Chapter 5

What exactly is a fish trap? Methodological issues for the study of aboriginal intertidal rock wall fish traps, Wellesley Islands region, Gulf of Carpentaria, Australia

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5.1 Introduction

The authors and their colleagues are currently re-activating a large-scale research project on the pre-history and cultural change of the Aboriginal people of the Wellesley Islands and adjacent mainland in the Southern Gulf of Carpentaria (figure 5.1). It includes a study of rock wall fish traps. In this paper we outline a range of methodological problems which impact on the way our fish trap research might be grounded and theorized. In this paper we address the question of what are the most useful conceptual units for traps and how that decision influences the way we measure densities of traps for inter-island and inter-group comparisons. Understanding the relative ages of proximate fish traps and whether they were used contemporaneously become further complicating issues. We explore these questions as essential components of a general methodological debate on fish trap research.

Why is the question 'What is a fish trap?' relevant to global perspectives on the archaeology of islands? Why is such a prosaic question of potential importance to issues of Australian Aboriginal offshore colonisation? Few places in Australia have had such a significant input into archaeological considerations of Aboriginal offshore island colonization than the Wellesley Islands. The archaeological substantiation for this influence is however, minimal.

The largest of the 15 Wellesley Islands, Mornington, and various smaller surrounding islands, are home to the Lardil people. Mornington is linked to the mainland by a number of smaller 'stepping-stone' islands. These intervening islands, home to the Yangkaal people, approach the mainland at Bayley Point. The mainland was occupied by the Ganggalida. This mainland coastline and the North Wellesley Islands are inter-visible in all seasons, with easy crossings over no more than 3.5 kilometre of open sea, traditional transport being by timber rafts. The South Wellesley Islands lie east from Bayley Point, the largest being Bentinck, home to the Kaiadilt people. The

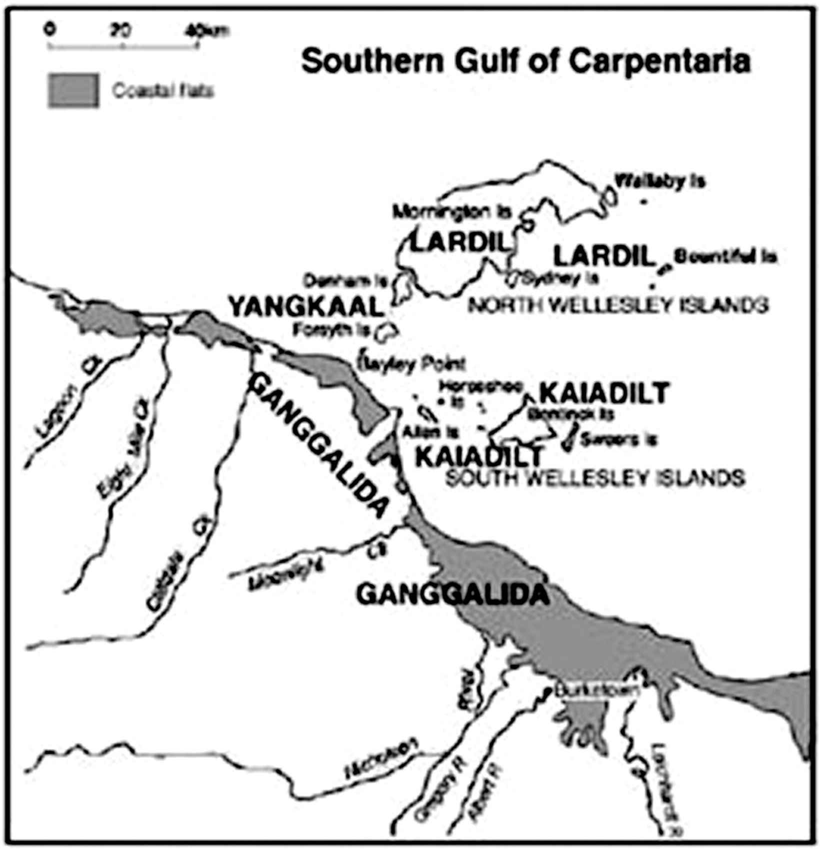

Figure 5.1: Wellesley Islands and the mainland coast showing the territories of the four Aboriginal study groups.

open sea gap between the mainland and the South Wellesleys (10.5 km) is more substantial than in the North Wellesleys, and was sufficiently challenging on rafts that the voyage was not undertaken lightly, perhaps several occasions in one's lifetime (Evans 2005).

In the early 1960s Norman Tindale and colleagues of the South Australian Museum undertook socio-cultural and biological research amongst the Islanders, and particularly amongst the Kaiadilt (Tindale 1962a, 1962b). Tindale's work led to several significant findings that have influenced debates about the Aboriginal colonisation of offshore islands. Tindale (1977, 1981) argued that:

- There were important differences in language, social systems, material culture and biological markers—most significantly the presence amongst the Kaiadilt of rare blood type for Aboriginal Australia;
- the Kaiadilt were an isolate of early Australian settlers who "bore the mark of Wajak" (referring to Pleistocene Java), and their social system, technology and material culture were impoverished due to lack of contact with other island and mainland groups; and
- the distance separating Bentinck from the mainland marked the limit for sure and successful movement by people using simple watercraft.

Recent linguistic, anthropological, archaeological and geomorphological research has challenged these assumptions (Memmott et al. 2004; Evans 2005). The upshot of this research indicates that the Kaiadilt are not a relict population—linguistic evidence for example, points to them having settled about 1500 years ago. The 10.5-kilometre distance is not the barrier to travel assumed by Tindale—Allen Island near the mainland coast is identified Kaiadilt country, and was periodically visited.[1] There were clearly cultural commonalities as well as obvious differences. These differences reflect a number of factors including the likely sequence of island settlement and the variation between the North and South Wellesley Islanders in the degree of permeability and acceptance of social transmission and socioeconomic adaptations.

Although the picture of isolation presented by Tindale was exaggerated, the debate about isolationism still remains. New data and arguments indicate a more complex set of relationships than Tindale envisaged, and the case of the Kaiadilt has become more important. Is there some archaeological substantiation for this picture? Can the archaeology provide some time depth? Can it point to changes in technologies? Can it assist in the identification of significant environmental changes that might have influenced events? Can archaeological markers that might culturally differentiate groups be identified?

The answers are 'maybe' and 'yes'. Archaeological reconnaissance indicates that traditional forms of archaeological evidence of the Southern Gulf are limited. There are no large rockshelters on the mainland or in the islands. There are no large shell mounds, although some small ones have been investigated. Much of the stone for manufacturing artefacts is imported from outside the region. Shell is quickly eroded in the warm, wet conditions. Sites with long stratigraphic sequences appear to be rare, if they exist at all. Three test excavations by Robins on the mainland have provided ages ranging from 1500 to 400 BP, whilst two sites on Mornington have provided basal dates of 5780 and 1710 BP respectively. Another potential source of archaeological information could come from human remains, however there are a number of cultural sensitivities that make this a difficult option to explore in the contemporary context.

The most prominent form of archaeological evidence is in the form of fish traps which have been created by building rock walls in strategically placed points of the intertidal zone (figure 5.2).[2] Fish, turtle, dugong, crabs, and shellfish can be obtained from them, although they have not been in regular usage since the early contact period.[3] Reconnaissance surveys of most of the

[1] See evidence submitted for Wellesley Sea Claim. However the Ganggalida and Yangkaal also claim rights in Allen Island, and successfully argued so during the Native Title claim in the late 1990s.

[2] The first written accounts of these fish traps appear in early exploration and colonial records (Boyd 1896:57, Roth 1901a)

[3] For the Lardil and the Yangkaal this period intensified in 1914 with the permanent establishment of a Mission on Mornington Island whilst for the Kaiadilt, traditional lifestyle was more or less maintained until the late 1940s. The Ganggalida however, being on the mainland experienced violent contact and degrees of local disruption as early as the 1880s (Memmott 1979:Ch. 6).

Figure 5.2: The typical fish trap of the Wellesley Islands with a single-wall and layout adjusted to substrate contour; located outside a fringe of mangroves, Allen Island. (Photo by Connah and Jones of the University of New England, 12/5/82.)

Wellesley Islands and the mainland between Moonlight Creek and Bayley Point, as well as aerial photo interpretation, ground surveys[4] and ethnographies of their use from traditional owners, indicate that there are some 108 fish trap sites containing at least 334 traps.[5] This makes it the largest complex of stone walled fish traps in Aboriginal Australia. Their distribution is limited to the coastlines of the North and South Wellesley Islands and along the mainland coastline opposite those islands (a coastal stretch of some 43 kilometres).[6] They represent an aspect of shared material culture throughout this area and demonstrate a regional cultural similarity in technology. (Robins 1983, 1998, 2000; Memmott et al. 1984; Memmott 1985, Robins et al. 1998; Trigger 1985, 1987; Memmott and Trigger 1998:114). The subtle differences in the construction, use and design of these traps between the four language groups remains the subject of ongoing investigation by the authors and their colleagues.[7]

How might the traps contribute to an understanding of cultural dynamics and diversity? The most striking characteristic of fish trap distribution is the variation in densities of traps between islands. The lowest densities are to be found in the Lardil country amongst the Lardil in the North Wellesley Islands, whereas the highest densities are to be found amongst the Kaiadilt in the South Wellesleys and the Yangkaal of the smaller North Wellesley Islands. Bentinck Island, in Kaiadilt country, is enormously rich with an average of one site every 0.9 kilometres and one trap per 0.4 kilometres. In contrast Mornington Island, the largest island of the Wellesleys and occupied by the Lardil, has traps at roughly every 20 kilometres of coastline.

Why this difference in density, expecially between Lardil traps and Kaiadilt ones? Our preliminary investigations indicate that the variation in numbers is not directly related to access to rock sources or to particular types of marine or terrestrial environments. An alternative hypothesis to explain the variation is that whilst the insularity of the Lardil facilitated cultural independence, at the same time the closeness of the islands facilitated regular trade and exchange of technologies and beliefs. This interaction permitted participation in socio-ceremonial events which fostered the use of large fish-nets rather than stone-wall traps. Whereas the Kaiadilt, due to their relative isolation, vigorously maintained a sense of social differentiation and underwent a process of local intensification through the specialized development of trap technology. However, the evidence is more intractable than it might first appear, and there are a number of issues that need to be

[4]Ground surveys coupled with ethnographic recording were undertaken on selected traps at Bayley Point, Point Parker, Mornington and Sweers Islands.

[5]Four techniques were used to identify the location of fish traps. The first was an aerial survey conducted in 1983. Low altitude flights in a small aeroplane were conducted over most of the islands and mainland. Fish traps were identified, counted, photographed obliquely and plotted on to topographic maps. The second technique involved ground truthing and documenting some of the identified or known traps on the mainland coast, Mornington and Sweers Island. Where possible plans were made and photos and measurements taken. The third method involved the identification of traps from aerial photographs and then plotting them onto master maps. The fourth method involved using local Aboriginal knowledge to elicit and identify traps, often during trips for other research purposes.

The quantity of ethnographic data elicited in preliminary interviewing with the members of the Aboriginal study groups varied inversely with the depth of their culture contact. Hence the least information was obtained from the Ganggalida whose cultural disruption had commenced in the 1880s, or possibly earlier. There is a medium corpus of data from the most elderly Lardil informants who are relying on their memory knowledge of the earliest years of the Mornington mission (1914-1925) and the period just prior to this (1905–1914). The most detailed information comes from the Kaiadilt who were using their fish traps at the time of their migration to Mornington mission (1947–48), and who then built a trap in the proximity of their new camp in the Mission and used it for several decades (Memmott 1979:243, 1982:38, 41A).

[6]The rock wall fish traps on the mainland coast are on that southerly part of the Gulf of Carpentaria coastline that is oriented roughly in a north-west/south-east orientation. The most south-easterly of these traps (as located to date by the authors) is at approximate latitude 17°14.5' (aeroplane GPS reading: S17°14.451', E139°10.674'.) The nearest map landmark to this trap is the mouth of James Creek about 2.25kilometres back up the coast (i.e., NNW of the site). The most north-westerly of the traps (as located to date by the authors) is at Bayley Point shown on topographical maps at latitude 16°55'. The distance between these two extreme locations tracing along the undulating mainland coastline is about 43 kilometres. Robins and Trigger have determined the extent of the traps along the mainland coast through a combination of (i) the knowledge of Ganggalida Elders (or ethno-geographers, e.g., Willie Doomadgee), (ii) observation by aerial passes, (iii) ground truthing. Checks were made as far as Eight Mile Creek, some 53 kilometres WNW of Bayley Point.

[7]The colleagues assisting us with our ongoing research in the Wellesley region are Dr Ian Lilley and Dr Sean Ulm of University of Queensland, Prof Nick Evans of University of Melbourne, Dr David Trigger of University of Western Australia, Dr Neville White of La Trobe University and Dr Sheila Pellekaan-Holst of University of New South Wales.

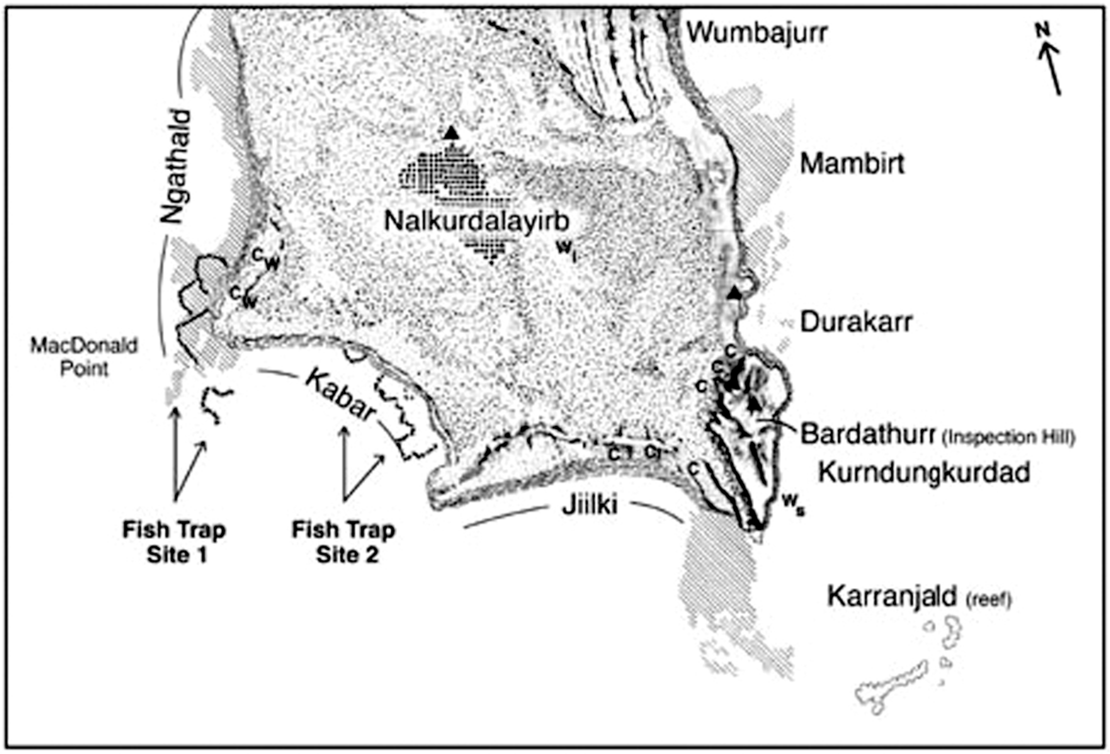

Figure 5.3: Map of southern end of Sweers Island in the vicinity of Inspection Hill and MacDonald Point showing environmental units with Aboriginal geography and the location of two fish trap sites at Ngathald and Kabar. Note the use of party walls and undulating walls in the trap designs. (Source: Map of Ringurrng by Paul Memmott 1982, made with Darwin Moodoonathi and Arthur Paul.)

addressed before we can make definitive statements about trap density and variation (let alone degrees of insularity).

5.2 Problems of selecting trap units

In trying to decide what units we should be defining and analysing in a study of fish traps, an initial problem comes from our access to different types of aerial photographs. The oblique aerial photos shot with hand-held cameras during several surveys (1981–2004) are in different formats[8] and at different stages of the tide. Similarly, the 1983 vertical aerial photos (1:25000) were taken on different days and stages of the tide. Objects like traps are recognised in all the aerial photos because of contrast (tone and/or colour) against their surroundings and the degree of linear coherence in the image. Recognition of trap walls in the oblique photos is relatively easy because they were visible targets for the airborne photographer. Locating traps in the vertical air photos is more problematical because of the scale factor: a 25-metre long wall is only one millimetre long in a contact print. Consequently, much of our work with the vertical aerial photos has required optical magnifications and enlarged prints. In addition, photography at high tide may have obscured many traps through submersion, and windy conditions may have created turbid water reducing the visibility of some traps. Despite our care and cross comparisons between oblique and aerial photographs, we expect additional work will add new traps to the 334 confirmed.

[8]35-mm SLRs, 70-mm Hasablads, panchromatic and colour film.

A current task of the authors is to map all fish traps and their surrounding coastal land systems at a scale of 1:25000. This will enable us to carefully re-count the numbers of traps and re-compare relative densities of traps. However this raises the question of what are the most useful units to consider. For preliminary working purposes, a 'fish trap' was defined *as a constructed rock wall enclosing a space for the purposes of trapping fish and other marine animals through the action of tidal movement*. The enclosed space can be termed the 'pen'. A 'fish-trap site' was then defined as *a cluster of fish-traps and/or associated rock wall features in close proximity*.

A trap therefore according to this definition is identified primarily by the space enclosed in the pen, not the number of walls. However, the incorporation of natural features into trap construction, and the weathering, deterioration and burial by sand of some walls can make the identification of individual pens difficult in some cases. But why should we be identifying pens as opposed to walls as units? And what of those cases where there are common walls to several pens? Should we identify more complex units?

One issue is how to identify two segments of a wall which line up with one another, but are separated by a small gap. Is this one wall, perhaps with a gate, or two discretely separate walls? Is it one wall with a portion dismantled, destroyed or covered with sand? Or do the two pieces of wall belong to two partially destroyed traps? Should it be identified as one unit or two units? Given the possible range of reasons here for the gap (if it is a gap), it would be methodologically wiser to count such a feature as two wall units.

The problems of identifying what constitutes a pen are even more difficult. Although we assume we can easily identify a pen when we see a roughly semi-circular shape with walls characteristically extending from the high tide line at right angles to the shore, there are nevertheless many walls or sets of walls which do not readily conform to this pattern. For example consider figure 5.3. At fish trap Site No. 1, the two more southerly walls form only semi-enclosed pens, not being oriented to the shore; whereas at Site No. 2 there is an undulating wall that could be interpreted as one large pen or several smaller pens. In figure 5.4, two lengths of wall (one of which is again undulating with three or four corners) are connected into a stand of mangroves. From the aerial photo it is not possible to discern whether this is one continuous wall, but if so, is it one trap, two traps or five traps?

Another methodological problem of trap identification is the confusion that arises when a natural reef or rock formation forms a natural trap and the tendency for local Aboriginal people to identify this as a 'trap' made by their ancestral heroes or creator people. This can be termed a 'naturefact' in material culture theory, after Oswalt's (1973, 1976) taxonomy of material culture items. Naturefacts are unmodified natural objects that are used consistently by a group to obtain food or water. In the case of a naturally occurring fish trap, Oswalt would further classify it as an 'intended facility'; a 'facility' being defined as a part of the environment that might attract, contain, hold, restrain, or direct an animal or other resource (as opposed to an 'implement' which is defined as a natural object that is physically transported to use as an instrument or weapon).[9]

In addition, we can consider the case of a naturally occurring substrate enclosed largely by rock outcrops and/or sandbanks or spits of gravel or shell, which only requires a few short pieces of wall to be constructed to seal it up into an effective trap. In such a case it may not be possible to readily discern the human-made pieces of wall and one may easily mistake an artefact for a 'naturefact'. Such a problem of classification is evident at Bountiful Island where Lardil consultants have identified two traps as manufactured by their ancestor *Marnbil* (figure 5.5).

To sum up, trap features that can be recognised in the aerial photography could be: a single trap with a clearly identifiable pen, or; an identifiable trap site but whose division into individual units is unclear or ambiguous, because not all features form obvious pen shapes, or; a trap-like feature that may actually be a natural rock formation (table 5.1).

[9]The usefulness of Oswalt's taxonomy is in the comparative study of the relative complexity of different material cultures.

Figure 5.4: Two lengths of wall connected to a stand of mangrove trees, Bayley Island. Is this one continuous wall and if so, is it one or two traps? (Photo by Connah and Jones of University of New England, 12/5/82.)

Figure 5.5: An inter-tidal rock platform on (large) Bountiful Island asserted by the Lardil to be a fish trap created by the Ancestor Marnbil. Signs of constructed rock walls are not obvious from aerial reconnaissance. There are however many rock pools which would yield a rich catch of food resources.

Problem	Source
False positives	Geological feature that resembles rock wall
Missed positives	Traps missed during systematic search of aerial photos due to: Trap decayed and weathered, losing its linear visual coherence Trap not visible through lack of contrast of rock wall colour on substrate Trap obscured by depth of water at time of survey Trap obscured by turbid water at time of survey Trap buried by sediments Trap too small
Wrong search model	Should a 'naturefact' be included if indigenous consultants identify it as a fish trap made by Ancestral Beings? Insufficient ethnographic data to understand the design and functioning of certain trap types, resulting in erroneous interpretation
Problematic unit description	Integrity of walls lost due to weathering, burial, rock removal Integrity of pens lost due to loss of integrity of walls Observer failure to appreciate more complex traps forms and whether all of the proximate walls were in contemporaneous use

Table 5.1: Summary of problems with identifying rock wall fish traps by aerial photos at 1:25000.

5.3 Understanding design and subsistence usage and how it effects interpretation of units

Lardil consultants[10] have given *derdernin*[11] as the name for the rock wall fish trap, whilst the Kaiadilt[12] call their traps *ngurruwarr*. All groups asserted that they caught not only fish, but turtle and dugong in traps. Other by-products were crabs obtained from the crevices within and underneath the rock walls, oysters from on the rocks themselves, and a range of species of shellfish from the muddy and sandy substrates of the traps.

The use of rock wall traps was under the direction of the local patriclan country custodian. With his (or her) permission, traps could be used whenever tidal conditions were suitable. In the most advantageous conditions, numerous fish were said to be left stranded on the floor of the trap when the water had completely run out. They were easily collected by hand (by men or women) or with a pronged fishing spear (by men), and carried ashore in bark containers or small hand-nets (figure 5.6). Dugong and turtle could be stranded in the same way but this was more likely during the biggest tides when the tops of the walls were covered with a substantial height of water. Such tides were associated with the sea surges of cyclones and/or the large influx of freshwater from the Gulf streams during the wettest summers. Lardil consultants stated that there were different types of traps for catching dugong, turtle and fish, and referred to a 'double trap' at the northern end of Mornington Island,[13] one part being for fish and one for dugong. This may refer to the combination of an inner and outer wall situated on a higher and lower substrate contour respectively.

By all appearances the Kaiadilt traps seem identical to those of the other groups. However Lardil consultants noted that many Kaiadilt traps encompassed 'bigger paddocks', containing a 'lot of weed'. This implies that the Kaiadilt have in some cases built large traps on areas of muddy substrate where sea grasses grow, which attract grazing dugongs and turtles; and further suggests that the Kaiadilt were more dependent on stone-wall traps than the Lardil to catch dugong and turtle. We intend to investigate this hypothesis with our ongoing research through a comparison of fishing technology repertoires. The Lardil employed a series of hibiscus rope nets for hunting dugong, a material culture item not used by Kaiadilt. We also note that the Aboriginal Protector,

[10]Kelly Bunbujee, Fred Jaurth, Henry Peters, Scotty Wilson and Pompey Wilson (all now deceased).

[11]The Lardil dictionary gives *derndernyin* as the term for a 'fish trap made of stones' (Ngakulmungan 1997:102) but provides *derdernyin* and *derdernin* as alternative recordings. The term *derndernin* was recorded by the linguist Ken Hale in the late 1960s from his Lardil informants (Hale *et al.* 1981). Also see Evans (1992).

[12]Pat Gabori, Maude Gabori, Roongka, Arthur Paul, Fred Bijarib. (The last three were deceased at the time of writing).

[13]In the country of Sandy and his son Maurice Sandy (both deceased) near White Cliff.

Figure 5.6: Ronnie Jupiter spearing a crab, Bayley Point, on a falling tide, September 1983. Note that the fishing spear was a male-specific implement. The wall is cemented together with oysters. (Photo from Trigger 1985:127.)

Dr Walter Roth (1901b) was informed of an 'alleyway' constructed by the Kaiadilt somewhere on the south-west side of Bentinck Island, to trap dugong. One of the highest densities of fish traps in the study region occurs at the south-west corner of Bentinck Island (see figure 5.12).

A second method of harvesting fish could be used prior to the trap becoming emptied, once the tide had fallen below the top of the wall. Fish were 'herded' into schools and towards one or more spearsmen by individuals hitting the surface of the water. Another technique was to simply walk along the walls spearing fish, as the tide fell. Similarly, it would be possible for dugongs to be chased by men on rafts into the shallower water where they became grounded and/or could be easily speared.

Numerous changes in wall direction can be explained by the stratagem of reducing construction labour by taking advantage of the highest area of the irregularly contoured substrate on which to position the wall. In this manner, various pieces of naturally protruding rock substrate could be designed into a wall under construction, as well as areas of elevated mangroves being used as part of the side (or wing) walls. However there is a further possible design criterion influencing the trap layout, evident from a preliminary examination of data, that of positioning an outer apex (i.e. the point of a V shape, albeit noting that seldom is it a perfect V shape), to coincide with a channel system of small runlets of water (visible at very low tide when the last waters recede), and which flow together to make a larger channel, draining out to sea. When the tide is rising or falling these streamlets become channels where the current is strongest, and through their velocity naturally direct and carry fish travelling inshore and offshore when the tide is changing (figures 5.7 and 5.8). Thus as the water in the trap falls with the tide, it will drain to the V point of the trap leaving a large pool in the lower part of the V, thereby concentrating the fish into one area. Several choices are then presented as to how to harvest the fish and there is clear evidence that at least three methods were employed. First the fish could be speared (by men). Secondly one could wait until the trap fully drains and pick up by hand any fish that might be stranded on the substrate in the V point.[14] Thirdly the fish could be netted by either men or women,

[14]However the authors know insufficient about fish behaviour to understand whether a fish caught within a trap or a receding tide has a behavioural capacity to seek to escape from the trap whilst the sea level is sufficiently high

Figure 5.7: Trap wall at low tide, showing a drainage channel and indicating a likely point to design in a gate. (Ref. RB 5668/7, AERC L8/2-158).

facilitated by a gate in the wall at the V point formed by removing a few rocks. The gate was left open on the rising tide, and then shut on the falling tied often with mangrove foliage (*Avicennia eucalyptophylla* or *Rhizophora mucronata*). Gaps were found in the foliage 'doors' and hunters could station themselves at these points with small purse-shaped hand nets, whilst others chased the fish in the emptying trap towards these points.

Lardil Elder Kelly Bunbujee has provided one of the authors (PM) with a typology of traps as shown in figure 5.9. The enclosed wall or *derdernin* is used for harvesting on a receding tide by spearing or picking up, the two-walled race or *baljan* for chasing and spearing, and the gated semi-circular trap *yilin* for chasing and netting.

A geometric method of classifying enclosed pens is as V shapes, curved shapes, or rectilinear shapes. One of our colleagues[15] has pointed out that a circle is the most effective (least lineal distance) in enclosing a large area. However, we have rarely seen a perfect semi-circular trap shape.[16] A further consideration is that rectilinear shaped traps are mechanically more susceptible to wave damage than V-shaped, pointed or curved ones (Bowen and Rowland 1999:3). Although Kelly's three categories occur in the Wellesleys, there are many more units and complexes which do not conform to these categories.

A refinement of the V corner with gate, evident in the Kaiadilt data, is what we have termed a 'pocket' whereby the corner gate leads the fish into a small fully enclosed pen, a contained area where they might remain alive for some time before the water drains away (figure 5.10). This would be a useful technique if only one or two individuals were attempting to harvest a large number of fish (a dozen or more), allowing time to transport a portion of the catch to land to a protected storage point without scavenging birds or dogs stealing any dead fish.

Yet another technique of trapping fish that can be discerned from an examination of the aerial photographs involves a curved trap wall, but rather than being oriented to the shore to catch a falling tide, it is oriented to catch fish travelling with currents flowing parallel to the shore. An example can be seen in the map in figure 5.11 at *Murarri* on Sweers Island (which also appears to have a pocket trap in its southern corner).

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and before it drops below the level of the wall. This needs to be tested in an experimental usage of a trap. (This will initially take place at a Kaiadilt outstation at *Nyinyilki* on south Bentinck Island.)

[15] Mike Rowland, Queensland Environmental Protection Authority, Brisbane.

[16] Another colleague has observed Torres Strait Island traps are neater in shape than Wellesley ones but they are all located on relatively flat substrate (Dr Ian Lilley).

Figure 5.8: Trap wall designed to take advantage of a rocky substrate and a drainage channel system. (Photo by Errol Stock, July 2004.)

Figure 5.9: Three categories of rock wall fish traps according to Lardil consultant Kelly Bunbujee (deceased): the enclosed wall, the race, the gated semi-circle (1983).

Figure 5.10: Part of a complex of rock wall fish traps off the south-west corner of Bentinck Island, with a pocket trap in the apex of a large pen. (Photo by Richard Robins.)

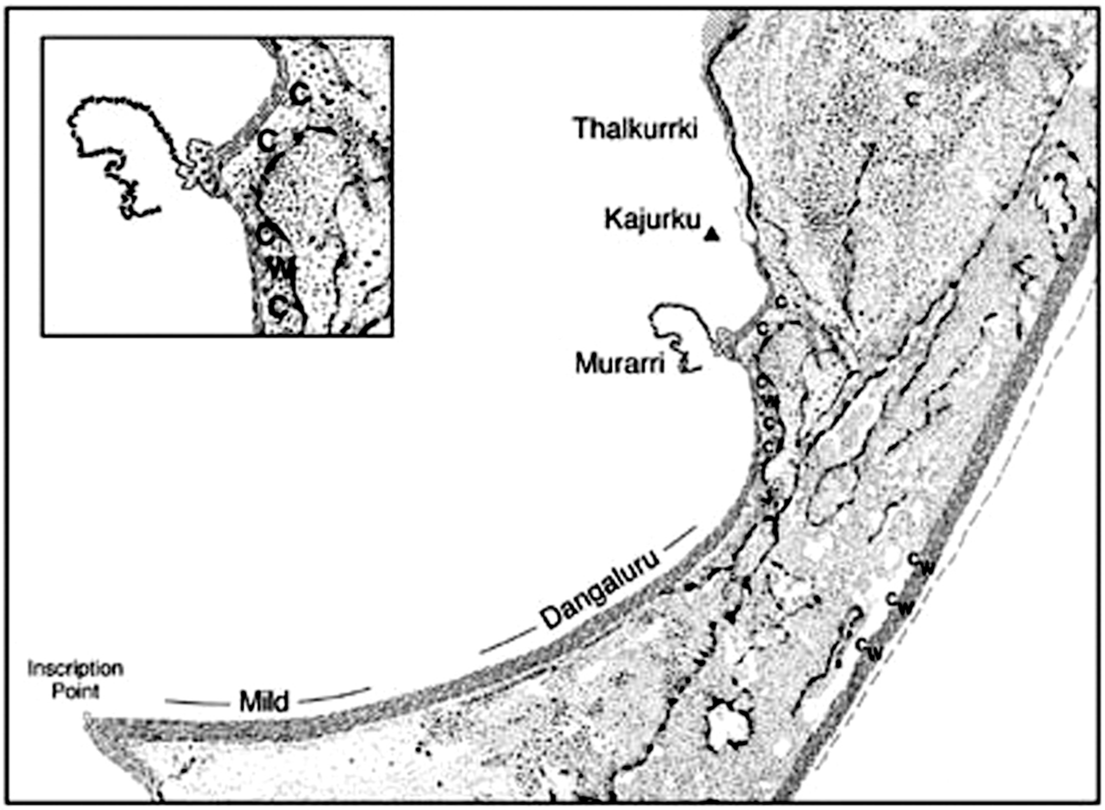

Figure 5.11: Map of Central Sweers Island in the vicinity of Inscription Point showing environmental units with Aboriginal geography and the location of a fish trap at Murrarri. Note that the trap is designed to catch fish moving with currents parallel to the shore. (Source: From map of Ringurrng by Paul Memmott 1982, made with Darwin Moodoonathi and Arthur Paul).

One of our later fieldwork tasks will be to address the various reasons why irregular and/or complex wall patterns occur. As noted, a key issue is likely to be substrate properties—undulations in sediment, small channels, rocky protuberances and outcrops and local run-off patterns—which in turn affect the design layout of a trap, with trade-off decisions being made to maximize yield but simultaneously minimize energy in construction.[17]

5.4 Measuring trap density and its significance

In his arguments for the scientific and cultural significance of the Kaiadilt, Tindale placed strong emphasis on his finding of high population density in relation to coastal exploitation. He calculated that the total area of the Kaiadilt islands[18] is about 181.3 square kilometres, with about a quarter of this area being littoral. Some 137.2 square kilometres is land, of which about a third is barren interior claypan. Tindale then calculated for those South Wellesley Islands which were regularly occupied and readily accessible in 1940, the last year when all Kaiadilt were present in their traditional lifestyle, that only about 14 square miles of reef were in constant use, giving a population density of over eight persons obtaining food on each square mile of reef, equivalent to over three persons per square kilometre. Tindale concluded that these figures were "remarkably high for a 'stone age' people", and that in "the southern parts of Australia, even in areas of high rainfall the figures for the most dense populations seemingly went no higher than about one person per two square miles..." Later Tindale (1977:249) suggested that the population density in the South Wellesleys was "one of the highest known for a living stone tool using people depending on foraging for their existence". Our revised calculations of fish trap units and densities will enable a reconsidered critique of Tindale's arguments on density.

One of Tindale's Kaiadilt consultants explained how the various South Wellesley clan groups had differing potential to build and exploit traps depending upon certain geographic properties of their estates. Tindale interpreted his informant's information as follows:

> Dolnoro S, U, and X people [the estates of Oak Tree Point, Raft Point and the western point/Albinia Is. groups] have reef areas which they can work throughout both the NW and SE trade wind seasons, their NW season fish traps, etc., being built on the lee side, and so protected, and the rest protected during the opposite season. Some other hordes-people can only be sure of fish supplies for about one-half of the year because fishing is often difficult on a windward shore in boisterous weather. Such folk have to depend to a larger extent on estuaries and the foods in mangrove swamps. The people of Dolnoro S have hard rock reefs and can build very substantial fish traps denied to some others who have only fragile coral to work with. (Tindale 1962b:304)

These geographic determinants can be summarized as availability of rock supply and availability of sheltered trap sites for both prevailing winter SE winds and summer NW monsoons. However Kaiadilt consultant, Arthur Paul (dec), provided Memmott with an interesting anecdote of animal behaviour which represents an alternate hypothesis. He described the walls as windbreaks, and explained that when surface conditions were choppy, schools of fish sought out the fish-trap walls against which to shelter from those prevailing boisterous winds. If on a windy day a hunter visited a piece of windward coastline, he could expect to find fish sheltering inside traps close to the walls.

Notwithstanding this latter proposition, a significant theoretical question then is whether the relative densities of fish traps were determined by geographic and environmental factors (e.g., protection from prevailing winds, regular habitat usage by marine fauna), or whether additional

[17] A further issue that is a possible reality given the local traditional practice of increased ritual at 'Story Places', is that a small number of wall features may be constructed as increase centres; they may not actually be used as traps.

[18] Tindale includes Bentinck, Sweers, Allen, Horseshoe, Albinia, Douglas, Bessie and Margaret (or McCarthy) Islands in his calculation.

cultural factors come into play in explaining the distribution of traps (e.g., limits of estate boundaries). The biophysical and cultural factors determining fish trap location are complex. Our research will identify which factors are the critical ones, but this is the subject of a separate analysis. What can generally be said at this early stage is that there is a widespread availability of suitable rock on all islands, and that lack of rock availability does not appear to be a key determinant in explaining the wide variation in trap densities between the Kaiadilt and Yangkaal on the one hand and the Lardil on the other.

Measuring fish trap density might provide a measure of the degree of local productivity of the fish trap technology and enable comparisons between islands, cultural groups and local clan groups on their degree of economic reliance on this technology. For example, we have already suggested the Kaiadilt relied more intensely on fish traps than the Lardil. In support of this hypothesis, refer to figure 5.12, an aerial photo of the south-west corner of Bentinck Island with most (but not all) trap walls enhanced for clarity. Features include both small and large traps, many inner and outer traps, party walls, lineal walls (no obvious pens), a pocket trap and one on-shore to off-shore sequence of four successive pens. A similar density of traps pertains for the southern end of Fowler Island (to the south-east of Bentinck). These two examples represent the highest densities of traps in the Wellesleys from our preliminary visual inspection of aerial photos, even though the precise calculation of such remains a methodological difficulty.

In order to explain such a high density, let us reflect on the dynamics of demography and fish traps. A possible simple scenario is as follows. A small Kaiadilt clan builds a trap and it yields an adequate supply of fish supporting the group. Over generations the clan population grows. The threshold of a sustainable yield is reached and then passed, resulting in the necessity to build another trap. There thus may be a direct relation between population growth and fish trap reproduction.

However in the case of the Lardil with the advent of large net fishing and dugong net hunting, there was a capacity to obtain a larger yield by drawing several clans together for multiple large net practices, as an alternative to the use of traps, albeit only under suitable climatic and social circumstances. The Kaiadilt could not so readily achieve this option, having only a smaller population on which to draw (notwithstanding feuds) and no way to readily draw mainland people over to Bentinck (in contrast to Mornington).

The above raises the methodological question, how should we measure the density of traps? Do we calculate numbers of wall units, trap units, or fish trap sites, per lineal coastal kilometre, or the summated area of pens per coastal kilometre?

The density of traps per kilometre of coast, however we measure it, may not necessarily be a useful measure of productivity. There is insufficient evidence in the Aboriginal Australian ethnography to argue that larger traps yield a directly proportional quantity of fish and hence support a larger population (Bowen and Rowland 1999:34–35). Nevertheless if we cannot assume a direct relationship between pen area and yield, we still may be able to make comparative analyses of densities for similar off-shore environments in the same geographical locale where one would expect yields to be more or less consistent.

5.5 The temporal properties of traps

Another pertinent issue when considering fish trap density is whether, amongst those traps evident at the time of early colonial contact, there were old disused traps. It so, it would be inappropriate to include them in any measure of trap numbers in synchronic use. We cannot assume all traps were for synchronic use. In fact Tindale has hypothesized the converse as recorded in his 1963 journal at *Rukuthi*[19] or Oak Tree Point on the northern peninsula of Bentick Island.

> There are several generations of fish traps. Old ones are preserved in part because oysters have sealed them to the basement rock and where there is sufficient water have

[19] His 'Rokoti' or 'Lukuti'. Unfortunately we have not obtained any drawings by Tindale of these fish traps from the S. A. Museum, if indeed he made any.

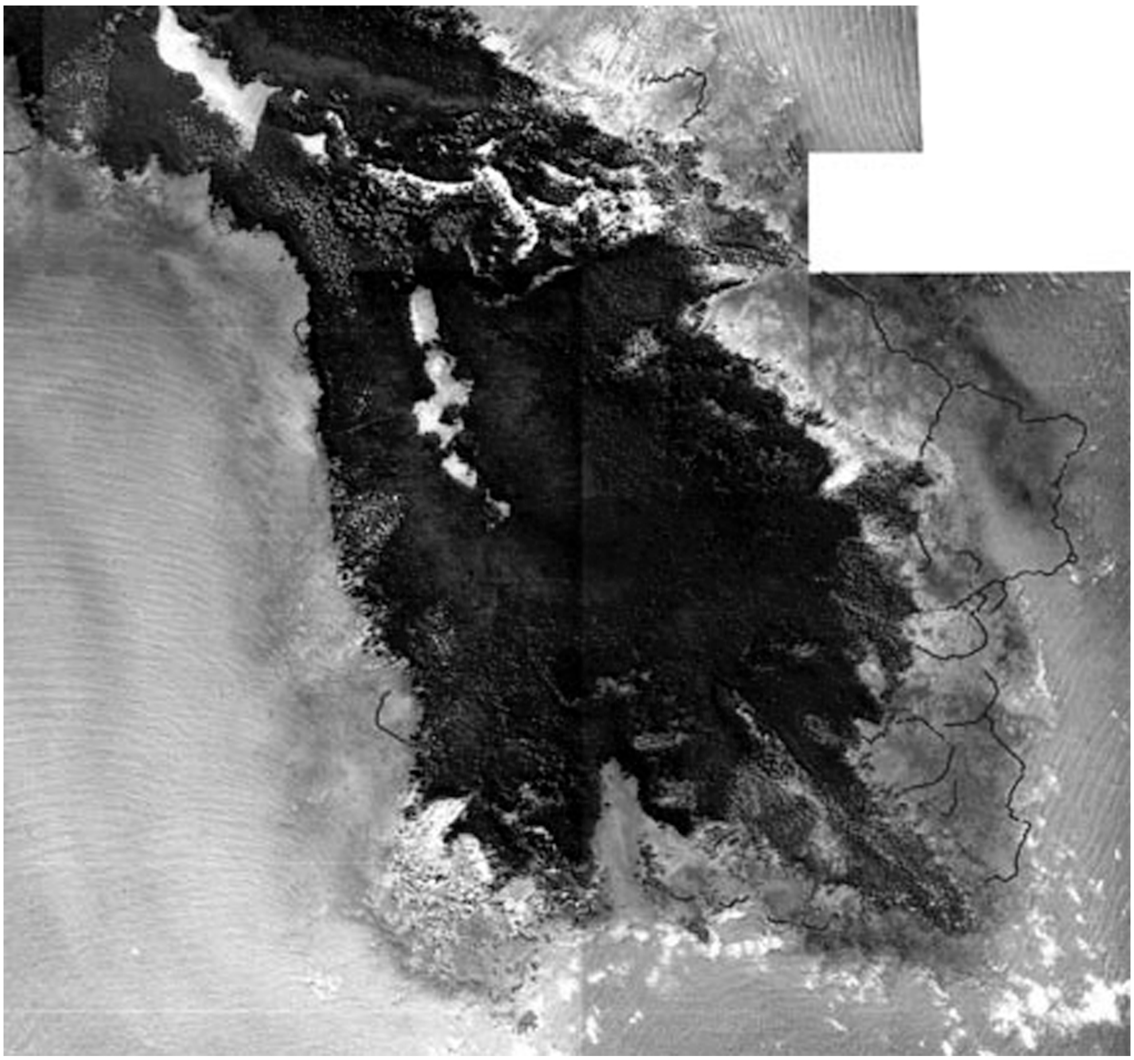

Figure 5.12: The south-west corner of Bentinck Island showing part of the large rock wall trap complex adjacent to a mangrove forest (aerial photo enhanced with line).

Figure 5.13: Illustration of a complex of inner and outer rock wall fish traps. Were these used in the same harvesting event upon a falling tide, or were they used under different tidal regimes, or are the inner ones remaining from a period of higher sea level? (Photo by Richard Robins.)

> been able to prevent their being swept away. The oldest ones with roots up to 3 or 4 feet [90–120 cm] above present day effective use were formerly covered with live oysters but these are now just dead oyster rock with boulders incorporated...
>
> At [Birrmuyi[20]] I was able to measure the depth below high tide mark of the principal fish traps with a margin of error of about a foot [300 cm]. The older ones nearer the shore are now ineffective through drop in sea level by up to 2 or 3 feet [60–90 cm] or a little more. (Tindale 1963:241)

Tindale concluded that functioning traps were over 2.1 m below highest tide (1963:237-8). He assumed the inshore traps were from a period of higher sea level but had no effective technique to date those traps. According to Stock's extrapolation (see preceding chapter in this volume) from the Australian east coast data (Larcombe and Carter 1998; Baker et al. 2001), the peak mean sea level in the late Holocene occurred around 5300 BP then dropped about 1.7 m to the present position between 4000 and 3400 BP. It is possible that as mean sea level rose, trap walls were extended higher and/or further inshore. Conversely, as mean sea level dropped some construction effort may have been concentrated at offshore sections.

An alternative hypothesis to the in-shore traps remaining from a period of higher sea levels is that a complex of inner and outer rock wall fish traps were used in the same harvesting event upon a falling tide (figure 5.13). We note in the Ganggalida data of our colleague David Trigger, a reference to people building up the walls of their traps when the tidal range becomes higher in the wet season. Traps of varying heights may have also been employed under the varying seasonal tidal regimes that occur in the Gulf of Carpentaria.

An interesting alternate explanation was suggested by another colleague Ian Lilley based on John Terrell's theory that the traps may not be very efficient at all but may be indispensable to obtaining food in an unstable environment particularly after a catastrophe, for example a tidal surge associated with a cyclone that destroys other food sources. Here is a possible hypothesis as to why the Kaiadilt and Yangkaal had more traps. They lived on relatively small islands with a comparatively smaller range of edible plant and animal species and hence potential food yield

[20]Tindale's 'Berumoi'.

in the interior land systems. On Mornington where there is a greater inland food harvest, there would be less dependence on littoral and marine food sources at such a critical time.[21]

5.6 The problem of dating fish traps

There is the further issue of whether, if a temporal sequence of wall construction based on changing sea levels was hypothesized, whether some sort of dating techniques could be used to verify such. It is reasonable to assume proximate camps would have been frequently occupied to carry out exploitation, surveillance and maintenance of the traps. Is there a possibility of correlating fish trap age with dates obtained from archaeological remains in nearby camps? For example Ganggalida Elders have demonstrated the use of a freshwater well approximately one kilometre inland from the Bayley Point traps. They stated this well site was commonly used as a camping place whilst using the traps, and the large mound of shellfish that remains was evidence of such use.[22] A critical related factor is fish bone and shell disposal, for unless such refuse is stored in a midden, a random scattering of bone and shell will weather relatively speedily in the local environment and leave no clear archaeological record of species type. Thus if there was a change in pattern of fish species consumption due to environmental change, it may not be visible in an excavation of a nearby campsite.[23] Dating midden/campsites can only provide an inferred approximation of the age of an adjacent fishtrap.

An alternate approach to dating is to look for trap sites where the possibility may exist of excavating the buried 'arm' walls of traps where they are found to be buried by later sediments. Tindale (1963:237-238) noted this possibility:

> Description of fish traps on point at Windjarukarru. 'Roots' of trap are on basement rock and cemented by oysters. One arm goes under the beach and thus established "when the sea level was a little higher than now"....These fish traps are ancient according to Percy [Loogatha].[24]

Excavations in accumulated sediment and beside the trap walls may provide materials suitable for dating (figure 5.14). These could include carbon-bearing materials deposited in the sediment. Calcareous faunal remains (sub-fossil relics) attached in growth positions on the rock wall could be candidates but suitable species in this region have yet to be determined. Luminescent dating of sediments would probably not be attempted unless they could be shown to be aeolian deposits.

Again Tindale (1963:249) speculated on the relation between age and oyster remains on the old traps at *Rukuthi* (his 'Rokoti'): "Where the rocks were less than 3 feet [90 cms] below high tide mark all the oysters on them were dead ones. At 4 feet [120 cm] below high tide line an old one or two were alive but most were dead and eroded...".

There is also the more remote possibility of finding an artefact within an existing fish trap wall that may have some datable property suitable for modern techniques (eg residue analysis). Tindale (1963:241) noted the use of walls to store artefacts on Bentinck Island:

> The wall directly off Berumoi spring extends up to only 1 ft. [30 cm] below highest tide in the protected bay. The inner end was once cemented by oysters but these have in large part decayed away leaving most of the stones loose again. Wedged in this wall at 3 ft. [90 cm] I found an oyster [hammer] stone and at 2 ft. [60 cm] a loose flake of jasper was present inside the wall..."

[21] To explore this hypothesis we would need inter-island comparisons of topographic heights, tidal surge inundation areas, edible interior fauna and flora, and to carry out interviews with consultants on post-cyclone food collection traditions.

[22] Similarly, in the Point Parker area, a major freshwater spring exists about one kilometre south from the location of the traps, but very close to the beach. People are said to have camped on the beach in the dry season, but to have sought shelter further inland in the stormy wet season.

[23] From an anthropological perspective we also need to understand if there were any rules of refuse disposal in addressing the interpretation of the existence or the non-existence of middens in the archaeological record.

[24] Referring to Percy Lugutha, a Kaiadilt Traditional Owner for this area, who was also known to one of the current authors (P. M.).

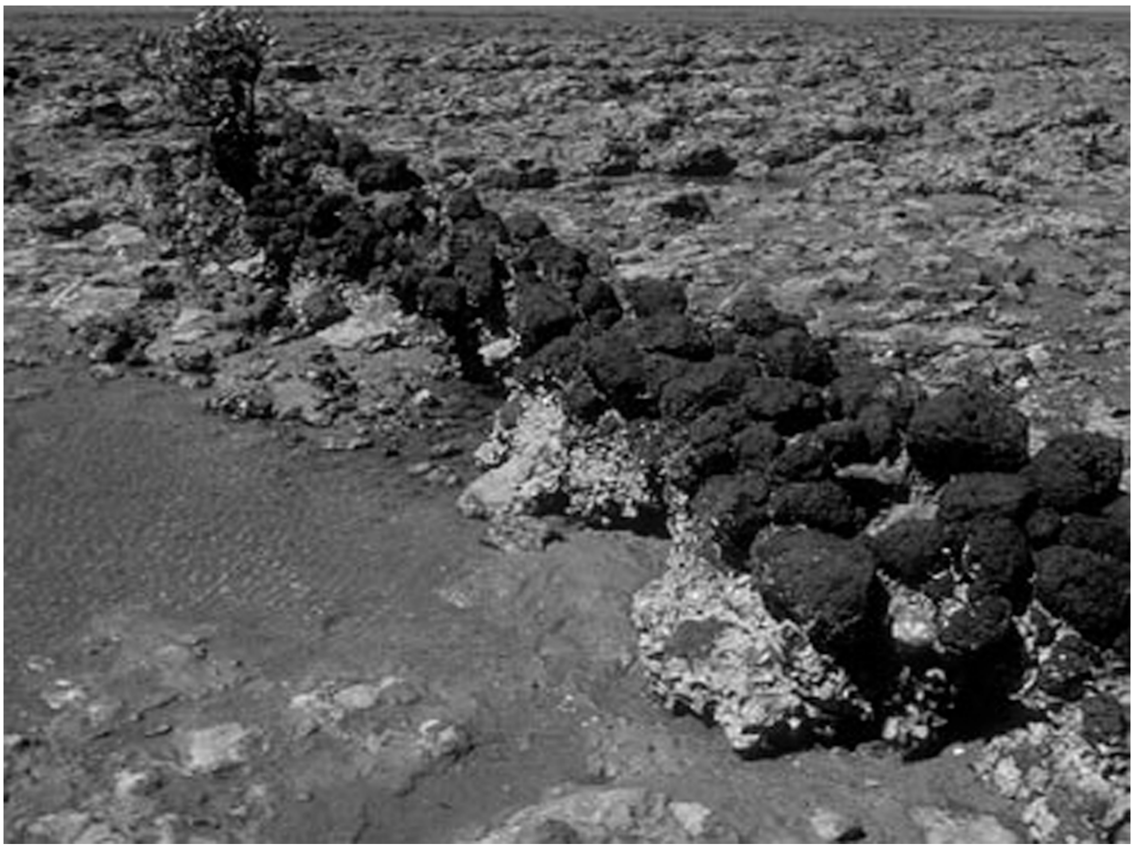

Figure 5.14: A rock wall of a fish trap at Bayley Point that appears very ancient. Oyster growth has forced the individual boulders apart. It is within an outer pen which had been used in relatively recent time. (Photo by Richard Robins).

5.7 Conclusions

The material cultures of the Wellesley groups have cultural commonalities as well as obvious differences. An accurate ethnographic and archaeological description of the fish traps and their properties must be made before contributing to an understanding of cultural change and isolation amongst the Wellesley groups. For example, how exactly do the traps work? What is the relationship between traps and nets? Is one a surrogate for the other or did they perform different economic and social roles? We hypothesize that the Kaiadilt developed a greater dependence on fish traps and may have specialized this technology in particular ways (fish herding). Our study will attempt to make comparisons between the four groups on the extent of trap use (versus other fishing and hunting technologies), trap numbers, sizes, layouts and shapes, usage under different seasonal tidal conditions, fish herding techniques inside traps, usage of trap gates and pockets, and other such properties. A specialized Kaiadilt trap technology would possibly explain why they had a less complex material culture repertoire than those of their neighbours.

As for our methodological problems, our interim working decision is to treat each single wall feature as a unit and defer abstract interpretation (of, for example, what is a pen?) until after more fieldwork. Despite the complexity outlined above, our final view on the way forward is to measure as much as possible, qualify our assumptions and guesstimates, correlate all of our physical units and trust some outstanding patterns will emerge from the analysis.

Our intention is to use these data on rock wall fish traps as one essential baseline for a reactivated research programme centred on the pre-history and cultural change of the Wellesley Islanders. The traps have the potential to play a vital role in the story of the people of the southern Gulf of Carpentaria. This potential will be greatly enhanced if we can answer the question—what exactly is a fish trap?

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