

1. Introduction

1.1 Background to the HRICSC/HRCCC

The Burdekin Shire Rivers Improvement Trust (BSRIT) is a statutory body under the *River Improvement Trust Act 1940* whose responsibility includes the protection of the banks and bed of the lower Haughton River. The BSRIT felt a holistic approach to natural resource management was required to assist in fulfilling their role with regard to the Haughton River. To achieve this the broader issues associated with the catchment need to be addressed through a coordinated catchment planning process. In the absence of an incorporated catchment management group the BSRIT secured Natural Heritage Trust (NHT) funds to prepare an Integrated Catchment Management Plan (ICMP) for the Haughton River.

Through the instigation of the BSRIT, a Haughton River Integrated Catchment Steering Committee (HRICSC) has been formed. The steering committee will coordinate the formation and incorporation of the Haughton River Catchment Coordinating Committee (HRCCC).

The Haughton River Integrated Catchment Steering Committee consists of representatives from:

- Burdekin Shire Rivers Improvement Trust
- Burdekin Shire Council
- Townsville City Council
- Dalrymple Shire Council, and
- Department of Natural Resources and Mines

Additional funding and in kind support has been provided by the organisations represented on the steering committee and other stakeholders involved in the planning process. The HRICSC engaged Connell Wagner to undertake the preparation of the Haughton River ICM plan. The BSRIT is responsible for overall project management as required by the NHT funding conditions, with the HRICSC guiding the process and determining policy.

1.2 Purpose of the Plan

Changes to Commonwealth and State natural resource and environmental policy in the last decade have signalled a move towards a more cooperative and inclusive form of natural resource management based on water catchment boundaries and biogeographic regions (bioregions). The **Natural Heritage Trust** (NHT) superseded the Decade of Landcare funding program and placed more emphasis on strategic regional planning as the basis for distribution of natural resource funding. The formation of regional natural resource management groups commenced in earnest during this period ie. 1997 to 2001.

The Decade of Landcare provided funding for the more traditional Landcare activities such as local erosion prevention schemes and revegetation. The Natural Heritage Trust provides funding at the same level as well as for more strategically orientated activities including the development of catchment management plans. One objective of the NHT is to unite the actions of the community, government agencies, and other natural resource managers with the aim of improving the way our natural resources are managed. The NHT has a greater emphasis on a cooperative and coordinated approach to natural resource management at the regional level while still enabling localised high priority projects to be implemented.

The **National Action Plan (NAP) for Salinity and Water Quality**, announced in October 2000, will result in further changes to delivery arrangements for Commonwealth natural resource funding. Regional natural resource management groups will become the main administrative bodies for natural resource funding under NAP. As part of a NAP priority catchment the Haughton River catchment is well placed to benefit from the new arrangements. The foundation work of the Burdekin Dry Tropics Group, and the sub regional organisations, is recognised, and the Haughton ICMP is designed to add to and compliment existing strategies and plans.

This planning process will be the initial stage in the development of a strong culture of coordinated natural resource planning and management for the Haughton River catchment. The Plan will be a living document capable of being changed and amended to suit the changing situations and condition of the catchment and it will also be a dynamic catalyst for action with the support of the Haughton River catchment community and stakeholders.

The development of an ICMP for the Haughton River aims to achieve the following:

- Provide a focal point for the formation of a catchment coordinating committee;
- Involve key stakeholders in a process based on common goals;
- Provide a starting point for the coordinated management of the catchment's natural resources;
- Provide a basis for the collation of scientific information on the catchment's natural resources;
- Identify broad scale and site specific issues in the Haughton River catchment;
- Provide some measures to address issues based on sound scientific information;
- Provide a better understanding of the condition of the catchment's natural resources;
- Lead to a better understanding of the catchment's natural resources through documentation of, as yet, unrecorded information;
- Provide a catalyst for conversion of scientific data into useable information;
- Provide an avenue for greater interaction between the various organisations involved in natural resource management, and between those organisations and the community;
- Inform, and be informed by, local government planning schemes;
- Raise the awareness of the community with regard to natural resource issues and management options;
- Provide a practical guide to assist in achieving the sustainable use of the catchment's resources;
- Provide a foundation for investment in natural resource management activities in the catchment; and
- Provide the basis for distribution of funds to the catchment, including those funds from the NHT2 and the NAP for Salinity and Water Quality initiatives.



1.3 Plan Development Process

The Plan development process commenced with the initial idea forwarded by the BSRIT. The BSRIT put the proposal to the local governments in the catchment along with the Department of Natural Resources and Mines. Support was obtained and a funding application submitted to the Natural Heritage Trust. Following the receipt of funding proposals were called for to facilitate the development of an Integrated Catchment Management Plan for the Haughton River. Connell Wagner was awarded the contract at the start of August 2002. Key steps in developing the plan are outlined in **Table 1-1** below.

Table 1-1 ICM Plan Development Process

Action/event	Timing
1. Appointment of consultants	August 2002
2. Information gathering and stakeholder identification	August - November
3. Development of a Stakeholder Involvement Plan	August
4. Invitations to stakeholder group representatives	August
5. Stakeholder Workshop at Giru	August 27
6. Collation of stakeholder workshop results	August - September
7. Development of a Plan Scope	August - September
8. Development of a Draft Catchment Overview Report	August – September 25
9. Community Information Paper mail out	September
10. Press releases for newspapers and radio, and Public Notices in newspaper	September
11. Public meetings at Giru and Woodstock	September 17 and 18
12. Collation of public meeting results	September-October
13. Distribution of stakeholder workshop results	October 1
14. Upper Haughton community meeting at Mingela	October 23
15. Development of a Draft ICM Plan	September – November 11
16. Draft ICM Plan on display	November
17. Press releases for newspapers and radio, and Public Notices in newspaper	November and December
18. Stakeholder workshop to review Draft ICM Plan	December 3
19. Final date for submission of comments	December 20
20. Review of submissions and amendments	December 20 to 23
21. Submission of a final draft ICM plan to the HRICSC	December 24

The overall process and associated inputs to the development of the ICMP are shown in **Figure 1-1**.

A list of the stakeholders and stakeholder groups noted in **Table 1-1** is included as **Appendix C (Volume 2)**.

It should be noted that this ICMP was developed in a short time frame with the involvement of as many stakeholders as possible. The ICMP is a living document and this plan another step in the ongoing process to improve natural resource management in the Haughton River catchment. The ICMP will be open for comment and continual review as the Haughton River Catchment Coordinating Committee is formed and proceeds to implement actions.

The stakeholders involved in developing this ICMP have not yet officially endorsed it and nothing in this ICMP is meant to imply any such endorsement.

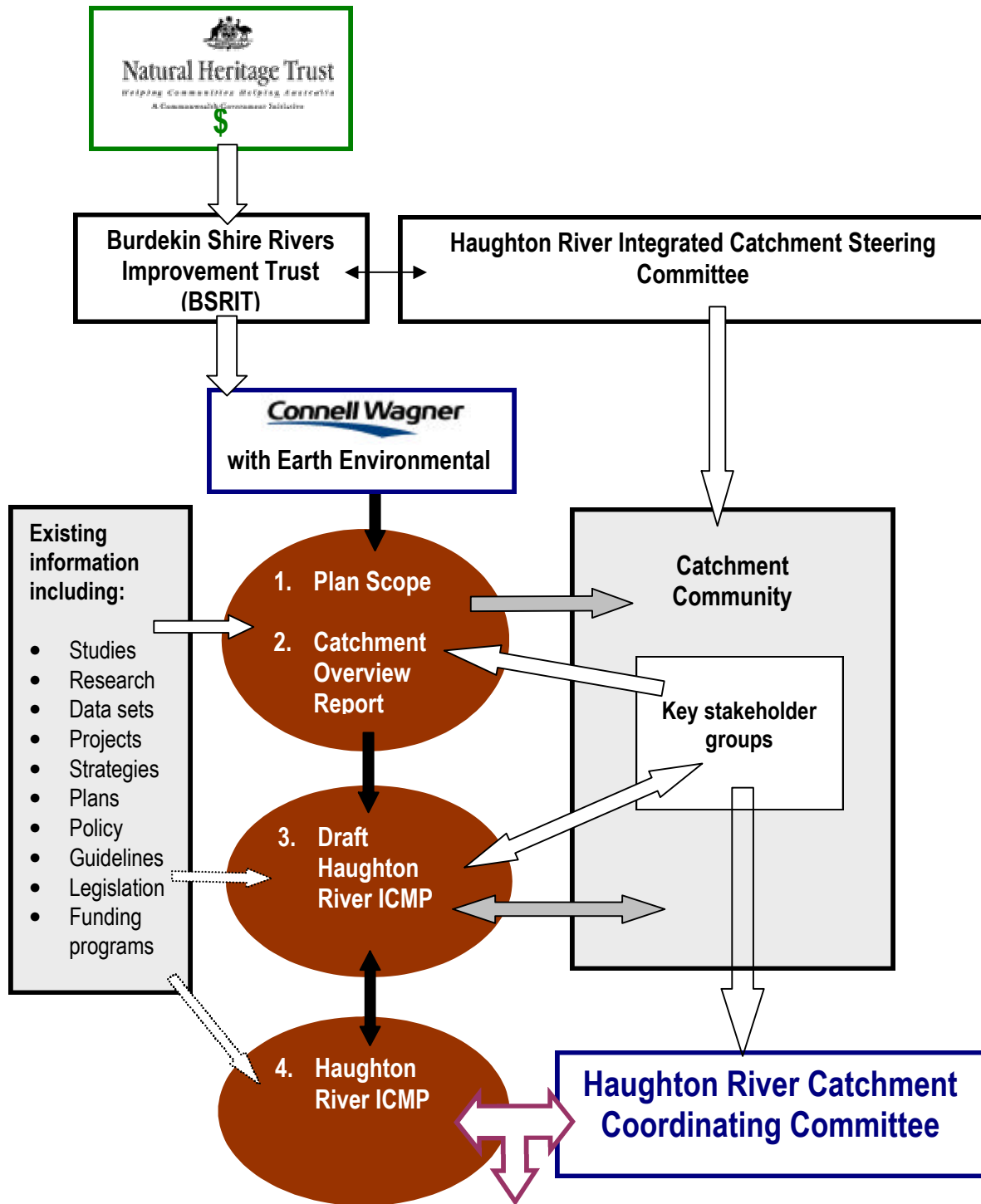


Figure 1-1 Haughton ICMP Development Process and Input

2. Planning Context of the ICMP

2.1 Planning Processes

There are a variety of strategies and plans in existence that are relevant to the Haughton ICM planning process. There are also a number of planning processes being developed which may have a bearing on the ICMP. In addition there are also a number of policies and agreements, which need to be considered in any integrated planning process. A list of the most significant strategies, plans, guidelines and planning processes are listed in **Appendix D**.

The Haughton River ICMP fits into a myriad of other planning processes as shown in **Figure 2-1**. Only the main, relevant planning processes have been included for brevity and clarity.

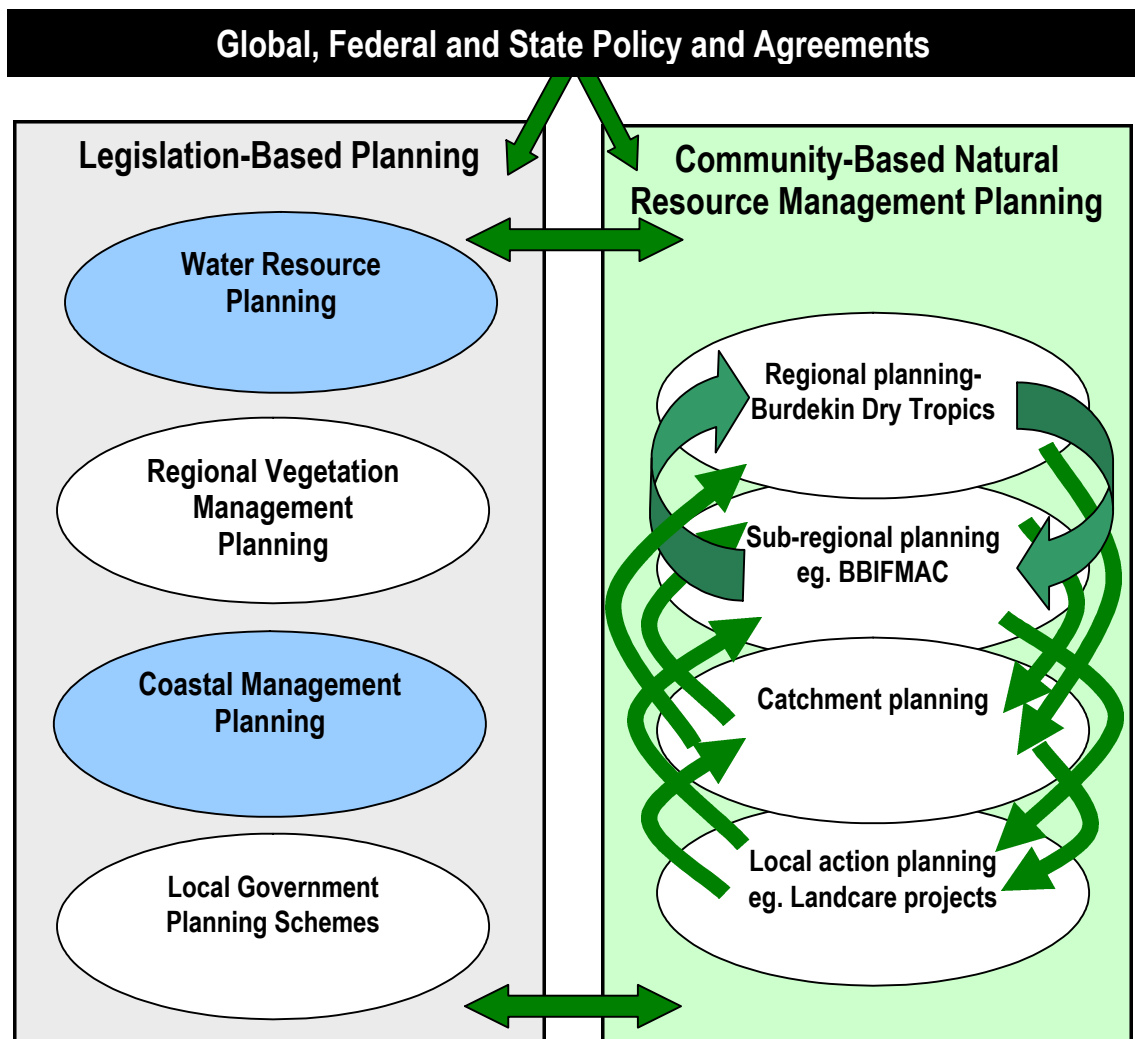


Figure 2-1 Related Planning Processes

Some planning processes are required to be carried out in accordance with a particular piece of legislation, with the process overseen by the agency appointed through the legislation. When these types of plans are finalised they often become subordinate legislation and have accompanying penalties for non-compliance.

Another form of planning is supported by legislation and government agencies, but does not become legally binding upon completion. This type of planning is usually strategic in nature and serves as a guide for participating authorities. An example would be a regional growth strategy prepared by State government agencies in conjunction with two or more local governments.

The Haughton River ICM planning process fits into a third planning category, which is undertaken on a voluntary basis by participating organisations and individuals who see the need to coordinate natural resource management activities to achieve common goals. This cooperative approach can deliver significant outcomes if those participating are committed to the process and willing to work with the other members of the catchment community to reach the stated objectives. It is not a short-term approach and it may be years before results of actions are recognised.

The Haughton River ICMP fits into the current community based natural resource planning process at the catchment level (refer **Figure 2-1**), that is, below the sub-regional level which includes a number of catchment areas, and above the local action plan level. The Haughton River ICMP draws on the work that has already been done by the regional and sub regional natural resource management groups and incorporates relevant components of the strategies and action plans that have already been prepared.

Activities that are already contributing to improved management of the Haughton River catchment have been identified and acknowledged so that efforts are not duplicated. The new area of work comprised in the Haughton River ICMP relates to natural resource issues that have been identified that specifically impact on the Haughton River catchment and its occupants. The focus of this plan is to provide options to address those specific issues through new projects and works and integration with existing activities.

2.2 Natural Resource And Other Relevant Legislation

A range of legislation relevant to natural resource management exists at the Commonwealth and State levels. The legislation influences natural resource management actions and in some cases requires action to be taken by government agencies, various groups and individuals. A list of relevant legislation is included as **Appendix E**.

Legislation that has a significant influence on natural resource management and development, and consequently on the ICM planning process, includes:

- Coastal Protection and Management Act 1995
- Environmental Protection Act 1994
- Fisheries Act 1994
- Integrated Planning Act 1997
- Land Protection (Pest and Stock Route Management) Act 2002
- Nature Conservation Act 1992
- Vegetation Management Act 1999
- Water Act 2000

Discussion of the main points of key legislation relating to catchment planning is included in **Appendix E**.

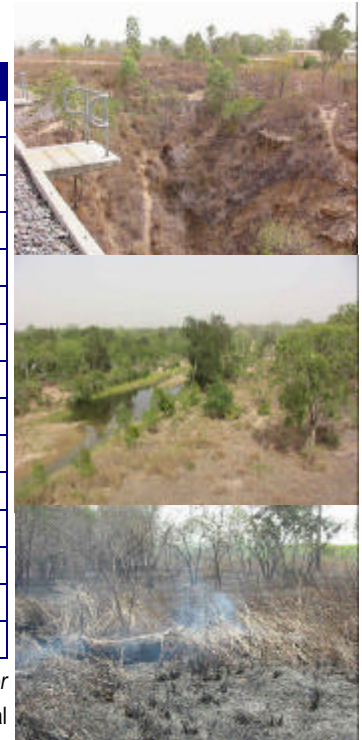
3. Issues and Pressures for the Catchment

3.1 Regional Natural Resource Issues

Regional issues have been identified by the Burdekin Dry Tropics Group in their *Strategy for Community Based Natural Resource Management*. The issues, listed in **Table 3-1**, are often expressed as impacts or influences, which provide a strategic area for further focus without necessarily identifying cause and effect, or local conditions. Issue management categories and issues identified in the regional and sub regional community based natural resource management strategies for the Burdekin Dry Tropics are listed in **Appendix F** and **G**.

Table 3-1 Regional issues identified by the BDTG

Issue
1. Awareness & involvement of community in catchment management activities
2. Biodiversity decline
3. Condition of riparian areas and wetlands
4. Degradation of ground and surface water quality
5. Downstream effects of land use
6. Fire regime management
7. Impact and control of weeds and pest animals
8. Impacts of development and land use on native vegetation
9. Impacts of natural resource management on marine and coastal areas
10. Irrigation salinity and potential dryland salinity
11. Pre-development planning and assessment
12. Reduction in connectivity of habitat
13. Reduction in wildlife populations
14. Social and economic issues that affect natural resource management
15. Soil erosion



(Source: Burdekin Dry Tropics Group Inc. (undated), *Burdekin Dry Tropics Regional Strategy for Community Based Natural Resource Management*, Natural Heritage Trust and Department of Natural Resources and Mines)

Figure 3-1 Example Issues

Overviews by the Great Barrier Reef Marine Park Authority and other regional planning and management bodies confirm the general issues expressed by the Burdekin Dry Tropics Group, whilst providing a more detailed view of the likely causes and effects. The issues identified by some of these regional planning processes are listed in **Appendix H**.

3.2 Natural Resource Issues Specific To The Haughton Catchment

Haughton River Catchment natural resource issues have been identified through formal and informal stakeholder consultation and community meetings. Existing studies and plans, along with those in process, have also been considered to ensure all relevant Haughton River Catchment issues are identified.

3.2.1 Categorisation and Ranking of Natural Resource Issues

Natural resource issues identified during the development of the ICMP are listed in **Appendix I**. These issues have been categorised into *issue/management areas* to enable similar issues to be grouped in a manageable format. Any underlying social and economic factors related to an issue need to be identified, as there may be some unseen elements to address along with the physical manifestation of an issue. The priority issues have been ranked based primarily on the number of times they were raised from the various sources. The top 25 issues raised by stakeholders, the public (at meetings) and from various regional plans and reports are shown in **Table 3-1**.

Table 3-1 Natural Resource Issues Raised During the Planning Process

Number	Related Issues Number	Issue / Category	Issues Ranked By				
			Public, S/holders, Plans	Public, Plans, S/holders	Plans, Public, S/holders	S/holders & Public, Plans	Average of all inputs
18	30	<i>Pest plants – aquatic and terrestrial</i> ¹	1	1	1	1	1
28	26	Loss and degradation of vegetation, habitat and biodiversity	2	2	2	2	2
27		Water use management and allocation	3	6	8	4	5
33		<i>Lack of information, knowledge, capacity and awareness</i>	4	3	3	3	3
22	27	Surface water quality-sediment, nutrients, chemicals, etc	5	4	4	5	4
26		<i>Erosion/sedⁿ/extraction & impacts of changes on streams</i>	6	8	11	7	7
17	30	<i>Pest animals</i>	7	5	5	8	6
23		Impacts of in stream structures eg. flow alteration and fish passage	8	9	12	12	10
7		Grazing management and pasture condition	9	7	9	13	8
31		Impacts from upstream sources	10	11	13	11	11
34	13	<i>Coordination and communication issues</i>	10	10	10	10	9
24		Impacts of in stream vegetation eg. flow alteration & silting/sanding	12	12	37	17	19
1		Impacts of land use change-residential, industrial etc	13	13	6	14	12
25		Flood impacts and mitigation structures	13	17	30	15	18
32		Different perspectives, attitudes and learning styles	15	14	14	16	13
20		Groundwater quality-eg. salinity from rising groundwater	15	14	14	20	16
6		Fire management	17	16	16	19	17
30	17, 18, 22, 26, 29	Management to maintain and enhance remnant vegetation, production, habitat and biodiversity eg. control threats	18	19	17	6	14
15		Soil degradation-erosion, structure decline, compaction etc.	19	18	7	18	15
4		Protection of community amenity and eco tourism potential	20	21	31	22	23
35		Sugar industry influence and impacts	20	21	32	22	24
13	34	Lack of legislative requirements for BMP and other measures	22	20	23	25	22
8	15, 25	Alteration of natural land contours eg. land levelling, rail	22	23	33	26	25
29		Protection of viable habitat, vegetation and biodiversity	24	29	24	9	20
5		Land capability as the basis for land use	25	24	18	21	21

Notes: 1. Issues in ***bold italics*** were raised at all the Haughton River ICMP consultation meetings.

2. A full explanation of the ranking methods used is included in **Appendix J**. Ranking was done by sorting the issues raised by the public, stakeholders and from regional plans and reports. The sources were combined to provide a weighting to the issues raised. Where issues, in any combination, had the same score they were ranked the same and the ranking below was reduced accordingly eg. if the two scores at issue rank 12 and 13 were the same then both issues were ranked as 12 and the following issue was ranked as 14.

3.2.2 Underlying Pressures Within Natural Resource Issues

The categorised issues appear to be generic until viewed in a local and catchment context, and relative to each other. For example, the main areas of concern for 'surface water quality' (ranked 5) relate to:

- 'loss and degradation of vegetation, habitat and biodiversity' (ranked 2),
- 'water use management and allocation' (ranked 3),
- 'erosion-sedimentation-extraction & impacts of changes on streams' (ranked 6),
- 'grazing management and pasture condition' (ranked 9),
- 'impacts from upstream sources' (ranked 10),
- 'impacts of land use change-residential, industrial etc' (ranked 13), and
- 'soil degradation-erosion, structure decline, compaction etc' (ranked 19).

In reality, the last issue - 'soil degradation-erosion', is the main issue, and is an 'impact from upstream sources', caused predominantly by 'impacts of land use change' and 'grazing management and pasture condition' which influences and is influenced by 'erosion-sedimentation-extraction & impacts of changes on streams' and 'loss and degradation of vegetation, habitat and biodiversity'.

The surface water quality issue (**Figure 3-1** shows an example) is further complicated by the issue of 'water use management and allocation' through the movement of water from the Burdekin River to the Haughton catchment, and by the movement of tail water from irrigation areas into the natural system.



Figure 3-1 Sediment and Algae at Giru Weir

So, why have we ranked the issues this way? Based on a simple ranking system, critical issues such as *grazing management and pasture condition*, and *land use changes leading to soil degradation-erosion*, can be obscured. Taking the example even further, another issue, 'land capability as the basis for land use' (ranked 25) was not considered a priority issue. If land capability had been used as the basis for land use and management practices then the pressures on surface water quality could have been minimised thereby reducing the need for intervention.

The highest ranked issue in **Table 3-1**, 'pest plants', impacts and is impacted in many ways by the issues ranked below it. 'Pest plants' contribute to the 'loss and degradation of vegetation, habitat and biodiversity' (ranked 2) as well as being promoted through that loss or degradation. Which is the symptom and which is the cause? What are the main forces promoting the spread of pest plants in the Haughton River catchment?

To better understand the relationships between the issues identified and the pressures on the Haughton River Catchment, the issues have been summarised in **Table 3-1** in terms of pressures (causal factors), symptoms and side effects. These relationships can become blurred at times, as what is seen as an issue can also be a cause or a side effect, as well as a symptom of another issue. The interrelationships tend to merge the issues requiring a definite separation of causal factors so that there is a point of focus when developing remediation plans. In addition, some of the issues raised are potential solutions to pressures from other issues. These will be discussed in a later section.

Table 3-1 Natural Resource Pressures, Symptoms and Side-effects

Natural Resource Issue	Associated Pressures	Symptoms	Side effects
Pest plants	Land use change and development Land management practices Fire regime changes Vegetation clearing/degradation Dispersal mechanisms (Burdekin River) Infrastructure corridors	Increased incidence of pest plants Degraded aquatic habitat Degraded terrestrial habitat Productivity reduction	Degraded aquatic habitat Degraded riparian zones Reduced biodiversity Increased pressure on remaining productive land Increased costs
Loss and degradation of vegetation, habitat and biodiversity	Land use change and development Land management practices Fire regime changes Vegetation clearing Habitat fragmentation Urban and industrial encroachment Agricultural encroachment Pest plants and animals	Reduced area of native vegetation Fragmented remnant vegetation Increased incidence of pest plants and animals	Increase in erosion and soil degradation Increase in salinity risk Reduced viability of remnant vegetation Loss of native species Increased pest populations
Water use management and allocation	Irrigation needs Urban and industrial requirements Stock and domestic needs	Reduced water quality Degraded aquatic habitat Rising groundwater	Loss of production Stakeholder separation
Lack of information, knowledge and awareness	Finite resources Political will Power and cultural structures	Poor management practices Frustrated natural resource managers	Reduction in environmental values & production potential Cynicism Stakeholder separation
Surface water quality	Land use change and development Land and grazing management Irrigation area management Vegetation clearing/degradation Soil erosion Altered flow regimes (Burdekin River) Pest animals	Increased washload Increased bedload Degraded aquatic habitat Degraded riparian zones In stream erosion Presence of exotic fish Native fauna reduction	Increase in aquatic weeds Blue green algae blooms Reduction of recreation opportunities Production limitations
Erosion sedimentation extraction and impacts from changes on stream	Altered flow paths Loss of riparian vegetation Sand and gravel extraction Uncontrolled grazing Unregulated stream works	Silting/sanding of channels Bank erosion Alteration of flood flow & overbanking Loss and degradation of habitat	Loss of production Threats to assets Transport disruption Promotion of pest plants & animals
Soil degradation-erosion	Land use change and development Grazing practices Vegetation clearing/degradation Pest animals	Reduction in topsoil depth Rills and gullies Reduced water quality	Silting/sanding of waterways Degraded aquatic habitats Coral reef degradation
Pest animals	Pest population ecology Disease spread	Loss of native flora and fauna Increased population and/or distribution of pest animals	Habitat alteration and degradation Soil erosion
Impacts of in stream structures	Irrigation requirements Urban water supply Political imperatives	Increased bedload Degraded aquatic habitat Altered flow paths and regimes	Restriction of fish movement Altered flow regimes Status change of aquatic habitat
Grazing management and pasture condition	Market economy Capacity to change	Erosion and soil degradation	Reduced production Water quality impacts
Impacts from upstream sources	See other issues	See other issues	See other issues

Natural Resource Issue	Associated Pressures	Symptoms	Side effects
Coordination and communication	Power and cultural structures & paradigms Capacity to change 'Territory' protection	Poor management practices Frustrated community natural resource managers	Reduced involvement in community natural resource management Greater government/community division
Impacts of instream vegetation	Alteration of flow regimes	Vegetation size and/or density increase Sand islands	Change in flow paths Altered flood patterns Community anxiety
Impacts of land use change	Population growth Economic growth strategies	Land use conflict Degraded natural systems Contaminant release Erosion and sedimentation Altered drainage patterns Encroachment	Reduced biodiversity values Production impacts Blame and derision Separation of industry, govt & community groups
Flood impacts and mitigation structures	Alteration of flow regimes Altered drainage patterns Unregulated works – beds and banks Existing and new infrastructure	Property damage Altered flow paths Altered breakout points	Community anxiety
Different perspectives, attitudes and learning styles	Depth of 'life' learning pathways Need to maintain positions Peer pressure to conform Capacity and will to change	Polarisation of views on natural resource management issues and solutions	Separation of industry-government-community groups Reduced cooperation and coordination of activities
Groundwater quality	Alteration of recharge processes Deep drainage from irrigation Surface water management (Burdekin River)	Rising groundwater Increasing salinity, nitrate & chemical levels Production decline	Degraded natural systems Change in land use
Fire management	Land use changes Altered management practices Incompatible adjoining land use Lack of buffers	Change in vegetation structure Change in vegetation type Wildfire devastation	Increased incidence of pest plants Reduced productivity
Management to maintain & enhance remnant vegetation etc	Resources available for management Proximity to agricultural, industrial and urban land use	Management responses Percentage of integrated property management plans	Population levels of pest plants and animals Fire regimes

3.3 Local And Sub Catchment Issues

To assist in determining the issues specific to the Haughton River catchment, meetings were held at different locations within the catchment. Not surprisingly, there were issues that were specific to a particular location while some were expressed as being catchment wide. Location specific issues influenced the overall rank of that issue category from a catchment perspective as expressed in **Table 3-1**. The importance of the issue at the local or sub catchment scale should not be lost in the ranking system, and accordingly the main issues from each meeting location are listed in **Table 3-1**.

Table 3-1 Main Issues Raised at Public Meetings

Local Issues from Public Meetings	Issue Category	Ranking (see Table 3-1)
Giru		
Flood impacts	<ul style="list-style-type: none"> Flood impacts and mitigation structures 	13
Sand in the river	<ul style="list-style-type: none"> Erosion-sedimentation-extraction & impacts of changes on streams 	6
In stream vegetation	<ul style="list-style-type: none"> Impacts of in stream vegetation Pest plants – aquatic and terrestrial 	12 1
Altered flow paths and regime	<ul style="list-style-type: none"> Erosion-sedimentation-extraction & impacts of changes on streams 	6
	<ul style="list-style-type: none"> Water use management and allocation 	3
	<ul style="list-style-type: none"> Impacts of in stream structures eg. flow alteration and fish passage 	8
Rising groundwater and salt levels	<ul style="list-style-type: none"> Groundwater quality-eg. salinity from rising groundwater 	15
Woodstock		
Industrial estate	<ul style="list-style-type: none"> Impacts of land use change-residential, industrial etc. 	13
Weeds especially in riparian zones	<ul style="list-style-type: none"> Pest plants – aquatic and terrestrial 	1
Native vegetation loss	<ul style="list-style-type: none"> Loss and degradation of vegetation, habitat and biodiversity 	2
Native vegetation management	<ul style="list-style-type: none"> Management to maintain and enhance remnant vegetation, production, habitat and biodiversity eg. control threats 	18
Native vegetation growing in stream	<ul style="list-style-type: none"> Impacts of in stream vegetation eg. flow alteration and silting 	12
Sand in the creek	<ul style="list-style-type: none"> Erosion-sedimentation-extraction & impacts of changes on streams 	6
Sand dams & other works in streams	<ul style="list-style-type: none"> Impacts of in stream structures eg. flow alteration and fish passage 	8
Fire management	<ul style="list-style-type: none"> Fire management 	17
Natural resource mgt coordination	<ul style="list-style-type: none"> Coordination and communication issues 	10
Mingela		
Weeds especially around creeks and following drought conditions	<ul style="list-style-type: none"> Pest plants – aquatic and terrestrial 	1
Fire control and erosion implications	<ul style="list-style-type: none"> Fire management 	17
		19
Drought and pasture condition	<ul style="list-style-type: none"> Grazing management and pasture condition 	9
Downstream water management	<ul style="list-style-type: none"> Water use management and allocation 	3
Erosion near creeks	<ul style="list-style-type: none"> Erosion-sedimentation-extraction & impacts of changes on streams 	6
	<ul style="list-style-type: none"> Soil degradation-erosion, structure decline, compaction etc. 	19
Pest animals-pigs, wild dogs, cats, cane toads and kangaroos	<ul style="list-style-type: none"> Pest animals 	7

3.4 Indigenous Traditional Owner Issues

The short time-frame available to develop this plan has not allowed the necessary processes to be established for the effective involvement of indigenous Traditional Owner groups. This has been recognised as a deficiency in the planning process and the ICMP seeks to address this issue through future actions. The specific action to address the situation has been included in Table 8.1 as Action/Response 2.4.

A summary of communication with indigenous groups which formed part of the ICM planning process is included as Appendix S.

3.5 Putting The Pieces Together Again

Effective natural resource management is based on having the best available information accessible for use by skilled natural resource planners and managers. The Haughton River Catchment Overview Report (*developed as part of the Haughton ICMP process*), and issue identification process both revealed information and knowledge gaps and varying skill levels of natural resource managers. The two elements (knowledge and skills) are inextricably connected with the information used through extension activities to improve the management ability of natural resource managers. Together they form the platform necessary for the success of all future natural resource outcomes. This is a whole of catchment issue and pressure.

Information is required to:

- Better understand the condition of the Haughton River catchment;
- Better understand threatening processes in the Haughton River catchment;
- Assess natural resource values and determine suitable condition targets;
- Assess land capability and suitability for better land use planning;
- Develop or adapt management guidelines to suit conditions in the Haughton River catchment;
- Strategically address catchment wide natural resource issues;
- Develop and adapt monitoring systems to effectively determine condition trends;
- Enable input to regional natural resource assessment processes;
- Provide a fundamental resource for training and awareness programs.

Having recognised that achieving natural resource management outcomes are constrained by information gaps, there is still a body of useful knowledge that can be immediately applied to some situations with more strategic applications implemented as further information is gathered and refined.

Another whole of catchment issue is the coordination of natural resource management activities. Improved coordination between the various groups and agencies involved in natural resource manipulation and management is imperative at a catchment and regional level to ensure the best outcomes are achieved. Local coordination of activities is often well managed and does not present as a significant issue eg. individual local government and Landcare projects.

Pressures from unsustainable land and water management practices are indicated by symptoms identified in the Haughton River catchment. These appear as localised issues as well as whole of catchment pressures. Vegetation clearing and degradation is perhaps the most critical factor associated with land management practices, as a wide range of side effects and downstream impacts occur as a result of this issue.

The main pressure/issue areas for the Haughton River catchment with the various associated pressures and natural resource issues identified are listed in **Table 3-1**.

Table 3-1 The Main Pressures and Associated Issues for the Haughton Catchment

Pressure	Associated issues/pressures	Local	Whole of Catchment
Information availability	All issue areas (in Table 3-1)	✓	✓
Coordination levels	Most issue areas (in Table 3-1)		✓
Land use change and development	<ul style="list-style-type: none"> • water (surface and ground quality) impacts eg. silting • potential increase in pest plant and animal populations • direct loss/degradation of vegetation/habitat/biodiversity • remnant vegetation fragmentation • alteration of flow regimes and drainage patterns • changes to fire regimes • erosion and other forms of soil degradation • potential increase in flood impacts 	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓
Unsustainable land management practices	<ul style="list-style-type: none"> • water quality-predominantly from erosion • spread of pest plants and animals • direct and incremental loss/degradation of vegetation/habitat/biodiversity • appropriate fire regimes for production and environment • erosion and other forms of soil degradation • flood impacts as a result of sediment build up in streams, interference with beds and banks, and loss of vegetation • instream alterations-as for flood impacts 	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓
Unsustainable water management practices	<ul style="list-style-type: none"> • ground & surface water quality-transfer of water from the Burdekin River (suspended sediment) & irrigation impacts • pest plants –transfer of weed seed from the Burdekin system and within and from irrigation areas, and increase of instream vegetation and aquatic weeds • pest animals-translocation of exotic fish • loss/degradation of aquatic habitat and biodiversity • water allocation for environmental health • resulting impacts of in stream structures associated with water resource development eg. fish passage & flow path alteration • flood impacts resulting from physical alterations to streams and changes in flow regimes and drainage patterns 	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓
Vegetation clearing and degradation	<ul style="list-style-type: none"> • water quality decline • spread and increase of pest plants and animals • loss/degradation of habitat and biodiversity • erosion-sheet, rill and gully • soil degradation (salinity) • fire management implications • land management practices • land use change and development impacts • flood impact implications • stream bed and bank alteration- stream stability 	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

4. State of the Catchment

4.1 Environmental Indicators

The state of the catchment has been assessed through a desktop study combined with information provided by representatives of key stakeholder groups and members of the catchment community. Environmental indicators suggested by the Australian and New Zealand Environment and Conservation Council (ANZECC) for reporting on the State of the Environment have been used to draw some conclusions on the condition, or state, of the Haughton River Catchment.

4.2 Land

Maintenance of our land resources is a prerequisite to achieving sustainable natural resource outcomes. The state of the land resources of the Haughton River catchment is shown in **Table 4-1**.

Table 4-1 State of Land Resources

Land			
Indicator	Pressures	State (or Condition)	
		Documented	Anecdotal
Changes in land use	Disturbance to land and vegetation, encroachment on significant environmental areas, downstream effects.	Burdekin Haughton Water Supply Scheme. The proposed Woodstock Industrial Estate could result in significant land use change. Extension of rural residential areas.	Woodstock Industrial Estate. Proposed expansion of cane and horticulture areas in the Major Creek catchment.
Erosion – potential, and actual	Vegetation clearing and disturbance, land management practices, grazing, development and construction, infrastructure and infrastructure corridors.	Estimates from the National Land and Water Resource Audit indicate erosion has increased significantly since 1850 based on a ten-fold increase in sediment export. Soil loss has not been measured directly but erosion hazard has been assessed based on soil type, topography and climatic conditions. Erosion potential is considered to be high for hillslope erosion and moderate to low for gully and stream banks.	Sand in streams has increased considerably with bridge clearances being a potential measurable indicator eg. there used to be enough room to ride a horse under the old timber rail bridge at Giru, and the Major Creek – Giru Road bridge. Sand in estuaries restricting access.
Salinity – rising water tables, and affected areas	Economic drivers & commercial interests, irrigation practices, coordination of agencies & groups, levels of understanding of surface water/groundwater interactions, time.	General areas have been identified such as the Giru Benefited Area. The near surface watertable is rising. Condition varies with some areas being directly affected at present. Risk is moderate for the general catchment and moderate to high in irrigated areas.	Conditions are seen as deteriorating with risk being extreme. It has been mooted that an area radiating 10km from Giru may become unproductive if irrigation salinity is not addressed.
Acidity	Intensive agriculture, and fertiliser and chemical application, disturbance of potential acid sulphate soils.	Not considered in condition assessments due to the general nature of soils ie. alkaline trend. Acid sulphate soil potential has not been mapped so the 5m contour is used as a default planning tool.	Not mentioned.
Contamination	Chemical residue finding its way into the food chain.	Not documented.	Not mentioned.

The *National Land and Water Resource Audit* (NLWRA), among other studies, made comparative assessments of catchment biophysical condition across Australia including the Haughton River catchment. The NLWRA was undertaken at broad scales and as a result the information can be rather coarse ie. not suited to local situations

where higher resolution is required. The majority of the work was undertaken between 1998 and 2001. The results of the audit are now available on an Internet accessible database. While the information is not as accurate as required in some situations it does act as a guide and provides a starting point to work from.

In terms of overall catchment condition the Lower Haughton was grouped in the second poorest category while the remainder of the catchment was rated as being in average condition. From a land condition perspective the lower Haughton was included in the poorest category with the remainder being average. As a comparative assessment it indicates that the lower Haughton catchment is highly degraded while the catchment as a whole is in moderate to poor condition.

The entire catchment was also placed in the two highest categories for soil degradation hazard indicating the potential for further degradation of land resources with consequent implications for water quality and other downstream impacts. The sources currently contributing sediment to streams in the Haughton catchment are considered to be hillslope erosion 81.3%, gully erosion 13.2% and streambank erosion 5.5%.

4.3 Water

Table 4-1 summarises the condition of waters in the catchment. Information gathered through the National Land and Water Resource Audit places the lower Haughton catchment in the moderate category for overall water condition while the remainder of the catchment is considered to be in a better condition. The condition downgrade in the lower Haughton is primarily due to groundwater salinity problems in the Giru area.

Table 4-1 State of Inland Waters in the Catchment

Inland Waters			
Indicator	Pressures	State (or Condition)	
		Documented	Anecdotal
Groundwater	Deep drainage from irrigation adding to salt levels, nitrate and chemical leaching.	Condition of groundwater is poor in parts of the Giru Benefited Area as a result of salt levels. Water is moderately to very hard in most areas of the catchment. Nitrates do not seem to be a problem. Pesticides and other chemicals are not well documented (DEH & DNR 1999)	Salinity is the main concern. Groundwater condition has only been measured with regard to main threat. Septic systems have the potential to influence water quality, especially in Cungulla and Giru.
Surface water	Removal of deep rooted vegetation, altered flow regimes, aquatic weeds, land disturbance by development, management practices and feral animals, erosion, buffer zones.	Surface water quality varies across the catchment with the rating for domestic use being moderate to poor. Recreational use quality varies from poor to good. Quality for irrigation and stock is rated as moderate to good (DEH & DNR 1999).	Water quality was not specifically mentioned but would be a concern as the amount of silt in the stream system affects quality.
Aquatic habitat	As for surface water and disturbance of beds and banks.	Not well documented.	Filling of waterholes with sediment and increased quantity of sand in the stream system generally affects aquatic habitat. Change in flow regimes has altered the ephemeral nature of the system with implications for aquatic habitat.

The condition of surface water is compromised primarily by delivery of sediment to the river system with the associated nutrients and, to a lesser degree, chemicals. It is estimated that 698,000 tonnes of sediment is delivered to the streams in the Haughton catchment each year. This is approximately 3 to 4 times the average Australia wide value calculated as tonnes per hectare per year (NLWRA).

4.4 Estuaries and the Sea

As shown in **Table 4-1**, the condition of the estuaries and the sea in the vicinity of the Haughton River appears to be in moderate to good condition based on surface water indications, lack of reports to the contrary, and the extent of protected areas in the vicinity. While protected areas do not significantly alter the potential impact of upstream activities they do reduce any localised impacts that may otherwise occur in less regulated areas.

Table 4-1 Condition of Estuaries and the Sea

Estuaries and the Sea			
Indicator	Pressures	State (or Condition)	
		Documented	Anecdotal
Marine habitat / resources	Changes in coastal use, disturbance to marine habitat, over-fishing, impacts from land management practices.	Condition appears to be good. Erosion has been reported at Cungulla however this appears to be a natural cyclic event.	Not mentioned as a degraded resource area with the exception of an increase in sediment in estuarine channels and creeks. Potential influences from Cungulla septic tank systems.
Water quality	Problems exported from the catchment.	Condition appears to be good. No point source industry however concern has been expressed about catchment inputs especially sediment and attached and soluble nutrients.	Not mentioned as a degraded resource area.

The only issue raised with regard to condition was the increase in sediment in tidal creeks and the Haughton River estuary. This has implications for marine habitat values and needs to be considered when determining a sediment budget for the catchment.

4.5 Biodiversity

The extent of native vegetation is often used as the default indicator in the absence of more detailed monitoring and analysis of biodiversity values. In this respect, based on regional ecosystem mapping, the Haughton catchment could be considered to have good biodiversity values with approximate remnant vegetation cover of 80%.

The extent of remnant vegetation does not, however, take into account the condition of the vegetation, any trends associated with threatening processes or the historic perspective of vegetation management. Without specific knowledge of habitat condition the extent of regional ecosystems only provides an indication of potential biodiversity values. Such issues as ‘tree thickening’ are also not recognised through Regional Ecosystem mapping and need to be considered when setting biodiversity targets based native vegetation extent.

To highlight the need for caution when using the extent of native vegetation as an indicator of biodiversity it has been reported that 77% of the catchment has been cleared (GBRMPA 2001). If that was the case and we were relying on the extent of native vegetation as the sole indicator then the biodiversity values of the catchment would be considerably downgraded. A number of indicators need to be used with the best indicator being flora and fauna field surveys. Unfortunately this type of information is limited and when available is often location specific rather than extensive.

Table 4-1 summarises the biodiversity condition of the Haughton River Catchment.

Table 4-1 Biodiversity Condition in the Houghton River Catchment

Biodiversity			
Indicator	Pressures	State (or Condition)	
		Documented	Anecdotal
Threatening processes	Native vegetation clearing resulting in reduced habitat areas and fragmentation, aquatic habitat degradation, altered fire regimes, introduced species, development works.	Threatening processes are continuing with introduced species and land management practices reducing values.	Development for intensive agriculture, grazing pressure and weed infestation are seen as reducing areas to poor condition. Fire management, or lack of, threatens native grasslands especially in conjunction with drought.
Loss of biodiversity	Threatening processes.	Not measured with the exception of regional ecosystem mapping which can be used as a default interpretive tool.	Silting of streams is resulting in aquatic habitat degradation and loss, and weed invasion is resulting in aquatic and terrestrial losses.
Biodiversity conservation management	Resources for managing protected areas, proximity to intensive agriculture and emerging groundwater problems, coordination of estate management practices with surrounding landholders, integration of biodiversity management with farm practices.	The condition of terrestrial protected areas appears to be good however protection is limited to a relatively small number of representative ecosystems. Marine and estuarine protected areas are extensive and in generally good condition. Recommendations have been made to increase the FHA to include freshwater & tidal wetlands (Bruinsma 2001).	Management of State lands is seen as an issue mostly with regard to control of pest species. The condition of areas adjoining private property is believed to be in moderate to poor condition and impacting on neighbours.

Another indicator of biodiversity values is the extent of pest plants and animals. The National Land and Water Resource Audit places the catchment in the moderate to low end of the scale based on feral animal density and weed density. Regardless of the overall extent of remnant vegetation the biodiversity values within the catchment are compromised by the extent of weeds and feral animals. Other factors compromising biodiversity values are increased in-stream sediment loads, altered fire regimes, altered stream flow and drainage patterns, erosion and soil degradation and salinity associated with irrigated areas.

The extent of protected areas is also used as an indicator for biodiversity. The protected areas in the Houghton River catchment are located near the coast and include parts of Bowling Green Bay National Park and two Conservation Parks. Details are provided in **Table 4-2**.

Table 4-2 Protected Areas in the Houghton River Catchment

Title	Total area	Area in catchment	% of catchment
Bowling Green Bay National Park	57,791 ha	16,827 ha	8.0
Bowling Green Bay Conservation Park	3,381 ha	3,381 ha	1.6
Horseshoe Lagoon Conservation Park	77 ha	77 ha	0.04
Totals	61,242 ha	20,285 ha	9.64

The regional ecosystems within the protected areas have been identified (see **Figure 4-1**) and their areas calculated. The calculated areas are in **Appendix L**.