Socio-Economic Assessment of the Batemans Marine Park

April 2006

TABLES

FIGURES AND CHARTS

1 Executive Summary

The NSW Government announced the establishment of Batemans Marine Park on 29 November 2005. The marine park is in the Batemans Shelf Bioregion on the NSW south coast and includes all NSW marine and estuarine waters from the northern end of Murramarang Beach (south of Bawley Point) to Wallaga Lake in the south (including Wallaga Lake, but excluding Nargal Lake).

The decision to establish a marine park followed detailed assessment of a wide range of biophysical information relevant to the proposed marine park. A regional economic impact assessment of commercial activities that were likely to be affected by the proposed Marine Park was undertaken in a separate study (CARE 2006).

The direct costs of establishing a marine park, including the administrative costs to government and the buy-back of commercial fishing endorsements, have been evaluated and incorporated into the economic impact analysis.

Economic analysis suggests zoning this area as marine park, particularly sanctuary zoning, is likely to have some adverse impact on commercial fishing. There may also be minor effects on charter boat operators and recreational fishers, which are difficult to determine in advance of a zoning plan. However, the economic impact analysis suggests the impact is likely to be small for the region as a whole and partly offset by additional Marine Parks Authority (MPA) expenditure. The magnitude of the impact on the region is expected to be lower in the future given the trends in the regional economy, notably population growth, an expanding tourism sector and a currently declining commercial fishing sector.

Based on experience from other marine parks in NSW and elsewhere, there are also likely to be positive economic and social impacts from marine park establishment. These include enhanced recruitment of fish for recreational fishing and growth in tourism through marine park management and promotion.

The direct cost of establishing a marine park, the administrative costs to government and the buy-back of commercial fishing endorsements have been evaluated separately and have been incorporated into the economic impact analysis.

Marine park establishment was assessed in two complementary ways. Firstly, a wide range of biophysical and qualitative information was assessed to provide a holistic context for the assessment. Additionally, available information, especially from other NSW marine parks, was used to infer the likely implications for the Batemans Marine Park. Secondly, the regional economic impact assessment was undertaken to identify the direct economic implications of the Marine Park to the regional economy of Eurobodalla.

1.1 Integrated assessment

1.1.1 Biophysical aspects

Marine and coastal environments are socially, economically and culturally important to many Australians, and are the location of many activities integral to the Australian way of life. Marine and coastal environments are under increasing threat from the expansion of human population and activity. To ensure that coastal and marine habitats are preserved for future generations, we must conserve existing levels of biological diversity, and sustain the ecological processes that support such biodiversity. Environmental managers must achieve these goals, whilst at the same time providing for sustainable human use and encouraging public appreciation, understanding and enjoyment of marine areas. Marine Parks are an effective way of managing an area and its resources for conservation, in accordance with the principles of ecologically sustainable use.

The area around Batemans Bay and Moruya was identified in the NSW Marine Parks Authority's Batemans Shelf Bioregional Assessment Project as a preferred location for a multiple-use marine park. This area meets the comprehensiveness and representativeness criteria for marine park selection, and has a high degree of naturalness and catchment protection. It includes areas recommended from previous conservation assessments, including coastal estuaries identified as requiring protection by the NSW Healthy Rivers Commission, and scored highest in quantitative analyses within the bioregional assessment on a range of criteria, including complementing existing marine and terrestrial protected areas, and other conservation management strategies.

The Batemans Marine Park represents an opportunity to conserve, within a single area, some of the State's most important resources for marine biodiversity and sustainable use. For reserve design, including many interrelated features within one marine park means the potential to conserve whole ecosystems, processes, communities and populations throughout the duration and spatial extent of entire life cycles. This will help to maintain connectivity among different ecosystems and their diverse components, and provides for greater control over threatening processes operating from within and outside marine protected areas.

Specifically, the proposed area includes examples of:

- Five of the six estuarine ecosystem types in the Batemans Shelf Bioregion;
- Three of the four ocean ecosystems;
- Most of the bioregion's reef and shoal and rocky intertidal habitats;
- The two most important aggregation sites for the grey nurse shark, a threatened species;
- Habitats, breeding and nesting grounds for seabirds, some of which are migratory, including the endangered Little Tern; and
- The only haul-out site in NSW for Australian fur seals.

1.1.2 Socio-economic trends

Four major socio-economic trends were identified in the regional economy. These trends, listed below, were identified during the assessment and used where possible to inform the regional economic study and projections of future trends in the area.

<u>Structural change</u>

The economic assessment of commercial activities indicates that there has been structural change in the commercial fishing businesses. A reduction in commercial fishing and the number of people employed in the industry is consistent with many other primary industries where there is a trend toward larger production units and higher output-labour ratios.

Growth in the service sector

The combination of rapid population growth, an aging population and increasing tourism is projected to continue. Tourism growth may be stimulated further by the declaration of the marine park. These trends are expected to stimulate the service sector with regards to the provision of tourism services such as accommodation and restaurants, household services such as construction, and increasing aged care services.

Population growth

The Eurobodalla Shire experienced population growth of 21% between 1991 and 2001, substantially above the state average. This growth is expected to continue, with a population growth in the shire between 2001 and 2011 forecast at 19% and between 2001 and 2031 at 55%, more than double the state average.

At the same time, this population is aging, with 22% of the population of Eurobodalla Shire being 65 years or older in 2001, projected to be 37% in 2031. These trends are likely to increase demand for recreational facilities, including low cost recreational services demanded by retirees.

Changing nature of households and household expenditure

The percentage of retiree households is expected to grow notably over the next few years. This is expected to increase expenditure on building and construction services and associated utilities, and private and public health services. Other growth areas may include entertainment and personal services.

1.2 Impacts of marine park zoning

Potential socio-economic impacts of the proposed marine park were identified in the commercial and non-commercial sectors of the Eurobodalla economy as follows.

1.2.1 Impacts on commercial industry of marine park zoning

Commercial fishing

It has been estimated that commercial fishing landed approximately $6 million in catch from the area of the proposed Batemans Marine Park. Approximately $3.9 million in catch was landed in the Eurobodalla Shire, which in 2005 represented 0.45% of the economy’s income and 1.1% of employment (although many of these are part-time or casual jobs).

Broad estimates of the possible impacts of zoning indicate revenue foregone of about $1.2 million for the State’s commercial fisheries sector. The total regional income effect of this reduction is approximately $1 million, much of which is projected to be offset by the benefits to regional income of expenditure on Marine Park operations.

However, only 22% of the commercial fishing licence holders active in the Batemans Shelf Bioregion live in the Eurobodalla Shire. Thus, the impact on the Eurobodalla economy may be substantially less than stated above as it is spread more broadly. Just over half of the licence holders (53.4%) reside in the South Coast of NSW. Of these, most live in the main regional centres of Ulladulla, Batemans Bay, Narooma, and Eden. However, this does not take into account local people employed by licence holders. Commercial fishing directly employed 127 persons in 2001 (about 1.1% of employment in the shire), projected to decline to 119 in 2005 and 117 in 2010. This corresponds to less than 0.9% of the projected total employment in 2005 and 2010, respectively.

Fishing co-operatives

A separate study has been commissioned to identify and report on the co-operatives and fish markets likely to be affected by the establishment of marine parks within NSW, including the nature of any impact and other associated issues.

Aquaculture

Aquaculture in the Batemans Shelf Bioregion was worth $8.8 million in 2004–2005, $5.4 million of which was produced within the proposed marine park area. Aquaculture production is likely to be unaffected by the marine park. Previous marine parks established in NSW have not restricted existing aquaculture activities. Aquaculture continues in Jervis Bay and Solitary Islands marine parks.

Currently, Sydney rock oyster production in the bioregion represents about a quarter of all production in NSW by value and is the only form of aquaculture in the marine park. With the outbreak of the QX disease in the Hawkesbury oyster grounds the importance of oyster production on the NSW South Coast may increase.

Charter fishing boat operations

The charter fishing activities conducted within the Batemans Shelf Bioregion include estuarine fishing, near-shore bottom fishing and sportfishing, game-fishing, and deep sea bottom fishing. Both the number of charter fishing licences, and the allowable passenger capacity under each licence, were capped in November 2000. Charter fishing will be restricted under marine park zoning, in particular in sanctuary zones. In many cases, operators will be able to adjust to the new zoning by conducting their charter trips in non-restricted locations.

In 2005 there were 35 charter fishing operations in the bioregion, 30 of which were based in either Batemans Bay or the Narooma area. The number of charter fishing trips reported in 2005 was around 1,200 for the bioregion and 1,000 for the Batemans Bay/Narooma area.

Whale and dolphin tours

It is not expected that the Batemans Marine Park will negatively affect the whale, dolphin and seal watching industry in the region. It is likely the marine park will enhance this industry through improved habitat conservation, marketing, tourism and education.

1.2.2 Impacts on non-commercial activities

Recreational fishing

Recreational fishing is an important component of the region's recreation economy – recreational fishing generates expenditures of $25 million per year (out of total tourist expenditures of $250 million per year). There may be some initial dislocation of social activities – e.g. where sanctuary zones preclude recreational fishing and recreational fishers need to adjust their fishing patterns. However, it is expected that these effects will be outweighed by enhanced recreational fishing experiences (both quantity and quality of catch) through reduced commercial catch, and enhanced conservation protection benefiting recreational fishers elsewhere in the Marine Park.

The effect of the marine park and its zoning on recreational fishing is difficult to quantitatively estimate because:

- sanctuary zones are undetermined and any displacement of recreational fishing is unknown; and
- the extent to which the recreational fishing experience will be improved by reduced commercial fishing and improved habitat is also unknown.

A recent assessment of the Recreational Fishing Haven at Tuross Lake (within the proposed marine park area) suggests that the quality of the recreational fishing experience has increased since commercial fishing ceased in the estuary in 2002.

Conservation and Recreation

The benefits of marine parks include the conservation of marine biodiversity for current and future generations; protection of ecological values that underpin growing tourist industries, including recreational fishing; and improved management of the human development impacts on the marine environment. The conservation of marine biodiversity also provides a benefit to local residents as the amenity and recreation opportunities in the area will be maintained or improved.

A recent survey of small businesses adjacent to the Solitary Islands Marine Park sought to assess impacts of the 2001 zoning plan for that marine park on local business activity. It indicated growth in visitation since the creation of the marine park that benefited accommodation businesses. There is no evidence that the 2001 zoning plan for this marine park adversely affected the turnover of the other businesses surveyed.

Similarly, surveys of visitors to Solitary Islands Marine Park indicate that the overall satisfaction of visitors was high, with an overall rating between 5.3 and 6.5 (out of 7) for those surveyed.

1.3 Regional economic impact assessment

Input-output analysis was used to estimate the impacts of the marine park zoning for the present-day and in 5 years' time. This approach provides a more continuous assessment of the potential impact of establishing the proposed marine park and implementation of a park zoning regime than would be available from using an IO analysis for a single point in time.

The input-output analysis shows commercial fishing is 0.7% of the economic activity in the region. The reduction in commercial fishing as a consequence of the marine park zoning may reduce regional economic activity by less than 0.15%. This impact would be partly offset by operating and maintenance expenditure in the local economy by the Marine Parks Authority (MPA).

Commercial fishing licence buy-back costs

A total of $8.5 million has been allocated for voluntary buy-back of commercial fishing licences for the Marine Park. The process of estimating the cost of fishing businesses to be purchased was in line with procedures used to estimate buy-back costs for other marine parks in NSW.

Commercial fishers who sell their fishing licence may reinvest their capital in other businesses. It can be assumed that some of the buy-back funds will find their way back into the local economy.

Management costs

Management costs have been estimated at approximately $5.6 million in recurrent and capital costs over 4 years. Together with the $8.5 million allocation for voluntary commercial fishing licence buy-backs, the total direct cost to government of establishing the park would be approximately $14 million over 4 years.

The input-output analysis indicates that regional economic activity may be increased by 0.13% as a result of MPA expenditure on management and operating costs associated with the Marine Park (excluding the buy-back). This expenditure is expected to provide an additional 11 jobs in the regional economy.

The Solitary Islands Marine Park economic study found that $6 million per annum in gross regional product (GRP) was directly attributable to government spending on the management of that marine park.

1.4 Conclusions

Marine parks are internationally recognised as an effective approach to the management and conservation of marine biodiversity in accordance with the principles of ecologically sustainable development. Establishment of the Batemans Marine Park will, over time, bring a range of benefits to the local region.

The creation of the marine park and the wider demographic changes occurring within the Eurobodalla region are mutually supportive. It will bring about an enhancement of the structural socio-economic changes that are already taking place in the Eurobodalla region by enhancing recreational values, improving environmental protection, and supporting tourism growth.

The Eurobodalla economy is growing and diversifying. The marine park will support growth by protecting many of the values that attract visitors to the region. Local residents, with a high proportion of retirees, will gain the benefit of enhanced recreational opportunities.

There will be costs to the commercial fishing industry but these will be substantially reduced by the commercial fishing licence buy-back scheme, opportunities for activity outside the proposed marine park, expenditure on the establishment and maintenance of the marine park, and economic growth in the Eurobodalla region. The relative contribution of commercial fishing to the economy of the Eurobodalla region is expected to decline steadily over time with or without the Batemans Marine Park.

1.5 Issues for further consideration

A number of issues require further consideration in the development of management arrangements for the marine park. These include:

1. Strategies required to limit the socio-economic costs and enhance benefits for:
    - The commercial fishing industries; and
    - The households that earn income from commercial fishing.

2. The potential for the commercial fishing sector to continue supplying a variety of fresh fish to local consumers, restaurants and visitors.

3. The importance and value of recreational fishing in zoning the marine park, given that, while recreational fishing will be prohibited in sanctuary zones, elsewhere it is likely to be enhanced by habitat protection and reduced commercial fishing in the marine park.

2 Background to the Study

Marine parks are a mechanism to enable inclusive and ongoing management of the scarce marine resources which are under increasing pressure in NSW waters. They provide a forum for a wide variety of stakeholder views and issues, and facilitate a realignment of community and industry interests.

The proposed establishment of a marine park in the Batemans Bay area is part of a program to declare a system of marine protected areas along the coast of NSW, and forms part of a national framework for planning marine protected areas. The proposed marine park forms part of the Batemans Shelf Bioregion, which is one of 65 Australian marine bioregions and provinces identified by scientists and conservation managers to assist in planning a National Representative System of Marine Protected Areas. Together, these bioregions provide a national framework for consistent and ecologically based planning of marine protected areas. By including representative samples of the ecosystem, habitats and species of each bioregion within a system of marine protected areas, the national project aims to ensure that all NSW and Australian marine ecosystems are managed for the conservation of biodiversity and for sustainable use.

The identification of the Batemans Bay area as the candidate site in the Batemans Shelf Bioregion was the outcome of a scientific assessment of the region. The assessment examined areas for their comprehensiveness; representativeness of species; ecological importance, condition and vulnerability; and irreplaceability of ecosystem and habitat units.

The Marine Parks Authority established a working group comprising economists from within DEC and NSW DPI in late 2005 to examine the socio-economic impacts of the proposed Batemans Marine Park.

Marine park establishment was assessed in two complementary ways. Firstly, a wide range of biophysical and qualitative information was assessed to provide a holistic context for the assessment. Additionally, available information, especially from other NSW marine parks, was used to infer the likely implications for the Batemans Marine Park. Secondly, a regional economic impact assessment was undertaken for commercial activities in the region that were likely to be affected by the proposed marine park.

This assessment is reported on in full detail in the technical report titled *The estimated economic impact of Batemans Marine Park on commercial activities* prepared by the Centre for Agricultural and Regional Economics Pty Ltd, which is available on the MPA website.

2.1 Marine parks

The *Marine Parks Act (1997)* aims to conserve marine biological diversity, habitats and ecological processes in marine parks. Where consistent with these objectives, it also aims to provide for the ecologically sustainable use of fish and marine vegetation (including commercial and recreational fishing) and provide opportunities for public appreciation, and the understanding and enjoyment of marine parks. Marine parks also assist in managing pollution, visitor use, activities on adjacent land, marine pests and a wide range of human activities.

Large marine parks attempt to include a range of interconnected ecosystems and habitats, and provide more insulation from external threats, increased protection for more mobile or widely dispersed populations and the capacity to manage a wider range of impacts. Having many features spread over broad areas within a large marine park also provides for greater flexibility in multiple-use zoning, with more opportunities to meet community and stakeholder requirements, while still meeting the primary conservation goals.

There is a range of tools for managing marine parks in NSW including zoning and operational plans, permits and licences to regulate activities and temporary closures. In addition to regulation, marine parks use education, consultation, research and monitoring to manage, not just what activities occur, but how activities can be carried out in a sustainable manner.

Marine parks have four types of zones, as detailed in the *Marine Parks Regulation 1999*:

1) *Sanctuary zones* – These areas of the marine parks prohibit the removal of any plant or animal from the area. This zoning results in a range of biological benefits such as increases in the size and number of species; protection of breeding areas to re-stock fishable areas; and habitat refuges for endangered species.

2) *Habitat Protection zones* – These are designed for habitat protection as well as permitting low impact activities including the limited removal of flora and fauna. This allows for some lower impact commercial fishing and a number of recreation activities to be carried out

3) *General Use zones* – Allows most recreational and commercial activities to the extent that they remain ecologically sustainable.

4) *Special Purpose zones* – These areas require more restrictive management controls, relative to the nature of the unique activities undertaken in that location. An example could be culturally significant areas or port facilities.

Park zones are finalised after extensive periods of community, commercial, visitor and stakeholder consultation. There is a statutory requirement for exhibiting the draft zone plan for a minimum three months and establishing a local marine park advisory committee to advise on marine park management. Reviews are scheduled every five years to ensure adequate updating of the park zones. Marine parks may also be closed pending an emergency that may threaten either wildlife or humans.

Five marine parks have been declared in New South Wales: Solitary Islands, Jervis Bay, Lord Howe, Cape Byron and Port Stephens–Great Lakes Marine Parks. These parks range in size from approximately 220 km^2 to 972 km^2 in area. Reflecting both conservation objectives and the broader interests of stakeholders, marine parks are zoned to protect representative examples of biodiversity and to allow for a range of human activities, including commercial and recreational fishing.

2.2 Economics consultancies for MPA

In 2003-04, the Marine Parks Authority allocated $100,000 to the development of economic analysis for NSW marine parks. Three consultancies, jointly managed by economists from DEC and NSW DPI (NSW Fisheries), were undertaken:

1. Economic values of NSW marine parks – models for identifying the economic values, and developing procedures for ongoing data collection and monitoring;
2. Economic values of NSW marine parks – baseline data collection; and
3. Priorities for economics research in NSW marine parks.

The first two studies provided the framework for socio-economic analysis of proposed marine parks. This framework was used in 2005 to examine the proposed Port Stephens – Great Lakes Marine Park, and is used in the present study to investigate likely socio-economics impacts of the proposed Batemans Marine Park.

The third study provided input into continuing research and information collection by the MPA. One important outcome of this was the establishment of regular marine park recreational user and commercial fisher surveys.

3 Batemans Shelf Bioregion

The Batemans Shelf Bioregion includes all estuarine, coastal and offshore waters to the edge of the continental shelf (approximately the 200 m depth contour) from the southern end of Shellharbour in the north to Wallagoot Lake in the south. The bioregion is one of 65 Australian marine bioregions and provinces identified by scientists and conservation managers to assist in planning a National Representative System of Marine Protected Areas. Together, these bioregions provide a national framework for consistent and ecologically based planning of marine protected areas. Including the biodiversity of each bioregion within a system of marine protected areas aims to ensure that all Australian marine ecosystems are managed for the conservation of biodiversity and for sustainable use.

In the Batemans Shelf Bioregion are the following reserves:

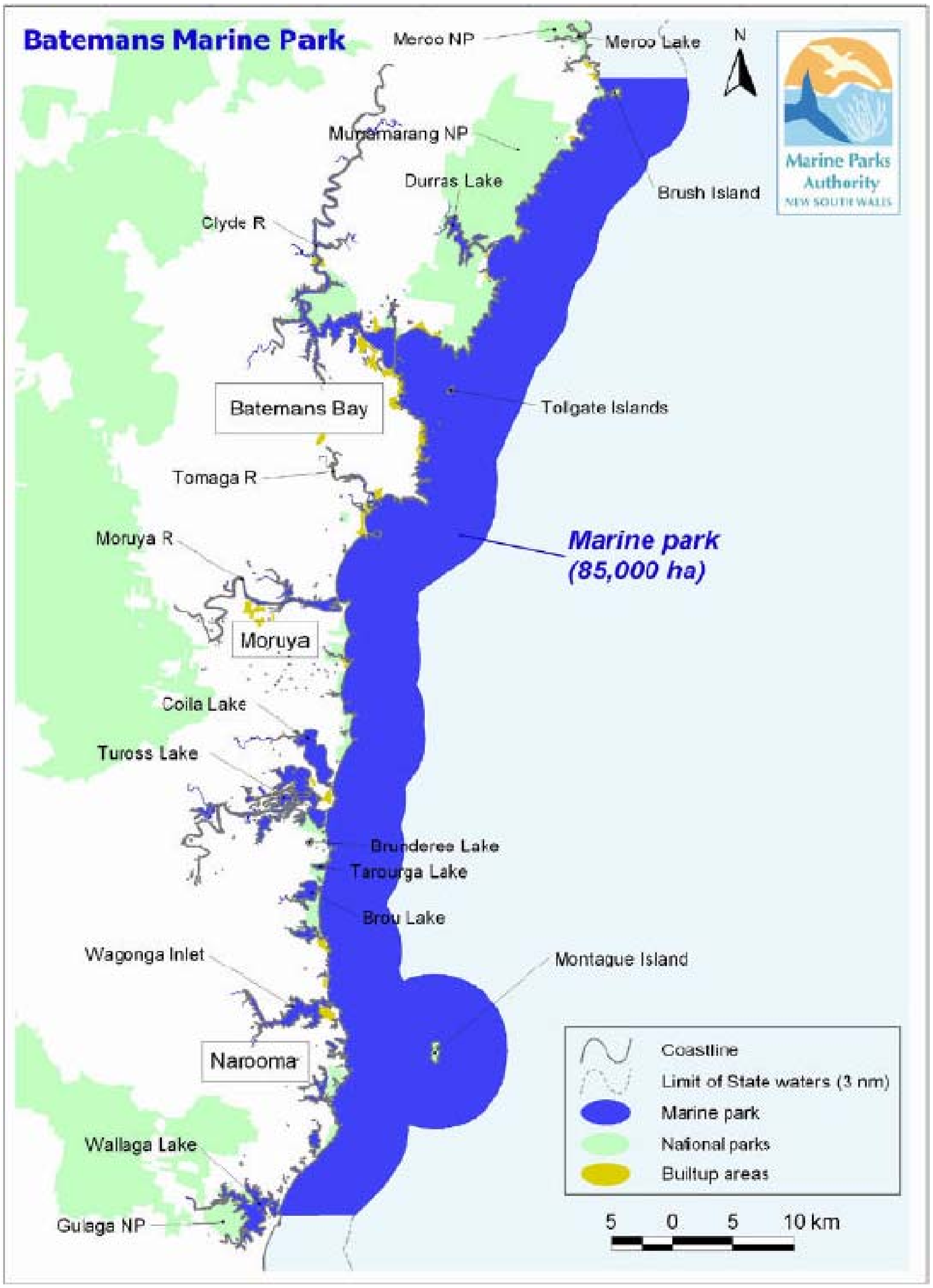
- One marine park, in Jervis Bay (214.5 km^2);
- One Commonwealth Marine Reserve, at Booderee National Park (~ 8.3 km^2)
- One aquatic reserve, at Bushrangers Bay (~ 0.04 km^2); and
- Nine national parks and nature reserves, which are recognised as having marine components (~ 20.6 km^2) but with no direct protection for fish or aquatic invertebrates.

The area around Batemans Bay and Moruya was identified in the Batemans Shelf Bioregional Assessment Project, prepared for the NSW Marine Parks Authority, as the preferred location for a multiple-use marine park. This area meets the comprehensiveness and representativeness criteria for marine park selection, and has a high degree of naturalness and catchment protection. It includes areas recommended from previous conservation assessments and scored highest in quantitative analyses within the bioregional assessment on a range of criteria, including complementing existing marine and terrestrial protected areas, and other conservation management strategies.

A boundary for the marine park has been approved by the Marine Parks Authority and covers an area of 850 km^2. The boundary extends from (and includes) Wallaga Lake in the south to just north of Brush Island, north of Batemans Bay, and out to the limit of the State's territorial waters (3 nautical miles) and includes:

- The Murramarang coast, north of Batemans Bay, with stunning landscapes, rocky reefs and islands that provide breeding areas for many seabirds;
- Intermittently open coastal lakes characteristic of the South Coast, such as Durras, Coila, Brunderee, Tarourga and Brou – many of which have been recommended for protection;
- Clyde River and Batemans Bay – a drowned river valley with important estuarine habitats, flowing into one of the South Coast's largest bays;
- Tollgate Islands – an important site for the grey nurse shark and noted for seaweed diversity;
- Tuross Lake, Wagonga Inlet and Wallaga Lake – extensive waterways with a diversity of habitats and large barrier estuaries; and

- The waters around Montague Island – a South Coast icon renowned for seals, grey nurse sharks, penguins and many other seabird species.



3.1 Selection of the Batemans Bay area for a marine park

Biodiversity conservation is most effectively achieved by protecting a representative range of marine ecosystems, habitats, and communities. The outstanding natural features of the estuaries, coast and ocean between Wallaga Lake and Brush Island make it an ideal site for a large multiple-use marine park.

Marine and coastal environments are socially, economically and culturally important to many Australians. Given the increasing pressures on the marine environment surrounding the Eurobodalla Shire, the Batemans Marine Park will help to ensure that the coastal and marine habitats are preserved for future generations.

Under the adopted criteria, comprehensiveness requires conserving examples of 'the full range of marine ecosystems and habitats across the marine environment'. According to the environmental classification adopted for the Broadscale Biodiversity Assessment of the Batemans Shelf and Twofold Shelf bioregions (MPA 2005)[1], this means representation of each of the five major estuary ecosystems, the four ocean ecosystems classified by depth, and eight habitat surrogates (mangrove, seagrass, saltmarsh, subtidal sediment, beach, intertidal rocky shore, subtidal reef and island).

Each of these ecosystems and habitats is represented in the region between Wallaga Lake and Brush Island, in some cases by the most extensive examples of their type in New South Wales. This represents an opportunity, within one area, to manage conservation of some of the State's most important resources for marine biodiversity and sustainable use. For reserve design, including many interrelated features within one marine park means the potential to conserve whole ecosystems, processes, communities and populations throughout the duration and spatial extent of entire life cycles. This will help to maintain connectivity among different ecosystems and their diverse components, and provides for greater control over threatening processes operating from within and outside marine protected areas.

The region not only includes the largest areas of most ecosystem and habitat types, but also a greater number and variety of these. This replication of habitats in different areas is likely to include a greater diversity of lifeforms and provide better protection against disturbance. Having many features spread over broader areas also provides for greater flexibility in multiple-use zoning, with more opportunities to provide for a range of conservation values, sustainable use and stakeholder interests.

There are also practical advantages in focusing broad-scale ecosystem management strategies in an area with so many important features. There are compliance benefits for more efficient monitoring and surveillance. Education and communication about the Marine Park is simpler and more efficient. A large marine park of national and international significance will also promote widespread awareness of the area's values and the benefits marine protected areas can have for biodiversity and sustainable use.

The outstanding natural features of the estuaries, coast and ocean between Wallaga Lake and Brush Island that identify it as a candidate site for a large multiple-use marine park are as follows:

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[1] All the data presented in this section was derived from this biodiversity assessment report.

Ecosystems

- Estuarine: the Clyde River is the only example of a tide dominated, drowned river valley in the bioregion. The catchment of the river is still 95% uncleared, ensuring continued good water quality and biodiversity in the estuary. Three endangered fish species have been recorded in the river.

  Other types of estuarine ecosystems such as wave dominated barrier estuaries (Tuross Lake, Wallaga Lake, Wagonga Inlet and Moruya River) and intermittent estuaries (Coila Lake, Durras Lake, Meringo Creek, Lake Brunderee, Lake Tarourga, Lake Brou, Congo Creek, Nangudga Lake and Corunna Lake) are also represented.

- Wetland: Several of the estuaries represented contain wetlands listed in the Directory of Important Wetlands and the Register of National Estate.

  Durras Lake contains extensive seagrass beds, which are important fish nurseries, and is habitat for several threatened seabird species and migratory seabird species; it has been previously proposed as an estuarine aquatic reserve.

- Saltmarsh: The Moruya River contains significant areas of saltmarsh, a habitat that is poorly represented in conservation reserves; the saltmarsh areas support a wide variety of plant species, which in turn support an assemblage of threatened seabirds.

- Multiple: Wallaga Lake has also been previously proposed as an estuarine aquatic reserve; it contains several aquatic ecotypes, including saltmarsh, mangroves, seagrass beds and sandflats; it is an important site for the endangered Little Tern and several other species of seabird.

Physical Features

- The stretch of coast within the proposed Marine Park includes five out of the six types of estuarine ecosystems and three out of four of the ocean ecosystems.
- The Clyde River is the largest tide dominated estuary on the South Coast.
- The coast between Brush Island and Congo Creek, as well as around Montague Island, includes most of the region's reef and shoal and rocky intertidal habitats.

Threatened Species

- The grey nurse shark is one of four threatened marine species in NSW and is found around the Tollgate Islands and Montague Island; these two areas have been identified as the most important aggregation sites. The Tollgate Islands are known to be an area where female grey nurse sharks spend the gestation period.
- The black cod, another threatened species, has been sighted in the Durras – Batemans Bay region.
- Seven other marine species are protected in NSW: three of them have been sighted in the area of the proposed marine park: the bleekers devil fish, the estuary cod and the Queensland groper.
- Various ecosystems of the proposed park (e.g. islands, saltmarshes, and mangroves) provide habitat and/or nesting grounds for seabirds, some of which are migratory. Among these is the endangered Little Tern. Fourteen threatened bird species were sighted in the Moruya–Tuross coastal section, as well as at Batemans Bay, Durras Lake, Wagonga Inlet and Wallaga Lake.

- Montague Island is the most northerly and only remaining haul-out site for Australian fur seals in NSW.
- Most of the offshore islands in the area are important breeding grounds for seabirds, including the Little Penguin, the Sooty Oystercatcher and the Wedge-tail Shearwater.

Human Development Impacts

- Because of its natural attractions, proximity to major urban centres, improvements in transport and access, and its development as a tourism, holiday and residential area, the region is increasingly vulnerable to impacts from high levels of use and development.
- Much of the catchment of the Murramarang coast, however, is protected in Murramarang National Park. Whilst other coastal estuaries have been damaged by sedimentation and pollution adjacent to urban areas, the Murramarang estuaries are in excellent condition because of the naturally vegetated catchment.

Infrastructure Support

- Local and state agencies and infrastructure already exist in the region to provide support for management, research and education for marine conservation.
- A large, multiple-use marine park in the region would provide for a more comprehensive management of important marine areas, and more efficient management of the increasing levels of human activity in the region.

4 Framework for Socio-Economic Analysis

The socio-economic assessment of the likely impact of the declaration of the marine park and zoning had two parts. First, a formal regional economic analysis of the impacts on commercial activities, focused on the local economy as documented by ABS economic and demographic statistics and related economic modelling, was performed. However, not all social and economic activities, particularly in coastal regions, can be documented, quantified and modelled. Thus, an important second component of the socio-economic assessment was the qualitative assessment of activities and trends not able to be formally assessed.

The framework used for analysing the socio-economic impact of the proposed marine park is based on work undertaken for the Marine Parks Authority in the first consultancy noted in Section 2. As well as providing a framework for undertaking economic analysis, the consultancies identified data requirements and methods for measuring the direct and indirect use values and regional economic impacts of marine parks.

This section considers:

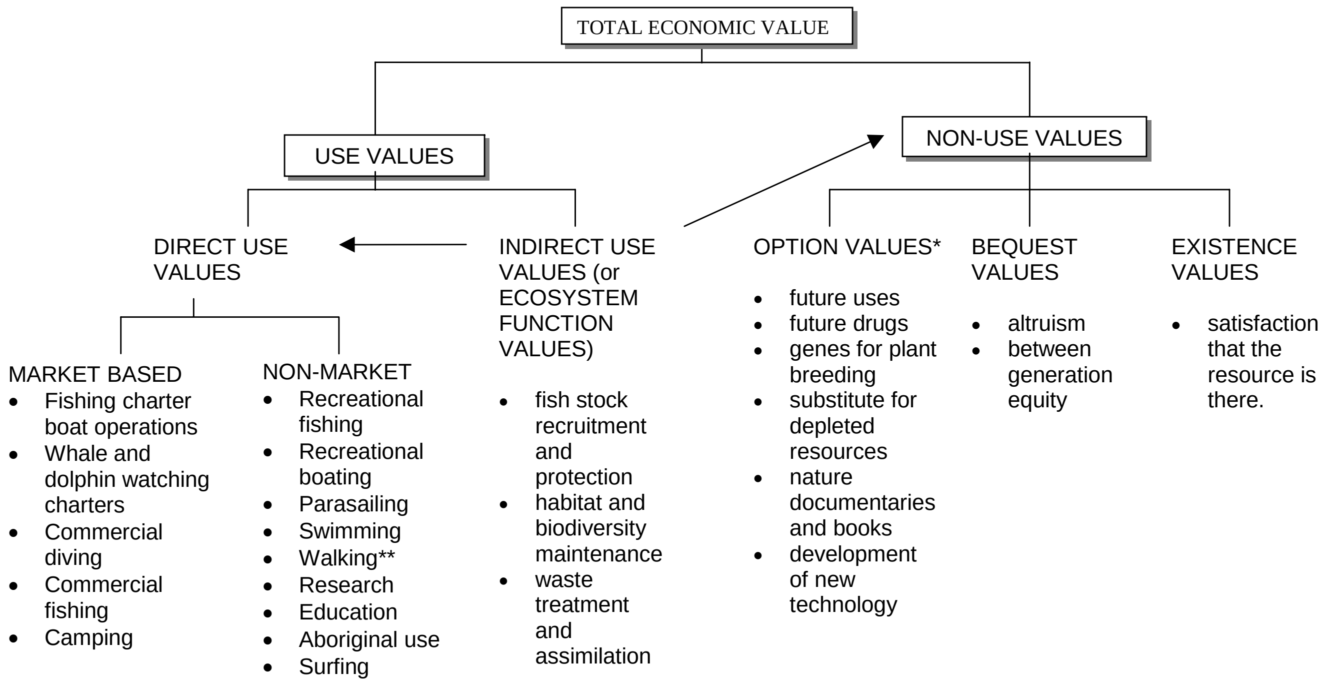
- the identification and measurement of the types of use values provided by marine protected areas;
- the identification and measurement of the regional economic impacts; and
- the linkages between use values and the regional economic impacts.

The framework established in this section is used in later sections to estimate the economic impacts on the Eurobodalla Shire, and to some extent on part of the Shoalhaven Shire, of the proposed marine park.

4.1 Identification of use values in marine protected areas

Marine resources, such as those contained within marine parks, have many economic values that can contribute to society. All the economic values combined are often referred to as the total economic value (see Figure 4.1). The mechanisms that link resources to individual and community well-being are the direct use of resources (e.g. commercial and non commercial recreation), the indirect use of a resource (e.g. ecosystem function values like the protection of biodiversity) and the passive or non-use (e.g. preservation of natural ecosystems, species or special areas).

Figure 4.1 – Components of total economic value of activities associated with NSW Marine Parks, use and non-use values



* Includes option, vicarious and quasi-option values
** Walking may occur in the inter-tidal zone

Direct use values are those that arise from the direct physical use of environmental resources (DEST *et al*. 1995) and may include:

- Commercial or market activities, such as
  - Fishing charter operators
  - Commercial fishing
  - Commercial dive tours
  - Whale and dolphin watching charters
  - Other sightseeing tours
  - Surf schools
  - Boat and jetski hire, and parasailing.

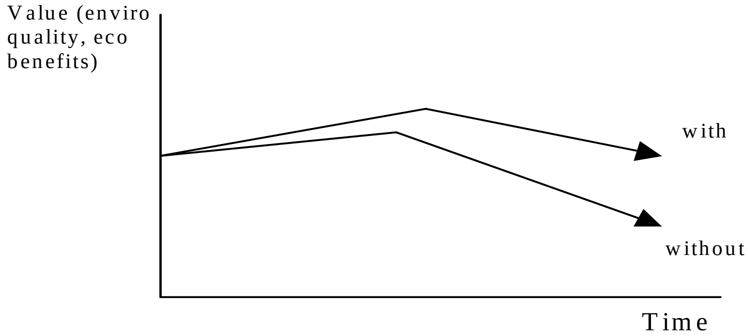
- Non-commercial or non-market activities such as:
  - Recreational fishing
  - Private boating
  - Research and education
  - Beach, rocky shore and headland walks
  - Surfing
  - Camping
  - Subsistence and Indigenous fishing

Indirect use values or ecosystem function values are the value of the ecosystem services and functions provided by an environmental resource. The concept attempts to capture indirect ecosystem values due to the interconnectedness of ecosystems through a variety of food chain and nutrient cycles. Ecosystem function values of marine parks may include fish stock recruitment and protection; habitat and biodiversity maintenance; and waste treatment and assimilation.

The *total economic value* of an existing marine park or marine resources comprises use (direct and indirect) and non-use values. With regard to measurement of these values, the important distinction is between market and non-market values. Furthermore, the economic valuation of creating a marine protected area should reflect the marginal change in management costs and use values resulting from declaration and zoning of a marine park. That is, it is necessary to identify and measure how each component of total economic value would change between the 'with' and 'without' marine park scenario (see Chart 4.1). It has been suggested that the economic value of a marine park should be measured as potential losses that are avoided because of marine protection, net of any costs associated with protection. This needs to be considered in an inter-temporal context to ensure that valuations support the objective of sustainability.

In Chart 4.1, the two hypothetical paths represent the value of a marine resource over time 'with' and 'without' protection. To ascertain the economic value of protection over time, the area between the 'with' and 'without' paths should be measured for relevant variables.

Chart 4.1 – Environmental and economic benefits with and without the marine park



4.1.1 Direct use

The underlying principles associated with economic valuations of marketable and non-marketable uses associated with marine parks are well documented in both the Australian and the international literature. The economic value of market and non-market use activities associated with marine protected areas are measured by:

- producer surplus, and where relevant consumer surplus, associated with each market-based activity;
- consumer surplus associated with each non-market use activity. The travel-cost method was specifically developed for the estimation of non-market use values.
- producer surplus and consumer surplus (both market and non-market use values) associated with any ecosystem function values; and
- net costs to government or other community groups (e.g. voluntary associations, clubs or other stakeholders that participate in management of the marine resource).

In addition, market and non-market use activities (including government expenditure) may provide an economic stimulus to the regional economy that is measured in terms of direct and indirect output, value-added, income and employment (see section 4.2).

4.1.2 Indirect use

While some economists consider indirect use (ecosystem function) values as a special category of environmental values, they can usually be decomposed into either use values or non-use values and estimated accordingly. For example, ecosystem function values associated with marine resources include:

- fish protection and stock recruitment;
- protection of biodiversity; and
- absorption of urban and non-urban run-off and point source pollution.

Absorption of waste from terrestrial run-off and point source pollution can be decomposed into use and non-use values. If run-off or pollution does not need to be contained on land or treated to a higher level before discharge, this confers a cost saving on society. This cost saving accrues either to individuals, if they were required to undertake additional treatment, or government, if they would otherwise have to undertake action. Measuring a baseline value for this cost saving, however, is problematic in the absence of alternative policy scenarios (‘with’ and ‘without’ scenarios) as the cost saving involved would depend on what alternative treatment or detention would be required.

To the extent that run-off and pollution affect the biodiversity of a marine park, there will be negative impacts on the use and non-use values of society. However, measurement of baseline use and non-use values already has regard to the existing condition of the environment. Change in use and non-use values associated with alternative policy scenarios for run-off and pollution is relevant to evaluation of alternative policy scenarios rather than baseline values.

4.1.3 Non-use values

Non-use values are measured by directly asking about individuals’ preferences using stated preference techniques such as choice modelling or contingent valuation. These techniques require the implementation of a survey instrument that needs to be specifically designed on a case-by-case basis. Specific data analysis is required to elicit consumer surplus estimates.

4.1.4 Government costs

Because there is generally a substantial public good element associated with environmental goods, some government intervention is generally required in managing environmental resources. Government costs associated with managing natural resources such as the marine environment essentially represent a supply curve for that good. Often the government costs may be offset to some extent by revenues. The net cost (or net revenue) of government activity in managing the environmental resource can be thought of conceptually as a negative producer surplus (or positive producer surplus, if this occurs).

4.2 Regional economic impacts

All activities that involve expenditure in a region provide some stimulus to economic activity in that region. Hence the following will provide economic stimuli to a region:

- market based activities;
- non-market use activities; and
- government expenditure.

Non-use values do not provide direct stimulus to a region since they do not involve consumer expenditure.

Industry and regional economic changes are summarised below with reference to the market model for an individual firm, although the same principle applies to expenditure associated with non-market use activity and government expenditure.

The market is characterised by the demand curve and the supply curve. The demand curve illustrates the revenue received by the firm from the sale of its product. The supply curve indicates the costs of production. These costs of production can be disaggregated into all the inputs into production such as wages to employees and other inputs to production, for example, petrol, machinery repairs and maintenance, clothing, food and transport.

Expenditures on any of these inputs to production become revenue to the supplier of the input. So another demand and supply schedule can be envisaged for the supplier of each input to production. The supplier of the input to production also has a range of different expenditures, which in turn become revenues to the supplier of these inputs etc. These first round and industrial support effects are collectively referred to as production-induced effects.

A similar thing happens with wages paid to employees. Employees spend some of their wages on goods and services, which in turn provides revenue for suppliers of these goods and services who have their own expenditure profiles, which provide revenue for suppliers of these inputs. These are referred to as consumption-induced effects.

Collectively, production-induced effects and consumption-induced effects are referred to as flow-ons. They measure the backward linkages associated with expenditures. Because regional economic impact assessment only assesses backward linkages, it is essential to identify the point in the production process at which to measure impacts. For instance, a regional economic impact assessment of commercial fishers would estimate the backward linkages associated with the expenditures of commercial fishers but would not capture forward linkages associated with fishing co-operatives.

To analyse the economic impacts of fishing co-operatives it would be necessary to examine the expenditure patterns of fishing co-operatives and this would include commercial fisher expenditure patterns as part of the backward linkages. Therefore, to avoid double counting, that is, counting commercial fisher expenditure twice, the additional expenditure associated with the fishing co-operative needs to be identified.

4.2.1 Input-output analysis

A method used to estimate direct and indirect economic changes in a region is input-output analysis and this requires:

- a model of the regional economy to be developed; and
- information on the total revenue and expenditure patterns (including wages to employees) associated with generating this revenue. In particular, expenditure needs to be broken down into different categories as well as by whether it occurs initially within the region or outside the specified region.

Only direct and indirect expenditures that occur in the specified region are considered. All other expenditures on goods and services that are provided from outside the region become imports.

To estimate regional economic impacts associated with market and non-market activities, in addition to total revenue and total costs, a detailed breakdown of the costs into expenditure categories and the location of the expenditure (inside or outside the region) is required. This generally requires a specific financial questionnaire for all direct expenditure activities. This expenditure information can be built into a typical travel–cost method questionnaire as was undertaken in surveys for the Marine Parks Authority.

4.3 Regional economic impact assessment and economic values

An important distinction between the measurement of economic values (i.e. consumer surplus and producer surplus) and the measurement of regional economic stimuli is that the latter tends to use four measures of economic activity that are not the same as the measures of economic values i.e. producer and consumer surplus. Regional economic impact analysis measures regional economic activity in terms of direct and indirect:

- output;
- value-added;
- household income; and
- employment.

In terms of the market model, regional economic impact assessment assumes perfectly inelastic demand (i.e. the model assumes a given level of output for each industry) and perfectly elastic supply for products. Within this model, direct output is equivalent to total revenue. Output is a measure of economic activity and therefore is not a net measure like producer surplus, as costs of production (supply) are not subtracted.

Direct value-added is the difference between the value of a business' output and the cost of intermediate products, such as raw materials, components or services, used to produce the output. However, value-added is not equivalent to producer surplus since the calculation of producer surplus requires all production costs, including labour and capital costs, to be subtracted. These costs are not subtracted from value-added calculations because value-added is a measure of returns to factors of product (i.e. capital, labour and land).

In terms of the market model, value-added is greater than producer surplus. The degree to which value-added exceeds producer surplus will vary considerably depending on, among other things, the level of labour and capital costs not subtracted and the elasticity of supply.

Income is the wages paid to employees and is a cost of production in the market model i.e. part of the area under the supply curve. Employment is the physical job numbers associated with the wages paid to employees.

A second major difference between the measurement of economic values in accordance with the total economic value framework and the indicators of economic activity used in regional economic impact assessment is that, in regional economic impact assessment, direct indicators are measured as well as second and third round effects i.e. flow-ons.

In the total economic value framework only first round effects on producer and consumer surplus are measured. This is because:

- In a fully competitive economy where there are small changes in output levels there are no real secondary costs and benefits (any secondary costs and benefits displace other benefits and costs).
- Even where the economy is not fully competitive, any spending of resources on alternative projects is assumed to generate comparable secondary costs and benefits.

- The general method of calculating secondary costs and benefits (i.e. regional economic impact analysis) measures income/expenditure rather than surpluses.

5 Benefits of Marine Parks

Marine and coastal environments are socially, economically and culturally important to many Australians, and are the location of many activities integral to the Australian way of life. Marine and coastal environments are under increasing threat from the expansion of human population and activity.

To ensure that coastal and marine habitats are preserved for future generations, we must conserve existing levels of biological diversity, and sustain the ecological processes that support such biodiversity. Environmental managers must achieve these goals, whilst at the same time provide for sustainable human use and encourage public appreciation, understanding and enjoyment of marine areas.

Marine parks are an effective way of managing an area and its resources for conservation, in accordance with the principles of ecologically sustainable use.

Two key benefits of creating a marine park at Batemans Bay are: the maintenance of biodiversity, and the protection of the marine and coastal environment from further damage by human encroachment.

However, research has identified a number of additional benefits for ecosystems, habitats and species from the creation of marine protected areas, including:

- improved fish stocks as a result of the protection of habitats critical for commercially and recreationally important species;
- dispersal of larval recruits and genetic diversity to surrounding areas;
- increased community awareness and understanding of marine conservation issues; and
- provision of scientific reference sites for research and long-term monitoring.

5.1 The maintenance of biodiversity

A key benefit of marine parks is the maintenance of biodiversity – the protection of a range of marine ecosystems, habitats, communities and their associated flora and fauna.

Biodiversity contributes to economic value through non-market direct use, indirect use, and non-use values. Key components include the ecosystem services provided by, the existence values held for, and the appreciation of, a biologically diverse marine environment.

As a reduction in the level of biodiversity would reduce these economic values, maintenance of biodiversity, above what would otherwise be the case, provides the benefit of the retention of these values.

Additionally, ecosystems in the Batemans area have been identified as having a high degree of irreplaceability. Therefore, loss of these ecosystems would constitute a permanent loss in economic value.

5.2 The protection of the marine and coastal environment from further damage by human encroachment

A second benefit of marine parks, which is also relevant to the Batemans Bay area, is their ability to protect marine environments from further degradation by increased human activities and population. Human activities have the potential to degrade marine environments and threaten the survival of marine species.

The presence of marine and coastal environments provides economic value through some market-based uses, many non-market direct use, indirect use, and non-use values. In this case, the principal components include amenity values and appreciation of the natural environment which result in visitation activities and bequest values.

As a reduction in the extent of these marine and coastal environments reduces economic values, maintenance of these environments, above what would otherwise be the case, provides the benefit of the retention of these values.

In comparison with the rest of Australia, the NSW coast is highly developed. There are many threats to, and pressures on, the NSW marine environment, with marine habitat loss an ongoing problem. Large parts of the coastline and most estuaries have already suffered through inappropriately coordinated planning and development. Only a small number of lagoons, catchments and estuaries, some of which are in the proposed marine park area, remain relatively pristine.

5.3 The maintenance of economic values

The categories of economic values most likely to be maintained from the creation of the proposed marine park are the non-market direct use values, the indirect use values and the non-use values. The specific activities and services entering these three categories are listed in Figure 4.1. Arguably, all of the non-market direct use activities should benefit from the creation of a park. The indirect use values and non-use values will be increased by the marine park. These represent economic benefits, in the form of improved ecosystem services (e.g. increased fish stocks, efficient treatment of waste in marshes) and potential ecosystem services (e.g. conservation of diverse gene pool, resilient ecosystem). Although widely accepted, these economic benefits are typically hard to measure.

Direct use values may also benefit. Commercial fisheries experience fluctuations in fish stocks, caused naturally or by human pressures such as overfishing. Sanctuary zones within marine parks help buffer these shocks, assisting in the sustainability of commercial fishing and the maintenance of the values that society holds for marine ecosystems.

Increasing the proportion of habitat protected within a marine park will increase many of the indirect use and non-use values. It may also increase non-market direct use values as visitor and recreational fisher experiences improve. However, there is a trade-off of reduced commercial fishing value as greater proportions of the marine environment are protected.

Although non-market economic values are considered to be maintained at a higher level with a marine park than without, potential impacts of zoning on recreational fishers may occur.

In 2004, the Great Barrier Reef Marine Park Authority introduced new zoning in the Great Barrier Reef to increase protection for representative areas and restrict some recreational fishing access. The revised zoning process included a regulatory impact statement where it was stated that there would be minimal impact on recreational fishers with the frequency and/or the cost of trips unlikely to be affected (GBRMPA 2003).

The Queensland Government recently released a draft zoning plan for the proposed Great Sandy Marine Park – Northern Section around Fraser Island. This zoning will restrict recreational fishing in 'green' zones and with gear restrictions in some other zones. However, they state that recreational fishers will benefit from the proposed zoning of that marine park by the likely increase in the abundance of fish, resulting in an improved fishing experience (Qld EPA 2005).

A recent assessment of the Recreational Fishing Haven at Tuross Lake (which is within the proposed Marine Park area) suggests that the quality of the recreational fishing experience has increased since commercial fishing ceased in the estuary in 2002. Before and after surveys show that there are now about 25% more recreational fishers, catching about the same total number of fish, but with most of these fish being, on average by species, larger than before the haven was introduced. Also, the composition of the catch landed changed markedly from lower value fish, like luderick and mullet, to higher value fish, like flathead, whiting and bream (Steffe 2005).

A study of visitors' behavior and perceptions in Solitary Island Marine Park analysed survey results collected between 2002 and 2005 (Ryan 2005). It showed that recreational fishers are generally happy with the marine park. Comments included the need for better signaling of the different zones within the park. Data on recreational fishing catch was only available after the declaration of the park and hence it was not possible to determine trends in the size and quantity of fish caught before and after the declaration. Seventy percent of park users were reported to use the park for non-extractive activities, such as swimming, surfing and snorkeling, and the general level of satisfaction associated with the park is very high (80%). Pristine environment and encounters with wildlife while undertaking these activities also contributed highly to that level of satisfaction.

The results of surveys collected by DEC in the Batemans Bay Bioregion between May 2004 and January 2006 (Appendix 1) support these findings, with similar percentages of park users citing swimming and surfing as their prime activity. It was also noted that non-extractive activities are undertaken on a much higher frequency (daily) than recreational fishing (2–3 times a week to weekly).

Several studies, including this Solitary Island visitors report and three Western Australian recreational fishing case studies (Mcleod 2003), concluded that a major factor in the enjoyment of a recreational fishing experience was the pristine environment including the absence of commercial fishing operations. The limits on recreational catch in the different fisheries was not seen by recreational fishers as diminishing their experience, as they generally optimised their utility below catch limits.

Finally, a report on recreational fishing in the Gulf of Mexico found an increase in consumer surplus for recreational fishers resulting from the increase in number and size of Red Snapper caught by recreational fishers after the area was closed to commercial fishing (Gillig 2000). Much of the increase in consumer surplus actually results from new recreational fishers coming to the area as a result of the improvement in fishing experience, measured in the number and size of fish caught.

6 Costs of Marine Parks

6.1 Administrative costs to government

A financial impact statement (FIS) detailing the financial resources required by the Marine Parks Authority to establish and operate the proposed Batemans Marine Park has been prepared as part of the overall socio-economic assessment. This section summarises the administrative costs to government based on the FIS. The timeframe listed in Table 6.1 was used to estimate the financial resources required for the marine park. This timeframe allows three years for developing park management plans (presently mid 2005 to mid 2008) and allows financial resources to be spread over several years.

Table 6.1 – Planning timeframe for Batemans Marine Park

Financial year	Major activity
Year 1 (2006-07)	Declare park and exhibit draft zoning plan. Finalise zoning plan and commence commercial fishing buy-back.
Year 2 (2007-08)	Finalise commercial fishing buy-back.
Year 3 (2008-09)	Park fully operational.

The financial resource requirements for the proposed Batemans Marine Park are summarised in Table 6.2. Experience gained in the management of other marine parks in NSW has been used to estimate the financial impact of the Batemans Marine Park.

Table 6.2 – Financial resource requirements for Batemans Marine Park

Resources	Year 1 2006-07 ($'000s)	Year 2 2007-08 ($'000s)	Year 3 2008-09 ($'000s)	Year 4 2009-10 & thereafter ($'000s)
Expenditure				
Recurrent	916	1,121	1,004	1,004
Asset acquisition	285	280	545	445
Commercial fishing buy-back	8,500	-	-	-
Source of funds	TBD	TBD	TBD	TBD

TBD: to be determined
* All funds to be provided by the NSW Environmental Trust.

6.2 Commercial fishing – Buy-back of fishing businesses and endorsements

The marine park creation process is committed to the purchase of fishing businesses primarily to prevent displaced effort placing greater pressure on fish populations immediately outside the marine park and in other regions along the NSW coast. The process recognises that commercial fisheries within NSW waters are fully fished, thus the buy-back process seeks to alleviate further potential pressures on the viability of fisheries in surrounding areas caused by displaced effort.

It is anticipated that the purchase of fishing businesses will cause some structural change within the NSW commercial fishing industry. Despite this, as the process is not part of a fisheries management strategy, issues relating to structural change in the commercial fishing industry are not be considered in the buy-back estimation process. In particular, the issue of latent effort has not been explored. However, the purchase of fishing businesses will remove some latent effort, as many businesses do not actively fish all of their endorsements.

6.2.1 Fishing business valuation

The calculation of the cost of fishing businesses to be purchased is based on the procedure used to estimate the buy-back cost for other marine parks in NSW. The value of a fishing business, which represents the cost of purchase, is given by:

Fishing business value = 2*(average of 3 best catch values, specified years)

The fishing business value calculation only values active endorsements (those which have been fished), as only these have reported catch value. The fishing business value is calculated for fishing businesses excluding lobster catch (if applicable). As the lobster fishery is managed under a share arrangement, the cost of purchasing lobster catch is based on current share value. The total cost of purchasing lobster shares is based on the share equivalent of catch and is given by:

Lobster cost = (share equivalent of displaced catch)*(share price)

The abalone fishery is also managed under a share arrangement. The total cost of purchasing abalone shares is based on the share equivalent of catch formula, given by:

Abalone cost = (share equivalent of displaced catch)*(share price).

Due to variations in the total allowable commercial catch (TACC) for both the lobster and the abalone fisheries, NSW DPI has indicated that only the current share price would be used in the above calculations.

6.2.2 One-off payments – administration, retraining and accelerated depreciation

Further to the estimated cost of the buy-back from the model above, a series of ‘one-off’ costs will be incurred in the buy-back process. From previous buy-back processes, an administration cost has been incurred and will be added to the estimated buy-back cost from the model (estimated at $500,000). Further, a $10,000 retraining package and allowance for accelerated depreciation is offered to fishers to help individuals move into other sectors of the economy. As the buy-back process is voluntary, it is thought that lobster fishers may seek an extra incentive to sell shares, that is, an extra payment above market price may be required. This is especially the case for lobster fishers who have paid a higher price than the current market value for their lobster shares. This payment will vary on a case-by-case basis.

The total buy-back cost of fishing businesses, including administrative costs and the one-off payments mentioned above, was estimated at $8.5m. Funding to this level has been made available by the NSW Environmental Trust.

7 Background on Batemans Bay Area and Eurobodalla LGA

The declaration and zoning of a marine park within the Batemans Bay/Twofold Shelf bioregion may affect existing economic activities within the area. Section 8 addresses the expected impact of the proposed marine park. To put these impacts in perspective, this section provides the economic context for evaluation of effects on commercial activities within the bioregion.

7.1 Commercial fishing

The Batemans Bay/Twofold Shelf bioregion extends from Shellharbour south of Wollongong to the Victorian border (34°34' S to 37°30' S). This area includes some of NSW DPI's Ocean Catch Reporting Zone 7, and all of Zones 8, 9 and 10. The proposed marine park is located between 35°30' S and 36°22' S latitude and would occupy less than 30% of the area of the bioregion.

Most of the major State commercial fishing activities are represented within the bioregion, with the majority of the abalone catch coming from the area, and a high value of catch from the estuary and ocean fisheries. The exceptions are Estuary Prawn Trawl, which does not occur in the area, and Ocean Prawn Trawl, which currently only has two fishing businesses operating in the area.

There are several commercially fished estuaries within the bioregion. Major estuaries include Lake Illawarra, the Shoalhaven River, Coila Lake, and Wallaga Lake. The fishery values (based on Sydney Fish Market prices) and catch in tonnes for the bioregion are presented in the following table (Table 7.1).

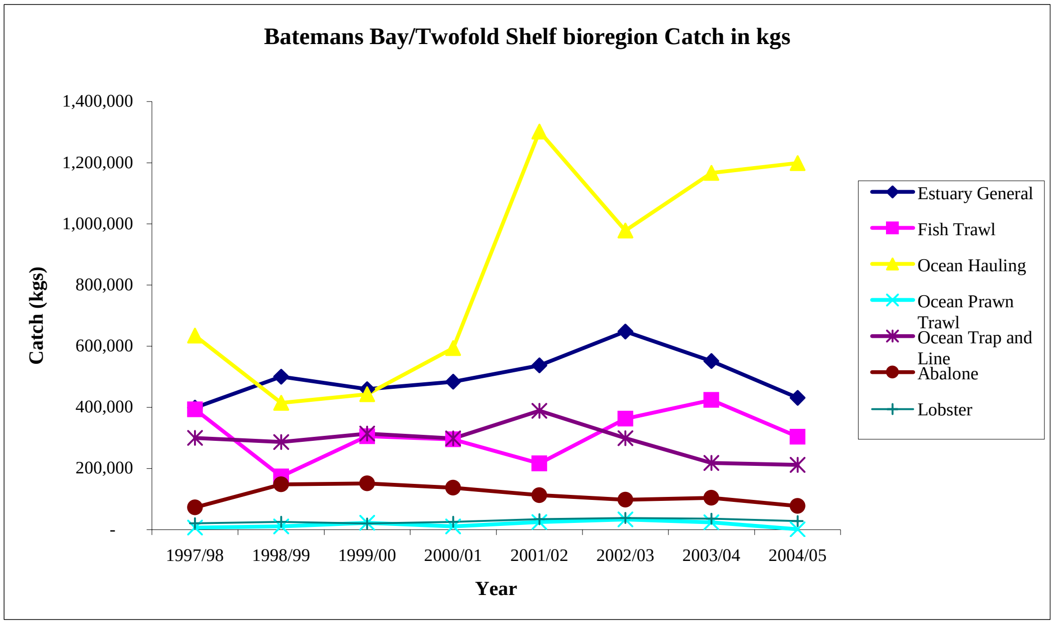
Table 7.1 – Batemans Bay/Twofold Shelf bioregion total commercial fishery value, 2004/05

Fishery	No. of fishing businesses	Estimated value	Catch in kg
Ocean Prawn Trawl	2	$24,419	1,378
Ocean Fish Trawl	23	$1,059,225	304,179
Ocean Hauling	18	$2,429,388	1,198,678
Abalone	*61	**$3,102,360	77,559
Lobster***	27	$1,027,390	28,456
Estuary General	133	$2,026,247	431,471
Ocean Trap & Line	70	$970,739	211,914
Totals	334	$10,639,768	2,253,635

Source: NSW DPI Database, January 2006
*: Endorsement Files
**: Estimated Average Beach Price $40 (2005-06 Abalone TACC Report)
***: The figures for the lobster fishery cover Ocean Zones 8 and 9 only.

The relative size of the catch in each of the fisheries has changed over the last few years. The catch for each fishery in the bioregion from the past eight years is presented in the following chart (Chart 7.1).

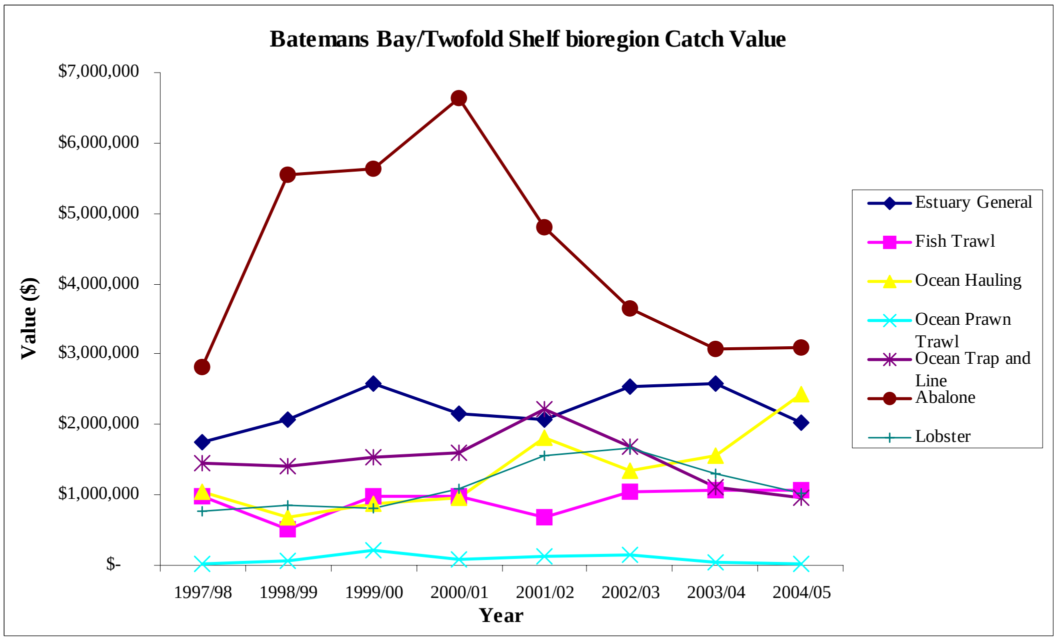
Chart 7.1 – Total Fishery Catch for the Batemans Bay/Twofold Shelf bioregion, 1997/98 to 2004/05



Source: NSW DPI Database, September 2005 extraction

The following chart illustrates the catch value of the different fisheries active in the bioregion.

Chart 7.2 – Total Fishery Catch Value for the Batemans Bay/Twofold Shelf bioregion, 1997/98 to 2004/05

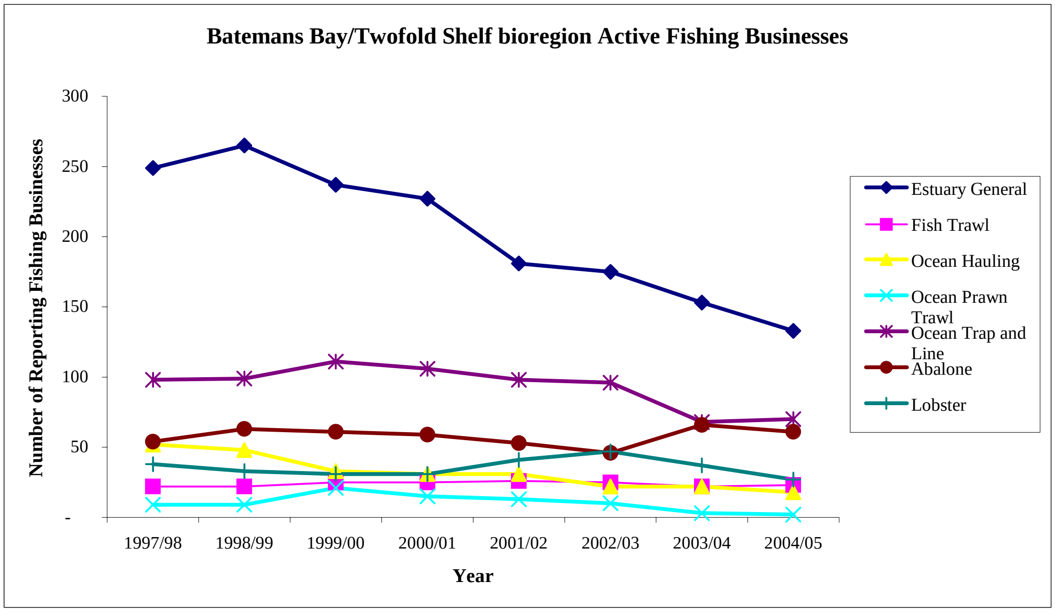


Source: NSW DPI Database, January 2006 extraction

There have been fluctuations in the catch and catch value in most of the fisheries over the past eight years. Ocean hauling has experienced an increase in catch and catch value over this period. The value of Estuary General catch in 2004/05 is about the same as it was in 1997/98. This is despite there being over 100 fewer fishing businesses active in this fishery (see Chart 7.3), recreational fishing havens being declared in some major estuaries in 2002, and gear and catch restrictions also being introduced in 2002.

The following chart shows the change over the last eight years in the number of fishers that are actively using an endorsement in the bioregion.

Chart 7.3 – Total number of active fishing businesses in the Batemans Bay/Twofold Shelf bioregion, 1997/98 to 2004/05

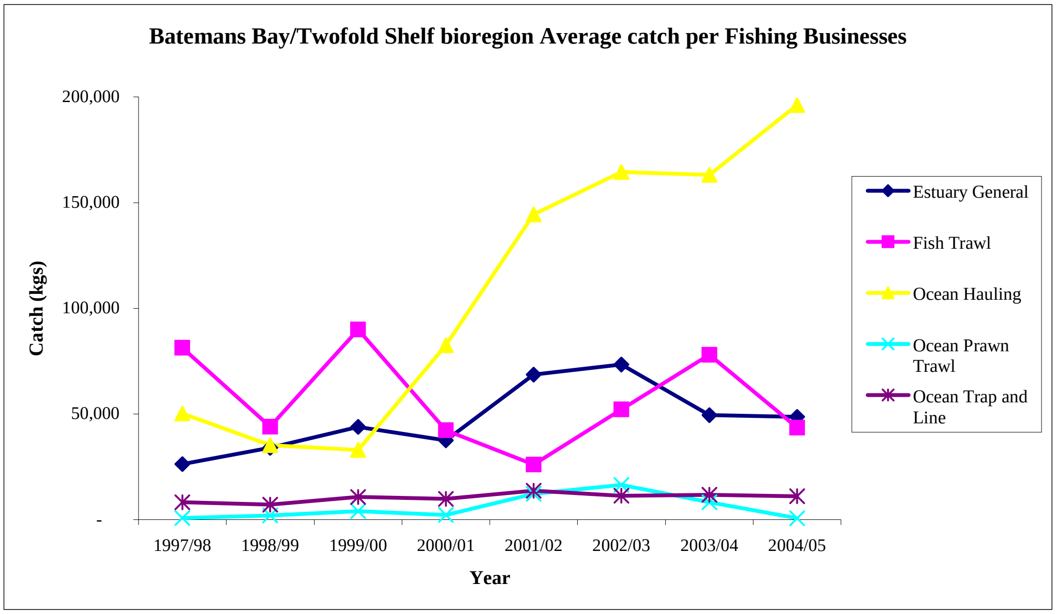


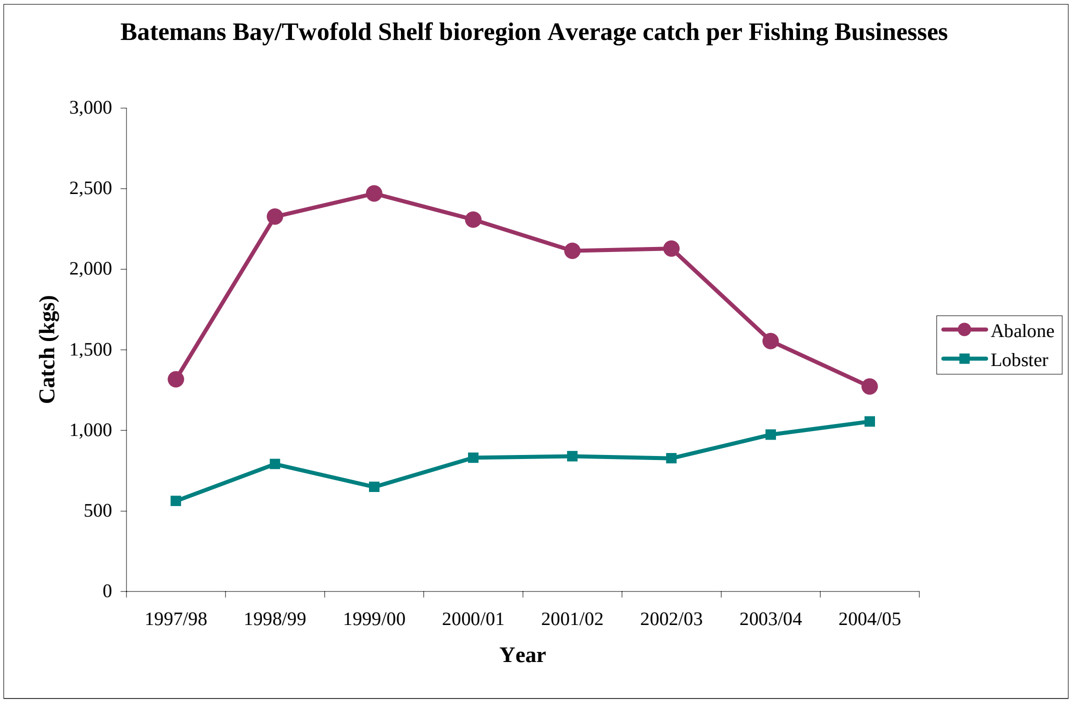
Source: NSW DPI Database, September 2005 extraction

In 2002, share management and zoning was introduced into the Estuary General Fishery. Lobster and Abalone are already managed on that basis, and the other fisheries are either being considered for, or are in the process of moving towards, share management. Share management is being pursued because it is considered to be more effective and efficient in managing fishery resources than input controls.

Along with other social and economic factors, these management changes have resulted in a reduction in the number of active fishers in most fisheries. Other fishers have either increased their specialisation or bought the capacity of departing fishers to increase their scale. This has resulted in generally increased catch per active fishing business, especially in the Ocean Hauling Fishery.

Chart 7.4 – Average Catch Value for the fishing businesses in the Batemans Bay/Twofold Shelf bioregion from 1997/98 to 2004/05





Source: NSW DPI Database, September 2005 extraction

7.1.1 Abalone

The abalone fishery is one of the most valuable fisheries in NSW with approximately 130 tonnes of blacklip abalone (*Haliotis rubra*), worth more than $5 million at first point of sale, harvested annually. Most commercial abalone fishing takes place within the Batemans Bay/Twofold Shelf bioregion, primarily from Jervis Bay to the Victorian border, with most abalone found close to the shore.

The commercial abalone fishery is a share management fishery with about 48 current shareholders in the fishery in 2005.

The stocks have decreased significantly over the past eight years and NSW's total allowable catch (TAC) was adapted accordingly: it fell from 281 t in 2003–04, to 206 t in 2004–05 and 130 t in 2005–06. Beach prices have also decreased in recent years, from 59.27$/kg in 2000 to 33.91$/kg in 2003. After a little recovery in 2004 (36$/kg), it is estimated at 40$/kg for 2005. Probably a result of these combined declining trends, the estimated price of shares dropped 25% between 2002–03 and 2003–04.

There is expected to be some impact on this fishery from the declaration of a marine park in the Batemans Bay/Twofold Shelf bioregion. These impacts are discussed in section 8.

7.1.2 Estuary General

Estuaries represent a 'mixing zone' between completely sheltered freshwaters and the open ocean. The Estuary General Fishery is the most diverse commercial fishery in NSW, with approximately 700 fishers operating in 102 estuaries along the NSW coast and employing more than 17 types of fishing gear.

This Fishery includes all forms of estuary fishing other than prawn trawling. The most common fishing methods are meshing and hauling nets. Other methods include trapping for crabs, eels and some other finfish, and a small amount of hand-lining and hand-gathering. Hauling is considered to be the most destructive method used, with seagrass destruction of particular concern. Significant estuaries currently fished within the bioregion include Lake Illawarra, Shoalhaven River, Coila Lake, and Wallaga Lake.

In 2002 recreational fishing havens were declared in the 30 rivers, estuaries and lakes in NSW. Of the havens declared in the Batemans Bay/Twofold Shelf bioregion, St Georges Basin, Lake Conjola, Burrill Lake, Tuross Lake, and Dalmeny Lake had produced 170,928 kg of catch in the financial year 1999/2000 (Tanner and Liggins 2000).

The introduction of recreational fishing havens, along with changes to the Estuary General fishery in 2002, with zoning and share management being introduced along with gear changes and catch restrictions, led to number of fishers exiting this fishery (pers. comm., Jessica Hartmann, NSW DPI).

There is expected to be some impact on this fishery from the declaration of a marine park in the Batemans Bay/Twofold Shelf bioregion. These impacts vary between estuaries and are discussed in section 8.

7.1.3 Ocean Fish Trawl and Ocean Prawn Trawl

The ocean fish trawl fishery uses the demersal otter trawl to target a large number of species, such as silver trevally, tiger flathead, redfish, john dory and numerous species of sharks and rays.

Prawn trawlers use prawn trawl nets to target prawns. Incidental catches of other species of fish may also be landed. Although the ocean prawn trawl fishery is the State's most valuable fishery, only a small number of fishers currently operate within the bioregion.

There is expected to be some impact on the ocean prawn trawl and ocean fish trawl fisheries from the declaration of a marine park in the Batemans Bay/Twofold Shelf bioregion. These impacts are discussed in section 8.

7.1.4 Lobster

The NSW lobster fishery is a small but valuable fishery worth approximately $4.6 million (reported commercial catch). Eastern rock lobster is the main species harvested but occasionally southern rock lobster and tropical rock lobster are also caught.

The fishery extends from the Queensland border to the Victorian border out to around 80 nautical miles from the coast and is separated into inshore and offshore sectors. Inshore fishers use small beehive or square traps in waters up to 10 metres in depth. Offshore fishers use bigger traps and catch bigger lobsters.

There were about 36 shareholders in the Batemans Bay/Twofold Shelf bioregion in January 2004 (Lobster EIS, page 42). Shareholders are entitled to relocate their operations to other parts of the fishery along the NSW coast without restriction. In the last two years there has been further structural adjustment with a reduction in the total number of total shareholders from 174 to 153 (TACC report 2005/06, page 13).

There is expected to be some impact on this fishery from the declaration of a marine park in the Batemans Bay/Twofold Shelf bioregion. These impacts are discussed in section 8.

7.1.5 Ocean Hauling

The Ocean Hauling Fishery targets approximately 20 finfish species using commercial hauling and purse seine nets from sea beaches and in ocean waters within 3 nautical miles of the NSW coast. On average 3500 tonnes of fish, worth around $6 million at first point of sale, are taken each year, mainly sea mullet, luderick, yellowtail scad, blue mackerel, pilchards and sea garfish.

This fishery is moving to share management, which is expected to result in a decline in active entitlement holders in the future. As this fishery operates from beaches and in high biodiversity areas, there is expected to be some impact on it from the declaration of a marine park in the Batemans Bay/Twofold Shelf bioregion. These impacts are discussed in section 8.

7.1.6 Ocean Trap and Line

The ocean trap and line fishery is a multi-method, multi-species fishery targeting demersal and pelagic fish along the entire NSW coast. Snapper, spanner crabs, yellowtail kingfish, leatherjackets, bonito and silver trevally form the bulk of the commercial catch.

Species targeted by trap and line fishers are generally considered to be fully exploited. Tuna and tuna-like species are also caught by these fishers, but are managed by the Australian Fisheries Management Authority, as this is a Commonwealth-controlled fishery.

There is expected to be some impact on this fishery from the declaration of a marine park in the Batemans Bay/Twofold Shelf bioregion. These impacts are discussed in section 8.

7.2 Residence of commercial fishery licence holders

Based on the postcode of the licence holder’s home address, the distribution of licence holders active in the Batemans Bay/Twofold Shelf bioregion was analysed to provide an indication of whether any reduction in commercial fishing employment would have economic impacts on smaller rural hamlets on the NSW South Coast. The results show that any economic impact is likely to be minimal, as a significant proportion of licence holders live outside the area, and those who do live in the shires mainly live in the urban areas.

Just over half of the licence holders (53.4%) reside in the South Coast of NSW (see Table 7.2). Of these, most live in the main regional centres of Ulladulla, Batemans Bay, Narooma, and Eden.

However, even though this analysis shows that less than a fifth of commercial fishing licence holders live in the smaller hamlets on the NSW South Coast, it does not include others that are directly employed in commercial fishing. A licence holder is usually a fishing business owner, but may employ a skipper to conduct fishing operations and employ other labour as required. These impacts are to be taken into account in the Regional Economic Impact Assessment. Nevertheless, only 22% of the licence holders active in the bioregion live in the Eurobodalla Shire.

Table 7.2 – Residence of licence holders in the Batemans Bay/Twofold Shelf bioregion

	Batemans Bay/Twofold Shelf bioregion	
Licence holder residence	Number	% Share
North of Sydney	33	12.4%
Sydney Region	69	25.9%
Wollongong area	9	3.4%
Kiama area	15	5.6%
Nowra	3	1.1%
Jervis Bay area	19	7.1%
Ulladulla	28	10.5%
Batemans Bay	21	7.9%
Moruya	7	2.6%
Narooma	30	11.3%
Bega	3	1.1%
Eden	16	6.0%
Southern Tablelands	1	0.4%
Interstate	12	4.5%
Total	266	100.0%

7.3 Commonwealth fisheries

All of the fishing in the Eastern Tuna and Billfish Fishery occurs outside the proposed marine park area. Therefore, the marine park is not considered to have any impact on this fishery. These fisheries may undertake some collection of bait in the proposed marine park area, however the extent and occurrence of this activity is not known.

7.4 Aquaculture

The Sydney Rock Oyster is the main focus of oyster production in the State. With a current annual production of around 106 million oysters worth about $30 million, oyster farming has been the most valuable aquaculture industry in New South Wales for over 100 years.

The value of the production of Sydney Rock Oysters in the Batemans Bay/Twofold Shelf bioregion is presented in Table 7.3. The production in the bioregion represents about a quarter of all production in the State by value. However, with the outbreak of the QX disease in the Hawkesbury oyster grounds, the importance of oyster production in the bioregion may increase. The estuaries of Clyde River, Tuross Lake (which is a recreational fishing haven), and Wagonga Inlet are within the proposed marine park area.

Existing aquaculture is not expected to be affected by the marine park.

Table 7.3 – Value of Sydney Rock Oyster production, Batemans Bay/Twofold Shelf bioregion

Estuary	1999/2000	2000/01	2001/02	2002/03	2003/04
Shoalhaven River	$121,236	$253,170	$146,297	$318,559	$356,865
Crookhaven River	$523,412	$327,720	$392,110	$497,246	$468,553
Clyde River	$1,887,766	$2,693,546	$2,683,606	$3,310,685	$4,058,849
Tuross Lake	$598,701	$454,420	$228,398	$234,935	$283,549
Wagonga Inlet	$771,427	$896,297	$908,127	$1,026,051	$1,075,355
Wapengo Lake	$326,865	$326,995	$309,928	$280,818	$372,857
Merimbula Lake	$1,292,475	$894,759	$1,064,917	$1,321,926	$1,483,610
Pambula River	$383,029	$488,785	$490,096	$601,914	$580,410
Wonboyn River	$304,599	$137,487	$52,251	$75,588	$144,355
Total bioregion *	$6,209,510	$6,473,179	$6,275,730	$7,667,722	$8,824,403

Source: NSW Aquaculture Production Reports 1999/2000 to 2003/2004

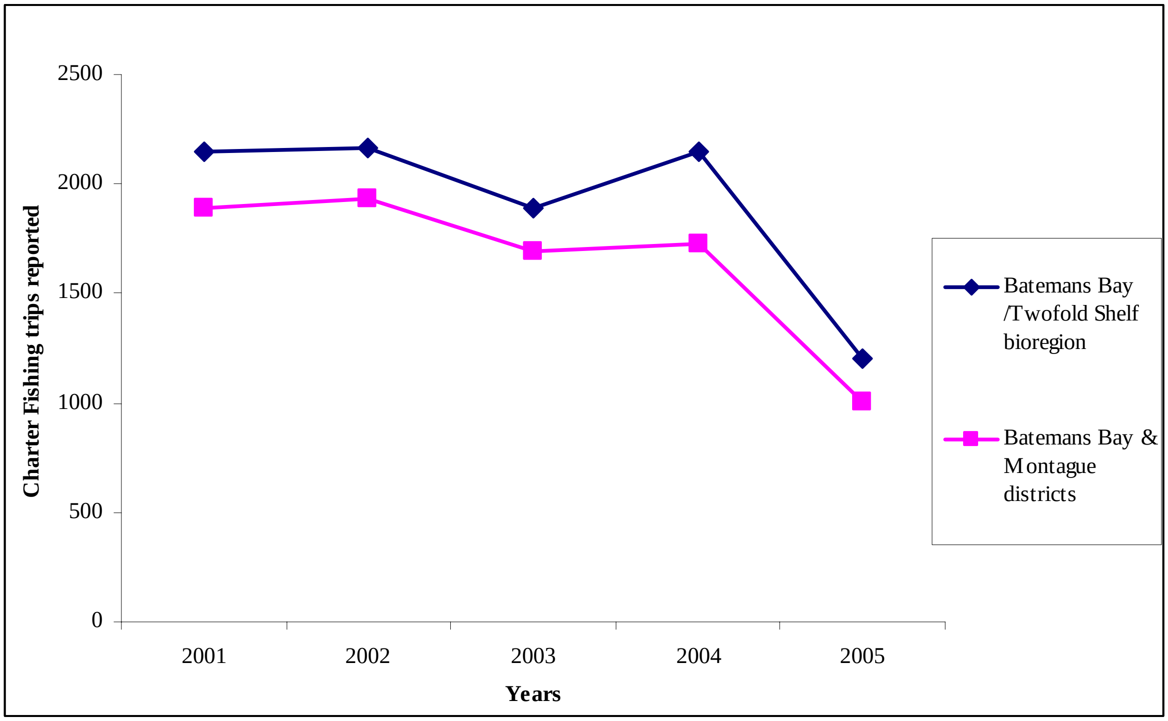
* Some smaller estuaries within the bioregion are not reported separately but are aggregated in the category of 'others'. These have not been included.

7.5 Charter fishing operators

The charter fishing activities conducted within the Batemans Bay/Twofold Shelf bioregion include: Estuarine fishing; Nearshore bottom fishing and sportfishing, Game-fishing, and Deep sea bottom fishing. Both the number of Charter Fishing licences and the allowable passenger capacity under each licence were capped in November 2000, with no more licences being issued.

In 2005 there were 35 Charter Fishing operators in the bioregion, 30 of which were based in either Batemans Bay or the Montague area. The number of charter fishing trips that were reported as being conducted in 2005 was around 1200 for the bioregion and 1000 for Batemans Bay/Montague. However, there was a decrease in the number of trips being conducted that year, as shown by the following chart (Chart 7.5).

Chart 7.5 – Reported Charter Fishing trips in the Batemans Bay/Twofold Shelf bioregion and the Batemans Bay & Montague area



Source: NSW DPI Fisheries - Charter Fishing data

Although the number of trips conducted is decreasing, the Batemans Bay/Montague area represents a large proportion of the charter fishing activity within the bioregion. Any change in the level of access to marine areas under the proposed marine park may affect operators within the bioregion. The impacts of zoning scenarios on charter fishing operators are discussed in section 8.

7.6 Recreational fishing and collecting

In 2001/02, there were approximately 1 million recreational anglers in NSW. Fish caught by recreational fishers in 2001/02 included 13 million finfish, 1.3 million baitfish, 500,000 crabs/lobsters, 16 million prawns/yabbies, 1.2 million shellfish, 160,000 squid/cuttlefish and 300,000 miscellaneous species, with the majority taken from estuarine waters.

A study of recreational fishing expenditures in NSW coastal towns was conducted in 2003 – early 2004 (Dominion 2005). One of the study areas was the combined coastal towns of Bermagui and Narooma, which are in the Batemans Bay/Twofold Shelf bioregion. The survey of recreational fishing licence holders identified fishing as their main reason for visiting these towns. Total expenditure in Bermagui–Narooma associated with recreational fishers in the 12-month period of the study was estimated to be $25 million. Around 83% of this expenditure was made by non-local visitors, making this is a very significant import into the local economy, which was estimated to be providing 19% of the local full- and part-time employment in Bermagui–Narooma.

Another study on of the expenditure of Sydney recreational fishers within regional NSW found that fishing in an unspoiled environment was ranked as very important by 72%, and catching one or more legal sized fish by 63%, of travelling Sydney anglers (Dominion 2003). The recreational fishers surveyed in the Bermagui – Narooma study favoured ocean fishing above anything else, with estuarine, rock and beach fishing coming next. The impacts of zoning on recreational fishing are discussed in section 8.

7.7 Employment

Employment figures are available at the LGA level and hence the numbers presented here refer to the Eurobodalla Shire, not to the Batemans Bay/Twofold Shelf bioregion.

Commercial fishing employed directly 127 persons in 2001, less than 1.06% of employment in the shire (not corrected for part-time employment). The projection for 2005 is showing a decline in commercial fishing employment at 119, further decreased to 117 for the 2010 projection. These numbers equate to less than 0.9% of the projected total employment in 2005 and 2010, respectively.

7.8 Fisheries data

Commercial fishers operating in Estuary Region 7 and Ocean Zones 8 and 9 were identified as being either directly affected by the establishment of the Marine Park, as its boundaries encompass their reported fishing areas, or indirectly affected, if their fishing areas lie outside the proposed park's boundaries but remain in Estuary Region 7 and Ocean Zones 8 and 9. The data did not clearly establish which local fishing businesses operated within the park or only in its surroundings.

However, most fishing businesses in the area are state-endorsed fishing businesses whose activity is very likely to be directly linked to the park, albeit for a very small proportion of their activity. The number of fishing businesses identified as being more or less directly related to the marine park area is listed per fishery in Table 7.4.

The Estuary General Fishery has the greatest number of fishing businesses that could potentially be directly and indirectly affected through the creation of the proposed Marine Park. Businesses directly affected are those operating at least partly within the Marine Park; businesses indirectly affected fish outside the Marine Park boundaries but in the ocean zones and estuary region directly surrounding it.

Table 7.4 – Fishing businesses directly and indirectly affected by the proposed marine park

Affected	Fishery	2000/01	2001/02	2002/03	2003/04	2004/05
Direct/Indirect	Ocean Prawn Trawl	12	10	9	3	2
Direct	Ocean Fish Trawl	16	16	17	15	16
Direct/Indirect	Ocean Trap and Line	72	72	70	54	54
Direct/Indirect	Ocean Hauling	27	27	19	18	15
Direct/Indirect	Estuary General	104	87	73	65	66

Source: NSW DPI Catch Records, January 2006 extraction

It was not possible to accurately forecast the level of commercial fishing effort that will be displaced or removed as a result of establishing the marine park due to several key factors. Firstly, an estimate of how much fishing effort will be displaced will not be available until the zoning is complete and finer scale data on commercial fishing is available. (Finer scale data on commercial fishing will be gathered by way of a survey of the commercial fishers who would be affected by the establishment of the marine park, subject to applying an appropriate methodology to prevent strategic bias in fishers' responses now that a marine park has been announced.)

Secondly, it is not possible to predict which businesses might seek a voluntary buy-out, which is an important variable given that the level of fishing effort varies significantly across businesses.

Thirdly, it is not possible to predict the future effort patterns of the fishing businesses that remain, particularly with respect to the potential activation of latent businesses or endorsements. It is also not possible to predict whether any businesses that accept a buy-out might subsequently re-enter fishing by buying another active or inactive fishing business, and the effect of this on any total change in fishing effort.

Fourthly, the level of effort displacement within the proposed boundaries will not be homogenous across fisheries due to differences in biophysical factors, as well as the differing fishing patterns of individual businesses.

Finally, catch and effort outside the proposed area may be affected through the lost option to fish within the protected area, or through a transfer in effort by fishers who occasionally fished within the proposed parks boundary.

Despite this, an estimate of the of percentage reduction in the commercial fishing catch following zoning within the marine park has been made. This estimated percentage reduction in catch was then applied to the average catch over the past eight years to determine the reduction in catch and value, except for abalone and lobster where the reduction is calculated on the value of the 2004-05 catch.

The estimates of the zoning impacts on each fishery are given in section 8.

Changes in aquaculture activity and value will depend on the zoning that occurs and a range of other factors, particularly the differing productivity of specific sites and technologies. If zoning prohibiting aquaculture occurs in areas where aquaculture production currently takes place, a direct loss in production and value would occur. However, aquaculture continues in Jervis Bay and Solitary Islands Marine Parks and it is not envisaged that existing lease arrangements would be inconsistent with the establishment of a multiple use marine park in the Batemans Shelf Bioregion.

Potential changes in other use values were identified but it was noted that these would largely depend on both environmental and legislative limits on these activities. The impacts on recreational fishers were not quantified in the absence of zoning.

7.9 Demographic factors

The Eurobodalla Shire has experienced population growth of 21% between 1991 and 2001 – substantially above the state average. This growth is expected to continue, with a population growth in the shire between 2001 and 2011 of 19%, and 55% between 2001 and 2031; both figures are more than twice those of the state average. Consequently, the human impact of increased habitation in Batemans Bay catchment areas will increase. These impacts include both direct pollution (from human activities such as boating and other recreation around the bay) and indirect pollution (e.g. urban stormwater run-off). The establishment of a marine protected area will assist in the management of the marine natural resource, and with environmental planning more broadly, in a region with a rapidly growing population.

Another important facet of population growth in the Batemans Bay area is the increased demand for recreational facilities, which is expected to be particularly strong as much of the population growth will come from retirees (section 9). In the Eurobodalla Shire, 22% of the population were 65 or older in 2001 (compared with a NSW average of 13%); this is expected to increase to 25% by 2011 and 37% by 2031 (compared with a NSW average of 15% and 22% respectively). Areas with high retiree numbers generate strong demand for low cost recreational services, and would thus be ideally served by a marine park with opportunities for environmentally sensitive waterside and on-water activities. Zoning within marine parks is recognised as an effective method of managing a multitude of activities, some of a conflicting nature, through the establishment of different zones that allow for varying degrees of interaction with species, habitats and other users.

7.10 Data collected by surveys in 2004–06

Surveys of recreational users and commercial fishers were undertaken in 2004–06 as part of the collection of baseline data requirements identified by the MPA consultancies. The surveys of recreational users collected data on the group size, home postcode, duration of trip, expenditure and activities of users. Data collection for the Jervis Bay and Solitary Islands Marine Parks occurred well after the declaration and zoning of these parks. The survey results are summarised in Appendix 1.

Since early 2004, four surveys of recreational users of the Batemans Bay bioregion have been undertaken as part of baseline data collection. Two of these surveys were in the off-season, with the other two in two during school holidays. Over 1200 individuals were surveyed. Of these survey respondents, 22% lived locally and about a third undertook regular recreational fishing whilst visiting the area; each person spent, on average, over $200 on their trip to the area.

A survey of commercial fishers located throughout the Batemans Bay bioregion was undertaken in May 2004. The 37 respondents represent about 14% of the commercial fishers licensed to operate within the larger Batemans Bay/Twofold Shelf bioregion. Of these respondents, 27% said that the main port they used was Batemans Bay, while another 24% mainly used Ulladulla. On average, these fishers obtained just under half of their catch from within the Batemans Bay bioregion. As the survey was conducted before the location of a possible marine park was known, the proportion of fish coming from within the proposed marine park was not identified.

The same survey revealed that the average years in activity among the sampled commercial fishers was 27 years. This indicates that a large proportion of active fishers in the region might tend towards the end of their full-time activity as a fisher. Supporting this conjecture, the number of days fished per year was 82 on average, indicating that many fishers operate on a part-time basis, or may be semi-retired.

8 Impacts of Marine Park Zoning on Use Activities

The creation of the proposed Marine Park and, more significantly, the implementation of a zoning regime to regulate economic and social activities in the area, will have impacts on some specific user groups. The purpose of the economic impact analysis is to identify these impacts and the groups that would be affected, and to estimate the nature and size of the potential impacts.

No assessment has been made of possible areas to be zoned for different uses within the Batemans Marine Park. For planning purposes, estimates of the change in economic activity were used, which were then assessed for their economic impact.

8.1 Commercial fishing

8.1.1 Commercial fisheries within the proposed marine park

Most of the major State commercial fishing activities are represented within the marine park area, although Ocean Prawn Trawl only currently has two fishing businesses operating in the area.

There are several commercially fished estuaries within the proposed Marine Park. Major estuaries include Brou Lake, Clyde River, Corunna Lake, Durras Lake, Coila Lake and Wallaga Lake; the latter two accounted on average for 62% of the total catch in the Estuary General fishery over the 1997 to 2005 period. The latest estimates of fishery values (based on Sydney Fish Market prices) and reported catch levels in tonnes for the proposed Marine Park are presented in the following table (Table 8.1).

Table 8.1 – Total commercial fishery value, proposed marine park, 2004/05

Fishery	No. of Fishing Businesses	Estimated Value	Catch in kg
Ocean Prawn Trawl	N/A	$9,232	689
Ocean Fish Trawl	N/A	$516,566	148,343
Ocean Hauling	N/A	$1,381,165	608,983
Abalone	N/A	*$2,754,240	68,856
Lobster	N/A	$285,061	7,896
Estuary General	N/A	$638,868	165,034
Ocean Trap & Line	N/A	$366,063	85,263
Totals	N/A	$5,434,629	936,721

Source: NSW DPI Database, January 2006
*: Estimated at beach price $40/kg (following Abalone 2005-06 TACC report)

The data in Table 8.1 are the latest observations of the varying trends presented in section 7. They do not provide the sole basis for estimating the continuing impact of the proposed Marine Park on the local economy.

The percentages of catch taking place within the proposed Marine Park boundaries for each fishery were also estimated by NSW DPI and are summarised in the table below (Table 8.2).

Table 8.2 – Percentage of commercial catch in marine park boundaries

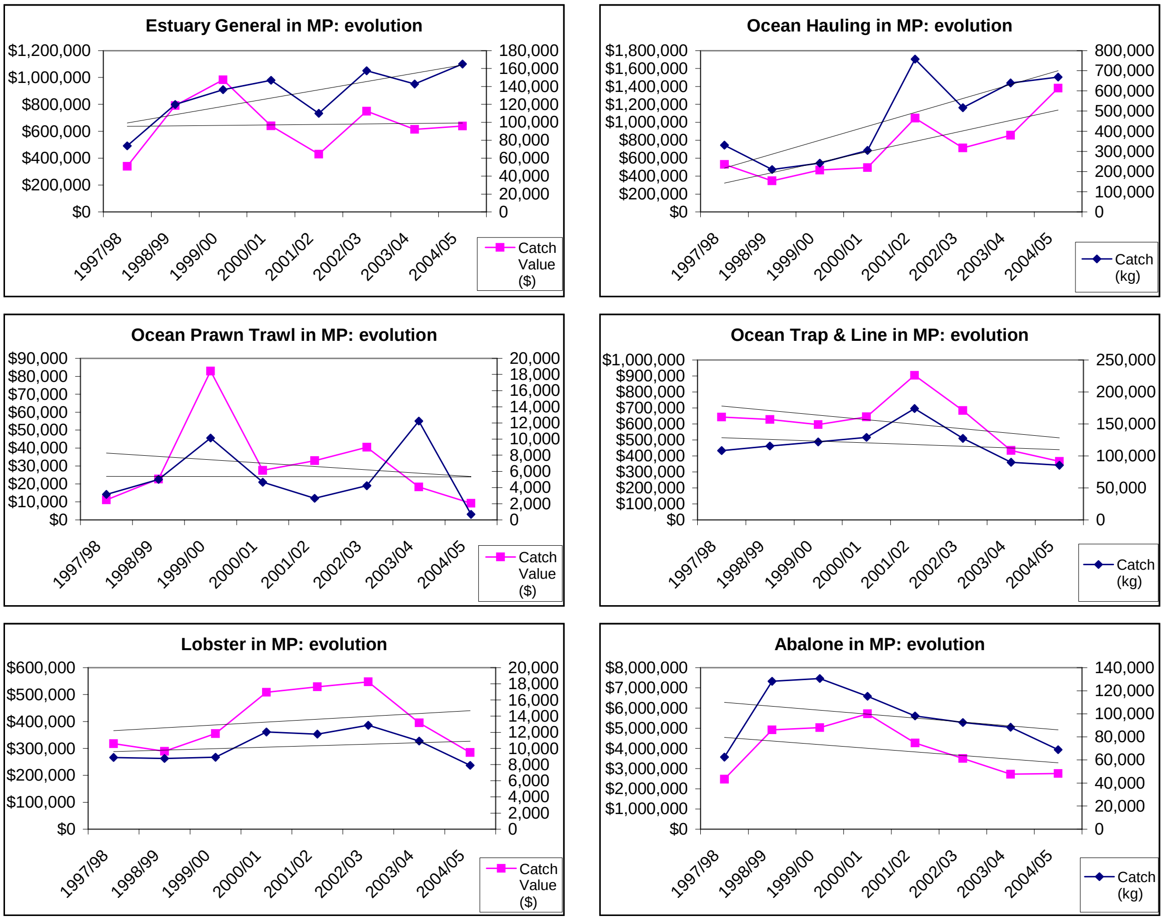
Area	Fishery	% Caught in MP
Zone 8	Estuary General	50%
	Fish Trawl	50%
	Ocean Hauling	50%
	Ocean Prawn Trawl	38%
	Ocean Trap and Line	44%
Zone 9	Estuary General	60%
	Fish Trawl	60%
	Ocean Hauling	60%
	Ocean Prawn Trawl	46%
	Ocean Trap and Line	100%
Brou Lake	Estuary General	100%
Candlagan Creek	Estuary General	100%
Clyde River	Estuary General	100%
Coila Lake	Estuary General	100%
Congo Creek	Estuary General	100%
Corunna Lake	Estuary General	100%
Durras Lake	Estuary General	100%
Kianga Lake	Estuary General	100%
Meringo Creek	Estuary General	100%
Nangudga Lake	Estuary General	100%
Wagong Inlet	Estuary General	100%
Wallaga Lake	Estuary General	100%

Source: NSW DPI Data base, extraction January 2006.

For the abalone and lobster fisheries, catch within the proposed Marine Park boundaries was readily available as it is collected at a finer scale than for the other fisheries.

The following charts illustrate the trends in catch and catch value associated with operations within the park boundaries over the last eight years.

Chart 8.1 – Catch and value in Marine Park: recent evolution



The data series represented in the preceding charts give a key account of the state of fisheries within the proposed Marine Park.

8.1.2 Impacts of the Marine Park on commercial fisheries

For evaluation purposes the Working Group agreed to use estimates of the change in economic activity, which were then assessed for their economic impact. For each fishery, the assumed reduction in the commercial catch value, based on the zoning scenario, is shown in Table 8.3. The percentage estimated reduction in catch was applied to the average catch over the past eight years to determine the reduction in catch and value, except for abalone and lobster where the reduction is calculated from the value of the 2004–05 catch.

Table 8.3 – Catch displacement scenarios

	Average catch value within MP	Reduction in catch value	Assumed scenario reduction	Remaining catch value in MP
Estuary General	$648,131	30%	$194,439	$453,692
Ocean Fish Trawl	$418,850	20%	$83,770	$335,080
Ocean Hauling	$729,684	30%	$218,905	$510,779
Ocean Prawn Trawl	$30,670	20%	$6,134	$24,536
Ocean Trap & Line	$612,357	30%	$183,707	$428,650
Abalone *	$2,754,244	15%	$413,137	$2,341,107
Lobster *	$285,061	20%	$57,012	$228,049
Total	$5,478,997		$1,157,104	$4,321,892

* Abalone and Lobster were based on the 2004–05 catch, other fisheries were based on the average over the last eight years

Further, there may be additional impacts of the Marine Park on the regional economy. Fishing activities have a range of related economic activities that are also part of the regional economic landscape. The total economic impact on the Eurobodalla Shire is examined in Section 9.

8.1.2.1 Abalone

Based on the value of catch, the Abalone fishery is by far the most important commercial fishery operating within the proposed marine park area. The ultimate determination of the Sanctuary Zone will have significant ramifications for this fishery. Under the assumed scenario, there will be an estimated reduction in catch value of $413,137.

The TAC is fixed at a new level every year and has been reduced in the last few years. Abalone catch data are collected at a very precise scale and there is the potential to accurately monitor the sustainability of the fishery within the park. For these reasons, the eventual economic impact on commercial fishers may vary from, and may be less than, the estimate presented here.

8.1.2.2 Lobster

The Marine Park zoning is expected to have an impact on the Lobster Fishery. The TAC for lobster is also set each year and there is accurate identification of catch within the Marine Park. The displaced catch and value are calculated on data from the most recent year and the estimated reduction in catch value is $57,012.

8.1.2.3 Estuary General

The estuary general fishery is a very diverse fishery. It is diverse by its fishing methods, by the number of target species and by the number of different locations in which it operates. Hence, the impact of the marine park zoning on the activity of individual fishers within the fishery is likely to vary greatly.

The estimated value of displaced catch for the Estuary General fishery is $194,439, as shown in Table 8.4.

Table 8.4 – Displaced catch in the Estuary General Fishery

	Estuary General		
	Catch (kg)	Value ($)	Value per kg
1997/98	73,802	$338,619	$4.59
1998/99	119,963	$790,748	$6.59
1999/00	136,348	$983,453	$7.21
2000/01	146,891	$640,682	$4.36
2001/02	109,971	$430,383	$3.91
2002/03	157,525	$748,586	$4.75
2003/04	142,647	$613,709	$4.30
2004/05	165,034	$638,868	$3.87
average	131,523	$648,131	$4.95
		displaced	
30%	39,287	$194,439	$4.95

8.1.2.4 Ocean Fish Trawl and Ocean Prawn Trawl

The Ocean Fish Trawl and Ocean Prawn Trawl fisheries are expected to be the least affected by the Marine Park. The Ocean Prawn Trawl Fishery is a small stakeholder in the region, with only two fishing businesses engaged in prawn trawling.

The estimated value of displaced catch, calculated using the average value of catch over the last eight years, is $83,770 for Ocean Fish Trawl and $6,134 for Ocean Prawn Trawl. The following tables (Table 8.5 and Table 8.6) show the displaced catch for these two fisheries.

Table 8.5 – Displaced catch in the Ocean Prawn Trawl Fishery

	Ocean Prawn Trawl		
	Catch (kg)	Value ($)	Value per kg
1997/98	3,141	$11,136	$3.55
1998/99	5,010	$22,778	$4.55
1999/00	10,134	$82,931	$8.18
2000/01	4,652	$27,523	$5.92
2001/02	2,664	$32,978	$12.38
2002/03	4,224	$40,454	$9.58
2003/04	12,239	$18,328	$1.50
2004/05	689	$9,232	$13.40
average	5,344	$30,670	$7.38
		displaced	
20%	831	$6,134	$7.38

Table 8.6 – Displaced catch in the Ocean Fish Trawl Fishery

	Ocean Fish Trawl		
	Catch (kg)	Value ($)	Value per kg
1997/98	173,986	$432,951	$2.49
1998/99	73,667	$218,701	$2.97
1999/00	95,700	$307,037	$3.21
2000/01	139,774	$460,338	$3.29
2001/02	104,584	$328,840	$3.14
2002/03	188,776	$543,765	$2.88
2003/04	216,458	$542,602	$2.51
2004/05	148,343	$516,566	$3.48
average	142,661	$418,850	$3.00
		displaced	
20%	28,532	$83,770	$3.00

8.1.2.5 Ocean Hauling

The striking feature of the Ocean Hauling Fishery in the Marine Park area is the sharp increase in catch in 2001/02. This increase has largely been sustained in the subsequent periods. However, this has a relatively small impact on the estimated total value of displaced catch resulting from the Marine Park, as this fishery is characterized by very low unit values.

The estimated value of displaced catch for Ocean Hauling is $218,905, calculated using the average value of catch over the last eight years, as shown in Table 8.7.

Table 8.7 – Displaced catch in the Ocean Hauling Fishery

	Ocean Hauling		
	Catch (kg)	Value ($)	Value per kg
1997/98	331,071	$530,224	$1.60
1998/99	209,889	$347,213	$1.65
1999/00	241,932	$468,128	$1.93
2000/01	305,126	$494,938	$1.62
2001/02	757,966	$1,046,460	$1.38
2002/03	517,257	$713,568	$1.38
2003/04	639,336	$855,775	$1.34
2004/05	668,983	$1,381,165	$2.06
average	458,945	$729,684	$1.62
	displaced		
30%	134,959	$218,905	$1.62

8.1.2.6 Ocean Trap and Line

The estimated value of displaced catch for Ocean Trap and Line is $183,707, calculated using the average value of catch over the last eight years, as shown in Table 8.8.

Table 8.8 – Displaced catch in the Ocean Trap and Line Fishery

	Ocean Trap and Line		
	Catch (kg)	Value ($)	Value per kg
1997/98	108,357.45	$642,613	$5.93
1998/99	115,442.51	$628,134	$5.44
1999/00	121,852.38	$595,739	$4.89
2000/01	129,123.51	$643,677	$4.98
2001/02	174,103.30	$903,828	$5.19
2002/03	127,481.98	$684,515	$5.37
2003/04	90,150.45	$434,288	$4.82
2004/05	85,262.75	$366,063	$4.29
average	118,971.79	$612,357	$5.11
	displaced		
30%	35,918	$183,707	$5.11

8.2 Impact on co-operatives and other value-adding operations

A separate study has been commissioned to identify and report on the co-operatives and fish markets likely to be affected by the establishment of marine parks within NSW, including the nature of any impact and other associated issues. The study will be completed in April 2006 but will remain confidential due to the small number of

Cooperatives involved and the commercially sensitive nature of the information provided. Its key findings will, however, inform the consideration of adjustment issues in the development of arrangements for the operation of the Marine Park.

8.3 Aquaculture within the marine park

Previous marine parks established in NSW, including Jervis Bay and Solitary Island Marine Parks, have not restricted aquaculture activities. It is expected that existing aquaculture licence holders will not be affected by park declaration or zoning.

The aquaculture activity occurring within the proposed Marine Park boundaries are summarised in the table below (Table 8.9), but are provided as background information only. Oyster farming is the only form of aquaculture undertaken in the area of the proposed Marine Park. The Clyde River is by far the most important site of production in the whole of Batemans Shelf/Twofold Shelf bioregions. The value of Sydney Rock Oyster production in the Clyde River alone in 2003/04 exceeded that of abalone within the whole Marine Park.

Table 8.9 – Value of Sydney Rock Oyster production within the proposed marine park*

Estuary	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
Clyde River	$1,887,766	$2,693,546	$2,683,606	$3,310,685	$4,058,849
Tuross Lake	$598,701	$454,420	$228,398	$234,935	$283,549
Wagonga Inlet	$771,427	$896,297	$908,127	$1,026,051	$1,075,355
Total Marine Park *	$3,257,894	$4,044,263	$3,820,131	$4,571,671	$5,417,753

Source: NSW Aquaculture Production Reports 1999/2000 to 2003/2004

* Some smaller estuaries within the marine park are not reported separately but are aggregated in the category of ‘others’. These have not been included.

The Eurobodalla Shire Council reports projects for the establishment of other aquaculture activities within the Shire. These include snapper farms, mussel farms and prawn farms. However, at this stage, only oyster farms are operating.

The only possible impact of the marine park could come in the form of restrictions to future expansion. However, given the flexibility that the zoning process can offer to activities such as aquaculture, and given that the zoning process is unknown at this stage, no impact on the aquaculture sector is expected.

8.4 Charter fishing operators

Charter Fishing operators conducting Estuarine Fishing will potentially be restricted as a result of some estuary areas being zoned as Sanctuary Zones. Charter Fishing operators conducting Nearshore Bottom Fishing and Sportfishing and Deep Sea Bottom Fishing usually focus around reefs and islands, which may also potentially be restricted. Live bait collected from bait grounds within the proposed marine park area is important for Game-fishing and may be affected by the marine park zoning. However, the fishing component of Game-fishing occurs outside the proposed marine park area.

The following table (Table 8.10) summarises the data and assumption used in the estimation of any possible impact on the charter fishing sector and the wider Eurobodalla economy.

Table 8.10 – Charter fishing data and data assumptions

Reported Charter Fishing trips in 2005	Average capacity of Charter Fishing Boats	Assumed customer to boat capacity proportion	Average price per customer	Total Charter Fishing trip revenue
1003 trips	12.6 persons	50%	$150 per trip	$945,328 pa

Source: NSW DPI Fisheries - Charter fishing data

The activities of some of the charter fishing operators may be affected by the marine park zoning. In some cases, operators may be able to adjust to the new zoning by conducting their charter trips in non-restricted locations. Because the location and extent of the areas to be zoned are unknown, a scenario of an assumed 20% sanctuary zone has been assumed to restrict activity by that proportion.

The following table (Table 8.11) shows the annual foregone revenue, and expenditure on direct operating costs, under this assumed scenario.

Table 8.11 – Estimates of the impact of the assumed zoning scenario

	Estimated annual revenue and expenditure	**Estimated possible reduction under marine park zoning**
		20% Sanctuary Zone
Revenue	$945,328	$189,066
Gross Profit Margin	50%	
Fuel, oil and grease	$167,023	$33,405
Repairs and maintenance	$112,855	$22,571
Employed labour	$107,786	$21,557
Bait	$18,031	$3,606
Other costs	$66,968	$13,394
Total operating costs	$472,664	$94,533

Source: NSW DPI Fisheries - Charter fishing data and Galeano 2004

The assumption that zoning restricts charter fishing operators homogenously and results in an inability to conduct that proportion of charter fishing trips may not be realistic. Restrictions on bait fishing may lead to operators purchasing baitfish from commercial fishers or using frozen bait. Further, changing demand for charter fishing services may mean that tours in non-restricted areas receive additional patronage equivalent to past tours in restricted areas.

With the number of charter fishing tours decreasing sharply in 2005, for reasons not related to the marine park, it is uncertain to what extent the marine park zoning will be a significant factor in the viability of charter fishing operators in the future. There is the possibility that the marine park may not have a significant impact on the logistics of future charter fishing operations. However, the figures in the table above (Table 8.11) represent the best estimates of foregone revenue at this point in time. Considering the Gross Output of the Eurobodalla economy of $1.4 billion, the impact on the Eurobodalla economy is not considered to be significant.

8.5 Whale and dolphin tours

It is not expected that the Marine Park will affect the whale, dolphin and seal watching industry in the Eurobodalla Shire. All of the marine mammal watching in the area is understood to occur outside the estuaries, either in open ocean or around the islands.

8.6 Recreational fishing

There is no consensus on the likely impact of zoning in the proposed Marine Park on recreational fishing. The principal issues are:

- Sanctuary zones are undetermined (recreational fishing is permitted in habitat protection zones) and therefore, it is not possible to identify to what extent recreational fishers will be affected.

- The extent to which recreational fishers displace (move) to other areas following the implementation of sanctuary zones; and

- The extent to which the quality of the recreational fishing experience is improved with reduction in commercial fishing.

As discussed in section 5.3, there is mixed evidence relating to there being any overall negative impacts on recreational fishing from the establishment of a marine park.

There may be some initial dislocation of social activities – e.g. where sanctuary zones preclude recreational fishing and recreational fishers need to adjust their fishing patterns. However, it is expected that these effects will be outweighed by enhanced recreational fishing experiences (both quantity and quality of catch) through reduced commercial catch, and enhanced marine biodiversity conservation, benefiting recreational fishers elsewhere in the marine park.

9 Projected Regional Economic Impacts

The assessment of the economic impacts on the regional economy of the changes in use activities has been carried out through the use of regional input-output (IO) analysis. This is an established economic assessment tool which examines the potential impact of a particular economic activity or potential economic activity on the local economy of the region in question.

In this study, input-output analysis was used to estimate the impacts in the present day, and in 5 years time. This approach has been adopted to provide a more sophisticated assessment of the significance of the potential impact of the establishment of the proposed Marine Park and implementation of a park zoning regime, than would be available from using an IO for a single point in time.

9.1 Related issues

9.1.1 Structural change in commercial fishing

The economic assessment indicates that there has been structural change in commercial fishing businesses, vessels and catch in the study area over the last few years. It is possible that these trends will continue at least at the same rate for the foreseeable future. The assessment examined the effect of the Marine Park on the regional economy, given this structural change in the commercial fishing sector.

9.1.2 Growth in the service sector

The recent trend of the increasing importance of tourism to the region is likely to continue (at least) at the present rate, and possibly at a faster rate. Some of this growth will be a background trend, but some growth may be stimulated by the presence of the Marine Park as another regional venue to attract visitors to the area.

The research considered the extent to which the background level of tourism growth and estimated visitation to the proposed Marine Park may compensate for the potential impact of the Marine Park on the economic contribution of the commercial fishing sector, under present conditions, and in 5 years time.

9.1.3 The nature of the regional economy

The regional economy was based on the Eurobodalla LGA. It includes commercial forestry, agriculture, commercial fishing, national parks, coastal residential development, tourism centres and economic activities relating to provision of goods and services.

Past Eurobodalla Shire economic growth has been based strongly around population increases and a growth in visitors. It is not surprising then that the key feature of Eurobodalla is the lack of dominance of any particular industry among the primary and manufacturing industries. The dominant activities are all related to the provision of public and personal services.

9.1.4 The changing nature of households and household expenditure

Households are expected to have different income sources (e.g. superannuation or pensions for retirees, and wages/salaries for employees) and expenditure patterns.

These patterns affect the demand for goods and services and the nature of transactions in the regional economy, thus the potential regional economic impact of the proposed Marine Park on the study area.

It is also believed that the percentage of retiree households would be expected to grow notably over the next few years. This demographic change will have implications for the demand and supply of private and public sector goods and services. The increasing proportion of retirees moving to the region would be expected to increase demand for building and construction services and associated utilities related to new home, and private and public health services. Other growth areas could include entertainment and personal services.

The growth in demand for health, recreational, hospitality and personal services associated with an increase in retirees and tourists in the eastern part of the study area would be expected to create particular employment opportunities. New workers moving to the area to take up these opportunities would in their turn create demand for different types of services such as schools, reserves, sporting facilities and other services associated with families with children.

The maps provided in Appendix 2 show the evolution of the concentration of retired people in the Eurobodalla LGA[2], based on the census data of 1996 and 2001.

Maps 1-2 show the concentration of retired people in each collection district in 2001, grouped by standard deviations from the NSW mean. Across all collection districts in NSW, the mean concentration of retired persons in 2001 was 15.71%, standard deviation 8.88%.[3] Of the 84 collection districts in the Eurobodalla LGA, only nine (those coloured in deep green) had retiree concentrations below the NSW mean. Very high concentrations of retirees (42.33% and above) were found in sections of Batemans Bay, Dalmeny, Narooma and Tuross Heads.

Maps 3-4 show the change in total numbers of retired people in each collection district between 1996 and 2001. Overall retiree numbers in the Eurobodalla LGA increased by 6.18% (from 8936 to 9488) over this period.

Maps 5-6 show the change in each collection district's retiree concentration between 1996 and 2001. The total population in the Eurobodalla LGA increased by 9.13% (from 30364 to 33137) over this period.

Between 1996 and 2001, much of the growth in absolute retiree numbers and in retiree concentrations occurred in collection districts outside the main urban areas. This should be understood in the context of two phenomena. The first is the very high 1996 baseline retiree concentrations for urban collection districts – retirees seem to have 'spread out' from urban enclaves throughout other sections of the LGA between 1996 and 2001. The second is the high overall population growth rates across the LGA, which has meant that retiree concentrations have decreased in some collection districts despite an absolute increase in retiree numbers.

[2] For the purposes of this study, any person aged 55 and over and not in the labour force is considered to be retired.
[3] The results of this study are not comparable with those from an earlier study conducted for the Port Stephens and Great Lakes LGAs, as the current study uses a different methodology that incorporates the 0-14 age group.

9.2 Economic impact

The key outputs of the economic analysis are:

- A description of the demographic and socio-economic structure of the study area and an assessment of trends.
- A description of the present-day commercial fishing sector in the study area and an assessment of industry trends over the last 5 years, and their implications for the contribution of the industry to the regional economy in the future.
- An analysis of the 2005 regional economic impacts of declaration of the Marine Park and implementation of the park zoning plan in 2005;
- An analysis of the impact on the regional economy in 2010, based on the declaration of the Marine Park and implementation of the zoning plan in 2005.

9.3 Economic modelling, 2005 Baseline

The results of the economic modelling of the regional economy in 2005 are presented in Table 9.1. This input-output table is a broad depiction of the Eurobodalla economy.

Table 9.1 – Aggregated input–output table, Eurobodalla, 2005

	Ag Forestry Fishing	Mining	Manufacturing	Utilities	Building	Trade Acommodation	Business Services	Public Personal Services	TOTAL	H-hold Exp	O.F.D	Exports	Total
Ag/Forest/Fish	2296	1	6870	1	53	4350	44	256	13871	2728	7134	15504	39237
Mining	24	32	673	42	1172	234	133	298	2609	55	253	808	3725
Manufacturing	1367	143	17965	310	25369	16265	5699	5055	72173	31424	6784	29765	140146
Utilities	206	3	807	1122	237	3269	2198	1619	9461	10614	670	408	21153
Building	49	9	16	9	116	846	2978	146	4168	0	151963	26112	182243
Trade/Accommodati	3028	254	5634	592	8620	16313	10557	7420	52418	190689	9397	181379	433883
Business Srvs	1989	436	10615	1275	17922	62465	56834	20386	171922	157971	13187	6407	349487
Public/Personal Srv:	207	57	881	103	453	5542	4027	10991	22261	83441	159887	16364	281953
TOTAL	9165	936	43462	3454	53943	109283	82471	46170	348884	476922	349275	276746	1451827
H-hold Income	11102	258	19297	3666	32689	85332	38773	105842	296960	0	0		296960
O.V.A.	5093	1565	20167	8882	50257	110155	177173	82477	455770	109478	9950		575198
Imports	13877	966	57219	5151	45353	129113	51069	47463	350213	222029	67942		640185
TOTAL	39237	3725	140146	21153	182243	433883	349487	281953	1451827	808430	427167	276746	2964170
Employment	447	8	703	76	1125	4100	1421	3305	11185				

As shown in Appendix 3, commercial fishing comprises 0.72% of turnover in the Eurobodalla economy, 0.45% of value added, 0.93% of household income, and 1.06% of employment.

The impact on the Eurobodalla economy of the commercial fishing industry is shown in Table 9.2. The multipliers in the bottom half of the table are to be understood as:

> A $1 change in commercial fishing sales, changes total sales in this economy by $1.71;
>
> A $1 change in commercial fishing sales changes total value added (income generated by labour and capital) in this economy by $0.92;
>
> A $1 change in commercial fishing sales changes total household income in this economy by $0.51; and
>
> A $1 million change in commercial fishing sales changes employment in this economy by 7.1 jobs in commercial fishing, and 12.2 jobs in this economy as a whole.

Table 9.2 – Estimated economic impact of commercial fishing, Eurobodalla, 2005

	Direct Effect	Flow-on Effects: Production Induced	Flow-on Effects: Consumption Induced	Flow-on Effects: Total Flow-on	**TOTAL IMPACT**	Share of Region
IMPACTS						
Gross Output ($'000)	5,951	1,943	2,277	4,220	10,171	0.7%
Value Added ($'000)	3,308	859	1,280	2,139	5,446	0.6%
Household Income ($'000)	2,232	354	424	778	3,011	1.0%
Employment (no.)	42	14	17	31	73	0.7%
MULTIPLIERS						Type II
Gross Output ($)	1.000	0.327	0.383	0.709	1.709	1.709
Value Added ($)	0.556	0.144	0.215	0.359	0.915	1.647
Household Income ($)	0.375	0.059	0.071	0.131	0.506	1.349
Employment (no./$m)	7.1	2.3	2.9	5.2	12.2	1.732

The total impact amounts to $10.2 million of gross output for a contribution of $5.4 million to Gross Regional Product (GRP) (value added). Within that GRP, there are payments to households of $3.0 million. Relative to the regional economy, the commercial fishing industry contributes about 0.6% to the regional economy, although that is about 1.0% in terms of household income.

9.4 Economic modelling of the impact at 2005

The modelling of the economic impact of the proposed marine park includes the separate modelling of the impact of changes to the level of commercial fishing and the impact of MPA expenditure.

Commercial fishing impact

In calculating the flow-on effects of the reduced fish catch, the simplifying assumption has been made that there will be no significant change in the fishing methods and technologies used by the various components of the fishery to make that catch. However, in this analysis, changes in the relative importance of the fishing industry components have been included in compiling the new fishing sector. That is, trends in individual fisheries and increasing local demand for fish have been extrapolated. This results in some adjustments to the multiplier values that have been used in calculating the new impacts.

The result of this modelling shown in Table 9.3 indicates the new levels of economic activity for the fishing industry for the scenario relative to the base level. The differences between the scenario and the base level are then shown in Table 9.4.

Table 9.3 – Economic impact of the marine park, Eurobodalla, 2005

IMPACTS	Direct Effect	Flow-on Effects: Production Induced	Flow-on Effects: Consumption Induced	Flow-on Effects: Total Flow-on	**TOTAL IMPACT**
GROSS OUTPUT ($'000)					
2005 Base	**5,951**	**1,943**	**2,277**	**4,220**	**10,171**
Base + Marine Park	4,794	1,522	1,829	3,351	8,145
VALUE-ADDED ($'000)					
2005 Base	**3,308**	**859**	**1,280**	**2,139**	**5,446**
Base + Marine Park	2,697	675	1,028	1,703	4,401
HOUSEHOLD INCOME ($'000)					
2005 Base	**2,232**	**354**	**424**	**778**	**3,011**
Base + Marine Park	1,799	278	341	619	2,418
EMPLOYMENT (no.)					
2005 Base	**42**	**14**	**17**	**31**	**73**
Base + Marine Park	34	11	14	24	58

Table 9.4 – Difference between 'with' and 'without' the marine park, Eurobodalla, 2005

IMPACT LOSSES	Direct Effect	Flow-on Effects: Production Induced	Flow-on Effects: Consumption Induced	Flow-on Effects: Total Flow-on	**TOTAL IMPACT**
Gross Output ($'000)	-1,157	-421	-448	-870	-2,027
Value Added ($'000)	-610	-183	-252	-435	-1,046
Household Income ($'000)	-434	-76	-84	-159	-593
Employment (no.)	-8	-3	-3	-6	-14

The reduction in the contribution of commercial fishing to the Eurobodalla economy as a result of the creation of the marine park and the zoning system amounts to between 17% and 21% (depending upon which measure is used). In the context of the Eurobodalla economy, these impacts are small and only represent 0.1 to 0.2% of the Eurobodalla economy.

Zoning is determined following community consultation. Better estimates of likely catch reductions from zoning become available during this process and zoning plans would be able to be developed that minimised unnecessary impacts. By the time zoning is actually implemented, the effects of a reduction in commercial fishing on regional economic activity are likely to be even smaller, because of the minimising of this impact, and the expected growth in the non-fishing sectors of the Eurobodalla economy.

MPA expenditure

Section 6.1 outlines the management and operating costs associated with the Marine Park. The 2004-05 estimated MPA expenditure of $1.2m has been used to estimate the total impact of this expenditure on the Eurobodalla economy (Table 9.5).

The total impact of this MPA expenditure is estimated to be $1.9m terms of GRP (value added), and involve 11 jobs with households receiving $0.46m. These estimates do not take into account the impact of funds used in any buy-back of fishing licences, which may be re-invested by bought-out fishers in businesses, some of which may be local.

Table 9.5 – Estimated impact of Marine Parks Authority expenditure on maintenance and operations, Eurobodalla, 2005

	Gross Output	Value Added	Household Income	Employment
	$m	$m	$m	No
Direct Impact	1.201	0.671	0.317	7
Total Impact	1.898	1.045	0.456	11
Multiplier	1.58	0.87	0.38	0.009

9.5 Economic modelling of the impact at 2010

The projected input-output table for 2010 is shown in aggregated form in the following table (Table 9.6).

Table 9.6 – Aggregated input–output table, Eurobodalla, 2010

	Ag Forestry Fishing	Mining	Manufacturing	Utilities	Building	Trade Acommodation	Business Services	Public Personal Services	TOTAL	H-hold Exp	O.F.D	Exports	Total
Ag/Forest/Fish	2392	2	7677	1	59	5234	53	311	15729	3044	6651	15712	41136
Mining	26	42	916	56	1454	314	170	409	3386	63	296	1021	4766
Manufacturing	1405	178	22158	386	31136	20609	7147	6631	89649	36467	8132	34920	169168
Utilities	212	4	966	1369	281	3953	2816	2016	11615	12190	719	1160	25685
Building	55	10	19	11	137	1033	3380	181	4826	0	155046	56950	216822
Trade/Accommodati	3121	323	6887	724	10236	20601	13201	9378	64472	214521	10840	253858	543691
Business Srvs	2151	552	13029	1577	21897	81369	72818	26998	220391	178142	14547	10578	423658
Public/Personal Srv	246	79	1142	128	557	6901	5168	14313	28535	98247	194362	38026	359170
TOTAL	9609	1190	52794	4251	65757	140014	104753	60237	438603	542673	390594	412225	1784096
H-hold Income	11043	306	21912	4096	35931	99659	45415	126648	345009	0	0		345009
O.V.A.	6087	2026	25746	11058	62889	145371	211411	115118	579706	123200	11560		714466
Imports	14398	1244	68716	6280	52246	158647	62080	57167	420777	243941	57335		722054
TOTAL	41136	4766	169168	25685	216822	543691	423658	359170	1784096	909814	459489	412225	3565625
Employment	456	10	794	85	1237	4793	1678	3954	13007				

The economic impact of commercial fishing in 2010 has been estimated by including the specification used in 2005 within the 2010 input-output table. This provides an estimate of the contribution of commercial fishing, which is unchanged from 2005, to the economy in 2010. The purpose was to test whether there has been any significant change in the multipliers for commercial fishing as a result of the other changes occurring within the regional economy. The result is shown in Table 9.7, with a summary of the differences in Table 9.8.

Table 9.7 – Estimated economic impact of commercial fishing, Eurobodalla, 2010

		Flow-on Effects				
	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	**TOTAL IMPACT**	Share of Region
IMPACTS						
Gross Output ($'000)	5,951	1,961	2,278	4,239	10,190	0.6%
Value Added ($'000)	3,308	869	1,280	2,150	5,457	0.5%
Household Income ($'000)	2,232	333	398	731	2,963	0.9%
Employment (no.)	42	13	16	29	71	0.5%
MULTIPLIERS						Type II
Gross Output ($)	1.000	0.330	0.383	0.712	1.712	1.712
Value Added ($)	0.556	0.146	0.215	0.361	0.917	1.650
Household Income ($)	0.375	0.056	0.067	0.123	0.498	1.327
Employment (no./$m)	7.1	2.1	2.7	4.8	11.9	1.685

Table 9.8 – Estimated economic impact of commercial fishing, Eurobodalla, 2005 and 2010 compared

		Flow-on Effects			
	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	**TOTAL IMPACT**
Gross Output ($'000)	0	18	1	19	19
Value Added ($'000)	0	11	0	11	11
Household Income ($'000)	0	-21	-26	-47	-47
Employment (no.)	0	-1	-1	-2	-2

The larger economy in 2010 means that the relative contribution of commercial fishing is slightly smaller than in 2005, about 0.5% of value-added compared to 0.6% in 2005, and 0.9% of household income compared to 1.0% in 2005.

Based on the assumption of no change in commercial fishing, there is no significant change in the multipliers estimated from the 2010 input-output. The gross output and value-added impact values are slightly higher than for 2005 as growth in the economy adds to the capacity to meet local demand from local suppliers, thus fewer fish are sent to Sydney. Employment and household income impact values, however, are slightly lower, as the economy of 2010 has deepened and the relative importance of commercial fishing to the Eurobodalla economy has declined.

Overall, the modelled impact on the Eurobodalla economy of the reduction in commercial fishing as a result of the Marine Park was less than 0.15%. This impact was not significantly different for the modelled 2010 Eurobodalla economy. Modelling of the impact of the increased MPA expenditure as a result of the Marine Park showed that much of the impact on commercial fishing would be offset.

Appendix 1 – Summary results from Marine Park Recreational User and Commercial Fisher Surveys

Table A1 – Summary results from Marine Park recreational surveys

Variable	Batemans Bay BR	Batemans Bay BR	Batemans Bay BR	Batemans Bay BR
Survey period	Fri 21 – Tue 25/05/04	Thu 24 – Sat 26/02/05	Thu 8 – Sat 10/12/05 *	Fri 6 – Sun 8/01/06 *
Notes	Off-season	Off-season	School holidays	School holidays
Sample size: persons (groups)	311 (125 groups)	305 (110 groups)	330 (110 groups)	340 (99 groups)
% adults in group	88%	79%	88%	72%
Avg no. of persons per group	2.5	2.8	3	3.4
Home residence (% of groups)	B/Bay area: 28% ACT: 21% Sydney: 11% Other: 40%	B/Bay area: 18% ACT: 39% Sydney: 11% Other: 33%	B/Bay area: 31% ACT: 25% Sydney: 13% Other: 30%	B/Bay area: 11% ACT: 27% Sydney: 25% Other: 38%
Expenditure per trip ($ per person visiting)				
Accommodation	$ 76.71	$ 89.65	$ 52.04	$ 92.52
Prepared meals	$ 32.99	$ 44.29	$ 26.88	$ 24.44
Living expenses	$ 39.67	$ 42.56	$ 24.70	$ 40.65
Petrol, fares & tours	$ 68.74	$ 54.86	$ 52.06	$ 30.65
Other	$ 32.78	$ 24.66	$ 19.75	$ 25.84
Total	$ 250.89	$ 256.06	$ 175.23	$ 214.20
Activities (% of groups)	Fishing: 35% Swim/surf: 29% Other: 36%	Fishing: 43% Swim/surf: 64% Other: 21%	Fishing: 31% Swim/surf: 63% Other: 13%	Fishing: 33% Swim/surf: 69% Other: 20%
Frequency of main activity use (% of groups)	Weekly or more frequently: 79%	Daily: 84%	Daily: 94%	Daily: 93%

*: The latter two surveys only cover expenses by visitors in the direct vicinity of the proposed Marine Park.
The earlier two studies cover expenses by visitors in the direct vicinity of the proposed MP and areas surrounding it.

Variable	Booderee NP	Jervis Bay MP	Jervis Bay MP	Jervis Bay MP	Solitary Islands MP	Solitary Islands MP	Cape Byron MP
Survey period	Thur 8 - Fri 16/04/04	Thur 8 - Fri 16/04/04	Fri 7 - Tue 12/05/04	Sun 8 – Wed 14/12/05	Sat 1 - Thur 6/05/04	Wed 5 – Fri 7/01/05	Fri 7 - Tue 11/05/04
Notes	School holidays	School holidays	Off-season	School holidays	Off-season	School holidays	Off season
Sample size: persons (groups)	1266 (260 groups)	697 (136 groups)	289 (125 groups)	387 (110 groups)	388 (125 groups)	214 (56 groups)	222 (125 groups)
% adults in group	69%	67%	75%	81%	72%	64%	91%
Avg no. of persons per group	4.9	5.1	2.3	3.5	3.1	3.8	1.8
Home residence (% of groups)	Sydney: 60% VIC: 8% ACT: 7% Other: 25%	Sydney: 72% Woll/Illwra: 8% Jervis Bay area: 4% Other: 16%	Jervis Bay area: 26% Sydney: 24% ACT: 14% Other: 36%	Jervis Bay area: 24% Sydney: 25% Woll/Illwra: 15% Other: 36%	Solitary Is. area: 53% QLD: 9% VIC or Sydney: 7% Other: 31%	Solitary Is. area: 23% QLD: 11% VIC or Sydney: 34% Other: 32%	Cape Byron area: 35% International: 29% North Coast: 8% Other: 28%
Expenditure per trip ($ per person visiting)							
Accommodation	$ 63.19	$ 72.00	$ 103.82	$ 56.36	$ 50.07	$ 162.86	$ 88.31
Prepared meals	$ 21.15	$ 40.44	$ 33.58	$ 11.36	$ 26.06	$ 60.44	$ 40.06
Living expenses	$ 25.22	$ 25.23	$ 47.34	$ 11.63	$ 18.31	$ 82.57	$ 26.15
Petrol, fares & tours	$ 13.06	$ 24.15	$ 42.31	$ 28.43	$ 28.83	$ 49.90	$ 51.74
Other	$ 6.12	$ 7.94	$ 34.29	$ 7.71	$ 16.84	$ 47.67	$ 22.52
Total	$ 128.74	$ 169.76	$ 261.34	$ 115.49	$ 140.11	$ 403.44	$ 228.78
Activities (% of groups)	Not included in survey	Not included in survey	Swim/surf: 33% Fishing: 24% Other: 43%	Swim/surf: 68%% Fishing: 13% Other: 21%	Swim/surf: 40% Fishing: 21% Other: 29%	Fishing: 41% Swim/surf: 100% Other: 55%	Swim/surf: 48% Diving: 18% Other: 34%
Frequency of main activity use (% of groups)	Not included in survey	Not included in survey	Weekly or more frequently: 84%	Daily: 65%	First time: 22%	Daily: 59%	First time: 37%

Notes: Frequency of activity use not included in the April surveys (Jervis Bay MP and Booderee NP).

Table A2 – Summary results from Marine Park commercial fishing surveys (surveyed 2004)

Variable	**Batemans Bay BR**	**Jervis Bay MP**	**Solitary Islands MP**	**Cape Byron MP**
Survey period	May 2004	May 2004	May 2004	May 2004
Sample size	37	33	39	53
Years as a fisher in region	27% between 20-25yrs Average: 27yrs	88% between 20-40yrs Average: 29yrs	67% fishing 20yrs or less Average: 20yrs	85% fishing 30yrs or less 60% between 20-30yrs Average: 23yrs
Main port used	Batemans Bay: 27% Ulladulla: 24% Other: 49%	Ulladulla: 25% Greenwell: 18% Other: 57%	Coffs Harbour: 66% Other: 34%	Tweed Heads/Byron Bay: 40% Ballina: 27% Yamba: 19% Other: 14%
Fish in MP/BR (% of fishers)	Yes: 97% No: 3%	Yes: 61% No: 19%	Yes: 84% No: 16%	Yes: 88% No: 12%
% of catch from within MP/BR	Wide range of responses Average: 47%	94% acquire no more than 30% of catch Average: 10%	66% acquire no more than 20% of catch Average: 22%	34% = no response (too variable/seasonal) 29% between 35-50% 29% more than 70% 20% = 0 Average: 40%
Main method or endorsement	Trap & line: 20% Estuary: 17% Prawning: 15% Other: 48	Haul: 23% Trap & line: 19% Estuary, Line: 15% Other: 43%	Prawn trawl: 39% Line: 23% Trap & line: 16% Other: 22%	Prawn trawl: 24% Line: 21% Crabbing: 18% Other: 37%
Top 5 primary weight species (% of fishers)	Prawns: 22% Bream: 16% Kingfish: 14% Shark: 11% Mullet: 8%	Bream:16% Garfish: 16% Squid: 13% Trevally: 13% Snapper: 10%	Prawn: 39% Snapper: 17% Kingfish: 17% Spanner crab: 6% Whiting: 6%	Prawns: 50% Spanner crab: 13% Mullet: 13% Pilchards: 6% Pippies: 6%

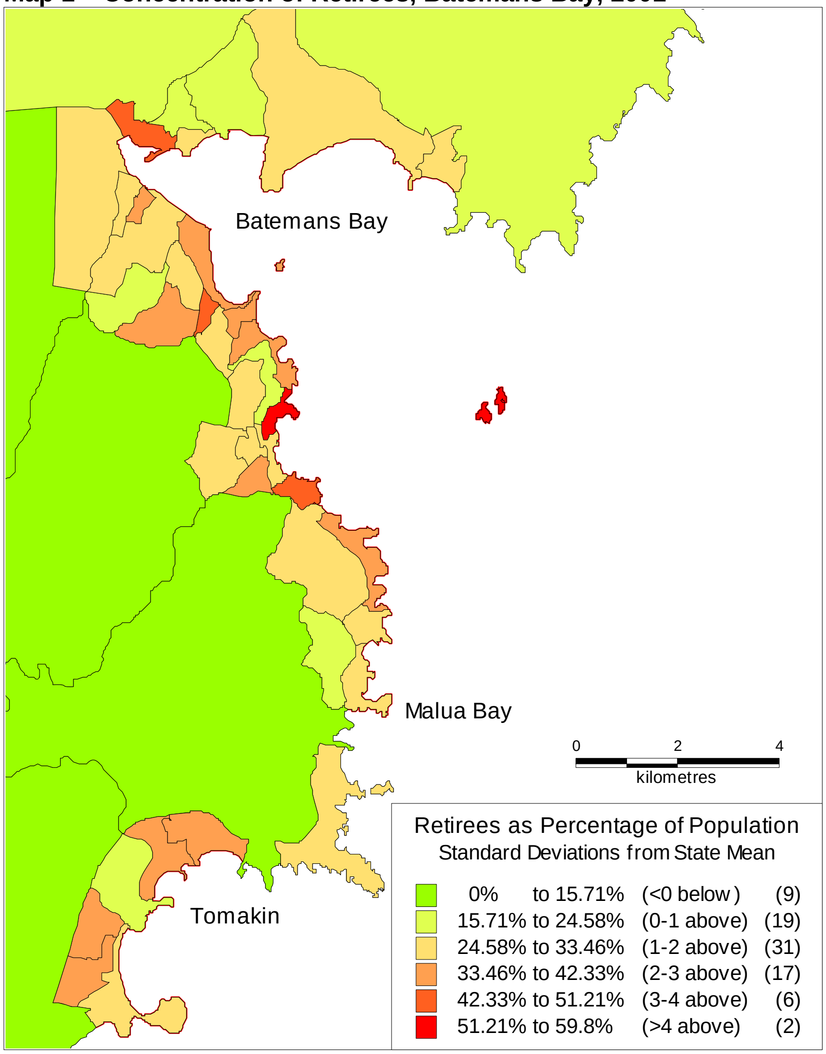
Variable	Batemans Bay BR	Jervis Bay MP	Solitary Islands MP	Cape Byron MP
Top 5 primary value species (% of fishers)	Prawn: 26% Bream: 18% Kingfish: 13% Mullet: 8% Shark: 8%	Garfish: 23% Bream: 16% Squid: 13% Snapper: 13% Trevally: 10%	Prawn: 46% Kingfish: 17% Snapper: 17% Bream: 6% Spanner crab: 6%	Prawns: 52% Spanner crab: 15% Mullet: 10% Snapper: 8% Pilchards: 6%
Days fished in MP or Bioregion per annum (distribution & average)	54% less than 70 p.a. 14% either 100 or 150 p.a. Average: 82	61% less than 20 p.a. 24% = 0 Average: 36	47% less than 30 p.a. 21% between 30-60 p.a. Average: 53 *NB: spread in data	60% less than 50 p.a. 15% = 0 Average: 69 *NB: spread in data
% revenue from within MP or Bioregion	32% less than 20% 35% greater than 70% Average: 50%	76% less than 20% 27% = 0 Average: 10%	60% less than 25% 18% = 0 Average: 27%	28% = 0 33% between 25-33% 25% between 70-90% Average: 33%
MP caused fisher to change fishing area?	Not applicable	Yes: 91% Increased travel Decreased area available Limit bait fishing Increased effort in other areas (Shoalhaven River, Batemans Bay, Lake Illawarra) No: 9%	Yes: 72% Decreased area available (eg. inshore) Increased travel Less prawn trawl area No: 28%	No: 92% (Zoning not yet begun) Yes: 5% Increased effort in other areas (Maclean River) Change where catch prawns
MP affect fish species caught	Not applicable	No: 70% Yes: 30%	No: 79% Yes: 21%	No: 100%
MP affect fishing method	Not applicable	No: 91% Yes: 9%	No: 85% Yes: 15% Affected line techniques	No: 100%

Variable	Batemans Bay BR	Jervis Bay MP	Solitary Islands MP	Cape Byron MP
MP caused purchase additional gear	Not applicable	No: 82% Yes: 18%, purchases between $20 00-25 000 Possible change to deep water gear	No: 82% Yes: 17%, purchases between $2 500-7 500 Additional line fishing equipment (deep water gear)	No: 98% Yes: 2%, purchase of $25 000 (type unknown)
MP affect size of catch	Not applicable	Yes: 79% 74% = decrease of 30% or less Average: 23% decrease No: 21%	Yes: 61% 87% = decrease of 30% or less Average: 18% decrease No: 38% (1 non response)	No: 98% Yes: 1= 50% decrease
MP increase no. of days fished?	Not applicable	No: 55% Yes: 45%. Of these 75% estimated increase of 30 days or less	No: 87% Yes: 13%	No: 100%
Comments	Need to access Long Beach	Had to purchase extra quota Nowhere to fish in NE winds JB took pressure off Lake Illawarra	Can no longer fish in poor weather	MP is the only location to acquire bait to fish outside the protected zones Concern about effect of indigenous rights Lack of consultation Don't wish to provide potentially harmful information Zones seriously hinder crabbing

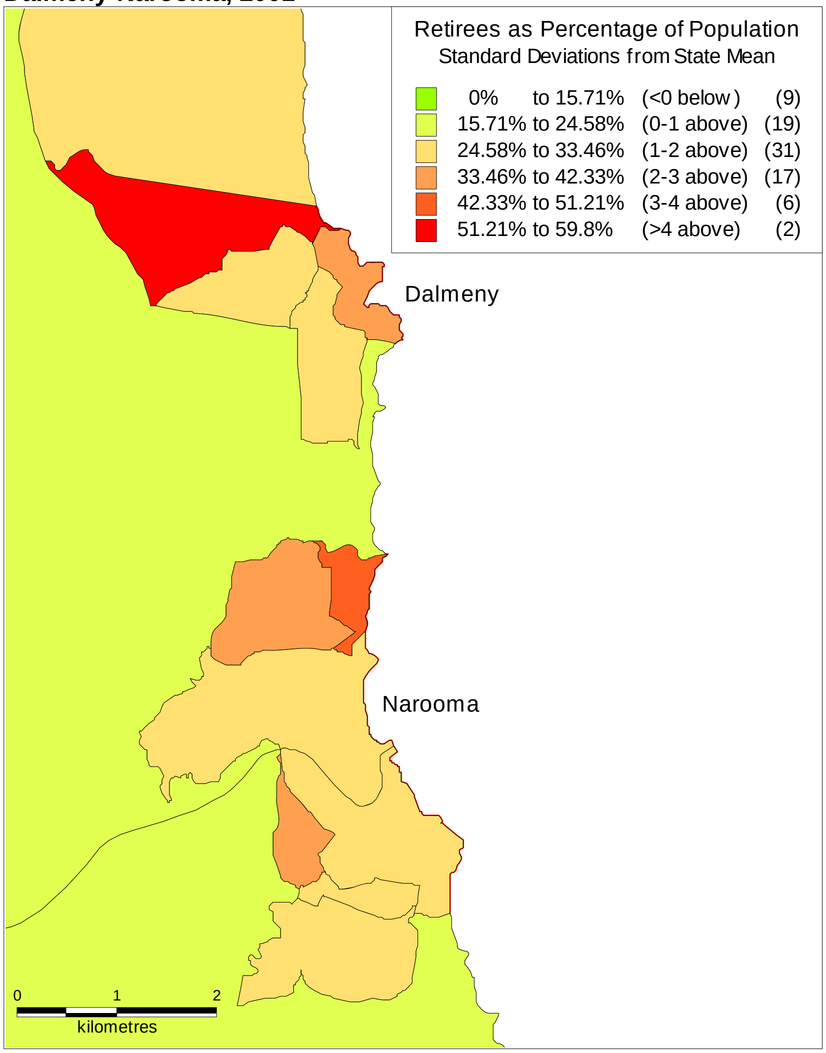
Notes:
1. Questions relating to the effect of zoning regulations were not included in Batemans Bay survey as it is not a marine park.

Appendix 2 – Retiree demographics in the Eurobodalla Shire (maps 1 to 6)

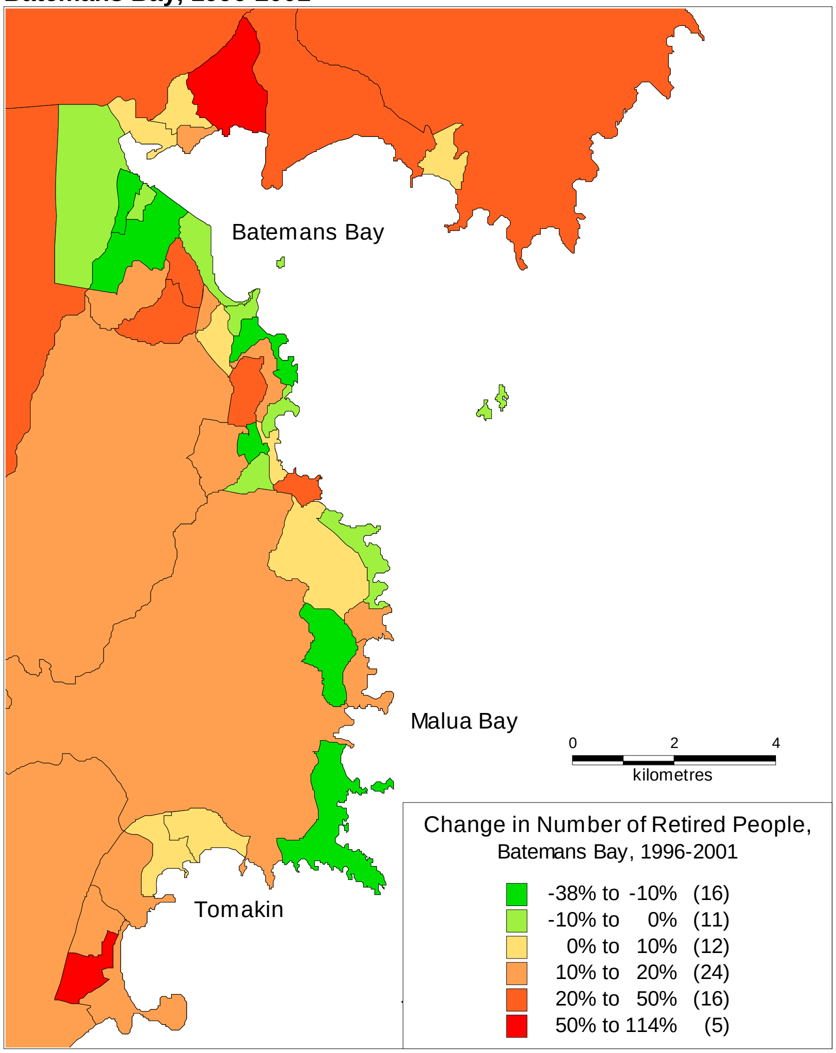
Map 1 – Concentration of Retirees, Batemans Bay, 2001



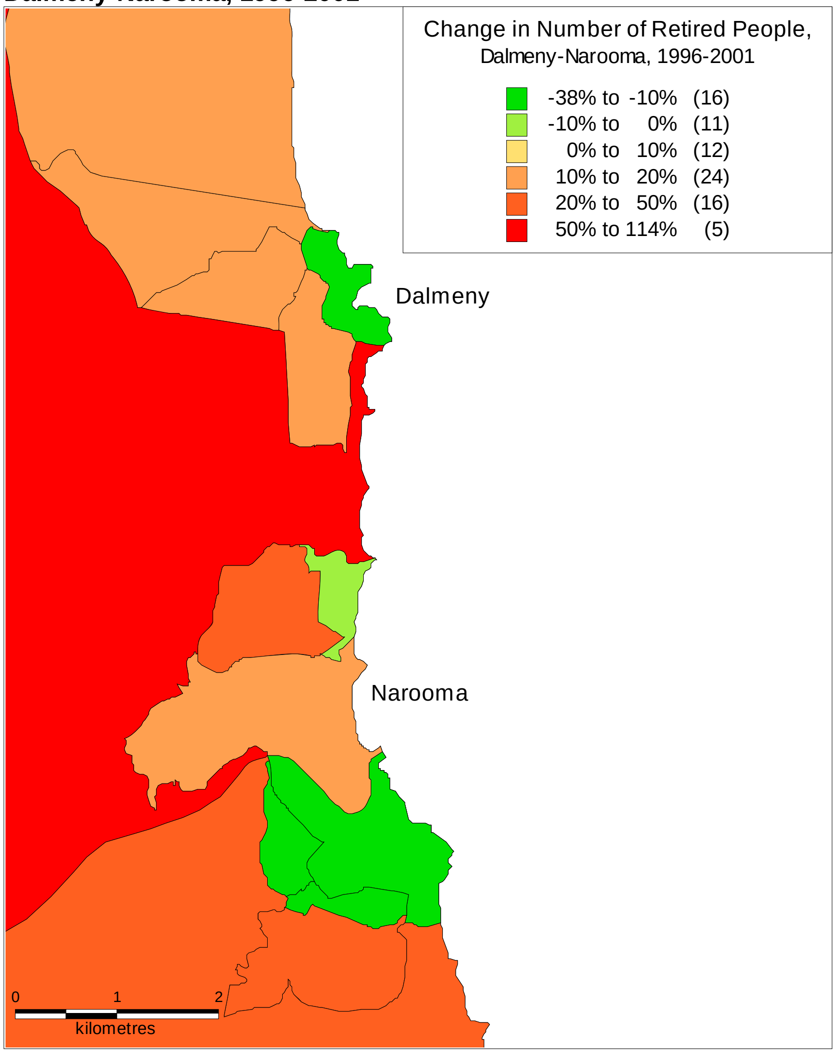
Map 2 – Concentration of Retirees, Dalmeny-Narooma, 2001



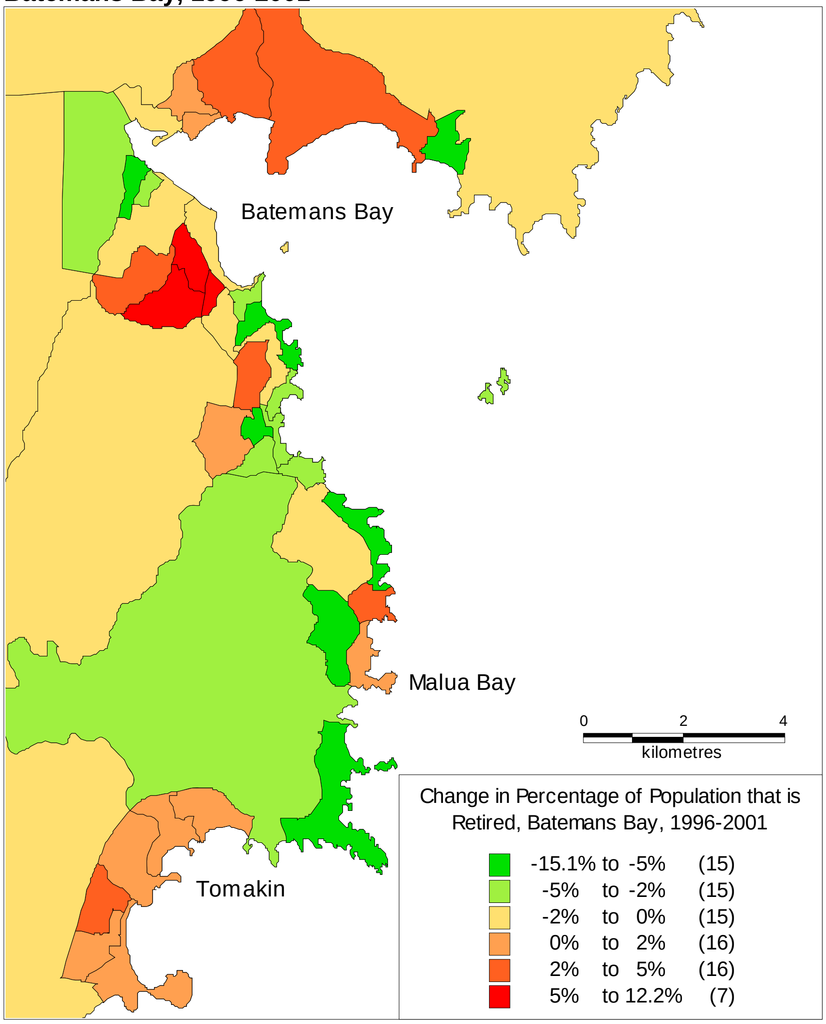
Map 3 – Change in Number of Retired People, Batemans Bay, 1996-2001



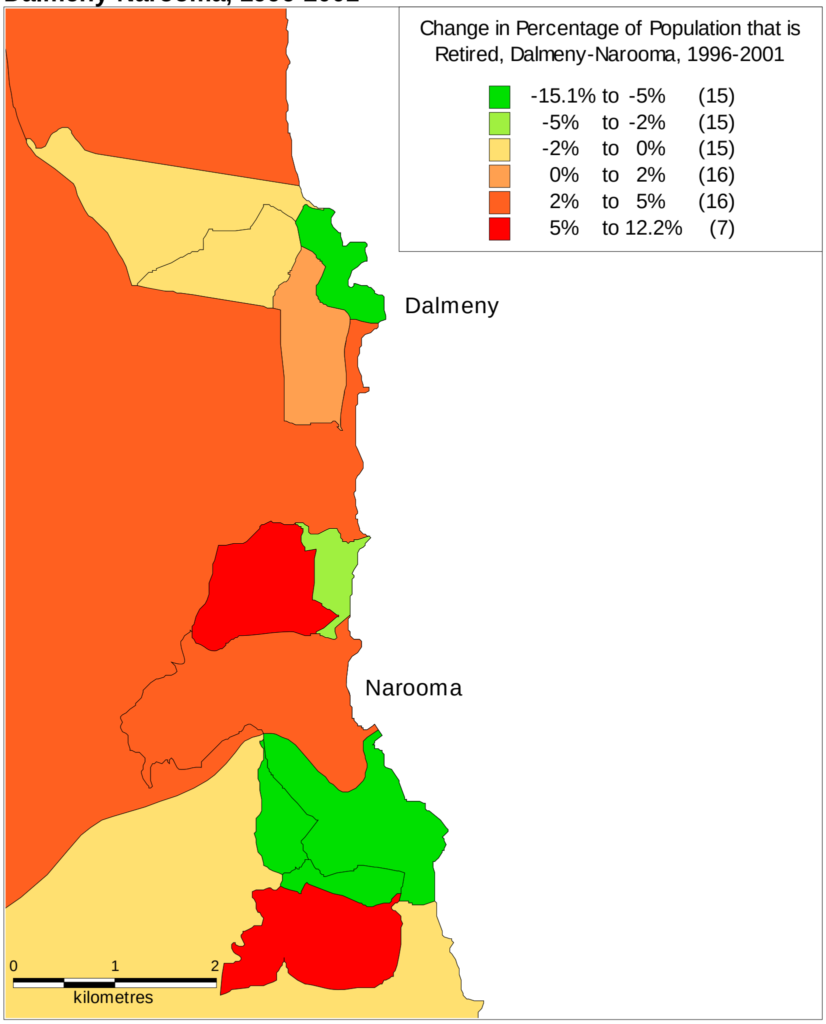
Map 4 – Change in Number of Retired People, Dalmeny-Narooma, 1996-2001



Map 5 – Change in Percentage of Population that is Retired, Batemans Bay, 1996-2001



Map 6 – Change in Percentage of Population that is Retired, Dalmeny-Narooma, 1996-2001



Appendix 3: Summary Data, Eurobodalla Economy, 2005

SECTOR	Gross O/P ($'000)	Value-added ($'000)	Income ($'000)	Employ-ment (no.)	Exports ($'000)	Imports ($'000)
Sheep	119	65	51	3	53	16
Grains	-	-	-	-	-	-
Beef cattle	3,755	1,985	1,621	111	1,785	934
Dairy cattle	6,568	2,620	2,163	59	1,993	2,435
Pigs	-	-	-	3	-	-
Poultry	-	-	-	-	-	-
Other agriculture	3,042	1,660	1,362	74	1,100	862
Services to agric.; hunting	1,950	859	726	25	957	852
Forestry and logging	13,307	5,102	2,403	53	6,890	4,315
Commercial fishing	10,496	3,904	2,776	119	2,726	4,462
Coal; oil and gas	-	-	-	-	-	-
Iron ores	-	-	-	-	-	-
Non-ferrous metal ores	-	-	-	-	-	-
Other mining	3,725	1,823	258	8	808	966
Services to mining	-	-	-	-	-	-
Meat and meat products	3,376	660	283	12	1,136	562
Dairy products	11,342	2,473	701	21	3,274	2,419
Fruit and vegetable products	-	-	-	-	-	-
Oils and fats	-	-	-	-	-	-
Flour and cereal foods	-	-	-	-	-	-
Bakery products	4,407	1,612	920	34	271	1,948
Confectionery	-	-	-	-	-	-
Other food products	885	192	78	4	232	344
Soft drinks, cordials, syrups	-	-	-	-	-	-
Beer and malt	-	-	-	-	-	-
Wine and spirits	-	-	-	-	-	-
Tobacco products	-	-	-	-	-	-
Textile fibres, yarns etc	-	-	-	-	-	-
Textile products	2,996	684	553	22	344	1,866
Knitting mill products	-	-	-	-	-	-
Clothing	6,003	1,183	1,071	36	703	3,891
Footwear	-	-	-	-	-	-
Leather and leather products	-	-	-	-	-	-
Sawmill products	13,165	4,808	1,061	48	5,095	3,501
Other wood products	8,544	2,800	1,569	72	292	2,733
Pulp, paper and paperboard	-	-	-	-	-	-
Paper bags and products	-	-	-	-	-	-
Printing; services to printing	4,985	1,914	1,323	43	111	2,086
Publishing; recorded media etc	11,727	4,885	2,132	66	387	4,225
Petroleum and coal products	3,454	385	329	9	487	2,862
Basic chemicals	-	-	-	-	-	-
Paints	1,270	454	136	6	64	587
Pharmaceuticals etc	-	-	-	-	-	-
Soap and detergents	-	-	-	-	-	-
Cosmetics and toiletries	-	-	-	-	-	-
Other chemical products	-	-	-	-	-	-
Rubber products	-	-	-	-	-	-
Plastic products	798	224	80	4	44	418
Glass and glass products	1,405	433	417	13	92	630
Ceramic products	2,284	771	573	15	158	1,206
Cement, lime and concrete slurry	4,923	1,400	693	20	22	1,590
Plaster; other concrete products	931	371	159	5	17	170
Non-metallic min. products nec	-	-	-	-	-	-
Iron and steel	7,414	1,996	880	28	1,216	2,548

Eurobodalla (cont.)

SECTOR	Gross O/P ($'000)	Value-added ($'000)	Income ($'000)	Employ-ment (no.)	Exports ($'000)	Imports ($'000)
Basic non-ferrous metals etc	7,194	1,625	721	22	4,328	3,118
Structural metal products	4,600	1,535	965	41	124	1,354
Sheet metal products	1,439	474	273	12	60	285
Fabricated metal products	1,647	507	255	11	117	605
Motor vehicles and parts etc	10,454	1,880	1,305	43	1,330	5,876
Ships and boats	1,067	279	-	8	459	585
Railway equipment	-	-	-	-	-	-
Aircraft	1,451	343	322	9	606	887
Scientific etc equipment	580	79	69	3	277	446
Electronic equipment	750	90	78	5	172	601
Household appliances	1,764	263	130	5	88	941
Other electrical equipment	-	-	-	-	-	-
Agricultural, mining etc machinery	610	103	95	4	80	341
Other machinery and equipment	1,762	305	276	9	539	1,185
Prefabricated buildings	3,884	1,417	356	12	3,323	1,224
Furniture	7,709	2,473	911	39	2,537	2,172
Other manufacturing	5,326	847	583	22	1,778	4,014
Electricity	8,126	5,006	2,382	45	-	2,309
Gas	-	-	-	-	-	-
Water, sewerage and drainage	13,027	7,542	1,284	31	408	2,842
Residential building	130,243	56,528	27,883	961	-	35,270
Other construction	52,000	26,419	4,807	164	26,112	10,083
Wholesale trade	57,219	23,570	10,169	371	2,118	9,439
Retail trade	108,636	52,543	43,134	2,198	24,993	28,081
Mechanical repairs	17,250	11,761	5,716	220	2,213	3,294
Other repairs	6,346	4,210	1,183	56	-	1,153
Accommodation, cafes & restaurants	244,432	103,403	25,130	1,255	152,055	87,147
Road transport	31,438	14,684	6,688	251	2,710	6,863
Rail, pipeline, other transport	196	100	91	3	-	40
Water transport	4,144	951	883	24	2,122	1,536
Air and space transport	1,852	571	105	5	220	589
Services to transport; storage	12,344	8,161	1,256	50	1,355	1,254
Communication services	25,952	15,275	3,306	116	-	4,747
Banking	15,248	9,691	4,136	111	-	2,584
Non-bank finance	6,355	2,508	1,360	36	-	1,772
Insurance	7,538	4,583	1,459	35	-	1,587
Services to finance etc	2,503	2,208	732	18	-	59
Ownership of dwellings	126,003	108,086	-	-	0	6,487
Other property services	58,963	22,000	4,362	194	-	12,606
Scientific research etc	9,075	5,428	3,320	95	-	1,350
Legal, accounting etc services	25,543	14,186	6,375	220	-	3,373
Other business services	22,333	7,514	4,702	263	-	6,222
Government administration	60,891	34,083	16,050	458	-	13,374
Defence	-	-	-	-	-	-
Education	56,596	48,957	30,610	829	1,094	4,176
Health services	57,600	46,821	30,598	879	-	5,869
Community services	21,086	9,351	6,738	363	-	5,828
Motion picture, radio etc	15,905	7,126	1,230	33	4,822	3,516
Libraries, museums, arts	10,022	6,691	4,253	125	1,251	1,620
Sport, gambling etc	21,396	9,413	4,791	181	5,414	6,253
Personal services	17,927	10,242	5,093	249	3,074	4,436
Other services	20,530	15,635	6,479	188	708	2,390
Household Expenditure		109,478				222,029
Capital Expenditure		9,950				67,942
TOTAL	**1,451,827**	**872,158**	**296,960**	**11,185**	**276,746**	**640,185**

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