birth date was given as 1922 in the Native Title Claim (Evans 1998:112).

[11] The Kayardild also had a wind/storm story place in their near-shore seas.

> "people at Leichardt station … went to boat and crawled into trees to escape the floods, where they remained for 5 days and nights … 9, 000 sheep and a shepherd drowned, and a large number of sheep were seen floating off the Albert Heads" [Albert River near Burketown] (*The Queenslander* 31 March 1870).

> "Houses at Normanton washed away by floods" (*The Queenslander* 6 February 1873).

It is thus clear from the early newspaper reports (albeit brief) that a number of these extreme weather events impacted on the southern Gulf in the late 1860s and 1870s. Their reported severity indicated that the extreme flooding of Yangkaal country reported in the Aboriginal oral history was plausible and necessitated a negotiated retreat into a neighbour's country for at least a year. The implication here is critical for understanding the likelihood of such retreats occurring on a regular basis; at least one in a hundred or so years through the several millennia of occupation history.

> "Previous conceptions of colonisation events in the Wellesleys may be too simplistic and emerging models will need to account for the possibility of periodic island abandonment and multiple colonisation events, punctuated by periods of coresidence with cultural groups on larger islands or the mainland. At present, we are unable to distinguish between multiple-colonisation with standard rates of lexical change and a single colonisation with slower rates of lexical change. To distinguish between them, we will need more fine-grained excavation data, capable of identifying discontinuities in occupation, as well as better dates from Mornington Island that give us another calibration point for checking the rates of linguistic change against archaeological dates. Ongoing investigation of these issues will create opportunities to achieve a more nuanced understanding of cultural change and isolation in the Wellesley Islands" (Ulm et al. 2010:41-42).

A key conceptual change we have come to since this passage was written is to reject the assumption that linguistic fissions occurred precisely with colonisations. Rather, fissions may have occurred significantly later than a group's initial expansion into new territory, partly in response to environmental or social pressures as we described above. Consequently, since occupation times and fission times may not coincide, we do not expect archaeological dates to settle questions of lexical change rates.

8. Conclusion

This exploratory paper opens up a new set of conjectures and lines of enquiry for understanding the complexity of the colonisation of the coastal lands and islands of the Gulf of Carpentaria in the Holocene, drawing together linguistic, archaeological, anthropological and environmental data. Instead of a series of successive fissions from the earlier proto-Tangkic group, we have posited a dynamic process of fissions and fusions, in order to correlate a Tangkic model of linguistic change and associated cultural change with archaeological, geomorphological and climate change models. In an exploratory approach we have flagged some of the salient features of the environmental changes that we consider necessary to take into account in explaining and modelling this sequence of change events. In so doing we are proposing a new phase and set of goals for studying the past of Tangkic people in the Wellesley region. We trust ongoing transdisciplinary research will test the explanatory capacity of the model we have postulated. A particular geo-linguistic analysis we are keen to pursue is the evidence for the transposal of local place names from Mornington

Island to Bentinck Island as well as signature sacred sites which appear to have occurred in the colonization process by the Kayardild, resulting in a complex system of 'traditional-ownership' geography.

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