Identifying Key Investment Areas for 2005/06 Priority Natural Heritage Trust Funding in South East Queensland using Regional Landscape Assessment and Confluence of Issues Mapping

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SEQ Catchments Ltd.

TECHNICAL PAPER Number 1

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Principal Acknowledgements

NRM SEQ as an endorsed regional body has the role of supporting, guiding and monitoring progress on behalf of communities within our designated region.

Whilst the primary aim is to respond to natural resource management frameworks written by the Australian Government, there is also a strong historical link between the community and Queensland Government.

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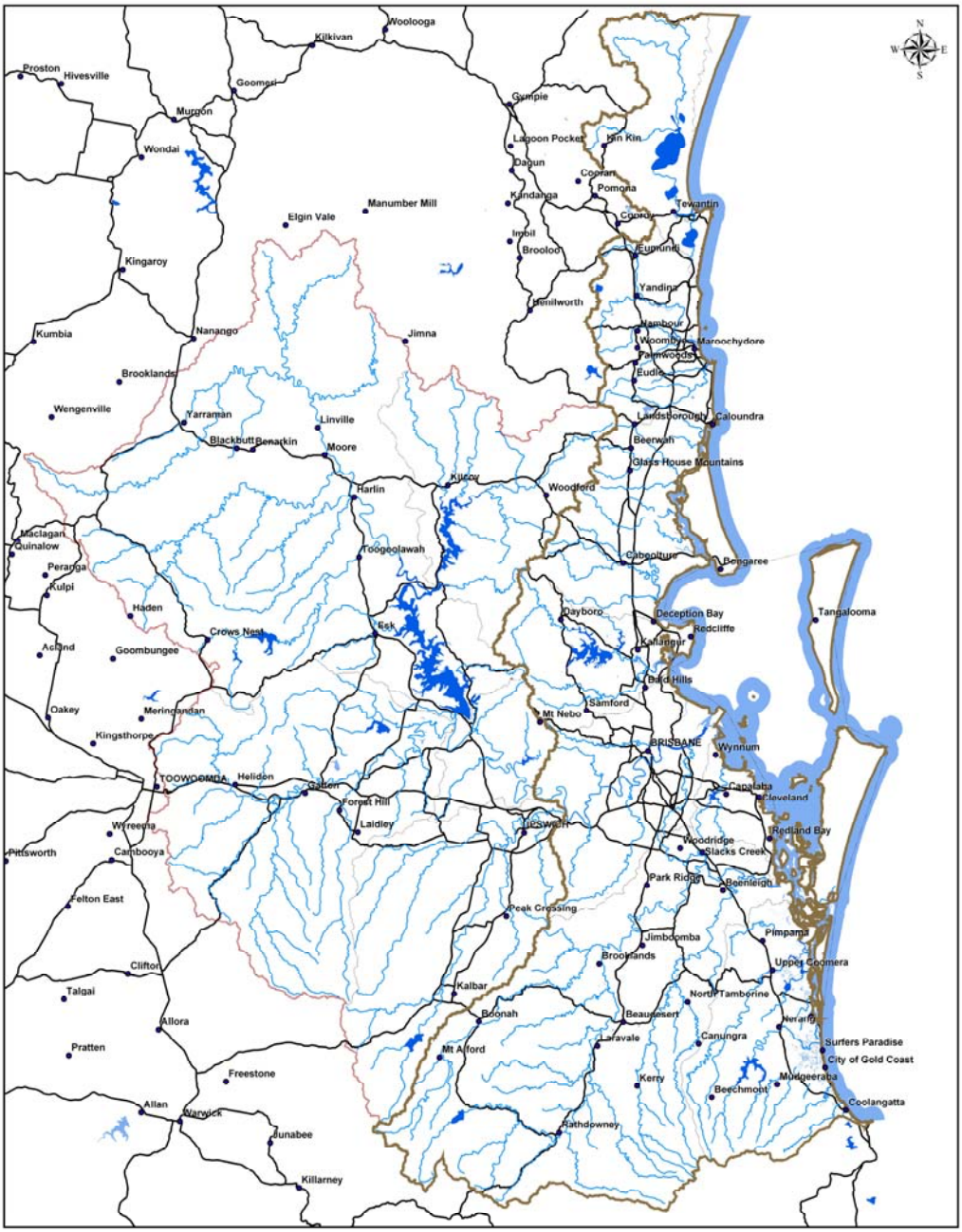
In a democracy there are three cultural rights:
The right to innovate, the right to participate and the right to heritage –
with government playing an enabling role.
(Donald Horne, The Lucky Country)



SEQ Region
Regional Landscape Assessment

Version: October 31 2005

Legend
Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

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Acronyms

ANZECC	Australian and New Zealand Environment and Conservation Council
ASS	Acid Sulfate Soils
AT	Aspirational Targets
AWQG	Australian Water Quality Guidelines for Fresh and Marine Waters
BAMM	Biodiversity Assessment and Mapping Methodology
BCC	Brisbane City Council
BPA	Biodiversity Planning Assessment
CNCCS	Common Nature Conservation Classification System
CRC	Cooperative Research Centre
DEM	Digital Elevation Model
DLPG	Department of Local Government and Planning
DO	Dissolved Oxygen
DPI&F	Department of Primary Industries and Fisheries
EHMP	Ecosystem Health Monitoring Program
EMSS	Environmental Management Support System
EPA	Environmental Protection Agency
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GIS	Geographic Information System
GQAL	Good Quality Agricultural Land
ha	Hectares
Ha/yr	Hectares per year
ICM	Integrated Catchment Management
IPA	*Integrated Planning Act 1997*
JSC	Joint Steering Committee
KIA	Key Investment Area
km	Kilometres
KRLA	Key Regional Landscape Area
LGA	Local Government Area
m	Metres
m^3	Cubic metres
MAT	Management Action Target
MBWCP	Moreton Bay Waterways and Catchment Partnership
ML	Megalitres
ML/yr	Megalitres per year
mg/g	Milligram per gram
mm	Millimetres
N	Nitrogen
NA	Natural Asset
NAP	National Action Plan (Short for NAPSWQ)
NAPSWQ	National Action Plan for Salinity and Water Quality
NHT	Natural Heritage Trust
NHT2	Natural Heritage Trust 2
NRI	Natural Resource Industry
NRM	Natural Resource Management
NR&M	Department of Natural Resources and Mines
NRM SEQ	Natural Resource Management South East Queensland
OUM	Office of Urban Management
P	Phosphorus
PIAC	Plan Investment Advisory Committee

pH	Level of acidity or alkalinity
PMP	Property Management Planning
QLUMP	Queensland Land Use Mapping Program
QPWS	Queensland Parks and Wildlife Services
QUT	Queensland University of Technology
RCG	Regional Coordination Group
RCT	Resource Condition Targets
RIS	Regional Investment Strategy
RE	Regional Ecosystem
RFGM	Regional Framework for Growth Management
RLA	Regional Landscape Assessment
RNCS	Regional Nature Conservation Strategy for SEQ
RUSLE	Revised Universal Soil Loss Equation
sat	Saturation, as is Dissolved Oxygen Saturation (DO sat)
SEDNET	A sediment erosion and generation model
SEQ	South East Queensland
SEQRWQMS	South East Queensland Regional Water Quality Management Strategy
SEQ RLA	South East Queensland Regional Landscape Assessment
SEQWCG	South East Queensland Western Catchment Group
SLATS	State Land and Tree Study
SO_2	Sulfur dioxide
SPP	State Planning Policy
STP	Sewage Treatment Plants
t/ha/yr	tonnes per hectare per year
TN	Total nitrogen
TO	Traditional Owners
TP	Total phosphorus
UQ	University of Queensland
USC	University of the Sunshine Coast
VCA	Voluntary Conservation Agreements
WONS	Weeds of National Significance
WQIP	Water Quality Improvement Plan
WQO	Water Quality Objectives
WRP	Water Resource Plan or Water Resource Planning

Executive Summary

Natural Resource Management SEQ (NRM SEQ) is an Australian Government accredited community, industry and government regional body for Natural Heritage Trust investment.

The Australian Government guidelines for the development of Regional NRM Plans for the delivery of NHT 2 investment require resource condition targets and management action targets to be addressed. This involves the identification of priority natural assets in addition to the threats that must be addressed in order to arrest negative trends in asset condition.

NRM SEQ undertook a spatial or place-based assessment of the natural assets of SEQ and the threats impacting on them by analysing available data sets in a GIS environment.

The 2005 SEQ Regional Landscape Assessment was used to produce a Confluence of Issues Map displaying Key Investment Areas (KIA) for NHT based on the spatial presence of multiple asset values and threats.

The 2005 SEQ RLA was facilitated by the staff of NRM SEQ with input from the SEQ RLA Panel and the NRM SEQ Board.

The identification of spatial priorities (i.e. SEQ geographical localities where investment would optimise the condition of our region) presented itself as an attractive output option compared with broad, untargeted theme-based asset management action packages. The process was challenged by incomplete or outmoded data sets, inefficient sharing of available data between State agencies and the Regional Body and the constraints of GIS software. This included the inability to incorporate changes in condition over time (temporal measurements). However, the benefits including enhanced partnerships with State Government Agencies and Officers have significantly outweighed the challenges and constraints.

The Community, Industry, Government and Research Round Table process described in this paper became the key building plank, and indeed, in some cases enhanced trust and partnerships with the community. With the Confluence of Issues Map as the focus, land managers (particularly Local Government who are major investors in NRM in SEQ) were able to explore realignment of their policies and budgets to support the achievement of regional targets. This alignment of funding provided a multiplying effect for the limited NHT funds available, with some projects providing a ten-fold multiplication of NHT investment through Local Government, community and industry cash and in-kind.

Contents

Key Words

Geographic Information System (GIS): Regional Landscape Assessment: Natural Resource Assets: Aspirational Targets: Resource Condition Targets: NRM Regional Arrangements: Natural Heritage Trust: Biodiversity: Landscapes: Water Quality: Prioritisation

Definitions

Natural Resource Assets

The assets that are the target of investment through the Natural Resource Management Plan to ensure long term sustainability of the region namely; Water, Biodiversity, Landscapes, Coasts and Seas, Air and Atmosphere, Social Capital (people, networks and social infrastructure), Cultural Heritage and Natural Resource Industries.

Resource Condition Targets (RCTs)

Scientific measurements at 10 year intervals to evaluate and adapt activity towards the achievement of the **Aspirational Target**. These targets are the scientific evidence that investment has been beneficial and can therefore be viewed as the bottomline for investment i.e. Natural Resource Management SEQ has entered into a contract with the Australian Government to work towards the achievement of RCTs.

The NRM Plan contains the Resource Condition Targets (RCTs). Using RCTs to address the priority threats to assets we create a statement of intent and denote positive effects on the condition of the region's natural assets.

The RCTs are considered catalytic for investment with consequent monitoring and evaluation of the success of the Plan promoting positive landscape change. The RCTs allow for the smart measurement of progress towards achieving the ideal vision for SEQ.

These targets are **SMART** in terms of being specific (S), measurable (M), achievable (A), realistic (R) and time bound (T). RCTs allow measurement of the effect of actions in addressing the threats to natural assets.

Aspirational Target

A vision of an ideal region expressed in terms of environmental, social and therefore economic condition. The natural resource management vision for SEQ: "By 2040, SEQ will be a caring community, sustainably using, protecting, enjoying and understanding the Region's natural resources, beauty and environment."

SEQ Regional Landscape Assessment (RLA)

The process by which maps illustrating Resource Condition Targets are used to identify Key Investment Areas (KIA) i.e. key areas where valuable Natural Assets are under threat.

Spatial Prioritisation

The computer process used in the Regional Landscape Assessment to identify KIAs by geographical location (in this case using GIS) to allow allocation of priority for funding on-ground action for those areas.

Resource Condition Target Maps (RCT Maps)

Maps indicating where in SEQ the value or threat targeted in each resource condition target in the Regional NRM Plan exists.

Natural Asset Layers (NA Layers)

Composite maps of Resource Condition Targets. Comprising layers illustrating the value of and threat to individual natural assets.

Confluence
Definition (Encarta)

1. GEOGRAPHY **meeting of streams:** a flowing together of two or more streams, a point at which streams combine, or a stream formed by their combining
2. **Meeting of two or more things:** a meeting or gathering together of two or more things, or the place where two or more things meet or join

Confluence of Issues Map

The end product of the Regional Landscape Assessment is the Confluence of Issues Map. The Confluence of Issues Map is the combination of all the Resource Condition Target Maps and the Natural Asset layers. This Map displays potential Key Investment Areas.

Key Investment Areas (KIA)

Where the combination of Resource Condition Targets, maps and available people and resources exist for investment towards achieving landscape change and therefore effective Natural Heritage Trust funding expenditure. These are areas in which there is high risk of imminent damage to our natural assets and where there is the potential for cost effective remedial works to address damage that has already occurred.

Introduction

Understanding and management of landscape processes through the use of computer software is not a new concept. Geographic Information Systems (GIS) are widely used to manage multiple data sets. However, the data sets describing SEQ landscapes have not previously been combined to identify priority areas for action to achieve positive landscape change.

The Australian Government guidelines for the development of Regional NRM Plans for the delivery of NHT 2 investment require resource condition targets and management action targets to be addressed. This involves the identification of priority natural assets in addition to the threats that must be addressed in order to arrest negative trends in asset condition. For example: the threat that weeds present to our important bushland areas.

NRM SEQ realised the potential offered by undertaking a spatial or place-based assessment of the natural assets of SEQ. This would enhance knowledge of the current condition of our natural assets underpinning socio-economic systems and quality of life in SEQ and consequently offer a more targeted approach to investment.

This paper will illustrate how investment for multiple outcomes facilitates potentially greater return on investment in terms of positive landscape management.

The eight **natural assets** were identified through the consultation process (the consultation process, the full case for these assets and the threats that impact on them are presented in the NRM SEQ Regional Management Plan) as:

1. Landscapes
2. Biodiversity
3. Water
4. Coastal and Marine
5. Air and Atmosphere
6. Cultural Heritage
7. Social Capital
8. Natural Resource Industries

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The threats identified varied in importance with the asset being considered and were listed as:

Threats to Natural Assets:		
Lack of information & awareness	Climate Change	Land & Landscape Degradation
Weeds & Pest Animals	Loss of habitat	Fragmentation of Remnant Vegetation
Loss & degradation of aquatic biodiversity	Fire	Point Source Pollution
Diffuse Pollution & Catchment Loads	Water Use and Management	Degradation of Air Quality
Upsetting the Greenhouse Gas Balance	Nuisance Algae	Loss of Social Capital
Loss of Traditional Owners Cultural Heritage Values	Loss of Cultural Heritage Values	
Loss of Sustainability of Natural Resource Industries (NRI)		

The process of interaction between Natural Assets, Threats and Targets is shown in Figure 1.

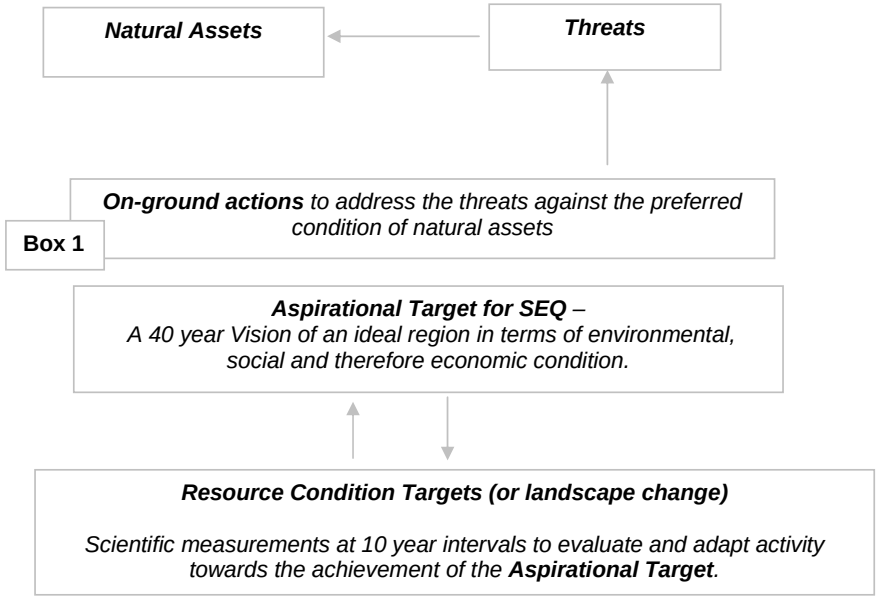

Figure 1: Interaction between Natural Assets, Threats and Targets

Box number 1 is the focus of the Regional Landscape Assessment, particularly where appropriate activity would enhance or contribute to the maintenance and condition of natural assets (as measured by the Resource Condition Targets).

The Regional Landscape Assessment facilitates identification of geographic areas where several threats are impacting on one or a number of assets.

In the first instance, the *Confluence of Issues Map* identifies areas for targeted field investigation. From further consultation with the local community and the assessment of available supporting literature, particularly previous planning and research, realistic and strategic property level actions will be developed that support the achievement of the regional RCTs.

The Regional Landscape Assessment is a decision support tool; consequently field investigation and local community consultation is a key to the success of natural resource management in SEQ. The tool does contain potential errors that have been generated by unavoidable assumptions, often as a result of gaps in data and understanding of the relationships between assets and threats in the landscape.

Eventual investment for positive outcomes will be successful only if the Confluence of Issues Map is verified in the field. This must be in partnership with the community and local experts. This community consultation and brokering of investment and project partnerships, is in its own right, a powerful process, as coordinated local action to achieve regional targets is the ultimate goal of regional NRM planning.

Central planning agencies designating regional planning areas often miss the fact that local communities are separated by the reality of geographic and often socio-economic barriers. Consequently, local communities undertaking action to address the same RCT may not be fully aware of each other on a daily basis or if they are aware, may choose to approach the alleviation of the threatening process at a different scale. Therefore an understanding, appreciation and respect for an individual's sense of place are keys to the success of regional NRM.

Endorsed Regional NRM Bodies have the role of coordinating action across a range of local areas or sense of place locales to develop a regional action plan and a coordinated regional approach to addressing threats in key regional or landscape areas.

The SEQ NRM Planning Environment

NRM SEQ was formed in July 2003 based on the membership from 9 sectors with a chequered history of collaborating together for NRM outcomes. The MBWCP and the SEQ 2021 research and planning processes had awakened a significant but limited awareness a regional facing major threats to the natural assets of SEQ.

In fact, some commentators have referred to the term “South East Queensland” as being an imaginary place existing only in the minds of some television lifestyle programmes, bureaucrats and planners. This refers to the fact that the overwhelming majority of residents of SEQ are not driven by whole of region interests preferring or in fact driven by the need to address local issues.

The challenge for NRM SEQ was to facilitate the development and ownership of a series of targets starting with an Aspirational Target or vision for the region for 2040 followed by a series of step by step targets known as Management Action Targets which could be measured by Resource Condition Targets. Therefore on ground, planning and research actions had to contribute to the achievement of these regional targets.

The socio-political environment dominant in SEQ at the time of NRM Plan development was dominated by the expressed desire of the community to re-establish support for ICM, Landcare and Environment groups after the prolonged gap between NHT 1 and NHT 2 funding.

The Australian Government response to this which was also driven by the Ministers’ desires to satisfy the wider public expectation for high profile environmental activity, was to request all NRM Plans to be submitted for accreditation before the end of 2004.

These factors resulted in an extremely truncated planning timeline of 10 months for staff and Board Members to facilitate satisfactory input to the SEQ NRM Plan from stakeholders.

The SEQ Region is one of the fastest growing regions in the southern hemisphere with a predicted extra million residents by the Year 2026. The State Government’s response to this growth has been to establish the Office of Urban Management (OUM) within the Department of Local Government and Planning charged with the task of developing a Regional Plan to guide land use and infrastructure planning. The OUM conducted a high profile consultation process during the later half of 2004 which further complicated the development of the NRM Plan. The growth being experienced across the region means that there are a number of significant local or regional planning processes underway at any one time in SEQ.

The 2005 SEQ RLA was conducted as a key component of the NRM planning timeline during this period of active regional planning and heightened socio-political activity. These factors meant that the gathering and use of data sets to produce land use planning outputs was difficult and at times sensitive. It also meant that the community was largely focussed on local issues and ensuring the survival of local groups rather than engaging in a seemingly conceptual assessment of the region using a computer and data sets that many of the community had never had the chance to view.

In the end it was the tight timeframe for NRM Plan development that had the most significant bearing on the RLA process particularly the lack of time to assemble a comprehensive coverage of data. The imperative to identify spatial priorities for investment overrode these concerns and was largely accepted based on the rider that the iterative nature of the RLA would allow for the inclusion of more local data in future assessments. The Regional Landscape Assessment Panel signed off on the available data and outputs of the RLA as an accurate starting point for NHT investment.

Despite the issues and limitations described above, this paper will show that there was significant social and environmental progress made during and as a result of the SEQ RLA.

The SEQ Regional Landscape Assessment Panel

Access to data and the expertise to relate data to the RCTs was a challenge for the regional body.

The sharing of data with state agencies was often a difficult, convoluted and haphazard process frustrated by external deadlines for plan development and the competing priorities of data custodians. State agencies differed in approaches to data sharing, with some of the larger organisations struggling to coordinate agreements between the many data custodians spread throughout large bureaucracies.

Local Governments in SEQ were involved in this process and the access to expertise and data is being integrated into the process. There is a wealth of information and data within Local Governments and this will be accessed in the coming year to add a finer scale of assessment.

The relationships and processes established as part of the 2005 SEQ RLA will facilitate constructive approaches to streamlining data sharing and addressing identified gaps in mapping coverages in the future.

The availability of relevant data on which to base RCT maps was also a major issue with a surprising lack of data in some major geographic and asset areas. These gaps necessitated the development of *surrogate layers*, a process that is described in the Section Two.

Consequently, a key ingredient for success was the establishment of a committee possessing the expertise to interpret and utilise data and, importantly, had access to the relevant data.

A Landscape Panel had been developed initially during a separate but related component of the NRM Plan development. This process aimed to:

1. Identify priority threats to the sustainability of natural resource industries
2. Identify landscape areas for the development of industry partnerships. (process sponsored by the Department of Primary Industries and Fisheries)

The activity of this Landscape Panel allowed an approach to be made for additional support from Natural Resource Sciences (NRS) section at Natural Resources & Mines (NR&M) Indooroopilly. Many of the early Panel members continued their involvement in the Regional Landscape Assessment Panel.

Expertise in the recent Salinity Hazard Mapping in Queensland from within NRS was made available. Salinity Hazard Mapping employed a similar methodology to that of the Regional Landscape Assessment.

NR&M, as the lead agency for landscape management, made the commitment of expertise and data sets crucial to the production of the Confluence of Issues map. This was a critical success factor because the Landscape Layer was the major gap in the inputs for the Regional Landscape Assessment. The Environmental Protection Agency (EPA) Biodiversity Planning Assessment and the Moreton Bay Waterways and Catchments Partnership (MBWCP) Environmental Management Support System had previously covered the Biodiversity and Water Quality data collection and mapping respectively.

NR&M's role in the Regional Landscape Assessment made possible the required data sets. This was critical to producing the Confluence of Issues Map in the necessary timeframe and facilitated prioritisation of NHT resources for the 2005/2006 Regional Investment Strategy.

Although the initial focus was to produce a Landscape Layer, the Assessment still required expertise in the area of Biodiversity and Water to ensure the appropriate use of available layers. The Scientific Coordinator from MBWCP participated in the overall Assessment in addition to members of the Biodiversity Planning Assessment.

Two RLA Panel Workshops were conducted, on the 5th and 21st April, 2005.

Notes from these meetings are described in **Appendix 1.**

Section Two: Natural Asset Layers (steps 1-3)

The use of three Natural Asset Layers in the SEQ RLA was decided by the prioritisation of assets in the Regional NRM Plan and the availability of data.

The three layers are:

1. Biodiversity
2. Landscape
3. Water

The derivation of these layers based on Resource Condition Target Maps is described in this section. The process is illustrated in Figure 2. This Section describes steps 1-3.

The final Natural Asset Layers are based on a 250 metre grid size classified 1-4 using quantiles where 1 is low and 4 is high. All component RCT Maps are similarly scaled and classified.

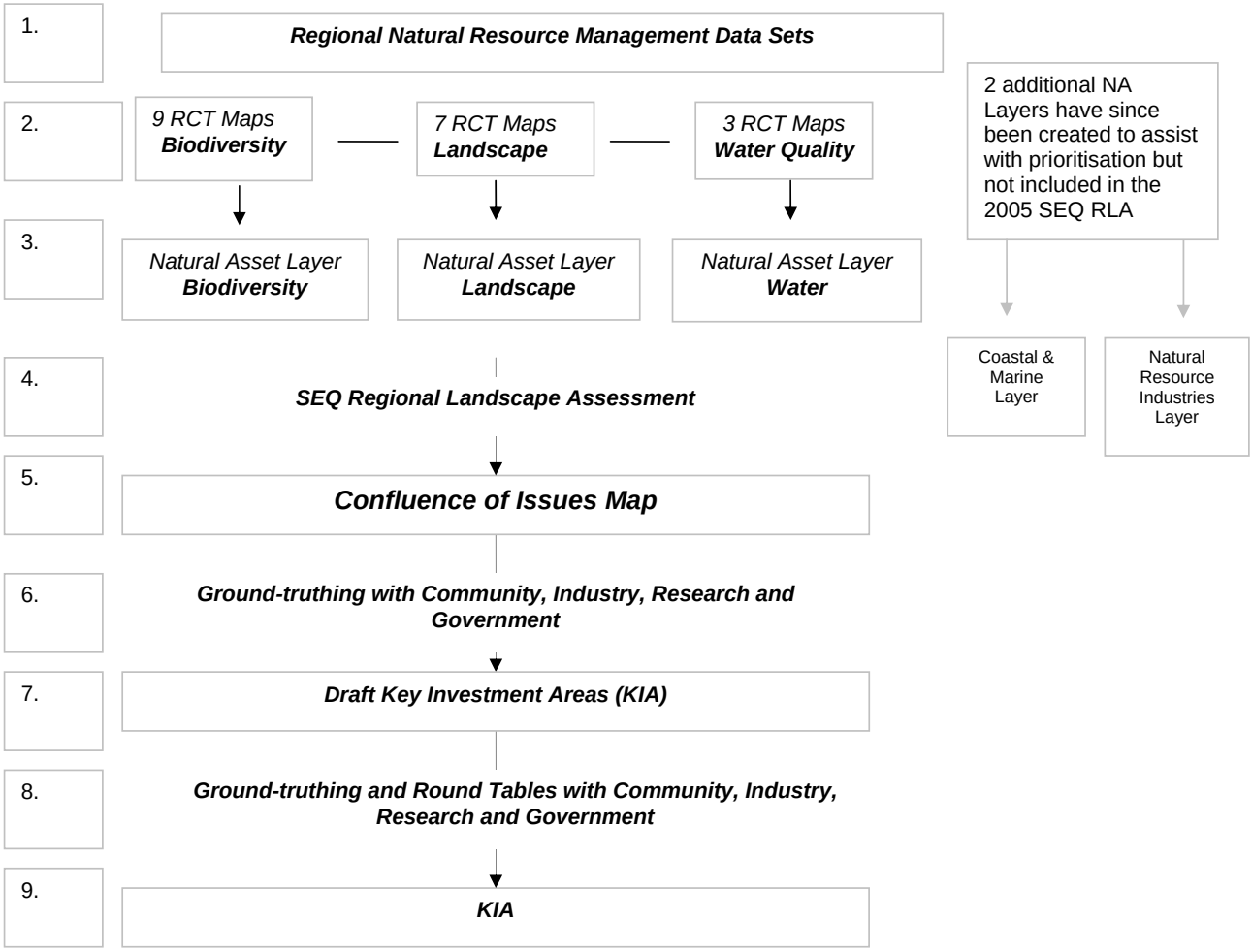

Figure 2 - A schematic representation of the process used to determine the Key Investment Areas

Natural Asset Layer One: Biodiversity

This layer draws on two input data sets. Outputs are the individual RCT maps and the combined Biodiversity Natural Asset Layer. The two data sets are:

1. **Environmental Protection Agency - Nature Conservation Score**
    - Derived from adding scores for nine criteria from SEQ Biodiversity Planning Assessment (BPA) from the Environmental Protection Agency (EPA) Version 3.4.

2. **Brisbane City Council - Nature Conservation Score**
    - Derived from adding ratings from eight criteria from Brisbane City Council (BCC) Common Nature Conservation Classification System (CNCCS).

The BPA and CNCCS were based on nature conservation values within a bioregion (SEQ for example) and expert knowledge to refine the initial output. The output is intended to function as an information tool to assist land use and land management decision making.

1 Environmental Protection Agency - Nature Conservation Score

The Biodiversity Assessment and Mapping Methodology (BAMM) outlines the approach for assessing nature conservation based on remnant vegetation. The methodology identifies areas with various levels of significance for nature conservation reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes.

While the BPA combines a number of individual data sets and criteria to produce an overall biodiversity assessment map for SEQ, the 2005 SEQRLA focussed on specific information in relation to RCT's. Each biodiversity RCT was matched with the appropriate individual data set and criteria from the BPA.

BPA Criterion used:

A - Habitat for Endangered, Vulnerable and Rare Taxa
B1 - State Ecosystem Value
B1 - Presence of Wetlands
B2 - Regional Ecosystem Value
D2 - Regional Relative Ecosystem Size

G - Context and Connection

H - Core Habitat for Priority Taxa

I - Special Biodiversity Values

J - Corridors

2 Brisbane City Council - Nature Conservation Score

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The Common Nature Conservation Classification System (CNCCS) defines areas of high conservation value at a regional level as a sound basis for planning, development control, environmental protection and rehabilitation. Through the application of the CNCCS, remnant vegetation is assigned three levels of conservation values: State Significance, Regional Significance, and Local Significance. This process was used to override the BPA in the Brisbane City area to identify biodiversity values in the largest urbanised local government area in the region.

CNCCS Criterion used:

A - Significant habitat for 'At Risk' Species

B - Ecosystem Value

D - Relative Size of Ecosystem

G - Context and Connection

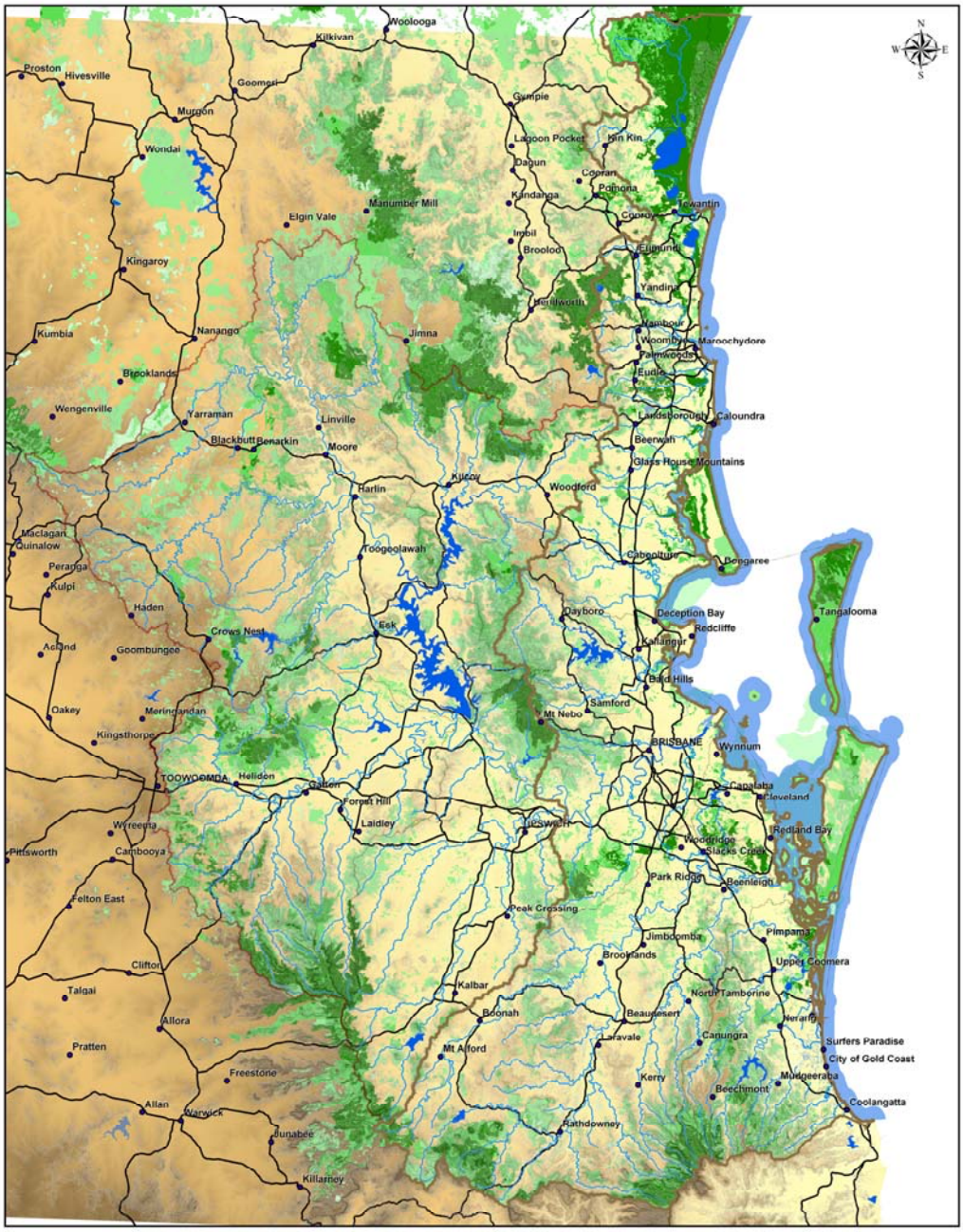
H - Other Habitat for 'At Risk' Species

I - Special Values

K - Corridors and Connectivity

The RCTs from the NRM Plan are listed in **Appendix 2**.

Appendix 3 contains further explanation of the Criteria used and the scores that were assigned to develop the Resource Condition Target maps relating to Biodiversity.


Natural Asset Layer - Biodiversity
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Cooran
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Kandanga
Tewantin
Manumbar Mill
Elgin Vale
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Imbil
Brooloo
Eumundi
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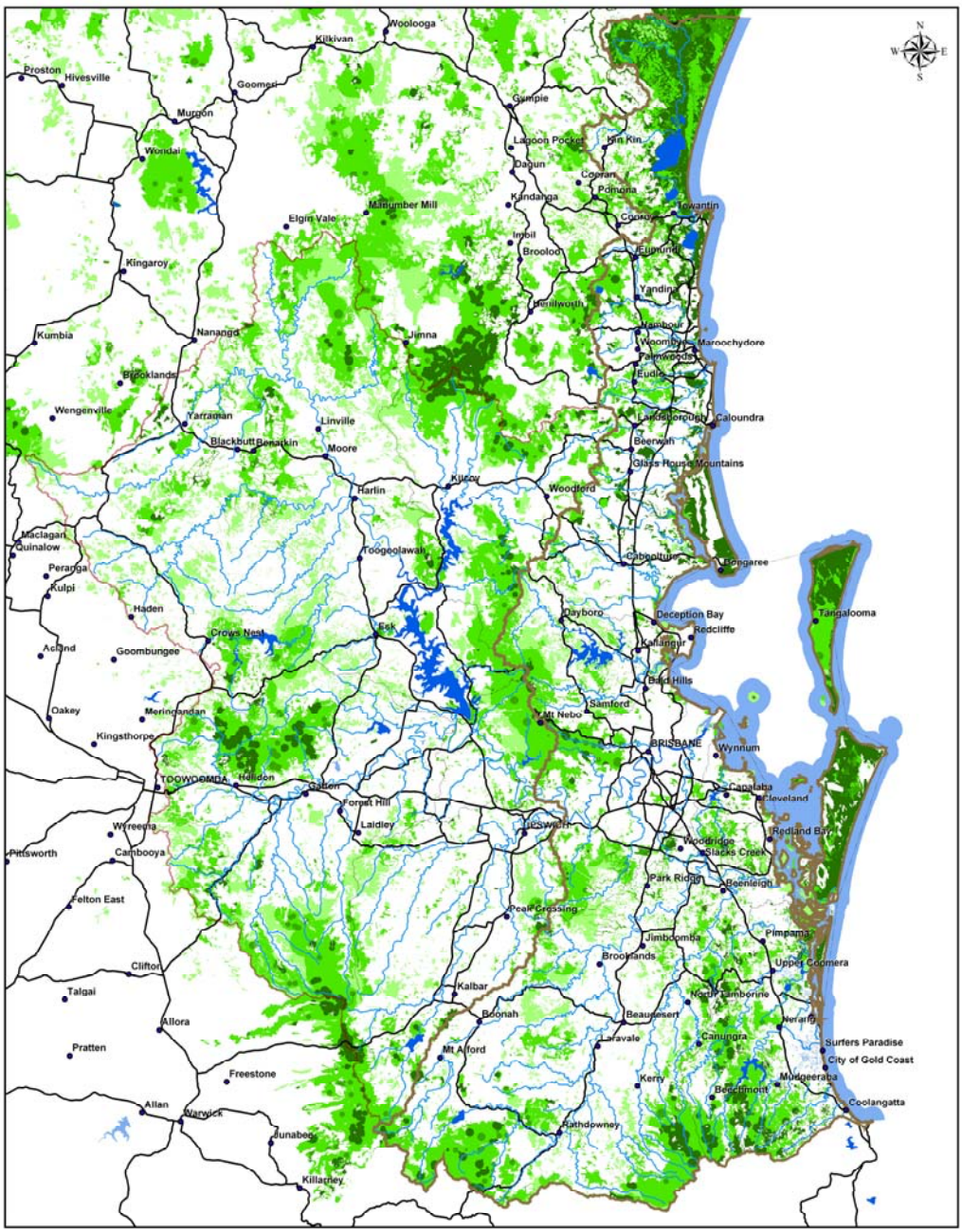
Yandina
Nambour
Kumbia
Nanango
Jimna
Woombye
Maroochydore
Palmwoods
Brooklands
Eudlo
Wengenville
Yarraman
Landsborough
Caloundra
Linville
Blackbutt
Benarkin
Moore
Beerwah
Glass House Mountains
Kilcoy
Harlin
Woodford
Maclagan
Quinalow
Toogoolawah
Caboolture
Bongaree
Peranga
Kulpi
Haden
Dayboro
Deception Bay
Tangalooma
Crows Nest
Redcliffe
Esk
Acland
Goombungee
Kallangur
Bald Hills
Oakey
Meringandan
Samford
Mt Nebo
Kingsthorpe
BRISBANE
Wynnum
TOOWOOMBA
Helidon
Cleveland
Forest Hill
Laidley
Ipswich
Wyreema
Redland Bay
Woodridge
Slacks Creek
Pittsworth
Cambooya
Park Ridge
Beenleigh
Felton East
Peak Crossing
Jimboomba
Pimpama
Brooklands
Upper Coomera
Clifton
Kalbar
North Tamborine
Talgai
Beaudesert
Boonah
Allora
Canungra
Surfers Paradise
Pratten
Mt Alford
Lamington
City of Gold Coast
Freestone
Kerry
Mudgeeraba
Allan
Warwick
Beechmont
Coolangatta
Rathdowney
Junabee
Killarney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Pomona
Kandanga
Malumber Mill
Elgin Vale
Cooroy
Tewantin
Imbil
Brooloo
Eumundi
Kingaroy
Yandina
Nanango
Jimna
Kumbia
Maroochydore
Brooklands
Eudlo
Wengenville
Yarraman
Linville
Landsborough
Caloundra
Blackbutt
Benarkin
Moore
Beerwah
Glass House Mountains
Kilcoy
Harlin
Woodford
Maclagan
Quinalow
Toogoolawah
Caboolture
Bongaree
Peranga
Kulpi
Haden
Dayboro
Deception Bay
Tangalooma
Crows Nest
Esk
Redcliffe
Acland
Goombungee
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Bald Hills
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Mt Nebo
Meringandan
Kingsthorpe
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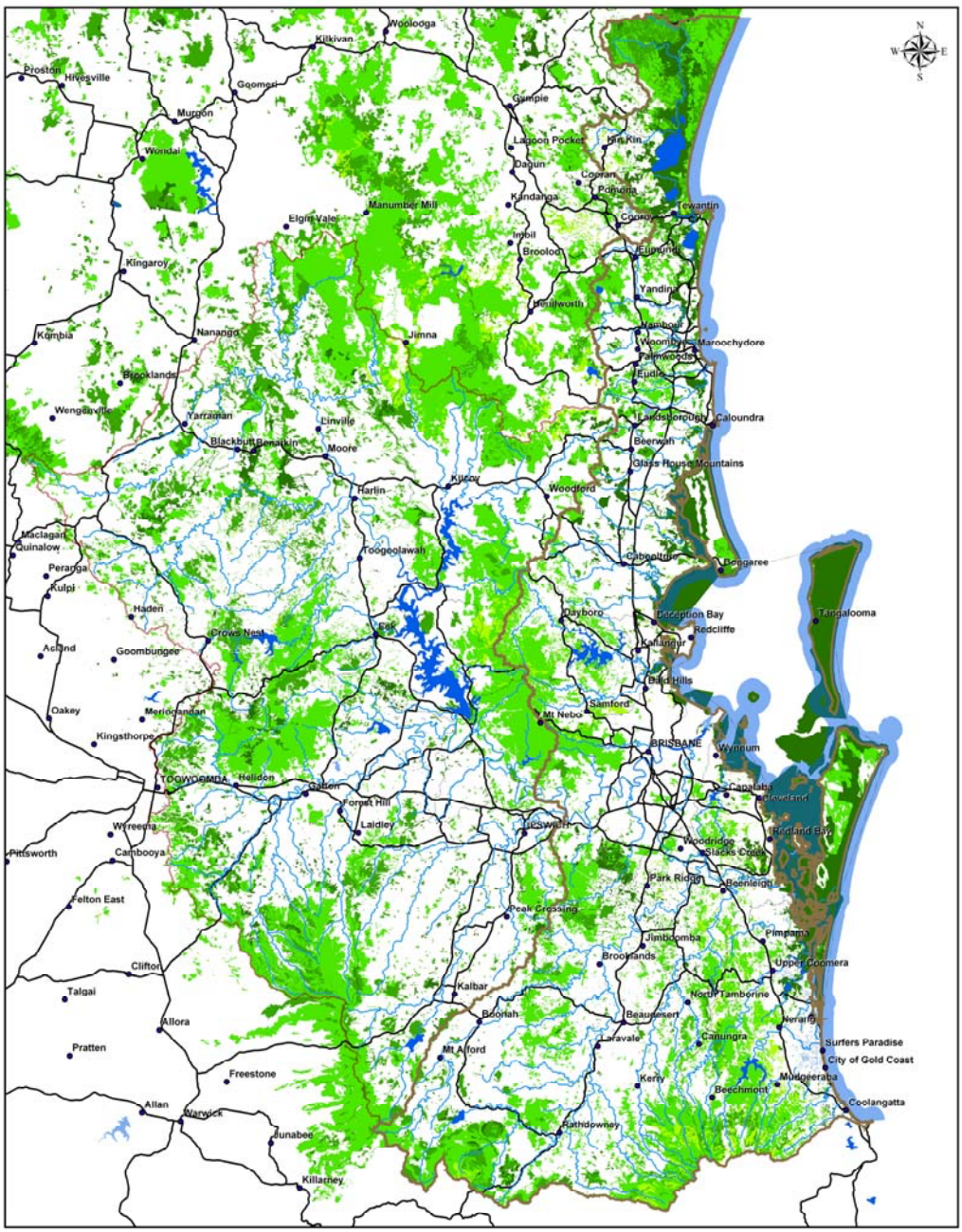

State Ecosystem Value
Regional Landscape Assessment

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Version: October 31 2005

Legend

Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
SEQ_B1
LOW
MEDIUM
HIGH
VERY HIGH

10 5 0 10 20 30 40 Kilometers

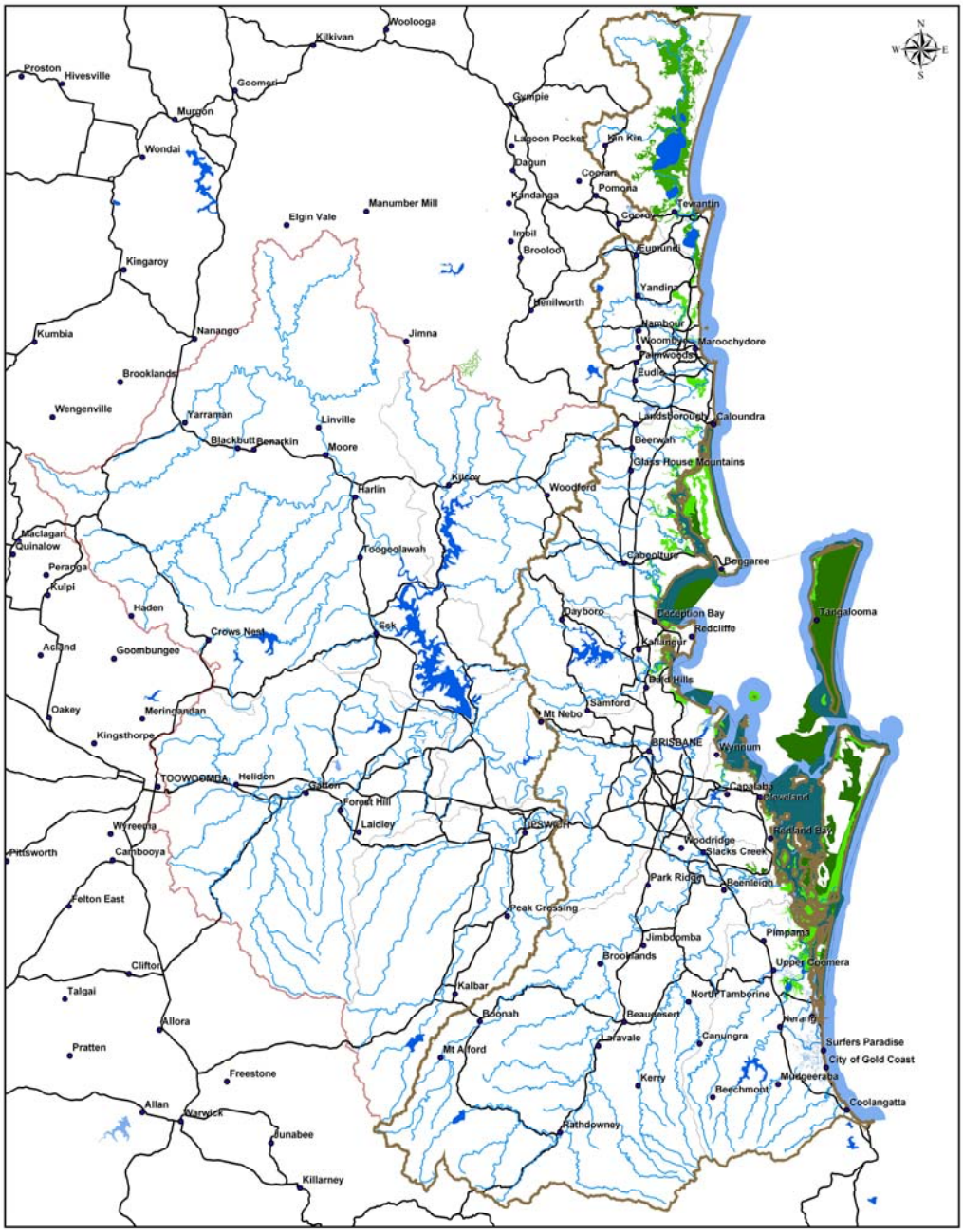
Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

NRMSEQ
Natural Heritage Trust



Presence of Wetlands
Regional Landscape Assessment

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Version: October 31 2005

Legend

Towns
NRMSEQ_Region
WCQ_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
SEQ_B1_Wetlands
Intertidal_Wetland
Wetland_Coastal_Plain
Important_Wetland
Ramsar_Wetland

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

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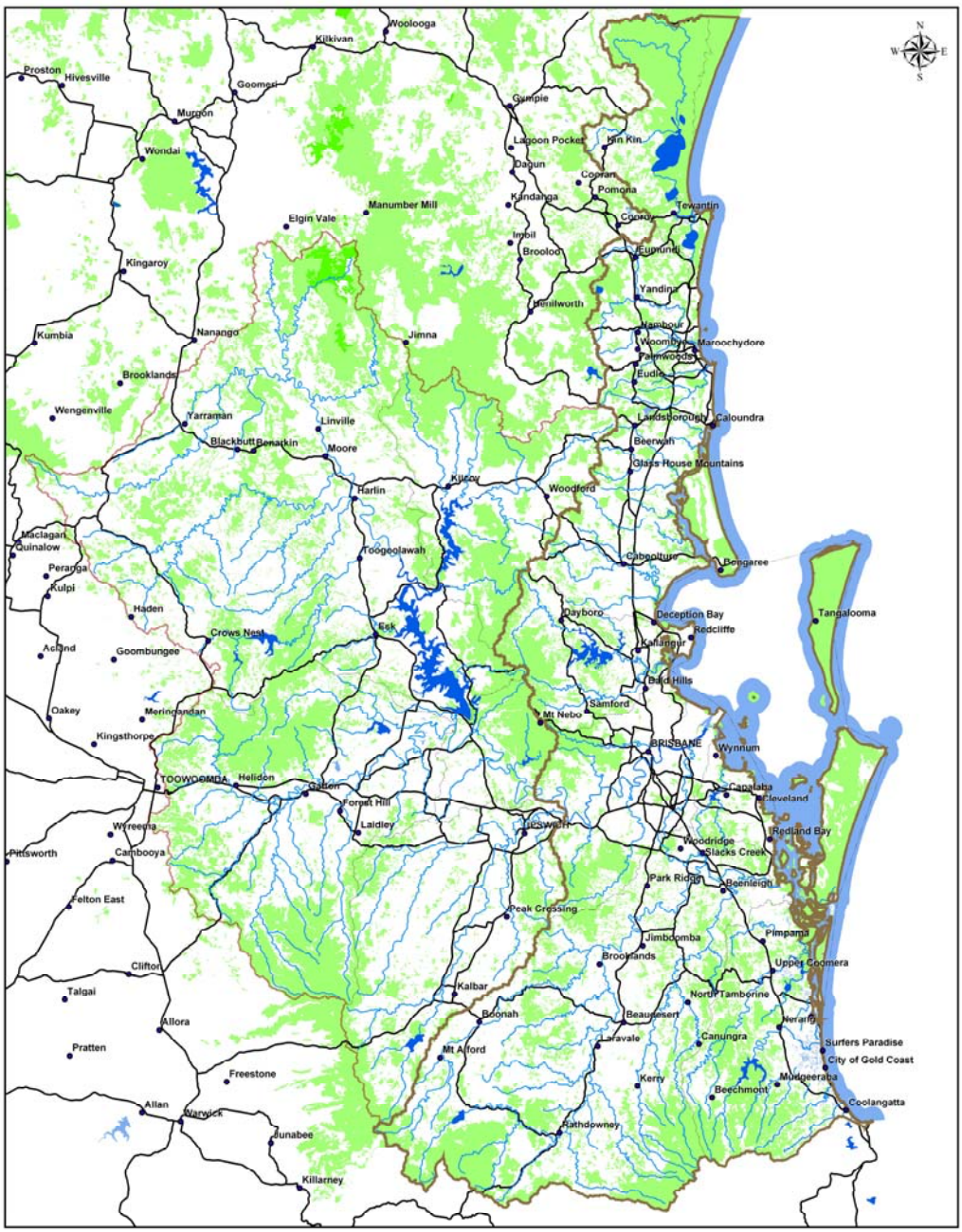
Natural Heritage Trust



Regional Ecosystem Value
Regional Landscape Assessment

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Version: October 31 2005

Legend

Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
SEQ_B2
LOW
MEDIUM
HIGH
VERY HIGH

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

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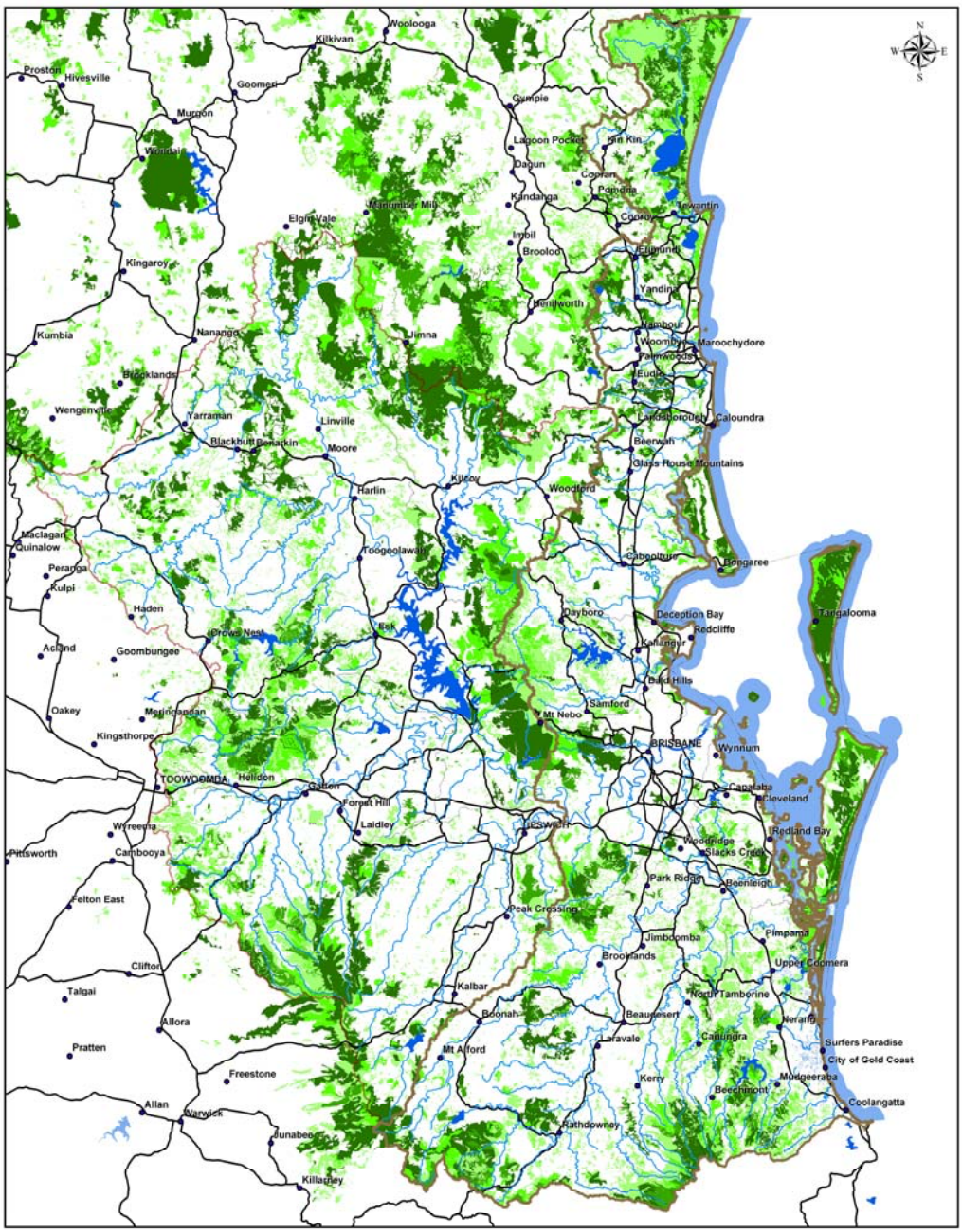
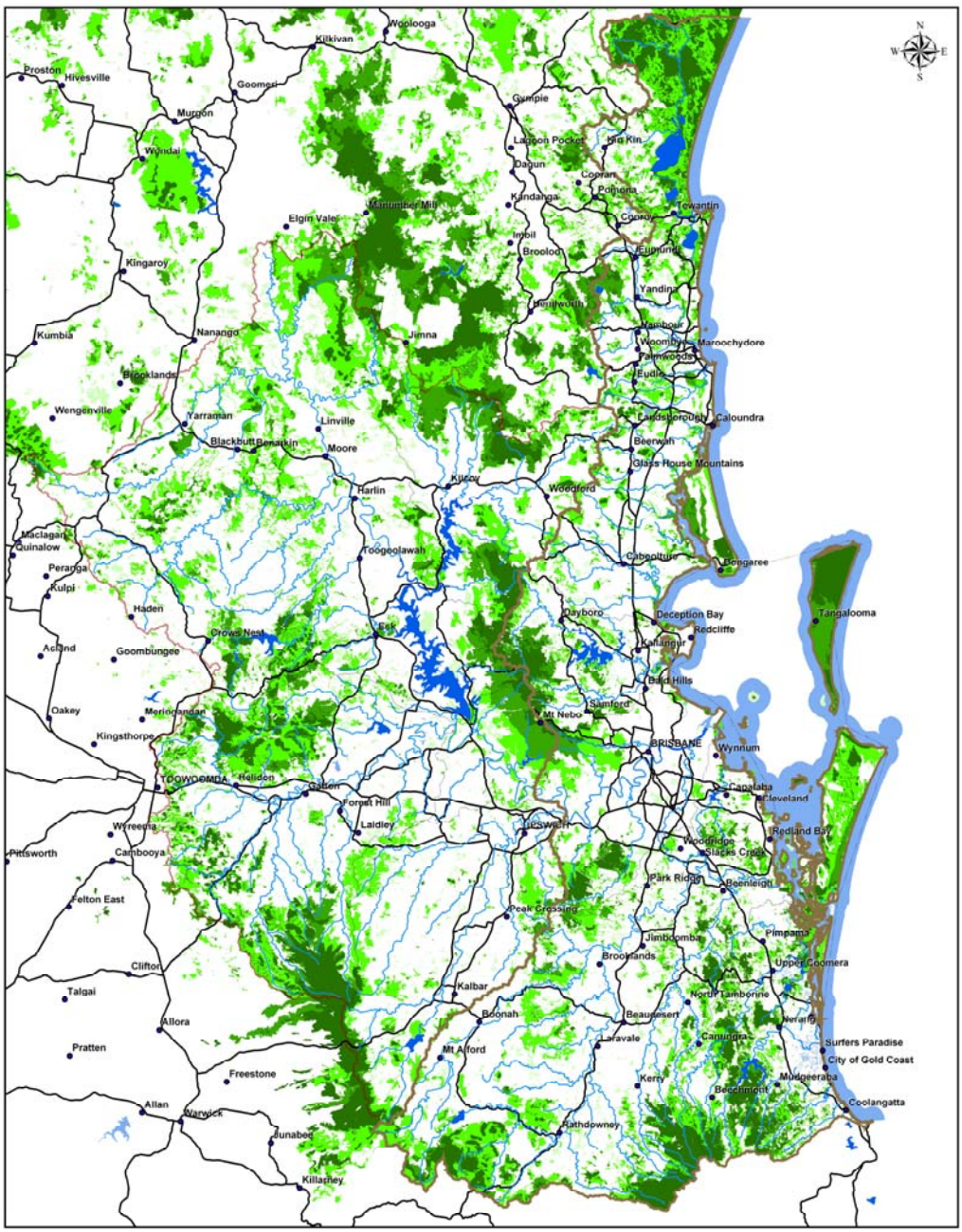
Natural Heritage Trust


Wooloolga
Kilkivan
Proston
Hivesville
Goomeri
Murgon
Wondai
Gympie
Lagoon Pocket
Kin Kin
Dagun
Conran
Pomona
Kandanga
Tewantin
Cooroy
Imbil
Elgin Vale
Manumbar Mill
Brooloo
Kingaroy
Yandina
Nambour
Kumbia
Nanango
Jimna
Woombye
Maroochydore
Palmwoods
Brooklands
Eudlo
Wengenville
Yarraman
Landsborough
Caloundra
Linville
Blackbutt
Benarkin
Moore
Beerwah
Glass House Mountains
Kilcoy
Harlin
Woodford
Maclagan
Quinalow
Toogoolawah
Caboolture
Bongaree
Peranga
Kulpi
Haden
Dayboro
Deception Bay
Redcliffe
Tangalooma
Esk
Crows Nest
Acland
Goombungee
Kallangur
Bald Hills
Oakey
Samford
Mt Nebo
Kingsthorpe
BRISBANE
Wynnum
TOOWOOMBA
Helidon
Gatton
Capalaba
Cleveland
Forest Hill
Laidley
Redland Bay
Pittsworth
Cambooya
Woodridge
Slacks Creek
Park Ridge
Beenleigh
Felton East
Peak Crossing
Pimpama
Jimboomba
Clifton
Brookfields
Upper Coomera
Talgai
Kalbar
Nerang
Allora
Boonah
Beaudesert
Pratten
Laravale
Canungra
Surfers Paradise
Mt Alford
City of Gold Coast
Freestone
Kerry
Mudgeeraba
Allan
Warwick
Beechmont
Coolangatta
Rathdowney
Junabee
Killarney
Regional Relative Ecosystem Size
Regional Landscape Assessment
10 5 0 10 20 30 40
Kilometers
Scale 1:750,000
GDA
Albers Equal Area Projection
Data Sources
EPA, DNRM, MBWCP, DPIF
Legend
Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
SEQ_D2
LOW
MEDIUM
HIGH
VERY HIGH
Version: October 31 2005
Proudly Supported By
NRMSEQ
Natural Heritage Trust



Context and Connection
Regional Landscape Assessment

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Version: October 31 2005

Legend

Towns
NRMSEQ_Region
WCQ_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
SEQ_Q
LOW
MEDIUM
HIGH
VERY HIGH

10 5 0 10 20 30 40 Kilometers

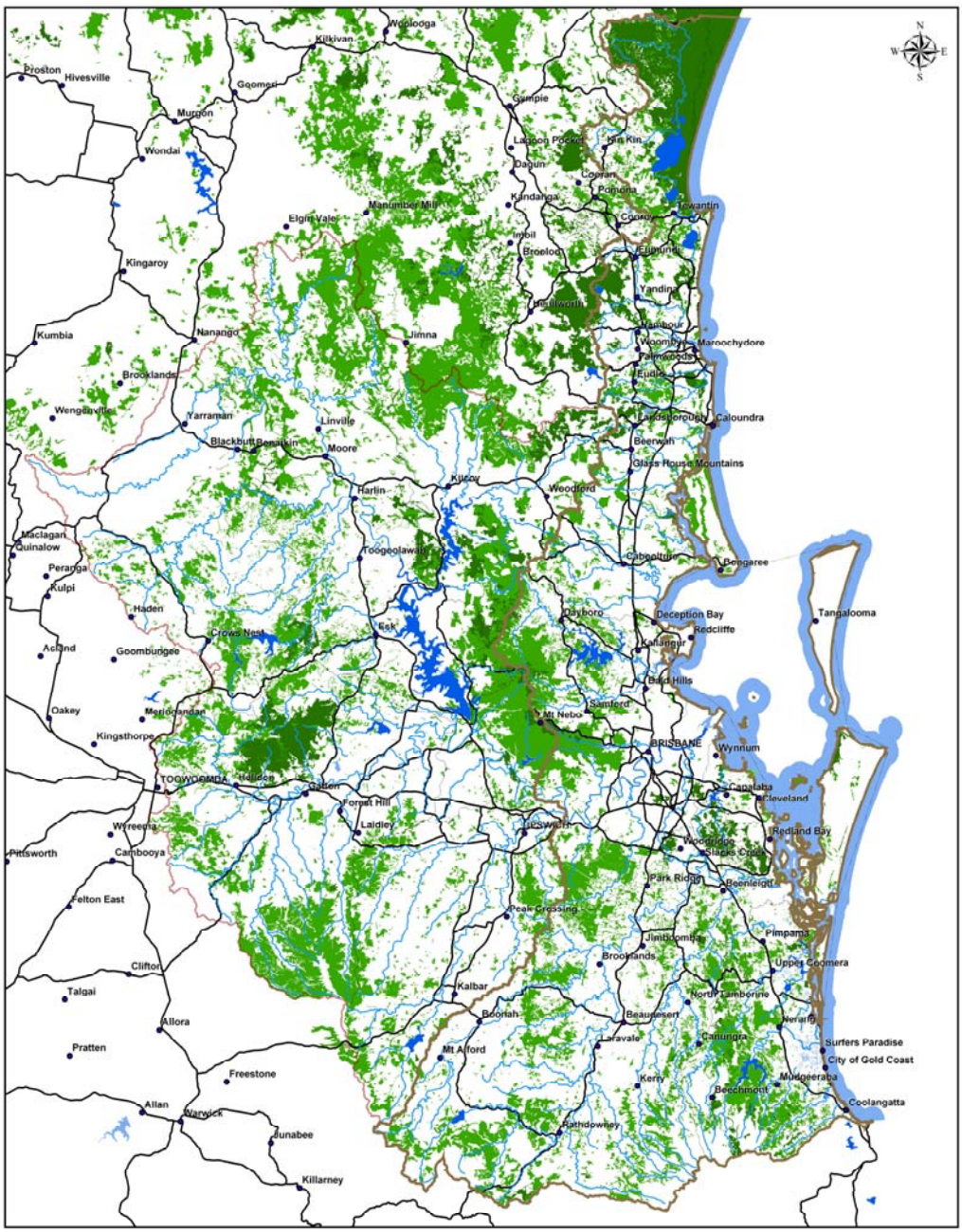
Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

NRMSEQ
Natural Heritage Trust



Core Habitat for Priority Taxa
Regional Landscape Assessment

Version: October 31 2005

Legend

Towns
NRMSEQ_Region
WQG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Floods
SEQ_PTaxa
Local
Regional
State

10 5 0 10 20 30 40 Kilometers

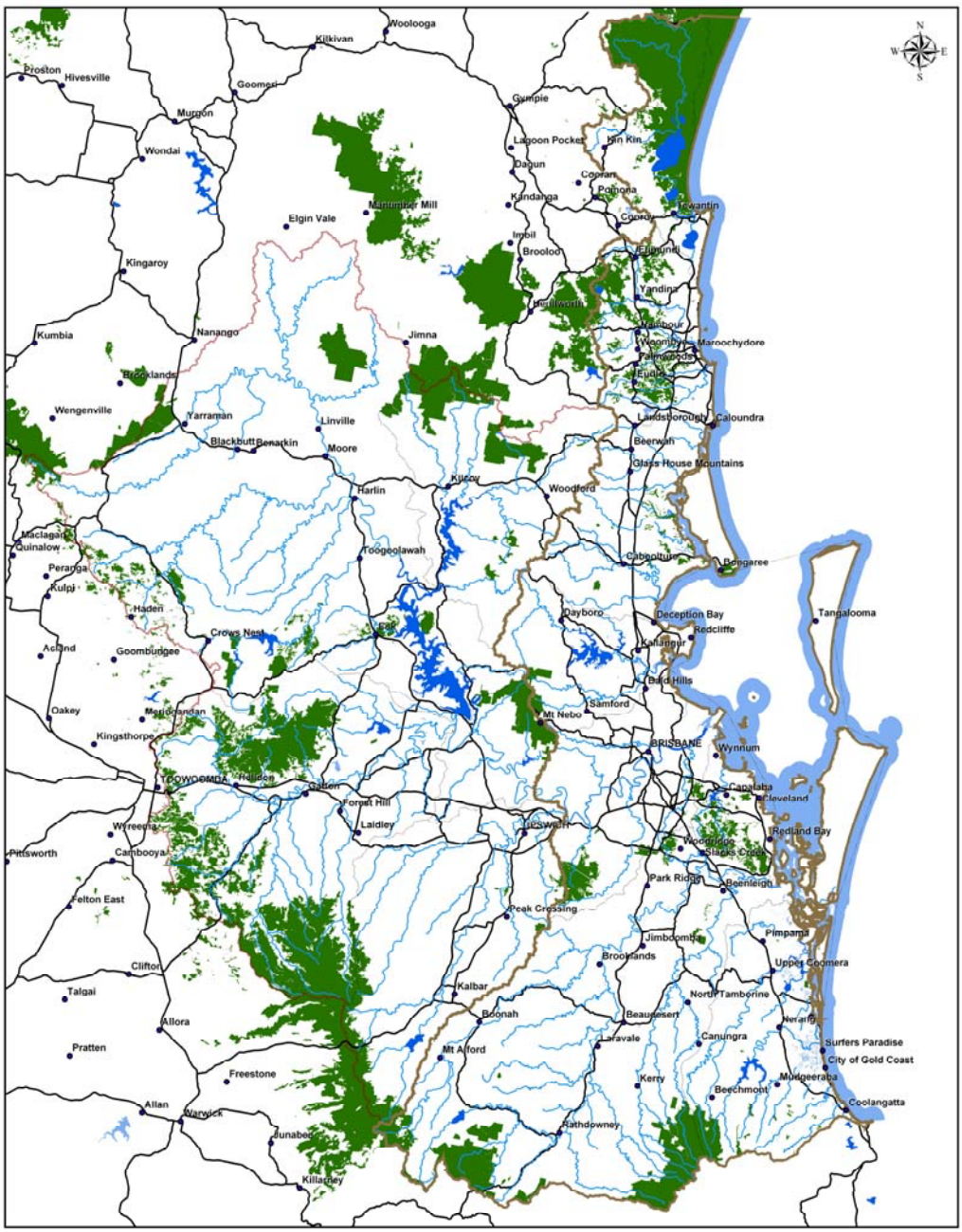
Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

NRMSEQ
Natural Heritage Trust



Special Biodiversity Values
Regional Landscape Assessment

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Version: October 31 2005

Legend

Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
SEQ_Special
Y

10 5 0 10 20 30 40 Kilometers

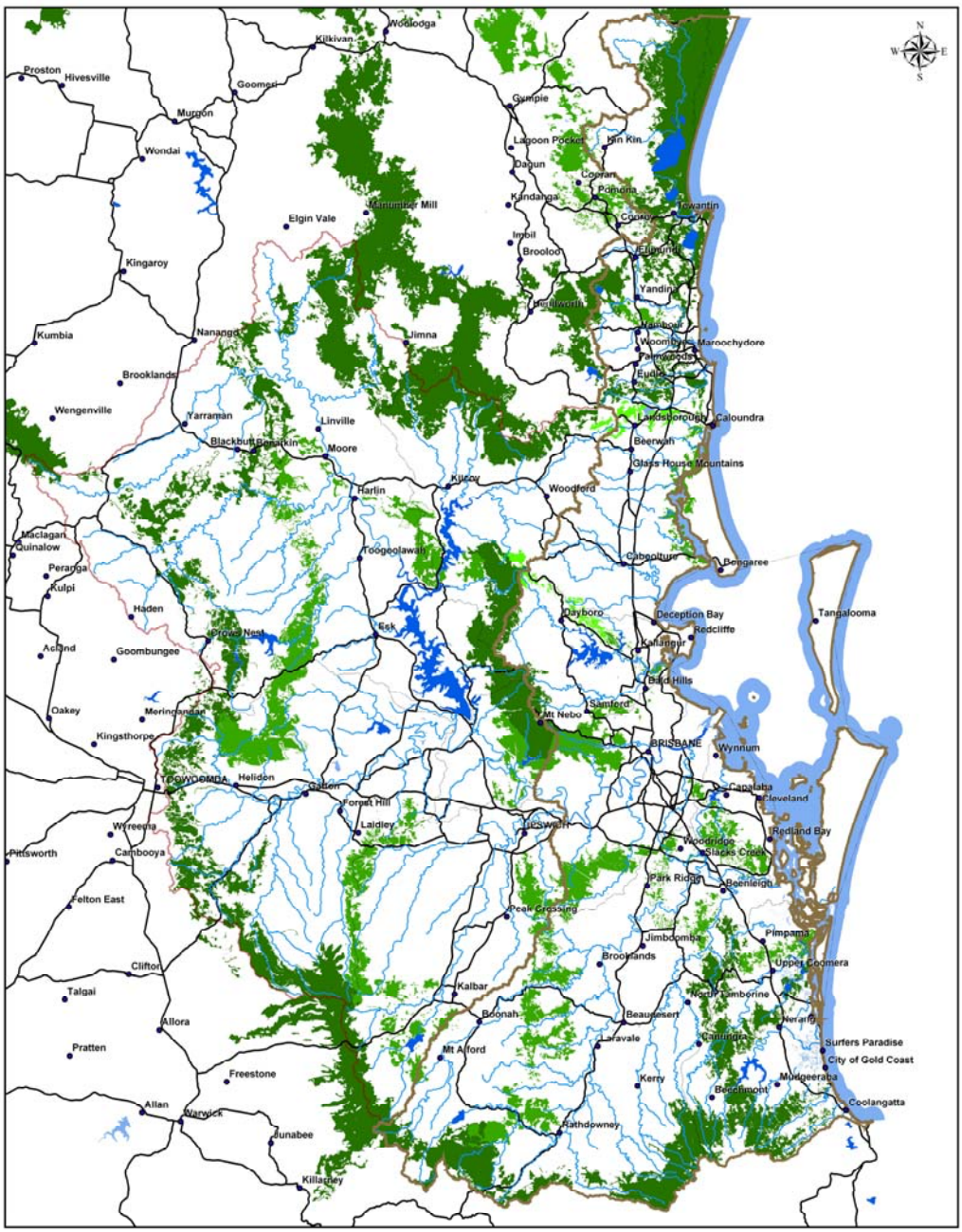
Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

NRMSEQ
Natural Heritage Trust



Corridors
Regional Landscape Assessment

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

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Version: October 31 2005

Legend

Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
SEQ_Corridor
Rehab
Local
Regional
State

Natural Asset Layer Two: Landscape Layer

The following RCT maps were produced to form the Landscape Asset Layer:

1. Acid Sulfate Soils
2. Soil Acidity
3. Salinity Risk
4. Soil Erosion
5. Loss of Scenic Amenity
6. Land Use Compatibility
7. Weeds

1. Acid Sulfate Soils

RCT addressed in NRM Plan - RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures.

Mapping of the presence or absence of acid sulfate soils i.e. a warning that any disturbance of these soils would impact on the achievement of RCTs was supplied by NR&M as a product from Natural Heritage Trust Phase One funding at a scale of 1:50,000 with some areas at 1:25,000.

Presence scored as a 4, absence scored as a 0, with no intermediate values.

2. Soil Acidity

RCT addressed in NRM Plan - RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures; and

RCT 5: A reduction in the percentage of the catchment affected by soil health decline.

Available data limited options for assessment of risks to soil health. Soil acidity (buffer capacity) was identified as an appropriate surrogate layer. This surrogate layer was generated by combining land use mapping (intensity) with soil order mapping. It estimates the risk of soil acidity affecting soil health and is grouped into high, medium and low categories. The expert panel identified soil acidity as a potentially major threat to the health of our soil assets. This threat has not been adequately measured, understood or addressed.

Land Use maps from the Queensland Land Use Mapping Programme (QLUMP) were used to estimate the intensity of land use across SEQ and hence the potential for overuse of artificial or inorganic inputs such as fertiliser, or intensive machinery use. These uses subject 'at risk soil types' to soil acidification processes with resultant loss of health, structure and productivity.

Table 1 - Land uses and their assigned land use intensity ratings. (H high; M medium; L low; 0 no risk)

Land Use	Rating
Cropping	M
Grazing Natural Vegetation	L
Intensive Animal Production	H
Intensive Horticulture	L
Irrigated Cropping	M
Irrigated Plantation Forestry	L
Irrigated Seasonal Horticulture	L
Lake	O
Managed Resource Protection	O
Manufacturing and Industrial	O
Marsh/Wetland	O
Mining	O
Nature Conservation	O
Other Minimal Use	O
Perennial Horticulture	M
Plantation Forestry	L
Production Forestry	L
Reservoir/Dam	O
Residential	O
River	O
Seasonal Horticulture	L
Services	O
Transport and Communication	O
Utilities	O
Waste Treatment and Disposal	O

The inherent properties of the soil types in SEQ were also scored, based on their ability to buffer against acidification due to the different intensities of land use described above.

Table 2 – pH Buffer Capacity rating of various soil orders

Soil Order	**pH Buffer Capacity Rating H- high; M – medium; L – low.**
Organosol	H
Rudosol	M
Tenosol	L
Podosol	L
Vertosol	H
Hydrosol	M
Kurosol	L
Sodosol	L
Chromosol	M
Calcarosol	M
Ferrosol	H
Dermosol	M
Kandosol	L

These two tables were combined in the matrix in table 3 to produce the soil health/acidity risk Resource Condition Target Map. High risk was scored 4, Medium 3, Low 2 and no risk 1.

Table 3 - Soil Health Risk Scores based on pH buffer capacity and intensity of land use

	Land Use Intensity Rating		
	Low	Medium	High
pH Buffer Capacity Rating			
Low	3	4	4
Medium	2	3	4
High	2	2	3

3. Salinity Risk

RCT addressed in NRM Plan - RCT 1: Area of salinity incidence across SEQ no greater than current extent by 2009; and

RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures.

Salinity Hazard Mapping has been conducted for the regions of Queensland designated under the National Action Plan for Salinity and Water Quality (NAPSWQ). Mapping for many other regions such as the SEQ NHT Region does not exist.

Given there is no salinity hazard mapping available for eastern catchments in SEQ, the expert panel considered the outputs generated from Fuzzy Logic And Groundwater (FLAG) modelling (Roberts et al., 1997) to be a suitable surrogate layer for salinity hazard. FLAG maps the locations in the landscape where there is a high convergence of discharge based on surface drainage. If adjacent catchment management disturbs natural flow regimes, these locations are potentially areas of the landscape where salts may accumulate, especially if water tables rise.

The results from this mapping were tested against known salinity outbreaks and the SEQ Western Catchments salinity hazard mapping and displayed reasonable correlation.

Islands and low, flat areas on coastlines were not included in salinity risk assessment as FLAG cannot operate in these landscapes.

The FLAG index value was classified into 2 categories, low (1) and very high (4) to produce the Salinity Risk Map. The classification was determined by comparing the FLAG output against the known salinity sites in SEQ.

As with all the Resource Condition Target maps, salinity risk mapping highlights areas for further investigation.

4. Soil Erosion

RCT addressed in NRM Plan - RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures; and

RCT 4: Vegetation cover (incorporating grasses, shrubs, trees etc) is greater than 70% where vegetation cover is appropriate to erosion risk – eg groundcover in cleared areas, and tree cover in forested areas.

The generation of the hillslope erosion hazard surface is based on the Universal Soil Loss Equation (USLE) (Wischmeier and Smith, 1978). The average annual soil loss (t/ha/yr) generated from the USLE is used in the RLA as the erosion hazard surface. The USLE is an empirical relationship designed to calculate long term average soil losses from sheet and rill erosion under specified conditions. A newer and more accurate method for calculating the effect of slope, steepness and slope length (Rosewell, 1993), the revised USLE (RUSLE) is used. The equation takes the form

A = R x K x L x S x C x P

Where:

A is the annual average soil loss (t/ha/yr),
R is the rainfall erosivity factor (MJ/mm/ha/hr/yr), a measure of the erosive power of the rain,
K is the soil erodibility factor, a measure of the resistance of soil to erosion,
L is the slope length factor,
S is the slope steepness factor,
C is the crop and cover management factor,
P is the support practice factor, a measure of the effect on erosion of soil conservation measures such as contour cultivation and bank systems (Rosewell, 1993).

The RUSLE predicts primarily sheet erosion, not gully erosion.

The C factor is based on an interpretation of the Queensland Land Use Mapping Program (QLUMP, 2004) data using foliage protective cover values determined from a review of the current literature. The QLUMP data are derived from automatic classification of 1999 Landsat TM satellite imagery refined by field checking. A full description of the methods used to generate the data can be found at the NR&M website[1].

In order to represent the model spatially, each of the terms in the equation is generated as a raster surface and combined in GIS. The method described by Lu et al. (2001) was used, with a number of minor modifications.

[1] http://nrm/science/lump/methodology

This RCT Map is expressed as an output of the RUSLE in total tonnes of soil lost per hectare per annum ranked using a 4 class quantile. A quantile classification is one in which each class contains an equal number of features. A quantile classification is well suited to linearly distributed data.

A Quantile is a view or surface of an area in a GIS map.

5. Loss of Scenic Amenity

RCT supported in NRM Plan – RCT 12: The amenity values of the landscape, and the scientific, recreation and tourism values on State land are maintained.

In order to measure valued societal aspects of amenity and scenery, the Councils of SEQ funded Stage 1 of the SEQ Scenic Amenity Study. This will provide planning bodies with a map highlighting areas of SEQ expressing the preferred views of our regional society. Obviously, it is essential these preferred views are not lost to processes such as development or other land use impacts.

The Study rated people's preferences for the broad range of scenery in SEQ on a scale of 1-10, with the higher end being of high scenic preference.

The 2005 SEQ RLA has used the scenic preference RCT map to highlight potentially significant components of preferred scenery such as escarpments, coastal, rural and urban landscapes, bushland and waterways. These critical lifestyle amenities maybe lost through threats such as inappropriate development, vegetation loss and water quality decline.

The 2005 SEQ RLA used preferences in the range of 1-10 and these were reclassified to a 1-4 quantile class system.

6. Land Use Compatibility

RCT addressed in NRM Plan - RCT 3: 25% of land in the region used within its capability (land uses to be managed to the level of recommended practice).

This RCT map was adopted as a surrogate map to express RCT 3 – Salinity Risk Map.
The proposition was that high intensity land use was not compatible with Class C1/C2 and CD/D land under the Agricultural Land Class System (Land Resources Branch Staff, 1990).

Land use from QLUMP was compared against the Land Classes mapping supplied by NR&M to determine how well the current land use matched the capability of that land to support that land

use (Table 4). eg land use on Class C1/C2 and CD/D scored 3 and 4 respectively. This interpretation was conducted by staff in the Natural Resource Sciences section of NR&M.

Table 4 – Scores for Current Landuse on Agricultural Land Classes

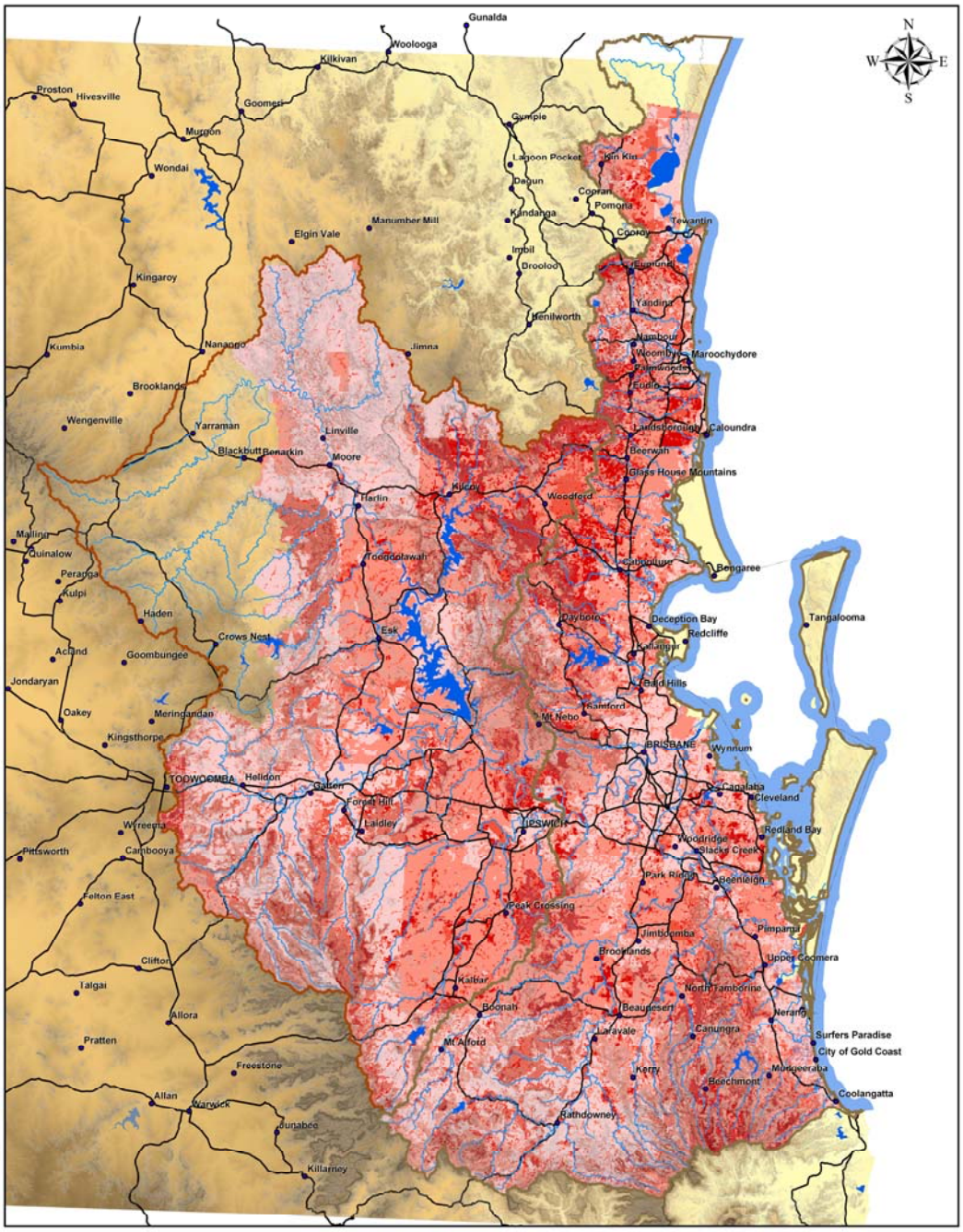
Current Land Use	A	B	C1/C2	CD/D
Cropping	1	2	3	4
Grazing Natural Vegetation	1	1	1	4
Intensive Animal Production	4	3	1	1
Intensive Horticulture	1	2	3	4
Irrigated Cropping	1	2	3	4
Irrigated Perennial Horticulture	1	2	3	4
Irrigated Plantation Forestry	2	2	2	4
Irrigated Seasonal Horticulture	1	2	3	4
Managed Resource Protection	4	3	2	1
Manufacturing and Industrial	4	3	2	1
Marsh/Wetland	0	0	0	0
Mining	0	0	0	0
Nature Conservation	4	3	2	1
Other Minimal Use	4	3	2	1
Perennial Horticulture	1	2	3	4
Plantation Forestry	4	3	2	1
Production Forestry	4	3	2	1
Reservoir/Dam	4	3	2	1
Residential	0	0	0	0
River	0	0	0	0
Seasonal Horticulture	1	2	3	4
Services	0	0	0	0
Transport & Communication	0	0	0	0
Utilities	0	0	0	0
Waste Treatment & Disposal	0	0	0	0

7. Weeds

RCT addressed in NRM Plan – RCT 6: The area, extent and density of identified priority weeds being addressed by regional bodies or community projects remains within the boundaries of ecological sustainability.

The RCT Map is based on the presence of 46 weed species as mapped by a Technical Panel of NR&M Land Protection Officers (Appendix 4). The 20 km grid cells presents a very “blocky” map. However, in the absence of other regional mapping, it was accepted by the RLA Panel. It was

recognised that some Councils and community groups have produced mapping at finer and more useful scales. This mapping will be included in future RLAs.



Natural Asset Layer - Landscape
Regional Landscape Assessment

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Version: January 18 2005

Legend

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

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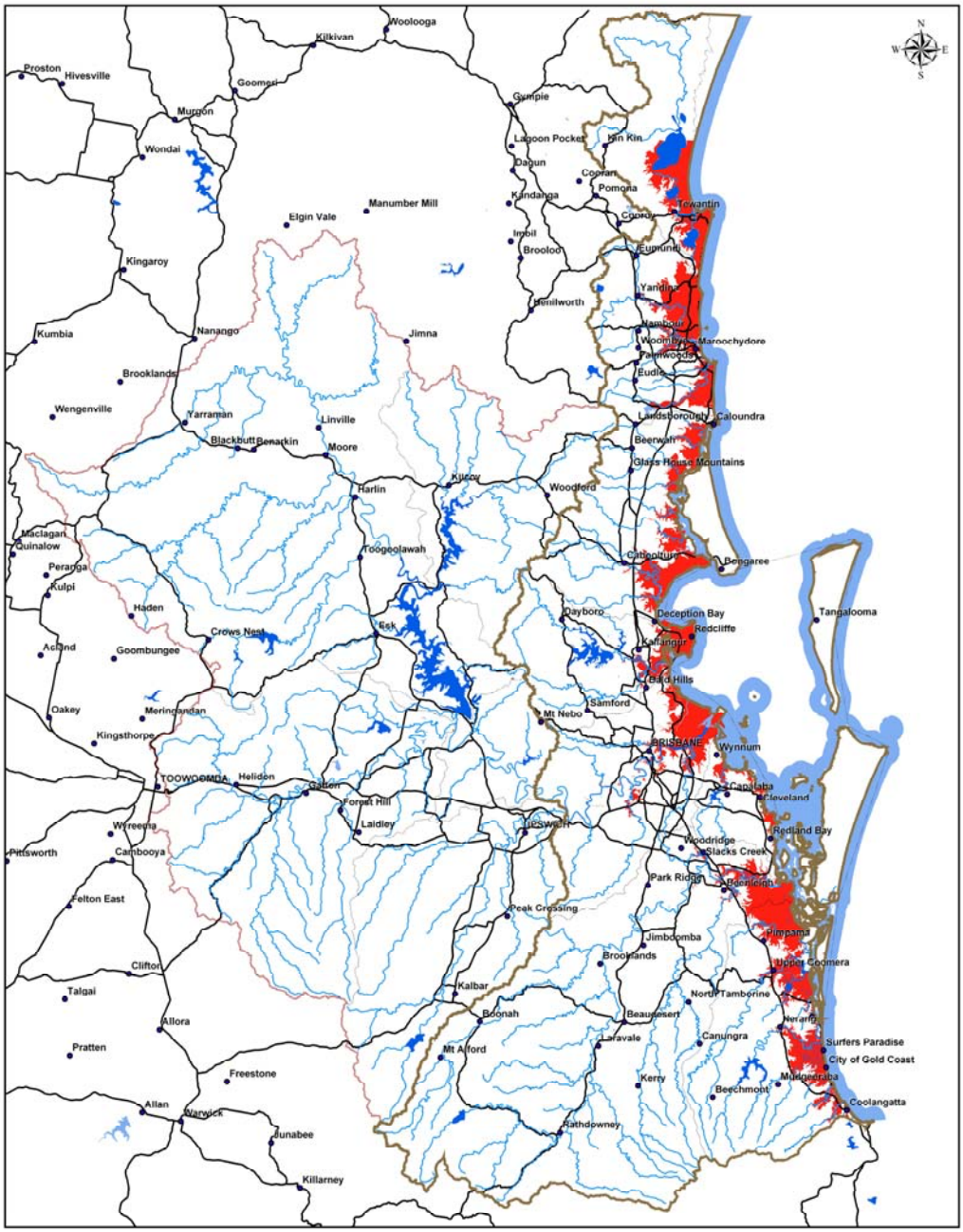
Wooloolga
Kilkivan
Proston
Hivesville
Goomeri
Murgon
Wondai
Gympie
Lagoon Pocket
Kin Kin
Dagun
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Pomona
Kandanga
Manumber Mill
Elgin Vale
Imbil
Brooloo
Tewantin
Cooroy
Eumundi
Kingaroy
Yandina
Nambour
Woombye
Maroochydore
Palmwoods
Eudlo
Kumbia
Nanango
Jimna
Brooklands
Wengenville
Yarraman
Linville
Blackbutt
Benarkin
Moore
Landsborough
Caloundra
Beerwah
Glass House Mountains
Kilcoy
Harlin
Woodford
Maclagan
Quinalow
Toogeolawah
Caboolture
Bongaree
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Haden
Dayboro
Deception Bay
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Tangalooma
Crows Nest
Esk
Acland
Goombungee
Kallangur
Bald Hills
Oakey
Meringandan
Samford
Mt Nebo
Kingsthorpe
BRISBANE
Wynnum
TOOWOOMBA
Helidon
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Cleveland
Redland Bay
Woodridge
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Pittsworth
Cambooya
Park Ridge
Beenleigh
Felton East
Peak Crossing
Jimboomba
Pimpama
Brookfield
Upper Coomera
Clifton
Talgai
Kalbar
North Tamborine
Boonah
Beaudesert
Allora
Canungra
Surfers Paradise
Pratten
Mt Alford
Laravale
City of Gold Coast
Freestone
Kerry
Mudgeeraba
Beechmont
Allan
Warwick
Coolangatta
Rathdowney
Junabee
Killarney
N
W
E
S
Acid Sulfate Soils Hazard
Regional Landscape Assessment
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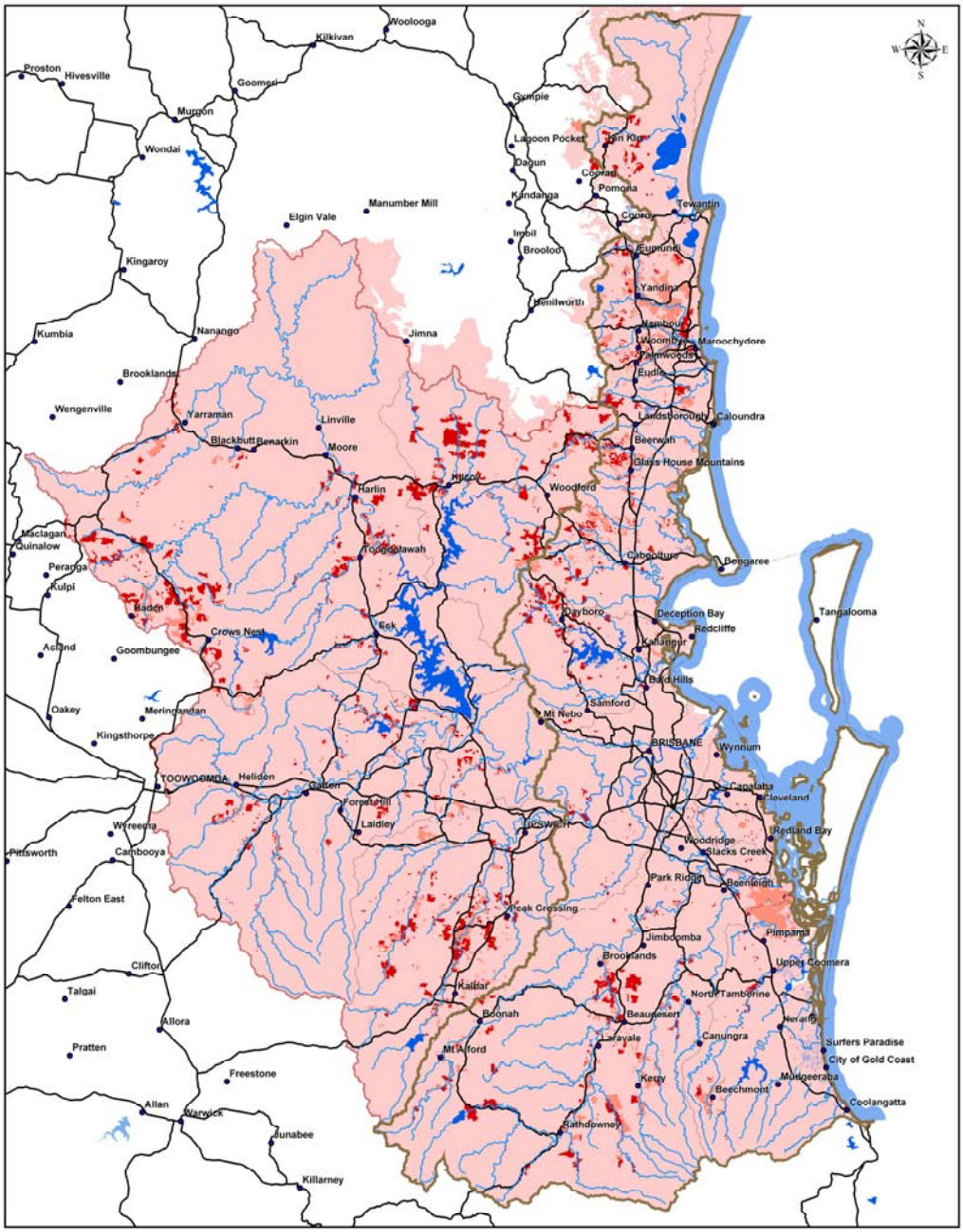
Version: October 31 2005
Legend
Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
Acid_Sulfate_Hazard
0 Absence
4 Presence
10 5 0 10 20 30 40 Kilometers
Scale 1:750,000
GDA
Albers Equal Area Projection
Data Sources
EPA, DNRM, MBWCP, DPIF
Proudly Supported By
NRMSEQ
Natural Heritage Trust


Wooloolga
Kilkivan
Proston
Hivesville
Goomeri
Murgon
Wondai
Gympie
Lagoon Pocket
Tin Kin
Dagun
Conrad
Pomona
Kandanga
Manumber Mill
Elgin Vale
Tewantin
Cooroy
Imbil
Brooloo
Eumundi
Kingaroy
Yandina
Nambour
Kumbia
Nanango
Jimna
Woombye
Maroochydore
Mooloolah
Brooklands
Eudlo
Wengenville
Yarraman
Landsborough
Caloundra
Linville
Blackbutt
Benarkin
Moore
Beerwah
Glass House Mountains
Kilcoy
Harlin
Woodford
Maclagan
Quinalow
Toogoolawah
Caboolture
Beerburrum
Peranga
Kulpi
Dayboro
Deception Bay
Tangalooma
Redcliffe
Esk
Crows Nest
Goombungee
Kalangur
Bald Hills
Samford
Oakey
Meringandan
Mt Nebo
Kingsthorpe
BRISBANE
Wynnum
TOOWOOMBA
Helidon
Gatton
Forest Hill
Laidley
Cleveland
Redland Bay
Woodridge
Slacks Creek
Pittsworth
Cambooya
Park Ridge
Beenleigh
Felton East
Peak Crossing
Jimboomba
Pimpama
Clifton
Brooklands
Upper Coomera
Talgai
Kalbar
North Tamborine
Allora
Boonah
Beaudesert
Pratten
Mt Alford
Canungra
Surfers Paradise
City of Gold Coast
Freestone
Kerry
Mudgeeraba
Allan
Warwick
Beechmont
Coolangatta
Bathdowney
Junabee
Killarney
N
W
E
S
Soil Acidity Risk
Regional Landscape Assessment
10 5 0 10 20 30 40 Kilometers
Scale 1:750,000
GDA
Albers Equal Area Projection
Data Sources
EPA, DNRM, MBWCP, DPIF
Legend
Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
Soil Acidity Risk
1 No Risk
2 Low
3 Medium
4 High
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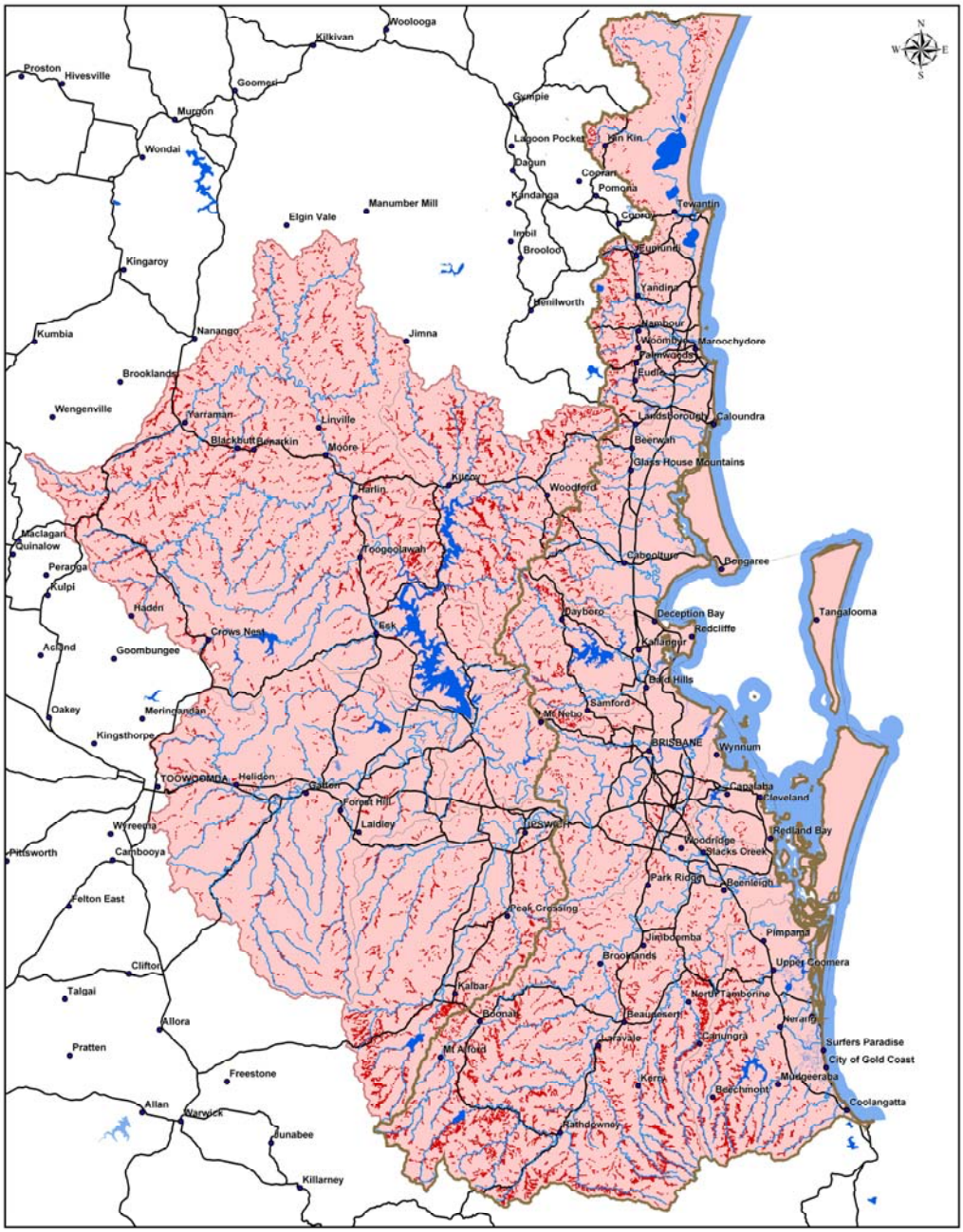


Salinity Risk
Regional Landscape Assessment

Version: October 31 2005

Legend

Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
Salinity Risk
1 Low Risk
4 Very High

10 5 0 10 20 30 40 Kilometers

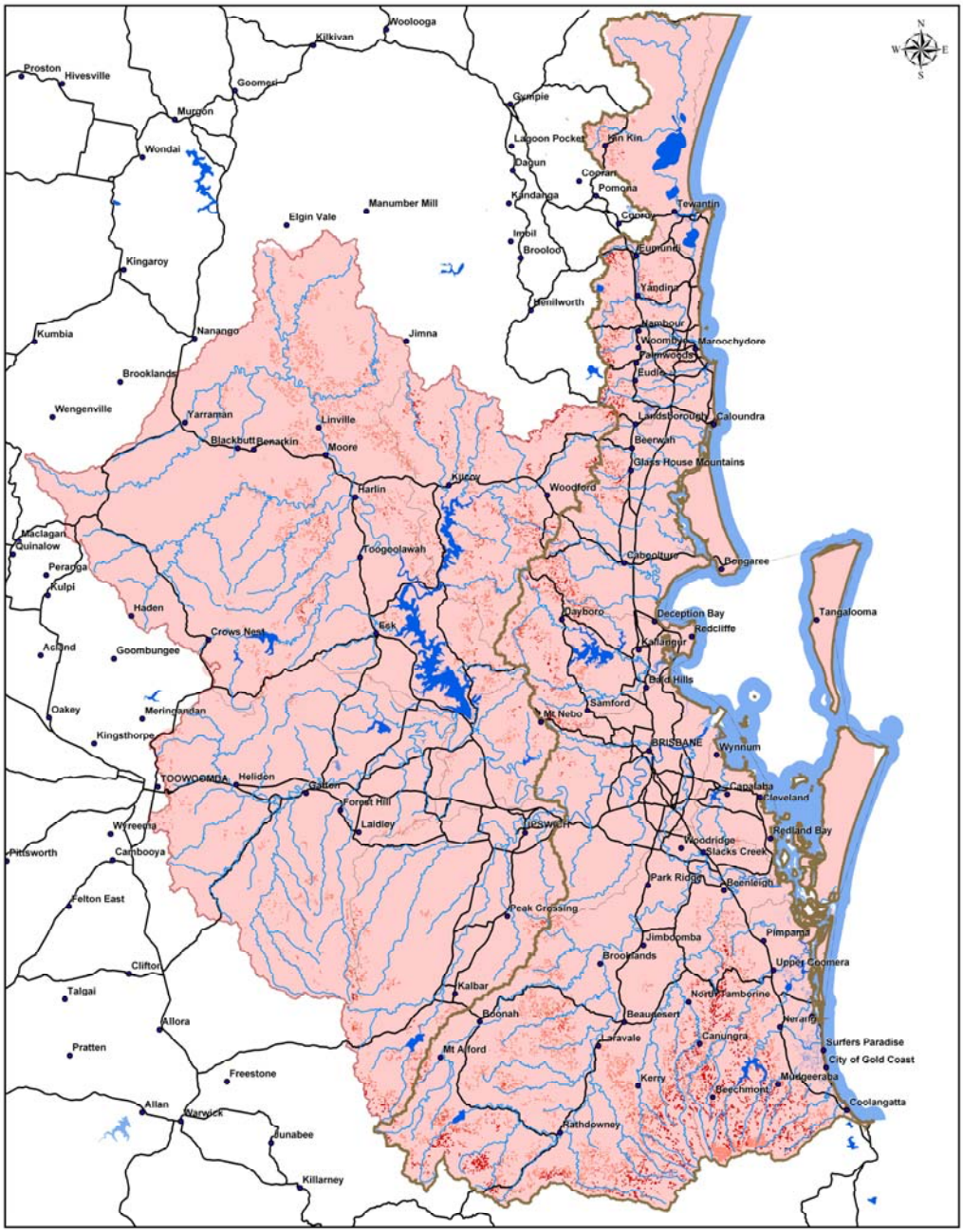
Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

NRMSEQ
Natural Heritage Trust



Soil Erosion Risk
Regional Landscape Assessment

Version: October 31 2005

Legend
Towns
NRMSEQ_Region
WCG_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
Soil Erosion Risk
1 Low_Risk
2 Medium
3 High
4 Very High

10 5 0 10 20 30 40 Kilometers

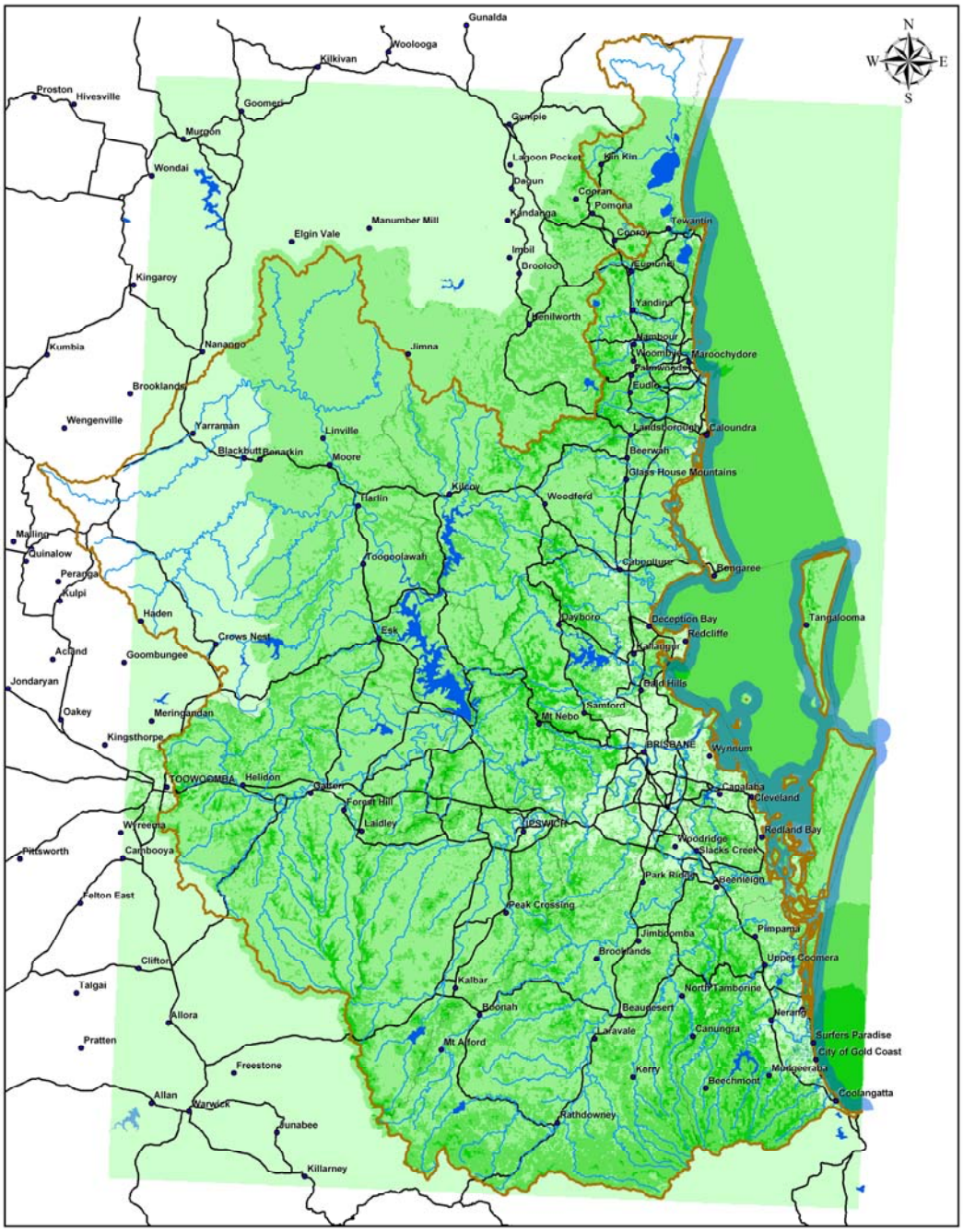
Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

NRMSEQ
Natural Heritage Trust



Scenic Amenity Hazard

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Version: October 31 2005

Legend

Towns
SEQCatchments_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads

Scenic Amenity: 1, 2, 3, 4

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

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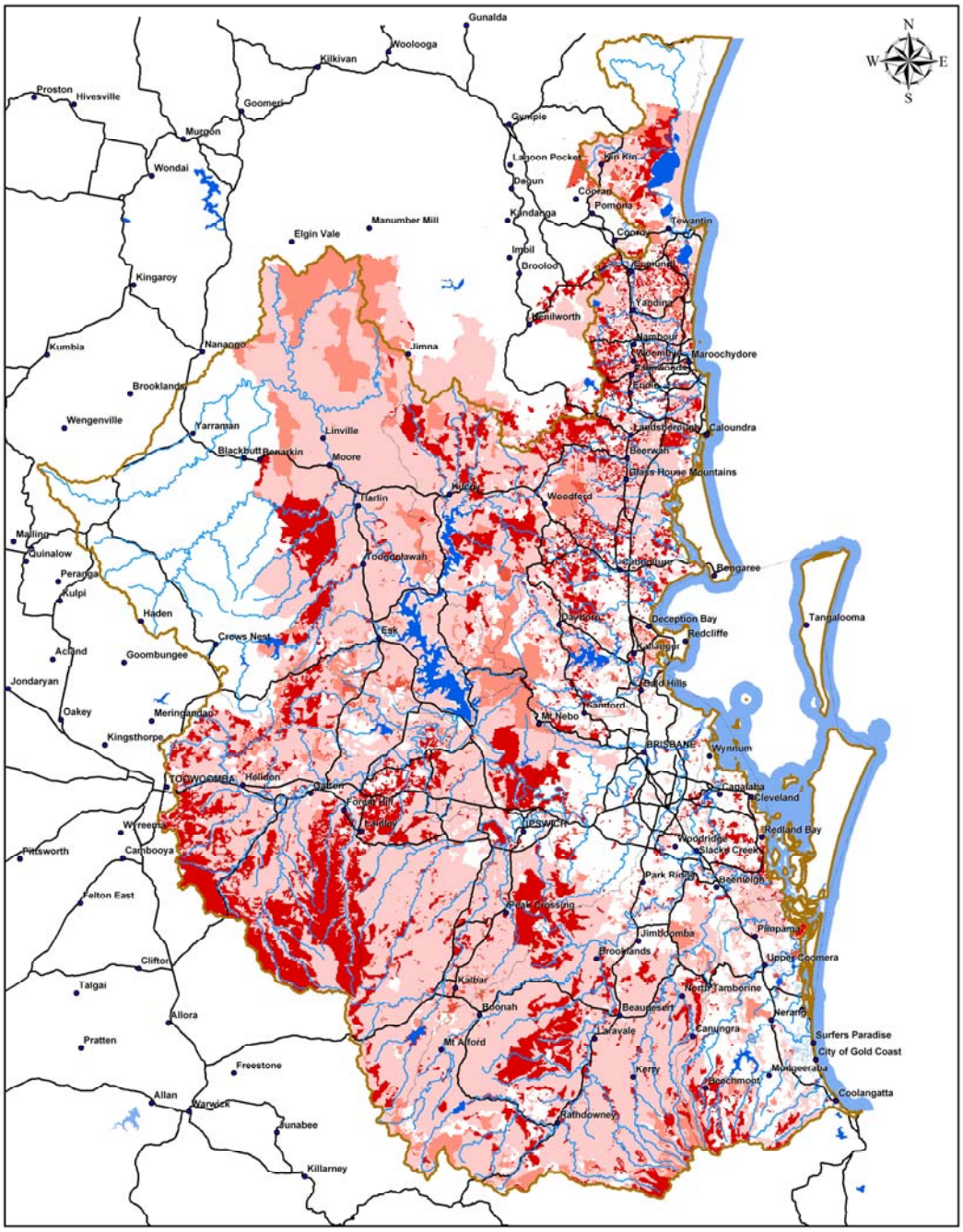

Land Use Compatibility

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Version: January 18 2005

Legend

Towns
SEQCatchments_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
Landuse Risk
1
2
3
4

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA

Albers Equal Area Projection

Data Sources

EPA, DNRM, MBWCP, DPIF

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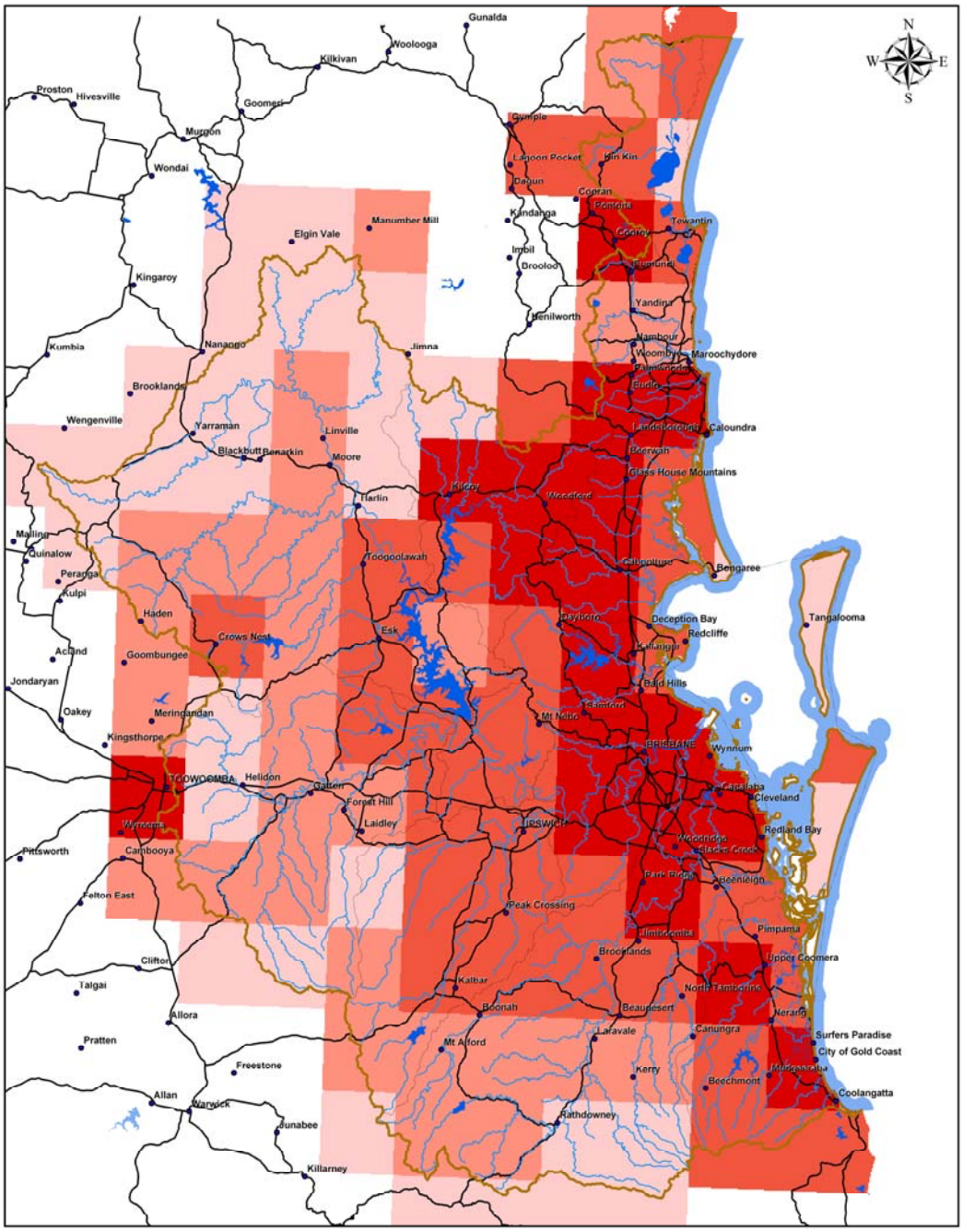
Natural Heritage Trust



Weeds Hazard

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Version: January 18 2005

Legend

Towns
SEQGetchments_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
Weeds Hazard
High : 4
Low : 1

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA

Albers Equal Area Projection

Data Sources

EPA, DNRM, MBWCP, DPIF

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Natural Asset Layer Three: Water Quality Layer

RCT Maps already existed for this Layer as outputs from the MBWCP Environmental Management Support System (EMSS).

1. **Subcatchment Total Nitrogen** (Provided by Moreton Bay Waterways and Catchments Partnership - Score 1 to 4)

RCT Addressed in NRM Plan - RCT 22: Levels of nutrients in aquatic ecosystems meet objectives set forward in SEQRWQMS and its successors.

2. **Subcatchment Total Phosphorus** (Provided by Moreton Bay Waterways and Catchments Partnership - Score 1 to 4)

RCT Addressed in NRM Plan - RCT 22: Levels of nutrients in aquatic ecosystems meet objectives set forward in SEQRWQMS and its successors.

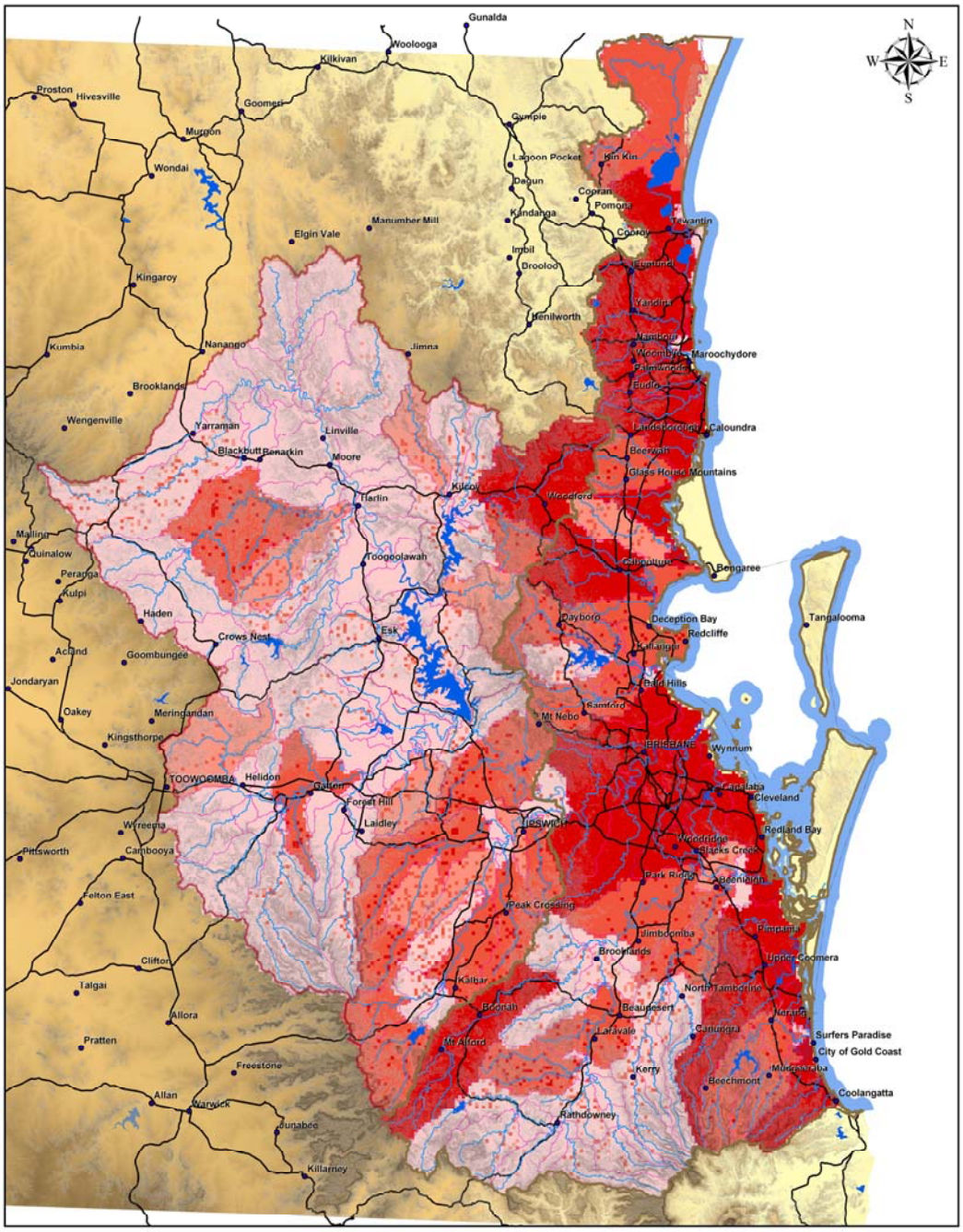
3. **Subcatchment Total Suspended Solids** (Provided by Moreton Bay Waterways and Catchments Partnership - Score 1 to 4)

RCT Addressed in NRM Plan - RCT 21: Toxicants in water, sediment and biota meet standards of Australian Water Quality Guidelines

The EMSS was based on 2002 land use as developed by the MBWCP. The model results are the average of an 11 year simulation extending from the beginning of 1990 to the end of 2000 and as such represent a range of wet, dry and average years.

The loads are diffuse only, no point sources (e.g. Sewerage Treatment Plant's) have been included.

These three Resource Condition Maps were combined and reclassified from 1-4 to score the Water Quality Natural Asset Layer.



Natural Asset Layer - Water
Regional Landscape Assessment

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Version: January 18 2005

Legend

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

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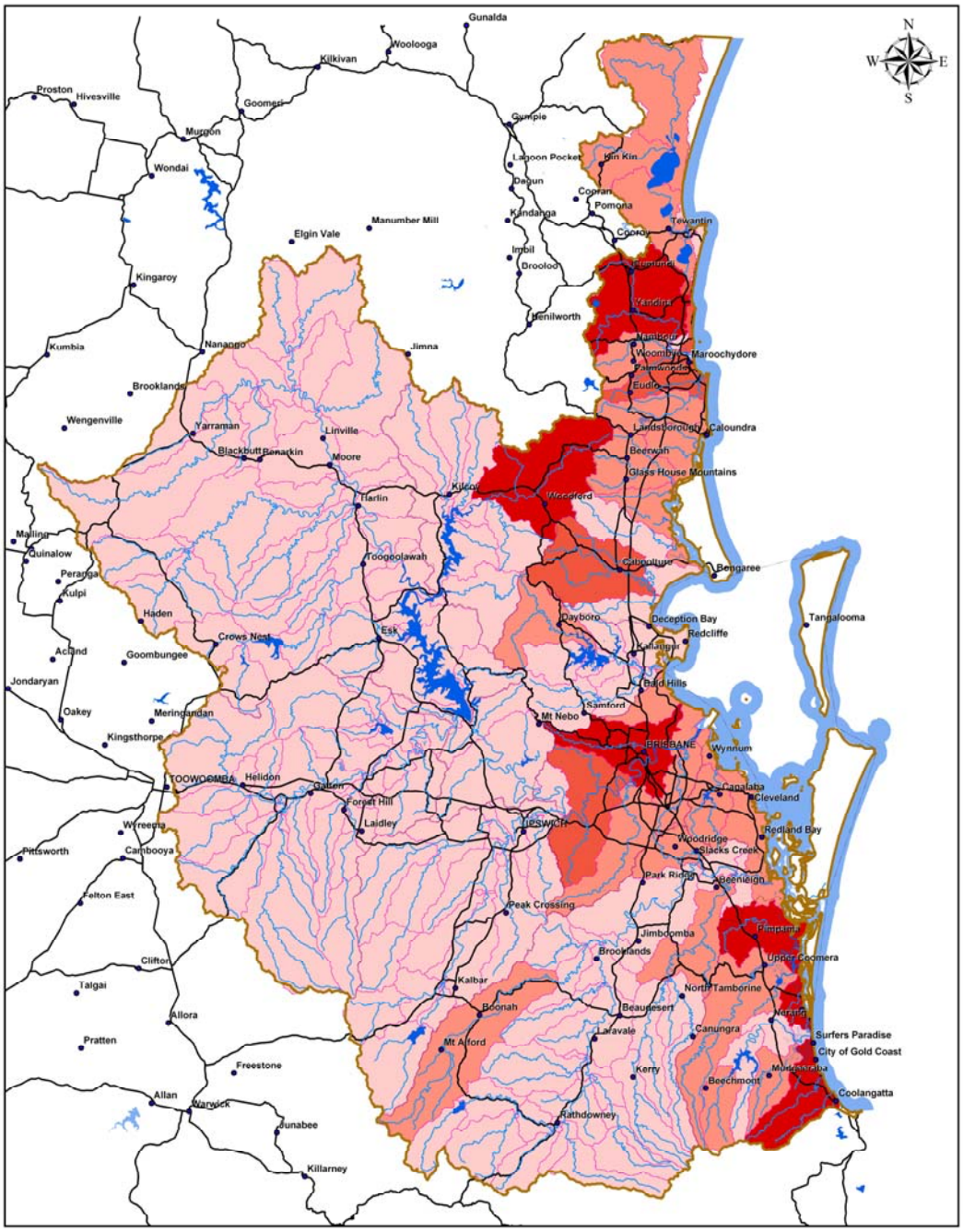

Total Nitrogen

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Version: January 18 2005

Legend

Towns
SEQCatchments_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
EMSG_loads
EMSG_loads
tn_final
1 Low Loads
2 Medium
3 High
4 Very High

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

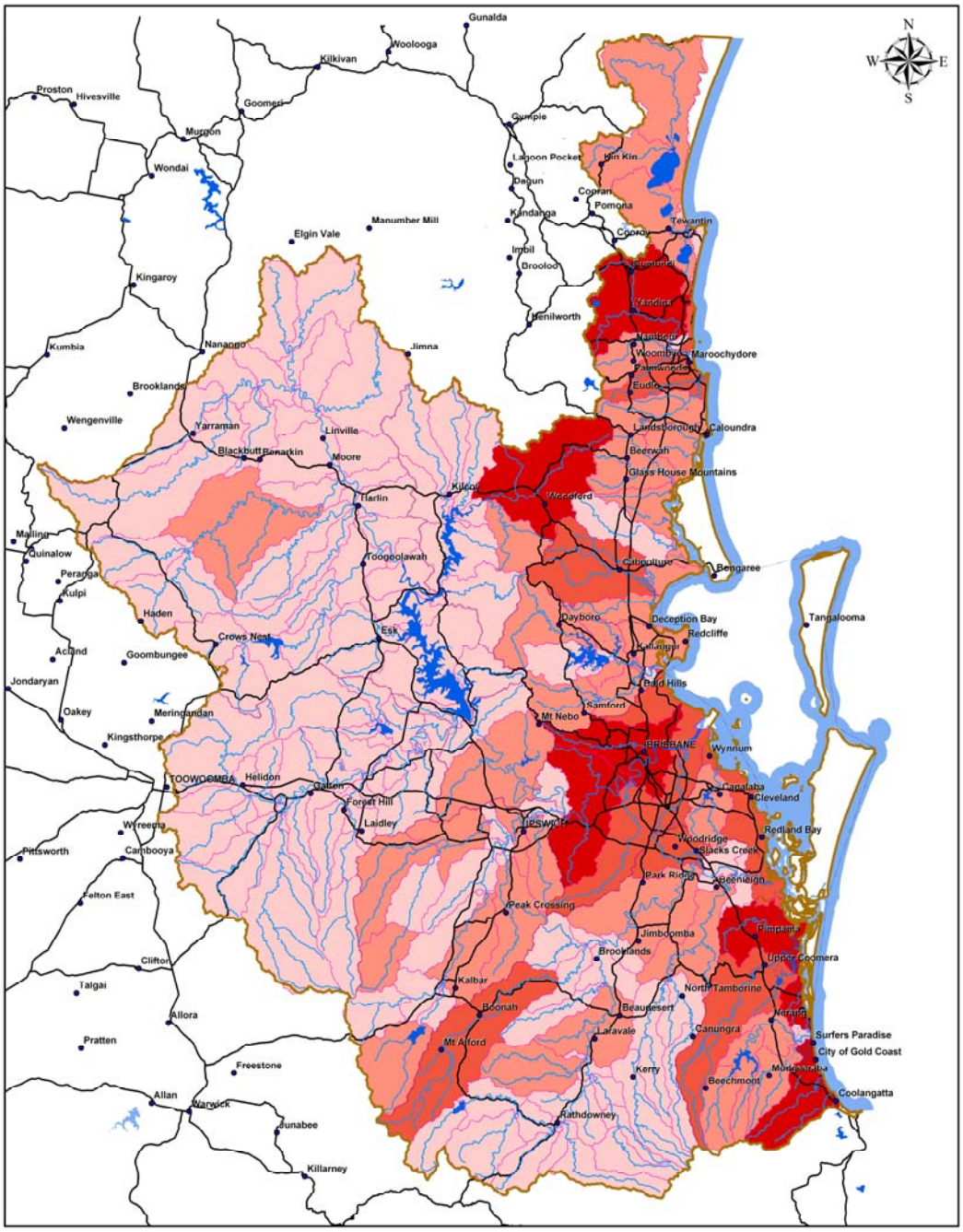
GDA
Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

NRMSEQ

Natural Heritage Trust



Total Phosphorus

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Version: January 18 2005

Legend

Towns
SEQCatchments_Region
Catchment_Boundaries
SEQ_Waterways
Reservoirs_Water
Major_Roads
EMSN_loads
EMSN_loads
tp_final
1 Low Loads
2 Medium
3 High
4 Very High

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA

Albers Equal Area Projection

Data Sources

EPA, DNRM, MBWCP, DPIF

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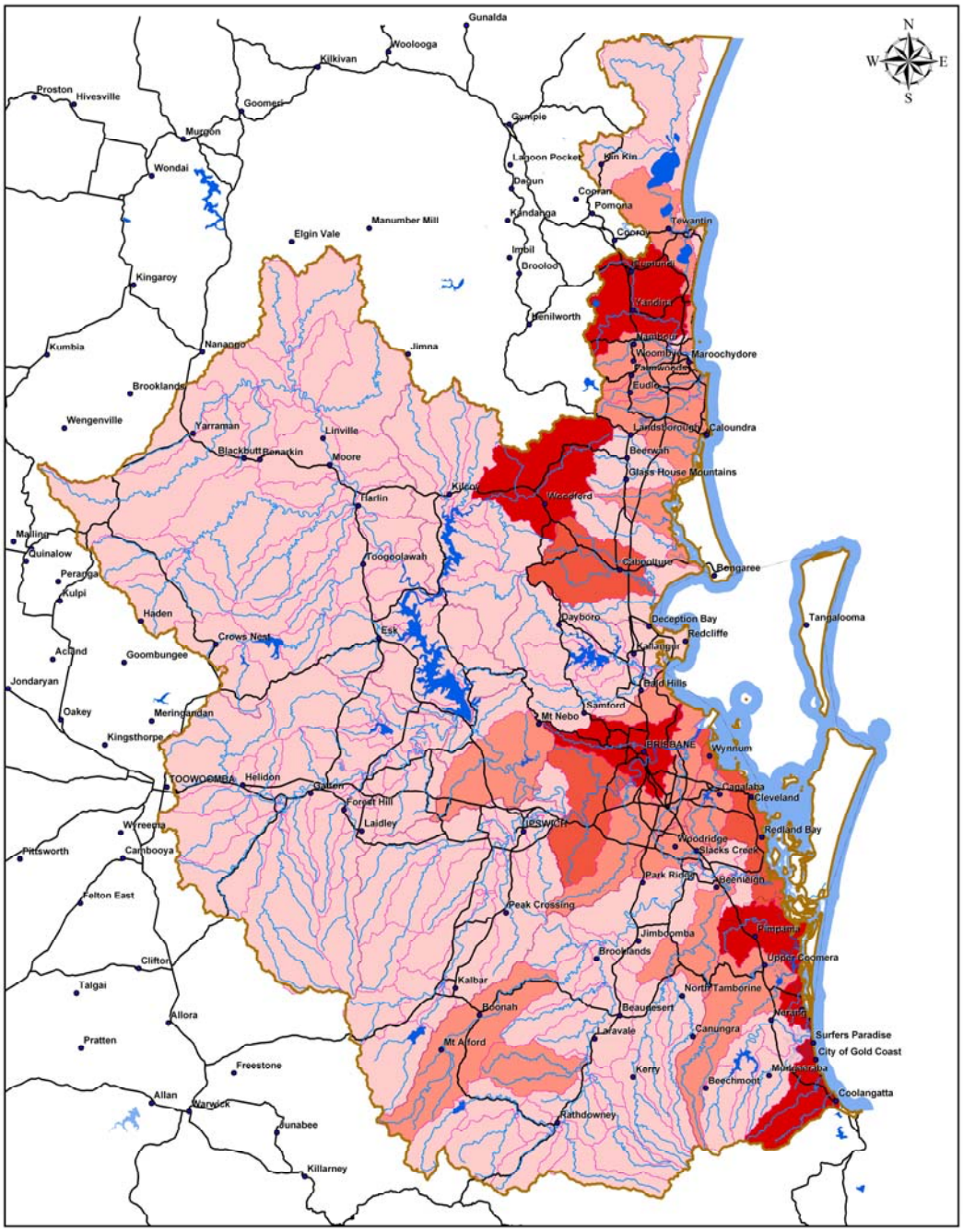

Total Suspended Solids

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Version: January 18 2005

Legend

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA

Albers Equal Area Projection

Data Sources

EPA, DNRM, MBWCP, DPIF

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Additional RCT Layers

After the Confluence of Issues Map was produced, a number of other RCT layers came into existence. These layers were used to qualify Key Investment Areas and will be included in future Regional Landscape Assessments. The four additional layers are:

1. Landslip
2. Stream Vegetation
3. Wildnet Density
4. The Office of Urban Management (OUM) urban footprint, regional landscapes and investigation area mapping.

1. Landslip

RCT addressed in NRM Plan - RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures.

The landslip risk map was derived from the South East Qld Digital Elevation Model (DEM) and the Statewide Land and Tree Study (SLATS) SEQ 2003 Woody Vegetation mapping supplied by NR&M. A slope map was generated from the DEM as well as a mask of areas that had no woody vegetation. Masking produced a map of sloped areas that had no woody vegetation. Slopes over 45 degrees (1:1) were considered likely to be rock and of lower risk. Slopes under 12 degrees (1:8) were also assumed to have a lower risk. The remaining areas were marked as having landslip risk. The next version of this map will include geology and climate information for further refinement. This layer was not combined with the other RCT layers due to time constraints. However it was used as supplementary information to further prioritise between and within KIAs.

Definition of Mask – A mask is an area or polygon that is used to clip out and area of interest from a raster surface.

2. Stream Vegetation

RCTs supported in NRM Plan - RCT 13: River Condition is improved from current state through maintenance or restoration of vegetation to achieve canopy shade resulting in:

1. moderation of temperature and dissolved oxygen extremes
2. organic cycling of leaf litter for nutrients and energy
3. transformation of diffuse nitrogen inputs

RCT 14: River Condition is improved from current state through maintenance or restoration of in-stream large woody debris for fish and invertebrates, native trees, shrubs and ground cover on the banks and tree roots to stabilise under-cut banks.

RCT 15: River Condition is improved from current state through maintenance or restoration of bank vegetation to minimise erosion.

This layer was derived from stream mapping from the Moreton Bay Waterways and Catchments Partnership and the SLATS SEQ 2003 Woody Vegetation mapping. Grid cells of 250 m and 50 m were generated but field validation suggested that the 25 m grid was the most accurate with the fewest false positives for both the presence and absence of woody vegetation. The stream data were converted to a 25 m grid layer and then used to mask the woody vegetation layer leaving a map of streams with and without woody vegetation.

3. Wildnet Density

RCT Addressed in NRM Plan - RCT 8: Populations of endangered, vulnerable, rare and regionally significant (classified priority under SEQ Biodiversity Planning Assessment) plant and animal species are maintained

The Wildnet Density layer was generated by applying a kernel density function with a 2000m radius using the Spatial Analyst software. While the EPA BPA mapping contained information about threatened species in remnant vegetation, it didn't include similar information for outside of remnant areas. This layer was used after prioritisation as supplementary information to aid project planning in non-remnant areas.

4. Office of Urban Management (OUM) urban footprint, regional landscapes and investigation area mapping.

RCT supported in NRM Plan - RCT 3: 25% of land in the region used within its capability (land uses to be managed to the level of recommended practice), 15-20 year timeframe.

The process to develop a SEQ Regional Plan (Growth Management) occurred in parallel to the NRM Regional Plan through the Queensland Government's newly created Office of Urban Management. The SEQ Regional Plan provides a planning and legislative framework to guide urban and infrastructure development to accommodate the predicted one million extra residents in SEQ by 2026.

The output of the Regional Plan is a spatial data set depicting the urban footprint (the area designated for future urban development) and regional open space (the area protected from future urban development - up to 80% of SEQ). The Plan also nominates investigation areas where further work is required before categorisation into urban or open space.

While not included in this 2005 SEQ RLA, these data sets were referred to before any investment decisions were made to ensure any activity was in tune with the future land use of that area.

Additional Natural Asset (NA) Layers

In addition to these RCT layers, two NA Layers were produced utilising outputs from the Draft SEQ Coastal Management Plan and the Natural Resource Industries Panel.

1. Coastal and Marine NA Layer

RCT addressed in NRM Plan - RCT 23: No net loss to the extent and condition of estuarine, coastal and marine habitat extent and distribution; and

RCT 24: No loss in condition of habitat at significant sites of selected estuarine, coastal and marine habitats.

This NA layer was produced using the data sets and maps from the Draft EPA SEQ Coastal Management Plan. Data from the Coastal Management Plan did not become available until after the 2005 SEQ RLA was conducted.

A similar alignment of Coastal RCTs from the NRM Plan and available data sets was employed to produce a map that indicated where investment would potentially address the maintenance and enhancement of the key values of the coastal and marine asset of SEQ.

The Coastal and Marine NA Layer could not be combined with the Land NA Layer due to differences in data coverage and therefore was treated separately with prioritisation for investment based on this layer alone.

Due to the natural separation between terrestrial and coastline landscapes and issues with combining the Land NA Layer and the Coastal and Marine NA Layer, further investigation will be required for integration of these.

2. Natural Resource Industries Layer (NRI)

A Landscape Panel had been established early in the development of the NRM Plan to:

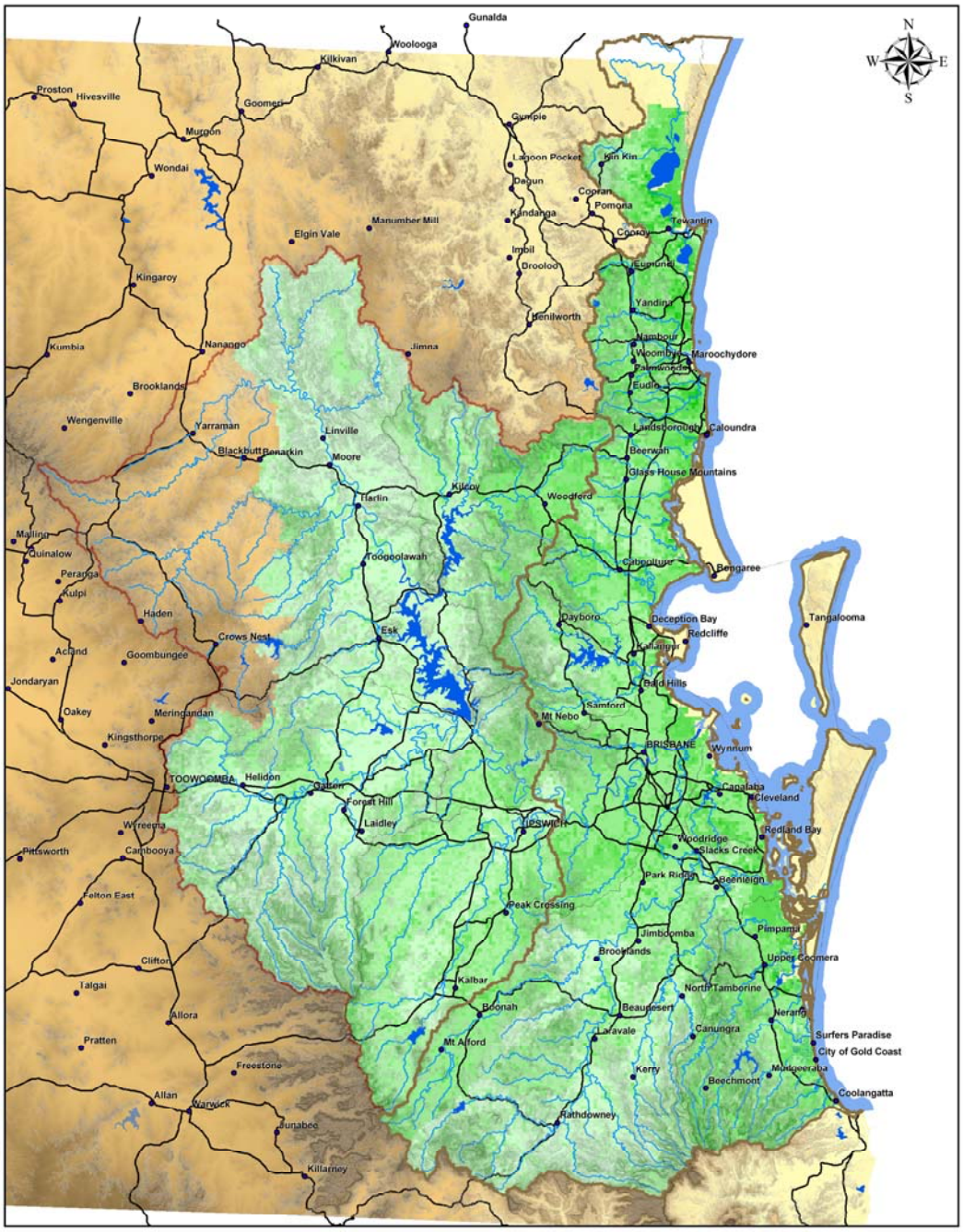
1. identify priority threats to the sustainability of natural resource industries
2. identify landscape areas for the development of industry partnerships. (The process was sponsored by the Department of Primary Industries and Fisheries - DPI&F)

Priority threats to Natural Resource Industries were identified as:

- Land use competition
- Loss and degradation of open space

- Loss of scenic amenity
- Loss and fragmentation of Good Quality Agricultural Land
- Siting of and inadequate nutrient management in intensive livestock industries
- Erosion– sheet, gully, tunnel, slip etc
- Salinity
- Acid Sulfate Soils
- Dispersive Soils mobilisation
- Soils Prone to Acidification
- Reduction in soil health eg.structural decline
- Tree Clearing and Riparian Land threats
- High grazing pressure
- Intensive use of more fragile land
- Poor or no ground cover
- Excessive cultivation rates
- Excessive Pesticides, nutrients and chemicals entering the landscape
- Cropping on unsuitable land for cultivation
- Intensification of Dairying and Grazing
- Weeds and pest animals
- Perceptions & Attitudes threatening to asset
- Landholder capacity to manage asset
- Economic constraints; cost price squeeze of ag
- Population Growth
- Recharge management

A NA Layer was produced to reflect the panel discussions and will be included in future RLAs.



Confluence of Issues

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Version: January 18 2005

Legend

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA

Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

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Draft Key Investment Areas

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Version: January 18 2005

Legend

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA

Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

Proudly Supported By

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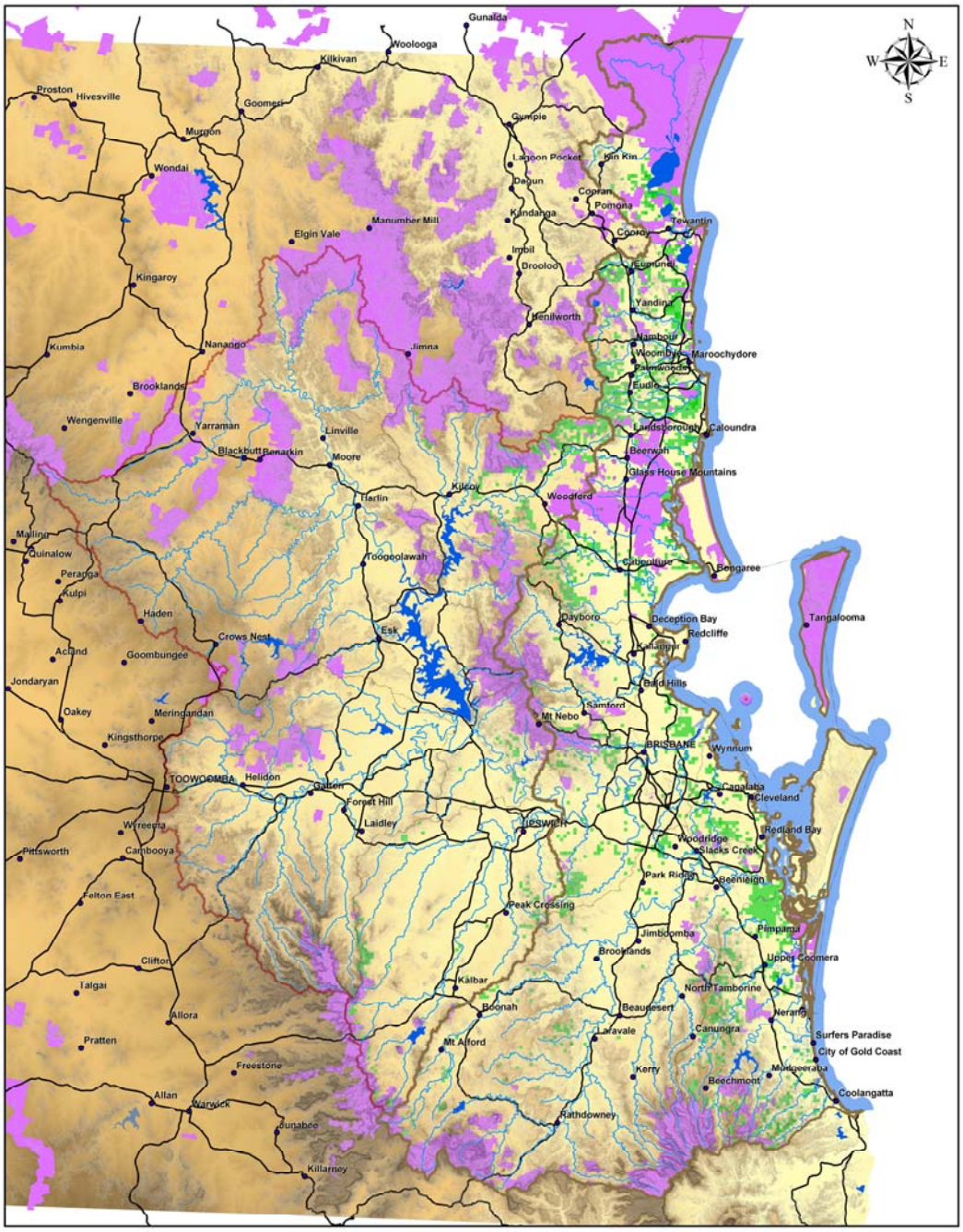
Natural Heritage Trust



Key Investment Areas

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Version: January 18 2005

Legend

10 5 0 10 20 30 40 Kilometers

Scale 1:750,000

GDA

Albers Equal Area Projection

Data Sources
EPA, DNRM, MBWCP, DPIF

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Section Three: The Regional Landscape Assessment (2005 SEQ RLA) and the Confluence of Issues Map

The process to establish and the mode of operation for the Regional Landscape Assessment Panel is described in the introduction to this paper. The 2005 SEQ RLA was conducted based on a number of key decisions and assumptions made by the Planning Team, the NRM SEQ Board and the Regional Assessment Panel. This Section list these decisions and assumptions to explain steps 4--9 in Figure 2.

1. Regional data would be used

In order to compare all the sub-regions and landscapes of SEQ equally, only data sets that provided a regional coverage were used. The identification of areas for investment was constrained by a tight timeframe. It was impossible to gather all local data sets, further reinterpret scales and projections to produce resource condition maps for seamless regional coverage.

The regional arrangements for the delivery of NHT also required all activity and monitoring and evaluation to be conducted to reflect regional targets.

The commitment was made to follow-up on finer scale data sets as part of the iterative process of RLA mapping. The RLA provides this option very willingly. In the meantime the Confluence of Issues Map will be ground-truthed in consultation with the local community and experts to add value to its regional relevance.

The only instance where local data were used extensively was in expressing biodiversity Resource Condition within Brisbane City Council boundaries. Complex urban biodiversity issues in the most intensively developed sub region in SEQ were not captured at an appropriate scale for regional planning in the EPAs Biodiversity Planning Assessment. Therefore the BCC Common Nature Conservation Classification System (CNCCS) was utilised. Other local area nature conservation classifications will be added to the Regional Landscape Assessment as part of the ongoing enhancement and fine tuning of investment priorities though Key Investment Areas.

2. Best available data would be utilised and gaps noted for future data collection

Lack of dedicated data to an RCT did not delay the Regional Landscape Assessment. The Expert Panel developed appropriate formulae to produce surrogate layers. They used available data sets in combination or as inputs to available modelling programmes. Relevant gaps were listed for future attention.

Where a threat or value could not be accurately expressed as an RCT map, due to lack of data, it would not be included in the 2005 SEQ RLA.

3. Quantile Splits would be employed in grading all Natural Asset Layers

A quantile split has been used to grade all Natural Asset Layers. It was agreed that quantiles would be easier to defend statistically compared to other splits such as natural breaks.

The quantile function describes more fully the distribution of a random variable. This provides a more complete picture of the interrelationships between a number of different factors. Consequently, the influence of many variables on where the particular issue appears in the landscape can be demonstrated.

Therefore quantiles are more valuable in scoring all the data in the absence of expert information and data are better distributed between scores. In the case of the RLA, the quantile split made sure that all data scoring a 4 or a 1 were evenly distributed across all scores. This allowed more effective prioritisation.

4. Both values and threats would be combined in the Natural Asset Layers

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The Confluence of Issues Map represents the gathering together of a mix of multiple values and threats. This map should be used as a guide for investment. The individual Resource Condition Target maps are the most valuable output of the Regional Landscape Assessment.

5. Resource Condition Target maps should be consulted in tandem with the Confluence of Issues Map

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Discussions took place on whether the Confluence of Issues Map masked some high priority issues amongst the combined natural asset layers, however consensus was that this was a low probability. As in the fourth principle above, final decisions would be made from studies of individual RCT maps at the sub-regional or KIA level.

6. Asset Maps would not be weighted

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Priorities are further separated by ranking or weighting the Natural Asset Maps. Professor Hugh Possingham (meeting held on the 7 February, 2005 with NRM SEQ Planning Staff to discuss methodology) advised against relying on rankings for identifying key investment areas. Rather a rules-based approach where the true interactions between issues and assets were identified should be adopted as a more scientific and pragmatic approach to prioritising. The Confluence of Issues process was adopted to overcome the need to generate specific rules to guide investment strategy.

7. **The Natural Asset Layers and the resulting Confluence of Issues Map will be converted into a 250 m grid format for the prioritisation process**

In some instances, smaller grid sizes provided better data for some areas or assets, however a standardized 250 m grid format was utilised for confluence mapping and priority-setting purposes.

Confluence of Issues Map

The three Natural Asset Layers Biodiversity, Landscape and Water Quality were combined to produce the ***Confluence of Issues Map***.

The Natural Asset Layers and the resulting ***Confluence of Issues Map*** were converted into a 250 m grid format for the prioritisation process.

Draft Key Investment Areas were identified through a desktop assessment by NRM SEQ planning staff. The decisions were based on the geographic concentration of the four highest scoring classes (9-12, leaving out Areas of Estate and State Forest) on the ***Confluence of Issues Map.***

Draft Key Investment Areas were ground-truthed with community representatives and NRM SEQ Community Support Officers to verify the relationships between the values and threats identified by the Map and actual on-ground conditions.

Information and observations from ground-truthing were employed to finalise the identity of Key Investment Area priorities for the 2005/06 Regional Investment Strategy allocations.

Community, Local Government, Research and Industry Round Tables

Seven Round Tables attended by key local professional, technical and community specialists including those equipped to carry out on-ground actions in the identified investment areas were conducted across the region. Key sectors represented were Local Government, Research and Education, Industry, Traditional Owners, ICM and Landcare, Waterwatch, Coastcare and Bushcare Groups. State Government representation was not actively sought on the advice of State Government Representatives on NRM SEQ's Planning and Implementation Advisory Committee, PIAC. This advice was based on the preference to focus on the local situation as understood by representatives from Local Government and community organisations.

State Government representation was limited to local Queensland Parks and Wildlife Service (QPWS) Staff at some Round Tables. Where QPWS was in attendance, there input was well received and added to partnership development at the local scale through enhanced links to the National Park framework and other programmes provided such as Nature Refuges.

The Round Tables comprised three sessions:

1. The first session focussed on explaining how the Confluence of Issues Map was produced by identifying each layer and its link to the RCT that was being funded by the Australian Government through the NRM Plan. The RLA Panel identified this as an important step in displaying the logic of the process and obtaining sign -off on each individual layer, culminating in the acceptance of the Confluence of Issues Map as an agreed starting point for discussions on regional investment.

The individual RCT Maps, the subsequent Natural Asset Layers and the final Confluence Map were displayed in a sequential fashion in order to clearly show the planning, prioritisation and implementation process visually.

2. The second session allowed the local community to connect the maps to their sense of place through small group discussions on the local validity of the maps and potential projects to address the issues identified in the draft KIAs. The membership of the small groups was based on attendee's geographic connection with the maps. Appropriate comments were noted on the maps for future reference and attention, including issues not yet integrated in the Confluence of Issues maps.

3. The third session provided feedback to the whole group from each individual group, so as to facilitate further discussion on sub-regional issues and actions that would add value to the draft investment areas.

The Round Tables further informed the prioritisation of investment areas and facilitated an exploration of the broader landscape with linkages to past, present and future planned projects by some of the Local Governments and organisations present. The capacity of the community to undertake the breadth of the work required in the investment areas was also gauged and therefore began the process of allocating available NHT resources.

Lack of social capital to undertake activity in targeted areas identified for investment was acknowledged early in the RLA process. The situation could well arise where the areas of highest priority for action lacked sufficient social capital to make a difference, and vice versa, those areas with large amounts of social capital might have few priority issues to address. Unlike economic

capital, social capital is not easily transferred within a region as volunteers more readily connect to their local area, due to community of interest or purely logistical and time-based realities.

Volunteers remain the greatest resource for on ground implementation although it is widely recognised that the extension of NHT funding should not depend solely on an increasingly burnt out and diminishing volunteer base for large scale landscape change. However, the necessary financial resources to employ labour to support or replace volunteers at the coal face of implementation are not readily available at this point in the investment cycle. Consequently, 2005/06 investment decisions were based on Confluence of Issues analysis and Round Table support at the KIA level.

In order to better inform investment decisions and to direct the limited expenditure available for building and strengthening social capital, a process to conduct a Social Capital Audit was developed in partnership with the CRC for Coastal, Estuarine and Waterways Management at Griffith University. The ultimate intention of this Audit is to produce a Social Capital Asset Layer to be included in the RLA. The time to research and develop a rigorous and precise methodology was not available in the lead up to the 2005 SEQ RLA.

A capacity audit of NRM groups and organisations in SEQ was conducted to trial some indicators developed by the CRC. These indicators varied in their intent ranging from measures of the group's vigour to its capacity to address and monitor RCTs and ability to involve or link community, industry and investment partners in NRM activity.

Some of these data have been spatialised and further activity towards the inclusion of a Social Capital Asset Layer in the RLA will occur shortly. Phase Two of the project will seek to quantify the wider elements of social capital including community trust, cohesion and awareness, these being important ingredients in achieving the Resource Condition Target of the regional NRM Plan. This will lead to a united community effort to address current issues particularly on the ground in local areas.

A further socioeconomic limitation with such a targeted approach to natural resource management activities is that landholders in the area or the property identified for action need to be attitudinally and behaviourally supportive of such action and indeed in a position socio-economically to engage in such activity.

The ability to offer a range of financial, technical and reward-based incentives and support packages to landholders is a crucial component of NRM. The Regional Investment Strategy

allocated funding and resources to a range of incentives. The diversification of incentives to address the broad range of socio-economic and environmental situations in SEQ will continue.

Prioritisation for a number of National Landcare Projects (NLP) was also informed by the 2005 SEQ RLA Round Table process. The Property Management Planning Programme Land Plus! and the Farm Forestry Programme both benefited from the prioritisation and the networks established through the process. In fact many of the programmes within the 2005/06 Regional Investment Strategy were implemented employing the findings from this process.

The Final Step – Key Investment Areas of SEQ

The multi-functionality of the RLA and its products allows for the development of on-ground management action packages aimed at addressing the highest scoring RCT layers in the Confluence of Issues Map. In this way current leading management practices and indicative budgets were collated for each draft KIA. These management action packages were again tested with potential service providers identified through the Round Tables to ensure their validity and appropriateness in terms of budget and time.

After further negotiation and identification of matching investment and in kind support, a final list of draft KIAs was created. Some draft KIAs were excluded based on the future release of critical information from planning or research activities currently underway e.g. significant areas of sugar cane land in SEQ were identified as draft KIAs but management action packages were not developed at this stage due to the imminent release of management recommendations for the future sustainable use of these areas. Such KIAs will be progressed in the next RLA.

The final list of KIA projects was assessed by the PIAC. Multiple criteria were referred to in deciding approved projects. A decision support tool is being developed with the assistance of NR&M to assist with current and future investment activities.

Investment was delivered through Partnership Agreements between service providers and NRMSEQ; these listed the agreed management actions, timeframes and reporting requirements for investment projects.

Section Four: Conclusions

The identification of spatial priorities (i.e. SEQ geographical localities where investment would optimise the condition of our region) presented itself as an attractive output option compared with broad, untargeted theme-based asset management action packages. The process was challenged by incomplete or outmoded data sets, inefficient sharing of available data between State agencies and the Regional Body and the constraints of GIS software. This included the inability to incorporate changes in condition over time (temporal measurements). However, the benefits appear to have significantly outweighed the challenges and constraints.

The resultant ***Confluence of Issues Map*** has been deployed to target the available limited NHT investment on-ground in the NRM SEQ Planning region of SEQ. The Map and the composite RCT Maps were well received by the community and promoted valuable dialogue between the Regional Body, land managers, State Agencies and the community.

The Round Table process described in this paper became the key building plank, and indeed, in some cases enhanced trust and partnerships with the community. With the Confluence of Issues Map as the focus, land managers (particularly Local Government who are major investors in NRM in SEQ) were able to explore realignment of their policies and budgets to support the achievement of regional targets. This alignment of funding provided a multiplying effect for the limited NHT funds available, with some projects providing a ten-fold multiplication of NHT investment through Local Government, community and industry cash and in-kind.

Despite issues (e.g. intellectual property rights) of sharing data between State agencies and the Regional Body, the expert panel process was valuable and in the words of one participant, 'provided a good case study of how regional arrangements were supposed to work'. The reinforcement of working relationships with key staff in State agencies provides a sound platform for future collaborations.

The two partnership-building outcomes described above were not initially identified as outcomes for the Regional Landscape Assessment but are certainly recognised as extremely valuable outcomes that would not have occurred if not for the 2005 SEQ RLA.

The iterative nature of the process in that it allows for new data, especially at a local level, to be included in future Regional Landscape Assessments, will ensure that community ownership and the precision of prioritisation will increase over time.

Establishing information and data management arrangements also offers opportunities for the development of a Regional Atlas of NRM Assets that will lead to improved information exchange across South East Queensland.

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Appendix 1

Regional Landscape Assessment Panel Notes

Values/Layer	**Threats from NRM SEQ Plan** Resource Condition Targets have been developed to measure progress against the threats.	**Data Set to be used in Assessment** These data sets reflect the RCTs.	**Notes** From Expert Panel **05/04/05**	**Further Action**
Water • Clean water • Aquatic Biodiversity	• Sedimentation	Sediment Loads from EMSS		Create Water layer by combining these data sets.
	• Nutrients (N and P)	Nutrient Loads from EMSS	Reflects the following RCTs: RCT 21: Toxicants in water, sediment and biota meet standards of Australian Water Quality Guidelines. RCT 22: Levels of nutrients in aquatic ecosystems meet objectives set forward in SEQRWQMS and its successors.	
Biodiversity • Habitats especially EVRs • Wetlands • Corridors • State significant vegetation • Regional significant vegetation • Local significant vegetation	• clearing and fragmentation • pest plants and animals • fire • climate change • changes in catchment hydrology • impediments to fish passage inappropriate grazing practices	Urban footprint	Layers from the Biodiversity Planning Assessment have been chosen to reflect the resource condition targets (RCT) in the NRM Plan: RCT 7: Corridors Layer and J Criteria RCT 8: BioSig State hab for EVR (“H_Info”<>”) Hab_EVR & more_EVR RCT 9: Priority RE Layer (“B1_Rating”=”Very High” or “B1_Rating”=”High” or “B1_M_POORC”<>”) RCT 10: Sub-regional RE Layer (“B2_Rating”=Very High” or “B2_Rating”=”High” or “B2_M_POORC”<>”) RCT 11: Special Biodiversity Layer (“I_Rating”<>”) RCT 18: B1 Wetlands Layer and SEQ Wetlands Layer (“B1_Wetland”<>”) RCT 19: Wetlands Buffer (“G_Wet_Buff”<>” or “G_Wet_Flag”<>“)	Updated and finer scale Common Nature Conservation Classification System from local governments to be used for sub-regional scale planning and investment.

Values/Layer	**Threats from NRM SEQ Plan** Resource Condition Targets have been developed to measure progress against the threats.	**Data Set to be used in Assessment** These data sets reflect the RCTs.	**Notes** From Expert Panel **05/04/05**	**Further Action**
Landscape • Soils • Good Quality Agricultural Land • Open space • Scenic Amenity			Individual layers described below. NB: In the case of this layer which has been built primarily from a range of surrogate layers, an accuracy assessment is important to ensure there is a full understanding of any assumptions made. This should be taken into account when investment decisions are made.	
	Weed and pest animal invasion	Weeds - Presence of 46 weed species; Expert Panel from NR&M Weed Officers.	RCT 6: The area, extent and density of identified priority weeds including environmental weeds remains within the boundaries of ecological sustainability Mapped in 20 km grid cells - very blocky. Local Government has better info.	
	Soil salinity	Wetness modelled using FLAG (Fuzzy logic and groundwater)	RCT 1: area of salinity incidence across SEQ no greater than current extent by 2009. (National Matter for Target - NMT1) Shows where there is a high convergence of discharge based on surface drainage. Results have been tested against known salinity outbreaks and Western catchments salinity hazard mapping – reasonable accuracy. Shows areas for further investigation. Islands and low flat areas on coastlines not included as FLAG cannot operate in these landscapes.	
	Soil erosion	RUSLE – soil degradation	RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures. 250 m grid pixel, finer scale to be available soon. Primarily sheet erosion, no gully erosion.	Finer scale RUSLE layer to be used when available.

Values/Layer	**Threats from NRM SEQ Plan** Resource Condition Targets have been developed to measure progress against the threats.	**Data Set to be used in Assessment** These data sets reflect the RCTs.	**Notes** From Expert Panel **05/04/05**	**Further Action**
			Includes a factor for existing vegetation. Cover factor for SEQ landuse was developed.	
	Acid sulfate soil disturbance	Acid Sulfate Soils – presence/absence	RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures. Some areas blank due to lack of high resolution mapping. Alternative is to identify areas less than 5 m AHD.	Map areas of less than 5 m AHD
	Loss of scenic amenity	Scenic Preference Map from SEQROC Scenic Amenity Study i.e. what people actually like to see.	Study provides scale of 1-10 with the higher end being high scenic preference. SEQ Landscape Assessment has used 1-10 and reclassified to 1-4 class system.	Clarify scenic amenity and preference maps. NRM SEQ to discuss with Scenic Amenity Study.
	Loss of health and productivity through processes such as acidity and carbon loss	Soil acidification – land use (intensity) x soil (geology)	RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures. RCT 5: A reduction in the percentage of the catchment affected by soil health decline. Some discussion about accuracy based on soil type and land use. Further discussion required.	NRM SEQ to follow up with Bernie Powell.
	Unplanned or inappropriate land use including urban and rural residential expansion	Identifies areas of high intensity land use on Class C1/C2 and CD/D.	RCT 3: 25 % of land in the region used within its capability (land uses to be managed to the level of recommended practice), 15-20 year timeframe. Better to call this a Land Use Compatibility Map. Issues of the ranking of intensity of land use to be resolved.	NRM SEQ to follow up with Bernie Powell.
	Localised mass movement	Mass movement – some areas mapped geology/slope	Not available.	Further investigation required – is a surrogate possible?

Values/Layer	Threats from NRM SEQ Plan Resource Condition Targets have been developed to measure progress against the threats.	Data Set to be used in Assessment These data sets reflect the RCTs.	Notes From Expert Panel **05/04/05**	Further Action
	Loss of structure through over cultivation and compaction	Soil structural decline – land use intensity x soil type etc.	Surrogate layer produced but did not add anything relevant to assessment – not included.	
	Soil contamination including failure of septic tanks	Septic Tank Audit – not spatial (Moreton Bay Waterways and Catchments Partnership)	Not available spatially.	
	Loss and degradation of open space		Not included.	
	Loss and fragmentation of Good Quality Agricultural Land (GQAL)		Change in GQAL – requires further measurement in future.	
	Increasing pressure on riparian lands	State of the Rivers	Not a full coverage of the planning region. Further discussions on surrogate layer required.	State of the Rivers to be used at catchment scale. Local Government and local group information to be used at catchment scale.
	Increasing waste and waste management issues	Landfills etc. Contaminated sites – EPA and geology.	Not included – change in land use data required.	

Values/Layer	**Threats from NRM SEQ Plan** Resource Condition Targets have been developed to measure progress against the threats.	**Data Set to be used in Assessment** These data sets reflect the RCTs.	**Notes** From Expert Panel **21/04/05**	**Further Action**
Water • Clean water • Aquatic Biodiversity	• Sedimentation	Sediment Loads from EMSS	General agreement that data add value to the assessment. Recommended to convert data to t/ha. Mik Petter presented a riparian health layer based on stream order mapping from MBWCP and presence and absence of remnant and woody vegetation cover. Streams without vegetation cover identified as priority areas. Panel accepted in general the methodology and output layer.	Convert data to t/ha. Riparian health layer to be added to combined water layer.
	• Nutrients (N and P)	Nutrient Loads from EMSS		
Biodiversity • Habitats especially EVRs • Wetlands • Corridors • State significant vegetation • Regional significant vegetation • Local significant vegetation	• Clearing and fragmentation • Pest plants and animals • Fire • Climate change • Changes in catchment hydrology • Impediments to fish passage • Inappropriate grazing practices	SEQ Biodiversity Planning Assessment	Accepted at last meeting. Discussion on whether estates, reserves and parks should be removed from the calculation of priority investment areas as initial NHT investment will not be made in areas where the State or other body has a stated responsibility for management (investment may occur where there is an over-riding priority or opportunity to progress substantial or innovative NRM). The estate network must remain as part of the NRM framework particularly where links can be made to the wider landscape values and where the highlighting of the values embodied in these estates provides responsible agencies with priorities for management. If estates are removed, there needs to be another layer added for prioritisation – a “proximity to conserved areas of value” layer.	Remove the estates from the calculation of the blob map and review the difference this makes to priority areas for initial investment. Develop another layer “proximity to conserved areas of value”.
Landscape • Soils • GQAL • Open space • Scenic Amenity		NB: In the case of this layer which has been built primarily from a range of surrogate layers, an accuracy assessment is	Individual layers described below.	

Values/Layer	Threats from NRM SEQ Plan Resource Condition Targets have been developed to measure progress against the threats.	Data Set to be used in Assessment These data sets reflect the RCTs.	Notes From Expert Panel **21/04/05**	Further Action
		important to ensure there is a full understanding of any assumptions made. This should be taken into account when investment decisions are made.		
	Weed and pest animal invasion	Weeds - Presence of 46 weed species. Expert Panel from NR&M Land Protection Officers.	Accepted at last meeting	
	Soil salinity	Wetness modelled using FLAG	Accepted at last meeting	
	Soil erosion	USLE – soil degradation	Accepted at last meeting	Finer scale USLE layer to be used when available.
	Acid sulfate soil disturbance	Acid Sulfate Soils – presence/absence	Accepted at last meeting – further discussion as to whether this layer was skewing the priorities towards the coast as ASS is not a priority in inland areas –consensus was that it does not.	
	Loss of scenic amenity	Scenic Preference Map from SEQROC Scenic Amenity Study i.e. what people actually like to see.	Accepted at last meeting	
	Loss of health and productivity through processes such as acidity and carbon loss	Soil acidification – land use (intensity) x soil (geology)	Accepted at last meeting	
	Land Use Compatibility Map - unplanned or inappropriate land	Where are areas of high intensity land use on Class	Methodology accepted at last meeting.	Modify priority of nature conservation on good quality

Values/Layer	Threats from NRM SEQ Plan Resource Condition Targets have been developed to measure progress against the threats.	Data Set to be used in Assessment These data sets reflect the RCTs.	Notes From Expert Panel **21/04/05**	Further Action
	use including urban and rural residential expansion	C1/C2 and CD/D?		ag land. (may be others to modify also)
	Localised mass movement	Mass movement – some areas mapped geology/slope.	Mik Petter presented a potential surrogate of mass movement risk based on no woody vegetation on slopes between 12-32%. Consenus reached to accept the layer noting its limitations as a risk map. Panel expressed desire to incorporate climate and geology in future iterations.	Incorporate layer into Land Layer.
	Loss of structure through over cultivation and compaction	Soil structural decline – land use intensity x soil type etc.	Surrogate layer produced but did not add anything relevant to assessment – not included.	
	Soil contamination including failure of septic tanks	Septic Tank Audit – not spatial (MBWCP)	Not available spatially.	
	Loss and degradation of open space		Not included.	
	Loss and fragmentation of Good Quality Agricultural Land (GQAL)		Change in GQAL – requires further measurement in future.	
	Increasing pressure on riparian lands	State of the Rivers	Surrogate layer discussed and added to Water Layer.	
	Increasing waste and waste management issues	Landfills etc. Contaminated sites – EPA and geology.	Not included – change in land use data required.	

APPENDIX 2

Resource Condition Targets (RCTs)

Land Salinity

RCT 1: Area of salinity incidence across SEQ no greater than current extent by 2009.

Soil Condition

RCT 2: All land susceptible to soil erosion, acidification, loss of structure, landslip and salinisation removed from damaging use or with appropriate prevention measures.

RCT 3: 25% of land in the region used within its capability (land uses to be managed to the level of recommended practice), 15-20 year timeframe.

RCT 4: Vegetation cover (incorporating grasses, shrubs, trees etc) greater than 70% where vegetation cover is appropriate to erosion risk – eg groundcover in cleared areas, and tree cover .

Ecologically significant invasive species

RCT 6: The area, extent and density of identified priority weeds being addressed by regional bodies or community projects remains within the boundaries of ecological sustainability.

Native vegetation communities' integrity

RCT 7: No further loss or degradation of viable networks and wildlife habitat.

RCT 9: The representativeness of regional ecosystems is maintained across the SEQ Regional Vegetation Management Plan area and its sub-regions (provinces).

RCT 10: The subregional conservation status of Priority Regional Ecosystems is maintained.

RCT 11: The identified values of Areas of Special Biodiversity Value (under the Biodiversity Planning Assessment) are maintained.

Native vegetation communities' integrity; Significant native species and Ecological communities

RCT 8: Populations of endangered, vulnerable, rare and regionally significant (classified priority under SEQ Biodiversity Planning Assessment) plant and animal species are maintained.

Inland Aquatic Ecosystems' Integrity

RCT 13: Improved from current state through maintenance or restoration of vegetation to achieve canopy shade resulting in:

1. moderation of temperature and dissolved oxygen extremes
2. organic cycling of leaf litter for nutrients and energy
3. transformation of diffuse nitrogen inputs

RCT 14: Improved from current state through maintenance or restoration of in-stream large woody debris for fish and invertebrates, native trees, shrubs and ground cover on the banks and tree roots to stabilise under-cut banks.

RCT 15: Improved from current state through maintenance or restoration of bank vegetation to minimise erosion.

RCT 16: Improved from current state through maintenance or restoration of woody debris for channel shape and form.

RCT 17: Improved from current state through improved management of livestock access.

RCT 18: Significant current natural wetlands, lakes and springs are retained in extent and distribution and purpose-built wetlands and lakes are maintained.

RCT 19: No further loss or degradation of significant existing wetlands and a net gain of vegetation in wetland ecosystems, lakes and springs.

RCT 20: Environmental flows are provided in accordance with WRP.

RCT 21: Toxicants in water, sediment and biota meet standards of Australian Water Quality Guidelines

Nutrients in aquatic environments

RCT 22: Levels of nutrients in aquatic ecosystems meet objectives set forward in SEQRWQMS and its successors.

Estuarine, coastal and marine habitats' integrity

RCT 23: No net loss to the extent and condition of estuarine, coastal and marine habitat extent and distribution.

RCT 24: No loss in condition of habitat at significant sites of selected estuarine, coastal and marine habitats.

Ecologically significant invasive species

RCT 25: Extent and impact of selected ecologically significant marine invasive species identified.

Resource Condition Targets are yet to be established for Air and Atmosphere, Social Capital, Cultural Heritage and Natural Resource Industries.

APPENDIX 3

Biodiversity Natural Asset Layer

Biodiversity Resource Condition Target Maps

Definition of Taxon (pl. Taxa)

A group of organisms of any taxonomic rank (from the Greek –*'arrange'.*

Taxa refers to a family, genus or species of plant or animal.

EPA – Nature Conservation Score

Criterion A Habitat for 'Endangered', 'Vulnerable' and 'Rare' Taxa

Classifies areas according to their significance based on the presence of Endangered, Vulnerable and/or Rare (EVR) taxa. EVR taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environmental Protection and Biodiversity Conservation Act 1999*.

Classification	***Indicator***	***Value***
Very High	Remnant unit has precise record/s or core habitat for one or more Endangered tax or two or more Vulnerable or Rare taxa	4
High	Remnant unit has precise record/s or core habitat for one Vulnerable taxon or one Rare taxon	3
Medium	Remnant unit has imprecise record/s for one or more EVR tax. Remnant unit falls outside the buffer area for precise redcord/s for EVR taxa. Remnant unit represents essential or general habitat for an EVR taxon that is not sufficiently accurate to be considered Core Habitat.	2
Low	Remnant unit has no confirmed records or otherwise defined areas of Habitat for EVR taxa.	1

RCT addressed in NRM Plan - RCT 8: Populations of endangered, vulnerable, rare and regionally significant (classified priority under SEQ Biodiversity Planning Assessment) plant and animal species are maintained.

Criterion B1 State Ecosystem Value

Based on the Biodiversity Status of each Regional Ecosystem, or the presence of intertidal or "Nationally Important Wetlands", or wetlands of "high" significance, or the presence of REs that are poorly conserved in Protected Areas declared under the *Nature Conservation Act 1992*.

Classification	***Indicator***	***Value***
Very High	'Endangered' RE; "Nationally Important Wetland"; Intertidal wetland vegetation; "State significance" wetland; Ramsar wetland; World Heritage Area declared primarily for its biodiversity values.	4
High	'Of Concern' RE; "Regional significance" wetland; significant wetland in SEQ designated as 'Regional/Major'.	3
Medium	'No Concern' RE with 30%-50% original extent remaining; poorly conserved RE; subdominant 'Endangered' or 'Of Concern' REs.	2
Low	'No Concern' RE with >50% original extent remaining in bioregion.	1

RCT addressed in NRM Plan – RCT 9: The representativeness of regional ecosystems is maintained across the SEQ Regional Vegetation Management Plan area and its sub-regions (provinces).

Criterion B1 Presence of Wetlands

Classification	Value
Ramsar Wetland	4
Important Wetland	3
Wetland in Coastal Plan	2
Inter-tidal Wetland	1

RCT addressed in NRM Plan – RCT 18: Significant current natural wetlands, lakes and springs are retained in extent and distribution and purpose built wetlands and lakes are maintained.
RCT Addressed in NRM Plan – RCT 19: No further loss or degradation of significant existing wetlands and a net gain of vegetation in wetland ecosystems, lakes and springs by 2020 (NMT4)

Criterion B2 Regional Ecosystem Value

Biodiversity status of mapped REs as determined for the particular subregion, or the presence of regionally important wetlands, presence of REs that are poorly conserved in Protected Areas within the subregion, or where pre-clearing extents are critically low (less than 300ha or less than 10%) within the subregion.

Classification	**Indicator**	**Value**
Very high	Very High Conservation Value RE (pre-clearing extent <300ha or <10% of the pre-clearing extent remains in the subregion).	4
High	High Conservation Value RE (10-30% of the pre-clearing extent remains in the subregion); a significant wetland in SEQ designated as “Valuable Habitat”.	3
Medium	Moderate Conservation Value RE (30-50% of the pre-clearing extent remains in the sub-region); “Poorly Conserved” RE within the subregion; contains subdominant (<30%) “High Conservation Value” or “Very High Conservation Value” RE.	2
Low	“Limited Conservation Value” RE (>50% of the pre-clearing extent remains in the sub-region).	1

RCT Addressed in NRM Plan – RCT 10: The sub-regional conservation status of Priority Regional Ecosystems is maintained.

Criterion D2 Regional Relative Ecosystem Size

Defined according to the analysis of Regional Ecosystems within a sub-region.

Classification	Indicator	Value
Very high	The RE within the Remnant Unit is >75% the size of the largest example of that RE in the subregion.	4
High	RE within the Remnant Unit is 50% to 75% the size of the largest example of that RE in the subregion.	3
Medium	RE within the Remnant Unit is 25% to 50% the size of the largest example of that RE in the subregion; contains a subdominant (<30%) RE that is >50% the size of the largest example of that RE in the subregion; Remnant Unit is heterogeneous in which no RE is >30%.	2
Low	RE within Remnant Unit is <25% the size of the largest example of that RE in the subregion.	1

Criterion G Context and Connection

The extent to which a Remnant incorporates or buffers: a waterway or important wetland, an Endangered RE, or is connected to other vegetation.

Classification	Indicator	Value
Very high	Remnant unit adjoins another remnant along >75% of its perimeter; borders/includes another remnant with an Endangered RE; borders/includes another remnant with a waterway or important wetland.	4
High	Remnant unit adjoins another remnant along 50% to 75% of its perimeter.	3
Medium	Remnant unit adjoins another remnant along <50% of its perimeter; is adjacent to an Endangered RE; is adjacent to a waterway or important wetland.	2
Low	Remnant unit is not physically connected to another Remnant.	1

RCT addressed in NRM Plan - As above RCT 9, 18 and 19.

Criterion H Core Habitat for Priority Taxa

Essential and General Habitat for EVR and other Priority Taxa additional to that derived under Criterion A.

Classification	Value
State	4
Regional	3
Sub-regional	2
Other	1

RCT Addressed in NRM Plan - RCT 8: Populations of endangered, vulnerable, rare and regionally significant (classified priority under SEQ Biodiversity Planning Assessment) plant and animal species are maintained

Criterion I Special Biodiversity Values

Areas with Special Biodiversity Values contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas include centres of endemism, wildlife refugia, disjunct populations, species richness, breeding or roosting sites etc.

Definition of Endemism

Where a species or other taxonomic group is restricted to a geographic region due to factors such as isolation or response to soil or climatic conditions.

Classification	Value
Presence	4
Absence	0

RCT addressed in NRM Plan – RCT 11: The identified values of Areas of Special Biodiversity Value (under the Biodiversity Planning Assessment) are maintained.

Criterion J Corridors

Corridor links are identified as existing vegetated corridors important for contiguity including regrowth, or cleared areas that could serve this purpose revegetated e.g. riparian habitats, stepping stones.

Classification	Value
State	4
Regional	3
Sub-regional	2
Other	1

RCT addressed in NRM Plan – RCT 7: No further loss or degradation of viable networks and wildlife habitat

For all RCT Maps, grids in which no data existed to describe Resource Condition Targets were scored ‘0’

These 9 RCT maps were combined to provide values ranging from min (0) to max (36) with final or observed values ranging from 0 to 32 with the highest score placed at 32.

BCC - Nature Conservation Score

8 Common Nature Conservation Classification System criteria were added together to address the same RCTs as the EPA Nature Conservation Score listed above.

Criterion A - Significant Habitat for ***'At Risk'*** species

Significance	**BCC Score**
VH	4
H	3
M	2
L	1
No data	0

Criterion B2 - Ecosystem Value, Sub-regional

Significance	**BCC Score**
VH	4
H	3
M	2
L	1
No data	0

Criterion D2 - Relative Size of Regional Ecosystems

Size	**BCC Score**
VH	4
H	3
M	2
L	1
No data	0

Criterion G - Context and Connection (Spatial Context e.g. buffering)

Spatial Connection	**BCC Score**
4	VH
3	H
2	M
1	L
0	No data

Criterion H - Other Habitat for '***At Risk'*** Species

Significance	**BCC Score**
State	4
Regional	3
Sub-regional	2
Other	1

Criterion I – Habitat for Other species

Significance	**BCC Score**
VH	4
H	3
M	2
L	1
No data	0

Criterion K - Corridor Links

Significance	**BCC Score**
VH	4
H	3
M	2
L	1
No data	0

APPENDIX 4

Weed Species and Density

Species density code number

The number is the density/distribution code: there aren't many 0's which is good as this means "unknown" and we discouraged that. These numbers are explained in the doc "freq_dens_code.txt" and denote the amount and location of the pest across each grid cell.

0 --- Unknown
1 --- Absent
2 --- Occasional & Localised
3 --- Occasional & Widespread
4 --- Common & Localised
5 --- Common & Widespread
6 --- Abundance & Localised
7 --- Abundance & Widespread

We are currently reviewing and updating the web site, so here is the development version of the scale description

Survey criteria

1. Species occurrence - present/absent/unknown

It is essential to know if a pest is present or absent in each cell. If the survey participants cannot say with a very high degree of accuracy whether the pest is present or absent, the cell is flagged as “unknown”. This criterion has the highest level of accuracy.

2. Distribution - localised/widespread

Once it has been established that a pest is present within a cell, it is necessary to indicate how much of the cell contains infestations of the species. Infestations that cover more than 50% of the cell in any density are considered widespread, while those that cover less than 50% are considered localised.

While distribution gives us a useful indication of the size of pest infestations within grid cells, its accuracy should not be relied on too heavily. Reasons for this include:

* Survey participants may have differing perceptions of distribution.
* Survey participants may lack knowledge of particular species.
* It is difficult to accurately assess large areas of remote and impenetrable land.

This criterion has a lower level of accuracy than 'occurrence', and should be used as a guide only when making state-wide comparisons.

3. Density - occasional/common/abundant

Density refers to how thick or sparse pest infestations are. The following three descriptors are used:

* Occasional: single plants/animals spaced apart at wide intervals
* Common: a middle measure between occasional and abundant
* Abundant: infestations that have reached their full potential and provide little opportunity for additional plants/animals to survive in that area.

Density is a particularly difficult criterion to apply, due to factors such as:

* Different species have different density measures, e.g. grasses spaced at 1 m apart may be considered occasional, whereas trees spaced at 1 m apart may be considered abundant
* The size of the species will directly influence the perception of density, e.g. many small seedlings may receive the same density rating as a few mature trees
* Some areas may be able to support higher densities of a species than other areas, due to environmental conditions. This criterion has a lower level of accuracy than 'distribution'. Density can be considered more accurate at the shire level than at the state level, and should be used as a guide only when making state-wide comparisons.

Weeds Table

CLASS	SPECIES ID	SPECIES
3	043	Lantana
3	045	African tulip tree
3	046	Broad leaved pepper tree
3	047	Camphor laurel
3	048	Cats claw vine
3	049	Creeping bamboo
3	050	Singapore daisy
2	001	African Boxthorn
2	004	Annual Ragweed
2	006	Bellyache Bush
2	009	Cabomba
2	010	Chinee Apple
2	011	Fireweed
2	012	Rats Tail grass (all five species)
2	013	Giant Sensitive Plant
2	014	Groundsel bush
2	015	Harrisia Cactus
2	017	Hymenachne
2	018	Mesquite
2	021	Mother of Millions
2	022	Parkinsonia
2	023	Parthenium
2	024	Pond Apple
2	025	Prickly Acacia
2	026	Rubber Vine
2	027	Salvinia
2	030	SicklePod
2	031	Thunbergia
2	032	Tobacco Weed

CLASS	SPECIES ID	SPECIES
2	033	Water Hyacinth
2	044	Water lettuce
2	034	Wild dog
2	035	Fox
2	036	Goat
2	037	Pig
2	038	Rabbit
2	039	Feral cat
1	003	Alligator Weed
1	005	Badhara Bush
1	007	Bitou Bush
1	008	Bridal Creeper
1	016	Honey Locust
1	019	Miconia
1	020	Mikania vine
1	028	Senegal Tea
1	029	Siam Weed
1	040	Kosters curse
1	041	Limnocharis
1	042	Mimosa Pigra
1	053	Hygrophylla
1	053	Hygrophylla
0	002	African Lovegrass
0	054	Callitrope
0	051	Cane toad
0	052	Deer spp
0	054	Callitrope