

Ref 15724



Australian Government
Bureau of Rural Sciences

Implementing the Representative Areas Program in the Great Barrier Reef Marine Park

Assessment of potential social impacts on commercial
fishing and associated communities

333.951
609943
IMP
2003

© Commonwealth of Australia 2003

This work is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced by any process without prior written permission from the Commonwealth available from the Department of Communications, Information Technology and the Arts. Requests and inquiries concerning reproduction and rights should be addressed to the Commonwealth Copyright Administration, Intellectual Property Branch, Department of Communications, Information Technology and the Arts, GPO Box 2154, Canberra ACT 2601 or at <http://www.dcita.gov.au/cca>.



Australian Government
**Department of Agriculture,
Fisheries and Forestry**

The Commonwealth of Australia acting through the Bureau of Rural Sciences has exercised due care and skill in the preparation and compilation of the information and data set out in this publication. Notwithstanding, the Bureau of Rural Sciences, its employees and advisers disclaim all liability, including liability for negligence, for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying upon any of the information or data set out in this publication to the maximum extent permitted by law.

Postal address:
Bureau of Rural Sciences
GPO Box 858
Canberra, ACT 2601

Implementing the Representative Areas Program in the Great Barrier Reef Marine Park

BRS assessment of potential social impacts on commercial fishing and associated communities.

Key Points

- BRS has made a rapid assessment of potential social impacts of implementing the Representative Areas Program in the Great Barrier Reef Marine Park, based on existing survey and commercial fishing data and proposed zoning provided by the Great Barrier Reef Marine Park Authority.
- This study provides a snapshot overview to identify regions potentially affected by reductions in commercial fishing, however it does not allow predictions to be made of actual impacts at the community and individual level.
- This report draws heavily on initial survey analysis undertaken in 2001 by Dr Mark Fenton and Nadine Marshall and updated in 2003 by Dr Fenton.
- A comprehensive understanding of social impacts would require targeted research at the community level, including surveys and community consultation to examine options.
- Approximately one-third or \$118 million of the commercial wild fisheries production in Queensland comes from the waters of the Great Barrier Reef Marine Park. Commercial catches are at or above sustainable levels for many of the targeted species, and the short-term impact of displaced fishing effort is likely to reduce total fishing production.
- Implementing the Representative Areas Program is estimated in this study to result in a \$10.3 million reduction per annum in the gross value of production of the commercial otter trawl, net, line and crab fisheries in the Marine Park. Estimates of the impact on all fisheries (including collection and beam trawl fisheries) are of the order of \$13.5 million to \$14 million. There were 1,721 licenses to operate in Queensland wild capture commercial fisheries during 2000/01.
- The estimated \$10.3 million loss in value from commercial fishing falls across 20 Town Resource Clusters associated with commercial fishing in the Marine Park. The loss represents on average approximately 10 per cent of production value, with a range of impacts from 6.7% to 12.9% of gross value of production.
- The maximum estimated reduction to the fisheries studied is in Bundaberg (\$2.082 million reduction in gross value of production) and the minimum is in Maryborough (\$15,000).
- Thirteen of these Town Resource Clusters rely solely or heavily on the Marine Park for their fishing activity, and can be expected to experience the greatest social impact. In the remaining Town Resource Clusters, the bulk of fishing operations are not within the Marine Park, and will largely not be directly affected by the proposal.
- Town Resource Clusters with fisheries characterised as having low mobility, and which also had a high level of commercial fishing activity in the Marine Park, were Airlie Beach, Ayr, Bowen, Cooktown, Innisfail, Lucinda, Port Douglas and Yeppoon. However in Airlie Beach, Ayr and Cooktown estimated gross value of commercial fishing in the Marine Park is low, less than \$1 million per annum
- Communities vary in terms of their resilience to change and this will influence the way they respond to the estimated reductions in the value of fishery production.
- Of the regions and fishing communities identified as less resilient, potential impacts for Bowen appear higher than for other areas. The impact on Bowen fishing families and the Bowen community cannot be quantified without further analysis.
- Within other regions such as Yeppoon, there may be substantial impacts on individuals or particular fisheries, due to differing dependence on rezoned areas. Other factors which will influence the level of impact on individuals are their capacity to shift effort, change the nature of their fishing operations or take other mitigating action, and their individual resilience to managing change.

Introduction

Implementation of the Representative Areas Program in the Great Barrier Reef Marine Park will substantially increase the areas of the Marine Park zoned as 'no take', where extractive activities such as fishing are not permitted. Under the revised zoning plan these areas are increased from the current level of approximately 5% to approximately 30%.

While all industries operating in the Marine Park are potentially affected by the proposed changes in zoning, the commercial fishing industry is likely to be most affected. This preliminary report outlines the potential social impacts of implementing the Representative Areas Program on the key commercial fisheries, the otter trawl, net, line and crab fisheries, operating in the Marine Park. There are significant fisheries operating in the Queensland coastal region adjacent to the Marine Park, and other industries dependent to varying extents on the Marine Park. The analysis also examines the basis of the fishing industry, trends within which the commercial fishing industry is operating, and the differing capacities of sectors of the industry to respond to reduced resource access.

The report was prepared in consultation with the Great Barrier Reef Marine Park Authority and includes the latest available fisheries data from the Queensland Fisheries Service. The analysis is based on catch reductions (described in terms of gross value of production) assessed as likely to result, in the absence of any fisher response, from the Great Barrier Reef Marine Park Authority's revised Draft Zoning Plan provided on 27 October 2003. Within the timeframe available to the study, analysis of collection fisheries (sea cucumber, trochus, tropical rock lobster and aquarium fish and coral collection) was not possible. Likewise, timing constraints have permitted only a partial fishing community social impact assessment to be undertaken, employing existing survey data and latest fisheries and Census data.

The report links the potential reductions in gross value of production to specific coastal communities, and assesses the likely impact on the community based on an analysis of the resilience of those communities and fishing families to change. This study provides a snapshot overview to identify regions potentially affected by reductions in commercial fishing, however it does not allow predictions to be made of actual impacts at the community and individual level. A comprehensive understanding of social impacts would require targeted research at the community level, including surveys and community consultation to examine options.

Background

Commercial fishing in Queensland

Tonnage and Gross Value of Production ⁽ⁱ⁾

- Fish 12,700 t, \$86 million
- Crustaceans 10,600 t, \$105 million
- Molluscs 3310 t, \$16 million
- TOTAL 27,105 t, \$206 million

Main Sectors ⁽ⁱⁱ⁾

- Trawl fishery (\$142 million)
- Inshore net fishery (\$27 million)
- Reef lining (\$20 million)
- Crab pot fishery (\$21 million)

(i) 2001/02 (ABARE 2003) (ii) 1999/00 (Caton and McLoughlin 2000)

There were 1,721 licenses to operate in Queensland wild capture commercial fisheries during 2000/01 (Queensland Government 2002). Prawn trawling is the most valuable part of Queensland's wild capture fisheries, extending the length of the east coast in areas between reefs (inter-reefal), up to Cape York. Other trawl sectors include scallop trawling and stout whiting trawling. Inshore net fishing takes mackerels, mullet and barramundi from beaches, bays and estuaries along the Queensland coastline. The reef line fishery takes species such as coral trout, emperors and tropical snapper, as well as Spanish mackerel from coral reef habitats on the Great Barrier Reef. The crab pot fishery takes spanner crab, mud crab, blue swimmer crabs from inshore, estuaries and offshore.

Several significant fisheries adjacent to the Great Barrier Reef Marine Park contribute to Queensland regional economies. These fisheries are managed or co-managed by the Australian Government, and include the Northern Prawn Fishery that operates in the Gulf of Carpentaria (\$135 million, 2001/02 gross value of production), the Torres Strait Prawn Fishery (\$25 million) in the Torres Straits, and the Eastern Tuna and Billfish Fishery longline sector that operates offshore of the Great Barrier Reef Marine Park, particularly in its southern reaches (\$79 million) (ABARE 2003).

Queensland and Australian Government managed wild fishery production tonnages and the gross value of production caught in Queensland waters have increased to \$361 million over the ten years to 2000/01 (Figure 1).

Approximately one third of the value of production of all commercial wild fisheries in Queensland waters (Australian Government and State), \$118 million (Productivity Commission 2002), is estimated to come from waters of the Great Barrier Reef Marine Park.

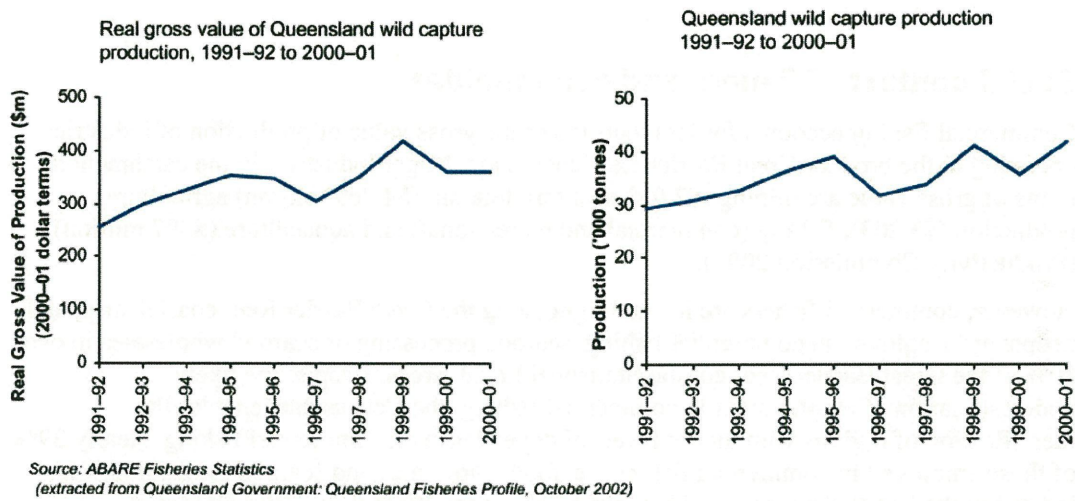


Figure 1. Wild fishery production and gross value of production caught in Queensland waters.

Queensland state fisheries are generally fully fished and there appears to be little opportunity for increased production from traditionally exploited resources (Figure 2).

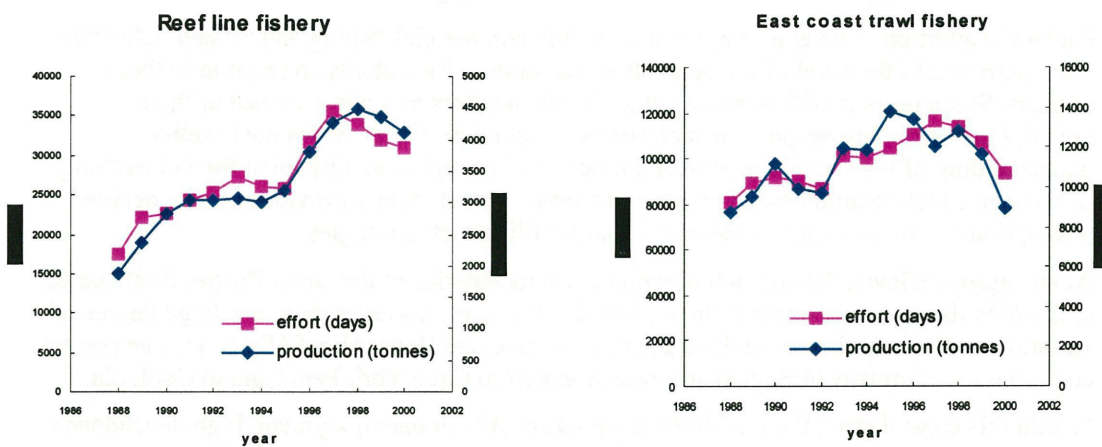


Figure 2. Trends in the Queensland reef line and trawl fishery.

Prawns are heavily exploited and there is a marked variability in catch of each species (probably due to environmental as well as harvesting effects). However, there is a fairly consistent annual prawn catch overall. Scallops are heavily exploited and have a highly variable catch rate. The crab fishery, also intensively fished, has a relatively stable catch. The spanner crab component has recently undergone a major restructure, concurrent with the introduction of a quota system for landings. Within the line fishery, there are concerns that snapper and mackerel may be overfished in some areas (Figure 2).

The commercial catch of sub-tropical inshore/estuarine species has declined, reflecting a decrease in total mullet catch. However, the mullet catch rate appears not to have declined. Tropical estuarine/inshore species catches are fairly stable, but there are indications of a decline in catch rate in some areas for species such as barramundi.

There is also a large recreational fishing sector that is active both inshore (taking fish and crabs) and in the coral reef habitats (line fishery). Catches of some species by the recreational sector may exceed the commercial sector.

Social context of fishers and communities

Commercial fishing accounts for less than 1% of the gross value of production of industries operating in the broader Great Barrier Reef catchment. Major industries in the catchment in terms of gross value are mining (\$7,052 million), tourism (\$4,269 million) agricultural production (\$3,203), fishing (commercial and recreational) and aquaculture (\$397 million) (Productivity Commission 2002).

However, commercial fishers are located right along the Great Barrier Reef coastal strip, and people are employed in commercial fishing, seafood processing or seafood wholesales in over 80% of the Great Barrier Reef coastal Statistical Local Areas. Despite the likely underestimation of employment in commercial fishing, the Census data enables the identification of regions with higher levels of dependence on commercial fishing. Nearly 39% of those employed in commercial fishing, seafood wholesales and seafood processing were located in the Far North region, with another 25% in the Wide Bay – Burnett region.

Commercial fishing has strong historical links in coastal communities, and for many is considered a defining industry in the livelihood and character of the region. Commercial fishing provides local employment directly, and employment in upstream and downstream industries and businesses associated with it. The availability and access to local fish produce is an important ingredient in the attractiveness of a region to tourists and locals. Fishing businesses tend to be small, owner-operated family businesses (Fenton and Marshall 2001), often with a strong generational link to particular fishing grounds.

Factors in addition to level of employment within commercial fishing and related industries will contribute to the level of impacts felt and a community's ability to respond to these impacts. Some regions will be more vulnerable than others as a consequence of their underlying socio-demographic characteristics. A social profile provides the baseline understanding of the social structure and processes in a region to determine the vulnerability or resilience that communities may have to change. Attachment 1 provides a more detailed description of Social Impact Assessment and profiling methodologies.

At an aggregate level, the socio-demographic characteristics of the Great Barrier Reef coastal strip are in line with non-metropolitan Australia averages, however there is a large degree of variation in the coastal communities adjacent to the Great Barrier Reef (Table 1). The coastal communities comprise 44 Statistical Local Areas from Cape York Peninsula to Cooloola.

Within this coastal strip, the Far North has pockets of high unemployment, high dependence on government pensions, and larger proportions of low-income households. The region is characterised by a larger Indigenous population. The combination of the concentration of fishing-related employment and lower economic resources and employment opportunities suggests that this region will be more sensitive to changes in commercial fishing access.

The Wide Bay – Burnett region at the southern end of the Marine Park is similarly placed in terms of high unemployment, high dependence on government pensions, and greater proportions of low-income households. Additionally, the region has a higher median age and much higher levels of total age dependency. Changes to employment opportunities in this region are likely to have a substantial impact on the community due to the already high levels of unemployment and the low number of working age people relative to those younger and older.

The middle portion of the coastal strip (Fitzroy, Mackay and Northern Statistical Divisions) has a lower proportion of employment in the commercial fishing industries (approximately 14% were located in each of the Fitzroy and Mackay regions, and nearly 7% in the Northern region). Despite the lesser dependence on commercial fishing in these regions, there are particular pockets of vulnerability as a consequence of lower levels of employment, higher levels of low-income households and higher levels of total dependency.

Table 1: Summary of Socio-demographic data for the Great Barrier Reef coastal strip.

Indicator	GBR Coastal strip	Range	Non metropolitan Australian average
Population Structure			
Total population	562,291		
Annual average population growth	0.8%	-1.6% - 4.8%	0.9%
Indigenous population	5.6%	1.2% - 92.9%	4.1%
Median age	37 years	22 - 44 years	37 years
Population sex ratio	102.3	59.8 - 141.5	99.5
Total dependency ratio	51.9	22.8 - 69.4	56.1
Labour force			
Labour force participation rate	58.3	32.1 – 70.1	57.6
Unemployment rate	8.7%	2.8% – 20.3%	8.4%
Employment in commercial fishing	0.5%	0.0% - 2.2%	0.3%
Employment in seafood wholesales	0.2%	0.0% – 0.7%	0.05%
Employment in seafood processing	0.1%	0.0% - 0.2%	0.1%
Employment in commercial fishing, seafood wholesales and processing	0.8%	0.0 – 2.4%	0.5%
Economic resources			
Low income households	14.7%	5.4% - 26.8%	16.3%
Government pension recipients	43.5%	20.9% - 60.5%	42.2%

Source: ABS 2001 Population and Housing Census.

Issues

A number of aspects are crucial in determining the potential social impacts that may arise from the change in zoning in the Great Barrier Reef Marine Park.

- The magnitude of the change, that is the extent to which the increase in ‘no take’ zones will reduce access to marine resources that commercial fishers currently use.

- The context of this impact in relation to the longer-term industry outlook and flexibility of the industry to adjust its operations, including the proportion of commercial fishing operations undertaken within the Marine Park.
- The capacity of commercial fishers, their families and the community to manage this change. Some individuals, families and communities may be more vulnerable or more resilient to the change, and so any impacts can generate a range of responses.

The impact of the Representative Areas Program on fisheries gross value of production

The magnitude of the impact of the Representative Areas Program was estimated in terms of decrease in gross value of production of commercial fisheries and in the absence of any fisher response. The analysis covered management zones with the potential to impact on commercial fishing. These include the green (Marine National Park Zone) where no extractive activities are allowed, the yellow (Conservation Park Zone) where only limited fishing is permitted, and the blue (Habitat Protection Zone) where no trawling is permitted.

Based on 2002 commercial logbook data from the Queensland Fisheries Service and the Great Barrier Reef Marine Park Authority's assessment of impacts of the revised Draft Zoning Plan, the estimated impacts of the Representative Areas Program on the gross value of production of the trawl, line, net and crab fisheries total approximately \$10.3 million annually. This analysis excludes consideration of the collection fisheries (sea cucumber, trochus, tropical rock lobster and aquarium fish and coral collection) that have a total gross value of production of some \$13 million per annum across the Great Barrier Reef Marine Park. It also excludes the beam trawl fishery operating in the Marine Park, which is small scale and highly variable, and estimated to have an annual gross value of production of less than \$1 million. With the addition of these components, the Great Barrier Reef Marine Park Authority has estimated the annual impact on all commercial fisheries in the Marine Park at approximately \$14 million.

To calculate the total and loss in gross value of production, logbook data aggregated to the level of a 6-minute grid cell were averaged on an annual basis over different time periods to represent the spatial and temporal variability in each fishery, as well as reflect recent fisheries management intervention (Trawl: 2001-2; Line: 1996-2002; Net: 1998 – 2002; Crab: 1996-2002). The data were adjusted to account for fishing outside the Marine Park, areas currently closed to various fishing methods, and total allowable catch limits to be implemented under the Coral Reef Finfish Fishery Fisheries Management Plan (2003) and recent amendments to Fisheries Regulation (Queensland) 1995 relating to Spanish mackerel. Adjustments made to the data to reflect the Queensland Government's impending total allowable catch limits for these latter fisheries limited the scope of this study to potential impacts from the Representative Areas Program.

Vessel Monitoring System data for the years 2000 – 2002 were also used to more accurately represent trawl effort spatially within grids. The measured distribution of catch across the Marine Park and the associated reduction in catch from the proposed rezoning were estimated for each 6 minute grid cell; no direct relationship between reduction in area fished and reduction in gross value of production was assumed.

The actual level of impact may be higher or lower than the \$10.3 million estimated. The estimates of gross value of fisheries production from the Great Barrier Reef Marine Park and attributable to individual Town Resource Clusters are based on information from the Queensland Fisheries Service and survey work by Fenton and Marshall (2001). A range of assumptions and potential sources of error are associated with these estimates. Queensland Fishery Service data collection protocols have been developed over several years, with logbooks serving as the principal source of information on the distribution of fishing activity and catch. These data are collected at the operational level, but may be recorded by latitude and longitude or on a 6-minute grid. Logbook data can contain recording errors. Vessel Monitoring System data were used to verify the position of some fishing activities,

particularly when these activities were recorded as being adjacent to Marine Park and proposed zone boundaries. Data were averaged over several years to smooth annual variations, with an emphasis on the most recent years to reflect the current situation in the fishery.

Gross value of production estimates were developed by the Queensland Fishery Service, and were provided on a 6-minute grid cell basis and estimated for each fishery. Landed value of fishery product can vary widely even for a single species. For example, dead coral trout may fetch \$10/kg, whereas live coral trout can be sold for \$50/kg or more. Changes in fishing operations, for example provision of dead or live product, and fluctuations in market price for similar products will alter the gross value of production.

A Town Resource Cluster analysis (Fenton and Marshall 2001) was used to identify and link communities to specific Great Barrier Reef fisheries usage patterns. The Town Resource Cluster analysis required attribution of gross value of production from individual 6-minute grid cells to one or more Town Resource Clusters. The Town Resource Cluster data was collected by telephone survey. Vessel characteristics were not distinguished in this analysis, and this could result in errors in estimation of gross value of production to individual clusters.

The Town Resource Cluster analysis enables a link to be made between reductions in access to fisheries resources and impact on the relevant community associated with use of that resource (Map 1). Preliminary results of the Town Resource Cluster analysis indicate the total gross value of production and estimated loss in value in fisheries by Town Resource Cluster associated with the proposed rezoning (Figure 3). See Attachment 2 for further details.

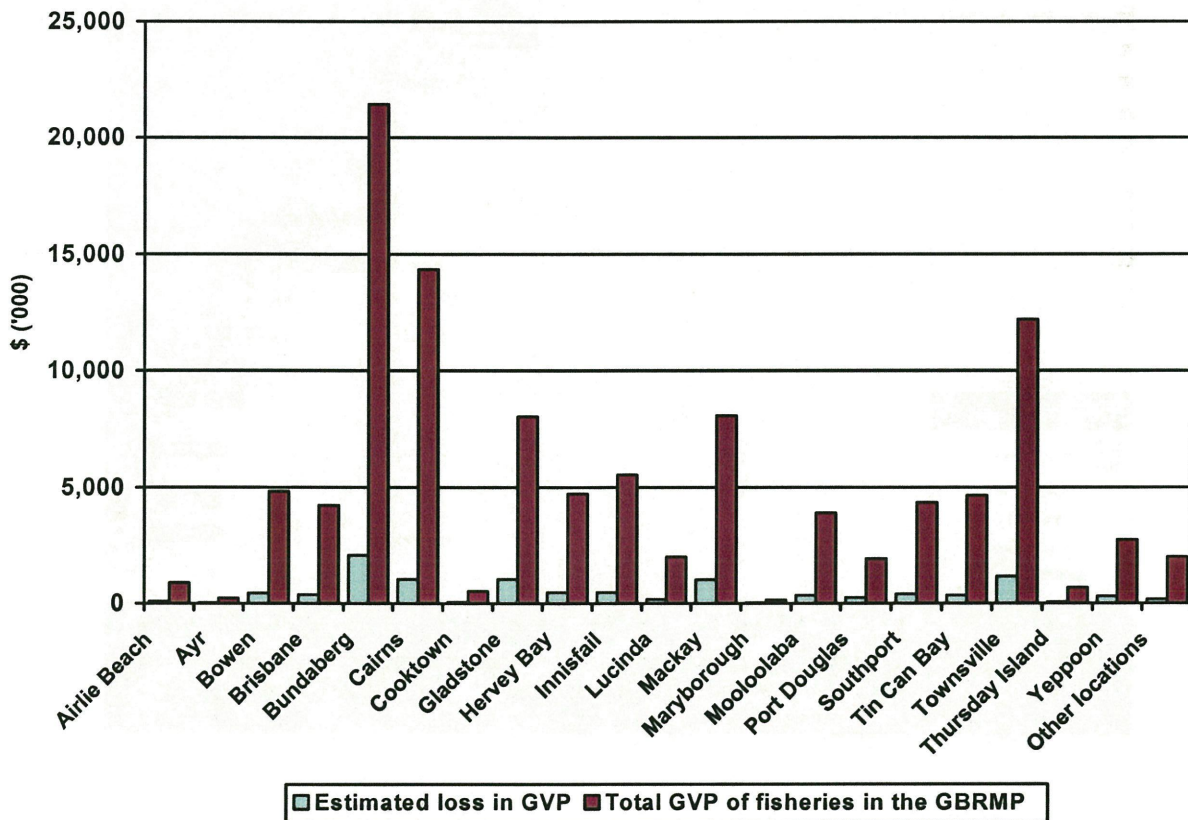
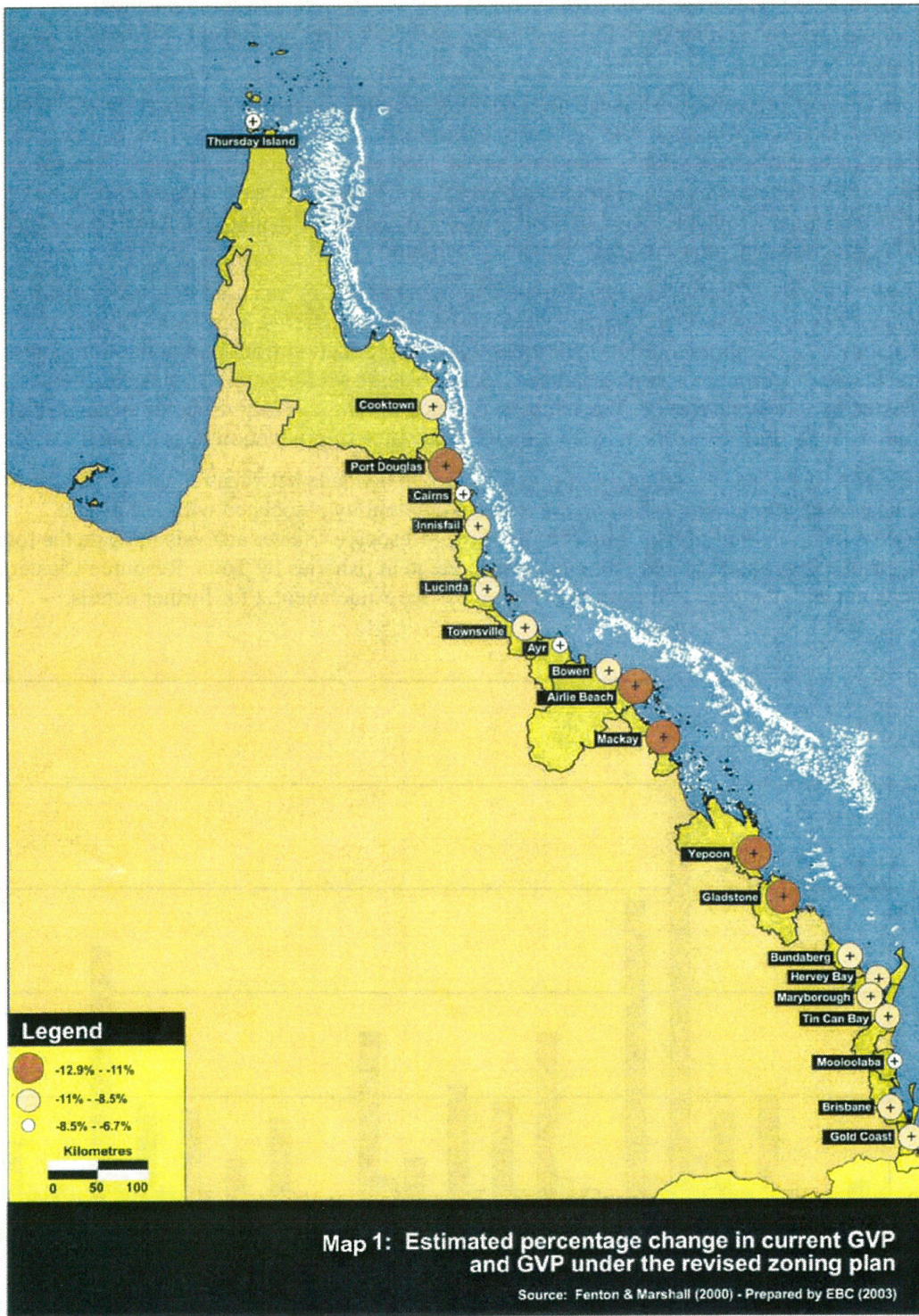


Figure 3. Estimated total gross value of production of fisheries in the Marine Park and estimated loss in value by Town Resource Cluster.



The estimated \$10.3 million per annum reduction in value resulting from the revised Draft Zoning Plan falls reasonably consistently across the 20 Town Resource Clusters associated with commercial fishing in the Marine Park, reducing the gross value of production by an average of 9.6% (Figure 4). Half of all Town Resource Clusters fell within 1% of the average value reduction. Figures 3 and 4 illustrate that the maximum dollar reduction in estimated gross value of production is \$2.082 million for Bundaberg (-9.7% change), and the minimum is \$15,000 for Maryborough (-10.1% change).

Most of the Town Resource Clusters identified as likely to experience above average reductions in percentage terms account for a relatively small proportion of the total value of fishing in the Marine Park.

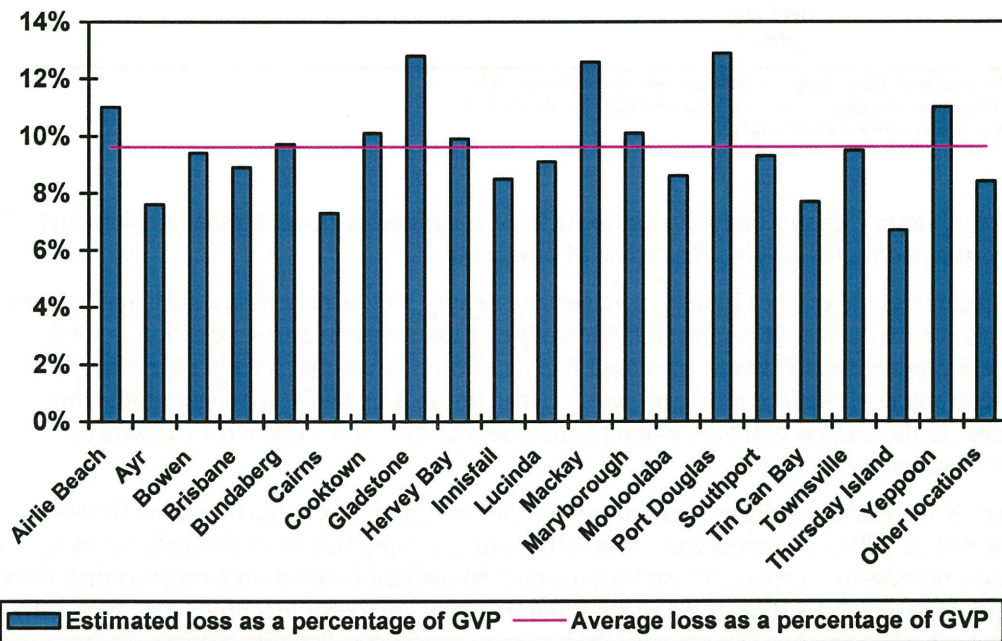


Figure 4. Estimated percentage change in gross value of production of fisheries by Town Resource Cluster.

Approximately two-thirds of the value of commercial fishing in Queensland is from areas outside the Marine Park. An examination of estimates of primary and secondary catchment areas identified by Fenton and Marshall (2001) for each of the Town Resource Clusters indicates there is a clear separation in terms of high and low levels of commercial fishing activity in the Marine Park (Table 2).

The pattern of fishing activity within some Town Resource Clusters is almost entirely within the Marine Park boundaries, indicating that those fishers are highly dependent for their fishing income on the Park. For others, activity in the Marine Park represents only a small proportion of their overall pattern of activity, and, it is suggested, a small proportion of the overall value of the fishery. Maps for each Town Resource Cluster are provided in Attachment 3. With only limited operations within the Marine Park, zoning changes are likely to have less impact in aggregate terms on fisheries operating from Brisbane, Maryborough, Thursday Island, Tin Can Bay, Southport, Mooloolaba and Hervey Bay. Conversely, where a high proportion of fishing activity takes place within the Marine Park, changes to resource access will have a potentially greater impact. It should be noted that Table 2 refers to activity in the Marine Park, and not specifically to those areas potentially impacted by zoning.

Table 2. Proportion of commercial fishery activity within the Marine Park by Town Resource Cluster.

High commercial fishing activity (a) in Marine Park	Low commercial fishing activity (b) in Marine Park
Airlie Beach	Brisbane
Ayr	Hervey Bay
Bowen	Maryborough
Bundaberg	Mooloolaba
Cairns	Southport
Cooktown	Thursday Island
Gladstone	Tin Can Bay
Innisfail	
Lucinda	
Mackay	
Port Douglas	
Townsville	
Yeppoon	

(a) All or most primary resource catchments within the Marine Park

(b) Only some secondary resource catchments within the Marine Park

Source: Derived from Fenton (2003).

The long-term industry outlook also needs to be examined in assessing the likely impact of the estimated reductions in gross value of production.

With commercial catches in many Queensland fishery sectors at or above sustainable levels, the short term impact of displaced fishing effort is likely to result in a reduction in total fishery production. However, increased fishing effort in areas that remain accessible to fishers, and exploitation of new or lightly fished grounds, is likely to bolster production. Access to these areas will vary among fishery sectors and Town Resource Clusters as explained below.

There is increasing evidence that protected areas can provide benefits to marine fisheries (Ward et al. 2001). Reserves can act as refuges to spawning fish and ultimately act as sources of new recruits to a fishery. These benefits may be realised in the short term (less than three years) for productive short-lived species, but will take longer for less productive longer-lived species. Unfortunately, data are very limited in relation to the benefits of reserves for commercially harvested species on the Great Barrier Reef.

The capacity of the fishing industry to adapt to changes

There are a range of possible responses from individual fishers to reductions in resource access. These include individuals changing their fishing location, increasing effort to maintain production, or changing the nature of their operation, for example, shifting operations to higher value outputs such as offered through the live fish trade. Other responses include leaving the fishing industry altogether.

Previous studies of social impacts in fisheries have pointed to the clear preference shown by fishers to remain in the industry, even in the face of declining returns (see Attachment 4). Increased pressures on business viability and reduced disposable income are likely to be felt both at the family and the broader community level. If individuals and their families leave the industry, and possibly the region, this will have impacts on diversity and social capital, potentially making the region more reliant on remaining industries and more vulnerable to short-term downturns in remaining industries. The strong self-identification of fishers with their industry also points to the potential for increased feelings of alienation if commercial fishing options are no longer available. Responses such as shifting effort can involve increased travel and running costs, and potentially lead to greater pressure on remaining areas and greater competition with commercial and recreational fishers for access.

Fisheries operations have varying capacities to alter their operations to address changed fishing circumstances. For example, at the extremes, gear and infrastructure suitable to in-shore fishing cannot be readily adapted to undertake trawling activity. The mobility of fisheries has been considered in terms of a Grid Mobility Index, based on recorded activity levels applied at the Town Resource Cluster level (see Attachment 5). The Grid Mobility index identifies those home ports where recorded activity indicates that the fishers currently operate in a highly localised pattern of activity, and those where the fishing activity is more dispersed. It is assumed that those with localised patterns of current activity have more limited scope to alter their operations and seek alternate fishing grounds in response to changes in zoning.

When comparing the mobility of fisheries using the Grid Mobility Index, 10 of the 20 Town Resource Clusters had comparably high levels of mobility, indicating greater capacity to offset potential impacts to production through changes to fishing locations. Those with higher mobility (generally with greater numbers of trawling operations) also tended to be those with higher absolute gross values of production, consistent with greater production reflected in increased area of operation. Those Town Resource Clusters with fisheries characterised as having low mobility, and which also had a high level of activity in the Marine Park for their commercial fishing activities, were Airlie Beach, Ayr, Bowen, Cooktown, Innisfail, Lucinda, Port Douglas and Yeppoon.

The ability of families operating within the fishing industry to manage change has been examined in terms of a family resiliency measure, which includes socio-demographic factors such as age and family structure, income, housing type and employment, and education. Attachment 6 provides the complete list of indicators applied and the data at a Town Resource Cluster level.

The family resilience analysis is based on earlier survey data from fishing families within the Town Resource Clusters (Fenton and Marshall, 2001). The analysis highlights the variation between towns in the level of resilience of their fishing communities (Figure 5).

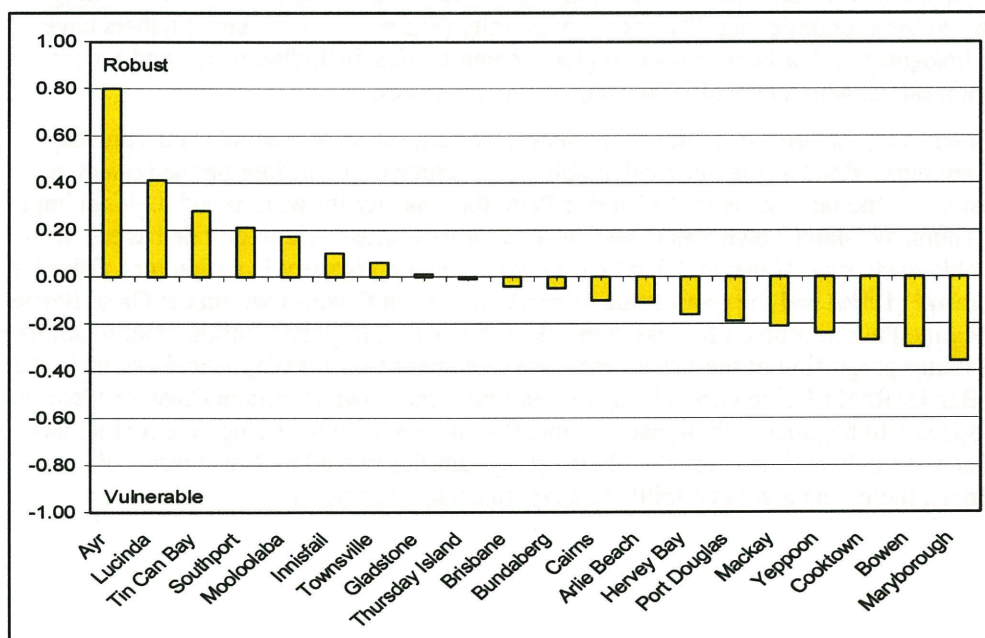


Figure 5. Family Resilience Index of Town Resource Clusters

Source: Fenton (2003).

This family resilience measure assists in understanding the range of likely responses to changes in the level of access to fisheries resources. Fishing families least resilient to change are those in Bowen, Cooktown, Maryborough and Yeppoon. However, with the exception of Bowen, these towns have a low level of employment in agriculture, fisheries and forestry and

account for only a very small amount of the total value of fishing in the Marine Park. In the case of Maryborough, it has a low level of commercial fishing activity centred in the Marine Park. While individual fishers operating out of Cooktown and Yeppoon may have a high dependence on the Marine Park, in aggregate terms a decline in gross value of production of the scale estimated would appear unlikely to have a large impact. To the extent that changes to fishing access may fall unequally within a Town Resource Cluster, while aggregate estimates of loss in value of fishing production in these towns are low, individuals may be less able to manage these impacts.

Analysis at the Town Resource Cluster level does not allow for impacts on individual fishers to be fully assessed. A township's commercial fishing activity may comprise a range of fisheries with different spatial coverage and hence potentially variable zoning impacts, different characteristics in terms of equipment and infrastructure and different options in terms of mobility. For example, fishing operations in the Yeppoon Town Resource Cluster include both in-shore prawn netting and wider trawl activity. Establishment of a 'yellow conservation zone' inshore will have a differentially greater impact on those sectors of the Yeppoon fishing community which are reliant on inshore activity. Other operations based in Yeppoon, notably those that fish offshore, are unlikely to be impacted by such a change in zoning.

The potential impact on regional communities

The resilience of the communities within these Town Resource Clusters was also examined. The composite regional-based index of resilience to change included variables such as housing, age, labour force, occupation, weekly incomes, education, family and Indigenous persons (Figure 6).

While this index provides some guidance on the potential responses of communities to changes in resource access, as with the family resilience index discussed above, the regional resilience index must also be considered in light of the relative importance of the fishing industry to the economic viability of the community (Figure 6). Commercial fishers have strong linkages to other businesses in regional communities, including to seafood processors and wholesalers, which may also face adjustment pressures.

Examined solely in terms of regional resilience, Bowen, Innisfail, Lucinda and Thursday Island are highlighted as the most vulnerable. In the context of considering the impact of increasing the 'no take' zone in the Marine Park, the capacity for widespread regional impact in the Thursday Island Town Resource Cluster appears limited. Although rated as the most vulnerable to change, Thursday Island has very limited employment in agriculture, fisheries and forestry (1.5%) and the gross value of production from fisheries within the Great Barrier Reef Marine Park accounted for less than 1% of the total Marine Park production. In addition, only a minor proportion of the fishery resource catchment for Thursday Island occurs in the Great Barrier Reef Marine Park. Using this approach, the Town Resource Cluster of Bowen again appears to be potentially impacted more than others. In considering potential impacts on Innisfail and Lucinda, it is noted that their fishing families ranked higher in terms of robustness, indicating a greater ability to adapt to change (Table 3).

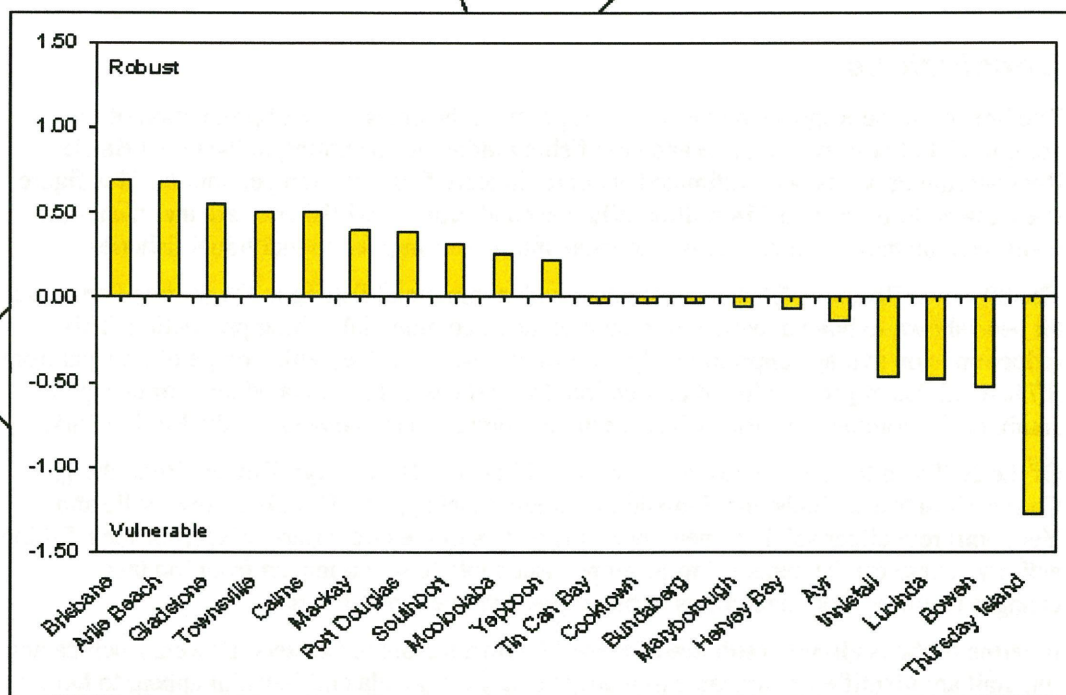


Figure 6. Regional Resilience Index of Town Resource Clusters

Source: Fenton (2003).

Table 3. Social impact summary of fishing communities

High commercial fishing activity in Marine Park	Estimated reduction in gross value of production \$'000	Low mobility	Family resilience vulnerability	Regional resilience vulnerability
Airlie Beach	98	X		
Ayr	17	X		
Bowen	454	X	X	X
Bundaberg	2,082			
Cairns	1,045			
Cooktown	51	X	X	
Gladstone	1,029			
Innisfail	469	X		X
Lucinda	181	X		X
Mackay	1,016			
Port Douglas	250	X		
Townsville	1,158			
Yeppoon	303	X	X	

Conclusions

The impact of the Representative Areas Program on the gross value of production of the commercial otter trawl, net, line and crab fishing industries operating in the Great Barrier Reef Marine Park has been estimated at approximately \$10.3 million per annum. This figure is estimated to be around \$14 million if harvest and beam trawl fisheries are included, but could well be higher depending on the value multipliers applied to individual fisheries.

The 20 Town Resource Clusters associated with commercial fishing in the Marine Park have all been shown to have a reduction in their value of commercial fishing production. This reduction is on average approximately 10% of production value, with a range of impacts from 6.7% to 12.9% of gross value of production. In most cases the estimated level of change is small, or the commercial fishery has alternate sources of catch outside of the Marine Park.

Of the 20 Town Resource Clusters examined, 13 (Airlie Beach, Ayr, Bowen, Bundaberg, Cairns, Cooktown, Gladstone, Innisfail, Lucinda, Mackay, Port Douglas, Townsville and Yeppoon) rely either solely or heavily on the waters of the Great Barrier Reef for their fishing activity. These can be expected to be more susceptible to social impact from 'no take' changes resulting from alterations to the Representative Areas Program.

In terms of the **regional resilience** of these 13 Town Resource Clusters, Bowen, Lucinda and Innisfail are identified as less able to manage change. Lucinda and Innisfail appear to have a greater capacity to adapt in terms of **family resilience**. Those in Bowen, Cooktown and Yeppoon are less able to respond to change in terms of family resilience. However, Cooktown has a very small amount of the total gross value of production of fisheries in the Marine Park, and Yeppoon has higher levels of **regional resilience**.

When considering potential social impacts, Bowen has both a lower regional and fishing family resilience and a high level of activity in the Marine Park for its commercial fishing operations. More detailed data collection and analysis including community surveys would be required to quantify these impacts at the fishing family and community level.

Previous studies of the fishing industry point to a clear preference for fishers to remain in the industry. When considering potential impacts from the Representative Areas Program, factors such as the capacity of fishers to alter their operations, or seek alternative activities are relevant. The potential for increased tourism activity, and the possibility for increased yields from fish stocks associated with positive benefits to fisheries of protected areas, may provide for more positive long-term social impact.

While the overall anticipated impacts from the Representative Areas Program are likely to be small, there will be individual fishers who may be highly impacted due to their greater reliance on the resources within the Marine Park and the differential impacts of the zoning on localised fishing arrangements. Other factors which will influence the level of impact on individuals are their capacity to shift effort, change the nature of their fishing operations or take other mitigating action, and their individual resilience to managing change. Within the scope of this study individual impacts have not been identified.

Assessing Social Impacts

Overview of Social Impact Assessment

Social impact assessment (SIA) refers to a broad group of methods and approaches used to assess and manage the potential and actual impacts of some type of current or future change or intervention. SIA is also referred to as socio-economic assessment and social assessment. The International Association for Impact Assessment defines SIA as:

Social Impact Assessment includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment (Vanclay 2003).

A full SIA goes beyond predicting the potential impacts of a planned activity. A full SIA predicts potential impacts under a range of scenarios, helps select the most appropriate scenario, develops mitigation strategies that address any unwanted impacts, monitors the outcomes of the change or intervention when it is implemented, and works on an ongoing basis to manage the impacts of that change. While it is desirable, where possible, to implement a full SIA, it is often not possible for reasons including time and resourcing constraints. Where these types of constraints apply, it is common to undertake an SIA that includes some, but not all, of the following steps (Taylor *et al.* 1990; Vanclay 2003):

- Scoping – Identifying individuals and groups who are interested in or will be affected by the intervention, and facilitating their input. It requires community consultation;
- Social profiling – Identifying the socio-demographic structure of the community or communities who will potentially be affected by the proposed intervention, using secondary data such as Census information and fishing licence information. The social profile provides an understanding of groups who may be more or less vulnerable to particular types of changes, based on their income and education level, number of dependents and other relevant socio-demographic variables.
- Social assessment - Gathering information needed to assess how different groups will be affected by the intervention which cannot be provided by social profiling, for example information specific to a region or a potential intervention, or related to values, attitudes and motivations, and access to and use of different resources and infrastructure.
- Formulation of alternatives – Once enough information is gathered, formulating possible alternative scenarios about the types of change that may occur;
- Prediction and estimate of effects – Investigating potential impacts under the different scenarios and estimating their nature and significance;
- Monitoring, mitigation and management – Developing mitigation strategies to address any adverse impacts, monitoring actual impacts and developing ongoing management strategies to help communities cope and adapt to impacts resulting from the intervention;
- Evaluation – Evaluating the process used and outcomes resulting both from the intervention, and the SIA process.

Changes to resource access have direct implications for the livelihoods of those dependent on the resource, which has an impact on both social and economic dimensions.

Social impacts of a planned change or intervention might include changes to (Vanclay 2003):

- **Way of life** – meaning how people live, whether it be work, home life or recreation;

- **Culture** – referring to shared beliefs, values, and customs;
- **Living environment** eg quality of air, water, food, access to resources, hazards and risks, personal safety, availability of and access to facilities and services;
- **Rights and responsibilities** eg changes to personal rights, property rights and consequences of these changes, or changes to rights under political systems;
- **Health and wellbeing** (physical, mental, social and spiritual); and
- Perceptions of **risk and opportunity**, meaning the perceptions of those in the community about the potential to achieve aspirations and opportunities for social wellbeing.

Approaches to Social Impact Assessment

SIA within the context of commercial fisheries in Australia and internationally have examined:

- Commercial fisheries closures;
- Introduction of or changes to gear restrictions;
- Changes to quotas, and introduction of different types of quota systems, particularly the introduction of Individual Transferable Quotas; and
- Declaration of marine reserves or changes to marine reserve boundaries that affect commercial fisheries.

Some specific methods have been developed for profiling and assessing commercial fisheries and fishing industries. However, few specific methods have been developed to then assess impact of changes in fisheries.

Social profiling and social assessment

Methods to profile and assess the 'baseline' situation for commercial fishing in a region include:

- Developing consultative committees of stakeholders to assist in identifying potential areas to examine in the SIA and to provide links into fishing communities;
- Identifying the social 'catchment' associated with particular fisheries. Town Resource Cluster (TRC) analysis is a method specifically developed to do this. It uses surveys and analysis of existing data to identify the social and resource catchment of a particular fishery, meaning the geographic regions where people employed in and dependent on that fishery live, purchase goods and services, land their catch and process their catch.
- Developing indices, for example, to measure the level of dependency of a region or community on commercial fishing, or the level of social, economic and physical infrastructure available to fishers and their families; and
- Surveys to gather information on the quality of life of fishers and their families, including mental and physical health, living environment, work hours, and access to resources.

Impact assessment

Impact assessment studies include attempts to predict future impacts, and assessments of the actual impacts of changes in fisheries management on commercial fishers. For example, a scenario planning approach was used to assess likely impacts of changes in management of the WA rock lobster industry (Huddleston and Drew, 2003).

Table .Estimated Gross Value of Production for TRCs ('000)

	Current GVP	Draft Zoning Plan	Revised Zoning Plan	Difference Between Current & Revised Plan	Percent Difference
Airlie Beach	894	745	796	-98	-11.0
Ayr	225	192	208	-17	-7.6
Bowen	4,817	4,213	4,363	-454	-9.4
Brisbane	4,217	3,765	3,841	-376	-8.9
Bundaberg	21,437	18,893	19,355	-2,082	-9.7
Cairns	14,353	12,815	13,308	-1,045	-7.3
Cooktown	507	444	456	-51	-10.1
Gladstone	8,040	6,809	7,011	-1,029	-12.8
Hervey Bay	4,729	4,159	4,262	-467	-9.9
Innisfail	5,541	4,897	5,072	-469	-8.5
Lucinda	1,993	1,781	1,812	-181	-9.1
Mackay	8,087	6,929	7,071	-1,016	-12.6
Maryborough	148	131	133	-15	-10.1
Mooloolaba	3,898	3,482	3,561	-337	-8.6
Port Douglas	1,935	1,609	1,685	-250	-12.9
Southport	4,342	3,873	3,940	-402	-9.3
Tin Can Bay	4,637	4,155	4,281	-356	-7.7
Townsville	12,209	10,739	11,051	-1,158	-9.5
Yeppoon	2,754	2,403	2,451	-303	-11.0
Thursday Island	673	622	628	-45	-6.7
Other Locations	2,008	1,799	1,839	-169	-8.4
Total	107,444	94,455	97,124	-10,320	-9.6

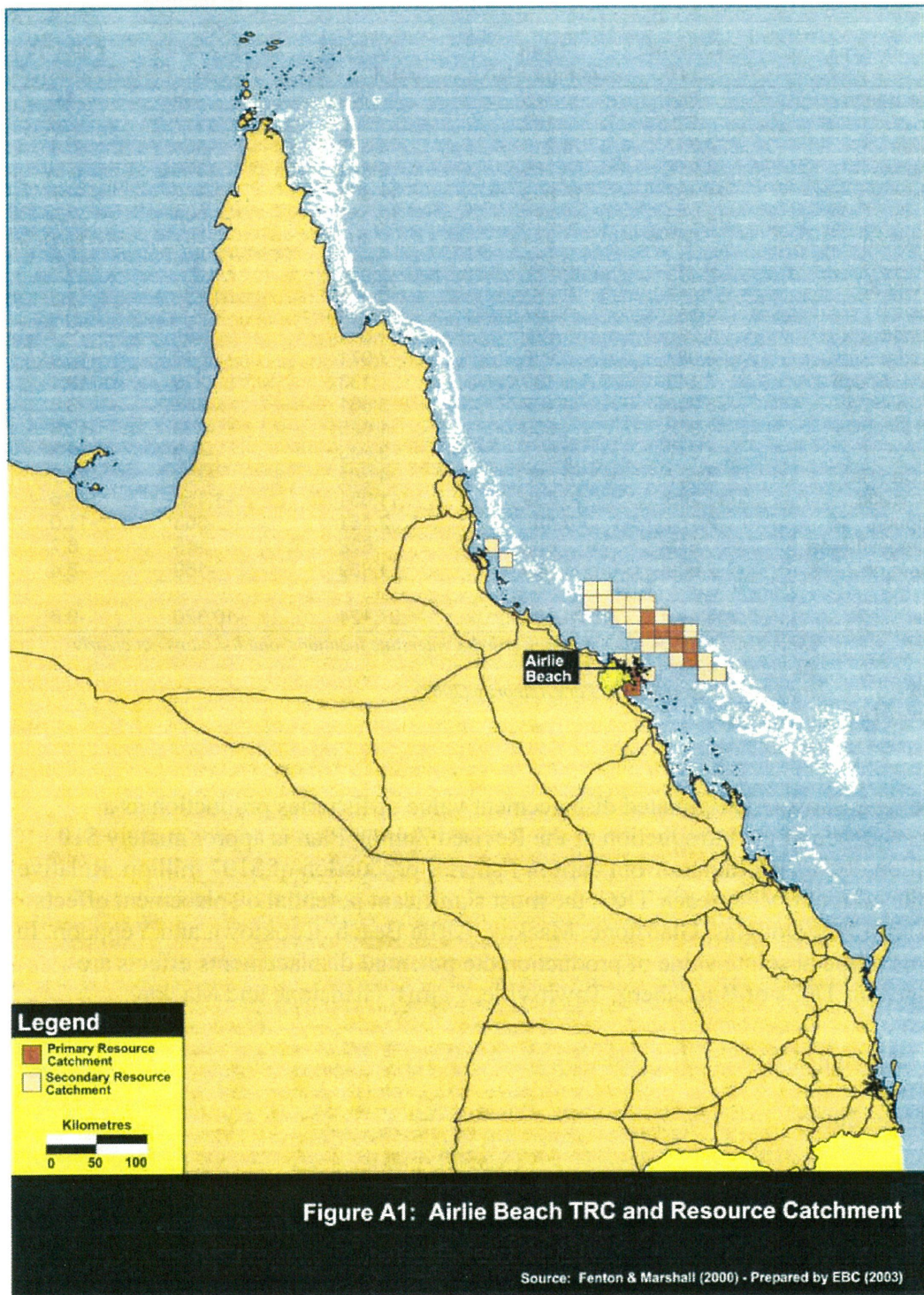
Note: 'Other Locations' includes Weipa, Karumba, interstate locations, and locations not clearly identifiable within existing TRCs.

Source: Great Barrier Reef Marine Park Authority (2003).

Prepared by: EBC (2003)

The table shows the estimated displacement value of fisheries production as a consequence of the introduction of the Revised Zoning Plan is approximately \$10 million dollars per annum from current fisheries production of \$107 million. Relative to the current GVP of each TRC, the most significant potential displacement effects occur in Port Douglas, Gladstone, Mackay, Airlie Beach, Cooktown and Yeppoon. In terms of the absolute value of production the potential displacements effects are highest in TRCs of Bundaberg, Townsville, Cairns, Gladstone and Mackay.

Fenton (2003)



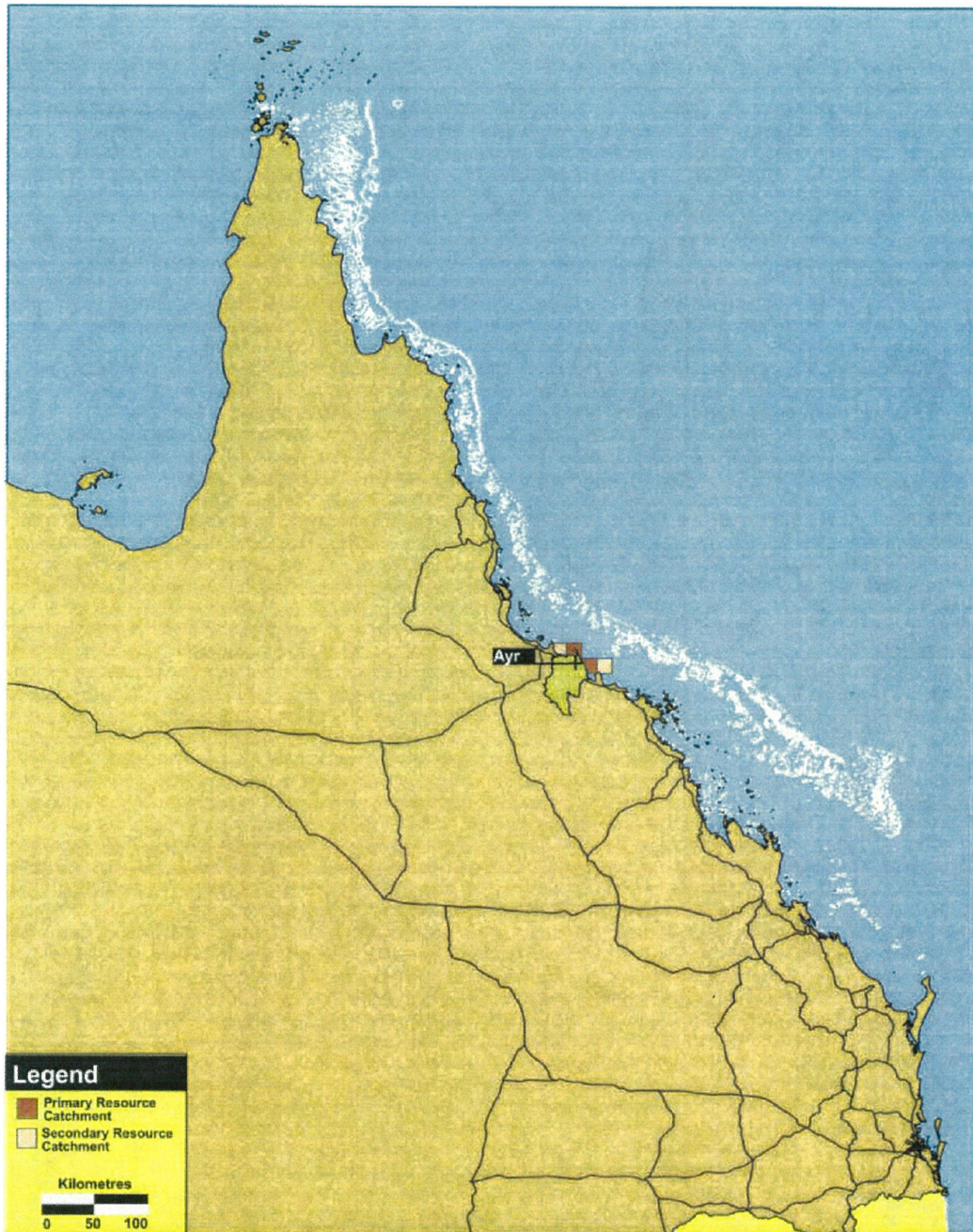
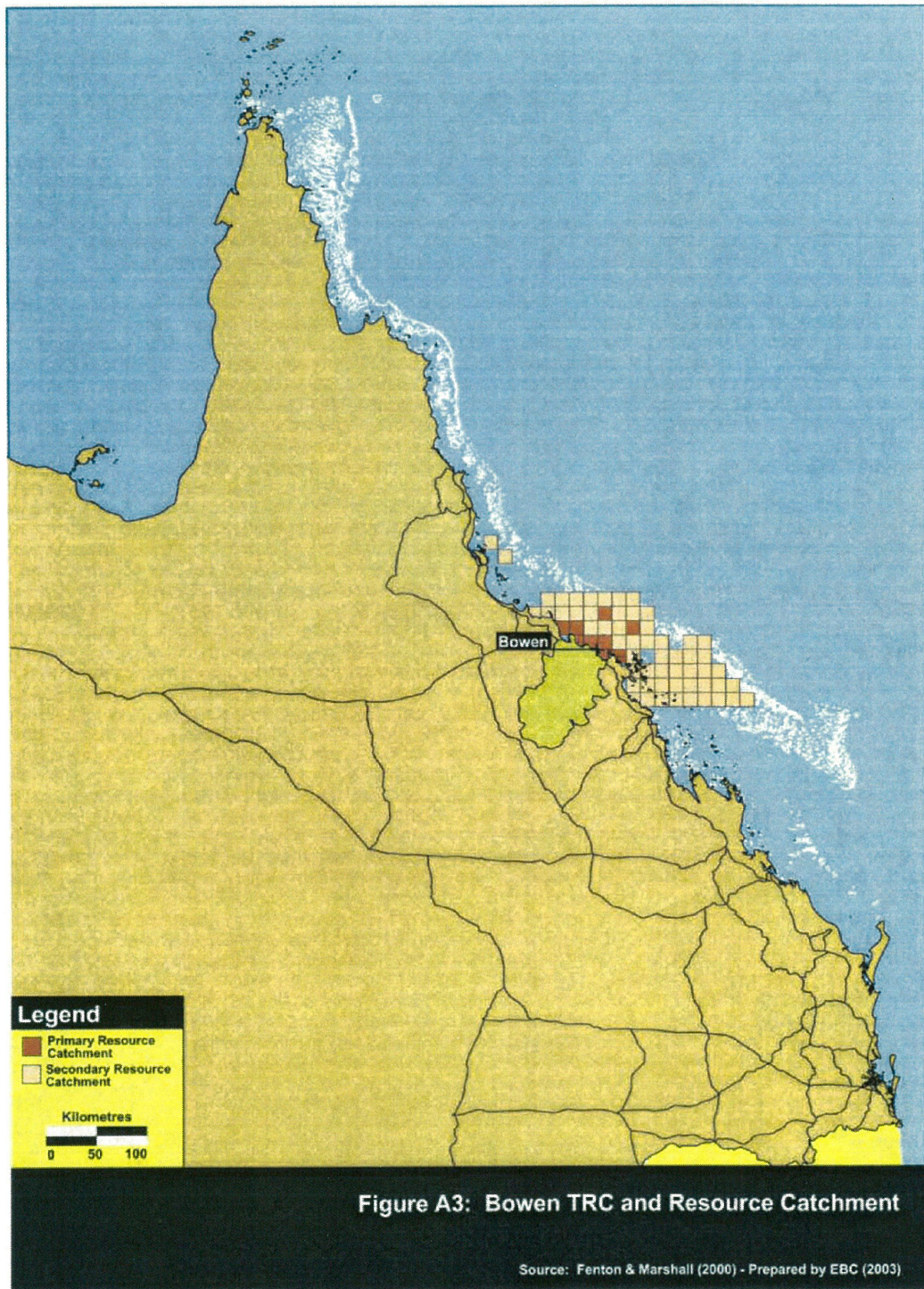


Figure A2: Ayr TRC and Resource Catchment

Source: Fenton & Marshall (2000) - Prepared by EBC (2003)



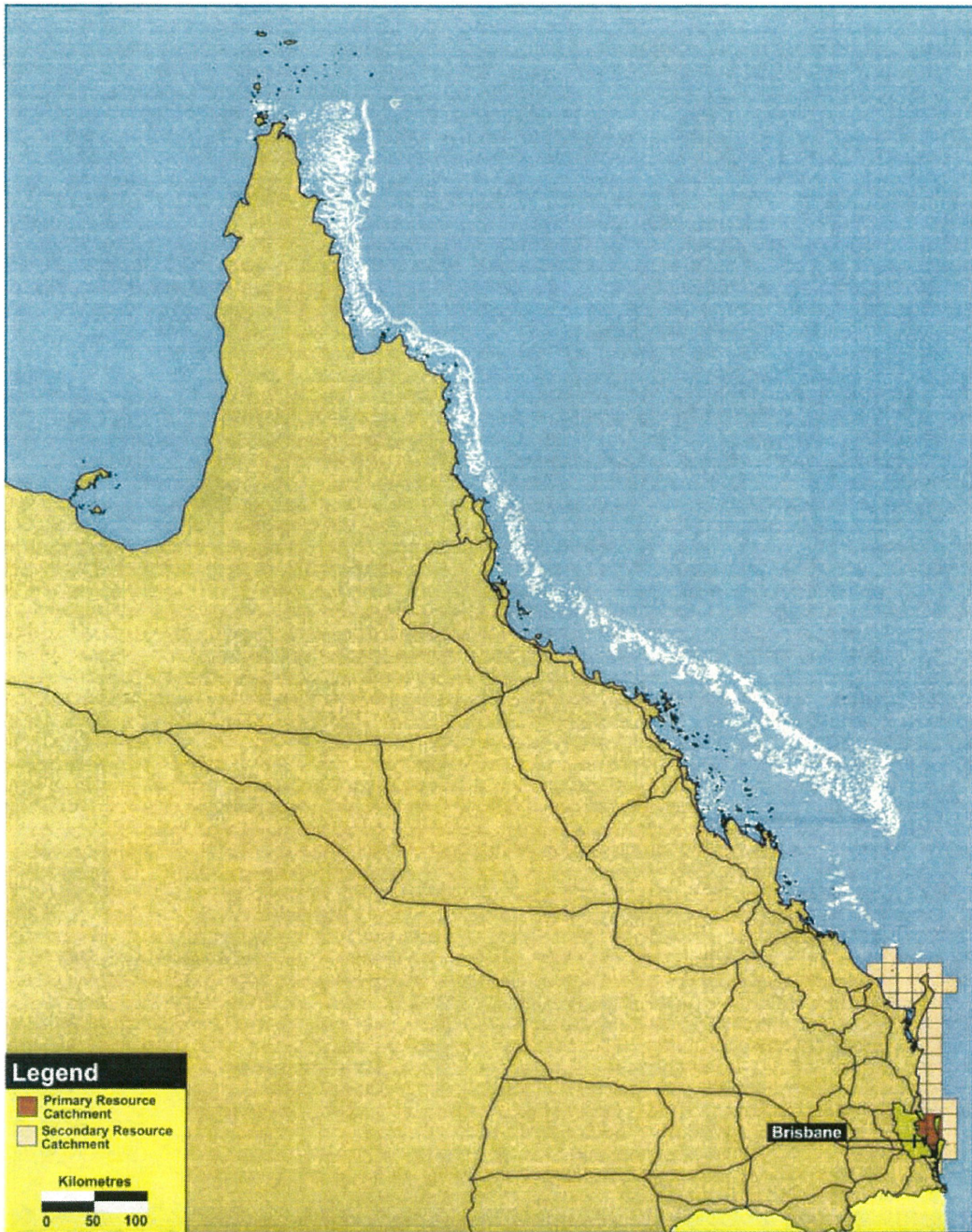
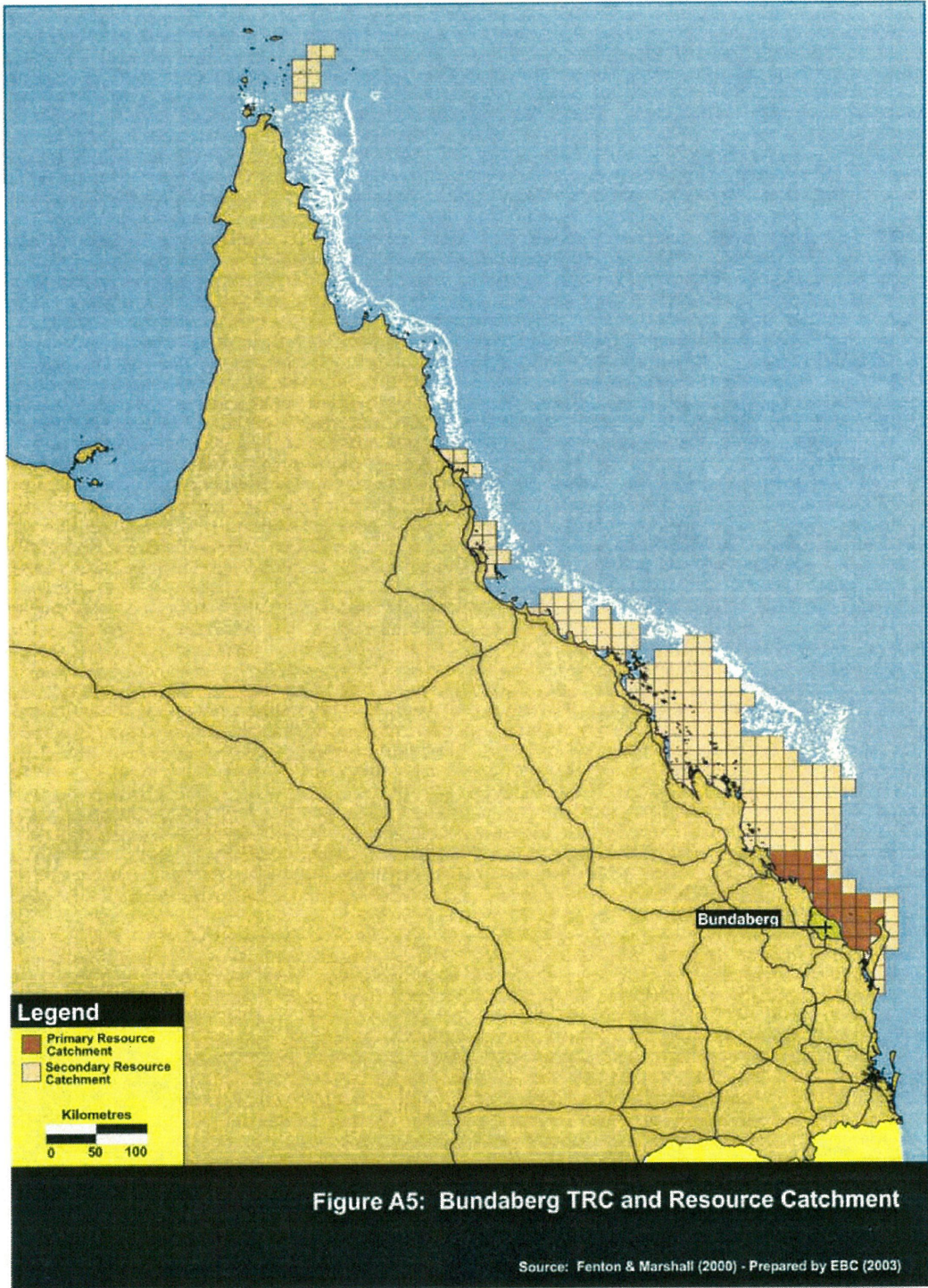
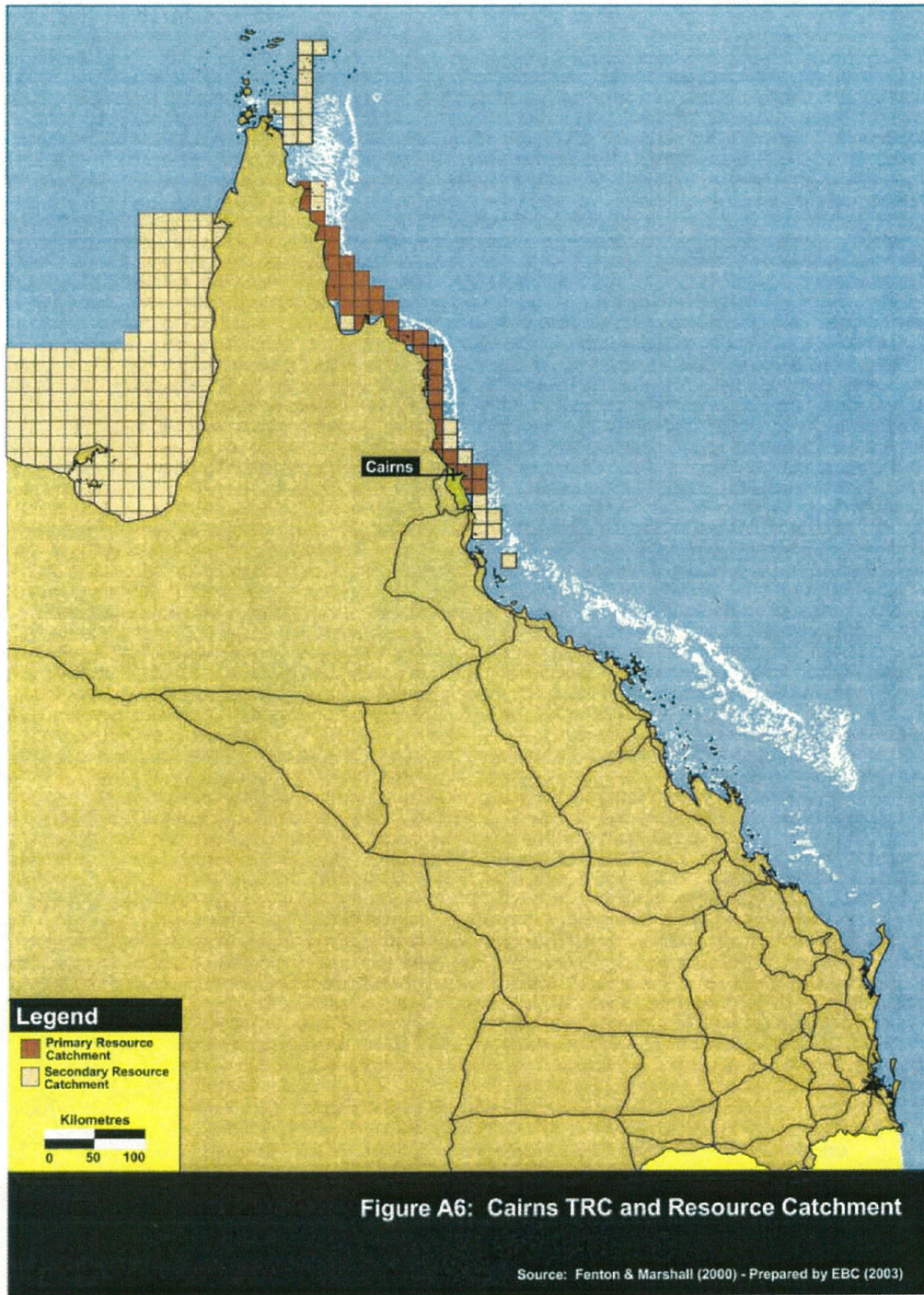
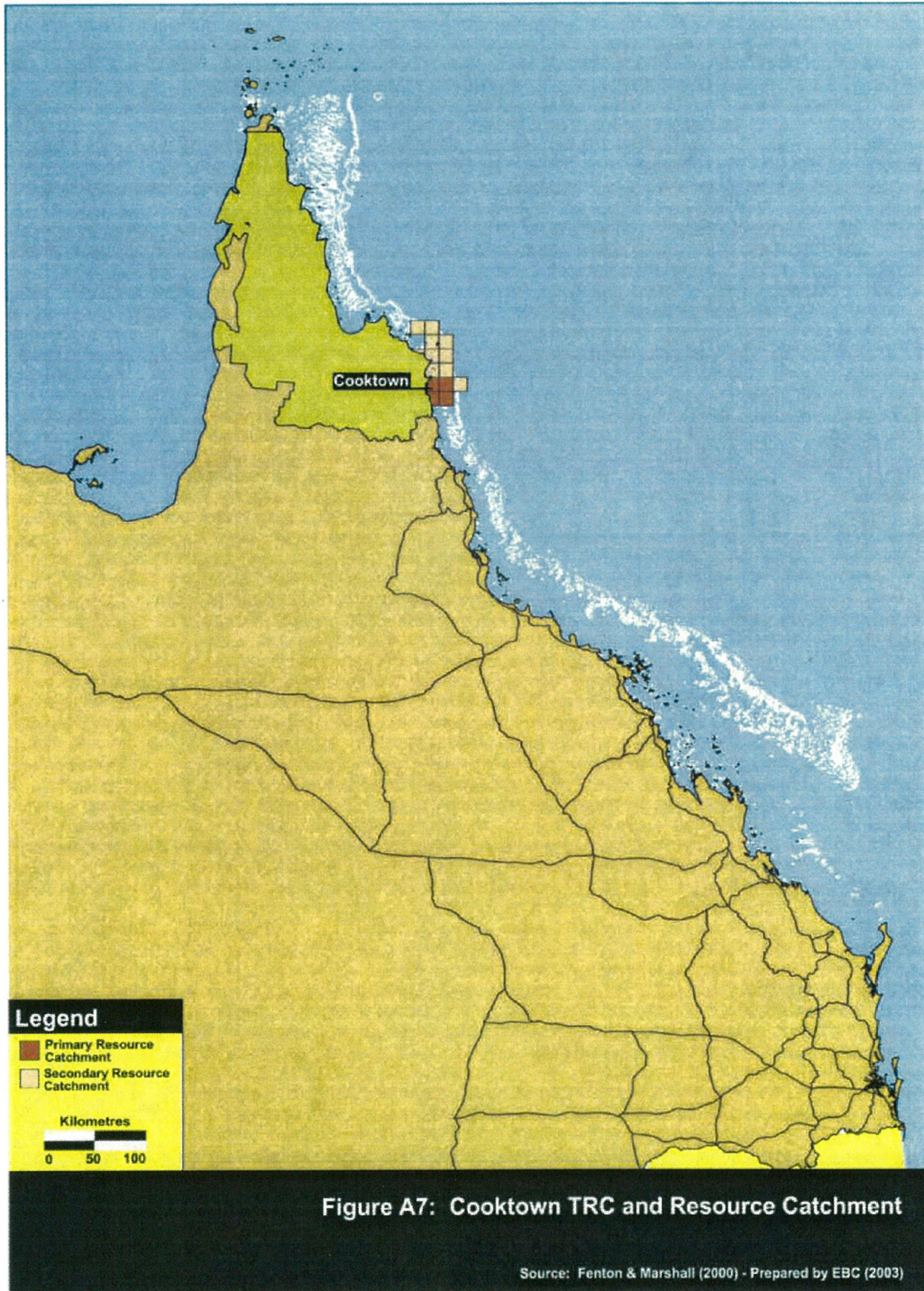


Figure A4: Brisbane TRC and Resource Catchment

Source: Fenton & Marshall (2000) - Prepared by EBC (2003)







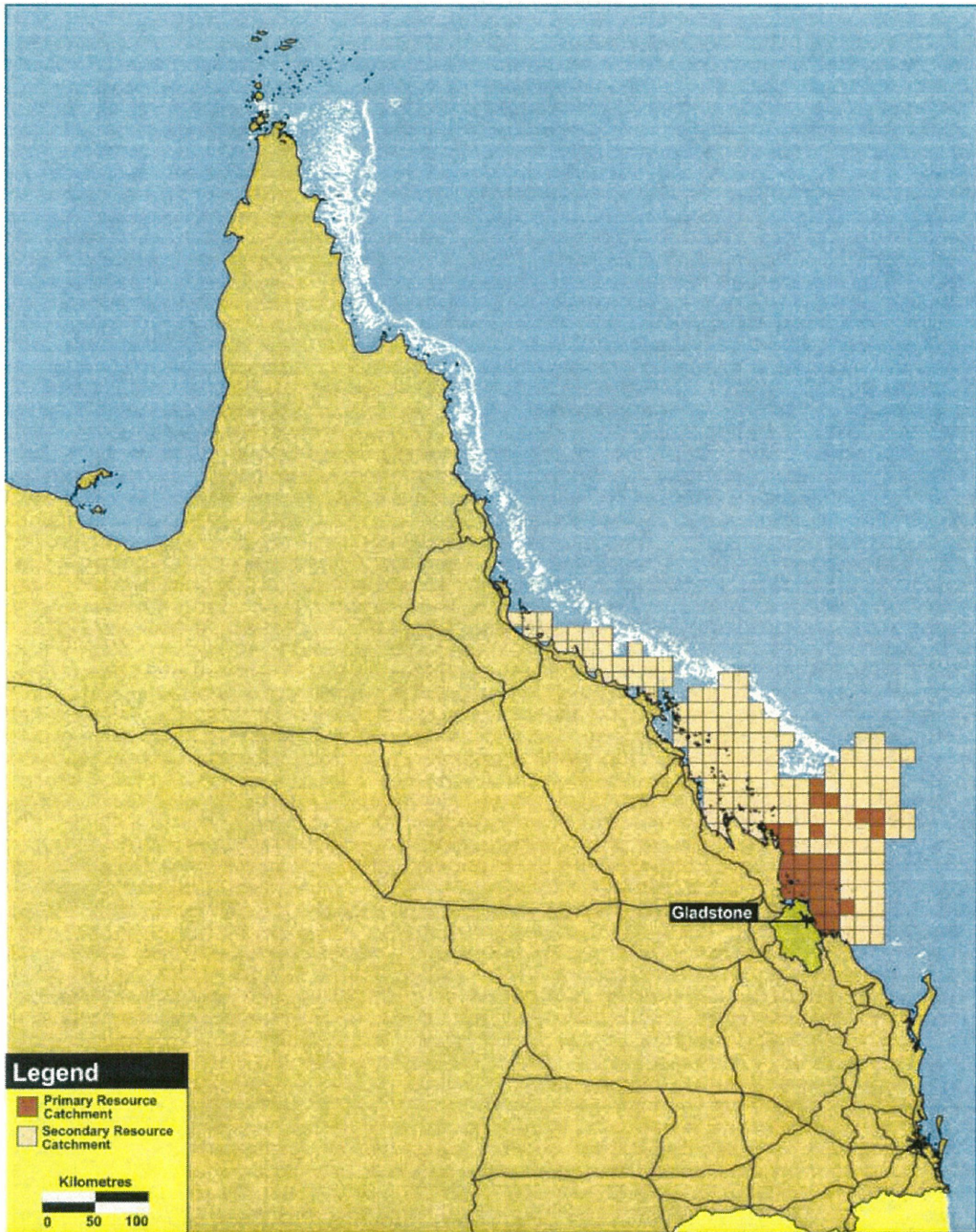
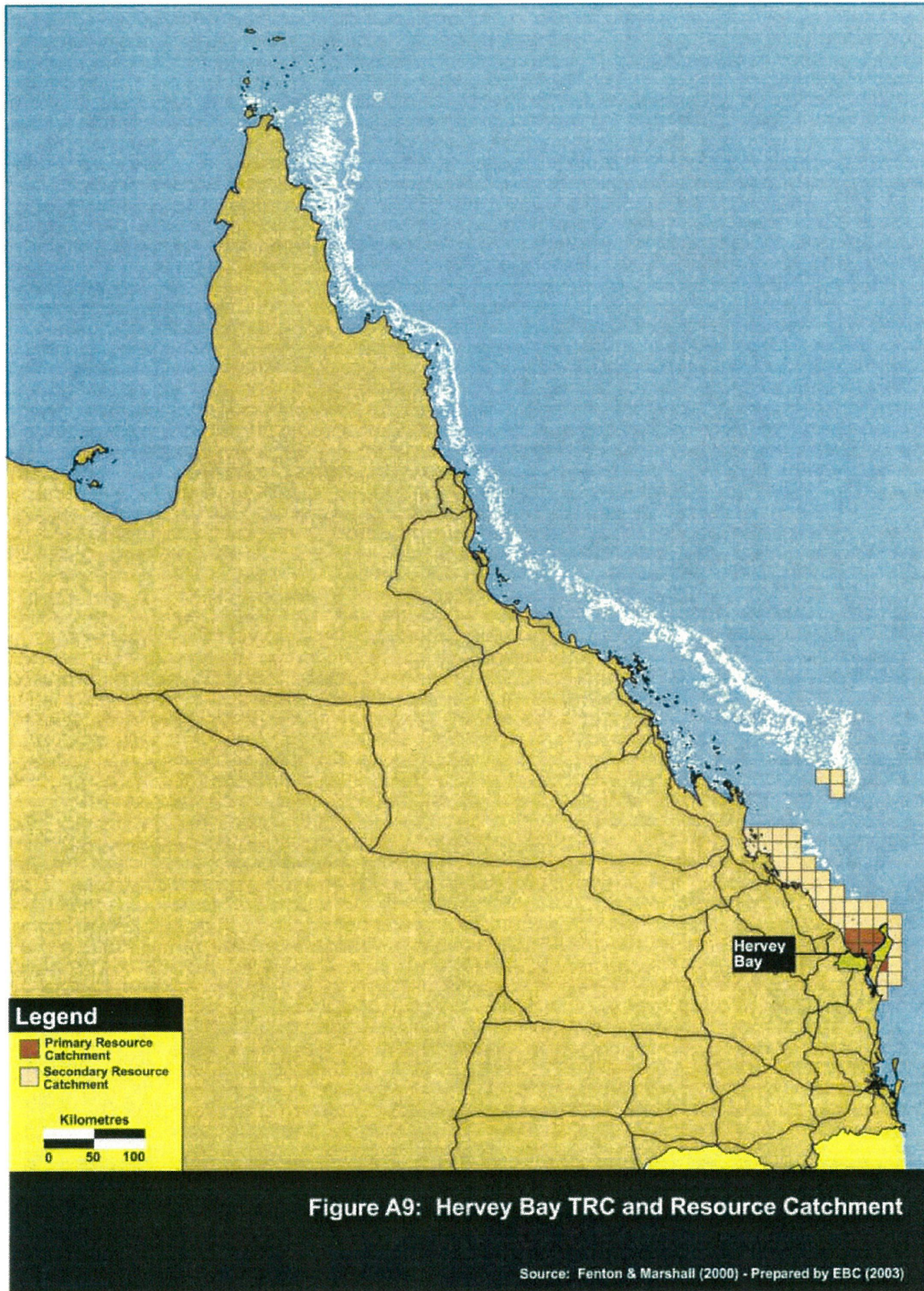


Figure A8: Gladstone TRC and Resource Catchment

Source: Fenton & Marshall (2000) - Prepared by EBC (2003)



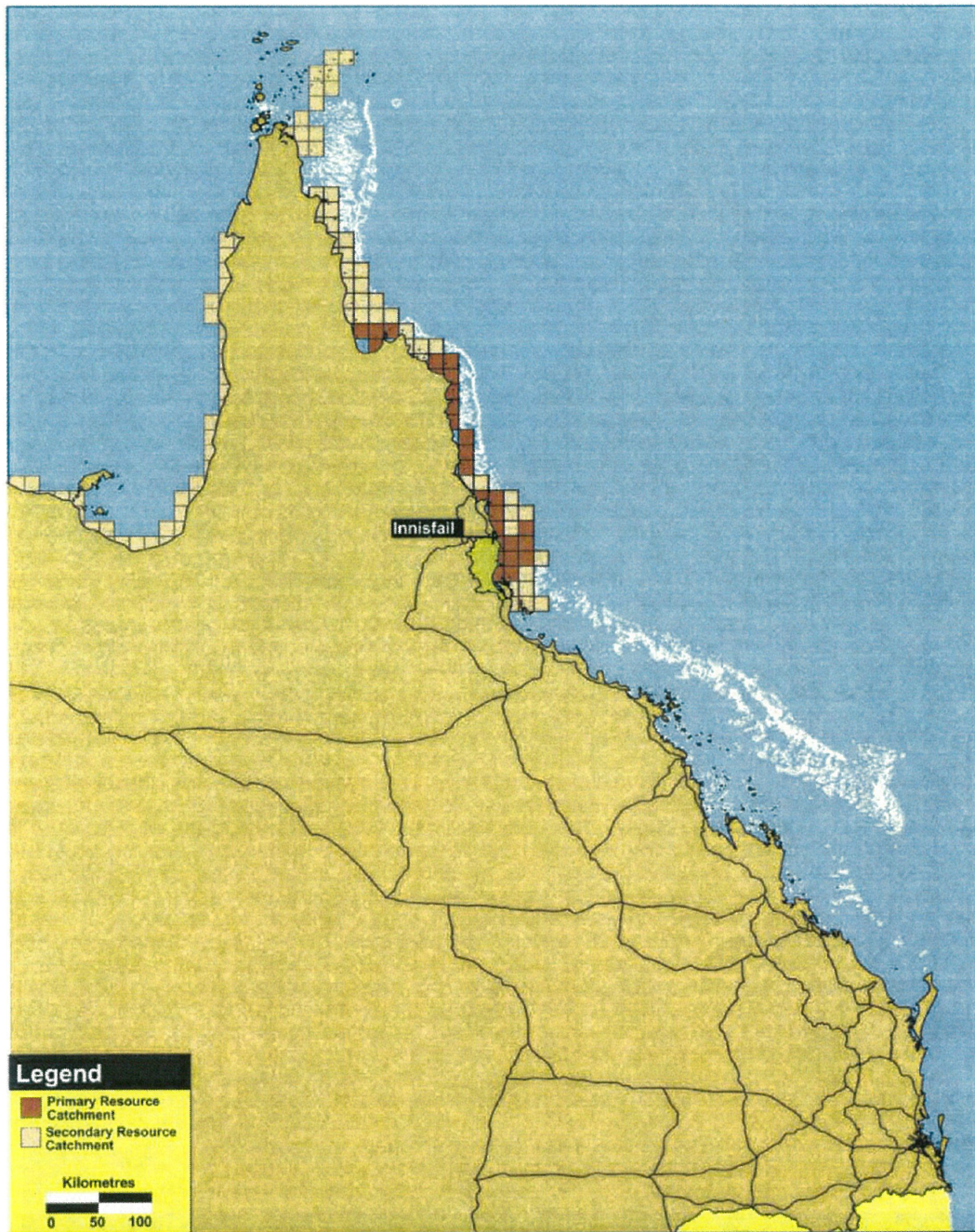
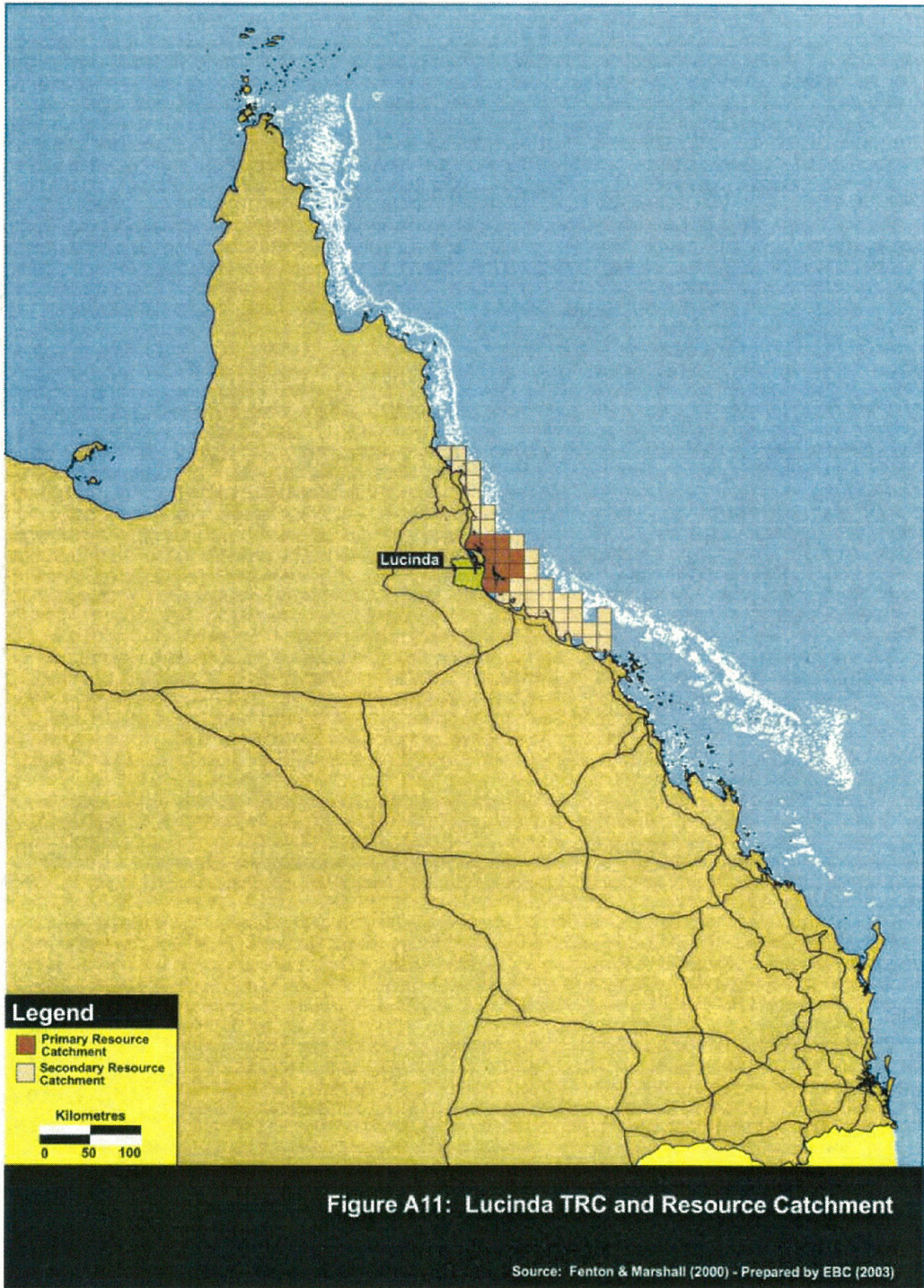
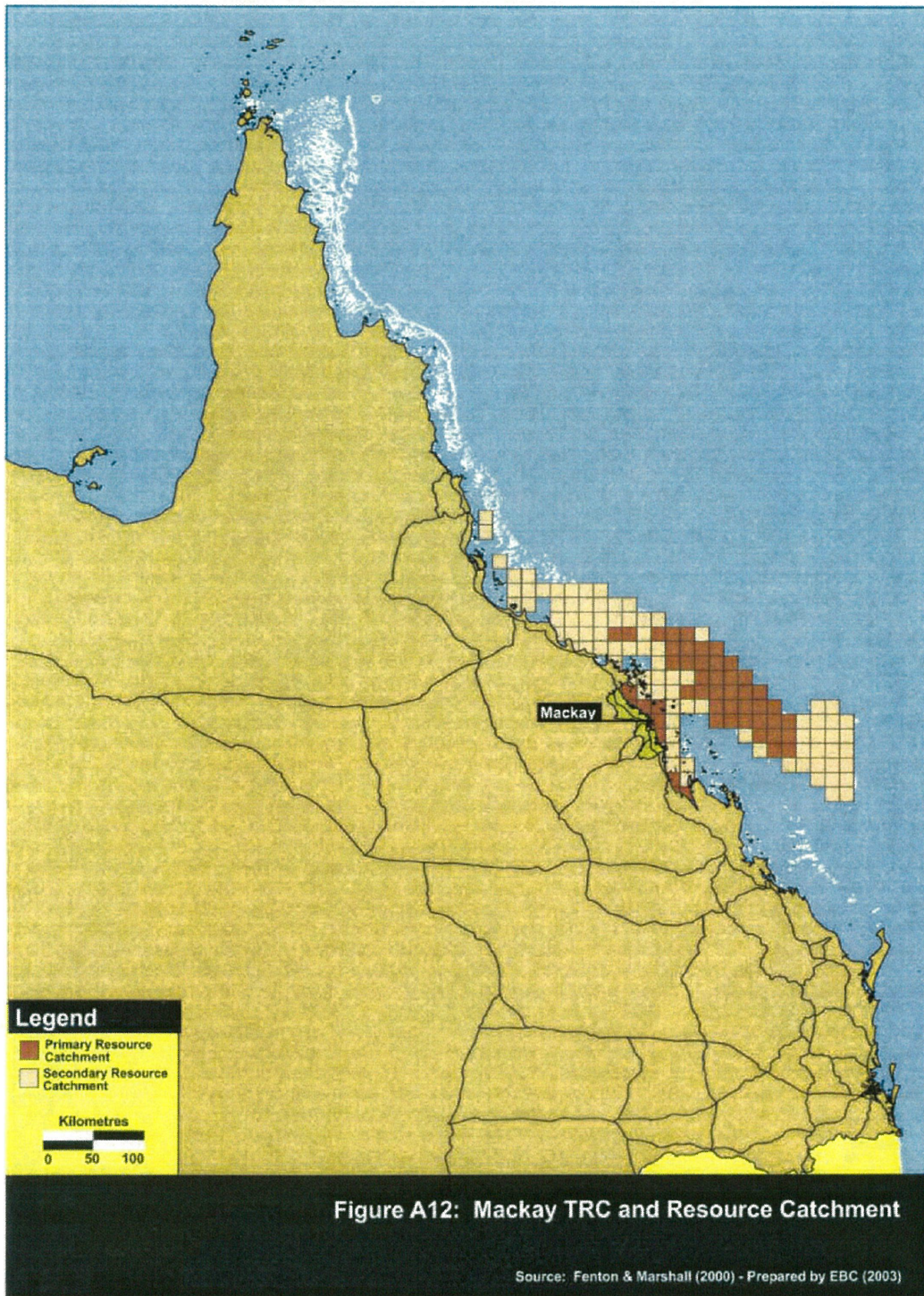


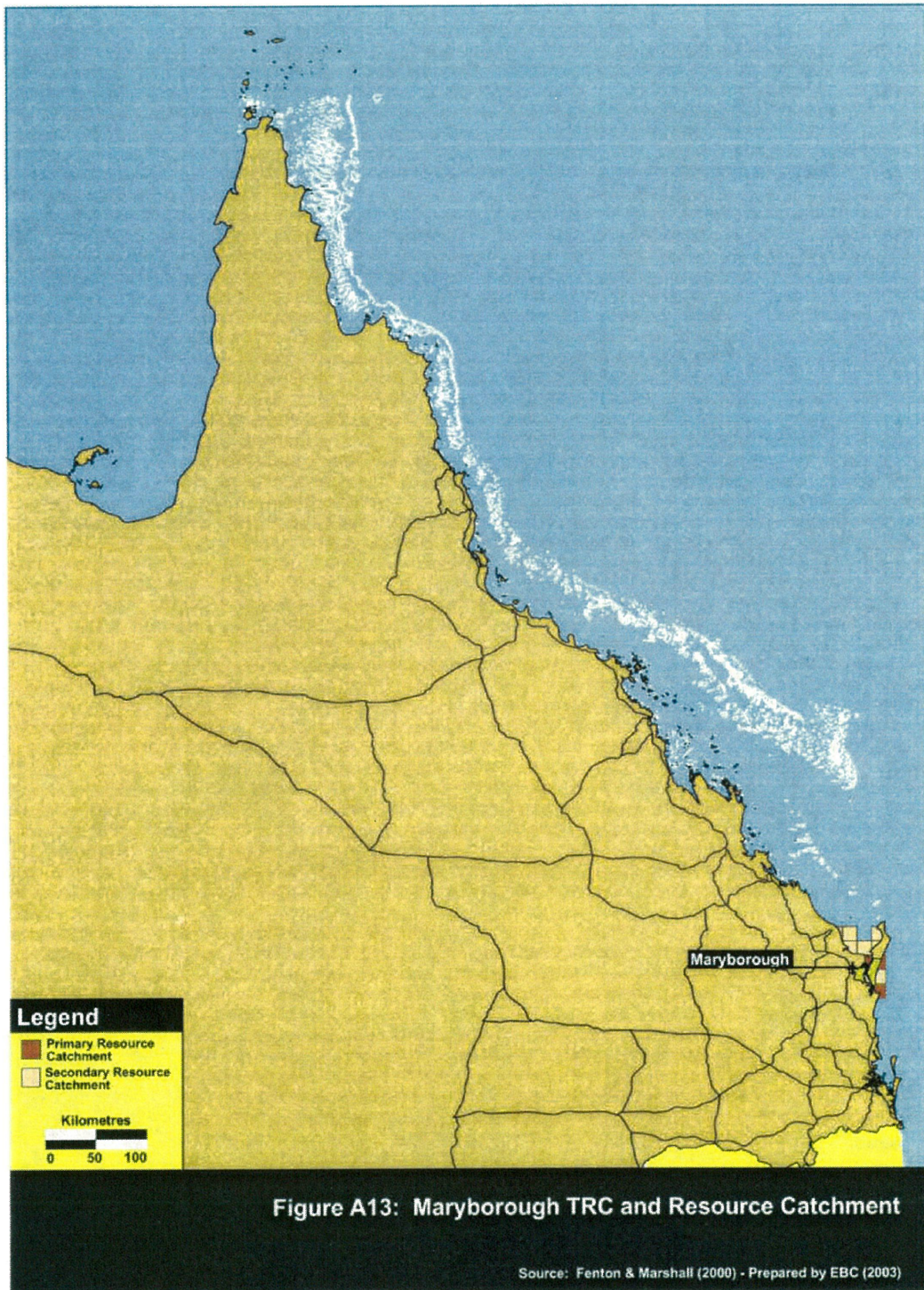
Figure A10: Innisfail TRC and Resource Catchment

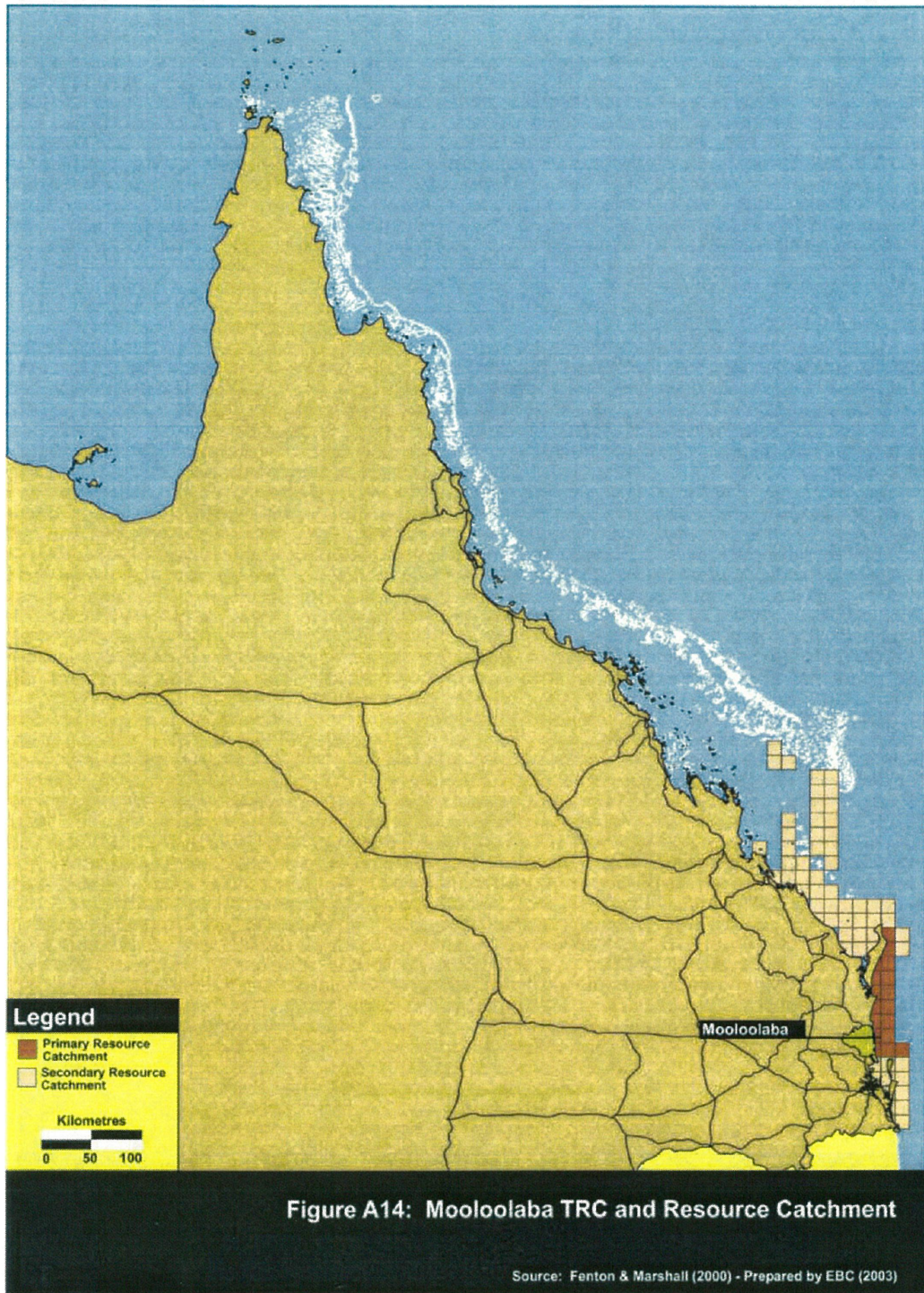
Source: Fenton & Marshall (2000) - Prepared by EBC (2003)

*The Library
Great Barrier Reef
Marine Park Authority
P.O. Box 1379
Townsville, 4810*









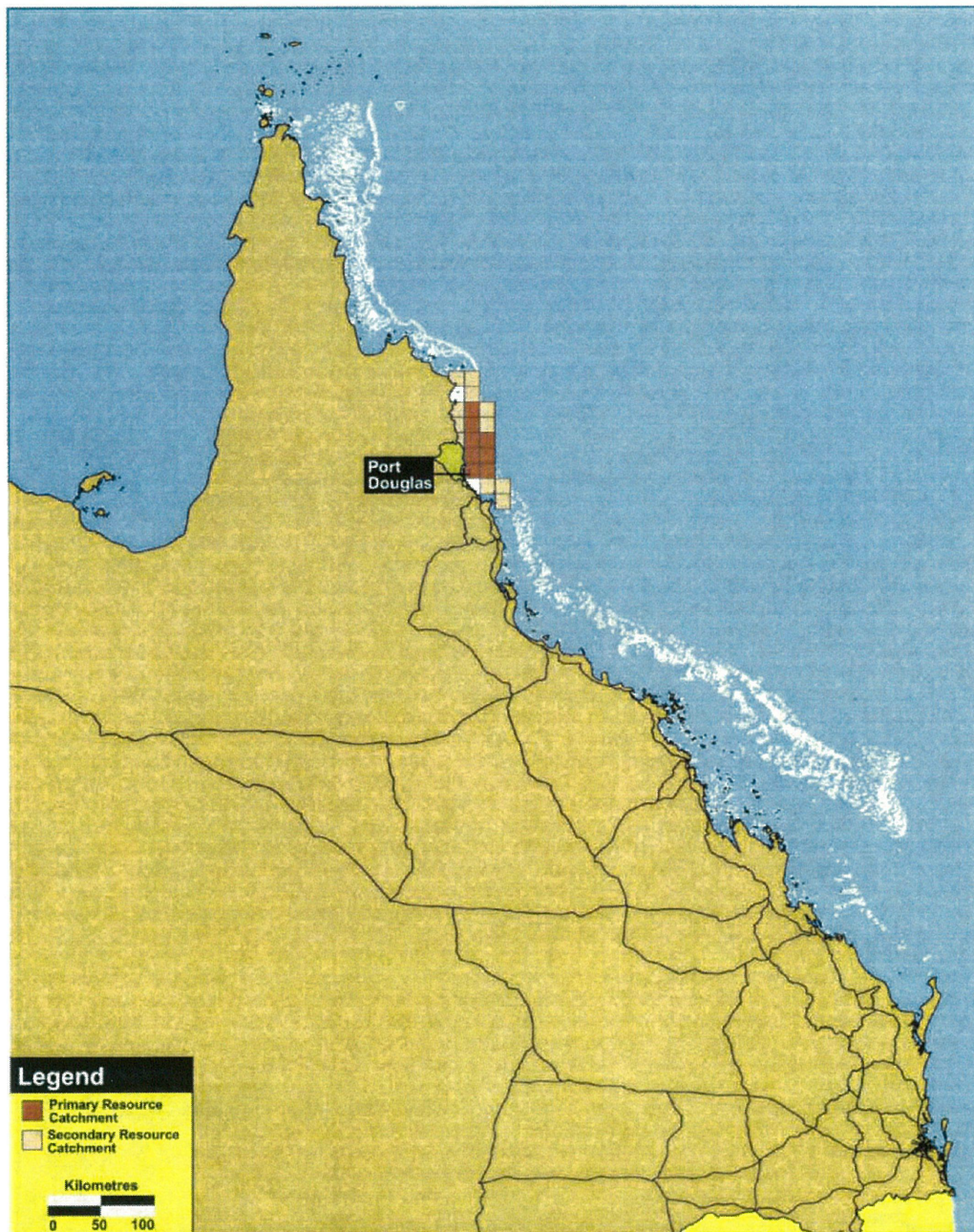
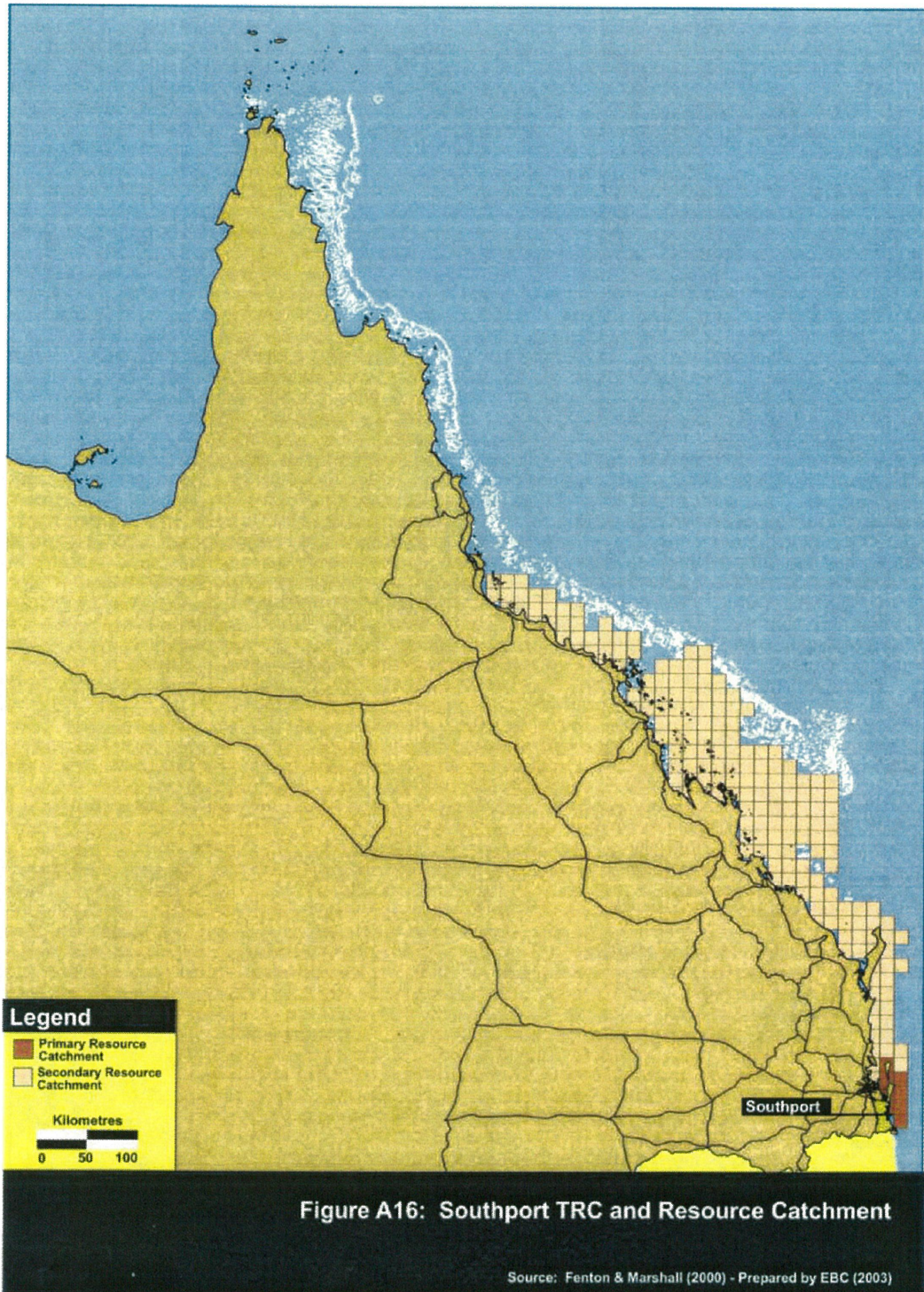
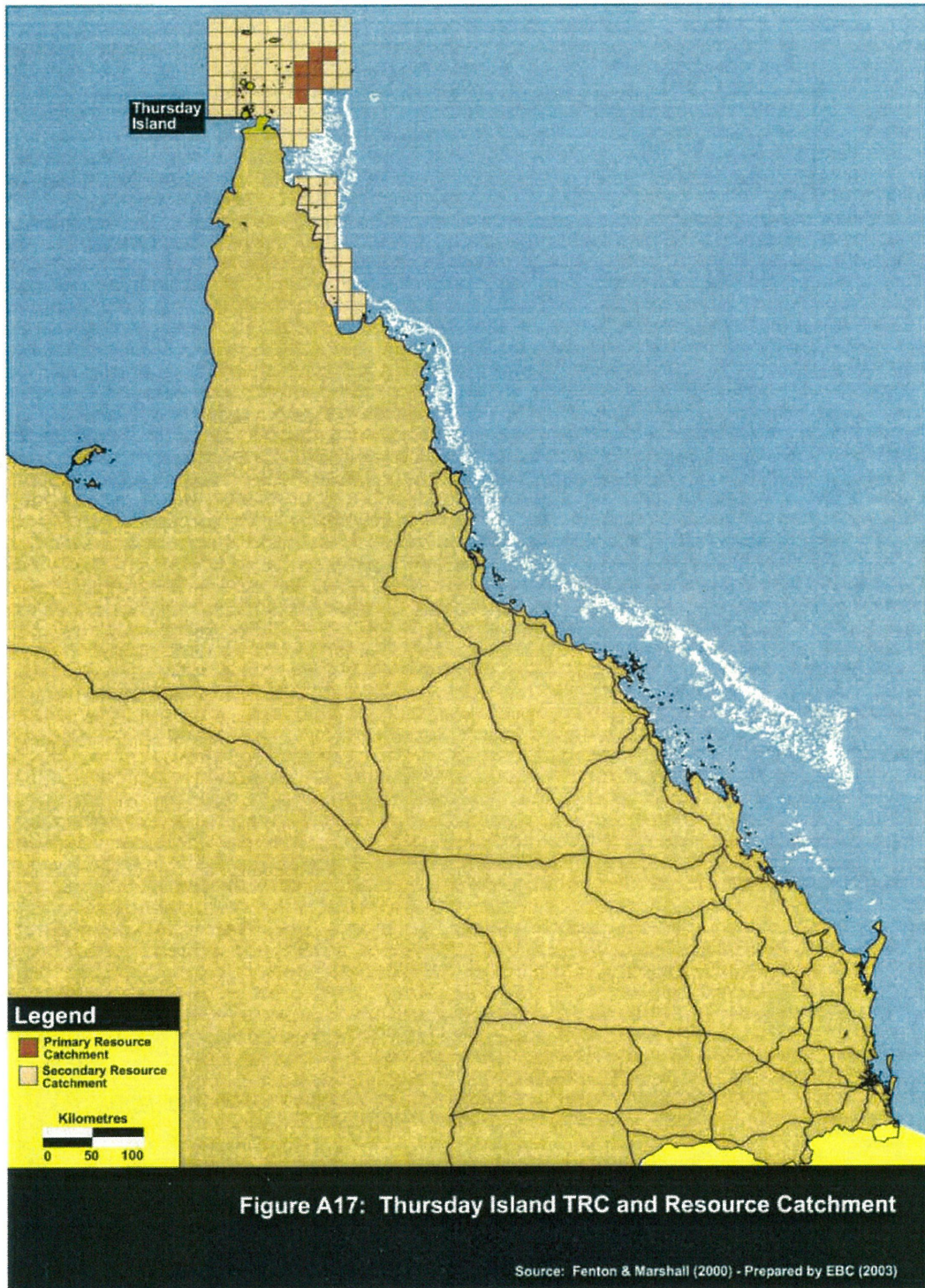


Figure A15: Port Douglas TRC and Resource Catchment

Source: Fenton & Marshall (2000) - Prepared by EBC (2003)





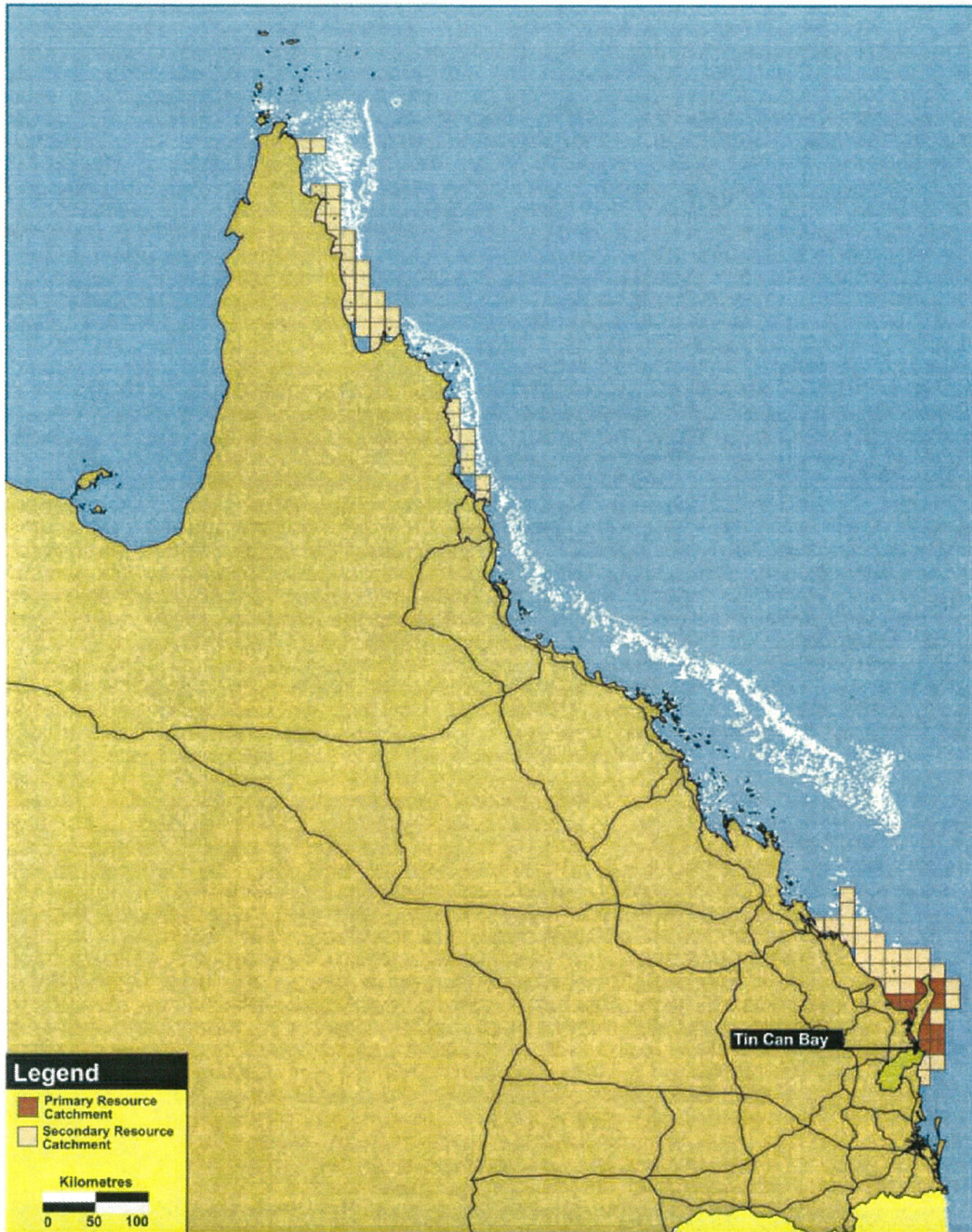


Figure A18: Tin Can Bay TRC and Resource Catchment

Source: Fenton & Marshall (2000) - Prepared by EBC (2003)

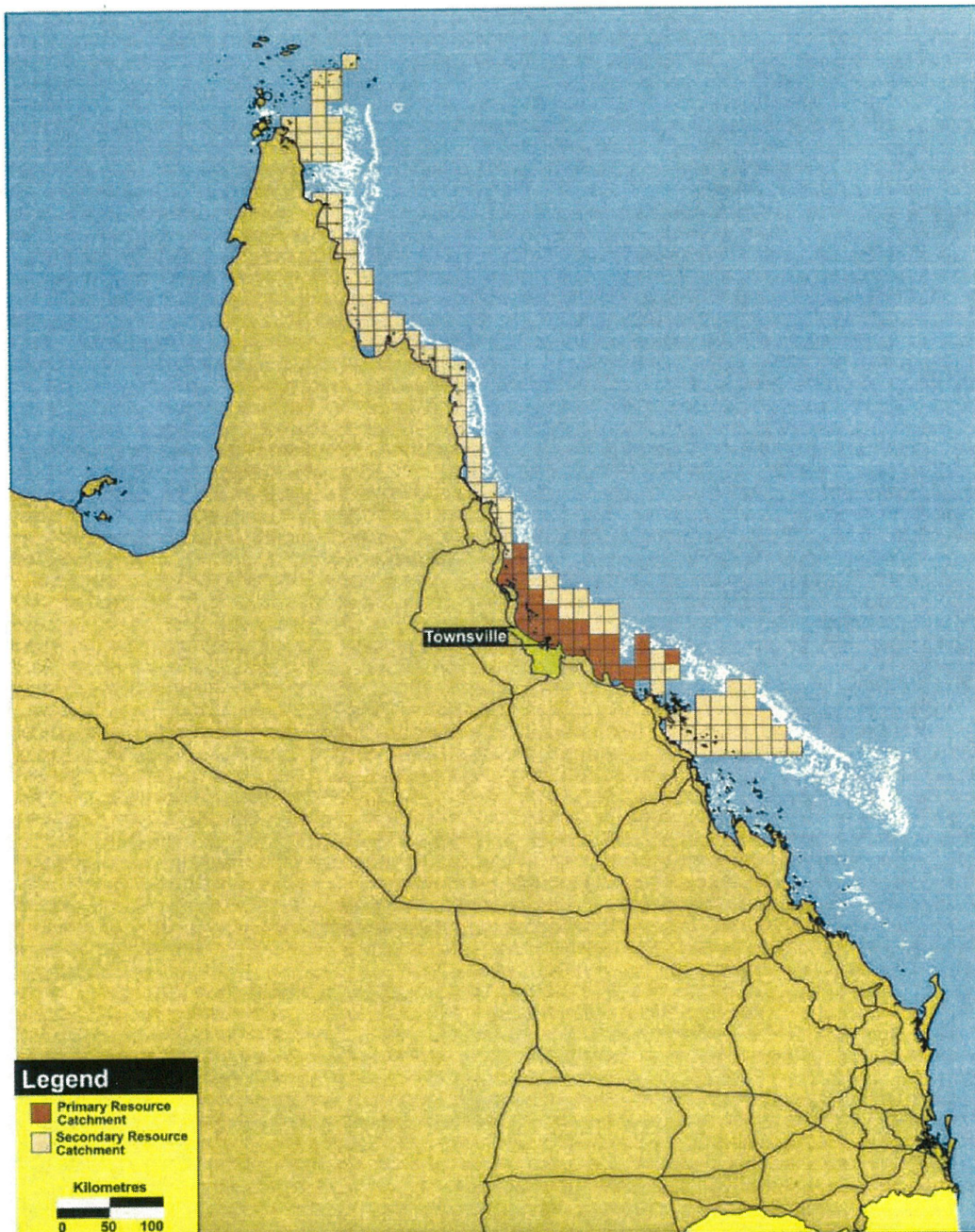


Figure A19: Townsville TRC and Resource Catchment

Source: Fenton & Marshall (2000) - Prepared by EBC (2003)

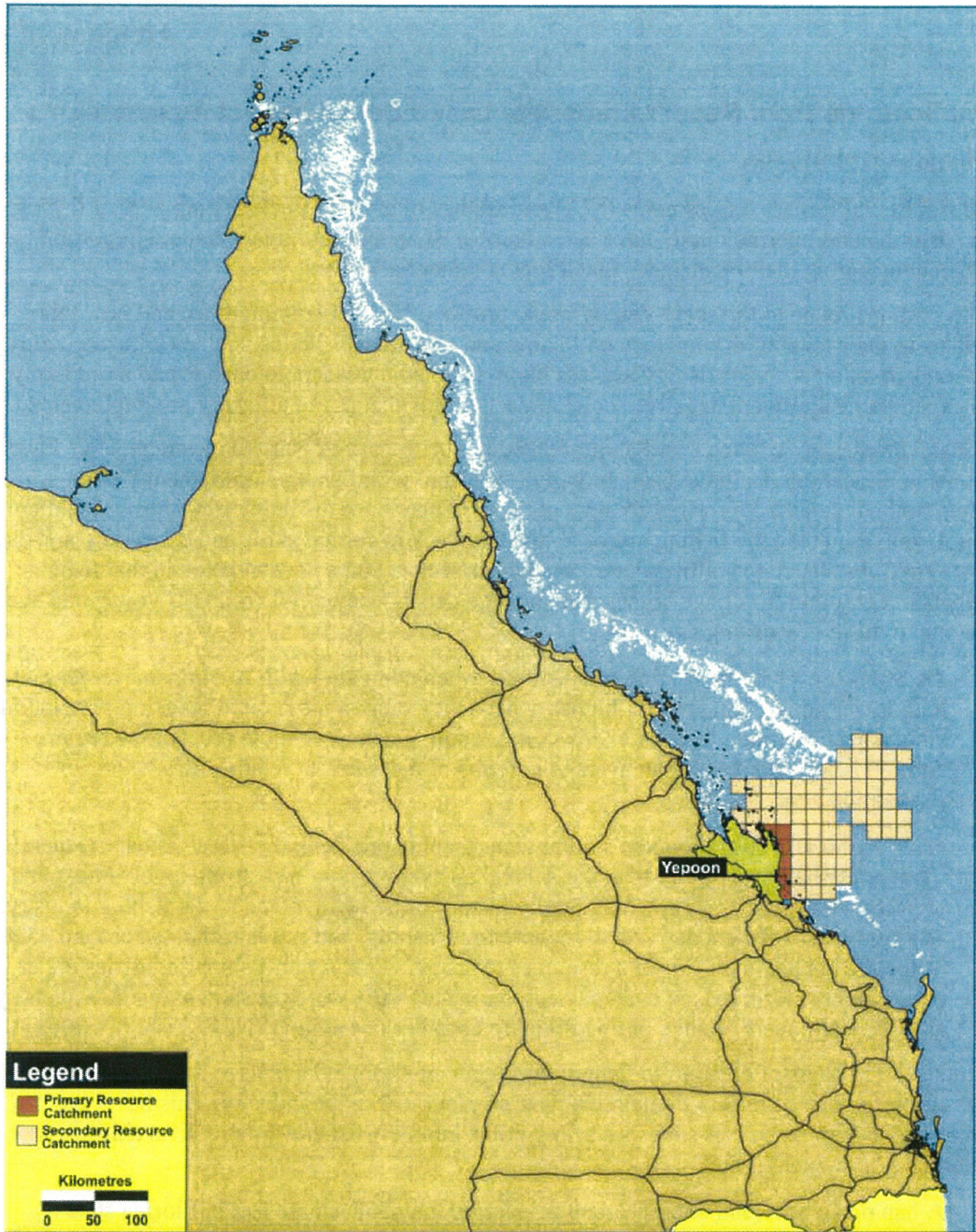


Figure A20: Yepoon TRC and Resource Catchment

Source: Fenton & Marshall (2000) - Prepared by EBC (2003)

Implications from Recent Fisheries- based Social Impact Assessments

Commercial Fisheries

Recent Social Impact Assessments (SIA) and studies of social aspects of commercial fishing in Australia and internationally have had a number of common findings that are important when considering making changes that affect commercial fishers.

The findings relate to the socio-demographic profile of fishing communities, and how this relates to their level of dependence on fishing and particular fisheries. Fishers who are highly dependent on a particular fishery are less likely to be able to adapt to change and more likely to experience significant negative social impacts when changes to a fishery are implemented.

Several studies have found that fishing-related populations are older than average, have lower levels of education, and have been strongly associated with fishing employment for some time. Some studies have further found that many fishers have difficulty transferring to other employment outside the fishing sector both due to lack of formal skills and education, and due to cultural resistance to shifting out of the fishing sector. Some have also found that fishing dependent communities have higher than average dependency ratios (ratios of young and aged people to those of working age).

- the South-East Marine Region of Australia, when compared with Australian averages, had: lower population growth; higher dependency ratio; a more rapidly ageing population; a higher ratio of men to women; lower household incomes in some parts of the region; and fell below the Australian average in terms of measures of relative disadvantage. (Larcombe *et al.* 2002)
- NSW Fisheries (2001) found a similar demographic profile in the NSW Estuary General Fishery. Fishers were older than the Australian average, and had strong involvement and identity with fishing, often with a family history of being involved in the fishing industry. Almost 80% of fishers derived all income from fishing, and it was estimated around 25% of the fishers had the skills and resources to access work in non-fishing industries either part time or full time. However, '... approximately 70% were insistent about their identity as fishers and were unable, or unwilling, to consider re training.'(NSW Fisheries 2001)

Studies on impacts of changes to fishery management arrangements have highlighted a very strong preference of fishers to maintain their employment in the industry. This has been shown to lead to responses such as shifting effort into new fisheries, rather than shifting to another employment sector.

- A ban on commercial entanglement nets larger than 500 square feet in Florida state waters resulted in considerable negative impacts on fishing families, particularly through increasing stress levels for both the fishers and their families, associated with higher levels of depression, anger and anxiety. These negative impacts lasted well after the ban was put in place. Despite government assistance in job retraining and direct financial assistance, the primary problems were a lack of effective coordination of government assistance, and a lack of start up capital for fishing families to develop alternative enterprises. The tendency of fishing families who did not manage to shift to alternative enterprises to remain in fishing and target different species may actually have placed more pressure on the marine environment (Smith *et al.* 2003).
- Restrictions on gear, quotas or closures in the New England region of the USA usually led to a shift into new fisheries, indicating the very strong preference of fishers to maintain employment in the fishing industry rather than shift employment to a different sector. Fishers often supplemented fishing employment with other work when fishing income was reduced, and retraining programs in aquaculture were generally unsuccessful, primarily due to cultural attachment to commercial wild catch fishing (Hall-Arber *et al.* 2001). The ability of fishers to adapt to changes made to their current fishery also

depended on the associated regulatory environment, and how much it restricted their ability to shift into other fisheries. This study identified five variables that had high success in predicting dependence on fisheries:

1. The degree to which fishers 'are isolated or integrated into alternative sectors of the economy or alternative fisheries' (Hall-Arber *et al.* 2001) with more isolated fishers more dependent on a single fishery;
2. Type of vessels used, with highly specialised vessels more likely to indicate high levels of dependence on a single fishery;
3. Degree of specialisation within the fishery, with more specialised roles more dependent on the fishery;
4. Percentage of population involved in fishing or fishing related activities; and
5. Higher levels of conflict and competition between fishing fleets in a port.

Marine Parks and Marine Protected Areas

Few authors have examined the social impacts in relation to Marine Protected Areas (MPAs).

A social impact study into potential impacts of establishing 13 highly protected marine national parks and 11 marine sanctuaries in Victoria coastal and estuarine areas concluded that the level of impact depended largely on the ability of commercial fishers to secure catch from alternative areas. If alternative sources of catch were not found, a potential job loss of 0.3% of all employment in towns near the recommended marine parks was estimated (Essential Economics Pty Ltd 2000).

The study found most Victorian coastal towns had relatively low dependence on commercial fishing, and so the net effect on coastal town economies of declaration of marine sanctuaries was unlikely to be significant. The limited impact on employment was based on an analysis that the proposal would affect only a small percentage of the commercial catch (only 11% of the abalone catch, 6.4% of the rock lobster catch and negligible effects on other commercial fishing). The analysis was also based on the assumption that the majority of employment associated with commercial fishing occurred in nearby towns. However, TRC analyses of marine social and resource catchments have shown that significant employment associated with a particular fishery can occur a considerable geographic distance from the waters of the fishery (see for example Larcombe *et al.* 2002). The Victorian analysis did not attempt to examine the ability of commercial fishers to transfer out of the commercial fishing industry, or their cultural attachment to commercial fishing.

Potential social costs and benefits of fisheries reserves to commercial fishers include (Committee on the Evaluation, Design, and Monitoring of Marine Reserves and Protected Areas in the United States, 2003):

- **Yield:** May lower catch temporarily or in long-term, or alternatively may help assure long-term stability of the resource, and hence provide support to long-term employment in the commercial fishing sector;
- **Displacement:** A significant negative impact may be the impact on commercial fishers and fishery dependent businesses, who may have to travel to more distant fishing areas. Displacement may also increase fishing pressure on areas still open to commercial fishing.
- **Enforcement:** Enforcement of new MPA boundaries can be costly, but using consultative approaches and engaging stakeholders can reduce enforcement costs.
- **Management:** The implementation of MPAs can result in new requirements for information and management systems.
- **Economic activity:** There may be disproportionate negative impacts on communities dependent on the MPA area, and possible short-term negative economic impacts. In the long term, potential for tourism and recreation and for increased yields of fish stock may provide positive impacts.

Mobility of fishers located with the Town Resource Clusters

The table below provides information on two independent indices of mobility for fishers located within each of the Town Resource Clusters (TRCs).

The Fisheries Type Index is a simple index of the proportion of trawl licences to non-trawl licences. Trawl operations generally have higher mobility than non-trawl operations such as netting, crabbing and line fishing. A score of 1.00 on this index indicates equal proportions of trawl and non-trawl licences, while a score of 0.33 such as found in Bowen would indicate there are one-third the ratio of trawl licences to non-trawl licences.

The table also describes a somewhat more complex index of mobility based on the earlier survey research of Fenton and Marshall (2000). Through interviews with fishers in each TRC the spatial location of their resource use was identified and described using 15-minute grids. The Grid Mobility Index is the average number of 15 minute grids used by each fisher from each TRC. In this case the fishers from Ayr are significantly less mobile using an average of 4 15-minute grids, while in comparison the fishers from Bundaberg are significantly more mobile using an average of 39 15-minute grids. Figure 2 shows the distribution of the Grid Mobility Index across TRCs

Table 3: TRCs and Trawl and Non-Trawl Licence Holders (2003)

TRCs	Fisheries Type Index	Grid Mobility Index
Bowen	0.33	27.30
Brisbane	0.32	18.61
Bundaberg	0.49	39.13
Ayr	0.25	4.00
Cooktown	0.00	11.00
Tin Can Bay	1.14	38.73
Port Douglas	0.08	28.75
Gladstone	0.22	42.64
Southport	0.52	44.10
Hervey Bay	0.63	44.14
Lucinda	0.09	25.33
Innisfail	0.44	28.84
Yeppoon	0.12	23.80
Mackay	0.22	42.45
Mooloolaba	0.50	28.40
Maryborough	0.21	10.73
Thursday Island	0.00	37.17
Townsville	1.05	50.33
Arlie Beach	0.09	19.80
Cairns	0.64	59.21

Prepared by: EBC (2003).

Some support for the validity of the indices of mobility is evident in the positive correlation of 0.56 between the two indices. It is probable given that the Grid Mobility Index is based on direct interview research, that it is also the more valid index of mobility and for this reason is used as the more preferred index in further analyses.

Fenton (2003)

Attachment 6

Table: Family Resilience Index for TRCs

Profiles	Airlie				
			Beach Bowen	Ayr Brisbane Bundaberg	
Homeport of trawl businesses	1	3	9	65	40
Homeport of line, net and crab businesses	11	12	27	205	81
Housing					
Percent rental accommodation	20.0	5.9	28.9	22.9	31.6
Percent fully owned	46.7	52.9	23.7	43.5	38.9
Percent purchasing	13.3	29.4	35.5	26.0	20.0
Mean years resident in the town	21.6	23.1	22.4	26.1	20.2
Age Profiles					
Mean age	40.5	36.8	38.4	41.5	39.4
Age dependency ratio	53.3	8.1	49.9	36.1	35.0
Elderly dependency ratio	3.3	0.0	0.0	2.8	2.5
Child dependency ratio	50.0	8.1	49.9	33.3	32.5
Family					
Mean family size	3.1	2.5	3.3	3.1	2.9
Family member industry dependency ratio	25.0	17.4	30.6	34.1	32.2
Income					
Percent gross income less than \$26,000	45.5	41.6	50.0	46.1	48.2
Employment					
Percent moved town to retain employment	20.0	17.6	18.6	19.1	28.8
Percent currently employed in other industry	33.3	88.2	39.5	25.6	27.2
Percent previously employed in other industry	71.4	81.3	75.6	64.4	75.5
Percent with partner employed in business	50.0	50.0	13.5	50.4	49.0
Mean years employed in the fishing industry	14.5	11.7	14.7	18.3	15.4
Education					
Percent completed to year 10	53.3	76.5	69.8	72.1	76.2
Percent completed trade or TAFE certificate	53.3	52.9	39.5	39.2	43.2
Percent completed industry or business course	13.3	5.9	16.3	16.9	16.8
Family Resilience Index	-0.11	0.80	-0.30	-0.04	-0.05
Profiles	Hervey				Innisfail
	Cairns	Cooktown	Gladstone	Bay	
Homeport of trawl businesses	53	0	12	20	23
Homeport of line, net and crab businesses	83	5	54	32	52
Housing					
Percent rental accommodation	24.0	46.7	30.6	25.4	17.3
Percent fully owned	35.4	20.0	32.9	33.9	53.1
Percent purchasing	32.3	13.3	23.5	35.6	19.8
Mean years resident in the town	18.1	10.4	17.0	16.7	21.7
Age Profiles					
Mean age	41.2	42.2	38.4	39.4	44.0
Age dependency ratio	36.1	40.0	29.9	42.4	35.3
Elderly dependency ratio	2.9	4.0	0.1	4.0	5.3
Child dependency ratio	36.1	36.0	28.8	38.4	30.0
Family					
Mean family size	3.0	2.3	2.8	3.1	3.2
Family member industry dependency ratio	31.1	45.5	29.6	35.5	31.2
Income					
Percent gross income less than \$26,000	31.7	66.7	40.6	22.4	46.4
Employment					
Percent moved town to retain employment	28.4	50.0	29.1	26.7	16.3
Percent currently employed in other industry	18.4	13.3	24.7	22.0	38.8
Percent previously employed in other industry	64.3	100.0	64.7	59.3	77.2
Percent with Partner Employed in the Business	30.0	50.0	79.4	58.1	59.1
Mean years employed in the fishing industry	18.3	13.7	13.4	17.2	18.3
Education					
Percent completed to year 10	78.4	60.0	71.9	69.6	46.4
Percent completed trade or TAFE certificate	27.6	46.7	38.8	23.7	38.8
Percent completed industry or business course	22.4	20.0	10.5	16.9	17.3
Family Resilience Index	-0.10	-0.27	0.01	-0.16	0.10

Note: Family member industry dependency ratio is the number of people in the family who are over 15 years of age and working in the fishing industry (excluding direct employees) as a proportion of all family members over 15 years of age.

Source: Fenton and Marshall (2000).

Prepared by: EBC (2003).

Table: Family Resilience Index for TRCs

Profiles					Port
	Lucinda	Maryborough	Mackay	Mooloolaba	Douglas
Homeport of trawl businesses	2	4	11	58	2
Homeport of line, net and crab businesses	23	19	49	115	25
Housing					
Percent rental accommodation	20.0	20.8	41.5	22.6	44.4
Percent fully owned	45.0	37.5	29.7	36.8	25.9
Percent purchasing	15.0	20.8	19.5	33.8	25.9
Mean years resident in the town	25.6	22.9	19.0	17.5	15.3
Age Profiles					
Mean age	41.6	39.1	38.8	42.0	37.3
Age dependency ratio	10.9	42.8	35.2	26.4	39.6
Elderly dependency ratio	1.8	0.0	0.4	2.4	2.1
Child dependency ratio	9.1	42.8	34.8	24.0	37.5
Family					
Mean family size	3.2	2.9	2.8	3.1	2.6
Family member industry dependency ratio	27.0	23.1	25.4	25.1	30.8
Income					
Percent gross income less than \$26,000	27.8	35.0	53.6	40.0	66.7
Employment					
Percent moved town to retain employment	31.6	8.3	16.1	23.9	18.5
Percent currently employed in other industry	50.0	12.5	36.1	24.6	22.5
Percent previously employed in other industry	61.1	66.7	79.5	73.5	74.1
Percent with partner employed in the business	53.3	26.7	65.0	59.5	57.1
Mean years employed in the fishing industry	20.2	16.8	12.4	16.7	12.2
Education					
Percent completed to year 10	77.9	83.3	82.0	70.8	62.9
Percent completed trade or TAFE certificate	36.8	13.0	33.1	46.3	53.8
Percent completed industry or business course	16.7	12.5	13.7	17.3	18.5
Family Resilience Index	0.41	-0.36	-0.21	0.17	-0.19
Profiles					Port
	Southport	Thursday Island	Tin Can Bay	Townsville	Yeppoon
Homeport of trawl businesses	22	0	24	39	6
Homeport of line, net and crab businesses	42	9	21	37	50
Housing					
Percent rental accommodation	18.0	42.9	21.4	28.9	19.7
Percent fully owned	42.0	50.0	53.6	35.5	42.6
Percent purchasing	32.0	0.0	17.9	23.7	26.2
Mean years resident in the town	25.8	19.1	25.8	21.9	23.9
Age Profiles					
Mean age	45.6	40.3	42.8	42.4	44.1
Age dependency ratio	32.8	30.3	15.2	33.4	37.2
Elderly dependency ratio	5.3	0.0	3.0	1.2	9.1
Child dependency ratio	27.5	30.3	12.2	25.4	34.8
Family					
Mean family size	3.1	2.9	2.6	3.1	2.8
Family member industry dependency ratio	16.9	42.1	28.2	33.6	26.7
Income					
Percent gross income less than \$26,000	36.4	30.8	35.0	42.7	54.2
Employment					
Percent moved town to retain employment	31.4	20.0	10.3	26.3	18.0
Percent currently employed in other industry	25.5	33.3	10.3	16.9	24.6
Percent previously employed in other industry	68.0	80.0	65.5	79.2	73.8
Percent with Partner Employed in the Business	34.6	49.7	56.3	60.0	41.4
Mean years employed in the fishing industry	20.7	14.3	19.1	15.9	16.6
Education					
Percent completed to year 10	62.8	40.1	82.2	64.9	79.3
Percent completed trade or TAFE certificate	38.0	26.7	37.9	46.1	36.1
Percent completed industry or business course	18.0	20.0	20.7	16.9	18.0
Family Resilience Index	0.21	-0.01	0.28	0.06	-0.24

Note: Family member industry dependency ratio is the number of people in the family who are over 15 years of age and working in the fishing industry (excluding direct employees) as a proportion of all family members over 15 years of age.

Source: Fenton and Marshall (2000).

Prepared by: EBC (2003).

Fenton (2003)

References

- ABARE 2003. *Australian Fisheries Statistics 2002*, Australian Bureau of Agricultural and Resource Economics, Canberra.
- Badalamenti, F.; Wahle, C.; Causey, B.; Simms, J. and Tulungen, J. 2002. Human dimensions of MPAs: Facing the challenges of social science and its implications. *MPA News* 4(1): July.
- Badalamenti, F. *et al.* 2000. Cultural and socio-economic impacts of Mediterranean marine protected areas. *Environmental Conservation* 27: 110-125.
- Caton, A. and McLoughlin, K. (eds) 2000. *Fishery Status Reports 1999: Resource Assessments of Australian Commonwealth Fisheries*. Bureau of Rural Sciences, Canberra.
- Clifton, J. 2003. Prospects for co-management in Indonesia's marine protected areas. *Marine Policy* 27: 389-395.
- Committee on the Evaluation, Design, and Monitoring of Marine Reserves and Protected Areas in the United States; Ocean Studies Board; Commission on Geosciences, Environment, and Resources; and National Research Council. 2003. *Marine protected areas: tools for sustaining ocean ecosystems*. National Academy Press, Washington D.C.
- Environment Conservation Council. 2000. *Marine Coastal and Estuarine Investigation: Final Report*. August 2000, Environment Conservation Council, East Melbourne.
- Essential Economics Pty Ltd. 2000. *Potential Social and Economic Effects of Recommendations for Victoria's Marine, Coastal and Estuarine Areas: A Review of the Recommendations in the Environment Conservation Council's Marine, Coastal and Estuarine Investigation Final Report*. Prepared for the Environment Conservation Council, September 2000.
- Fenton, D.M. 2003. *An assessment of the social impacts of implementing the revised zoning plan under the Representative Areas Program for the Great Barrier Reef Marine Park (GBRMP): A profiling assessment based on TRC-Analysis*. Report prepared for Bureau of Rural Sciences. Environment and Behaviour Consultants, Townsville, Queensland.
- Fenton, D.M. and Marshall, N.A. 2001. *A guide to the fishers of Queensland: TRC-Analysis and social profiles of Queensland's commercial fishing industry*. Report prepared for the CRC Reef Research, Townsville, Queensland.
- Hall-Arber, M.; Dyer, C.; Poggie, J.; McNally, J. and Gagne, R. 2001. *New England's Fishing Communities*. MIT Sea Grant College Program.
- Huddleston, V. and Drew, N. 2003. *The assessment of prospective changes to social infrastructure as the result of rock lobster industry management initiatives*. Report prepared for the Western Rock Lobster Council Inc. Institute for Regional Development, June 2003, Crawley WA.
- Larcombe, J.; Brooks, K.; Charalambou, C.; Fenton, M.; Fisher, M.; Kinloch, M.; and Summerson, R. 2002. *Marine Matters – Atlas of marine activities and coastal communities in Australia's South-East Marine Region*, Bureau of Rural Sciences, Canberra.
- Mascia, M.B. 2001. *Designing effective coral reef marine protected areas: a synthesis report based on presentations at the 9th International Coral Reef Symposium, Bali, Indonesia, October 2000*. April 2001, IUCN World Commission on Protected Areas – Marine.
- Mascia, M.B.; Bunce, L.; Llewellyn, G.; and Wilson, M. 2002. Designing and implementing effective marine protected areas. In Best, B.A., Pomeroy, R.S. and Balboa, C.M. *Implications for coral reef management and policy: Relevant findings from the 9th International Coral Reef Symposium, Bali, Indonesia, October 2000*. US Agency for International Development, USA.



Mirimbiak Nations Aboriginal Corporation. 2000. *Outcomes of consultation with Victorian Aboriginal communities on the ECC marine, coastal and estuarine investigation draft report (1999): Report to the Environment Conservation Council*. May 2000, Victoria.

NMPAC (National Marine Protected Areas Center) Science Institute. 2002. *Marine Protected Areas Social Science Workshop: Notes from Breakout Groups*. Marriott Hotel, Monterey California, April 8-9 2002.

NMPAC (National Marine Protected Areas Center) MPA Science Institute. 2003. *Social science research strategy for Marine Protected Areas*. June 11 2003, MPA Science Institute, Santa Cruz, California.

NSW Fisheries. 2001. *Estuary General Fishery Environmental Impact Statement Public Consultation Document*. November 2001, NSW Fisheries, Cronulla NSW.

Productivity Commission, 2002, *Industries in the Great Barrier Reef Catchment and Measures to Address Declining Water Quality – Issues Paper*, August 2002.

Queensland Government 2002. *Queensland Fisheries Profile*. Queensland Government, Department of Primary Industries, October 2002.

Smith, S.; Jacob, S.; Jepson, M.; and Israel, G. 2003. After the Florida net ban: the impacts on commercial fishing families. *Society and Natural Resources* 16: 39-59.

Taylor, N.; Bryan, C. and Goodrich, C. 1990. *Social assessment: Theory, process and techniques*. Centre for Resource Management, Canterbury.

Vanclay, F. 2003. *Social Impact Assessment: International Principles*. International Association for Impact Assessment Special Publication Series No. 2, May 2003, IAIA. URL: <http://www.iaia.org> Last accessed 23/10/2003.

Ward, T.J., Heinemann, D. and Evans, N. 2001. *The Role of Marine Reserves as Fisheries Management Tools: a review of concepts, evidence and international experience*. Bureau of Rural Sciences, Canberra, Australia. 192pp.

GBRMFA LIBRARY

Order No.

Cost

Accession

No. #1984

Call No.

333.951

609943

IMP

2003