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**CRC for Coastal Zone
Estuary & Waterway Management**



Sustainable Land Management & Wetlands Conservation on Freehold & Leasehold Land in the Great Barrier Reef Catchment

VOLUME 1

Capacity of NRM Regions and Local Governments in the Reef Catchment to Support Sustainable Land Management Practices and Conservation on Private and Leasehold Land

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Introduction

This report provides a profile of the Natural Resource Management (NRM) regions within the Great Barrier Reef (GBR) catchment influencing the water quality entering the GBR lagoon. The profile provides summary information to make an assessment of the capacity of individual land managers, the NRM regional bodies and local authorities to undertake land management and conservation activities. The NRM regions of interest are:

1. Burnett–Mary;
2. Fitzroy;
3. Mackay–Whitsunday;
4. Burdekin;
5. Wet Tropics; and
6. Cape York.

For the purposes of this report, capacity is defined as:

The ability of actors (individuals, groups, organisations, institutions, countries) to perform specified functions (or pursue specified objectives) effectively, efficiently and sustainably (UNDP 1995: 14).

In the context of this report, capacity is interpreted as the ability of individual landholders to undertake sustainable land management on private and leasehold land and the ability of regional organisations, industry and government institutions to facilitate and support sustainable land management outcomes.

According to the National Natural Resource Management Framework, land managers' capacity to undertake sustainable land management practices is dependent on whether they have the skills, knowledge and will to respond effectively to natural resource management challenges. Determining the type of skills and knowledge a land manager requires to undertake sustainable land management is relatively straightforward, although establishing the best way to impart those skills and knowledge is considerably more difficult. Identifying the factors that influence their will to change to more sustainable practices is complex and obviously varies greatly between individuals. That said, socio-economic characteristics and locality advantages of specific regions have been found to influence land managers' within those regions decisions about sustainable land management practices. Additionally, factors such as involvement in landcare groups and opportunities to participate in regional decision making and planning for NRM are said to have an impact on the 'will' of land managers to undertake sustainable land management (Webb and Curtis 2002: 98). It should be noted also that the uptake of sustainable land management practices depends also on how land managers assess the value of recommended practices and the degree of risk associated with implementing a new practice (Cary et al: 14). A detailed discussion of the factors that influence land managers' decision making with respect to sustainable land management can be found in Report 3.

Institutions¹ play a number of key roles in facilitating sustainable land management practices in terms of providing skills and knowledge and influencing the 'will' of land managers to undertake sustainable practices. This can involve changing perceptions about the degree of risk involved in undertaking specific land management activities, providing appropriate networks

¹ In this instance, institutions refers to all organisations, such as industry groups and regional bodies, and government agencies of all levels who are involved in building the capacity of individual land managers to undertake sustainable land management.

(e.g. Landcare groups) and support mechanisms (e.g. facilitators and coordinators) for landholders, as well as providing a sense of ownership of regional NRM issues by enabling them to participate in planning. Institutions can also influence the will of land managers to undertake sustainable land management practices, through the use of incentives, inducements and regulation. More effort is required in areas where the socio-economic characteristics could potentially reduce the motivation of land managers to undertake sustainable land management activities.

Part 1 investigates the socio-economic and demographic factors thought to be influential with respect to individual capacity to undertake sustainable land management. It compares the NRM regions within the GBR catchment on the basis of these socio-economic and demographic factors and provides detailed information on the major agricultural industries operating within the GBR catchment.

Part 2 examines some of the institutional factors that influence landholder's capacity to undertake sustainable land management on private land such as:

- The level of effort by government and non-government sectors in initiating and supporting sustainable land management activities by describing the sustainable land management programs operating within the reef catchment and determining the number of programs operating within each NRM region;
- The capacity of government and non-government organizations (NGOs) to provide opportunities and support for landholders to engage in planning for conservation outcomes and sustainable land management for wetlands management;
- The level of participation by private landholders in environmental programs in the reef catchment and ascertain the number of Landcare groups and environmental NGOs in regions;
- The number and funding levels of Envirofund (NHT2) projects in the GBR catchment; and
- Existing environmental education and training programs.

Part 1

**Social and economic capacity of NRM
regions in the reef catchment to promote
sustainable land management practices and
conservation on private land**

1. Social and economic capacity of the regions

The reef catchment encompasses a broad geographic area and comprises a broad range of resource uses, including agriculture, commercial fishing, mining, manufacturing as well as service industries such as the tourist industry. Agriculture is the dominant land use in the GBR catchment. Individual agricultural industries in the region require substantially different land management practices, have different cost structures and show variable returns on investment. As a result, there are considerable differences in the social and economic capacity of the regions to take up sustainable land management practices. The variability of the capacity of the GBR NRM regions is important information for policy makers designing incentive programs to improve natural resource management. It is stressed at the outset of this profile, that although information is provided in this report at the NRM regional scale, there are marked differences in industry, community and government capacity at a sub-catchment scale that are likely to be critical factors influencing take-up of sustainable land management.

An assessment of the social capacity of the regions to undertake sustainable natural resource management is problematic with respect to the choice of indicators or factors that influence social capacity. One of the issues is the accuracy of an indicator to measure change. Coakes et al. (2000) suggest that while there are many indicators that may be collected at an individual level, the relationship between these indicators and adoption of management practices is sketchy. In addition, the linkages that exist between social indicators and better environmental management are also unclear. While some studies have suggested that greater participation, higher sense of community and strong social networks may assist in the adoption of better practices, there is not sufficient research in this area to conclude that these linkages do in fact facilitate change at the individual level (Coakes et al. 2000).

Findings from the National Land and Water Resources Audit (2000) studies provide useful frameworks and information to support a better understanding of the linkages between agriculture and land management practices with the social capacity of rural landholders. The Audit identifies a number of factors that go some way towards measuring the social capacity of land managers to take up sustainable land management practices.

The factors suggested by Taylor et al. (2000) are described as:

- 1) Economic viability/resource sustainability: Fundamentally affects capacity in that adequate financial resources are needed to take action, and the natural resource base needs to be viable for this action to be sustained;
- 2) Community vitality: Refers to the general health and vitality of individuals, communities and regions. Community vitality indicators refer to a wide range of indicators such as health, housing, education, demographics, etc;
- 3) Institutional vitality and integration: Indicates the ability of a family's, company's, community's, industry's or region's institutions to operate in an integrative way, to use data effectively, to structure internal (within the institution) and external (between institutions) negotiations and to coordinate effort;
- 4) Political efficacy: Refers to the political capacity of individuals, communities and regions to build social capital, to engage in meaningful political partnerships/ negotiations, and to

participate in the political institutions available in society; and

5) Cognitive/appraisal: The series of psychological and cognitive factors that influence the way in which a given change event is perceived and understood.

Part 1 of this report investigates the first two factors, providing a snapshot of the socio-economic and demographic profile of the GBR NRM regions.

1.1 Economic Viability / Resource Sustainability

Consideration of land use and the structure of the economies of the regions, indicated by the sectoral distribution of gross output and the distribution of employment across industry sectors, the contribution of agriculture to gross output from the region, the diversification of agricultural activity as well as the type of agricultural activity undertaken in the regions, is likely to provide information about differences and similarities between the regions that would affect their capacity to take up natural resource management. The Goulburn–Broken catchment in Victoria has been adopted in this study as a catchment against which the GBR NRM regions can be benchmarked as it is generally considered to have a good track record with respect to the implementation of sustainable land management (CSIRO 2003).

1.1.1 Land use within the regions²

Agriculture is the primary land user in the GBR catchment NRM regions and in the Goulburn–Broken catchment as illustrated in [Table 1.1](#). Agriculture accounts for over 50% of land use by area in the Burnett–Mary (55%), Cape York (62%), Goulburn–Broken (68%), Fitzroy (75%) and Burdekin (90%). Grazing is the dominant agricultural land use in all NRM regions and in Cape York (62%), Fitzroy (63%) and the Burdekin (87%) it is the dominant form of land use across all categories. The ‘intensive use’ land classification (defined as urban, industry, transport and communication and mining) accounts for between 0.02% and 2% of land use by area (i.e. a relatively small share when compared to agriculture) of the regions examined but is likely to be responsible for the majority of point sources of pollutants to waterways impacting on the GBR.

The regions with the greatest diversity of land use within the NRM catchments include the Burnett–Mary, Wet Tropics and the Goulburn–Broken.

² The economic contribution by industries such as mining, manufacturing, the service industries and tourism to the regional economies is dealt with in section 1.7 of this report.

Table 1.1 Land classification across each region (%) 1997

Land use category	Burnett– Mary	Fitzroy	Mackay– Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn –Broken
Dryland cropping/ pasture	4.9	11.6	11.9	2.6	8.6	0.1	24.3
Irrigated cropping/ pasture	1.4	0.2	6.1	0.3	0.3	0	8.9
Dryland horticulture	0.1	0.01	0	0	0.1	0	0.1
Irrigated horticulture	0.2	0.01	0.02	0.05	0.2	0	0.5
Grazing	48.9	63	31.8	87.4	34.3	62.3	34.6
Total agriculture	55.4	74.9	49.8	90.4	43.5	62.4	68.4
Forestry	17.2	6.6	9.3	1.1	21.5	2.3	18.9
Intensive use	0.5	1.9	0.5	0.8	1.4	0.02	0.5
Managed resource protection	0.1	0.4	0	0.1	1	16.6	0.4
Minimal use	21.1	11.3	25.5	5.3	13	3	5.7
Nature conservation	4.7	3.6	10.8	1.6	16.1	13.3	4.7
Waters	0.9	1.3	4.2	0.7	3.5	2.3	1.5
No data	0.1	0.01	0	0	0	0.01	0.01
Total area (ha)	5,574,963	15,758,144	943,358	14,219,676	2,193,675	11,103,335	2,431,984

Source: Land Use area sourced from National Land and Water Resource Audit, Land use of Australia April 1996 – March 1997 which was derived and compiled by the Bureau of Rural Sciences. The data were constructed by automated analyses of a one-year sequence of normalised difference vegetation index (NDVI) images with a 0.01-degree cell size. Classification assigns the dominant land use of one cell the area of the entire cell, thus the results will both over- and under- estimate the real extent of individual land use classes. Estimates of error propagation within the dataset do not accompany the dataset. Therefore, we caution that the results will be more accurate in more homogenous landscapes and less accurate at the edges of homogenous landscapes and in heterogeneous landscapes. Notes: Forestry; includes production and plantation. Water; includes estuary/coastal waters, lakes, marshes/wetlands, reservoirs and rivers. Managed resource protection; includes traditional indigenous use. Nature conservation; includes managed habitat, national parks, protected areas and conservation areas. Minimal use; includes defence areas and remnant native cover. Intensive use includes transport and communication, mining, urban and industrial areas.

1.1.2 Sectoral contribution to the value of agriculture in the regions

The relative contribution of agricultural sectors to the total value of agricultural production, the diversification of agriculture, the nature of production undertaken (extensive or intensive) and the opportunities for value-adding are important considerations for determining the socio-economic capacity of the regions.

Table 1.2 shows the percentage contribution of a number of agricultural activities to the total value of agricultural production from each region (valued at farm gate prices). The value-added from agriculture including sugar milling, cotton ginning, fruit and vegetable processing and meat processing contributes substantially to the value of agricultural output from these industries.

The Goulburn–Broken (\$1.25billion) and Fitzroy (\$1.14billion) produce the highest return from agricultural output among the NRM regions examined. In contrast, the contribution of agriculture to the economy of Cape York (as indicated by the number of people employed and the value of agricultural output: 415 persons or 5.3% of total employment and \$18 million respectively) is relatively small indicating that the strength of the economy is not agriculture.

The bulk of the total value of agriculture in the Fitzroy and Cape York regions is provided by beef cattle production contributing 64% and 63% respectively. This is consistent with the large area under grazing in these regions (see Table 1.2).

In the Mackay–Whitsunday, drylands and irrigated cropping and pasture (mainly sugar cane) accounts for approximately 36% of land under agriculture but contributes 80% of the value of agricultural production. In contrast, grazing accounts for approximately 64% of agricultural land yet contributes only 14.4% of the value of agricultural production. The area estimated to be under horticulture in the Wet Tropics is only 0.3% but contributes at least 54% of the total value of agricultural production, suggesting intensive land use.

The value of agricultural production within the Burnett–Mary and Goulburn–Broken regions is distributed across a number of sectors (e.g. fruit and vegetables, dairy and beef cattle) demonstrating a diversification of production and a reduced reliance on any particular sector. Conversely, sugar cane production contributes 80% of total value of agricultural output in the Mackay–Whitsunday region.

Dependence on a limited range of agricultural sectors, particularly where employment is concentrated within industries servicing these sectors such as sugar milling, cotton ginning, abattoirs and transport, means that there is an increased risk of an amplified decline in the regional economy (due to flow-on effects) if there is a substantial decrease in production resulting from drought or a fall in commodity prices. Although production of sugar cane and its manufacture into raw sugar is not the primary contributor to gross output from the Mackay–Whitsunday region (coal mining contributed \$2 billion to the economy in 2000), it is a concern that agricultural production is dominated by a single crop that has strong forward linkages in the economy given the current and expected, continuing downturn in the world price for sugar.

Table 1.2 Sectoral contribution to the total value of agricultural production (%)

Sector	Burnett– Mary	Fitzroy	Mackay– Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn– Broken
<i>Crops</i>							
Cereals for grain	2.2	15.6	0	6.3	0.3	2.5	6
Cotton	0.7	8	–	0.3	–	–	–
Nurseries, flowers and turf	3	0.3	2	1	1.7	1.2	2.6
Sugar cane	12.2	–	80	24.9	26.4	13.1	–
Fruit	15	2	0.7	3.2	53.7	12.7	18.6
Vegetables	15.3	1.1	0.4	23.1	3.4	0.1	5.2
Pastures and grasses	1.2	0.8	0.2	0.2	0.3	0.7	5.4
Other Horticulture	3.7	5.3	1.6	1.2	1.6	6.7	2.1
Total all crops	53.3	33.1	84.8	60.2	87.6	36.9	40.1
<i>Livestock</i>							
Beef cattle	33.2	64.2	12.7	38.2	6.5	62.9	15.3
Milk	7.2	0.8	1.2	0.3	4.9	–	33
Pigs	5.9	1.4	0.2	0.6	0.2	–	2.2
Poultry and eggs	0.1	0.2	0.3	0.5	0.3	0	1.2
Sheep and wool	0.1	0.2	–	0.1	0	–	8.1
Other livestock	0.2	0	0	0	0.1	0	0.1
Total all livestock	46.7	66.9	14.4	39.8	12.2	63	59.9
Total value (\$m) of agriculture	865	1,139	158	682	642	18	1,249

Source: ABS, Agricultural Census, 2001\

1.1.3 Farm performance measures

ABARE (2004a) undertakes annual surveys of farm financial characteristics that provide an indication of farmer capacity to take up natural resource management (e.g. farms with a high

level of farm business profit could be more likely to undertake riparian revegetation or fencing work which would be less appealing to farmers faced with high debt and low farm cash income).

The farm survey is based on a stratified random sample using location as the determining characteristic. Statistical information presented in this paper is based on data collected for the 2001–02 financial year. The following farm numbers were surveyed in each GBR region:

- 32 – Burnett–Mary;
- 51 – Fitzroy;
- 5 – Mackay–Whitsunday;
- 9 – Burdekin;
- 8 – Wet Tropics;
- 40 – Goulburn–Broken.

Only one farm survey was returned for the Cape York region, therefore, to preserve confidentiality no data is included for this region. A total of 105 surveys were included for the GBR region as a whole. Given the relatively small size of the samples (particularly in Mackay–Whitsunday, the Burdekin and Wet Tropics), the sampling errors are likely to be high; therefore, it could be misleading to draw meaningful conclusions based on the ABARE data presented below.

Major financial performance indicators

Farm cash income = total cash receipts - total cash costs

*Total revenues
received by the farm
business during the
financial year*

*Payments made by the farm business for
materials and services and for permanent
and casual hired labor (excluding owner
manager, partner and family labor)*

Farm business profit = farm cash income + changes in trading stock - depreciation - imputed labour
*(Return produced by
all the resources used
in the farm business)*

Profit at full equity = farm business profit + rent + Interest and finance lease payments + Depreciation on leased items
*(Return to all
capital used)*

Rate of return = profit at full equity ÷ total opening capital × 100
*(Owner manager
and spouse only)*

Off-farm income = wages off-farm + other business income + investment + social welfare payments
*(Owner manager
and spouse only)*

Source: ABARE 2003: 2

Table 1.3 shows farm performance measures reported in the farm survey of resource management undertaken by ABARE (2004a). It is important to note that this information is not specific to any particular agricultural activity in the NRM regions for which it is reported.

Table 1.3 Farm performance measures (average value per farm)³

Farm Pperformance Measure	Burnett–Mary	Fitzroy	Mackay–Whitsunday	Burdekin	Wet Tropics	Goulburn–Broken
Farm cash income	\$26,489	\$131,558	\$146,523	\$39,154	\$94,589	\$71,768
Farm business profit	\$28,511	\$81,056	\$45,574	\$116,134	\$26,757	\$27,309
Total capital	\$1,454,773	\$3,629,241	\$4,530,701	\$6,785,794	\$1,883,069	\$1,663,7
Farm equity ratio	87%	82%	95%	86%	96%	85%
Profit full equity	\$16,021	\$122,990	\$79,023	\$193,980	\$42,133	\$50,646
Rate of return	1%	4%	2%	3%	3%	3%
Farm business debt	\$131,961	\$480,078	\$225,006	\$945,553	\$73,060	\$241,261
Total off-farm income	\$16,215	\$13,784	\$846	\$2,035	\$1,215	\$12,855

Source: ABARE, 2004a

The Burnett–Mary and Goulburn–Broken regions have the lowest level of total capital (value of all assets on the farm) on average per farm of the regions examined. In contrast, the Burdekin region has the highest average level of total farm capital and the highest level of farm business debt. Average debt levels are lowest in the Wet Tropics and Burnett–Mary regions. Low debt levels (and subsequently relatively low capital investment) could be interpreted as a reflection of the uncertainty of the future of the agricultural industries in the relevant regions. However, only 23% and 33%, respectively of respondents in the Wet Tropics and Burnett–Mary agreed that their profit levels were falling (see [Table 1.4](#)).

Average farm equity ratios appear to be relatively high across the regions examined (82–96%). However, the rate of return on the invested capital is poor. These low rates of return could constrain land managers' ability to invest in improved, sustainable NRM as scarce funds are channeled towards servicing debt.

Farms in the Burnett–Mary region are more heavily reliant on off-farm income, have the lowest level of profit at full equity and the lowest rate of return of the regions examined. This is offset to some degree by a relatively low level of farm debt.

In general, with regard to profit level at full equity, farms in the Burdekin and Fitzroy appear to be better positioned than the other regions, particularly the Burnett–Mary and to a lesser extent the Wet Tropics, to invest in sustainable NRM. However, both the Burdekin and Fitzroy regions are burdened with large levels of debt and all regions examined are subject to low rates of return (1–4%) that militates against spending on sustainable NRM.

1.1.3.1 The structure of farm debt

Reeve (2002) suggests that the structure of debt and the stress this puts on farm family business is critical for the ability of the farm unit to withstand the impacts of natural resource management. Reeve notes that the size of farm debt in Queensland has increased markedly over the last 5 years and that the type of borrowings has changed. The most common type of farm loan now used in Queensland is an interest only facility over approximately 5 years. Reeve describes this type of borrowing as covering 37% of sample loans taken out by farmers in

³ The above values (and those in Appendix A) are for 2001–2002. However, conditions have changed considerably due to the recent drought. For example, it is estimated that farm cash income for broadacre industries in Queensland will fall from \$112,800 to \$41,000 in 2002–2003. In Queensland, farm business profit is expected to fall from \$43,800 to \$38,000 (ABARE, 2002, p 566).

Queensland and that the majority of borrowing is for farm capital. That banks have no obligation to extend the loan at the end of the period is a matter of concern for farm businesses if there have been adverse climatic conditions or a downturn in commodity prices.

Further, Reeve points out that the age of farmers incurring debt is between 45 and 65. Typically, people in this age bracket would be preparing for retirement and finalising debt. The structure and level of farm debt in the regions needs to be routinely monitored. Interest only debt has the potential to destabilise a farm unit.

It would appear from the ABARE (2004a) statistics ([Table 1.3](#)) that farm debt per se is not a critical problem. Farmers have substantial amounts of invested capital and relatively low levels of debt (less than 12% on average). Rather it may be the structure of the debt, the age of farmers incurring debt and poor return on capital and equity that is an issue. In general, farmers need to enhance productivity levels and diversify to increase their return on capital. Efforts to improve the financial stability of farmers (traditionally in the form of income support and interest rate subsidies) might be better directed towards structural adjustment to help people to exit the industry.

1.1.4 Future broadacre farm profit

[Tables 1.4 and 1.5](#) illustrate farmer perceptions about farm profit and resource constraints to implement sustainable NRM. This data is subject to the same caveats as above with regard to the sample size and reliability of the data.

Table 1.4 Farm profit (% of sample)

Respondents who agree/disagree that profit is falling	Burnett–Mary	Fitzroy	Mackay–Whitsunday	Burdekin	Wet Tropics	GBR catchment	Goulburn Broken
Strongly disagree	0	12	0	0	0	4	6
Disagree	39	27	18	75	77	40	25
Neutral	28	20	30	21	0	23	7
Agree	26	39	52	4	12	28	46
Strongly agree	7	2	0	0	11	5	15

Source: ABARE, 2004a.

With reference to [Table 1.4](#), there is no obvious or agreed consensus concerning farm profitability. This is surprising given the low rates of return noted in [Table 1.3](#) (suggesting perhaps that farmers are accustomed to low rates of return).

Interestingly, farmers in the Burdekin and Wet Tropics, where sugar cane is an important crop, largely disagreed that profits are falling while in the Mackay Whitsunday (where sugar cane is the primary agricultural crop) and Goulburn–Broken regions, the majority of farmers surveyed agreed that profits are falling.

This result in the Mackay Whitsunday is not surprising, due to the heavy reliance on sugar cane, however, in the Goulburn–Broken, production is relatively well diversified indicating perhaps that there is a general reduction in profits across the entire agricultural sector as the cost of supply increases while demand remains constant and commodity prices fall. Further, the

Goulburn–Broken and Mackay–Whitsunday regions also suffer from constrained access to new land that may be stifling their ability to capture economies of scale. In contrast to this, farmers in the Burdekin and Wet Tropics are not land constrained (i.e. properties are larger and more scale efficient) which may go some way to explaining why they are relatively optimistic with respect to profit levels.

The Burnett–Mary and Fitzroy regions returned conflicting results with approximately 40% of respondents indicating that they either disagree or strongly disagree that profits are falling and the other 40% agreeing or strongly agreeing that profits are falling.

Table 1.5 Lack resources to implement sustainable NRM (% of sample)

Respondents who agree/disagree that they lack resources	Burnett–Mary	Fitzroy	Mackay–Whitsunday	Burdekin	Wet Tropics	GBR catchment	Goulburn–Broken
Strongly disagree	6	11	0	0	0	7	16
Disagree	45	48	70	49	4	43	34
Neutral	31	7	30	0	2	19	35
Agree	16	14	0	51	55	21	14
Strongly agree	1	20	0	0	39	11	0

Source: ABARE, 2004a

As per the results in [Table 1.4](#) there does not appear to be any agreed consensus about the availability of resources for sustainable NRM in the regions examined. With reference to [Table 1.5](#) 94% of respondents in the Wet Tropics either agree or strongly agree that they lack resources for NRM. Considering that 77% of farmers in the Wet Tropics disagreed that profits were falling and given the relatively low debt levels in the region, this result is surprising. There may be constraints other than lack of funding, limiting the implementation of sustainable NRM in the region (perhaps lack of information and management expertise).⁴

A substantial majority of farmers in the Mackay–Whitsunday region disagreed that they lacked resources to implement sustainable NRM. However, given relatively high debt levels and the perception that profits are falling, spending to improve NRM is likely to be limited.

1.1.5 Assessment of the beef, sugar and horticulture industries

The beef, sugar and horticulture industries in the GBR NRM regions are the major contributors to agricultural production in the GBR catchments. The following provides an assessment of these industries.

1.1.5.1 The beef industry in the GBR catchment

The beef industry is an important contributor to the regional economies within the GBR catchment, in particular the Fitzroy, Burdekin and Burnett–Mary. The Fitzroy contributes over

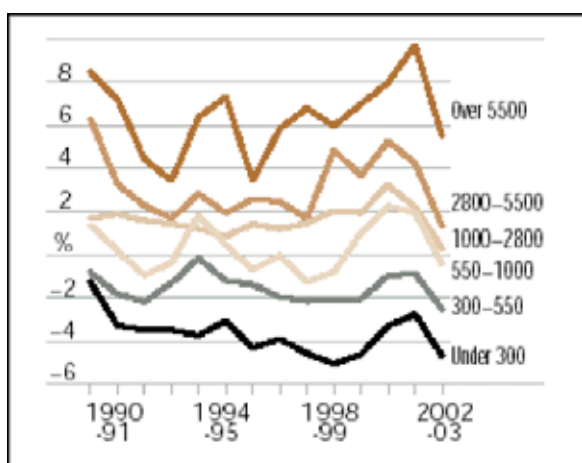
⁴ The support for resource owners to engage in NRM, in particular the availability of sustainable land management programs, information networks and environmental programs is taken up in section 2 of this report.

40% of the total value of the GBR catchment's beef industry and accounts for 36% of sector employment.

Specific farm financial analysis of the beef industry in the GBR is lacking, however the ABARE survey of the Australian Beef Industry for the 2002–03 financial year (Gleeson et al. 2003) provides some general indicators of industry well being in Queensland and these are summarised below.

1.1.5.1.1 Rate of return

Financial characteristics of beef producers are positively influenced by the size of the herd, with the largest operators able to ride out natural disasters (i.e. drought) without incurring the crippling financial damage often suffered by smaller producers (i.e. negative returns and unsustainable debt). With reference to [Figure 1](#), producers running herds in excess of approximately 1000 head are able to continually maintain rates of return above 0%. Herd sizes below 550 appear to consistently return negative rates of return.



Source: Gleeson et al 2003: 32

Figure 1. Rate of return, by herd size – specialist beef producers.

With reference to [Table 1.12](#), approximately 63% of specialist beef properties⁵ in Queensland run less than 1,000 head of cattle suggesting that there are likely to be large numbers of financially marginal beef farms in Queensland. It is important to note, that a high percentage of smaller farms might be managed as 'lifestyle' investments rather than purely profit driven ventures:

Low rates of return for small specialist beef properties are partly a consequence of their location in closer settled areas where property values per hectare are high, where there is greater emphasis on the 'lifestyle' aspects of farming and where there is greater accessibility to off-farm employment.
(Gleeson et al 2003: 39–40)

The bottom 25% of Queensland specialist beef properties (ranked according to rate of return) in 2001–02 relied on off-farm wages and salaries worth, on average, \$37,352 (248% of farm income) compared to just \$696 (0.17% of farm income) for the top 25%. This might have implications for improved NRM on smaller farms where owners who rely relatively less on the productive capacity of the land for the majority of their income may be less inclined to manage

⁵ Specialist beef properties are those where grazing is the main activity and does not include feedlots or dairy farms.

their land sustainably.

Table 1.12 Characteristics of specialist beef properties in Queensland

Cattle per property	% of total Properties		% of total herd	
<300	30		3	
<1000 300– 550	21	63	6	16
550– 1000	12		7	
1000– 2800	29		37	
>1000 2800– 5500	5	37	14	84
More than 5000 Cattle	3		32	
Total (Australia)	35.3		55.1	

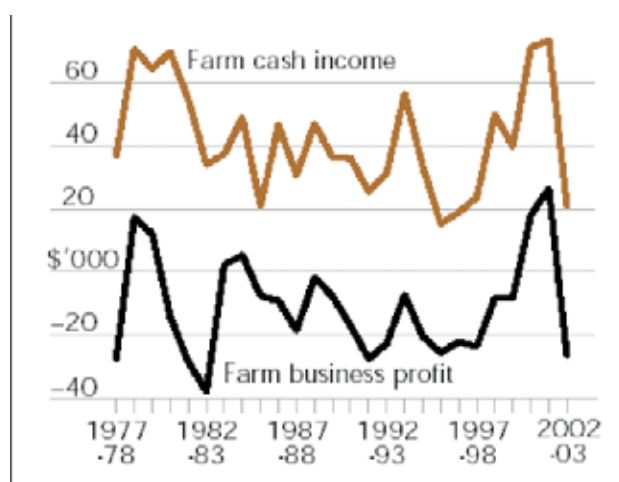
Source: Adapted from Gleeson et al 2003: 26

Average rates of return in the Queensland beef industry are generally low, but higher than the Australian average. In 2001–02, the average rate of return was only 2.9% (1.9% Australia wide) despite record profit and income levels. With the onset of drought, the average rate of return across Queensland beef producers was –2.4% (–2.3% Australia wide).

1.1.5.1.2 Income and Profit Levels

Average farm cash income and profit levels in 2001–02 for Queensland beef producers were \$132,632 and \$64,204 respectively (well above the Australian record average of \$73k and \$25k respectively). However, with the onset of drought in 2002, average Queensland farm cash income levels fell dramatically to just \$26,141 in 2002–03 and average profit levels plummeted to –\$114,525.

With reference to Figure 1.1, income and profit levels fluctuate widely from year to year. Climatic conditions, particularly drought, have strong, negative impacts on farm income and profit levels. (There were major droughts in 1982–83 and 2002–03 and a prolonged dry period throughout the 1990s.) On average, post 1977, profit levels in the beef industry appear to have been more often in the red than in the black.



Source: Gleeson et al 2003: 32

Figure 1.1 Farm cash income and business profit for specialist beef producers in Australia.

1.1.5.1.3 Debt levels

The majority of debt spending on specialist beef properties in Australia in 2001–02 facilitated property expansion and appears to have been fuelled by relatively high, income levels (Gleeson et al. 2003: 36–37). With reference to [Table 1.13](#), the average farm debt level on Queensland specialist beef properties was \$252,913 per farm in 2001–02 which this represents an increase in the level of debt over the previous three years but historically and as a percentage of total invested capital, debt levels are not significantly high. The onset of drought in 2002–03 and the subsequent drop in income levels may seriously hamper the ability of smaller producers to service debt, raised in 2001–02.

Table 1.13 Capital, debt and equity ratio on specialist beef properties in Queensland, 2001–02

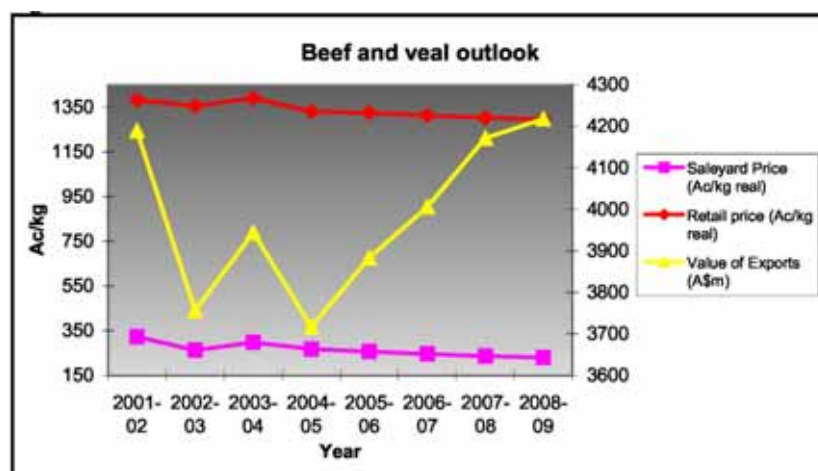
Farm characteristic	\$
Total Capital	3,418,035
Total farm debt	252,913
Farm equity ratio	92

Source: Gleeson et al. 2003: 76

1.1.5.1.4 The beef market

In 2002–03 average prices for Australian beef fell due to the drought (increased turn-off rates), decreased demand in Japan and the US, an appreciating Australian dollar and increased competition from South America (Gleeson et al 2003: 7). Over the next ten years, it is predicted that in real terms saleyard and retail prices will decline while the value of exports is likely to return to 2001–02 levels (see [Figure 1.1](#)).

Almost two thirds of Australia’s beef produce is exported with the majority going to Japan and the US. The US market is likely to grow in line with the negotiations over the recent US–Australia free-trade agreement and the value of exports to Japan are also predicted to increase (or at least recover) as reaction to the BSE scare dies down and production levels recover, post-drought. Canada and Korea are also major export destinations with smaller emerging markets scattered throughout Asia and the Middle East.



Ac = Australian cents. Index reference year 2003-04. Source: ABARE 2004b.

Figure 1.1 Price outlook for beef and veal 2001/02 – 2008/09.

The domestic market is the biggest single customer for the Australian beef industry and in general, demand in recent years has been falling. On average, people consumed approximately 36–40kg of beef and veal annually throughout the 1990s. However, in 2003–04 this figure is likely to fall to 35kg.

The feedlot sector has experienced substantial growth in the last decade and this growth is expected to continue as consumer demand for high quality meat continues to grow. However, in the short term, the feedlot industry is expected to suffer in the face of increasing grain costs and water restrictions as a result of the recent drought.

1.1.5.1.5 Implications for sustainable NRM

The specialist beef industry in Queensland is characterised by a large number of small farmers producing a minority of total industry output and a relatively small number of large producers generating the majority of output. Larger producers appear to be much more able to maintain positive rates of return during climatic extremes such as drought while smaller producers cope with low or negative rates of return both in good and bad times. Debt levels are relatively small when compared to farm capitalisation, but servicing debt is problematic due to characteristically low rates of return and this problem is exacerbated during drought or periods of prolonged, low beef prices.

Larger producers appear to be in a more conducive position to undertake improvements in NRM as they experience much higher income levels and return higher profits. Smaller producers and lifestyle farmers are often cash constrained (and therefore less able to invest in sustainable NRM) and earn a relatively large percentage of income off-farm.

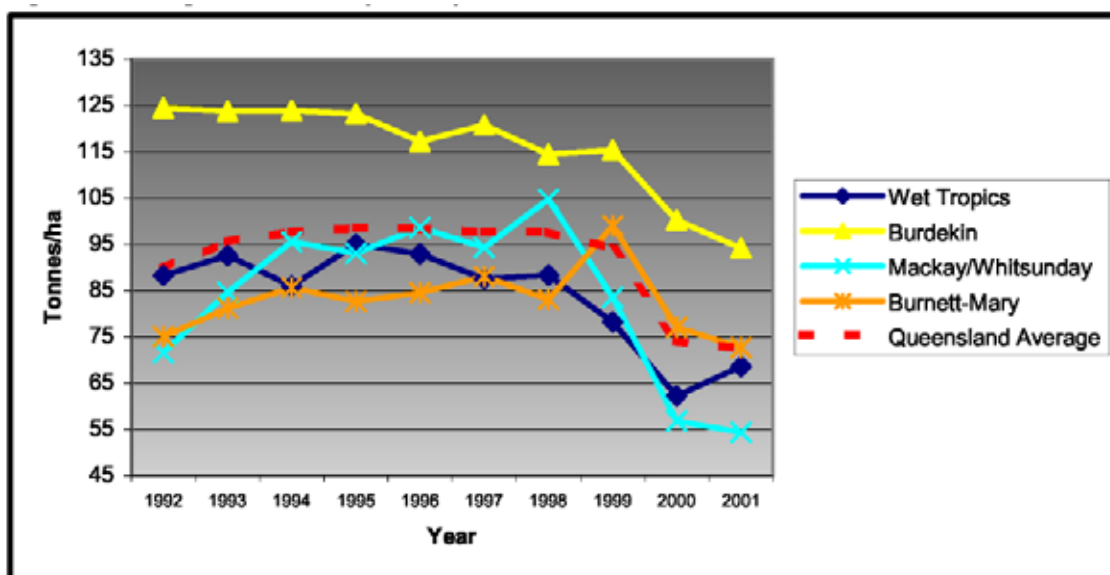
Encouraging smaller to medium sized farmers to invest in improved NRM will require financial incentives or regulation unless relevant techniques are seen to improve the profitability of the enterprise. Whether or not environmentally sustainable NRM techniques or capital investment can make small enterprises financially viable and resilient to climatic events is beyond the scope of this paper, other than to say that in the long term, it might be more cost effective to encourage farm consolidation or exit from the industry as larger farms are potentially better equipped to invest in and manage environmental issues.

1.1.5.2 The sugar industry in the GBR catchment

The Queensland sugar industry extended over 521,183ha in 2002. Just over 505,000ha were in the GBR catchment.

1.1.5.2.1 Farm yield

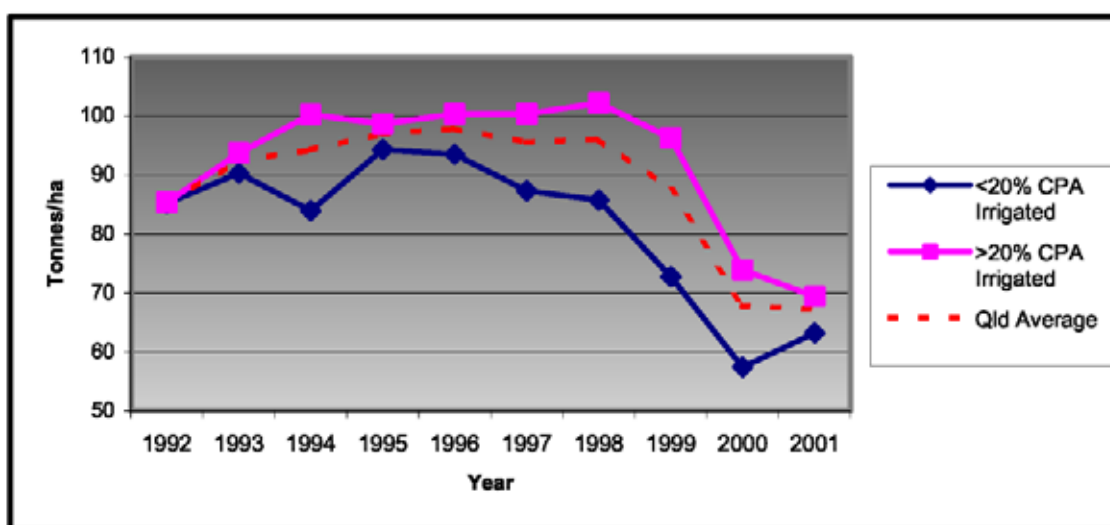
With reference to [Figure 1.2](#), between 1992 and 2001, the Burdekin region yielded the most cane per hectare planted when compared to all other cane-growing regions in Queensland. In the same period, the other cane growing regions returned yields well below those in the Burdekin, approximately equal to, or below the Queensland average.



Rural Press Queensland, 2002.

Figure 1.2 Sugar cane farm yield by Mill area.

Figure 1.3 reveals a positive correlation between yield and percentage of regional CPA irrigated: The sugar-cane regions in which greater than 20% of the CPA is irrigated (Burdekin, Mackay, Burnett–Mary) consistently yield higher returns than the Wet Tropics growing areas which are predominately rain-fed.

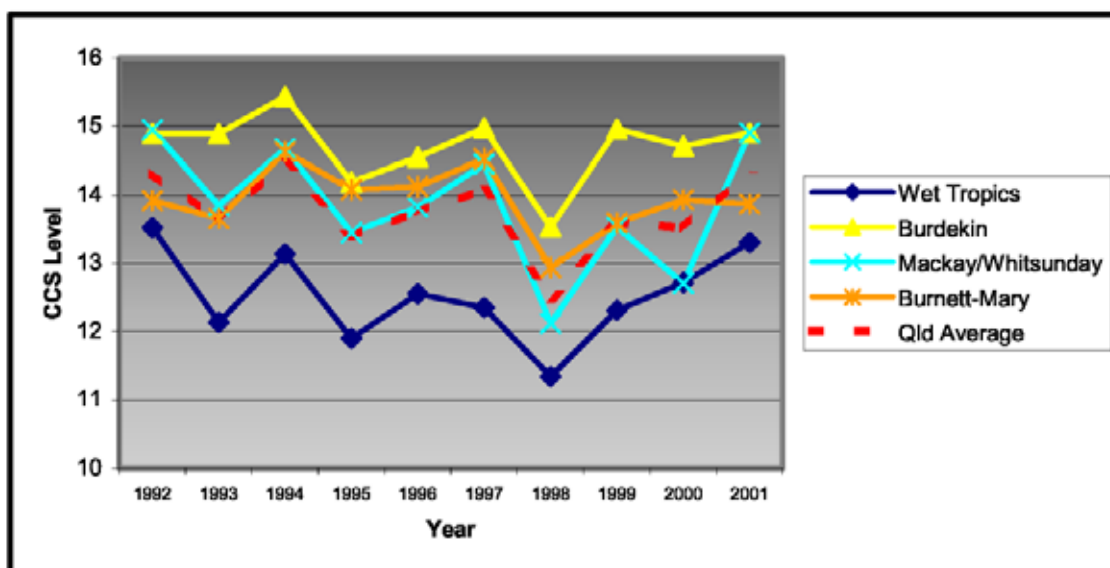


Rural Press Queensland, 2002.

Figure 1.3 Sugar cane yield (t/ha) according to percentage of CPA irrigated.

1.1.5.2.2 CCS

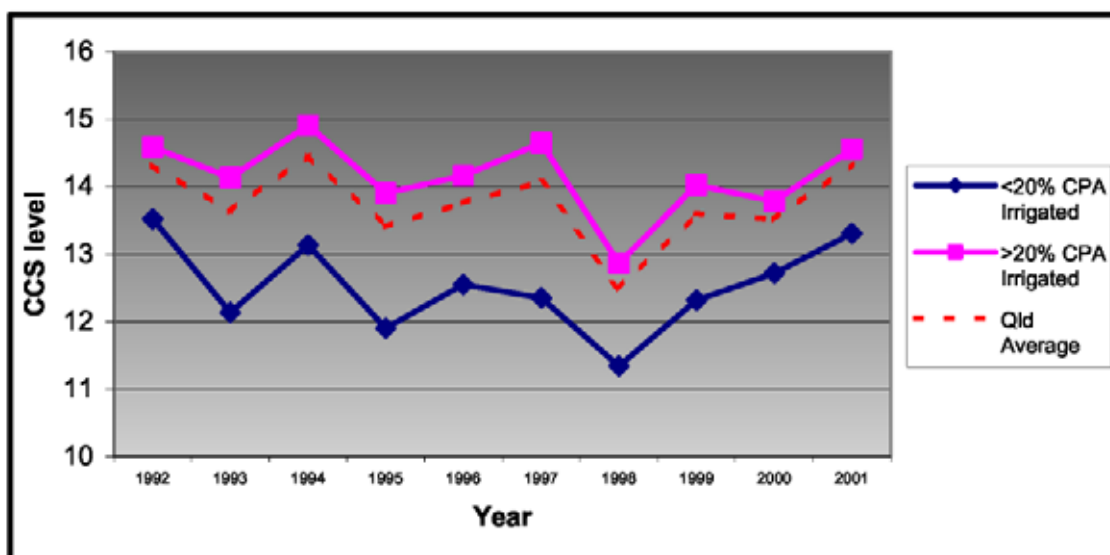
The Burdekin produces sugar cane with above-average CCS levels. (CSS is a measure of sugar content.) Conversely, the Wet Tropics consistently yields CCS levels well below those achieved in the other cane-growing regions (see Figure 1.4)



Rural Press Queensland, 2002.

Figure 1.4 CCS level by NRM region.

There are two key factors that determine CCS levels in sugar cane: exposure to light and a consistent supply of water. The Wet Tropics experiences fewer average hours of sunlight per day, particularly in the summer and autumn months when compared to the central and southern regions (BOM 2004). Lower average sunlight levels, combined with lack of access to irrigation (see Figure 1.5), puts the Wet Tropics region at a clear disadvantage when compared to the other cane-growing regions in Queensland.



Rural Press Queensland, 2002.

Figure1.5 CCS levels according to percentage of CPA irrigated.

1.1.5.2.3 Farm size

With reference to Table 1.12, between 2000 and 2001 the average size of Queensland cane farms (calculated by dividing the total CPA by the number of growers in the region) increased

(although in the Burdekin and Mackay–Whitsunday regions farm size decreased in 2002). Average farm yield statistics were extrapolated using the average farm size and regional yield per hectare (see [Table 1.13](#)).

Table 1.12 Average farm size (ha)

Region	2000	2001	2002
Wet Tropics	72.0	74.6	75.5
Burdekin	105.7	111.1	110.3
Mackay–Whitsunday	88.4	89.1	87.9
Burnett–Mary	71.9	72.8	75.1
Average	81	82.7	83.2

Source: Rural Press Queensland. 2002

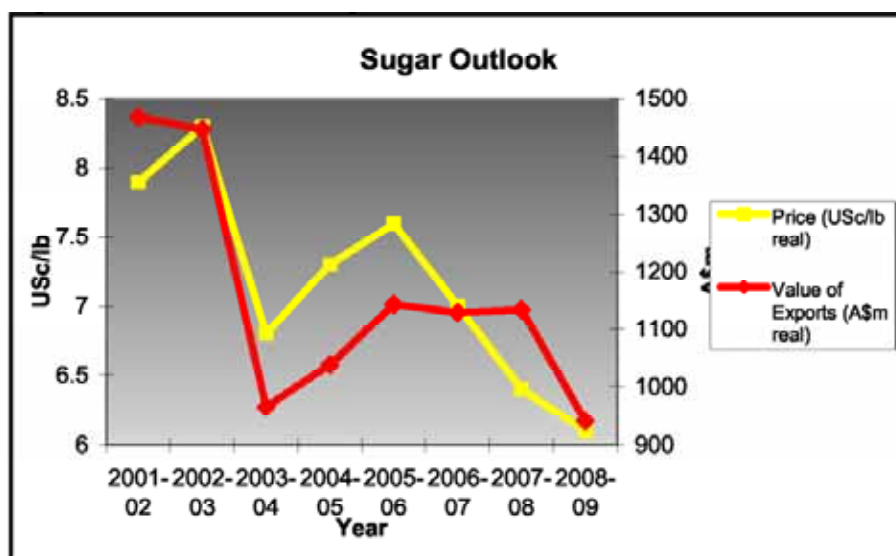
Table 1.13 Average farm yield (tonnes)

Region	2000	2001
Wet Tropics	4,483.9	5,116.0
Burdekin	13,154.3	13,747.0
Mackay/Whitsunday	5,021.5	4,845.8
Burnett–Mary	5,537.7	5,293.5
Average	5,969.8	5,994.2

Source: Rural Press Queensland. 2002

1.1.5.2.4 Viability in the sugar industry

Hildebrand (2002: 17) estimated that “the farm crop size required to provide a satisfactory living for a family was variously rated as being 10,000–15,000 tonnes minimum... some rated the necessary crop as higher, to 20,000 tonnes, some lower to 8,000 tonnes”. With reference to [Table 1.13](#), only farms in the Burdekin satisfy Hildebrand’s estimates, while the others fail to achieve even the lowest estimate for financial viability: 8,000 tonnes.



Notes: USc = United States cents. Index reference year 2003-04. Source: ABARE 2004b.

Figure 6 Price outlook for sugar 2001/02 – 2008/09.

The 2000 and 2001 growing seasons were particularly poor compared to the previous five years (approximately 25% fewer total tonnes harvested). However, even if the harvest increases substantially in the future, world sugar prices are likely to remain depressed or sink lower ([Figure 6](#)) forcing farmers to substantially increase yields (and/or lower costs) to remain viable.

1.1.5.2.5 Implications for sustainable NRM in the sugar industry

The sugar industry is currently experiencing record low prices for raw sugar and many producers are not recovering costs. According to the information outlined above, the average cane farm in Queensland outside of the Burdekin is not financially viable. In this operating environment, expenditure to improve NRM is likely to be constrained. Even where management changes or infrastructure investment designed to improve NRM are likely to lead to productivity increases (and therefore increased profits) many growers will be unable to afford to implement them (either because they lack equity or are reluctant to raise debt) or will be unwilling to implement them given the current outlook for the sugar industry.

The Queensland government Rural Water Use Efficiency Initiative (RWUEI) is currently targeting irrigators in the sugar industry with financial incentives designed to encourage investment in water efficiency improvements. The financial incentives offered effectively reduce grower risk. At the publication of the 2003 milestone report for the RWUE sugar program, 1,898 irrigators had applied for incentive funding with 101 growers investing in improved irrigation systems. The government has provided \$3.7million in incentive funding and growers have contributed \$16 million in private funds indicating that growers are willing to invest given appropriate incentives (see Volume 2 for a discussion of the RWUEI).

However, as was the case for the beef industry, alternative NRM management or capital investment are unlikely to make small enterprises financially viable and in the long run, it might be more cost effective to encourage farm consolidation or exit from the industry rather than invest valuable resources in an attempt to make small, unviable farms, environmentally sustainable.

1.1.5.3 The horticulture industry

The horticulture industry in Queensland produces more than 120 types of fruit and vegetables on approximately 3,700 farms. The industry is currently worth approximately \$1.2 billion. Each major commodity has its own industry body and financial data is collected accordingly, making regional analysis extremely difficult.

The horticulture industry is highly localised in the GBR catchment and accounts for a significant proportion of horticultural production in Queensland. Production is labour intensive and requires relatively high fertiliser and water inputs when compared to other agricultural industries. However, horticulture does not occupy a substantial amount of land (occupying only 3% of total land under crops in Queensland) yet produces nearly 40% of the total value of Queensland's irrigated products (QFVG 2004). The main crops produced in the GBR catchment are bananas, pineapples, mangoes, lychees and tomatoes.

There are considerable regional differences in growing these products, largely determined by the availability of water and the underlying soil type. Farm activities likely to impact on water quality include the application of fertilisers, herbicides and insecticides, clearing of vegetation to expand cropping as well as a general deterioration in soils resulting from continued

cultivation.

1.1.5.3.1 The horticultural market

The domestic market for horticultural produce is well supplied and accordingly there are very few opportunities for expansion within the domestic market (Deuter 2004). Fruit and vegetables are relatively high value crops that are relatively easy to grow and there is anecdotal evidence to suggest that struggling sugar cane farmers in particular are supplementing their income by diversifying into horticultural production for the domestic market. If this trend continues, there could be a substantial increase in quantity (but not necessarily quality) of certain fruit and vegetable products that would deflate already low, farm gate prices paid to producers. This phenomenon has the potential to destabilise parts of the existing horticulture industry.

In 2002-2003, Queensland exported \$72 million or 9% of Australia's total exports of fresh and processed horticultural product. Queensland currently exports 80% of its fresh produce to Asia (pers. comms. QFVG).

According to Mark Napper, managing director of the Australian Horticultural Corporation, the situation for the industry is uncertain. World production is expected to increase, especially from countries like China. China has been able to capitalise on the Asian economic downturn, by supplying cheaper fruit to South East Asia, undercutting Australian produce. The emerging issue is that, in the past, Australia has been able to maintain its Asian markets because it offers a higher quality and reliable supply of fruit and vegetables. Napper suggests that China is now improving the quality of fruit, becoming a real threat not only to Australian horticultural markets, but also the United States, New Zealand and Chile.

1.1.6 Agricultural land management

The type and duration of land tenure (freehold or leasehold) over properties may have an important bearing on the way the land is managed. Traditional farm families on freehold land are likely to be more inclined to manage their land sustainably (as their well-being is tied to the land) compared to those on leasehold properties whose tenure over the land is less secure and assured for a relatively short period of time. There does not appear to be any conclusive evidence to confirm this hypothesis and it may be worth investigating to see whether land degradation is more or less of a problem on leasehold than freehold land.

With reference to Table 1.6, the majority of land in the GBR catchment is privately owned and operated. However, approximately 10 million hectares or 25% of the entire GBR catchment is classified as either crown leasehold or privately leased or rented land, compared to just 10% in the Goulburn–Broken.

The Queensland State government draft Leasehold Land Strategy is designed to encourage producers on leasehold land to manage their land more sustainably by utilising a system of 5-yearly audits and extension incentives to encourage compliance (see section 2 of this report for more detail).

Table 1.6 Land tenure classification (ha and % of region)

	Burnett –Mary	Fitzroy	Mackay— Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn– Broken
Total holdings	3,902,572	13,798,531	475,595	13,504,784	1,360,681	4,313,650	1,380,847
Crown leasehold land	585,386 (15%)	1,793,809 (13%)	66,583 (14%)	3,241,148 (24%)	299,350 (22%)	1,854,870 (43%)	27,617 (2%)
Privately owned and operated	3,122,058 (80%)	11,176,810 (81%)	385,232 (81%)	9,588,397 (71%)	938,870 (69%)	2,027,416 (47%)	1,228,954 (89%)
Privately leased or rented	156,103 (4%)	689,927 (5%)	19,024 (4%)	540,191 (4%)	108,854 (8%)	388,229 (9%)	110,468 (8%)
Other	39,026 (1%)	137,985 (1%)	4,756 (1%)	135,048 (1%)	13,607 (1%)	86,273 (2%)	13,808 (1%)

Source: ABARE, 2004a

1.1.6.1 Irrigation

The availability of an assured supply of water for irrigation facilitates the stabilisation of farm production and enables farmers to diversify production. The Goulburn–Broken region has the largest amount of irrigated land (both as a percentage of the total regional area and in absolute terms) and produced the highest value of agricultural output of all regions examined in 2001. On average, approximately 50,000 ha of land in the respective GBR regions is irrigated compared to 222,118 ha in the Goulburn–Broken ([Table 1.7](#)).

Irrigation techniques vary across the regions depending on the soil types and the crops produced. For example, over 90% of the area irrigated in the GBR catchment is under sugar cane, which is largely furrow irrigated, except for in the Burnett–Mary and Mackay where overhead lateral move or centre pivot equipment is more common. In the Fitzroy region, irrigation water is primarily applied to cotton crops using furrow techniques. In the Goulburn–Broken, irrigation water is used primarily for the fruit and vegetable and dairy industry where it is applied to ponded pastures.

In general, furrow irrigation techniques use the highest volume of water and are the least efficient, in terms of ‘leakage’ to ground and surface water systems, followed by spray systems, with trickle infrastructure providing the most efficient and expensive, in terms of start up and maintenance costs, for crop irrigation (PC 2003: 127).

Table 1.7 Irrigation

	Burnett –Mary	Fitzroy	Mackay— Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn– Broken
Total area irrigated (ha)	98,366	53,800	50,751	98,705	19,046	685	222,188
Fraction of total agricultural land (%)	2.5	0.4	11	0.7	1.4	0.02	16

Source: ABARE, 2004a

1.1.6.2 Cultivation techniques

Preparation of land for the production of cereals for grain, cotton and sugar has been identified as contributing to erosion and eutrophication of waterways. Best practice cultivation techniques are defined as those using zero till, as they minimise the potential for erosion and nutrient runoff.

Cultivation techniques used across the NRM regions are shown in [Table 1.8](#). The Goulburn–Broken region (with the exception of Cape York, which has a comparatively minor part of its agricultural land under cultivation) prepared the highest percentage of land using zero or minimal till techniques (84%). The Burnett–Mary region prepared the least amount of land (50%) using zero or minimal till. Using a weighted average, 68% of cultivated land in the GBR catchments is prepared using zero or minimum till techniques.

Table 1.8 Cultivation techniques (% of land prepared)

Technique	Burnett–Mary	Fitzroy	Mackay–Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn–Broken
No cultivation or zero till (apart from actual sowing)	16	35	6	33	12	2	41
Minimal till – one or two cultivations only (immediately prior to sowing)	34	38	47	35	45	94	43
Conventional cultivation – land prepared with other cultivation	50	26	47	32	43	4	17

Source: ABS, Agricultural Census, 2001

Land under grazing accounts for a substantial area of land across the GBR catchments and in the Goulburn–Broken ([Table 1.1](#)). Management practices for grazing of beef cattle (the largest contributor to the value of gross output from livestock activities in the GBR catchment) varies considerably both within and between catchments. Land clearing to increase stocking rates for grazing activities is cited as a possible contributor to sediment and nutrient run-off into water courses (PC 2003).

The Queensland Department of Natural Resources and Water (2003) estimated that in 1999 and 2000, 577,000ha of land was cleared of vegetation annually. It is estimated that approximately 94% of this was cleared for pasture. A considerable share of the clearing was located in the GBR catchments with 32% of total clearing occurring within the Fitzroy and Burdekin catchments. The Productivity Commission (2003) identified overgrazing and soil disturbance by cattle, cattle access to waterways, as well as the application of fertilizers and herbicides to pastures as potentially impacting on water quality.

1.1.6.3 Tree planting

Tree planting is widely regarded as making a positive contribution to resource management. With reference to [Table 1.9](#), approximately 4811 ha of land (0.35% of total holdings) was planted for nature conservation or to protect land and water across the Goulburn–Broken region. This figure is greater than the total plantings that occurred in the entire GBR catchment for the same period (775 ha or 0.002% of the entire catchment, [Table 1.9](#)).

It would be useful to supplement the planting data presented in [Table 1.9](#) with statistics comparing the amount of remaining remnant vegetation in the GBR and Goulburn–Broken regions. It may well be that there is far more native vegetation remaining within the GBR catchment (as a percentage of total land area), hence the need for revegetation and rehabilitation

is less relevant (i.e. efforts to conserve remaining remnant vegetation may be more effective than planting new trees).

Table 1.7 Tree planting

	Burnett –Mary	Fitzroy	Mackay– Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn– Broken
Total area (ha) planted for nature conservation or to protect land and water	420	54	57	62	163	19	4811
Area planted as a % of total holdings	0.01	0.0004	0.01	0.0005	0.01	0.0004	0.35

Source: ABS, Agricultural Census, 2001

No information is available about where plantings occurred, for example, in riparian or gully areas or in strategic locations to combat salinity or erosion.

1.1.6.4 Protective fencing

In 2001, large areas of grazing land in the Burdekin (71,309 ha) and Fitzroy (54,729 ha) regions were fenced off to protect sensitive land (Table 1.10). A large percentage of the protective fencing in these regions is used to protect creeks and rivers. This is detailed in Table 1.10.

Overall, approximately 150,000 ha or 0.43% of grazing land (0.28% of the entire GBR catchment) within the GBR catchment is fenced off from animal intrusion. This compares favourably with that in the Goulburn–Broken. However, it is likely that fencing in the GBR catchment (as in the Goulburn–Broken) is far below optimal levels, which ideally would result in the exclusion of cattle from all waterways. A more useful set of data might compare existing fencing against a map detailing areas of high nutrient and sediment sensitivity (i.e. riparian areas within close proximity to waterways draining directly into the GBR lagoon).

Table 1.10 Percentage of total land fenced-off from grazing

Land Protected	Burnett Mary	Fitzroy	Mackay Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn Broken
Saline Areas	3.4	0.2	2.3	2.0	0.8	0	3
Other degraded areas	1.5	5.0	0.0	7.9	0.4	0	4
Planted trees and shrubs	3.5	0.3	1.9	0.1	1.1	0	21
Creeks and rivers	27.9	40.7	20.7	38.6	10.7	0	25
Remnant native vegetation	6.9	8.1	0.0	5.5	1.1	0	17
All other areas	56.9	45.7	75.1	46.0	86.0	100	29
Total area protected (ha)	9,976	54,729	2,611	71,309	2,718	207	6,147
Area protected as a % of total holdings	0.26	0.4	0.55	0.53	0.2	0.005	0.45

Source: ABS, Agricultural Census, 2001

1.1.6.5 Salinity management

In the Mackay–Whitsunday, Burdekin and Goulburn–Broken regions approximately 9% of farms reported that they had some area of their land affected by salinity. However, of the farms in the Mackay–Whitsunday and Burdekin regions only 24% and 25% respectively, reported

that they were using salinity management practices compared to 46% in the Goulburn–Broken region ([Table 1.11](#)).

Given that the Burnett–Mary, Burdekin and Fitzroy are NAPSWQ priority regions with large areas of land classified as having a moderate to high potential for salinity mobilisation, the relatively low percentage of farms currently using specific management practices is disappointing.

1.1.7 Importance of non-agriculture industries in the Great Barrier Reef (GBR) Catchments

Although agriculture dominates land use in the GBR catchments, mining, manufacturing and tourism make a substantial contribution to gross output. The Productivity Commission (2003), reports that in 2000, the mining and tourism industries contributed more to the gross value of production in the region than agriculture. Specifically, mining contributed over \$7billion and tourism, valued as expenditure by all visitors, is estimated to have contributed approximately \$4.3billion.

1.1.7.1 Mining

The coalfields in the Bowen Basin (located in central Queensland) are concentrated in the Fitzroy and Mackay NRM regions and contribute over 80% of the value of mining in the GBR catchments. To support the mining industry, sophisticated transport facilities, including rail and port handling infrastructure are located at Abbott Point in North Queensland, Hay Point and Dalrymple Bay in Mackay as well as coal handling facilities in Gladstone.

A number of coal-fired electricity generating plants are located in close proximity to the coalfields. Stanmore, Gladstone power station as well as Callide power station are located in the Fitzroy NRM region, producing approximately 75% of the electricity requirements for the State electricity grid.

Employment in the mining industry is not substantial (see [Table 1.12](#)), attracting large numbers of itinerate persons earning relatively high incomes.

1.1.7.2 Manufacturing

Mineral processing, including alumina and aluminium production in Gladstone contributes nearly \$1.4billion to the economy of the Fitzroy NRM region. The ore for processing alumina is sourced from Cape York. In addition, Townsville is the location of both a nickel and copper refineries.

The processing of agricultural produce is estimated to have contributed nearly \$800million to the regional economies.

Employment in the manufacturing industries is higher than in mining across all the NRM regions with the exception of Cape York. Manufacturing also employs more people than the agricultural industries in the Fitzroy, Mackay–Whitsunday, Burdekin and Goulburn–Broken (see [Table 1.12](#)).

1.1.7.3 Tourism

The Reef Cooperative Research Centre (CRC Reef) estimates that marine based tourism on the GBR had a financial value of nearly \$1 billion in 2001. Further, it is estimated that expenditure on recreational fishing in the lagoon was \$240 million in 1999–2000. The CRC Reef estimates that 1.6 million visitor days are spent on commercial-based activities in the Great Barrier Reef Marine Park (GBRMP) each year. The tourism industry in the GBR catchment is estimated to employ approximately 47,660 people (Productivity Commission 2003).

Closely associated with the tourist industry, is considerable infrastructure in the form of accommodation, transport, retail shopping, and services such as health facilities, water and electricity supply.

CRC Reef has recognized that tourist development along the coastal strip of Queensland is a planning issue that must take into account social and cultural impacts.

1.1.7.4 Commercial fishing

In 1999–2000, commercial fishing in the GBR catchment is estimated to have been worth \$119 million with 641 persons employed (Productivity Commission, 2003). The Productivity Commission (2003), reports that the Far North region accounts for almost half of the gross value of commercial fishing from the GBR lagoon. The Commission reports that the commercial fishing industry is relatively small in comparison to other major industries in the region and that the economic value of the commercial fisheries catch is likely to contract.

1.1.8 Industry sectoral contribution to employment in the regions

A relatively simple indicator of the economic structure of a region is the sectoral distribution of employment. [Table 1.12](#) details the employment by industry in the regions. In 2001, with the exception of Cape York, the major employer in the regions was the trade sector, followed by community services (which include education and health services). The Cape York region is strongly dependent on the government for the provision of jobs (47% of the workforce is employed by government), with government administration and defense supplying 33% of employment and community services an additional 14.6%.

Relatively high growth in employment in the service sectors and stable or declining employment in agriculture/forestry and fishing is a general trend across developed countries. To some extent, this is a reflection of the increased role of technology in agricultural production (supplanting labour) and an increased demand for services such as health and education.

Table 1.12 Industry sector employment in 2001

Sector <i>Number (%) of people employed</i>	Burnett– Mary	Fitzroy	Mackay– Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn– Broken
–Agriculture / Forestry / Fishing	12,178 (13.6)	7,863 (9.0)	4,539 (9.0)	4,818 (5.7)	8,677 (9.1)	415 (5.3)	9,988 (14.7)
–Mining	561 (0.6)	6,515 (7.5)	1,358 (2.7)	2,004 (2.4)	494 (0.5)	538 (6.9)	132 (0.2)
–Manufacturing	9,556 (10.6)	8,638 (9.9)	5,016 (10.0)	7,114 (8.5)	7,455 (7.8)	214 (2.7)	10,324 (15.2)
–Electricity, water and gas	966 (1.1)	1,642 (1.9)	375 (0.7)	795 (1.0)	704 (0.7)	39 (0.5)	660 (1.0)
–Construction	5,786 (6.4)	6,070 (6.9)	3,490 (7.0)	5,830 (7.0)	6,025 (6.3)	457 (5.9)	4,267 (6.3)
–Trade (retail and wholesale)	18,494 (20.6)	16,353 (18.7)	10,709 (21.4)	16,174 (19.4)	18,732 (19.7)	691 (8.9)	13,080 (19.2)
–Transport and Communication	4,435 (5.0)	5,741 (6.6)	3,889 (7.8)	5,326 (6.4)	7,244 (7.6)	325 (4.1)	3,339 (4.9)
–Financial services	6,786 (7.5)	7,161 (8.2)	4,850 (9.6)	7,609 (9.2)	9,116 (9.6)	328 (4.3)	5,051 (7.4)
–Government admin / Defence	3,491 (3.9)	2,984 (3.5)	1,326 (2.7)	8,130 (9.8)	5,153 (5.4)	2,606 (33.4)	2,190 (3.2)
–Community services	16,571 (18.4)	13,935 (15.9)	7,272 (14.5)	14,872 (17.9)	14,668 (15.3)	1,141 (14.6)	10,864 (16.0)
–Recreation services	6,110 (6.8)	5,749 (6.6)	4,614 (9.2)	5,921 (7.1)	11,311 (11.9)	552 (7.0)	4,587 (6.8)
–Personal and other services	2,646 (2.9)	2,745 (3.1)	1,472 (2.9)	2,975 (3.6)	3,411 (3.6)	221 (2.8)	1,987 (2.9)
–Other	2,278 (2.5)	1,943 (2.2)	1,245 (2.5)	1,750 (2.1)	2,280 (2.4)	274 (3.5)	1,609 (2.4)
Total employed	89,858	87,339	50,155	83,318	95,270	7,801	68,079

Source: QRBIS, 2003; ABS, Community profile Census, 2001

Employment in agriculture and manufacturing in the Goulburn–Broken catchment is higher (both in absolute terms and as a percentage of the workforce) than in the GBR NRM regions. This may be a reflection of the type of agricultural production in the Goulburn–Broken (primarily intensive agriculture) where manufacturing is largely based on the processing of raw produce from the dairy, meat and fruit and vegetable industries. The distribution of employment in the Burnett–Mary region is fairly consistent with that prevailing in the Goulburn–Broken catchment, reflecting the diversification across the industries (intensive agriculture including dairying, sugar and fruit and vegetable production) noted in [Tables 1.1 and 1.2](#).

The number of people employed as well as the number of people in the total labour workforce in all regions, has increased over the last three census periods. Correspondingly, during the same period, the unemployment rate has decreased. Of people employed in 2001, the percentage in part-time employment is similar across all regions as was the participation rate in the workforce (Table [1.13](#)).

Unemployment was lowest in Cape York (5.8%) and Goulburn–Broken (6.5%) and highest in the Burnett–Mary (11.6%).

Table 1.13 Employment status

	Burnett–Mary	Fitzroy	Mackay–Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn–Broken
–Total employed	89,980	87,369	50,209	83,411	95,343	7,810	68,083
–% part time employed	37.2	30.7	32.1	31.7	34.3	45.2	33.3
–Total unemployed	11,761	7,021	4,401	7,228	7,903	482	4,729
–% unemployed	11.6	7.4	8.1	8.0	7.7	5.8	6.5
–Total labour force	101,742	94,390	54,610	90,640	103,246	8,292	72,811
–Not in labour force	88,698	51,323	30,901	46,282	55,988	4,296	42,864
–Participation rate (%)	53.4	64.8	63.9	66.2	65.9	65.9	62.9

Source: QRBIS, 2003; ABS, Community profile Census, 2001

1.2 Community vitality

1.2.1 Population and age structure

The population in all NRM regions has increased over the last decade and this trend is expected to continue over the next decade. With reference to [Table 1.15](#), in 2001, of the regions examined, the Burnett–Mary had the highest population of 258,248 (accounting for 7.1% of the population of Queensland). With the exception of Cape York (10.7%) and the Fitzroy (0.7%), the GBR regions have experienced relatively modest growth rates since the 1996 Census compared to the overall growth rate in Queensland of 8.5%.

The population across the regions examined currently lies between the ages of 30 and 40, with the exception of Cape York, where the median age is 28.

Although population growth rates and the median age of the population in the NRM regions appears sound (i.e. positive and relatively young respectively), population growth is largely confined to the coastal fringe and in the larger regional cities such as Bundaberg, Gladstone, Mackay, Townsville and Cairns. In inland, rural areas, the population is declining and ageing.

Table 1.15 Population and age structure

	Burnett–Mary	Fitzroy	Mackay–Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn–Broken
–Population (2001)	258,248	199,208	113,282	184,541	211,731	17,687	157,311
–Number people per ha	0.046	0.013	0.120	0.013	0.097	0.002	0.065
% population increase for the period 1996–2001	6.5	0.7	5.9	7.1	4.5	10.7	4.0
–Median age (2001)	39	33	34	32	34	28	36
–Estimated population by the end of 2019	330,000	222,000	154,000	216,000	296,000	21,100	173,000 [†]
–Estimated rate (%) of annual population growth to 2019	1.35	0.52	1.57	1.00	1.66	1.10	0.55

[†] Estimated from LGA data, which may differ slightly from the SLA data, used to produce the 2001 population.

Source: QRBIS, 2003; ABS, Community profile Census, 1996; ABS, Community profile Census, 2001; Victorian Department of Sustainability and Environment, 2004

1.2.2 Education

Of people aged 15 years and over, there is little difference in the level of education achieved between the regions examined. In particular, the majority of the population in all regions under

consideration has at least completed a primary level education and could be expected to be literate. As is the case for the population structure, this situation is not uniform throughout individual NRM regions.

1.2.3 Income

With reference to [Table 1.14](#), with the exception of the Burnett–Mary (\$160–299), the median weekly individual income for the GBR catchment and Goulburn–Broken region at the 2001 Census was \$300–599. With the exception of the Burnett–Mary and Cape York (\$160–299), the highest percentage of individuals in the regions examined earned between \$300–599 per week.

Table 1.14 Individual weekly income in 2001

Individual weekly income	Burnett–Mary	Fitzroy	Mackay–Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn–Broken
Nil	5.6	7.1	6.7	6.5	6.0	5.9	6.1
\$1 – \$159	14.8	13.8	12.7	12.9	11.7	15.3	13.2
\$160 – \$299	34.2	23.7	24.4	22.3	24.5	28.5	25.4
\$300 – \$599	28.4	25.5	30.1	27.9	31.8	25.4	30.9
\$600 – \$999	12.1	16.9	17.1	20.8	17.9	14.5	17.2
\$1000 – \$1500 or more	4.9	13.0	8.9	9.7	8.1	10.4	7.1
Median individual income	\$200–299	\$300–399	\$300–399	\$300–399	\$200–299	\$200–299	\$300–399
Median family income	\$600–699	\$800–999	\$800–999	\$800–999	\$800–999	\$600–699	\$800–899

Source: QRBIS, 2003; ABS, Community profile Census, 2001

1.2.4 Communication

1.2.4.1 Language

The ability to communicate natural resource management concepts effectively is influenced by the language spoken by the individual. Although the Wet Tropics had the highest percentage of people born in a non-English speaking country (10%), the Goulburn–Broken region had the highest percentage (8%) of people born overseas who spoke English poorly or not at all ([Table 1.16](#)).

Table 1.16 Country of birth and language

	Burnett Mary	Fitzroy	Mackay Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn Broken
% of residents born in non-English speaking country	4.5	3.3	4.7	5.6	10	3.6	5.3
% of residents who speak a language either in addition to, or instead of, English	2.5	2.1	3.2	4.8	9	32.7	3.3
% residents born overseas who speak English poorly or not at all	1.7	1.9	2.1	3.6	5.5	1.6	8.3

Source: QRBIS, 2003; ABS, Community profile Census, 2001

1.2.4.2 Access to computers

Access to computers and more particularly the Internet is important for policy makers as it indicates the usefulness of Internet services as a communication tool. With reference to [Table 1.17](#), all regions reported similar, relatively low rates of computer and Internet usage: On average, approximately 35% of people in the GBR catchment had used a computer at home in the week prior to census night and only 30% had used the internet during the same period. These results are marginally lower than in the Goulburn–Broken, which reported 39% and 31%, respectively.

Table 1.17 Access to computers

	Burnett– Mary	Fitzroy	Mackay– Whitsunday	Burdekin	Wet Tropics	Cape York	Goulburn– Broken
% used a computer at home during the week prior to census night	35	41	38	41	36	18	39
% used the Internet during the week prior to census night	26	33	32	36	33	19	31
% used the Internet at home during the week prior to census night	19.7	24.3	23.3	26	23.6	10.4	22.1

Source: ABS, Community profile Census, 2001

1.3 Concluding Comments

An important observation from this profile of the economies of the GBR NRM regions is that although agriculture accounts for the highest proportion of land use, the economies of the regions are by no means dominated by, or totally reliant on, agricultural production. Tourism and mining, in particular, contribute significantly more to the gross value of production from the GBR catchment. Further, employment in agriculture has been declining over the past 10 years whereas employment in a number of the service industries, in particular the trade sector, has been increasing. In general, the increase in employment in the trade industry is attributable to retail trade and is a reflection of the growing importance of tourism in the region.

A contributing factor influencing the capacity of land managers in the GBR NRM regions to take up resource management is the financial viability of their enterprise. A number of economic factors have been identified in this report which are likely to be influential for enterprise viability; these are summarised below.

The results of the comparison of existing land management techniques, and measures of community vitality, between the GBR NRM regions and the Goulburn–Broken are summarised briefly and, where possible, the current level of sustainability and the future prospects for extension and facilitation are assessed.

1.3.1 Economic factors influencing enterprise viability

1.3.1.1 Limited financial capacity for improved NRM

The ABARE farm performance survey (2004a) and an examination of the beef and sugar

industries, suggest that agricultural establishments in the GBR catchment are constrained by low rates of return on invested capital and relatively high levels of debt. This could impact negatively on investment in sustainable NRM as farm profit is directed toward debt service and capital maintenance. In general, larger farms are in a better position to invest in NRM as they experience relatively high and more stable returns on invested capital, and are able to maintain positive returns during periods of climatic instability (e.g. drought).

There does not appear to be a general consensus with respect to future profit levels. Farmers in the Burdekin and Wet Tropics appeared confident that profits were not falling; conversely, in the Goulburn–Broken and Mackay–Whitsunday regions a majority agreed that profits were falling. This may have implications for investment on improved NRM, as farmers who are pessimistic about future profit levels may be reluctant to invest in new infrastructure or investigate new management techniques.

1.3.1.2 Access to water

The availability of an assured and consistent supply of water for irrigation is vital for the stabilisation of farm production and for any potential diversification into high valued crops. However, facilitating access to water for irrigation needs to be weighed against the environmental costs incurred. Increasing current water use efficiencies will go some way towards removing the need for new water infrastructure

1.3.1.3 Reliance on world commodity markets

A number of the agricultural industries within the GBR catchment are heavily reliant on prevailing world commodity prices (e.g. beef and sugar). According to ABARE (2004b), commodity prices are likely to trend down in the immediate future. Substantial productivity gains and diversification into value-added sectors might help to counteract negative price movements on world markets.

Agricultural diversification in general could help to counteract the worrying characteristic of single-sector reliance, evident particularly in the Mackay–Whitsunday (sugar cane) and, to a lesser extent, in the Fitzroy (beef). A crash in the price of either commodity is likely to have a strong, negative impact on regional economies.

1.3.1.4 Lack of value-added capacity for agricultural production

Apart from some limited primary processing of sugar and beef cattle in a number of the GBR NRM regions, value-adding of agricultural production, such as fruit and vegetable processing or production of meat smallgoods, is limited. If the value-adding capacity of agricultural production is not developed in the future, these industries will become increasingly reliant on world commodity markets and be vulnerable to global economic fluctuations.

1.3.1.5 The agricultural market

Productivity gains and diversification into higher value crops has been put forward as a potential solution for farmers in financial difficulties. However, both of these alternatives result in more produce entering the domestic market. This may lead to a situation of excess supply in which farm gate prices will contract, potentially leaving farmers worse off. It is important that farmers are aware of the dynamics of the market into which they are considering moving. In

some areas, particularly fruit and vegetable production, the domestic market is saturated and new farmers entering are likely to fail, while eroding the profitability of existing producers. The export market could provide an alternative; however, entry into these markets is often highly regulated and growers might have to compete against protected produce coming from the US, Europe and Japan.

1.3.2 Comparison of land management techniques

1.3.2.1 Land management

There are almost 10 million hectares of land under lease in the GBR catchment. There is anecdotal evidence to suggest that freehold land is more appropriately managed. If this were demonstrated to be the case, then additional resources would need to be allocated to address sustainability issues, specifically on leasehold land.

The majority of irrigated land in the GBR catchment is devoted to sugar cane, and a substantial part of this land is irrigated using potentially inefficient furrow techniques which could have a negative impact on the surrounding waterways.

There are some notable regional differences with respect to cultivation techniques, specifically the use of zero or minimal till when compared to the Goulburn–Broken, but no sizeable difference on a whole-of-catchment scale. This suggests that there is a need for a regional awareness or information campaign targeting the Burnett–Mary, Mackay–Whitsunday and the Wet Tropics regions.

1.3.2.1.1 Environmental activities

Fencing, tree planting and salinity management are considered proactive approaches to on-farm improvements in the condition of the environment. Although tree planting in the GBR catchments has not been substantial when compared with the plantings in the Goulburn–Broken, protection and conservation of remnant native vegetation might be more important in the longer term for the GBR catchment.

Over 150,000 ha of land in the GBR catchments are protected by fencing. However, information is not available to identify the extent to which sensitive areas, such as riparian areas or gullies, which could mitigate erosion and nutrient run-off, are protected by fencing.

On farms with an acknowledged salinity problem, specific management plans are lacking. The Burdekin, Fitzroy and Burnett–Mary catchments have been identified as having potential salinity problems. In these regions, salinity management strategies may need to be evaluated to raise the level of awareness.

1.3.3 Community vitality

1.3.3.1 Population and age structure

Although the current population growth rates in the GBR NRM regions are comparable to the Queensland average, the growth rates within the Fitzroy and Wet Tropics regions are considerably lower than the state average. Population growth is confined largely to the major cities and coastal fringe and, in general, inland rural, agricultural areas are experiencing

population decline and ageing. This is an important consideration for NRM as local authorities, who have traditionally been given responsibility for environmental management at the local level, are currently financially constrained as their rate-base contracts.

1.3.3.2 Ability to communicate with land managers

Education level and language skills are important considerations for community engagement. In general, the majority of the population across the GBR catchment has completed primary level education and is literate. A relatively insignificant proportion of the population is estimated to speak English poorly or not at all. Approximately one-third of the population of the GBR catchment has access to a computer and the Internet. At such low levels, the Internet is not a viable option for the communication of NRM information at this stage. Given this situation, community engagement is likely to be more effective via locally based NRM or industry groups and by demonstration workshops and extension work. The Internet, however, is a potentially powerful, low-cost conduit for the provision of NRM information; therefore, facilitating access to information technology resources within the GBR catchment might improve awareness of NRM issues and uptake of sustainable management techniques.

1.3.4 Limitation of study

A major limitation of this study is that the socio-economic profiles have been provided only at the scale of NRM regions. Information at this scale effectively masks critical differences within the regions that would affect their capacity to implement improved NRM. In addition, the reliability of the data used to compare the financial viability of land managers in the target NRM regions is a matter of concern. The sample size of the ABARE (2004a) survey data varied widely across the regions and the sampling errors are likely to be high. Therefore, any assumptions and conclusions are largely speculative.

There appear to be substantial differences in land management practices and socio-economic characteristics between the different industries located within the GBR catchment and also within the industries on a regional and catchment scale. However, detailed information, in particular related to the beef, sugar and horticulture industries is not easily sourced. This makes formulating recommendations on a regional, industry-specific basis difficult.

Appendix A. Individual socio-economic profiles of the NRM regions of the GBR

A.1. Burnett-Mary NRM Region

Economic viability / Resource sustainability

Land use within the Burnett–Mary region

With reference to [Table A1.1](#), agriculture is the principle land use (55% or three million ha) in the Burnett–Mary region. The grazing industry dominates followed by cropping and horticulture. Land use within the region is relatively diverse.

Table A1.1 Land classification across the Burnett–Mary NRM region – 1997.

Land use	Area (ha)	%
Dryland cropping/pasture	273,439	4.9
Irrigated cropping/pasture	79,949	1.4
Total cropping/pasture	353,387	6.3
Dryland horticulture	3,761	0.1
Irrigated horticulture	8,914	0.2
Total horticulture	12,676	0.2
Grazing	2,725,051	48.9
Total agriculture	3,091,114	55.4
Forestry	957,694	17.2
Intensive use	26,015	0.5
Managed resource protection	3,668	0.1
Minimal use	1,177,202	21.1
Nature conservation	259,498	4.7
Waters	51,923	0.9
No data	7,848	0.1
Total area (ha)	5,574,963	100.0

Source: Land Use area sourced from National Land and Water Resource Audit, LandUse of Australia April 1996 – March 1997 which was derived and compiled by the Bureau of Rural Sciences. The data were constructed by automated analyses of a one-year sequence of normalised difference vegetation index (NDVI) images with a 0.01-degree cell size. Classification assigns the dominant land use of one cell the area of the entire cell, thus the results will both over- and under- estimate the areal extent of individual land use classes. Estimates of error propagation within the dataset do not accompany the dataset. Therefore, we can only caution that the results will be more accurate in more homogenous landscapes and less accurate at the edges of homogenous landscapes and in heterogenous landscapes. Notes: Forestry; includes production and plantation. Water; includes estuary / coastal waters, lakes, marshes / wetlands, reservoirs and rivers. Managed resource protection; includes traditional indigenous use. Nature conservation; includes managed habitat, national parks, protected areas and conservation areas. Minimal use; includes defence areas and remnant native cover. Intensive use; includes transport and communication, and urban areas.

Agriculture sectoral contribution to the value of total agriculture in the Burnett–Mary region

[Table A1.2](#) shows the agriculture sector contribution to gross output from the economy of Burnett–Mary NRM region. Agricultural production is valued at farm gate prices. The value-added from agriculture (i.e. from sugar refining to manufacturing) adds substantially to the value of agricultural output from these industries. Despite the enormous amount of land devoted to grazing, the cropping and horticulture industries yield far more in terms of \$ earned per hectare of land under management.

Table A1.2 Gross output, Burnett–Mary NRM region 2001.

Sector	Value (\$)	% of total
<i>Crops</i>		
Cereals for grain	18,651,234	2.2
Cotton	6,005,316	0.7
Nurseries, flowers and turf	26,277,217	3.0
Sugar cane	105,169,864	12.2
Fruit	130,100,746	15.0
Vegetables	132,535,851	15.3
Pastures and grasses	10,223,694	1.2
Other Horticulture	32,384,531	3.7
Total value of crops	461,348,453	53.3
<i>Livestock</i>		
Beef cattle	287,240,094	33.2
Milk	62,167,732	7.2
Pigs	51,080,479	5.9
Poultry and eggs	664,700	0.1
Sheep and wool	569,043	0.1
Other livestock	1,926,184	0.2
Total value of livestock	403,648,232	46.7
Total value of agriculture	864,996,685	

Source: ABS, Agricultural Census, 2001.

Farm performance measures⁶

Table A1.3 shows the farm performance measures reported in the farm survey of resource management performed by ABARE (2004a) for the Burnett–Mary region.

Table A1.3 Farm performance measures in the Burnett–Mary NRM and GBR region.

Farm performance measure	Burnett–Mary – Value (average per farm)	Whole GBR region – Value (average per farm)
Farm cash income	\$26,489	\$69,627
Farm business profit	\$28,511	\$21,710
Total capital	\$1,454,773	\$2,566,073
Farm equity ratio	87%	85%
Profit full equity	\$16,021	\$48,167
Rate of return	1%	2%
Farm business debt	\$131,961	\$289,144
Total off-farm income	\$16,215	\$12,960

Source: ABARE, 2004a.

The Burnett–Mary region has the lowest level of total capital (value of all assets on the farm) on average per farm when compared to the other GBR NRM regions examined. The average total capital for the whole GBR region (\$2,566,073) was higher than that of the Burnett–Mary region.

The relatively low level of capital investment in the Burnett–Mary might help to explain the relatively low levels of farm debt in the region (i.e. there is a reluctance to incur debt and invest in the region for one percent return on equity). However, only 33% of respondents agreed that profit was falling (see Table 1.4). The Burnett–Mary region has a slightly higher equity to debt ratio (87%) than the average for the GBR region (85%). However, the low rate of return will probably constrain landholder ability to undertake changes in farm management practices.

⁶See **Note** under ‘Farm performance measures’ Section 1: page 6

Farms in the Burnett–Mary region have the lowest level of profit at full equity and the rate of return is well below the average for the GBR region as a whole. Again, this is likely to constrain spending on sustainable land management.

Agricultural land management

The total area of holdings for the Burnett–Mary NRM region reported in the 2001 Agricultural Census was 3,902,572 ha. 15% of this land was reported to be leased from the crown, while 80% was owned and operated, 4% was leased or rented and 1% was listed as other.

Irrigation

Of the total land holdings in the region, approximately 2.5% (98,366ha) of land is irrigated. Irrigated land in the region is primarily located in the Burnett, Isis and Bundaberg Local Government Areas (LGAs). The Burnett and Isis areas have the highest and third highest agricultural output by value respectively in the region.

Cultivation techniques

50% of land cultivated in the Burnett–Mary NRM region was prepared using zero or minimal till. The different cultivation techniques across the region are given in [Table A1.4](#).

Table A1.4 Cultivation techniques used in the Burnett–Mary region.

Land Preparation Technique	% of land prepared
No cultivation or zero till (apart from actual sowing operation)	16
Minimal till, One or two cultivations only (immediately prior to sowing)	34
Conventional cultivation, land prepared with other cultivation	50

Source: ABS, Agricultural Census, 2001.

Tree planting

In the 2001 Agricultural Census (ABS 2001) it was reported that 420ha of land (0.01% of total holdings) was planted with seedlings for nature conservation or to protect land and water across the Burnett–Mary NRM region.

Protective fencing

According to Table A1.5, by 2001, 9,976ha of agricultural land in the Burnett–Mary region was protected by fencing.

Table A1.5 Land fenced off from grazing in the Burnett–Mary region.

Land Protected	% of total land fenced off
Saline Areas	3.4
Other degraded areas	1.5
Planted trees and shrubs	3.5
Creeks and rivers	27.9
Remnant native vegetation	6.9
All other areas	56.9
Total area protected (ha)	9,976

Source: ABS, Agricultural Census, 2001.

Salinity management

6% of the farms in the Burnett–Mary were affected by salinity. In addition, approximately 19% of all farming establishments reported that they were using salinity management practices.

Industry sectoral contribution to employment in the Burnett–Mary region

Table A1.6 details employment by industry in the Burnett–Mary and shows changes in

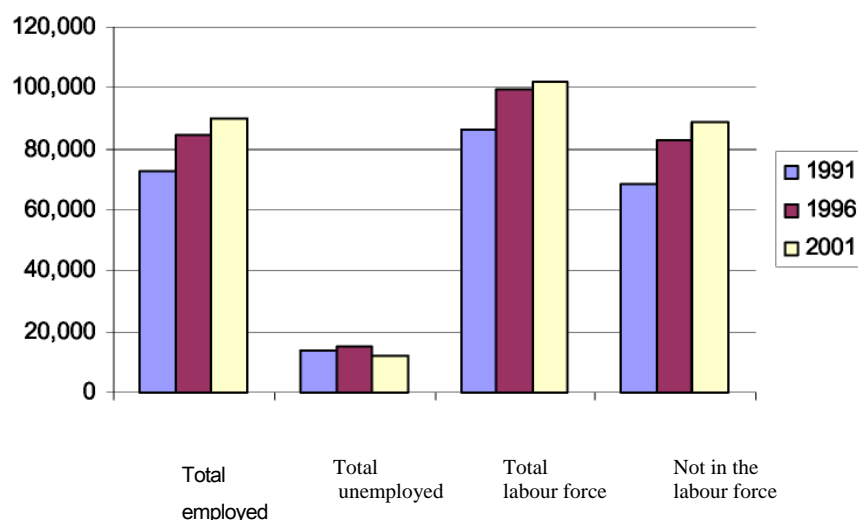
employment since 1996. There does not appear to be any major shift in employment between the 1996 and 2001 census. Trade, agriculture, manufacturing, and health and education remain the dominant sources of employment.

Table A1.6. Sector Employment in the Burnett–Mary NRM region

Sector	Number of people – Census 1996	%	Number of people – Census 2001	%
Agriculture / Forestry / Fishing	11,798	13.9	12,178	13.6
Mining	662	0.8	561	0.6
Manufacturing	9,041	10.7	9,556	10.6
Electricity, Water and gas	930	1.1	966	1.1
Construction	5,755	6.8	5,786	6.4
Trade (Retail and wholesale)	16,082	19.0	18,494	20.6
Transport and Communication	4,226	5.0	4,435	4.9
Financial services	6,950	8.2	6,786	7.6
Government admin / Defence	3,408	4.0	3,491	3.9
Community Services	14,678	17.3	16,571	18.4
Recreation Services	5,457	6.4	6,110	6.8
Personal and other services	2,491	2.9	2,646	2.9
Other	3,331	3.9	2,278	2.5
Total	84,809	100.0	89,858	100.0

Source: QRBIS, 2003.

The workforce and the number of people employed in the Burnett–Mary region has expanded since 1991 and the unemployment rate has decreased from 15.8% in 1991 to 11.6% in 2001 (Figure A1.1). In 2001, 37.2% of the workforce was employed in part-time employment. This is an increase of 4.1% from 33.1% in 1996 (QRBIS 2003). The participation rate at the 2001 Census was 53.4% (QRBIS, 2003), which is significantly lower than the Queensland average (63.1%) (ABS 2001).



Source: QRBIS, 2003.

Figure A1.1 Employment in the Burnett–Mary NRM region at the Census years 1991, 1996 and 2001.

Income

The median weekly individual income for the Burnett–Mary region at the 2001 Census was \$200–\$299 which was lower than the state median income (\$300–\$399). 34.2% of individuals earned between \$160–\$299 per week (Table A1.7). The median weekly family income was \$600–\$699 in 2001 which was well below that of the state (\$800–\$899).

Table A1.7 Individual weekly income in 2001.

Individual weekly income	Number of people – Census Year 2001	%
Nil	10,264	5.6
\$1 – \$159	27,343	14.8
\$160 – \$299	62,959	34.2
\$300 – \$599	52,447	28.4
\$600 – \$999	22,411	12.1
\$1, 000 – \$1, 500 or more	9109	4.9
Total	184,533	100

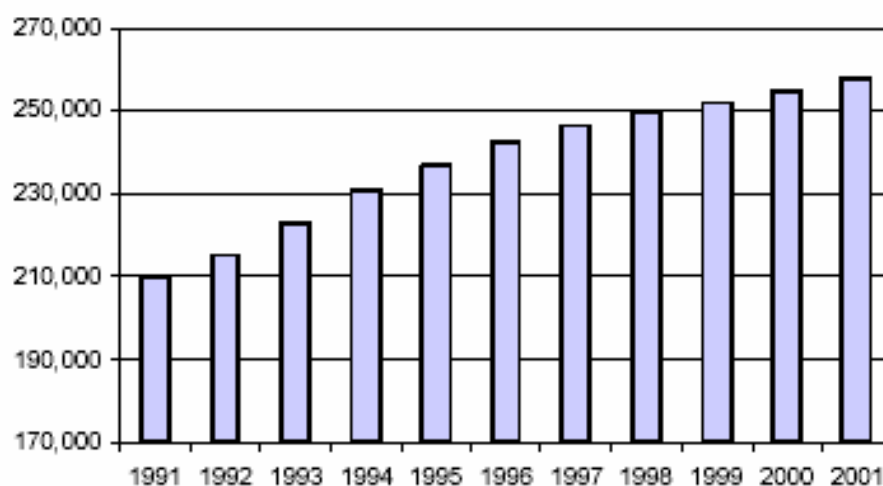
Source: QRBIS, 2003.

Community vitality

Population and age structure

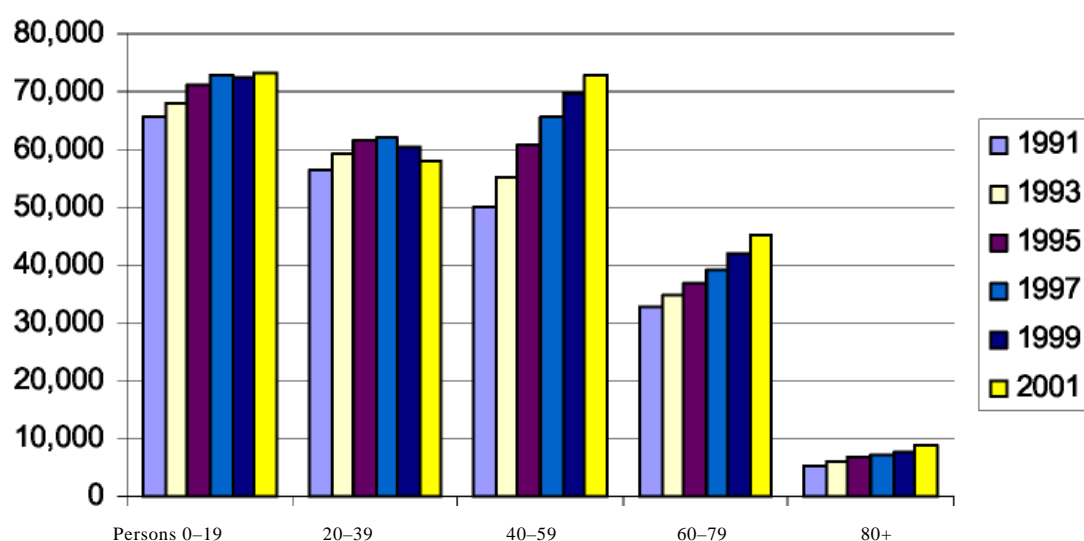
The population of the Burnett–Mary region has increased from approximately 243,000 in 1996 to 258,000 in 2001 (Figure A1.2), a regional increase of approximately 6.5% compared to the Queensland average of approximately 8.5%. The main population centres are located on the coast in Hervey Bay, Bundaberg, Cooloola and Burnett. Population is projected to increase at 1.35% per annum (state average 1.43% per annum) reaching approximately 330,000 by 2019 (Figure A1.4).

The population of the Burnett–Mary is ageing as indicated by a rise in the median age of the population: 30–34 years in the 1991 Census, 36 in 1996 and 39 in 2001 (QRBIS 2003; ABS 2001), as shown in Figure A1.3.



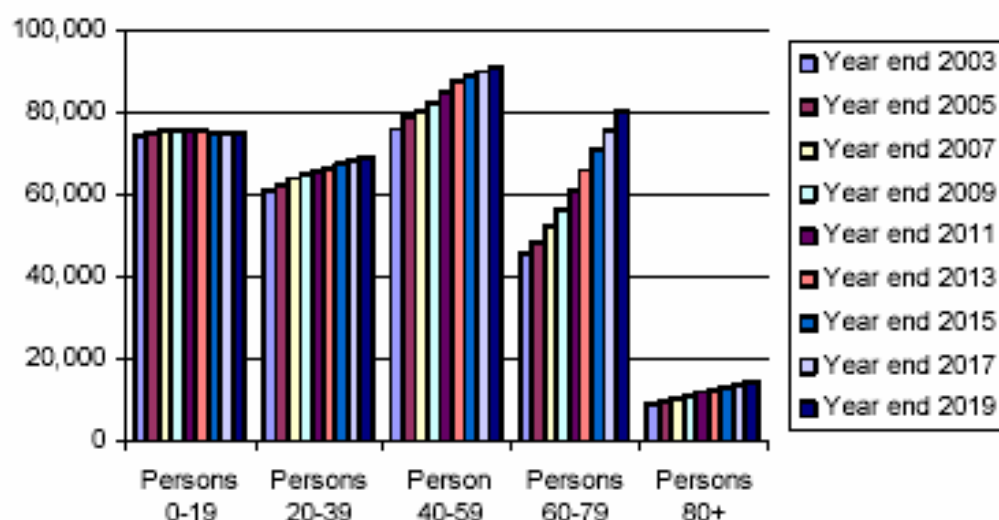
Source: QRBIS, 2003.

Figure A1.2 Change in total population living in the region between 1991 and 2001.



Source: QRBIS, 2003.

Figure A1.3 Age profile for the region.



Source: QRBIS, 2003.

Figure A1.4 Age projections for the region.

Migration

At the 2001 Census 20% of the population within the region reported that they had moved location within the last year, with 45% moving within the last 5 years (QRBIS 2003).

The index of relative disadvantage

According to the index of relative socio-economic disadvantage calculated in 1996, the Wide Bay–Burnett statistical division, which covers most of the Burnett–Mary NRM region, received a score of 926, well below that of Queensland as a whole, which scored 988. The index of relative socio-economic disadvantage is a measure of the relative disadvantage between geographic locations. Scores above 1000 are considered relatively advantaged. The index scores are derived

from attributes including low-income levels, level of educational attainment, high unemployment and jobs in relatively unskilled occupations (McLennan 1998).

Education

Of people aged 15 years and over, 0.5% did not attend school, 16.5% completed grade 8 or less, 36% left after completing grade 10 and 26.5% completed grade 12. 29.9% of people in region are, or have, received some form of tertiary (post high school) education. This is up from 25.6% in 1996 and 23.2% in 1991 (QRBIS 2003).

Communication

Access to computers

Access to computers and the internet in particular is important for policy makers as it indicates the usefulness of internet services as a communication tool. 35% of residents in the region reported that they used a computer at home in the week prior to Census night, 2001. The internet was used by 26% of people (with 19.7% of people accessing the internet from home) in the week prior to Census night, 2001.

Language

Approximately 2.5% of people in the region speak a language either than, or in addition to, English. This percentage has stayed constant over the last two Census periods (QRBIS 2003). In 2001, the percentage of people living in the region that were born in a non-English speaking country was 4.5% (QRBIS 2003). Of the people born overseas living in the region, 1.7% speak English poorly or not at all (ABS 2001).

A.2. Fitzroy NRM Region

Economic viability / Resource sustainability

Land use within the Fitzroy region

With reference to Table A2.1, agriculture and in particular the grazing industry dominates the Fitzroy region. The LGAs with the greatest diversity of land use include Emerald, Banana and Bauhinia. Irrigated land is concentrated in the Banana LGA (Theodore irrigation area) and Emerald (Emerald irrigation scheme).

Apart from the Gladstone urban/industrial district, all areas within the Fitzroy region contain beef cattle farms.

Table A2.1 Land classification across the Fitzroy NRM region – 1997.

Land use	Area (ha)	%
<i>Dryland cropping/pasture</i>	<i>1,835,580</i>	<i>11.6</i>
<i>Irrigated cropping/pasture</i>	<i>31,245</i>	<i>0.2</i>
Total cropping/pasture	1,866,825	11.8
<i>Dryland horticulture</i>	<i>1,249</i>	<i>0.01</i>
<i>Irrigated horticulture</i>	<i>793</i>	<i>0.01</i>
Total horticulture	2,042	0.01
Grazing	9,929,111	63.0
Total agriculture	11,797,978	74.9
Forestry	1,043,888	6.6
Intensive use	305,189	1.9
Managed resource protection	58,435	0.4
Minimal use	1,781,995	11.3
Nature conservation	569,630	3.6
Waters	199,799	1.3
No data	1,231	0.01
Total area (ha)	15,758,144	100

Source: Land Use area sourced from National Land and Water Resource Audit, LandUse of Australia April 1996 – March 1997 which was derived and compiled by the Bureau of Rural Sciences. The data were constructed by automated analyses of a one-year sequence of normalised difference vegetation index (NDVI) images with a 0.01-degree cell size. Classification assigns the dominant land use of one cell the area of the entire cell, thus the results will both over- and under- estimate the areal extent of individual land use classes. Estimates of error propagation within the dataset do not accompany the dataset. Therefore, we can only caution that the results will be more accurate in more homogenous landscapes and less accurate at the edges of homogenous landscapes and in heterogenous landscapes. Notes: Forestry; includes production and plantation. Water; includes estuary / coastal waters, lakes, marshes / wetlands, reservoirs and rivers. Managed resource protection; includes traditional indigenous use. Nature conservation; includes managed habitat, national parks, protected areas and conservation areas. Minimal use; includes defence areas and remnant native cover. Intensive use; includes transport and communication, and urban areas.

Agriculture sectoral contribution to the value of total agriculture in the Fitzroy region

Table A2.2 shows the agriculture sector contribution to gross output from the economy of the Fitzroy region at farm gate prices. Agricultural production, which is dominated by beef cattle production, contributes \$1.325billion of gross output (representing 11.4% of gross output in the region) to the regional economy.

Despite the enormous amount of land devoted to grazing, the cropping and horticulture industries yield far more in terms of dollars earned per hectare of land under management.

The value-added from agriculture, i.e. from meat processing and cotton ginning, to manufacturing adds substantially to the value of agricultural output from these industries.

Table A2.2 Gross output, Fitzroy NRM region 2001.

Sector	Value (\$)	% of total agriculture
<i>Crops</i>		
Cereals for grain	178,139,851	15.6
Cotton	90,987,712	8.0
Nurseries, flowers and turf	3,053,183	0.3
Fruit	23,191,669	2.0
Vegetables	12,723,165	1.1
Pastures and grasses	8,991,679	0.8
Other Horticulture	60,161,264	5.3
Total value of crops	377,248,523	33.1
<i>Livestock</i>		
Beef cattle	731,391,844	64.2
Milk	9,384,945	0.8
Pigs	15,484,687	1.4
Poultry and eggs	2,676,203	0.2
Sheep and wool	1,991,284	0.2
Other livestock	400,776	0.0
Total value of livestock	761,329,739	66.9
Total value of agriculture	1,138,578,262	

Source: ABS, Agricultural Census, 2001; Central Queensland Information Paper, 2003.

Farm performance measures⁷

During 2001–02, data from a total of 51 farms in the Fitzroy NRM region were collated for this report. Given the relatively small size of the sample the sampling errors are likely to be high.

Table A2.3 shows the farm performance measures reported in the farm survey of resource management performed by ABARE (2004a).

Table A2.3 Farm performance measures in the Fitzroy NRM and GBR region.

Farm performance measure	Fitzroy – Value (average per farm)	Whole GBR region – Value (average per farm)
Farm cash income	\$131,558	\$69,627
Farm business profit	\$81,056	\$21,710
Total capital	\$3,629,241	\$2,566,073
Farm equity ratio	82%	85%
Profit full equity	\$122,990	\$48,167
Rate of return	4%	2%
Farm business debt	\$480,078	\$289,144
Total off-farm income	\$13,784	\$12,960

Source: ABARE, 2004a.

Farm capital in the Fitzroy region is approximately equal to the average (\$3.32 million) for the six regions examined. When compared to the average farm capital for the entire GBR catchment (\$2,566,073) the average capital in the Fitzroy region is relatively high.

Farm debt and the debt to equity ratio in the Fitzroy region is relatively high compared to the other regions examined. This may be attributed to the relatively high rate of return (and therefore willingness to invest and incur debt) to agricultural enterprises in the Fitzroy region. However, the above hypothesis appears to be at odds with the ABARE (2004a) landholder survey that indicated that 41% of respondents agreed that profit was falling. Despite this, the Fitzroy region has the second highest average farm business profit (\$81,056) when compared to the other regions examined indicating that landholders may be in a position to invest in conservation and sustainable management practices (Table A2.3).

⁷See **Note** under ‘Farm performance measures’ Section 1: page 6

Agricultural land management

The total area of holdings for the Fitzroy NRM region reported in the 2001 Agricultural Census was 13,798,531 ha. 13% of this land was reported to be leased from the crown, while 81% was owned and operated, 5% was leased or rented and 1% was listed as other.

Irrigation

Of the total land holdings in the region, approximately 0.4% (53,800 ha) of land is irrigated. Irrigated land in the region is primarily located in the Banana and Emerald LGAs, which have the highest value of agricultural output in the region.

Cultivation techniques

With reference to Table A2.4, approximately 73% of land cultivated in the Fitzroy NRM region was prepared using zero or minimal till.

Table A2.4 Cultivation techniques used in the Fitzroy region.

Land Preparation Technique	% of land prepared – Region
No cultivation or zero till (apart from actual sowing operation)	35
Minimal till, one or two cultivations only (immediately prior to sowing)	38
Conventional cultivation, land prepared with other cultivation	26

Tree planting

In the 2001 Agricultural Census (ABS, 2001) it was reported that 54ha of land (0.0004% of total holdings) was planted with seedlings for nature conservation or to protect land and water across the Fitzroy NRM region.

Protective fencing

With reference to Table A2.5, in 2001, 54,729 ha of agricultural land in the Fitzroy region were fenced off from grazing. 40.7% of the protective fencing in the region is used to protect creeks and rivers.

Table A2.5 Land fenced off from grazing in the Fitzroy region.

Land Protected	% of total land fenced off
Saline Areas	0.2
Other degraded areas	5.0
Planted trees and shrubs	0.3
Creeks and rivers	40.7
Remnant native vegetation	8.1
All other areas	45.7
Total area protected (ha)	54,729

Source: ABS, Agricultural Census, 2001.

Salinity management

Of the agricultural establishments in the region, approximately 4% of these indicated that they had some area of their land affected by salinity. In addition, approximately 17% of all establishments reported that they were using salinity management practices.

Industry sectoral contribution to employment in the Fitzroy region

Table A2.6 details the employment by industry in the region and shows changes in employment in these industries since 1996. It also shows that the industries contributing the most to employment in the region are the service sectors. In 2001, the major employer in the region was the trade sector, which contributed 18.7% to the total employment. Manufacturing (9.9%), agriculture (8.7%) and education (8.1%) were the next major sectors employing people within the region.

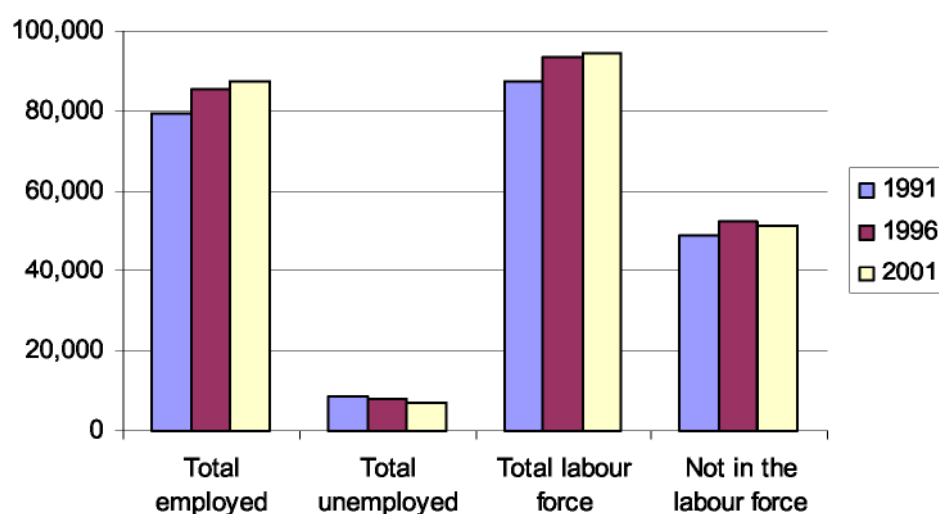
The Census data shows a relatively large increase in employment in the trade and education sectors with more modest increases in the manufacturing and agricultural sectors. There was a marked decline in employment in the mining sector with other sectors remaining relatively constant since 1996.

Table A2.6 Sector employment in the Fitzroy NRM region

Sector	Number of people – Census 1996	%	Number of people – Census 2001	%
Agriculture /Forestry /Fishing	7,202	8.4	7,863	9.0
Mining	8,481	9.9	6,515	7.5
Manufacturing	7,922	9.3	8,638	9.9
Electricity , water and gas	1,602	1.9	1,642	1.9
Construction	6,253	7.3	6,070	6.9
Trade (Retail and wholesale)	14,353	16.8	16,353	18.7
Transport and communication	5,812	6.8	5,741	6.6
Financial Services	6,921	8.1	7,161	8.2
Government admin / Defence	3,274	3.8	2,984	3.4
Community services	13,098	15.3	13,935	16.0
Recreation Services	5,281	6.2	5,749	6.6
Personal and other services	2,516	2.9	2,745	3.1
Other	2,756	3.2	1,943	2.2
Total	85,471	100.0	87,339	100.0

Source: QRBIS, 2003.

The size of the labour force and the number of people employed in the Fitzroy region has increased over the last three Census periods (Figure A2.1). During this period, there has been a corresponding drop in the unemployment rate from 9.4% in 1991 to 7.4% in 2001. Part-time employment has increased from 27.2% in 1996 to 30.7% in 2001 (QRBIS 2003). The workforce participation rate in the Fitzroy region at the 2001 Census was 64.8% (QRBIS 2003), exceeding the Queensland rate of 63.1% (ABS 2001).



Source: QRBIS, 2003.

Figure A2.1 Employment in the Fitzroy NRM region at the Census years 1991, 1996 and 2001.

Income

The median weekly individual income for the region at the 2001 Census was \$300–\$399 which was the same as that for the state. 13.6% of individuals earned between \$200–299 per week (Table A2.7). The median weekly family income was \$800–\$999 in 2001 which was the same as the state.

Table A2.7 Individual Weekly Income in 2001.

Individual Weekly Income	Number of People –	%
Nil	9,921	7.10
\$1–\$159	19,352	13.80
\$160–\$299	33,145	23.70
\$300–\$599	35,706	25.50
\$600–\$999	23,542	16.90
\$1,000 –\$1,500 or more	18,269	13.00

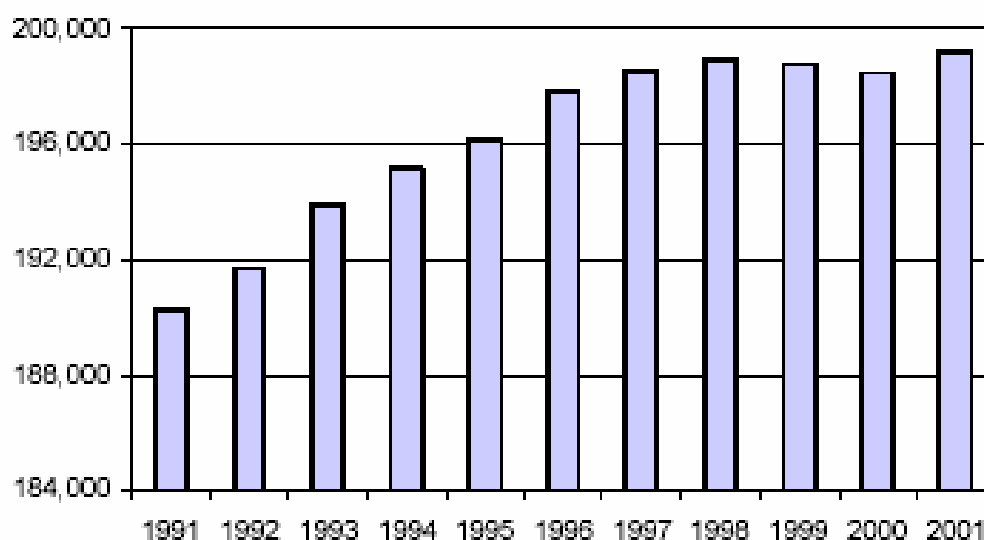
Source: QRBIS, 2003.

Community vitality

Population and age structure

The Fitzroy has been subject to very slow, and at times negative, growth rates between 1991 and 2001 (Figure A2.2). Since the 1991 Census, the population has increased by 1424 indicating a growth rate of just 0.7%, well below the state average of 8.5%. In 2001, the total population of the Fitzroy region was 199,208 people accounting for 5.5% of the population of Queensland (ABS 2001, cat. no. 2001.0).

The majority of the population lives in the coastal cities of Rockhampton, Livingstone, Calliope and Gladstone.



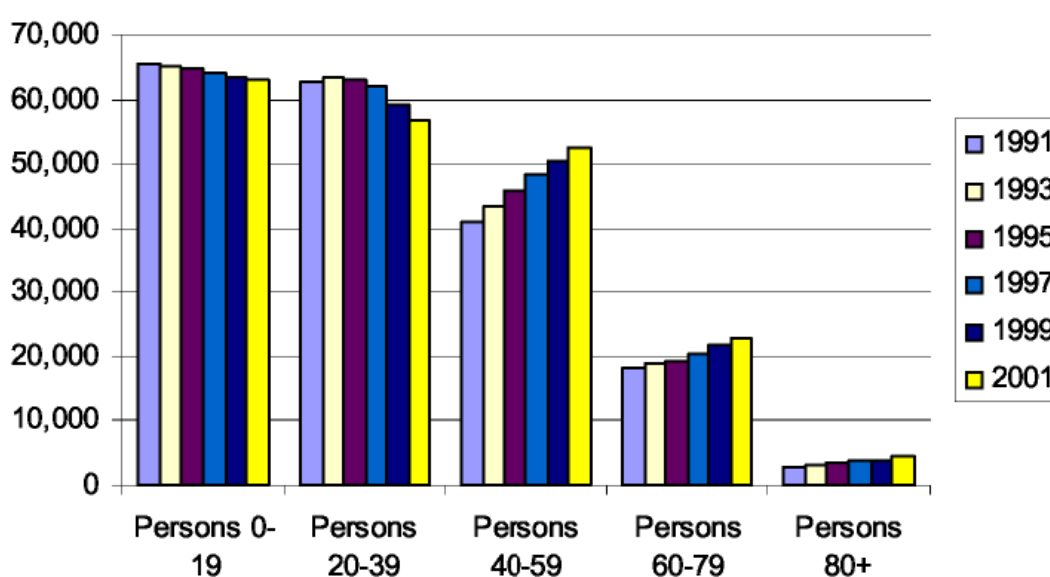
Source: QRBIS, 2003.

Figure A2.2 Change in total population living in the region between 1991 and 2001.

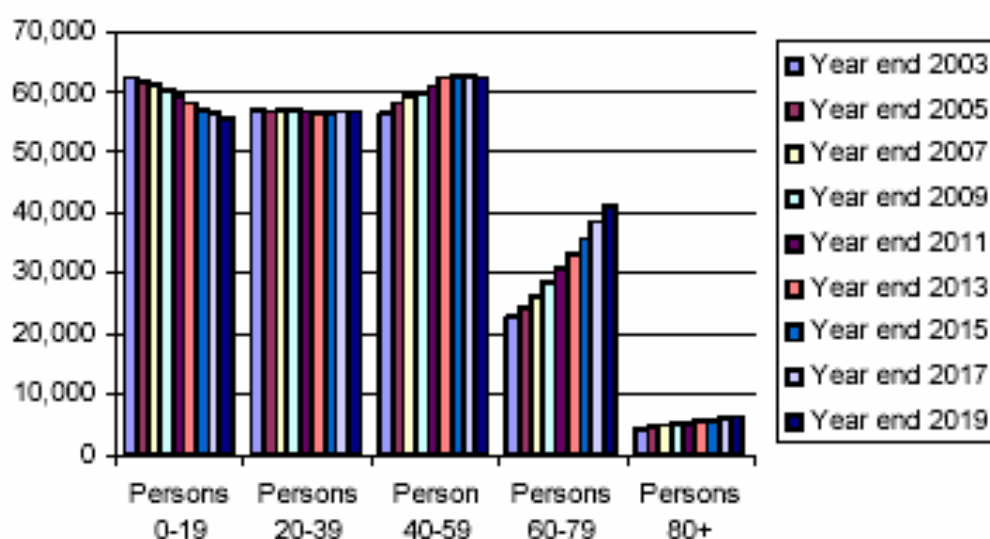
The population of the region is ageing and will continue to age (Figure A2.3 and A2.4). The median age of people in the region in the 2001 Census was 33 years, compared with 31 years in the 1996 Census and 25–29 years in the 1991 Census (QRBIS 2003; ABS 2001).

The population of the Fitzroy region is projected to increase to 222,000 by 2019 at an average rate of 0.52% per annum. The population growth rate is significantly lower than that projected for Queensland (1.43% per annum).

Figure A2.3. Age profile for the region.



Source: QRBIS, 2003.



Source: QRBIS, 2003.

Figure A2.4 Age projections for the region.

Migration

At the 2001 Census, 22% of the population within the region reported that they had moved location within the last year, with 49% moving within the last 5 years (QRBIS 2003).

The index of relative disadvantage

According to the index of relative socio-economic disadvantage calculated in 1996, the Fitzroy statistical division, which covers most of the Fitzroy NRM region, received a score of 972, slightly lower than Queensland as a whole, which scored 988. The index of relative socio-economic disadvantage is a measure of the relative disadvantage between geographic locations. Scores above 1000 are considered relatively advantaged. The index scores are derived from attributes including low-income levels, level of educational attainment, high unemployment and jobs in relatively unskilled occupations (McLennan 1998).

Education

Of people aged 15 years and over, 0.5% did not attend school, 13.6% completed grade 8 or less, 34.7% left after completing grade 10 and 31.9% completed grade 12. 32% of people in region are, or have, received some form of tertiary (post high school) education. This is up from 28.5% in 1996 and 25.9% in 1991 (QRBIS 2003).

Communication

Access to computers

41% of residents in the region reported that they used a computer at home in the week prior to Census night, 2001. The internet was used by 33% of people (with 24.3% of people accessing the internet from home) in the week prior to Census night, 2001.

Language

Approximately 2.1% of people in the region speak a language either in addition too, or instead of, English. This has decreased from the last two Census periods (2.3% in 1996 and 2.2% in 1991)

(QRBIS 2003). In 2001, the percentage of people living in the region that were born in a non-English speaking country was 3.3% (QRBIS 2003). Of all the people born overseas but now living in the region 1.9% speak English poorly or not at all (ABS 2001).

Social capacity of the Fitzroy NRM region

An extensive regional survey of graziers, cotton farmers, grain growers and mixed farmers in the Fitzroy NRM region produced a number of key messages on their capacity to implement sustainable management practices (Taylor et al. 2000). A summary of these findings and interpretations follow:

Farming experience

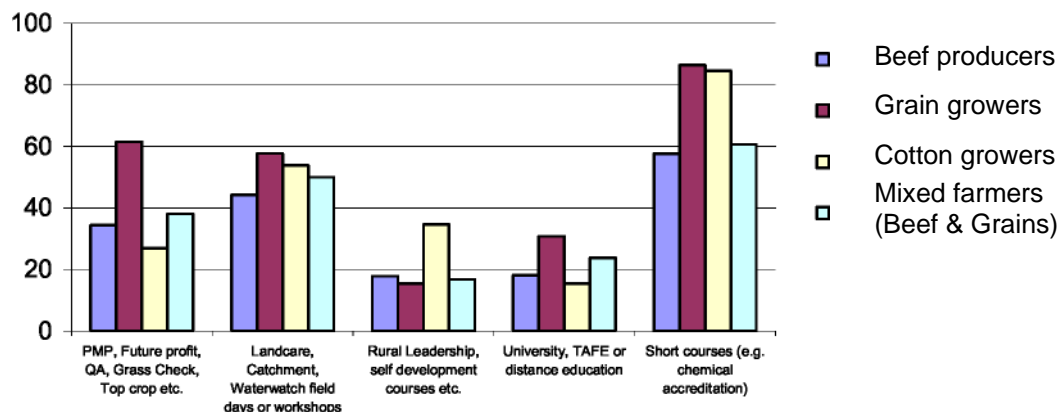
- Regional industries are quite consistent in this area. The 'average' producer in the region has had twenty-four years farming experience, is third generation primary producer and is fifty years of age;
- Grains and cotton and beef industry producers undertook similar levels of tertiary education during 1996–1999.

Management-relevant training (Figure A2.5)

- Despite general similarities in participation in training and education activities across the region's rural industries, there are some notable differences;
- The trends indicate there may be some issues relating to providing and promoting appropriate training activities to some rural industries, particularly those involving beef production;
- There is also strong involvement by producers across all industries in Landcare, catchment field days or similar information/training sessions. This shows that there is support amongst producers for accessing community generated and informal learning opportunities.

Farm financial characteristics

- The grains industry, with roughly one in four producers (26.9%) involved in off-farm employment also earn the greatest proportion of their income from off-farm sources (12.6%). The beef and mixed farming industries have approximately one in five producers (19%) involved in off-farm income generation, which contributes on average some seven to eight percent to their income. Cotton producers are least involved in off-farm income opportunities (4%) but those that are manage to contribute the same amount to their overall income as beef and mixed farming (7.4%);
- Cotton producers have been most active in acquiring additional land for production over the last five years (36%) followed by beef producers (26.7%), Mixed farmers (22.6%) and grain growers (19.2%).



Source: Taylor *et al.* 2000.

Figure A2.5 Participation in land management relevant training activities during 1996–1999.

Farming styles and sustainable practice adoption

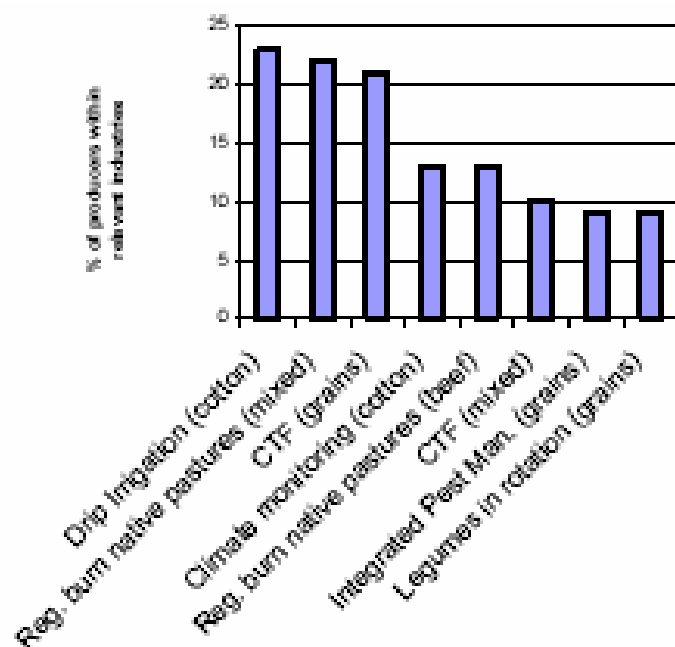
- Cotton and grains industries relied largely on a part-time and full-time non-family labour force whereas regional operations involving beef cattle relied more on family based full-time and part-time workers. There is anecdotal evidence, however, that the use of off-farm labour is increasing in the beef industry;
- At an industry level there was no notable difference in the proportion of producers who indicated their intent to continue production activities in their current district;
- Producers from cropping industries tended to have worked more regularly with extension officers to trial new land management practices in the last three years than have producers involved in beef production; and
- The more notable potential trends in practice adoption (Figure A2.6), based on producers indicating their intention to implement particular practices (in addition to existing current industry use of the practice) in the next 3-year period, were:
 - beef cattle and mixed farming sectors moving towards incorporating burning regimes of native pastures in their management in the next three years; this practice if undertaken wisely has some positive benefits for biodiversity of native pasture communities and improved productive potential of those communities;
 - In the grains and mixed farming sectors 21% and 10% of producers intend to implement Controlled Traffic Farming techniques on top of existing use; indications are that this may have a significant effect on reducing levels of sediment and nutrient build up in waterways adjacent to cropping areas; and
 - In the cotton industry there are significant moves to implementing drip irrigation practices and to a lesser degree climate monitoring techniques with obvious benefits for increased water use efficiency, reduction in the use of aerial spraying and consequently, off-site drift of pesticides from intensive cropping areas.

Information use and access

- Generally the sources of management information which were rated most highly by producers were: other farmers, field days, technical journals and extension notes and the

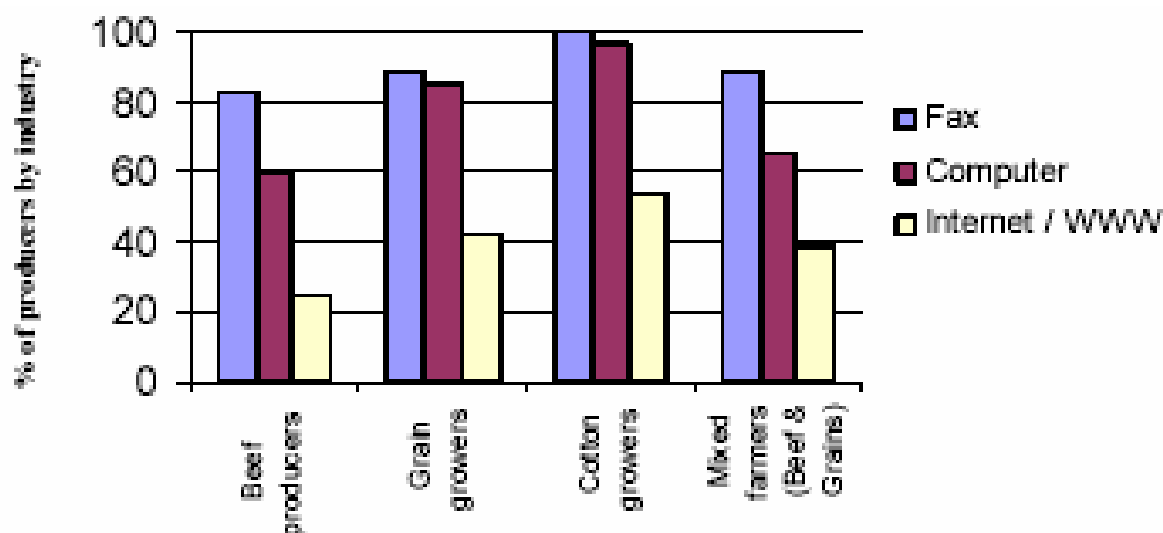
World Wide Web, with the grains, cotton and mixed industries indicating they valued a diversity of land management information sources;

- Facsimiles appear widely in use amongst producers from all industries. The use of computers and the internet as part of farm business operation is more evident amongst cotton and grain producers in the region (Figure A2.7).



Source: Taylor *et al.* 2000.

Figure A2.6 Intended practice adoption amongst producers over the next three years, 1999–2002.



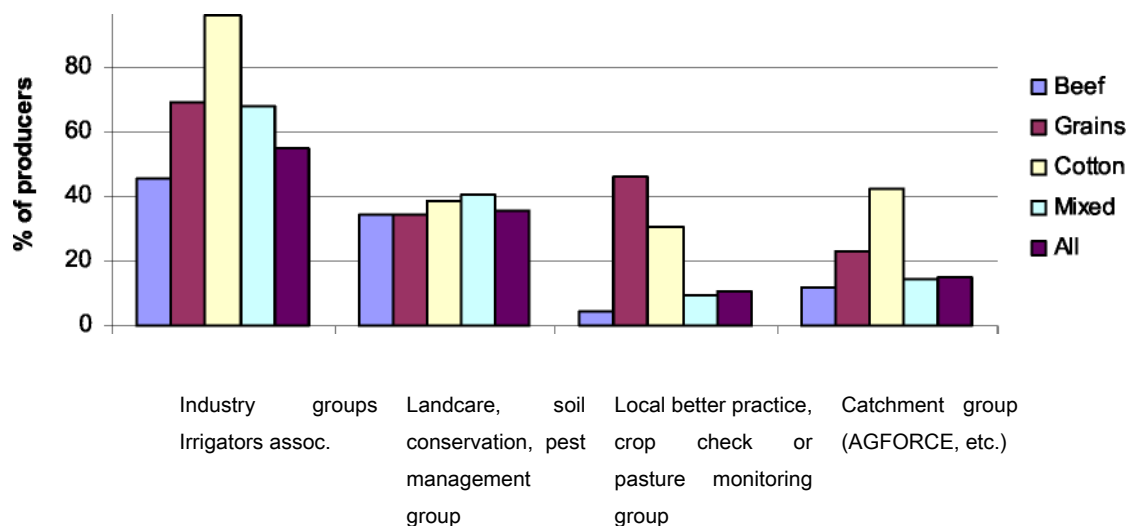
Source: Taylor *et al.* 2000.

Figure A2.7 Use of information technology by industry as of October 1999.

Group membership

Membership by regional producers of industry-based or land management groups is presented below and summarised in Figure A2.8.

- Producers' membership of industry associations is much stronger than other forms of membership in the region. However, cotton producers and producers involved in grains or mixed farming show significantly higher involvement than beef industry members;
- Approximately one in every three producers across all industries is a member of Landcare, soil conservation or pest management type groups, consistent across all industries;
- Grain and cotton producers have a much higher involvement in local better practice or crop checking type groups than operators involved in beef or mixed farming; and
- All industries show some involvement or association with catchment groups, however, it is the cotton industry that again displays higher levels of participation

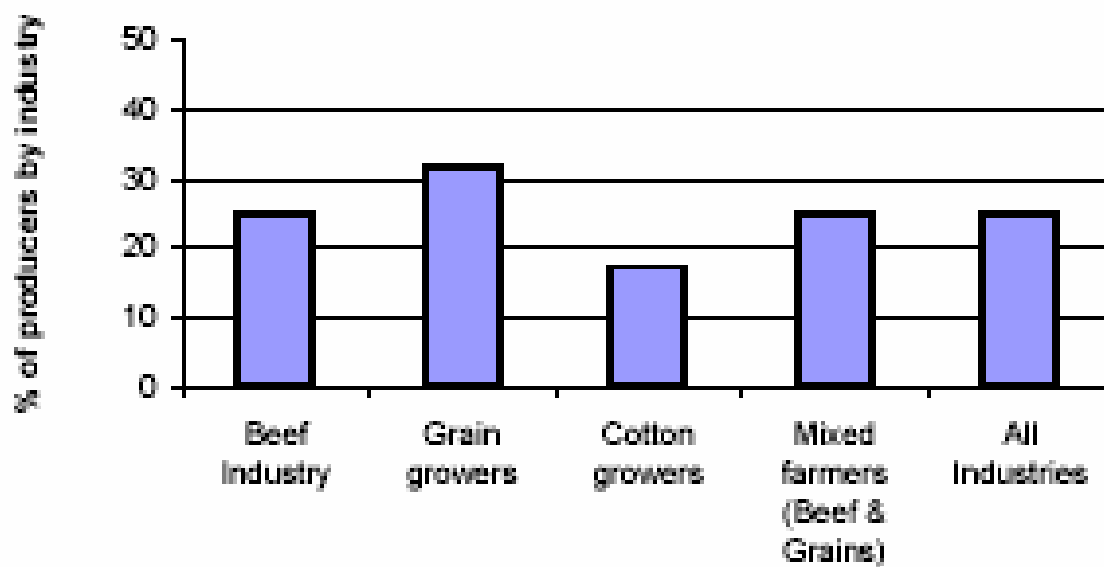


Source: Taylor *et al.* 2000.

Figure A2.8. Membership of industry and land management groups and networks by Fitzroy NRM region industries as of October 1999.

Less than one-third of all producers in the region are seeking to access external funding sources (e.g. Natural Heritage Trust, Queensland Rural Adjustment Authority) for improved land management ([Figure A2.9](#)).

In the last 3 years grain producers (32%) have been most active in applying for funds such as NHT or QRAA funding (not including drought relief payments) followed by beef producers and mixed farmers (25%) and cotton growers (17.4%). This is interesting in that there is little difference between producer membership of groups such as Landcare or Pest management groups that might be better positioned to apply for some sources of funding.



Source: Taylor *et al.* 2000.

Figure A2.9 Percentage of producers from each industry, who, during 1996–1999 accessed funds for improved land management.

A.3. MacKay-Whitsunday NRM Region

Economic viability / Resource sustainability

Land use within the Mackay–Whitsunday region

The dominant land classification across the region, shown in Table A3.1, is agriculture, accounting for 49% of land use. Grazing accounts for the majority (64%) of the agricultural land use and 32% of all land use in the region. Land use within the region is relatively diverse.

Table A3.1 Land classification across the Mackay–Whitsunday NRM region.

Land use	Area (ha)	%
<i>Dryland cropping/pasture</i>	<i>112,210</i>	<i>11.9</i>
<i>Irrigated cropping/pasture</i>	<i>57,359</i>	<i>6.1</i>
Total cropping/pasture	169,569	18.0
<i>Dryland horticulture</i>	<i>0</i>	<i>0</i>
<i>Irrigated horticulture</i>	<i>230</i>	<i>0.02</i>
Total horticulture	230	0.02
Grazing	299,807	31.8
Total agriculture	469,606	49.8
Forestry	87,802	9.3
Intensive use	4,396	0.5
Managed resource protection	0	0.0
Minimal use	240,273	25.5
Nature conservation	101,979	10.8
Waters	39,303	4.2
No data	0	0
Total area (ha)	943,358	100

Source: Land Use area sourced from National Land and Water Resource Audit, LandUse of Australia April 1996 – March 1997 which was derived and compiled by the Bureau of Rural Sciences. The data were constructed by automated analyses of a one-year sequence of normalised difference vegetation index (NDVI) images with a 0.01 degree cell size. Classification assigns the dominant land use of one cell the area of the entire cell, thus the results will both over- and under- estimate the areal extent of individual land use classes. Estimates of error propagation within the dataset do not accompany the dataset. Therefore, we can only caution that the results will be more accurate in more homogenous landscapes and less accurate at the edges of homogenous landscapes and in heterogenous landscapes. Notes: Forestry; includes production and plantation. Water; includes estuary / coastal waters, lakes, marshes / wetlands, reservoirs and rivers. Managed resource protection; includes traditional indigenous use. Nature conservation; includes managed habitat, national parks, protected areas and conservation areas. Minimal use; includes defence areas and remnant native cover. Intensive use; includes transport and communication, and urban areas.

Agriculture sectoral contribution to the value of total agriculture in the MackayWhitsunday region

Table A3.2 shows industry contribution to gross output from the economy of MackayWhitsunday NRM region.

Table A3.2 Gross output, Mackay–Whitsunday NRM region 2001.

Sector	Value (\$)	% of total agriculture
<i>Crops</i>		
Cereals for grain	640	0.0
Nurseries, flowers and turf	3,132,904	2.0
Sugar cane	126,296,503	80.0
Fruit	1,060,539	0.7
Vegetables	698,867	0.4
Pastures and grasses	298,932	0.2
Other Horticulture	2,486,345	1.6
Total value of crops	133,974,730	84.8
<i>Livestock</i>		
Beef cattle	20,114,081	12.7
Milk	1,892,850	1.2
Pigs	260,903	0.2
Poultry and eggs	535,851	0.3
Other livestock	13,899	0.0
Total value of livestock	22,817,583	14.4
Total value of agriculture	157,931,847	

Source: ABS, Agricultural Census, 2001.

Farm performance measures⁸

Table A3.3 shows the farm performance measures reported in the farm survey of resource management performed by ABARE (2004a).

Table A3.3 Farm performance measures in the Mackay–Whitsunday NRM and GBR region.

Farm performance measure	Mackay–Whitsunday – Value (average per farm)	Whole GBR region – Value (average per farm)
Farm cash income	\$146,523	\$69,627
Farm business profit	\$45,574	\$21,710
Total capital	\$4,530,701	\$2,566,073
Farm equity ratio	95%	85%
Profit full equity	\$79,023	\$48,167
Rate of return	2%	2%
Farm business debt	\$225,006	\$289,144
Total off-farm income	\$846	\$12,960

Source: ABARE, 2004a.

The Mackay–Whitsunday region has a relatively high level of total average capital compared to the five other regions examined second only to the Burdekin. The average farm capital for the

entire GBR region (\$2,566,073) was well below that of the Mackay–Whitsunday region.

Farm debt is relatively low when compared to the average level of capital in the Mackay–Whitsunday region possibly reflecting a low willingness to incur debt to expand the capital base in the present economic climate (characterised by low rates of return and falling profits: 52% of respondents agreed that profit was falling) or that current capital levels are sufficient for present needs.

The Mackay–Whitsunday region has a higher equity ratio (95%) than the average for the GBR region (85%). However, as per the other regions, low rate of return may be a constraint on their ability to undertake changes in farm management practices (Table A3.3).

§See **Note** under ‘Farm performance measures’ Section 1: page 6

Farms in the Mackay–Whitsunday region have relatively moderate levels of profit at full equity. The profit at full equity of the region is higher than that of the whole GBR region. This suggests that the Mackay–Whitsunday region may be better placed to spend money on NRM than other catchments in the GBR region.

Agricultural land management

The total area of holdings for the Mackay–Whitsunday NRM region reported in the 2001 Agricultural Census was 475,595 ha. 14% of this land was reported to be leased from the crown, while 81% was owned and operated, 4% was leased or rented and 2% was listed as other.

Irrigation

Of the total land holdings in the region, approximately 11 % (50,751 ha) of land is irrigated. Irrigated land in the region is primarily located in the Mackay and Whitsunday LGAs, which have the highest value of agricultural output in the region.

Cultivation techniques

With reference to Table A3.4, 53% of land cultivated in the Mackay–Whitsunday NRM region was prepared using zero or minimal till.

Table A3.4 Cultivation techniques used in the Mackay–Whitsunday region.

Land Preparation Technique	% of land prepared – Region
No cultivation or zero till (apart from actual sowing operation)	6
Minimal till, One or two cultivations only (immediately prior to sowing)	47
Conventional cultivation, land prepared with other cultivation	47

Tree planting

In the 2001 Agricultural Census (ABS 2001) it was reported that 57 ha of land (0.01% of total holdings) was planted with seedlings for nature conservation or to protect land and water across the

Mackay–Whitsunday NRM region.

Protective fencing

With reference to Table A3.5, 2,611 ha of agricultural land in 2001 in the region were reported to be fenced off from grazing. 20.7% of the protective fencing in the region is used to protect creeks and rivers.

Table A3.5 Land fenced off from grazing in the Mackay–Whitsunday region.

Land Protected	% of total land fenced off
Saline Areas	2.3
Other degraded areas	0.0
Planted trees and shrubs	1.9
Creeks and rivers	20.7
Remnant native vegetation	0.0
All other areas	75.1
Total area protected (ha)	2,611

Source: ABS, Agricultural Census, 2001.

Salinity management

Of the agricultural establishments in the region, approximately 9% of these indicated that they had some area of their land affected by salinity. In addition, approximately 24% of all establishments reported that they were using salinity management practices.

Sectoral contribution to employment in the region

Table A3.6 details the employment by industry in the region and shows changes in employment in these industries since 1996. It also shows that the industries contributing the most to employment in the region are the service sectors. In 2001, the major employer in the region was the trade sector, which contributed 21.4% to the total employment. Manufacturing (10%), agriculture (8.6%), and health and community services (7.9%) were the next major sectors employing people within the region.

The Census data shows modest increases in employment in the trade, mining, property and business services, health and community services and education sectors. There was a moderate decline in employment in the accommodation and restaurants sector, while employment in other sectors has remained steady since 1996.

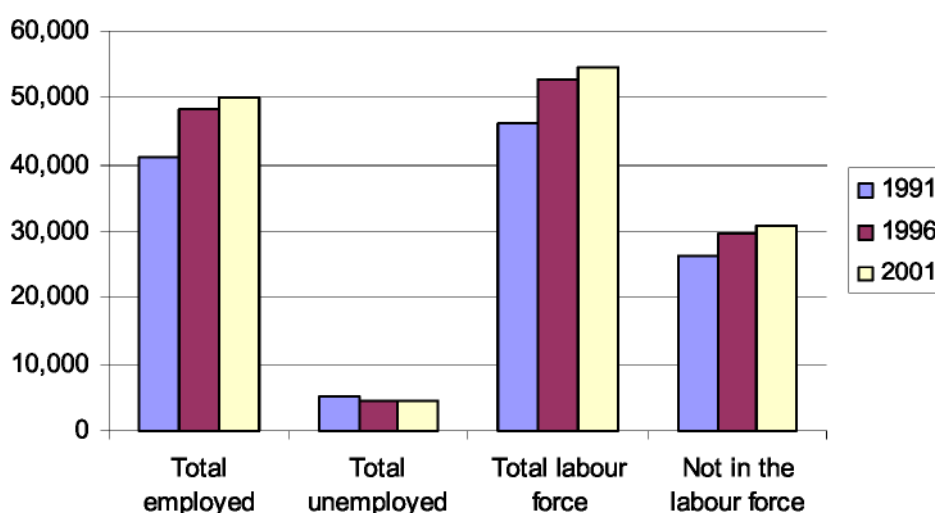
Table A3.6 Sector Employment in Mackay–Whitsunday NRM region

Sector	Number of people – Census 1996	%	Number of people – Census 2001	%
Agriculture /Forestry /Fishing	4,731	9.8	4,539	9.0
Mining	966	2.0	1,358	2.7
Manufacturing	5,177	10.7	5,016	10.0
Electricity , water and gas	394	0.8	375	0.7
Construction	3,578	7.4	3,490	7.0

Trade (Retail and wholesale)	9,586	19.8	10,709	21.4
Transport and communication	4,192	8.7	3,889	7.8
Financial Services	4,341	9.0	4,850	9.7
Government admin / Defence	1,198	2.5	1,326	2.6
Community Services	6,250	12.9	7,272	14.5
Recreation Services	4,989	10.3	4,614	9.2
Personal and other services	1,362	2.8	1,472	2.9
Other	1,623	3.4	1,245	2.5
Total	48,387	100.0	50,155	100.0

Source: QRBIS, 2003.

The total number of people in the workforce and the number of people employed in the Mackay–Whitsunday region has increased over the last three Census periods (Figure A3.1). There has been a corresponding drop in the unemployment rate from 11.2% in 1991, to 8.1% in 2001. Part-time employment has increased from 28.5% of the workforce in 1996 to 32.1% in 2001 (QRBIS 2003). The participation rate in the Mackay–Whitsunday region at the 2001 Census was 64% (QRBIS 2003), comparable to the Queensland rate of 63.1% (ABS 2001).



Source: QRBIS, 2003.

Figure A3.1 Employment in the Mackay–Whitsunday NRM region at the Census years 1991, 1996 and 2001.

Income

The median weekly individual income for the region at the 2001 Census was \$200–\$299 which was lower than that for the state (\$300–\$399). 14.6% of individuals earned between \$200–299 per week (Table A3.7). The median weekly family income was \$800–\$999 in 2001 which was the same as the state.

Table A3.7 Individual Weekly Income in 2001

Individual Weekly Income	Number of People – Census Year 2001	%
Nil	5,495	6.7
\$1–\$159	10,404	12.7
\$160–\$299	20,017	24.4
\$300–\$599	24,662	30.1
\$600–\$999	13,920	17.1
\$1,000–\$1,500 or more	7,345	8.9

Source: QRBIS, 2003.

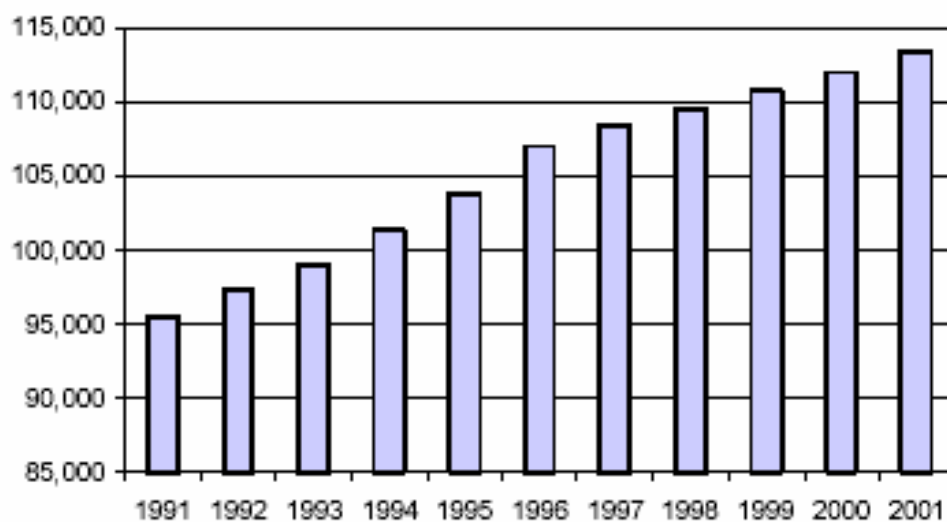
Community vitality

Population and age structure

The population in the region has increased between 1991 and 2001 ([Figure A3.2](#)). In 2001, the population of the region was 113,282 people accounting for 3.1% of the population of Queensland (ABS 2001, cat. no. 2001.0). This is an increase of 6,262 people between 1996 and 2001. This represents a relatively low 5.9% increase from the 1996 Census compared to the state increase of 8.5%.

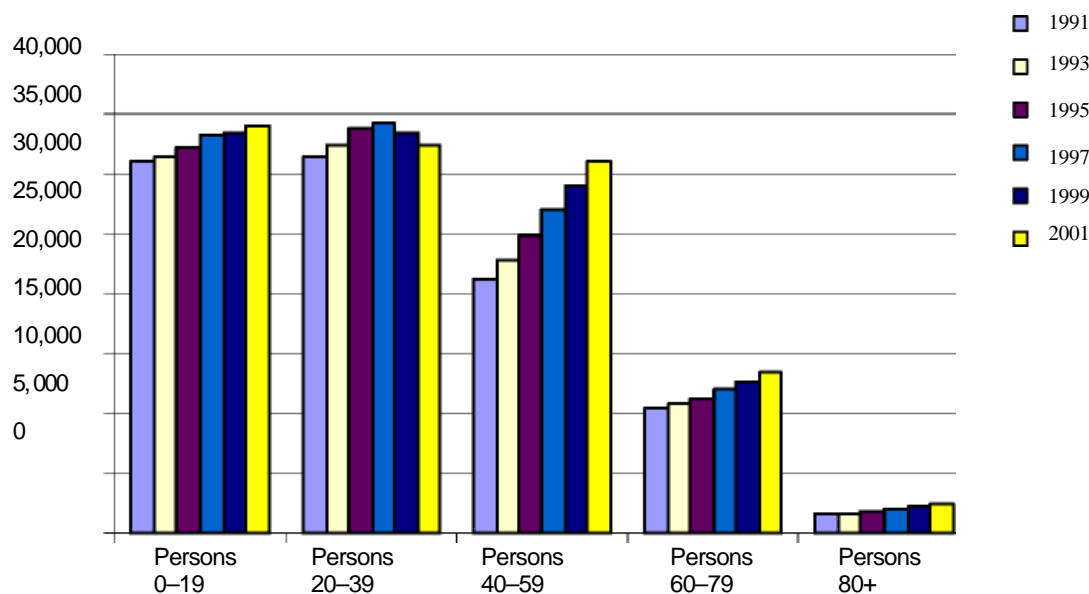
The population of the region is ageing ([Figure A3.3](#)). The median age of people in the region in the 2001 Census was 34 years, compared with 32 years in the 1996 Census (QRBIS 2003; ABS 2001).

It is projected that the population will continue to increase to 154,000 by the end of 2019, at an average rate of 1.57% per annum and the population is ageing ([Figure A3.4](#)). This annual average population growth rate is slightly higher than that projected for the State (1.43% per annum).



Source: QRBIS, 2003.

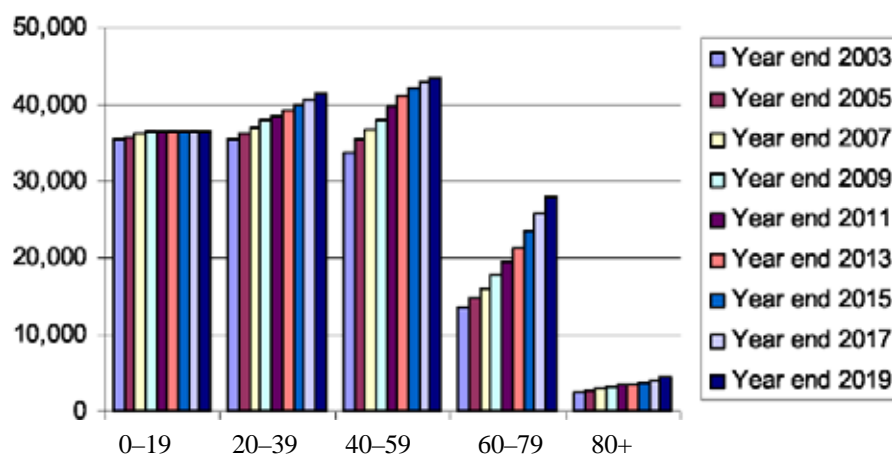
Figure A3.2 Change in total population living in the region between 1991 and 2001.



Source: QRBIS, 2003.

Figure A3.3 Age profile for the region.

Figure A3.4. Age projections for the region.



Source: QRBIS, 2003.

Migration

At the 2001 Census 22% of the population within the region reported that they had moved location within the last year, with 49% moving within the last 5 years (QRBIS 2003).

The index of relative disadvantage

According to the index of relative socio-economic disadvantage calculated in 1996, the Mackay–Whitsunday NRM region received a score of 982 (average of the region's SLA scores), which was slightly lower than Queensland as a whole, which scored 988. The index of relative socio-economic disadvantage is a measure of the relative disadvantage between geographic locations. Scores above 1000 are considered relatively advantaged. The index scores are derived from attributes including low-income levels, level of educational attainment, high unemployment and jobs in relatively unskilled occupations (McLennan 1998).

Education

Of people aged 15 years and over, 0.5% did not attend school, 13% completed grade 8 or less, 34.7% left after completing grade 10 and 31.7% completed grade 12. 33.6% of people in region are, or have, received some form of tertiary (post high school) education. This is up from 29.8% in 1996 and 26.3% in 1991 (QRBIS 2003).

Communication

Access to computers

38% of residents in the region reported that they used a computer at home in the week prior to Census night, 2001. The internet was used by 32% of people (with 23.3% of people accessing the internet from home) in the week prior to Census night, 2001.

Language

Approximately 3.2% of people in the region speak a language either in addition too, or instead of, English. This has decreased over the last two Census periods (3.3% in 1996 and 3.4% in 1991) (QRBIS 2003). In 2001, the percentage of people living in the region that were born in a non-English speaking country was 4.7% (QRBIS 2003). Of all the people born overseas but now living in the region 2.1% speak English poorly or not at all (ABS 2001).

A.4. Burdekin NRM Region

Economic viability / Resource sustainability

Land use within the Burdekin region

The dominant land classification across the region, shown in Table A4.1, is agriculture, accounting for 90% of land use. Grazing accounts for the majority (97%) of the agricultural land use and 87% of all land use in the region.

Table A4.1 Land classification across the Burdekin NRM region – 1997.

Land use	Area (ha)	%
<i>Dryland cropping/pasture</i>	364, 777	2.6
<i>Irrigated cropping/pasture</i>	45,205	0.3
Total cropping/pasture	409,981	3
<i>Dryland horticulture</i>	702	0.00
<i>Irrigated horticulture</i>	6,406	0.05
Total horticulture	7,107	0.05
Grazing	12,433,997	87.4
Total agriculture	12,851,085	90.4
Forestry	155,401	1.1
Intensive use	106,907	0.8
Managed resource protection	19,194	0.1
Minimal use	758,796	5.3
Nature conservation	224,789	1.6
Waters	103,503	0.7
No data	0	0
Total area (ha)	14,219,676	100

Source: Land Use area sourced from National Land and Water Resource Audit, LandUse of Australia April 1996 – March 1997 which was derived and compiled by the Bureau of Rural Sciences. The data were constructed by automated analyses of a one-year sequence of normalised difference vegetation index (NDVI) images with a 0.01-degree cell size. Classification assigns the dominant land use of one cell the area of the entire cell, thus the results will both over- and under- estimate the areal extent of individual land use classes. Estimates of error propagation within the dataset do not accompany the dataset. Therefore, we can only caution that the results will be more accurate in more homogenous landscapes and less accurate at the edges of homogenous landscapes and in heterogenous landscapes. Notes: Forestry; includes production and plantation. Water; includes estuary / coastal waters, lakes, marshes / wetlands, reservoirs and rivers. Managed resource protection; includes traditional indigenous use. Nature conservation; includes managed habitat, national parks, protected areas and conservation areas. Minimal use; includes defence areas and remnant native cover. Intensive use; includes transport and communication, and urban areas.

Sectoral contribution to gross output in the region

Table A4.2 shows industry contribution to gross output from the economy of Burdekin NRM region. At farm gate prices, beef cattle is the single largest contributor to agricultural output by value in the region with 38.2%, followed by sugar cane and vegetables contributing 24.9% and 23.1% respectively. In terms of value produced per hectare under management, cropping is by far the most profitable sector.

Table A4.2 Gross output, Burdekin NRM region 2001.

Sector	Value (\$)	% of total
<i>Crops</i>		
Cereals for grain	42,773,836	6.3
Cotton	2,047,937	0.3
Nurseries, flowers and turf	6,664,369	1.0
Sugar cane	169,660,572	24.9
Fruit	21,823,188	3.2
Vegetables	157,435,531	23.1
Pastures and grasses	1,200,567	0.2
Other Horticulture	8,375,805	1.2
Total value of crops	409,981,805	60.2
<i>Livestock</i>		
Beef cattle	260,563,510	38.2
Milk	2,187,009	0.3
Pigs	4,221,942	0.6
Poultry and eggs	3,532,619	0.5
Sheep and wool	797,175	0.1
Other livestock	240,011	0.0
Total value of livestock	271,542,267	39.8
Total value of agriculture	681,524,072	

Source: ABS, Agricultural Census, 2001.

Farm performance measures⁹

During 2001–02, data from a total of 9 farms in the Burdekin NRM region were collated for this report. Given the relatively small size of the sample the sampling errors are likely to be high.

Table A4.3 shows the farm performance measures reported in the farm survey of resource management performed by ABARE (2004a).

Table A4.3 Farm performance measures in the Burdekin NRM and GBR region.

Farm performance measure	Burdekin – Value (average per farm)	Whole GBR region – Value (average per farm)
Farm cash income	\$39,154	\$69,627
Farm business profit	\$116,134	\$21,710
Total capital	\$6,785,794	\$2,566,073
Farm equity ratio	86%	85%
Profit full equity	\$193,980	\$48,167
Rate of return	3%	2%
Farm business debt	\$945,553	\$289,144
Total off-farm income	\$2,035	\$12,960

Source: ABARE, 2004a.

The Burdekin region has the highest level of total capital on average per farm of the six regions examined and well in excess of the average total capital for the whole GBR region (\$2,566,073). Not surprisingly then, debt levels are also the highest when compared to the other regions. However, farmers in the Burdekin are earning much higher profits at full equity in comparison to farmers in the GBR and of those landholders surveyed only 4% of respondents agreed that profit was falling. There may well be a high level of optimism about future returns in the Burdekin, hence a greater willingness to incur debt despite relatively low returns (3%).

The Burdekin region has a comparable average debt to equity ratio (86%) to the GBR region as a whole (85%). As stated above, farms in the Burdekin region have the highest level of profit at full equity and second highest rate of return of the regions examined suggesting perhaps that farmers in the Burdekin region may be better placed to invest in sustainable land practice than other catchments in the GBR region.

Agricultural land management

The total area of holdings for the Burdekin region reported in the 2001 Agricultural Census was 13,504,784 ha. 24% of this land was reported to be leased from the crown, while 71% was owned and operated, 4% was leased or rented and 0.4% was listed as other.

Irrigation

Of the total land holdings in the region, approximately 0.7% (98,705 ha) of land is irrigated. Irrigated land in the region is primarily located in the Burdekin and Bowen LGAs, which have the highest value of agricultural output in the region.

Cultivation techniques

68% of land cultivated in the Burdekin NRM region was prepared using zero or minimal till. The different cultivation techniques across the region are listed in Table A4.4.

Table A4.4 Cultivation techniques used in the Burdekin region.

Land Preparation Technique	% of land prepared
No cultivation or zero till (apart from actual sowing operation)	33
Minimal till, One or two cultivations only (immediately prior to sowing)	35
Conventional cultivation, land prepared with other cultivation	32

Tree planting

In the 2001 Agricultural Census (ABS 2001) it was reported that 62 ha of land (0.0005% of total holdings) was planted with seedlings for nature conservation or to protect land and water across the Burdekin NRM region.

Protective fencing

With reference to Table A4.5, in 2001, 71,309 ha of agricultural land in the region were fenced off from grazing. 38.6% of the protective fencing in the region is used to protect creeks and rivers.

Table A4.5 Land fenced off from grazing in the Burdekin region.

Land Protected	% of total land fenced off
Saline Areas	2.0
Other degraded areas	7.9
Planted trees and shrubs	0.1
Creeks and rivers	38.6
Remnant native vegetation	5.5
All other areas	46.0
Total area protected (ha)	71,309

Source: ABS, Agricultural Census, 2001.

Salinity management

Of the agricultural establishments in the region, approximately 9% indicated that they had land affected by salinity. In addition, approximately 25% of all establishments reported that they were using salinity management practices.

Industry sectoral contribution to employment in the Burdekin region

Table A4.6 details the employment by industry in the region and shows changes in employment in these industries since 1996. It also shows that the industries contributing the most to employment in the region are the service sectors. In 2001, the major employer in the region was the trade sector, which contributed 19.4% to the total employment. Health and community services (9.8%), manufacturing (8.5%), and education (8.1%) were the next major sectors employing people within the region.

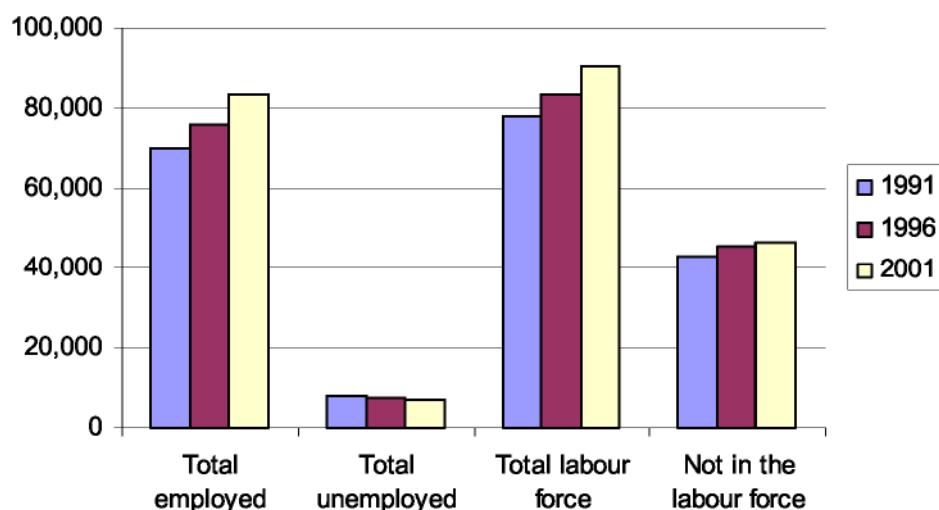
The Census data shows an increase in employment since 1996 in the trade, construction, health and community services and government administration sectors. Employment declined in the cultural, sport and recreation services sector while remaining steady in other sectors of the regional economy.

Table A4.6 Sector employment in the Burdekin NRM Region

Sector	Number of people – Census 1996	%	Number of people – Census 2001	%
Agriculture /Forestry /Fishing	4,600	6.1	4,818	5.8
Mining	1,931	2.5	2,004	2.4
Manufacturing	6,657	8.8	7,114	8.5
Electricity , water and gas	726	1.0	795	1.0
Construction	4,905	6.5	5,830	7.0
Trade (Retail and wholesale)	14,495	19.1	16,174	19.4
Transport and communication	4,796	6.3	5,326	6.4
Financial Services	7,075	9.3	7,609	9.1
Government admin / Defence	6,978	9.2	8,130	9.8
Community services	13,013	17.1	14,872	17.8
Recreation Services	5,768	7.6	5,921	7.1
Personal and other services	2,596	3.4	2,975	3.6
Other	2,451	3.2	1,750	2.1
Total	75,991	100.0	83,318	100.0

Source: QRBIS, 2003.

The number of people employed and the total number of people in the labour workforce in the Burdekin region has increased over the last three Census periods (Figure A4.1). Over the same period, the unemployment rate has decreased from 10% in 1991 to 8% in 2001. Of those individuals employed in 2001, 31.7% were in part-time employment, an increase from 29.1% in 1996 (QRBIS 2003). The Burdekin region workforce participation rate at the 2001 Census was 66.2% (QRBIS 2003), which is higher than the Queensland rate of 63.1% (ABS, 2001).



Source: QRBIS, 2003.

Figure A4.1 Employment in the Burdekin NRM region at the Census years 1991, 1996 and 2001.

Income

The median weekly individual income for the region at the 2001 Census was \$300–\$399 which is the same as that for the state. 13.4% of individuals earned between \$200–299 per week (Table A4.7). The median weekly family income was \$800–\$999 in 2001 which was the same as the state.

Table A4.7 Individual weekly income in 2001.

Individual Weekly Income	Number of People–Census Year 2001	%
Nil	9,098	6
\$1–\$159	17,876	11.7
\$160–\$299	37,465	24.5
\$300–\$599	48,530	31.8
\$600–\$999	27,388	17.9
\$1000–\$1500 or more	12,408	8.1

Source: QRBIS, 2003.

Community vitality

Population and age structure

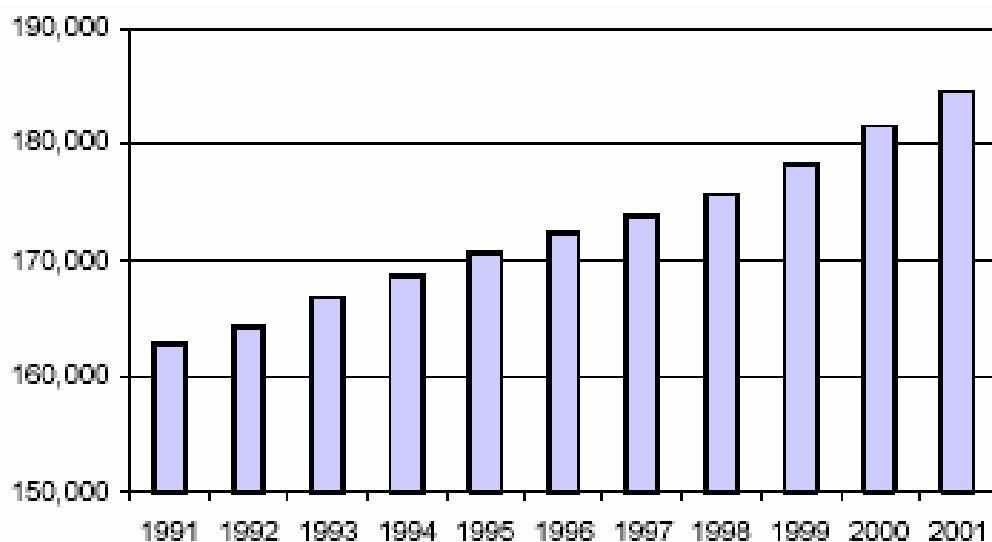
The population in the region has increased between 1991 and 2001 (Figure A4.2). In 2001, the population of the region was 184,541 people accounting for 5% of the population of Queensland (ABS 2001, cat. no. 2001.0). This is an increase of 12,165 people between 1996 and 2001. This represents a relatively low 7.1% increase from the 1996 Census compared to the state increase of 8.5%.

The bulk of the population lives in the coastal centres of Townsville, Thuringowa and Burdekin.

The population of the region is ageing (Figure A4.3). The median age of people in the region in the 2001 Census was 32 years, compared with 30 years in the 1996 Census and 25–29 years in the

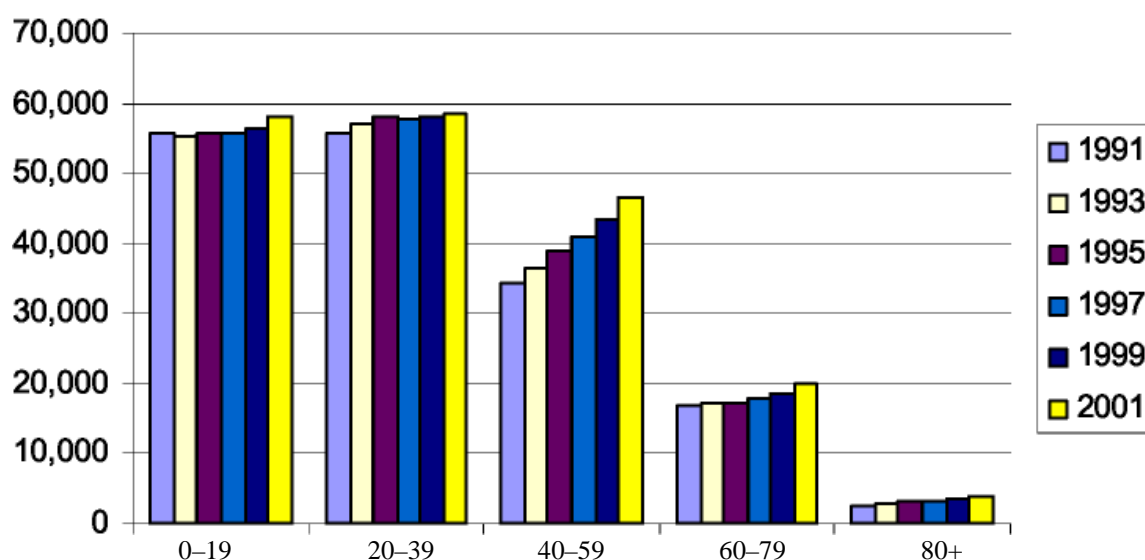
1991 Census (QRBIS 2003; ABS 2001).

It is projected that the population will continue to increase to 216,000 by the end of 2019, at an average rate of 1% per annum, though the population is ageing (Figure A4.4). This annual average population growth rate is lower than that projected for the State (1.43% per annum).



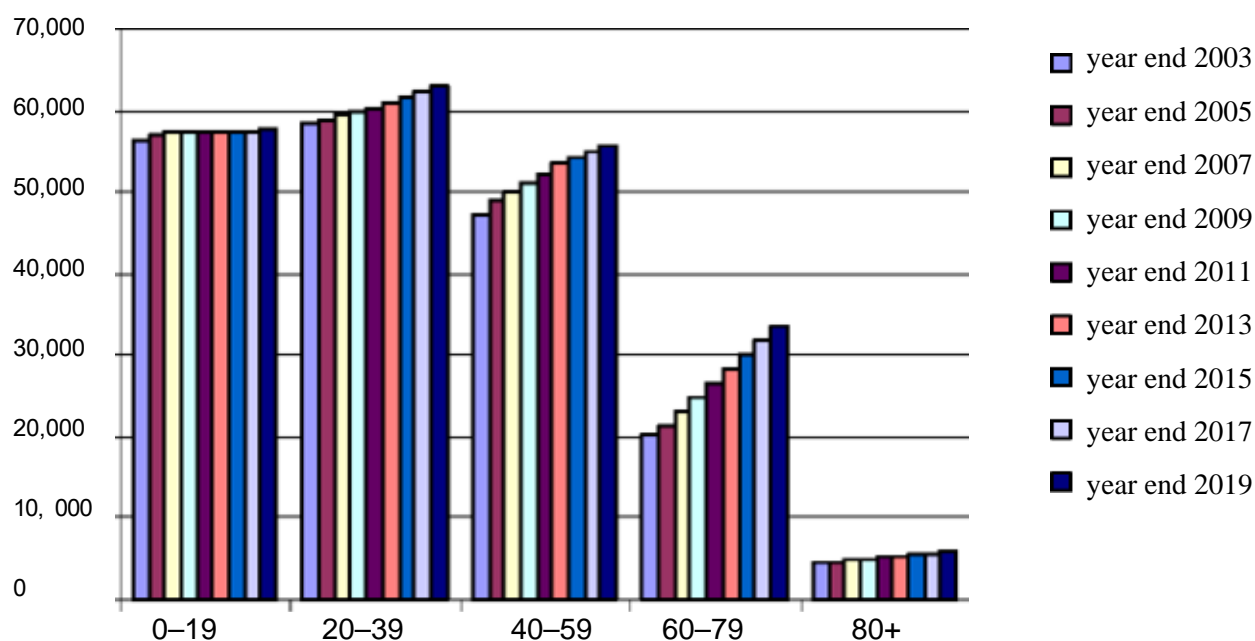
Source: QRBIS, 2003.

Figure A4.2 Change in total population living in the region between 1991 and 2001.



Source: QRBIS, 2003.

Figure A4.3 Age profile for the region.



Source: QRBIS, 2003

Figure A4.4 Age projections for the region.

Migration

At the 2001 Census 24% of the population within the region reported that they had moved location within the last year, with 53% moving within the last 5 years (QRBIS 2003).

The index of relative disadvantage

According to the index of relative socio-economic disadvantage calculated in 1996, the Northern statistical division, which covers most of the Burdekin NRM region, received a score of 981, slightly lower than Queensland as a whole, which scored 988. The index of relative socio-economic disadvantage is a measure of the relative disadvantage between geographic locations. Scores above 1000 are considered relatively advantaged. The index scores are derived from attributes including low-income levels, level of educational attainment, high unemployment and jobs in relatively unskilled occupations (McLennan 1998).

Education

Of people aged 15 years and over, 0.5% did not attend school, 11.1% completed grade 8 or less, 31.4% left after completing grade 10 and 38.3% completed grade 12. 34.6% of people in region are, or have, received some form of tertiary (post high school) education. This is up from 29.9% in 1996 and 26.7% in 1991 (QRBIS 2003).

Communication

Access to computers

41% of residents in the region reported that they used a computer at home in the week prior to

Census night, 2001. The internet was used by 36% of people (with 26% of people accessing the internet from home) in the week prior to Census night, 2001.

Language

Approximately 4.8% of people in the region speak a language either in addition too, or instead of, English. This has decreased from the last two Census periods (5.2% in 1991 and 5.1% in 1996) (QRBIS 2003). In 2001, the percentage of people living in the region that were born in a non-English speaking country was 5.6% (QRBIS 2003). Of all the people born overseas but now living in the region 3.6% speak English poorly or not at all (ABS 2001).

A.5. Wet Tropics NRM Region

Economic viability / Resource sustainability

Land use within the Wet Tropics region

According to Table A5.1, the dominant land classification within the Wet Tropics region is agriculture, accounting for 43.5% of land use. Grazing accounts for the majority (79%) of the agricultural land use and 34% of all land use in the region. Land use within the region is relatively diverse.

Table A5.1 Land classification across the Wet Tropics NRM region – 1997.

Land use	Area (ha)	%
<i>Dryland cropping/pasture</i>	187,758	8.6
<i>Irrigated cropping/pasture</i>	6,590	0.3
Total cropping/pasture	194,348	8.9
<i>Dryland horticulture</i>	2,383	0.1
<i>Irrigated horticulture</i>	4,522	0.2
Total horticulture	6,905	0.3
Grazing	753,258	34.3
Total agriculture	954,511	43.5
Forestry	471,683	21.5
Intensive use	30,756	1.4
Managed resource protection	21,062	1.0
Minimal use	285,480	13.0
Nature conservation	353,883	16.1
Waters	76,299	3.5
No data	0	0
Total area (ha)	2,193,675	100

Source: Land Use area sourced from National Land and Water Resource Audit, LandUse of Australia April 1996 – March 1997 which was derived and compiled by the Bureau of Rural Sciences. The data were constructed by automated analyses of a one-year sequence of normalised difference vegetation index (NDVI) images with a 0.01-degree cell size. Classification assigns the dominant land use of one cell the area of the entire cell, thus the results will both over- and under- estimate the areal extent of individual land use classes. Estimates of error propagation within the dataset do not accompany the dataset. Therefore, we can only caution that the results will be more accurate in more homogenous landscapes and less accurate at the edges of homogenous landscapes and in heterogenous landscapes. Notes: Forestry; includes production and plantation. Water; includes estuary / coastal waters, lakes, marshes / wetlands, reservoirs and rivers. Managed resource protection; includes traditional indigenous use. Nature conservation; includes managed habitat, national parks, protected areas and conservation areas. Minimal use; includes defence areas and remnant native cover. Intensive use; includes transport and communication, and urban areas.

Agriculture sectoral contribution to the value of total agriculture in the Burdekin region

Table A5.2 shows industry contribution to gross output from the economy of Wet Tropics region. At farm gate prices, fruit and sugar cane dominate agricultural earnings contributing 53.7% and 26.4% of total earnings respectively.

Table A5.2 Gross output, Wet Tropics NRM region 2001.

Sector	Value (\$)	% of total
<i>Crops</i>		
Cereals for grain	2,218,845	0.3
Nurseries, flowers and turf	11,084,674	1.7
Sugar cane	169,654,527	26.4
Fruit	344,731,779	53.7
Vegetables	22,032,712	3.4
Pastures and grasses	1,650,235	0.3
Other Horticulture	10,561,031	1.6
Total value of crops	561,933,802	87.6
<i>Livestock</i>		
Beef cattle	41,850,073	6.5
Milk	31,735,953	4.9
Pigs	1,557,736	0.2
Poultry and eggs	1,939,709	0.3
Sheep and wool	152,945	0.0
Other livestock	753,509	0.1
Total value of livestock	77,989,926	12.2
Total value of agriculture	641,564,495	

Source: ABS, Agricultural Census, 2001.

Farm performance measures¹⁰

During 2001–02, data from a total of 8 farms in the Wet Tropics NRM region were collated for this report. Given the relatively small size of the sample the sampling errors are likely to be high.

Table A5.3 shows the farm performance measures reported in the farm survey of resource management performed by ABARE (2004a).

Table A5.3 Farm performance measures in the Wet Tropics NRM and GBR region.

Farm performance measure	Wet Tropics – Value (average per farm)	Whole GBR region – Value (average per farm)
Farm cash income	\$94,589	\$69,627
Farm business profit	\$26,757	\$21,710
Total capital	\$1,883,069	\$2,566,073
Farm equity ratio	96%	85%
Profit full equity	\$42,133	\$48,167
Rate of return	3%	2%
Farm business debt	\$73,060	\$289,144
Total off-farm income	\$1,215	\$12,960

Source: ABARE, 2004a.

The Wet Tropics region has the second lowest level of total capital (value of all assets on the farm) on average per farm of the six regions examined and was well below the average total capital for the whole GBR region (\$2,566,073). Low capital levels may explain correspondingly low debt levels in the Wet Tropics region (debt levels are the lowest of the six regions examined and well below the average for farms in the GBR region). Farmers may be unwilling to raise debt to invest in capital when rates of return are low. However, only 23% of farmers surveyed agreed that profit was falling.

The Wet Tropics region has a higher equity to debt ratio (96%) on average than the GBR region (85%). Despite the higher rate of return reported for the Wet Tropics region (3%) compared to the GBR as a whole (2%), this rate is still relatively low and may be a constraint on their ability to undertake changes in farm management practices (Table A5.3).

Farms in the Wet Tropics region have the second lowest level of profit at full equity (the return on all the resources used in the farm business) of the five GBR NRM regions examined (and below the values reported for the whole GBR region). This will place limits on expenditure for NRM.

Agricultural land management

The total area of holdings for the Wet Tropics NRM region reported in the 2001 Agricultural Census was 1,360,681 ha. 22% of this land was reported to be leased from the crown, while 69% was owned and operated, 8% was leased or rented and 1% was listed as other.

Irrigation

Of the total land holdings in the region, approximately 1.4% (19,046 ha) of land is irrigated. Irrigated land in the region is primarily located in the Johnstone, Cardwell and Atherton LGAs, which have the 1st, 2nd and 4th highest agricultural output by value in the region, respectively.

Cultivation techniques

With reference to Table A5.4, 57% of land cultivated in the Wet Tropics NRM region was prepared using zero or minimal till.

Table A5.4 Cultivation techniques used in the Wet Tropics region.

Land Preparation Technique	% of land prepared
No cultivation or zero till (apart from actual sowing operation)	12
Minimal till, One or two cultivations only (immediately prior to sowing)	45
Conventional cultivation, land prepared with other cultivation	43

Tree planting

In the 2001 Agricultural Census (ABS 2001), it was reported that 163 ha of land (0.01% of total holdings) was planted with seedlings for nature conservation or to protect land and water across the Wet Tropics NRM region.

Protective fencing

In 2001, 2,718 ha of agricultural land in the Wet Tropics region were fenced off from grazing. 10.7 % of the protective fencing in the region is used to protect creeks and rivers (Table A5.5).

Table A5.5 Land fenced off from grazing in the Wet Tropics region.

Land Protected	% of total land fenced off
Saline Areas	0.8
Other degraded areas	0.4
Planted trees and shrubs	1.1
Creeks and rivers	10.7
Remnant native vegetation	1.1
All other areas	86.0
Total area protected (ha)	2,718

Source: ABS, Agricultural Census, 2001

Salinity management

Of the agricultural establishments in the region, approximately 1% indicated they had some area of their land affected by salinity. In addition, approximately 5% of all establishments reported that they were using salinity management practices.

Industry sectoral contribution to employment in the Burdekin region

Table A5.6 details the employment by industry in the region and shows changes in employment in these industries since 1996. It also shows that the industries contributing the most to employment in the region are the service sectors. In 2001, the major employer in the region was the trade sector, which contributed 19.7% to the total employment. Accommodation and restaurants (9.4%), health and community services (8.5%), and agriculture (8.4%) were the next major sectors employing people within the region.

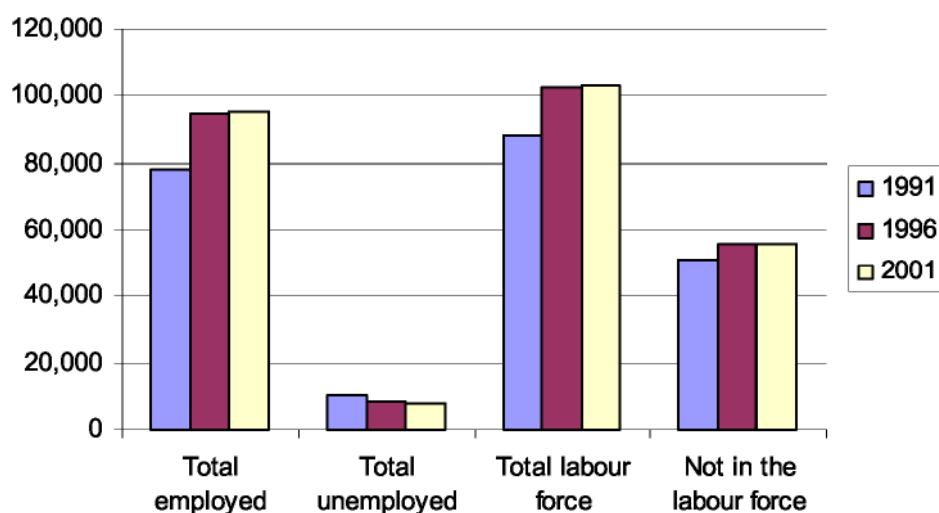
The Census data shows an increase in employment in the trade, health and community services and education sectors. There was a decline in employment in the construction sector, while employment in other sectors has remained relatively constant within the region since 1996.

Table A5.6 Sector employment in the Cape York NRM

Sector	Number of people – Census 1996	%	Number of people – Census 2001	%
Agriculture /Forestry /Fishing	387	5.4	415	5.3
Mining	787	11.0	538	6.9
Manufacturing	197	2.7	214	2.7
Electricity , water and gas	24	0.3	39	0.5
Construction	459	6.4	457	5.9
Trade (Retail and wholesale)	573	8.0	691	8.9
Transport and communication	358	5.0	325	4.2
Financial Services	304	4.2	328	4.2
Government admin / Defence	1,542	21.5	2,606	33.4
Community services	1,720	24.0	1,141	14.6
Recreation Services	453	6.3	552	7.1
Personal and other services	151	2.1	221	2.8
Other	221	3.1	274	3.5
Total	7,176	100.0	7,801	100.0

Source: QRBIS, 2003.

The size of the workforce and the number of people employed has increased in the Wet Tropics region over the last three Census periods (Figure A5.1). There has been a corresponding decline in the unemployment rate from 11.5% in 1991 to 7.7% in 2001. 30.1% of the workforce was employed in part-time employment in 1996 compared to 34.3% in 2001 (QRBIS 2003). The workforce participation rate at the 2001 Census was 64.8% (QRBIS 2003), which is higher than the rate for Queensland as a whole (63.1%) (ABS 2001).



Source: QRBIS, 2003.

Figure A5.1 Employment in the Wet Tropics NRM region at the Census years 1991, 1996 and 2001.

Income

The median weekly individual income for the region at the 2001 Census was \$200–\$299 which was lower than that for the state (\$300–\$399). 14.4% of individuals earned between \$200–299 per week ([Table A5.7](#)). The median weekly family income was \$800–\$999 in 2001 which was the same as the state.

Table A5.7 Individual weekly income in 2001.

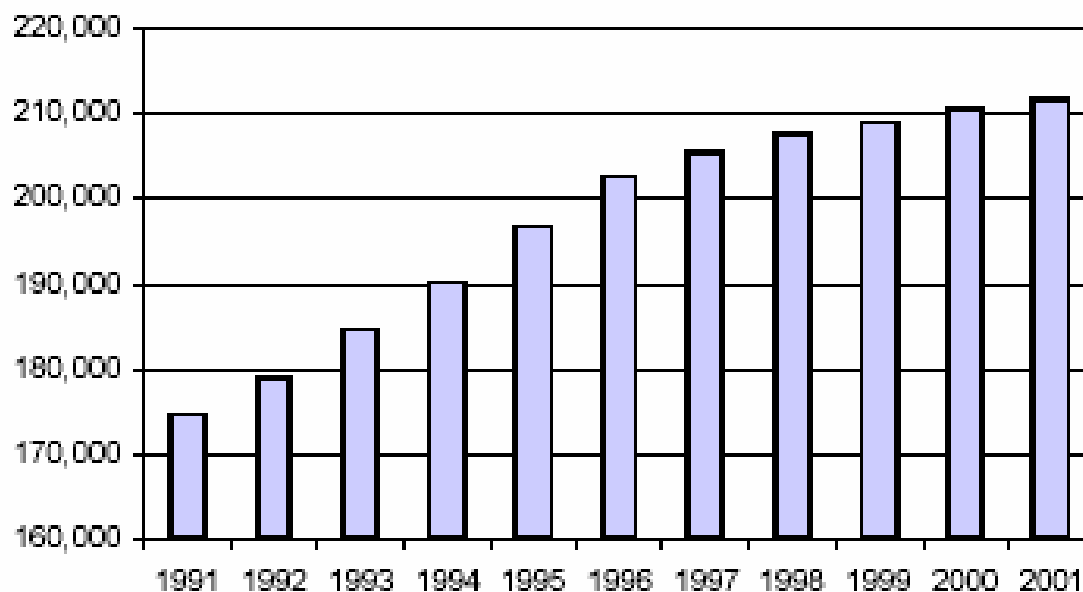
Individual Weekly Income	Number of People–Census Year 2002	%
Nil	705	5.9
\$1–\$159	1,837	15.3
\$160–\$299	3,433	28.5
\$300–\$599	3,057	25.4
\$600–\$999	1,749	14.5
\$1,000–\$1,500 or more	1,257	10.4

Source: QRBIS, 2003.

Community vitality

Population and age structure

The population in the region has increased between 1991 and 2001 ([Figure A5.2](#)). In 2001, the population of the region was 211,731 people accounting for 5.8% of the population of Queensland (ABS 2001, cat. no. 2001.0). This is an increase of 9,100 people between 1996 and 2001. This represents a relatively low 4.5% increase from the 1996 Census compared to the state increase of 8.5%.

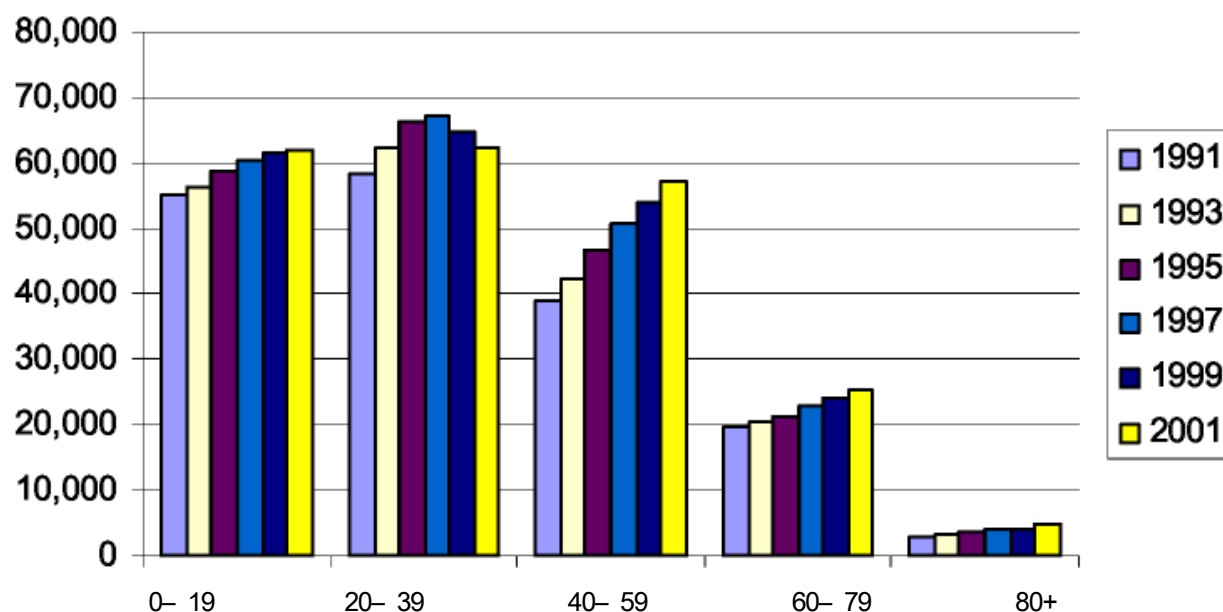


Source: QRBIS, 2003

Figure A5.2. Change in total population living in the region between 1991 and 2001.

The population of the region is ageing ([Figure A5.3](#)). The median age of people in the region in the 2001 Census was 34 years, compared with 32 years in the 1996 Census (QRBIS 2003; ABS 2001).

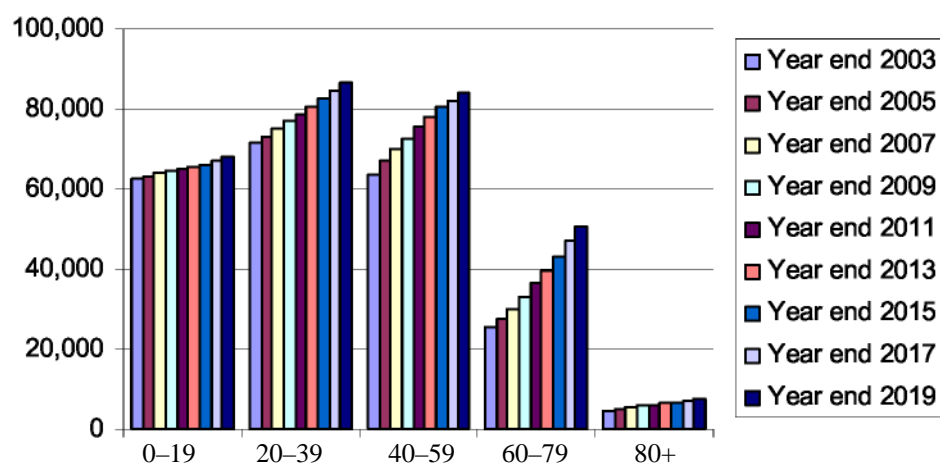
It is projected that the population will continue to increase to 296,000 by the end of 2019, at an average rate of 1.66% per annum, though the population is ageing ([Figure A5.4](#)). This annual average population growth rate is higher than that projected for the State (1.43% per annum).



Source: QRBIS, 2003.

Figure A5.3 Age profile for the region.

Figure A5.4. Age projections for the region.



Source: QRBIS, 2003

Migration

At the 2001, Census 23% of the population within the region reported that they had moved location within the last year, with 49% moving within the last 5 years (QRBIS 2003).

The index of relative disadvantage

According to the index of relative socio-economic disadvantage calculated in 1996, the Wet Tropics statistical division received a score of 963 (average of the region's SLA scores), which

was lower than Queensland as a whole, which scored 988. The index of relative socioeconomic disadvantage is a measure of the relative disadvantage between geographic locations. Scores above 1000 are considered relatively advantaged. The index scores are derived from attributes including low-income levels, level of educational attainment, high unemployment and jobs in relatively unskilled occupations (McLennan 1998).

Education

Of people aged 15 years and over, 0.8% did not attend school, 11.6% completed grade 8 or less, 30.9% left after completing grade 10 and 37.2% completed grade 12. 36.5% of people in region are, or have, received some form of tertiary (post high school) education. This is up from 32.5% in 1996 and 29% in 1991 (QRBIS 2003).

Communication

Access to computers

36% of residents in the region reported that they used a computer at home in the week prior to Census night, 2001. The internet was used by 33% of people (with 23.6% of people accessing the internet from home) in the week prior to Census night, 2001.

Language

Approximately 9% of people in the region speak a language either in addition too, or instead of, English. This has decreased from the last two Census periods (9.3% in 1996 and 9.2% in 1991) (QRBIS 2003). In 2001, the percentage of people living in the region that were born in a non-English speaking country was 10% (QRBIS 2003). Of all the people born overseas but now living in the region 5.5% speak English poorly or not at all (ABS 2001).

A.6. York NRM Region

Economic viability / Resource sustainability

Land use within the Cape York region

The dominant land classification across the region, shown in Table A6.1, is agriculture, accounting for 62% of land use. Grazing accounts for the overwhelming majority (99.9%) of the agricultural land use and 62% of all land use in the region.

Table A6.1 Land classification across the Cape York NRM region – 1997.

Land use	Area (ha)	%
<i>Dryland cropping/pasture</i>	7,814	0.1
<i>Irrigated cropping/pasture</i>	122	0.00
Total cropping/pasture	7,936	0.1
<i>Dryland horticulture</i>	0	0
<i>Irrigated horticulture</i>	0	0
Total horticulture	0	0
Grazing	6,922,783	62.3
Total agriculture	6,930,719	62.4
Forestry	251,538	2.3
Intensive use	2,102	0.02
Managed resource protection	1,848,000	16.6
Minimal use	337,623	3.0
Nature conservation	1,473,007	13.3
Waters	258,722	2.3
No data	1,643	0.01
Total area (ha)	11,103,355	100

Source: Land Use area sourced from National Land and Water Resource Audit, LandUse of Australia April 1996 – March 1997 which was derived and compiled by the Bureau of Rural Sciences. The data were constructed by automated analyses of a one-year sequence of normalised difference vegetation index (NDVI) images with a 0.01-degree cell size. Classification assigns the dominant land use of one cell the area of the entire cell, thus the results will both over- and under- estimate the areal extent of individual land use classes. Estimates of error propagation within the dataset do not accompany the dataset. Therefore, we can only caution that the results will be more accurate in more homogenous landscapes and less accurate at the edges of homogenous landscapes and in heterogenous landscapes. Notes: Forestry; includes production and plantation. Water; includes estuary / coastal waters, lakes, marshes / wetlands, reservoirs and rivers. Managed resource protection; includes traditional indigenous use. Nature conservation; includes managed habitat, national parks, protected areas and conservation areas. Minimal use; includes defence areas and remnant native cover. Intensive use; includes transport and communication, and urban areas.

Agriculture sectoral contribution to the value of total agriculture in the Cape York region

Table A6.2 shows industry contribution to gross output from the economy of Cape York.

Table A6.2. Gross output, Cape York NRM region 2001.

Sector	Value (\$)	% of total
<i>Crops</i>		
Cereals for grain	452,185	2.5
Nurseries, flowers and turf	208,811	1.2
Sugar cane	2,365,635	13.1
Fruit	2,292,440	12.7
Vegetables	18,975	0.1
Pastures and grasses	135,381	0.7
Other Horticulture	1,207,548	6.7
Total value of crops	6,680,974	36.9
<i>Livestock</i>		
Beef cattle	11,399,433	62.9
Poultry and eggs	3,409	0.0
Other livestock	3,152	0.0
Total value of livestock	11,405,994	63.0
Total value of agriculture	18,117,632	

Source: ABS, Agricultural Census, 2001.

Farm performance measures¹¹

Due to the extremely small sample size of respondents within the Cape York NRM region ABARE could not supply any data from their resource management survey for the region.

Agricultural Land Use and Management

The total area of holdings for the Cape York NRM region reported in the 2001 Agricultural Census was 4,313,650 ha. 43% of this land was reported to be leased from the crown, while 47% was owned and operated, 9% was leased or rented and 2% was listed as other.

Irrigation

Of the total land holdings in the region, approximately 0.02% (685 ha) of land is irrigated.

Cultivation techniques

96% of land cultivated in the Cape York NRM region was prepared using zero or minimal till. The different cultivation techniques across the region are given in Table A6.3.

Table A6.3. Cultivation techniques used in the Cape York region.

Land Preparation Technique	% of land prepared
No cultivation or zero till (apart from actual sowing operation)	2
Minimal till, One or two cultivations only (immediately prior to sowing)	94
Conventional cultivation, land prepared with other cultivation	4

Tree planting

In the 2001 Agricultural Census (ABS 2001) it was reported that 19ha of land (0.0004% of total holdings) was planted with seedlings for nature conservation or to protect land and water across the Cape York NRM region.

Protective fencing

In 2001, 207 ha of agricultural land in the region were reported to be fenced off from grazing to protect areas. None of the protective fencing in the region is used to protect creeks and rivers. This is detailed in Table A6.4.

Table A6.4. Land fenced off from grazing in the Cape York region.

Land Protected	% of total land fenced off
Saline Areas	0
Other degraded areas	0
Planted trees and shrubs	0
Creeks and rivers	0
Remnant native vegetation	0
All other areas	100
Total area protected (ha)	207

Source: ABS, Agricultural Census, 2001

„See **Note** under ‘Farm performance measures’ Section 1: page 6

Salinity management

Of the agricultural establishments in the region, approximately 3% of these indicated that they had some area of their land affected by salinity. In addition, approximately 5% of all establishments reported that they were using salinity management practices.

Industry sectoral contribution to employment in the region

Table A6.5 details the employment by industry in the region and shows changes in employment in these industries since 1996. It also shows that the industries contributing the most to employment in the region are the service sectors. In 2001, the major employer in the region was the government administration sector, which contributed 32.8% to the total employment. Trade (8.9%) and education (7.6%) were the next major sectors employing people within the region.

The Census data shows a considerable increase in employment in the government administration sector. There was a relatively large decline in employment in both the mining sector and the health

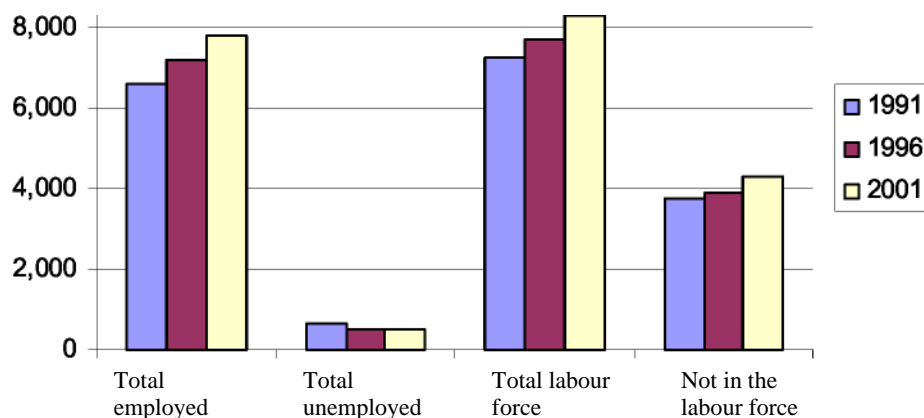
and community services sector. Employment in other sectors has remained relatively constant since 1996.

Table A6.5. Sector employment in the Cape York NRM region.

Sector	Number of people – Census 1996	%	Number of people – Census 2001	%
Government administration	1,452	20.2	2,559	32.8
Trade (retail and wholesale)	573	8	691	8.9
Education	542	7.6	594	7.6
Health and community services	1,178	16.4	547	7
Mining	787	11	538	6.9
Accommodation and restaurants	392	5.5	471	6
Construction	459	6.4	457	5.9
Agriculture	306	4.3	330	4.2
Property and business services	256	3.6	285	3.7
Transport and storage	304	4.2	275	3.5
Other	221	3.1	274	3.5
Personal and other services	151	2.1	221	2.8
Manufacturing	197	2.7	214	2.7
Commercial fishing	77	1.1	77	1
Cultural, sport and recreation services	61	0.9	81	1
Communication services	54	0.8	50	0.6
Finance and insurance	48	0.7	43	0.6
Defence	90	1.3	47	0.6
Electricity, water and gas	24	0.3	39	0.5
Forestry and logging	4	0.1	8	0.1
Total	7,176	100	7,801	100

Source: QRBIS, 2003.

The size of the labour force and the number of people employed in the Cape York region has increased over the last three Census periods (Figure A6.1). There has been a corresponding drop in the unemployment rate from 8.8% in 1991 to 5.8% in 2001. In 2001, 45.2% of the workforce was in part-time employment. This is an increase from 35.8% in 1996 (QRBIS 2003). The participation rate in the workforce at the 2001 Census was 65.9% (QRBIS 2003), slightly higher than the rate (63.1%) for Queensland (ABS 2001).



Source: QRBIS, 2003

Figure A6.1 Employment in the Cape York NRM region at the Census years 1991, 1996 and 2001.

Income

The median weekly individual income for the region at the 2001 Census was \$200–\$299 which was lower than that for the state (\$300–\$399). 15.1% of individuals earned between \$160–199 per week (Table A6.6). The median weekly family income was \$600–\$699 in 2001 which was well below that of the state (\$800–899).

Table A6.6 Individual weekly income in 2001.

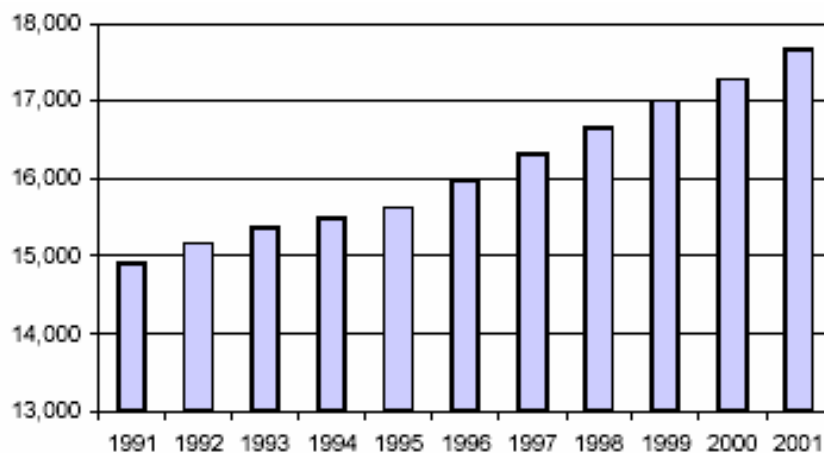
Individual weekly income	Number of people – Census Year 2001	%
Neg/Nil	705	5.9
\$1 – \$39	85	0.7
\$40 – \$79	273	2.3
\$80 – \$119	566	4.7
\$120 – \$159	913	7.6
\$160 – \$199	1,819	15.1
\$200 – \$299	1,614	13.4
\$300 – \$399	1,277	10.6
\$400 – \$499	1,001	8.3
\$500 – \$599	779	6.5
\$600 – \$699	634	5.3
\$700 – \$799	461	3.8
\$800 – \$999	654	5.4
\$1, 000 – \$1, 499	932	7.7
\$1, 500 or more	325	2.7
Total	12,038	100

Source: QRBIS, 2003.

Community vitality

Population and age structure

The population in the region has increased between 1991 and 2001 ([Figure A6.2](#)). In 2001, the population of the region was 17,687 people accounting for 0.5% of the population of Queensland (ABS 2001, cat. no. 2001.0). This is an increase of 1,705 people between 1996 and 2001. This represents a relatively high 10.7% increase from the 1996 Census compared to the state increase of 8.5%.

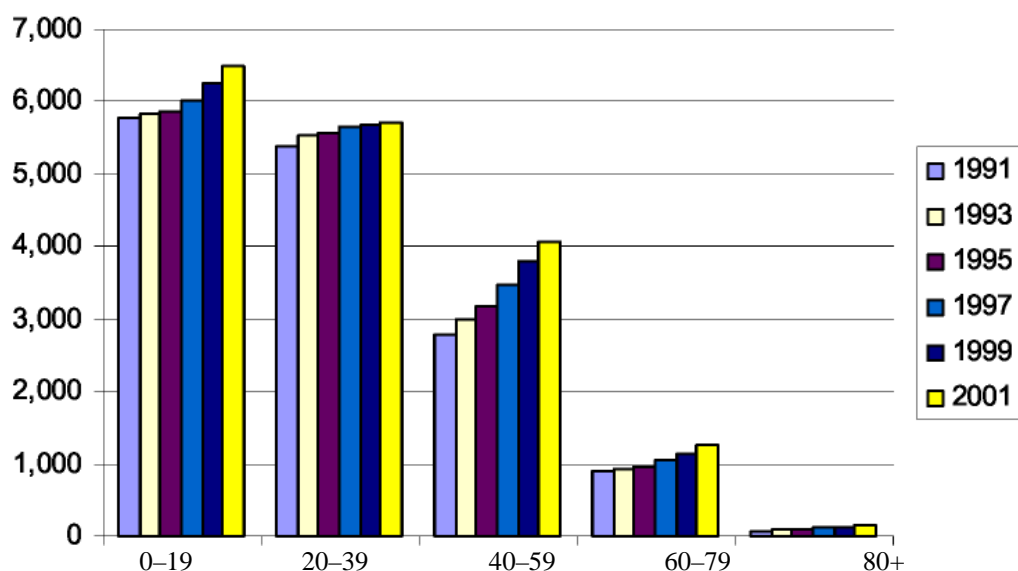


Source: QRBIS, 2003.

Figure A6.2 Change in total population living in the region between 1991 and 2001.

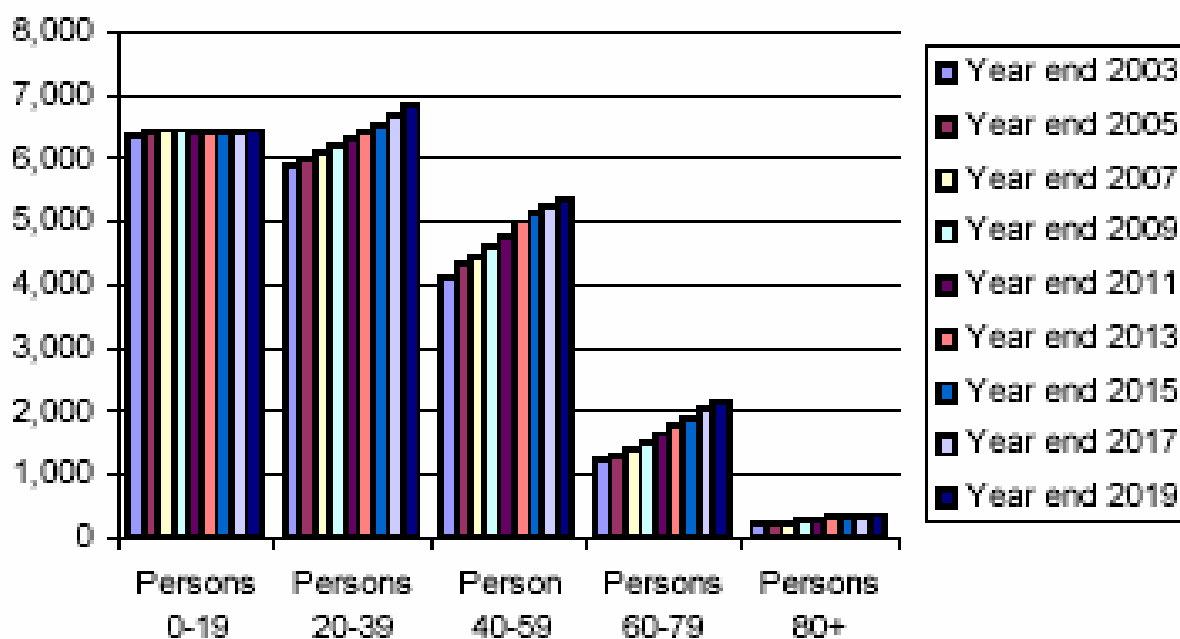
The population of the region is ageing ([Figure A6.3](#)). The median age of people in the region in the 2001 Census was 28 years, compared with 27 years in the 1996 Census (QRBIS 2003; ABS 2001).

It is projected that the population will continue to increase to 21,100 by the end of 2019, at an average rate of 1.1 % per annum, though the population is ageing ([Figure A6.4](#)). This annual average population growth rate is lower than that projected for the State (1.43% per annum).



Source: QRBIS, 2003.

Figure A6.3 Age profile for the region.



Source: QRBIS, 2003.

Figure A6.4 Age projections for the region.

Migration

At the 2001 Census 21 % of the population within the region reported that they had moved location within the last year, with 41% moving within the last 5 years (QRBIS 2003).

The index of relative disadvantage

According to the index of relative socio-economic disadvantage calculated in 1996, the Cape York statistical division received a score of 838 (average of the region's SLA scores), significantly lower than Queensland as a whole, which scored 988. The index of relative socio-economic disadvantage is a measure of the relative disadvantage between geographic locations. Scores above 1000 are considered relatively advantaged. The index scores are derived from attributes including low-income levels, level of educational attainment, high unemployment and jobs in relatively unskilled occupations (McLennan 1998).

Education

Of people aged 15 years and over, 1.6% did not attend school, 16.9% completed grade 8 or less, 30.8% left after completing grade 10 and 30.1% completed grade 12. 30.9% of people in region are, or have, received some form of tertiary (post high school) education. This is up from 26.4% in 1996 and 24.2% in 1991 (QRBIS 2003).

Communication

Access to computers

Only 18% of residents in the region reported that they used a computer at home in the week prior to Census night, 2001. The internet was used by 19% of people (with only 10.4% of people accessing the internet from home) in the week prior to Census night, 2001.

Language

About 32.7% of people in the region speak a language either in addition too, or instead of, English. This has decreased from the 1996 Census (33.3%) but increased from the 1991 Census (28%) (QRBIS, 2003). In 2001, the percentage of people living in the region that were born in a non-English speaking country was 3.6% (QRBIS 2003). Of all the people born overseas but now living in the region 1.6% speak English poorly or not at all (ABS 2001).

Appendix B. River catchments, Local Government Area (LGA) and State Statistical Area (SLA) components of the NRM regions of the GBR and Goulburn–Broken region

B.1. BURNETT–MARY NRM REGION

The Burnett–Mary NRM region is an aggregation of:

River Catchments:

Baffle
Burnett
Burrum
Kolan
Mary

Local Government Areas:

<i>LGA</i>	<i>LGA number</i>	<i>% area in region</i>
Banana	30350	0.1
Biggenden	30700	100
Bundaberg	31810	100
Burnett	31980	100
Caboolture	32000	3
Calliope	32100	2
Caloundra	32130	35
Chinchilla	32350	34
Cooloola	32530	88
Eidsvold	32950	100
Esk	33050	0.3
Gayndah	33300	100
Hervey Bay	33750	100
Isis	34000	100
Kilcoy	34250	25
Kilkivan	34300	100
Kingaroy	34350	100
Kolan	34400	100
Maroochy	34900	39
Maryborough	34950	100
Miriam Vale	35100	100
Monto	35150	96
Mundubbera	35450	100
Murgon	35500	100
Nanango	35650	80
Noosa	35750	36
Perry	35900	100
Tiaro	36850	100
Wondai	37450	93
Woocoo	37500	100

Statistical Local Areas:

<i>SLA</i>	<i>SLA number</i>	<i>% population in region[†]</i>	<i>% area[‡] in region</i>
Biggenden	0700	100	100
Bundaberg (C)	1810	100	100
Burnett (S) Pt A	1981	100	100
Burnett (S) Pt B	1984	100	100
Calliope (S) – Part A	2101	12	18
Caloundra (C) – Hinterland	2136	88	80
Chinchilla	2350	2	34
Cooloola (S) (excl. Gympie)	2532	100	88
Cooloola (S) – Gympie only	2535	100	100
Eidsvold	2950	100	100
Gayndah	3300	100	100
Hervey Bay (C) – Pt A	3751	100	100
Hervey Bay (C) – Pt B	3754	100	100
Isis	4000	100	100
Kilcoy	4250	4	25
Kilkivan	4300	100	100
Kingaroy	4350	100	100
Kolan	4400	100	100
Maroochy (S) Balance	4918	22	49
Maryborough	4950	100	100
Miriam Vale	5100	100	100
Monto	5150	100	96
Mundubbera	5450	100	100
Murgon	5500	100	100
Nanango	5650	74	81
Noosa (S) Balance	5758	71	38
Perry	5900	100	100
Tiaro	6850	100	100
Wondai	7450	100	93
Woocoo	7500	100	100

SLAs with less than 5% of their area located within the NRM region are excluded from the analysis. [†]% used by QRBIS.

B.2. FITZROY NRM REGION

The Fitzroy NRM region is an aggregation of:

River Catchments: Boyne

Calliope Curtis Island

Fitzroy

Shoalwater Styx

Waterpark

Local Government Areas:

<i>LGA</i>	<i>LGA number</i>	<i>% area in region</i>
Banana	30350	100
Bauhinia	30500	100
Belyando	30600	16
Bendemere	30650	4.8
Booringa	30850	0.1
Broadsound	31700	89
Bungil	31850	49
Calliope	32100	98
Chinchilla	32350	0.1
Duaringa	32850	100

<i>LGA</i>	<i>LGA number</i>	<i>% area in region</i>
Emerald	33000	100
Fitzroy	33150	100
Gladstone	33350	100
Livingstone	34550	100
Miriam Vale	35100	0.1
Monto	35150	4
Mount Morgan	35350	100
Murilla	35550	0.2
Nebo	35700	68
Peak Downs	35850	100
Rockhampton	36350	100
Sarina	36550	16
Tambo	36650	4.9
Taroom	36750	100

Statistical Local Areas:

<i>SLA</i>	<i>SLA number</i>	<i>% population in region[‡]</i>	<i>% area[‡] in region</i>
Banana	0350	100	100
Bauhinia	0500	100	100
Belyando	0600	92	16
Broadsound	1700	92	96
Bungil	1850	44	49
Calliope (S) – Part A	2101	88	82
Calliope (S) – Part B	2104	100	100
Duaringa	2850	100	100
Emerald	3000	100	100
Fitzroy (S) – Part A	3151	100	100
Fitzroy (S) – Part B	3154	100	100
Gladstone	3350	100	100
Livingstone	4550	100	100
Mount Morgan	5350	100	100
Nebo	5700	45	68
Peak Downs	5850	100	100
Rockhampton	6350	100	100
Sarina	6550	6	33
Taroom	6750	100	100

[‡] SLAs with less than 5% of their area located within the NRM region are excluded from the analysis. [†] % used by QRBIS.

B.3. MACKAY–WHITSUNDAY NRM REGION

Mackay–Whitsunday NRM region is an aggregation of:

River Catchments:

O’Connell
Pioneer
Plane
Proserpine
Whitsunday Island

Local Government Areas:

<i>LGA</i>	<i>LGA number</i>	<i>% area in region</i>
Bowen	30950	23
Broadsound	31700	11
Mackay	34760	100
Mirani	35050	45
Nebo	35700	0.9
Sarina	36550	84
Whitsunday	37330	100

Statistical Local Areas:

<i>SLA</i>	<i>SLA number</i>	<i>% population in region[†]</i>	<i>% area[‡] in region</i>
Bowen	0950	58	2 [‡]
Broadsound	1700	8	4 [‡]
Mackay (C) – Pt A	4762	100	100
Mackay (C) – Pt B	4765	100	100
Mirani	5050	92	45
Sarina	6550	94	67
Whitsunday	7330	100	100

[‡] SLAs with less than 5% of their area located within the NRM region are excluded from the analysis

[†] % used by QRBIS

B.4. BURDEKIN NRM REGION

The Burdekin NRM region is an aggregation of:

River Catchments:

Black
Burdekin
Don
Haughton
Ross

Local Government Areas:

<i>LGA</i>	<i>LGA number</i>	<i>% area in region</i>
Belyando	30600	83
Bowen	30950	77
Burdekin	31900	100
Charters Towers	32300	100
Dalrymple	32700	92
Emerald	33000	0.2
Etheridge	33100	1
Flinders	33200	1
Herberton	33700	25
Hinchinbrook	33800	18
Jericho	34100	67
Mirani	35050	55
Nebo	35700	31
Thuringowa	36800	100
Townsville	37000	100
Whitsunday	37330	0.1

Statistical Local Areas:

<i>SLA</i>	<i>SLA number</i>	<i>% population in region[†]</i>	<i>% area[†] in region</i>
Aitkenvale	7001	100	100
Belyando	0600	8	83
Bowen	0950	42	98
Burdekin	1900	100	100
Charters Towers	2300	100	100
City (Townsville)	7003	100	100
Cranbrook	7007	100	100
Currajong	7012	100	100
Dalrymple	2700	100	92
Douglas	7014	100	100
Garbutt	7015	100	100
Gulliver	7018	100	100
Heatley	7023	100	100
Herberton	3700	0	25
Hermit Park	7026	100	100
Hyde Park–Mysterton	7027	100	100
Jericho	4100	78	67
Kelso	6801	100	100
Kirwan	6804	100	100
Magnetic Island	7031	100	100
Mirani	5050	8	55
Mt Louise–Mt St John–Bohle	7033	100	100
Mundingburra	7034	100	100
Murray	7038	100	100
Nebo	5700	55	31
North Ward–Castle Hill	7041	100	100
Oonoonba–Idalia–Cluden	7044	100	100
Pallarenda–Shelley Beach	7047	100	100
Pimlico	7051	100	100
Railway Estate	7054	100	100
Roslea	7058	100	100
Rowes Bay–Belgian Gardens	7062	100	100
South Townsville	7065	100	100
Stuart–Roseneath	7068	100	100
Thuringowa (C) Part A Bal	6807	100	100
Thuringowa (C) Part B	6831	100	100
Townsville (C) Pt B	7084	100	100
Vincent	7071	100	100
West End (Townsville)	7074	100	100
Wulguru	7078	100	100

SLAs with less than 5% of their area located within the NRM region are excluded from the analysis.

[†] % used by QRBIS.

B.5. WET TROPICS NRM REGION

The Wet Tropics NRM region is an aggregation of:

River Catchments: Barron

Daintree Herbert

Hinchinbrook Island

Johnstone

Mossman

Mulgrave–Russell Murray

Tully

Local Government Areas:

LGA	LGA number	% area in region
Atherton	30200	100
Cairns	32060	100
Cardwell	32200	100
Dalrymple	32700	0.4
Douglas	32800	60
Eacham	32900	100
Herberton	33700	74
Hinchinbrook	33800	81
Johnstone	34150	100
Mareeba	34850	3

Statistical Local Areas:

SLA	SLA number	% population in region [†]	% area [‡] in region
Atherton	0200	100	100
Cairns (C) – Barron	2062	100	100
Cairns (C) – Central Suburbs	2065	100	100
Cairns (C) – City	2066	100	100
Cairns (C) – Mt Whitfield	2068	100	100
Cairns (C) – Northern Suburbs	2072	100	100
Cairns (C) – Pt B	2078	100	100
Cairns (C) – Trinity	2074	100	100
Cairns (C) – Western Suburbs	2076	100	100
Cardwell	2200	100	100
Douglas	2800	95	76
Eacham	2900	100	100
Herberton	3700	100	74
Hinchinbrook (S) – Palm Is.	3804	100	100
Hinchinbrook (S) – excl Palm Is.	3801	100	97
Johnstone	4150	100	100
Mareeba	4850	76	2 [†]

SLAs with less than 5% of their area located within the NRM region are excluded from the analysis. [†] % used by QRBIS.

B.6. CAPE YORK NRM REGION

The Cape York NRM region is an aggregation of:

River Catchments:

Endeavour
Jacky Jacky
Jeannie
Lockhart
Normanby
Olive–Pascoe
Stewart

Local Government Areas:

<i>LGA</i>	<i>LGA number</i>	<i>% area in region</i>
Aurukun	30250	100
Carpentaria	32250	3
Cook	32500	90
Douglas	32800	40
Torres	36950	11

Statistical Local Areas:

<i>SLA</i>	<i>SLA number</i>	<i>% population in region[†]</i>	<i>% area[‡] in region</i>
Aurukun	0250	100	100
Carpentaria	2250	43	3
Cook (S) (excl. Weipa)	2501	100	83
Cook (S) – Weipa only	2504	100	100
Douglas	2800	5	24
Torres	6950	59	71

<i>LGA</i>	<i>LGA number</i>	<i>% area in region</i>
Campaspe	21370	41
Delatite	21950	93
Greater Shepparton	22830	100
Mitchell	24850	81
Moirra	24900	96
Murrindindi	25620	99
Strathbogie	26430	100

[‡] SLAs with less than 5% of their area located within the NRM region are excluded from the analysis. [†] % used by QRBIS

B.7. GOULBURN–BROKEN REGION (Victoria)

The Goulburn–Broken region is an aggregation of:

River Catchments:

Part of the Murray–Darling system: Goulburn River and Broken River catchments

Local Government Areas[‡]:

<i>LGA</i>	<i>LGA number</i>	<i>% area in region</i>
Campaspe	21370	41
Delatite	21950	93
Greater Shepparton	22830	100
Mitchell	24850	81
Moirra	24900	96
Murrindindi	25620	99
Strathbogie	26430	100

[‡]SLAs with less than 5% of their area located within the NRM region are excluded from the analysis

Statistical Local Areas[‡]:

<i>SLA</i>	<i>SLA number</i>	<i>% area in region</i>
Campaspe – Kyabram	1374	81
Campaspe – South	1376	68
Delatite – Benalla	1951	100
Delatite – North	1954	99
Delatite – South	1955	89
Greater Bendigo – Pt B	2628	8
Greater Shepparton – Pt A	2831	100
Greater Shepparton – Pt B East	2834	100
Greater Shepparton – Pt B West	2835	100
Macedon Ranges – Kyneton	4131	7
Mitchell – North	4851	84
Mitchell – South	4854	75
Moirra – East	4901	90
Moirra – West	4904	100
Murrindindi – East	5621	100
Murrindindi – West	5622	98
Strathbogie	6430	100
Yarra Ranges – Pt B	7458	25 [†]

[‡]SLAs with less than 5% of their area located within the NRM region are excluded from the analysis.

[†]The Yarra Ranges – Pt B SLA is excluded from the analysis as the area of this SLA occurring within the Goulburn–Broken Catchment is mainly forestry and national park with negligible population or agriculture.

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Part 2

Profile of Institutional Activities to Support the Capacity of Land Managers to Undertake Sustainable Land Management

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2.1 Introduction

Ultimately sustainable land management on private land is an activity carried out by the land manager. Government agencies and non-government sectors can attempt to modify behaviour by using instruments that facilitate, compel or induce practice change.

Instruments to compel change generally refer to regulations, where there is a requirement to undertake certain activities and an associated penalty for breaching these environmental obligations. In most cases, regulations are only useful for achieving a minimum duty of care with respect to environmental issues and may not promote long-term sustainable management outcomes.

Instruments that facilitate change, relying on moral suasion, can encourage natural resource users to meet and exceed an environmental duty of care. Facilitative mechanisms (also known as motivational or persuasive measures) involve policy designed to increase the supply of, or create a flow of new and useful information (i.e. it is designed to educate and expand an individual's knowledge base). Due to their voluntary nature, facilitative mechanisms are likely to be most successful where it can be demonstrated that the desired behavioral modification will directly or indirectly result in increased returns to the targeted industry or individual (PC 2003: 189); in short, in situations where public interest and private benefits are closely aligned. Where self-interest is lacking, the success of facilitative mechanisms used in isolation is likely to be limited (Gunningham and Sinclair 2004). These mechanisms also often provide the land managers with the skills and knowledge required to undertake sustainable land management effectively.

The limitations of legal instruments and moral suasion reinforce the need for economic incentives to induce change by providing financial encouragement to implement sustainable management practices that contribute to an improvement in the environment. Policies that seek to induce change are effective because they involve provision of a financial incentive or penalty depending on compliance. This type of policy is needed to "...deal with the fact that farmers see no particular benefit from undertaking these new behaviours" (Bromley 1997: 51). Policies designed to induce change include economic instruments such as tax incentives, fees, subsidies and grants, management payments, offset schemes and tradeable permits and accreditation schemes. A more detailed description of these policy instruments is provided in Volume Two.

2.2 Background

The National Action Plan for Salinity and Water Quality (NAPSWQ) and the Natural Heritage Trust Extension (NHT2) are the key driving mechanisms in a move toward increasing community participation in, and regionalisation of, natural resource management. The stated rationale for this approach is that a consultative and inclusive process that provides opportunities to contribute to problem definition, target setting and the development of strategies will enhance ownership of problems and commitment to implementing solutions. Criteria for consultative processes include early and iterative involvement of key stakeholders,

well-planned and comprehensive processes, building on previous regional consultation processes, social profiling to address regional needs and securing stakeholder commitment (Joint State and Commonwealth Steering Committee 2002, p.7).

The National Action Plan for Salinity and Water Quality Protection is a joint commitment of \$1.4 billion over 7 years (2000-2007) between the Commonwealth, State and Territory Governments, for regional solutions to salinity and water quality problems. This funding is complemented by the Commonwealth funding allocated to the extension of the Natural Heritage Trust (2002-2007) of \$200 million. A further \$122 million over three years has been allocated to the National Landcare Program by the Department of Agriculture, Fisheries and Forestry (DAFF) to encourage on ground action that will result in integrated and sustainable natural resource management at the farm, catchment and regional level.

In Queensland, NAPSWQ is delivered via a number of Statewide Investment Programs (NAP SIPs) initiatives and through natural resource management bodies in four priority areas (three of which are in the GBR catchment). NHT funding is delivered to priorities identified by regional natural resource management bodies and through the Envirofund, which provides one-off funding to small-scale projects.

The National Landcare Program has two components: community support which funds Landcare investments principally through accredited regional NRM plans and national support which funds projects that have a broad scale national outcome. Specific NAPSWQ, NHT2 and Landcare program activities occurring within the Great Barrier Reef catchment and within specific natural resource management regions are identified in Table 3.

At a State level in Queensland, activities to initiate and support sustainable land management on private and leasehold land are coordinated by two main state agencies: the Department of Natural Resources and Water (DNRW) and the Department of Primary Industries and Fisheries (DPI&F). A recent restructure within DPI&F however, would indicate a greater profitability focus and reduced effort with respect to natural resource management. The Environmental Protection Agency (EPA) also has a contributing role, and is responsible for the conservation and management of wetlands and regulation of many land-based activities that may impact on wetlands.

Many of the sustainable land management programs, which may have once been delivered direct from the State government, are now being delivered in partnership with industry bodies. Industry bodies are perceived to have a higher level of credibility with landholders and a greater appreciation of the key issues. The main activities of the key industry bodies are discussed in section 2.1.4

Non-government organisations also deliver programs supporting sustainable land management on private and leasehold land. Regional Natural Resource Management (NRM) bodies are the primary non-government organisations working on sustainable land management initiatives within the GBR catchment. Other NGOs are working closely with regional groups and in some cases are funded by the NRM groups to carry out on-ground actions. Greening Australia has a “Changing Lives and Landscapes project” which is, at this stage, a capability framework

highlighting the skills, techniques and information Greening Australia can provide to regional groups. It has three components – veg link, river recovery and bush benefits.

Landcare Australia is a not-for-profit company that works to ensure governments, the private sector and the wider community embrace the vision for Landcare and Coastcare. It works closely with the Australian Landcare Council and the National Landcare Facilitator Program to assist the landcare group movement. Landcare Australia raises sponsorship from the corporate sector, runs campaigns such as National Landcare Week, National Coastcare Week and the National Landcare Awards, and coordinates large national projects. Coastcare often involves volunteers working on public land in coastal areas rather than on their own properties.

2.2.1 GBR Catchment Wide Programs

There are a number of programs delivered across the State and therefore across the whole GBR catchment. Many of these relate to provision of incentives for on-ground activities such as the Primary Industries Productivity Enhancement Scheme (PIPES) provided by the Queensland government and the income tax incentives program for land care activities. These programs are discussed in detail in Volume 2 (2.1.7 and 2.2.1). In addition, there are a number of programs that incorporate multiple mechanisms for supporting the uptake of sustainable land management activities. This section also provides a discussion of the opportunities and support provided to landholders to engage in planning for sustainable land management and wetlands conservation.

2.2.1.1 Rural Water Use Efficiency Initiative

The Queensland Government, in conjunction with industry bodies has recently entered the second phase of the rural water use efficiency initiative. The first 4-year phase of this initiative (RWUEI1), which focused on an improvement of water use availability across Queensland irrigation industries, concluded in June 2003. A total of \$41 million was spent across the major irrigation industries – sugar, fruit and vegetables, cotton and irrigated grain. It consisted of four components: an adoption component managed by rural industry associations, a financial incentive scheme, a research and development component and a special project component. An independent review of the initiative by Coutts and Bell determined that the RWUEI1 met its original objectives based around improved water use efficiency, percentage of irrigators achieving best management practice and social indicators.

An analysis of the effectiveness of RWUEI1 in achieving sustainable land management and wetland conservation outcomes is provided in Volume 2. The Rural Water Use Efficiency Initiative is the umbrella for a number of industry specific programs such as the cane industries' COMPASS program, Dairying Better and Better, QFVG Water for Profit scheme and Cotton Best Management Practice (BMP). The details of the industry led programs will be discussed in the industry section of this report. Phase II of the Initiative (2003–2005) has been broadened to also include a focus on the off-farm environmental impacts of irrigation. It aims to build on the success of the first phase of the project and enhance the partnership approach with industry. However, the overall level of funding has been significantly reduced. Each industry body has a relatively high level of autonomy over how they manage the program. The main role of DNRME is to ensure milestones are being met.

2.2.1.2 Agricultural Performance Systems

The Agricultural Performance System (APS) is a whole of State government project set up to ‘analyse options for a consistent approach to managing the impacts of agricultural land uses and practices that will assist with achieving the objectives of the Reef plan and other similar initiatives’ (The Agricultural Performance System Executive Summary Draft). If implemented this project may go some way toward addressing issues of institutional vitality and integration. This program is still in draft format and does not represent government policy at this stage. The project has identified three critical components required for the uptake of sustainable practices: motivation, information and capacity. Additionally, a risk-based approach has been recommended with implementation mechanisms focusing on:

- *High risk/high gain activities (A track)* – the State government targets intensive mechanisms (market based instruments, regulation or co-regulation and provision of financial incentives) to practices that are high gain and if possible, located within high-risk locations;
- *Activities within high risk/ high value landscapes (B track)* – the State, in partnership with NRM bodies and industry and using an agreed mechanism or approach, identifies ‘high risk’ landscapes or hot spots and work collaboratively with all industry sectors to increase voluntary uptake of sustainable practices; and
- *Industry sector approaches (C track)* – the State continues and increases its effort to work in partnership with industry groups to focus on high risk practices and/or develop improved farm management systems and uptake within industry sectors. According to the executive summary of the APS, while mechanisms will have to be flexible and outcomes based rather than prescriptive, because of the difficulties in setting and measuring outcomes at the property level, mechanisms will have to focus on uptake of practices and/or farm management systems. Additionally, the ‘landscape’ (regional or sub-catchment) level is considered to be more practical for setting outcomes and designing interventions.

Several high risk/high gain (track A) subprojects have been identified and will be investigated to determine:

- If current mechanisms are sufficient;
- If increased effort is warranted;
- The options for increased government effort; and
- Advantages, disadvantages and costs and benefits of those options.

These subprojects are:

- *Subproject 1*– Options for Government to reduce sedimentation through *improved grazing land management to maintain ground cover* and decrease soil loss to streams (includes uptake of conservative stocking rates and other practices for reduced sedimentation, including converting degraded pastoral land to less damaging use; using deep-rooted perennial pastures, uptake of drought management strategies;

- *Subproject 2* – Options for Government to increase uptake of *riparian zone protection* practices for reduced sedimentation through practices such as retaining vegetation along drainage lines; protecting waterways from stock by fencing;
- *Subproject 3* – Options for Government to increase uptake of *grazing management practices for wetlands protection*;
- *Subproject 4* – Options for Government to increase *practices that reduce salinity risk*, including commercial tree and shrub planting, deep-rooted perennial pastures – need for any action?;
- *Subproject 5* – Review of whether Government needs significant further effort and if so, options to *reduce sedimentation through improved cropping practices*, including stubble or pasture retention in ploughing (direct drilling); use of contour banks in cropland (maintenance also an issue) – need for any action?;
- *Subproject 6* – Review of whether Government needs significant further effort, and if so, options to improve uptake of *sustainable irrigation practices*, including irrigation scheduling, automation, optimisation of systems, monitoring of system effects;
- *Subproject 7* – Review of whether Government needs significant further effort in improving *chemical application practices*. Including use of practices such as crop or fallow pest breaks; IPM; precise applications (note: this is a Reef plan commitment); and
- *Subproject 8* – Options for Government to improve uptake of practices that *reduce nutrification of waterways*, including application of Nutrient Sensitive Zones, though practices such as nutrient balance accounting, including soil and plant tests.

2.2.1.3 FarmBis

One of the key mechanisms for supporting the uptake of sustainable land management practices is by providing training to landholders. The joint Commonwealth/State FarmBis program has been one of the main sources of funding for a broad range of training activities that relate to improved sustainable land management and property management in general. An additional \$66.7 million (across Australia) has been allocated by the Federal government to extending FarmBis for another four years but is contingent on receiving matching funding from the State government.

2.2.1.4 Land for Wildlife

Land for Wildlife is a voluntary program which encourages and helps landholders to provide habitats for native plants and animals on their property. Land for Wildlife is free of all legal binds and landholders can leave the program at any time. Once registered, land managers receive professional information, support and advice on conserving native plants and animals as well as solutions to environmental and wildlife management problems on their property. The EPA no longer provides support for the Land for Wildlife program however individual Councils are still supporting the program

2.2.1.5 Nature Refuge

EPA has recently announced a new program, valid for properties purchased after July 2003, which refunds land tax and transfer duty. To be eligible for the refund the land must include vegetation, plants or animals that are considered by the EPA to be of a high conservation value and the landholder must enter into a Conservation Agreement with the EPA to create a Nature Refuge over part of or all of the land.

2.2.1.6 Education and Extension Initiatives

Education and extension is considered a critical facilitative mechanism for encouraging land managers to undertake sustainable land management. NRM bodies have a clear education and training role and many of the priority actions identified within their regional NRM plans have an education and training component. There does appear to be a move away from general education and training programs, to education and training being integrated into specific projects.

Environmental education is a key aspect of the role of the EPA's Queensland Parks and Wildlife Service (QPWS). Although much of its activity is focused on National Parks, there is a network of extension officers who provide management advice, property assessments and assist with negotiating conservation agreements such as nature refuges. Within the GBR, QPWS extension officers are located in Rockhampton (Fitzroy), Maryborough (BurnettMary), Emerald (Fitzroy), Mackay (Mackay–Whitsundays), Townsville (Burdekin), Charters Towers (Burdekin), Ingham (Wet Tropics) and Atherton (Wet Tropics).

The QPWS have a series of 25 fact sheets for landholders on community nature conservation available on their website: http://www.epa.qld.gov.au/nature_conservation/community_role/landholders/resources/fact_sheets/. As many of these fact sheets were developed as part of the Land for Wildlife program, it is uncertain whether QPWS will continue to maintain them.

The Department of Primary Industries and Fisheries also have a number of web pages and fact sheets with information relevant to sustainable land management, including information on protection and management of fish habitats (wetlands). These can be accessed from: <http://www.dpi.qld.gov.au/environment/>. This site also provides information on the resources available to land managers from the DPI&F shop, such as the Prime Notes CD-Rom. The *PrimeNotes* CD-ROM (also known as *Prime Notes*) is a single point of access to information for primary industries and natural resource management from 15 government departments and centres, information organisations and research and development corporations Australia-wide.

NRM&E used to have a very active education unit however this seems to have been scaled down. The State AGSIP agricultural and capacity building activity outlined in appendix 1 has identified education and training as very important but is not running any programs at this stage.

Many environmental NGOs provide environmental education and training. Conservation Volunteers Australia is running a series of free training workshops (funded by the Landcare program) to volunteer organisations to enhance their management of volunteers within priority NRM projects. Wetlands Australia does have an education project but no specific activities are being carried out within the GBR region.

There is also a great deal of education material available both on the Internet and in printed format, much of which is out of date. Appendix 2 sets out the major education and extension initiatives being carried out within the GBR region.

2.2.1.7 Industry Initiatives

Due to the industry specific nature of industry initiatives, effort obviously correlates with the proportion of activity within that industry in an NRM region. For example, CANEGROWERS will only support a small proportion of landholders in the Fitzroy region as there is little cane growing activity. This section provides an overview of the specific activities being carried out by industry bodies.

Cane Industry Initiatives

Industry initiatives are delivered primarily through CANEGROWERS, the formal producer representative body and BSES Ltd. BSES Ltd (formerly Bureau of Sugar Experiment Stations) is an organisation owned by sugarcane growers and millers. It undertakes research and provides technical advice to Queensland cane growers and millers.

The main sustainable land management programs currently operating within the cane industry are the Prosper initiative, COMPASS (combining profitability and sustainability in sugar) the Rural Water Use Efficiency Initiative (WUE) and the 1998 Code of Practice for Sustainable Cane Growing.

COMPASS is considered the cornerstone of CANEGROWERS sustainability program. It is a facilitated, self-assessment process, which accommodates a basic level of farm management planning. Industry field staff follow up with participants to assist with plan implementation. COMPASS has a full time coordinator and a number (around 26) of part time field staff.

PROSPER involves establishing or utilising grower group activities and on-farm demonstrations to increase the level of adoption of best management practice. The PROSPER program of work is driven by the five BSES Regional Planning and Advisory Committees to ensure that the efficiencies being promoted specifically address the needs of each region. The programs include promoting the use of the best varieties for given soils and rainfalls, adoption of best practice weed and crop management, maximising the efficient use of water, adoption of best practice harvesting methods, improvement in fallow management, and increasing understanding of how climate affects productivity.

The Rural Water Use Efficiency Initiative is now in its second phase. \$800,000 has been allocated across all four sugar-growing regions (Northern, Burdekin, Mackay, Southern) and implementation has a regional focus and is managed at a local level.

According to their Environmental Program, CANEGROWERS aim to have by 2006:

- Sustainability awareness programs in place;
- All growers engaged in sustainability education;

- All growers participating in quality, efficiency, and innovation activities;
- Sustainability verification by third party available; and
- Supply chain involved in sustainability activities.

To achieve these objectives they plan to:

- Enhance community and government understanding of the business of sugar production via a community education program;
- Revise the *Code of Practice for Sustainable Cane Growing* as part of the process of achieving stakeholder endorsement of best management practices;
- Achieve adoption of agreed best management practices by the majority of growers through the delivery of a competency based training program (COMPASS);
- Develop a program that is endorsed by stakeholders and is based on the Environment Management System's (EMS) model through revision of the COMPASS program;
- Develop and implement a system of biennial public reporting on industry environmental performance against agreed targets; and
- Investigate certification systems for the sugar industry with potential incentives for the adoption of best management practices.

Queensland Fruit and Vegetable Growers Organisation

QFVG has been a key implementer of the Rural Water Use Efficiency Initiative, which they brand as Water for Profit. Phase II of the Water for Profit program (2004–2006) incorporates the development and implementation of a Farm Management Systems (FMS) approach as well as assisting growers to optimise on-farm natural resource management and water use efficiency. It also aims to enhance the alignment of industry NRM initiatives with regional planning processes. A team of regional field officers will implement the program and full time co-ordinator has been employed to design and trial a “farm management systems” toolkit with growers. This FMS will link with the overarching framework being developed by QFF. QFVG have also developed a two-day training course “Introduction to Environmental Management for Horticulture Enterprises”.

Cotton Industry

The Cotton Best Management Program (BMP) is the major program supporting and initiating sustainable land management practices on private and leasehold land within the cotton industry. The cotton BMP provides farmers with guidelines on farm design and management, integrated pest management and application of pesticides. It also provides growers with practical manuals, best practice booklets and training workshops for cotton farmers and a BMP co-ordinator at the grass roots level. The Cotton BMP does have an auditing component. Cotton Australia and the Cotton research and development corporation have recently received \$602,250 (under the NHT program) to expand the BMP into an environmental management systems approach that includes key natural resource issues. The cotton BMP is often cited as an example of an effective approach to increasing sustainable land management practices. Within the GBR catchment, cotton is only significant in the Fitzroy region.

Grazing Industry

Meat and Livestock Australia's (MLA) Grazing Land Management (GLM) education packages are available to producers in Northern Queensland on a user pays basis (subsidised by government programs such as FarmBis). It is delivered via a training workshop that increases producers understanding of grazing management and grazing land ecological processes, identifies management options and results in development of a management plan. At this stage, GLM is only available within the Burdekin and inland Burnett areas of the GBR catchment as it requires very locally specific information to be effective. GLM will be expanded to the Fitzroy Basin including the Desert Uplands, Coastal Burnett and Mary Catchment. These programs are funded via several sources including NAP, MLA and the state government. It is planned to broaden the focus of the program to include biodiversity and water quality issues.

Dairy

"Irrigation for Profit" is the dairy industries component of the RWUEI and is administered by the Queensland Dairy Farmers Organisation. In each of the five dairy regions and three lucerne-growing regions in Queensland, WUE officers provide an education program, which includes an award scheme, provision of best practice information and evaluation. Part of this program is the "Dairying Better and Better" decision support tool which provides information on efficient irrigation practices.

2.2.1.8 Planning for sustainable land management and wetland conservation on private and leasehold land

Planning has been defined as both a process through which choices about the future can be made and a method to chart the path to get there. At its most basic, planning recognizes that there is a social responsibility for estimating future consequences and giving them due weight in reaching every public policy decision (Low Choy et al. 2002). For landholders to have the capacity to manage their land sustainably, they must be provided with opportunities to undertake or participate in natural resource management planning, both for their own properties and at a broader level. In addition, landholders must be provided with adequate support to ensure that planning is carried out in a systematic manner and based on the best available information. If landholders are not adequately engaged and supported, planning undertaken by State agencies, regional NRM bodies and local governments is less likely to meet its objectives (Noss et al. 1997).

Specific state legislation mandates that state agencies and local government must undertake certain planning activities and prepare and adopt plans of legal standing. These plans are referred to as statutory plans. Examples of statutory plans affecting wetlands include Water Resource Plans, which become subordinate legislation under the Water Act 2000 and local government planning schemes required under the Integrated Planning Act 1997. Non-statutory planning involves those planning processes, activities and plan preparation that are undertaken by choice such as Catchment Management Plans and Property Management Plans. In some instances, provision of funding is contingent on the development of plans that meet certain requirements such as regional NRM plans.

Table 1 identifies the government plans, policies and programs relevant to sustainable land

management and wetlands conservation on private land in Queensland. A discussion of the legislation underpinning natural resource management in the state is provided in Volume Two (3.1) of this report.

Table 1. State planning mechanisms

Agency	Mechanism	Plan, Policy or Program
Environmental Protection Agency	<i>Statutory:</i> <i>Coastal Protection and Management Act 1995</i>	~ State Coastal Management Plan
		~ SEQ Regional Coastal Management Plan
	<i>Environmental Protection Act 1994</i>	~ Licencing scheduled "Environmentally Relevant Activities" (ERAs)
		~ Approved industry codes-of practice
		~ Queensland State-of-the-Environment Report
	<i>Environmental Protection (Water) Policy 1997</i>	~ Statutory Environmental Values (EVs) and Water Quality Objectives (WQOs) for Queensland waters
		Local Government Environmental Plans
		• Sewage Environmental Management Plan
		• Trade Waste Environmental Management Plan
		• Water Conservation Environmental Management Plan
	<i>Non-Statutory:</i>	~ Draft Regional Nature Conservation Strategy for SEQ (2001-2006)
		~ SEQ Regional Landscape Strategy
		~ The Strategy for the Conservation and Management of Queensland Wetlands (1999)
		~ State Interest Planning Policies
Agency	Mechanism	Plan, Policy or Program
Queensland Parks and Wildlife Service	<i>Statutory:</i> <i>Nature Conservation Act 1992</i>	(SIPPs)
		~ Voluntary Conservation Agreements
Department of Natural Resources and Water	<i>Statutory:</i> <i>Land Act 1994</i>	~ State Land Planning Guidelines,

		~ State Lands Practice Manual ~ Broadscale Tree Clearing Policy for Leasehold Land
	<i>Water Act 2000</i>	~ Water Resource Plans ~ environmental flow objectives (EFOs) ~ water allocation security objectives (WASOs) ~ Resource Operation Plan Land and Water Management Plan
Agency	Mechanism	Plan, Policy or Program
	<i>Water Resources Act 1989</i>	Riverine Protection Permits Quarry Allocation Notices Riverine Quarry Materials Management Plans Declared Catchment Areas”
	<i>Vegetation Management Act 1999</i>	Regional Vegetation Management Plans State Policy for Vegetation Management Property Vegetation Management Plans
	<i>Rural Lands Protection Act 1985</i>	Pest Management Plans Queensland Pest Animals Strategy 2000-2005 Queensland Weeds Strategy 2000-2005
	<i>Rivers Improvement Trust Act 1940</i>	River Improvement Trusts
	<i>Soil Conservation Act 1986</i>	Soil Conservation Project Area Plans Soil Conservation Property Plans
	<i>Non-Statutory:</i>	National Action Plan for Salinity and Water Quality (NAP) (Queensland component) Community-Based Natural Resource Management Policy Framework Overview
Department of Primary Industries and Fisheries	<i>Statutory:</i> <i>Forestry Act 1959</i>	Farm Forestry
	<i>Fisheries Act 1994 [DPI&F]</i>	Marine Plants Permits Waterway Barrier Works permits Restoration Notices Fish Habitat Areas
	<i>Non-Statutory:</i>	Strategy for Freshwater Fisheries in Queensland (1999)
Department of Local Government and Planning	<i>Statutory:</i>	
	<i>Integrated Planning Act 1997 (IPA)</i>	Coordination of planning schemes IDAS Agency referral coordination State Planning Policies
	<i>Local Government Act 1994</i>	

	<i>Non-Statutory:</i>	SEQ Regional Growth Management Framework
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The degree of state control over freehold rural land is significantly less than that for other land tenures including freehold urban land and rural leasehold land (EP report Volume 3 page 37). This means that voluntary forms of planning are of critical importance for the management of natural resources. These forms of planning can include industry codes of practice, property management plans and NRM plans.

A Code of Practice (CoP) is a collection of voluntary rules or procedures drafted by an industry primarily in response to s.436 of the *Environmental Protection Act 1994*. Compliance with a CoP approved under s.548 of the Act forms a defence against a charge of causing environmental harm in that it constitutes evidence that a defendant has complied with the general environmental duty. Whilst there are a number of CoPs relevant to the GBR catchment, such as the Sustainable Cane Growing in Queensland CoP, the Sustainable Fruit and Vegetable production CoP and the dairy CoP, there appears to be a move away from Codes of Practice. CoPs in general can be criticised for giving broad, non-specific advice on environmental management without providing specific best practice solutions, which often vary between regions and landscapes. In addition, CoPs do not generally identify environmental objectives to be achieved nor do they provide performance indicators by which progress toward specified goals can be measured. In an effort to overcome some of the shortcomings of CoPs, industry organizations and government agencies have been moving increasingly toward property level management planning.

Property level management planning is currently considered by both industry and government as the key planning mechanism for obtaining sustainable land management outcomes on private and leasehold land. In fact, Cary et al (2002: 44) have identified the development of a property level plan as one of the key factors determining if sustainable land management practices will be implemented. As with other forms of planning, property level management plans can be both statutory or non-statutory. The primary motivations for landholders to undertake property level planning are to meet their legislative obligations, obtain a direct incentive or because they perceive it to be a useful exercise.

A number of different and potentially overlapping approaches to property level planning have been developed by government and industry in Queensland and there are no agreed statewide standards for farm plans. This means a landholder may be required to undertake more than one plan, depending on the reason for the planning activity, which leads to frustration and duplication of effort. In recognition of the number of different types of property plans that a land manager can undertake (or be required to undertake), the Queensland Farmers Federation (QFF) is working on an overarching framework: the Farm Management System. This framework aims to integrate the individual industry property management planning approaches. QFF are negotiating with the Queensland government who are currently developing One-Plan, a property-level planning system that integrates all the legislative requirements for property level plans.

While there is no shortage of opportunities for landholders to engage in planning, they are often not aware of these opportunities or do not have the skills, confidence or desire to undertake property level planning. Therefore, there is a need for landholders to be adequately supported in their planning activities. The major government and industry programs supporting land managers with respect to property level planning are set out in Table 2.

The main supporting mechanisms provided by State agencies are FutureProfit and the Rural Water Use Efficiency Initiative. DPI&F are the current lead agency dealing for FutureProfit. However, with the department's recent change in direction there is some uncertainty about the future of FutureProfit in terms of planning for sustainable land management outcomes. Most of the sustainable land management programs (see table 3) being implemented by the NRM regional bodies provide support to land managers to undertake property management plans although it is usually part of an integrated approach to improving sustainable land management practices.

One of the major national initiatives to support property level planning is the recently developed Pathways to Industry EMS (Environmental Management System) program. This program, based on government industry-partnerships seeks to develop and implement EMS (based on the plan, do, check, act cycle) and other environmental assurance approaches to achieve:

- the adoption of profitable and sustainable farming practices;
- improved natural resource management and environmental outcomes; and
- an ability to demonstrate environmental stewardship to domestic and international markets.

The Commonwealth is providing up to \$8.5 million to fund 15 projects across Australia under the Environmental Management Systems National Pilot Program. In Queensland, the Department of Primary Industries and Fisheries will develop a pilot EMS for pastoral industries, including beef, sheep, game meat and wool. The pilot will particularly consider the use of EMS as a basis for credible product labelling, and marketing of premium meat and fibre products. The project will evaluate the performance of several environmental management systems on 30 pastoral properties in Queensland, ranging from a baseline EMS to an ISO14001 certified EMS.

Landholders are clearly provided with a range of opportunities to engage in property level planning and there is moderate support both in the form of incentives and advice. In addition, property level plans are increasingly being recognised as a regulatory tool. For example, under the draft State Leasehold Land Strategy all leaseholders will be required to develop a property resource management plan to obtain a renewed lease. There has been some concern voiced that with the increasing focus on property planning there is a lack of support for on-ground action. There is also a general perception that land managers are overwhelmed by the number of property management planning options available to them (Coastal CRC Property Level Planning Workshop 2004). It is anticipated that the development of the Queensland Farmers Federation FMS and the State government One-Plan approaches may alleviate some of these concerns.

Table 2. Programs to support property planning

PROGRAM	WHAT'S DELIVERED	WHO DOES IT	REGION
Land and water management plans for water trading and new allocations. (legislative requirement)	Workshops to support the development of land and water management plans	CANEGROWERS, BSES and NRM&W	Mackay–Whit Burnett–Mary Burdekin Wet Tropics Cape York
Land and water management planning for water trading and new allocations. (legislative requirement)	Resource information and property level assistance	QFVG and NRM&W	Burnett–Mary Burdekin Wet Tropics Cape York
COMPASS (Combining profitability and sustainability in Sugar)	Self-assessment package supported by workshops to identify areas for growers to increase sustainability and profitability	Canegrowers, BSES, SRDC, EPA	Mackay–Whit Burnett–Mary Burdekin Wet Tropics Cape York
Grazing Land Management (GLM) Packages	Assistance to develop Sustainable grazing management plan	DPIF/Meat and Live Stock Association (MLA) (Quirk)	Burnett–Mary (in development) Burdekin
EMS	Financial support (up to \$3000) to develop and implement an EMS e.g. – advice or on-ground actions	DAFF, industry groups	All
Farm Management Systems	Overarching framework for development of property management plans	QFF	All (in development)
One-plan (property management planning)	Guidelines for the various regulatory requirements of different State agencies as well as integrating the existing voluntary property management planning approaches.	Queensland Government	All (in development)
FutureProfit	Workshops delivering farm management training to landholders – profit focus now being expanded to include natural resource management modules	DPIF	All
FarmBis	Funding for training for development of PMPs and BMPs	DAFF	All

PROGRAM	WHAT'S DELIVERED	WHO DOES IT	REGION
Rural Water Use Efficiency Initiative ((RWUEI) II	Coordinated by industry groups - provide on-farm advice and extension on efficiency measures and BMP. Incentives for the use of BMP and more efficient equipment.	NRM&E, DEWHA, Canegrowers, Queensland Fruit and Vegetable Growers (QFVG), Cotton Australia, Queensland Dairyfarmers Organisation	All – phase 2 of RWUEI has a greater planning focus
Dairying Better and Better (part of RWUEI)	Decision support tool to provide information on efficient irrigation practices	Queensland Dairyfarmers Organisation	Burnett–Mary Wet Tropics
Farmcare / Farm management systems	Previously a code of practice outlining a range of strategies to assist farmers to meet environmental objectives now moving toward a farm management system (overarching framework for property management planning). Two-day training course on environmental management	QFVG	Burnett–Mary Burdekin Wet Tropics Cape York
Cotton BMP	Guidelines on farm design and management, IPM and application of pesticides Practical manuals, best practice booklets and training workshops	Cotton Australia	Fitzroy
	A BMP co-ordinator to oversee adoption at grass roots level		
EMS pilot program	The pilot will particularly consider the use of EMS as a basis for credible product labelling, and marketing of premium meat and fibre products. The project will evaluate the performance of several environmental management systems on 30 pastoral properties in Queensland, ranging from a baseline EMS to an ISO14001-certified EMS	ALMS (consultants) funded by the Commonwealth	Burdekin

In addition to these programs supporting the development of property level plans, land managers are increasingly being consulted about broader planning issues. For example, Crossland (2002) noted that “a feature of Australia is the commitment of the community and its institutional structures to resolve problems by taking action, involving regulation and legal instruments, policy and planning initiatives, education and community participation mechanisms”. The type, number and effectiveness of the participation mechanisms vary across strategies and may be specific to landholders. For example, landholders are considered key stakeholders in developing

plans relating to land and water management and often significant effort and resources are allocated to ensuring they have been consulted. Nineteen workshops were held across the state to obtain landholder input into the Draft Leasehold Land Strategy and the development of each Water Resource Plan involves a regional forum and two rounds of community submissions.

Almost all local governments within Queensland are developing their planning scheme under the Queensland Integrated Planning Act (IPA), which provides opportunities for public comment as an integral component of that process. At this stage, most councils within the GBR catchment are still at the planning phase and many of them have not released their drafts for public comment. In developing areas where there is a “material change of use” of land, the Queensland Integrated Planning Act and subordinate Local Government Plans become relevant to management at the property level. The express purpose of the IPA is to seek to achieve ecological sustainability. Functions carried out under the IPA, including planning scheme preparation, are required to be performed in a way that advances this purpose. The IPA also requires that the matters dealt with by a planning scheme, including matters that involve interests of the State or a region, are satisfactorily coordinated and integrated.

Community consultation is the basis for the NRM plans being developed by the regional bodies. Effective engagement of stakeholder and community ownership of any planning documents developed by the regional groups is considered to be integral to the long-term success of the plans. In fact, recognition of the lack of well coordinated, community driven natural resource plans was the key driver for the development of the NAPSWQ and NHT2 processes. At this stage, all NRM bodies surveyed indicated high level of landholder involvement in the development of their plans. This has not been independently assessed in any way.

2.3 Regional Comparison of Effort

To enable a comparison of the different levels of effort by state government, industry, local government and regional bodies in each NRM region, Table 3 identifies the major programs being undertaken and the amount of NAPSWQ, NHT2, and Landcare funding allocated to each region. Regulatory mechanisms and Commonwealth activities have not been included as they are relatively uniform across all NRM regions. Table 4 sets out the number of facilitators and co-ordinators employed by each NRM regional body and Table 5 sets out the number of staff employed by councils involved in supporting sustainable land management on private land.

2.3.1 Major regional programs

The programs identified in Table 3 are based on either facilitative or inducement mechanisms or a combination of both. Some programs do incorporate a legislative requirement. Information about the level of effort for supporting and initiating sustainable land management was obtained from State, Federal and local governments, industry bodies and regional NRM groups. This information was gathered in the form of written surveys of local governments and regional NRM bodies, semi-structured interviews with industry organisations and agency staff and an analysis of the literature including government and industry group documents and community information. All six regional NRM bodies responded to the survey. With respect to the council information, not all councils responded to the survey so response rates are indicated in the table. Detailed information gathered from the survey of local governments and NRM bodies is

provided in Appendix 3.

Many of the programs supporting the uptake of sustainable land management practices are partnership arrangements between government, industry groups and regional bodies so the separation into individual organisations is somewhat artificial. As levels of support for sustainable land management are also aligned with industry as well as NRM regions, the dominant land use for each region is identified. Much of the state level NAP funding for sustainable land management is delivered through the Agricultural State Investment Priorities (AgSIP) program, which forms part of the NAP State Investment Priorities program, and is delivered through industry, regional body and government partnerships. Details of the AgSIP programs are provided in Appendix 1.

Table 3: Programs to Support Sustainable Land Management

Region	State (including AgSIP)	Industry	Councils	NRM bodies ¹²	Other	Funding ¹³
Burnett Dominant agricultural industries Fruit &Vegetables (F&V)- 30.3% Cane – 12.2% Beef – 33.2% Dairy- 7.2%	AGSI P NAP wide programs	COMPASS (Combining Sustainability in Sugar) PROSPER package (Cane) Land and Water Management Planning Cane) Rural Water Use Efficiency Initiative (RWUEI) -Dairy -Cane -F&V	<i>(10 out of 23 relevant councils responded)</i> Land for Wildlife – 3 councils. Landcare/ICM group support - 3 councils Other (education/information) -4 Councils	Grazing Land Management (GLM) package development and testing Farming Land Management Systems Native Vegetation and associated waterways, floodplains and wetlands – prioritisation and restoration River Assessment Stream Reach Rivercare Plans (some of the funding will be directed toward devolved grants) Regional landholder ownership of sustainable land-use issues and solutions (Landcare project)	Bundaberg District Grain in Cane (National Landcare Program – innovative natural resource program – \$90,600)	NAP-\$871,473
	Planning and implementation support for landscape best practice (IAWM) (\$360,000) Grazing environmental monitoring program (\$360,000) Grazing modelling simulation (\$360,000) Coordination and support of sustainable agricultural initiatives (\$1 300 000) Decision support to assess impact of land use change (\$960,000) Economic assessment of costs/benefits of land use change and incentive mechanisms to support change (\$360 000) Burnett/Burdekin programs Pesticide and nutrient movement in new cane and horticulture systems (\$810,000 shared with Burdekin) Capacity building within horticulture industry (\$300,000) CANEGROWERS – pesticides and nutrients (\$300,000)					NHT – \$1,090,616 Landcare -\$402,040 Total \$2,364,129
Fitzroy Beef – 64.2% Grain/cereal – 15.6% Cotton – 8% F&V – 3.1% Other hort – 5.3%	Integrated Area Wide Management Model (IAWM) (involves cotton RDC, NRM&E, DPIF, 4 T consultants, FBA and SunWater)	LWMP assistance (QFVG) RWUEI -cotton -F&V Cotton BMP	<i>(8 out of 15 councils responded)</i> Land for Wildlife 1 Council Landcare/community group support 3 councils Central Highlands Natural Resource Management Group 4 C ouncils (some of th e area overlaps the Burdekin NRM region)	Achieving biodiversity targets through neighbourhood catchments (Property management planning; Technical support and information exchange; Neighbourhood Catchment Plans; and devolved Grant Projects) Supporting community adoption of sustainable resource management in the Fitzroy region (Landcare)		NAP \$1,430,000 NHT \$696,000 Landcare \$298,955 Total \$2,424,955
	Sustainable Farming Systems Project (DPI and GRDC funding) AgSIP					

¹² includes Landcare Support programs administered via the NRM regional bodies
¹³ While all efforts were made to cross check funding allocations between NRM groups and government agencies, these Figures may have changed by the time of report publication.

	<p>NRM capacity building in cotton and grain industries (\$557,000) Case studies of IAWM (\$1 130 000) Burdekin and Fitzroy</p> <p>Case studies for increased adoption of sustainable grazing (\$1 400 000 total) NAP wide</p> <p>6 programs as above</p>					
<p>Mackay-Whitsunday Cane – 80% Beef – 12.7%</p>		<p>COMPASS</p> <p>PROSPER</p> <p>RWUEI -Cane</p>	<p><i>(2 out of 4 councils responded)</i></p> <p>Land for Wildlife 3 councils</p> <p>Landcare/ICM support 3 councils</p> <p>Direct landholder support 1 council</p> <p>Other <i>(education/information)</i> -2 councils (Mackay city council has a \$20 environment levy)</p>	Sustainable Landscapes program (Landcare)		<p>NHT \$1,109,400</p> <p>Landcare \$300,000</p> <p>Total \$1,409,40</p>
<p>Burdekin Grain – 6.30% Cane – 24.9% F&V- 28.1% Beef – 38.2%</p>	<p>Rangelands to Reef initiative (\$3 million over 3 years – now in final year – DPI&F)</p> <p>AgSIP Burdekin/Fitzroy programs</p> <p>Case studies for increased adoption of sustainable grazing (\$1 400 000)</p> <p>Burdekin/Burnett programs Pesticide and nutrient movement in new cane and horticulture systems (\$810,000)</p> <p>Capacity building within horticulture industry (\$300,000)</p> <p>CANEGROWERS – pesticides and nutrients (\$300,000 shared with Burnett)</p> <p>NAP wide</p> <p>6 programs as detailed above</p>	<p>COMPASS</p> <p>PROSPER</p> <p>GLM</p> <p>RWUEI -Cane -F&V</p> <p>LWMP assistance (QFVG)</p>	<p><i>(5 out of 7 councils responded)</i></p> <p>Land for Wildlife 4 councils</p> <p>Landcare/ICM support - 1 Council</p> <p>Creek to Coral project -2 councils (Townsville and Thuringowa councils)</p> <p>Workshops to support Envirofund applications -1 council (Townsville City Council)</p> <p>Green Corp teams -2 councils (Townsville City Council and Thuringowa City Council)</p>	<p>Property level rangeland grazing targets for the northern Brigalow belt</p> <p>Improving water quality in Belyando-Suttor (uncertain of exact funding)</p> <p>Lower Burdekin Salinity and Water Quality Management program</p> <p>Dryland salinity in the Belyando-Suttor sub catchment</p> <p>Desert upland capacity building for sustainable production</p> <p>ALMS EMS pilot project in the Belyando Suttor and Bowen-Broken catchment (Landcare)</p> <p>Desert Uplands on-ground landcare support</p>	<p>Lower Burdekin Grazing Project (Wetlands Care Australia – Rangelands to Reef) \$60,000</p> <p>\$17,000 – CANEGROWERS (fencing for trials)</p>	<p>NAP \$1,762,400</p> <p>NHT \$1,106,509</p> <p>Landcare \$172,500</p> <p>Total \$3,041,40</p>
<p>Wet Tropics F&V – 57.1% Cane – 26.4% Beef – 6.5% Dairy – 4.9%</p>		<p>COMPASS</p> <p>PROSPER</p> <p>RWUEI -cane</p>	<p><i>(6 out of 8 Councils responded)</i></p> <p>Land for Wildlife 5 Councils</p> <p>Landcare/Community group support 2 councils</p> <p>Rate discount scheme</p>	Minimising the diffuse sources of pollution exported to the GBR lagoon (Landcare)	<p>Achieving environmentally sustainable sugar cane farming – demonstration site (\$16,450)</p>	<p>NHT \$1,661,800</p> <p>Landcare \$376,450</p>

		<div>-dairy</div> <div>F&V LWMP assistance (QFVG)</div>	<div>1 Council (Johnstone)</div> <div>Rate rebate scheme</div> <div>1 Council (Douglas)</div> <div>Bonus Development scheme</div> <div>1 Council (Johnstone)</div> <div>Water Quality Joint Venture Partnership (\$2.5 million)</div> <div>1 Council (Douglas Shire)</div> <div>Education/information</div> <div>3 Councils</div>			<div>Total</div> <div>\$2,038,250</div>
<div>Cape York</div> <div>Cane – 13.1%</div> <div>F&V – 12.8%</div> <div>Beef – 62.9%</div>		<div>COMPASS</div> <div>PROSPER</div> <div>RWUEI</div> <div>-cane</div> <div>-F&V</div> <div>F&V LWMP assistance (QFVG)</div>	<div>(1 out of 3 councils responded)</div> <div>Pest management activities only</div>	<div>Building a Landcare ethic within Cape York Peninsula (\$137,500)</div> <div>Supporting the development of sustainable grazing management systems on Cape York Peninsula (\$100,400)</div> <div>Natural Environment rehabilitation and restoration through Landcare and Catchment management (\$100,000)</div>		<div>NHT</div> <div>\$677,793</div>
						<div>Landcare</div> <div>\$237,900</div>
						<div>Total</div> <div>\$915,693</div>

2.3.2 Facilitator and coordinator networks

Most facilitators and co-ordinators within the GBR region are employed through regional NRM bodies. Each NRM body functions differently and employs different “types” of staff depending on their priority actions and their stage in the planning process. Many of these positions, such as catchment management positions, are similar to those funded under NHT1. In general, most groups have head office planning staff, regionally based staff and technical staff who have expertise in a certain areas such as coastal management. Table 4 sets out the NRM body facilitators and coordinators in each region.

Table 4. NRM body co-ordinators and facilitators

NRM Region	Planning Staff	On-ground/place based staff	Issue based/technical staff	Total Staff
Burnett–Mary	Executive officer Communication officer Partnership development officer	3 Community Support officers	Biodiversity coordinator Coastal and marine co-ordinator	8
Fitzroy	Executive officer Regional planner/coordinator Local government liaison officer Science co-ordinator	6 sub-regional planning coordinators 6 sub-regional field officers 4 neighbourhood catchment officers	Waterwatch officer Coastcare officer 2 indigenous officers	23
Mackay–Whitsunday	Executive officer Business manager	3 ICM coordinators	Biodiversity conservation officer Indigenous engagement officer Waterwatch officer (0.6 FTE) Farm forestry / environmental services officer (0.6 FTE)	8.2
Burdekin	Executive officer Planning officer Community support officer	5 sub-regional co-ordinators 3 NAPSWQ project officers	Coastal technical support officer Freshwater technical support officer Biodiversity and Veg management technical support officer Regional aboriginal land management facilitator	15
Wet Tropics	Executive officer Client Services manager Regional co-ordination and communication officer Regional programs information officer	5 catchment co-ordinators	Sustainable agriculture facilitator Nat resource co-ordinator (indigenous) Project officer (indigenous)	14
			Natural resource co-ordinator – water quality Natural resource co-ordinator – biodiversity	
Cape York	No funded positions at this stage			0

The Australian Government funds strategic regional facilitators who support two regional

bodies each and four Queensland statewide facilitators who provide statewide support on coastal and marine issues, sustainable resource use, biodiversity and water conservation. There has been a generally acknowledged decline in the number of “extension officers” employed by Queensland government agencies in the last ten years and the term “extension” is rarely used. Officers filling extension type roles usually do so with respect to specific projects, so it is not possible to obtain numbers. Industry organisations, such as BSES and CANEGROWERS, and NRM bodies are now the primary deliverers of extension.

In addition to the coordinators and facilitators employed by the regional NRM bodies, councils also fund staff to support sustainable land management by private land managers. This information is not comprehensive, as some councils did not respond to the survey. Additionally, many councils did not differentiate between environmental health officers and those who had direct facilitator and coordinator roles. Table 3 presents the information collected in the survey of councils.

Table 5. Council facilitators and coordinators

NRM region	Council	Number of relevant staff
Burdekin	Burdekin	0.3
	Thuringowa	6.0
	Townsville	4+
	Jericho	0.2
	Total	10.5
Burnett–Mary	Burnett	0.5
	Cooloola	0.8
	Gayndah	1.0
	Hervey Bay	3.0
	Murgon	0.125
	Total	5.625
Fitzroy	Livingstone	2.0
	Rockhampton	2 part-time
	Peak Downs	0.2
	Bauhinia	0.2
	Belyando	0.2
	Emerald	0.2
	Total	3.8
Mack-Whit	Whitsunday	1.0
	Mackay	1.0
	Total	2
Wet Tropics	Cairns	2.0
	Douglas	6.0
	Johnstone	14.5
	Atherton	3 +
	Cardwell	5.4 (2 on wetlands)
	Eacham	7
	Total	37.9

2.3.3 Existing environmental groups

The table below outlines the number of Landcare groups and other environmental NGOs in

each region based on information obtained from the survey of regional NRM bodies and local governments. These figures are not definitive as environmental groups, particularly those entirely based on volunteer input or centered on a single issue, are very dynamic and form, fold, amalgamate or change their name quite regularly. Additionally, some of the regional NRM bodies seemed to interpret the question differently so different types of groups may have been included in different regions. In addition, there is no information about the actual level of participation in each of these groups and how effectively they are considered to function.

Table 6. Existing environmental groups

NRM region	Landcare	Other NGO	Total
Burnett–Mary	14	40	54
Fitzroy	15	10	25
Mackay–Whitsunday	1	13	14
Burdekin	25	14	39
Wet Tropics	25	125	150
Cape York		3 ICMs	3

2.3.4 Funding for on-ground works

One of the key sources for funding for on-ground works is provided through the Envirofund which acts to support small scale projects (up to \$35,000). Envirofund funding is also only available to applicants who have not received previous NHT funding. Envirofund allocations for the last 2 rounds have been sorted by region however, there is insufficient publicly available information about the most recent round (May 2004) to enable this regional breakdown.

Table 7. Envirofund allocations by NRM region

NRM region	NHT envirofund funding	
	02/03	03/04
Burdekin	188,967.00	403,018.46
Burnett–Mary	257,715.37	243,472.00
Cape York	5,000.00	148,773.00
Fitzroy	181,803.00	126,438.00
Mackay–Whitsunday	273,586.00	0.00
Wet Tropics	402,568.00	682,834.92
TOTAL	1,309,639.37	1,604,536.38

2.3.5 Participation in Environmental Groups

Information about membership of environmental programs is difficult to obtain. Table 8 summarises available data on membership of landholders in Landcare groups for each of the regions. It should be noted that this is based on small sample sizes from specific surveys held for ABARE and provides indicative information only. It seems highly unlikely that no landholders participate in the 25 Landcare groups operating in the Wet Tropics

Table 8. Landholder participation in Landcare

	Burnett Mary	Fitzroy	Mackay Whitsunday	Burdekin	Wet Tropics	GBR catchment
% respondents who are a member of a Landcare group	13	43	50	6	0	22
Years as a Landcare member	5	9	ns	–	–	8

Source: ABARE, 2004 – unpublished data

2.4 Analysis of Regional Comparison

From the information gathered in this study, the major differences between the GBR NRM regions with respect to the level of institutional support (financial, number of programs and staff) for sustainable land management relate to:

- the dominant industries within the region
- whether or not the region is an NAPSWQ priority region
- the level of activity by local government within the region
- number of facilitators and co-ordinators
- Envirofund allocations.

It should be recognised that not all the regions are uniform in geographical area or have the same population size, and these results need to be placed in this context. The Fitzroy region is the geographically largest region at around 15 million hectares and the Mackay–Whitsunday region is the smallest at just under 1 million ha (see Table 1.1 of Chapter 1). In terms of population, the Burnett–Mary has the highest and Cape York the lowest (see Table 1.15 of Chapter 1).

2.4.1 Industry

Cane growers and fruit and vegetable farmers receive a comparatively high level of support from their industry organisations both in terms of provision of incentives, information and assistance with property management planning (facilitative mechanisms). Therefore, regions such as the Fitzroy and Cape York and to a certain extent the Burnett–Mary, which are more dependent on beef, receive less industry support. At this stage, the Grazing Land Management (GLM) system is not available in the Fitzroy, Burnett–Mary or Cape York regions, despite these regions being the most dependent on beef. However, one of the NAPSWQ projects funded by the Burnett–Mary group involves development and testing of GLM for that region, as well as support for the development of farm management systems. Additionally, the neighbourhood catchments project operating in the Fitzroy region does focus on (and provide significant resources for) the development of property management plans, technical support and information exchange and devolved grants for on-ground action which may compensate for this reduced industry support. There is also significant input into improved grazing land management as part of the AgSIP projects, which would indicate the lack of support in this respect has been recognised and is being dealt with.

2.4.2 NAPSWQ

Clearly, the highest level of overall effort with respect to programs supporting sustainable land management practices is in the three NAP priority regions, the Burdekin, Burnett–Mary and Fitzroy. These regions, as part of the AgSIP program, are receiving significant levels of support for sustainable land management activities ranging from capacity building and incentives,

education and information provision and property management planning. In addition to the AgSIP programs there are 24 broader NAP SIP programs being implemented across the Queensland NAP regions based on the themes of capacity building, salinity management, water quality and social and economic considerations.

The three NAP regions also have the highest number of programs relating to sustainable land management administered by NRM bodies and at this stage have received the most funding through the NHT/NAP program. This is not particularly surprising, as these regions have been identified as priorities and the NAPSWQ bilateral agreement between the State and Commonwealth governments was signed in March 2002 whereas the NHT2 Bilateral agreement has yet to be signed off. Non-NAPSWQ regional bodies are at an earlier stage in their regional planning process, therefore, a large proportion of their funding is being directed toward the development of regional plans and investment strategies. This would indicate that NAPSWQ regional bodies are currently in a better position to support sustainable land management on private land than the other regions as they receive more funding and are further advanced in their planning processes. The Fitzroy Basin Association was the first region in the GBR catchment to complete its NRM plan (although it has not yet been approved) and the Burdekin is well advanced. However, despite being an NAPSWQ priority region, the Burnett–Mary has had significant delays in preparing their regional plan, which may reflect a lack of community integration and capacity in the region.

2.4.3 Local Government Activity

Local governments are not solely dependent on external funding and have a statutory capacity, which means they have a key role in supporting sustainable land management in the long term (LGAQ pers comm.). The importance of their role is being increasingly recognised, as is the need to build local government capacity in the area of natural resource management.

The Local Government Association Queensland (LGAQ) conducted two surveys of the capacity of local governments within the NAPSWQ region in 2003 to participate in NRM regional planning. Four broad activity areas that contribute to council capacity were identified:

- awareness of local and regional NRM issues
- access to appropriate biophysical, social and economic data for NRM decisions
- access to the necessary technical, Human Resources, project
- management and planning skills to undertake the implementation of NRM at a local
- and regional scale
- support systems in place to effectively engage and motivate local government to
- exercise ownership over regional NRM decisions and effectively implement them.

Most councils were rated as under-developed or not developed with respect to these activity areas and 98% of councils surveyed expressed support for local government training, awareness building and network development programs. To address these issues, a capacity building project is being conducted by LGAQ as part of the NAPSWQ SIP capacity building projects. This project is now being expanded to NHT2 regions.

As part of their capacity building project, LGAQ identified a limited understanding by councils of what actually constitutes natural resource management. Many councils are undertaking natural resource management activities, but are not aware they are doing so. Whilst the survey conducted for this project asked more specific questions about sustainable land management and wetlands protection, there were some councils who were uncertain about their level of activity.

There are significant differences in the level of support provided by councils to landholders in the different NRM regions within the GBR. Clearly local governments within the Burdekin and Wet Tropics regions play a much more active role, both in terms of provision of staff and number of programs, in supporting sustainable land management activities than Councils within other regions, particularly the Cape York region. It be noted however, that while individual councils within a region can be very supportive of sustainable land management practices, it is difficult to generalise about council activity across whole regions. Additionally, while a council can be very active at a local level there is a need for improved cooperation between councils to deliver NRM at a regional level (pers. comm., LGAQ).

Wet Tropics

Douglas Shire, situated in the Wet Tropics region is one of the most proactive shires in the state with respect to environmental management and has a long history of supporting environmental initiatives. The Douglas Shire has entered a joint venture partnership with DEWHA, CSIRO and canegrowers. This partnership developed a sustainability strategy and has recently obtained \$2.5 million funding for a water quality program which seeks to encourage adoption of agricultural BMPs (Best management practices) for farm planning to ensure water quality objectives are met. Additionally the Shire provided \$70,000 in rate rebates for land conservation in 1000 blocks north of the Daintree. Another rebate scheme has been proposed for the preservation of remnant vegetation. Council contributes around \$300,000 and one officer to sustainable land management activities. This \$300,000 was raised from the Daintree ferry levy for biodiversity conservation.

Also, in the Wet Tropics region, Johnstone Shire Council employs 14.5 staff in its environment section dealing with conservation, ecologically sustainable development, revegetation and weed and pest management. They are the first council in Australia to offer rate discounts of between 20 and 100% for land area going into conservation and also promote and support the development of property resource management plans. They provide a “bonus” developments scheme, which allows for more intense development on a small proportion of the site in exchange for conservation of other areas of the site. Additionally they support the Land for Wildlife scheme with a conservation officer. Two percent of rate revenue has been allocated to these programs although this target has not yet been reached. It should be noted that 54% of the Johnstone catchment is in a World Heritage area.

The Eacham Shire Council has an active environmental management unit with five grant funded field positions and a manager working on 20 different projects. The Council works very closely with community groups on projects dealing with riparian restoration and reduction of soil loss on farms. The Council supports and promotes the development of property resource management plans. It should be noted that a large proportion of these councils’ jurisdictions are World Heritage area and as a consequence, these regions have attracted higher levels of funding. Additionally, there has been a history of community support for environmental initiatives in the region and something like 150 community environment groups currently operate in the Wet Tropics region. A large proportion of councils within the region support the Land for Wildlife program. Interestingly, despite having one of the largest rate bases in the GBR, Cairns City Council does not have any programs directed at sustainable land management except for the Land for Wildlife program and they have four registered properties in the Shire.

Burdekin

In the Burdekin region, the largest councils, Townsville and Thuringowa, have initiated the Creek to Coral program, a joint community, and industry and government project to identify

and manage impacts on coastal waterways. This program will support sustainable land management activities. Townsville City Council also acts as an Envirofund sponsor for seven Round 1 projects around the region. They provide project management assistance and in-kind and cash support to the projects which include sustainable land management planning projects in the headwaters of the Ross River. Four out of seven councils in the Burdekin region support the Land for Wildlife program, which is also a relatively high proportion compared to other regions.

Mackay–Whitsunday

In the Mackay–Whitsunday region three out of four Councils support Land for Wildlife and provide support to their local ICM or Landcare group. Whitsunday Shire Council currently has 20% of a position allocated to working directly with landholders on sustainable land management issues and there are plans to create a new position to expand these activities. There are no other significant Council driven sustainable land management programs aimed at private land in this region although Mackay City Council does have a \$20 environment levy. One of the survey respondents indicated that many councils lacked the will to support sustainable land management due to a lack of awareness in middle management within councils.

Fitzroy

There seems to be relatively low support for Land for Wildlife in the Fitzroy region with only one Council supporting the program. The FBA was identified as the lead organisation for natural resource management by many different councils and these councils contribute toward their activities rather than employing their own staff or developing their own programs.

Four local governments within the Fitzroy Basin (Belyando, Bauhinia, Peak Downs, and Emerald) are involved in the Central Highlands Natural Resource Management Group (CHNRMG), which also includes the Jericho Shire Council within the Burdekin region. CHNRMG evolved from a pest management group set up in 1998 and has been successful in working with landholders and implementing on-ground natural resource management activities within the region. The group is primarily funded by the participating local governments and has partnerships with the Emerald Agricultural College, Landcare, EPA, DPIF, FBA, NRM&E and the Belyando-Suttor implementation group. CHNRMG has a project officer with primarily an extension role based at Peak Downs Shire Council. There have been some concerns expressed about the long-term future of the group as it crosses NAPSWQ/NHT regional boundaries.

Burnett–Mary

From the results of the council survey, it appears that local government support for sustainable land management activities in the Burnett–Mary region is relatively low. Only 3 councils out of 23 are involved with the Land for Wildlife program and 6 of the ten councils who responded to the survey indicated that they had no activities relating to supporting sustainable land management on private land. A number of the Shires within the region have small rate bases and cited lack of funding as one of the main reasons they did not have more environmental programs.

2.5 Conclusions and recommendations

Overall, the level of institutional support and promotion of sustainable land management is not uniform across the GBR catchment. Direct comparisons between regions are difficult as NRM regions are not uniform in area or population size. Additionally, the NRM regions themselves are not homogenous and there are a number of socio-economic and demographic and ecological differences within each region as well as between the regions. While this report highlights some of the differences between the regions, the factors influencing uptake of sustainable land management are so complex that it would be inappropriate to suggest resources should be

directed toward one region at the expense of another.

The results of this study indicate that land managers within the NAPSWQ regions of Burdekin and Fitzroy have access to more support for sustainable land management activities than those in the Burnett–Mary, Wet Tropics, Mackay–Whitsundays and Cape York regions. They have access to more programs and funding as a consequence of being NAPSWQ priority areas, have more facilitators and co-ordinators and receive a reasonable level of support from local governments. The Burdekin, as a consequence of being more agriculturally diverse has a higher level of support from industry organisations than the Fitzroy. The Fitzroy is also larger and has a bigger population than the Burdekin, although this may be compensated by fact that the Fitzroy do have more facilitators and coordinators employed by the NRM body. Consideration should also be given to providing ongoing support to successful programs such as the CHNRMG (Fitzroy and Burdekin), which may not fit the regional funding paradigm. Whilst the low level of participation in Landcare within the Burdekin region is of concern this may be related to the small survey sample, as there are a reasonable number of environmental groups operating in the area.

The Wet Tropics regions, while not being a NAPSWQ priority region appears to have a high level of existing capacity to support sustainable land management practices. This is reflected by the number and diversity of programs offered by local government within the area and the high number of existing environmental organisations. The consistently high level of Envirofund funding being directed toward this area also reflect a healthy level of support for on-ground activities, although it is difficult to establish how much of this activity would relate to sustainable land management on private land. Council support however, is not necessarily in those Shires where there is a high level of agricultural activity (Herberton and Atherton for example). The Wet Tropics NRM body is an amalgamation of two pre-existing organisations, which may explain why they have a high number of facilitators and coordinators. Although there appears to be fewer programs focussing specifically on sustainable land management on private land this could be a consequence of the high proportion of land within this region being allocated for nature conservation (16.1%) and forestry (21.5%)

Whilst the Burnett–Mary region ostensibly has a high number of sustainable land management programs as a consequence of the NAPSWQ initiatives, the low level of local government support is concerning. There appears to be a genuine lack of available resources and skills within local governments in this region (LGAQ pers comm.). As discussed in Chapter 1, this area has the highest overall population with a greater number of landholders, which suggests resources must be more thinly distributed. In addition, the agricultural population is ageing and the region has the lowest farm income resulting in a reduced likelihood of uptake of sustainable land management activities. This is particularly concerning as the region has fewer facilitators and co-ordinators than the other NAPSWQ regions and a history of difficulties with the development of the regional plan. It would appear that this region would benefit from increased, well-targeted support for sustainable land management activities.

The Mackay–Whitsunday region is significantly smaller than the other regions and the number of facilitators and coordinators seems appropriate for a region of that size. However, the regions almost complete dependence on sugar and the limited effort by local government would indicate that there is some justification for increasing support to land managers in this region. It is interesting that this region was not successful in obtaining any Envirofund funding in the 2003/2004 funding round, despite being quite successful in the previous round.

Land managers in the Cape York region receive very little support for sustainable land

management activities. Whilst this area is sparsely populated, it would appear to be a key region to target increased support for sustainable land management activities. On a positive note, funding for on-ground activities (Envirofund) increased by a great deal, which may reflect an increased level of support for applicants and an improving environmental consciousness within the region.

This study provides a snapshot of how each institution operates individually and the level of support provided for landholders in each NRM region. To obtain a comprehensive picture of the capacity of the GBR region as a whole, it would be necessary to investigate the level of communication, integration and trust between NRM bodies, local governments, state agencies and non-government organisations operating within and between NRM regions.

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Appendix 1. Background to the NAPSWQ NAPSIP program

Under the National Action Plan for salinity and water quality, 42 state level subprojects have been initiated. Eighteen of these subprojects, known as the AgSIP projects, have been funded to build the capacity to research and enhance adoption of sustainable agricultural production practices (see table 1 below). AgSIP subprojects fit within four themes:

- Improving the capacity of industry to engage in natural resource management
- Integrated landscape management
- Grazing lands management
- Coordination and process support

Funding of \$7.797 million has been allocated for three years with a possible further \$1 million for an additional 2 years⁶¹⁶. This funding will be divided across industry (27%), the Queensland Department of Natural Resources and Water (9%), the Queensland Department of Primary Industries (56%) and CSIRO (8%).

The other 24 NAP SIP projects fit within the following themes:

- Capacity Building – These projects aim to support regional NRM plan development and implementation by investing in the skills and systems required by groups and individuals to participate effectively in regional planning
- Water quality – The NAP water quality program aims to provide monitoring, assessment and decision support activities to support regional planning. These projects have been allocated a total of \$6.08 million over 3 years (2002-2005).
- Social and economic frameworks – The statewide projects aim to improve the consideration of economic and social issues in natural resource management through targeted research and capacity building. These projects have been allocated \$4.3 million over 3 years.
- Salinity – These projects aim to provide knowledge and understanding of salinity processes to develop tools that support natural resource decision-making and planning by regional bodies and industry and government partners. These projects have been allocated a total of \$12.5 million over 3 years.

¹⁶ Final agreements are awaiting Ministerial sign-off

Table 1: OVERALL AG SIP PROJECT SUMMARY 17

THEME	TOTAL (\$'000)	INITIATIVES	BUDGET (\$'000)	PERIOD (Yrs)	DELIVERY AREA	DELIVERY AGENCY	COLLABORATIVE AGENCIES
Industry NRM Enhancement	1 967	5. Benchmarking pesticide and nutrient movement in new cane and horticultural farming systems	810	3	Burdekin	DPIF	BSES Mary-Burnett Reg. Body DNR&M
		17. Developing an integrated small catchment approach to management of pesticides and nutrients in cane systems	300	3	Burdekin Mary Burnett	Canegrowers	BSES WWF/GA DNR&M Burdekin DTB
		16. Scoping and capacity building of NRM issues within the horticulture industry of Dry Tropics	300	3	Mary Burnett Burdekin	DPIF	QFVG Mary Burnett Reg Body Burdekin Dry Tropics Board
		15. Building NRM capacity	557	3	Fitzroy	Cotton CRC	DPIF/EPA/DNR&M WWF/GA

¹⁷The numbers denote the level of priority. Only projects relevant to the GBR catchment have been included.

		in irrigated cotton and grain industry					
Landscape Management	1 490	1. Planning and implementation support to landscape best practice through the IAWM process in NAP Regions	360	3	NAP wide	QFF	DNR&M/DPIF/EPA Regions
		8/11/12. Supporting strategic development and capacity building within the IAWM process through <u>specific case studies</u>	1 130	3	FBA	QFF	Regions DPIF/DNR&M

THEME	TOTAL (\$'000)	INITIATIVES	BUDGET (\$'000)	PERIOD (YRS)	DELIVERY AREA	DELIVERY AGENCY	COLLABORATIVE AGENCIES
Grazing Lands Management	2 120	9. Develop and implement an environmental monitoring program across grazing lands of the NAP Regions	360	3	NAP wide (Based in Emerald)	DPIF	Regional Bodies MLA Agforce CSIRO DNR&W/ EPA WWF/GA
		2/4/6. Case studies for the development of approaches which achieve higher adoption rates of sustainable grazing in NAP Regions	1400	5	Burdekin and Fitzroy	DPIF	Regional Bodies MLA Agforce CSIRO EPA/ DNR&W
		10. Modelling simulation to support the adoption of	360	3	NAP Wide (Based in Charters	DPIF	EPA/ DNR&W Conservation/Agforce

		sustainable grazing			Towers)		
Coordination & Process Support	3220	3. Coordination and process support of Sustainable Agriculture Initiatives in NAP	1 300	5	NAP Wide (Based in Miles and Kingaroy)	DPIF	Regions QLD and Fed Gov't Peak Bodies R&D Corps
		7. Decision support to assess impact of land use change	960	3	NAP Wide	DPIF/CSIRO/DNR&W	WQ + Salinity SIPs CRCs Unis
		13. Resource economic assessment of costs/benefits involved in landuse change and incentive mechanisms to support change.	360	3	NAP Wide (Based in Fitzroy)		Regions DNR&W Socio Economic SIP
		14. Socio economic study of the capacity of small holdings to deliver NRM outcomes	300				DPIF DNR&W

Appendix 2. Programs with an education and extension focus

PROGRAM	TARGET SUSTAINABLE PRACTICE	WHAT'S DELIVERED	WHO DOES IT	STAGE ¹⁸	COMPONENTS
Neighbourhood catchment project	Improved erosion management in cropping lands Improved erosion management for grazing land	Use of focus sub-catchments to demonstrate the effects of land management on water quality – dissemination of scientific information through a “neighbourhood” approach	NRM&W Fitzroy Basin Association	Developing	~ DSS : training/education : planning : on-ground ~ incentives
Integrated area wide management model IAWM	Improved erosion management in cropping lands Improved erosion management for grazing land	Provision of integrated water quality, land management and use, soils, topography, climate and other information on a landscape scale	Cotton RDC, NRM&E, DPIF, 4 T consultants, SunWater and FBA	Expanding	: DSS : training/education ~ planning ~ on-ground ~ incentives
Ecograz	Improved erosion management for grazing land Increase uptake of riparian zone protection practices	Response to grazing, spelling fire	CSIRO	Extension phase	~ DSS : training/education ~ planning ~ on-ground ~ incentives
Grazier Guides	Improved erosion management for grazing land	Rangeland Plant guides	DPIF (Milson)	Completed	~ DSS : training/education ~ planning ~ on-ground ~ incentives
National Riparian Lands Research and Development program	Increase uptake of riparian zone protection practices	Guidelines for managing riparian lands in the cotton and cane industries	Land and Water Australia	Still being delivered. Phase 2 research started.	~ DSS : training/extension ~ planning ~ on-ground ~ incentives
ChemCert	Improve pesticide management practices	Training and certification in farm chemical use	Industry associations	Ongoing	~ DSS : training/education ~ planning ~ on-ground ~ incentives

¹⁸ This table outlines current projects. Many NRM regional body projects have not yet commenced so this table will need to be updated for the final draft.

PROGRAM	TARGET SUSTAINABLE PRACTICE	WHAT'S DELIVERED	WHO DOES IT	STAGE ¹⁸	COMPONENTS
DrumMuster	Improve pesticide management practices	Collection and recycling of empty, cleaned, non returnable crop production and on-farm animal health chemical containers	Australian Local Government Association (ALGA), Avcare (the National Association for Crop Protection and Animal Health), the National Farmers' Federation (NFF), and the Veterinary Manufacturers and Distributors Association (VMDA)	Ongoing	~ DSS ~ training/education ~ planning : on-ground ~ incentives
Northern Nutrition	Improved erosion management for grazing land	Understanding of animal requirements Understanding of nutrient supply of pasture I quality and quantity Understanding of what to supplement Cost of feeding	MLA /DPIF/ private consultants	In progress	: DSS ~ training/education ~ planning ~ on-ground ~ incentives
<i>Grazing for Profit</i> Workshops	Improved erosion management for grazing land	High level of pasture mgmt Cell Grazing	Resource Consulting Services (RCS)	In progress	~ DSS : training/education ~ planning ~ on-ground ~ incentives
FutureProfit	Sustainable land management	Workshops delivering farm management training to landholders – profit focus now being expanded to include natural resource management modules	DPIF		~ DSS : training/education ~ planning ~ on-ground ~ incentives
Rural Water Use Efficiency	Improving water use efficiency	Coordinated by industry groups - provide on-farm advice and	NRM&W, DEWHA, Canegrowers,	Phase 1 completed in	~ DSS : training/education

PROGRAM	TARGET SUSTAINABLE PRACTICE	WHAT'S DELIVERED	WHO DOES IT	STAGE¹⁸	COMPONENTS
Initiative ((RWUEI)		extension on efficiency measures and BMP. Incentives for the use of BMP and more efficient equipment.	Queensland Fruit and Vegetable Growers (QFVG), Cotton Australia, Queensland Dairyfarmers Organisation	June 2003. Phase 2 being implemented	: planning : on-ground ~ incentives
Education	Sustainable irrigation practices	Extension – information and workshops at a regional and national level	Irrigation Association Queensland	ongoing	~ DSS : training/education ~ planning ~ on-ground ~ incentives
Dairying Better and Better (part of RWUEI)	Sustainable irrigation practices for dairyfarmers	Decision support tool to provide information on efficient irrigation practices	Queensland Dairyfarmers Organisation	Phase 2 just commenced	: DSS ~ training/education ~ planning ~ on-ground ~ incentives
Water for Profit (part of RWUEI)	Sustainable irrigation practices for horticulture	-provision of local expertise on improved irrigation practice - incentive scheme for the provision of equipment	QFVG	Phase 2 just commenced	~ DSS : training/education : planning ~ on-ground ~ incentives
Farmcare / Farm management systems	Sustainable land management practices	Two day training course on environmental management to encourage adoption of BMP	QFVG	ongoing	~ DSS : training/education : planning ~ on-ground ~ incentives
Cotton BMP	Sustainable land management	-Guidelines on farm design and management, IPM and application of pesticides -practical manuals, best practice booklets and training workshops -a BMP co-ordinator to oversee adoption at grass roots level	Cotton Australia	ongoing	~ DSS : training/education : planning ~ on-ground ~ incentives

Appendix 3. NRM Bodies and Local Government

Information for this section was primarily derived from surveying Regional NRM bodies and local councils. All six regional groups responded to the questionnaire and entered into further telephone discussions. Copies of the survey can be found at the end of this appendix. Each of the 64 councils with a significant area within the GBR was contacted by telephone. In some cases, the council did not have any agricultural land (eg Gladstone and Bundaberg) or were unwilling to receive a survey. Forty-seven surveys were sent out with thirty responses received to date.

Burnett–Mary

The Burnett–Mary Regional Watershed Management Group (BMRWMG) was set up under NAPSQ and the group has obtained NAP funding for a number of programs relating to supporting and initiating sustainable land management. Funds have been obtained for the following priority actions:

- *Grazing Land Management Systems* – Develop & adapt the Grazing Land Management package for the region, and test pilot methodologies in key sub-catchments
- *Farming Land Management Systems*– Establish a groundwater monitoring network, and test pilot farming land management methodologies in key sub-catchments
- *Assessment & Prioritisation Framework for Native Vegetation and Association Waterways, Floodplains & Wetlands*– Develop a prioritisation matrix to target salinity hotspots and devolve funds to protect/restore high value areas to contain saline outbreaks and improve water quality.

Other projects that indirectly impact on sustainable land management practices are:

- Providing Social & Economic data to underpin catchment planning for NRM
Establish a framework for understanding regional, social, economic and cultural heritage issues, drivers and environmental values
- What landholders and natural resource managers need to know and how they can best access it
 - Compare & contrast NRM information required by land managers & industry
 - Identify NRM training needs & resource requirements
- River assessment Stream Reach Rivercare Plans
 - Undertake pilot Rivercare project and stream reach planning in the Mary
 - Assist landholders to undertake activities through devolved grants
 - Apply knowledge to develop a rehabilitation strategy for the Burnett and Baffle Catchments

These projects are in the process of being rolled out so detailed work plans outlining volunteer numbers and paid positions are not yet available. Negotiations are also continuing with industry, local government and volunteer partners.

The Burnett–Mary region encompasses 23 local government areas although it should be noted that a number of these only have a very small area within the region. Of these, ten responded to the survey. From the results of the survey, it would appear that limited activity is occurring at a local government level in this catchment. Only Hervey Bay, Cooloola, Gayndah and Burnett Shires are involved in or provide staff time to any direct land management activities or operate any environmental management schemes although the Kolan Shire does provide support to the local Landcare group for an education facility. Hervey Bay City Council has allocated between

1 and 3 staff over the last four years to sustainable land management activities including Land for Wildlife (now on hold), vegetation management and general environmental activities. Burnett Shire Council have three staff who work intermittently on environmental activities (each 0.5 fte) and are involved in the regional Land for Wildlife Program, with numerous properties listed. Burnett Shire Council does also provide in-kind and direct resources to Landcare and catchment care projects as well as having community displays and landholder field days on environmental issues. The Council is looking at introducing an environmental levy. The Cooloola Shire Council, which only has a small land area within the Burnett–Mary region provides funding (approximately \$75,000) to a number of landcare and catchment groups and runs a rate rebate scheme for farm forestry. Gayndah Shire Council employs an NRM officer who was previously working with Monto, Biggenden, Mundubbera and Eidsvold Shires to develop a regional approach to NRM. However, the new council is not as supportive of these activities and the officer is applying for external funding to support a local PMP approach in conjunction with the Burnett Catchment Coordinating Association (volunteer only). The Mary River Catchment Coordinating Association is a long-standing group with a coordinator funded by the Maroochy, Cooloola and Tiaro Shire Councils. Many shires have no activities relating to sustainable land management and conservation on private land and in an earlier study conducted by LGAQ, cite low rate bases as the major reason.

Within the southern sugar region, which encompasses the Burnett NRM region, a regional sugar taskforce has been set up to implement the PROSPER package. This taskforce focuses on maximising benefits of rainfall, minimising harvesting losses, improving weed management, sustainable nutrition management, effective pest control and effective use of varieties. The project aims to achieve prosperity in sugar through a reliable and increasing cane supply in a sustainable production system

Fitzroy

The Fitzroy region is a NAPSQ priority region and the Fitzroy Basin Association (FBA) are in the final phases of community consultation and target development with the draft plan for public comment due for release in June 2004. It should be noted that the FBA has been in existence for many years and is a well-developed group with a number of functioning programs. The FBA have identified sustainable landscapes as a high priority within their *Draft Central Queensland Strategy for Sustainability 2*. They aim to stabilise and improve the condition of the region's land assets by adopting a holistic and integrated approach to management at the 'whole of property' and landscape level supported by Sustainable Production Systems and more widespread use of effective and cohesive property and neighbourhood catchment planning. The major mechanism for achieving this will be via the uptake of property management planning (PMP) and implementation of property management plans through a "neighbourhood catchments" approach. This will build on the work already conducted by the FBA in developing and implementing the neighbourhood catchment approach in key catchments within the region. A "neighbourhood catchment" consists of a group of properties that reside in a local catchment. The objective is to involve all landholders within that catchment (typically around 300 km²) at a scale small enough to ensure they have a sense of "neighbourhood" with the other members of the group and have ownership of the common catchment and water issues. The priority is to highlight the benefits of on-farm improvement both within and beyond the farm gate. A number of on ground actions have already been implemented through devolved grants (using \$700,000 obtained from NHT in previous funding rounds) to landholders for the uptake of best management practices. Improvement of water quality is considered one of the highest priorities under the draft plan and landholders are being offered incentives to increase ground cover and in some areas, salinity. Additionally, incentives are being offered for biodiversity conservation and weed management. A network of

neighbourhood catchment facilitators and external private providers (equivalent to 1 FTE) is supporting these activities. The State government has contributed \$1 million in cash through the NAPSWQ and \$150,000 in kind through NHT, which has been matched by cash contributions from the Commonwealth. Landholders will also make significant in-kind contributions matching the NAPSWQ incentives dollar for dollar (around \$750,000)

Local Government

Of the 15 relevant shires within the Fitzroy region (Gladstone and Mt Morgan Shires do not contain agricultural land), 8 responded to the survey. Pest control is the main focus for environmental activities within most shires. Of the respondents, only Rockhampton City Council and the Fitzroy Shire Councils offer any incentive schemes or rate rebates for sustainable land management. Fitzroy Shire has a herbicide subsidy scheme and contributes around \$250,000 (5.5% of the rate base to this scheme) and also provides in-kind support (office space) to an FBA neighbourhood catchments officer as well as three staff dedicated to working with landholders on weed control. Rockhampton City Council is a non-financial participant in the Land for Wildlife scheme, although no sites are listed in Rockhampton at this stage, and has a part-time waterways manager and environmental projects officer, although they do not work specifically with landholders. It should be noted that less than 10% of Rockhampton Shire is used for agriculture whereas Fitzroy Shire is predominantly agricultural. The Livingstone and Central Highlands Shire Councils provide in-kind support to FBA and Calliope Shire Council provides office space to the local Landcare group. Four local governments within the Fitzroy Basin (Belyando, Bauhinia, Peak Downs, and Emerald) are involved in the Central Highlands Natural Resource Management Group (CHNRMG), which also includes the Jericho Shire Council within the Burdekin region. This group evolved from a pest management group set up in 1998 and has been successful in working with landholders and implementing on-ground natural resource management activities within the region. The group is primarily funded by the participating local governments and has partnerships with the Emerald agricultural college, Landcare, EPA, DPIF, FBA, NRM&E and the Belyando–Suttor implementation group. This group has a project officer with primarily an extension role based at Peak Downs Shire Council. There have been some concerns expressed about the long-term future of the group as it crosses NAPSWQ/NHT regional boundaries.

Mackay–Whitsunday

The Mackay–Whitsunday region is not a priority area under the NAPSWQ and the Mackay-Whitsunday Regional Watershed Management Group (MWRWMG) is therefore at an earlier stage in planning. The group is in the process of compiling data, preparing baseline reports and compiling and synthesising goals, strategies and actions from existing plans. Sustainable land management on private land is considered a very critical issue in this region. The major mechanism to support and initiate sustainable land management practices is via a proposed Sustainable Landscapes Program. This program will develop and implement a voluntary incentive that targets the highest priority actions in both agricultural production and natural environment systems (eg cane farming, grazing, native vegetation, weeds and fish habitat). It will accelerate the adoption of the most sustainable practices by landholders across the whole landscape. The first three months of the Sustainable Landscapes Program will focus on developing the mechanisms, processes and arrangements, required to implement the incentive scheme. The Sustainable Landscapes Program will then be implemented, monitored and evaluated. This will test the effect of the program on the underlying resource condition (soil, water, vegetation) as well as the effectiveness of the incentives in encouraging adoption of the components by individual landholders. Funding allocations have not been secured at this

stage but it is anticipated that when the system is developed it will guide the investment plan and will attract several million dollars per year through NHT and state government that will be more than matched by regional and local stakeholders (industry, local govt, community). The MWRWMG have budgeted for \$850,000 for 2004-05 and thus far have been successful in obtaining \$360,000 through the National Landcare Program. MWRWMG will fund a biodiversity conservation officer who will support the Land for Wildlife program. Current initiatives promoted in the region, all of which will be considered as part of the Sustainable Landscapes Program to accelerate adoption include:

Grazing Initiatives (generally administered by DPIF)

- Property planning
- Best use of Natural Resources Stocking Rates
- Grazing Land Management Capacity Building.

Vegetation Initiatives (generally administered by the 3 ICM Associations, DPIF, NR&W and local government)

- Riparian / Remnant Vegetation Management
- Revegetation
- Farm Forestry.

Coastal Management Initiatives (generally administered by the 3 ICM Associations, local government)

- Foreshore Protection
- Vegetation Management.

Sugarcane Initiatives (generally administered by BSES and CANEGROWERS)

- Farm Layout – Efficient Layout
- Fallow – Min Till planting / Break Crops / Weed Control
- Planting – Min till planting / Grub control in zero till planting / Bed former / GPS
- Harvesting – Harvester modifications for Controlled Traffic Farming Systems
- Irrigation/Drainage – Water use efficiency initiative
- Weed Control – Hooded sprayers
- Fertiliser application
- Pest Management
- Business/Farm Plan.

Of the five local governments within this region, three responded to the survey. Mackay City Council has an environment levy and has contributed \$25,000 to the Sustainable Landscapes program. The Bowen Shire Council supports Greening Australia by providing them with office space but does not have any council staff allocated to sustainable land management activities on private and leasehold land. The Whitsunday Shire Council provides in-kind support to the Land for Wildlife program, funded by the local Integrated Catchment Management group (part of MWRWMG), by providing office space. There are also plans to create a new position within council to support the one existing position which has 20% allocated to working with landholders on land management issues. The council previously operated a devolved grants scheme (\$250,000) for on-ground projects for riparian fencing, revegetation, weed control and provision of off-stream waterpoints. Sarina and Pioneer Councils also received \$250,000 each but the scheme is now finished.

The Cane industry's Prosper program within the Mackay region operates via an established group meeting process and has a number of farm trial sites demonstrating BMP. There are 35

Interactive cell groups, which act as discussion groups. Grower ownership of shed meetings is encouraged and a grower champion decides on topics.

Burdekin

The Burdekin region is a priority region under the NAPSWQ. The Burdekin Dry Tropics Board is in the final phases of community consultation and target development with the draft plan due out for public comment due for release in June 2004. With respect to sustainable land management, four priority action programs have been identified and a project officer appointed. They are:

- Improving water quality in the Bowen–Broken river catchment through appropriate land use and on-ground works. This program includes extension, monitoring and evaluation and development of a framework for prioritisation of on-ground works. It will also include an incentives scheme for landholders to implement sustainable land management activities. Greening Australia will be responsible for managing the project officer and the funds associated with the incentives.
- Initiation of a Lower Burdekin Salinity and Water Quality management program. This program will include all the irrigation schemes and the adjacent wetlands of international importance. Building on the Burdekin Water Resource Plan, it will provide a greater understanding of the integrated system and develop tools for a coordinated approach from the water managers and landholders. Additionally it will provide incentives to landholders to develop tailwater recycling systems capable of decreasing the amount of water flowing off farms and minimising the amount of nutrients entering waterways. The program will also promote environmental best practice to irrigators.
- Addressing Dryland salinity in the Belyando Suttor sub-catchment through salinity hazard assessment, community engagement and pilot projects. The project will be managed by the Belyando–Suttor Implementation Group.
- Desert Upland Capacity building for sustainable production and Natural Resource Management. This project will encourage the adoption of PMP and survey changes in knowledge and attitudes as a result of PMP.

A total of \$1,762,400 cash has been allocated to these projects under the NAPSWQ (State and Federal) with an additional \$2,809,560 (cash and in-kind) contributed by councils, industry and landholders.

The DPIF Rangeland to Reef program is a \$3 million project aimed at improving the triple bottom line (social, economic and environmental sustainability) for communities of the Burdekin River Catchment. It is now in its final stages and Wetlands Australia has recently been allocated funding to research the use of grazing as an environmental management tool for wetlands.

Local Government

Of the six councils within the Burdekin Dry Tropics region, three responded to the survey although it should be noted that the Charters Towers Shire council is not relevant as it has limited agricultural land. Unfortunately, Townsville City Council did not respond to the survey. The Thuringowa Shire Council has 6 environmental officers, although it is uncertain how much of their time is allocated to supporting and initiating sustainable land use on private and leasehold land. They do support the Land for Wildlife program by promoting the scheme and preparing property management plans in conjunction with Townsville City Council. Other activities relate to property based pest management planning. Thuringowa City Council and Townsville City Council have recently launched a Creek to Coral initiative, which is a joint

government, industry and community program to identify and manage impacts on coastal waterways. Creek to Coral is a collaborative venture between key partners involved in water management, and includes the Environmental Protection Agency and Townsville and Thuringowa Councils. Creek to Coral, modelled on the Healthy Waterways partnership in south-east Queensland, will cover all waterways from the Black River north of Townsville to Sandfly Creek south of Townsville, including groundwater aquifers. Details of the project are unclear at this stage. The Burdekin Shire Council has no staff or programs dedicated specifically to sustainable land management programs although around a quarter of an FTE has been estimated for these type of activities. The Dalrymple Shire Council does not employ any staff or have any specific programs for sustainable land management activities. Most activity within this region is coordinated by the Burdekin Dry Tropics Board.

Cane industry

The Prosper program in this region is implemented via 46 grower groups established for 18 months. There are a number of demonstration trials with mainly an irrigation focus.

Wet Tropics

Due World Heritage status of much of the wet tropics region, this area has had a relatively high level of investment and activity in natural resource management. A new NRM board for the Wet Tropics region, FNQ NRM Ltd, combining the former Wet Tropics Board and the North Queensland Afforestation Program was appointed in late 2003 and they are working in partnership with the Rainforest CRC to develop an NRM plan for the region. Due to the early stage of planning for the NRM region there are no specific initiatives relating to sustainable land management on private and leasehold land being coordinated at this stage although it sets a “regional land use management standard.” However they are trying to establish a property management planning and certification framework linked to a green labelling accreditation scheme. This scheme, known as Primary Green, is similar to the Cotton BMP approach and will be tailored to each industry with incentives for adoption. Funding for this program has been sought from the National Landcare Program This program will involve 3 staff and involves peer audits with third party accreditation. Landholders will pay most of their audit costs in-kind or using voluntary auditing. Further discussions with FNQ NRM Ltd will be sought as they may have more information about the success of their funding application and details of specific programs.

There are around 150 organisations with a sustainable land management / conservation focus operating within the region with around 25 Landcare / ICM groups. Most of these are affiliated with councils so will be discussed then. The Councils within this region have been very active in promoting sustainable land management and conservation and all bar one council, Hinchinbrook, responded to the survey. Due to the high level of activity, each council will be discussed separately.

Cardwell

Cardwell Shire Council has 5.4 permanent staff allocated to environmental activities of which approximately two are involved in wetlands related tasks. Council operates a Land for Wildlife program in the shire. Council also offers technical advice and resources to landholders completing on-ground environmental works on private property. Council works closely with community groups and stakeholders to seek funding for revegetation and pest control works.

The Cardwell Shire Council provides a great deal of technical support and resources to community groups, individuals and agencies in the pursuit of natural resource management

outcomes. Council has allocated approximately \$420,000 to Natural Resource Management related issues in 2003/04. Approximately 40% of this allocation is met from general rate revenue. The Cardwell Shire Council Revegetation Unit provides high levels of support to community and stakeholders in areas of Natural Resource Management and sustainable land management -approximately 20 hours per week face to face with individual landholders.

Johnstone

Johnstone Shire Council employs 14.5 staff in its environment section dealing with conservation, ecologically sustainable development, revegetation and weed and pest management. They are the first council in Australia to offer rate discounts of between 20 and 100% for land area going into conservation and also promote and support the development of property resource management plans. They provide a “bonus” developments scheme, which allows for more intense development on a small proportion of the site in exchange for conservation of other areas of the site. Additionally they support the land for wildlife scheme with a conservation officer. Two percent of rate revenue has been allocated to these programs although this target has not yet been reached. It should be noted that 54% of the catchment is in a World Heritage area.

Herberton

The Herberton Shire Council is predominantly a rural area with pest management being the only sustainable land management activity taking place and no funding or staff allocation for broader environmental activities.

Cairns City Council

Council was involved in the Land Management conservation project from 1998 to September 2002. A total of 11 Land Management Agreements were entered into with landowners. These agreements were in most cases of 10-year duration and provide for rate refunds over the areas of land set aside for conservation purposes. Rate refunds continue to be given in respect to existing landowners. A total of \$78,000 was received for the program of which \$56,970 was returned to the DNRM&E following termination of the LMA program. Council at the same time also gave support to the Land for Wildlife conservation program. Three LFW agreements are in existence with a further one in the process of registration. Other conservation mechanisms such as environmental covenants have been used to protect ecologically significant land as part of development approval conditions when required. Minimal funding and staff are currently allocated to these projects. Within Cairns City Council, there is currently a Strategic Environmental Planning officer who plans and coordinates strategic planning activities and coordinates land management agreements/ land for wildlife programs and a team leader, environment & Culture who is responsible for operational aspects. The need for community engagement and promotion/ awareness of sustainable land management are items which have been identified in the preliminary draft of the Council’s new corporate plan.

Eacham Shire Council

The Eacham Shire Council has an active environmental management unit with five grant funded field positions and a manager working on 20 different projects. The Council works very closely with community groups on projects dealing with riparian restoration and reduction of soil loss on farms. The Council supports the Land for Wildlife scheme and promotes the development of property resource management plans. There is provision through the town planning process to protect areas of significant vegetation via Commonwealth covenants.

Atherton Shire Council

There are no staff allocated specifically to sustainable land management and conservation

activities on private land although \$3500 has been allocated in 2004 for Land for Wildlife. Whilst \$385,000 of funding has been allocated to conservation activities over the past five years, none of this has been directed toward activities on private and leasehold land.

Douglas Shire Council

Douglas Shire is one of the most proactive shires in the state with respect to environmental management and has a long history of supporting environmental initiatives. The Douglas Shire has entered a joint venture partnership with DEWHA, CSIRO and canegrowers. This partnership developed a sustainability strategy and has recently obtained \$2.5 million funding for a water quality program. This program has 6 projects, the first of which was to develop a water quality improvement plan and employs four staff.

Additionally the Shire provided \$70,000 in rate rebates for land conservation in 1000 blocks north of the Daintree and the town-planning scheme contains a number of protective measures to reduce/prevent unsustainable development. Another rebate scheme has been proposed for the preservation of remnant vegetation. Council contributes around \$300,000 and one officer to sustainable land management activities. This \$300,000 was raised from the Daintree ferry levy for biodiversity conservation.

Cape York

A Cape York Interim Advisory Group was established through the Environmental Protection Agency and tenders were called for planning to start in March 2004. There seems to be very little activity relating to sustainable land use although a pilot property management planning project was conducted in the region as part of the NHT1 Cape York Natural Heritage Trust Plan. There are three catchment groups within the region however these are considered to be fairly inactive. The Cape York region did receive significant levels of funding in the latest NHT funding rounds but this is primarily to engage staff and initiate planning. Only Cook Shire responded to the survey and their main activity with respect to sustainable land management and conservation on private land is pest management. The Council manages the Cape York Weeds and Feral animals program.

Appendix 4. Information sources

Web sites consulted:

<http://www.fba.org.au>

<http://www.qraa.qld.gov.au/farmbis/> <http://www.landcareaustralia.com.au/>

<http://www.lgaq.asn.au/portal/dt> <http://www.qff.org.au/>

<http://www.nrme.qld.gov.au>

<http://www.epa.qld.gov.au>

<http://www.nrmboard.org.au/> <http://www.burdekindrytropics.org.au/>

<http://www.bmrg.org.au/> <http://www.environment.gov.au/>

<http://www.daff.gov.au/>

http://www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/home_ENA_HTML.htm

Local Government Survey

Questions for local government

Council Name:

Contact Officer:

Do you have any staff allocated to environmental activities especially activities which may relate to sustainable land management or wetlands conservation?

Has your council supported any activities relating to sustainable land management on private and leasehold land eg. Rate rebates, land for wildlife programs?

What level of funding is directed toward these activities and how much staff time is allocated?

Do you undertake any education and extension activities for landholders to promote sustainable land management / wetlands conservation?

Awareness education and training activities eg for elected members, contractors and council staff.

Level of effort?

Has your council applied for external funding for sustainable land management programs? Who from and how much?

With respect to partnerships with community groups and catchment organisations are you aware if they have any activities specifically targeted at sustainable land management on private land or can you give me details of who to contact?

Have the community, and in particular, landholders had an opportunity to provide input into planning for wetlands?

Regional NRM Body Survey

Name:

Regional Group:

What stage are you at with your NRM planning process?

Are there any specific initiatives aimed at promoting sustainable land use on private and leasehold land being administered by your NRM group and what are they?

Private land & Leasehold land

How much (rough Figures are fine) funding is being allocated to this?

State

Federal

Council (please indicate which one)

Other (please specify)

Are there any paid positions attached to this initiative and how many volunteers are involved?

Is sustainable land use on private/leasehold agricultural land reflected as a priority in your area/ regional strategy (if it has been developed) and how is intended to be realised?

Are there, or have there been, any other initiatives in your area that promote the uptake of sustainable land management practices on private/leasehold agricultural land and who are they administered by (please provide contacts where possible)?

What conservation organisations are operating in your region eg Landcare, ICM (please provide contacts)?

What are the impediments to the promotion of sustainable land management practices on private/leasehold agricultural land in your region?

How much involvement has there been by agricultural landholders in the development of regional priorities and strategies?

Thankyou