This rationale has long been a part of the theory base of industrial geography, i.e. that site location is a rational outcome of the resolution of competing forces, significantly transportation costs of commodities (see discussion by Hamilton 1967:361-424). This can be represented by an object suspended by a number of tensioned strings, the tension of each string represents the importance of each resource, transport costs and so on. The location of sites results from the balancing of forces. In practice there have been found to be additional (invisible) strings which are not tensioned in a similar manner to the others, and related to ideology, political considerations and historical precedents.

If we anticipate that prehistoric site location mechanically reflects the relationship between social organisation and the spatial distribution of resources, we do so on the assumption that prehistoric small scale societies were more mechanistically rational than those on which site location theory has foundered. In addition to a systematic rationality (intrinsic to mechanistic analysis) we must be able to assume individual rationality. The cultural record is after all composed of individual actions which collectively make-up the patterned rationality of systems.

It is likely more appropriate to expect that archaeological evidence reflects balance between disparate forces (some of which may be invisible strings) rather than effects of single causes. It is therefore assumed rather than demonstrated that site location is broadly rather than closely correlated with resource distribution.

An ethnographic contradiction of mechanistic rationality is provided by Meehan (1982) who notes that for her Anbara informants an important aspect of site location is access to marine shell beds. Objectively the contribution of shell-fish to the Anbara diet is limited, and expendable. That is, the "pull" of the shell-beds is weighted by subjective factors, rather than by a strict accounting of weights and costs of resources.

The criticism is made (Bowdler 1976) that our perceptions of Aboriginal consumption of resources is coloured by our own perceptions of hearth behaviour. A model of middle-class dining rooms is transferred to the Aboriginal camp with hungry foragers returning home at night and pooling the day's product in the hearth group. This model of hearth behaviour can be broadly dismissed across Aboriginal Australia from Gippsland to Arnhemland. Bulmer (n.d.4) observed that the term "hungry as a hunter" could never describe successful hunters who are likely to have already made a meal in the field. The same applies to women who with their children consumed part of their product during the course of the day, so creating a class of archaeological deposit termed by Meehan's Anbara informants "dinner time camps" (1982:198). We cannot therefore regard the central camp as the sole focus of
consumption, or use it as a strict indicator of resource catchment, resource "pull", or resolution of transport costs.

Central site location is therefore better seen as a general indicator of the catchment in which resource use occurred, rather than the focus of resource use. Site locations might be approached as nuclei from which people gained access to resources rather than the foci of consumption and redistribution. What is suggested here is a greater emphasis on the trip out from the central location, and a de-emphasis on the laden trip home to the central hearth. Further, transportation cost can be analysed not merely in terms of weight or bulk, but also in terms of "value" (however defined). Decisions may be made to locate sites with respect to valued goods, be they foodstuffs or other classes of commodity. In such circumstances there may be greater costs in transporting other less valued commodities. For example Meehan's (op. cit.) Anbara enjoy eating shell-fish and site residential locations in order to maximise access to this minor but indispensable resource. They thereby possibly add to the cost of of terrestrial resources, some of which may be of greater objective dietary significance.

It is not clear whether the priorities of one element of the population can take precedence over those of another, especially if some consume different resources from others, and if there are possibilities of differences in priorities between sub-groups. It cannot simply be assumed that all people and resources can be compared on the same terms.

Binford (1980) suggests that the term "site" be used to designate what are essentially residential locations, and "location" be used for non-residential areas where other activities occur. In this schema the central camp, or site is the focus for a wider range of activities, and may be more archaeologically obtrusive than ephemeral locations. He stresses the importance of the central camp as a centre for consumption of materials, as opposed to the location where extraction of materials is the defining characteristic. This model of site classification is likely to be an outcome of experience in Arctic North America among specialised hunters where reliance on hunted meat disallows sexual division of diet, dispenses with a range of other (gender specific) extractive locations and emphasises the central site as the centre of consumption and redistribution.

As Bowdler (1976) and Cowlishaw (1981) suggest, it is misleading to imagine Aboriginal diets resulting from families sitting down each evening to identical meals of meat and vegetables. The ecology of an Aboriginal group may be more accurately represented by the spectrum of minor sites occupied during the day, than by the main domestic site. Unfortunately many of these sites may be invisible without durable residues. While a
relatively small intake of shell-fish can leave substantial midden deposits digging many tonnes of roots from a swamp may leave nothing. The visibility of traces has no direct relationship to productivity or economic significance.

In a strictly rational organisation siting would maximise access to more bulky, reliable, depended-upon or "staple" resources. In Southeastern Australia this class of food can be typified the roots of swamp plants, notably *Typha spp.* and *Triglochin procera*. In contrast, meat is unreliable. The need for "back-up" supplies of vegetables in camps is a further argument for the logistic weighting of bulk or staple commodities. This is of course contradicted by Meehan’s (op. cit.) work.

Rationality in site location is complicated by the nature of technology used. Gippsland fishing nets large enough to encircle a school of fish must involve a good deal of labour in hand manufacture. The result is necessarily bulky, heavy when wet and need considerable maintenance, eg. repairs, drying when not in use. Among hunter-gatherer possessions they represent an almost unique investment of time and work. Being bulky, heavy, and valuable it would be anticipated that nets would not be transported far from shore. Although canoes are described as easily and quickly made this depends on the availability of suitable trees at the location of use. It can be assumed that away from forested shores where suitable trees were available canoes similarly required some investment of care.

It is plausible that these impedimenta would tie their users close to the shoreline. Further the investment in equipment indicated by nets indicates a reliance on fishing in the local economy. This should "pull" site location close to the shore perhaps regardless of the pull of other resources. In contrast, people who use hook and line, or spear, use equipment which is far more transportable, needs less maintenance and less investment of time, effort and materials in manufacture. A population not investing so much in net making and maintenance may not be tied to the shore, whatever the significance of fish in the economy. The camps of such populations can be located at some distance from the shore so that the "pull" of the resource may then be more easily compared to the pull of other resources.

Arguably then, two hypothetical fishing populations, with or without nets, might in a given season be similarly dependent on fish but site their home bases not only according to the pulls of the resources exploited, but also according to the constraints imposed by their technologies.
5.2.3. Interpretation of shell midden

Much has been written about both midden and shell-fishing. Meehan (1982) describes shell-fishing and its role in the economy of a contemporary Aboriginal group. Bowdler (1976) in interpreting changes in a South Coast NSW midden assemblage approaches interpretation from a feminist perspective interpreting change in terms of the labour of women. Osborn (1977) developed an argument that returns from coastal exploitation generally, and shell-fishing in particular, are potentially so poor that for a population to exploit the inter-tidal zone argues for resource stress. This idea of shell-fishing in extremis is rejected by Perlman (1980). Beaton (1985) argues that the late expansion of shell-fishing on the coast of the Australian mainland is a product of an expanding human population in the latter half of the Holocene. Lampert and Hughes (1974) note the apparently late date of exploitation of the southeast Australian littoral and reason that the availability of rocky shore mollusc taxa is related to increased area of habitat through the Holocene evolution of shore platforms. These are related to contemporary sea-level and in effect, needed time to grow.

Research into shell-fish has indicated that they are not objectively a prime resource. A primary disadvantage is a low dry meat wt/shell wt. ratio of most taxa. Meehan’s study of the use of molluscs (1982:161-141) by present-day Aborigines in Arnhemland reveals some interesting results. Fresh whole shell over a range of key taxa yields only around 20% by weight wet meat. This meat is not energy dense. She derived an average calorie yield for bivalve molluscs of 800 kcal per 1000gm flesh. This she compared to 1,500 kcal for the flesh of reptiles, 1370k cal for fish, and around 3000 kcal for mammals. They did however yield a fair protein return, comparable at around 20 gm per 100 gm. weight to other animal sources.

Shellfish made up only 10-30% by weight of animal foods according to the season, and provided only 6-17% of energy intake. The period when the dietary importance was greatest was in January, during the beginning of the wet season when heat and humidity prevented great exertion. Due to lethargy, diet for this month fell to 79% of recommended calorie intake. During other months of the study calorie intake stood in excess of recommended minimum at 102-122%.

As a means of acquiring basic nutrition shell-fishing is an inefficient use of time. Meehan showed that a woman working efficiently could expect to harness 2000 kcal in two hours. If that woman is young it is likely that she is providing for herself, a husband who may or may not contribute to the family’s subsistence on that day, children and perhaps aged
relatives. At a rate of return of around 1000 kcal per hour she would have to be able to stop the tides if she were to be able to feed all her dependents from the shell-beds. Although time consuming shellfishing was frequently carried-out, on 58% of observed days.

It is an easy low-skill operation in which anyone could take part including the old and infirm, heavily pregnant women or women with small children to look after. The prey is fairly immobile and predictable, and the only impediment on availability is the state of the tides. In this it contrasts with other gathering and chasing involving long walks, heavy loads, digging and generally hard work. In these other activities a young woman may not have the aid of less able members available to her, as when visiting the shell beds.

The Anbara group studied by Meehan had answers for the problem of the cost of transport of whole shell over excessively long distances. One was to consume the animals "on the spot" in a "dinner time camp", the other was to de-flesh the shells near the point of collection and transport only the meat. From an archaeological perspective this may mean that the amount of shell found in central sites may not represent the amount of flesh consumed there, and that further the amount consumed during the day is not equivalent to that consumed in the camp.

If she were to be responsible for the sustenance of her dependents a woman would be better off harvesting more energy dense resources. As Meehan stresses however, shellfishing is one activity in which just about all the woman’s dependents can take part. In contrast if she went off digging yams or hunting goannas she might earn a better energy return, but work much harder. Her dependents could not easily take part, children would be a severe handicap.

Meehan also notes that shellfish protein is a constant reliable input to the diet, and not subject to the alternate glut and shortage of hunted protein. Although other meat sources (eg. wallaby or buffalo kills) can provide far greater quantities of meat, kills cannot be counted on occurring every day, and unless it is quickly consumed the meat has only a short life. In contrast shellfish are available for the taking for a number of hours every day. While this input is not large it is constant.

The ease with which shell-fish can be gathered, and the useful if not abundant returns to be obtained, can be demonstrated by historical examples of how shellfish have been exploited by non-Aboriginals. When William Buckley escaped from the failed convict settlement at Sorrento on Port Phillip in the early 1800’s, he apparently survived on shellfish for some months before his rescue by Aborigines (Morgan 1980). The crew of the
Sydney Cove wrecked in 1797 in Bass Strait made their way to the Ninety Mile Beach and commenced to walk to Botany Bay (Bladen 1895). During this trek they subsisted largely on shellfish. While neither Buckley nor the remnants of the crew of the Sydney Cove flourished on their diet of mollusca it did undoubtedly prolong life. Given their prior lack of experience in foraging for a living, and that they were probably using considerable energy to make forced marches and keep warm, the short-comings of mollusca should not be overemphasised.

Thus, despite the deductions of Osborn (1977) that shell-fishing and coastal occupation in general are only to be adopted in extremis, it is apparent that the situation is more complex than he anticipated. Although an unsophisticated mechanistic interpretation indicates that shell-fish exploitation is the sort of thing people are forced to do when better options are not available, Meehan's analysis of a real world situation indicates that the context in which people gather shellfish is complex and has a systemic rationality beyond Osborn's mechanistic deductions.

The chance of deposits surviving is a particularly important consideration with organic material. Normally wood, fibre and flesh are not preserved in any but the most exceptional circumstances. Bone too may be poorly preserved, scavenging by camp dogs and burning limit the likelihood of it even being a candidate for the archaeological record. Shell is the one organic material with a reasonable chance of survival, it is relatively inert, offers little incentive to dogs or other scavengers, does not contain combustible grease and is very bulky. The bulk of a midden deposit and its potential to generate a high local pH can be expected to create a micro-environment in which preservation will be enhanced.

The question with shell is not whether it can enter the archaeological record and survive for an appreciable period of time, but for how long and in what circumstances. The main process of weathering and erosion of carbonates is dissolution in acidic ground water. Acidification will result from humic acids and carbon dioxide from the air and soil biological processes. Simple experiments by Hughes (1977:206-16) suggest that in porous matrices (e.g. sand) dissolution will proceed more rapidly than in less porous matrices (e.g. silt) the critical factor here is the through-flow of water. Hughes suggests that in certain circumstances shell may have a life of only a few hundred years on the New South Wales coast. It can be expected that in the cooler and often drier environment of the study area both through-flow and soil biological processes occur at a lower rate.

Dated middens from this survey indicate that with robust shell like Anadara 4000 years leads to limited decay. On site DD120 fragile shells including Mytilus occur in a sandy
naturally derived deposit. Dating of tidal connections in the adjacent Lake Reeve suggest that the *Mytilus* and other fragile shells must date to >4000 years. It would appear that erosion of shell in the study area is not a problem from at least the middle Holocene.

This allows typological site description. It is valid to expect middens to survive from at least the middle Holocene, unless exposed to accelerated sub-aerial weathering. What is recognised today as an artefact scatter need not be suspected of being a midden whose shell has been weathered and eroded.

5.3. Discovery and preservation of archaeological deposits

5.3.1. The Archaeological Site Concept

The *site* is generally regarded as a discrete location where evidence of past activity is preserved. In practice this may imply:

- that there is some level of equivalence between site boundaries and boundaries of prehistoric action

- past human activities will leave detectable traces

- landscape processes will enable traces to survive

- landscape processes will enable traces to be discovered

- that the sample of sites preserved and discovered is somehow representative of past organisation

It has been suggested above that of organic materials only shell can be expected to stand a reasonable chance of being incorporated in a deposit. However the increase in pH which may accompany shell deposition may be anticipated to enhance preservation of bone. There may be less evidence of the production of many tonnes of *Typha* or *Triglochin* in a wetland over centuries than of a single meal of shell-fish in a dune-field.

There is little cause to hope to empirically determine more than a part of the complexity of even a straightforward aspect of life such as food gathering. In the discussion above on the applicability of site location assumptions it was suggested that we cannot assume spatial information (or such techniques as site catchment analysis) to be more than general pointers toward possibilities of resource use. As discussed in Chapter Eight suppositions of optimality behaviour may not be altogether justifiable.
In the study area many landforms are depositional and overall well vegetated. It can be expected that a significant proportion of locations are aggrading (eg. through capture of aeolian particles by vegetation) rather than eroding, and archaeological deposits will be obscured. When deposits become visible as a result of erosion site boundaries are better regarded as a function of erosion than of previous human behaviour. Site boundaries and site location data are therefore in significant part non-archaeological in meaning.

Thus along the ocean side of the Ninety Mile Beach barrier exposures of archaeological material coincide with invasive dune blow-outs. Sites are therefore "windows" into extensive lensed Donax midden rather than discrete phenomena. However, without a program of extensive excavation geared to uncover possibly hundreds of square metres of deposit fine detail on past activity will be unobtainable. One must therefore treat evidence in an extensive rather than intensive manner.

It is concluded that as deposits in the study area tend to be exposed as a result of ground surface disruption, the boundaries of sites, and indeed site location must be regarded as artefacts. If the processes of exposure could be argued to occur randomly across the landscape a level of quantitative analysis might be possible, however as the main cause of disruption is historical human activity systematic bias limits archaeological meaning. While comparisons of trends in site environments may emerge these are of little statistical significance and must therefore be treated qualitatively.

5.4. Survey method

Although archaeological information is to be used in this study, it was intended from the outset that the approach to field investigation would be via survey and description of surface exposures of archaeological material rather than excavation or other intensive techniques. That is, the nature of the investigation and analysis would be extensive rather than intensive.

In addition to survey carried out during this project there is also a body of site information derived from consultancy surveys. These are of variable quality, and as untargetted work consultancy results are of only limited applicability in research oriented situations. However, as the aims of this project are extensive rather than intensive, the generalised nature of consultancy results can cited. These will be discussed in Chapter Six.

Radiocarbon dates were obtained in section and surface exposures from a number of midden sites. As the dating material is usually shell the dates are corrected for Ocean
Reservoir effect by the 450 ± 35 yrs factor suggested by Gillespie and Temple (1977), and applied to southern Australian coastal waters by the ANU radiocarbon laboratory. Its applicability in Bass Strait waters is confirmed by Head et al (1983). For details of radiocarbon dates see Chapter Seven.

The size of the study area made a complete survey coverage impossible. Furthermore, because of the climate of the area natural exposures of the ground surface are limited by sometimes thick vegetation and leaf litter. As Flannery (1976:159) notes, one can carry-out as statistically valid a sampling program as one likes, but if the ground is covered by dense vegetation it will mean little. It is only after intense fires that ground surface visibility would be adequate, but no fires coincided with field work. Although random sub-surface sampling might have been undertaken, unless many shovel pits were dug the results would be meaningless. For example pits 30x30 cm represent less than 0.09 m², to obtain a less than satisfactory 1% coverage of a 1 km² area, in the order of 10,000 m² or somewhat more than 100,000 shovel pits are required, this is simply not practical.

Such testing is only of value in areas with a high probability of archaeological deposits. This raises ethical, legal and political problems, as well as being dubious science. Guided by water, sandy rises etc. artefact collectors have long been able to pilfer archaeological exposures. This can be elaborated through application of “predictive theory” to permit the discovery of predictable or "normal" deposits. The complement is a failure to encounter unusual or special sites. Such results are of little value. Homing-in on locations where deposits are likely raises a number of concerns. Discovery of sub-surface deposits necessarily results in at least partial damage. Disturbing areas where discovery is likely introduces an element of willful damage. In the eyes of many persons of Aboriginal descent, and state cultural resource protection authorities, this may constitute vandalism. For these reasons extensive sub-surface sampling was rejected as an inappropriate survey strategy.

It was concluded however that having to restrict survey to available exposures posed logical problems of no greater magnitude than pretending that site survey of areas with no ground surface visibility was a valid use of time, attempting to carry-out a sub-surface sampling program over even a small part of the study area, deliberately imposing an element of bias by restricting sub-surface sampling to areas of high “normal” archaeological sensitivity, or hoping for fortuitous bush-fires to hit areas of interest.
5.4.1. Selection of Survey areas

In recognition of the complexity of environments in the study area it was decided that it would be impossible to delineate useful sample land units. This complexity involves the history of landform evolution, and changes to vegetation patterning complementing landform evolution, and resulting from climatic change, succession and historic disruption. This eliminates the possibility of undertaking statistically valid sampling, e.g. stratified random sampling. In lieu of such an analysis it was decided that the best approach was wide-scale sampling in an attempt to gain at least a range of site variability.

Such sampling relies on ground surface visibility, in the study area this depends in large part on human disruption of the ground surface. As this is commonly in the form of tracks the distribution of exposures can be expected to be systematically distributed, thus further reducing the possibility of statistically valid sampling.

Areas to be surveyed were selected according to a number of considerations. The extent of surface exposure determines the extent to which it is worthwhile surveying an area. A diversity of natural environments needs to be surveyed in order to be able to control environmental association. A range of ages of land forms needs to be surveyed in order to obtain a control on age as a factor in diversity. As the project is primarily concerned with the coastal zone, interest was largely concentrated in areas close to both environments. As estuarine shellfish taxa (e.g. *Anadara trapezia*, *Ostrea angasi*) were expected to indicate the age of deposits relative to the barrier-lagoon complex, sampling of locations near source areas (e.g. near Lake Reeve) was expected to locate these key deposits.

Tracks, roads and eroded areas provide the most consistent exposure of sub-surface sediments. In the case of tracks and paths, routes crossing more than one environmental zone can be made to serve as *de facto* transect routes. Survey was also directed to areas where gross geomorphology would make the discovery of deposits possible, e.g. not on lake flats where intermittent flooding and deposition of biogenic carbonates can be expected to obscure occupation evidence.

Availability of surface fresh water was not considered as it is universally scarce in the sandy terrain away from the saline lagoon affected areas. Conversely sub-surface water is likely to be universally available floating above the marine controlled saline water table.

Landforms and areas which have been previously examined under consultancy surveys are regarded as surveyed, and they or similar areas adjacent to them were not re-surveyed unless there were doubts or questions about the original work. Areas with unique or rare
environmental associations are regarded as intrinsically interesting and given relatively high priority for survey.

Survey areas were chosen on the basis of field inspection, reference to the literature of the area, and consultation of topographic and orthophoto sheets. Some areas initially selected for survey ultimately received limited attention, for example the drowned valley of North Arm and flats near Lakes Entrance township. In this case tourist development has lead to extensive disturbance of much of the ground surface. Where ground surface disturbance may not have been as severe heavy lawn cover precluded the discovery of any deposit. In other cases, for example Sperm Whale Head, relatively limited development, and a good coverage of fire-tracks invited a far more intense survey.

The location of survey areas and spot checks are presented in Figure 7.1 to 7.5.

5.4.2. Field Methods

Selected survey areas were visited in turn, topographic maps and orthophoto sheets were used to identify tracks, exposures and blow-out areas where attention could be concentrated. While travelling attention was paid to roadside exposures, these were checked for deposits when encountered. Such exposures were also valuable geomorphic checks.

When exposures of archaeological material were encountered they were given a field identification, usually the identification consisted of the name of the locality or transect, and a numeral. Occasionally whimsy or a special characteristic of a site altered the field nomenclature. As there is a legal requirement in Victoria that Aboriginal sites be reported to the state authority each site will receive an identification in the state register.

See Appendix A for details of site recording format.
Chapter 6

The historic Aborigines of the region

This chapter attempts to derive a picture of historic, protohistoric and prehistoric Aboriginal culture in the study area relevant to cultural adjustment to the natural environment. The logic of adaptation demands that cultural forms are explicable in terms of the objective physical environment. Because of the impossibility of documenting the totality of an extinct system the following is directed toward those aspects of socio-cultural systems with the most direct and obvious bearing on the ecology of the population, notably economy, population numbers and distribution, seasonal organisation, material culture and inter-group relations.

It will be argued in this chapter that we can have only a partial picture of Aboriginal culture through this period, back to the period of British colonisation of Eastern Australia in 1788. It will be argued that ethnographic accounts following British settlement in the 1840’s are of people who have already survived almost fifty years of pressure during 1789-1840. The onslaught of the main invasion after the 1840’s, and 25-30 years of dislocation, retreat, loss of autonomy and decimation preceded anthropological enquiry in the 1870’s. By then Aborigines were nine decades removed from the time when any development could be easily attributed to a closed man-environmental system. It is apparent on the logic of adaptation that the behaviours of historic Aborigines must be seen in relation to their contemporary environments, and these environments, including their social components are not necessarily those in which their ancestors of a few decades previously lived.

Recognising these difficulties, this chapter calls on inference and reconstruction of some aspects which may not be dealt with directly in historical sources. Other conclusions will be drawn on the basis of historical records and explicit assumptions.
6.1. Ethnographic and Ethnographic Sources

At first sight there is an embarrassment of information on the Aborigines of Gippsland in the last century. A closer examination of this wealth indicates that what it promises in quantity is negated by sometimes poor quality. The main sources to be quoted below are:

R. Brough-Smyth Geologist, member of the Board for the Protection of Aborigines, and author of the government sponsored The Aborigines of Victoria. This work in two volumes is a compilation of questionnaire replies about the Aborigines of Victoria, plus a smattering of ethnographic oddities from other parts.

A.W. Howitt Geologist, police magistrate, gold field administrator and pioneer anthropologist. Howitt was a practical gentleman who earned his appointments in Gippsland as recognition of his achievements in leading the relief column to what was left of the Burke and Wills expedition.

Howitt seems to have gained a respect for Aborigines through experience, and his career as anthropological pioneer followed. He published numerous papers, two books and corresponded with notable anthropologists of the day. His first book was in joint authorship with a missionary gentleman, Lorimer Fison, Kamilaroi and Kurnai. The second was published late in life, The native tribes of Southeast Australia. He claimed to have been initiated into tribal manhood.

Howitt was not an old resident of Gippsland and little of what he describes is derived from first hand observation. He relied on interviews with Aborigines, some of whom he employed as farm labour. His work is marred by his theory base which was formed from the evolutionary social anthropology of the time.

John Bulmer Lay missionary. After a number of years as missionary on the Murray, Bulmer moved to Gippsland to establish the Lake Tyers station in the 1860’s. He was not overly educated and was an Englishman of his times. Although he appears to have had respect for the Aborigines, it was not necessarily transferred to their culture and institutions in toto, he was after all a missionary. Despite this he was attentive to aspects of Aboriginal life and drawing on his decades of experience wrote one paper, notes and correspondence with Smyth, Curr and Howitt. Although a friend of Howitt he sometimes differed in anthropological interpretation.

George Augustus Robinson. Has an unparalleled position in southeastern Australian and Tasmanian Aboriginal history. In the 1840’s he was Chief Protector of Aborigines in the
Port Phillip District after having playing a role contributing to the extinction of the remaining full-blood Aborigines of Tasmania.

He made a single excursion into the study area in 1844. Delayed by weeks in cutting a road through the dense scrub west of Wilson’s Promontory and anxious to cross the ranges before the winter snows he paid a brief visit to the Gippsland lowlands soon after serious conflicts broke out. Precipitated by the murder of the son of Macalister, Angus McMillan’s master, the "Highland Brigade" took vengeance with the "dispersal" of Aborigines in the Warrigal Creek Massacre near Jack Smith Lake (Gardner 1980,1975). These circumstances conspired to prevent Robinson meeting with local Aborigines. The little he wrote on that part of the journey is however valuable. His report is fuller on the people of the tablelands and New South Wales South Coast.

During part of his journey Robinson was accompanied by G.H. Haydon. His literary contribution is typical of the nineteenth century genre of travellers’ tales dwelling on the oddities and roughness of Imperial outposts.

W.J. Cuthill Cuthill has compiled documents relating to the story of a white woman supposedly held captive by Aborigines. The most valuable are the reports of parties in search of the woman. James Warman and C.L.J. De Villiers led a party funded by public subscription, and backed by the Port Phillip Herald which published their reports. They were in competition with government sponsored expeditions to achieve the same ends. Without the necessity to report back to a newspaper the official documentation is more sparse.

The quality of all sources is variable, and often suspect. In the Cuthill documents one must be aware that reports were written and edited with the popular press in mind, that is to gratify the the burghers of early Melbourne whose subscriptions funded the expedition.

Ethnographic recording during contact would probably have been impossible, conflict began early and would have limited constructive contact.

There is reason to believe that before the arrival of the commissioner a large amount of mischief had been inflicted upon the original Inhabitants by the lawless and depraved who had infested the Port from Van Dieman’s Land and the Middle Districts... (Robinson in Mackaness 1941:10)

The Aborigines had already retreated to the hills, lakes and wetlands by the end of 1844.
6.2. Proto-historic changes to the population of the region

6.2.1. Sources of disruption

History suggests that the populations encountered in the region in 1840 were not "pristine", autonomous isolates, rather they are likely to have had to adjust to a number of externally derived influences over the previous fifty years.

In the first few years of British settlement a lethal epidemic of what is taken to be small-pox is reported to have halved the Aboriginal population around the British colony at Port Jackson. This is discussed by Butlin (1983) who concludes that the disease was indeed small-pox, and that it spread far from the supposed point of outbreak at Port Jackson. It is claimed by Butlin (1983:25) and others that no evidence of small-pox was seen in what is now Gippsland. This assertion is apparently based on the observations of Bulmer (cited by Curr 1887 Vol 3:545), who did not arrive in Gippsland until around 1860, seventy-odd years after the first supposed outbreak, and when less than two hundred Aborigines survived.

Infant mortality is high with small-pox, it follows that the highest probability of surviving an attack would lie with a youth rather than a child. We can add ten or fifteen years to the seventy year time lapse, to allow for the age of the youngest cohort likely to survive infection. Very few people of this eighty to eighty-five year old cohort can be expected to have survived under "normal" conditions, given the trauma suffered prior to Bulmer's arrival the odds become extremely long that he would see any such person. Simply we have insufficient evidence of whether this epidemic hit Gippsland or not.

Evidence for a second epidemic around 1829 comes from the Murray-Darling basin, from Port Macquarie and Bathurst (Butlin 1983). Younger survivors of the second epidemic, using the same reasoning as above, would have been from forty to forty-five years old when Bulmer arrived, and young adults at the time of settlement. If pock-marking were present among this cohort it should have been recognisable to Bulmer. We can be confident that no such epidemic hit Gippsland. Barwick (1984) questions whether a widely reported disfiguring disease called small-pox by settlers (eg. see Robinson in Mackaness 1941:26, 28) was not in fact an endemic skin disease, a "native pox". She suggests a diagnosis of impetigo contagiosa. If this is the case, the lack of indigenous impetigo in Gippsland may reflect local health status, ecology or the distribution of indigenous pathogens.

It is improbable that an indigenous infection could be blamed for the 1789 mortality
around Port Jackson and what appears to be an outbreak of small-pox ought not be confused with what appears to be a less dangerous if equally disfiguring disease. While we cannot know about the spread of the 1789 epidemic, the evidence for the 1829 case indicates that neither small-pox nor the indigenous pathogen spread to Gippsland.

There were established routes whereby infections, information or disturbance arising beyond the study area could be carried in. Bulmer (n.d.4) recorded a "corroboree" he witnessed on the Murray years before, being performed years later in Gippsland. Further evidence of external contact comes from Sinclair and White's (1984) craniometric analyses of an admittedly limited sample of burials indicating a possible genetic link between the Upper Murray and the southeastern coast. Robinson (in Mackaness 1941:17) found steel hatchets originating with the Imlays at Twofold Bay in use in Gippsland in 1844. Warman and de Villiers (Argus 26 Jan 1847) met an Aborigine on the Snowy River in 1846 who had learnt some English while working at Twofold Bay. It is apparent that introductions of disease could occur from both the North and from the East Coast.

Before the turn of the century the sealing industry was established in neighbouring Bass Strait, notably at Wilson's Promontory and on rocky shore areas to the west, eg. Phillip Island (Gaughwin and Sullivan 1984:82) and Westernport. The men employed in the sealing industry have earned a poor name in history. Many are supposed to have been criminals, escaped convicts and misfits to whom a period of seclusion on an island or remote peninsula was attractive. Many are reputed to have taken Aboriginal women from either side of Bass Strait as concubines or slaves. While some women may have been willing consorts, others appear to have been simply kidnapped (Ryan 1981:66-71).

A serious risk of close contact with the sealers and later settlers was the spread of contagious exotic disease, notably tuberculosis and venereal infections. In addition to increased mortality, there is the likelihood of debilitation and morbidity, increased infant mortality and decreased fertility. During his 1844 visit to the Twofold Bay whaling establishment and the Southern Tablelands, Robinson recorded the disastrous toll exotic infections were taking of Aboriginal life and health (Robinson in Mackaness 1941:13, 15, 19, 28). Virulent exotic diseases can be expected to led to significant mortality in the younger and oldest age cohorts.

Whether their departure was willing or forced the loss of young women from small scale societies is likely to have had serious results. Young women were a vitally important component of Aboriginal society, if only for their productive and reproductive capacity (Rose 1987). One of the first impacts of the loss of fit young women would have been the creation of an imbalance between producers and consumers.
Young women are also attributed a role of currency in traditional Aboriginal social relationships through betrothals and marriage between exogamous groups. Inter-group marriage, the relationship of children to their different descent groups, and the obligations and relationships between husband, wife’s parents and Mothers-Brother led to a considerable complexity of relationships. Events which threaten the institution of Aboriginal marriage can be expected to threaten the stability of society as a whole.

Marriage-based alliances were of course threatened. Firstly, and most obviously on the local level, young women lost to sealers do not bind relationships between Aboriginal groups. Hostility and tension arising from increased disease mortality may not allow for marriage arrangements to be made between groups with equivocal relationships. Alternatively, a limited pool of potential partners might offer an incentive to make "improper" matches, with the danger of social disruption. Examples of the latter include wife raiding and elopement. It will be argued below that among Howitt’s informants elopement had become normal so that he regarded it as customary (Fison and Howitt 1880:200).

The sealing industry waxed and waned, depleting its resource within a few decades. By the 1820’s and 1830’s the edges of the study area were feeling a new set of pressures. Bay whaling and grazing had been established at Twofold Bay, and pastoral expansion was occurring on the Southern Tablelands and the Monaro, and later the Port Phillip district. It is likely that the failed settlements at Sorrento and Corinella also had allowed the introduction of exotic pathogens. There were ample opportunities for neighbouring populations to contract exotic diseases which could be transmitted into the study area.

6.2.2. Intensification of ethnic hostility

There was an acceleration in hostilities between Kulinic speakers west of Wilson’s Promontory and Kurnic (Ganic) speakers from the east during the proto-historic period. This had its roots in prehistory, as is indicated by patterns of redistribution of stone hatchets from the celebrated central Victorian quarries (eg. see McBryde and Harrison 1981, McBryde 1984a).

The border zone between the two ethnic groups, the Kulin marine-bek, or Kurnai wia-wak ("bad country"), was recorded as being protected by powerful supernatural forces demanding ritual observance if outsiders were to enter. Thomas (in Bride 1983:434-5), Howitt (1904:403), Bulmer (n.d.1) Barwick (1984:115) and Haydon (in Mackaness 1941:42-3), all describe in greater or lesser detail ceremonies undertaken by Aborigines
while in this country. Strangers were in peril unless they had been granted the right or "freedom" to be present. This involved sponsorship, with the sponsors taking responsibility for the care of their guests who they fed and isolated from the earth until they were acclimatised. In Haydon's account the Kulin policemen accompanying him have no sponsors, but are careful to build themselves platforms above the earth every night. Whatever its other functions this institution can be expected to have regulated the passage of people (including raiders) between the two areas. It can be expected to have kept overt conflict to a minimum.

The Kulin clan from west of Wilson's Promontory (identified as Yowenjenne by Robinson in Mackaness 1941:8) was said to have been exterminated by Kurnai raiders in the years immediately prior to the settlement of Melbourne according to Thomas, cited by Gaughwin and Sullivan (1984), and the evidence of Haydon (in Mackaness 1941:62).

To be extinguished the Yowenjenne must previously have been weakened. Natural processes of local groups either growing to the point of segmentation or shrinking beyond critical mass can be expected to follow random variation in sex ratios, or fertility between generations. But this does not demand group debilitation. Although patrilineality and exogamy demand out-migration of females from local groups in theory, this need not occur in practice. The complement of increased pressure on the territory of a growing group is the surplus territory of a shrinking one. Under such circumstances affinal in-migration and claims to usufruct are likely. As recent Aboriginal land claim cases demonstrate such usufruct can solidify into a form of ownership over time. Men of the southeast appear to have claimed usufruct over the tract of their birth (eg. Thomas in Bride 1983:399), and could claim usufruct over the territory of their wife's lineage (Howitt 1904:83). Characterisation of local groups as strictly patrilineal and patrilocal is perhaps more useful as a model than a strict representation of social organisation in the Australasian region (eg. see Barnes 1966).

Inter-territorial mobility is illustrated in East Gippsland by Howitt's account of a Biduelli man

his "father's father" was a Kurnai of Bukkan-Munji¹, who left his country and settled in the small open tract, known as Goungra Valley, west of Mount Ellery. (1904:80)

Had the Yowenjenne been fading as a result of long term random processes recruitment into their territory would be expected. The fact that their part of the wia-wuk had such a strong tabu nature, and was not claimed by members of other groups suggests that their

¹Buchan
decline was dramatic, unsettling, and beyond the cultural experience of neighbouring populations. Being located between the sealing grounds of Wilson's Promontory and Phillip Island, prior contact with the sealers is likely and confirmed by Thomas' assertion (cited by Barwick and Barwick 1984:9) that light caste Aborigines in the same region were their mixed-race off-spring. The possibility of infection, increased mortality and morbidity, disruption and confusion arising from such contacts is very strong indeed.

At Port Phillip there was an early trade in the tails of lyre-birds, facilitated by the supply of fire-arms to Kulin hunters. These were used in homicidal raids into Kurnai territory (Gunson 1968:6) in the years immediately prior to the settlement of Gippsland. Historical records indicate that recruitment into the native police gave Kulin an unusual capacity to take revenge for perceived wrongs. By the time of British settlement of the area it is likely that a cycle of intensified suspicion fear and pay-back killings was underway.

There was also conflict with highlands populations referred to by Kurnai as brajerak (Yaitimathang, including the local group "Omeos"). These uplanders had come into contact with the British somewhat earlier than the Gippsland lowlanders, and with Kulin were recruited against their southern neighbours. They were also encouraged onto lowland runs by private individuals

"the Majority of the Settlers Encourage them on pretence of watching their Cattle and Keeping the Warrigles from Spearing their flocks...". [Anonymous Journal kept by a member of the second expedition for the recovery of the white woman held captive by the Gippsland Blacks in Cuthill n.d.].

The pitch of exterminating warfare seen in the historic period (Robinson in Mackaness 1941:8,13, Haydon in Mackaness 1941:49-50,52,62-4, Fison and Howitt 1880:223) cannot be traced back to prehistory, simply, it is unsustainable. The evidence of the annihilation of the Yowenjenne, and the likelihood that they had been debilitated in the years prior to settlement indicates the process of decay of indigenous lifeways was underway in the protohistoric period.

6.2.3. Effects of pre-settlement impacts.

The most obvious effect is likely to have been an overall decline in numbers. This will result from immediate disease mortality, chronic debilitation and reduced fertility. Secondary effects result from the fear, mistrust and hostility arising from inexplicable disease mortality. In addition to avenging actual homicide or insult, pay-back homicide can be revenge for sorcery, eg. that perceived after outbreaks of epidemic disease which cannot be explained by any other cause. It is to be expected that as disease spread from points of contact accelerating pay-back followed increasing accusations. Without regulatory
mechanisms protohistoric pay-back cycles are likely to have had severe effects because of their self regenerating nature. Disruption of amicable relations is also probable. In coastal areas depletion of the marriageable female population and thereby social regulation can be expected. This can be expected to lead to "improper" or unusual liaisons which are a further threat to the web of social relations.

It is concluded that the historic Kurnai are likely to have been diminished in numbers compared to 1788, particularly on their borders with other ethnic groups with whom they had entered a spiral of reciprocal hostility. It is likely that social institutions had been severely strained by the spread of infection and suspicion caused by the arrival of the British in adjacent areas. One such institution is political betrothals, another is the mystic "bad country" which regulated the flow of the unwelcome and presumably enabled hostility to be maintained at a manageable level.

6.3. Kurnai social and spatial organisation

The spatial distribution of the Kurnai according to Howitt and other authorities, and a hierarchy of population aggregates, is presented below. In addition to these spatial or even ecological population divisions Howitt (1904:73-77) also discussed another level of social organisation. The organisation of the Kurnai has been regarded as anomalous, it will be suggested below that the apparent anomaly is not intrinsic to the evolution of the Kurnai in their physical environment, but rather explicable as an outcome of stresses during the proto-historic and historic periods.

6.3.1. Social organisation

A significant part of the Aboriginal population of the southeastern corner of Australia was split into two exogamous divisions, one Bunjil the Eaglehawk (Wedgetailed eagle, Aquila audax), and one Waa the Crow (Corvus spp.) (see Barwick 1984, particularly figure p.118). In such an arrangement, ego is born to the moiety of his/her father. As the clan is an exogamous patriline, all males in the clan must be of the same moiety, females will be of the opposite moiety if resident as wives, but of the same moiety as the males if they are sisters or daughters. If ego is male his wife must be of the same moiety as his mother, and Mother' Brother (MoBro) his ritual guardian.

Howitt maintained that this moiety system did not apply in Gippsland, rather the Kurnai were organised on the basis of sex totems. Therefore all females, regardless of their clan of birth and lineage, belong to the same classification, Djeetgun (djeetgun = "Superb
Warbler", *Gerygone spp.*), all Kurnai males were *Yeerung* (*yeerung* = "Emu Wren" *Stipiturus spp.*). See Fison and Howitt (1880:233).

Howitt was very much influenced by the post-Darwinian evolutionary theory of his day, particularly the work of the anthropological pioneers Morgan and Tylor. As with all branches of learning anthropological theory owes much of its form and content to its context. The theories adopted by Howitt were those of a Victorian amateur on the fringes of Empire and involved unidirectional evolution from lower to higher states, and the belief that surviving "savages" retain *primitive* characteristics, obsolete in more evolved societies. Among "savages" some could be found to be more archaic than others.

Assuming unilinear ascent, and that past stages would be *fossilised*, as it were, a sequence of fundamental social stages from a state of primitive "group marriage", to Victorian Christian monogamy could be anticipated. These stages were identified and named by contemporary theorists, and associated with extant ethnic groups. Howitt (1878:323-4) presented the stages of human marriage as spanning from the *Consanguine Family*, group marriage of groups of brothers and sisters, through *Punaluan, Turanian, Pairing, Patriarchal* until finally achieving the *Monogamian Family*.

The complexity of Australian social organisation was appreciated by Howitt, but Gippsland appeared to him to be different. Here Howitt imagined a large population had been isolated by usage, mountain ranges and dense forests from other Aboriginal groups. In their isolation, Howitt reasoned, they retained primitive forms, and within these historic constraints had continued to evolve in their own way particularly, in marriage and sex-based classification. The sex totems he perceived were vestiges of classification from a time when all men were married to all women, or at least within a bounded population (see again Howitt 1878).

The validity of Howitt’s scheme is questionable. His contemporary, informant, friend and Kurnai expert, John Bulmer, appears to have believed that a conventional classification system may have existed in recent times but had fallen out of use since European disruption (see Curr 1887 Vol.3:546). Howitt’s strength of commitment to his evolutionary theory of social progression may have made him a little tunnel-visioned. Bulmer, was not a "gentleman of science" in touch with the debate of his time, but he was in daily contact with Kurnai, and having at least once been called upon to act as marriage broker he is likely to have known as much as any European could (eg. see Thompson 1985:36).

Howitt thought marriage among the Kurnai was contracted in a unique way, by elopement of consenting parties rather than by arrangements between other parties.
The young Kurnai could, as a rule, acquire a wife in one way only. He must run away with her (Howitt 1880:200).

This he claimed led inevitably to hot pursuits, and beatings until by continual efforts the couples wore down the conventional opposition to their matches.

Bulmer contradicted Howitt:

Wives were generally obtained in exchange for sisters and cousins. Occasionally, however, a youth got a girl to elope with him. The pair were certain to be overtaken in a day or two at latest, when the girl received some wholesome correction, and the man a sound thrashing and some wounds. As the result of several elopements and several thrashings, it not unfrequently happened that the constancy of the youthful pair overcame the customs of the tribe, and the marriage was ratified (Bulmer, cited by Curr 1887 Vol.3:546).

He insisted that the rules of incest avoidance were adhered to perhaps over-fastidiously, and marriage to persons too closely related genetically or by classification were scrupulously avoided.

Howitt's more anarchic scheme is compatible with persistence of archaic group marriage while Bulmers's writing is suggestive of conventional formal cultivation of relationships typical of Aboriginal society.

Howitt did derive his information from native informants and might, on the surface anyway, be justified in concluding that what he was recording was normal. However by the time of his field-work in the 1870's he was dealing with survivors of possibly eight decades of disruption, not representatives of a fully functioning society. No informant younger than middle age could speak from mature experience of life before the invasion of the 1840's. Decline of "normal" social regulation and degeneration of institutions could have been well advanced before any informant was born. Further, one cannot expect Howitt's informants to portray their own domestic arrangements as irregular or improper.

It is suggested that the apparently anomalous nature of Kurnai social divisions and marriage may be explicable as a consequence of the decay of institutions over a long period of disruptions. Especially as numbers declined, finding an entirely proper mate made have been increasingly difficult, and a moiety system became increasingly irrelevant. Arguably, strict adherence, in Bulmer's opinion perhaps to a fault (nd 2,3), to the rules of incest avoidance allowed the fundamental proprieties to be observed while ignoring the full demands of exogamy. It must be borne in mind that Bulmer thought he could detect the last traces of a moiety system, and saw conventional marriage negotiations despite Howitt's emphasis on elopement. As Bulmer was in daily contact with Kurnai his opinions count for a good deal.

On Bulmer's evidence we would be unwise to see the Kurnai as a group which had "gone
its own way" in isolation. Indeed as the evidence of inter-group contagion discussed in this chapter indicates Howitt’s picture of geographic isolation (Fison and Howitt 1880) may need to be qualified. The in-flow of information demonstrated in archaeological and ethnographic material culture does not support isolation.

6.3.2. Population distribution

The distribution and density of population are fundamental aspect of ecological relations, and concern the diversity and density of resources, the number of consumers supported by each area, and the organisational and technological capacity of populations to exploit resources. Howitt (1904, Fison and Howitt 1880) attempted a hierarchy of socio-spatial organisation for Gippsland.

In 1880 he identified a major linguistic grouping. The people speaking three dialects formed a greater linguistic grouping the Kurnai (men or people in distinction to all others). To be Kurnai was not to belong to a political group but to a body in which linguistic similarity is complemented by a belief in common ancestry, and reinforced by "widely ramifying relationships" (Fison and Howitt 1880:232-3). While conflict could occur within this group Howitt suggested that the rules were different from the rules of conflict between Kurnai and non-Kurnai.

Howitt called the Kurnai language group a tribe which he divided into five geographically defined clans sharing three dialects, two clans being exclusive speakers of two of the dialects. There is therefore a partially linguistic base for this division. In 1878 he referred to one of the "clans" (Brabralung) as a tribe indicating a certain degree of latitude in definition (see Smyth 1878 Appendix F).

The clan is in turn sub-divided into a number of local patrilineal divisions. These are exogamous land-owning units said to be composed of a number of families. Divisions could be identified by a central locality around which "their components were clustered" (Fison and Howitt 1880:225).

In 1904 Howitt suggested that the divisions could be "again divided and sub-divided" (p.73) until the unit was a small group of kindred "frequently an old man, his sons, married or unmarried, with their respective wives and children". See Figure 6.1, map of Howitt’s population distribution.

Smyth presents a map of "tribes" and "petty nations" in Victoria, and a listing of "tribes". These along with Howitt’s scheme are presented in Table 6.1 and Figure 6.2. Smyth’s
Figure 6-1: Regional Populations after Howitt
Figure 6-2: Regional Population after Smyth
names may be questionable. The Tarra River was named by the British in honour of a New South Wales Aboriginal guide, Charlie Tarra. It is reasonable therefore to question the authenticity of the name of the local Tarrawarracka. Other names indicate specific locations, eg. Bunda Wark Kani [Kani=Kurnai="men"/people]. Wark or wurk appears to signify the country of a local population (Barwick 1984). In contrast Krow-thon Koole has two interesting elements. The first Krow-thon is cognate with Howitt's Krauatung and suggests a general rather than specific grouping. Koole suggests the Kulin Kuli (people), and that the informant was Kulinic rather than local. It is reasonable to doubt that this refers to a local Kurnai population.

Robinson (in Mackaness 1941) presents names for a number of groupings beyond the study area, but none within it. His "tribes" are of an unknown scale. Groups he identifies are, "the Buchan tribe", the "Bimmermittong" from the Monaro (from "Bimerringal", a generic term for "uplanders" see Howitt 1904:82). "Mallekotang Mittong", are identified from the Mallacoota-Cape Howe area, "Benmitter" from Bemm River (coastal reaches at least). "Tinnon" is a place name and appears to refer to the Genoa River. "Kyerkong", "Poneyang", and "Worarer Mittong", are inland groups whose locations are uncertain. It is not clear if with the terms: Tinnon, Kyerkong and Poneyang, Mittong is not meant to be understood. See Figure 6.3. Robinson asserts that the "tribes" of the mountains (not including the lower ranges) are distinct from the Gippsland lowlanders. The uplanders he identifies as "Yowenillium" a section of the "Tarounwarong" at the headwaters of the Goulburn; "Mokalumbeets" by the "Deberer Plain"; and without specific locations the "Yatemittong", "Tinnemittong", and "Worarer Mittong". It is likely that "Tinnemittong" refers to the people of the "Tinnon", i.e. the Genoa River. Yatemittong is suggestive of the Ya-itma-thang of Howitt (1904:77) who had inhabited the uplands around Omeo.

Robinson uses the term "Mittong" frequently for upland groups, eg. "Yammoit Mittong" on the Limestone Plains (ie. around Canberra), and the "Bolarer Mittong" and "Jinne Mittong" on "the Eastern and Southeastern extremity of the Mountains" (op. cit.26). Barwick (1984) suggests that the term "Mittong" marks the estate of a local clan. In that case Robinson's groups are equivalent to Howitt's divisions. Howitt (1904:78) regards "mittong" as equivalent to the Kulin "balluk", or local exogamous patriline.

In the Cuthill documents De Villiers (report to the backers of his expedition, 15 Feb. 1847) identifies a number of "tribes": Bungel Paul Paul, islanders, the lakes "tribe"; Bungel Mageelong, the Snowy River "tribe"; Jenora, Upper Snowy River "tribe"; Parberry Long, mountain "tribe", centred on "Tongamangel", fifty miles from the mouth of the Tambo; Canbowerib, a mountain "tribe" located between the La Trobe and the Mitchell.
Table 6-1: Named Aboriginal Populations

<table>
<thead>
<tr>
<th>Location</th>
<th>Authority</th>
<th>Location</th>
<th>Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lakes entrance platform</strong></td>
<td></td>
<td><strong>Western Rivers</strong></td>
<td></td>
</tr>
<tr>
<td>Southern end</td>
<td>c-BRAKALUNG</td>
<td>Northern end</td>
<td>c-BRAKALUNG</td>
</tr>
<tr>
<td></td>
<td>Bruthen</td>
<td></td>
<td>Farberry</td>
</tr>
<tr>
<td></td>
<td>djang</td>
<td></td>
<td>Long</td>
</tr>
<tr>
<td></td>
<td>yuK-wuk</td>
<td></td>
<td>Canbowerib</td>
</tr>
<tr>
<td></td>
<td>Lairgo</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Runji</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Snowy river</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valley - lower</td>
<td>c-KRAU TUNGALUNG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Gippsland Coast</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snowy River</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valley - upper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mallacoota Inlet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Uplands lower ranges</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tablelands and plateaux</strong></td>
<td>c-SAMARDO</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lattrobe Valley Depression</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Seaspray Depression</strong></td>
<td>c-BRATKALUNG</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bunjil Nullung</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kutuntaura</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bunjil Dan</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bunjil Kraura</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NMB and HARRIRD DEPOTS</strong></td>
<td>c-GERAULUNG</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kut-Wut</td>
<td></td>
<td>Tatongolong</td>
</tr>
<tr>
<td></td>
<td>Tauung</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drelin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Binmanjerra</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 6-3: Regional Populations after Robinson
Bungel would appear to be equivalent to Howitt's Bunjil (an honorific term not to be confused with Bunjil the Kulin moiety). Paul Paul (the islanders) is cognate with Howitt's Baul or "island[s]", so that when he talks of Bunjil Baul (1904:73-4) he refers to the "men of the islands", otherwise a division of his Tatungulong tribe. Elsewhere referred to as Boul-Boul, they gave their name to the Boole Poole Peninsula. Parberry Long a mountain "tribe" is cognate with Howitt's (op. cit.) Brabralung centred on the plains with lake frontage and some upland territory.

Cuthill also includes an article by himself (The Journal and The Record, Traralgon. 13 September, 1962). In this he quotes from a dispatch from Tyers concerning the number of Aborigines in Gippsland, and identifies six "tribes": The Dergo or Mountain Tribe; Low country or Plains Tribe; Tarra or Corner Inlet Tribe; Mitchell (River) Tribe; Swan Reach (Lower Tambo) Tribe; Upper La Trobe Tribe. The Dergo are cognate with Howitt's Dairgo an upland division of his Brabralung while the Upper La Trobe population is largely missing from Howitt's scheme, a weakness which did not escape his notice but which at that late date he could not rectify.

What is clear from the foregoing is that although a number of cognate names are assigned to groups the scale of the groups is uncertain. Thus La Trobe's Dergo are a major mountain population, while Howitt's mountain Dairgo are a local grouping of Brabralung whom the expeditioners record as essentially montagnards. As Howitt had years of experience, had interviewed Aborigines, and had the concurrence of Bulmer, he is the preferred authority.

Largely as a matter of convenience each of Howitt's five groups is called a tribe for the following discussion. This is a most unsatisfactory term which has been extensively debated (eg. see Peterson 1976). Some alternative terms are mating network, connubium or maximum band (Bettinger 1980:192) none of which appear to be much better.

Two important patterns emerge from Howitt's scheme; firstly with the exception of his Dairgo all Kurnai groups have centres below the 200 metre contour and secondly the "tribes" can be broadly correlated with geological structures within the Gippsland Basin. There are adjacent populations occupying the region of uplifted paleozoic rocks of the uplands which can be similarly identified.

The most easterly tribe (called Kroatungulong by Howitt) inhabited an area of dissected Pleistocene marine sediments forming a narrow strip of rugged piedmont between the sea and the ranges. It is well watered and often densely forested. The local population reportedly spoke the Thang-quai dialect. The coast is largely sandy with little outcropping
hard rock, there are a few drowned valley estuaries around which Howitt’s divisions are centered.

The land of the Brabralung, sole speakers of the Muk-thang dialect, centres on the Gippsland Lakes proper, incorporating the Lakes Entrance Platform, adjacent fringes of the Lake Victoria Depression and the Paleozoic rock of the ranges. It is the catchment of two major rivers, the Tambo and the Mitchell descending from the watershed of the Divide to the broad plains and downs of the lowlands. Vegetation ranged from tall woodland and forest to lake fringing closed scrub and saltmarsh, and offered a range of habitats and resources for human consumers.

Beyond the Tambo-Mitchell lies the catchment of the Latrobe and its tributaries, and the Avon, a minor stream. This catchment, roughly equivalent to the Latrobe Depression and parts of Baragwanath Anticline, can be defined by the Dividing Range to the north, the Mitchell-Avon interfluve to the east, to the west the South Gippsland Highlands and across to Lake Wellington. Plains and woodland are extensive between the Lakes and wetlands and the ranges. This area was reportedly the range of the Brayakalung one of three tribes reputedly speaking the Nulit dialect.

The Berataualung are another Nulit speaking group whose territory lay between Wilson’s Promontory and Merrimans Creek, and inland as far as the South Gippsland Highlands. This territory is narrow, consisting of the of the sub-aerial part of the Seaspray Depression, separated from the Lake Wellington Depression by the line of the Strzeleckis and the Baragwanath Anticline. There is little relief below the ranges, largely produced by the valleys of a number of minor streams, and the subdued forms of Pleistocene dunefields. The coast lacks the drowned valleys occurring further northeast. Vegetation ranged from open forest and woodland on the coastal plain to tall forest and cool temperate rainforest on the range. Coastal vegetation included dune, saltmarsh and estuarine communities, including mangroves. The coastal strip is distinguished by the extensive lagoons and wetlands behind the coastal barrier dunes, these include Jack Smith Lake and Lake Denison. The coast is sandy with no on-shore exposures of rock.

The Tatungalung are the last of Howitt’s tribes, Nulit speakers they inhabited the low relief Quaternary deposits of the older and recent barriers and islands, from Merrimans Creek to Red Bluff. There are no surface sources of fresh water within this territory. This study is particularly concerned with the territory of this group.

It appears that elsewhere in southeastern Australia broad geographic-ecological zoning
could define populations. Howitt (1904:82-3) described a native scheme on the New South Wales South Coast starting with sea-coasters (Katungai), differentiated from the foresters of the hinterland (Paiendra), and finally from the montagnards (Bemeringai). The terms are derived from Katung "the sea", Paien "hatchet", (referring to forest tree climbing using stone hatchets), and Bemering "mountain".

This geographic-ecological regionality can be seen in at least two ways. Firstly it allows a higher degree of specialisation of knowledge and technique and thus more efficient use of the range of local environments. Such a position depends on the assumption that the diversity of habitat and resources between area is greater than that within any such area. A second approach is that it allows or causes cognitive differentiation of populations. This approach is dependent on the assumption that there is something intrinsic in human psychology which leads to atomisation and classification, and differentiation of ego and his grouping from others.

6.4. Population size

As has already been lamented there is little detailed early description of the area. Further as has earlier been argued historical records may be of people who have already suffered decades of disturbance. This section begins with estimates of the Aboriginal population in 1840, and attempts to deduce the possible number in 1788. This can be used as an index of resource utilisation and therefore of the degree to which the local population had been able to adjust to the natural conditions prevailing in the region.

6.4.1. Historic population of the region

Some population estimates are:

- Commissioner Tyers 1844 (in Bride 1983:233) estimated >1000 near the Lakes only in 1843-4.

- Commissioner Tyers 1846 (in Cuthill n.d.) estimated 800-1000 in the mountains, morasses, lakes vicinity and sea coast.

- Commissioner Tyers 1853 (in Cuthill n.d.) estimated a total of 1800 in the early 1840's for the same area as the 1846 estimate. He gave a breakdown of numbers according to the "tribe": Dargo ("mountain tribe") 300 men women and children, Tara (Tarra River-Corner Inlet) 300, Plains 500, Mitchell and Swan Reach (Lower Mitchell and Tambo Rivers) 300, Pal-Pal (the "lakes tribe") 300, Upper La Trobe 100.
Bulmer, (in Curr 1887 Vol 3:544) hazards a guess that the regional population may have reached 1000 prior to European settlement.  

Curr, (1887 Vol 3:543) thought there had been around 1500 in the region at contact.  

De Villiers 1847 (in Cuthill n.d.) thought around 1200, while he suggests McMillan's estimate at contact was 5000.  


Here we would do well to note Gardner's (1978) point that estimates of Aboriginal population made early in the contact period, or in retrospect, must be low simply because it is not seemingly for a coloniser to admit to having eradicated a significant population. Further the admission that there was already a substantial population enjoying the use of land negates any assertion that land is wilderness and "available".  

Tyers' official role and duty as the highest government official in the region demand that he attempt some degree of objectivity. In his 1850's estimate for the mid-1840's he has even given a regional break-down of population suggesting some basis in fact. Accepting this we can suggest 1,800 people survived the initial onslaught of British settlement.  

Howitt provided detailed information on the distribution of the Kurnai population (see Figure 6.1, and Table 6.1). We can start with his subdivision of population into "tribes", "clans", "divisions" etc. and make some assumptions:  

Howitt's divisions are clans composed of multiple bands, after the manner of Barwick (1984).  

-the minimum number of bands per clan is two. This is the minimum possible number bearing in mind that Howitt specifically states that his divisions are divided and subdivided into families based on elderly men and their descendants. This unit of population is identical to the notional patrilineal, patrilocal exogamous band  

-the average number of people per band is 25 minimum, 50 maximum, 38 mean  

-there are at least 19-20 named clans in the study area (but Howitt claimed that he thought that there had been more, firm knowledge of which had passed by the time of his anthropological enquiries after 1872)  

This makes a minimum of 40 (20 clans x 2 bands) bands in the study area. With a
minimum number of people per band of 25, the minimum possible population at contact is: 25 \times >40 = >1000. With two bands per clan averaging 38 people a population of >1500 can be derived. Allowing a limit of 50 people per band and the minimum >40 such groupings there were >2000 people. On Howitt's information the population around the contact period cannot have been less than 1000, and 1500 is a reasonable minimum.

6.4.2. Prehistoric population of the region

We can anticipate that the 1788 population exceeded the 1839 population due to the spread of disease and disruption ahead of settlement. Figures 6.4 and 6.5, are models of changes to a population akin to that of the study area under the influence of disease outbreaks. Conditions of the models are:

Figure 6.4: Population Trends after Disease Outbreaks
-they are modified from Butlin's (1983) attempted reconstruction of the population of southeastern Australia. For a number of reasons his model is not directly transferable to the Gippsland area. Some of the major difficulties are that he uses an 1829 small-pox epidemic in his modelling, he delivers venereal disease as if from an invading army rather than via internal transmission, he allows for the arrival of venereal disease only after 1815, rather than 1790

-life-tables are taken from Butlin (1983), and are constructed from his West, level 5 population where female life expectancy at birth is 30 years

-age-specific mortality rates from Indian small-pox out-breaks are taken from Butlin (op. cit.). As Butlin notes these figures are from a society with institutional back-up and experience in caring for the afflicted. In contrast an unexposed and inexperienced population can be expected to have a higher mortality rate. The mortality expectations of the model are likely to be too optimistic. Experience in Port Jackson and the Americas suggest to Butlin that mortality in the order of 50-100% can be expected, this higher rate is not built into the model
- exotic diseases for which there is no immunity will have a high rate of mortality and can therefore be likened to the mortality rates of the Indian small-pox data above. As Tyers reported to LaTrobe (15 Jan. 1953, in Cuthill n.d.) the "Pal Pal tribe" (i.e. the people of the lakes and islands) appear to have been extinguished by influenza in 1849-50. They are reportedly likely to have still exceeded 100 persons immediately prior to that. A close to 100 percent mortality rate is therefore possible. Butlin (op. cit.) suggests that Fijian influenza mortality records from last century match small-pox rates

-the rate of increasing venereal disease induced infertility at 5% per 5 years up to 40% is taken from Butlin (op. cit.) based on African gonorrhoea-induced infertility data

-the Gippslanders appear to have offered females to visitors as an aspect of hospitality (Warman 25 Feb. 1847), although how freely extra-nuptial relations were otherwise sanctioned is unknown. With widow remarriage, polygamy, inter-group marriage and some level of promiscuity or marital infidelity, there are ample means to spread venereal disease away from contact points

-while gonorrhoea may affect fertility, syphilis is frequently mentioned in historic texts as a cause of both adult and neonate death. It is not possible however to model infant mortality from congenital syphilis due to lack of suitable analogous cases.

-the model does not account for spontaneous abortions or wastage of unborn children due to maternal illness

-the quarantine imposed by the long sea voyages from Britain meant lower levels of communicable disease in the British colonies, however sealers and whalers were liable to infection from contact in the Americas, Asia and the Pacific. Their capacity to infect need not reflect health at Port Jackson in contrast to Butlin's position (op cit:80) that acute infections can be down-played

-direct contact with invaders is not necessary, infection could be spread through contact with intermediate hosts. There is therefore a potential for infection from the day of the British landing at Botany Bay.

-there were pathways for infection which ran through Aboriginal societies ahead of the frontiers of settlement, eg. from Twofold Bay or the Murray Basin

-the model does not allow for increased morbidity, fighting or debilitation following acute or chronic infections
-the model does not take into account violence at the point of contact with outsiders, or as part of disruption following the introduction of exotic disease

**Results** See Figures 6.4 and 6.5. An outbreak of serious disease in 1790, or the introduction of gonorrhea in 1800 will leave a population reduced to 80% of its 1788 size in 1840. A population suffering an outbreak of serious disease in 1790, and gonorrhoea in 1800 must be depleted to at most 60% in 1840. An additional epidemic, here influenza in the 1820’s, will make the 1840 population half its 1788 level.

Barwick (1971) presents figures suggesting that in the historic period, and after pacification Victorian Aboriginal mortality could occur at a rate of 50% every 10 years (mean rate = 5% *per annum*). This population decline is free of massacre effects and high mortality on first exposure to exotic disease. A rate of 50%/10yrs may be too low for the early years of contact, but in line with the conservative nature of estimates to date it will be used. In 1846 John Meyrick (quoted by Watson 1984:169) suggested that to his knowledge not less than 450 Aborigines had been murdered. Thomas in Bride (1983:414) estimated that of 1,800 people in 1843, 131 survived in 1853, that is 93% of the population perished in 10 years. With this kind of estimate at hand it may be difficult to over-emphasise mortality in the first few years. With Tyers’ and Thomas’ estimate of around 1800 in 1847, we can expect the 1840 population to be in the order of 2500 at a *minimum* rate of depopulation of 5% *per annum*.

It is now possible to suggest 1788 populations. Working back from an 1840 population of 2500, if contact after 1790 led to venereal infection, or an epidemic killing 20% only of the population occurred, the 1788 population must have been in the order of 3100 people. If a 40% depletion occurred the 1788 population was at least 4200, prior to a still credible 50% depletion the 1788 population was in the order of 5000.

For comparison, the *minimum* reasonable 1846-7 population is 1000. Prior to population depletion at 5% *per annum* after 1840 the number is likely to have been around 1400. In 1788 before 20% depletion an estimate of 1750 is likely, before 40% loss 2300, before 50% depopulation 2800 people.

The population range for the region in 1788 lies between 1750 and 5000 people. As both Thomas and Tyers suggest 1800 still survived in the 1840’s, comparable to the figure of 1500 inferred from Howitt’s information the figure of 1750 for the year 1788 is clearly too low.
6.5. Population density

Table 6.2 analyses the land areas per Gippsland "tribe" and clan according to Howitt's scheme, the proportions of the area allotted each tribe and clan is held constant in Figure 6.6 to indicate population densities according to the range of estimates above. As Howitt's listing is incomplete, missing particularly Brayakalung from the Latrobe Valley, the density of some populations is too low.

Table 6-2: Population Density by Clan and Tribe

<table>
<thead>
<tr>
<th>TRIBE</th>
<th>KRAUAT</th>
<th>BRABRA</th>
<th>BRAYAK</th>
<th>BRATAU</th>
<th>TATUNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area below 200 m. (km²)</td>
<td>2300</td>
<td>1600</td>
<td>4200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>Number of clans</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Area per clan (km²)</td>
<td>575</td>
<td>320</td>
<td>1050</td>
<td>533</td>
<td>233</td>
</tr>
<tr>
<td>number of clans x 100</td>
<td>20%</td>
<td>25%</td>
<td>20%</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>total area x 100</td>
<td>5.1%</td>
<td>2.8%</td>
<td>9.3%</td>
<td>4.7%</td>
<td>2.1%</td>
</tr>
<tr>
<td>band area x 100</td>
<td>20.4%</td>
<td>14.2%</td>
<td>36.2%</td>
<td>22.1%</td>
<td>6.2%</td>
</tr>
<tr>
<td>total area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results suggest very high population densities occurred. Thus at the lower end of the scale, with a population of 1750, densities of one person per 11 km² are indicated for the Brayakalung "tribe", while for the Tatungalung and Brabralung less than 4 km² may have served each person. At the upper end of the scale a Kurnai population of 5000 would be distributed so that the lowest density is one person per 4 km² (Brayakalung) while the greatest density is less than 1 km² per head (Tatungalung and Brabralung).

These figures can be compared with Lourandos' (1977:222) reconstruction of Victorian Western District population densities of 1.5-2.3 km² per person for the Peek Whuuroong of the Port Fairy area, 2.0-3.0 km² per person for the Manmeet (Gunditjmara), and 2.6-3.9 km² per person for the Northern Tjapwurong. These are among the densest in Australia. Even at the lower ranges of population (eg. regional population of 1000-1750) the denser populations such as Tatungalung (<4 km² per capita) are of the same magnitude as Manmeet and Northern Tjapwurong.
6.6. Material Culture of the Gippsland Coast and Lowlands

The material culture or technology of a population allows it to exploit its environment, and is therefore an index of adjustment to environment. This of course hinges on the proposition that without a capacity to exploit elements of the landscape they can not be regarded as resources. A population which does not or cannot exploit fish or mollusca cannot, for example, realise the resource potential of a coastal lagoon. If a knowledge of the technique and technology required to catch fish appears in an area, and is adopted, significant changes to the ecology of the population can be expected to follow. This can result from changed seasonal cycles and intensity of harvest from different environmental zones, changed nutritional status and subsequently changed carrying capacity. Such change must be assumed to have occurred all along the southeastern Australian coast between the last marine transgression and historic times.

No detailed inventory of the material culture of the study area is known to the writer, it is difficult therefore to determine the extent to which the technology of the area can be seen as
typical of that of southeastern Australia, or the extent to which ideas have been locally adapted. Cur (1887), citing Bulmer suggests the possession of much of the weaponry of Southeastern Australia but with insufficient detail to suggest specialisation of form or function. As tends to occur, aggressive weaponry attracts more attention than household chattels. Notes on selected items of equipment are as follows.

**Spears (fishing)**

It was made generally of thin pieces of bone about a foot long let into the stem of the grass tree, or neatly spliced on to a straight piece of wood, and bound with sinews of kangaroo or string made from the bark of the light wood (Bulmer n.d.3)

It should be noted that the whole prong is of bone, not merely the tip. See Figure 6.7 of a boy with a fish spear at Lake Tyers in the 1880’s, note the two prongs. The use of the spear appears to be particularly associated with torch fishing at night, and given the unique form it might be a locally derived or specialised implement. As noted in Chapter Seven, there is a local tradition of bone cutting using a burin tool going back to the mid-Holocene. This suggests the possibility that this class of spear could have been in use during the earlier occupation of this coast.

**Figure 6-7:** Woman in bark canoe, and boy with fishing spear, Lake Tyers

**Spears (hunting)**

In hunting the kangaroo they used spears barbed with pieces of flint or in modern times
with broken glass. This was secured with the gum of the grass tree (Kamma) on hunting days it was amusing to see every man busy - one was chopping the flint or glass, an other was scraping wood to get fine shavings to mix with the gum. Others were finishing off the spear points. The gum was softened and put on the spear. The glass or flint was then stuck onto the glass (?) and the fine shavings were put on the outside to keep gum together. This was to be repeated every hunting day as the barbs came off at once when killing an animal. (Bulmer N.D.2)

This style of spear ("death" or "jagged" spear) appears elsewhere to be associated with serious fighting. Bulmer thought it was a "formidable" hunting weapon for with the glass or stone flakes it made an "ugly" wound in the prey (Bulmer n.d.3).

Canoes
...their canoe a sheet of bark from the straight part of a tree folded at the end... (Robertson in Mackaness 1941)

Howitt (in Smyth 1878) described the manufacture of Gippsland canoes in detail. Like Bulmer (see below) he spoke from personal experience having made and used bark canoes with Aborigines. In a case described the tree chosen was a stringybark about four feet (1.3m) in diameter at ground level. The bark was cut around 2-3 feet (60-100cm) above ground level, and around 10 feet (3m) above that, a vertical cut was made between the two rings. Two saplings were trimmed to a bladed form, inserted in the vertical cut and used to lever the bark off. Once detached the outside "fuzzy" bark was removed, and either end was further thinned. The bark was heated over a fire until pliable, then turned inside-out, cords around the outside held it in shape. The ends were next gathered and folded like a fan and tied with a cord of stringybark. See Figure 6.7.

The canoe described by Howitt was further improved by the addition of sticks as ribs and spreaders. Perhaps recognising he would be ferrying an inexperienced boatman across the flooded Snowy River the Aborigine Toolabar, opted for a safer craft. The use of ribs and thwarts does not appear to have been common.

Howitt and Toolabar crossed the Snowy with their saddles and effects in a canoe about ten feet long, Toolabar paced for Howitt the approximate lengths of canoe required for different numbers of people (Smyth op. cit. 411). Two or three people required seven or eight feet of canoe, four people ten to twelve feet of canoe. Haydon (in Mackaness 1941:45) recorded near Wilson's Promontory that,

...many of the trees near the river had been stripped of their bark to the height of twenty feet by the Gipps Land blacks for the purpose of making canoes.

Bulmer (n.d.2) noted
I have seen one big enough to carry three bags of flour, three men, indeed it was wonderful to see the number of men, women & dogs which could get into a large canoe
also

The canoes were used by the women in fishing, and also by the men in hunting moulting swans and ducks. (Bulmer n.d.3)

and (see also Figure 6.8)

The manner of fishing was that two men in canoes held each one of the ends of the net which was spread out behind them in the shallow water while in front of them at a little distance another man in his canoe drove the fish before him by beating the water with his canoe pole. Thus the fish swam between the two canoes into the net beyond and the two men approaching each other had them enclosed... (Bulmer n.d.1)

Because of their frail construction we are unlikely to be able to directly date the arrival of canoe making. Circumstantial evidence exists in dated midden deposits on Glennie Island off the Western shore of Wilson’s Promontory. To have reached Glennie Island requires a fair level of boatmanship and seaworthiness. Howitt (1904:422) and Robinson (in Mackaness 1941:19) witnessed southern New South Wales Aborigines "like floating Specks off the Coast spearing Salmon". This indicates an adequate level of both boatmanship and seaworthiness. It is not unreasonable to suggest the Glennie visitors used similar craft. The earliest midden deposition is 1850 BP (ANU 3832), with more frequent visits after 1480 BP (ANU 2429) (Head et al 1983:99-112). We can therefore suggest a date of 1,500-1,900 BP for tied bark canoes.

Stone artefacts. Interested recorders of Aboriginal life arrived late in Gippsland, as a result details of more prosaic aspects of camp life such as the use of stone flakes are unknown.

The only stone implement to receive much notice is the stone hatchet. Bulmer (n.d.3) notes: "It was made of a flat stone... rubbed down till it had an edge." This seems to imply that a natural pebble formed an axe-blank rather than quarried material. Bulmer says it was wood-working tool, and used to cut toe holds when tree climbing. As noted in Chapter Two there is no outcrop of suitable stone in the study area, hatchet stone would need to have been imported, or possibly collected as river cobbles.

Smyth (1878) after Bulmer, talks of stones as net sinkers. It is not known if these were modified and recognisable as implements, or what size they are likely to be. This type of information could aid their recognition in archaeological contexts.

Reed Knives Victorian Aborigines made use of the hardness and sharpness of phytoliths in monocotyledonous plants to make butchering knives:

In cutting up a kangaroo, they are not at any loss for implements, using the rush or reed, which they split down, and disjoint with ease the limbs of large animals by that simple means. (Warman in The Port Phillip Herald 25 Feb. 1847, in Cuthill documents)
Similar knives are recorded elsewhere in Victoria, eg. see Robinson 27 May 1841 in Presland 1980:26.

Shelter There is little rock in which overhangs can form. Shelter therefore needed to have been constructed varying according to the season. According to Bulmer in Smyth (1878:142):

...in summer in their temporary camps, a few boughs would suffice, as the nights were warm, and indeed, as they occupied themselves at night in fishing, they did not require much shelter. In case of wet they made a grass camp. In winter the camp was more substantial, as they remained longer in one locality in that season. It was thatched with grass or made of sheets of bark.

Clothing The Aboriginal skin cloak or rug of southern Australia was used in Gippsland, it receives little attention and is therefore presumably essentially similar to those made elsewhere, consisting of untanned possum or kangaroo hides, dried, scraped, scored, greased and stitched together.

In Gippsland and on the Murray they made themselves beautiful rugs, fine specimens of native workmanship. They were coloured in various colours and the marking was strictly Aboriginal though no white man need have been ashamed of the work... The Gippsland people were certainly very comfortable as during winter they made themselves good camps with sheets of bark and had good rugs to keep them warm. (Bulmer n.d.2)

Nets During his time as missionary on the Murray Bulmer saw emu hunts using drives and nets, but makes no reference to it in Gippsland. However as Satterthwait (1987) indicates net hunting was widespread in Aboriginal Australia.

Nets were however used for fishing. "The most common mode of getting fish was with a net" (Bulmer n.d.3). In his survey of fishing methods in eastern coastal Australia Lawrence (1969:144) concludes that the reference to net-fishing by Robinson (in Mackaness 1941) is questionable as he found little evidence of nets in neighbouring areas. The local emphasis on net fishing would therefore appear to be unique in southern Australia. Elsewhere, the main effort was directed towards spear and hook, with an apparently strict sexual division of techniques. In contrast both sexes in the study area appeared to use nets, hooks and spears were sex specific.

Bulmer noted

In fishing they used set nets, and also drag nets, but the set net was the most popular with them, as they did not make them very deep, hence they were not so successful with the drag. (Bulmer n.d.3)

Fish were driven into set nets, see Figure 6.8. Bulmer notes that net fishing in the Gippsland Lakes region was restricted to shallow water. As Blackman and Hinwood (1983) note much of the Gippsland Lakes is shallow water often 1-2m in depth and deeper nets, or drawn nets may not have been practical.
Bulmer provided Smyth with information and samples of two types of net (Smyth op cit:389). One is a hand net, stretched on a bow, and used to capture small fish for bait. The second is described as having a mesh size of about two inches, with floats of tea-tree bark, and stone sinkers. The length and drop are not described.

There is some ambiguity regarding the fibre from which nets are made. Bulmer suggests "Kangaroo Grass" (species identification uncertain) was used. The grass was spun untreated into two-ply twine. (Bulmer n.d.3). Warman in his published journal (Port Phillip Herald 23 Feb. 1847 in Cuthill documents) talks of an emergent aquatic "grass" in Lake Reeve. "The natives use it to make lines and nets with, and their manufacture is of a very superior order". Curr (op cit:544) refers to the use of stringybark. Elsewhere (Bulmer n.d.1) Bulmer says that:

"... the fishing nets were made by the women of a sedge called Bun or garn.

Bulmer makes the point that because the fibre is not separated from the "pulp" Gippsland nets were weak compared to those he saw on the Murray.

The use of nets in Australia appears to go back to the earliest days of Aboriginal occupation of the Willandra Lakes where sorting of the sizes of fish otoliths indicates a selective agent such as mesh size (Kefous cited by White and O’Connell 1982:36). The use of nets was possible therefore from the earliest days of coastal occupation.
Fish hooks Robinson (Mackaness 1941:11), Bulmer (in Smyth 1878:391), Curr (op cit 548) and unpublished papers (n.d.1,2,3) refer to the use of hooks made of bone. Bone hooks are ethnographically restricted, in southeastern Australia, to the Gippsland area, elsewhere along the SE Australian coast true hooks (as opposed to gorges, see Smyth op. cit.391) appear to be made of shell. The use of shell hooks is dated on the Southeast Coast to <1,100 BP (Sullivan 1987:98).

Bulmer (n.d.1), describes the manufacture of bone hooks:

Fish hooks were used by the women and were made from piece of the leg bone of a kangaroo which being broken with a stone afforded flat pieces which were first of all rubbed smooth on both sides on a stone, then (perforated?) with a hole which was then enlarged and the (illegible) being rubbed smooth a hook was formed... A line made of the... was tied to the shank. Baits of shrimps were tied to the hook.

The fishing line was called... is made by the women from the inner bark of the "light wood" Acacia melanoxyylon...

The process of hook making is very similar to that used on the South Coast of New South Wales as described by Lampert and Turnbull (1970:312-3), using the large Turban shell Ninella torquata. This species does not live in Victorian waters today. Further the paucity of outcropping rock restricts the distribution of any rocky shore species which might be suited to hook making.

What are taken to be bone hooks were excavated near Mildura on the Murray by Gallus and Gill (1973:215-6), an area where ethnographically fish hooks are not supposed to have been used. Along the Southeast coast of Australia bone hooks are unique to Gippsland, but their manufacture and form (see Smyth op.cit.:391) is very similar to that of east coast shell hooks. The fact that the large Turban shells favoured elsewhere are not found on this coast may go a long way in explaining the use of bone. Bulmer did not think the Aboriginal hook could be effective (n.d.2, n.d.3), but he never saw one in use.

Another variant on the fish hook theme is the reported use of "animal claws" as hooks (Warman in Port Phillip Herald 25 Feb. 1847).

Neither the tied end canoe nor fish hook are reliably reported west of the study area. Howitt (in Smyth 1878:410-11) suggests that the more normal style of watercraft north and west consists of what is in effect a preformed dish of bark cut from the bend of a tree. The tied-bark canoe of Gippsland appears to be the basic model of the Australian east coast. In southern New South Wales Robinson recorded that "Their canoes like the Gipps Land Natives are folded at the Ends and though bouyant are frail: (Mackaness 1941:19).

The method of canoe making described previously removes a collar of bark from the
whole circumference of the tree, killing it and leaving it vulnerable to fires. The odds are against any valid "canoe tree" being found in the coastal zone.

The bi-point fish spear, with solid bone prongs around 30 cm. long described by Bulmer, differs from the bone-tipped tri-points recorded in use along the east coast. Despite such differences it is apparent the Gippslanders shared with the people of the East Coast a basic kit of coastal material culture, possibly modified like the spear and hook, but still part of what appears to be a single tradition. In the case of the hook it might be argued that the similarity is all the more remarkable given the demands of different raw materials, and the possibility that this might stimulate the development of new forms.

6.7. Subsistence economy

6.7.1. Labour and population demands of net fishing

Figure 6.8 is a sketch by Bulmer (n.d.1) of Aboriginal men net fishing. While two men in canoes hold the ends of a net a third is beating the water with his canoe pole to drive fish into it. This appears to have been a common and productive fishing technique. Nets could also be dragged but Bulmer thought this was less common, less productive and not suited to the relatively frail nets in use in Gippsland. There is no description of how dragging was undertaken.

The minimum labour requirement with the method described is three reasonably active men with canoes, poles and net. A single extended family could provide the labour necessary. With Howitt's assistance a single Aboriginal man could produce a canoe in a relatively short time. This too lies within the labour capacity of the extended or nuclear family.

Production of nets requires a greater investment of time, forward planning a number of steps in production: gathering of raw materials, spinning of twine, knotting, and fixing of floats and sinkers. There is sufficient information on southern Australian nets to gauge the inputs of labour in parts of the net making process. The most laborious and time consuming tasks would appear to be the spinning of the twine and knotting. Other tasks, eg. gathering fibrous plants, floats or sinkers could be done incidentally while engaged in other tasks and may be hard to quantify. There is however sufficient information to make a reasonable assessment of the commitment involved.

Smyth (1878:389) described a sample of Gippsland netting as 2" (5 cm.) between knots, that is 2.8" (7 cm.) diagonally between knots, and 8" (20 cm.) around each square or cell.
Quoting correspondence from South Australia Smyth (1878:199) implies a southern Australian net would be around 4’ (122 cm.) deep. This is a useful depth on the extensive shallows of much of the Gippsland Lakes. Bulmer (n.d.3) states that it is the women who produced the twine from which nets were made and that a single woman could produce less than 100 yds. of twine per day.

If netting is imagined as composed as columns of square cells with diagonals oriented vertically, each cell will require 8" of twine. With a depth of 4’ there will be around 17 cells in each separate column. Each column will then require 17 x 8" = 136" of twine. A daily production of 100 yds. (3600") of twine will be sufficient for 3600/136 = 26 columns. Each column is 2.8" (diagonal width of 2" square) wide, therefore the length of netting which can be produced from a day’s twine spinning is 2.8" x 26 = 73" (around 1.9 m.) excluding knots. Presumably knotting, attaching weights and floats etc. would be equivalent to another day’s work for a second person, with an average rate of production of <1 m. of net per person day.

It is apparent that the production of a useful net would require some weeks of person days, with an equivalent loss of production of other materials. This presents any number of possible variants of numbers of person days versus calendar days in the organisation of time and labour. If the population were full-time fishers nets could be made at a rate anticipating the deterioration of those in service. If fishers are seasonal only they have the choice of curating nets over winter, or replacing them annually. If people are organised at the nuclear family level seasonal replacement may involve considerable opportunity costs. This may not be as critical at the level of the extended family group or larger level where a concerted effort could achieve relatively quick results and minimise opportunity costs by fully utilising the labour of the whole group in food production and net making over a relatively short period.

It is likely that once made Aboriginal nets would be an encumbrance which limited mobility, especially in the hinterland, required constant maintenance and careful handling, but which as bulk harvesting devices were well suited to providing the needs large groupings. From the foregoing it can be reasoned that net fishing not only allows large groupings, but requires aggregate labour in production and in maintenance. Opportunity costs are likely to be minimised if the rate of manufacture matched the rate of deterioration in use. Nets are therefore more likely to be of benefit to groups with a long or perennial fishing season.
6.7.1.1. Seasonality of the fishery

It has been widely accepted that on the Central and South Coasts of New South Wales the historic Aboriginal fishery was disrupted in the cooler months by an apparent scarcity of fish (Poiner 1974:198, Lawrence 1969:146). However, as the biological data in Chapter Two indicate this scarcity is not due to all fish leaving in winter. Rather, they were less accessible with the hook-spear technology used. The Aboriginal response to this scarcity appears to have been in part at least seasonal transhumance.

In the study area it can be argued that the use of nets allows the possibility of a perennial fishery by freeing spearmen and women line-fishers from seasonal constraints of fish behaviour and feeding patterns. This is likely to be of particular significance to groups whose territories do not, according to Howitt’s distribution, include large tracts of hinterland.

6.7.2. Shell-fishing

Bulmer (in Smyth 1878:205, and nd.2) refers to the exploitation of freshwater mussels, and coastal shell-fish by Victorian Aborigines.

Sometimes when a man was very hungry (Wike wilkana) or in the Gippsland tongue (Ganu ganook) he would take a bag and dive to the bottom of the river to get mussels, it would take 3 or 4 dives to fill his bag, but as soon as it was full he would quietly go ashore and roast his catch (Bulmer nd2).

In this case it is apparent that shell-fishing is not an exclusively female occupation, and that the class of deposit so formed reflects opportunistic use of shell-fish. Arguably successful hunters do not form this class of deposit.


Smyth suggests Linnaean identifications for these as: freshwater mussel-*Unio* sp. (probably *Velasunio* sp.), "periwinkle"-*Lunella undulata* (probably *Subninella undulata*), Limpet-*Patella tramoserica* (probably *Cellana tramoserica*), "Cockle"-*Cardium tenuicosta* (probably *Fulvia tenuicosta* or its look-alike *Anadara trapesia*), Mutton-fish-*Haliotis nivosa* (probably *Notohaliotis ruber*). His crab is identified as *Pseudocarcinus gigas* a large species usually thought of as deep water. The identification of the "sea cucumber" is difficult.

The taxa above are overwhelmingly rocky-shore taxa, the "cockle" however suggests
sheltered marine conditions might also be exploited. It is interesting in light of the density of *Donax* middens in the region that Bulmer does not acknowledge ocean beach resource use.

6.7.3. Food plants recorded


Botanical identification from this list is difficult, and it is interesting that it is largely fruits rather than roots, stems or leaves. Robinson (in Mackaness 1941:23) observed in the vicinity of Bega (Biggah) that:

Of the fruits eaten by the Coast Natives the *Solanum Laciniatum*, (Kangaroo Apple) *Mesembryanthemum Equilaterale*2 and *Astrolama Humifusa* (Native Cranberry) are the most common.

Similarities with Smyth’s list should be noted.

One food plant not included in Smyth’s list but appearing elsewhere as an important root staple is the bullrush, *(Typha spp.)*. In Bulmer’s papers (n.d.1) he relates tales in which domestic scenes are portrayed, including gathering of *dura* ie. the rhizomes of Typha spp. It is assumed that this reflects a role for *Typha* as a staple. It is one of few taxa able to have supplied Victorian Aborigines with a carbohydrate staple (Gott 1982).

Bulmer (n.d.2) speaking of Murray Valley and Gippsland suggested that, ”The food of an Aboriginal consisted chiefly of animal substances to which he added a few vegetable roots and as they had no salt they used the pig face...” *Pig face* covers two genera of Chenopods, *Disphyma* and *Carpobrotus* (Bridgewater et al n.d.), these are halophytic and salty to taste. Both genera were previously included in *Mesembryanthemum*.

As discussed in Chapter Two the major Southeastern Australian plant taxa likely to have provided significant quantity and quality of carbohydrate, *Typha spp.*, *Triglochin procera*, *Scirpus spp.* are aquatic (Gott 1982) and widespread in a region in which wetlands are almost ubiquitous. In Gippsland the dry-land food taxa are diminished by the infrequency of occurrence of *Microseris* (Willis 1966) while both the Orchidaceae and Liliaceae may be sparse and low density in occurrence.

---

2pigface
One plant suggested by Bulmer (in Smyth 1878:141) and Robinson (Mackaness op cit:23) to have been a summer staple is "kangaroo apples" (*Solanum spp.*). This poses an interesting problem as the same Southeastern Australian species are plantation grown in the USSR as sources of *solasodine*, used in Soviet pharmacology in the production of an oral contraceptive (Low 1987). It is possible therefore that seasonal consumption of this taxon may have led to an annual cycle of fertility and infertility among Aboriginal women. This would be unusual among human populations.

**6.7.4. Seasonal economy and mobility**

It has already been noted that there are no real accounts of Aboriginal life from the study area dating to contact in the 1830-40's, and that patterns of Aboriginal life in 1839 need not reflect life in 1788. Early in the contact period Aborigines rapidly disappeared from good grazing land, i.e. potentially the best macropod areas. We have no picture therefore of the organisation of herbivore hunters.

Observations of interest are:

Robinson (June 1844 in Mackaness 1941:11)

"The Lakes the chief rendezvous of the natives contiguous to the coast are unsurpassed by any in the colony ...the Aborigines may be termed Ichthysophagist".

Bulmer (in Smyth 1878:141-2) talking of what would appear to be more northerly Kurnai:

"In summer their days would be spent chiefly in fishing for eels and fat mullet (*Pert-piag*). They camped at the entrance to the Lakes, where they are plentiful at this season. They would also find in the gullies near the entrance plenty of *koonyang* (kangaroo apples), and these, with the fish, would form their chief diet. Excepting when they desired a change of food, a day would be spent in going back into the bush for wallaby... In summer his nights would be spent getting eels or other fish, as at night they can be more easily taken. He would go into the water with a torch and spear; the fish would be attracted to the light, and they would fall easy prey to the spear...

In winter the greater part of the time was occupied in hunting native bears, kangaroo &c.;... In spring the time was devoted to fishing, as the fish then begin to be plentiful. The autumn was spent in visiting other tribes and getting up new corroborees. Their food during this season was various, chiefly opossums, bears, kangaroo, &c;...

In spring, as well as in summer, they live much on vegetables and fruits.

In summer they fished mostly on the coast,² or at the mouths of the rivers which run into the sea, as at this season the fish were either going to or returning from the sea. In winter they would more likely procure fish in the rivers...

The time when they kill the most wild-fowl is in spring, when the birds are moulting. At this season they kill swans in large numbers. The wild-fowls they get principally are swans and ducks.

Bulmer (n.d.2) "In Gippsland different fish were plentiful in certain seasons of the year, at

---

²This does not mean fishing off shore as elsewhere Bulmer makes it clear that the Gippslanders did not attempt to take water craft off the Ninety Mile Beach.
the beginning of summer they were able to spear the flounder and the fat mullet. The first Perpin latter Perpeang. The fish became plentiful just before the Lake opened to the sea as the fish were then wanting to get out"

They now live in the winter in the most inaccessible parts of the mountains, and in summer they come to the Lakes to get eels, which are in great abundance and of an immense size, but they reside principally in the reedy swamps, not daring to show themselves in the forest country. Mostly all were more or less attacked with cold in their chests... (Warman in *Port Phillip Herald* 21 Jan. 1847)

Aborigines were seen to be making for the eelimg grounds on Lake Wellington in the cool month of May in 1847 (Anonymous *Journal kept by a member of the second expedition for the recovery of the white woman held captive by the Gipps Land Blacks*, in Cuthill n.d.). Aboriginal men were also seen spearing eels in Lake Reeve in January 1847 (Warman in *Port Phillip Herald* 21 Jan. 1847). The May eeling presumably involved fish beginning their migration from the hinterland to the estuaries, the January eeling occurred further down the system and closer to the outlets as the season progressed. Although there may have been a major cycle of winter-inland/summer-coastal movement there is also a secondary pattern of movement available to those with access to the eeling grounds.

Scheduling of activities according to Warman and Bulmer involves moving to the wetlands in spring for ducks and moulting swans; summer sees a shift to the coast and lower rivers after migrating fish, hunting excursions to the hinterland are a summer option. Autumn sees a return to the hinterland to exploit terrestrial fauna over into winter when camps are more permanent and weatherproof. Eeling may have been a winter option complementing the use of hinterland resources, although it may be questioned whether freshwater wetlands should be classed as coastal or hinterland.

A problem arises with Howitt's proposed population distributions (see Figure 6.1 and Table 6.1). There are some groups for whom a hinterland-coast pattern is not possible, the Dairgo for instance appear to be isolated from the sea by intermediate populations, while the Ngaraawut appear to have little access to land other than islands and barrier deposits. Others such as Munji have access to both the plains and lakes, but the coast and mountains belong to other groups. The schedule suggested by Bulmer is not applicable to all clans.

The observation above of people moving to Lake Wellington to catch eels in May (early winter) suggests that the summer-coastal winter-hinterland model is not adequate. Rather than to search for a general scheme of seasonal movement and resource exploitation between coast and hinterland (eg. see Poineer 1974) adjustment to local conditions, including human and topographic organisation must be considered. There is no good reason why a single strategy of coastal-hinterland use must apply to the whole of coastal
Southeastern Australia, while the logic of man-environment relations suggests the probability of numerous local patterns along the SE Australian coast.

Accordingly, distinct populations, e.g. the Munji, Dairgo, Ngarawut, or Bemm might be located in almost contiguous territories (e.g. Munji and Ngarawut) but would be required to pursue distinctive seasonal strategies.

6.7.5. Manipulation of resources

People can be expected to affect vegetation, its structure and distribution in a number of ways. The first is via burning of vegetation to alter the successional state, eliminate firesensitive taxa or encourage the growth of fire-tolerant taxa. This appears to have been carried-out in Gippsland through burning of wooded areas with the effect of maintaining a more open structure (Howitt quoted by Hancock 1972:25-28). How this affected food plants is not clear, a predictable outcome is however the maintenance of habitat for a range of desirable generalist open forest game notably grey kangaroos and wombats.

Two other effects on vegetation are creation of conditions favouring the proliferation of invasive taxa, or maintaining the habitat requirements of desirable taxa. The first class of change is brought about by disturbance. Typical disturbance factors are burning and digging, responses may be a proliferation of "weeds", opportunistic species which may not compete in more mature vegetation associations.

In the study area Solanum aviculare (Kangaroo Apple) habitat availability was almost certainly enhanced by human action. As Solanum seeds are fairly durable in passing through birds’ digestive tracts (D. Yen pers. comm.), it is conceivable that seeds were spread through consumption by people who later bury their faeces. That is people are likely to have not only prepared sites for plant growth but to have consciously or not sown seed. A similar process can be seen today in the study area where disturbed ground is frequently invaded by Solanum.

With taxa like Solanum simple human presence, with the inevitable disturbance it causes, may increase both their number and distribution. This is interesting as Bulmer (see above) notes that Solanum was a seasonal "staple". It might be argued that there is a feed-back loop in operation, the more human presence, the more a taxon proliferates, the greater the proliferation, the more the area is capable of supporting a human population.

Digging and firing can be deliberately undertaken to maintain the habitat of desired taxa. Head (1983) argues that Aboriginal management of swamps in Western Victoria served to
maintain the *Typha* habitat. Although not directly attributing it to Aborigines, Ladd (1978) suggests that burning may have been responsible for maintaining a *Phragmites-Typha* community and preventing the succession to *Melaleuca* closed scrub around Lake Curlip on the lower Snowy River. In light of Head's thinking the possibility must be entertained that *Typha* firing was a wide-spread practice.

Both *Typha* firing and *Solanum* expansion provide interesting insights into pre-agricultural interaction of human populations and staple food plants, and one where it can be argued that the human carrying capacity of the area has been increased as a consequence of prior activity.

The only recorded animal domesticate in Australia, the dingo (*Canis familiaris*) was an inhabitant of Aboriginal camps in the study region. Skeletal analysis of dogs buried in midden deposits at Mallacoota (Gollan 1984:338-347) indicates nothing to differentiate them from wild stock. The Kurnai of the study area did however differentiate tame dogs (*baan*) from wild dogs (*ngooran* or *mirigaan*) (Mansergh and Hercus 1981:114). Whether camp dogs were eaten is not recorded, however the fact that the dogs examined by Gollan (op cit) were buried at death suggests they were not. It is not known if dogs were used in hunting in the study area.

6.7.6. Food Storage.

A capacity to preserve flesh is clearly demonstrated during historic times. Harvey (1943:109) outlines the preservation of fish by Aborigines of the Lower Murray region. The process appears to have been applied to a mullet, Murray cod and a "carp". The fish is cooked in an earth oven, vented "for the steam to escape". The oven as described consisted of a pit into which hot stones were put, then lined with dry grass on which the food was placed and covered with more dry grass, stones, coals and finally earth. The bones and skin were removed after cooking, and the flesh was put in baskets, covered with dry grass and hung in shelters. Dried it was said to last for many months. Leubers (1981) notes that when shelters were filled with fish the Aborigines erected timber framed structures to cope with the overflow. The obvious departures from other descriptions of cooking in earth ovens are the use of dry grass, and a venting aperture.

Unlike a sealed earth oven a vented oven can be expected to contain a dry atmosphere, and desiccation of the contents can be anticipated. This first stage of processing could stabilise the fish, add preservative chemicals and begin the drying process.
In Victoria, Protector of Aborigines for the Westernport area, William Thomas, wrote of the Aborigines:

I have known an encampment on the move thro’ a desert country for 2 or 3 weeks before hand industriously collecting some hundreds of opposums kangaroo rats then cure them which they do in a judicious manner by effectively drying them, after taking out their entrails, I have tasted after a fortnight an oppossum as eatable as a bit of bacon, I have known them to be so precauous as to collect in abundance Gum, that they might not be without it when it was not in season to have as much as 30 lb. by them, and a further precaution to plant in trees as much as 50 lb. where they know they would pass in the barren season (Thomas n.d.)

Dawson (1981:17), in the Western District of Victoria describes possums being prepared and "toasted" before the fire to improve their keeping qualities. "In this way the natives make provision for travelling through country where food is scarce". In this case the preparation may involve simply dry cooking. He also (op cit:18) notes that to prevent meat being fly-blown it was hung in the smoke of the camp fire.

In 1844 Crown Lands Commissioner for Gippsland, C. Tyers recorded an expedition in pursuit of Aborigines accused of stealing cattle, an Aboriginal encampment was attacked. Amongst the material reported left by the fleeing occupants was 12 cwt of smoked beef (Watson 1984:165).

On 2 March 1847 James Warman, reported that:

"...the police and Omeo blacks had been killing some Worrigals near a place called the Green Wattle Station, and that a large quantity of beef was found smoked and cured in the camp of the Worrigals," supposed to be Mr. McAlister’s cattle. (Port Phillip Herald 2 March 1847 in Cuhill n.d., My italics)

In March 1844 P.C. Buckley was in pursuit of Aborigines accused of cattle stealing in the southern Gippsland Lakes region. During the hunt his party attacked an Aboriginal camp:

...we rushed after them, I fired but he was too far off. We made them leave their spears and other implements of war behind them... found about five hundredweight of beef half roasted which I suppose was for the purpose of preserving it. Judging by the number of their camps I suppose there were about sixty of them... (cited by Pepper and De Araugo 1985:36)

A pre-Contact understanding of flesh preservation is demonstrated in the reported funerary practices of Gippsland. A number of historical references are made to keeping the preserved hands of relatives and friends. The European discoverer of Gippsland, Angus McMillan, described an early encounter with an elderly Aboriginal man.

The only ornaments he wore were three hands of men and women, beautifully dried and preserved." (in Bride 1983:207)

Howitt (1904:459) referred to the dried hand as bret and stated that it was worn in remembrance of the deceased.

---

"Worrigal or warrigal, warrigle is a colonial term meaning wild dog, but frequently found in reference to Gippsland Aborigines."
Warman recorded:

In speaking of the hubra of the man who had supplied us with fish, she had a pair of child’s hands suspended round her neck; said the child belonged to herself.

Elsewhere in the same article he recorded that:

The wurrigals are in the habit of wearing the hands of deceased persons slung around their necks as a token of affection. They are beautifully preserved, nails and flesh with veins all perfect. Their mode of preserving them is by a curious process of stewing with hot stones. *(Port Phillip Herald* 25 Feb. 1847 in Cuthill n.d.)*

*Stewing* with the dry heat of hot stones seems to be a contradiction in terms. Given Buckley, Dawson and Thomas’ reference to preservation using with dry heat, and Harvey’s fish preservation involving a dry earth oven it appears that simultaneous dessication, smoking and destruction of spoilage organisms through cooking were the basis of Aboriginal flesh preservation.

The methods of flesh preservation and the custom of preserving the *bret* suggest an indigenous knowledge of meat curing in southern Australia. Whether the techniques used, other than on *bret* were in fact indigenous or modified from European practice is less relevant than the practice. The contact period was a period of stress with the Aborigines displaced from the best hunting areas and suffering considerable abuse and humiliation in addition to resource loss. The practice of driving herds into the swamps may be seen as substituting one form of game for another (i.e. beef for kangaroo), although revenge cannot also be discounted as a motive.

Curing of beef can be interpreted as a resource substitution and husbandry strategy compensating for the loss of traditional subsistence while sheltering in peripheral areas. Prior meat or fish preservation, if it occurred, may have served a number of other purposes (eg. see Ingold 1983), including allowing for populations to be fed over seasonal lean periods.

### 6.8. Discussion

While a number of aspects of Aboriginal socio-cultural systems were degraded during the historic period, and almost certainly during the proto-historic period it is anticipated that some aspects would remain more intact than others. Major effects of British colonisation are decimation of population, alienation of territory, disruption of sense of self-worth, symbolic systems and world view, and deterioration of general health and population fertility. It is reasonable to assume that this would lead to damage to the organisation and political relations of population groups.

It is suggested here that although incest was scrupulously avoided a prior system of
moiety exogamy and political betrothals declined early in the history of colonial expansion. This may be most simply explained as a rationalisation of propriety following decades of proto-historic depopulation and demographic shifts. Arguably with a decline in numbers it might have been increasingly difficult to make ideal matches and incest avoidance might have sufficed over traditional niceties. If as certainly occurred on border areas, inter-group relations decayed, political betrothals between groups may have become difficult.

Judging by the greater availability of information to Howitt, population distribution was a more conservative area of socio-cultural organisation than moiety or section organisation, and perhaps marriage negotiation. There are however good ecological reasons for this. Many Gippsland Aborigines remained, to a greater or lesser extent, hunter-gathers up to the 1860's, and there was a need to retain spatial organisation as an aspect of ecological regulation. Despite the greatly reduced numbers of people to be supported the capacity of the land to support them was also reduced. As has been demonstrated in Chapter Two some of the greatest human resource potential lay in the lowland plains, an area the British occupied early, Aborigines were left with marginal lands. The capacity of the land to support hunter-gatherers also declined. This is demonstrated in the early 1840's when an anonymous expeditioner after the Wild White Woman found to his discomfort that the surface water between Port Albert and Merriman's Creek was fouled by cattle and unfit for consumption (Journal of Expeditioner contained in Cuthill n.d.). It is reasonable to suggest that the reduced number of exploiters had a reduced resource base, and continued adherence to territorial organisation was desirable.

Population distribution may be sanctioned and perpetuated through systems of belief, symbolism and ideology. A correlation between local population units and central group mythic centres is stated by Peterson (1975) for Arnhemland. Similar affective ties of people, their identities and land can be expected in southern Australia. Even if they are not able to be resident on their land we can expect the Gippslanders to maintain attachment to mythic centres.

It has been argued above that the demography, economy, patterns of political relationships and sedentism-nomadism witnessed among Victorian Aborigines during the historic period is not necessarily a true reflection of the way things were in the proto-historic period, and extrapolations back into the pre-historic period demand discretion. However, aspects of economy, and therefore material culture will demand continuity to the extent that the populations are excluded from the colonial economy and must continue with aspects of traditional subsistence. Further there are likely strong symbolic and affective ties
between people and land whose disintegration is of more fundamental concern than the
demise of unworkable social organisation principles.

In this light it is suggested that much of the anomalous description given to Gippsland
social organisation may simply reflect rationalisation of institutions in a changing
environment. There may be little need to claim the Kurnai had developed unique social
institutions in isolation, or that if isolation were to be argued for it might be asked whether
the most significant barrier between populations was the mountains representing the natural
environment, or the institution of *wia-wuk* representing sociocultural organisation.

In terms of material culture the population of the study area would appear to be part of a
technological community of coastal Southeastern Australia. Despite the major similarities it
is apparent that a number of local adjustments had been made in recognition of peculiar
local factors, eg lack of rock platform shell, increased landscape complexity compared to
South Coast New South Wales influencing seasonal movements, and the extensive shallows
of the Lakes making net fishing a viable option.

A high level of competence in resource utilisation is indicated by the dense populations of
the region. As will be argued in Chapter Seven, it is likely that although fine-tuned to local
circumstances much of the technology, and techniques involved in exploitation of the area,
was introduced not as a response to local adaptive pressures but as a part of almost
continental scale Holocene information flows.
Chapter 7

Regional Archaeology

Our knowledge of human behaviour through the greater part of the Holocene must be derived from the archaeological record. As detailed in Chapter Five interpretation of archaeological remains is circumscribed by cultural, natural and methodological considerations, results do not speak for themselves. To be recognised past cultural activity must leave traces, these must be able to be preserved and natural processes must in turn allow them to be discovered. Methodologies must take these considerations into account, while interpretation must allow that much archaeological evidence is frequently non-cultural and even non-archaeological in meaning.

The aims and methodologies of research further impress themselves on results. In recognition of the biases of exposure and complexity of landscapes of the study area it was recognised that an extensive rather than intensive approach was most appropriate. This approach imposes limits on the nature of information which can be sought, thus details of stone artefact use or production, or comparative studies of intensity of site usage via age structures of shell deposits are impossible. The present study thus searches for major trends rather than local particulars.

One must also be aware that it is not only the culture of past populations which impresses itself upon archaeological results, but also that of the researcher. Thus if the researcher wishes to find mechanistic rationality of resource use in site location it can be sought and likely found. This is made no easier to cope with by the nature of archaeological traces, particularly macroscopic evidence. In the study area this is likely to be in the form of stone artefacts, bone and shell, and most directly linked to technology and subsistence. Other behaviour and information may be unrecognisable, and therefore difficult to incorporate in interpretation.

This chapter outlines the results of regional archaeological studies, beginning with prior work and leading to current work. Regional radiocarbon results are discussed. Sites located in this survey are described particularly according to contents and location. Discussion
includes description of systematic variations in stone artefact assemblages according to age, environmental context, and spatial location. By examining both chronological and spatial variation in archaeological traces this chapter pursues the role of environmental variation discussed in Chapters Two, Three and Four, in controlling the evolution of local cultural systems.

7.1. Prior archaeological work in the region.

Archaeological work in the region has been largely in the coastal zone, here divided into three stretches: around Wilson’s Promontory, along the Ninety Mile Beach as far as Lake Tyers, and from L. Tyers to Cape Howe.

7.1.1. Wilson’s Promontory

Coutts (1970) carried out site survey and excavation on the Promontory and identified two suites of archaeological deposits associated with two periods of dune growth and soil formation. He called the older suite of dunes the A-series, the younger the B-series. He traced the A-series soils, dated at 6000-3000 BP, from dunes to freshwater peats situated within 60-90 cm of high water on beaches on the Promontory.

B-series deposits overlie the A-series. Sediments are dated <3000 BP and are less consolidated. Coutts (1970:67-74) argues for warmer conditions during deposition of the A-series sands.

Within each soil-sediment series are distinctive archaeological deposits. A-series middens contain rocky shore mollusca such as Cellana and Subninella. B-series deposits also contain the sandy shore bivalve, Donax deltoides. Bone is more abundant in the B-series deposits.

Stone technologies differ between the two suites, in the A-series there is a more elaborate stone technology, with a microlithic component missing in the B-series, raw materials include "quartzite" and "chert" which do not occur on the Promontory (ibid:124). In the B-series deposits there is less use of imported stone, and greater use of locally obtained quartz and flint. Other significant aspects of the B-series deposits include the use of Donax shell implements, and an association with ground edge axes and large chopper tools made on flint nodules and pebbles. The density of artefacts is lower in the B-series deposits.

Archaeological dating at Wilson’s Promontory is difficult as most of the dates available are on soils rather than archaeological material, dating of the B-series in particular is
inconclusive (Coutts 1970:32,124). Thus Coutts suggests there was a hiatus in sand deposition from 3000-1000 BP. Whether this hiatus is a break in sedimentation, or in cultural activity is not resolved.

Disregarding dating problems it appears that a change in behaviour related to midden accumulation occurred some time between 3000 and 1000 BP. Results include simplification of stone technologies, diminished use of "exotic" stone types, changes in the mollusca exploited and perhaps increased use of heavy chopping tools.

7.1.2. The Ninety Mile Beach

Work along the Ninety Mile Beach has largely been consultancies and not directed toward research goals. Studies were at Maralyns Beach, (Clark and Pickering 1978); Loy Yang-Bass Strait pipeline entering the coastal zone between McGuaran’s Beach and Lake Denison (Bell, Pickering and Stuart 1977); the ESSO-BHP Snapper pipeline survey on the NMB barrier (Simmons and Irish 1977); at Jack Smith Lake (Hotchin 1982, Hotchin and May 1984); at Dutson Downs (Hotchin 1986a, 1987); and at Red Bluff near Lakes Entrance (Hotchin 1986b). The location of consultancy surveys is shown on Figure 7.1-5 Consultancies have not involved dating. The dates in the text below were collected during the present study and are included to augment consultancy results.

At Maralyns Beach Clark and Pickering (1978) investigated extensive lag deposits of shell and artefacts. Shell came from two habitat areas, medium energy sandy beaches and sheltered marine environments. The consultants could not determine whether estuarine shell was naturally or culturally deposited. Stone artefacts included a range of finely retouched items including microliths and what the consultants considered to be dihedral burin forms. Raw materials were "quartzite", "chert" and quartz.

This area was visited by the writer. There has been extensive erosion and in situ material is sparse. Intact residual deposits of *Donax* midden appeared to lie in line with the projected curve of the blown-out dunes. Taken with the accumulation of organics in the sandy matrix suggesting an *A*-horizon, this indicates that the *Donax* deposits come from near the ground surface. No estuarine shell was observed in situ. A number of deep blow-outs were investigated and worn estuarine shell without artefactual material was observed in lags. Basal sediments are sandy, and lacking fines and organics resembled beach or dune sands. It was decided that the shell was derived from beach deposits overrun by prograding dunes.

The Loy Yang survey occurred in two stages, of which only the second in the coastal
Figure 7-1: Prior Consultancies and Sites Recorded in This Survey
zone will be dealt with here. Midden deposits consisting of middens of *Donax deltoides* and *Anadara trapezia*, were recorded at McGuaran's Beach (Bell, Pickering and Stuart 1977). *Anadara* is of course locally extinct. This area was also visited during current work.

Stone artefacts assemblages are of quartz and silicified sediments and sample assemblages are described below. A sample of *Anadara* gave a radiocarbon date (ANU 5810 corrected) of 3030 BP. Exposed material shows that *Donax* midden overlies *Anadara*.

On the ESSO-BHP survey along the NMB barrier Simmons and Irish (1977) identified two suites of *Donax* middens. Extensive deposits containing rare unmodified quartz fragments occur in foredune exposures. The other suite of deposits occurs on the "ridge" of the barrier. This suite contains a greater density of artefacts, made of quartz, "chert" and "quartzite", and contained a number of retouched items including microliths.

On one exposure valves of *Ostrea angasi* are associated with the *Donax* midden. These present problems to be discussed below in reference to the Dutson Downs surveys.

Jack Smith Lake was investigated by Hotchin and May in 1982, but the death of May lead to the loss of much information so that publication of the final report was delayed until 1984. Hotchin reported on archaeological and geomorphic aspects of Jack Smith Lake for his BA Honours thesis (1982).

Two suites of midden were identified at Jack Smith Lake, upper *Donax* midden, and lower either *Ostrea angasi* or *Anadara trapezia*. Five radiocarbon dates were obtained and indicated that estuarine shellfish were being exploited there during the period 4000-3000 BP. Dating of articulated shell from the dry lake bed shows contraction of the tidal lagoon by 4500 BP. *Donax* midden dates indicate deposition within the last half of the last millenium. *Donax* dates are compatible with others collected in the region for geomorphic purposes. See below for radiocarbon results.

While *Donax* middens appear as extensive thin lenses of shell, estuarine shell deposits occur as smaller discrete concentrations when viewed in section. There is a greater density of stone artefacts associated with the earlier, less dense midden deposits. Differences in stone assemblages will be discussed below. Data on collections from Jack Smith Lake have been re-analysed for this study.

A number of bone points were found positively associated with *Donax* shell midden. All were made on mammalian long-bone and many finished points and discarded pieces are scored in a manner consistent with cutting during manufacture. Cutting of long bone has
been reported elsewhere in Victoria (e.g. Mulvaney 1962:13, plates i, iii; Coutts and Witter 1977:61). A groove and splinter technique is indicated Figure 7.6. Archaeological

**Figure 7-6:** Groove and Splinter Bone Working. Stage 1, Parallel grooves cut in mammal long bone, Stage 2 pre-forms detached from cut bone and Stage 3 pre-forms brought to final forms

![Groove and Splinter Bone Working](image)

evidence of bone cutting is presented in Figures 7.7 and 7.8. Associated with bone cutting are stone implements conforming typologically with Tixier's (1974:9-14) dihedral and truncation burin forms. Examples are illustrated in Figures 7.9 and 7.10. Figure 7.11 demonstrates the postulated production sequence.

At Dutson Downs (Hotchin 1986a) survey transects ran from above the escarpment to the NMB. The two types of *Donax* midden recorded by Simmons and Irish (1976) were confirmed, as were *Donax* middens with a component of *Ostrea* valves. Artefact scatters and isolated artefacts were recorded away from the immediate coastal area.

No deposit containing estuarine shell, apart from *Ostrea* shell in recent *Donax* midden, was found. With termination of tidal exchange around 4000 BP, and deposition of evaporites after 3000 BP in Lake Reeve it is impossible for the *Ostrea* to have been collected from Lake Reeve as late as the last millennium. The *Ostrea* could only have been collected from an area where tidal change persisted, or have been imported some considerable distance.

Red Bluff (Hotchin 1986b) was investigated to make management recommendations rather than for research. The site is uniquely located adjacent to the first rocky shore habitat
Figure 7-7: Grooved Bone From Jack Smith Lake (Site JSL21)
Figure 7-8: Bone Implements from Jack Smith Lake. Nos. 1-3, modified macropod tibia and artefacts on identifiable pieces of tibia; No. 4, grooved bone fragment: Nos 5-13, finished point forms.
Figure 7-9: Samples of Burin Forms, showing platform preparation and detachment of burin spalls

R = steep retouch on margin/platform preparation
Figure 7-10: Burins from the Study Area
east Wilson’s Promontory, and is adjacent to the migrating prior natural outlet ethnographically seasonally inhabited by historic Aborigines (Bulmer in Smyth 1878). Three radiocarbon samples were sent for dating, one charcoal from the top of the deposit, and one matched pair of Ostrea shell and charcoal from the bottom. These all indicate an age of around 450 BP.

The deposit is stratified in a sand body partially blocking the outlet of an unnamed creek. The age of the midden therefore dates sand accumulation. The fauna are from sandy beaches (Donax), rocky shores (Subrinella, Scutus, Cellana and others), and sheltered marine (Mytilus and Ostrea). In addition there is mammal and fish bone. Mytilus can be regarded as typical of sheltered waters rather than ocean shores along the high energy Victorian coast where it also competes with the mussel Brachidontes rostratus. Mytilus and Ostrea suggest sheltered marine conditions persisted near the outlet longer than studies to the southwest have indicated. This complements the association of Ostrea with recent Donax midden at Dutson Downs

7.1.3. East Gippsland Coast

No consultancy surveys have been undertaken east of Red Bluff. Prior archaeological work involves research oriented site survey and excavation at Mallacoota Inlet, and in the Clinton Rocks-Point Hicks area.

The Victoria Archaeological Survey (VAS) undertook extensive site survey and excavation at Mallacoota Inlet (Coutts et al 1984). Survey around the Inlet recorded numerous middens dominated by sheltered marine fauna, notably Anadara and Ostrea. Deposits range from thin lenses of a few square metres to mounded deposits up to 2500 m$^2$. 

Figure 7-11: Burin Manufacture Sequence
and 0.75 m depth (McConnell and Gunn 1984:190,196). Ocean coast middens contain rocky and sandy shore taxa. East of the estuary toward Cape Howe a greater number of artefact scatters occur. There excavation data indicates little coastal occupation up to 950 BP (Fullagar 1984:250). Within the inlet basal dates from excavated mounded middens were 920 and 1270 BP at Goanna Bay (McConnell and Gunn 1984:200), 1750 BP at Fisheries Point (Simmons 1984:141), and 2380 and 2420 BP at Captain Stevenson’s Point (Coutts et al 1984).

The mounded middens at Goanna Bay and at Fisheries Point overlie a non-midden horizon containing substantially different artefactual material to that in the overlying middens. The more recent assemblages are characteristically of unspecialised flakes and often blocky fragments made on the local pebble quartz and poor fissured chert. The lower assemblage contains a more elaborate blade industry on non-local silicified sediments, and has similarities with material from artefact scatters found around the Inlet, often inland of the shore-line mounds. At Fisheries Point the microlithic level is dated at 2470 BP (Simmons 1984:141), essentially the same as the basal date at Captain Stevensons Point. This suggests that around 2500 BP there was a major cultural shift involving an increased estuarine foraging, a decrease in specialised stone technology and importation of exotic stone, and an increased use of locally available stone. Interestingly for all their differences the earlier and later sites, are similarly located. Thus although a difference in ecology and therefore site resource catchments may be inferred, this is not reflected in site location.

Non-molluscan fauna includes fish (notably snapper), shellfish, macropod and other land mammal bone including human and dog burials, and fur seals. Points were made on whole macropod long-bones. Despite the large quantity of fish found no hooks of shell or bone were identified.

To explain the chronology of the area Coutts (op cit:5,93) invokes the sedimentary-hydrological history of the area. He suggests that intensive use of the estuary (<2500 BP) follows barrier deposition around 3000 BP. In this he has confused his dating of geomorphic processes, and it would appear misread his notes.

Coutts and Witter (1977:59-62) excavated two midden deposits at Point Hicks-Clinton Rocks adjacent to supposedly similar marine environments. At Clinton Rocks the major species is the small mussel Brachidontes rostratus found in dense mats in the upper littoral. At Point Hicks the major species is the lower littoral gastropod Subniniella (Turbo) undulata. Stone artefacts at Point Hicks were more abundant, made on quartz, "quartzite" and "chert", and contained a number of retouched items including microliths. At Clinton
Rocks artefacts were scarcer, less elaborate, lacking retouch, and made on quartz. Bone cutting or "burination" was found at Clinton Rocks.

Clinton Rocks dated at 220±90BP (SUA-378) and 360±90BP (SUA-377), and Point Hicks 1425±100BP (SUA 573). A similarly timed change from predominantly lower littoral gastropods to upper littoral mussels (in this case Mytilus planulatus) is claimed for the South Coast of New South Wales (Sullivan 1987).

This evidence supports a wide-spread transition in stone technology and coastal economic behavior in the last few millennia. Changes include shifts in mollusca targetted, in possibly more opportunistic use of stone resources, and a proliferation of evidence of coastal occupation. The date of change on the Ninety Mile Beach, Red Bluff and Point Hicks-Clinton Rocks is in the last millenium although the Mallacoota evidence suggests a shift had begun there somewhat earlier. The Wilson's Promontory evidence suggests similar changes in the same time bracket.

7.1.4. Southeastern Australian Coastal Archaeology- Comparisons

At Glen Aire on the Otway Peninsula Mulvaney (1962) excavated a "type" site of late Holocene coastal southeastern Australia. Characteristics he noted are "the poverty of stone craftsmanship", and an emphasis on organic raw materials. The "poverty" of stone working is a lack of formal or retouched artefacts. This might be regarded as opportunistic rather than gadget oriented. Glen Aire bone implements involved cutting of blanks from long bones. This is similar to the "groove and splinter" technique identified at Jack Smith Lake, and presumably the "burination" recorded at Clinton Rocks. A further attribute of late Holocene technology in southeastern Australia is increased use of quartz in stone tool kits (Hiscock 1981). Whether this should be interpreted as a trend toward quartz as a preferred raw material, or if it represents more simply a greater emphasis on locally available raw materials is rarely debated.

These technological changes coincide with widespread archaeological changes in the late Holocene. These include an apparently late occupation of the Victorian Mallee (Ross 1985), initiation of mounded occupation sites in the Victorian Western District (see dates in Coutts and Witter 1977), regular occupation of mainland alpine areas (Flood 1980), increased occupation of the New South Wales coast (Hughes and Djohadze 1980, Hughes and Lampert 1982), and changed targetting of coastal resources on the N.S.W. coast (Bowdler 1976, Sullivan 1987), and a continental scale late occupation of coastal areas (Beaton 1985).
This widespread evidence of change has been attributed to a number of simultaneous causes, population increase (Beaton 1983, Hughes and Lampert 1982), increased social complexity, population growth and "intensification" of resource use (Lourandos 1983, 1984), and environmental changes (Beaton 1985, Lampert and Hughes 1974). These explanations share a theme of balance of resources vs. consumers, and the induction of new behaviours as a mechanical response to disequilibrium.

7.1.5. Inland Sites

Cloggs Cave near Buchan (Flood 1980), was excavated during 1971-2. Two phases of human occupation were identified, overlying bones of extinct fauna dated at around 23000 BP. The lower human occupation deposit spans from 18000 until around 9000 BP. Sediments of the deposit contain a major component of roof-fall, replaced with a sand-sized matrix at the end of occupation. The upper deposits occur outside the entrance, where basal dates are in the order of 1000 BP.

The Pleistocene assemblage contains large, steep-edged flake and pebble tools (unifacial and bi-facial), quartz unifaces and a bone point. Late Holocene material includes bi-polar pieces, small low-angle flake tools and microliths and lacks the larger tool types (Flood 1980:266).

7.2. Results of current project

A number of areas were chosen for inspection, see discussion in Chapter Five, as were selected sites from the VAS Site Register. Site locations are shown in Figure 7.1-5, Appendix B is a summary of details of deposits, Figure 7.12 illustrates areas surveyed, prior consultancy locations are not included.

7.2.1. Sites recorded

For codes used in the following see Appendix B.

Table 7.1 is a summary of sites located and their environmental contexts. A summary of characteristics of assemblages is set out in Table 7.2. Estimates of the sizes of assemblages associated with each site type are shown in Table 7.3. Table 7.4 and Figure 7.12 show the relationship of site location to water (not necessarily potable) and vegetation.
<table>
<thead>
<tr>
<th>SITE TYPE</th>
<th>LANDFORM</th>
<th>LOCATION</th>
<th>SURFACE WATER</th>
<th>VEGETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Du Te Bl</td>
<td>Cr Ms Ba Fl</td>
<td>La Li We St Ut</td>
<td>Cs Le BaLe Bu BaBu Ba BaMe Me Sm Ut</td>
</tr>
<tr>
<td>Isolated Artefacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>qtz fragments</td>
<td>19</td>
<td>4</td>
<td>11 7 5</td>
<td>18 5</td>
</tr>
<tr>
<td>qtz-silic fragment</td>
<td>2</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>silic flake</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>hatchet</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>bipolar</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b. blade</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>22</td>
<td>1 6</td>
<td>12 8 9</td>
<td>23 6</td>
</tr>
<tr>
<td>Artefact Scatters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>silic</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>qtz-silic-(oth)</td>
<td>13 5 3 5</td>
<td>15 4 7 21 1 1</td>
<td>10 11 2 1 2</td>
<td></td>
</tr>
<tr>
<td>qtz-(oth)</td>
<td>12 2 3</td>
<td>7 5 2 3 15 2</td>
<td>5 12</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>26 7 3 8</td>
<td>23 9 2 10</td>
<td>36 3 2</td>
<td>1 15 23 2 1 2</td>
</tr>
<tr>
<td>Midden-Scatter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>estuarine</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>estuarine-Donax</td>
<td>11</td>
<td>1</td>
<td>10 1</td>
<td>10 1</td>
</tr>
<tr>
<td>Donax qtz-silic-oth</td>
<td>21 1 2</td>
<td>20 2 2 3 20 1</td>
<td>23 1</td>
<td></td>
</tr>
<tr>
<td>qtz-oth</td>
<td>24 8 15 14 10</td>
<td>6 7 5 5 1 5 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>57 1 2 40 17 1 2 18 40 1 1</td>
<td>6 1 7 3 8 6 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midden</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donax</td>
<td>60 2</td>
<td>17 28 15 2</td>
<td>25 31 6</td>
<td>26 2 6</td>
</tr>
<tr>
<td>Donax-estuarine</td>
<td>13 5 3 5</td>
<td>5 1 7</td>
<td>5 3 5</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>73 2</td>
<td>22 31 20 2</td>
<td>30 32 13 31 5 11 19 7 2</td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Recorded Sites and Environmental Contexts
Figure 7-12: Areas surveyed
<table>
<thead>
<tr>
<th>SITE TYPE</th>
<th>LANDFORM</th>
<th>LOCATION</th>
<th>SURFACE WATER</th>
<th>VEGETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Du Te Bl Lf</td>
<td>Cr Ms Ba Fl</td>
<td>La Li We St Ot</td>
<td>Cs Le BaLe Eu BaBu Ba BaMe Me Sm Ot</td>
</tr>
<tr>
<td>Isolated Artefacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>qtz fragments</td>
<td>19</td>
<td>4</td>
<td>11 7 5</td>
<td>18 5</td>
</tr>
<tr>
<td>qtz-silic fragment</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>silic flake</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>hatchet</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>bipolar</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>b. blade</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>22</td>
<td>1</td>
<td>6 12 8 9</td>
<td>23 6</td>
</tr>
<tr>
<td>Artefact Scatters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>silic</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>qtz-silic-(oth)</td>
<td>13</td>
<td>5</td>
<td>3 5</td>
<td>15 4 7</td>
</tr>
<tr>
<td>qtz-(oth)</td>
<td>12</td>
<td>2</td>
<td>3 7 5 2 3</td>
<td>15 2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>26</td>
<td>7</td>
<td>3 8 23 9 2</td>
<td>10 36 3 2</td>
</tr>
<tr>
<td>Midden-Scatter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>estuarine</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>estuarine-Donax</td>
<td>11</td>
<td></td>
<td>11</td>
<td>10 1</td>
</tr>
<tr>
<td>Donax qtz-silic-oth</td>
<td>21 1 2</td>
<td>20 2 2 2</td>
<td>3 20 1</td>
<td>23 1</td>
</tr>
<tr>
<td>qtz-oth</td>
<td>24</td>
<td>8 15 1</td>
<td>14 10</td>
<td>6 7 5 5 1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>57</td>
<td>1</td>
<td>2 40 17 1 2</td>
<td>18 40 1 1</td>
</tr>
<tr>
<td>Midden</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donax</td>
<td>60</td>
<td>2</td>
<td>17 28 15 2</td>
<td>25 31 6</td>
</tr>
<tr>
<td>Donax-estuarine</td>
<td>13</td>
<td></td>
<td>5 3 5</td>
<td>5 1 7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>73</td>
<td>2</td>
<td>22 31 20 2</td>
<td>30 32 13</td>
</tr>
<tr>
<td></td>
<td>McBeA</td>
<td>McBeD</td>
<td>JSL21</td>
<td>JSL22</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Total</td>
<td>133</td>
<td>93</td>
<td>268</td>
<td>93</td>
</tr>
<tr>
<td>QUARTZ n</td>
<td>34</td>
<td>44</td>
<td>125</td>
<td>57</td>
</tr>
<tr>
<td>Febble Surface</td>
<td>(26%)</td>
<td>(47%)</td>
<td>(47%)</td>
<td>(61%)</td>
</tr>
<tr>
<td>S3LIC. STONE n</td>
<td>96</td>
<td>49</td>
<td>143</td>
<td>34</td>
</tr>
<tr>
<td>Febble Surface</td>
<td>(72%)</td>
<td>(53%)</td>
<td>(53%)</td>
<td>(37%)</td>
</tr>
<tr>
<td>OTHER STONE n</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>CONCH. S3LIC. DEBITAGE n</td>
<td>32</td>
<td>22</td>
<td>47</td>
<td>12</td>
</tr>
<tr>
<td>Mean l/w</td>
<td>1.6</td>
<td>1.6</td>
<td>2.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Mean w/t</td>
<td>4.1</td>
<td>3.8</td>
<td>3.0</td>
<td>3.4</td>
</tr>
<tr>
<td>S3LIC. CORES n</td>
<td>3</td>
<td>1</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Mean Wt</td>
<td>7.4</td>
<td>5.1</td>
<td>3.2</td>
<td>1.3</td>
</tr>
<tr>
<td>FORMAL ARTEFACTS</td>
<td>3</td>
<td>4</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Backed Blades Ma</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Burins</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
### Table 7-3: Artefact Numbers and Site Types

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Number of Artefacts</th>
<th>Formal Artefacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10's</td>
<td>100's</td>
</tr>
<tr>
<td>Isolated Artefacts</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Artefact Scatters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silic only</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Qtz-Silic-Qt</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Qtz-Qt</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td>Midden and Scatter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estuarine shell</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Estuarine-Donax</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Donax Qtz-Silic-Qt</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Donax Qtz-Qt</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>Midden only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donax</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Donax, minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estuarine</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SITE TYPE</td>
<td>WATER DISTANCE TO WATER</td>
<td>1 (1-100 m.)</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Isolated Artefacts</td>
<td>La</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Artefact Scatters</td>
<td>silic only</td>
<td></td>
</tr>
<tr>
<td></td>
<td>We</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>St</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>qtz-oth</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Midden and Scatter</td>
<td>estuarine shell</td>
<td></td>
</tr>
<tr>
<td></td>
<td>La</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>we</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>qtz-silic-ot</td>
<td></td>
</tr>
<tr>
<td></td>
<td>La</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>St</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>qtz-ot</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Midden</td>
<td>Donax</td>
<td></td>
</tr>
<tr>
<td></td>
<td>La</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td></td>
</tr>
<tr>
<td></td>
<td>we</td>
<td>6</td>
</tr>
<tr>
<td>Lonax, minor</td>
<td>estuarine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>La</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td></td>
</tr>
<tr>
<td></td>
<td>we</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>
7.2.1.1. Isolated Artefacts

Twenty-nine isolated artefact sites were recorded. These are defined as locations where less than three artefacts occur without midden deposits. They consist overwhelmingly of quartz fragments, occur over a range of landscape features, and in areas of Banksia and Eucalyptus association woodlands. Three isolated artefacts were formal tools, a hatchet head, an asymmetric microlith and a quartz bipolar piece. Exposure occurred predominantly on tracks (26/29) and through wind, water and animal erosion. Discovery of this site type is therefore directly a result of historic ground surface disruption and does not necessarily reflect prehistoric site patterning.

7.2.1.2. Artefact scatters

A total of 44 artefact scatters was recorded. These can be classified according to the proportions of raw materials present. The most common are combinations of quartz and silicified sediments, with minor components of "other" stone.

Scatters were most commonly encountered along tracks (37/44) with further examples in a quarry and road cutting (2/44), the remainder were exposed by wind and water. Again site location must be regarded as directly a product of both later cultural patterns and natural processes.

Only a single entirely siliceous stone assemblage was recorded, as this is known to have been picked-over it is no longer considered here. Sites dominated by, or composed solely of quartz and siliceous rock number 26. Quartz, or quartz with a minor proportion of "other" stone makes up 17 sites. There are systematic differences in the size of assemblages, estimated in the field as 10’s, 100’s, and 1000’s. Quartz assemblages are small, in 10’s rather than 100’s and never 1000’s, in contrast mixed assemblages are frequently in the 100’s. See Table 7.3.

Scatters are preferentially located close to the major perennial water bodies rather than the intermittent back-dune lagoons. Despite the small sample size mixed material scatters appear to be more closely linked to perennial water. See Table 7.4.

7.2.1.3. Middens with associated scatters.

This discussion is biased by the Jack Smith Lake situation, where deep extensive exposures of stratified deposits make lags appear rich. This leads to mixed lags forming a synthetic class of Donax/estuarine midden with artefact scatter. The remaining class of midden with artefact assemblage is composed overwhelmingly of Donax deltoides. As with artefact scatters the assemblages can be divided into quartz and mixed assemblages.
The greatest artefact densities occur in the mixed assemblages, many of which are estimated to contain 100's and in a few cases 1000's of items. In contrast quartz assemblages tend to contain 10's only, and rarely 100's. This complements the pattern observed among midden sites where mixed stone assemblages tend to be larger. Both classes of scatter are most frequently encountered in dunefields. Few were found in other locations such as the coastal escarpment, more than 1-2 kilometres from the coast. There midden is thin, although with the limitations on exposure this could not be quantified in the field. It is clear subjectively that the density of shell falls-off rapidly away from the coast.

These middens are more frequently located adjacent to intermittent rather than perennial surface water. This presumably reflects the "pull" of shore-line Donax, or a de-emphasis on aquatic resources, see Table 7.4. However, as with other classes of deposit systematic biases in site discovery are likely to occur. With this class the major cause of exposure is localised wind erosion (37/60), with the rest (23/60) exposed in tracks and cuttings, again we can only hope to discern trends rather than attempt absolute statements.

7.2.1.4. Middens without artefact assemblages

Midden deposits without artefacts fall into two classes, composed entirely of Donax, and with minor components of estuarine shell. At Reeves, Woodside and McLoughlins Beaches the estuarine component can be related to the sheltered waters of Corner Inlet and the mouth of a small stream. In the central Ninety Mile Beach the occurrence of Ostrea in middens is problematic. Dating indicates an age of only a few hundred years and collection from a possible perennial tidal area such as the Bunga Arm outlet must be considered.

These deposits are most common in foredune blow-outs. Isolated broken quartz pebbles occur infrequently.

The most common cause of exposure is tracks (usually ad hoc foot tracks to the beach), (41/75) initiating extensive blow-outs. A lesser number of blow-outs (27/75) appear to result from other disturbance, seven deposits were exposed in formed road cuttings. The correlation with recent cultural behaviour remains high.

7.2.2. Dating of Deposits.
7.2.2.1. Radiocarbon dating

A number of radiocarbon samples on cultural deposits have been collected along the Gippsland coast (see Figures 7.14 and 7.15). Most are on shell, and need to be corrected for the ocean reservoir effect. This is calculated as: reported age - 450±35, derived for southern Australian coastal waters. It is recommended by the ANU Radiocarbon Laboratory, Gillespie and Temple (1977), and Head, Jones and Allen (1983). Some of the shell dates below are on sheltered marine taxa. It is necessary to recognise that the chemistry of the water in which they formerly lived need not be identical to that of ocean waters. This is more important when sheltered waters receive large inputs of water "contaminated" by "old" ions, eg. derived from limestones in stream catchments, and where exchange is impaired. At Jack Smith Lake, adjacent former tidal areas, and L. Reeve these problems are minimised as none is fed by any significant stream. A correction factor of -450±35 is probably not excessively inaccurate in those locations but not in the main Lakes with their major river inputs.

Old Settlement Beach, Port Albert A single shell (Anadara), date is available on a midden of sheltered marine shell (OSB1).

ANU-4974 2860±70, the corrected date is 2410 BP

Ninety Mile Beach/Reeves Beach There is a single date from the back of the dunes at Reeves Beach. This is from a Donax midden with minor amounts of estuarine shell (Donacilla and large "whelks"). The likely source of the estuarine shell is an arm of Corner Inlet.

ANU-5809 540±70, the corrected date is 90 BP, ranging 160-20 BP within the first standard deviation.

Jack Smith Lake to McGuaran’s Beach Five shell dates on archaeological deposits are from middens. Shell species are Donax deltoides or pipi, Anadara trapezia or "cockle" and Ostrea angasi or mud oyster.

ANU-3242 3130±80, from JSL21, on Ostrea shell, corrected date, 2680 BP, dates tidal connection and the earlier phase of occupation.

ANU-3255 4280±80, from JSL74, on Anadara shell, the corrected date, 3830 BP, dates tidal connection and the earlier phase of occupation.

ANU-5810 3480±80 from McGuaran’s Beach (MCGB) on Anadara shell, the corrected date, 3030 BP, dates tidal connection and earlier occupation.
Figure 7-14: Radiocarbon Dates Gippsland Lakes Region
Figure 7-15: Schematic Locations of Radiocarbon Sample Locations
ANU-3243 660±80, from JSL22, on Donax shell, the corrected date is 210 BP

ANU-3256 880±80, from JSL21, on Donax shell the corrected date is 430 BP

Dates in the Jack Smith Lake-McGuaran's Beach area fall into two time periods, the last millennium, and the period 3000-4000 BP, no deposits of intermediate age were identified.

**Ninety Mile Beach/Delray Beach** Dates at Delray beach have been collected by the writer, and Dr. Bruce Thom (then of ADF, Canberra).

SUA-1822 630±100 a date on Donax midden from the foredune at Delray beach, the corrected date is 180 BP.

SUA-1823 810±70, a date on Donax midden from the older landward side of the NMB barrier at Delray Beach, the corrected date is 360 BP.

A set of dates was also obtained from a foredune midden layer containing both Donax and Ostrea near Delray Beach.

ANU-4597 810±60 a date on Donax shell from the lower level of the midden, this is at the same level as ANU 4598. The corrected date is 360 BP.

ANU-4598 660±70 a date on Ostrea at the same level as ANU 4597. The corrected date is 210 BP.

ANU-4599 390±60 a date on Donax overlying ANU 4597 and ANU 4598. The corrected date is a problem as the age of the deposit is less than the the correction factor.

**Ninety Mile Beach/Letts Beach** There is a single sample from the Letts Beach area. It was collected from the back of the barrier adjacent to L. Reeve.

ANU-5811 2390±80 BP, the corrected date on the Donax shell sample is 1940 years BP

This is the only one out of eight pipi midden dates on the Ninety Mile Beach which is more than a few hundred years old. As an anomalous case it is suspect.

**Red Bluff, near Lakes Entrance and Lake Tyers.** There is a major midden at Red Bluff containing mussel, oyster, pipi and shells from the nearby rocks including various "whelks" and "winkles", and abalone. There is also fish bone.

ANU-4976 450±60, charcoal, from near the top of the deposit.
ANU-4977 450±60, charcoal, from near the base of the deposit. This is identical with ANU 4976 indicating that the midden accumulated rapidly.

ANU-4975 810±70, Ostrea shell paired with ANU-4977 giving a corrected date of 360 BP, and almost identical to the charcoal date within a standard deviation.

Lake Tyers A single date from an oyster shell midden near the lakes edge indicates permanent tidal connection, it was also requested by members of the Lake Tyers Aboriginal community.

ANU-5813 1540±70 The corrected date is 1090 years BP.

Sperm Whale Head/Gippsland Lakes This date is on fragmented Anadara shells from a track exposure, and is the only example of estuarine shell midden in the Gippsland Lakes area proper. The sample is of fragmented eroded shell and contamination must be anticipated.

ANU-5812 3000±90, the corrected date is 2550 years BP. This date post-dates the supposed cessation of tidal exchange by two millennia and is problematic on face value. The sample however was not ideal and must be treated with caution.

7.2.2.2. Relative Dating.

In addition to direct dating some relative dating is possible.

The shoreline is a complex and dynamic sedimentary environment and prone to dramatic short-term effects, eg. unusual storminess and climatic variations. Deposits near this zone (eg. the foredune) are potentially young.

Artifactual Styles A broad sequence of changes in stone artefact production has been established in Holocene Australian prehistory (see Mulvaney 1975). The clearest of these is the spread of backed blade industries after 4000 BP. Their presence indicates a maximum date.

Faunal Evidence The presence of sheltered marine fauna in archaeological deposits (eg. the molluscs Anadara, Ostrea, Mytilus, Cabestana and others) should indicate that the deposit predates the transition from free to restricted tidal change ca. 4000 BP.
7.3. Inter-Site Variation

7.3.1. Variation in lithic assemblages

Collections of artefacts were made on sites where numbers were sufficient to make useful generalisations.

Stone artefact assemblages consist of tools, tool discards and manufacturing waste (debitage). These are taken to represent work in the realm of the "subsistence economy", and the manufacture of other artefacts.

It has long been recognised that in historical Australian material culture stone comprises only a minor if durable component (Mulvaney 1975, Thomson 1939), the greater part of past technological activity is not visible. Analysis of stone technology can only supply a restricted insight into technology, which in itself reflects only aspects of total socio-cultural systems. As this information comes from a sample of sites, and is visible for reasons not necessarily related to cultural patterning, lithic analysis can only provide a limited view of cultural behaviour.

The function of only a few formal artefact types is clearly apparent, notably hatchet heads and grinding stones rather than more numerous flaked stone artefacts, but knowledge of what was ground or chopped requires analysis of edge damage and residues. This may not be satisfactory on artefacts from open sites because of weathering of residues and erosion of wear patterns, eg. through sand-blasting. Because of the extensive nature of the present study flaked stone material has not been intensively analysed. Variation in assemblages is pursued in gross characteristics: raw materials, proportions of components of assemblages, techniques of production and morphology ofdebitage.

Propositions relating to the significance of variance are:

- formal tool types are task specific, or at least restricted to a limited range of functions. The greater the incidence of a type the more specific activities were carried out

- the number of formal flaked tool types in southeastern Australian artefact assemblages is limited, and perhaps not necessarily validly identified. Thus while backed blades may be relatively easily identified, a "thumbnail scraper" may exist more in the eye of the beholder

- some raw materials are more suited to particular techniques than others

- raw material choice will be affected by availability. Availability has two aspects,
physical accessibility, and social availability. Social availability takes into account the political and demographic factors permitting movement of materials between areas and territories

-opportunism appears to be characteristic of at least some recent Australian stone tool users (eg. see Hayden 1979)

7.3.1.1. Raw Materials

The proportions of raw materials in sites analysed is presented in Figure 7.16, for locations of sites see Figures 7.1-5, and Appendix B. The raw materials identified are quartz, silicified sediments and "other". "Other" encompasses quartzite, sandstone, rhyolite and other volcanics, and "flint". With the exception of the flint, "other" stone and quartz frequently carry water worn pebble surfaces. Modern and ancient fluvial and deltaic deposits are common in the study area reflecting its complex geomorphic history. "Other" stone types are to be found in the the bedload of rivers in the region (eg. see Goede 1976). Despite their distant provenance quartz and "other" stone are therefore locally abundant.

Flint, fossiliferous chert from marine limestones, is not part of the regional geology, and is found archaeologically only in minor quantities in the area near Wilson’s Promontory where it also appears in archaeological deposits (Coutts 1970) after being washed-up on the shores. Despite frequent searches no flint nodules were encountered along the Ninety Mile Beach. Flint frequently carries areas of chalky white cortex, indicating only minimal if any core preparation at the point of collection.

Silicified sediments very rarely carry any pebble surfaces. This indicates quarry rather than gravel bed source(s). They are often fine-textured, show even conchoidal fractures and produce sharp edges. These are the "quartzite" and "chert" of the consultancies.

Stone can be classified according to flaking properties. Quartz is difficult to work using conventional freehand percussion techniques because of the the irregular internal structure of non-crystalline forms. Volcanics and quartzites, fall within the "other" class and may develop fractures approaching a predictable conchoidal form. While not always finely controllable these can produce durable edges.

Figure 7.16 presents the comparative proportions of raw materials found in each assemblage as percentages of total number of artefacts (including debitage, cores, formal implements, utilised and retouched implements), by weight in each assemblage. The sequence JSL22....Rt24 follows a SW - NE transect, the final LW6 and ViLag are located
Figure 7-16: Proportions of Raw Materials

Composition of assemblage by total weight of raw material

Composition of assemblage by number of items per raw material

Proportion of items ≥ 3.0 gms
Siliceous stone
‘Other’ stone
Quartz
inland away from this transect. It will be noted that proportions by weight are different to proportions by number of items. This is particularly so with the "other" stone category where the moderate number of artefacts is disproportionate to weight, reflecting larger individual artefact sizes.

Assemblages with the greatest proportions of siliceous stone have three distinguishing features, they are from the southwest of the study area, are associated with estuarine shell midden (JSL22, McGB[a], Anad), or if nearby sites are compared (eg. JSL22-JSL21, or McGb[a]-McGb[d]) assemblages associated with estuarine midden contain more siliceous stone component than those with the later Donax middens.

This agrees with the proposition (see Hiscock 1981), that quartz use increases in the later Holocene, and is indicated in the prior work in the area (see preceding discussion). It is suggested here that the use of quartz represents increased use of local rather than imported stone.

7.3.1.2. Stone artefact typology.

Fragments are here defined as knapped items lacking clear conchoidal features, ie. platform and bulb, and are the results of breakage rather than individual purposeful flaking. flakes on the other hand are whole and display conchoidal features which are supposed to represent the intentions of competent knappers, and not unplanned breakage.

All artefacts less than 0.2 gm were excluded from analysis. In this size range flakes can be too easily missed during collection, meaningful analysis is therefore prejudiced. An unhappy outcome is that particularly diagnostic items such as retouch flakes and shatter fragments, indicating intensity of manufacturing and retouch, are excluded.

Assemblages were divided into fractions >3.0 gm and <3.0 gm following the observation that at around 3.0 gm plots of frequency/wt. change. Below 3.0 gm values are clustered below a regular skewed curve, above 3.0 gm a relatively few items are spread across a wide range of values. These are frequently cores, or irregular pieces of inferior stone. Such items are not amenable to analysis in the same terms as conchoidal flakes.

Stone assemblages potentially contain a range of artefact types. They may conveniently be divided into two functional classes, durables, and expendables. Durables are curated artefacts which may entail some cost in acquisition and transport and which may last in service for some time. Such items may be regarded as potentially valued, or valuable, goods (eg. see McBay and Harrison 1981, Dawson 1981:24 on stone hatchets). Stone
hatchets are the single durable identified in the study area. Finds include one whole example (site V101), and a number of fragments.

The second class, expendables is usually flaked stone. While raw materials may involve some cost in acquisition and transport, the individual flaked stone products may be of little intrinsic value away from their immediate context of use. This is well illustrated by the fundamentally utilitarian approach to flaked stone tools demonstrated by Aborigines performing demonstrations of their use for ethno-archaeologists (eg. see Hayden 1979).

There are a number of sub-categories: formal types, eg. backed blades, burins etc.; pieces which have been modelled or retouched to improve functioning, or in sequential reduction; items which have been utilised but display no macroscopic evidence of use; debitage or manufacturing waste and lastly opportunistic tools.

Opportunistic implements are exemplified by Hayden’s (1979) informants’ use of conveniently sharp naturally occurring stones as tools in central Australia. At Jack Smith Lake a flat sandstone cobble with one face coated with red ochre was found recently eroded from a section. This pallet would not have been recognised if discovered after the pigment had eroded. At other locations sandstone pebbles were found in deposits. No evidence of utilisation was noted.

Formal flaked artefacts. Two types of formal implement were recognised, backed blades and burins. Backed blades are morphologically defined. Current thinking is they were used as projectile barbs (eg. see McBryde 1984b, 1985), and have acquired a quasi-functional definition.

They fall into two morphological classes, elongate or asymmetric "bondi points", and symmetric "geometrics". In the southern section of the study area only asymmetric forms are recorded. Some symmetric forms occurred in the northeast.

Figure 7.17 is a plot of mean length-width values and first standard deviation, of asymmetric points from northeastern and southwestern assemblages, and symmetric points from northeastern sites. Their distributions overlap considerably and it is concluded that backed blades have remained undifferentiated over time in the study area.

Figure 7.18 illustrates size, and plan morphology, of backed blades from the assemblages analysed. The index of morphology is the ratio L/W indicating elongation. The numbers of individuals in each collection were too small to undertake comparisons to determine variation between assemblages, so all material is combined in a single figure. There is no evidence of clustering into sub-groups.
Figure 7-17: Comparative Size distributions, Backed Blades

- NE sites—symmetric forms
- NE sites—assymmetric forms
- SW sites—assymmetric forms

First standard deviation—NE symmetric forms
First standard deviation—NE assymmetric forms
First standard deviation—SW assymmetric forms
Figure 7-18: Backed Blade Sizes and Plan Morphology

backed blade morphology (asymmetric) according to L/W ratios
L/W = 1  L/W = 1.6  L/W = 2  L/W = 2.5  L/W = 3  L/W = 3.5

backed blade morphology (symmetric) according to L/W ratios
L/W = 1  L/W = 1.5  L/W = 2  L/W = 2.5  L/W = 3

- asymmetric BB
- symmetric BB

Length (mm)
0  4  8  12  16  20  24  28

L/W ratio
1.2  1.6  2.0  2.4  2.8  3.2  3.6  4.0
The distribution of both sizes and morphological indices forms a loose cluster with little internal differentiation. This would appear to indicate that backed blades are a single variable, but unspecialised, class of artefact. An alternative interpretation is however possible. The most popular interpretation of Australian microliths is that they armed the ends of spears in a similar manner to the stone flakes of the ethnographic "death" or jagged spear (e.g. see Hayden 1973 and discussion Chapter Six). The efficiency of cutting barbs would be enhanced if the size and protrusion of barbs graded upwards away from the tip, deeper penetration would result as wounds were progressively opened by each barb. The loose clustering above may indicate graded sizes, and not imprecise manufacture.

Burins can be defined morphologically and functionally. The term is derived from graving tools with a narrow robust chisel end. The stone analogue has been extended from the edge to its method of creation, through the detachment of small narrow blades away from the burin chord, i.e. the production of "burin spalls" (see Tixier 1974). In the Eurasian context burins are associated with graving or grooving, particularly on bone and antler, and have acquired a functional definition. Thus Coutts and Witter (1977) refer to cut bone as "burinated".

Typological burins were identified in the Jack Smith Lake area, an association with a bone industry allowed an extension of the typological definition to a functional one (Hotchin 1982). This extension was confirmed by Flenniken and White (1985:145-7). See Figures 7.9, 7.10 and 7.11, and discussion of prior work at Jack Smith Lake. Burins from Jack Smith Lake were submitted to R. Fullagar for edge inspection. As the examples were collected from open sites weathering and erosion, and therefore ambiguity in results was anticipated. Fullagar expressed the opinion that use wear is consistent with working medium to dense material, possibly bone, with evidence of graving (R. Fullagar pers. comm.).

Further examples have been found in the Lakes area proper (see Tables 7.2 and 7.3). They are typical of older deposits associated with estuarine shell, but have been found in association with Donax shell. Burins are made only on siliceous rock.

Identifications of morphological burins have since been extended to Pretty Beach on the South coast of New South Wales (Hotchin 1985) and Piallago in the Australian Capital Territory (Professor I. McBryde pers. comm.). However, no cut bone has been found in association with burins away from Jack Smith Lake, where the rate of erosion of deposits has been very rapid and has apparently outstripped the rate of weathering of exposed bone.
There are two forms, conforming typologically to Tixier's (1974) *dihedral* and *truncation* types. The *dihedral* form is formed on the end of a flake by creating two facets meeting to form a narrow chisel-like edge vertical to the planes of the dorsal and ventral surfaces. The *truncation* form is created by applying steep backing retouch to the end of a flake to form a slightly concave and/or oblique edge encountering an adjacent spalled edge at an angle of 90 degrees or less. The retouched edge is the striking platform for the burin spall.

*Microburins* were also recognised. These are a debitage form from the manufacture of backed blade preforms using a notch and snap technique (see Tixier 1974:15-9). There is a superficial similarity with a minute *truncation* burin. See Figure 7.19.

### 7.3.1.3. Technological Analysis

The following assumes that different patterns of behaviour will be reflected in different tool and raw material usage, and this will in turn lead to different patterns of artefact discard. Different patterns of behaviour will have time and space dimensions. The present analysis attempts to determine variation in the forms and sizes of artefacts between assemblages drawn from a range of locations and across the period during which the study area has been occupied. In this approach manufacturing waste is as diagnostic as work implements. As Australian stone assemblages may be seen as opportunistic, without edge studies stone classed as "waste" may actually include a component of implements. Therefore this study does not differentiate utilised items from non-utilised.

Indicators of similarity or variation are raw material, weight, length, width and thickness of individual artefacts, and the ratios length/width (L/W) and width/thickness (W/T). The analysis is only applied to conchoidal material, in which the purpose of the knapper is presumed to be represented. Fragments (pieces lacking conchoidal features) are treated as the results of uncontrolled breakage, and are not therefore amenable to analysis. Similarly broken flakes are excluded from analysis. This excludes large quantities of material from analysis, including raw material which does not fracture conchoidally. The dimensions length, width and thickness were measured in a standard manner. Length is the distance from the junction of the dorsal and platform "planes", to the distal end of the flake. Width is the greatest distance between the opposite margins of the flake perpendicular to the axis of length. Thickness is self explanatory and is measured at the point of maximum depth. This is frequently in the vicinity of the platform or bulb.

Figure 7.20 shows size distributions of siliceous flakes from selected assemblages plotting length against weight. Numbers are low in some assemblages so that the distributions can only suggest trends.
Figure 7-19: Microburins, Manufacturing Sequence and Archaeological Examples
Figure 7-20: Size distribution, Siliceous Flakes
The most obvious thing to note is *clustering* of points. Despite their comparatively greater sample size assemblages JS1.22 and Anad are more clustered in the smaller size range than the other assemblages which, despite their smaller sample size appear to tend to be more widely distributed. McGB[A] also tends toward tighter clustering although the sample is rather small. These assemblages are associated with estuarine shell midden dating 4-3000 BP. The looser clustering is matched by a wider distribution of flake sizes in the younger assemblages particularly RI1 and McGB[D].

The trend to emerge is that in the older sheltered marine midden deposits there is clustering of conchoidal flakes toward the smaller size range, while in the younger sites material is distributed more evenly across a broader size range. That is, during the earlier period knappers were producing smaller flakes while in the latter period a broader range of sizes was produced.

Figure 7.21 plots ratios of L/W against W/T for four pairs of stone assemblages. In each pair the collection locations lie within a kilometre of each other so that each pair is at a comparable distance from stone sources. This eliminates distance from source as a factor in stone use. Within each of the first three pairs one assemblage is associated with a sheltered marine midden deposit (JS1.21, McGB[A], Anad), the second with *Donax* (JS1.22, McGB[D]). The last pair of assemblages are associated with *Donax* midden from the same area as Anad/RI 1.

The ratios L/W and W/T indicate artefact form. A high L/W indicates an elongate flake form, a low value indicates a short form. The ratio W/T refers to section form, at high values a flatter thinner form is indicated, at low values a narrower thicker form. A flake with high values for each would tend toward a thin leaf form, one with low values toward a cube.

For each pair the distribution of points is broadly internally comparable. This suggests that geographical location is a factor in artefact form. This suggestion is strengthened when the first two pairs (from the southern NMB) are compared with the latter pair. There is far greater variation between geographical areas than between time periods. The most significant aspect of variation between geographic areas is in the distribution of L/W values. In the southwestern sector a significant proportion of the conchoidal items have a L/W value exceeding 2. In the northeast sector this value is rarely exceeded.

Stone tool technologists use a L/W value of <2 to differentiate *flakes* from *blades* (eg. see Tixier 1974:7). While the production of *flakes* (L/W <2) is achievable using a range of