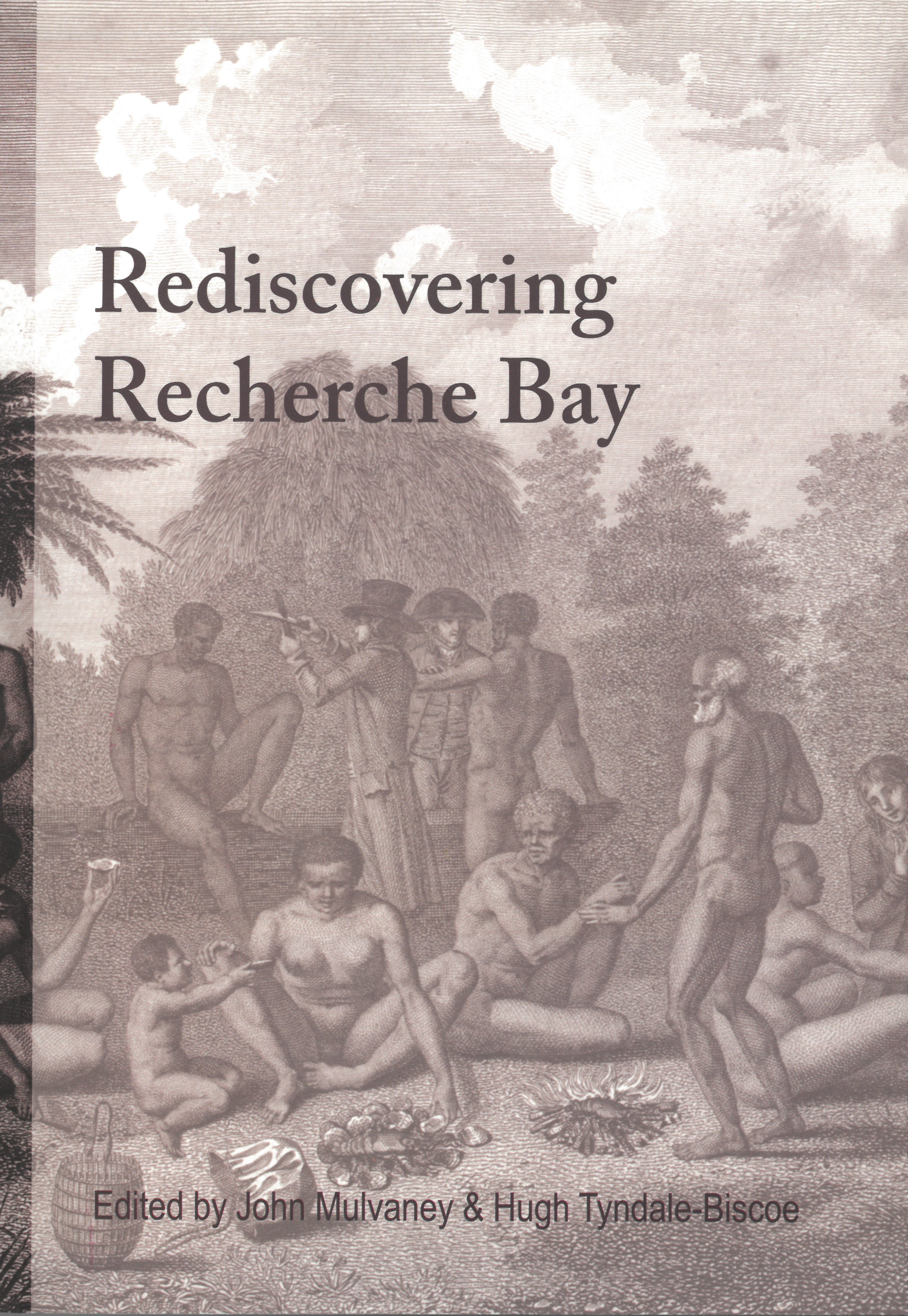

Rediscovering Recherche Bay

Edited by John Mulvaney & Hugh Tyndale-Biscoe

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National Academies Forum

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Contents

1 Introduction
Recherche Bay, Tasmania
A site of great significance in the history of science in Australia
John Mulvaney & Hugh Tyndale-Biscoe

9 01
From the hills of Provence to the coast of Van Diemen's Land: The expedition of Antoine-Raymond-Joseph Bruny d'Entrecasteaux, 1791–1793/94
Alan Frost

17 02
'Nothing left undone':
The hydrographic surveys of Beautemps-Beaupré
Michael Pearson

35 03
Labillardière and the beginnings of botanical exploration in Tasmania
Gintaras Kantvilas

45 04
'J'étais convaincu qu'il dormait'.
European views of a unique Australian mammal
Stewart Nicol

59 05
Meeting the Tasmanians
John Mulvaney

69 06
Tasmanian Aborigines and the origins of language
Iain Davidson

87 07
The technology of whaling:
Why they did it and how
Ian D Rae

99 08
The lost garden of Recherche
Jean-Christophe Galipaud, Antoine de Biran, Greg Jackman, Anna Gurnhill, Rufino Pineda & Angela McGowan

119 09
A land mapped by stories
Joan Domicelj

125 10
Right deeds and wrong reasons:
The politics of nature, history and the preservation of Recherche Bay
Aynsley Kellow

135 11
Legal lessons from the recent history of Recherche Bay
Tom Baxter

145 12
The conservation and management of ecological communities
David Lindenmayer

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The northeast peninsula of Recherche Bay with Black Swan Lagoon (beyond) and Southport Lagoon (centre). (Photo courtesy of Senator Bob Brown.)

Introduction: Recherche Bay, Tasmania

A site of great significance in the history of science in Australia

John Mulvaney and Hugh Tyndale-Biscoe

Two sites in Australia have especial significance for science and history: Botany Bay in New South Wales and Recherche Bay in Tasmania. At these two bays, many of Australia's unique plants were collected by botanists for the first time and they became the type specimens to which all later botanists have to refer. Because both sites still support the same species, it is possible with modern techniques of molecular biology to make direct comparisons of the type specimens and the descendant plants alive today. While Botany Bay has long been a site of national heritage, the Tasmanian site had been largely forgotten until 2003. This was where the French Scientific Expedition of 1791–93, under the command of Bruny d'Entrecasteaux, made landfall on 21 April 1792 and to which he returned a year later (Figure i). D'Entrecasteaux named the site Recherche Bay, for his flagship. He was so impressed by the beauty and tranquillity of the surroundings that he wrote in his journal:

> Nature in all her vigour, yet in a state of decay, seems to offer to the imagination something more picturesque and more imposing than the sight of this same nature bedecked by the hand of civilised man.[1]

During the next month the hydrographer Beautemps-Beaupré charted the coast so well that the charts were used for generations; Lieutenant Rossel carried out his pioneering work on geomagnetism; the astronomers attempted to observe the transit of Jupiter's moons on Bennett's Point; the gardener, Fèlix Delahaye, prepared a French kitchen garden near the shore and planted the seeds of common vegetables; and the botanists, led by Jacques-Julien Labillardière[2] collected some 4,000 specimens of hitherto unknown plant species on the peninsula and around Southport Lagoon (Figure ii).

Nearly a year later, on 20 January 1793, the ships returned to Recherche Bay. The astronomers set up their tents on the south side of the bay and the botanists made several excursions inland and went across the harbour to the northeast peninsula where they had collected the year before. They discovered that the plants in the kitchen garden had not fared well.

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 1-8.

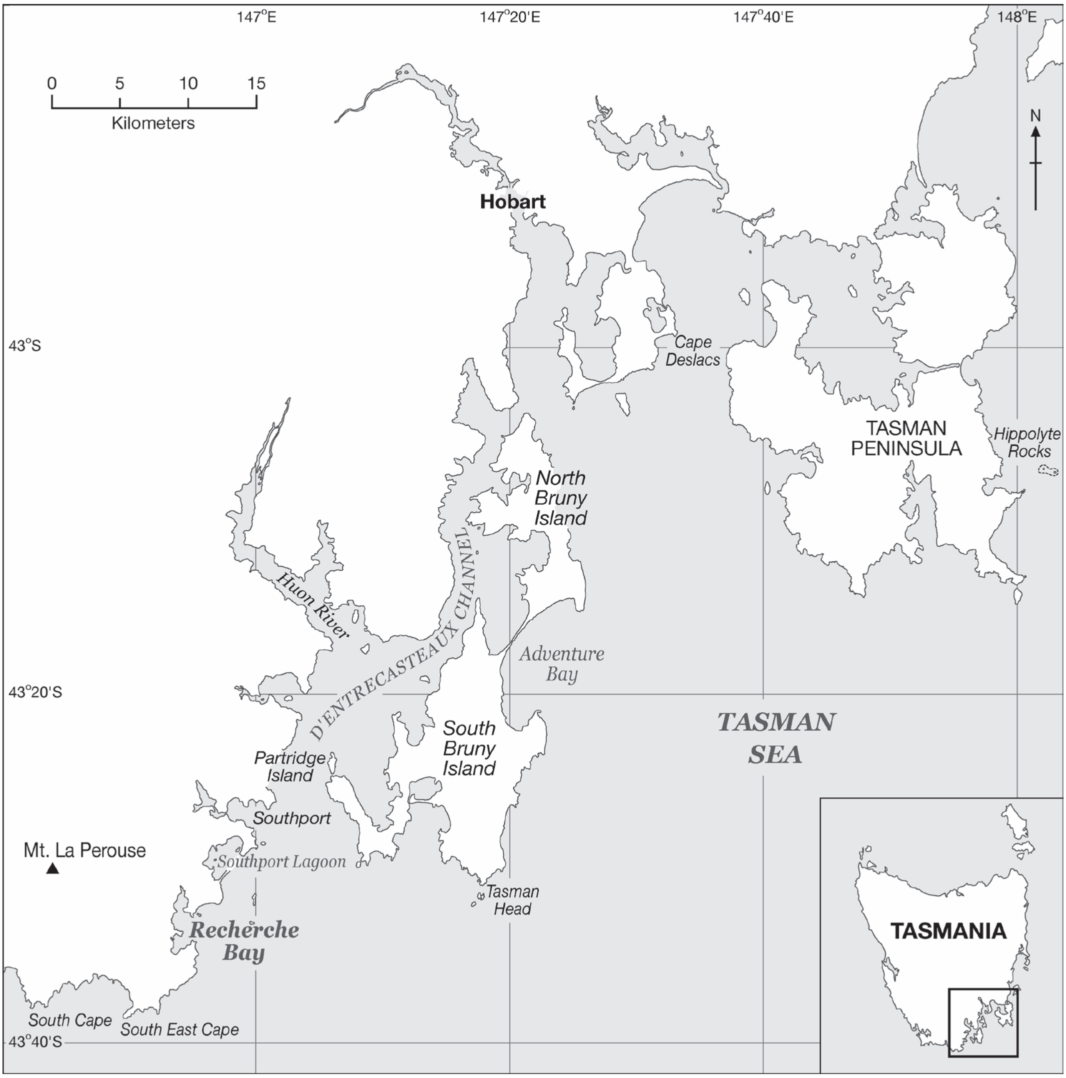

Figure i. Southeastern Tasmania (Hannah Gason).

The members of the expedition had observed signs of human occupation on the peninsula but on their first visit had not encountered any people. Then on 6 February 1793, while working near Southport Lagoon, the botanists saw a group of about fifty men, women and children approaching. Observing their friendly behaviour the French put down their weapons and a joyous rapport was established between the two groups. Over the next few days several meetings took place, the highlight being an al fresco picnic at the southern end of Black Swan Lagoon where songs were sung by both parties and dances were joined. The French worked intelligently on a vocabulary of the language and sketched the local people: today these contacts between the French and Indigenous Tasmanians offer insights into first cultural interaction and are the most important description of Tasmanian society and the most complete vocabulary of the language of a local group.

Two centuries passed. Coal was collected during the convict times, and in 1838 Delahaye's garden was sought but not found by Lady Jane Franklin, the enterprising wife of the

Governor of the Penal Colony, and the botanist RC Gunn. Later, whaling took place in the bay; in the early-20th century timber was cut and coal mining resumed; and the peninsula passed into private hands. A substantial rock platform, more than 20 m long and 1 m high on Bennett's Point, 1 km south of the garden, is considered to be associated with French oared boat repairs but subsequently adapted for boat building during the 1850s.

Apart from this, the historical importance of the area was largely forgotten until 1992, the bicentenary of the visit of the d'Entrecasteaux expedition, when the work on magnetism carried out by Elisabeth Paul Edouard de Rossel was honoured by a three–day symposium in Hobart on *Progress in Geomagnetism in Australia, 1792–1992.*[3] Rossel's observations during the voyage and his two critical measurements made at Recherche Bay have long been recognised as important because they were the first demonstration that the Earth's magnetic field increases in intensity away from the Equator. Also they constituted the first deliberate scientific experiment in Australia intended to answer a specific question about the Earth. In recognition of their importance, and on the precise bicentenary of his first observation (11 May 1992) members of the Specialist Group on Solid–Earth Geophysics of the Geological Society of Australia visited the site on Bennett's Point where he conducted his observations. A plaque was fixed and a dip needle was oscillated to re-enact Rossel's measurement. It showed a slight difference consonant with the movement of the south magnetic pole in 200 years.[4]

In 2001 a road was driven into the northeastern peninsula by the Tasmanian State Government to provide access for logging trucks to harvest the forest on the private land. This endangered some species of rare plants but considerably increased the value of the land. It also provoked a strong protest among the local community near Recherche Bay which was opposed to the clear felling of the historic area. Two groups were founded in response, the Recherche Bay Protection Group led by Wren Fraser Cameron, and the Far South Regional Arts Group.

In February 2003 two members of the Recherche Bay Protection Group, Helen Gee and Bob Graham, discovered a stone structure, of what could be Delahaye's garden, a short walk through the bush from the beach on Recherche Bay. This made it possible, by reference to the careful records in the journals of the scientists and ship's crew, to fix the positions of several other activities of the French expedition.

Soon after, on 14 February 2003, at the request of Senator Bob Brown, Emeritus Professor John Mulvaney examined the site and concluded that it was very likely the remains of the kitchen garden. He was supported in this conclusion by Sydney archaeologist, Anne Bickford, who also visited the site. With their support the Recherche Bay Protection Group formally nominated the whole of the northeastern peninsula of Recherche Bay for inclusion on the Tasmanian Heritage Register.

The discovery of the possible garden site prompted considerable media attention, although it proved difficult to direct media coverage away from the garden to the general heritage significance of the entire northeastern peninsula, where various French activities were documented, especially meetings with Tasmanians.

Over the following months many approaches were made by individuals and institutions to both the Tasmanian Government and the Commonwealth Government. John Mulvaney prepared a discussion paper for the meeting on 3 June 2003 between the National Cultural Heritage Forum and David Kemp, Federal Minister for Environment and Heritage.

Figure ii. Recherche Bay region (Hannah Gason).

Thenceforth the matter was actively pursued by Simon Molesworth, Chair of the Australian Council for National Trusts, and by Australia ICOMOS, a member of the International Council on Monuments and Sites.

Two members of the Recherche Bay Protection Group, Deborah Wace and Wren Cameron Fraser, sought the support of the Australian Academy of Science and, in September 2003, the President wrote to the then Premier of Tasmania, Jim Bacon, strongly supporting the nomination. The Premier responded favourably and said the matter would be determined by the Tasmanian Heritage Council.

In November 2003, seven Fellows of the Australian Academy of the Humanities (AAH) and of the Australian Academy of Science wrote to the Prime Minister urging his involvement. The President of the AAH also wrote to relevant Commonwealth Government Ministries. In May 2004, Professor Mick Dodson, Chair of the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS), wrote to the Premier of Tasmania, and representatives of AIATSIS later met with the Commonwealth Environment and Heritage Department, to further stress the significance of the area for Aboriginal people. Throughout 2004–2005 the Ambassador of France, Patrick Hénault, expressed positive interest in the outcome and he visited the area in 2004.

The revised Environment Protection and Biodiversity Conservation Amendment Regulations Act came into force in February 2004 and, immediately after, Mulvaney nominated the northeast peninsula of Recherche Bay for inclusion on the National Heritage List. The Australian Garden History Society attempted to have the area declared under the new legislation as National Heritage in Danger. This was rejected by Senator Ian Campbell, Federal Minister for Environment and Heritage.

In 2004 the Tasmanian Heritage Council recommended that the whole northeastern peninsula, of approximately 146 ha, be preserved. However, because the area was privately owned, the State Minister for Heritage, Forests and Tourism, Ken Bacon, felt unable to accede to this and instead excised a 100 m strip around the shoreline, and the area around the garden and observatory, as a reserve. He granted the owners of the land, David and Rod Vernon, permission to log the rest of the area. Because these sites have such great significance for the early history of scientific endeavours in Australia and, with vegetation regrowth, are still in much the same condition as they were 210 years ago, the President of the Academy of Science again wrote to the Premier, by then Paul Lennon, in June 2005 urging him to reconsider this decision and accept the full recommendation of the Tasmanian Heritage Council.

Through 2005 it looked as though there would be no change and the owners began to prepare to log the area. There were large protest meetings in Hobart and at Recherche Bay, led by Senator Bob Brown, and equally strong condemnation of the conservationists by the Australian Forest Growers Association; the Tasmanian Branch President, Arthur Lyons, argued that the owners of the land were being harassed in the pursuit of their legitimate activities.[5]

Meanwhile in the Commonwealth Gazette of 7 October 2005, a 385–hectare area of the peninsula and surrounding sea was included in the National Heritage List. Once this was confirmed, Senator Bob Brown held private meetings with the Vernon brothers who agreed to delay operations while he attempted to raise the now inflated purchase price of $2.2m. When Dick Smith heard of these negotiations in November 2005 he offered to underwrite the purchase of the land by the Tasmanian Land Conservancy. The Vernon Brothers accepted the offer and, as a result of Dick Smith's initiative, the Tasmanian Government waived stamp duty on the sale, released additional funds for remediation of the earlier road work and, on 8 February 2006, the Premier declared: 'We have saved this site. If Dick Smith hadn't put his $2m on the table we wouldn't be standing here, it's a simple as that.'[6]

The next day Bob Brown told the Senate:

> The potential was there for yet another divisive, quite huge protest in Tasmania over our fantastic environment. But this time it was different: it was a fight not over a crown asset but over a private asset. Looking at that potential for legal action, for protest, for uproar, for unhappiness, I made contact again with Rob and David Vernon in October last year. Thanks to the repeated good offices of Dick Smith, the Tasmanian Land Conservancy and the Vernon brothers, the Tasmanian government has come into this very positive equation [which] means that, instead of an outcome where people feel this is not as good as it could have been, there is now a very happy outcome. I want to thank the Tasmanian government for that and I want to thank everybody who is involved.[7]

The Australian Academy of Science welcomed this excellent outcome and the Executive Secretary, Professor Sue Serjeantson, proposed a National Academies' Forum to celebrate the cultural, historical and scientific significance of Recherche Bay. The proposal was enthusiastically supported by the three other Academies—Humanities, Social Sciences and Technological Sciences and Engineering—and a small organising committee was convened to draw up a program. It was agreed that the Forum should be held in Hobart and CSIRO Marine and Atmospheric Research generously agreed to host the meeting at no charge. It was also agreed that the Forum should review current work on the history of the French exploration; the scientific implications of the discoveries at Recherche Bay, then and now; the subsequent history of the area; and its socio-political significance today.

The response from all the invited speakers was immediate and positive, with only two of the original invitees being unable to attend. Each was asked to address a particular topic within their expertise, either on the French discoveries themselves, or on their consequences and implications for today.

The seventeen contributors presented an eclectic span of topics ranging from the historical background to the expedition; the relations with and records of the Aboriginal people; through the important achievements of the scientists seen in the context of the same disciplines today; to an examination of why and how the site of the French expedition's major endeavours on the northeastern peninsula of Recherche Bay has been secured for the future.

The Forum was preceded by a cruise through the d'Entrecasteaux Channel, a close look at the foreshore of Recherche Bay and a return trip around Bruny Island. The excellent on-board commentary was supplemented with brief remarks by some of the contributors, so that we began the Forum the next day with a lively appreciation of the topics.

The Forum opened with a welcome to country by Debra Hocking, a descendant of the Mouhenneer people, who addressed us in the language of her people, some of which has been revived through the vocabulary recorded by the French on Recherche Peninsula in 1793.[8]

The Forum began with an introduction to the genesis of the d'Entrecasteaux expedition and the climate of scientific endeavour at the time it set out. It included men (and one woman) imbued with the zest for discovery and the liberating ideas of the brotherhood of mankind; the latter beautifully exemplified by the respectful encounter with the Tasmanians that was so different from those that would later follow. They were also caught up in the rivalry of France, Britain and Spain, each supporting scientific expeditions to secure new territories and trade, and to further knowledge of the Earth. Although the expedition achieved much, circumstances conspired to diminish its impact at the time and it is still less well known and appreciated than the contemporary expeditions of Cook, Bligh, Flinders and Baudin. It is one of the unexpected successes of the campaign to secure Recherche Peninsula for posterity that the achievements of the d'Entrecasteaux expedition have been brought into public awareness like never before.

The large complement of scientists was equipped with the finest instruments then available for measuring the magnetic force of the Earth, observing the moons of Jupiter and determining latitude and longitude. The newly developed French instruments and chronometers enabled Beautemps-Beaupré to make charts of punctilious accuracy and beauty of style, while the Linnean method of classifying organisms enabled the biologists to make coherent collections of the fauna and flora, later published by Labillardière as the first *Flora of Australia*.

The Forum continued with a series of papers on current research in the same disciplines as practised by the French: how DNA sequence comparisons now divide the genus *Eucalyptus* of Labillardière's classification into seven genera; how early French observations of torpor in the Echidna have been greatly extended by use of on-board data loggers; and how Rossel's original observations on magnetism can now be interpreted through understanding of the amazing dynamo at the centre of the Earth.

The final session reviewed the context of Recherche Bay and how it attained its present secure status. The main issue in the Recherche Bay dispute was about private ownership and public interest: the right of landowners to use or work the estate and the contrary view of a wider public interest in particular places. This concept of place was explored, especially the idea of cultural landscape linking natural features with associative traditional values. The d'Entrecasteaux expedition left a trail of geographic names on the landscape and the names of plants collected at Recherche Bay reflect the time and the collectors. We were reminded that if we value such places we should be prepared to pay for them; and we were led through the legal processes that followed the generous act of Dick Smith in underwriting the purchase. The Forum concluded with an outline by the Tasmanian Land Conservancy of the Recherche Bay Management Plan.[9]

At the Forum's conclusion there was a general consensus that the diversity of topics explored by the participants merited a wider audience. On behalf of the National Academies' Forum, the Academy of Social Sciences in Australia offered to publish a selection of papers from those presented, as well as one invited paper on a topic unable to be covered at the Forum. The submitted papers have been reviewed by both editors and appropriate referees.

The format of the volume largely follows that of the Forum. It begins with a review of the historical context of the French expedition by Alan Frost, which is complemented by Michael Pearson's paper on cartography in the late-18th and early-19th century, Gintaras Kantvilas' paper on botany and Stewart Nicol's paper on zoology in the same period.

These are followed by John Mulvaney on the French encounter with the Tasmanians, Iain Davidson on archaeology and language of the Tasmanians and Ian Rae on the subsequent history of Recherche Bay as a centre of whaling.

The second series of papers deals with contemporary matters. Jean-Christophe Galipaud and co-workers report on the archaeological assessment of the stone structure purported to be the French garden, Joan Domicelj discusses the concept of place, Aynsley Kellow examines the basis of public versus private values, and Tom Baxter describes the legal aspects of the controversy over Recherche Bay. The final paper by David Lindenmayer looks to the future: how best to conserve the several values represented at Recherche Bay.

Acknowledgements

We acknowledge the help of the anonymous referees, and for production of the volume we thank the staff of the Academy of Social Sciences in Australia, especially the Executive Secretary, Dr John Beaton, Irina Kotycheva and the copy editor and designer, Freya Job.

We also acknowledge the combined and long sustained effort of many ordinary Tasmanians, led by Senator Bob Brown, and the timely philanthropy of Dick Smith that secured a satisfactory heritage outcome for the northeast peninsula of Recherche Bay. Without their inestimable contributions there would not have been a Forum or this publication.

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1 From the hills of Provence to the coast of Van Diemen's Land

The expedition of Antoine-Raymond-Joseph Bruny d'Entrecasteaux, 1791–1793/94

Alan Frost

The second half of the 18th century saw the most far-reaching program of deliberate exploration of the Earth's oceans and coastlines in all of human history.

In the years between 1764 and 1814 the age-old geographical assumptions of *Terra Australis Incognita* and the Northeast and Northwest Passages were removed from the maps of the world; and the previously missing coastlines of Australia, northwest America and northeast Asia were drawn in. Islands and waterways lost to European view for up to two hundred years—the Marquesas Islands, the Solomons, the New Hebrides, Torres Strait—were rediscovered, and numerous others discovered. Indeed, all the major and many of the minor island clusters in the Pacific Ocean were located, and the great ocean's vastness fully understood for the first time. Thousands of kilometres of the continental shores that fringe it were charted with unprecedented accuracy. The Indian Ocean's coastlines and islands were similarly surveyed and investigated. Countless botanical, zoological and mineral specimens were collected, and a wealth of ethnographic detail recorded. In the duration of one European lifetime—say, that of Sir Joseph Banks, 1743–1820—explorers revealed the features of one third of the globe's surface and recorded and publicised them. It is no exaggeration to say that in this brief period of sixty-or-so years Europeans gathered more information about the world than in any such previous one.

I wish to offer three general propositions about the nature of European exploration in this period, so as to put into perspective the expedition to the Indian and Pacific oceans between 1791 and 1794 led by Antoine-Raymond-Joseph Bruny d'Entrecasteaux. These are:

1. Whatever its scientific import, this exploration was at heart profoundly political and imperial.
2. This exploration developed in conjunction with the emergence of the modern scientific disciplines from the older catch-all concept of 'natural philosophy'.
3. From the beginning of the 1790s, the nature of this exploration changed significantly, from being comprised predominantly of vast oceanic sweeps punctuated by sojourns

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at harbours, to the close surveying of coastlines and the collection of scientific data which the development of new instruments made possible. In this, it foreshadowed a dominant activity of the British, French and United States navies in the 19th century.

1. Whatever its scientific import, this exploration was at heart profoundly political and imperial.

The Seven Years War (1756–1763) resulted in Britain's obtaining a hitherto unmatched maritime superiority over its major imperial rivals France and Spain. Immediately on the conclusion of peace it moved to take advantage of this superiority, before—as the Earl of Egmont, then First Lord Commissioner of the Admiralty, put it—'a War with France or Spain, or the Jealousy of those two Powers should oblige Great Britain to part with the Possession of Falklands Islands, or otherwise Interrupt the attempts of Great Britain in that Part of the World'.[1]

So, between 1764 and 1780, the British mounted a series of expeditions to the southern Atlantic and Pacific oceans—those of John Byron (1764–66), Samuel Wallis and Philip Carteret (1766–69), and James Cook (1768–71, 1772–75, 1776–80).

Learning enough of wind and current systems to establish how best to navigate these vast oceanic domains; locating coastlines and islands, harbours and bays where ships might rest and refresh and obtain other resources; and establishing informal links with Indigenous peoples, these expeditions gave Britain further advantages over its rivals where the needs of war and commerce were concerned.

Effectively, they also created maritime and political agendas which France and Spain had to match if they were to remain Britain's rivals, and to reduce its new superiority. And this these two nations did, with the expeditions of Louis Antoine de Bougainville (1766–69), Jean-François de Galaup, Comte de La Pérouse (1785–[88]), and Alejandro Malaspina (1789–94).

A significant consequence of this was that the Continental nations (and, in particular, Spain) were forced to relinquish claims to possession and exclusive navigation and trade based on the Papal dispensations of the later-15th and early-16th centuries, and to accept instead that such rights had to be founded on first discovery and acts of symbolic possession followed by effective occupation, as in the case of New South Wales (1770–88)—as Henry Dundas said after the Nootka Sound crisis of 1790 had been resolved in Britain's favour, 'we were not contending for a few miles, but a large world'.[2]

2. This exploration developed in conjunction with the emergence of the modern scientific disciplines from the older catch-all concept of 'natural philosophy'.

Into the 1770s, such science in a modern sense as there was in Europe was mostly conducted under the auspices of national societies such as the Royal Society of London. However, it was intermixed with much that we would now not consider to be scientific, such as interest in human and animal oddities, peculiar natural phenomena, and views based on mediaeval (and older) theories of humours, miasmas, etc, and on those limited by the Biblical scheme of creation.[3]

However, by the 1760s, two developments were gathering that would progressively lead to change. The first of these was the extension of the binominal system of classification promulgated by Linnaeus; the second was the development of mathematics and attendant instrumentation which enabled the accurate determination of longitude.

Both these developments are evident in the first voyages of the period. The botanist Philibert Commerson sailed on Bougainville's circumnavigation; and Joseph Banks and Daniel Solander went with Cook on the *Endeavour*. Johann Reinhold and Georg Forster went on Cook's second voyage; and even after the great navigator had grown tired of the obstreperous behaviour of scientists, a number of the surgeons on his third voyage who were possessed of botanical and zoological knowledge continued the collection of data.

A person having 'great Merit' in utilising the Lunar Tables developed by Neville Maskelyne, the Astronomer Royal, went with Wallis in 1766.[4] The astronomer Charles Green sailed on Cook's first voyage, when they and the suffering midshipmen used the lunar tables. (One of the purposes of this voyage was of course to observe the Transit of Venus at Tahiti.) William Wales and William Bayly went on Cook's second voyage, and Bayly again on his third, when they had the use of Harrison's chronometers as refined by Kendall.

These expeditions obtained thousands upon thousands of zoological, botanical and mineral specimens; data about winds, currents and weather; and detailed observations of peoples, most of whose existence had hitherto been unknown to Europeans, and whose cultures 'exhibit[ed] a new picture of human life'.[5]

Banks and Solander returned with an immense treasure in natural history; and when told of it Linnaeus saw that 'these discoveries' would 'delight and benefit' the world, and that 'the foundations of true science will be strengthened, so as to endure through all generations'.[6] The Forsters made similarly extensive collections on Cook's second voyage. Baudin's voyage brought some 18,500 zoological specimens, including some 2,500 that were new. Antoine Laurent de Jussieu, Professor of Botany at the Muséum d'Histoire Naturelle, considered this the greatest collection to be brought from different lands to France. In the three and a half years spent with Flinders about the Australian coast, Robert Brown collected some 3,400 specimens, of which about 2,000 were new. The process of classification was given an enormous impetus.[7] Extended study of the plants he had collected and of the thousands of others in Banks's herbarium eventually allowed Brown to refine Jussieu's 'natural' system of classification so that it was seen to be superior to the Linnean one.

It is Georg Forster who has best indicated the significance of the ethnographic data deriving from the voyages of exploration. 'Let us look', he reflected a dozen years after he had sailed with Cook,

> at the most important object of our researches, at our own species; at just how many races, with whose very name we were formerly unacquainted, have been described down to their smallest characteristics through the memorable efforts of this great man! Their physical diversity, their temperament, their customs, their mode of life and dress, their form of government, their religion, their ideas of science and works of art, in short everything was collected by Cook for his contemporaries and for posterity with fidelity and tireless diligence.[8]

Again, it is difficult to overestimate the significance of this data for the nascent discipline of anthropology. Johann Reinhold Forster reflected on what he had seen, and came close to a polygenetic view of human origins. The German anatomist Johann Friedrich Blumenbach incorporated details of Pacific peoples into the scheme of human classification that he was enunciating based on appearance, skin colour and skull shape. Forster, and after him William Marsden, contemplated the similarity of languages in the oceanic amplitudes from Easter Island to Madagascar, to develop a view of how the islands of the Indian and Pacific oceans were peopled, which still retains an essential validity. The philosopher JG Herder considered the evidence the Pacific had to offer when he formulated his striking views of the relativity of cultures.

La Pérouse's and Malaspina's expeditions in particular reflect the process of the emergence of the modern scientific disciplines. His venture more fully equipped than any of Cook's had been, La Pérouse sailed with a retinue of scientists charged with making new observations in the fields of geography, geometry, astronomy, mechanics, physics, chemistry, anatomy, zoology, mineralogy, botany, medicine and ethnology.[9]

Malaspina's was the most lavishly equipped of all the great voyages of this period; for Spanish authorities intended it to produce 'new discoveries, careful cartographic surveys, important geodesic experiments in gravity and magnetism, botanical collections, and descriptions of each region's geography, mineral resources, commercial possibilities, political status, native peoples and their customs'.[10]

3. From the beginning of the 1790s, the nature of this exploration changed significantly, from being comprised predominantly of vast oceanic sweeps punctuated by sojourns at harbours, to the close surveying of coastlines and the collection of scientific data which the development of new instruments made possible. In this, it foreshadowed a dominant activity of the British, French and United States navies in the 19th century.

Until the voyages of Bougainville and Cook, all circumnavigations had essentially followed the path pioneered by Magellan, which was determined by prevailing wind and currents systems. This generic route involved a western approach to the Pacific—that is, down the Atlantic and round the end of South America; up the coast of South America and then northwest until above the equator, then more gradually northwest to the Philippine Islands; then down through the India Ocean to the Cape of Good Hope; and home up the Atlantic.

By the end of Cook's first voyage, however, enough information had accumulated about the ocean's wind and current systems and the position of its major island groups for Europeans to understand that there might be other ways of navigating it. By the time he returned to England in 1771, Cook himself had formulated a comprehensive scheme to complete the exploration of the southern Pacific, which involved an eastern approach—east through the southern Indian Ocean to New Holland or New Zealand, then east again in high southern latitudes, with great sweeps back to the central island clusters to rest and refresh.[11] It was the determined pursuit of this scheme that enabled Cook to say at its conclusion that:

> the intention of the Voyage has in every respect been fully Answered, the Southern Hemisphere sufficiently explored and a final end put to the searching after a Southern Continent, which has at time ingrossed the attention of some of the Maritime Powers for near two Centuries past and the Geographers of all ages.[12]

While the situation is not as clear-cut as my proposition, unqualified, makes it seem, large oceanic sweeps characterised the voyages of both La Pérouse and Malaspina. But these were really the last voyages of the old dispensation; and those which followed are marked rather by close coastal surveying. Consider, for example, George Vancouver's exhaustive charting of the tortuous Northwest Coast (1791–95), and François Baudin's and Matthew Flinders's charting of continental Australia (1800–1804). And while the collection of data about botany, zoology and human cultures continued with these voyages, there was also greater emphasis on the collection of information concerning sea temperature and salinity, atmospheric temperature and pressure, and magnetism, which a new generation of specialist instruments permitted with a hitherto unknown accuracy.

Since it involved both oceanic sweeps and detailed coastal surveys, the expedition commanded by Antoine-Raymond-Joseph Bruny d'Entrecasteaux stands intermediate in character between the two generic types just outlined.

Antoine-Raymond-Joseph Bruny was born on 8 November 1737 in Provence. Though the family maintained a substantial presence in Aix, on being ennobled twenty-three years previous to the explorer's birth his grandfather had bought the Marquisate of Entrecasteaux, thus making the imposing castle high in the rocky hills of Provence the family's seat.

D'Entrecasteaux's life followed a then common path for young nobles wishing a career at sea: education at a Jesuit school; entry into the navy as a *garde de la marine* (at Toulon, July 1754); service at sea; action during the Seven Years War; specialist training after it (in his case, in cartography); promotion to junior command; service in the Mediterranean in the 1770s. In March 1775 he was promoted to captain, and some unremarkable service in the war of 1778–83 followed.

After a brief stint as assistant to the Comte de Fleurieu (Director of Ports and Arsenals) at the conclusion of the war, d'Entrecasteaux undertook a mission to China. Towards the end of 1787, he was appointed governor of Ile de France (Mauritius) and Bourbon (Réunion). He held this position for less than two years, during which he sought to counter Britain's expansionist policies in the India Ocean, organising competing surveying expeditions, on which FF Beautemps-Beaupré and Jean-Baptiste Willaumez taught astronomical, hydrographic and sketching techniques to junior colleagues; protesting at Britain's having taken possession of Diego Garcia in 1786; and warning more generally of Britain's ever-growing power in the eastern oceans.[13]

D'Entrecasteaux returned to France in 1790. In January 1791, the Société d'Histoire Naturelle petitioned the National Assembly to undertake a search for La Pérouse's expedition, of which nothing had been heard since it left Botany Bay in March 1788. The search expedition, which consisted of two ships, was organised by Fleurieu and d'Entrecasteaux was given the command of it. Its first purpose was to locate the missing La Pérouse, but it was also intended to undertake extensive scientific work as the Instructions, which extensively repeated those given to La Pérouse, amply indicate.[14] Among its complement were four naturalists and gardeners, two hydrographers, a mineralogist, two astronomers and two artists; and a number of the officers, including Willaumez, Jean-Michel Huon de Kermadec and of course d'Entrecasteaux himself, were competent to undertake scientific tasks; and they were given up-to-date instruments to enable them to do so.[15]

There was another purpose, distinctly less important than these first two, but in the long view of history not insignificant. This was to continue the transference of Western hemisphere biota to the Pacific region, a process which had effectively begun with the Spanish colonisation of the Philippines, and which more recently had been furthered by Wallis, Cook, William Bligh, James Colnett, and, most strikingly, by Joseph Banks and Arthur Phillip in New South Wales.[16]

The expedition sailed from Brest on 28 September 1791. It called at Tenerife in mid-October, then at the Cape of Good Hope (17 January–16 February 1792).

D'Entrecasteaux sojourned on the southeast coast of Tasmania from 21 April to 28 May 1792. Then, beginning his search for La Pérouse, he went north up the Pacific past the reef–bound coast of New Caledonia to New Ireland and the Admiralty Islands, deciding when almost within sight of it not to stop at Vanikoro, where he would have found evidence of the wreck of La Pérouse's ships. He crossed Amboina, where he rested from 6 September to 13 October 1792.

D'Entrecasteaux sailed for the southwest corner of Western Australia on 13 October 1792. In December 1792 he stopped for eight days to examine Esperance Bay (9–17 December), before crossing the Great Australian Bight and putting into Recherche Bay again from 21 January to 27 February 1793, where he and his colleagues continued their scientific work.

He then set out again in search of La Pérouse, going past the northern tip of New Zealand to Tongatapu; back to New Caledonia, and the Santa Cruz Islands (where he once more passed very close to Vanikoro); then to the Solomons and the Louisade Archipelago and New Britain.

Kermadec died on 6 May, and d'Entrecasteaux on 20 July 1793. The expedition's surviving officers took the ships to Sourabaya in the Dutch East Indies, where the discord between Royal and Republican supporters, which had been present from the first, grew.[17] Because France was at war with Holland, the crews were arrested in February 1794. In the course of the next two years, members of the expedition slowly made their way via Mauritius back to Europe. Many died in the process, while others chose to enter the service of the Dutch. Through a series of mischances, the expedition's charts, observations and collections (packed in 92 cases) were seized by a British warship and taken to London, where Sir Joseph Banks arranged for their release and despatch to France, on the premise that 'the science of two Nations may be at Peace while their Politics are at war'.[18] This was done, but not before the British Admiralty had copied the charts.

The delay in the French obtaining access to the expedition's records meant that accounts of it were much delayed—Labillardière's did not appear until 1799,[19] and Rossel's not until 1808. This late appearance of its narratives, together with its failure to locate La Pérouse and its unfortunate end in the East Indies, meant that the expedition's scientific accomplishments did not quickly receive the praise they deserved.

These accomplishments were however substantial. The charting, perhaps best exemplified in that of the islands of the Louisiade Archipelago, was meticulous. There were more than 10,000 individual botanical specimens; about 1,200 bird skins; there were fish preserved in spirits, dried snakes and lizards, and insects. There were daily tables of the ships' positions, magnetic variation, atmospheric pressure, temperature, wind direction and weather. There were extended ethnographic observations and vocabularies.

The officers and scientists of d'Entrecasteaux's expedition pursued all these activities during their two extended stays at Recherche Bay. Rossel, Willaumez and Beautemps-Beaupré charted the coasts of the mainland and Bruny Island, established the fact of D'Entrecasteaux Channel, took soundings in the bays and the Huon Estuary, and recorded latitudes and longitudes, temperatures and magnetic deviations. The naturalists rambled back from the coast, collecting botanical and zoological specimens; and both groups together tried to make contact with the Aborigines who remained aloof, but whose habitations and artefacts they saw, and to make sense of their culture, which seemed to them simple beyond example. The officers viewed with satisfaction the 'vast and safe anchorages . . . [where] all the fleets of the world could be assembled . . . and there would still be ample space left'.[20] D'Entrecasteaux himself wondered at the 'beauties of unspoilt nature' which he saw all about, and reflected on the disparities between the world in the states of nature and civilization.[21]

As did many of those attending the Forum, I took the tour down to Recherche Bay and saw an area possessing still many of those attributes remarked on by the French explorers.

In 1987, as a prelude to the Australian Academy of the Humanities' Bicentennial conference, I helped to organise a small conference for speakers on *European Voyaging towards Australia* at Château d'Entrecasteaux in Provence. I saw the rooms that the d'Entrecasteaux family inhabited. From the terraces, I saw the village and surrounding farms. Once or twice, in my best (but still atrocious) French, I welcomed tourists and collected the entrance fee from them. With some whimsical indulgence, one might see this as an iteration of Macaulay's trope of the New Zealander who at some point in the distant future would travel to sketch the ruins of St Paul's cathedral. It is because of the efforts of such explorers as Antoine-Raymond-Joseph Bruny d'Entrecasteaux that people like us now do indeed travel from its Antipodes to visit Europe.

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7. Cf Sir JE Smith's comment:

   When a botanist first enters on the investigation of so remote a country as New Holland, he finds himself as it were in a new world. He can scarcely meet with any certain fixed points from which to draw his analogies; and even those that appear most promising are frequently in danger of misleading him. Whole tribes of plants, which at first sight seem familiar to his acquaintance, as occupying links in Nature's chain... prove, on a nearer examination, total strangers, with other configurations, other economy, and other qualities; not only the species that present themselves are new, but most of the genera, and even natural orders. Smith, Sir JE (1793) *A Specimen of the Botany of New Holland*. London, p 9.
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9. Milet-Mureau, LA (1799) 'Private Instruction from the King to the Sieur de la Pérouse' and 'Plan of the Voyage', in *A Voyage Round the World*, vol. 1, pp 11-47. Underlying political rivalry not being forgotten, La Pérouse was also told to observe and report on the defences and trade of the European colonies he visited, on the commercial potential of the Pacific lands' products, and on the purpose of any settlement the British might have formed in the southern half of the ocean.
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2 'Nothing left undone': The hydrographic surveys of Beautemps-Beaupré

Michael Pearson

On 13 January 1802, while moored in Recherche Bay, Nicolas Baudin wrote:

> It would undoubtedly be difficult to find anything better executed than the chart of this area done by Citizen [Beautemps-] Beaupré, the surveyor on [the d'Entrecasteaux] expedition. And one may be certain that he has left nothing undone for those who should follow him and go reconnoitring along this part of the strait.' [1]

D'Entrecasteaux in Tasmania

Joseph-Antoine Bruny d'Entrecasteaux was dispatched from France in 1791 to lead a surveying expedition to the Pacific, and to search for the missing La Pérouse expedition. The expedition had a substantial scientific staff, including two hydrographers, Beautemps-Beaupré and Miroir-Jouvency, and two astronomers, Pierson and Bertrand (who left the expedition at Cape of Good Hope, being replaced by an officer, Rossel). The astronomers were to provide the results of their 'geographical observations' to the hydrographers, and the latter were to make their plans of the coast available to the astronomers. The astronomers were also to take geophysical measurements of the magnetic field.[2]

The *Recherche* and *Espérance* sailed via the Cape of Good Hope direct to Van Diemen's Land, where, due to a mistaken navigation bearing, d'Entrecasteaux made anchor on 23 April 1792 in a protected bay previously unknown to Europeans. He named the bay Recherche. But for the navigation error, d'Entrecasteaux would have anchored at Furneaux's Adventure Bay. D'Entrecasteaux was quite taken with Recherche Bay:

> I shall attempt the vain task of conveying the feelings I experienced at the sight of this solitary harbour, placed at the ends of the earth, and enclosed so perfectly that one could think of it as separated from the rest of the universe. Everything reflects the rustic estate of raw nature. Here one meets at every step, combined

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 17-34.

with the beauties of nature left to itself, signs of its decay, trees of enormous height and corresponding width, without branches along the trunk, but crowned with foliage always green: some appear as old as the world; so interlaced and compacted as to be impenetrable, they support other trees equally large but dropping with age and fertilizing the ground with debris reduced to rottenness. Nature in all its vigour, and at the same time wasting away, seems to offer the imagination something more embellished by industry and by civilized man; wanting to conserve only the beauty, he has destroyed the charm; he has removed its unique character, that of being always ancient and always new.[3]

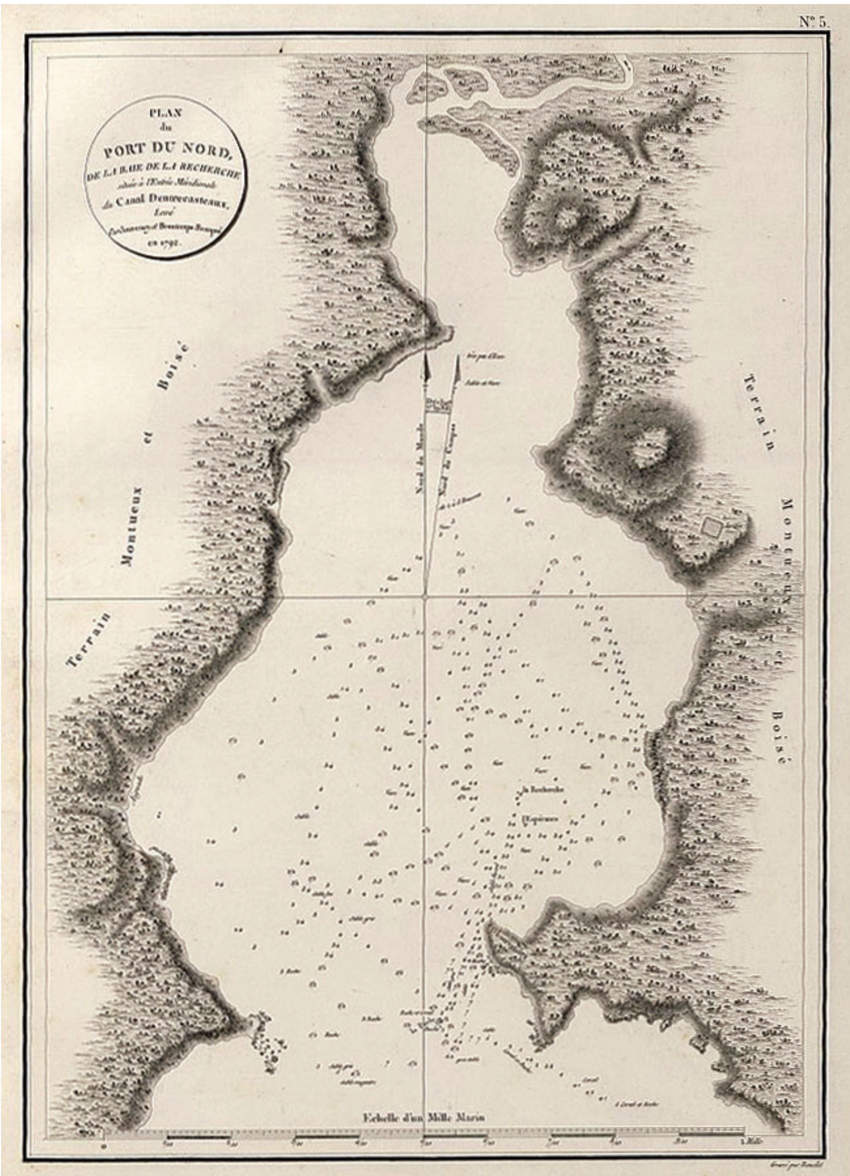

Figure 2.1. Beautemps-Beaupré's chart of Port du Nord (now Pigsties Bay), Recherche Bay, 1792. Garden site marked centre right. (National Library of Australia, nla.map-ra82-s7-e)

Anchoring in Port du Nord (now Pigsties Bay), the expedition spent three weeks repairing the boats, taking astronomical and magnetic observations, watering and wooding, and collecting natural history specimens. Parties were sent out to investigate the surrounding area, and the southern shores of what is now D'Entrecasteaux Channel were explored and charted.

The observatory was located on what is now Bennett's Point, and on the shores of Coal Pit Bight, between the observatory and the garden established by the gardener Delahaye, were the site for a carpenter's work area, boat repair yard with forges, and tents for the crew and officers. At the Bennett's Point observatory, Rossel, on May 11 1792, took a number of observations of the intensity of the magnetic field, and observations to establish longitude.

During the second stay of three weeks in January–February 1793, the ships moored in Port du Sud (now Rocky Bay), on the southern side of Recherche Bay. Here they established another observatory.[4] The purpose of these observatories was to take astronomical observations to fix longitude and rate the chronometers; to establish the local magnetic variation and dip (declination); and make further measurement of the intensity of the magnetic field. With the partial exception of the intensity measurements, the observations were related to practical navigation rather than exercises in pure research.

Between the two visits to Recherche Bay, d'Entrecasteaux had sailed northeast to New Caledonia and New Britain, around the top of New Guinea to Timor, then south to strike the Western Australian coast at Cape Leewin. He then coasted along the southern coast, passing King George Sound, mapped by Vancouver in 1791. The expedition landed at Espérance Bay on 9 December 1792, in a location protected by Observation Island and many islands further offshore. Willaumez and Beautemps-Beaupré surveyed the nearby islands by boat. This large cluster of islands, to be named the Archipelago of the Recherche, had been seen by Nuyts and roughly located on his small-scale map in 1627 but never accurately surveyed.

Upon leaving Esperance Bay the ships were held up by adverse winds, and d'Entrecasteaux took the opportunity to further survey and chart the islands as they slowly made their way eastward over the next seven days, before coasting along the Great Australian Bight, then heading again for Tasmania. The ships' track, however, was outside the chain of islands, and Beautemps-Beaupré's chart does not achieve the detail or accuracy of Flinders' later survey of the archipelago, though Flinders copies and acknowledges Beautemps-Beaupré's more detailed survey of the area around Esperance Bay.[5]

While d'Entrecasteaux added only a relatively modest area of coast to the known continent, the expedition was a major one, largely because of the botanical work of Labillardière, the ethnographic observations, and the cartography of Beautemps-Beaupré. The success of the expedition in charting southern Tasmania, when added to Baudin's wide-ranging visit in 1802, raised British fears of French intentions in southern Australia, and stimulated the British settlement of Port Phillip and Hobart in 1803 and Launceston in 1804. The importance of the early surveys was apparent to both the French and British. Baudin had written a private letter to Governor King, dated 23 December 1802, at Elephant's Bay on King Island, which provided a clear basis for the British fears:

> I have no knowledge of the claims that the French Government may have on Van Diemen's Land, nor its projects for the future, but I believe that its title would be no better founded then yours. However, if it were sufficient, according to the

principle you have adopted, to have fully explored a land for it to belong to the first to have made it known, you would have no claim. To convince oneself that it was not the English, one has only to cast an eye over the theoretical maps drawn up by Arrowsmith, your geographer, and compare them with those drawn by Beautemps-Beaupré, which leave little to be desired.[6]

The science and art of hydrographic surveying

As an anglophone living in a former British colony, I have found my maritime reading dominated by the British maritime saga (a bias long decried by Leslie Marchant[7]). The Admiralty Chart has been fostered as the apex of 19th century hydrographic cartography, and certainly the scope of British naval and mercantile shipping and the systematising of the collection of hydrographic data by the Admiralty's Hydrographic Service produced the first readily available, reliable and often very accomplished and beautiful charts for global navigation. But what about the French, and the dialogue between French hydrographic cartography and that of the British in a period characterised by war and distrust between the two nations?

How good were Beautemps-Beaupré's charts? Baudin certainly rated them highly, as the quote heading this article indicates. On entering the approaches to Recherche Bay from sea on 12 January 1802, Baudin could not lower his boats to investigate the entrance to the bay due to bad weather. 'However, the map given in the account of d'Entrecasteaux's voyage seemed to us to have been extremely carefully done, so we put all our trust in it and were guided by it.'[8]

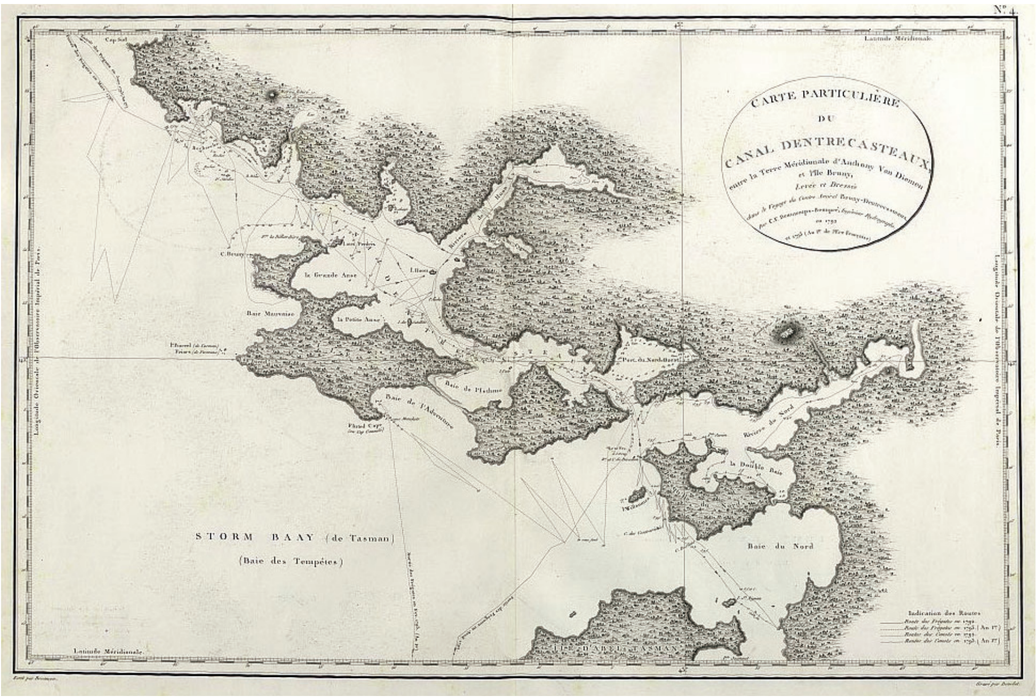

Figure 2.2. Beautemps-Beaupré's chart of the D'Entrecasteaux Channel. North is to the right. (National Library of Australia, nla.map-ra82-s6-e)

Seven days later, while navigating the D'Entrecasteaux Channel, Baudin again praised the charts:

> Despite the confidence that we necessarily had in Citizen Beaupré's chart, we still sounded constantly and everywhere found the depth that he indicates. As I have already remarked, it would be hard to produce a more accurate and detailed piece of work than his chart of this channel. With such a plan, one could pass through it by day or night, provided the winds enabled one to steer a direct course.[9]

One could expect the French to praise their own, but such praise was not limited by nationalist interest. Matthew Flinders, Baudin's contemporary and rival, also held Beautemps-Beaupré's work in the highest regard:

> The charts of the bays, ports, and arms of the sea at the southeast end of Van Diemen's Land, constructed by Mons. Beautemps-Beaupré and his assistants, appear to combine scientific accuracy and minuteness of detail, with an uncommon degree of neatness in the execution: they contain some of the finest specimens of marine surveying, perhaps ever made in a new country.[10]

What was it about Beautemps-Beaupré's charts that attracted this praise, and how did they compare with the work of his contemporaries? Partly, the superiority lies in the superb draughtsmanship that went into their production, and partly it is in the accuracy of the methods used in the surveys on which the charts were based.

The great navigators of the 18^{th} and early-19^{th} centuries were explorers who also surveyed. They charted many miles of coastline in limited time. Their charts were primarily the result of what were known as 'running surveys'. The method was long established, and would have been recognisable to the more scientific navigators as early as the 16^{th} century. The instructions for taking a running survey, given to James Bassendine, James Woodcocke and Richard Browne for the voyage of discovery to the north coast of Russia in 1588, and those to Arthur Pet and Charles Jackman for a voyage to the far East in 1580, contain all the basic approaches still in place in the 18^{th} century.[11]

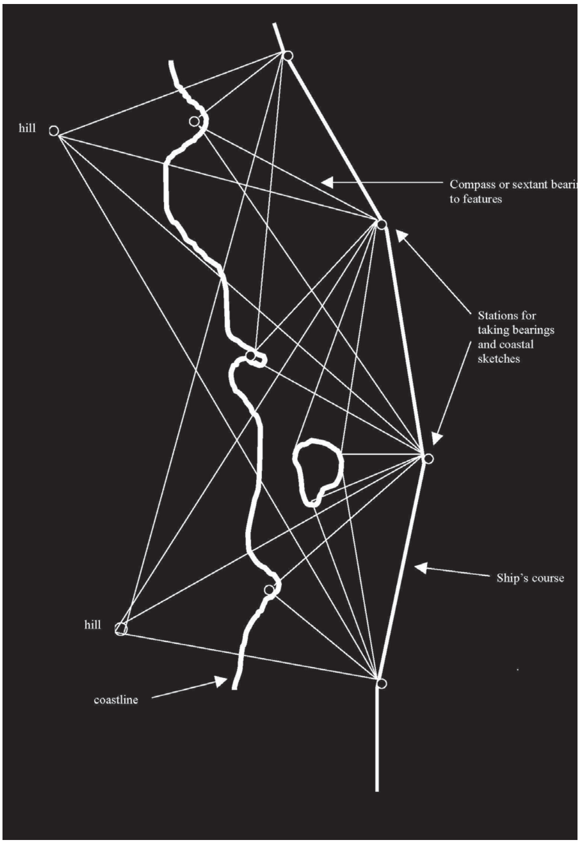

Figure 2.3 Running survey along a coast (M Pearson)

The standard approach in the 18^{th} century was generally similar to that set out in a navigation manual by John Robertson (1764).[12] It consisted of taking bearings with the azimuth compass of the prominent coastal features in evidence from the ship, which was anchored or hove-to to provide a steady observation point. The next set of observations was taken from a new position several miles along the coast, taking bearing back to the last landmarks, and adding new ones now in view. A sketch of the coast was made at each observation position, and the points to which bearings had been taken were marked by letters on the sketch. The progress of the ship between observation positions was measured by log, and the resulting triangulation of the bearings taken transferred to the chart, building up a running survey of the coastline. The method required that at least the last point surveyed before dark be in view the following morning, so the survey would not be broken. To achieve this the ship usually hove-to or sailed very slowly out to sea and back so that the last surveyed landmarks were still visible at daybreak. Cook's running survey along the east coast of Australia was carried out in this way, at a rate averaging thirty miles a day.[13]

The accuracy of the running survey depended partly on the frequency with which the surveyor landed and took astronomical observations to establish longitude and to determine the rate of loss or gain of time by their chronometers; partly on the accuracy of observation and sketching of coastal features; and partly on the proximity of the ship's route to the coast. The history of the charting of any coast is one of increasing intensity and accuracy of survey. It is noticeable, for example, that Flinders' chart of the Recherche Archipelago and the Great Australian Bight shows the track of the *Investigator* to be consistently closer to the coast than that taken by d'Entrecasteaux's ships—Flinders already knew where the land was from the earlier charts of d'Entrecasteaux, so one risk factor in coastal survey was reduced, allowing more confidence in the close approach. In considering comparisons of different navigators it is necessary to take account of any differences in their ships. While d'Entrecasteaux's ships were rated as 'frigates', presumably in deference to the rank of their commander, they were of comparable tonnage (about 350 tons) to Cook's *Endeavour*, Flinders' *Investigator* and Baudin's *Geographé* and *Naturaliste*. True frigates were two-to-three times that tonnage. Hence the navigability of the ships used by the key expeditions of the era should have been comparable, and inability to approach the shore due to ship size cannot be an excuse for differences in chart accuracy.

More precise survey methods were adopted where special features, usually harbours, had to be charted. The standard approach in the 18th century followed that set out, with progressive improvement in technique, in the navigation manuals written by Alexander Dalrymple (1771 and 1806), and, most importantly, by Murdoch Mackenzie (1774 and 1819).[14] This involved establishing a base line, either ashore between two points that could be flagged and easily observed from the ship, or between the ship and a prominent point ashore. The base line had to be able to be accurately measured, and used as the base for triangulation of other features which would become the survey points for the wider survey. Flinders, for example, sometimes measured a base line from his anchored ship to a point ashore by sound, measuring the time between the flash of a canon on the ship and the arrival of its sound at the other end of his base-line ashore. This was done by counting the swings of a pendulum made of a musket ball on the end of a 9.8 inch long piece of twine, each swing of the pendulum taking half a second. The speed of sound being 1,142 feet per second, the length of the base line could be calculated. This measurement was repeated three times (three shots of the cannon), to arrive at a reasonably accurate average. Theodolite angles were then taken from each end of the base line, to tie-in prominent features such as hills, islands and headlands, and then again from these tied-in points to more distant features to extend the survey outwards. A base line on a north-south trending coast could be measured by recording the latitude of each end of the line and the compass bearing between them.[15]

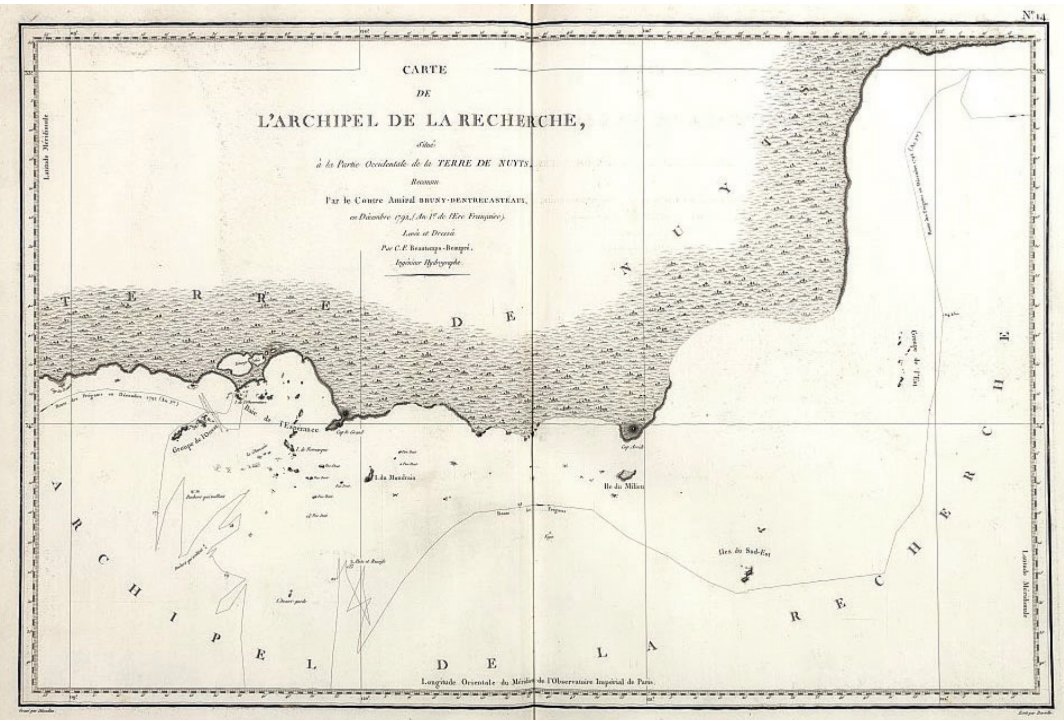

Figure 2.4. Detail of Beautemps-Beaupré's chart of the Recherche Archipelago in Western Australia. (National Library of Australia, nla.map-ra82-s16-e, detail)

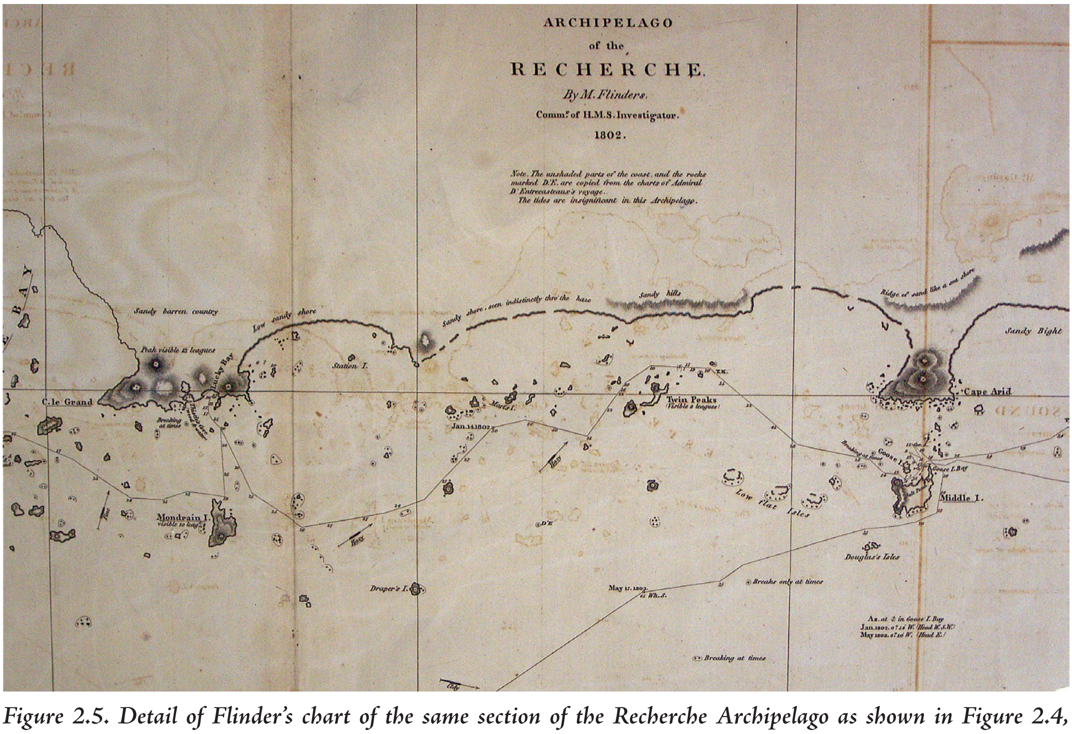

Figure 2.5. Detail of Flinder's chart of the same section of the Recherche Archipelago as shown in Figure 2.4, showing a closer and more detailed survey. (National Library of Australia, nla.map-t571-v, detail)

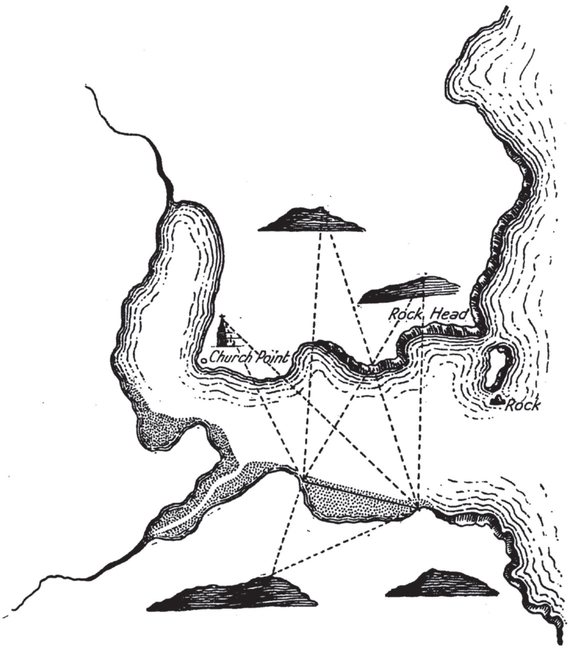

Figure 2.6. Harbour survey using a base line on land. (Murdoch Mackenzie 1774.)

Lines of soundings made from the boats were tied in to the base survey by compass bearings, and later by sextant or reflecting-circle angles, triangulated to the prominent features or the ends of the base line. Triangulation from the boats was improved in accuracy if the distance from the stationary ship (already triangulated into the base survey) was measured, and Dalrymple recommended doing this by taking a sextant angle between the mast-head and a line painted on the ship's side. British survey vessels long carried such a line for this purpose.[16]

The techniques for close survey, like those for a running survey, remained little changed throughout the 19th century. A description of the survey of the Great Barrier Reef area by HMS *Dart* in the 1890s follows the same basic techniques as set out by Mackenzie a hundred years earlier,[17] and Wharton and Field's classic survey manual of 1909 suggests little change in approach.[18] The only development referred to in 1909 is the invention of the range-finder, but this was not yet in common use. Measuring distance by sound was still among the techniques used, but now using the ticks of a chronometer rated to tick at five ticks every two seconds.[19]

It was the less accurate running surveys that provided the basis for the famous charts that showed the shape of the seas, the continents and the world. The more detailed harbour charts made safe the focal points of the world's commerce. The renown of Captain Cook as an explorer was based on his ability to create reasonably accurate charts from running surveys. Cook learnt his surveying skills from the military surveyors in Canada in 1758, and his best work was based on land-based theodolite and compass angles, and the establishment of good base lines. Similar approaches to the survey of coasts had been adopted by Murdoch Mackenzie for his triangulated survey of the Orkneys and Lewis in 1744, and of Ireland and Britain's west coasts between 1751 and 1770.[20] John Beaglehole, Cook's scholarly editor and biographer, states that:

> ...nothing [Cook] ever did later exceeded in accomplishment his surveys of the southern and western sides of Newfoundland from 1763 to 1767. He was so successful because he could deploy all the techniques he had acquired from the military 'engineers'; because he could work at times on land as well as from the sea; because, therefore, he could use, sometimes, instruments that required solid earth as their base.[21]

While Cook tried to use similar methods where he could in subsequent surveys, the majority of his work was, of necessity, running survey. Detailed triangulated survey from

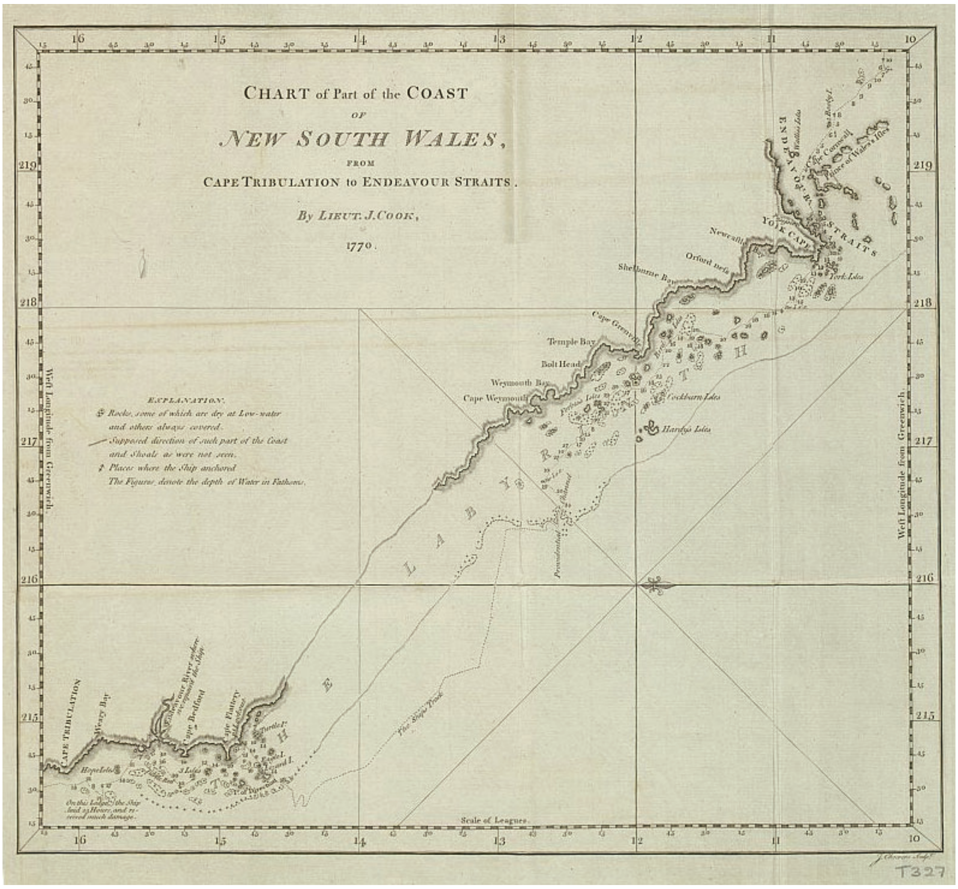

Figure 2.7. James Cook's running survey of the Cape Tribulation section of the Queensland coast, 1770. Note the track of the Endeavour, and the dotted section of coast not surveyed. (National Library of Australia, nla.map-t327-e)

a measured base line was a very time-consuming technique, and not suited to the rapid mapping required during exploration voyages. Cook was engaged for four years in his detailed survey of the west coasts of Newfoundland, but in the Pacific he charted huge distances in a fraction of the time—3,800 km of New Zealand's coast in six months; 3,200 km of Australia's east coast in four months; and nearly 500 km of New Caledonia's coast in under four weeks.[22] He said of his work on the New Hebrides coast (where his survey covered six degrees of latitude, or roughly 600 km north to south in six weeks): 'The word Survey, is not to be understood here, in its literal sence. Surveying a place, according to my Idea, is takeing a Geometrical Plan of it, in which every place is to have its true situation, which cannot be done in work of this kind.' [the spelling is Cook's].[23]

Cook's methods for conducting running surveys were not specifically recorded in his journals. It is clear he took numerous compass bearings and sextant angles of coastal features. He does not appear to have used the 'distance run' as logged aboard ship as the source of his running base lines while on the New Zealand and Australian coasts, but calculated the ship's position from the running survey itself, by plotting his position from the ship's course and intersecting rays on landmarks ashore, adjusted frequently by astronomical observations of position. He augmented the observations from the ship by occasional observations ashore, taking azimuth compass bearings to coastal and inland features from the tops of prominent headlands and hills near the coast. In later voyages he may have used a sextant to assist in this process.[24]

One of the reasons Cook's running surveys were so accurate, compared with those of earlier times, was his regular establishment of consistently accurate latitude and longitude through astronomical observation, backed up, from his second voyage onwards, by the use of reliable chronometers. Cook states of his survey of the Australian east coast that 'we seldom faild of getting an Observation every day to correct our Latitude by, and the Observation for Settling the Longitude were no less numberous and made as often as the Sun and Moon came into play'.[25] His charts were all corrected between rough chart and final chart by factoring in these observations. Such accuracy only became achievable after the publication of the first edition of *The Nautical Almanac* in 1767, which coincidentally used Greenwich as its prime meridian, making Cook's *Endeavour* expedition the first major exploration to relate all its charts to longitude measured from Greenwich.[26] While almanacs had been available before this time, they lacked the accuracy and comprehensiveness of the 1767 edition. Cook commented that 'By these tables the Calculations are rendered short beyond conception and easy to the meanest capacity and can never be enought recommended to the attention of all Sea Officers, who now have no cause left for not making themselves acquainted with this …part of their Duty.'[27]

Other explorers were faced with the same dilemma of charting many miles of coastline in a limited time, and therefore being unable to apply the techniques they knew would produce more accurate results. The Spanish explorer Alejandro Malaspina tried to improve the accuracy of the base lines created during his running surveys (1789–94). In normal practice these baselines were established by a single ship running a logged distance between stations from which angles were taken of features ashore. Malaspina had two ships, and observed the angle of elevation from the deck of each ship, when stationary, to the masthead of the other, to establish by triangulation the length of a sea-based baseline. Sextant angles or compass bearings to the same coastal features were then taken from each vessel (a method previously described by the Englishman Phipps on his Arctic voyage of 1773). When the ship-distance baseline was used, simultaneous sextant angles between the main mast of the other ship and the point ashore had to be taken, and the time noted for cross-reference between each ship's record of the survey. This was best done when the two ships were stationary, otherwise major discrepancies would result. Frequent exchange of survey data was also necessary to ensure a reliable correlation of reading was achieved. Latitude and longitude readings were taken as frequently as possible to tie-in the observations.[28] But even this system was not as accurate and reliable as the use of shore or ship-to-shore measured base lines.

Throughout the 19th century the pattern set by Cook and his successors was established as standard Royal Navy practice. Wharton uses the example of the *Beagle* surveys:

> In a survey of a particularly wild, stormy, and exposed coast, such as the southern coast of Terra del Fuego, the general plan adopted by Captain Fitzroy, of HMS *Beagle*, was to measure a base, and to survey, from the shelter of a harbour fixed astronomically, as far afield as practicable, fixing points to the utmost limit in every direction. Then, running for the next harbour, a similar survey of it and the

> vicinity was executed. The harbour surveys were afterwards connected by sketch surveys, the ship being fixed on the points already plotted, and all theodolite shots to intermediate points utilised as far as practicable. The use of steam now enables this sort of work to be carried out somewhat differently and more expeditiously.[29]

The distinction in the accuracy of triangulation between running surveys and detailed harbour surveys remained into the 20th century:

> The construction of this "triangulation", as it is termed, is of various kinds; ranging, from the rough triangles obtained in a running survey, where the side is obtained by the distance it is supposed the ship has moved, and the angles are sextant angles, taken on board from a by no means stationary position, to the almost exactly formed triangles of a detailed survey, when carefully levelled theodolites observe the foundation of a regular trigonometrical network, which covers the whole portion to be mapped.[30]

The technological basis of hydrographic cartography

The principles of survey that served hydrographers during the late-18th and the whole of the 19th century were old, but the instruments were themselves mostly surprisingly new when Beautemps-Beaupré carried out his surveys.

The compass had been known since at least the 12th century, initially as a needle magnetised by a loadstone floating in a bowl, modified through the invention of the pivoted needle attributed to Alexander Neckam in about 1180, and with the use of a wind rose showing 32 points added by the early 16th century. The basic cross-staff for measuring vertical angles to stars or the sun appeared in the 14th century, while the more complex astrolabe and quadrant were invented in the 15th century. These latter tools were largely made redundant by the invention of John Davis's back-staff in 1595.[31]

The form of charts themselves had evolved over the same period, the most important development being the invention of the new projection by Gerard Mercator in 1569, which gave true bearings between any two points—the basis of all modern charts.

The principles of survey and cartography were thus in place by the 18th century, but major refinements then took place that revolutionised hydrographic survey. These developments were largely based on the explosion of industrial and scientific invention resulting from the enlightenment and the first stirrings of the industrial revolution. The accuracy and responsiveness of compass needles was improved by the use of magnetised steel bars to magnetise the needle instead of the weaker lodestones, developed for the azimuth compass by Dr Godwin Knight and adopted by the Royal Navy in 1751. John Hadley invented the compact quadrant (usually referred to as Hadley's Octant) in 1731, which led directly to the development of the repeating circle in Germany (Figure 2.9) and the more handy sextant (Figure 2.8) by Captain John Campbell in 1757. The sextant, with its 120° range, was more useful in taking horizontal angles as well as vertical, and became the basic tool of the hydrographer until recent times. The mercury artificial horizon was invented by George Adams in 1738, overcoming the problem caused by an obscured horizon.[32] The station-pointer, which provided a mechanical drafting solution enabling the position of a survey boat in relation to survey features to be directly plotted on the chart, was probably invented by Murdoch Mackenzie and improved by Graeme Spence in about 1780.[33]

Perhaps the single most important breakthrough for the manufacture of accurate survey instruments was the invention and refinement of the dividing-engine by Jesse Ramsden between 1766 and 1777. The dividing-engine allowed the highly accurate engraving of the primary measuring scales and Vernier scales for instruments, and hence also allowed instruments to become smaller and easier to handle. Accuracy was also improved by the invention of the achromatic lens, by John Dollond in 1758, which allowed the production of shorter telescopes in the surveying instruments with a clearer image for more precise observation.[34] The other major improvement was the marine chronometer developed by John Harrison between 1735 and 1760, and improved by his successors, which provided another method of determining longitude at sea that was both simpler and more precise than lunars.[35]

These developments had a profound effect on the development of hydrographic charts. Before accurate instruments such as Hadley's octant, the sextant and repeating circle were invented, and lunar tables perfected, longitude and often latitude was a matter of estimate, and the full use of charts on Mercator's projection to accurately delimit distant coasts was a matter of art rather than science. The increased accuracy of surveys provided by the new instruments called for the development of a range of charting conventions so that the increased amount of information gathered (such as accurately located soundings and coastal features) could be concisely reflected on the charts in a standardised format.

While Britain led in the development of survey instruments, other European nations and particularly the French were also active. Johann Tobias Mayer, a German astronomer based in Gottingen, designed a new instrument based on the octant but with a full circle, for astronomical observations, called, because of its mode of double-readings, the 'repeating circle'. This was improved by Jean-Charles Borda (after whom Baudin named Kangaroo Island on his charts, the name surviving in 'Cape Borda') as the 'reflecting circle' in a work published in 1787. It was made in considerable numbers, especially in France.[36] The British Board of Longitude carried out trials of a Mayer circle between 1757 and 1759, but it was found to be cumbersome to use at sea, and led instead to the development of the sextant.[37]

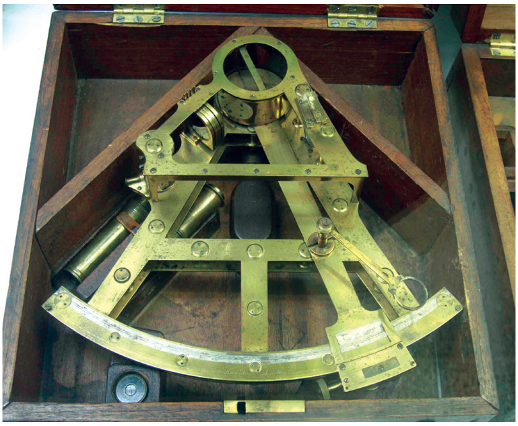

Figure 2.8. Sextant (Deutches Museum, Munich, photo M Pearson)

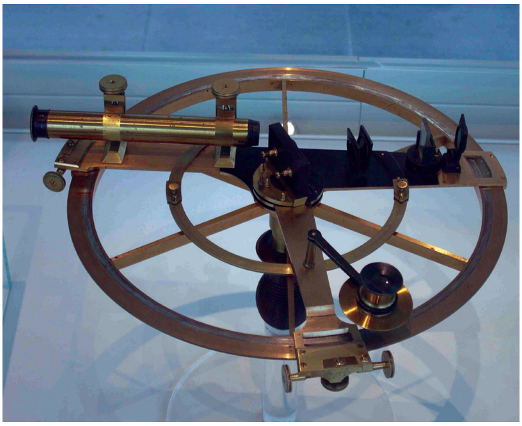

Figure 2.9. Reflecting circle. (Greenwich Maritime Museum, photo M Pearson)

The late-18th century French expeditions relied largely on the reflecting circle for survey purposes, while the British relied on the sextant.

Beautemps-Beaupré and his contemporaries

Charles-François Beautemps-Beaupré (1766–1854) was employed by the French Hydrographic Office in 1783 and became a surveyor two years later. His major experience of exploration was on the d'Entrecasteaux expedition between 1791 and 1795. In 1814 he was appointed Chief Hydrographical Engineer of the Department General des cartes, plans et journaux de la Marine (the French Hydrographic Office), and in 1816 commenced the detailed re-survey of the French coast, resulting in the *French Pilot* in 1844.[38]

Figure 2.10. Charles-François Beautemps-Beaupré (1766–1854)

The major geographical outcome of d'Entrecasteaux's stays at Recherche Bay in 1792–93 was the mapping of the D'Entrecasteaux Channel, Huon River, Bruny Island, the estuary of the Derwent, and the general form of Storm Bay. The charts produced by the expedition's hydrographer, Beautemps-Beaupré, were based on the consistent and intense application of the best principles of hydrographic survey available at the time. His success in producing accurate and attractive charts, which were presented as the *Atlas du voyage de Bruny Dentrecasteaux*,[39] appears to be not so much a result of the invention of a new method, but the refinement and rigorous application of best practice.

Whereas Cook had used the sextant (at sea) and the theodolite and azimuth compass (ashore) for his surveys, Beautemps-Beaupré utilised the reflecting circle which allowed multiple horizontal angles to be taken to prominent points on the coast with (according to the French) far greater ease than the sextant, with its restricted arc, or the theodolite, which required a stable base and was hence difficult to use at sea.

However, Beautemps-Beaupré did not argue the superiority of the reflecting circle over the sextant, but rather over the compass, suggesting this was the instrument of choice used by most of his contemporaries for survey. He described his technique as including the use of the reflecting circle to get accurate angles between survey features and the taking of a 'view' of the coast at each station,

> on which the most remarkable objects were indicated, not only by letters and figures, but the measures of the observed angles contained between them were also noted, the bearing of such points as were observed in one with each other, the estimate of distance, etc, etc.[40]

Beautemps-Beaupré echoed Cook's preference in using survey triangulation and latitude-longitude fixes as the basis for judging the ship's position, over the use of dead reckoning: 'We could cite a thousand examples to prove that, even in the most frequented or best-known coasts, the *dead reckoning, or estimated distances, should never be trusted*.'[41]

What were Beautemps-Beauprés contemporaries achieving? Flinders' method, like that of Beautemps-Beaupré, was based, where possible, on careful triangulation between two points ashore and the anchored ship.[42] His charts are more informative about his survey methods, accuracy and sources of information than is evident in earlier mapping of the coast. Innovations in his maps included:

- showing clearly the fixed points on land used in the survey
- distinguishing between those parts of the ship's track that were sailed by day and in clear visibility, and those sailed at night or in bad weather
- distinguishing between sections of the coast charted by him and those charted by others
- distinguishing between his soundings and those taken by others
- distinguishing place names given by him and those given by others: and
- marking the strength and direction of tides, currents and winds he encountered.[43]

Flinders' instruments used for lunar observations included:

- nine-inch sextant by Ramsden
- three sextants of eight inches made in 1801 by Troughton for the voyage.[44]

On land, sextants were fixed on a stand for stable observation when possible. The nature of Flinders' survey task, however, meant that running survey still predominated. It is noticeable that Flinders' running surveys, where they covered coastlines also surveyed by d'Entrecasteaux, are based on more observations, and with more soundings, than d'Entrecasteaux, and are hence more accurate. Flinders himself noticed that Beautemps-Beaupré's chart of the Great Australian Bight lacked soundings for half its length, which he regarded as:

> ...an extraordinary omission, arising either from the geographer, or the conductor of the voyage. In the first 12° of longitude [of the southern shore of Australia] no soundings are marked along the coast; whilst, in the last 5°, they are marked with tolerable regularity: the cause of this difference is not explained.[45]

This may have been due to the separation of the roles of hydrographer and commander, as Flinders seems to allow, an issue that is touched on below.

George Vancouver's expedition of 1791–1794 included a running survey of the North American coast, mapping 1,400 miles of coast in nineteen weeks. At Juan de Fuca Straits and Puget Sound more detailed surveys were employed, setting up shore stations to rate chronometers and ascertain compass variation and so determine accurate locations to key-in the running survey. Boats were sent out to do detailed surveys, with frequent landings to take angles of the trends of the coast and plot offshore islands and features.[46] The expedition also called at southwestern Australia in 1791, and Vancouver discovered and did a rapid survey of King George Sound. Flinders' chart of the Sound of 1802 is much more accurate than Vancouver's.

The Baudin expedition was the other major charting effort of the period. As noted by Ingleton, the expedition 'was not notable for the quality of its marine surveys'. Of the charts of Louis de Freycinet, the officer responsible, Ingleton rightly observes that '...by their exceeding beauty of draughtsmanship, are impressive, but on close inspection it is at once apparent that the quality of the original surveys was of a sketchy nature.'[47]

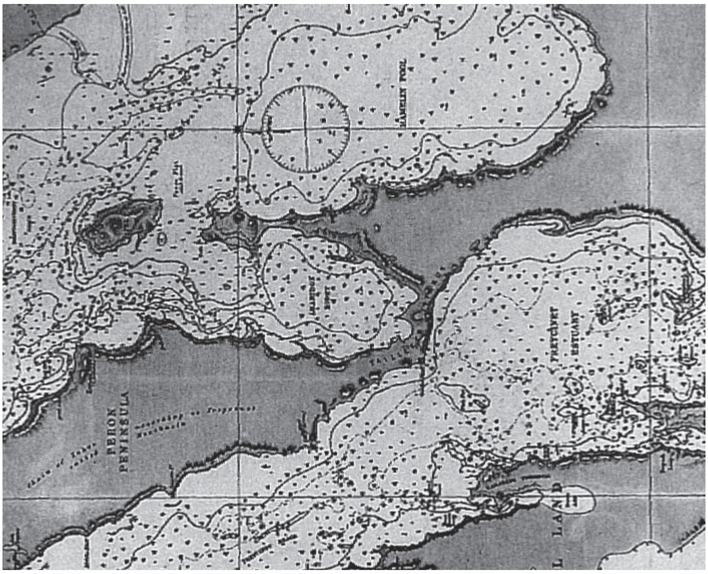

Figure 2.11. Southern part of WM Denham's admiralty chart of Shark Bay, 1858.[49]

It is interesting to consider one of the differences between the British and French approach to hydrographic surveying. Cook himself gave rise to a virtual dynasty of explorer/hydrographers who followed his techniques. Bligh, Vancouver and Flinders all learnt their skills from Cook himself or from each other. They were naval commanders first and hydrographers second. Civilian astronomers might be taken on expeditions, but the cartography was left in the hands of the commander and his immediate subordinate officers. The French, on the other hand, favoured greater compartmentalisation of their specialists, with hydrographic surveyors such as Beautemps-Beaupré being employed as part of a large coterie of semi-official and civilian savants. A drawback of this approach was that the hydrographer could not guarantee that the ship's commander would adjust his ship's routine and course to the best advantage of the hydrographic survey. What is more, the French system did not tend to foster the transmission and retention of hydrographic skills to the extent seen in the case of Cook's successors.

The draughtsmanship of charts was a separate issue from the accuracy of the survey methods used. A well-surveyed yet poorly drafted chart was unlikely to instil confidence in its users, whereas a poorly surveyed but beautifully draughted one might. The British, relying on naval officers with mixed skills and training in cartographic drafting, often failed to produce inspiring charts. Even famous navigators could produce mediocre results. For example, Sir John Narborough's chart of the Strait of Magellan (1669–1670) was criticised by John Evelyn, Secretary of the Royal Society, and Samuel Pepys, Secretary to the Admiralty, for its poor draughtsmanship, but the (tidied-up) printed version was the most reliable chart of the Strait available until the 1760s.[48] On the other hand, as we have seen above, Louis de Freycinet's well-draughted charts of the Baudin expedition were often based on poor survey work. His chart of Shark Bay is a lovely thing, but its faults in accuracy stand out when compared with WM Denham's 1858 Admiralty chart of the same area (Figure 2.11).

Conclusions

The excellence of Beautemps-Beaupré's detailed charts, recognised by his contemporaries both French and British, resulted from both the accuracy of his survey methods and the beauty of his draughting style. His surveys were carried out with the rigorous application and refinement of current best practice, using accurate angles observed by reflecting circle, rather than by compass as appears to have been still common at the time, and transferring this information to both the rough chart and coastal views drawn at each station of the survey.

Beautemps-Beaupré's detailed harbour surveys are superb, and inspired trust in later navigators, which was reinforced by the experience of using the charts. However, his running surveys appear to be no better than his contemporaries, and are sometimes not as detailed, suffering perhaps from his commander's reluctance to close with the coast, allow time for observations and soundings, and ensure the continuity of the running survey.

Beautemps-Beaupré's work at Recherche Bay and southeast Tasmania was not only the pinnacle of hydrographic practice at the time, but had geo-political consequences of importance in Australia's history. It seems likely that the d'Entrecasteaux's expedition, of which Beautemps-Beaupré's cartography was a highly visible component, added to British fears about France's intentions in the region triggered by the later Baudin expedition, and led to the first British settlements at Port Phillip and Van Diemen's Land.

Just as last year's 400th anniversary of the first Dutch charting of Australia's coastline was a necessary corrective to the often blinkered, Anglo-centric, populist view of Australia's maritime history, so too should Beautemps-Beaupré's achievements in the context of his French and British contemporaries be better understood and celebrated.

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3 Labillardière and the beginnings of botanical exploration in Tasmania

Gintaras Kantvilas

Jacques-Julien Houtou de Labillardière (1755–1834) was one of the first European botanists to visit Tasmania, arriving with the expedition of Bruny d'Entrecasteaux in 1792. He lived during a period of great upheaval and change: amidst the turmoil of post-revolutionary France and at a time when the science of Botany was undergoing a major transition, not least because of the discovery of new and diverse floras.

Labillardière is a very interesting character, vividly brought to life recently by historian Ed Duyker.[1] Born in Normandy in 1755, the ninth of 14 children, Labillardière was well educated and well travelled. In addition to strong associations with the French botanical establishment, he had excellent connections with British botanists, developed during a visit to London in 1783.[2] He could count on the influential Sir Joseph Banks, President of the Royal Society, and Sir James Edward Smith, President of the Linnean Society, as friends, and these friendships were to prove critical to him in later years. These were tumultuous, revolutionary times for France, and Labillardière was a convinced Republican and an admirer of the new revolutionary movement; these were factors that were later to land him in a deal of trouble. However, amongst other things, Labillardière left an outstanding legacy that included several very significant publications, notably his account of his voyage to Australasian waters,[3] and three major regional floras: one on the Near East;[4] one on Australian and Tasmanian plants;[5] and the third on the plants of New Caledonia.[6] He also made significant observations on zoology and anthropology, and in the latter field has been praised for being refreshingly objective and scientific,[7] free of both missionary zeal and the romanticism of the noble savage.

Botany in Europe in the early-19th century

By the latter part of the 18th century in Europe, the Linnean System of plant classification was fully established and very much in general use. Linnaeus is best known for devising the system of binomial nomenclature, giving all plants a genus name and a species name. Each

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 35-44.

species was systematically described and linked to preserved specimens in his herbarium. This methodology is still in use today.

Critical aspects of Linnaeus' system included the belief that species are natural, created by God, and constant and unchanging. His system was 'artificial'; that is, it was based on a small number of characters selected by its author, in this case the appearance of the flower and fruit. This is in contrast to what is called a 'natural' system, where the emphasis is on general relationships based on a multitude of characters. Linnaeus also arranged things from the complex to the simple, thus philosophically blocking the notion of evolutionary advance from lower to higher forms of life. Indeed he acknowledged but was quite untroubled by the growing new ideas of evolution.[8]

However, when d'Entrecasteaux's ships, *la Recherche* and *l'Esperance*, with Labillardière on board, sailed into Tasmanian waters in 1792, all this was beginning to change. There was a dawning realisation that living organisms were not static but that the simple gave rise to the more complex; that is, that they *evolved*. There was also the idea that plants should be grouped phylogenetically to reflect common descent and evolutionary relationships. The emphasis was also shifting from merely identifying and naming plants based on a limited number of characters, to a full examination and comparison of all their features.[9]

This process was accelerated by the regular discoveries of new plant species as a result of the extensive geographical exploration of the world. The first forays had been to the New World but, by the late-18th century, the Pacific region was a major focus. Here the British in particular had set the standard, with James Cook undertaking three major voyages: 1768–1771, 1772–1775 and 1776–1779. The French were likewise heavily involved in exploration, and the voyage commanded by Bruny d'Entrecasteaux that brought Labillardière to Tasmania was the third major French venture, preceded by those of Bougainville (1767–1768) and La Pérouse (1785–1788).[10] Indeed the first natural classification of plants had just been published (in 1789) in France by the botanist Antoine-Laurent de Jussieu.[11]

Labillardière himself, by virtue of his extensive collection and discovery of new and exotic plants, was a major contributor to the growth of botanical knowledge, but curiously he was untroubled by the new ideas. He remained a steadfast Linnaean, with a practical rather than philosophical view of botany and nature.[12]

Botanical knowledge of Australia and Tasmania

The uniqueness and diversity of the Australian flora were initially revealed by the English adventurer and buccaneer, William Dampier, who collected the first few botanical specimens from Australia in the far northwest of the continent in 1699.[13] None of the Dutch navigators that preceded him, including Abel Tasman who discovered Tasmania in 1642, had shown any interest in collecting scientific material.[14] Thus the first major plant collections from Australia were not made until 1770, when Joseph Banks and Daniel Solander, botanists aboard James Cook's *Endeavour*, arrived on the east coast of the mainland.[15]

On his return to England, Banks had envisaged a lavish publication of his results, complete with stunning paintings and engravings. However, despite much anticipation, his *Floriligeum* was not published for another 200 years (by Editions Alecto in association with the Natural History Museum, London). Nevertheless, Banks was generous with his specimens and made them available to be studied and published by many leading European botanists. As a result, the earliest descriptions of Australian plants were not by Banks and Solander who first discovered and collected them, but by botanists such as Linnaeus the younger, Joseph Gaertner, Olaf Swartz and L'Héritier de Brutelle, none of whom ever visited Australia.

After his *Endeavour* voyage, Cook conducted two further scientific expeditions to Australian waters, thus adding greatly to the number of Australasian botanical specimens in European collections. The botanists on his second voyage, Johann Forster and his son Georg, published an account of their botanical collections in 1776,[16] but as the ship they had been on did not touch Tasmania, no Tasmanian species were mentioned directly. Significant numbers of Tasmanian botanical specimens were collected (by David Nelson and William Anderson) from Bruny Island during Cook's Third Voyage in 1777. Collections were also made during Bligh's first visit to Tasmania in 1788 in the *Bounty* (again by Nelson) but were subsequently lost during the famous mutiny. Further collections were made during Bligh's second voyage (by Christopher Smith and James Wiles), which preceded the French arrival by just two months.[17]

Thus in April 1792, when the d'Entrecasteaux expedition anchored in Recherche Bay, southeastern Tasmania, Labillardière found himself in very much a virgin land from a botanical viewpoint. He was not unfamiliar with the Australian flora, for he had already studied the herbarium specimens collected by Cook's voyages during his visit to London in 1783. Nevertheless, few Tasmanian plants had been collected and even fewer had been studied and published. An exception was the genus *Eucalyptus*, which had been described by his friend L'Héritier de Brutelle in 1788, based on a specimen of stringy bark, *E obliqua*, brought back on Cook's third voyage.[18] Some other iconic genera of Australian plants had also already been named, for example *Banksia*, *Haloragis*, *Leptospermum*, *Melaleuca* and *Pimelea*, but the vast majority that Labillardière was to encounter on stepping ashore was completely novel. Also significant was the fact that whereas previous visitors to Tasmania had made short, often unscheduled, visits mainly for the purpose of refreshment, with botanising being a very incidental business, the French were here for a longer stay, prepared to make forays inland to explore and to establish relations with the native inhabitants.[19] Labillardière represented the beginning of the detailed, extensive botanical exploration of the island that continues to this day.

Labillardière's activities in Tasmania

Labillardière spent two extended periods in Tasmania, the first in 1792 from 21 April to 28 May, and the second in 1793 from 21 January until 27 February. His time was confined to the southeastern corner of the island where he collected assiduously.[20] He was not alone, for the expedition was well staffed with naturalists including Deschamps, Lahaie, Riche and Ventenat;[21] however, he was by far the most experienced, active and prolific. On his first visit, his excursions concentrated mainly on the shores and immediate environs of Recherche Bay, Southport Lagoon and Bruny and Partridge Islands. These sites were revisited on his second visit, but he also strayed further afield, visiting Blowhole Valley, South Cape Bay and what was probably the summit of Mt Leillateah.[22]

His impressions, recorded in his published journal,[23] represent the earliest impressions of the Tasmanian landscape, flora, fauna and Indigenous peoples made by a European scientist.

He was clearly deeply moved by the grandeur and beauty of the landscape he encountered, and on his first landing he wrote:

> We were filled with admiration at the sight of these ancient forests in which the sound of the axe had never been heard. The eye was astonished in contemplating the prodigious size of these trees.[24]

He made copious notes on many of the plants he observed and collected, often also speculating on their economic uses. Of the celery top pine, *Phyllocladus aspleniifolius*, he observed:

> Towards the southeast, I found a fine tree, which appeared to me to belong to the family Coniferae, judging by the disposition of its stamens and resinous smell of every part. I mention this tree not only on account of the singularity of its leaves for a tree of this family, for they are broad and deeply indented on their edges, but for their utility in making beer. They afforded a bitter and aromatic extract...and on making a trial of it with malt, I found that I was not mistaken.[25]

In later years he maintained his interest in the utility of plants and was actively involved in promoting the introduction of useful exotic plants into France.[26] He also wrote frequently of the roughness and impenetrability of the Tasmanian bush, especially of what is now called *Gahnia* or cutting grass:

> ...we attempted to make our way across some marshes but a species of Sclerya [*Gahnia*] which grew to a height of 6 or 8 feet cut our hands and faces with its leaves in such a manner that we were obliged to desist from our attempt.[27]

His writings also reveal his egalitarian leanings and consequent frequent clashes with the officers of the expedition. For example:

> As my cabin was already full, I had no other place where I could deposit some of my specimens of plants...than the great cabin. Dauribeau, who acted as first lieutenant, thought that this place ought not to be lumbered with such useless things as natural curiosities, and ordered my two presses with the plants they contained to be turned out.[28]

On encountering an inscription at Adventure Bay, Bruny Island, left by Smith and Wiles, botanists with Captain Bligh's expedition a year earlier, he wrote:

> [The inscriptions] all displayed the same marks of deference which the English botanists paid the commander of their ship, by putting only the initial letters of their own names, and expressing that the Captain himself had sowed and planted various vegetable productions, which he had carried from Europe. I am much inclined to doubt, whether Bligh was sensible to the honour which the botanists were desirous of paying him.[29]

Overall, however, Tasmania clearly made a strong impression on him:

> After a very laborious walk, we at length reached the summit of a mountain... Night soon obliging us to halt, we kindled a large fire, round which we reposed; and a comfortable sleep dissipated the fatigues of the day. The air was extremely calm; and about midnight I waked, when, solitary in the midst of these silent woods, the majesty of which was half disclosed to me by the feeble gleam of the

> stars, I felt myself penetrated with a sentiment of admiration of the grandeur of nature, which it is beyond my power to express...[30]

Labillardière's return to France is a fascinating tale, laced with the politics of the time. By the time the expedition limped into the Dutch port of Surabaya on the island of Java in October 1793, the commanders of both ships, d'Entrecasteaux and his deputy, Huon de Kermadec, were dead. Unbeknown to the expeditioners, their King had been executed, a Republic proclaimed and France was at war with Holland, England, Prussia, Austria and Spain. What had been irritations and antagonisms between the Republican crew and Royalist officers boiled over, culminating in the imprisonment of the Republicans (including Labillardière) and the confiscation of the expedition's collections and papers. These were eventually placed aboard a Dutch convoy bound for Europe, but by this time the Netherlands had been defeated by France and were at war with England. The convoy was attacked and scattered off the Cape of Good Hope and again off St Helena, before the ship carrying the collections was finally seized by the English off the Shetland Islands.[31] That the collections survived throughout this tumult is quite remarkable.

Labillardière himself returned to France in March 1796. It was a changed place for the Revolution had elevated some persons as swiftly and ruthlessly as it had eliminated others, and scientists had not been spared by the Terror. Labillardière's friend Desfontaines had gained a professorship, whereas L'Héritier had only barely escaped the guillotine.[32] Labillardière set about petitioning the English for the return of his specimens, in particular via his friend, Sir Joseph Banks.[33]

On 14 April, 1796, Labillardière wrote to Banks: 'Nobody better than you, Sir, knows the value of the researches of a naturalist on a long, difficult and dangerous voyage. Oblige me by doing what you can to enable me to recover my most rightful property.'[34]

Banks had already approached the Queen's Vice-Chamberlain, William Price, on the matter (31 March, 1796):

> The collection of plants bears testimony of an industry all but indefatigable in the Botanists who were employed, the chief of whom I am sorry to say was the principle formenter of the Mutiny which took place in the ships...[35]

Banks also wrote to the French botanist Jussieu (10 August, 1796):

> I confess I wish much to learn from his specimens...but it seems to my feelings dishonourable to avail myself even of the opportunity I had of examining them... all will be returned to him. I shall not retain a leaf, a flower, or a botanical idea of his collection, for I have not possessed myself of any thing at all of his that fortune committed to my custody.[36]

The collections were finally returned to a grateful Labillardière who wrote to Banks (5 March,1800): 'It is to you, Sir, that I owe the good fortune of recovering the collection which I made...I shall have the honour of sending you duplicates from time to time.'[37]

That he did, and the specimens remain to this day at the Natural History Museum in London.

Figure 3.1. Labillardière's specimen of the Tasmanian endemic tree Eucalyptus cordata, collected from Penguin Island (off Bruny Island). This is one of the many plant specimens that a grateful Labillardière presented to Sir Joseph Banks and which today are housed in London's Natural History Museum.

Results of the expedition

In all Labillardière is said to have collected some 4,000 plant specimens on the voyage.[38] By virtue of the places he visited, namely the southwest corner of Western Australia and the southeast of Tasmania, he was thus the first European botanist to encounter many Australian genera and species. However, just as he was preceded in Tasmania by Cook and Bligh, so in Western Australia he was preceded by Vancouver's expedition (1791–1795) with the botanist Archibald Menzies.[39] But for the time being, all these English collections resided in Banks' herbarium in London, unpublished. Labillardière thus had virtually unfettered access to what was a stunningly unusual flora.

His first publication, in 1800,[40] was a general travelogue of the voyage wherein he also described eight Tasmanian species including the Tasmanian blue gum, *Eucalyptus globulus*. His magnum opus, however, was his *Novae Hollandiae Plantarum Specimen*,[41] published in fascicles from 1804 to 1807, wherein he described a further 265 species from Tasmania and southwestern Western Australia. Many of his collections were also studied and published by other leading botanists of the time. He is known to have collected at least 248 different species from Tasmania alone.[42]

Labillardière's *Specimen* represents the first extensive flora for any Australian territory, though it was soon eclipsed by Robert Brown's *Prodromus* in 1810[44] that described more than 2,000 species. However, Labillardière's publication has to be seen in the context of his working only from his own collections and from only two localities.[45] Also noteworthy is that, whereas the later publications of Brown and, subsequently, George Bentham's monumental *Flora Australiensis*[46] were concerned solely with vascular plants, Labillardière's account includes representatives of all the major plant groups, including fungi, lichens, mosses, liverworts and seaweeds. His book was written according to the Linnean system, and was probably one of the last major botanical works to be so. The natural system of Jussieu was soon to gain the ascendancy amongst botanists.

From a Tasmanian perspective, Labillardière can be credited not only with the publication of the first detailed account of the island's flora, but also with the descriptions of the first Tasmanian lichen (*Cladia retipora*), the first fungus (*Aseroe rubra*), the first mosses (*Hypnodendron comosum* and others), liverwort (*Hymenophyton flabellatum*) and seaweeds (*Durvillea potatorum* and others).[47] He was also the first to describe many iconic Tasmanian plants such as sassafras (*Atherosperma moschatum*), leatherwood (*Eucryphia lucida*), celery-top pine (*Phyllocladus aspleniifolius*), musk (*Olearia argophylla*), native laurel (*Anopterus*

126 TABULA SYSTEMATICA.

Tetragynia.

	tom.	pag.	tab.
Ruppia antarctica.	2	116	264

CLASSIS V.

PENTANDRIA.

Monogynia.

	tom.	pag.	tab.
Sheffieldia incana.	1	40	54
Epacris myrtifolia.	1	41	55
heteronema.	1	42	56
lanuginosa.	1	42	57
impressa.	1	43	58
cerinthoïdes.	1	43	59
Styphelia richei.	1	44	60
glauca.	1	45	61
serrulata.	1	45	62
cordata.	1	46	63
virgata.	1	46	64
collina.	1	47	65
trichocarpa.	1	47	66
obovata.	1	48	67
abietina.	1	48	68
oxycedrus.	1	49	69
Campanula littoralis.	1	49	70
Lobelia gibbosa.	1	50	71
alata.	1	51	72
cuneiformis.	1	51	73
heterophylla.	1	52	74
Goodenia elongata.	1	52	75
repens.	1	53	76
Velleia trinervis.	1	54	77
Scævola globulifera.	1	55	78
crassifolia.	1	56	79
cuneiformis.	1	56	80
Cyathodes glauca.	1	57	81
disticha.	1	58	82
Pogonia tetrandra.	1	59	83
Ceanothus spatulata.	1	60	84
globulosa.	1	61	85
Pomaderris elliptica.	1	61	86
apetala.	1	62	87
Lasiopetalum triphyllum.	1	63	88
Billardiera longiflora.	1	64	89
fusiformis.	1	65	90
Viola hederacea.	1	66	91
Actinotus helianthi.	1	67	92
Thesium drupaceum.	1	68	93
Canthium quadrifidum.	1	69	94

Digynia.

	tom.	pag.	tab.
Coprosma hirtella.	1	70	95
Chenopodium baccatum.	1	71	96
Swertia parnassifolia.	1	72	97
Eryngium vesiculosum.	1	73	98
Azorella lanceolata.	1	74	99
ovata.	1	74	100
compressa.	1	75	101
Scandix glochidiata.	1	75	102
Apium prostratum.	1	76	103

Trigynia.

	tom.	pag.	tab.
Stackhousia monogyna.	1	77	104

Pentagynia.

	tom.	pag.	tab.
Drosera binata.	1	78	105
spatulata.	1	79	106
fig. 1.			
peltata.	1	79	106
fig. 2.			

CLASSIS VI.

HEXANDRIA.

Monogynia.

	tom.	pag.	tab.
Borya nitida.	1	81	107
Hypoxis hygrometrica.	1	82	108
Ornithogalum dichotomum.	1	83	109
triandrum.	1	84	110
Anigozanthos rufa.	2	119	
Aletris punicea.	1	85	111
Dracophyllum verticillatum.	2	118	
Anopterus glandulosa.	1	86	112
Loranthus floribunda.	1	87	113
Frankenia tetrapetala.	1	88	114
Gahnia psittacorum.	1	89	115
trifida.	1	89	116
Ehrharta distichophylla.	1	90	117
stipoïdes.	1	91	118
Lomandra longifolia.	1	92	119
rigida.	1	93	120

Figure 3.3. A page from Labillardière's* Novae Hollandiae plantarum specimen*, the first extensive flora for any Australian territory. Note Labillardière's use of the Linnean system of classification, based on numbers of stamens (indicated by the Greek suffix -andria, meaning male) and carpels (indicated by the Greek suffix -gynia, meaning female. The Linnean system was artificial and brought into the same classes plants which today are known to be completely unrelated.

Figure 3.2. The image of Eucalyptus globulus (Tasmanian blue gum) that accompanied the first scientific description of this species by Labillardière in his account of the voyage.[43] This tree has subsequently become a major plantation timber tree in many parts of the world.

glandulosus), tree fern (*Dicksonia antarctica*), dog-wood (*Pomaderris apetala*), waratah (*Telopea truncata*) and climbing heath (*Prionotes cerinthoides*).[48] The new plants described also include what were to become the floral emblems of Tasmania (*Eucalyptus globulus*) and Victoria (*Epacris impressa*).

It is also interesting what he didn't describe or collect. Most notable is the absence of alpine plants. Although he ascended Mt Leillateah,[49] this peak is a mere 780 m high and therefore does not support a typical alpine flora. The taller peaks of Mt La Perouse and Moonlight Ridge nearby eluded him, being too far or too difficult to approach due to the impenetrable scrub. He also refers to these peaks being snow-covered despite his being there in summer and autumn.[50] Perhaps more noteworthy is that he makes no mention of *Nothofagus* (myrtle beech); he would certainly have encountered this tree and it is obvious from his vegetation descriptions and from the other species he collected that he spent considerable time within cool temperate rainforest where *Nothofagus cunninghamii* is the dominant tree.

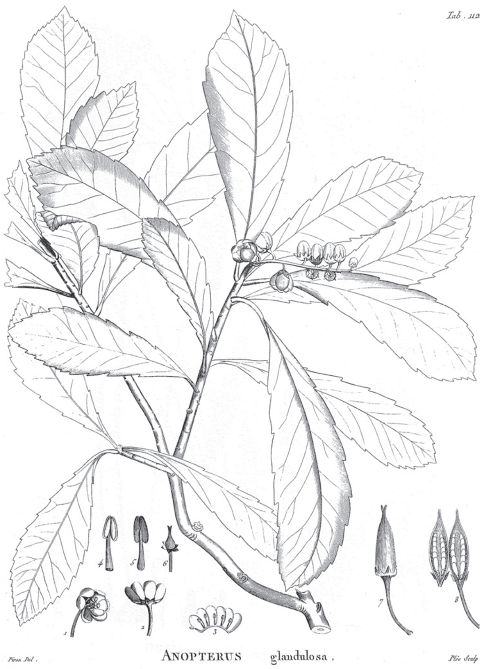

Figure 3.4. Image of Tasmania's native laurel, Anopterus glandulosus, from Labillardière's* Novae Hollandiae plantarum specimen. *This and most of the other plates were drawn by the expedition's artist, Piron.

Figure 3.5. Image of Stylidium armeria, from Labillardière's* Novae Hollandiae plantarum specimen. *The type specimen of this species is housed in Florence together with the main part of Labillardière's collection.

Another interesting aspect of Labillardière's collections and publications is the frequency with which he confuses his localities. Thus several Tasmanian species such as *Eucalyptus ovata* are attributed to Western Australia, whereas others such as *Adriana quadripartita* that occur in Western Australia but not in Tasmania are cited as having been collected in Tasmania.[51] Labillardière was clearly a careful observer and recorder, but perhaps the muddles arose in the course of the specimens being transferred from ship to shore and shore to ship as they endured their convoluted journey through the difficulties of the voyage and the intrigues of the Napoleonic wars.

Today Labillardière's plant collections are scattered across a wide range of herbaria. The major part are in Florence, having found their way there via the Englishman Philip Barker Webb who purchased them in the 1830s and bequeathed them to the Duke of Tuscany. A large number are also in the Natural History Museum in London. Smaller numbers are in Geneva, Uppsala, Leiden, Paris, Vienna, Verona and elsewhere.[52] They remain essential scientific tools that underpin our knowledge of our flora, and are consulted to this day—for botany, perhaps more than the other sciences, is intimately linked with history. History is enshrined in botanical nomenclature through the principle of priority—the oldest published name for a plant is the one that counts—and specimens underpin the very names of plants and our knowledge of them. As recently as 2001, a long-overlooked Labillardière name, *Stylidium armeria*, was reinstated for a distinctive species of trigger-plant that occurs on Tasmania's coasts.[53] Another study currently underway on the Epacrid genus *Cyathodes* is also referring extensively to Labillardière's original material and it appears very likely that another long-forgotten Labillardière name will soon be re-instated.[54]

When the French arrived in Tasmania in 1792, they commenced and advanced the exploration, collection and publication of Tasmania's rich and unique flora. That process goes on to this day. And Labillardière himself is remembered in geographical place names and in the scientific names of a wallaby and many plants from both the vascular and cryptogamic groups.

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4 ‘J’étais convaincu qu’il dormait’

European views of a unique Australian mammal

Stewart Nicol

The French voyages of discovery and exploration represent a major contribution to our understanding of the natural world. This contribution is all the more impressive given that these voyages took place during one of the most tumultuous periods in French history. Over the period of the expeditions listed in Table 4.1 France went from a monarchy under the House of Bourbon, to the First Republic (1792–1804), to the First Empire (1804–1814), and then Restoration (1814–1830). During this time the populace endured the Reign of Terror (1793–1794) and the Revolutionary and Napoleonic Wars (1792–1815). At the same time intellectual battles were being fought in natural history, as *savants* attempted to find an orderly classification of plants and animals.

For nearly 2000 years scholars had accepted Aristotle’s *scala naturæ*, or great chain of being, which placed all of nature in a strict hierarchical ladder. In 1735 Linneus had published his *Systema naturae*, which departed from the linearity of the Aristotelian model by placing organisms into nested hierarchies—kingdoms, orders, families, genera, species—but, by late in the 18^{th} century, there was dissatisfaction with the artificiality of aspects of the Linnean system, particularly with its classification of animals. Without the unifying concept of descent with modification from a common ancestor, scientists argued about what constituted a natural classification. The struggle to construct a natural classification was confounded further by the arrival of specimens collected in the Antipodes. Georges Cuvier (1769–1832), who is considered to have been the most influential biologist of his time, wrote in a report to Napoleon in 1808 of the need for a new *Systema naturae*:

> The whole of Europe undoubtedly needs a work of this kind, written by French naturalists. The collection Annales du Muséum d’Histoire Naturelle, published five years ago, has proven indeed, that Paris is perhaps the only city where objects of study and aids to scholarship are combined with the knowledge and the lofty aims necessary to make a success of such a vast enterprise. Encouraged by your all-powerful protection, French naturalists will redouble their zeal, and will strive to erect for your Majesty a monument worthy of it; and it will be beautiful to see

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 45-57.

> the name of NAPOLEON, already attached to so many wise laws, to so many great institutions, to decorate the frontispiece of a fundamental work. [1]

The foundation of the Muséum National d'Histoire Naturelle at the Jardin des Plantes in Paris by the National Assembly in 1793 provided a stimulus to zoology and botany, with the opportunity to assemble a central collection of a wide representation of the fauna and flora of the world. Prior to this, zoology had lagged behind the other natural sciences, with its main practitioners being enthusiastic amateurs. As well as holding a collection which facilitated systematic zoological study, the museum provided a centre of expertise and made possible the detailed planning necessary for the success of these often epic voyages.[2]

At the start of the 19th century, despite social upheaval, France was pre-eminent in the zoological sciences. The Muséum had a staff of twelve professors, who were appointed for life. Three who are of particular significance in this story are Jean-Baptiste Lamarck, Etienne Geoffroy Saint-Hilaire and Georges Cuvier. Lamarck, whose evolutionary theories are now often quite unfairly lampooned, had advanced a theory of organic change based on a tendency for life to develop progressively more complex forms, and on the inheritance of acquired characters. Geoffroy, who expanded and defended Lamarck's evolutionary theories, was the leader of the French transcendental morphologists,[3] and claimed that all animals are built on the same plan, and demonstrated how the basic designs for vertebrates, insects, and molluscs were related. (Indeed it could be claimed that he anticipated the now rapidly expanding field of evolutionary developmental biology.)

Cuvier insisted on the immutability of species, and in 1817 established his leadership in natural history with the publication of the first edition of his *Règne Animal distribué d'après son Organisation pour servir de base à l'Histoire Naturelle des Animaux et d'Introduction à l'Anatomie Comparée (The animal kingdom, arranged according to its organisation: forming a natural history of animals, and an introduction to comparative anatomy)*. In 1830 Cuvier launched a stinging attack on Geoffroy and his theories on the relationships between vertebrates, insects and molluscs, and the concept of transformation of species. He urged younger naturalists to confine themselves to describing the natural world, without wasting time on theories purporting to explain it.[4] Cuvier did not believe it was necessary to see the creatures he studied in their own environment.[5]

> It is a great error while on a voyage, to do anything but collect the raw material for study, either by preparing specimens or by drawing what cannot be preserved, or finally, by writing down the ephemeral details that the specimen does not retain. It is likewise a mistake to waste time with descriptions, or in the search for nomenclature, work which will have to be started afresh once back in the laboratory.[6]

By contrast, it can be argued that Charles Darwin's insights into natural selection could not have occurred if he had not seen animals and plants in their own ecosystems. After the public dispute between Cuvier and Geoffroy, Cuvier's disbelief in transmutation tended to dominate French zoology.[7] How much this impeded the development of zoological thought in France is hard to say, but after the publication of the *Origin of Species* by Charles Darwin in 1859, leadership in the natural sciences passed to Britain and Germany.[8]

The echidna and the platypus are the two mammals that 19th century scientists struggled most to fit into their ordering of the natural world. Everard Home, who gave the first detailed anatomical description of both the platypus and echidna[9] which he classed together in the genus *Ornithorynchus*[10], stated after listing the characters of the genus:[11]

> These characters distinguish the Ornithorhynchus, in a very remarkable manner, from all other quadrupeds, giving this tribe a resemblance in some respects to birds; in others to Amphibia; so that it may be considered as an intermediate link between the classes Mammalia, Aves, and Amphibia…[12]

These difficulties of classification were summarised in an English version of Cuvier's Animal Kingdom:

> The systematic zoologists were much puzzled in allotting them a place in their systems, more especially as the questions of their parturition and lactation were, in some degree, matter of doubt. M Geoffroy proposed making a distinct order of them [the Monotremata]; Duméril placed them after the Edentata; Tiedman appended them as an addition to the class Mammalia; Lamarck proposed a distinct class for them [Prototheria]; Illiger associated them with one of the Tortoises and named the group Reptantia; Blainville treated them as anomalies amongst the Didelphous animals [marsupials], and would with Lamarck, separate them into a class, and our author [Cuvier] as we have seen, refers them to a third tribe, or group, to the order Edentata.[13]

Even today, the general perception of the monotremes reflects the Aristotelian *scala naturae*. An article on platypuses in Time reported 'Platypus reproduction is a baffling business, for platypuses are not quite mammals'[14] and this perception is not confined to the popular press.[15] One feature of the biology of the echidna that has contributed to a perception that it is a primitive near-mammal is its ability to hibernate. In this paper I will first briefly summarise the earliest French observations of Tasmanian mammals, which predate the founding of the Muséum, and then discuss what appears to be the first observation of hibernation in an echidna, which was made by Prosper Garnot, a zoologist on the voyage of *la Coquille* (1822–1825). Finally, I review subsequent observations on hibernation in this species, including my own research, and attempt to place this in the context of the echidna's life history and Australian ecosystems.

The expeditions

The 1792 expedition led by Bruny d'Entrecasteaux was one of a series of French expeditions which began in pre-revolutionary France in 1756 when Louis XV sent Louis-Antoine de Bougainville to look for the Terres Australes (Table 4.1). De Bougainville did not land in Australia, but returned to France in 1769, the first Frenchman to have circumnavigated the globe. The first French explorers to land in Tasmania were Marion Dufresne and his crew, who also became the first Europeans to communicate with the Aboriginal Tasmanians.[16] Dufresne anchored at Cape Fredrick Henry, at the south of what is now known as Marion Bay, in March 1772, in almost exactly the same place as Abel Tasman had anchored 130 years previously. The Dufresne expedition stayed in the region for six days while they unsuccessfully searched for fresh water and for timber to repair the mast of the *Marquis de Castries*.[17] During this time several of the officers reported sighting 'tiger' or 'tiger cat' like mammals, which may have been thylacines, and a 'dog-like quadruped', presumably a

Tasmanian devil,[17] and several warren-like holes in the ground,[18] which may have been wombat burrows, but more probably were the burrows of shearwaters or little penguins.

The next expedition, that of Jean-François de Galaup, Comte de La Pérouse, arrived in Botany Bay in January 1788, just six days after Captain Phillip and the First Fleet. After six weeks La Pérouse left Botany Bay, sailed north, and disappeared.[19] In January 1791 the Société d'Histoire Naturelle (a short-lived society superceded by the formation in 1793 of the Muséum National d'Histoire Naturelle by the National Assembly) petitioned the National Assembly to send out a search party that would also conduct scientific research. If

Table 4.1. Seventy years of French expeditions to the Pacific. The table gives some indication of the continuity of officers between voyages.

1756	Louis-Antoine de Bougainville	*La Boudense* *L'Etoile*	Great Barrier Reef
1772	Marc-Joseph Marion Dufresne Julien Crozet	*Le Marquis de Castries* *Le Mascarin*	Marion Bay
1788	Jean-François de Galaup, comte de La Pérouse	*L'Astrolabe,* *La Boussole*	Botany Bay
1792 1793	Bruny d'Entrecasteaux Huon de Kermadec Jacques de Labillardière *naturalist*	*La Recherche* *L'Espérance*	Recherche Bay
1802	Nicolas Baudin François Péron *zoologist* Leseur *assistant gunner, animal drawings* Louis de Freycinet *junior officer*	*Le Géographe* *Le Naturaliste*	D'Entrecasteaux Channel Port Jackson
1819	Louis Claude de Saulces de Freycinet Paul Joseph Gaimard *surgeon and naturalist* Jean René Constant Quoy *surgeon and naturalist* Louis-Isidore Duperrey *ensign*	*L'Uranie*	Sydney
1822	Louis-Isidore Duperrey Jules Dumont d'Urville *executive officer* René-Primavère Lesson *physician* Prosper Garnot *assistant surgeon, naturalist*	*La Coquille*	Sydney
1825	Hyacinthe de Bougainville	*Le Thétis* *L'Espérance*	Sydney
1826	Jules Dumont d'Urville Joseph Paul Gaimard *surgeon and naturalist* Jean René Constant Quoy *surgeon and naturalist*	*L'Astrolabe (La Coquille renamed)*	Sydney Hobart

Englishmen were willing to mount a similar effort to punish the miscreants who had mutinied against William Bligh, surely Frenchmen should do the same to rescue a heroic captain and crew![20] Later that year, the new revolutionary government sent such an expedition, led by Bruny d'Entrecasteaux. Unlike the Dufresne expedition, the d'Entrecasteaux expedition included several naturalists: Jacques Julien Houton de Labilliardière (surgeon-naturalist); Louis Auguste Deschamps (surgeon-naturalist); Claude-Antoine-Gaspard Riche (surgeon-chemist-naturalist); Félix de Lahaie [Delahaye] (botanist); Louis Ventenat (chaplain and naturalist) and Jean Piron (artist). The Société d'Histoire Naturelle had provided the scientists with detailed directions for the studies of each branch of science. The eighteen-and-a-half foolscap pages of instructions for the zoologists included detailed instructions for preserving zoological material, with recipes incorporating such toxic materials as corrosive sublimate (mercuric chloride) and arsenic. The instructions for botanists occupied seventeen pages, while the instructions to the gardener filled twenty-nine foolscap pages.[21]

The expedition spent a total of nine weeks at Recherche Bay in 1792 and 1793, in conditions that would have been very favourable for making scientific collections. Zoological material required more storage space and deteriorated more rapidly than plants, which were also easier to collect; when Labilliardière handed over his collection in Java it included twenty-two large boxes of dried plants and seeds, four boxes of insects, eight boxes of birds and a small kangaroo.[22] This may also reflect the personal interests of the naturalists on this voyage, all of whom are much better known for their botanical than zoological work.[23]

While at Recherche Bay the expedition did record seven species of mammal. Four were macropods: Bennett's wallaby *(Macropus rufogriseus)*, the pademelon (*Thylogale billardieri*), whose specific name honours Labilliardière, the bettong (*Bettongia gaimardi*), named for Gaimard, a surgeon-naturalist on two subsequent expeditions (Table 4.1), and the potoroo (*Potorous tridactylus*). Also recorded were a dog-sized black and white quadruped, clearly the Tasmanian devil (*Sarcophilus harrisii*), 'a little species of cat' which is assumed to be the quoll (*Dasyurus viverrinus*), and 'rats closely related to the three-toed sloth', assumed to be ringtail possums (*Pseudocheirus peregrinus*).[24] The only drawing of a mammal by the artist Piron was of a 'musk rat' which appears to be the small carnivorous marsupial *Antechinus* (either *A swainsonii or A minimus).*

One mammal they did not observe was the echidna (*Tachyglossus aculeatus*), although it is relatively common in the region. Three months before the d'Entrecasteaux expedition arrived at Recherche Bay, William Bligh made his third visit[25] to Adventure Bay on Bruny Island, only 40 km away, and provided the first written description of an echidna. On 18 February 1792 Bligh wrote in the log of the Providence:

> Lieut Guthrie in an excursion today killed an animal of very odd form. It was 17 inches long and the same size around the shoulders, to which, rather a small head is connected so close, that it can scarcely be said to have a neck. It has no mouth like any other animal, but a kind of Duck Bill 2 inches long which opens at the extremity where it will not admit above the size of a small Pistol Ball—the tongue is very small. It has four legs which carry the belly about an Inch or two from the ground and on each fore foot it has three very strong Claws an Inch long, and two, about a quarter of an Inch. On the Hind feet, it has the same number, but they form more like the thumb and fingers of a hand, except that the fore Claw is the longest and curved. The Eyes are remarkably small, and lie just

above the beak. It has no tail, but a rump not unlike that of a penguin, on which are some quills about an inch long, as strong and like those of a porcupine. These Quills or Prickles are all over its back amidst a thick coat of rusty brown hair; but the belly is a light greyish colour. The skin is remarkably White.[26]

Bligh also made a sketch of this animal (Figure 4.1), which he sent to Sir Joseph Banks, who provided it to Everard Home to accompany his anatomical description of the species.[27]

The next of the French expeditions, led by Nicolas Baudin, spent several days in the D'Entrecasteaux Channel in January 1802. With the Muséum National d'Histoire Naturelle now firmly established, this expedition had a very strong zoological emphasis. François Péron, who has been described as the first informed zoologist to land in Australia,[28] was the senior zoologist on this voyage. During the four-year voyage, Péron collected some 100,000 zoological specimens, representing 2,500 new species. Artist Charles Alexandre Lesueur made 1,500 drawings, which included an echidna collected in the D'Entrecasteaux Channel region.[29]

The following expedition was commanded by Louis de Freycinet, whose wife Rose was smuggled on board and became the first woman to circumnavigate the globe.[30] The naturalists Jean René Constant Quoy and Paul Joseph Gaimard made an extensive zoological collection, but this was lost when *l'Uranie* was wrecked at the Falklands in 1820. Quoy and Gaimard returned to the Pacific with Dumont d'Urville in 1826, making another extensive collection, including an echidna from Tasmania.[31]

However, it is *la Coquille*, or at least its assistant surgeon and naturalist, Prosper Garnot, that is of the most interest in this discussion of the French contribution to an understanding of the unusual biology of the echidna. The corvette *la Coquille* sailed from Toulon on 11 August 1822. Louis Isidore Duperrey, who had been ensign and hydrographer on *l'Uranie* was commander, and Jules Dumont d'Urville was second in command. During this epic voyage *la Coquille* covered more than 130,000 km, and crossed the equator six times. Various islands were discovered and named, part of the coast of New Guinea was charted, and vast quantities of specimens of all kinds were collected. Duperrey was also instructed to look at the suitability of southwest Australia (Swan River and King George Sound regions) for establishing a French colony, but he claimed that unfavourable winds prevented him from sailing there, and spent the time in Sydney. The ship returned to Toulon on 24 March 1825.

M Garnot's echidna

The senior zoologist (and surgeon) on this trip was René-Primavère Lesson, who is best known for his ornithological work; he made the first description of the Birds of Paradise from New Guinea and the Molluccan archipelago,[32] and authored a number of other significant ornithogical studies. Assisting Lesson was Prosper Garnot (1794-1838). Lesson and Garnot collected numerous natural history specimens in South America, the Pacific and New Guinea, and wrote the zoological section of the voyage's report.[33] Garnot had become very ill with dysentry, and left the voyage when *la Coquille* arrived in Sydney on 17 January, 1824. He obtained passage home on the *Castle Forbes* which had arrived from Cork the previous day with a consignment of 139 male Irish convicts. While he was in

Sydney, Garnot bought an echidna from an old convict. Garnot kept the echidna in his cabin, where it would have been better accommodated than the convicts had been, and observed it closely.

> It is with a very particular satisfaction that I liked to follow the behaviour, hitherto unknown, of this small animal. I looked for the smallest particulars, well persuaded that they would be interesting in the eyes of naturalists.[34]

So interesting that he published the accounts of his observations three times—a lengthy account in *Annales des Sciences Naturelles*,[35] and a slightly shorter version in *Bulletin de la Société Philomatique*,[36] which was reproduced in the official account of the voyage.[37] The majority of the quotations that follow are from the longer account.

> A few days before my departure from Port Jackson, in April 1824, I had the occasion to buy a live echidna, which for some time had been kept in captivity. The person who sold it to me said that he had had this animal for two months, giving it only plants for food. On inspection of its tongue, it appeared nevertheless to be organized for feeding on insects, particularly ants. I was told that it ate mice; but I greatly doubt it; the masticatory apparatus by no means appearing to be laid out for this purpose.[38]

Figure 4.1 Drawing by William Bligh of an echidna shot in 1792 at Adventure Bay.

Garnot soon freed the animal from its 'prison', a crate with some earth in the bottom, and let it roam freely in his cabin, and became very attached to the animal. 'Its greatest pleasure was to lay its nose in my shoe; it was of a soft and peaceful nature, and let me caress it...'

The echidna developed a routine of walking around the room for four hours a day.

> One day, not seeing it going for its habitual walk, I was astonished and took it out of its corner. I roused it strongly to ensure it was still alive. It made such weak movements that every moment I expected to see it die. I carried it into the sun, rubbed its belly with a hot cloth, and bit by bit it came back to life, and returned to its habitual activity. After this, the spiny echidna remained without moving for 48, 72, 78, and even 80 hours at a time; but I did not worry any more, because I was convinced it was sleeping (mais je ne m'en inquiétai plus, parce que j'étais convaincu qu'il dormait).

This appears to be the first recorded observation of hibernation in echidnas. Garnot also noted the echidna's capacity to survive for a long time without food, a capacity associated with its ability to hibernate:

> I think that it was only water that kept it alive for three months. I impatiently awaited my arrival at l'ile de France (Mauritius) to give it ants. I thought that, having kept it alive for three months after sailing around Van Diemen's Land, I

would realise my hope of taking it to Europe; but three days before my departure from l'ile de France, I found it dead in my cabin…

Garnot thought the cause of death was the echidna eating the arsenical soap he kept for preserving animal skins. As it happens, the echidna would probably not have made it back to Europe as the ship was wrecked off the Cape of Good Hope, and while no lives were lost, all Garnot's specimens were lost.

Subsequent observations on echidnas and hibernation

In 1846, Professor George Waterhouse, who had written the mammal section of the zoology of the Voyage of the Beagle,[39] reported in his *Natural History of the Mammalia* some observations by the naturalists Quoy and Gaimard from their 1826 expedition with Dumont d'Urville.

> [Messrs Quoy and Gaimard] procured a specimen of an Echidna (the *E setosa*) at Van Diemen's Land, which they kept alive for some time. They describe it as an apathetic and stupid animal; and state, that for the first month after its capture it took no sustenance whatever, but at the end of that time it began to lap, and finally, to eat some food prepared for it, consisting of a mixture of flour, water, and sugar.

This unsympathetic text is accompanied by an equally unsympathetic illustration (Figure 4.3) showing a very reptilian echidna.

Gerard Krefft in his *Mammals of Australia* published in 1871, speculated on the possibility of echidna hibernation, as well as describing some experiments that would not now be approved by animal ethics committees.

> Even now we are as ignorant as possible about the habits and economy of this well-known animal, and we cannot tell what becomes of our spiny friends in summer-time. A keen observer, Mr Charles Kepert, of Soldier's Point, Port Stephens, who always supplies us with Echidnas in winter, is of the opinion that these animals retire into the ground,—in fact, hibernate during the hot season.[40]
>
> The Echidna will live for months in captivity without taking food; and Mr Kepert's suggestion that the animal feeds in winter only, and hibernates during summer, is by no means improbable. It is difficult to drown one, and from eight to ten minutes at least are necessary for the experiment. The animal is tolerably snake-proof,

Figure 4.2 Echidna from Lesson's 1830 volume on the voyage of la Coquille.[49] This was not the echidna bought by M Garnot in Sydney. Lesson and Garnot note in the 1826 account of the voyage: 'We collected three individuals: one was used to make a skeleton for the laboratory of the Museum and the two others were given to us by General Brisbane for M Cuvier'.[50] (Allport Library and Museum of Fine Arts, State Library of Tasmania.)

and a specimen frequently bitten by some of our most venomous reptiles lived for ten hours. The flesh is considered excellent.

Krefft, who was director of the Australian Museum, was an evolutionist who ran foul of the Australian scientific establishment, which was strongly anti-evolutionary. He was later physically removed from the museum—carried out in his chair by two prize-fighters employed by the Trustees.[41] His suggestion that echidnas hibernate was echoed by the Russian explorer, naturalist and ethnographer, Baron Miklouho-Maclay, who suggested that hibernation occurs in winter, rather than summer.

… in the month of July the Echidnas appeared to be in a very sleepy state, moving about in the day time only when disturbed. It is possible that during the winter months the Echidna is subject to a state of hibernation, which may also to a certain extent depress the usual temperature of the body.[42]

Miklouho-Maclay measured the body temperature of two echidnas, and these observations mark the beginning of laboratory based physiological studies on the species. These studies are often notable for the implicit assumption of the *scala naturae*—a concept which had not disappeared with Darwin's evolutionary theory. Thus Martin, in the introduction to a pioneering study on body temperature and metabolic rates of the platypus, echidna and several marsupials, wrote 'The present paper is an attempt to locate more precisely the position of Monotremes and Marsupials in this ascending scale of physiological superiority…', and in his conclusions ranks them in terms of evolutionary progress. The echidna is ranked lowest because 'during the cold weather Echidna abandons all attempts at homœothermism and hibernates for four months.'[43]

Since that was written, the perception of hibernation has changed. Studies on a range of hibernating species have shown it to be a precisely regulated physiological state, rather than representing a failure of thermoregulation.[44] In the case of the echidna, a combination of plesiomorphic or ancestral anatomical features with unusual thermal physiology had been used to characterise the species as a primitive not-quite-mammal, an evolutionary remnant hanging on in a remote corner of the world. This was despite the fact that it was clearly a very successful species—in fact the most widely distributed native mammal. Echidnas are distributed across all of Australia, and parts of New Guinea, from regions with winter snow to deserts, and appear to have no particular habitat requirements.

A feature of the various laboratory and captive studies was that echidnas would only hibernate for short periods, and in the early studies many died. In reviewing over seventy years of such studies, including his own, Mike Augee from the University of New South Wales concluded that echidnas will only enter hibernation reluctantly, in response to

ECHIDNA ACULEATA. The long-spined Echidna.

Figure 4.3 Drawing of an echidna from Waterhouse's **A Natural History of the Mammalia.**[51] *(Royal Society of Tasmania Collection, University of Tasmania Library.)*

starvation, and are not true hibernators.[45] However, only eleven years later, Gordon Grigg and Lyn Beard from the University of Sydney, working with Augee, used radio telemetry to monitor body temperatures of free-ranging echidnas in Kosciusko National Park, and demonstrated that echidnas are 'classical' hibernators.[46]

At about the same time, my research group began studying free-ranging echidnas in Tasmania. Using implanted data-loggers to record body temperature we found that echidnas normally entered hibernation during the period February–March (the earliest was January 30). The timing of arousal differed between males and females, and varied for females between reproductive and non-reproductive years. The median date for arousal from hibernation for males was mid-June, and for females that reproduced that year, mid-July. In years in which they didn't reproduce, females hibernated for an additional two months[47] (Figure 4.4).

Clearly echidna hibernation is not a device to avoid the cold—they end their hibernation and mate before the coldest part of the year. In doing so they ensure that the maximum growth rate of the young, which is wholly dependent on its mother's milk, occurs during late spring or early summer. Echidnas are less commonly observed from late summer until early winter, and it seems quite likely that throughout their range echidnas show some degree of torpor over this period, although it may not be as obvious when ambient temperatures are higher.[48]

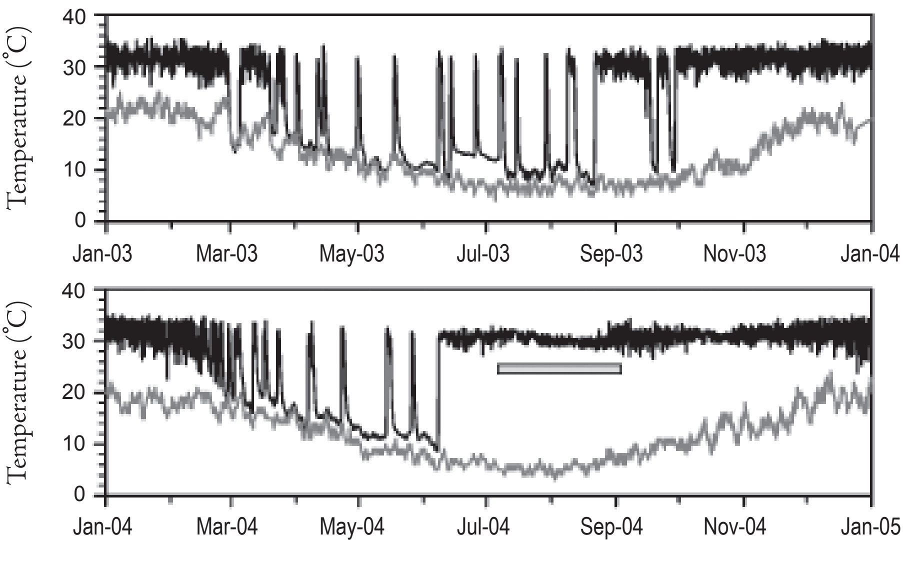

Figure 4.4 Body temperature (black line) of a female echidna over two successive years. The grey line is soil temperature measured at a Bureau of Meteorology site about 4 km away. The grey bar on the lower panel marks the period when the mother is in the nursery burrow, first with an egg, then with the young, until she begins foraging again. During hibernation body temperature is dependent on soil temperature. The spikes in body temperature are periodic arousals, which are shown by all hibernators, but why they occur is not clear. Echidnas are unusual in that they may move to another shelter during these arousals. In both years this female began hibernation only in March, when the weather is comparatively mild. In 2003 she hibernated until the end of September, but in 2004 she ended her hibernation on 8 June, mated eleven days later and moved into a nursery burrow on about 12 July. In Tasmania most female echidnas mate within two days of arousal from hibernation.

It also seems likely that this energy conserving behaviour has contributed to the success of the echidna in an ecosystem where climate and resources are unreliable. By definition, hibernation is a winter phenomenon, but there seem no major physiological differences between hibernation in echidnas, and hibernation in eutherian mammals. Just as a taxonomy based on northern hemisphere animals had difficulties accommodating the monotremes, a view of hibernation based on how it is used by northern hemisphere mammals has impeded our understanding of the role of hibernation in other ecosystems. Hibernation encompasses a suite of physiological responses which significantly reduce energy requirements, and while we are most familiar with its use in northern hemisphere ecosystems characterised by cold winters with greatly reduced food availability, in other ecosystems it may be used differently. Echidnas use hibernation not to avoid cold but to reduce energy expenditure at the least productive time of the year.

M Garnot made detailed observations of his echidna as it walked freely in his cabin; now advances in technology have made it possible to monitor equally closely many aspects of the physiology and behaviour of undisturbed animals in their normal habitat. Such observations will continue to improve our understanding of how Australian animals interact with their environment.

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5 Meeting the Tasmanians

John Mulvaney

The most momentous consequence of the d'Entrecasteaux expedition for Australian history was its encounter with Tasmanians during the final week of its second stopover at Recherche Bay in 1793, when 220 French fraternised with around fifty Tasmanians. The written observations of several scientists and officers, together with the sketches by the artist, Jean Piron, provide more detailed ethnographic data than previous British visits. Nearby Adventure Bay on Bruny Island was visited during Captain Cook's 1773 and 1777 voyages. Bligh also watered and wooded there on his epic *Bounty* voyage in 1788. The French informal racial interaction was characterised by mutually respectful human values, so it proved more significant for human understanding beyond its mere ethnographic record.[1]

King Louis XVI took deep personal interest in this search for La Pérouse, last seen sailing from Botany Bay in February 1788. In keeping with late-18th century French or British instructions to explorers, the King ordered d'Entrecasteaux:

> … to recommend to every person among the crews, to live in a good understanding with the natives, to endeavour to conciliate their friendship by a proper way of acting and respect; and must forbid them … ever to employ force … On every occasion … act with great mildness and humanity … His Majesty will look upon it as one of the most successful parts of the expedition that it may be terminated without costing the life of a single man.[2]

At Recherche Bay those precepts were followed, but that events in Paris would cost the King his own life is one of the ironies of these instructions.

During almost seven weeks of the two sojourns at Recherche Bay, the Indigenous inhabitants frustratingly remained concealed. However, smoke, warm ashes and fresh brush shelters tantalisingly established their presence. It was not until 6 February 1793 that they emerged from the bush in numbers. That morning chief botanist Labillardière and gardener Delahaye were botanising near the southern shore of Southport Lagoon when they heard lively voices. They prudently hastened back to their bivouac, collecting their muskets and the two armed seamen.[3]

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 59-68.

Fear proved groundless when a party of forty-two men, women and children approached. In what the Tasmanians possibly interpreted as a ceremonial gift offering, Labillardière proffered a ship's biscuit. An older man accepted it with 'very good grace'—obviously more so than its donor, who grumbled about the quality and quantity of his meagre rations. Gift exchanges continued with a neckcloth and a handkerchief supplementing the biscuit, while the French received a shell necklace. It was a hot day, following a cold night, so surplus French clothing became personal gifts as the donors marvelled at Tasmanian nakedness.

The men had hidden their long spears, which they retrieved when the French prepared to leave; according to Delahaye entrusting them to the women to carry away. The unarmed men escorted the party by the shortest track to the boat station. Before they left, however, Labillardière initiated the earliest episode in Tasmanian ethnographic technology. He encouraged a man to demonstrate spear throwing. The man threw his spear at an indicated target on several occasions with what the French judged to be impressive accuracy. Labillardière's important observation was that the man held the spear high and horizontal, drawing back three times 'with a jerk, which gave it a very perceptible tremor movement at each extremity' when it flew almost 100 paces. The tremulous movement, he believed, accelerated its pace and prolonged its flight. When aimed at the indicated target, his accuracy was impressive. Delahaye paid tribute to his 'great dexterity at a great distance'.

Labillardière made several careful ethnographic observations concerning their beards and 'woolly' hair, skin colour made darker with charcoal powder and impressive cicatrices—incised, he later learned, with the edge of a mussel shell. He also used his knowledge of exploration journals to remark that, unlike the New Hollanders, these people did not follow the custom of knocking out their upper front teeth. Meanwhile Delahaye was interested to note that they rejected offers of food and 'were surprised to see hot water' in utensils.

On the trek homewards, 'the attentions lavished on us by the savages astonished us', Labillardière confessed. They cleared the track by removing dead branches and breaking off obstructions, thereby probably following customary practices for maintaining trackways. To French irritation, when encountering slippery areas, the Tasmanians took their arms while singing and chattering.

The long desired encounter had been achieved peacefully. The extent of what may be termed participant observation during the following days is remarkable, as was the agreement in essentials between diarists. Captain d'Auribeau of Recherche, in particular, provided objective and corroborative observations to the scientists. However, Labillardière must have supplied much information for d'Entrecasteaux's journal record because, though the commander only once mingled with the Tasmanians, his data agreed with Labillardière's text.

It is appropriate to reflect upon the significance of this friendly encounter before considering later interaction. Following their arrival in southern Tasmania at least 35,000 years ago, the Tasmanians became isolated from all human contact for a period of some 10,000 to 14,000 years. While Europeans had landed briefly on Tasmanian soil during the previous two decades, this French presence of 220 people was the most substantial racial confrontation to have occurred. The bearing of Tasmanians on that eventful day surely established that those isolated people were characterised by values which are humanity's criteria. Their animated speech and mime proved capable of communicating with the strangers on their shore. They sang, danced and showed trust, affection and solicitude.

During their 1792 visit the French discovered a cremation burial, from which some sensationalists inferred a fearsome cannibalism.[4] In fact, this cremation proved Tasmanian respect for human death—whether it be from love or fear—providing further proof of their essential humanity. In the year following their racial contact, d'Entrecasteaux observed with feeling: 'Oh. How much we should blush, having suspected them, last year of eating human flesh!'

Such distinguishing characteristics of conversational jollity, and adaptability to the Other, stamp these remote people as fully sentient Homo sapiens. It is reasonable to conclude that their ancestors, the near contemporaries of the Lake Mungo people, brought their humanity with them on their long migration. Knowledge of this French episode should have prevented British colonists denigrating the mentality and society of Tasmanians across a century. The fact that Recherche Bay happenings refuted the nonsense that Tasmanians were unintelligent, primitive savages, provides the prime reason why the northeastern peninsula, where most events occurred, merits its status as a National Heritage place.

Returning now to the happy party on 6 February 1793. They arrived at the boat station before their transport so they set off for the nearby vegetable garden, planted by Delahaye during the previous year. Another lesson in Tasmanian comprehension followed. The two botanists left the sailors, hoping that they would detain the Tasmanians so they would not harm the prospective vegetable crop (as if they had not visited there previously!). Of course there was no crop, but Labillardière believed that the Tasmanian who accompanied them distinguished the struggling European plants from native flora. Whatever the meaning of the mime, it is relevant that Labillardière favoured an interpretation which stressed the intelligence and inquisitiveness of the Tasmanian, just as the spear throwing showed skill.

The following morning a larger party set out to meet the people; fortunately Piron, the artist, was among them. This time they rowed along the shore 'beyond the port' and met the welcoming people on higher land, possibly near Blackswan Lagoon. There were nineteen people present, eating shellfish beside three fires.[5]

This extraordinary encounter of racial harmony was eternalised by Piron, whose realistic sketch of the occasion was spoiled by his and the Paris engraver's emphasis on classical artistic forms which possibly exaggerated Piron's classicism. Given the ethnographic accuracy in this image, the background hills and totally unrealistic vegetation may also be the imaginative work of the engraver. Note, however, that the area is clear of brush, in marked contrast to the whole of the peninsula today. Presumably this resulted from regular Aboriginal firing, unless the Paris engraver 'improved' the scene.

While classical ideals of bodily stature prevail, there is a remarkable degree of realism in the scene. The setting includes three hearths with crayfish broiling and in the foreground are depicted fine examples of basketry and seaweed water containers. Seventeen Tasmanians are identifiable, although the sex of some is indeterminate. The probable tally is seven men, five women and five children. Some women are seated with one foot concealing their genital area, a characteristic commented upon by most diarists, so this sketch represents keen ethnographic accuracy.

It is possible to suggest tentative identifications of the French participants, following readings of diaries to ascertain who could have been present. To begin with, the figure standing in the rear wearing a navel tricorne hat: d'Auribeau did not attend this meeting, but an enlisted man, Ventenat, was present and he would have worn a uniform. Before him is a well-dressed figure holding an object in an awkward fashion. He could be whittling wood, thereby demonstrating the use of a knife, as diarists recorded this activity at other times. Surely, however, this is Lieutenant Saint-Aignan playing his violin, even though to identify the object as a violin is questionable. He was there and played to the people, a sound which 'did not please them at all', remarked La Motte du Portail. He also commented that Saint-Aignan 'can be considered a very good amateur player'. While on Buka Island some months before, his violin had proved popular, so 'at the indifference shown to his performance here', Labillardière thought Saint-Aignan was mortified. Ventenat played his flute with greater success.

There is a well-dressed man wearing a brimmed beaver hat standing to the left of the group, in friendly stance with a statuesque Tasmanian. This is probably Labillardière. Also in this group is a figure in cap and pantaloons. Is he French or Tasmanian? Labillardière provides the likely answer. He recounted that Piron expressed a 'wish of having his skin covered like theirs with the powder of charcoal'. His body was soon blackened by an obliging man, who even blew dust from Piron's eyes. Much to the delight of the charcoal artist, 'Piron was presently as black as a New Hollander', so Piron surely placed himself by his friend Labillardière and his new-found body painter, whose hand appears blackened from his labour.

Such carefree fraternisation indicates the degree of informality and equality which typified the humanising spirit of the occasion. So too does the fact that a nursing mother allowed various Frenchmen to hold her baby. This incident also is included by Piron: a man is shown holding a baby aloft. As sailors were present, it may be a crew member. On the other hand his clothing, cap and proximity to the officers suggest superiority to a common seaman. There is no evidence concerning naturalist Riche's attendance, but that may be because there is no surviving Riche journal. He seems a likely candidate for Piron's eye. Riche was tubercular, so is this portrayal symbolic of the transmission of deadly diseases which, by 1831, according to George Augustus Robinson, had reduced the population of Bruny Island and southeastern Tasmania to a handful. In 1793 there were possibly 150 inhabitants. And finally, what of the remaining well-dressed figure on one knee to the right of the scene? La Motte du Portain described the meeting so he is the likely person.

At the next meeting Piron again used his artistic skills to picture an incident illustrating Tasmanian economic and social life. The occasion probably took place in Quiet Cove, pictured as another open area. Gathered around ten fires, according to witnesses, were ten men, fourteen women and twenty-four children, twelve of each sex. This tally of forty-eight people was common to both Labillardière and du Portail's accounts. It suggested to them that each monogamous family had its own hearth. Saint-Aignan again played his violin to an unappreciative audience, who placed their hands over their ears. d'Auribeau was present at this gathering and offered this comment on Piron's sketch of the scene: 'the drawing … of each particular individual, the whole meeting during the meal, the fishing etc—the truth, the naturalness that this clever artist has had the talent to achieve in every respect…'

The special attraction was the preparation and eating of a meal. Food freshness was the keynote, with the women diving for crayfish, shellfish and edible seaweed, which were then placed on coals until they were cooked. The fires also were maintained by the women. The female divers stayed under the cool water for twice as long as the French thought possible and then had to prepare the meal, so many attempts were made to influence the men to help, to no avail. This visual and written account of the female role in food procurement was detailed, more so than that of most 19^{th} century observers, who stressed the male hunting role in mainland society.

Piron's human figures observe classical statuesque proportions. They also reflect the virtues held by the French republicans of the era when Piron left France. To quote Bernard Smith's categories of virtue: 'Simple in his needs and desires, self-disciplined, courageous, and with great capacity for endurance', symbols of freedom and romantic perfectibility.[6] Piron's Tasmanians exemplified hard primitivism, as opposed to the soft, languorous, sensuous Polynesians depicted in the art and literature of the Cook era. Piron's people were 'dry, wiry natives', supported in this character interpretation by all the diarists; and, unlike Polynesia, there were no sexual liaisons. Piron's art is one further cultural factor in the Recherche Bay situation. These people were type specimens of noble savages in the state of hard primitivism. His females in this cross section of activities preparing this one meal are frozen in time as they catch and cook shellfish and crayfish. An archaeological midden may be visualised accumulating from the ashes mixed with discarded shells and food debris.

Most diarists emphasised the desire shown by the Tasmanians to know the sex of each visitor, because the male imbalance worried them. Consequently sailors were emboldened to exhibit their genitals, with Tasmanians concentrating upon young and beardless sailors. They were disturbed to find that they were males also.

In the midst of such amicable relations, only one incident appears to have jarred: three sailors attempted to gain sexual favours from two girls who fled onto rocks to escape. D'Entrecasteaux was pleased to conclude at the end of their visit that 'no indiscretion was committed'. This probably was correct, as only one sailor, who was disbelieved, claimed to have had sex. It was a remarkable record of restraint amongst 200 men, contrasting greatly with contemporary mores in Polynesia. D'Auribeau made a special point of acknowledging the crew's behaviour, despite their being 'surrounded by naked women and enjoying great freedom'.[7]

All observers emphasised the family as the focus of life. Considerable discussion ensued as to whether polygamy was the rule (as then philosophically expected in a 'primitive' society), but the evidence suggested monogamy, the strength of 'marriage' and the devotion of parents to their children. D'Auribeau took this matter very seriously:

> 'I asked several officers from the two frigates to study the matter carefully … but most of the observers saw no sign at all of polygamy … I merely report the result of my observations and those of almost all the officers'. It is interesting to note that, as a royalist, he did not trust republican opinion enough to ask the advice of savants, but otherwise his objectivity is impressive.[8]

The more the two races became acquainted, the greater was the emphasis placed on the essential humanity of the Tasmanians and their loving treatment of children, the sharing of food and their good humour. 'We never saw in them a trace of bad temper', d'Entrecasteaux reflected.

The objectivity of these observers, even when they were puzzled by actions, added a significant collection to the meagre store of ethnographical knowledge of contact period Tasmanians. While d'Auribeau appears to have been unpopular with Labillardière and du Portail, what he drew from his limited meetings with the Tasmanians is impressive, both

Figure 5.1 'Sauvages du Cap de Diemen prèparant leur repas', engraving by Jacques Louis Copia, after a sketch by J Piron. A friendly meeting near Black Swan Lagoon, 1793. Plate 5, de Labillardière. (NK3030 National Library of Australia.)

for its scope and its sympathy. As with the monogamy question, d'Auribeau verifed his information. Collecting a word list, he tested the data: 'we carefully compared' and repeated words to informants, 'and they understood most of the words very well'. He realised that French pronunciation must have proved difficult to comprehend, just as a Frenchman who reads English may not be understood in conversation with an Englishman. He found that Tasmanians could not articulate 'f' and substituted 'p'. On the other hand, Ventenat concluded: 'there are very few consonants and the sounds T and F are unknown, it being difficult to pronounce them'.[9]

D'Auribeau provided a sensible account of physical anthropology.[10] He made fourteen measurements to describe male and female subjects and estimated the ages of the forty-eight people whom they met. Two men he judged to be older than seventy and four women between fifty and sixty. All the rest were younger than fifty. He found that they expressed a definite preference for presents of red cloth, over white or blue cloth. Wisely, he concluded that 'we spent too short a time with these good natives to be able to discover any religious beliefs. Moreover I hold that metaphysical ideas are not transmitted with the same ease as are physical ones and that it is only after a long sojourn among a people that one can determine something in that connection'.

It is a loss for the history of anthropology that this thoughtful man died within the year. Had he survived to write an account of his voyage and the 'natural goodness' of these people, it could have assisted in dispelling much nonsense later written about Tasmanians.

The French made strenuous efforts to establish a word list. Labillardière's vocabulary included eighty-three words, and Plomley and Piard-Bernier consolidated a vocabulary of 165 words from all the French diarists. Words were carefully obtained, as d'Entrecasteaux explained: 'We have made them repeat the same word several times; and after they had repeated it, they would designate the object we had requested them to name. We have asked the same question of several of them; and we have used the same means to ensure that the pronunciation was correct'.[11]

Joseph Raoul, the second pilot on Recherche, produced a reliable word list, which he gave to d'Auribeau. Upon meeting the same informants again, he related, 'I profited by their willingness to correct some of the words I had collected from them … and to gather some more. Because I had the opportunity to check the meaning I am sure that they are accurate; and I have only recorded words which I heard clearly and were repeated several times'.

Ventenat, priest and flautist, was interested in their song and dance. At one of the meetings he observed:

> Their dance consists of raising one foot behind them, touching the head with the hand, then they bend the body down and straighten up in turn, the movements being made quite violently. Their voice is sonorous, pleasant and agreeable. When they sing they only have two tones, which are pitched between B and G.[12]

Some of the vocabularies may have been derived through songs, for both the French and Tasmanians sang, the former lustily. Labillardière 'was singularly struck' with the modulation of their singing. He drew an analogy with the tunes of Arab music, with which he would have been familiar from his time botanising in Syria. 'Several times two of [the girls] sang the same tune at once, but always one a third above the other, forming a concord'. La Motte du Portail thought that 'the women often sang among themselves, but also very softly and

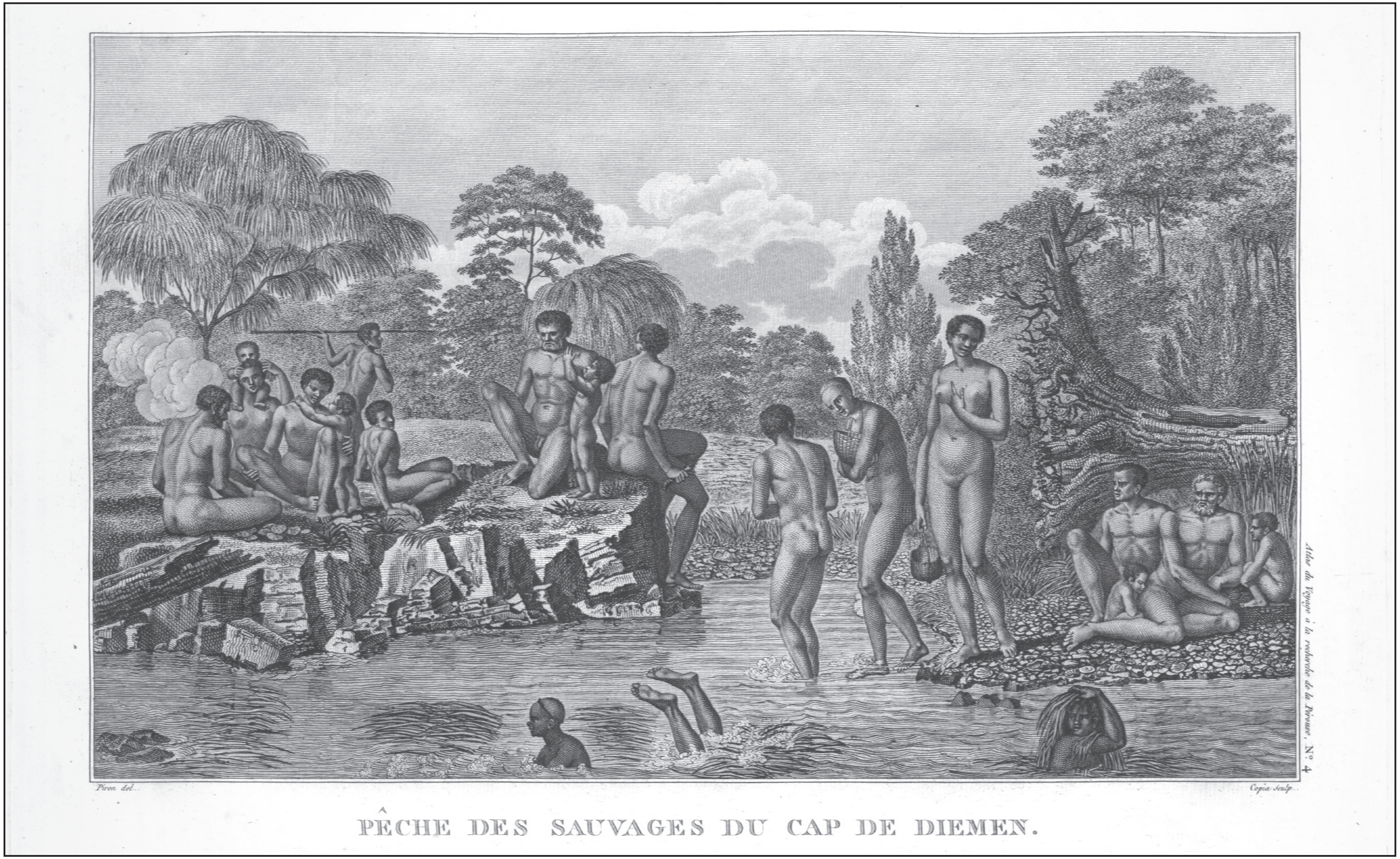

Figure 5.2 'Pêche des sauvages du Cap de Diemen', engraving by Jacques Louis Copia, after a sketch by J Piron. This meal was prepared in 1793, possibly in Quiet Cove. (NK3030 National Library of Australia.)

in a very sad manner'. As for our songs', he reported, 'they seemed to listen to them with pleasure'.

Whatever the linguistic merits of the combined vocabulary, it was a sizeable list from a single area, a commendable attempt by 18th century standards. When they anchored at Adventure Bay in 1793, the explorers found that the Bruny Islanders understood their words, which, they correctly concluded, not only established their common language, but also proved that their words had real meaning.[13] Given the trouble that was taken to collect these words, and the general care taken by officers and savants to observe the Tasmanians with objectivity and sympathy, a remarkable corpus of information resulted.

Chaplain and botanist Ventenat made a significant reference to inferred Tasmanian kangaroo hunting that had environmental impact. 'My idea, after much thought about this and having examined the ground carefully, is that one frequently comes across in the interior of the country large open spaces which have been burnt. But by whom? Certainly it is by the natives!'[14]

His opinion was that firing the bush drove the fleeing kangaroos into the spears of hunters who waited along animal paths. Whatever the reasons, his comments must rank as one of the earliest references to ecological changes due to deliberate Aboriginal firing.

The final word rests with the humane d'Entrecasteaux, writing in the ambience of both the state of nature and natural man so dear to late-18th century minds:

> If our stay in port could have been extended, we would have had a real opportunity of obtaining a very interesting insight on the lifestyle of human beings so close to nature, whose candour and kindness contrast so much with the vices of civilization.[15]

He was not to know that within forty years the southeastern Tasmanian communities would become virtually extinct.

References

1. A full account of the d'Entrecasteaux expedition, with more detailed references, is provided in my book, *'The axe had never sounded': Place, People and Heritage of Recherche Bay, Tasmania*, (2007) Canberra: Aboriginal History Monograph and ANU e-press.

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5. For the following meetings: Labillardière op cit, pp 303-308; Plomley B and Piard-Bernier, J op cit, pp 283, 305-306, 339, 342, 361; Poulson, B (2004) *Recherche Bay: A Short History*, Southport: Southport Community Centre, p 14.

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12. Song: Plomley B and Piard-Bernier, J op cit, pp 302, 306, 363; Labillardière, op cit, p 305.

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6 Tasmanian Aborigines and the origins of language

Iain Davidson

The nature of Tasmanian isolation

First contacts between Indigenous people and explorers or colonisers from lands across the sea were always extraordinary events.[1] At Recherche Bay in 1793, there was considerable questioning of the nature of the people the French were encountering. By the French account, the Tasmanians, too, seemed curious about the nature of the visitors from the sea—which is hardly surprising if we consider the quite extraordinary nature of contact for the Tasmanians.

The very first humans who lived in Australia had to cross the sea to get there, just as the European invaders did.[2] But about 10,000 years ago there was already substantial variation in body and behaviour on the one land mass, from the Melanesian agriculturalists of highland New Guinea,[3] on one hand, to the Australian fishers, gatherers and hunters,[4] on the other (Figure 6.1). These disparate peoples were destined to be isolated from each other a couple of thousand years later by the flooding of the Arafura Sea and Torres Strait by the rising sea level of the last great global warming.[5] The isolation of Greater Australia from the islands of southeast Asia was great,[6] but not complete: for we know that the dingo was introduced to Australia perhaps 4,000 years ago,[7] and we also know that several Indonesian islands have Australian animals as part of their fauna which must have been introduced by people travelling back to the west.[8] In Timor, cuscus bones have been found that may be as old as 9,000 years.[9]

But Tasmania was even more extreme. The Tasmanians had never seen a European before 1642, and no inhabitant of Tasmania had seen anyone from outside the island since it had been cut off by rising seas 14,000 years before—at the end of the last Ice Age.[10] Indeed, we can go further and state that, unless knowledge was retained in the oral tradition over those 14,000 years, no Tasmanian could have known that land other than Tasmania, and people other than Tasmanians even existed. We can be reasonably sure, then, as we cannot for Australian or New Guinea first contacts that, apart from a brief encounter with Cook

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 69-85.

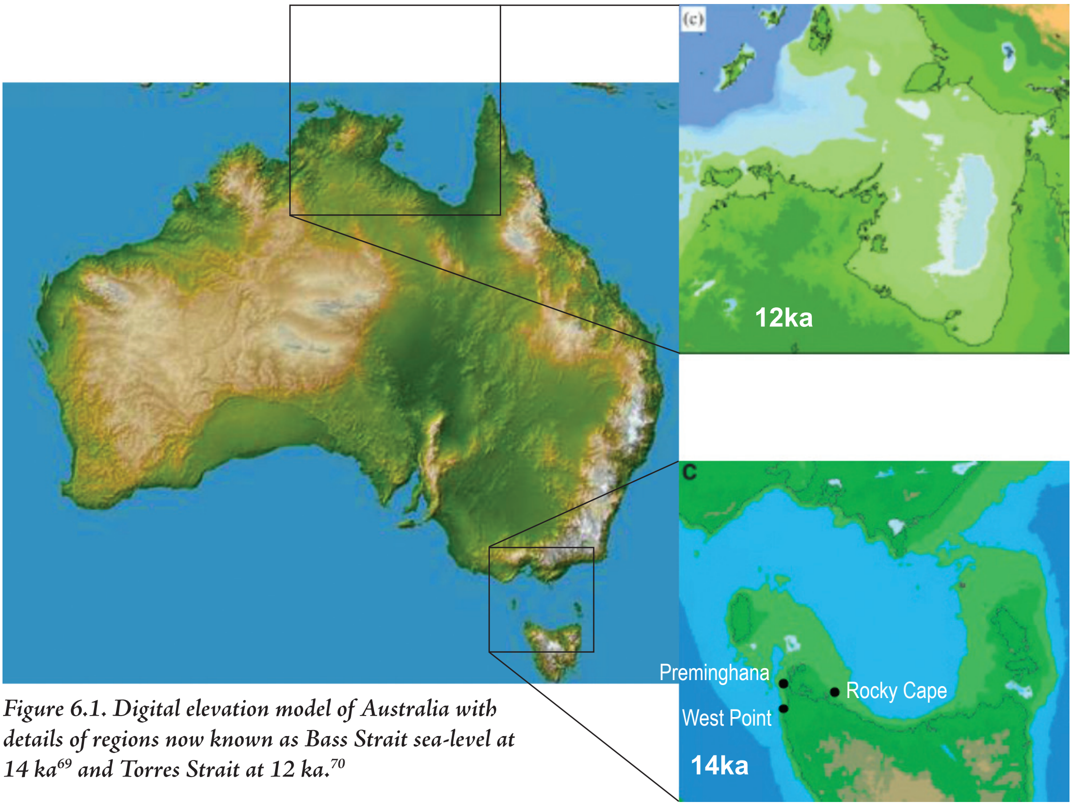

Figure 6.1. Digital elevation model of Australia with details of regions now known as Bass Strait sea-level at 14 ka[69] and Torres Strait at 12 ka.[70]

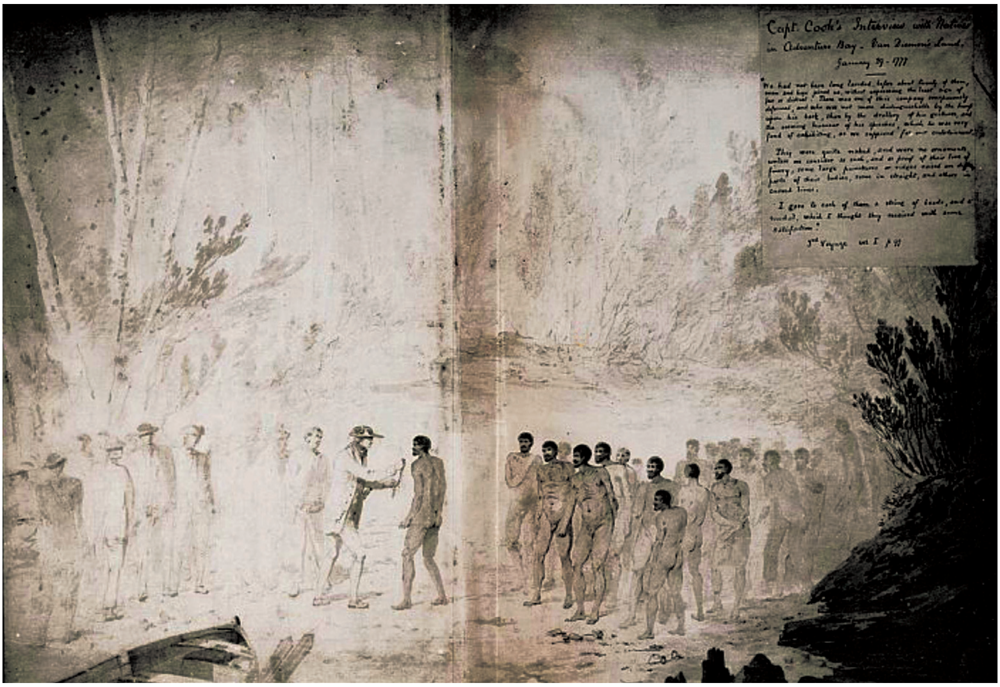

Figure 6.2. Cook's 1777 meeting with Aborigines on Bruny Island, Tasmania. (National Library of Australia. nla.map-nk10592a-9-v)

in 1777 (Figure 6.2), the people described with such vividness by Labillardière had had no contact at all with people from any other society near or far.

For the Australian mainland, and for New Guinea, even when their people made first contact with Europeans, there was some possibility, however remote, that aspects of their behaviour as observed and described in the 18th and early-19th century had been influenced by earlier contact with people from Indonesia or elsewhere to the north—such as the Macassan traders who visited the Kimberley and Arnhem Land.[11] Not so Tasmania, where the first contact between Tasmanians and Europeans, most fully documented at Recherche Bay, was contact between people whose traditions were separated absolutely by the isolation of Tasmania 14,000 years before. For the Tasmanians, their technology, their social and economic conditions, their biology and behaviour, as first described by the d'Entrecasteaux expedition, were uniquely the product of their circumstances when they left behind their relatives on the mainland, and the ways they found to survive and adjust to the various changes over the ensuing fourteen millennia.

This isolation had been a matter of curiosity to Europeans in the 19th century:

> The natives of the East Coast have a tradition that this Island was settled by emigrants from a far country, that they came here on land, that the sea was subsequently formed. … for aught we know V.D.L. [Van Diemen's Land] might at an early period have been joined to N.H. [New Holland] in which case the tradition would be true.[12]

Figure 6.3. Watercraft from Eastern Tasmania.[71] (National Library of Australia nla.pic-an7573651-v)

This report seems to suggest a tradition of dry land crossing, long before any evidence was available to Tasmanians or Europeans that Bass Strait had ever been dry. Tasmania is not the place to be sceptical of oral traditions, but if we are to believe that the tradition was indeed 'true', as Robinson described it, then it was astonishing. Just how astonishing can be seen from Wiessner's work among the Enga of New Guinea.[13] By analysing and cross-checking an enormous range of evidence—186 genealogies from eighty-six tribes—in Highland New Guinea, Wiessner has been able to show that oral traditions preserve corroboratable information back seven to eight generations; historical traditions retain good information for the last five generations; and genealogies may go back ten generations. In the best of cases, the histories constructed could be tied to the known dates for the introduction of the sweet potato. By comparison, the Tasmanians were isolated for more than 500 generations, or fifty times as long.

As Rhys Jones and Jim Allen so graphically demonstrated in the Tom Hayden film *The Last Tasmanian?*, the watercraft depicted in an early-19th century picture from the Baudin expedition (Figure 6.3), were not suitable for travel on the open sea. So Rhys Jones in 1968 argued that the earliest evidence he found in his excavations at Rocky Cape, while not demonstrating human occupation back to the Pleistocene, at more than 8,000 years was sufficiently close to the date of the isolation of Tasmania to make it probable that it was colonised on foot.[14]

Getting to know the Tasmanians

Nearly one hundred years after the encounters at Recherche Bay, Henry Roth, while sitting in his armchair at the Bankfield Museum, Halifax, compiled the known accounts of Tasmanian Aborigines into a single volume.[15] Henry had been to Australia to work in Mackay, but he never went to Tasmania.[16] Henry's work was one of the great classics of armchair anthropology, reprinted nine years later[17] at the dawning of 19th century fieldwork-based anthropology[18]—we can hardly call it a new development in light of the French research at Recherche Bay.

In the luxury of Bankfield House, originally built by Edward Akroyd in a park from which he could survey the mill he owned and the terrace houses of his workers—workers who doubtless processed Australian wool there—Henry wrote about the conditions of people half a world away. From this privileged context, he reproduced Labillardière's account of the exchanges at Recherche Bay in a section called 'Psychology', which was much exercised with differences of dress and comportment between the clothed Frenchmen and the unclothed Tasmanians. The differences in clothing were as strange to the Frenchmen as *burqas* are to the youth of Cronulla, or indeed to modern French educationists—with the tables strangely turned: the people with power (the French) were dramatically over-dressed compared with the Tasmanians' nakedness. We do not know whether the Tasmanians thought the Frenchmen's clothing offensive though they did explore beneath it to see that the French were men; one was not.[19] We also know that they did not adopt the clothing they were given, showing interest in the buttons, but not the garments.

There is a very revealing passage:

> I wished to get a kangaroo skin; among the savages about us there happened to be only a young girl who had one. When I proposed to her, to give it me in

exchange for a pair of pantaloons, she ran away to hide herself in the woods. The other natives appeared truly hurt at her refusal, and called to her several times. At length she yielded to their entreaties, and came to bring me the skin … She received a pair of pantaloons …[20]

(And we probably can say that we have some idea of what those pantaloons looked like from the drawing shown in Figure 5.1)

We showed her the manner of wearing them; but notwithstanding, it was necessary for us to put them on for her ourselves. To this she yielded with the best grace in the world, resting both her hands on our shoulders, to support herself, while she lifted up first one leg, then the other, to put them into this new garment.

The concept of nakedness is, of course, laden with cultural values.[21] We may ask whether the Tasmanians had any such preconceptions about nakedness. Clothing is not just about protection from the elements, though in climates only a little more extreme than Recherche Bay it must have been necessary for that purpose—the scarcity of kangaroo skins suggests that they were not needed at the end of February in 1793, despite the fact that the temperature fell to 6°C on the night before the first encounter between the French and the Tasmanians.[22] Clothing is also regularly used to indicate status and personal relations[23]—just look at the hats of the Frenchmen, and the handkerchief.

And the Tasmanians were no exception. We know from the early drawings that Tasmanians, as with other Australians, wore body scars. Some of these were similar between individuals, others were different. Were these markers of status, or group identity, as well as of individual difference?

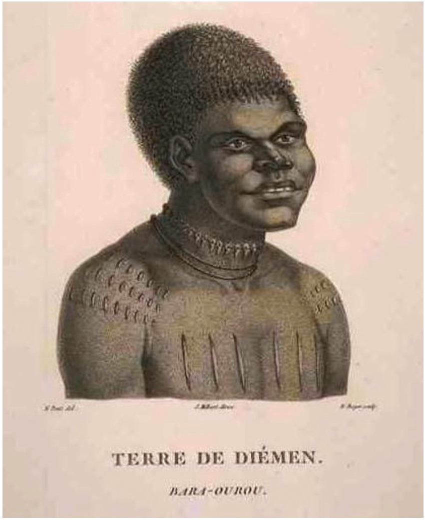

Figure 6.4. Homme du Cap de Diemen by Jacques Louis Copia.[72] (National Library of Australia nla.pic-an7573651-v)

Cook had commented on the scarification of the people he saw in January 1777 at Adventure Bay on the east side of Bruny Island.[24] He also noted that none of the people wore ornaments, and indeed rejected his gift of beads. Like the figure in the later portrait from the Baudin expedition (Figure 6.4), the Recherche Bay people used beads. Labillardière describes how one of the young people:

had the generosity to give me a few shells of the whelk kind, pierced near the middle and strung like a necklace … A handkerchief supplied the place of this present, [was it the handkerchief in the Piron drawing?] gratifying the utmost wishes of my savage, who advanced towards me, that I might tie it round his head for him, and who expressed the greatest joy, as he lifted his hand up to feel it again and again.[25]

The marks of language use and modern human behaviour

Beads have recently become a matter of discussion in the archaeological literature for their significance in the emergence of modern human behaviour[26]—including the fact of their occurrence in Australia quite soon after first colonisation.[27] Noble and I argued that such personal markers of identification would have been particularly important in the environment of early language use.[28] The reason for this, we suggested, is that the adoption of a means of communication based on the use of symbols that are both arbitrary and conventional, places a high premium on the ability to identify individuals who share the same conventions.

The first colonisation, itself, we argued,represents one of the fixed points in understanding the emergence of that modern human behaviour which flowed from the origin, among humans alone, of language based on communication using symbols.[29] The construction of a watercraft to make the necessary crossings required planning abilities that follow from a cognitive ability unknown among other animals, and rarely represented in the archaeological record of earlier hominins. The presence of distinctive artefacts, such as the beads, further implied the presence of communication based on conventional symbols.

The archaeological evidence of the first colonists of Australia indicates that the watercraft and the beads were not the only indicators of modern human behaviour (Figure 6.5). The

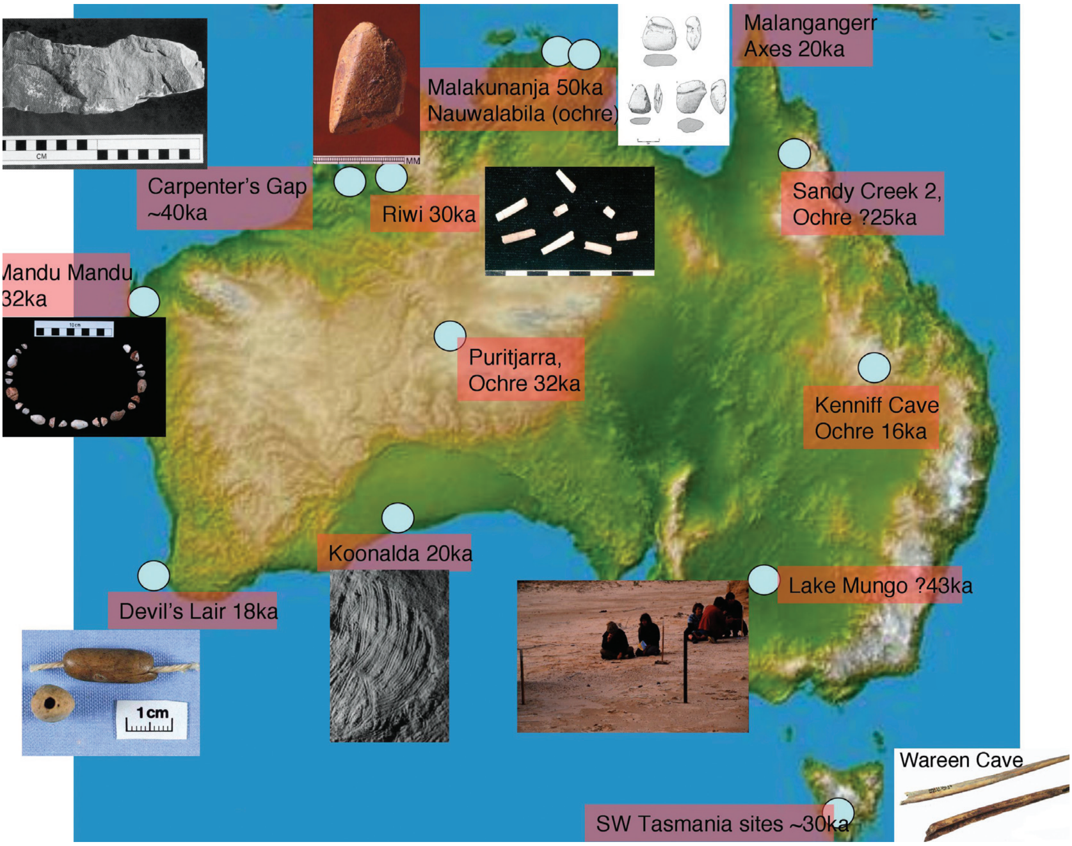

Figure 6.5 Distribution of some of the symbolic evidence from early in the archaeological record of Australia.[73]

ground ochre from the lowest layers at Malakunanja and Nauwalabila in Arnhem Land makes it highly likely that the first Australians were using ochre to make pigment to apply to themselves or other objects.[30] O'Connor has excavated painted rock at Carpenter's Gap in the Kimberley that dates to about 40,000 years ago.[31] The burials at Lake Mungo in western New South Wales are possibly the oldest burials in the world at 43,000 years[32] and at least two of them involved different but elaborate behaviour we should probably call ritual.[33] Ground bone points, as found dating to about 20,000 years ago at Wareen Cave in Tasmania,[34] indicate the performance of the capacity to construct artefacts to a preconceived shape. Ground stone axes also reveal this capacity, at 23,000 years, possibly 10,000 years earlier in Arnhem Land than anywhere else in the world.[35]

Archaeological evidence of this type is often featured in 'trait lists', such as Noble and I produced in 1991 to show by examples what we meant by the phrase 'modern human behaviour'.[36] Most importantly, we justified the definition of these traits theoretically by showing how they are the products of three characteristic outcomes of language use: *information flow*; *planning depth*; and *conceptualisation*. All of these, we argued, are features that follow from the emergence of language, and, as revealed in a recent paper, we can now fit such abilities into a more comprehensive model of the evolution of hominin and human cognition.[37] *Information flow* might be exemplified by the Tasmanian tradition of dry land colonisation that Robinson recorded, whatever its veracity; *planning depth* by the ability evident in the achievement of the first colonisation of Australia across open water; and *conceptualisation* would apply to the beads and personal decorations recorded among the Tasmanians.

McBrearty and Brooks[38] more recently produced a longer trait list (but without the theoretical argument). Many of their traits, but not all, have an explanation in the theoretical principles we outlined—information flow, planning depth and conceptualisation. Noble and I had not included in our earlier discussions two traits of the technology suggested by McBrearty and Brooks. These were blades, microblades and backing—which need further argument about their conventional nature to meet our criteria—and the proliferation of tool categories—for which I see no simple justification within our theoretical model. As it happens these traits are not features of Tasmanian material culture either in the ethnographic or the archaeological records.

Similarly, of those aspects of economy and society discussed by McBrearty and Brooks, Noble and I[39] did not discuss curation of exotic materials because their mere presence may be due to a variety of different circumstances. And we did not discuss scheduling of activities, site re-occupation and the structured use of space because these too have ambiguous characteristics in the archaeological record, while being obvious enough in the ethnographic record.

We now know that the two less important traits of the material technology are not represented in the Tasmanian record—blades and proliferation of tool categories.[40] But the four unimportant aspects of economy and society are represented in Tasmania—curation of raw materials, scheduling of activities, site reoccupation, and the use of structured space.[41] There is a further absence of four, and probably five, other traits, which, when present, are said to be indicators of modern human behaviour. The four traits certainly absent are the standardisation of tool form, and regional variation of technology, intensification of economic activities, and the presence of distinctive artefact styles in different regions.

The fifth trait is the presence of long distance exchange, a feature that is always difficult to identify and distinguish from the long distance procurement of raw materials.[42] So about a quarter of the traits on the McBrearty and Brooks list are not present in Tasmania. What are we to make of this?

This analysis raises questions about appropriate methods of interpreting the archaeological record. No one doubts that all people who have ever lived in Australia have been fully modern people. Yet the Tasmanian archaeological record appears to lack some of the archaeological indicators of modern human behaviour. There is little to be gained by enumerating traits or numbers of items of technology, for the point about humanity is that we are able to adjust to the conditions for survival through the technology of the mind as well as material technology. But those traits that were present undoubtedly required the information flow, planning depth and conceptualisation that are the real markers of modern human behaviour.

Most importantly these were the cultural characteristics that were so well explored by the d'Entrecasteaux expedition. The interactions described by Labillardière are full of descriptions of established behaviours, of emotional reactions which imply more than instinctive fears, of attempts to communicate by improvised gestures as well as words, and of curiosity about the new environment that was being brought to them. These are the normal cultural reactions whenever there has been first contact, whatever rationalisations the Frenchmen may have had for their exhaustive descriptions. These interactions show beyond any doubt that the Tasmanians, despite 14,000 years of isolation from the rest of humanity, were cognitively little different from any other humans. They lacked writing and printing, which, it has been argued, make cognitive differences in history, but they did not lack the ability to acquire these behaviours.

Representing Tasmanians

In one of his most notorious papers, Rhys Jones[43] reflected on the simple toolkit of the 19th century Tasmanians and on his discovery that the Tasmanians had once caught fish but by the 18th century had taboos against it.[44] The early recorders of Aboriginal life on the mainland were all impressed by the complex ceremonies of the Australian Aborigines, but the Tasmanians appeared to lack these. Jones concluded his reflections with a speculation that the long isolation of the Tasmanians had 'squeezed their intellectuality', asking the question 'were they in fact doomed—doomed to a slow strangulation of the mind?'

Particularly through the archaeology of the Tasmanian Southwest Forests,[45] we now know much more about the archaeology of the Tasmanians, how they coped with the vicissitudes of the climatic and environmental fluctuations of the Pleistocene,[46] how they survived the expansion of the rainforests and the isolation of the island from the rest of Australia, and how they changed their economic dependence on the sea to increase their focus on seals and abalone.[47] And amidst all this, they also maintained what we can see as a rich symbolic life—evident in their continued use of body markings, but manifest in other ways too.

In addition, since Rhys Jones's paper, we know more about the history of isolated human populations. Mike Morwood's work over the last ten years on the island of Flores would seem to suggest that there was a population of human ancestors who were isolated on that much smaller island for more like 800,000 years and yet survived until after the date when Tasmania was cut off from the rest of Australia.[48]

But I think there is another point about Jones's judgement and the historical context of our knowledge about the processes of human adaptation. Humans who speak languages use symbols in other ways too. We need to consider a much broader question of the ways in which we structure our whole lives symbolically, not least, of course through claims for the possession of land.

In our own lives, we do this at an individual level by markers of identity in the way we dress—the use of neckties, surely the quintessential symbolic marker of the 20th century, and the wearing of special clothing to denote membership of particular groups—often involving religious reasons for covering up women with habits, burqas, or just with hats or handkerchiefs. We do it at a societal level in the ways in which we demarcate the special status of buildings—from the grand precincts of religious buildings to the picket fences of suburbia—or in eating habits such as the avoidance of certain animals as foods in one society which might be common in others—horses and dogs are avoided in Australia, but we do eat pigs and cows. And we also have cultural conventions about representations—some societies do and others do not depict humans.

All of these choices are both arbitrary and conventional and thus part of the structuring of our lives symbolically. How we do this depends on choices made at levels we often do not understand but, once established, they can be defended irrationally and often to our detriment. Such choices are the stuff and substance of our cultures and they provide a measure of coherence within the groups whose customs they are. But they also mark differences between cultures and when we do not understand cultural difference, we often retreat into an irrational defence of our cultural norms as natural and 'theirs' as strange, alien or threatening, forgetting that our norms are just as strange, alien and threatening to people from other cultures.

On the west coast of Tasmania (for site locations see Figure 6.1) are vast shell middens like that at West Point—a prime site that illustrates that, although they obtained huge amounts of food from the sea, for the last 3,500 years or so Tasmanians did not eat fish.[49] Yet at Rocky Cape, 75 km away, before this avoidance, fish seem to have been caught using baited box traps and possibly nets.[50] Both items of technology imply a conceptualisation of tool-making that probably exceeded the technology described in the 19th century.

About 12 km to the north of West Point are the engravings at Mt Cameron West (Preminghana)[51]—another site where fish remains were not found. These engravings date from the last couple of thousand years, long after the isolation of Tasmania. There are two possibilities, both remarkable. First, they might be the result of a long continued tradition of engraving that was continuous from before the isolation. Or they might have been a separately invented tradition, and some might say the convergence on the use of circles and other simple images would represent a remarkable coincidence. Either way we know that the people who lived by getting food from the sea but not catching fish nevertheless structured their lives symbolically through markings of their environments such as rock art,[52] or more ephemeral tombs such as those described by the Baudin expedition in 1801 (Figure 6.6), and the marked wood found near them.[53] It seems likely that, even by the time Robinson toured the island in the 1830s, many such markings would have been rotted or decayed.

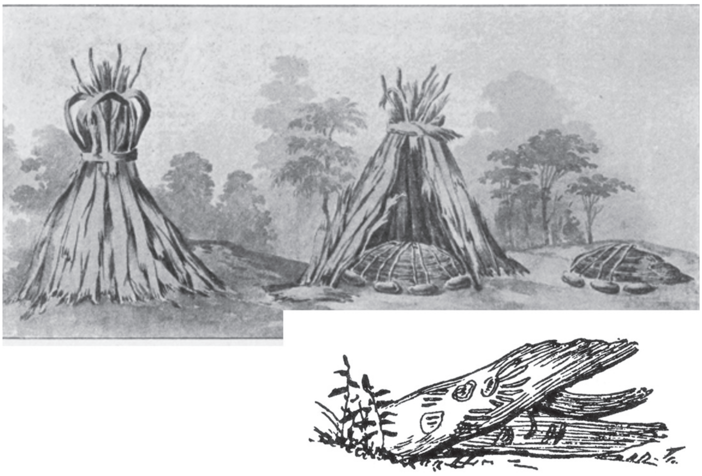

Figure 6.6 Tasmanian tombs discovered by Peron and marked pieces of bark found near the tombs drawn by Petit.[74]

At this stage we need to consider the whole record of symbol use in Australia. It is generally accepted that the watercraft that brought people to Australia is part of a suite of evidence for early use of symbols found across Australia.[54] Such evidence is widely spread across the continent from north to south, east to west and into the centre (Figure 6.5). The artefacts of first colonisation are material manifestations in the archaeological record of Australia that make it certain that the first colonists came fully equipped with symbolic communication and symbolic construction of their worlds. They were fully modern people in their anatomy and in their behaviour.

But Brumm and Moore[55] have pointed out that the evidence is not uniformly of the presence of symbolic artefacts throughout the occupation of Australia. We might represent this schematically in Table 6.1. How do we account for this pattern?

Table 6.1. Chronological distribution of evidence of symbol use in Australia.[75] *(See Figure 6.5)*

	Australia	America
75 ka–65 ka		
65 ka–55 ka	Earliest possible date	
55 ka–45 ka	More likely colonisation date	
45 ka–35 ka	Beads at Riwi, burials at Mungo	
35 ka–25 ka	Beads at Mandu Mandu, axes in NT	
25 ka–15 ka	Symbolic stuff decreasing	First colonisation, big game hunting
15 ka–5 ka	Art increasing	'eked out a mere existence'
5 ka–present	Lots of stuff	'Seeds of societal inequality and hierarchy'

In Australia, at least, there may be a sampling issue. Brumm and Moore show that the number of sites with symbolic evidence increases through time, but so too does the number of sites known for each period (Table 6.2). In fact, the number of sites with symbolic evidence generally decrease as a proportion of the number of sites known. This suggests that not all sites will necessarily have evidence of symbol use, but, as you increase the number of sites sampled, the probability of finding such evidence will increase. That is one factor.

John Speth[56] has produced a similar argument about North America—suggesting that there is an absence of markers of modernity after the early Palaeoindian stage with its big game hunters using elaborately styled projectile points (Table 6.1). For 5,000 years or so afterwards, Archaic foragers 'eked out a meagre existence harvesting seeds, nuts and smaller animals…'[57] Speth suggested that this means it is inappropriate to use absence of evidence in any argument about the behaviour of earlier hominins such as Neandertals.

Table 6.2. Number of sites with symbolic evidence by period.[76] Percentages calculated for this paper.

AUSTRALIA	N sites	N sites with symbols	Percent with symbols
>40 ka	4	?1	25
40 ka–31 ka	18	3	16.7
30 ka–21 ka	31	4	12.9
20 ka–10 ka	96	8	8.3

I, too, like to make a comparison between Australia and North America—with reference to environmental conditions. The temperature curve from the Vostok ice-core in the Antarctic shows the pattern of climate change over the last 160,000 years[58] (Figure 6.7). Australia was colonised at 50,000 (or so) years ago, but sea levels were never low enough for people to walk here. The Americas were colonised about 15,000 years ago as the extreme cold of the Arctic was ameliorating. The previous time such environmental conditions had prevailed was 80,000 years ago, and no one is suggesting that the Americas were colonised *then*.[59]

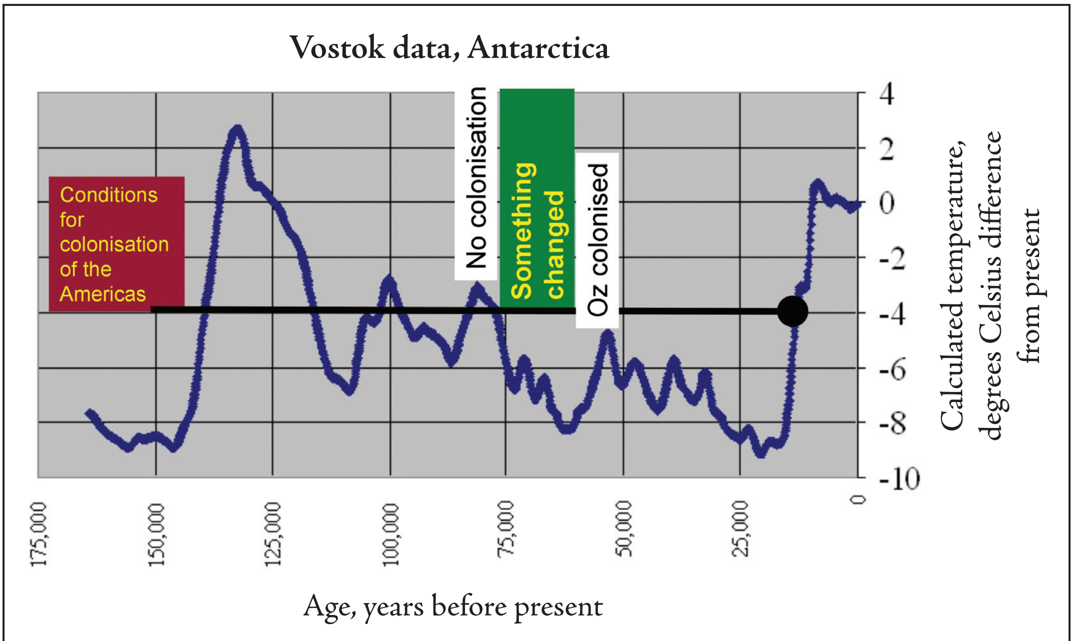

Figure 6.7. Pattern of climate change in Antarctica from Vostok ice core.[77]

Between 80,000 and 50,000 years ago something changed. I suggest it was the emergence of anticipatory planning—the propositional system implied by modern human cognition and characterised here as the emergence of language. The colonisation of the north that was necessary for people to get into the Americas across a Bering Strait made dry by the Ice Age lowering of sea level required the sort of planning that comes from propositional thought, symbol use, language use, etc. The similarity with the cognitive requirements for colonisation of Australia is only made stronger if the initial colonisation of the Americas involved the use of boats moving between coastal refuges.[60]

Bill McGrew once attempted to compare the technology of chimpanzees with the supposedly simplest human technology—that from Tasmanian Aborigines.[61] To do this he used a methodology devised by Oswalt[62] which identified the number of elements in a technology. Using this methodology, McGrew argued that the chimpanzee's termite wand and the Tasmanian digging stick were at a similar level of technology. Alas, although the intent is fine (though some found it offensive even to make a scientific comparison between humans with present-day descendants and non-human animals), but the methodology is flawed.

McGrew himself acknowledged the simplicity of the termiting wand. The digging stick, on the other hand, is not just a piece of wood snatched from the nearest tree to poke into a nearby mound that is a product of the activities of prey animals, it has been made with stone scrapers, and is part of a tool kit which includes baskets for carrying the dug up tubers —themselves not always as easy to find as a termite mound. We know that elsewhere in Australia digging sticks are also the subject of a knowable ritual and artistic life of which no trace need survive in the archaeological record.

Some have suggested (generally in conversation and not in print) that the argument is difficult because all archaeologists have left are stone tools that may reveal evidence of having worked wood. Generally such people do not argue that absence of evidence is evidence of absence, but rather that absence of evidence could be a justification for a belief in the *presence* of such symbolical complexity. This is why the evidence for the watercraft is such an important part of the argument. Once the evidence suggests that humans have reached modern human cognition, then we might suggest that the evidence of symbolic complexity has been lost by taphonomic processes. Before that we have no reason to believe it. Without these signal moments it would be easy to suggest that later absence of evidence is evidence of absence, but coming after the signal moments, a taphonomic argument is appropriate.

So, going back to Jones's approach to the Tasmanians and their cultural practice of not eating fish, what can we say thirty years later? What seems to me to have been missing from Jones's account was a sense of the variation among fisher-gatherer-hunting people. He was not alone in this. For too long, textbooks emphasised that there was a time before agriculture when all people lived by fishing, gathering and hunting, without paying enough attention to the variations among modern people who live that way, and less to the variations that existed in the past. My own work in Spain has emphasised that the variations between east and west Mediterranean peoples led one lot to agriculture, the other not.[63] The contrast is exemplified by the encounter at Recherche Bay where the French planted gardens, which, it must be said, did not prosper during their absence. However, in 1793, Labillardière hoped the Tasmanians would soon take up agriculture, if only to free the women from the exertions of diving for abalone and crayfish.

Views that encapsulate a preconception of the advantages of agriculture over all forms of fisher-gatherer-hunter life have been widespread historically and are (almost) enshrined in the Middle Eastern myth of Jacob and Esau. Early accounts of first contact in the Americas seem even further from reality than those biblical myths,[64] emphasising yet again the truly extraordinary quality of the descriptions made at Recherche Bay. Labillardière made comparisons between the Tasmanians and agriculturalists and speculated about the likely outcomes of contact with colonists,[65] but in his writings there are not the obvious distortions of the North American accounts. In both cases—the bible and contact with North American Indians—what was being established was a myth of justification for depriving the Indigenous inhabitants of land. Cook's account was not free of this—stressing as it did the lack of agriculture—but Labillardière seems to have been concerned with assessing the evidence before passing judgement or making political claims.

Now we are in a better position to understand that fisher-gatherer-hunter societies were diverse particularly through the ways they related to each other and their environments symbolically. We see this in the archaeological record of the diversity of rock art across the country—including Tasmania. But we see it too in the fact that, despite a presumptively small initial colonising group who presumably spoke a small number of languages, at contact greater Australia (including New Guinea) had more than a thousand languages.[66] Such diversity is the result of a 50,000-year history of diversification and, I would argue, the generation of change and difference through the use of symbols.

Seen in this way, the apparent impoverishment of Tasmanian culture, which Jones pointed to as a paradox, is only paradoxical in the context of Jones's preconceptions about the directedness of cultural change. Provided we hang on to the language–using, cognitively modern nature of the behaviour of Tasmanians, the appearance of Tasmanian culture, described with such acuity by the French at Recherche Bay, is simply a manifestation of variation in behaviour among fisher-gatherer-hunters.[67]

Understanding how and why some groups of fisher-gatherer-hunters, but not others, discovered a way of life we came to call agriculture and pastoralism[68] must be seen against this sort of understanding of the factors that generated diversity between different peoples in Australia—but that is another story.

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7 The technology of whaling:
Why they did it and how

Ian D Rae

Most evocations of whales and whaling are visual. While I have experienced this in person and through print media, I also have a personal experience that is somewhat different. A few years ago, I visited the old whaling station at Cheynes Beach, near Albany in Western Australia. Their last whale was caught and dismembered in 1978. Now it is possible to visit the museum there and take a tour of the works. For me, the most evocative part of my visit was the smell of a sample of whale oil. I had not experienced that odour for at least 50 years, but I remembered it well, although until I visited Cheynes Beach I did not know what it was.

The oil of olfactory memory came along with the workbench and the woodworking tools of my maternal grandfather who had worked as a carpenter for the Victorian Railways. He died long before I was born. I still have the writing desk he made, but the tools are long gone, as is the old lemonade bottle half-full of a viscous, amber-coloured liquid. Now I knew what it was … but what had he used it for?

Seeking an answer, I wrote about this experience in my regular column in the magazine *Chemistry in Australia*. Several people responded that whale oil was the preferred lubricant for sharpening tools on the whetstone. And yes, the whetstone I inherited was plastered with gunk that I had to clean off before I could sharpen my tools. Being a modern young man, I applied a film of mineral oil. Twenty-five years after it had been applied, the whale oil was more solid than liquid and it didn't smell, and so I had never made the connection with the stuff in the bottle.

My experience was a reminder to the historian of chemical technology in me of the important part that whale oil played in society. It served as a specialist lubricant, as a lamp fuel, as raw material for soaps and candles and later in margarine. In addition there was whalebone. Not much use was made of the real bone, except for scrimshaw and furnishing museum displays, but the strands of bony material—known as baleen—found in the mouths of certain species was a valuable by-product.

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 87-97.

In telling the story of the whaling industry and its products we need to consider technological displacement, international agreements on fishing, natural and synthetic materials, and the relative importance—both culturally and economically—of different primary products.

I do not intend to discuss the present day controversies surrounding whaling, but rather to concentrate on historical and technological aspects of the industry and on a long period when current concerns were never, or almost never, raised.[1] Despite its present-day image, historically the whaling industry has largely been about oil and baleen and not about whale meat. The meat has always been a niche product in Japan and demand for it has declined in recent years. In Norway and Iceland, however, it is still widely consumed and is readily available.

Early whaling

The earliest stories are about shore-based whaling. About whales beaching or being caught in shallow water where they could be killed and eaten by people living on the coast. As well as opportunistic whaling, in many places whales traveling past or loitering within sight of the shore were attacked by boatloads of men armed with harpoons and then finished off with lances (long spears). This was a much more hazardous business than carving up a passive (dead or near-dead) whale, since once a harpoon was lodged in the whale the whalers had to deal with an angry and very dangerous animal.

Figure 7.1. Iron 'try pots' were used to heat whale blubber to extract the oil.

There is no doubt that Inuit people of northern Canada have been catching and eating whales for a very long time.[2] There are also references to early Chinese whaling and the use of 'dragon blubber' in lamps in the middle of the first millennium before the Christian Era.[3] Moving forward many centuries, Japanese people living near the coast were adept at netting whales from as early as the beginning of the 18th century.[4]

Early in the 19th century, shore-based whaling became a well-developed industry and it was practised extensively in the Derwent Estuary and at Recherche Bay. The desired product was the oil that could be extracted from the fatty outer-layers of the whale's body. The bony fronds of baleen were secondary products. The oil was extracted by heating chunks of blubber in large iron pots, called 'try pots' ('try' being an old term meaning to 'separate' or 'extract'). Spent blubber, from which the usable oil had been extracted, was used as fuel under the try pots. Some try pots survive in Hobart public places (Figure 7. 1) while others find use as garden ornaments.

It was not a huge technological leap for the whalers to move from standing on the shore watching all the whales go by, and dashing out to pick off one or two, to full-scale expeditions in larger ships that could cruise the oceans in search of their prey. Once a whale was sighted, small chaser boats were sent after it and the kill had to be effected from a small boat that could be smashed up or at least towed around by a wounded whale. Shore-based whalers had simply taken blubber home to be rendered down in try pots, but ocean-going whalers had try pots mounted on their ships. What they took home was whale oil in wooden barrels.

This is the kind of whaling that most of the novels and reminiscences are written about. The classic description is in Herman Melville's *Moby Dick*, published in 1851, the year that gold was discovered in New South Wales and Victoria. Melville gives some interesting detail about the try pots. They were two in number, made of iron and held in a firebox made of brickwork which was insulated from the wooden deck by a 'shallow reservoir' of water which was constantly replenished. From early in the voyage, the ship's carpenter put his scraps and shavings in the furnaces to serve as kindling, but once the try pots were in use the fuel was 'crisp, shrivelled blubber, now called scraps or fritters'. Deck hands added chunks of blubber to the try pot, sieved off the spent scraps, and ladled hot oil into cooling pans from whence it was transferred to barrels.

Some of the oil never made it back to port. 'In merchantmen', says Melville's narrator, Ishmael:

> oil for the sailor is more scarce than the milk of queens. … But the whaleman, as he seeks the food of light, so he lives in light. … See with what entire freedom the whaleman takes his handful of lamps—often but old bottles and vials, though – to the copper cooler at the tryworks and replenishes them there, as mugs of ale at a vat.[5]

So the ship's quarters are well lit, and moreover, with the purest oil available, no doubt free of the taint of rancidity that might ensue after a long voyage.

This brings me to another feature of the shore-based whaling industry—its smell. Once the oil and baleen had been recovered, the rest of the carcass was waste. One remarkable use has been reported as a cure for rheumatics, the sufferer being lowered into a decaying carcass[6]—an unusual form of redemption by total immersion. In general the carcass was left to rot on the shore or sometimes consigned to the tides in the hope that they (and the sharks) would take care of it. Regulators in most jurisdictions soon stepped in to ensure that this noxious trade was conducted away from the noses of the gentry.

Shore-based whaling in Tasmania

There were many black (right) whales to be seen in the Derwent Estuary when the settlement at Hobart was established in the first years of the 19th century, and so shore-based whaling became a prominent local industry for the colony of Van Diemen's Land.[7] At first the techniques were as described above, with whales attacked by men who rowed out from the shore, but later there were small ocean-going vessels that caught whales. In both cases, the processing was done on-shore. In a typical year of the early 1830s, 200 whales were taken. But as a consequence of increased activity in the colony, and the reduction in 1828 of the duty that had to be paid on whale oil landed in England, the annual take rose to a peak of over 1,000 in 1839 before declining to fewer than 100 by the mid-1840s. Whale oil and baleen were valuable products, and by the 1820s its export value equalled that of wheat and flour. The two commodities remained in lock step until whaling declined in the 1840s. There were ancillary industries, too: making barrels to contain the oil and, from

Figure 7.2. Sculpture of a Southern Right Whale at Recherche Bay.

about 1840, building wooden ships for the trade as whalers ventured further afield.

In about 1830, a number of shore-based whalers set up at Recherche Bay where whales came to calve.[8] There is extensive archaeological evidence of their presence there (at that time up to fourteen stations were operating), and the whaling tradition is marked by a modern sculpture of a southern right whale at the entrance to the bay near Cockle Creek (Figure 7.2). When a whale came into the bay, there was often fierce competition between whalers and, on one occasion, it is said, no fewer than twenty-one boats were pursuing a single whale. Although there were established rules of possession for those who actually killed the whale, there were some pretty robust encounters, especially as whale numbers began to dwindle after 1840. The decline continued to the point where virtually no whales came inshore. It was all over for whaling in Recherche Bay by 1860.

Ocean whaling

Whales were hunted in the North Atlantic and North Pacific, and there has been extensive writing covering the practices and economics of the industry, archaeological investigation of the sites of processing factories, and the establishment of museums such as the famous one at New Bedford, Massachusetts.

South of the equator, whales were abundant not only in Tasmanian waters but also further south, where there had for more than half a century been intense competition between northern hemisphere whalers[9] who traveled long distances in search of their prey. On behalf of the local industry, whaling stations were established on the east and west coasts of Australia, along the routes of annual migration.[10]

Australia's whaling tradition began in the late-18th century, well before the Tasmanian operations described above. Whales were observed, in the vicinity of Sydney, by the crews of ships that brought settlers to Australia. Having unloaded their human and material cargoes, two of the ships set out to sea in successful pursuit of these cetacean prizes. In addition, five of the six convict transports that arrived in Sydney in 1791 carried out whaling cruises on their return journey. Two of them, the *Brittania* and the *William and Ann* caught whales near Sydney on 25 October 1791.[11] It is not recorded what use was made of the catch, or whether the ships possessed the equipment needed to render the oil and store it for on-the-spot use or eventual sale back home.

Harpoons and gunnery

In the 19th century the harpoons of the *Moby Dick* era gave way to gunnery; the advent of harpoon guns is usually attributed to the Norwegian Svend Foyn, who was awarded a patent for a harpoon cannon in 1872. This weapon, allied with steam-driven ships, enabled whalers to deplete the population of most whales to the point where whaling became uneconomic. Before that decline, which was to be repeated on several subsequent occasions and in several regions, a connection was established between the whalers and the military and naval forces engaged in land- and sea-based gunnery, however, commercial whaling was the recipient of technology transfer and adaptation rather than a leader in technological development.

There were pre-Foyn developments in the whaling industry that demonstrate how army technology slowly found its way to the decks of the whalers. England's William Congreve invented the military rocket in 1804 and it was used in battles against French forces, first at Copenhagen in 1807.[12] Soon after, whales were attacked with harpoon–bearing rockets however, the whales sank before the carcasses could be recovered so the rocket was not used commercially until the mid-1860s and then only sparingly.

Swivel guns were used from the early-18th century, but the flintlock technology with black powder in a flash pan did not lend itself to the damp conditions at sea. Following the military, the next development was initiation of the charge by a percussion cap, in the gun invented by Britain's William Greener. The gun was accurate up to forty yards, although it was seldom used beyond twenty-five. Two further improvements were made by German inventors, JP Rechten and HG Cordes, whose patent in 1856 was for a larger-bore gun and a harpoon with an explosive head (a 'bomb'). The bomb had a separate gunpowder fuse which could be adjusted for burning time, typically twenty-five seconds, after which the explosive charge of the embedded harpoon went off with deadly effect. In another version, the 'bomb' was in a separate hand–held harpoon that was thrust into the whale, the impact triggering a conventional 'cap' (detonator), like that used in a gun, to explode a small charge of black powder.

There were others in the second half of the 19th century, too, but Foyn's invention dominated the field. Its larger charge of gunpowder, muzzle loaded, was better for propelling the harpoon, as was the heavy line to which it was attached. In such a harpoon, the flukes were sprung out by the explosion, making the harpoon much harder to dislodge from the whale. The harpoon charge was initiated on impact by the shattering of a vial of sulfuric acid, thus releasing the acid onto a sensitive substance (probably potassium chlorate) that initiated the killer punch. This military technology was transferred to other activities, as well, in the late-19th century. Explosions initiated by sulfuric acid were popular with the Fenians in London in the 1890s, and possession of sulphuric acid by people not involved in the chemical industry, where it was an important 'heavy chemical' (and its volume of production a key indicator of industrial development), was grounds for suspicion of terrorism.[13]

A poor man's version of the harpoon cannon was the 'shoulder gun' invented by Oliver Allen in 1846. This was a hand-held gun, rather like a present-day shotgun, and it could propel a harpoon from a ship into a whale at close quarters. This could be done from the small boat in which harpooners normally operated, or from the larger parent vessel. The Hobart Maritime Museum has an excellent whaling display which includes a shoulder gun.[14]

Before I leave the killing fields, I just want to mention some zany inventions. One was a harpoon filled with prussic acid (cyanide) which was intended rapidly to poison the harpooned whale but never did. And, moreover, workers refused to work on such carcasses for fear of being poisoned. A more sophisticated version using curare also failed, and was attended by concerns for the health of anyone eating curare-tainted whale meat. Another innovation was an electric harpoon that could give the whale a jolt from a hand–cranked generator aboard the boat and a long electrical cable. Protected by a US patent of 1852, this one never worked well and, despite some later successful trials, was not widely adopted.

Dissecting the carcass

There is an extensive literature on the implements used to slice the blubber from the whale carcass, most of which involved long handles and extremely sharp blades, the latter not infrequently the cause of serious accidents.[15] An Australian contribution to this literature is that of Pearson, which draws on local sources of information, including economic data.[16] While much of the equipment was imported, Pearson draws attention to the local ship–building industry, and also remarks on improvisation such as the use of sheep boiling tanks for rendering blubber. Dissecting tools are usually featured in museum displays, too, being more manageable in those venues than whaleboats or swivel guns.

The products

Until the late-19th century, whale oil was used as lamp fuel and a lubricant. Brought up in the era of electricity and petroleum, it can be hard for people in the 21st century to imagine a world lit by candles (mainly animal products) and by lamps fuelled with whale or vegetable oils. Even the lamps we remember from grandma's house, or in those of our country relatives, were fuelled by the kerosene that displaced whale oil in this application.

Whale oil was said to burn with a particularly white light and was preferred in many domestic and commercial applications throughout the 19th century. It also went down to the sea as fuel in the lamps of lighthouses. The advantages it brought to the sharpening of tools, although widely spoken of in craft circles and revealed to me as I described earlier, have not been recorded in the technical literature I consulted. Only one step removed is the use of oil as a lubricant for clocks, again largely a 'craft' matter, but we know it was preferred in many applications. However, in the highest-performance clocks like those of William Harrison, no oil was used, and gear trains were instead constructed of low-friction timber.[17] The reason is ostensibly because temperature-induced changes in lubricating oil viscosity would have been a threat to the uniform working of the mechanism. However, the formation of gum, under the influence of oxygen, would also have been a factor militating against the use of an unsaturated oil.

Soaps and candles could be made from whale oil, as they could from other naturally occurring fats and oils, by splitting the oils' chemical combination of fatty acids away from the glycerol, with which they are chemically combined in the natural oils, in a process known as saponification. The sodium salts of these acids are common soaps, while the acids themselves can be fashioned into candles. The best of these, stearine candles, came from beef fat. These animal and vegetable raw materials were displaced by a mineral one, paraffin wax.

There remained some competition from cetacean sources, in the fatty material, spermaceti, that could be was recovered from the head cavity of the sperm whale. The spermaceti is chemically unlike the whale oils. It strongly resembles beeswax in its chemical composition and, like beeswax, was used for the manufacture of candles.

But what of the strong, flexible strips of 'whalebone', as baleen was known? Think of today's use of plastics and, in some cases, high quality steel strips, and you can quickly arrive at the sort of uses to which this marine product was put. They included umbrellas, whips, crinolines and corsets. One wit dubbed the corset 'a synthetic exoskeleton fortified with whalebone'. At a cost of £800/ton, whalebone was a high-tech product indeed, and a whale of the baleen class (like our Southern Right Whales) might yield up to three-quarters of a ton of it.

Whale oil and margerine

Although the main focus of this paper has been the 19th century, the story deserves a coda that enables us to make a connection with our own times. Starting in the late-19th century, petroleum products took over the lamp fuel, candle, and lubricant markets. Other markets opened up, however, based on the chemical similarity of whale oils to vegetable and other animal fats and oils. As remarked earlier, all of these are chemical combinations of glycerol and a range of fatty acids, with long carbon-chains as shown in the following table.[18]

Table 7.1 Typical fatty acid compositions (% of total acids in each case)

Source of fatty oil	Saturated C_{14}, C_{16},C_{18}	Unsaturated C_{14}, C_{16}, C_{18}	Polyunsat. C_{18}	Polyunsat. C_{20} and C_{22}
Whale	24	28	20	28
Grey seal	19	45	10	27
Palm	47	43	10	–
Peanut	14	56	26	–
Butter fat*	54	31	–	–
Beef tallow	48	50	2	–

* butter fat also contains up to 15% of lower acids.

The unique characteristic of whale oil is its content of longer–chain fatty acids and its high proportion of polyunsaturated acids. While these differences were of chemical significance, and impacted to some extent on the processing of the various products, they made little difference to the digestibility and nutrient value of the oils.

Ousted from many uses by petroleum products, the major outlet for whale oil, and also for a number of the vegetable oils, became the production of margarine by large industrial corporations like Unilever.[19] Starting in the 1870s and growing slowly over the next century, margarine production represented a major incursion of the chemical industry into food production. By early in the 20th century, even allowing for the cost of the hydrogenation process that was used to alter its fatty acid content, margarine could be produced much more cheaply than butter. Even vegetable oils were more expensive: in 1935, coconut, palm and soya bean oil brought about £20 a ton in London, with peanut oil more expensive at £32, but all were undercut by whale oil at £12–£15/ton. This is part of a larger story of the butter versus margarine wars that raged for nearly a century. The availability of whale oil had particular impact in Germany in the 1930s, where strong pressures were exerted against whale products—and hence against whaling—by the dairy farmers.

Most countries have their stories of these margarine wars. For example, in Victoria, the colouring of margarine was prohibited by law in 1893.[20] Although such restrictions disappeared from the Australian scene in the early-20th century, they lived on in the United States where restrictive legislation was repealed only in 1950,[21] and in dairy–rich New Zealand where sale of margarine was illegal until 1974.[22]

In Canada, margarine legislation and regulation has been erratic. Recognised by an Act in 1878 as a 'wholesome food', provided it was correctly labeled, it was banned in 1886 as 'nefarious', permitted between 1918 and 1922 as a War Measure, then banned until 1948.[23] From 1948, Canadian provinces were free to rule on margarine, and Quebec has retained to this day the requirement that margarine should be white.[24]

Post–war whaling

After a lull during World War Two, there was a resurgence of whaling in the late 1940s and 1950s, and two food shortages were important drivers. The first was a world-wide shortage of fats and oils caused not only by the upheavals of war but by poor harvests in 1947. Producer countries in the tropics also began to consume more of their own vegetable oil production, so there was less for export to their traditional markets in the Northern Hemisphere. The expansion of production in Malaysia, now the world's leading supplier of palm oil, did not begin until the late 1950s, following a World Bank recommendation and the achievement of independence.

The second stimulus for resumption of whaling was a desperate food shortage in post-war Japan. The head of the US occupying forces, General Douglas Macarthur, gave approval for limited Antarctic whaling in August 1946. The oil was to go to the International Emergency Food Council, but the meat was retained for human consumption in Japan. Despite complaints from other whaling nations such as Norway, Japan's temporary permission was renewed year by year until the practice became institutionalised.[25]

Although the market was busy for a few years, as other meat became available in Japan the human consumption of whale meat became the exception rather than the rule. It was more widely available in Norway and Sweden. In Britain, at least, most of it went for pet food, but Australians who studied in Britain in the late 1940s recall whale meat being served in college dining rooms.

And what about Australia? Twentieth century interest in whaling flickered from time to time, but nothing came of Douglas Mawson's recommendation in 1914 to establish a whaling industry. Returning from an Antarctic voyage, he had observed the large whale populations in the far south. Then there was the activity at Eden,[26] on the New South Wales south coast, where killer whales apparently worked in cahoots with their human brethren to prosper the industry.

Australia did not stand aside from the resurgence of whaling in the mid-20th century. In the trying conditions that followed World War Two, Australia took the opportunity to increase primary production by encouraging, among other things, the whaling industry. This saw the reopening of old stations at Point Cloates in Western Australia (1949–1956) and Byron Bay (1954–1962), and establishment of new shore stations at Babbage Island near Carnarvon (1950–1955), Cheynes Beach near Albany, Western Australia (1952–1978), Tangalooma on Moreton Island, Queensland (1952–1962), and Norfolk Island (1956–1962). Oil was sold into the margarine market, but most of the solid material was converted to pet food or fertiliser. Not all of it, however, because in the 1950s whale steaks were served as a novelty once or twice a week in the canteen at Tangalooma.[27]

Conclusion

The whaling industry that we see today, and which arouses so much controversy, is much smaller than the industry that made important contributions to primary production. At first it provided fuels, lubricants, candles and strong, flexible materials; later it was mostly edible oils. To misquote the slogan of animal activists, meat was minor. The eclipse of the industry by petroleum and other materials, on the one hand, and by an extended range of vegetable oils on the other, means that its former importance to international trade is less noticed today. However, whale oil was once an important commodity, the production of which involved technological development, international agreements, human and other animal nutrition, and agricultural economics

The technology of whale catching and processing has not been completely lost to view. A significant reason for this is its potential to provide good visuals in a small but important number of museums, including those at Hobart, Cheynes Beach and (when it is put on display) the Queensland Museum in Brisbane. This account tries to go beyond the museum, to show why they did it and how they did it, and to link the history of whaling technology with the history of weapons, food, boat building, the fashion industry and the settlement of Australia by Europeans. I have drawn on the work of specialist historians and made a new synthesis of their work that gives a broader perspective, ranging from the arcane and the frivolous to the margarine you grew up with.

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8 The lost garden of Recherche Bay

Jean-Christophe Galipaud, Antoine de Biran, Greg Jackman, Anna Gurnhill, Rufino Pineda & Angela McGowan

A surface stone layout near the top edge of the coastal bluff at Coal Pit Bight, in the northern part of Recherche Bay, has recently been the subject of controversy.[1] The stone feature is located in the general area of the 1792 French garden ('Delahaye's garden') indicated on the French maps. This feature has dimensions close to those indicated by the French and for this reason it has been proposed that it represents the ultimate witness of the former French garden. Discrepancies between the position and nature of the stone layout and the 1792 and 1793 descriptions have fuelled debate between historians on this matter and the need for some further research has been stressed. This chapter describes the work undertaken on the area of the French garden in 2006 by a French-Australian team led by JC Galipaud.

The objectives of the research can be summed up in the following questions: Is the rock layout in any way related to the French garden and are there scientific ways to demonstrate it? If not, does the general environment give us some clue as to the possible place of this garden?

The garden in history

To answer these questions we need first to understand the reality of an 18th century explorer's garden. Gardens were an important part of a botanist's duties during 18th century French expeditions. Gardeners were to collect useful plants and seeds to enrich the variety of European vegetables and fruits and were at the same time to sow European seeds in the new lands to facilitate later travels and, eventually, future settlement. According to d'Entrecasteaux:

> Various seeds sowed by M. Delahaye, gardener-botanist, might in future furnish supplies to navigators who will shelter in this haven, if however their produce escapes the destructive zeal of the natives who might mistake the new plants, the properties of which they are ignorant of, for all the other herbs which they seem to allow to perish with their fires.[2]

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 99-118.

During both visits, seeds were sown in several areas that were believed to be suitable for cultivation, in particular cress, which grew well in damp places. In addition, in 1792, the gardener was asked to prepare a garden with a variety of plants for future travelers (including celery, chervil, chicory, cabbage, grey romane lettuce, turnips, white onions, radish, sorrel, peas, black salsify and potatoes).[3] It took three men more than three days to prepare the ground and then sow the seeds.

D'Entrecasteaux explicitly asked that this garden be marked on the chart of the bay. This can be taken as an indication that this Tasmanian garden meant more to him than the usual dispersal of European plants or trees in newly found lands during 18th century expeditions. The time taken to prepare the ground, the diversity of plants that were sown and the diligent mapping of the place, are all indications of d'Entrecasteaux's wish to create an enduring record of his visit. A place with good and sheltered anchorage, fresh water, abundant wood, a rich marine environment, benign inhabitants and fauna, and a climate close to that of Brittany, must have seemed an appealing place indeed for a sailor.

Location of the garden

The mapping of Beautemps-Beaupré

In 1792 the cartographer Beautemps-Beaupré with the help of Jouvency, the second cartographer, made a chart of the *Port du Nord* (now called Pigsties Bay), or *Baie A* as it is mentioned on the general charts of the *Baie des Tempêtes*. Beautemps-Beaupré was already a leading geographer and cartographer when he joined the expedition. His work during the expedition, together with his development of later survey techniques, and the accuracy and systematic nature of his maps, led to them being taken as examples by later geographers.[4]

The maps were made from the sea with light embarkations along the coasts. The instruments used were the graphometer and the plane table. Using triangulation methods, the cartographers were able to plot precisely the coasts and the main points of interest further away from the shore, as long as they were visible from the sea (a condition which the garden probably did not meet).

Modern maps of the area might today challenge the accuracy of this 1792 map, although there is remarkable similarity between the published 1792 map of Baie du Nord and the current 1/25000 topographic map of the area. The accuracy of a map should be considered with regard to the accuracy of the instruments used to fix and plot a position. In this regard, Beautemps-Beaupré's charts of Recherche Bay are of outstanding quality.

Available cartographic resources for Pigsties Bay

We are in possession of several drafts and maps of the bay, with and without indications of the garden. These documents were obtained from the National Archives in Paris in 2005. These archives are incomplete and lack in particular some precise drafts of the bay that might still be located elsewhere. The documents of the d'Entrecasteaux expedition, and particularly the maps, were scattered during and after the return to France. Beautemps-Beaupré made two copies of the set of maps drawn during the expedition and some of the copies lack the type of information we are seeking. It is not possible to determine whether the maps from the National Archives in Paris are originals or copies.

The map resources for the *Port du Nord* are:

a. A partial draft of the bay (Figure 8.1) with indications of bearings and stations. This draft was probably drawn at an early stage. It shows mostly the coast. The garden is not depicted.

b. A lightly colourised map of the Bay (Figure 8.2), with indications in sepia ink of the topography. Soundings, anchorage of ships and rivers are marked. The garden is positioned as a near square without details. We assume that this map is a final draft made in 1792 (also published by Plomley).[5]

c. A black and sepia ink map with topographic details (Figure 8.3). The garden is larger in size on this map and has details on its internal layout. This map is the proof drawn prior to engraving the final print (Figure 8.4). It is very similar to the known original engraving, except for the internal layout of the garden, which has been positioned differently on the published engraving.

Figure 8.1. Draft of Port du Nord. Only part of the coastline has been drawn. (Queen Victoria Museum)

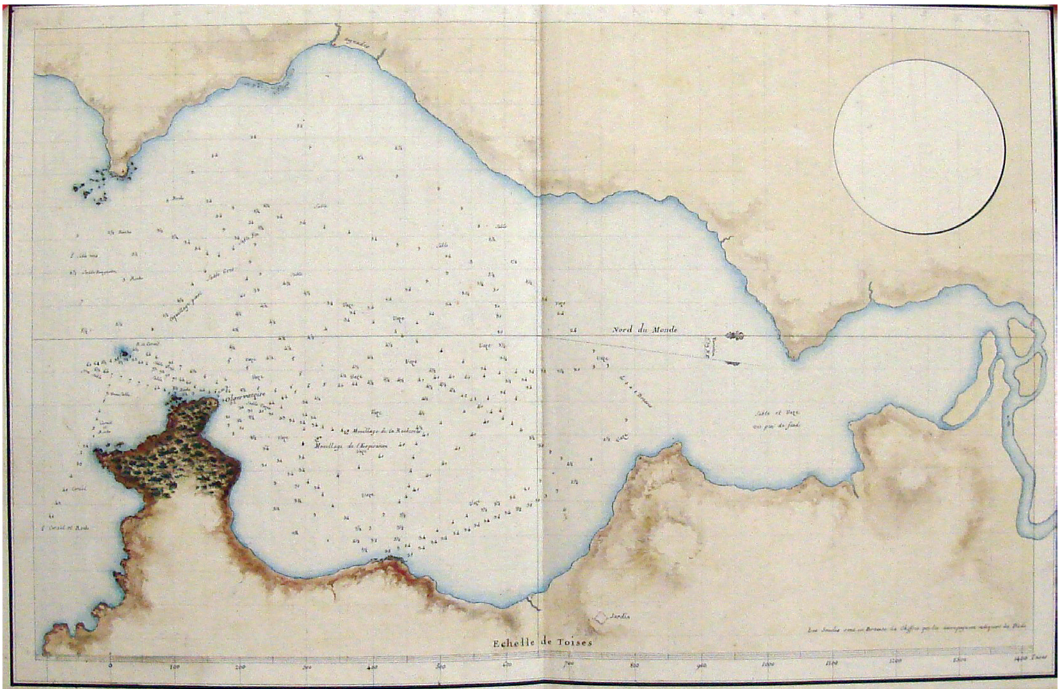


Figure 8.2. Coloured map of Port du Nord. (Queen Victoria Museum, Launceston)

Figure 8.3. Proof of final engraving of Port du Nord. (National Library of Australia)

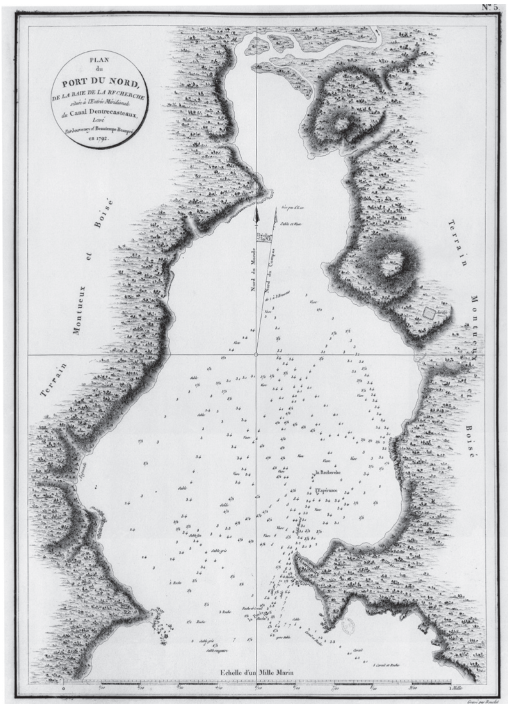


Figure 8.4. Original published map of Port du Nord. (National Library of Australia)

From these documents we can observe that there are differences in the drawing and positioning of the garden. It appears that the later documents, prepared in France for publication, emphasised the garden layout and not its position.

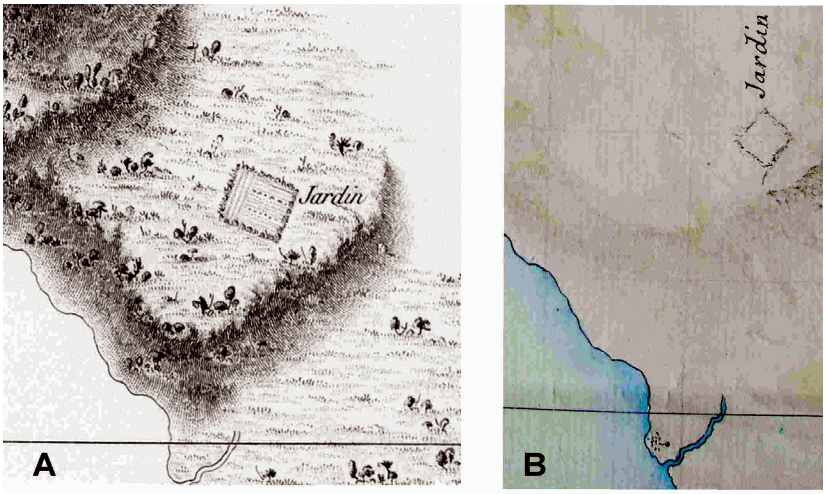
Size and position of the garden

The written accounts and the maps give us some information on the size and location of the garden. The gardener himself speaks of a piece of land of '28 pieds carré' which could be translated either as '28 feet square' or as 'a square of 28 feet per side'. In 1793 Labillardière gives a more precise description[6]: 'It was a plot of ground 27 Feet by 21 Feet (8.8 m and 6.8 m respectively. One French foot of the time equals 0.3248 m), divided into four beds', and later, 'this spot which is very well dug for an extent of nine meters by seven, had been divided into four patches', which suggests that the garden was a near square.[7]

The distance from the garden to the shore can only be estimated by using the scales of the different maps (a French *toise* is equal to 1. 949 m). Map B: (Figure 8.2) Size of the garden 28 x 30 m; distance to the shore: 159 m (81.7 toises). Plomley estimated the distance to the shore using the same map to about 80 toises (156 m) but indicated 146 m in his book.[8] Map C: (Figure 8.3) Size of the garden 44 x 53 m; distance to the shore: 149 m (76.5 toises).

Projection of the original Beautemps-Beaupré map (Figure 8.4) onto the actual topographic map gives a distance of about 175 m. The orientation of the garden relative to geographic north also varies: 34°E on map B (Figure 8.2) and 19°E on the final print (Figure 8.4).

The discrepancy between the written accounts and the measurements on the maps indicate that the garden was purposefully drawn larger on all the maps in order to make it more visible (Figure 8.5). The largest representations of the garden are on the final proof and on the published map, where the details of the layout of the garden necessitate a minimum size in order to be discernible. This exaggeration allows us to



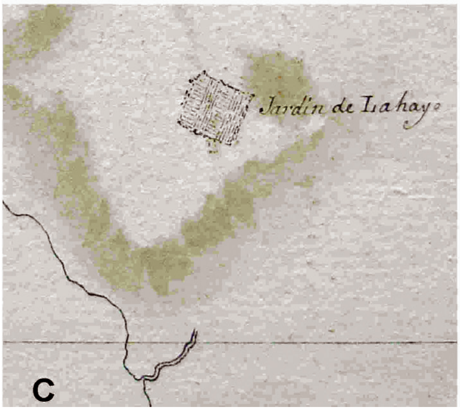


Figure 8.5. Three representations of the garden of Delahaye: A is from the published engraving (Figure 8.4), B from the colourised map (Figure 8.2) and C from the final proof for the engraving (Figure 8.3). Note the differences in the layout of the garden between C and A.

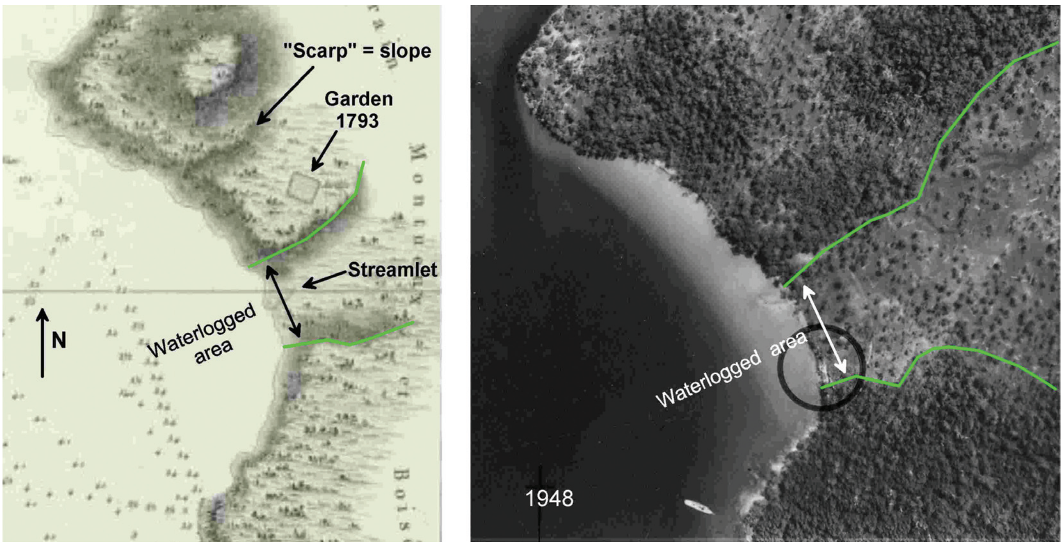


Figure 8.6. Delahaye's garden on the 1793 map (from Figure 8.4), and (b) the same area in 1948 from an aerial photograph. Substantial deforestation had taken place by 1948, but nowadays the forest cover is more homogenous. (The black circle on the original photo is irrelevant here.)

conclude that the drawing of the garden on the map is not accurate enough to give us an exact representation of what it was, nor to allow us to extrapolate its exact size. The distance between the garden and the shore however is quite similar on all maps, between 150 to 170 m. Thus we can assume that the garden has been positioned with accurately and that only the differing sizes of the garden itself limits our ability to infer its correct position.

Previous research and exploration

The garden of Delahaye has always been seen as a potentially visible and durable witness to the d'Entrecasteaux expedition's stay at Recherche Bay. Lady Franklin's visit to the bay in 1838 gave expression to this quest as well as the first description of what might have been the French garden. Serious attempts to locate the garden were made by a group of local historians from the Far South Historical Society in 2003 and the re-discovery of the garden was announced the same year.

The stone structure found in 2003 by Bob Graham and Helen Gee, which is considered potential evidence of the French garden, is: '75 m in direct line from the northern end of Crescent Beach.'[9] The garden as they describe it is:

> of symmetrical shape and measuring approximately 9 m by 7 m and divided into four sections, its inner and outer lines are edged by stones, some of which may have been quarried from a nearby outcrop.[10]

In 2003, Gaughwin, Tasmanian Forest Practice Authority archaeologist, noted the need for an archaeological excavation and analysis of the soil between the stones of the structure. She also questioned the stones as an adequate marker for the garden site.[11]

During a brief visit in 2005, Galipaud and Richard tested the proposed location against the known descriptions in the French archives. Some of the characteristics of the garden and its location were examined. The authors concluded in their report that the discovered stone structure did not fully comply with the French descriptions. Of particular concern was the size and location, which did not exactly match the 1792 descriptions, and, as Gaughwin had also noted, the stone outline, a feature never mentioned in French accounts.[12]

Objectives and methods

In view of this, several objectives were identified for further study of the French garden in 2006. Most importantly it was necessary to assess, if possible, the nature of the stone structure found in 2003, and to survey and test the larger potential area of the garden as delimited on the 1792 and 1793 maps of the baby. Furthermore, due to the obscure nature of any potential biological remains, sampling of soils for possible pollens, starch grains or phytoliths was also planned, not only for the stone structure but also for the wider potential area of the garden.

The survey of the area of the stone layout and of the potential extended area of the garden was undertaken with particular attention to soil quality, the nature of local vegetation and the stone and (possible) earth structures. The geology and soil characteristics of the place are particularly relevant here as they probably indirectly or directly influenced Delahaye's choice of location for the garden (Figure 8.6).

The methods used included a geophysical survey of the stone layout to check for artifacts (EM38 magnetometer) and to provide a non-destructive assessment of the structure, including potentially hidden buried features (EM38 magnetometer and fluxgate gradiometer). Archaeological mapping, excavation of one key area and core sampling, completed the survey.

Geology

The shallow geology of the stone structure site is weathered bedrock and shallow soil with loose pebbles and boulders. It is unclear whether the rocks derive from in-situ weathering, and which part of the soil profile is residual or transported. The reader is referred to Sharples[13] for a description of the glacial and periglacial geomorphology in South East Tasmania, and to Duncan[14] for the present vegetation in the area of the garden.

The garden area is part of the 'Southport Lagoon Plains Land System' while the southern part of Recherche Bay is part of the 'Catamaran Land System'. The attributes of those land systems and landforms are detailed in Davies[15] and Derose.[16]

The type of soil in the garden area probably fits within the classification of Grant et al[17] for Tasmania. Their description of the suitability of this kind of soil for agriculture, regeneration and forestry is relevant here. Their comments probably apply also when considering the suitability of establishing a garden, particularly as they indicate the amount of preparation ripping and ploughing necessary for effective cultivation. The main types of soil for the potential garden area as a whole are:

a) *Loamy over mottled clayey soil under dry forest*. The soil is a very dark greyish brown clay loam becoming paler with depth over dolerite bedrock. This soil is poorly drained and any attempt to establish plantations 'would require deep ripping on the contour to improve subsoil rooting and improve moisture characteristics'.[18]

b) *Red clayey soil under dry forest*. The soil is a dark brown clay loam becoming more yellow with depth. As for (a), it is poor soil for plantations and deep ripping is necessary.[19]

c) *Yellowish brown mottled clayey soil under wet forest*. This soil is a very dark greyish brown clay loam becoming greener with depth. It is more suitable for plantation with 'deep ripping of compact subsoil and mound ploughing [necessary] to provide a suitable planting medium'.[20]

Soil (a) is present around the stone layout. Soil (a) and (b) are characteristic of the wider area of the garden and soil (c) is only represented close to the intermittent creek. The soil characteristics of the surveyed area thus indicate that the less suitable soils are around the stone layout and in the vicinity of the possible garden area as extrapolated from the map. The most suitable soils for cultivation lie further down near the creek.

Interestingly the French expeditioners also address this issue in their records. Delahaye notes in his journal (April-May 1792) that: 'the soil is generally very difficult to cultivate being generally swampy and clayish. It is a little worth under the big trees ... there are a few sand plains which are not too bad'.[21] In 1793 Labillardière criticised his gardener, noting 'the soil was rather too full of clay to ensure the success of the seeds'.[22] After having visited again the garden in 1793, Delahaye and Labillardière noted that the plants had not grown very successfully, a failure attributed to the lack of sufficient watering and the nature of the soil.

Geophysical survey

The surface rock feature (Figure 8.7) was surveyed with the EM38, electro-magnetometer, first by exploratory transects of medians and diagonals of the layout, as well as the external outer edge of the northern wall. For those transects, conductivity and susceptibility in both vertical and horizontal dipole modes were measured. The results led us to complete two additional high-resolution gridded susceptibility surveys with the instrument in vertical dipole mode (maximum penetration): one south-north grid (9.25 m x 11.25 m) and one west-east grid (10.25 m x 10.25 m). The flux gate gradiometer and the metal detector were also used for systematic random searches in this small area. The following section describes both electric conductivity and magnetic susceptibility of the stone layout.

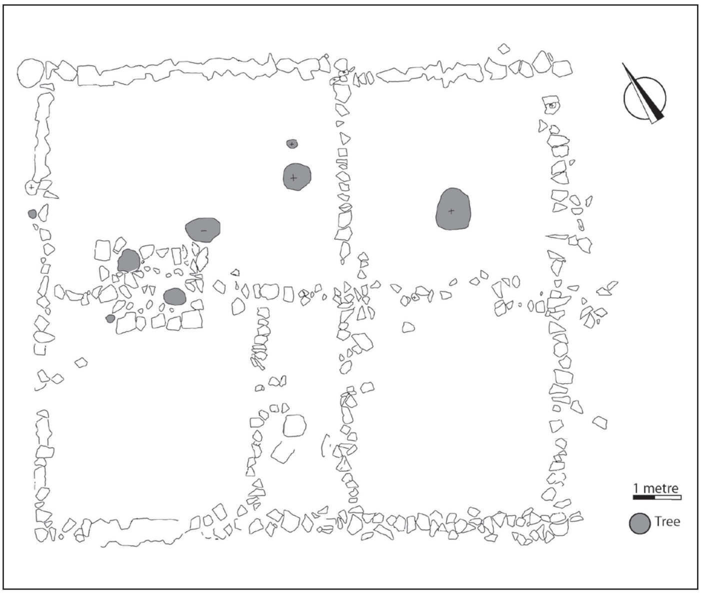


Figure 8.7. Plan of the stone layout.

Electrical conductivity

The following geophysical transects were taken: transects across the stone feature, and a long exploratory transect. No transect was taken across the location indicated on the 1792 chart.

Owing to the shallowness of bedrock in the area, median and diagonal transects showed that here the conductivity component of the EM38 was probably directly related to soil thickness. As the various exploration transects were coherent, their data were merged and gridded. The map obtained for the very shallow conductivity (EM38 dipole in horizontal mode) only concerns the depth of the first few centimetres of the ground and is therefore mostly unaffected by bedrock. The results show which anomalies on the deeper conductivity map (EM38 in vertical dipole mode) are due to sources shallower than bedrock in the ground, like shallow loose or surficial rocks.

The deeper conductivity map suggests that soil thickness varies significantly under the stone layout; in particular, it suggests that soil thickness increases inland. Subsequent ground testing with a metal probe confirmed this. A single long exploration transect right from the shoreline, and perpendicular to it, was done in order to estimate depth to bedrock beyond the stone layout right up to the estimated wider garden area indicated on the 1792 draft map. The transect suggests that inland from the stone layout, the soil cover is indeed possibly deeper, but then becomes shallower once the garden area is reached. This is consistent with the topography of the area, and as noted earlier, some of the variations in soil conductivity may be due to the changes in soil character.

This result is particularly interesting as it shows that in terms of soil depth, the area of the stone layout is not the best place for a garden in this vicinity. The bedrock is so shallow here that it is very likely the French gardeners would have *de-facto* tested soil thickness by trial and error.

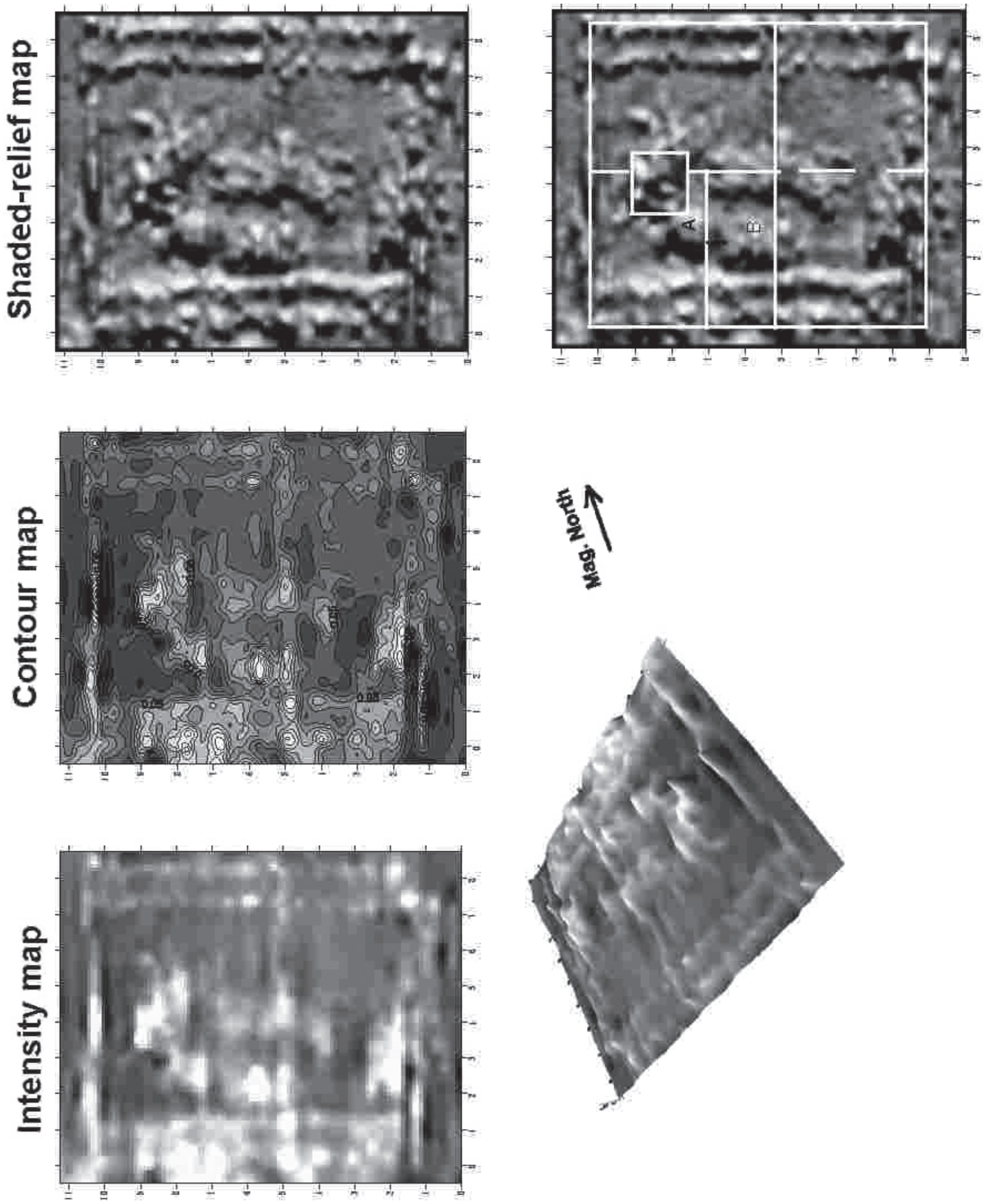


Figure 8.8. Magnetic susceptibility averaged to about 1-1.5 m deep maps from high resolution south-north EM38 grid. (Stone lineations perpendicular to the survey lines appear thicker than they are in reality).

Magnetic susceptibility

The initial transects showed that the susceptibility component was mostly imaging the distribution of loose rocks (a combination of natural and anthropic distribution of rocks). Indeed in the high resolution susceptibility grid (Figure 8.8), the data image the surficial stone layout (inner and outer rock lineations) as well as other anomalies where there are no rocks at the ground's surface. These anomalies are of a similar character to those created by the stone layout. They are therefore most likely due to buried loose rocks similar to those used for the surficial layout, although ground testing would be required to test this hypothesis. The flux gate gradiometer and the metal detector were also used on this site. No metals were detected either within or in the vicinity of the stone layout.

Surface survey of the wider garden area

The position of the garden on the 1792 map, once transferred onto the modern topographic map, appears to be in one of the least likely spots for a garden to be established in the area: on a dolerite outcrop where the micro-topography is the most rugged and the soils the shallowest in the vicinity. The location of the garden as per the available maps must therefore be used as a relative rather than an absolute position.

In order to identify the most plausible area for the garden, a surface survey of the wider area was undertaken (Figure 8.9). It was then completed with a series of soil samples which

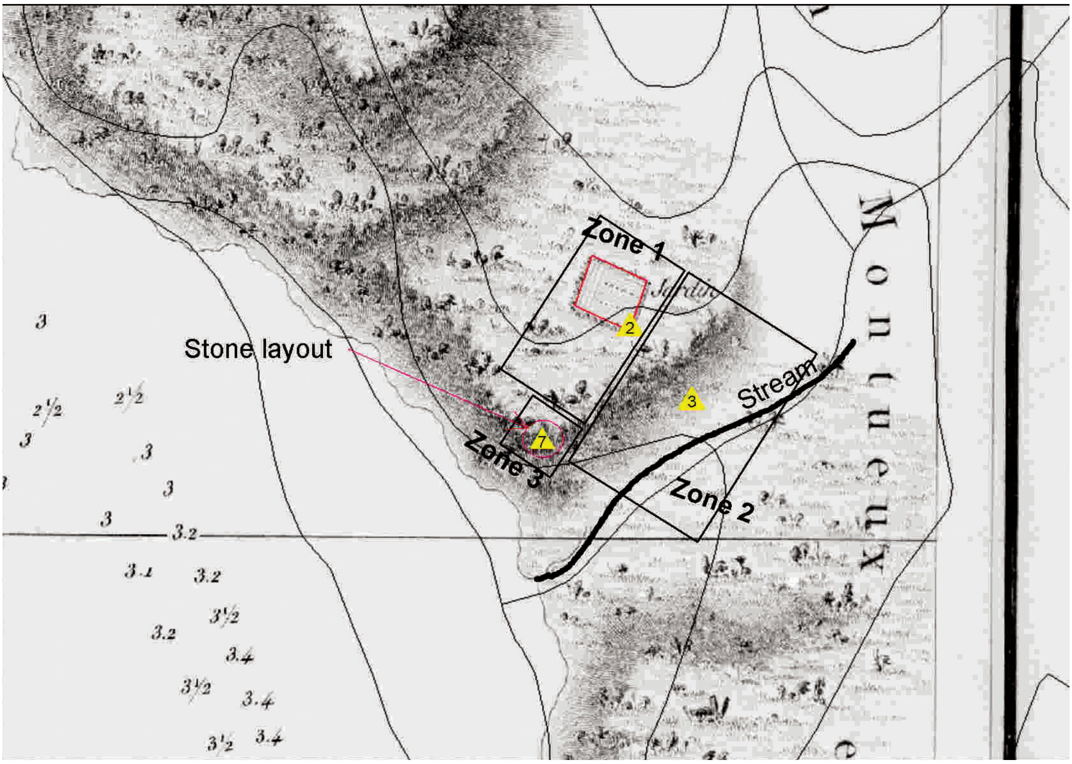


Figure 8.9. The wider context of the garden survey with indications of the three prospected zones and the location of the soil samples for phytolith analysis. The final engraving has been projected onto the modern map of the area.

reflected the different environments encountered during the survey. Samples were taken with a 1 m long gouge auger (diameter at the base 20 mm and at the top 50 mm).

The surveyed area was split into three zones (Figure 8.9). The first zone comprises the potential garden area as drawn on the 1792 draft map. The coordinates of the garden were extracted using a projection of the 1792 map onto a modern map and then located on the ground using a Magellan GPS. The second zone comprises the area between the first zone and the intermittent stream identified on both the 1792 map and modern maps. The third zone comprises the area of the stone structure.

In the first two zones, a systematic surface survey was conducted. The survey was made difficult due to the dense vegetation, particularly in zone one, where cutting grasses (*Gahnia grandis)* were abundant. In this area, which according to the map is the most likely site of the old garden, the vegetation is characterised by large *E obliqua* and dense concentrations of *Gahnia grandis*. The terrain is uneven with dolerite rocks emerging around trees and in the northern area of the zone. The area slopes from north to south.

Zone 2, between Zone 1 and the stream, is gently sloping, not so densely wooded, and flatter towards the stream. *E. obliqua* and *Gahnia grandis* are not as common and are replaced near the stream by *Melaleuca* shrubs, an indication of the wetter environment.

Seven soil samples were taken from Zone 1 and 2 (four samples) and Zone 3 (three samples). Additional samples were taken during the excavation process of trench one in the stone layout.

Three soil samples were sent for phytolith detection to Dr D Bowdery at the School of Archaeology and Anthropology, Australian National University, Canberra (Core 2 from Zone 1, Core 3 from Zone 2 and Core 7 from Zone 3) (Figure 8.9). In addition, three soil samples from excavation Trench 1 in the stone layout (context 5, 8 and 11)—part of Zone 3—were submitted. The aim of the analysis was to determine whether the French garden location could be assessed using phytolith analysis.

The stratigraphy of Core 2 is representative of soil type (a) in dolerite outcrop in Zone 1. It is a dark clay soil (5 cm), becoming rapidly crumbly and clayish (12 cm), which overlays the dolerite bedrock. Core 3 was sampled in Zone 2 halfway between the dolerite outcrop and the stream. It is very wet dark brown clayey soil, becoming greener with depth (type 15.3 of Grant's classification, our type (c)). The core was limited to 44 cm as the sidiment became too soft to sample because of the high water content. Core 7 (40.6 cm) was taken at the southwest corner of the stone feature and is a red clayey sediment (type 15.1 of Grant's classification, our type (a)). Differences between overall depths of the four samples (Trench 1 and Core 2 are less than 20 cm while Cores 3 and 7 are at least 40 cm deep) limit comparisons across the area.

As no illustrations of the economic plants sown by Delahaye were available in the literature, the analysis included the creation of a limited reference collection made up of commercially available seeds, seedlings and other plant parts, using the list of plants published by Delahaye. Of the economic plants prepared for phytolith analysis, only celery leaf, chicory inflorescence and leaf, and white onion leaf and radish produced diagnostic phytolith morphologies.[23]

All samples contained varying amounts of *Gahnia* and shrub phytoliths. Phytoliths of *Gahnia* and carbon particles were densest in Core 2. Large fan-shaped phytoliths, produced by hydrophilic grasses that can show relative changes in water availability, were abundant especially in Core 7 and Core 3. Carbon particles were highest in Test Pit 1 and Core 2, the drier samples. Phytoliths transformed from silica to cristobalite were noted in all sediments, indicating high temperatures during fire occurrences.

In her report, Bowdery also noted that, regarding economic plants:

> two phytoliths, one each from chicory and radish, are very difficult to distinguish from *Gahnia* morphologies which dominated the assemblage, similarly, a white onion morphology is undistinguishable from an unidentified phytolith present in the assemblages. Under these conditions, I cannot positively identify phytoliths to plants other than to say that these look-alikes were single occurrences in Core 3 and Core 7.[24]

Finally, Bowdery notes the surprising absence of small-cell bilobate phytoliths which are abundant in many grasses. Presence/absence of these small cells often indicates opening/closure of grassland. In this instance however, she suggests rather that a different dynamic, possibly water or fire, has removed them from the area.

In conclusion, this preliminary phytolith analysis highlighted the difficulty of sampling and interpreting, as well as the methodological limits of the procedure. It provided further interesting information on the nature and dynamics of the garden environment. The drier conditions of the dolerite area, the evidence of large fires and their impact on the conservation of natural materials, are of great relevance for our study.

Both soil sampling and analysis and depth estimation by probing, as well as reconnaissance geophysical surveys (EM38), show that there is significant variation in topography, soil thickness, soil type, soil moisture/drainage and soil chemistry within the general area where the garden has been said to be. A working hypothesis is that those variations are somewhat similar, at least in their distribution, to those in the days of d'Entrecasteaux. It is probable that Delahaye did not choose the location of his garden randomly but rather tried to locate a place with adequate soil and moisture conditions. As noted earlier, however, his choice was criticised a year later by Labillardière, when the loss of the plantings was acknowledged.

Still, it is worth noting that the intermittent stream near the garden area is in the vicinity of one of the major geological contacts in Recherche Bay: between Jurassic dolerite and Triassic sandstone. This contact possibly determines topography, hydrology (stream location and drainage), geomorphology, and soil/subsoil characteristics, and thus, indirectly, the vegetation and possibly the general location of the garden as well. This statement has to be moderated by the fact that glacial, periglacial and Quaternary processes may have offset the variations of these landform attributes relative to the exact position of the contact.

The maps tell us, more qualitatively than quantitatively, that the garden lies to the north of a kind of swampy area where a streamlet runs. Nowadays it is a waterlogged subdued valley (ie, with very low topographic contrast) (Figure 8.6). This stream is probably intermittent but is indicated on the modern 1/25,000 map. The swampy area of the 1792–1793 maps matches surprisingly well with the preferentially logged/devegetated area in the 1948 aerial photographs. We ground–truthed the edge of this waterlogged area and noticed that it has deeper soils and a flatter surface than the higher areas, and is therefore much more suited to a garden than the area of the stone layout. It is about 50 m south and west of the 1792–1793 map location of the garden.

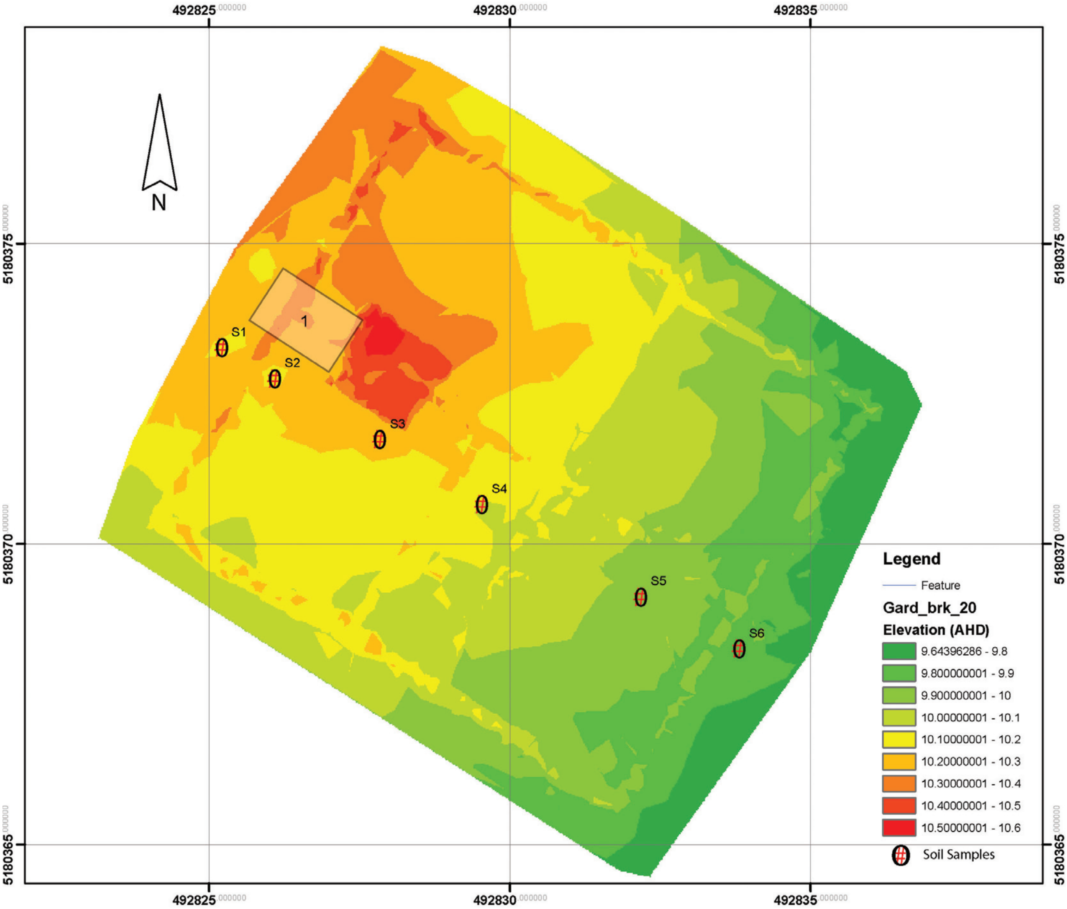


Figure 8.10. 100 mm elevation grid (AHD) showing the south-southeasterly fall of the site, and the generally consistent relationship of stone feature surface elevation to surrounding terrain. (20 mm cell size, coordinates are aligned to the north.)

Interestingly, some of the 1792–1793 maps from the expedition depict an escarpment to the north of the garden (Figure 8.6). No such escarpment exists. Still, this detail, styled and printed from field original sketches and data, is not gratuitous. This is simply the way hydrographic charts of the time used to roughly/qualitatively indicate a slope, irrespective of its real and exact extent, inclination and direction. Those parameters are indeed difficult to quantify from coastal or offshore observations alone. The 'scarp' of the 1793 map depicts the actual general slope of the dolerite outcrop in our area of research, and tells us that the actual position of the garden is at/near the lower-lying part of the slope.

To sum up, the Beautemps-Beaupré maps of the area of the garden tell us that the garden is close to the edge of the low-lying waterlogged area. This is consistent with, albeit 50 m from, our field estimation of the most suitable spot for a garden onshore from Coal Pit Bight, where soils are deeper and moist, less rocky, and the area is flatter. Conversely, the area of the stone layout is rocky, without a sufficient depth of soil for a garden and some 100 m from the location indicated on the Beautemps-Beaupré map.

Archaeological mapping and excavation

Detailed topographic survey of the stone structure

A detailed topographic survey was carried out of the stone feature, which involved the capture of over 1,500 data points, using a Nikon DTM720 total station. The data were used to create a digital elevation model (DEM) of the feature in order to facilitate analysis of surface levels and correct geophysical data (Figure 8.10). The stone structure is oriented at about 30º ENE, which is about the same as the final draft of the garden (Figure 8.2)

From the model it can be clearly seen that the site terrain is most elevated in the northwest corner, falling steadily away to the southeast. The highest area is formed by the square cluster of fieldstones separating the western-most cells of the feature. The mean height differential between built surface and surrounding ground in this area exceeds 200 mm. This contrasts with an average height differential between built element and adjacent ground surface of between 100-200 mm for the linear stone alignments. There does not appear to be any significant difference in average standing heights of the linear stone elements (relative to neighbouring ground) between different areas of the feature. Assuming that the site has not been 'tidied up', the absence of significant quantities of collapsed rubble suggests that there was no consistent finish height for the stone alignments. There is little evidence of building up, additional courses or selection of larger rocks to compensate for the observed decrease in terrain elevation to the southeast. In summary, the stone alignments essentially comprise a single course covering the existing (modified) site terrain.

Archaeological excavation, Trench 1

A 1.6 m x 1 m trench was positioned adjacent to the west side of the rectangular stone mound, extending westwards to encompass the western stone alignment and centered longitudinally over the short stone alignment connecting both. The trench was sited to test a series of questions pertaining to the spatial layout of the stone feature, its construction and use. The trench aimed to facilitate exploration of internal and external spaces, variability between internal spaces, and structural development of the site.

Stratigraphy

The trench was subdivided into three excavation cells: A, B and C, each separated by aligned stone. The cells were approximately equal in size (Figure 8.11). Leaf litter and surface vegetation were removed and designated contexts [1], [2], and [3] for areas A, B and C respectively.

Further excavation followed this general system. In all areas the surface litter deposits overlayed friable light clay impregnated with white fibrous fungal matter [4], [5], [6] (Figure 8.12). This was removed to expose an irregular topography of medium clay, grading to heavy clay with organic staining in some areas [7], [8], [9] (Figure 8.13). With no natural stratigraphic subdivisions observable at the surface, the clay was taken down in level spits to a maximum depth of 80 mm, the soil becoming increasingly homogenous and compact with depth.

Figure 8.11. Trench 1, pre-excavation.

Figure 8.12. Trench 1, contexts [4], [5] and [6].

Figure 8.13. Trench 1, contexts [7], [8] and [9].

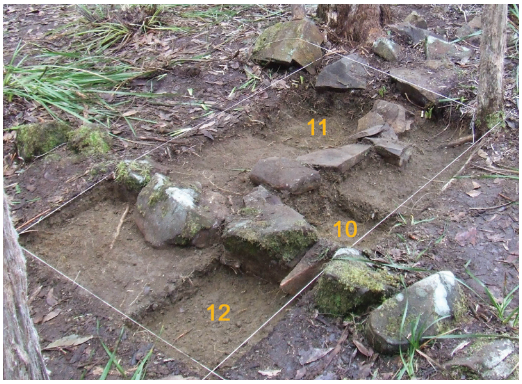


Figure 8.14. Trench 1, contexts [10], [11] and [12].

Three 0.25 m^2 sondages were excavated at this level, one in each area, with the soil removed as [10], [11] and [12] (Figure 8.14). The shallow sondages were discontinued at a depth of 70 mm below the spit surface.

Results

Apart from some small isolated fragments of ferrugenised stone located tentatively identified as possible ochre,[25] no artefactual material was encountered during the excavation. The soil profile was relatively weakly developed, with minimal A0/A1 ([1], [2], [3]) and A2 ([4], [5], [6]) formation. The pockets of A2 fibrous material did not appear to bear any significant spatial relationship to the stone features, such as post-hole or trench fill, and would seem to indicate relatively recent (active) decomposition of native plant material. The clay substrate B21 horizon ([7], [8], [9]) did not display evidence of cultural modification, such as incorporation of charcoal, organic or other introduced material. No significant textural changes were observed within the sondages, which exposed a gradation into culturally unadulterated mottled olive dolerite clay B22 ([1], [11], [12]). No gross compositional or textural differences were observed within the A0-B22 sequence between areas A, B and C. If anything, A1 was locally underdeveloped in all areas, suggesting generic truncation/disturbance of the topsoil at some point.

The stone alignments comprised a single row of dolerite fieldstone sitting on the B21 surface ([7], [8], [9]). No evidence of entrenching was observed. Similarly, no evidence of feature truncation, keying in or other sequential activities were observed, suggesting single-phase construction of feature elements in this location. No historical artefacts were found during the excavation.

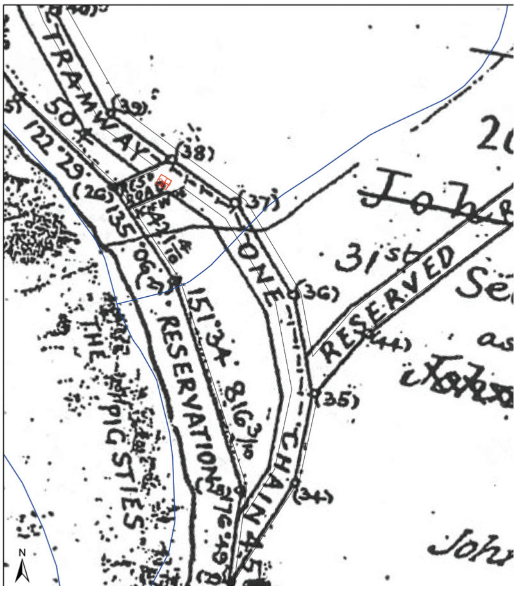


Figure 8.15a. Survey diagram 30/23 1905.

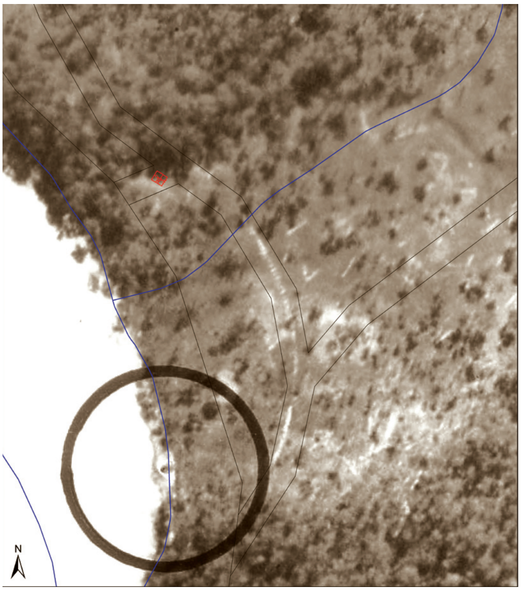


Figure 8.15b. 1948 aerial photograph of the area.

Historical context of the stone structure

Timber milling commenced in the area in 1898, with John Kemsley taking out a 400 acre area lease at the Crescent for a sawmill, linked by a tramway to a 5,000 acre timber lease further north near the D'Entrecasteaux River.[26] The mill appears to have operated under a range of owners until around 1910. The tramway, constructed by 1904, operated until closure of the mill, being partially reopened during the late-1920s–early-1930s when Henry Jones and Co began construction of a new mill and wharf approximately 1 km north of the abandoned Crescent mill site. The new mill was never completed.

The route of Kemsley's Crescent mill tramway is shown within a one-chain road reserve on the accompanying block survey prepared in 1905 (Figure 8.15a), along with two other road reserves that are not indicated as being developed. The tramway clearing is clearly visible on the 1948 aerial photograph of the site (Figure 8.15b).

The stone structure is situated approximately 30 m west of the tramway, a surviving 25 m long segment of which was recorded heading in a northwesterly direction (approx 311° grid reference). This position is parallel to, but offset from, its charted position on the 1905 survey by several metres.

In order to locate the stone feature with respect to the 1905 survey and 1948 aerial photographs, both survey plan and aerial image were georeferenced using the 1:25000

Tasmap vector dataset for Recherche.[27] The method for each operation utilised a first order polynomial (affine) transform.[28] The discrepancy between the on-ground measured position of the tramway alignment and its position indicated on the georeferenced image is 11 m, which falls within the published confidence levels for the 1:25000 dataset.[29] The relative precision of the georeferenced 1905 cadastre relative to the stone feature is considered to be of the same order.

The stone feature coincides with a short section of surveyed reserved road, shown on the block survey plan, which connects the tramway easement with the coastal reserve. The purpose of the road reserve is unclear, however two parallel broken lines shown extending from its western end into the bay suggest the road may have been under consideration as access to a possible jetty site. The road reserve appears on the 1948 aerial photograph as a clearing with minimal regrowth, suggesting recent activity contemporary with the extensive harvesting at the Crescent further south.

Assuming that the positioning of the recorded feature relative to historical data sources is sufficiently accurate, the proximity of the stone feature to proposed and recorded land clearing activities suggests the possibility of some kind of relationship between the two. The condition of surviving fabric gives a clue as to the relative timing of the events, as it is unlikely that a pre-existing built feature would have survived the clearing activity without being substantially disturbed. Some level of disturbance to the stone alignments is evident, where it appears an object has been dragged diagonally across the western three cells, however this relatively small surface impact is inconsistent with the degree of ground disturbance normally observed in historic timber harvesting areas. The A horizon soil truncation observed in Trench 1 is consistent with such an order of disturbance, however, suggesting timber harvesting/land clearing prior to construction of the stone feature. This interpretation is inconsistent with the historical description of the garden's establishment, which apparently did not involve major land clearing.

Apart from the evident landscape modification and stone feature itself, no other historical artefact types were observed at this site, suggesting limited development and little or no subsequent occupancy or use. The absence of fastenings, either from the excavation or elsewhere at the site, and lack of any consistent finish level, or evidence of downhill coursing to the stonework, mitigates against the feature being evidence for a completed and subsequently removed standing structure. The possibility that the evidence indicates site preparation and early groundworks for an uncompleted structure cannot be discounted on present data.

Conclusion

The main objective of our research in 2006 was to test the working hypothesis that the stone layout was witness to a garden created in 1792 by the French gardener Delahaye, during d'Entrecasteaux's first visit to Recherche Bay. We decided to extend our study field beyond the limits of the stone structure in order to get a correct idea of the environmental setting of the place which had been chosen by the gardener.

The results of our study clearly show that the area under consideration is on the limit of two geological formations, which have impacted the natural environment. The stone structure is at the limit of a dolerite outcrop, in a dryer environment prone to fires and with shallow soil, which contrasts with the deeper soils and a more humid environment near the creek.

The lack of any artefactual evidence on the stone structure, the nature of the soil in and around it, the absence of any recognisable phytoliths, and the proximity of the structure to the sea, all point to the conclusion that the stone layout cannot be the French garden of Delahaye, although its size and orientation are quite similar to the known descriptions of the garden. In addition, the close spatial association between the stone feature, surviving tramway formation, historical plans and documentary and landscape evidence of 20th century timber getting, together with the site formation history gauged through archaeological investigation, suggest that the stone feature may instead relate to early-20th century activity at the site. The lack of evidence for a standing or occupied structure is consistent with the feature being incomplete or halted in development.

Partially completed structures are a common feature of marginal industrial ventures in Tasmania, where limited capital and proprietary arrangements tend to increase the rate of opportunistic, ultimately fruitless, infrastructure investments.

The possibility exists that the stone structure represents an outline or base course laid out for a small standing structure that was never completed. The historical association of such a proposed structure is presently unknown, however it may be related to either Kemsley's 1898-1910 timber harvesting operation at the Crescent or the 1920s–early-1930s Jones and Co venture to the north. Further documentary and oral historical research work is required to more adequately establish the 20th century context for this feature.

The geophysical and archaeological study of the area around the stone feature, as well as the soil sampling strategy and close inspection of the 1792–1793 maps, suggest that the most suitable area for the garden is near the intermittent stream (Zone 2 of our survey). The area near the stream is flat, the vegetation is typical of wet and swampy ground and the soil is deep and clayish. Dryer conditions during the 1793 stay at Recherche Bay are attested to by the lack of water at the 1792 watering place. Such conditions would explain why a place, which was considered adequate in 1792, appeared unsuitable a year later. This explanation is not inconsistent with the information on the maps; it reflects Delahaye's descriptions and a garden near the creek would have been easier to access and re-locate a year later from the sea.

Delahaye's garden is the first European mark on the Tasmanian landscape. Its hidden nature should not minimise its historical significance.

Acknowledgements

A number of people have been very actively involved in preparing this work and organising the financial support for this research. It is hardly possible to name them all. We particularly are indebted to the former French Ambassador in Canberra, Patrick Henault and to his Cultural Attaché, Jean Poncet for their strong commitment and genuine historical interest, an interest shared by their successors at the French Embassy.

Hélène Richard, Director of the charts department at the National Library in Paris had from the beginning a major involvement in this research; she kindly provided the historical background, helped us acquire the missing archives and in particular made available the maps which are presented here. We are also indebted to Professor John Mulvaney and Professor Jack Golson, Patricia Sabine and Roberta Salerno for their very useful suggestions at an early stage of the project.

In Tasmania, we owe the successful completion of the research to the commitment and financial support of the Government and the efficiency and enthusiasm of the team at Heritage Tasmania led by Pete Smith. Peter McFie, Parry Kostoglou, Greg Hogg and other Tasmanian historians have been very helpful and willing to share their knowledge of the area. The Vernon family and others at Recherche Bay did their best to make our stay profitable and enjoyable.

We finally wish to thank the Academy of the Social Sciences in Australia and in particular its executive director, Dr John Beaton, as well as two anonymous referees who kindly led us to the successful completion of this paper.

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9

A land mapped by stories

Joan Domicelj

Salman Rushdie wrote of Bruce Chatwin and his book *Songlines*: 'how could writers fail to love a world which has been mapped by stories?'[1] In that context, I will introduce briefly a conceptual framework that has evolved over the last fifteen years for understanding and protecting those extraordinary natural environments that are overladen with significant human stories; places, like Recherche Bay and its surrounding lands and waters, that are mapped by encounters and discoveries. As an enthusiastic newcomer to this place, I will illustrate specific terminology with discussion of a couple of places more familiar to me.

The aim to protect specific, highly valued places is part of the broader international concern to study and sustain healthy life across the whole of our beleaguered planet. It can be seen as a sampling process. The definition of boundaries is always fraught, so when I refer to Recherche Bay, I am incorporating its hinterland and setting.

One mechanism is UNESCO's World Heritage Convention, which was established in 1972 to 'identify, protect, conserve, present and transmit to future generations the world's cultural and natural places of outstanding universal value'. The World Heritage Committee, created under the Convention, has, over time, adopted three idiomatic terms of relevance to the evaluation and care of places such as Recherche Bay. They are equally applicable to sites of National status:

1. **cultural landscapes**—places where cultural and natural values intertwine
2. **associative values**—where intangible values are linked with the tangible place, and
3. **cultural routes**—serial sites tracing significant movements of people and their interaction with the environments they cross.

We will consider these concepts one by one, because they are applicable to any evaluation of the natural and cultural values of Recherche Bay.

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 119-124.

1. Cultural landscapes

These are said, in Article 1 of the 1972 Convention, to represent `the combined works of nature and of man'.

This particular Tasmanian story could run something like this:

> Once upon a time, there was a bay, beautifully sculpted by geological forces and the play of water. It was sheltered at the `extremity of the globe' at the icy latitude of 43.5 degrees South,and it guarded the entry to a vast, luminous channel running north between mainland and island. As we have heard, this wooded environment was floristically rich ('the most luxuriant vigour of vegetation is here contrasted with its final dissolution, and presents to the mind a striking picture of the operations of nature, who, left to herself, never destroys but that she may again create', wrote Citizen Labillardière[2]).
>
> For millennia it was inhabited by its custodians, the Lyluequonny, a sub-group of the Southeast littoral people. Some two centuries ago it happened that they were visited by strange boat people (French officers, savants and a young woman disguised as a man). In Bob Brown's words, this extraordinary encounter of alien cultures was met at the time with 'mutual human forbearance, respect and entertainment'.[3]
>
> During the ensuing `chaotic years' of whaling and pioneering industrial initiatives, life in and around the Bay tended to suffer. These were the `good and bad times' described by John Mulvaney.[4] More recently the bay has been threatened with worse destructive forces.

How is such a place to be understood, now? Is it possible for the bay's future health to be assured? Interdisciplinary practices continue to evolve to analyse these questions. In current terminology, Recherche Bay—this captivating place with its rich narrative—would be described as a 'cultural landscape'.

On the World Heritage Convention's twentieth birthday in 1992, a new definition was introduced to describe cultural landscapes, adopting the following three categories:

i. The clearly defined landscape designed and created intentionally by man

ii. The organically evolved landscape:

   - a relict landscape in which an evolutionary process came to an end at some time in the past
   - a continuing landscape which retains an active social role in contemporary society associated with a traditional way of life and which is still evolving

iii. The associative cultural landscape with powerful religious, artistic or cultural associations of the natural element.

Under these descriptions, Recherche Bay would probably be cited as part of a larger, organically evolved landscape with powerful scientific, historic and cultural associations with its natural environment, all of which are to be respected.

2. Associative values

International deliberations over identifying and conserving `cultural landscapes', 'cultural associations' and 'cultural routes' have, over recent decades, been both prolonged and, at times, painful. At least two Australian doctoral theses have been written to describe their permutations and subtleties.

The first named **associative** cultural landscapes to be inscribed on the World Heritage List (they are places where there may be no tangible in situ evidence of the strong cultural connection) lie within our own region. New Zealand's Tongariro National Park was renominated in 1993 and Australia's Uluru-Kata Tjuta National Park in 1994. Both were formerly listed for their natural values alone. Both listings now acknowledge the respective powerful Maori and Aboriginal cultural associations of belief and traditional practices with those natural features.

I recall at the time telling my Aboriginal friend, colleague and co-mediator, Bob Ware, about these events and the formal linking of cultural and natural values at last. He roared with laughter: `However did you split them up in the first place?' Indeed. How strange our culture is. The difficulty over this intellectual process is inexplicable to Indigenous peoples—seeking to unite the concepts of the physical and the spiritual when they are, and always will be, inseparable. Two separate mindsets.

I see some parallel with Michelle Stacey's recent article on the differing mindsets of astronomers and physicists over the measurement of time.[5] The astronomer, working with the rhythms of constellations and our slightly wobbly spaceship earth, accepts the occasional need to adjust Time with the `free second'. The physicist, ready to harness the abstract precision of atomic oscillations to give Time perfect accuracy, inevitably, slowly, loses the connection with our solar time, our seasons, the tides, day and night.

Olwen Beazley's doctoral thesis, *Drawing a Line Around a Shadow?*, reflects on the associative values and intangible qualities of certain World Heritage sites of painful memory like Auschwitz-Birkenau, or the slave-holding compounds of Senegal's Ile de Goree.[6] The term `spirit of place', commonly used in discussing intangible values, applies of course more widely than that. I suspect it applies to Recherche Bay—positively perhaps as the `symbol of reconciliation' cited by Bob Brown. Derivatives of the word 'spirit' link the breath of life (respiration) with creativity (inspiration) and hope (aspiration). Being boundless, beyond the limits of body and time, spirit offers a fine antidote to short-term solutions to land management.

The World Heritage Committee had already, in the 1980s, begun to suspect a certain bias in its work towards European and Middle Eastern monuments. Even as late as 1991, the eminent Tunisian archaeologist, Adelaziz Beschaouch, wrote:

> It is hardly surprising that Italy should have a large number of cultural properties whereas Australia (a fairly recently discovered continent) cannot present any. Similarly, because the Mediterranean Sea was for thousands of years the cradle of civilisations and crossroads of History the List includes a large number of Mediterranean properties. On the other hand, most natural properties are located in countries whose histories are more recent (= uncivilised?): the United States, Canada, Australia …[7]

In response, UNESCO organised a meeting of eight experts from Niger, Canada, Germany, France, Tunisia, Brazil and Australia to establish `a Global Strategy to create a World Heritage List which is representative, balanced and, through its rigour, credible'. I was the Australian member of this group. The focus of the List was to shift from the monumental to the illustration of societies and traditions and from isolated individual places to places within their physical and intellectual contexts. Listed places were to be balanced among regions of the world, time periods and types of places.[8]

Further findings are described in Sarah Titchen's doctoral thesis *On the Construction of Outstanding Universal Value*. She asks:

> Is there any opportunity for the Convention to adopt an holistic approach to the identification, assessment and conservation of heritage?' [The UNESCO meeting determined that] Each individual piece of evidence is to be considered … with an understanding of the reciprocal relationships that it has with its physical and non-physical environment. This new anthropological articulation of the definition of cultural heritage … has established a sound foundation for the inclusion of cultural landscapes in the World Heritage List.[9]

Those of us concerned with the New South Wales Greater Blue Mountains World Heritage Area continue to live and work through these issues, even now. In 2000, this million hectares of mists and dissected sandstone plateaux was listed for the biodiversity of its eucalypt related vegetation and for its recessed habitats that shelter rare and ancient species.

Yet Australia's nomination had argued for more. It claimed that 'the Greater Blue Mountains represent an extraordinary story of natural antiquity, diversity, beauty and human attachment' and that they 'exemplify the links between wild places and human aspirations'. Now, across the seven reserves, fieldwork on rock art, oral histories, cultural mapping projects and the documenting of traditional practices by the six language groups indigenous to the area, continue apace. These studies, together with evidence on the birthplace of the Australian conservation movement, are essential to complete the story and to enhance the case for a more complex renomination, with the potential for sound co-management between Indigenous communities and the parks service.

3. Cultural routes

Again in 1994, the World Heritage Committee decided that the 1972 Convention was sufficiently ample to include the protection of places that represent great journeys of people across the world, not only their settled lives. A heritage route, it jargonistically determined,

> is composed of tangible elements of which the cultural significance comes from exchanges and a multi-dimensional dialogue across countries or regions, and that illustrate the interaction of movement, along the route, in space and time.[10]

These extensive routes connect significant sites along the journey-lines of nomads, colonisers, pilgrims, transhumance-herders, traders (of spices, silk, slaves …) and explorers. And herein lies another niche for Recherche Bay.

The Bruny d'Entrecasteaux expedition set sail from France in September 1791 in search of La Pérouse and paused, six months later, at the southern extremity of Tasmania. It trailed behind it a Hansel and Gretel–like series of breadcrumb sites of scientific readings, gathered specimens and place names, scattered across miles of coast and islands, thereby creating in the wake of its ships a significant cultural route.

Recherche Bay, as a major marker on that route, is redolent of the Enlightenment's trials and joys in exploration and the hunger for understanding. The cordial meetings between the Lyluequonny people and the French (particularly botanist Labillardière, whose `generosity of spirit in relation to the indigenous inhabitants…was returned in kind'), epitomises the rewards of cross-cultural exchange. The relict exotic garden, planted by Citizen Fèlix Delahaye in May 1792, gives material expression to another form of exchange.

From Tasmania, way across the Pacific Ocean to its eastern rim, lies South America. Along the length of its youthful and volcanic Andean spine runs the Incan road system, known as the Qhapaq Nan. Built for people travelling on foot with their burden-bearing llamas, it connected pre-Incan civilisations and their earlier 12,000 kilometres of paths across jungle, ice-field and desert into one great, if brief, imperial system. It is also known as La Ruta Sagrada del Condor-Wiracocha. It crosses Colombia and Ecuador, Peru and Bolivia, Chile and Argentina.[11]

These six neighbouring countries are talking to their Indigenous communities above all, but also to anthropologists, conservators, ecologists, archaeologists and planners to share in a single project that will connect sacred sites, ancient cities, areas of high biodiversity and ceremonial centres, languages (eight million people still speak the Incan language, Quechua), micro-centres of crop origin and diversity, outstanding mountain ecosystems, traditional agriculture and gardens, along this sacred road system of the Condor. Their common purpose is to identify, share and conserve this cultural route, as part of the world's heritage.

In the context of gardens and of international matters, it is relevant that next year, 2008, is designated as the International Year of the Potato. My daughter told me this and it made me laugh. Even more when she said that her colleague responded `and about bloody time too!' Yet listen.

In the Pisac Valley of Peru, six Quechuan communities are working to create an Andean community-conserved area, the Parque de la Papa—the Potato Park. Its not-so-funny purpose is the conservation of the agro-biodiversity of an heirloom species. It links traditional agricultural landscapes with high mountain native forests, grasslands and wetlands. Potatoes will flourish there, beside the sacred road. This celebration of the indigenous potato in Peru can be coupled with the respect with which Citizen Fèlix Delahaye planted his small vegetable garden with much travelled seeds at Recherche Bay, offering European food to all comers in this far-off southern land.

Thomas Heyd[12] wrote that World Heritage cultural landscapes are intended 'to maintain and enhance a kind of human spontaneity which does not overwhelm the spontaneity of nature—but plays into it'. The articulation of cultural bonds with the natural environment, unveiling marks and meanings, is part of understanding any place in order to cherish it and be nourished by it. Understanding is the precursor to decisions on how to care for country, to keep it alive. It offers a basis for custodianship.

Bob Brown dedicated his recent book on Recherche Bay to the d'Entrecasteaux expedition, to the Lyluequonny people, to the beauty of their lands and to the end of the desecration.

He saw its cultural significance as a symbol of reconciliation and peace. Recherche Bay is linked to the world by the practices of Indigenous, transitory and colonising peoples and by the natural systems governing earth, water and air. Conserving its outstanding qualities as a living system within its wider setting is one happy step in sustaining healthy living systems on earth more widely.[13]

At another time and in another Tasmanian place, I ended a talk at Port Arthur on conserving places holding painful histories with a plea to colleagues: that maybe, just maybe, our work could be neither jingoistic celebration nor black armband nor ivory whitewash, but blue and gold: a program of well-conserved forget-me-nots set in the gold of *A Bran Nue Day*. And so to end this story:

> May Recherche Bay and its surroundings with its interconnections of …flowering plants, trees and small and noisy creatures on soil and sand, again find its relations with idiosyncratic journeymen from the outside world maintained with mutual forbearance, respect and entertainment within a nature-affirming culture and, thus, live happily for the moment. Ever after is a little more difficult to guarantee.

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10

Right deeds and wrong reasons

The politics of nature, history and the preservation of Recherche Bay

Aynsley Kellow

The last temptation is the greatest treason: to do the right deed for the wrong reason.

TS Eliot, *Murder in the Cathedral*

The preservation of Recherche Bay is an achievement worth celebrating. Recherche Bay has considerable natural beauty, and has significant natural and cultural heritage values, and these values have been safeguarded as the result of a well-fought campaign. But in the warm afterglow of such successes it is commonplace to allow sentiment to obscure lessons that might be drawn. It is not the intention here to detract from the celebrations, but rather to ensure that we do not overlook the learning opportunities.

There are probably many ways in which the success of Recherche Bay preservation campaign is leading to the creation of some new myths, for example, the tendency, perhaps understandable given the support of the French government for archaeological survey, to romanticise the nature of the contact between the French and the Aboriginal people on the basis of the contact that occurred at Recherche Bay.

While that encounter was remarkable for its friendly character, it was rather atypical, and we should not conclude that French exploration and colonial ambition was any more benign than that of the British. For example, in March 1772, Marion Dufresne had a somewhat more conflictual encounter with Tasmanians at what is now Marion Bay—though perhaps it was something about Dufresne, who (with twenty-six others) was killed shortly after in New Zealand.

This paper considers some of the lessons to be drawn from the case of Recherche Bay: the possibilities for private, rather than public, action to preserve places of value; the advantages and dangers of what have been termed 'whirlpool politics', including the dangers of assuming that the preservation of cultural and natural heritage and conservation biology form a single agenda. I argue that we need to be doing the right thing for the wrong reasons.

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Preservation, public and private

Recherche Bay represents an interesting case in the politics of preservation, not least because of the mechanism by which it has been saved: the purchase of private land by the Tasmanian Land Conservancy. This is a notable feature because it reminds us that all things worth preserving are not located on public land, and that governments should not (and, perhaps, cannot) be relied upon to act to protect all that is of value. All that is of value is not always protected in national parks or heritage areas, and there are limits to the amount of land that can be acquired and protected in this way. Many important scenic, conservation or heritage values exist on private land and must be protected by government regulation, but private landholders can also play a positive role in protecting things of value.

Common property problems can be solved by government administration, but they can be addressed also by the establishment of clear property rights and the use of market mechanisms,[1] although private conservation is controversial. Anderson and Leal's, *Free Market Environmentalism,*[2] met with a somewhat hostile reception, and the Australian company Earth Sanctuaries (which sought to make wildlife preservation a profit-making concern) did not fare well as a private, capitalist attempt to preserve wildlife habitat. Yet most people now recognise that providing economic incentives, and (importantly) avoiding the creation of perverse incentives, has some part to play in achieving good conservation outcomes. While the capitalist model of Earth Sanctuaries might have failed, there are other examples in Australia that, like Recherche Bay, tap into altruism to buy land for conservation purposes. The reserves (such as Gluepot Reserve), purchased by the Australian Wildlife Conservancy, Australian Bush Heritage Fund, and Birds Australia are three examples, while the Victorian 'BushTender' initiative recognises that there is also a role for governments in providing incentives for private conservation initiatives.[3]

Governments face myriad demands for the use of limited resources, and it is inevitable that they will sometimes decide not to commit resources to save areas like Recherche Bay, because the costs are considered too high or the preservation values too low. But there is no reason why those who believe that an area has higher conservation value should not commit their resources to help achieve such an outcome. The challenge is not simply to find the funds, but a collective means of achieving such an outcome where the size of the task is beyond the capacity of a single individual. Governments and affluent individuals can play a facilitative role under such circumstances—as they have done in this case. With individual property-holders, it is much easier to make a difference.

In the United States, private property instruments are often made to work *for*, rather than *against*, preservation of both natural and cultural heritage. There, it is quite commonplace for landholders to place conservation covenants on their properties (for natural or cultural heritage reasons), and pay in any capital value reduction for the cost of saving things of value for future generations. Favourable taxation provisions assist this process of private philanthropy, thus enabling private citizens to make a meaningful contribution to preserving natural and cultural heritage. The practice is not as widespread in Australia, but one of the many positive features of the Recherche Bay case is this effort by private citizens to ensure its preservation. Internationally, the buying of debt in exchange for commitments to preserve rainforest also represents a useful approach to achieving this end. It is certainly preferable to affluent nations, that have profited from clearing their own forests, demanding that developing countries not do the same; or rock stars (who often arrange their own affairs to minimise tax) urging leaders to spend the taxes of their citizens to forgive debt, without attaching conditions stipulating either good governance or good forest management.

Whirlpool politics

One further important issue to note in relation to the preservation of Recherche Bay is that the campaign in favour was initially primarily an extension of the conflict over forestry in Tasmania. Not for the first time, the campaign saw the active linking of the two issues of heritage and nature conservation. The dynamics of political campaigning frequently involves protagonists seeking to build coalitions (or prevent opponents from forming coalitions) with those who have different motivations, but whose participation can help tip the balance one way or the other. Schattschneider[4] long ago stressed the importance of expanding or limiting the scope of conflict for determining its outcome. The fundamental strategy of relatively powerless groups that resort to protest action is usually to try to involve influential third parties that can help to carry the day.[5]

Finding additional issues that might activate other actors, and provide additional bases for political (and legal) action, is important in many campaigns against development (as it was in the Recherche Bay case). Often this is a process that can take on a life of its own, beyond the control of the campaigners. Henning[6] described this somewhat uncontrolled dynamic, which he saw as common in environment and resource politics, as 'whirlpooling'. There are dangers inherent in this process because it cannot be assumed that there is always a common agenda across all the issues at stake. It is debatable, for example, whether there is a common agenda involving the case for wilderness preservation and those for conservation biology and cultural heritage—be it Aboriginal heritage or that relating to European discovery and settlement. There is a danger that, once harnessed to the politics of preservation, the significance of the issues of heritage and conservation biology can be lost, or simply assumed to flow automatically from the act of preservation.

Cultural heritage and wilderness preservation

It is part of the folklore of the struggle to save the Franklin River from hydro-electric development in the late 1970s and early 1980s that Kevin Kiernan was despatched to relocate a cave that was known to contain rich evidence of prehistoric human use, in the hope that this would provide an additional reason to save the Franklin. Kiernan, having successfully located the cave, initially named it Fraser Cave in a failed attempt to appeal to the vanity of the Prime Minister. It was eventually given the name Kutikina Cave.

Not all the whirlpooling in the Franklin campaign took place in the river. As Robert Goodin noted in his landmark book *Green Political Theory*[7], the successful listing of Tasmania's Southwest on the World Heritage register owed much to this evidence of significant cultural heritage importance. The irony lay in the fact that the campaign to save the Franklin was overwhelmingly one of wilderness preservation, and, as Goodin pointed out, wilderness has value largely because of the absence of human influence. The significance of Kutikina Cave lay in the fact that the listing of the Southwest as World Heritage relied in no small part on this evidence that there had been a human presence in the area. An impression is common in Australia that the World Heritage Convention is about *natural* heritage, but cultural heritage is as, if not more, important to its focus globally, and it was of considerable importance in the acceptance of Southwest Tasmania onto the Register. The External Affairs Power was at the crux of the High Court decision that preserved the Franklin, though there were other constitutional bases for action. This does not mean that the case would have failed in the absence of significant cultural heritage values, but their presence certainly strengthened it.

Two decades on from the Franklin campaign, it is worth pondering what has happened to prehistory in southwest Tasmania. It is fair to say that the potentially rich cultural heritage of southwest Tasmania has all but disappeared from the popular consciousness. Herein lies a lesson for the future of cultural heritage in the case of Recherche Bay. Kutikina Cave is now merely a side trip to ecotourism adventures down the Franklin: 'Day 10 We enjoy a relatively easy paddle this morning, before a brief stop to explore Kutikina Cave.'[8] The discovery of a prehistoric Aboriginal presence in the southwest was convenient for the campaigners wishing to preserve the Franklin, but there has been little follow up to this region's exciting potential for further archaeological research.

This use of cultural heritage for political purposes is not the only example, and the strategy has not gone unremarked. Monica Nugent, for example, has argued that green groups utilised archaeological evidence of Aboriginal life to support their case for preservation 'rather than to support Aboriginal land rights *per se* and have fallen into the trap of appropriating the Aboriginal cause to support their own.'[9] This stance has invited criticism of environmental campaigners from Aboriginal people.

Something similar occurred with the campaign to oppose the uranium mine at Jabiluka, which environmental groups argued would make Kakadu worthy of a 'World Heritage in Danger' classification. As with the earlier campaign over Coronation Hill, the Jabiluka campaign saw the appropriation by environmentalists of the opposition of some traditional owners, with the addition this time of an anti-nuclear strand, to produce a broad, sometimes confused, coalition.

Such whirlpooling of issues is an attractive political tactic, but it does little for the integrity of international governance, which is all too problematic without complications such as these. As it happened, the attempt to list Kakadu failed. Since the development would have occurred in an area deliberately excised from the Heritage–listed park, and involved the closure of the Ranger mine, it was unlikely that Jabiluka (whatever its other merits) would have been judged to have put Kakadu in danger.

The varied issues which are drawn into the whirlpool of any political conflict do not always form a coherent agenda. It is relevant to consider a brief hypothesis. What if Recherche Bay was the site not of a transitory French presence but of a substantial settlement of some duration that had since become overgrown with the vegetation we see today? Under these circumstances, might we not consider that it merited a full site excavation, rather than the limited and rather unobtrusive survey that has occurred? What then might the wilderness campaigners make of the need to remove trees in order adequately to excavate the site?

This thought experiment points to the possibility that there are situations where wilderness preservation and heritage conservation might be in conflict. One example is the Amazon forests, which have iconic status for environmentalists because of their supposedly ancient provenance, but are now accepted to have once been the site of an agricultural civilisation of some sophistication. Rather than sustainiing tropical rainforest for 150 million years, for example, parts of the Amazonian rainforest might be about 1,000 years old, and have grown over a system of raised fields, irrigation canals, fish weirs, settlement mounds, roads and causeways and other anthropogenic features constructed between about 100 BC and 1100 AD. First described in the 1960s by geographer William Denevan, these features were studied in detail by archaeologist Clark Erickson from the 1970s.[10] Should we clear rainforest in the cause of archaeology?

There is no easy, automatic answer to that question. But we might note that there is no logical resonance between wilderness preservation and heritage conservation, and be wary of the consequences of assuming that there is. In the recent past we have witnessed peace activists, self-identifying as Greens, deface the now World Heritage listed Sydney Opera House, and anti-forestry activists deface the more mundane (but historically significant) 'Keen's Curry' sign on a hillside in Hobart—just after some young people on a work program had restored it. We have a right to call for something better than single-issue politics, where heritage is used or abused in the name of a cause some individuals decide is more worthy.

Conservation biology

The theme of the symposium on Recherche Bay reflected a welcome determination to ensure that its heritage values were not lost to view. It is worth noting, however, that there are problems also with the other cause which has been harnessed to help preserve Recherche: conservation biology. Conservation biology and the protection of endangered species are *not* coterminous with wilderness preservation, desirable as both might be.

The relationships between 'wilderness' and 'biodiversity conservation' are complex. Undisturbed wilderness areas are often important for species conservation, however, areas that have been subjected to substantial disturbance can be also. The merits of any case for preservation require the exercise of human choice. The term 'wilderness' embodies human valuations that have changed from negative ('wastelands') to strongly positive over the past century. Moreover, the science of ecology is far from value-neutral, and cannot serve as an authoritative source of policy advice without contest from those who differ. Ecology is full of terms, like 'natural enemies', which were first used metaphorically but are now frequently used non-problematically and in different contexts to that of their initial usage. Chew and Laubichler[11] have concluded that many, if not most, ecological concepts reflect familiar cultural experience. They note that the discipline is replete with value-laden terms such as 'alien', 'colonise', 'community', 'competition', 'contest', 'disturbance', 'efficiency', 'enemy', 'invasive', 'native', 'stability' and 'territory.' Further, the new 'synthetic discipline' of conservation biology was founded in the mid-1980s by Michael Soulé, who established the Society for Conservation Biology in 1985 and its journal *Conservation Biology* in 1987. Conservation biology was founded unashamedly as activist science. Soulé[12] maintained that ethical norms were a genuine part of conservation biology.[13]

As Stephen Budiansky[14] shows in *Nature's Keepers*, endangered species turn up somewhat inconveniently in the most 'un-wilderness' like locations—including industrial wastelands. To give but one example: the salt works and sewerage treatment works on the western side of Port Philip Bay are about as far removed from wilderness as possible, yet they are Ramsar listed wetlands of international importance, and attract ornithologists from around the globe, despite substantial human impact.

Just as non-wilderness can have considerable value, so the desire to protect wilderness by removing human agency can lead to problems. A single example starkly demonstrates the fragility of the assumption that leaving 'wilderness' alone is both desirable and unproblematic. On Queensland's Cape York Peninsula, an area of wet sclerophyll forest is being 'invaded' by rainforest.[15] The wet sclerophyll is habitat to several endangered species. What management decision should we take? Rainforest ecologists might argue that rainforest is naturally more biodiverse than wet sclerophyll, and that therefore the invasion should be allowed to proceed. But if we care about species extinction, should we not intervene? And what difference does it make that both the origins of the wet sclerophyll and the resurgence of rainforest are anthropogenic—the former in the fire activity at the hands of Indigenous people, and the latter because of the termination of that practice with the development of the cattle industry?

Should we privilege the wet sclerophyll (which is an artefact of pre-industrial human fire activity) over the rainforest which is advantaged by the fire suppression activity of modern society? Rainforest ecologists tend to argue for rainforest, citing its greater inherent biodiversity, but conservation biologists would argue that acting to preserve the wet sclerophyll enhances biodiversity on a global scale. As this example shows, all environmental management requires the exercise of human judgement about whether or not to intervene. A decision not to act is just as much a decision as one to do so, and we may no longer assume that protected areas should be left to their own devices: they are assets that must be managed by human agency, for particular outcomes, chosen by human judgement.

Neither should we assume that preservation of an area means that we have done much (or anything) to conserve endangered species. As Alston Chase[16] demonstrated convincingly in his *Playing God in Yellowstone*, assumptions that nature will look after itself are dangerous when they inform the management of reserves. (The Yellowstone tragedy included the operation of 'natural management' theories when wolves and other predator species had been removed; the case of feral cat eradication on Macquarie Island is yet to be fully described). Human intervention and management, especially the re-introduction of species such as wolves, has improved Yellowstone, and much of the vegetation has rebounded from the fires of 1988 that helped focus political attention on the management of the park.[17] Much of the contemporary politics of the environment appears to be based upon assumptions of harmony, stability and climax communities that have been discarded in ecological science. Contemporary ecological science has important consequences for both 'natural management' and for ecocentric philosophical positions; many environmental activists have yet to appreciate this.[18]

But there are dangers, too, in the way in which iconic endangered species (especially charismatic megafauna) are repeatedly employed in the cause of wilderness preservation. The dangers are threefold.

First, most of the earth's species are *not* charismatic megafauna, and the emphasis on those that are does nothing to build public support for the uncharismatic and downright ugly. Insects, fungi, slimes, moulds and microbes comprise not only a greater number of species than charismatic megafauna, but they are probably more significant, ecologically speaking.

Second, charismatic megafauna are not always as at risk of extinction as their champions would have us accept. There are, for example, far more tigers than the numbers often quoted. It is frequently claimed that there are only around 5,000–7,500 tigers left in the wild and

1,000 in zoos. Even if we accept those numbers, the discovery of a tiger in a New York apartment in 2003 (when it attacked its owner) points to a phenomenon which suggests that tiger conservation is *not* about mere numbers. In the United States alone, there are estimated to be as many as 13,000 tigers in private hands.[19] The argument in favour of tiger conservation is properly about the importance of preserving tigers in the wild (whether or not private captive breeding can secure biodiversity and species survival), rather than merely about numbers.

Third, if endangered species are claimed to be at risk from a disparate number of development proposals, there is a danger that that future claims for protection will be received with increasing scepticism on the part of the public. In the case of Recherche Bay, the Swift Parrot is being used: as the Tasmanian Land Conservancy fundraising brochure states, this species is 'endangered at a national level due to habitat destruction'. Now, in the recent past in Tasmania, the Swift Parrot has been invoked in the case of logging the Weilangta Forest and a housing development on Mt Nelson. Any more claims and the public might be forgiven for thinking that it is ubiquitous, rather than endangered. (One might make the observation that endangered species seem to cluster around the sites of development proposals). Each time a charismatic species is tossed into the political whirlpool, there is a risk that its credibility as an endangered species will be damaged. Consider that other highly endangered bird, the Orange-bellied Parrot. It has been employed in opposition to the Heemskerk Windfarm, (famously) the Bald Hills Wind Farm and the proposed Point Lillias Chemical Storage facility (when former Premier Kennett dismissed it as a 'trumped-up corella').

Australia is not the only place where renewable energy and conservation biology have clashed. In February 2004 English Nature and the Royal Society for the Protection of Birds threatened legal action against the Shell Flats wind farm on the basis of the threat it posed to the Common Scoter (*Melanitta nigra*), a rare little black duck.

The Orange-bellied Parrot is seriously endangered and needs funds, and it is salutary to note that when the Point Lillias project was abandoned, among those who were most disappointed were conservation biologists because with the project's cancellation went the sizable sum the developers had promised for Orange-bellied Parrot conservation—fencing habitat from foxes and feral cats, for example.[20] Conservation requires human management and the allocation of resources, not the exclusion of human agency.

The Orange-bellied Parrot appeared in another political role in 2006—one that demonstrated the dangers of invoking endangered species for political purposes. This time the merest hint of a parrot, together with some mathematical modelling and the precautionary principle, were used by the Commonwealth Environment Minister to disallow the construction of a wind farm. While the wind farm was the environmentalists' preferred response to climate change, it was opposed by residents in a marginal constituency. The authors of the report into the impact of the Bald Hills wind farm on the Orange-bellied Parrot produced modeling on the assumption that the birds spent time at most wind farm sites in Victoria. This was despite the fact that the birds had not been recorded at twenty of the twenty-three wind farm installation sites along the coast of Victoria[21] and only one or two sightings had been made at the other three sites. The authors then assumed that the birds would remain present within a single wind farm location for six months—the longest possible period the migratory species could remain at a winter site, and longer than any bird had been recorded at any site. They also assumed that the parrot would make two passes through the Bald Hills site. They did all this to err on the side of overestimation of impact. While no parrot had been sighted within 50 km of the proposed site, the Minister then acted in accordance with the precautionary principle (and an election promise) to block the Bald Hills wind farm on the basis of cumulative impact—compounding the precaution already embedded in the assumptions underlying the modeling.

Conclusion

It is important to do the right thing for the right reasons. We need to support heritage conservation on its own merits—because it informs us about who we are. And we should support conservation biology on its own merits, unencumbered by myths of 'natural management' and notions of 'wilderness' uncritically held. While much of environmental politics consists of political whirlpooling, of harnessing other issues to the cause, its practitioners need to exercise caution about how their tactics might impact upon causes that are as worthy as their own. This does not mean that we should not support wilderness conservation, but society is likely to insist upon a balancing of competing values. These include more than utilitarian values, and those that are sometimes harnessed to the cause of preservation.

The preservation of Recherche bay is an outcome that should be celebrated. It is also a case that offers several lessons, not least of which is that its assets will require active management, with some difficult choices to be made between different values. Acquiring the asset is just the beginning; keeping and treasuring it requires further and permanent effort.

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11 Legal lessons from the recent history of Recherche Bay

Tom Baxter

The real voyage of discovery lies not in seeking new landscapes but in having new eyes.

Marcel Proust *À la Recherche du Temps Perdu* [*In Search of Lost Time*][1]

As earlier chapters have highlighted, Recherche Bay is one of Australia's most significant cultural landscapes. This chapter focuses on the State and Federal heritage listings of the northeast peninsula and the controversial logging plans for the Vernon brothers' block which preceded its acquisition by the Tasmanian Land Conservancy. It considers the Tasmanian Government's limited listing under the *Historic Cultural Heritage Act 1995* (Tas) of a 100 m wide heritage area around the northeast peninsula's coast and around both the garden and observatory sites—allowing logging to proceed outside those boundaries. Also considered is the eventual National Heritage listing under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) of the Recherche Bay (North East Peninsula) Area. The chapter also examines how, even after this National Heritage listing, the heart of that National Heritage place came so close to being logged.

Limited listing under the *Historic Cultural Heritage Act 1995* (Tas)

In around 1948 a significant parcel of land on the bay's northeast peninsula was purchased by a Mr Vernon. By 1987 the land had been passed down the family to two of his grandchildren, brothers Robert and David Vernon of northern Tasmania. In the early 21st century plans to log that land came to public attention.

Local residents formed the Recherche Bay Protection Group and lobbied the State and Federal governments. Public interest grew after the discovery, in 2003, of stones laid out in 9 x 7 m dimensions, in the approximate location recorded by the French, apparently marking the site of a garden planted by Félix Delahaye.

In Mulvaney, J and Tyndale-Biscoe, H (eds) (2007) *Rediscovering Recherche Bay*. Canberra: Academy of the Social Sciences in Australia, pp 135-144.

Premier Jim Bacon's statement: August 2003

Then Premier and Minister for Tourism, Parks and Heritage, the late Jim Bacon MHA, stated during Question Time in the Tasmanian Parliament on 21 August 2003, *inter alia*, with respect to the northeast peninsula of Recherche Bay:

> The Government is determined to protect the whole site. …. for its cultural heritage values and others, but this is not just a simple story as you would like to tell because there are potentially other heritage aspects and, most importantly, indigenous heritage aspects to the site.
>
> Given the reasons for the peninsula's nomination, a comprehensive interdisciplinary analysis of the range of heritage values and associated information is needed to ascertain the entire significance of the site as required by the *Historic Cultural Heritage Act 1995*. The Tasmanian Heritage Council is overseeing the process. At the conclusion of the process the THC will report to me with a recommendation on the future status and management of the heritage values of the area. ….
>
> The recommendations from the Heritage Council will be considered by the Government, but I can assure you that we are not just looking at one particular 20-metre square area or anything like that; we are looking at all the heritage values. In fact, modern, contemporary consideration of heritage values includes the whole notion of cultural landscape.[2]

Tasmanian Heritage Council's Recommendation: November 2003

On 19 November 2003, the Tasmanian Heritage Council [the THC], a statutory body established under the *Historic Cultural Heritage Act 1995* (Tas), issued a media release highlighting three resolutions passed by the THC that day. The THC's media release read, in part:

> Having considered all the documentation which had been submitted to it, having before it the Recommendations of the Registration Committee and having heard presentations by both the three nominating agencies and the major owners of the land the THC resolved as follows:
>
> *Resolved* that the [THC] believes there may be, on the present evidence available, places of historic cultural heritage significance relating to the D'Entrecasteaux Expeditions (as well as other activities from the nineteenth and twentieth centuries) on part of the northeast peninsula, Recherche Bay.
>
> *Further Resolved* that the Council recommends to the Minister that he should declare for a period of two years the area which is the land mass to low water mark of the northeast peninsula …. to be a heritage area on the grounds that it does contain, and may contain further places of historic cultural heritage significance in particular relating to the Expeditions of Bruni D'Entrecasteaux.
>
> *Further Resolved* that the Council recommends to the Minister that while the Heritage Area declaration is in place all necessary steps be taken to minimise activities which would diminish the heritage significance of the area and in particular the D'Entrecasteaux connection.[3]

Minister Ken Bacon's Decision: October 2004

In October 2004, after Jim Bacon's death, the then Minister for Tourism, Parks and Heritage, Ken Bacon MHA, rejected the THC's recommendation that the area to low water mark of the North East Peninsula of Recherche Bay be nominated for interim listing under Part 5 of the *Historic Cultural Heritage Act 1995* (Tas) [the *HCHA 1995*].[4] The Minster told the THC:

> … I consider that it is not appropriate, at this time, to list the entire NE Peninsula of Recherche Bay. This is primarily because the *HCHA 1995* makes no provision for the listing of cultural landscapes. Furthermore, all known significant sites can be protected by a 100 metre buffer zone. Finally, forestry activity is an exempt activity for the purposes of the *HCHA 1995* and consequently the Forest Practices Code already affords a significant degree of protection.[5]

Instead, the Minister provided cultural heritage protection for a much more limited area, encompassing a pre-existing coastal reserve. To this end, he declared:

> by order, for a period of five years, that an area of 100 metres from the high water mark, and including the coastal reserve, around the entire coast to the south and west of the NE Peninsula of Recherche Bay in Southern Tasmania be a heritage area of historic cultural heritage significance under Part 5 of the *HCHA 1995*, on the basis that this area encompasses all of the known significant cultural heritage sites and that further work is required to appreciate the area's full historic significance.[6]

The Minister also recommended:

- that a 100 metre buffer zone around the [French] observatory and garden sites be registered as an historic cultural heritage place of significance under Part 4 of the *Historic Cultural Heritage Act 1995*, on the basis that there is already enough evidence to register these areas;[7]
- the Tasmanian Heritage Council … ensure that the issue of cultural landscapes is part of the consideration of the current review into the *HCHA 1995*;[8] and
- the Tasmanian Heritage Council should commission further research to determine if other significant sites exist within the Rocky Bay area, particularly in relation to the D'Entrecasteaux expedition, and pursue nominations for any such sites.[9]

In a media release of 14 October 2004, Ken Bacon announced his decision, which he said would protect the French Garden of Recherche Bay, the site of the French Observatory and other potential sites of historic heritage significance in the area.[10]

At the same time, Mr Bacon said his Department had given approval for the major landowners in the area—David and Robert Vernon of Launceston—to access their land (by construction of a forestry road through the neighbouring Southport Lagoon Conservation Area), for 'commercial activities'. Mr Bacon said in his media release:

> I have made a decision that I believe is the best outcome for both our historic heritage and the rights of private landowners to access and enjoy their land. …

> Today I am announcing that there will be a 100 metre heritage area around the entire coast of the northeast peninsula of the Recherche Bay area in Southern Tasmania.
>
> I am also recommending to the Tasmanian Heritage Council (THC) that there should be an additional 100 metre heritage area around both the garden and observatory sites, and that these enlarged sites be registered immediately as historic cultural heritage places of significance.
>
> The heritage area declaration is for five years and incorporates a 100-metre zone from the high water mark including the existing coastal reserve. The time frame will allow for further heritage surveys to be undertaken.[11]

Mr Bacon said the declaration of the 100 m coastal heritage area had been made under Part 5 of the *Historic Cultural Heritage Act 1995* (Tas) on the basis that this area encompassed all of the known significant cultural heritage sites and that further work was required to appreciate the area's full significance.

Mr Bacon said the advice from his Department was that the existing *Historic Cultural Heritage Act 1995* did not enable him to consider the issue of cultural landscapes and he had requested that the THC consider cultural landscapes as part of a review into the legislation.

> I have also requested the THC to undertake further research to determine if a similar nomination for parts of Rocky Bay, adjacent to Recherche Bay, or any other places of significance in the area should be progressed (Rocky Bay being the site of the majority of French activity during their stay in 1793).[12]

Mr Bacon claimed that the five-year timeframe, the review of cultural landscapes as part of the Act, and his request to undertake further research at Rocky Bay, went further than the initial recommendation from the Heritage Council.[13] He added:

> What we do know for certain is that this area has had a rich and varied history since before European settlement and during the 200 years since. Today's announcement is about finding a balance between the preservation of significant cultural sites and the rights of private landowners. David and Robert Vernon should be able to access the land that has been in their family for many years.[14]

Tasmanian Reaction: October 2004

Opponents of logging on the peninsula attacked the Tasmanian Minister's decision and appealed for the Federal government to intervene, arguing that the peninsula and its heritage values should not be compromised ahead of a decision whether to include the peninsula on the National Heritage List.

For example, in a media release of 14 October 2004, the Tasmanian Greens accused Minister Ken Bacon of being 'in thrall to the timber industry over his astounding decision to ignore the advice of the THC to protect the entire northeast peninsula of Recherche Bay and instead allow the heritage values of the area to be destroyed.'[15] Tasmanian Greens Environment spokesperson, Nick McKim MHA, stated:

> The area is currently the subject of a nomination for listing on the National Heritage Register, and the State Government's decision is a pre-emptive strike against Australia's environmental and cultural heritage. …
>
> Paul Lennon is sending a belligerent message to the Howard Government that he has no intention of allowing cultural and environmental values to stop the logging madness in Tasmania.
>
> Just five days after the federal election Paul Lennon is showing that he will go flat out to destroy Tasmania's forests and cultural heritage in defiance of the wishes of the majority of the country.[16]

Forest practices plan approved: 2005

On 31 March 2005, the Tasmanian Forest Practices Board certified a Forest Practices Plan submitted by brothers David and Robert Vernon covering their privately owned land within the NE Peninsula.[17] The Plan provided for a total area of 103 hectares to be harvested within a 150.9 hectare total area of operation.

A road corridor across the adjacent Southport Lagoon Wildlife Sanctuary was included in the Forest Practices Plan (consented to by the Tasmanian Director of National Parks and Wildlife).[18] This corridor contained roughly half the length of a 4.23 km road (the remainder to be within the Vernons' land), to provide access to, and for cartage of timber from, the logging coupe.[19]

The Forest Practices Plan specified known cultural heritage sites and provided, *inter alia*, that:

> All known sites outside the 100 m wide Coastal and Historical Reserve will be clearly marked with light blue tape prior to the commencement of any roading or harvesting operations.[20] ….
>
> Should any new historic feature be discovered in the course of the operations, work in the general vicinity of the feature will cease and the Contractor will notify the Forest Practices Officer in charge of the operation who will in turn notify the FPB Senior Archaeologist.[21]

The Forest Practices Plan named and included signatures on behalf of Gunns Limited as the Principal Processor expected to process timber from the Plan and responsible for roading and reforestation.[22] Reforestation was to include site preparation and low intensity burning. The Plan included a statement that 'Every endeavour will be made to keep fire within all harvested boundaries.'[23]

In April 2005, over 1,000 people walked in protest along the logging road which now crossed the Southport Lagoon Wildlife Sanctuary.

Federal legislation for the protection of national heritage

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) [the EPBC Act] is the principal Australian statute for protection of the environment, governing a range of environmental issues considered matters of national environmental significance. From 2004, Commonwealth natural, Indigenous and historic cultural heritage laws were integrated with the EPBC Act. Thus, the objects of the EPBC Act now include, *inter alia*:

(ca) to provide for the protection and conservation of heritage; and

(d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land–holders and indigenous peoples;[24]

In order to achieve its objects, the Act, *inter alia*:

(fa) includes provisions to identify places for inclusion in the National Heritage List and Commonwealth Heritage List and to enhance the protection, conservation and presentation of those places;[25]

The EPBC Act also sets out the following principles as '*principles of ecologically sustainable development*':

(a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;

(b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

(c) the principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;

(d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;

(e) improved valuation, pricing and incentive mechanisms should be promoted.[26]

For present purposes, the EPBC Act confines the Commonwealth's heritage interest to places of World Heritage or National Heritage significance and to property owned by the Commonwealth. The Act establishes a National Heritage List and provides a scheme whereby a place can be: nominated; assessed; and, if deemed to possess National Heritage value(s), inscribed on the National Heritage List as a National Heritage place.

In the absence of specific approval by the Commonwealth Minister for the Environment and Water Resources, the Act prohibits (punishable by a civil penalty) 'A constitutional corporation, the Commonwealth or a Commonwealth agency' from taking 'an action that has, will have or is likely to have a significant impact on the National Heritage values of a National Heritage place.'[27]

Such conduct can also constitute an offence of strict liability[28] against s 15C.

The Act contains some other similar provisions which variously prohibit a person (in certain circumstances) from taking an action that does, will or is likely to significantly impact on certain aspects of the national heritage values of a listed national heritage place.[29] However, these prohibitions are quite limited and appear to have been drafted taking a cautious view of the Commonwealth's constitutional powers in this area.

Exemption of RFA forestry operations

The above civil penalty prohibitions and offences are contained in Part 3 of the EPBC Act, along with other similar provisions designed to protect other matters of national environmental significance. However, their major limitation in the context of Recherche Bay is that s 38 of the Act provides:

> (1) Part 3 does not apply to an RFA forestry operation that is undertaken in accordance with an RFA.
>
> (2) In this Division:
>
> RFA or regional forest agreement has the same meaning as in the *Regional Forest Agreements Act 2002*.
>
> RFA forestry operation has the same meaning as in the *Regional Forest Agreements Act 2002*.[30]

Thus, such RFA forestry operations are exempted from the EPBC Act's primary prohibitions and offence provisions (and also, by extension, from the Act's main environmental assessment and approval processes elsewhere in the Act).

National heritage listing: October 2005

Despite the imminent threat of logging the then Minister for the Environment and Heritage, Senator Ian Campbell, refused (on 28 January 2005 and then again later in 2005) multiple applications for the northeast peninsula of Research Bay to be included in the National Heritage List as an Emergency Listing under the EPBC Act, s 324F.

Eventually, on the basis of a National Heritage nomination by Emeritus Professor John Mulvaney in January 2004, Senator Campbell inscribed the Recherche Bay (North East Peninsula) Area on Australia's National Heritage List, pursuant to the EPBC Act, on 7 October 2005.

The Federal Government's Summary Statement of Significance noted a range of values of the peninsula that extend well beyond the coastal heritage area declared under the Tasmanian Act. The more significant of those values include, *inter alia*:

- The whole peninsula has an association with the French scientific and exploratory expedition of Rear Admiral Bruny d'Entrecasteaux. The association of the place with the d'Entrecasteaux expedition is regarded as sufficient to establish the place's outstanding heritage value to the nation.
- The whole peninsula is regarded as having heritage value for its association with Labillardière's botanical collection.

- The known activities of the French expeditioners across the peninsula and the significance of many of those activities are regarded as constituting, through their association with the entire peninsula, an associative cultural landscape. Important features of that landscape are identified as including not only the coastal settings, sites of the French garden and observatories, etc, and any further archaeological sites dating to the French expedition, but also 'trees or remnant elements of old growth forest or other vegetation contemporaneous with the French visits'.
- Whilst there has been disturbance and the land contains substantial regrowth forest not directly related to the values of the place, the listing statement notes that 'the predominantly undeveloped character of the landscape contributes to the appreciation of the values'.
- The extensive documentation and specimen collections created by the French expeditioners, together with information that might derive from possible future field survey and investigation of the place, creates an important research potential to improve the understanding of Australia's cultural history.
- The place is regarded as having a strong or special association by the Tasmanian Aboriginal community with the Recherche Bay area as the place associated with the best documentary evidence of Tasmanian Aboriginal culture before European settlement. This is said to relate to various parts of the peninsula, principally including the area around Black Swan Lagoon, and the beach and hinterland east of Sullivan's Point.[31]

However, the National Heritage listing allowed '… logging of a harvest area of 103 hectares of a privately owned forestry reserve within the place.'[32] In any event, such logging could have relied upon the RFA exemption in the EPBC Act, s38.

Subsequent to the listing, appeals to the Federal Government to stop the logging proceeding were rejected. Negotiations with the Vernons involving Senator Bob Brown, Dick Smith (who donated generously), and, eventually (on the eve of a State election), Premier Paul Lennon, finally resulted in the Vernons selling their land to the Tasmanian Land Conservancy, a non-profit NGO largely reliant on donations from individuals and philanthropic bodies. The Vernons received around $2.2 million. Their access road across the adjoining Southport Lagoon Wildlife Sanctuary now requires rehabilitation, at public expense.

Conclusion

Even after their heritage listings, neither the Australian nor (until the eve of the State election) the Tasmanian government was prepared to prevent logging of the privately-owned land in the heart of the National Heritage listed Recherche Bay (North East Peninsula) Area. This provided an incentive for the private landowners to bulldoze an access road and pursue logging. This was only averted when, after extended negotiations, they agreed at the eleventh hour to sell their land to the Tasmanian Land Conservancy. The landowners' willingness and capacity to log enabled them to ultimately negotiate and achieve a price well in excess of the returns logging would have provided.

Both State and Federal governments appeared to acknowledge that insufficient information was available and insufficient archaeological survey work had been undertaken to fully assess heritage values relating to the North East peninsula. Despite this, both appeared satisfied with logging proceeding, so long as it avoided the specific sites identified (eg the French Garden and observatory) and followed the Forest Practices Plan. The EPBC Act requires that the precautionary principle be applied, yet both Governments would have allowed logging to proceed before full archaeological surveys had been carried out.

In the present case, the EPBC Act provided precious little incentive for private landowners pursuing logging to protect the National Heritage values of their property, despite the significant impact this would likely have had on, at the very least, the cultural landscape values of the peninsula. The forestry exemption in section 38 would have made it difficult for the Minister to prevent the Vernon brothers from logging their property, had he been moved to do so.

Thanks to private philanthropy and political pressure, the campaign to protect the northeast peninsula was ultimately successful, and just in time. However, the fact the National Heritage-listed peninsula came so close to being logged demonstrates the urgent need to reform at least the EPBC Act and Tasmanian legislation to provide proper protection for Australia's heritage places.

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12 The conservation and management of ecological communities

David Lindenmayer

Much of the focus of modern conservation science has been on identifying and establishing national parks and nature reserves. Indeed, there is a well developed science underpinning reserve selection, much of it originating in Australia. Reserves are a core part of any credible conservation strategy. However, conservation efforts based on reserves alone will invariably be inadequate for a wide range of reasons. Off-reserve strategies are essential for biodiversity conservation, not only in forests but in all types of vegetation. In the case of forests, a multi-scaled hierarchy of conservation approaches is required. At the regional scale, management should ensure the establishment of large ecological reserves. At the landscape scale, off-reserve conservation measures should include: meso-scale protected areas within wood production forests; buffers for aquatic ecosystems; appropriately designed and located road networks; the careful spatial and temporal arrangement of harvest units; and appropriate fire management practices. At the stand level, off-reserve conservation measures should include: the retention of key elements of stand structural complexity (eg large living and dead trees with hollows, understorey thickets, and large fallen logs); long rotation times (coupled with structural retention at harvest); silvicultural systems alternative to traditional high impact ones (eg clearfelling in some forest types); and appropriate fire management practices and practices for the management of other kinds of disturbances.

Integrating commodity production with conservation outside reserves requires high quality empirical data to evaluate the effectiveness of many specific on-the-ground management actions. These data are lacking for almost all forested regions Australia-wide. Hence, considerable effort is needed to adopt adaptive management 'natural experiments' and monitoring to better identify the impacts of logging operations and other kinds of management activities on biodiversity, to quantify the effectiveness of impact mitigation strategies and to identify ways to improve management practices.

The management and conservation of forests has been one of the most socially divisive issues in Australia over the past four decades.[1] Heated public debates remain in several parts of the continent and most of these revolve largely around ongoing access to native

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forests for the production of wood products versus the reservation of land from industrial forestry. These debates have focused attention away from the fact that there is a complex but still rapidly evolving science associated with both the selection of reserves to best conserve biodiversity and other key attributes of native forests,[2] and conservation outside the formal reserve or protected area system.[3]

There is a very large and rapidly expanding literature on conservation science.[4] It is not the intention (nor is it possible) to reproduce that extensive body of material here. Rather, the aim of this chapter is to very briefly outline some aspects of the scientific basis for the conservation and management of ecological communities in forests. To achieve this aim, the chapter contains three key sections. In the first, the importance of large ecological reserves as a key component of any credible conservation strategy is outlined. The importance of conservation outside reserves is the primary focus of the second section. The third and final part indicates where the conservation of Recherche Bay lies in a hierarchy of scientifically-based strategies aimed at the conservation of ecological communities.

Background—the need for multi-scaled conservation strategies

All credible plans for the conservation of biodiversity must embody a continuum of approaches from the establishment of large ecological reserves through to an array of off-reserve conservation measures spanning landscape, stand and individual tree levels.[5] (Figure 12.1).

Multiple management scales are needed for three key reasons:

1. There are multiple ecological scales,[7] not only for different ecological processes and different species, but also for the same species.[8] Thus, there is no single 'right' or 'sufficient' scale for forest and conservation management. A single conservation strategy adopted at a single spatial scale will only meet a limited number of stand and landscape management goals[9] and will provide suitable habitat for only a limited number of different taxa.
2. Different processes at different spatial scales are inter-dependent. What happens at the stand level cannot be divorced from what takes place at the landscape–level and vice-versa. For example, a stand of old–growth surrounded by other old–growth stands may behave quite differently (and support different species assemblages) than an old-growth stand embedded within an extensive region of continuous clearcutting.[10] Similarly, a landscape is comprised of an array of stands and the structural composition of these stands can influence species occurrence at the landscape level. A lack of suitable habitat within many different stands may combine to preclude a species from entire landscapes.[11]
3. Multi-scale conservation strategies may produce a heterogeneous landscape[12] containing the spatially dispersed array of resources needed by some species.[13]

Given the need for multi-scaled management strategies for conservation, the following sections briefly outline the basis for large ecological reserves and conservation outside reserves.

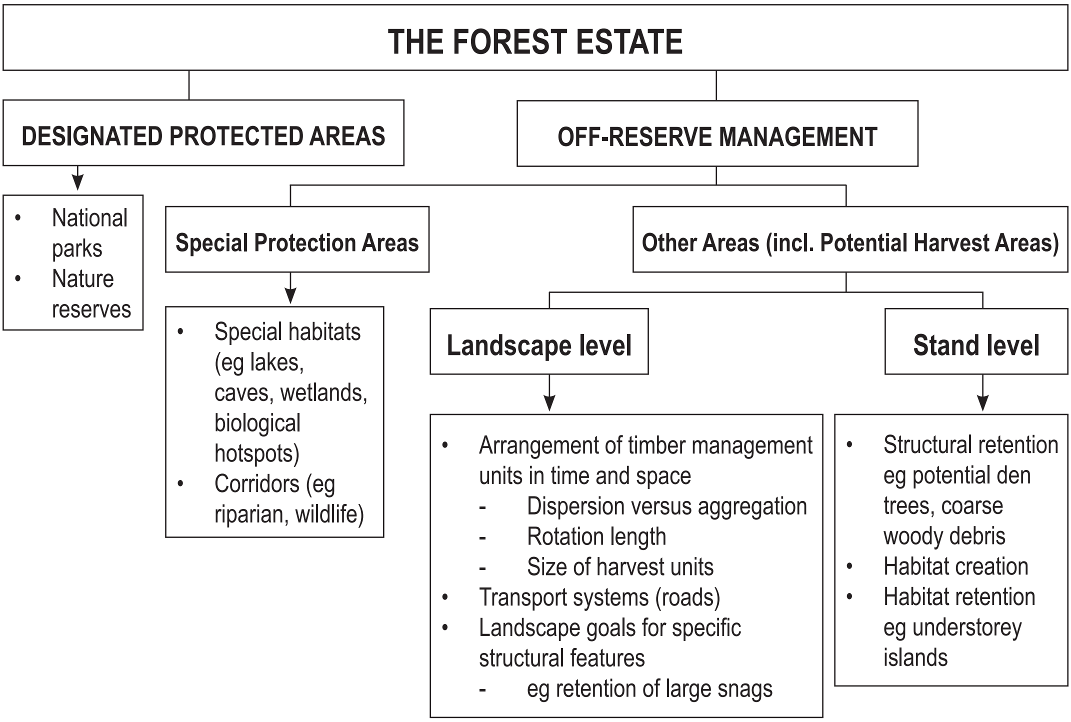

Figure 12.1. A framework for biodiversity conservation across protected areas (typically in public ownership) and off-reserve areas (including public and private native forests).[6]

Large ecological reserves

Large ecological reserves are an essential part of all comprehensive conservation plans. There are four key reasons why they are so important:

1. They support some of the best examples of ecosystems, landscapes, stands, habitat, and biota and their inter-relationships as well as opportunities for natural evolutionary processes.
2. Many species find optimum conditions only within large ecological reserves which become strongholds for these species.
3. Some species are intolerant of human intrusions, making it imperative to retain some areas which are largely exempt from human activity.
4. The effects of human disturbance on biodiversity are poorly known and some impacts may be irreversible. Others such as synergistic and cumulative effects can be extremely difficult to quantify or predict. These factors make large ecological reserves a valuable 'safety net' relatively free from human disturbance.

In 1890, Baron Ferdinand von Mueller called for a representative system of large ecological reserves in Australia—the first such recognition in the world. This sentiment was followed some eighty years later by similar calls by the Australian Academy of Science.[14] There is a now a strong and well developed science that underpins the selection of reserves and much of it has developed in Australia.[15] A key part of that science encompasses the process of systematic conservation planning which aims to make reserves comprehensive, adequate, and representative(CAR).[16] The primary objective is to protect the full array of biodiversity of a region. Comprehensiveness refers to the need to include the complete array of biodiversity, ranging from species (and their associated genetic variation) to communities and ecosystems. Adequacy relates to the need to support populations that are viable in the long term. Representativeness means that a reserve system should sample species, forest types, communities, and ecosystems from throughout their geographic ranges.[17]

Systematic conservation planning is dominated by methods such as reserve selection algorithms[18] and gap analysis.[19]Three principles govern the use of these tools: complementarity, flexibility and irreplaceability.[20] Complementarity is the degree to which an area adds previously under-represented features (eg species, land units, ecosystem types or environmental climatic domains) to a reserve system. Most algorithms operate by identifying new reserves to be added to a set of protected areas until all species or units are represented, or are represented a number of times.[21] It may be possible to develop a representative network of reserves from different combinations of areas—the principle of flexibility. Different areas can be substituted in a reserve system if they contribute the same conservation values.[22] The concept of irreplaceability has two meanings in reserve selection: firstly, the degree to which an area is essential to achieving a completely representative reserve system, and, secondly, the contribution a given area makes to representativeness.[23] Irreplaceability provides a means to explore planning options.

Systematic conservation planning in Tasmania

Systematic conservation planning approaches (which had their origin in Tasmania)[24] have underpinned the evolution of the reserve system in that state over the past few decades. Indeed, the protected area network is now more representative than virtually anywhere else in the world.[25] Prior to the early 1970s, the reserve system was biased toward areas of unproductive land of high scenic and aesthetic but low economic value—a trend typical of reserve systems in Australia and worldwide. Over the following decades there was a substantial increase in the area of the reserve system, with an improvement in the level of representation of many vegetation communities, including economically valuable ones.[26] For example, by 1992, the reserve system supported fifteen percent of the pre-European land cover of one-third of Tasmania's plant communities. Some of the gaps in the representation of the reserve system have been filled since then, particularly during the Regional Forest Agreement (RFA) process in the late 1990s. Mendel and Kirkpatrick[27] found that the RFA identified gaps in the reserve system and attempted to achieve representative levels of forest reservation according to set criteria of fifteen percent of pre-European area.[28] After the end of the RFA, there was an increase from sixteen to twenty-seven forest communities (out of fifty) that had fifteen percent reservation levels or higher.[29]

Despite the outstanding conservation gains in Tasmania, there are still some vegetation communities that are poorly represented in the reserve system, especially ones that have experienced large rates of loss since European settlement. In addition, there are some major remaining conservation problems, such as land clearing for plantation establishment,[30] and within–reserve management issues, including altered fire regimes and the spread of pathogens such as Cinnamon Fungus. These problems, as well as a number of others, highlight the importance of conservation outside reserves—the key topic of the following section.

Off-reserve conservation

Although large ecological reserves are a fundamentally important part of any credible conservation strategy, there are significant limitations of a reserve–only focus for conservation. They include:

- The area available for reserves is limited.
- The size of most reserves is limited.
- Many reserves are on steep terrain or infertile soils, which are not always suitable habitats for many elements of the biota.
- There are social and economic impediments to the expansion and management of reserve systems.
- Mobile taxa such as migratory or nomadic species and species with patchy distributions are not contained in conventional reserves.
- Abiotic and biotic conditions within reserves can be unstable.
- Human exploitation in the surrounding off-reserve areas may intensify once reserve systems are established.

In the case of forests managed under Regional Forest Agreements (or other arrangements), even if a reserve system includes fifteen percent of the pre-European extent of each forest type in Australia, a large proportion of each vegetation community and its associated biodiversity will still remain outside the reserve system. Even for threatened species known to occur on reserves, many important populations may not be on protected lands. For example, of all the Australian plant species considered to be endangered, vulnerable or rare in 1996, about half were represented on conservation reserves.[31] These factors indicate that off-reserve conservation is critical for the conservation of biodiversity.

Off-reserve conservation measures at the landscape–level

Off-reserve conservation strategies can be conceived at two broad spatial scales—the landscape level—typically hundreds to thousands of hectares, and the stand level (individual trees to tens of hectares). Five broad categories of approaches to landscape-level off-reserve forest management can be recognised:

- Establishment of landscape–level goals for retention, maintenance, or restoration of particular habitats or structures as well as limits to specific problematic conditions (eg the amount of a forest landscape subject to prescribed burning[32]).
- The design and subsequent management of transportation systems (generally a road network) to take account of impacts on species, critical habitats, and ecological processes.[33]

- The selection of the spatial and temporal pattern for harvest units or other management units.[34]
- The application and/or management of appropriate disturbance regimes such as those involving fire[35] or grazing.[36]
- The protection of aquatic ecosystems and networks (such as rivers, streams, lakes and ponds), specialised habitats (eg cliffs and caves), wildlife corridors, biological hotspots (eg spawning habitats, roosting areas for birds or camps for flying foxes), and remnants of late-successional or old-growth forest and disturbance refugia found within off-reserve forests.[37]

It is important to distinguish between large ecological reserves[38] and the protection of smaller areas *within* landscapes broadly designated for wood production.[39] Such systems of scattered small reserves provide increased protection of habitats, vegetation types, and organisms poorly represented or absent in large ecological reserves; they promote the protection for aquatic and semi-aquatic ecosystems; they maintain refugia for forest organisms that subsequently provide propagules and offspring for recolonising surrounding forest areas as they recover from timber harvesting; and they act as 'stepping stones' to facilitate the movement of biota across managed landscapes.

Off-reserve conservation measures at the stand–level

The objective of off-reserve management at the stand level is to increase the contribution of logged and regenerated areas to the conservation of biodiversity. Harvest units can be managed to sustain species, increase habitat diversity, improve connectivity, buffer sensitive areas, and sustain ecosystem processes including site productivity.

The internal structure and composition of harvested units can have a significant influence on the degree to which a managed forest can sustain biodiversity and maintain ecosystem processes. Several broad types of strategies can contribute to the maintenance of structural complexity:

- Structural retention at the time of regeneration harvest (eg large hollow trees and associated recruit trees;[40] understorey thickets,[41] and large fallen logs[42]). In other cases, specifically targeted strategies may be required to add or create particular structures such as girdling trees to increase quantities of dead wood[43] or installing nest boxes.[44]
- Management of regenerated and existing stands to create specific structural conditions (eg through novel kinds of thinning activities[45]). This may include the maintenance of open areas as well as heath and grassland habitats within forests that can be critical for some key elements of biota.[46]
- Long rotations or cutting cycles.[47]
- Application of appropriate disturbance management regimes such as prescribed burning to reduce fuel loads and reduce the risk of a high-intensity fire.

The various stand–level strategies can often be effectively combined to address a broader range of objectives as part of innovative silvicultural systems that address the twin objectives of commodity production and biodiversity conservation.[48] For example, the advantages of long rotations can be multiplied when accompanied by structural retention at the time of harvest. Conversely, rotation times may be shortened if greater levels of retention characterise logged stands at the time of harvest.

Data deficiencies and other issues

Although the need for a combination of large ecological reserves and an array of off-reserve conservation strategies is intuitive, empirical data on the effectiveness of most specific on-the-ground management actions are limited. Indeed, there have been over seventy-five enquiries into the timber industry since World War II and virtually all of them have highlighted the lack of empirical data on logging effects and the efficacy of strategies designed to mitigate them.[49] Given this, considerable effort is needed to implement true active adaptive management 'natural experiments',[50] and monitoring to better identify the impacts of logging operations and other kinds of management of biodiversity and quantify the efficacy of impact mitigation strategies and ways to improve practices where necessary. True adaptive management involves rigorous monitoring and a commitment to change when negative impacts of current practices are identified. Unfortunately, although active adaptive management is widely discussed in the literature, it is only very rarely implemented on the ground. In addition, the record on forest monitoring, which is a fundamental part of active adaptive management, is generally poor in forests around the world.[51] This needs to be rectified as part of attempts to make transitions to ecologically sustainable forest management not only in Tasmania but elsewhere in Australia.

The case of Recherche Bay

So far, this chapter has outlined the scientific basis underpinning a multi-scaled approach to conservation, but where does the specific case of Recherche Bay sit in such an overarching hierarchical approach?

Recherche Bay clearly qualifies as a meso-scale protected area within a larger area broadly designated primarily for timber and pulpwood production. As outlined above, these kinds of areas can have considerable conservation value either singly or in combination with other meso–scale protected areas and/or landscapes–scale and stand–level conservation strategies.

There is considerable precedent for the protection of meso-scale forest reserves which are specially managed for cultural and social reasons.[52] The Aboriginal and European significance of Recherche Bay is well recognised in the draft management plan for the area[53] and one of its explicitly stated aims is 'to conserve sites or areas of heritage significance'. The draft plan recommends such actions as limiting vegetation removal and 'encasement' of sites particularly sensitive to human interference to protect the Aboriginal and European significance of Recherche Bay area.

Notably, although some meso–scale reserves are managed primarily for cultural reasons these same areas also can have considerable value for many elements of biodiversity.[54] For example, cemeteries and other religious sites have functioned as refugia for many species including significant subsets of biotic communities.[55] Similarly, railroad and road right-of-ways sometimes function as refugia for communities or particular organisms of conservation concern.[56] In the particular case of Recherche Bay, the area is known to be used by and to provide habitat for four species listed as threatened or endangered in Tasmania. These include the White-bellied Sea Eagle (*Haliaeetus leucogaster*), the Grey Goshawk (*Accipiter novaehollandiae*), the Masked Owl (*Tyto novaehollandiae*) and the Swift Parrot (*Lathamus discolor*).[57] The status of these species means that careful management is required to ensure their persistence in the area. This is in keeping with a broad aim of the draft management plan for Recherche Bay[58] which is to 'conserve the natural biological diversity of the area'.

Small and medium-sized reserves, although often valuable for cultural and conservation reasons, can be highly susceptible to an array of factors that can degrade them and undermine the values which led to their protection. For example, the size and location of logged areas and associated road networks in the surrounding (unreserved) areas may produce deleterious impacts on adjacent small and medium-sized reserves.[59] Strategies such as the establishment of buffers, planning the size and location of logged areas in space and time, and the deconstruction of roads once timber harvesting is finished, are among a suite of strategies that can be employed in an attempt to limit negative landscape context effects on small and medium-sized reserves. These kinds of considerations and allied management strategies are relevant at Recherche Bay and need to be an integral part of well informed forest planning. The case of the conservation of the Swift Parrot at Recherche Bay is particularly important because the long-term conservation of the species depends almost entirely on management actions outside large ecological reserves.[60] Indeed, it has been estimated that less than two percent of the nesting habitat of the species occurs in dedicated conservation reserves with the rest on private and publicly–owned production forests.[61] Even the best formulated plans at a local level can fail if inappropriate practices are applied in the broader landscape. In the case of Recherche Bay, this means, for example, that logging schedules in the adjacent areas may need to be designed to ensure the broader persistence of wide ranging species such as the Swift Parrot. Thus, there needs to be close co-ordination between the plans for the conservation and management of Recherche Bay and those for adjacent areas, particularly where extensive logging operations have occurred or are scheduled in the future.

Conclusion

There is a well-developed (although still rapidly evolving) science that underpins conservation. It is complex because it entails considerations at multiple spatial scales from regions to individual stands and trees. The primary focus of most conservation efforts has been on the establishment of networks of large ecological reserves, which is in part guided by systematic conservation planning tools such as reserve design algorithms and gap analysis. The science behind off-reserve conservation is less well developed but is at least equally important as the establishment of large ecological reserves. There is an increasing realisation that medium and small protected areas within landscapes and regions broadly designated for wood production can have important conservation and cultural values and these values should not be discounted simply because these areas are not large. However, small and medium-sized areas such as the one at Recherche Bay may require special additional management because they are potentially vulnerable to negative effects emanating from surrounding unreserved areas. However, the effectiveness of impact mitigation strategies in off-reserve areas remains poorly known because of a chronic paucity of empirical studies backed by rigorous monitoring programs. The landscapes and region which contains Recherche Bay provides no exception to this systemic problem which is characteristic of wood production forests elsewhere in Australia and worldwide.

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Beautiful Recherche Bay, in southwest Tasmania, came to prominence only recently, but its significance for Australians goes back more than two centuries. It was there in 1791–1793 that many of Australia's unique plants were collected by botanists for the first time; a joyous encounter occurred between visiting French explorers and the Tasmanian people; and critical experiments on the earth's magnetic field were conducted by French scientists. Long forgotten, the place hit the news in 2001 with the discovery of remains thought to be from the French expedition. A public campaign to save the site from logging was resolved through the generosity of businessman Dick Smith, who underwrote its purchase by the Tasmanian Land Conservancy. To celebrate that outcome a symposium was held in 2007 in Hobart with experts in several disciplines exploring the historical, scientific and cultural significance of Recherche Bay. This book is the outcome.

It begins with a review of the historical context of the French expedition, followed by assessments of its scientific contributions to cartography, botany and zoology. The French encounter with the Tasmanians is examined and its significance to later studies on archaeology and the origin of language discussed. This is followed by a review of the subsequent history of Recherche Bay as a centre of whaling.

The remaining chapters deal with contemporary matters. A report on the current archaeological assessment of the stone structure purported to be the French garden is followed by examinations of the concept of place, the basis of public versus private values and the legal aspects of the controversy over Recherche Bay. The final chapter looks to the future: how best to conserve the several values represented at Recherche Bay.

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