The Economic Value of Wild Resources to the Indigenous Community of the Wallis Lakes Catchment

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The Australian National University

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March 2005

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THE ECONOMIC VALUE OF WILD RESOURCES TO THE INDIGENOUS COMMUNITY OF THE WALLIS LAKE CATCHMENT

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FOREWORD

This Discussion Paper is the published form of a research report commissioned by the New South Wales Government Department of Environment and Conservation (DEC) on the economic value of wild resources to the Indigenous community living in the Wallis Lake catchment. DEC's objectives in commissioning this research were:

- to determine whether wild resources provide economic benefits to Indigenous communities in coastal New South Wales;
- if so, to provide information to local government planners about the economic value of wild resources of a New South Wales coastal environment for Aboriginal communities; and
- to produce guidelines for local councils to help identify and value wild resources, as part of coastal land-use planning decisions.

It is anticipated that the information provided in this report will be of value to the New South Wales government's ongoing Comprehensive Coastal Assessment process by quantifying one category of the economic value of natural resources in the Comprehensive Coastal Assessment study area. The Comprehensive Coastal Assessment process is primarily about collecting information on the value of different uses of coastal areas of New South Wales and developing decision-making tools and methods. Broad guidelines on undertaking studies of the economic significance of wild resources to Indigenous communities are contained in Appendix B in order to assist local councils wishing to carry out such assessments.

Matthew Gray

Jon Altman

Natane Halasz

TABLE OF CONTENTS

TABLES

FIGURES

ABBREVIATIONS AND ACRONYMS

AGPS	Australian Government Publishing Service
AIAS	Australian Institute of Aboriginal Studies
AJAC	New South Wales Aboriginal Justice Advisory Council
ALRA	Aboriginal Land Rights Act 1983 (NSW)
ANU	The Australian National University
ATSIC	Aboriginal & Torres Strait Islander Commission
CAEPR	Centre for Aboriginal Economic Policy Research
CDEP	Community Development Employment Projects
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEC	New South Wales Department of Environment and Conservation
NATSIS	National Aboriginal and Torres Strait Islander Survey (1994)
NATSISS	National Aboriginal and Torres Strait Islander Social Survey (2002)
SC	Steering Committee
SIPF	Special Indigenous Personal Form
TEV	total economic value

ABSTRACT

There is currently a growing policy interest in the effects of the regulatory environment on the ability of Indigenous people to undertake customary harvesting of wild resources. This Discussion Paper develops and describes a methodology that can be used to estimate the economic benefits derived from the use of wild resources. The methodology and the survey instrument that was developed were pilot tested with the Indigenous community of the Wallis Lake catchment. The harvesting of wild resources for consumption makes an important contribution to the livelihoods of Indigenous people living in this area.

ACKNOWLEDGMENTS

This paper is based on a research project carried out by the Centre for Aboriginal Economic Policy Research, The Australian National University for the New South Wales Department of Environment and Conservation. This project was conceived and managed by Nicholas Conner, Principal Conservation Economist, Department of Environment and Conservation, and funded under the New South Wales government Comprehensive Coastal Assessment process. The views expressed in this paper are those of the authors and cannot in any way be taken to represent those of the New South Wales Department of Environment and Conservation.

The paper has been substantially improved as a result of detailed comments provided by Nicholas Conner, Jeremy Cross, Bill Fogarty, Dan Gillespie, Quentin Grafton, Boyd Hunter, David James and Peter Whitehead. Copy editing was by Frances Morphy, proof reading by Geoff Buchanan, and layout and design by John Hughes.

EXECUTIVE SUMMARY

There has been relatively little research into economic aspects of Australian Indigenous peoples' use of wild resources. Most previous research has been on subsistence production or customary harvesting of wildlife in remote areas. There has been almost no research into the economic benefits from the use of wild resources for Indigenous Australians living in more densely settled areas. This study provides the first estimates of the economic benefits derived from the use of wild resources in the Wallis Lake catchment, part of the Great Lakes region of the Mid-North Coast of New South Wales.

The study has involved the early development and testing of a cost-effective methodology which can be used to estimate the economic value of wild resource harvesting. It is hoped that this method will be used by local councils to sponsor studies of the economic significance of wild resources to the Indigenous community as part of the New South Wales government's ongoing Comprehensive Coastal Assessment process.

There is currently a growing policy interest in the effects of the regulatory environment on the ability of Indigenous people to undertake customary harvesting of wild resources. For example, recent reports have drawn attention to the fact that the New South Wales *Fisheries Management Act 1994* does not provide for customary fishing by Indigenous people to be a separate class of fishing activity. Fishing for domestic use may therefore bring Indigenous fishers into conflict with current New South Wales law.

THE WALLIS LAKE CATCHMENT

The Wallis Lake catchment covers an area of 1,440 square kilometres and can be divided into two major units: the coastal plain and estuary, and ridges and valleys. Wallis Lake is the largest New South Wales estuarine seagrass area and is listed as a 'Wetland of National Importance'. A number of islands in the estuary are nature reserves and most of the estuary islands are currently listed on the Register of the National Estate. About 9 per cent of the catchment is managed by the National Parks and Wildlife Service (part of the New South Wales Department of Environment and Conservation) and approximately 44 per cent of the catchment has been cleared.

The original people of the Wallis Lake area are the Wallamba. The archaeological and anthropological record reveals that they had a diet rich in seafood, with occasional and seasonal consumption of mammals and birds. The Indigenous population of the Wallis Lake catchment is estimated in 2001 to be over 800, which is around 3 per cent of the total catchment population of 25,500.

ECONOMIC BENEFITS FROM HARVESTING WILD RESOURCES

Non-commercial or non-market use of wild resources by Indigenous people is termed here the 'customary economy', and comprises a range of productive activities that occur outside the market and that are influenced by current cultural practices. Activities include hunting, gathering and fishing, as well as a range of associated activities such as land and habitat management, species management and the maintenance of biodiversity.

This study is concerned with the economic benefits which accrue to Indigenous people from the direct use of wild resources. These direct benefits might include:

- consumption of wild resources harvested;
- the use of wild resources as an input into something which is sold (e.g. a work of art); and
- employment resulting from connection with wild resources.

In this paper we do not attempt to estimate the value of purely cultural aspects of wild resource use. These are less tangible and more difficult to monetise than many of the economic aspects. For this reason the estimates in this paper are lower bound estimates of the value of harvesting to the Indigenous community. This should not be taken to imply that cultural aspects of the use of wild resources are not highly significant to the Indigenous population. Indeed they represent an important part of contemporary cultural practice that links people to their country.

VALUE OF WILD RESOURCES HARVESTED IN THE WALLIS LAKE CATCHMENT

Information on the types of wild resources which are harvested, the amounts harvested, the number of harvesters, the costs of harvesting and the market price of each type of wild resource harvested were collected during a short period of fieldwork conducted in July 2004.

In the Wallis Lake catchment most resources harvested by the Indigenous population are aquatic. While a number of terrestrial plant and wildlife species are harvested, the amounts are very small and they are harvested primarily for symbolic, cultural purposes. This should not be interpreted to mean that the harvesting of these resources is unimportant.

The value of wild resources harvested by Indigenous people in the Wallis Lake catchment is estimated to be between $468 and $1,200 per adult per year. Expressed as a proportion of the gross income of the Indigenous population, the value of the wild resources harvested is between 3 and 8 per cent. While the value of wild resources harvested appears to be only a relatively small proportion of total income, it is a significant contribution to the dietary intake of a relatively poor community. For those households with a very active and successful harvester, the value of wild resources consumed constitutes a far higher proportion of household income than is the case when total estimated return is averaged across the entire community.

Virtually all of the resources are used for personal consumption (including own household) or distributed to family outside of the harvester's own household. The harvesting of wild resources is not seen as a recreational activity, but rather as being of economic importance and as an important source of food. There is only limited commercial exploitation of wild resources by the Indigenous population.

The findings of this study indicate a keen Indigenous economic, social and cultural interest in the harvesting of wild resources in the Wallis Lake catchment. Innovative approaches are needed to facilitate the engagement of local Indigenous customary fishers in community-based monitoring and management of fishing effort and harvest levels, to ensure long-term species sustainability. It is our view that the potential common law property rights in customary use under native title legislation, alongside recreational and commercial use, should be recognised by New South Wales authorities. This report suggests that efficient resource use requires that the property rights and interests of all stakeholders in wild resources are recognised, and all fisheries effort, including the customary, is accurately monitored.

1. INTRODUCTION

There has been relatively little research into economic aspects of Australian Indigenous peoples' use of wild resources. The majority of research has been on subsistence production and has been undertaken in remote areas that are far from mainstream labour market and commercial opportunities. A number of case studies clearly demonstrate that with access to land-based or coastal resources, Indigenous Australians can establish production systems which exploit wildlife both for subsistence and commercial purposes.[1] There are, however, few studies which provide estimates of the value of economic benefits derived from the use of wild resources, and those which exist are for Indigenous people in remote regions (Altman 1987, 2001, 2003b, 2003c; Arthur 1990; Vardon 2001).[2]

The dearth of research that attempts to quantify the economic benefits accruing to Indigenous Australians living in non-remote or more densely settled areas from the use of wild resources is surprising given the wide recognition of the importance of such activities to the wellbeing, identity and cultural heritage of Indigenous peoples (e.g. Council of Australian Governments 1992). While there have been several studies of the economic benefits from the commercial use of wild resources for Indigenous Australians, these studies have focused on specific species in particular locations (e.g. Skira 1996).

This report provides estimates of the economic benefits derived from the use of wild resources by the Indigenous community of the Wallis Lake catchment in coastal New South Wales. A literature search has determined that these would appear to be the first estimates of the economic benefits from the use of wild resources to an Indigenous community in New South Wales. Both commercial and non-commercial uses are considered in this report. Non-commercial use of wild resources by Indigenous people is sometimes termed the 'customary economy', and comprises a range of productive activities that occur outside the market and that are based on cultural continuity from precolonial times. Uses include hunting, gathering and fishing as well as a range of other activities such as land and habitat management, species management and the maintenance of biodiversity. Such activities are often interdependent and occur concurrently (Altman & Whitehead 2003). There is a range of other sources of economic value including indirect use value, option value and non-use values (e.g. existence and bequest value) that are not quantified in this study, and hence the estimates in this paper are likely to be lower bound estimates of the value to the Indigenous community.

There is currently a deal of policy interest in the effects of the regulatory environment on the ability of Indigenous people to undertake traditional fishing in New South Wales. Two recent reports have drawn attention to the fact that the New South Wales *Fisheries Management Act 1994* does not provide for customary fishing by Indigenous people to be a separate class of fishing activity. Thus customary fishing by Indigenous people fishing for themselves and their families, and also for their extended family and communities, may bring those people into conflict with current State law (Cozens 2003; Hawkins 2003; Palmer 2004).

The economic, social, cultural and environmental context in coastal New South Wales is very different from that in remote areas, and so it is important to undertake empirical research on the harvesting and other use of wild resources by Indigenous people in coastal New South Wales. In this area, by comparison to remote areas, there are far higher levels of engagement with the market via private sector employment and small business, as well as heavy reliance on government income support payments. What little evidence there is on the value of the customary sector suggests that it might be extremely small and close to non-existent in many urban and metropolitan contexts. Smyth (2001) suggests that in New South Wales the customary economy is focused on establishing and maintaining cultural associations in co-managed national parks, especially in terms of protection of cultural sites and heritage, rather than on harvesting wildlife or resource management through the maintenance of customary practices like landscape burning.

According to the 2001 Census there are 135,000 Indigenous people in New South Wales, just on 2 per cent of the total state population of over six million. Social indicators show that Indigenous people are relatively badly off. For example, Indigenous unemployment was three times higher than non-Indigenous unemployment (23% versus 7%); Indigenous median weekly income was about 75 per cent of that of the non-Indigenous population; only 16 per cent of Indigenous people completed Year 12 or equivalent compared to 40 per cent of the non-Indigenous population; and in the only comparative asset indicator available, 16 per cent of Indigenous people owned their home outright compared to 44 per cent of non-Indigenous people in New South Wales. Use of wild resources may be one way in which Indigenous people can supplement their incomes and create economic development opportunities. One of the objectives of the New South Wales *Indigenous Fisheries Strategy and Implementation Plan*, released in 2002, is to support the involvement of Indigenous communities in the management of the State's fisheries resources; another is to encourage and support the involvement of Indigenous communities in commercial fishing, fishing-based ecotourism, and the emerging aquaculture industry.[3]

Throughout this paper 'wild resources' refers to the native flora and fauna of the Wallis Lake catchment. There are some introduced species such as rabbits and deer that are harvested occasionally by Indigenous people. Harvesting of these species is excluded from the estimates of the value of wild resources. In this study we only take account of wild resources that are harvested by adults (those aged 15 years and over). Although children do harvest wild resources, the amount is relatively small and hence contributes relatively little to livelihoods. However, it is important as a means of inter-generational transfer of harvesting skills.

The remainder of this report is structured as follows. Section 2 gives an overview of the topography and ecology of the Wallis Lake catchment and provides information on the Indigenous population. In section 3 what is currently known about the use of wild resources by Indigenous Australians is summarised and the few studies which estimate economic benefits are briefly reviewed. In section 4 legal regulations of the use of wild resources in New South Wales are described. Section 5 discusses the potential economic benefits arising from the use of wild resources. Section 6 describes a methodology which can be used to estimate the economic benefits that Indigenous people may derive from the use of wild resources. The types of data needed to implement the proposed methodology are discussed and the advantages and disadvantages

of the different ways of obtaining the information needed are outlined in section 7. Having laid out a methodological approach, the results of a pilot study in the Wallis Lake catchment are reported. Section 8 reviews the range of wild resources that are harvested by the Indigenous community. Estimates of the value of wild resources are presented in section 9. The commercial use of wild resources is described in section 10, and factors which Indigenous people thought were limiting their ability to participate in the customary economy are outlined in section 11. The final section makes some concluding comments and highlights some potential implications of this research for policy.

2. THE WALLIS LAKE CATCHMENT

The primary source of information on the topography and ecology of the catchment area is the *Wallis Lake Catchment Management Plan* (Wallis Lake Catchment Management Plan Steering Committee (SC) 2001) and in particular the chapter by Harris in that volume.

TOPOGRAPHY AND ECOLOGY

Wallis Lake is part of the Great Lakes region of the Mid-North Coast of New South Wales. The Great Lakes region is east of the Dividing Range. The region is dominated by high summer rainfall. The Wallis Lake catchment covers an area of 1,440 square kilometres. It extends approximately 40 kilometres north to south adjacent to the coast, and up to 40 kilometres from the coast inland to Kyle Range in the west. It is bounded by the Manning River and Khappinghat Creek catchment to the north and west, and by Myall and Smiths Lakes to the south. Wallis Lake catchment is drained by the Wallamba, Coolongolook, Wallingat and Wang Wauk Rivers which all feed into the north-western end of Wallis Lake in the island and entrance area of the estuary.

The catchment can be broadly divided into two major units based on structure and elevation: the coastal plain and estuary, and ridges and valleys. The coastal plain consists of a series of sand barriers less than 10 metres high that run parallel to the coast. The barrier system extends inland for about 8 kilometres. Inland of the dune barrier system is a small coastal floodplain. Wallis Lake itself is formed by a dune barrier system that stretches between the rocky headlands of Booti Hill and Cape Hawke. West of Wallis Lake and the coastal plain, the land rises to form ridges and valleys. The Wallamba River sub-catchment consists of a series of broken ridges intersected by valleys which rise to coastal ranges over 450 metres in altitude around the northern and western watershed of the catchment. The Wallingat, Coolongolook and Wang Wauk River valleys are separated by a series of lower but steeper ridges that run in a north-south direction. In the upper catchment, the Wallamba River sub-catchment consists of broken sedimentary hills and valleys in the upper catchment, with soils of loamy yellow earths and podsols. More recent dune, fluvial and swamp deposits of sand and silt form the lower catchment coastal plain. Prior to European settler intervention Wallis Lake was primarily a freshwater or brackish system, opening to the sea only after heavy ran. Since European

settlement, the lake entrance has been opened, fundamentally changing the ecosystem from primarily freshwater or brackish to a much more marine system.

Approximately 39 per cent of the catchment has been cleared for agriculture, mining and infrastructure, and approximately 5 per cent of the catchment area has been developed for urban and rural residential uses including industrial, commercial and infrastructure purposes. Population densities in the rural parts of the catchments are relatively low, being less than one person per hectare, and most of the cleared land is used for either cattle grazing or dairying.

The remnant vegetation is highly variable, ranging from lowland wetland ecosystems to dry sclerophyll forests in the hinterland. Approximately 50 vegetation communities can be identified in the catchment, making up eight major ecosystem types including rainforests, swamp forests, moist sclerophyll forests, hinterland dry sclerophyll forests, coastal lowland dry sclerophyll forests, heathlands, sedgeland, rushland, and disturbed vegetation.

Approximately 9 per cent of the catchment is managed for nature conservation by the National Parks and Wildlife Service (now part of the New South Wales Department of Environment and Conservation (DEC)). A number of the islands in the estuary are nature reserves including Wallis Island, Yahoo Island, Regatta Island, Mills Island and Bandicoot Island. Two other nature reserves are Coolongolook and Darawank. Larger areas are managed as national parks including Booti Booti, Wallamba and Wallingat National Parks. Wallis Lake, the Cape Hawke Coastal Area and most of the estuary islands are currently listed on the Register of the National Estate. Wallis Lake and adjacent estuarine islands are also listed as a 'Wetland of National Importance'. Harris (2001) concludes that in comparison with many of the smaller coastal lagoons on the east coast of New South Wales, Wallis Lake is in reasonable ecological and environmental condition. The lake ecosystem still has large areas of seagrasses, except in the lower regions of some of the feeder streams.

The natural resources of the catchment form the basis of agriculture, aquaculture, fishing and tourism industries. While the oyster aquaculture industry is significant, by far the most important industry to the local economy is tourism (Wallis Lake Catchment Management Plan SC 2001).

THE INDIGENOUS POPULATION

Historical

The original inhabitants of the Great Lakes region of coastal New South Wales were the Worimi people. Worimi is made up of several groups: the Buraigal, Gamipingal and Garawerrigal. The people of the Wallis Lake area are the Wallamba. Middens around the Wallis Lake area suggest that food from the lake and sea was harvested in abundance, as well as wallabies, kangaroos, echidnas, waterfowl and fruit bats. Fire was an important feature of life, both at campsites and in the seasonal 'burning' of the land. Traditionally, the coastal tribes of New South Wales would move inland during the cooler months (June to September) to hunt, then back to the coast in spring and the early summer months (September to December) to fish.

Table 1. Wallis Lake catchment population by Indigenous status, 2001

	Indigenous	Non-Indigenous	Proportion of pop. Indigenous
Foster-Tuncurry			
15+	381	14,443	
All ages	634	16,885	3.6
Remainder			
15+	116	6,135	
All ages	187	7,776	2.3
Wallis Lake catchment			
15+	497	20,578	
All ages	821	24,661	3.2

Notes: The geographic population data released by the ABS does not match with the geographic area covered by the Wallis Lake catchment. Population counts are released for the town of Forster-Tuncurry which lies entirely within the catchment, and for Dungog/Great Lakes which covers an area roughly five times the size of the catchment. The Dungog/Great Lakes population is allocated to that living within the catchment, and that living outside the catchment using figures from Wallis Lake Catchment Management Plan SC (2001) for the proportion of the catchment population living in Forster-Tuncurry and the proportion in the remainder of the catchment. The population for the 'remainder of the catchment' is allocated between the Indigenous and non-Indigenous populations according to the proportion of the population which identified as Indigenous in the Dungog/Great Lakes area. The not-stated responses to the question about Aboriginality are proportionally allocated to the Indigenous and non-Indigenous populations. For the Indigenous population, undercount is corrected for using the undercount proportion for the Coffs Harbour ATSIC region (11%). For the non-Indigenous population, undercount is corrected using the undercount proportion for New South Wales Balance (2.8%).

Source: 2001 Census.

The Wallamba people of Wallis Lake had a central camp in the area now known as Coomba Park. Middens indicate that the Wallamba had a diet rich in seafood with whelk, pipi, oyster, crab, cockle, Venus shell and prawns as well as many varieties of fish. Nets were used for prawning, and women fished from bark canoes using hooks made of shell. Men caught mullet on the beach. Occasionally they also hunted wallabies, kangaroos and echidnas with boomerangs and spears. Waterbirds provided meat and eggs. Yams, berries and fruit from pigface, plum pine, black apple and geebung were also utilised (Leon n.d.).

A detailed history of Indigenous people in the Forster and Wallis Lake area from the nineteenth century is provided by Byrne and Nugent (2004). They describe extensive harvesting (fishing and hunting) by the Indigenous population for their own use but also commercial use of wild resources including taking tourists out fishing and the production of cane chairs and some sale of fish and rabbits.

Table 2. Occupation by Indigenous status, Wallis Lake catchment employed, 2001

	Indigenous	Non-Indigenous
	per cent	
Managers and Administrators	4.2	11.5
Professionals	11.0	13.0
Associate Professionals	6.4	12.6
Tradespersons and Related Workers	5.9	14.4
Advanced Clerical and Service Workers	2.5	4.2
Intermediate Clerical, Sales and Service Workers	19.5	14.6
Intermediate Production and Transport Workers	8.1	8.8
Elementary Clerical, Sales and Service Workers	10.6	9.6
Labourers and Related Workers	31.8	11.2

Notes: Not stated and inadequately described are excluded.

Source: 2001 Census.

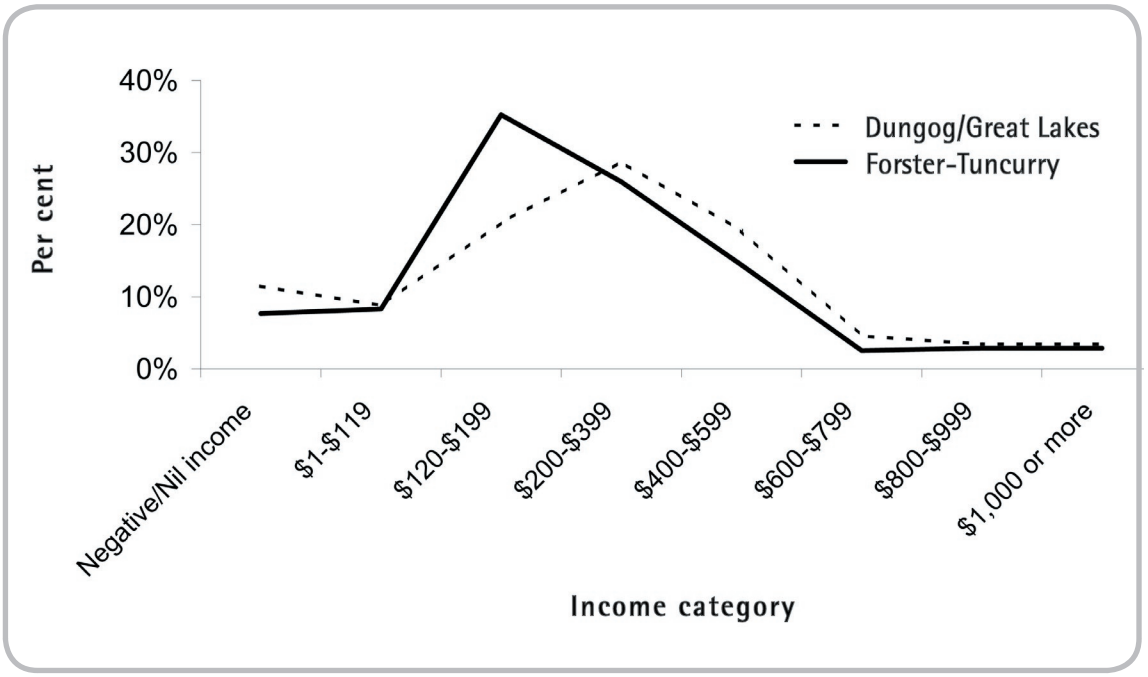
Contemporary

At the time of the 2001 Census, the Indigenous population of the Wallis Lake catchment is estimated to be 821, which is 3.2 per cent of the total catchment population of 25,482 (Table 1). Within the catchment around 69 per cent of the total population live in the towns of Forster-Tuncurry, and 6 per cent in the villages of Green Point, Pacific Palms, Charlotte Bay and Coomba Park. The remaining 25 per cent live in the middle and upper catchment (Wallis Lake Catchment Management Plan SC 2001). Whilst the Indigenous population lives throughout the Wallis Lake catchment, there is a concentration of people living on land in Forster which is owned and administered by the Forster Local Aboriginal Land Council.

Although the population in the Wallis Lake catchment is relatively old with just 16.5 per cent of the total population being under 15 years of age, the Indigenous population is much younger with 39.5 per cent aged less than 15 years. The median age of the Indigenous population in Forster-Tuncurry is 18 years as compared to 52 years for the non-Indigenous population.[4] In the remainder of the catchment the median ages are 21 and 42 years for the Indigenous and non-Indigenous populations respectively.

The employment rate of Indigenous people of working age living in the Wallis Lake catchment is 42.0 per cent, which is lower than the employment rate of 55.5 per cent for the non-Indigenous population. However, a significant proportion of Indigenous employment is in the Community Development Employment Projects (CDEP) scheme, a voluntary work-for-the-dole style scheme for Indigenous Australians. When CDEP employment is excluded, the employment rate for the Indigenous population falls to just 33.2 per cent.[5] The number of CDEP participants in the Wallis Lake catchment may be an underestimate because of incomplete enumeration in the Census.[6]

Fig. 1. Gross weekly individual income, Indigenous persons aged 15 years and over, 2001 Census



Source: 2001 Census.

The low employment rates combined with the disproportionate number of Indigenous people employed in lower paying occupations (Table 2) means that the financial living standards of the Indigenous population are lower than amongst the non-Indigenous population. The average annual individual income (before tax) of the Indigenous population aged 15 years and over living in the Wallis Lake catchment is estimated to be $15,898 per annum.[7] The distribution of gross (before tax) weekly individual income for Indigenous persons aged 15 years and over at the time of the 2001 Census is shown in Fig. 1.

3. EXISTING INFORMATION ON THE USE OF WILD RESOURCES BY INDIGENOUS AUSTRALIANS

There is no reliable information at the national level on the use of wild resources by Indigenous Australians. The only nationally representative survey of Indigenous Australians that provides any information at all is the 1994 National Aboriginal and Torres Strait Islander Survey (NATSIS). In that survey, use of wild resources was canvassed as part of the question on voluntary work. Respondents were asked 'Do you do any work that you are not paid for?' Respondents chose from a number of categories, one of which was 'hunting, fishing or gathering bush food'. According to the NATSIS, just 6.3 per cent of the Indigenous population engaged in

hunting, fishing and gathering bush foods. Figures ranged from 2.2 per cent in capital cities to 4.7 per cent in other urban areas and 11.8 per cent in rural areas (Hunter 1996). It is probable that the framing of the question in terms of voluntary work led to a substantial understating of the prevalence of hunting, fishing and gathering. Prima facie evidence of this is that in seven Aboriginal and Torres Strait Islander Commission (ATSIC) regions the proportion of fishing, hunting or gathering reported is 2 per cent or less (Brisbane, Geraldton, Kalgoorlie, Kununurra, Perth, Roma and Tamworth).

A second survey, the National Aboriginal and Torres Strait Islander Social Survey (NATSISS) was conducted in 2002. It did contain a question on hunting, fishing and gathering, but unfortunately it was only asked of people living in remote areas, and so provides no information on these activities elsewhere. A further limitation of the NATSISS survey is that it only asks about hunting, fishing and gathering in the previous three months and hence does not take account of seasonal variation in the undertaking of these activities. According to the NATSISS survey, in very remote areas 52 per cent of Indigenous people had hunted, fished or gathered wild resources in the previous three months. The figure for remote areas is 16 per cent. These estimates are very different from those in the National Recreational and Indigenous Fishing Survey which found that almost 92 per cent of all Indigenous people aged five years or older living in the surveyed communities had fished at least once in the twelve months covered by the survey (Henry & Lyle 2003).

While there are no nationally representative quantitative data on how many Indigenous people harvest wild resources or on the amounts harvested, there are a number of studies of particular regions or species. However, few of these studies estimate economic value. One of the earliest studies was by Altman who, in the late 1970s, estimated the value of harvesting of wild resources for a group of Kuninjku-speaking outstation residents in Arnhem Land. Altman (1987) found that in the late 1970s the customary sector accounted for the major part of the local economy: 64 per cent of cash and imputed (at market replacement value) income was generated by the customary economy; 26 per cent by welfare (the state); and 10 per cent by the sale of art (the market). In research undertaken with the same people at the same places in 2002–03, it was estimated that with full incorporation into the social security system and the CDEP scheme the relative importance of these sources of income had changed somewhat. In 2002–03 the customary economy comprised a relatively smaller proportion of income (32%), the state sector had grown to be 57 per cent while the contribution of the market sector was similar to what it had been in the 1970s (Altman 2003a).

4. REGULATION OF THE USE OF WILD RESOURCES IN NEW SOUTH WALES

In New South Wales the use of wild resources is regulated by both State and Commonwealth Acts. While some of the legislation contains provisions relating specifically to Indigenous people other Acts contain no special provisions. An overview of the legal right to terrestrial wild resources in New South Wales is provided by English (2002: Appendix 1).

Under the *Native Title Act 1993* (Cwlth), a Commonwealth, State or Territory law that prohibits action or access except with a licence or permit does not prevent native title holders from hunting, fishing or

gathering in accordance with their native title rights. However this is only the case so long as they do so for the purpose of satisfying their personal, domestic or non-commercial communal needs. In 1999 there was a High Court Decision which confirmed that Aboriginal and Torres Strait Islander people may claim a right under native title to hunt living resources according to local customary law (*Yanner v Eaton* (1999) 201 CLR 35). In October 2001 the High Court of Australia confirmed that native title rights to areas of sea and marine resources continue to exist where Aboriginal and Torres Strait Islander people have retained their traditional relationship with their sea country. Marine native title rights, however, must coexist with other existing (usually commercial) rights, which will prevail wherever conflicting rights occur. In order to have these rights recognised, Indigenous people must lodge a claim with the Federal Court for a determination of native title.[8]

FISH

The taking of fish in New South Wales is primarily regulated by the *Fisheries Management Act 1994* (NSW). The fishing laws in New South Wales generally do not distinguish Indigenous fishing as being distinct from recreational or commercial fishing. Indigenous fishers will be regarded as being either recreational or commercial fishers depending on a number of variables, including the size and type of the catch, the method used in acquiring it and whether the catch is sold.[9]

Thus if an Aboriginal person, or any other person, were to take fish beyond the bag limit allowed for a recreational fisher in waters protected from commercial fishing, they could be prosecuted for at least three offences under the Act that carry both terms of imprisonment and heavy financial sanctions. The only exception is that the Act does not affect native title rights and interests (which are non-commercial in nature).

USE OF WILD RESOURCES IN NATIONAL PARKS

Use of wild resources in national parks is governed by the *National Parks and Wildlife Act 1974* (NSW), and provides that a person shall not harm any animal in a national park or historic site. However, a system of licences is in place that allows the hunting of protected and non-native animals on private land and in reserves. Aboriginal people can seek to apply for such a licence. In addition there is discretion to issue licences for hunting and gathering for cultural purposes (English 2002).

A small number of national parks and historic sites are co-managed by a Board and the New South Wales government in a lease-back arrangement. The Board has powers to develop the Plan of Management for the area and to direct cultural use of the lands by Aboriginal people. In these areas Aboriginal owners or any Aboriginal person who has consent of the Board, may harm an animal or pick timber, vegetation and plants for domestic, ceremonial or cultural purposes. However, animals defined as a threatened species or animals protected by the reserve Plan of Management cannot be harvested.

The *National Parks and Wildlife Regulation 2002* (NSW) provides exemptions for Aboriginal people for specific sections of the Act dealing with harming wildlife, collecting plant material and carrying weapons and traps in reserved areas other than National Parks and Historic Sites such as Nature Refuges, Wildlife Management Areas, Wildlife Districts, Wilderness Areas and Conservation Areas.

The *Aboriginal Land Rights Act 1983* (NSW) (ALRA) provides for wild resource use on private lands as well as a mechanism for gaining access to lands traditionally used for this activity. Under the ALRA, a local Aboriginal land council may negotiate agreements with the owner, occupier or person in control of any land to permit Aboriginal people to gain access to that land for the purposes of hunting, gathering and fishing, subject to the provision of any other Act, rule, by-law, regulation or ordinance. This right is also available to any member of the public. The ALRA allows a land council to lodge a submission with the Land and Environment Court for determination where they have been unable to gain access to land traditionally used for hunting, in order to hunt and gather traditional foods for domestic purposes. English (2002: 78) notes that it would appear that the lands in question can be a protected area such as a national park, but that it is unclear whether this provision has been tested.

The *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth), which aims to protect the environment and to promote ecologically sustainable development and the conservation of biodiversity, is also relevant. Four different groups of species and communities are established by the Act: threatened species and ecological communities, migratory species, whales and other cetaceans, and listed marine species. The Act establishes a permit system for each species. The permit authorises the holder to take the actions specified in the permit without committing an offence. This Act does not affect native title rights.

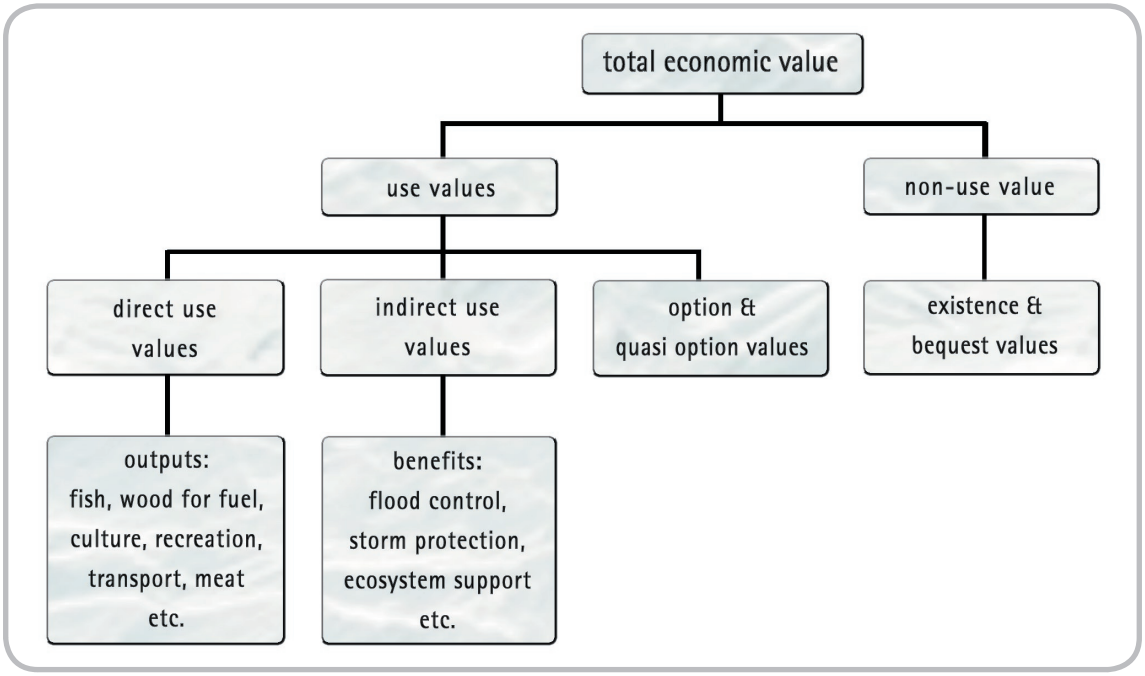
5. POTENTIAL ECONOMIC BENEFITS OF USING WILD RESOURCES

This study is concerned with the economic benefits which accrue to Indigenous people from the direct use of wild resources. There are a number of potential sources of economic benefit. The direct benefits may include:

- consumption of wild resources harvested;
- the use of wild resources as an input into something which is sold (e.g. a work of art); and
- employment resulting from connection with wild resources and the consequent increased income and any intangible benefits from employment such as self esteem.

The concept of total economic value (TEV) provides a framework for valuing natural resources. Total economic valuation distinguishes between *use* values and *non-use* values, the latter referring to those current or future (potential) values associated with an environment or resource which rely merely on its continued existence and are unrelated to use (Pearce & Warford 1993). Typically, use values involve some human 'interaction' with a resource, whereas non-use values do not.

Fig. 2. Components of total economic value of wild resources



Source: Adapted from Barbier (1989)

Conventionally, use values are grouped according to whether they are *direct* or *indirect* values (Fig. 2).[10] Direct uses are things such as the harvesting of fish, collection of fuel-wood and use of wild resources for recreation. Direct use involves both commercial and non-commercial use of the resources. Commercial use occurs when the resource is sold in the market. Non-commercial use is for personal consumption or consumption by family and friends. Non-commercial use is sometimes termed customary or subsistence use. In the remainder of this paper the terms customary and non-commercial use are employed interchangeably.

Indirect uses are the flow of services such as flood control and external ecosystem support which the natural resource provides. A special category of use values are *option value* and *quasi-option value*. Option value refers to the value that arises from retaining an option to use a good or service for which future demand is uncertain. The option value is an additional value to any utility that may arise if and when the good is actually consumed. If we are not certain about either our future preferences or about future availability, we may be willing to pay a premium (the option value) to keep the option of future use open. Quasi-option value refers to the utility gains expected to be realised from not undertaking irreversible decisions, and so maintaining options for future use of some resource (Grafton et al. 2004; Perman, Ma & McGilvray 1996).

Non-use values are related to the desire to see a resource preserved 'in its own right'. Such 'intrinsic' values are referred to as *existence values*. Existence values involve subjective valuations by individuals unrelated to either their own or others' use, whether current or future. An important subset of non-use value is *bequest value*, which results from placing a high value on the conservation of a resource for future generations to use.

Fully accounting for the economic value of wild resources to the Indigenous population living in the Wallis Lake catchment requires estimating use and non-use values. The appropriate method for estimating the different types of value differ. Good overviews and discussion of the techniques available for valuing natural resources are provided by Barbier, Acreman and Knowler (1997) and Bann (1998).

The potential flow-on economic benefits are very broad. For example, a successful cultural tourism operation might draw into the region tourists who are interested in Aboriginal culture. These additional tourists might be more likely to spend money purchasing art produced by the Aboriginal population.

It is likely that in the absence of harvesting of wild resources, dietary consumption would be altered and it is probable that a less healthy diet would result (Lee et al. 1994; O'Dea 1984). There may also be health benefits to harvesters resulting from a more physically active lifestyle. Harvesting of wild resources may also provide a sense of identity and pride in Indigenous customary practice and increase social cohesion. To the extent to which the harvesting of wild resources leads to a greater level of activity, many of the social problems associated with inactivity are likely to be reduced, leading to substantial economic benefits for the Indigenous and non-Indigenous communities in the form of lower health expenditure, policing and criminal justice costs.

While in principle it is possible to value both direct and indirect (or flow-on) economic benefits, in practice the information required to estimate the value of the indirect benefits is very difficult, if not impossible, to obtain. The fundamental problem is that while an association may be observed between harvesting of wild resources and a range of social outcomes, it is very difficult to determine whether it is the harvesting of wild resources that is improving wellbeing or whether people with a higher level of wellbeing are more likely to be harvesting wild resources.

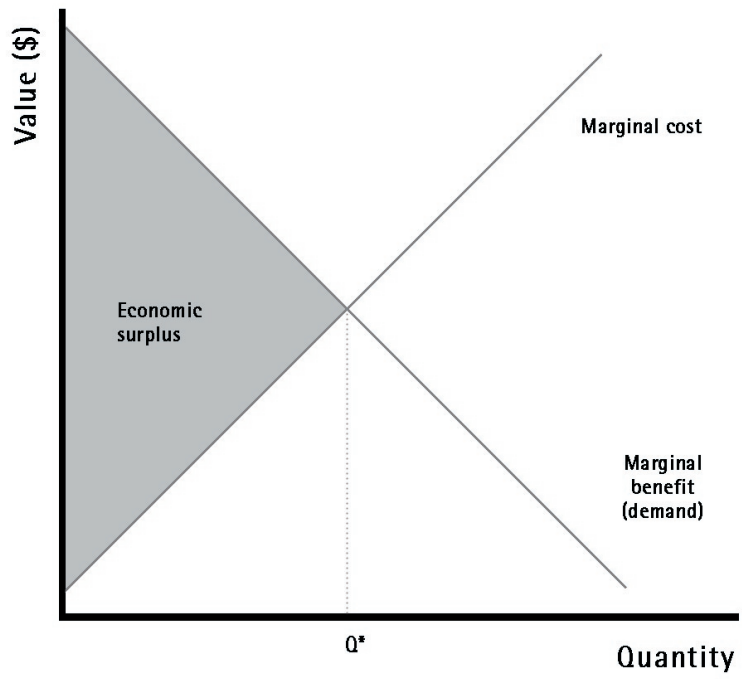
Sometimes economists attempt to place a dollar value on culture. However, there remain serious doubts as to the meaningfulness of estimating the dollar value of, for example, religious beliefs.[11] In this paper we do not attempt to estimate the value of cultural aspects of wild resource use. This is not to deny that these aspects of the use of wild resources are highly significant to the Indigenous population—indeed they provide a link to land, and to attendant cultural and religious practices.

6. THE VALUATION OF NON-COMMERCIAL USES OF WILD RESOURCES

THE CONCEPT OF ECONOMIC BENEFIT

Valuation of the direct economic benefits to the Indigenous community resulting from the customary use of wild resources is relatively simple since, in most cases, a measure of economic value can be obtained from market prices (e.g. fish prices).[12] Conceptually, the economic value of a good or services is measured in terms of what consumers are willing to pay for the commodity, less the costs of supplying it. This is shown diagrammatically in Fig. 3. Consumers' willingness to pay for each successive unit of the commodity is shown by the marginal benefit curve and the cost of supplying each successive unit of the commodity is shown by the marginal cost curve. Economic theory suggests that in an unregulated market the commodity will be produced and consumed until marginal cost is equal to marginal benefit (quantity Q*). The economic surplus (economic value) generated by the consumption of Q* is given by the area between the marginal benefit and marginal cost lines to the left of Q*.[13]

Fig. 3. Economic surplus



Source: Adapted from Barbier (1989)

Thus, the economic value derived from the non-commercial harvesting of wild resources can be defined as the difference between the value of consumption and the costs of production. If the person doing the harvesting is the sole consumer then they personally receive the full economic surplus, and in the absence of constraints, such as bag limits, they will harvest the wild resources until the marginal benefit equals the marginal cost of harvesting. Of course, people have a social network or community with whom they share harvested resources. This is a complex economic and social phenomenon which may involve reciprocity, barter and exchange. That is, sharing of harvested resources with others may create an obligation for the receiver of the 'gift' to reciprocate in some way. We make the assumption that the value of the use of the wild resources harvested by the Indigenous population as a whole can be calculated by aggregating the economic benefits obtained by all the people who consume the resources minus the costs of obtaining the resources.

The above analysis assumes that access to the wild resources is unrestricted. No account is taken of the externalities which are commonly associated with use of free-access resources. Free-access resources may create stock and crowding or congestion externalities. Stock externalities stem from the common-pool nature of a wild resource whereby one harvester's harvest reduces the amount of the wild resource available to be harvested by others. A congestion externality occurs where harvesters are constrained by either time or space so that the act of harvesting increases the harvesting cost of others, regardless of the catch (Grafton et al. 2004: 120). In New South Wales, the fisheries catch is primarily regulated through the application of bag-limits for recreational fishing and licences for commercial fishing.

In general, information on the marginal benefit of consumption of wild resources that do not enter the market is not observable. The standard approach is to use market prices to calculate the market replacement value of the wild resources harvested.[14] If market prices are not available the prices of reasonably close substitutes can be used as proxies. It must be stressed that this does not necessarily equate to the economist's concept of economic value. This is because the market prices do not necessarily reflect an individual's willingness to pay. If wild resources were not harvested, then the goods might not be purchased at market prices, but rather a cheaper substitute might be purchased. Many Indigenous families have relatively low incomes, and they might not accord the same relative values as the market does to particular resources. The clearest example of this is abalone meat, which retails at over $100 per kilogram. Indigenous people would rarely, if ever, purchase abalone, or indeed the more expensive fish species which they catch, at market prices.

DATA REQUIRED AND METHODS OF OBTAINING DATA

The estimation of the economic value of wild resources that are harvested requires the following information:

- average amount of each species harvested;
- number of people harvesting each species;
- market price of each type of wild resource; and
- costs of harvesting the wild resources.

Accurate information on the number of people harvesting each species of wild resource can only be obtained from a representative random sample of the population of interest. While it is certainly possible to conduct such a survey, it is quite costly.

Information on the harvesting of wild resources can be collected in two broad ways. The first is by direct observation and measurement of the amount, size and weight of wild resources harvested for a representative sample of the population. This information can be obtained either by a data collector measuring the wild resources harvested or by getting the fishers to record the amount, size and weight of each resource harvested (see Altman 1987, 2003c). If their literacy levels permit, harvesters can be asked to contemporaneously record information on the resources harvested using a diary which they are asked to complete following each time they harvest wild resources.[15]

The second way of obtaining information on the wild resources harvested is through a questionnaire which asks people to estimate the amounts of each species harvested over a previous period of time (e.g. one week, one month or 12 months). While it is clearly desirable to obtain information on the size and weight of the resources harvested, if average sizes of species are available from other sources, then the economic value can be estimated from the numbers of each species harvested. Harvesters may be unable to accurately estimate the precise size and weight of the wild resources they harvest, although they will generally be able to provide an estimate of the number harvested.

Given the seasonal nature of the use of most naturally-occurring wild resources it is important to collect information for a twelve-month period. In the case of the direct measurement approaches, this means that data must be collected throughout a 12-month period. If questionnaires are used, then either the respondent must be asked about their use of wild resources for the previous 12 months, or surveys need to be conducted several times over a 12-month period. The longer the period of time that the respondent is asked to report on, the greater will be the potential problem of recall error.[16] An example of a quantitative survey which involved several data collections over a 12-month period is the Indigenous fishing survey which was conducted in north Australia (Henry & Lyle 2003).

Each approach has advantages and disadvantages. The direct observation and measurement of the wild resources harvested will produce more accurate information than a questionnaire.[17] However, data collectors cannot be at all places at all times and thus the questionnaire approach will be more comprehensive. Although more accurate information on numbers and weights will be obtained using direct observation for the harvesting trips observed, it is not necessarily the case that information collected using questionnaires without physical measurement of the harvest will, on average, result in an under- or over-estimate of the amount of wild resources harvested. This will depend upon on whether or not people, on average, under- or over-estimate the amount they harvest.[18]

The two methods of obtaining data will differ substantially in cost. The direct observation and measurement of resources harvested by trained data collectors is time-intensive, and hence expensive. This method is also quite intrusive. Asking respondents to record the number, size and weight of each species harvested is expensive because respondents need to be provided with standardised measuring and weighing equipment. It also places a considerable burden on respondents and requires monitoring by the data collection agency to ensure that the data being recorded is accurate and being recorded in a useable form. The use of questionnaires will, in general, be the cheapest way of obtaining information on wild resources harvested. It is also likely to be the least intrusive method for the respondents. Direct observation and measurement of catch will not provide an estimate of the number of harvesters in the population of interest, unless the catch of the entire population of interest is measured.

Information on the costs of harvesting resources needs to be obtained from the harvesters. Information should be gathered on costs associated with fishing, and may include: bait and/or berley; boat and possibly trailer; fishing gear; dive gear; and transport. *The National Recreational and Indigenous Fishing Survey* (Henry & Lyle 2003) provides useful guidance on the collection of information on expenditure associated with fishing.

The economic value derived from the commercial exploitation of wild resources can be measured using standard accounting methods. In general, these methods treat wild resources as an input into a production process and hence the value is in terms of the relative importance of wild resources to the good or services produced by the business. The flow-on benefits are much more difficult to identify and estimate. In general, estimation of the flow-on effects requires an economic model which articulates the linkages between the different sectors of the regional economy.

7. DETAILED DESCRIPTION OF METHODOLOGY

Given the limited resources available and the exploratory nature of this study, the data that could be collected on use of wild resources in the Wallis Lake catchment were limited. The estimates provided in this report have a high degree of uncertainty and are therefore indicative only. Nonetheless, they do allow us

to assess whether the use of wild resources by the Indigenous population in this area is significant and to provide an order of magnitude for their value.

Data on the amount of wild resources harvested by those who are actively involved in harvesting were collected using a questionnaire that gathered information about the quantities of wild resources harvested over the previous 12 months. In addition to the quantitative information, qualitative information was collected. Quantitative information was collected on the number of Indigenous harvesters of wild resources in the entire Wallis Lake catchment.

The fieldwork and interviews were conducted by Matthew Gray over a period of five days in July 2004. The fieldwork was undertaken in collaboration with Steve Brereton, a member of the local Aboriginal community and a field officer from DEC based at Booti Booti National Park. Mr. Brereton arranged the interviews and was present during all interviews.

Data were collected via face-to-face interviews. A survey instrument was used (see Appendix A) to collect information on all of the wild resources used by the informant in the previous 12 months. For each resource identified, the informant was asked whether they collected the resource alone or with other people, and if they collected it with other people, how many. Information was also collected on how often in the last 12 months the respondent had collected the resource, how long they typically spent collecting the resource, the amount of the resource collected, and whether the resource was used for personal consumption, distributed to friends or family, sold or used for other purposes. Finally the respondents were asked whether there were any pressures or limitations on their use of each resource. A species guide was used to help prompt respondents and to identify species.

Detailed data on harvesting of wild resources was collected from ten informants from the Aboriginal community. The people interviewed represented both males and females and a range of age groups. All of those interviewed had harvested wild resources in the previous 12 months. The respondents provided information for the 'group' they went fishing with and so the interviews provide information on around 27 members of the Indigenous community. The small sample size and non-random selection means that some caution is needed in interpreting the results. People reported that they tended to go fishing with a fairly constant group of people, although for certain species the group could be much larger. This was particularly the case for the gathering of shellfish which tended to be a day out for ten or more people. The interviews ranged in length from approximately 20 minutes to over two hours. Discussions were also held with other members of the Indigenous community. Some of the areas from which resources are harvested were visited.

Overall, the questionnaire appeared to produce meaningful data. Respondents were readily able to list the wild resources which they harvested and the times of year at which the resources were used. The people interviewed showed a high level of species familiarity. Providing average amounts harvested was more difficult for many respondents since the amount harvested varied from time to time and from season to season. Some respondents provided ranges of the amounts of each species harvested (e.g. between 5 and 10

Table 3. Aquatic species included in the valuation

	Use[a]	Average weight (kg)[b]	Price ($/kg)[c]	Notes
Australian Salmon	C	2.54	5.25	
Blacklip Abalone	C	0.2	9.5	Blue Swimmer Crab used as substitute
Australian Bass	C	0.6	5.25	Price of Salmon used as substitute
Black Drummer	C	2.2	4.75	Drummer not usually sold. Price of Luderick used
Blue Mussel	C	0.023	7.5	
Blue Swimmer Crab	C	0.2	9.5	
Bronze Whalers	C	80		
Cockle	C & B	0.031	10	
Dusky Flathead	C	2.3	10	
Eastern Rock Lobster	C		60	
Gould's Squid	C & B	0.2	11	
Hairtail	C	1.6		
Jew Fish (Mulloway)	C	30	$55 per fish	
Leather Jacket	C	0.6	10	
Luderick (Black fish)	C	0.72	4.75	
Mud Crab	C	0.5	21.5	
Mullet (Bull)	C & B	0.9	5.25	
Octopus	C	1	9	
Oyster	C		$9 per dozen	
Periwinkles	C & B	0.015	10	
Pipies	C	0.031	10	
Prawns (King)	C		20.25	Average price of King & School Prawn used
Prawn (School)	C & B		20.25	Average price of King & School Prawn used
Sand Whiting	C	0.2	16.5	
Tailor	C	1.12	5.6	
Trevally	C	0.78	5.5	
Yellowfin Tuna	C	25		
Turban Snail	C	0.031	10	Price of Cockles used
Wrasse	C	0.98	4.75	Price of Luderick used
Yellowfin Bream	C	0.6	16	

Notes: (a) C stands for consumption and B stands for bait.

(b) Weights are expressed for whole animals in kilograms. Weights are for common (average sizes for each species) from Yearsley, Last and Ward (2001). Some sizes are from the Sydney Fish Market species information sheets. In general, the 'average' weight has been derived by adding 40 per cent of the difference between the lower common weight and the upper common weight to the lower common weight. So, for example, Luderick are commonly 0.4 kg to 1.2 kg so the weight used is (1.2-0.4)*0.4+0.4=0.72 kg. Forty per cent of the difference between the lower and upper common weights is used rather than the mid-point in order to produce slightly conservative estimates. For some species, following discussions with local fishers, the average catch weight was lowered to more accurately represent average weights in the Wallis Lake catchment.

(c) The average prices were obtained from seafood retailers in the Wallis Lake catchment. They are mid-range or average prices. Where retail prices are not available for a particular species the price of a substitute product is used.

Table 4. Wild resources that are used but not valued

Plants	Aquatic resources
Appleberry (*Billardiera scandens*)	Beach Worm
Black Apple (*Planchonella australis*)	Cartrut Shell (Dog Winkle)
Blood wood	Cobra Woodworm
Bunya pine	Conjevoi
Bush lemon	Eel
Coastal Beard-heath (*Leucopogon parviflorus*)	Razor fish
Dianella (Flax Lily)	Skip Jack
Ink weed	Wirrah
Lilly Pilly, Blue Lilly Pilly, Weeping Lilly Pilly	Yabbies
Matt Grass (lamandra)	
Native bee honey	**Terrestrial Wildlife**
Narrow-leaved Palm Lily (*Cordyline stricta*)	Little Lorikeet (*Glossopsitta pusilla*)
Paper bark	Native Rosella
Pig face	Red-necked Wallaby (*Macropus rufogriseus*)
Plum Pine (*Podocarpus elatus*)	Eastern Grey Kangaroo (*Macropus giganteus*)
Potook (possibly Native Guava)	Witchetty Grubs
Native Raspberry (*Rubus parvifolius*)	Lace Monitor (*Varanus varius*)
Sandpaper fig	Short-beaked Echidna (*Tachyglossus aculeatus*)
Crab apple	Australian Brush-turkey (*Alectura lathami*)
Harsh Ground Fern	Fluttering Shearwater (*Puffinus gavial*)
Bracken	Australian Wood Duck (*Chenonetta jubata*)
Native Yam (*Dioscorea transversa*)	Pacific Black Duck (*Anas superciliosa*)
Black Plum (*Diospyros australis*)	Wonga Pigeon (*Leucosarcia melanoleuca*)
Wombat Berry (*Eustrephus latifolius*)	Noisy Friarbird (*Philemon corniculatus*)
Native Rosella (*Hibiscus heterophyllus*)	White-winged Chough (*Corcorax melanorhamphos*)
Creek Sandpaper Fig (*Ficus coronata*)	Carpet or Diamond Python (*Morelia spilota*)
Silkpod vine	Red-bellied Black Snake (*Pseudechis porphyriacus*)
Native Cherry (*Exocarpos cupressiformis*)	Diamond Python (*Morelia spilota spilota*)
Cape Gooseberry (*Physalis peruviana*)	
Sarsaparilla (*Smila australis*)	
Sweet Sarsparilla (*Smilax glyciphylla*)	
Native Guava (*Rhodomyrtus psidioides*)	

Note: Wild resources are not necessarily native.

Flathead). Better quality information could be obtained by conducting the survey several times over a 12-month period and asking about resources harvested since the previous interview.

There was a strong feeling amongst the Indigenous community that they had been subject to too much research, particularly by, or on behalf of government agencies. There was an understandable scepticism about whether the research would lead to any benefits for themselves or the Indigenous community. There were also some sensitivities about the use of wild resources. This all contributed to the need to win the confidence of the local community and made obtaining interviews over a fairly short period of time initially more difficult than anticipated. Nevertheless, having Mr Brereton assisting with the fieldwork helped to address the concerns of members of the community and a positive response was obtained in a short time.

8. WILD RESOURCES USED NON-COMMERCIALLY

A wide range of wild resources are currently harvested on a non-commercial basis. There are almost certainly other wild resources that are harvested which were not reported by those interviewed. However, any such resources will probably make a relatively minor contribution to the TEV of the wild resources used by the Indigenous community. The aquatic-based resources used in the economic valuation are listed in Table 3. This table also shows the average weights and prices used to estimate the market replacement value of the resources harvested.

While a number of terrestrial plant and wildlife species are harvested, the vast majority of the wild resources harvested are aquatic. The use of terrestrial plants and wildlife was primarily symbolic and cultural, and while there was an element of domestic consumption involved, the economic value is very small.[19] This should not be interpreted as meaning that the harvesting of these resources is unimportant or not valuable. The size of the sample interviewed was too small to produce reliable estimates of amounts harvested of the lesser-used terrestrial plants and wildlife. Furthermore, in most cases market prices are not available for these products. Aquatic based resources, flora and land-based fauna which were reported as being used, but which are not included in the economic valuation, are listed in Table 4.

From the interviews it is apparent that the harvesting of wild resources is not seen as a recreational activity. It is seen as being both a customary activity and part of being Indigenous and as a means of obtaining food.[20] This is very different from the reasons for fishing reported by the Australian population as a whole. According to the *National Recreational and Indigenous Fishing Survey*, conducted during 2000–01 across Australia, amongst the general Australian population only 8 per cent of respondents said that their primary reason for recreational fishing was fishing for food, 37 per cent said that it was to relax and unwind, 18 per cent for sport, 15 per cent said to be with friends and 13 per cent to be outdoors (Henry & Lyle 2003).

9. THE ECONOMIC VALUE OF THE HARVESTING OF WILD RESOURCES

AVERAGE VALUE AMONGST THOSE WHO HARVEST WILD RESOURCES

While information was collected on the amount of each species harvested, information was not collected on the size or weight. Typical fish sizes and weights were obtained from a range of sources, including Yearsley, Last and Ward (2001) and the Sydney Fish Market website, <**http://www.sydneyfishmarket.com.au/**>. Average weights of several of the shellfish could not be located in published sources and so were obtained by weighing samples of shellfish purchased from fish retailers. The typical fish and shellfish sizes and weights and prices used to estimate the value of wild resources harvested are listed in Table 3 above.

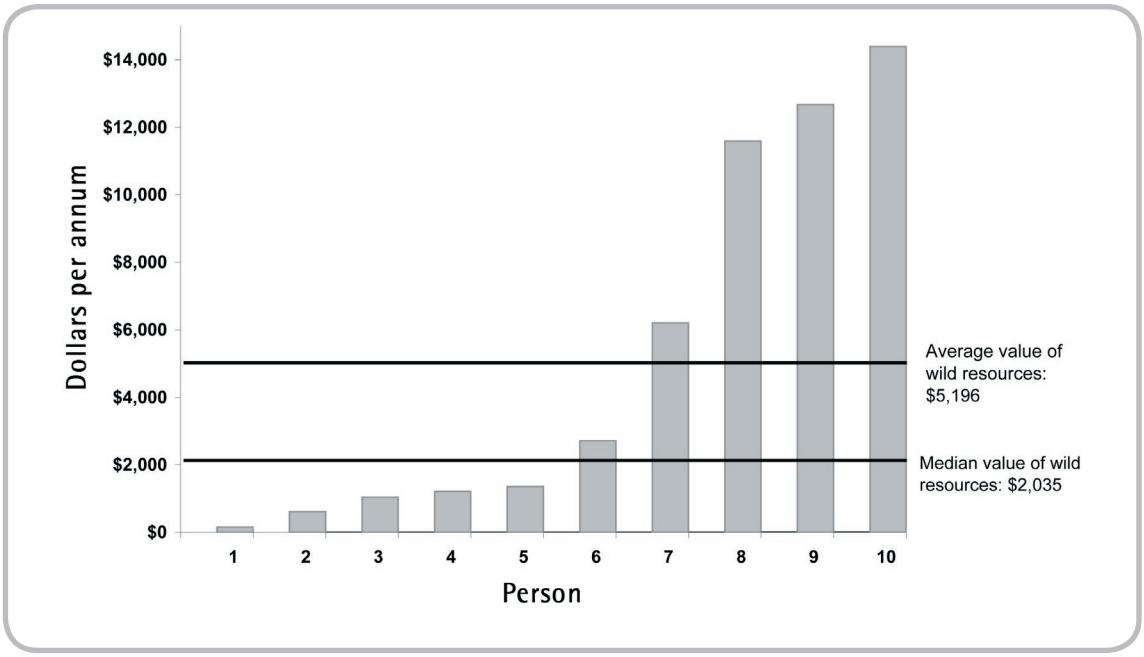
While these weights and prices are estimated from the best available information, the average weight of fish caught in the Wallis Lake catchment may differ. Estimates of the value of harvesting of wild resources based on catch monitoring information would produce more accurate estimates.

In cases where respondents provided information on the amount of wild resources harvested by the group they went fishing or hunting with as a whole, the amounts have been converted into per person figures.

In principle, the costs of catching and harvesting the fish need to be subtracted from the value of the wild resources in order to obtain an estimate of the economic benefits. However, the informants all said that the direct expenditures involved in obtaining the wild resources are minimal. With the exception of bread, bait is very rarely purchased (species used for bait are indicated in Table 3 and also include Beach Worms). Expenditures on fishing equipment are also relatively low, with most fishers using hand-lines or rod and reel. Some informants reported using a boat with a motor and in these cases the reported expenditure is typically $5 or $6 worth of fuel for a group of three to four fishers.[21] We therefore have not adjusted for financial costs of fishing. The calculations will therefore tend to overstate the economic value of fishing.

Although the actual monetary costs of fishing are minimal, a considerable amount of time is spent obtaining the wild resources. Time has an opportunity cost which should be taken into account, but since employment rates are quite low amongst the Aboriginal community it follows that increased market employment may not be an available alternative use of time. Also, the 2001 Census suggests that at least 25 per cent of those in the Wallis Lake catchment who are employed are working in the CDEP scheme and are therefore mostly working part-time, ensuring the availability of time for the harvesting of wild resources. The amount of fishing (time input) is much greater amongst those who are not employed or who are employed part-time in the CDEP scheme, although some employed people undertake a great deal of fishing.

Fig. 4. Estimated value of Indigenous harvesting of wild resources, Wallis Lake catchment



Notes: Estimates are for the 12 months to July 2004.

Fig. 4 shows the distribution of the estimated value of wild resources caught, hunted or gathered by the informants. There are large differences in the value of wild resources harvested. The minimum value per annum is $155 and the maximum $14,391. The average (mean) value of wild resources caught is $5,600 and because the distribution is quite highly skewed the median is much lower at $2,035 per respondent.

Three of the respondents were well known for being exceptionally active fishers. Several of the respondents, independently, estimated that there would be 15 to 25 fishermen who were fishing four to six days per week and catching similar amounts to the three very active fishermen who were interviewed.

ECONOMIC VALUE OF WILD RESOURCES TO THE INDIGENOUS PEOPLE IN WALLIS LAKE

The information on fishing given by the respondents can be combined with estimates of the number of fishers in the Wallis Lake catchment to provide estimates of the value of the harvesting of wild resources to the Wallis Lake Indigenous community.

The average value of wild resources harvested by those interviewed can be converted into an estimate of the total value harvested by the Indigenous community using information on the number of fishers in the

community. Formally, the value of wild resources harvested by the Indigenous community is shown in equation (1), where *N* is the population aged 15 years and older, and *n* is the number of people interviewed:

$$Value\ \ community = N \times proportion\ \ fish \times \left(\sum_{i=1}^{n} value\ \ fish_i \Big/ n \right) \qquad (1)$$

As discussed, there is no reliable data on the proportion of the Indigenous population that harvests wild resources. However, it is possible to use the existing data to place a lower and upper bound on the proportion who fish. As discussed above, the NATSIS (1994) questions underestimated, perhaps seriously, the incidence of hunting, fishing and gathering. According to the NATSIS, in the Coffs Harbour ATSIC region (in which the Wallis Lake catchment lies), the proportion of the Indigenous population aged 15 years and over who hunt, fish or gather was 9 per cent. We use this as the lower bound.

The question about hunting, fishing and gathering was only asked of those who reported doing any voluntary work (35 per cent). Of those who did voluntary work, around one-quarter reported hunting, fishing or gathering. An upper bound estimate can therefore be obtained by assuming that everyone did some voluntary work and thus the upper-bound estimate is 25 per cent. The mid-point figure used is 16 per cent. This is the proportion of the Cairns ATSIC region respondents who reported undertaking hunting, fishing or gathering in the NATSIS. The Cairns ATSIC region has been selected because, like Forster-Tuncurry it is a large town in a resource-rich area. Although these bounds are to some extent arbitrary, it is likely that the true proportion hunting, fishing or gathering on a regular basis lies between the lower and upper bounds.

The second method of estimating the value of harvesting of wild resources to the Indigenous community makes use of the fact that there are 15 to 25 'high-catch' fishers. We first estimate the value of the wild resources harvested by the high-catch fishers (the three highest value respondents—see Fig. 4). The average value per fisher of wild resources harvested by the rest of the Indigenous community is estimated as the average for respondents excluding the high-catch fishers. The lower and upper bounds for the proportion of the population (excluding the high-catch fishers) described above are used.

Since the high-catch fishers contribute a substantial proportion of the wild resources harvested and the number of high-catch fishers is known with reasonable accuracy, the estimates made using this method will be less sensitive to the figure which is used for the proportion of the population which is actively harvesting the wild resources.

Formally, the value of wild resources harvested by the Indigenous community is shown in equation (2), where *N* is the population aged 15 years and older, *HC* is the number of high-catch fishermen in the community,

X is the number of high-catch fishermen interviewed and *Y* is the number of respondents who fish, but are not classified as being high-catch.

$$Value\ community = HC \times \left(\sum_{i=1}^{X} value\ fish_i \Big/ X \right) + (N - HC) \times proportion\ fish \times \left(\sum_{i=1}^{Y} value\ fish_i \Big/ Y \right) \quad (2)$$

Estimates of the value of wild resources harvested by the Wallis Lake Indigenous population are shown in Table 5. The top panel shows the estimates based on the average value of fishing (method 1) and the bottom panel those based on the value by high-catch fishers plus the value by the remainder of the community (method 2).

Focusing first on the estimates based on the average value of fishing, the average value for the 12 months to July 2004 per Indigenous person aged 15 years and over ranges from $468 for the lower bound estimate to $1,299 for the upper bound estimate. The mid-point estimate is $831. The value for the community as a whole ranges from $232,420 to $645,611 for the lower and upper bound estimates respectively. The mid-point, or best, estimate is $413,191. The relative importance of this contribution to the living standards of the Indigenous population can be gauged by expressing the value of wild resources harvested as a proportion of the average personal income for the Indigenous population ($15,898 pa). Our estimates suggest that the value of the wild resources harvested is between 2.9 per cent and 8.2 per cent of gross income. The mid-point estimate is 5.2 per cent.

The estimates based upon valuing the resources harvested by the high-catch fishermen and the rest of the community separately (method 2) show less variability according to the estimate of the proportion of the population who fish than those based on a simple average. The per capita value for those aged 15 years and over ranges from $683 to $975 per annum with a mid-point estimate of $810. The value for the community ranges from $339,298 to $484,427 per annum with a midpoint estimate of $402,792.

While the value of wild resources harvested is only a relatively small proportion of income, it is a significant contribution to the consumption levels of a relatively low-income population. It also provides a means of increasing income for people who may not have the opportunity to increase income through the market sector. There are differences between households in the amount of wild resources consumed. For those households containing a very active harvester then, the value of wild resources consumed may constitute a much higher proportion of household income than is the case when averaged across the entire community.

10. COMMERCIAL EXPLOITATION

Economic benefits to the local Indigenous community may also arise from the commercial exploitation of wild resources. While the wild resources of the Wallis Lake catchment are extensively exploited by the general community, with the value of the commercial fishery estimated at $2 million per annum, it would appear that the Indigenous community has only limited involvement in the commercial exploitation of

Table 5. Value of use of wild resources by the Wallis Lake Indigenous population, $ per annum

	Lower-bound (9%)	Mid-point (16%)	Upper-bound (25%)
	Based on average value of fishing (method 1)		
Per person aged 15+	$468	$831	$1,299
Per person (all ages)	$283	$503	$786
Community	$232,420	$413,191	$645,611
Proportion of income	2.9%	5.2%	8.2%
	20 very active fishermen and rest at community average (method 2)		
Per person aged 15+	$683	$810	$975
Per person (all ages)	$413	$491	$590
Community	$339,298	$402,792	$484,427
Proportion of average income	4.3%	5.1%	6.1%

Notes: Estimates are for the 12 months to July 2004.

resources. Given the budgetary and time constraints of this project it was not possible to provide any dollar value estimates of the commercial use of wild resources. Examples of commercial exploitation which were identified during the fieldwork include the following:

- Tobwabba Tours which provides walking tours encompassing Aboriginal sites, traditional history, music and dance. Along the walk, guides point out natural bush tucker such as berries, fruits and various offerings from the sea.
- Kayak Tours employs Aboriginal guides and provides occasional casual employment.
- Forster Local Aboriginal Land Council runs a CDEP scheme with 164 participants which undertakes some commercial activities. The CDEP scheme offers services in bush and land restoration. One of their selling points is that they have both customary and western scientific knowledge. The CDEP scheme also runs a nursery that grows Australian plants for use in regeneration and rehabilitation works. However, it is not clear whether this should be classified as use of wild resources.

There are a number of Indigenous artists working in the Wallis Lake catchment. The arts and crafts produced are primarily marketed through Tobwabba Art Australia which is based in Forster. In July 2004 there were 22 artists working through Tobwabba.[22] While the designs are inspired by the wildlife and environment of the catchment, the production of the art works does not use wild resources. A number of the artists are active fishers.

11. PRESSURES ON THE USE OF WILD RESOURCES

The ability of the Indigenous community to harvest terrestrial animals and plants is severely restricted by urban development and private ownership of land. The use of firearms is restricted in much of the catchment. A number of informants said that bag limits limited their fishing, particularly for shellfish.

Almost all of the older respondents believed that many native species are less abundant than they were in the past. This was attributed to a variety of factors. Respondents believed that the largest factor in the decline in fish stocks was fishing by recreational and commercial fishers. There was particular concern about recreational fishing, which the respondents believed had grown dramatically over recent years. Respondents also believed that recreational fishers had less understanding of the environment and were less responsible in their taking of fish than Indigenous fishers. This could be especially so since visitors and tourists are not stakeholders in the long-term sustainability of the Wallis Lake catchment fisheries.

12. CONCLUDING COMMENTS AND POLICY IMPLICATIONS

This report develops and describes a methodology which can be used to estimate the economic benefits derived from the use of wild resources. A survey instrument has been developed and pilot tested in the Wallis Lake catchment. The harvesting of wild resources for consumption (as part of the customary economy) makes an important contribution to the livelihoods of Indigenous people living in the Wallis Lake catchment.

In the Wallis Lake catchment almost all of the resources harvested are aquatic, and only these resources are included in this valuation. Given the uncertainty surrounding our estimates, lower and upper bound estimates of the likely value of wild resources harvested have been made. The lower bound estimate is $468 per person aged 15 years or over per year, and the upper bound estimate is $1,299. The relative importance of this contribution to the living standards of the Indigenous population can be gauged by expressing the value of wild resources harvested as a proportion of the average personal income for the Indigenous population. Our estimates suggest that the value of the wild resources harvested is between 3 and 8 per cent of gross personal income, although as noted we do not value customary use of terrestrial species. Virtually all of the resources were used for personal consumption (including own household) or distributed to family outside of own household. There are a range of other sources of economic value including indirect use value, option value and non-use values (e.g. existence and bequest value) that are not quantified in this study and hence the estimates in this paper are likely lower bound estimates of the value to the Indigenous community.

While the amounts of wild resources harvested are smaller than in remote areas of Australia this is not surprising given legal restrictions, availability of resources and competing availability of mainstream employment opportunities. Harvesting of wild resources is not seen as a recreational activity, but rather as being of cultural importance and as a source of food. This is quite different to the reasons that non-Indigenous recreational fishers give for fishing, with only 8 per cent saying that the main reason for their fishing was for food.

It appears that there is only limited commercial exploitation of wild resources, but further research is needed to confirm this. Increased commercial exploitation may be a possible source of increased employment and income for Indigenous people in the Wallis Lake catchment. We did not ask Indigenous people in this region if they hold aspirations to undertake commercial exploitation of wild resources to enhance livelihoods.

There have been several reports which draw attention to the fact that non-commercial fishing by Indigenous people (who fish not only for themselves but also for extended family) may bring them into conflict with current New South Wales law which does not provide for recognition of customary Indigenous fishing practices (Hawkins 2003; Palmer 2004). The Aboriginal Justice Advisory Council (AJAC) report makes a number of recommendations including that the *Fisheries Management Act* (NSW) be amended to create a separate reference to customary fishing and provide for it to be a separate class of fishing activity. The AJAC report also recommends that the legislation be amended to recognise the continuation of customary Indigenous fishing practices, including concepts of barter, exchange and communal sharing, by exempting these activities from regulation.

Hawkins (2003) argues that the lack of recognition of 'traditional' fishing activity by Indigenous people has limited their ability to continue the customary practices of providing for extended families and communities, since the amount and types of fish they catch has the potential to result in prosecution for unlicenced commercial fishing. The lack of recognition for customary fishing by Indigenous people in the New South Wales Fisheries Act is not consistent with the legislation in most other jurisdictions.

Fisheries legislation in all States and Territories, except for New South Wales and South Australia, protects to varying degrees the rights of Indigenous people to practice traditional fishing methods (Hawkins 2003). Such protection of traditional Indigenous fishing practices extends to both freshwater and saltwater fishing, and allow for traditional Indigenous fishing practices that are limited not by what is taken or how it is taken, but whether or not the activity will have a detrimental impact on the sustainability of resources or the activities of other sectors of the industry.

The *Indigenous Fisheries Strategy and Implementation Plan* was released by the New South Wales Department of Fisheries in 2002 following recognition that traditional, cultural and community activities have become increasingly and negatively affected by fisheries laws. The stated aims of this strategy are: to encourage a broad community understanding of Indigenous traditional cultural fishing issues in New South Wales; to ensure that the importance of traditional cultural fishing is acknowledged in fisheries policy and practices and in discussions on fisheries resource management issues; to encourage and support the involvement of Indigenous communities in the management of the State's fisheries resources; and to encourage and support the involvement of Indigenous communities in commercial fishing, fishing-based ecotourism, and the emerging aquaculture industry.

From a public policy perspective, total harvesting of wild resources (traditional harvesting of wild resources by Indigenous people, recreational fishing and commercial harvesting) needs to be sustainable. The report *Commercial Utilisation of Australian Native Wildlife* by the Senate Rural and Regional Affairs and Transport

References Committee (Commonwealth of Australia 1998: 20.77) expressed the concern 'that there is insufficient monitoring of the level of subsistence use by Aboriginal people and its impact on wildlife populations and hence on biodiversity'.

In Canada there are fears that self-regulation by Aboriginal fishers will result in very rapid resource depletion and reduced size and profitability of maritime resource industries. The standard neoclassical fisheries models predict dramatic stock and industry decline in the absence of regulatory constraint on Aboriginal effort (Grafton et al. 2004). Keay and Metcalf (2004) argue that these predictions are a function of the assumptions regarding Aboriginal behaviour. Their modelling suggests that most reasonable assumptions regarding Aboriginal sensitivity to the economic and regulatory environment lead to potentially substantial redistribution of catch and profit, but fairly small changes in aggregate variables. However, Keay and Metcalf (2004) do not provide empirical evidence to support the assumptions they make.

Our fieldwork suggests that Indigenous people living in the Wallis Lake catchment believe that the way in which they use wild resources differs from that of non-Indigenous fishers. Indigenous people in Wallis Lake said that they would never take more of a resource than they and their families needed and had 'rules' which they followed which prevented depletion of the resources. They believed that many other fishers, particularly tourists, do not self-regulate in this way. This is quite plausible since tourists are not generally stakeholders in the long-term sustainability of the Wallis Lake catchment fisheries. There was also concern about over-exploitation and harmful fishing practices amongst commercial fishermen.

There is a growing body of research (e.g. from the Australian Research Council Key Centre for Tropical Wildlife Management in Darwin) that suggests that robust Indigenous customary harvesting of wildlife coupled with residence on country and no restriction on customary take of wild resources is resulting in sustainable harvesting and robust wildlife populations (Altman & Whitehead 2003; Griffiths, Philips & Godjuwa 2003). Such interstate experience could be of assistance to New South Wales in its development of laws to protect customary fishing effort.

As outlined in the paper, the 'high-catch' Indigenous fishers distributed their catch amongst extended family members. Indigenous fishers said repeatedly that the existing bag limits restrict their ability to provide fish to their extended families. Therefore, there may be a case for increasing the bag limits of Indigenous fishers. However, given that fish are a renewable common-property resource it is necessary to regulate the total fish harvest to ensure that harvesting levels are sustainable and that the stocks of fish are not depleted. If there is scientific evidence that current levels of fishing are sustainable and socially optimal but that additional fishing by Indigenous people would make the fish harvest unsustainable, then it would be necessary to reduce the catch of either recreational or commercial fishing interests.

In the native title era where common law rights in species are recognised, especially for common-property resources, it is likely that Indigenous customary fishing effort will expand. Our research suggests that effective natural resource management will be increasingly dependent on engagement with Indigenous

stakeholders who represent people with a long-term interest in sustainability as the long-term residents of the region and as long-term harvesters of coastal resources.

Innovative approaches are needed to facilitate the engagement of local Indigenous customary fishers in community-based monitoring and management of fishing effort and harvest levels, to ensure long-term species sustainability. It is our view that the potential common law property rights in customary use, alongside recreational and commercial use, should be recognised by New South Wales authorities. It is unlikely that optimal resource use will occur if the property rights and interests of all stakeholders are not recognised, and unless all fisheries effort is monitored.

The findings here indicate a keen Indigenous economic, social and cultural interest in the harvesting of wild resources in the Wallis Lake catchment. This area might be an appropriate jurisdiction to trial community-based, adaptive management of customary harvesting alongside similar management and monitoring of recreational and commercial sectors by the New South Wales Department of Primary Industries.

NOTES

1. For example, Altman (1987) undertook research with Gunwinggu people at Momega outstation in central Arnhem land, and Meehan (1982) with Burada people at Kopanga (Kuninjku) outstation in coastal Arnhem Land. Cane and Stanley (1985) visited a number of outstations in central Australia. Palmer and Brady (1991) worked at Oak Valley on the Maralinga lands. Other relevant studies are Johannes and McFarlane (1991) in the Torres Strait, Kwan, Marsh and Delean (2004) in Torres Strait, Lee (1992) in Bathurst Island with Tiwi people, Roberts, Klomp and Birckhead (1996) in North Queensland and Griffiths, Philips, and Godjuwa (2003) in central Arnhem land.
2. English (2002) provides a mapping and assessment of places associated with the use of wild resources by the Gumbaingirr people at Corindi Beach on the north coast of New South Wales.
3. Online at <**http://www.fisheries.nsw.gov.au**>, consulted 16 July 2004.
4. The statistics are for the average of Forster-Tuncurry and Dungog/Great Lakes.
5. Figures are all from the 2001 Census.
6. In the 2001 Census, CDEP participation is only accurately measured where the Special Indigenous Personal Form (SIPF) was used as part of the Indigenous Enumeration Strategy. The SIPF was used in discrete Indigenous communities. These communities are predominantly in remote areas although the SIPF was used in a small number of communities in urban areas.
7. Estimated as a weighted average of the average income in Forster-Tuncurry and Dungog/Great Lakes. Weighted according to population shares. The income data is collected in ranges and so the mid-point of each income category is used. For the maximum income ($1,000 or more per week) the income is assumed to be $1,500. There are so few Indigenous people in this category that this assumption does not make any significant difference.

8. National Native Title Tribunal, 'Fishing and native title: what rights apply?' <http://www.nntt.gov.au/publications/1021874397_11824.html>, consulted 16 July 2004.

9. The *Fisheries Management Act 1994* (NSW) requires recreational freshwater and salt-water fishers to pay a fee unless they are exempted from doing so. Indigenous people are exempted from paying the licence fee.

10. There may also be economic benefits resulting from payment for expert knowledge of wild resources. These benefits do not fit easily within the total economic value framework described in Fig. 2 since it is arguable that they involve use of the resource.

11. For a discussion of these issues see Throsby (2001).

12. Estimating the value of things such as culture involves the use of methods such as the travel cost method, contingent valuation and hedonic pricing that are used to estimate directly willingness to pay. Contingent valuation methods and related techniques attempt to assign an economic value to the externality or public good by assessing what the demand function would be if in fact demand could be expressed through normal market channels (Throsby 2001: 25).

13. In the case in which the producer and consumer of the good are not the same person it is conventional to separate economic surplus into consumer and producer surplus.

14. An alternative approach to estimating the value of harvesting wild resources to the Indigenous population would be to value the inputs to the harvesting. In the case of harvesting of wild resources by Indigenous people time is the primary input, and this could be valued using an imputed value of labour (and the value of other resources involved in harvesting). A comparison of the direct approach of valuing output (used in this paper) and the indirect approach of valuing inputs is provided by Fitzgerald and Wicks (1990). However, there are conceptual difficulties in estimating the value of time for a group of people with few opportunities to participate in the labour market.

15. An overview of the different methods of collecting data on the customary economy is provided by Altman and Allen (1992).

16. Recall error is when respondents make errors when asked to report on events that have occurred over some previous period. Recall error has been separated into 'telescoping' and 'recall decay'. Telescoping refers to the tendency for respondents to report events as occurring in the wrong time period. In other words respondents may report events as having occurred earlier or later than they actually occurred. Recall decay refers to the inability of respondents to recall all of the events occurring in the past.

17. Having a data collector measuring the wild resources harvested is likely to produce more accurate data than having the harvesters do the measurement themselves.

18. Studies of whether recall error results in under- or over- estimates have produced mixed results. Chu et al. (1992) in a study of recall error in self-reported fishing and hunting activities in the USA find that one-year recall produced over-estimates of most hunting and fishing activities. In contrast Gems, Ghosh and Hitlin (1982) found that a two-month recall produced underestimates when compared to a two-week recall period in a study of anglers.

19. One respondent reported using wild resources for medicinal purposes and said that a few other people, particularly older people, also did this.

20. Indigenous people in New South Wales sometimes use the term 'cultural' economy rather than customary economy.

21. In principle the depreciation of boats and trailers used for fishing, fishing gear and other capital items used for fishing should be used to calculate the capital costs of fishing.

22. Online at <**http://www.tobwabba.com.au/**>, consulted on 27 July 2004.

APPENDIX A. SURVEY INSTRUMENT

USE OF NATURAL RESOURCES

Month/Season:

Species e.g. fish, bird, mammal, reptile, plant, mineral	**How many people do you go with**	**How often** e.g. every day, every week	**Time spent** e.g. Hours per day, per week	**Amount** (number or size or weight)	**How collected or caught** e.g. rod, hand line, net, gun, from shore, from boat	**Use** a. Personal consumption b. Gift (to whom?) c. Distribution (to family, friends?) d. Sale e. Other (specify)	**Impacts or pressures on your use of the resource (any?)**

APPENDIX B. GUIDELINES FOR ESTIMATING THE ECONOMIC BENEFITS DERIVED FROM THE USE OF WILD RESOURCES BY INDIGENOUS PEOPLE

This Appendix provides some broad guidelines as to how local councils can identify whether Indigenous people derive economic benefits from the use of wild resources, to identify which resources produce economic benefits, and to estimate the value of these benefits. It is not possible to 'follow a recipe' to evaluate the economic benefits of wild resources to Indigenous people. Those conducting such studies will need to make a number of decisions about research methodology depending upon the particular circumstances in the region being studied.

The importance of working with members of the Indigenous population when undertaking a study of the value of wild resources cannot be overstated. This is important in relation to the quality of the information collected, the extent to which people are prepared to provide information, and whether the results of the study are accepted by the Indigenous community. However, having a member of the Indigenous community who is assisting with the project present during interviews with Indigenous respondents may sometimes mean that harvesters will be reluctant to provide detailed information on where and how they harvest resources to an Indigenous 'competitor'.

THE CONCEPT OF ECONOMIC VALUE

The economist's concept of total economic value (TEV) provides a framework which can be used for valuing natural resources. Economists conventionally distinguish between *use* values and *non-use* values. Non-use values refer to those current or future (potential) values associated with an environment or resource which rely merely on its continued existence, and are unrelated to use. Use values usually involve some human 'interaction' with the resource.

These guidelines are concerned with estimating the value of the economic benefits which accrue to Indigenous people from the direct use of wild resources. These may include:

- consumption of wild resources harvested;
- the use of wild resources as an input into something which is sold (e.g. a work of art); and
- employment resulting from connection with wild resources

These uses of wild resources can be separated into commercial use and non-commercial use. Commercial use is where the resources are sold in the market and non-commercial use is for personal consumption or consumption by family and friends. There may also be economic benefits resulting from payment for expert knowledge of wild resources.

The potential flow-on economic benefits are very broad. For example, having a successful cultural tourism operation may lead to more tourists who are interested in Aboriginal heritage and cultural practices coming to the region. These additional tourists may be more likely to spend money purchasing art produced by the Aboriginal population. If the harvest of wild resources and associated levels of activity and improved diet result in improved health and a lower rate of social problems associated with inactivity then there will be substantial economic benefits for the community as a whole in the form of lower health, policing and criminal justice costs. These kinds of economic benefits are very difficult to estimate and would require a very extensive research project by highly skilled and specialised economists with input from specialists in the areas being examined. Nonetheless, the flow-on benefits are potentially large and should not be ignored.

VALUATION OF WILD RESOURCES HARVESTED FOR CONSUMPTION

The estimation of the economic value of wild resources which are consumed requires the following information:

- the average amount of each species harvested;
- number of people harvesting each species;
- market price of each type of wild resource; and
- costs of harvesting the wild resources.

Information on the number of people using each species of wild resources can only be obtained using a survey of Indigenous people living in the region. It is essential that the respondents to the survey be selected randomly in order to ensure that it is representative of all Indigenous people living in the region.

Information on the amounts of harvesting of wild resources can be collected in two broad ways:

1. Direct observation and measurement of the amount, size and weight of wild resources harvested for a representative sample of the population of interest. This information can be obtained either by a data collector measuring the wild resources harvested or by getting the fishers to record the amount, size and weight of each resource harvested. If literacy levels are sufficient, respondents can be asked to contemporaneously record information on the resources harvested using a diary.
2. The use of a questionnaire that asks people to estimate the amounts of each species harvested. Information on the average size and weight of the resources harvested can be obtained from a range of sources. It is probably not possible to collect accurate information on the size and amount of resources harvested using this method.

If the questionnaire method is used it is necessary to obtain information on the average size and weight of each species. A good general source for this information is: Yearsley, Last and Ward (2001). If information is available on the average sizes of each species for the study location, this should be used.

Given the seasonal nature of the use of most naturally-occurring wild resources it is important to collect information for a 12-month period. For the direct measurement approaches this means that data must be collected throughout a 12-month period. If questionnaires are used, then either the respondent must be asked about their use of wild resources for the previous 12 months, or surveys need to be conducted several times over a 12-month period. The longer the period of time that the respondent is asked to report on, the greater will be the potential problem of recall error.

Each approach has benefits and costs:

- *Accuracy of Data:* Direct observation and measurement of the wild resources harvested will produce more accurate information than will a questionnaire. In the direct observation and measurement method the data collectors cannot be at all places at all times and thus the questionnaire approach will be more inclusive.
- *Cost:* The direct observation and measurement of resources harvested by trained data collectors is time intensive and hence quite expensive. Asking respondents to record the number, size and weight of each species harvested is also expensive because respondents need to be provided with standardised measuring and weighing equipment. It also requires monitoring to ensure that the data being recorded is accurate, and is being recorded in a useable form. The use of questionnaires is the cheapest way of obtaining information on wild resources harvested.
- *Intrusiveness:* Direct observation and measurement can be quite intrusive and places a considerable burden on respondents.

An example of a questionnaire which can be used to collect information on use of wild resources is presented in Appendix A. It is important that respondents have the questionnaire and required information explained in some detail. The majority of respondents will need assistance with completing the questionnaire and if literacy levels are limited then the data collector will need to fill in the questionnaire for the respondent. The questionnaires used in the National Recreational and Indigenous Fishing Survey may be of use.

ECONOMIC VALUE OF WILD RESOURCES TO THE INDIGENOUS COMMUNITY AS A WHOLE

The average value of wild resources obtained by Indigenous harvesters can be converted into an estimate of the total value harvested by the Indigenous community, using information on the number of fishers in the community. Formally the value of wild resources harvested by the Indigenous community is shown in equation (1).

$$Value\ \ community = N \times proportion\ \ fish \times \left(\sum_{i=1}^{n} value\ \ fish_i \Big/ n \right) \qquad (1)$$

where N is the population aged 15 years and older, and n is the number of people interviewed.

VALUATION OF COMMERCIAL EXPLOITATION OF WILD RESOURCES

The economic value derived from the commercial exploitation of wild resources can be valued using standard accounting methods. In general, these methods treat wild resources as an input into a production process and hence the value is in terms of the relative importance of wild resources to the good or services produced by the business. The flow-on benefits are much more difficult to identify and estimate. In general, estimation of the flow-on effects requires an economic model which articulates the linkages between the different sectors of the regional economy.

The information being sought may be quite sensitive, and therefore tact and discretion is required by the people collecting the data. It is preferable that survey respondents are not personally identified so that the information provided cannot be linked back to the respondent. Respondents will need to be convinced that the information they provide will be treated confidentially and will not result in increased surveillance of their harvesting of wild resources. For this reason it is desirable that a person independent from the agency or local government council commissioning the research should do the actual data collection.

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