Preparation of the Biodiversity Plan for Desert Channels Queensland would not have been possible without the support of many people.

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The Desert Channels Region occupies a unique place in the Australian and Queensland landscape. Home to a boom and bust cycle, the region has a profound richness in biodiversity.

The biodiversity of the region, composed of the species, the ecosystems and the genetic diversity within, is supported by the intact regional landscapes, ranging from the flooding river plains of the channel country, the woodlands of the Desert Uplands to the wide open grasslands of the Mitchell Grass Downs.

Within these landscapes over 748 native animal species are found, as well as over 2,500 plant species. A number of these are found nowhere else, such as the iconic small marsupials like the bilby, or freshwater fish found only in small artesian springs. The wetlands within the region are also highly recognised, consisting of a number of national and international significance for migratory birds. The ecosystem richness is also broad, with the over 298 unique ecosystems found, providing habitat and refugia for the species, and playing a role to conserve the valuable water, pasture and soil resources of the region.

This biodiversity plan, which is split into two parts, aims through the use of the best knowledge and community engagement, to conserve the region’s biodiversity through a range of goals, initiatives and actions.
The goals for this plan over the next five years (2012-2017) include:

1. **The conservation of regional and local biodiversity.**
   Identifying the key values for biodiversity, such as vegetation and aquatic environments and developing actions to ensure resilience. Building resilience will ensure the ecosystems and species can absorb ‘shocks’ or threats.

2. **Ecological knowledge influencing decision making.**
   Using and gathering the best available information to assist with decision making to conserve the region’s biodiversity. Through ongoing information collection, it will foster an approach of ‘learning and improving by doing’ (adaptive management) within the region.

3. **Community ownership and stewardship for biodiversity.**
   This goal identifies actions to develop a capable and committed community with knowledge, skills, access to information and support that can face challenges affecting biodiversity.

4. **Adapting to change.**
   With the region subject to future changes, like a changing climate, new weeds and development, this goal identifies actions to be proactive and predict what actions can be taken to minimize impacts on biodiversity.

Within each of these goals are a number of strategic initiatives focussing a number of actions that will be taken as a result of this plan. These actions are prioritised from high to low, and will influence implementation of the plan until 2017. Monitoring and evaluation, which is also outlined in the plan, will ensure that there is feedback and reporting over the life of the plan. Within each of these actions, it is important to recognise the range of threats to the biodiversity within the region. These include the total grazing pressure, changing climate, introduced plants and animals, altered fire regimes and altered hydrology. Acknowledging each of these threats has been important in development the goals, initiatives and actions for this plan.

This plan highlights the need for important actions to be taken to protect biodiversity, and develops this through a whole of community approach. From government, to regional bodies, community groups and primary producers, each has an important role in implementing the goals of this plan. Working together will ensure the importance of the Desert Channel’s biodiversity is valued and protected well into the future.

The first part of the plan provides details of the plan, while the second part, is more for reference, outlining the values in greater detail that contribute to the region’s biodiversity.
How to use the Desert Channels Queensland’s Biodiversity Plan

The Desert Channels Biodiversity Plan is composed of two parts.

1. The first part provides an introduction to the plan, the details of the plan and an overview of biodiversity within the region. It also provides details on threatening processes occurring within the region that may affect biodiversity. Use this part of the plan to find out what the plan is aiming for with regards to biodiversity conservation, the specific goals, initiatives and actions. Also use this part to provide a snapshot of the values within the region and a list of threatening processes.

2. The second part provides more detail on the biodiversity values within the region, listing a range values currently known. This includes the numbers of plants and animals, the number of species threatened (endangered species), introduced species (weeds and feral animals), regional ecosystems, wetlands and special landscape values such as refugia. This part also identifies management options for dealing with certain threatening processes by landform. This part should be used by those seeking more detailed information on the values within the region, management options and sources of information used to build the plan.
Our strategic direction

What is biodiversity?

Biodiversity is the variety of all living things: the different plants, animals and micro-organisms, the genetic information they contain and the ecosystems they form.

Biodiversity is usually explored at three levels: genetic diversity, species diversity and ecosystem diversity. These three levels work together to create the complexity of life on Earth.

We all depend on biodiversity. Much of the region’s economy is based on the use of our biological resources. The goods and services that drive our economy and support our social systems stem largely from a healthy and functioning environment.

Why do we need a biodiversity plan?

Biodiversity plans provide a focus for the conservation and management of biodiversity in a region. They help us take a strategic approach to implementing conservation actions.

This plan identifies biodiversity conservation priorities for the Desert Channels Queensland (DCQ) region over the five-year period 2012–2017.

Although this biodiversity plan has been developed by DCQ, we have designed it to be useful as a guide for the broader region and those working in it.

The purpose of this plan is to:

- set a vision for biodiversity conservation in the region
- promote the fundamental importance of biodiversity conservation in natural resource management
- set clear priorities and practical directions for biodiversity conservation over the next five years, while acknowledging external influences
- promote an integrated and coordinated approach to biodiversity conservation in the region
- be a reference point for engaging the community and other stakeholders
- attract increased investment into biodiversity conservation in the region.
The DCQ 2012 Biodiversity Plan fits within a framework of legislation, policies, agreements and plans at international, national, state and regional levels:

- Convention on Wetlands of International Importance (Ramsar) 1971
- JAMBA Japan-Australia Migratory Bird Agreement 1981
- CAMBA China-Australia Migratory Bird Agreement 1986
- ROKAMBA Republic of Korea-Australia Migratory Bird Agreement 2007
- Australia’s Environmental Protection and Biodiversity Conservation Act 1999
- National Principles and Guidelines for Rangelands Management 1999
- Australia’s Biodiversity Conservation Strategy 2010
- Queensland’s Nature Conservation Act 1992
- Queensland’s Biodiversity Strategy 2011
- Queensland Government Biodiversity Planning Assessments
- Central West Queensland Regional Plan 2009
- DCQ Regional Natural Resource Management Plan 2010-15
- DCQ biodiversity plan 2012-17

Queensland’s Biodiversity Strategy 2011 is the Government’s framework for the future direction of the State. It has two primary goals: reversing the decline in biodiversity; and increasing the resilience of species, ecosystems and ecological processes. To achieve these goals, the strategy lays out three primary objectives and three supporting objectives, each with key outcomes. These are summarised overleaf.

The Central West Queensland Regional Plan deals with key issues for the sustainable growth of the region’s communities, including physical and social infrastructure and planning.

The DCQ Natural Resource Management (NRM) Plan 2010–2015 was developed through extensive consultation with the community, government agencies, local government, Remote Area Planning and Development Board and AgForce. Although the NRM plan is voluntary, with no statutory powers, it reflects and supports relevant Australian and Queensland government legislation that covers environmental protection, biodiversity conservation, land protection, cultural heritage and water, among others.

This new DCQ Biodiversity Plan integrates well with these state and regional level documents.
Building Nature’s Resilience
A Biodiversity Strategy for Queensland, 2011

Primary objectives and outcomes: building resilient ecosystems

1.1 Building protected areas
- Protected areas on public and private land provide sound foundations for landscape resilience.
- Queenslanders are connected with nature.
- Marine biodiversity is better understood, protected and valued.

1.2 Conserving species
- Greater protection of species and their habitats.
- At risk species populations are stabilised or recovered.

1.3 Managing extent, condition and connectivity
- Stronger natural systems that can respond to threats and stressors.
- Climate change adaptation strategies that are flexible and responsive to new information.
- Improved management on privately managed lands provides greater safeguards for biodiversity values and ecological integrity.
- The contribution of Aboriginal and Torres Strait Islander Traditional Owners and communities to biodiversity protection and management is supported.

Supporting objectives and outcomes: managing adaptively

2.1 Valuing biodiversity
- Increased community and industry understanding, participation and investment in biodiversity conservation activities.
- Strong partnerships between governments and between the Queensland Government and key industry and community sectors to support biodiversity conservation.
- Existing successful programs are consolidated and sufficiently resourced.
- The contribution to the economy and society of ecosystem services and natural capital is valued and accounted for.

2.2 Building knowledge
- Decisions affecting the resilience of Queensland’s biodiversity are based on best available science.
- Early warning of potential impacts of climate change and other threats on biodiversity and identification of strategic responses.
- Biodiversity benchmarks and indicators inform biodiversity management practices and decisions across the landscape.
- Aboriginal and Torres Strait Islander Traditional Owners’ and communities’ contribution to contemporary biodiversity protection and management is recognised and valued.
- The role of terrestrial, freshwater and marine ecosystems in the broader landscape is better understood and valued.
- Biodiversity data is accessible and used to support better policy development and decision making.

2.3 Managing responsively
- Biodiversity is maintained, managed and/or enhanced.
- Government decisions are reviewed for their contribution to the achievement of biodiversity conservation outcomes.
- Biodiversity conservation is a core consideration of state, regional and local planning strategies and development decisions.
- Monitoring systems are in place to underpin adaptive management.
- There is a coordinated approach to biodiversity conservation across all levels of government.
- Accountability for meeting biodiversity outcomes is improved.
Overview of the region

The Desert Channels Queensland region is that part of Queensland where the rivers run inland to Lake Eyre. Its 510,274 square kilometres (30 percent of the State) making it the largest regional body area in Queensland.

Its ancient landscapes range from the western watershed of the Great Dividing Range, through open Mitchell grass plains, to the floodplains of the Channel Country and sand dunes of the Simpson Desert.

The major rivers of the region, the Georgina-Diamantina and Cooper, are the most variable flowing major rivers on the planet. Rising in the north and east of the region they feed the wetlands and waterholes of the Channel Country as well as the Ramsar listed Coongie Lakes and Lake Eyre itself.
These unique, largely unmodified rivers are also among the world’s last unregulated dryland river systems. Compared with wetlands in the Murray-Darling Basin, which are compromised with regulation of water flows, those of the Lake Eyre Basin, which are still in their natural or unregulated form, are critical natural environments for the region.

Aboriginal people have lived in the region for at least 17,000 years, and the region is dotted with sites showing evidence of their presence. Today, however, the Aboriginal population is small compared with many other parts of outback Australia and is estimated at around 6 percent, with most living in the Georgina-Diamantina catchment.

The region is a rich tapestry of landscapes and ecosystems, often in delicate balance within their boom and bust cycles. Undoubtedly its character has changed over the past 150 years, and it is facing new challenges as the 21st century unfolds.

Rural settlement began in the 1860s with the discovery of the Mitchell Grass Downs and Channel Country by the early explorers. Initial vast holdings were later broken up, with the hope of promoting closer settlement. The development of the region for wool brought a substantial labour force and towns and settlements sprang up as the railway line extend west, reaching Longreach in 1892. In more recent times the strong move towards cattle has seen the aggregation of many properties and as a result property management units are increasing in size once more.

Land tenure in the region is predominantly leasehold, with most freehold in the more densely populated Barcaldine to Tambo area. The unique landscape and biodiversity of the region is today shared with the pastoral industry in a way that demonstrates how well-managed agriculture can co-exist with natural values. The region includes one of the largest areas of organic beef production in the world, driven principally by the natural irrigation of vast areas of highly productive Channel Country. The native pastures of the region are in remarkably good condition and the land managers are embracing sustainability and looking towards the future.
The region supports many unique plants, animals and ecosystems. Parts of the region are significant habitat for rare and threatened plant and animal species, and for species of conservation concern. The red-finned blue-eye is a fish found in a few shallow artesian springs north of Aramac and nowhere else in the world. The ancient waddi tree is restricted to three locations on the fringes of the Simpson Desert, two of them in the DCQ region. This area is also the last Queensland stronghold of the once-abundant bilby. Desert Channels Queensland contains 19 national parks covering around 4.2 percent of the region, and 10 nature refuges under voluntary protection covering 2.2 percent. Approximately 12,000 kilometres of active and inactive stock routes traverse the region.

From an economic perspective, apart from rangeland grazing, the main industries are tourism, government services, mineral extraction and the rapidly developing coal and coal seam gas sectors.

From a socio-economic perspective, the main trend has been the declining and ageing rural populations over the past 30 years, with the region’s current population estimated at about 14,500, distributed through 25 settlements varying in size from a handful of people to almost 4,000 in Longreach. The shift from sheep to cattle has been a major factor in population decline, and more recently the loss of labour to the mining industry outside the region. Absentee landholders have purchased enterprises that once supported families and which now have only a single caretaker or no residents at all.

The natural biodiversity of the region fortifies landscapes and ecosystems with resilience in changing times and in relation to extreme local events, and provides ecosystem services such as good water quality, nutrient recycling, and natural pastures. The challenge is to protect environmental values for future generations whilst ensuring economic viability for the communities of the region.

The most commonly listed threats to the biodiversity and ecology of the region today are: total grazing pressure; introduced plants and animals; altered fire regimes and altered hydrology. Identifying the causes, effects, locations and ameliorating actions to threats to our natural systems is an important component of the development of this biodiversity plan for the DCQ region.

Managing for landscape resilience will ensure that we maintain the region’s natural values and their ecosystems services for biodiversity, production and social benefit for the long term future.
Regional biodiversity principles, vision and goals

Principles
The principles below are the outcome of consultation with regional stakeholders. They are fundamental to the conservation of DCQ's biodiversity and guide how the goals, strategies and targets of the plan can be achieved.

Biodiversity
- Acknowledge the many natural values of the region
- Apply a holistic, ecological approach across the landscape
- Prioritise biodiversity conservation without precluding use that is ecologically sustainable for the long term.

People
- Acknowledge the fundamental reliance on biodiversity for quality of human life, economy and identity
  - Value the cultural assets of the region
- Effectively engage the community and stakeholders
  - Promote ecologically sustainable development

Knowledge
- Build on existing biodiversity planning and regional ecosystem approaches
- Connect and integrate the plan with biodiversity planning at national and state levels
  - Base the plan on the best available science
- Take a precautionary approach where there is a lack of full scientific certainty
  - Ensure the plan is adaptive to incorporate future knowledge

Action
- Address causes not symptoms
- Focus actions on enhancement/conservation AND rehabilitation/recovery
- Ensure actions incorporate an adaptive approach that is flexible and inclusive, and continually improves by testing and learning
**Vision**

The vision for our biodiversity plan has been adopted from our overarching natural resource management plan:

*By 2050 all ecosystems in the region have in place the best protection possible recognising their vulnerability to climate change and other external forces. Ecosystem services are well understood and managed.*

Putting in place the best protection possible for the long term doesn’t mean locking away the region’s biodiversity assets. It does mean taking action which is necessary to protect biodiversity from threatening processes. This will give the region’s ecosystems the best chance possible of building resilience and continuing to provide essential ecosystem services.

**Regional biodiversity goals**

To achieve the vision, four goals have been workshopped and adopted for the next five years:

- Conservation of regional and local biodiversity
  supporting the resilience of our landscapes and ecosystems, and protecting the conservation values and productive capacity of the region’s natural resources.

- Ecological knowledge influencing decision making
  accessing good information and knowledge for making effective decisions, and taking an approach of ‘learning and improving by doing’ or adaptive management.

- Community ownership and stewardship for biodiversity
  developing a capable and committed community that faces challenges with confidence backed by knowledge, skills and access to information.

- Adapting to change
  retaining the region’s shock-absorbing capacity by reducing risk from declining connectivity and condition in habitats and threats such as climate change, weeds, grazing pressure and industry development.

**Strategic initiatives and actions**

The highly complex, interconnected nature of biodiversity poses many challenges for identifying specific priority strategies. Strategic initiatives and actions have been workshopped with our stakeholders to provide a focus for working towards the vision and goals of this plan.
Strategic initiatives

- Managing extent and condition of native vegetation
- Better protect and manage aquatic environments
- Conserving species
- Protected areas management
- Promote an understanding of the fundamental reliance on biodiversity for quality of human life, economy and identify
- Identify and establish new partnerships particularly with indigenous groups
- Increase opportunities for landholders to act as biodiversity stewards

Conservation of regional and local biodiversity

Ecological knowledge influencing decision making

Community ownership and stewardship for biodiversity

Adapting to change

- Improve knowledge and understanding of DCQ biodiversity
- Improve accessibility, dissemination and knowledge sharing
- Influence government planning and policy
- Reduce the impact of climate change on biodiversity
- Reduce the impact of changes in land use on biodiversity
- Reduce the impact of total grazing pressure on biodiversity
- Reduce the impact of invasive species on biodiversity
Action plan

1. Conservation of regional and local biodiversity

After floods, fires or droughts our ecosystems tend to recover without being permanently changed. This ‘shock-absorbing’ capacity, or resilience, enables ecosystems to recover from shocks up to a limit. The more resilient a system is the larger the shock it can take without being pushed beyond a limit from which it is able to recover.

Resilience is usually stronger in natural ecosystems as they have a great diversity of plants, animals and connected habitats. By removing habitats and reducing the diversity of plants and animals, we simplify our landscapes and natural resources, and inevitably make them less resilient and more vulnerable to shocks, natural or not.

We can support the resilience of our landscapes and ecosystems in many ways, and so protect the conservation values and productive capacity of the region’s natural resources.

<table>
<thead>
<tr>
<th>1.1</th>
<th>Managing extent and condition of native vegetation</th>
<th>Priority for DCQ</th>
<th>Proposed DCQ actions 2012-17</th>
</tr>
</thead>
</table>
| 1.1.1 | Support resilience in the landscape by maintaining native vegetation | high | • Promote and support property planning for a resilient landscape  
• Promote and implement strategic best practice groundcover management projects across the landscape  
• Strategically manage weeds and feral animals – in particular in riparian and wetland areas, and on the open grass downs |
| 1.1.2 | Ensure native vegetation corridors are identified and maintained | high | • Promote and implement best practice groundcover management in recognised terrestrial and riparian corridors |
| 1.1.3 | Work with relevant authorities to integrate biodiversity outcomes into plans e.g. fire management | high | • Identify key players and planning processes  
• Develop and promote best practice e.g. fire management information |
| 1.1.4 | Protect and where possible enlarge areas of threatened plant communities | medium | • Identify hotspots  
• Develop plans for their protection |
<table>
<thead>
<tr>
<th>1.2</th>
<th>Managing extent and condition of native vegetation</th>
<th>Priority for DCQ</th>
<th>Proposed DCQ actions 2012-17</th>
</tr>
</thead>
</table>
| 1.2.1 | Promote water management which protects aquatic environments | high | • Promote the values of wetlands and wetland health  
• Develop signage for wetland hotspots to raise awareness of human impacts  
• Develop and promote stories of best practice management of surface and underground waters |
| 1.2.2 | Identify and where necessary implement rehabilitation of high value riparian areas and wetlands | high | • Strategically manage weeds and feral animals in high value riparian and wetland areas  
• Promote importance of managing total grazing pressure in high value riparian and wetland areas  
• Deliver strategic on ground initiatives to rehabilitate artesian springs and other high conservation value aquatic ecosystems |
| 1.2.3 | Protect high-conservation value wetlands outside of the protected areas system | high | • Promote the significance of artesian springs and other high conservation value aquatic ecosystems  
• Deliver strategic on ground initiatives to protect artesian springs and other high conservation value aquatic ecosystems |

<table>
<thead>
<tr>
<th>1.3</th>
<th>Conserving species</th>
<th></th>
</tr>
</thead>
</table>
| 1.3.1 | Identify, protect and, where necessary, restore key habitats, communities and populations | medium | • Identify key habitats, communities and populations  
• Seek partners and funding to develop plans for their protection  
• Promote and implement on ground projects in line with plans |
| 1.3.2 | Identify and monitor threatened species populations | medium | • Identify, engage with and influence key players |
| 1.3.3 | Review existing recovery and threat abatement plans for threatened species and implement recovery actions | low | • Identify, engage with and influence key players |
| 1.3.4 | Develop new threat abatement plans for identified threatened species | low | • Identify, engage with and influence key players |

<table>
<thead>
<tr>
<th>1.4</th>
<th>Protected areas management</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4.1</td>
<td>Ensure that pest and fire management for the protected area estate supports species and habitat protection</td>
<td>low</td>
</tr>
<tr>
<td>1.4.2</td>
<td>Increase the area under protection</td>
<td>low</td>
</tr>
</tbody>
</table>
2. Ecological knowledge influencing decision making

The management of biodiversity deals with very complex issues. It seeks to achieve social, economic and environmental outcomes through the use, management and protection of natural resources. It requires an understanding of biophysical systems that operate over a range of scales, in both time and space.

Biodiversity management also requires understanding of many other factors such as social and economic drivers; rural sociology and community capacity building; and industry development and outlooks. Often there is an urgency to address issues and land managers such as pastoralists, industry operators and park managers must make decisions and take actions, with limited information and resources.

Effective decision making relies on access to good information and knowledge. It also demands an approach of ‘learning and improving by doing’ (adaptive management).

<table>
<thead>
<tr>
<th>2.1</th>
<th>Improve knowledge and understanding of DCQ biodiversity</th>
<th>Priority for DCQ</th>
<th>Proposed DCQ actions 2012-17</th>
</tr>
</thead>
</table>
| 2.1.1 | Develop and implement biodiversity monitoring programs | high | • Seek expert opinion and develop a proposal for collaborating in a monitoring program for biodiversity hotspots with key players  
• Seek funding to implement proposal  
• Establish and maintain ongoing monitoring for all DCQ on ground projects |
| 2.1.2 | Develop a research prospectus for the DCQ region | high | • Produce and circulate a prospectus of strategic research projects |
| 2.1.3 | Identify and pursue funding opportunities in partnership with research institutions, government and industry | high | • Develop a prospectus of strategic biodiversity investments  
• Identify potential partners and pursue funding opportunities |
<table>
<thead>
<tr>
<th>2.1</th>
<th>Improve knowledge and understanding of DCQ biodiversity</th>
<th>Priority for DCQ</th>
<th>Proposed DCQ actions 2012-17</th>
</tr>
</thead>
</table>
| 2.1.4 | Support research that promotes understanding of the value of biodiversity and ecosystem services | **high** | • Support and promote regionally relevant research:  
• ecosystem services provided by biodiversity  
• species and sites at high risk from climate change  
• impacts of climate change on pest plant and animal distributions  
• economic and biodiversity benefits of alternative grazing strategies  
• commercial activities that maintain or enhance biodiversity  
• fire and new chemical and biological methods to control prickly acacia  
• fire to control gidgee thickening and encroachment  
• targeted feral cat control in areas of high risk to threatened species  
• species-specific work in rivers and wetlands  
• inventory of biota in all artesian spring super groups  
• innovative wild dog management  
• innovative macropod management  
• poorly known and potentially threatened flora species  
• locally relevant carbon farming opportunities  
• Identify and support additional research needs in response to emerging issues |

<p>| 2.1.5 | Benchmark unregulated river systems | <strong>low</strong> | • Identify, engage with and influence key players |</p>
<table>
<thead>
<tr>
<th>2.2</th>
<th>Improve information accessibility, dissemination and knowledge sharing</th>
<th>Priority for DCQ</th>
<th>Proposed DCQ actions 2012-17</th>
</tr>
</thead>
</table>
| 2.2.1 Develop information management processes to improve the timely availability of relevant information | high | • Expand and refine use of DCQ intranet and web-based information delivery  
• Train staff in biodiversity information management and retrieval  
• Facilitate and convene working networks/groups to share specialist regional knowledge |
| 2.2.2 Support the collection and capture of traditional and local biodiversity knowledge | high | • Collect, collate and promote the following local knowledge:  
  • local, including indigenous, biodiversity knowledge  
  • total grazing pressure issues and best management practice  
  • best practice fire management  
  • best practice control of predators of small marsupials (bilby, Julia Creek dunnart) and yellow-footed rock wallaby  
  • Identify and support additional topics in response to emerging issues |
| 2.2.3 Investigate opportunities for commercialisation of knowledge | medium | • Seek expert opinions and write report  
• Progress plans with partners in line with report |
| 2.2.4 Develop and implement a biodiversity knowledge strategy incorporating data management | medium | • Seek funding to develop a corporate knowledge management strategy  
• Write and implement the knowledge management strategy |

<table>
<thead>
<tr>
<th>2.3</th>
<th>Influence government planning and policy</th>
<th>Priority for DCQ</th>
<th>Proposed DCQ actions 2012-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.1 Provide technical assistance to local government and developers to support their planning decisions</td>
<td>high</td>
<td>• Identify, engage with and influence key players through their planning processes</td>
<td></td>
</tr>
<tr>
<td>2.3.2 Work with local government to improve biodiversity outcomes through land use planning policy</td>
<td>high</td>
<td>• Identify, engage with and influence key players through their planning processes</td>
<td></td>
</tr>
</tbody>
</table>
3. Community ownership and stewardship for biodiversity

Like many regional and rural communities, the DCQ Region is facing the challenges of social and economic change, in increasingly variable climatic conditions. For a community so dependent on natural resources for its economic base, future challenges are likely to be great.

A capable and committed community with knowledge, skills, access to information and support, can face challenges with confidence.

Within communities, levels of appreciation and experience with biodiversity will always differ and so there will always be a need to actively inform, consult, involve and empower community groups and individuals.

<table>
<thead>
<tr>
<th>3.1</th>
<th>Improve knowledge and understanding of DCQ biodiversity</th>
<th>Priority for DCQ</th>
<th>Proposed DCQ actions 2012-17</th>
</tr>
</thead>
</table>
| 3.1.1 | Promote the relevance of biodiversity to all our community | high | - Develop a practical biodiversity communication plan for the region, aligned with DCQ’s current strategic communication plan  
- Plan, research and prepare locally relevant biodiversity awareness training, information and display materials  
- Promote at public events |
| 3.1.2 | Develop a biodiversity education program in partnership with regional schools | high | - Provide locally relevant biodiversity information for schools |
| 3.1.3 | Assist the community to undertake biodiversity conservation activities | high | - Promote information to community re best practice methods of managing groundcover, macropods, total grazing pressure, weeds and feral animals |
| 3.1.4 | Encourage and assist the community to minimise their ecological footprint | high | - Seek expert opinion and write project proposal for program of works  
- Seek funding for strategic community awareness and on ground projects |
| 3.1.5 | Ensure biodiversity is well integrated into information packages and programs developed for new landholders | high | - Deliver biodiversity awareness training and information to landholders  
- Promote best practice land management through case studies and stories |
<table>
<thead>
<tr>
<th>3.2</th>
<th>Identify and establish new partnerships particularly with Indigenous groups</th>
<th>Priority for DCQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.1</td>
<td>Improve Indigenous participation in management of species and ecological communities</td>
<td><strong>high</strong></td>
</tr>
<tr>
<td>3.2.2</td>
<td>Support and strengthen biodiversity forums and partnerships that are driven by local government</td>
<td><strong>high</strong></td>
</tr>
<tr>
<td>3.2.3</td>
<td>Identify opportunities for (and needs of) philanthropic and private industry sponsorship</td>
<td><strong>high</strong></td>
</tr>
<tr>
<td>3.3</td>
<td>Increase opportunities for landholders to act as biodiversity stewards</td>
<td></td>
</tr>
</tbody>
</table>
| 3.3.1 | Provide increased opportunities and reward for involvement in biodiversity conservation | **high** | • Seek expert opinion and develop plan for a stewardship program for landholders  
• Seek funding opportunities in line with plan |
| 3.3.2 | Identify and support private land managers who manage large areas of habitat | **high** | • Develop contact list and engage network  
• Promote DCQ incentives and information to group  
• Seek to implement stewardship program in line with funding opportunities |
| 3.3.3 | Assist in skills development and training for biodiversity conservation | **high** | • Deliver training in biodiversity conservation to landholders |
4. Adapting to change

The current shock-absorbing capacity of the DCQ Region is at risk from the decline in connectivity and condition of habitats, and threats such as weeds, grazing pressure and industry development. These risks are likely to be worsened by predicted changes in the region’s climate. The challenge is to set a path that ultimately helps the natural adaptation of species to climate change, and protects species that are particularly vulnerable to climate change. Goal 4 focuses on increasing our understanding of climate change, minimising the impacts of climate change on biodiversity, and incorporating knowledge and harm-minimisation strategies into biodiversity and land use management strategies.

<table>
<thead>
<tr>
<th>4.1</th>
<th>Reduce the impact of climate change on biodiversity</th>
<th>Priority for DCQ</th>
<th>Proposed DCQ actions 2012-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.1</td>
<td>Undertake regional assessment of the potential impacts of climate on biodiversity</td>
<td>medium</td>
<td>• Commission a review of current climate change information to determine the impact on sustainable grazing systems and use it to guide future planning and projects</td>
</tr>
</tbody>
</table>
| 4.1.2 | Identify species and sites at risk from climate change and develop a program to monitor these sites and species | medium | • Identify high risk species and sites  
• Plan a program to monitor these  
• Seek funding to implement program |
| 4.1.3 | Seize opportunities for climate change mitigation and adaptation by encouraging biodiverse carbon farming | low | • Await outcomes of current research by rangeland experts |

<table>
<thead>
<tr>
<th>4.2</th>
<th>Reduce the impact of changes in land use</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.1</td>
<td>Support land use planning that takes account of climate change risk assessments</td>
<td>high</td>
<td>• Identify the key players and provide input to local government land use planning</td>
</tr>
<tr>
<td>4.2.2</td>
<td>Identify and support commercial activities that maintain or enhance biodiversity</td>
<td>high</td>
<td>• Develop and promote best practice management fact sheets by industry group to stakeholders</td>
</tr>
</tbody>
</table>
| 4.2.3 | Promote infrastructure development that minimises impacts on biodiversity | high | • Review all DCQ-funded infrastructure projects to assess their effectiveness and to assist decision making and promotion of best practice  
• Promote best practice infrastructure development (tracks, fences, waters etc.) to stakeholders |
| 4.2.4 | Develop an environmental management framework for mining development offsets | high | • Identify the key players and influence the development of an environmental management framework for mining development offsets  
• Promote community awareness of the effects of mining |
| 4.2.5 | Develop an environmental management framework for the tourism sector | high | • Identify the key players and influence the development of an environmental framework for the tourism industry  
• Promote community awareness of the effects of tourism and recreation |
<table>
<thead>
<tr>
<th>4.3</th>
<th>Reduce the impact of total grazing pressure</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.1</td>
<td>Work with landholders to maintain appropriate levels of ground cover</td>
<td>high</td>
<td>• Set up demonstration projects for best practice management of total grazing pressure</td>
</tr>
<tr>
<td>4.3.2</td>
<td>Support research to investigate the economic and biodiversity benefits of alternative grazing strategies</td>
<td>medium</td>
<td>• Identify current research contacts and collate relevant knowledge • Identify knowledge gaps and seek funding for cost benefit analyses</td>
</tr>
<tr>
<td>4.3.3</td>
<td>Protect vegetation on stock routes</td>
<td>medium</td>
<td>• Identify, engage with and influence key players</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.4</th>
<th>Reduce the impact of invasive species</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4.1</td>
<td>Identify the risk of emerging weeds in the face of a changing climate</td>
<td>high</td>
<td>• Seek expert opinion to determine the impact of climate change on emerging weeds such as cacti and weed grasses • Revise regional pest management plan in light of review above</td>
</tr>
<tr>
<td>4.4.2</td>
<td>Develop pest management strategies for highest risk species</td>
<td>high</td>
<td>• Develop strategies for best practice invasive species control in high risk habitats of small marsupials such as bilby and Julia Creek dunnart, and yellow-footed rock wallaby</td>
</tr>
<tr>
<td>4.4.3</td>
<td>Implement existing pest plant and animal management strategies for highest risk species</td>
<td>high</td>
<td>• Continue to refine and promote the regional pest management plan • Facilitate and implement strategic best practice feral animal control – dogs, pigs, cats, goats • Facilitate and implement strategic best practice weed control – WONS and emerging threat weeds • Establish demonstration projects for best practice weed control in most threatened areas</td>
</tr>
<tr>
<td>4.4.4</td>
<td>Refine risk assessment methods for the introduction of new production species</td>
<td>medium</td>
<td>• Identify, engage with and influence key players</td>
</tr>
</tbody>
</table>
Evaluation and improvement

Monitoring
Monitoring, evaluation and reporting are activities that help demonstrate that the goals of this plan will be achieved over time. An important component of the success of this plan will be positive change to biodiversity in the region. Monitoring resource condition at the local and regional level to measure change in biodiversity condition or trend will give an important indication of our progress.

For the purpose of this plan, we will know we are on the right track if:
• there is high community acceptance of the plan and implementation of identified actions by people in the region
• community interest in the biodiversity management process continues
• the plan and its strategies are acted upon.

Evaluation and adaptive management
The key to successful adaptive management is for information to clearly feedback into decision making. Decision makers can compare the actions undertaken with improvements in biodiversity.

This comparison needs to consider questions such as:
• Has the plan been acted on as intended?
• Have the actions made progress towards the four goals of the plan?
• Is the condition of biodiversity improving or worsening?
• To what extent is any change in the condition of, or use of, our biodiversity related to the actions arising from the plan?

To answer these questions an evaluation framework will be needed that can:
• establish mechanisms to check if the region is moving towards its agreed biodiversity goals
• establish a culture of learning and improvement
• engage stakeholders in this learning and improvement
• promote an integrated approach to planning, doing and learning
• set up efficient and effective mechanisms of accountability.
Biodiversity of the Desert Channels region

Natural values

Geology and landforms

The Desert Channels region is the Queensland section of the Lake Eyre Basin and is an ancient weathered landscape, ranging in elevation from 850 metres above sea level in the northeast at White Mountains to 15 metres above sea level in the salt lakes of the Simpson Desert at Poeppel Corner in the southwest.

The major river systems of the Georgina-Diamantina and Cooper Creek are extremely variable in their flow, generating the boom and bust cycling typical of the Desert Channels region. The rivers of the basin are generally slow flowing, with very low gradients and often braided channels, and are usually ephemeral, depending on seasonal conditions. They all flow towards the lowest point which is 16 metres below sea level, at Lake Eyre in South Australia.

The northwest edge of the region has some of the most mineral rich rocks in the state, supporting an important mining industry in and around Mt Isa. The rest of the region is a series of huge sedimentary basins, most of it underlain by the water bearing rocks of the Great Artesian Basin, and the oil, gas and coal-rich Eromanga, Cooper and Galilee Basins.

Around 180 million years ago, the region consisted of a stable, deeply weathered land surface, covered with dense forest. The Lake Eyre Basin began to form as southeast South Australia began to subside, triggering erosion of the land surface, and deposition of sandstones which now form important parts of the Great Artesian Basin aquifer. As the land was subsiding, the global sea level was rising, leading to the Lake Eyre area being inundated several times during the period 97-140 million years ago. More sediments, mainly mudstones and sandstones, were laid down during this time.

As the climate changed from wet to arid over the last 60 million years, periods of alternating deposition and exposure continued. It was at this time that silcretes formed in the landscape as a result of chemical weathering, becoming hard cap rock on top of softer sedimentary layers. As these eroded they formed the characteristic mesas and escarpments we see today.

From 10 million years ago, conditions became much drier, and the region’s current lakes and dune fields began to take shape. Since that time, periodic flooding on a huge scale and windy dry conditions have shaped the dunes of the region into their final forms. The basin is still gradually sinking, and still gradually accumulating sediment.

The Desert Channels landscape is naturally saline from its time as part of the vast inland sea, with the natural vegetation evolved to cope with these salinity levels. Man-made salinity is not a significant issue in the region.

Most natural systems in the region are still relatively intact. Fragmented landscapes are the exception, rather than the norm, occurring mostly in the more densely populated eastern parts of the region. The lands are in relatively good condition. Erosion is still part of the natural landscape today, just as it has been in the past, with highest potential for water erosion in the Desert Uplands and wind erosion in the Channel Country.
Climate
The region is hot and dry, with highly variable, predominantly summer rainfall, usually associated with trough systems. Significant rainfall events can also be delivered from monsoonal/cyclonic influences in the north of the region, but more rarely further south. Rainfall ranges from more than 600mm in the north of the region to 165mm at Birdsville in the south. Evaporation is very high, with a range across the region of 2.4 to over 3.2 metres a year.

The natural ecosystems are adapted to the boom and bust climatic cycle of highly irregular rainfall and flooding events, but it is a significant challenge for the region’s pastoral industry and town communities. The impacts of climate change may place additional stresses on the ecology and productivity of the region.

Bioregions
Six bioregions are represented in the Desert Channels region, with the two major areas being the Mitchell Grass Downs and Channel Country, covering 81 percent of the region. Smaller areas of the region are covered by the Desert Uplands, Mulga Lands, Northwest Highlands and Brigalow Belt. The bioregional approach categorises the landscape using geology and climate, together with major changes in native flora and fauna, as shown below.

Bioregional make up of the Desert Channels Region

<table>
<thead>
<tr>
<th>Bioregion</th>
<th>km2</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Country* (CHC)</td>
<td>219,365</td>
<td>43%</td>
</tr>
<tr>
<td>Mitchell Grass Downs (MGD)</td>
<td>193,943</td>
<td>38%</td>
</tr>
<tr>
<td>Desert Uplands (DEU)</td>
<td>41,650</td>
<td>8%</td>
</tr>
<tr>
<td>Mulga Lands (ML)</td>
<td>28,284</td>
<td>6%</td>
</tr>
<tr>
<td>Northwest Highlands (NWH)</td>
<td>26,019</td>
<td>5%</td>
</tr>
<tr>
<td>Brigalow Belt South (BBS)</td>
<td>4,723</td>
<td>1%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>513,984</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*includes Simpson Desert dune fields
Bioregion and Description

**Brigalow Belt South**
- predominantly young deposits of the Great Artesian Basin
- woodlands and open forests of eucalypt, brigalow
- areas of high fertility clay pans

**Channel Country**
- vast braided flood plains surrounded by gravel or gibber plains, dune fields and low ranges
- heavy grey clays on the flooded areas, shallow calcareous soils, loams
- predominantly forb and grasslands with sparse shrublands and woodlands
- includes the Simpson Desert dune fields

**Desert Uplands**
- dominated by sandstone ranges and sand plains with remnants of ancient deeply weathered plateaus
- on the eastern margin of the Great Artesian Basin, important uptake areas for the aquifers of the basin
- sandy, infertile, poorly structured soils
- wide diversity of plant species including dense eucalypt and acacia woodlands and spinifex grasslands

**Mitchell Grass Downs**
- predominantly treeless undulating downs interspersed with drainage lines and isolated remnant plateaus
- deep, fertile grey and brown clay soils with high moisture retention capacity
- smaller areas of less fertile calcareous desert soils, red earths and sands
- dominated by Mitchell grass, sometimes with a low tree layer of gidgee and other trees

**Northwest Highlands**
- rugged hills, ranges and outwash with undulating valleys
- caves and sinkholes
- skeletal soils
- predominantly low open woodland over spinifex

**Mulga Lands**
- flat to undulating plains and low ranges supporting a range of mulga shrublands and woodlands
- infertile sandy soils

---

**Legend**
- Localities
- Drainage
- DCQ Boundary
- Brigalow Belt South
- Channel Country
- Desert Uplands
- Mitchell Grass Down
- Mount Isa Inlier
- Mulga Lands

**Scale 1:2,750,000**
- 0 20 40 80 120 160 Kilometres

**Map 2 - Bioregions of the dCQ area**
Plants and animals

Relatively undeveloped regions such as the Desert Channels are usually characterised by good native vegetation cover and poor detailed site data. The mapping of regional ecosystems (the vegetation communities that are consistently associated with a particular combination of geology, landform and soil in a bioregion) across the region is uniform and accurate at 1:100,000 scale, but more detailed mapping of individual flora or fauna species is mostly very inadequate. Many areas are still under-surveyed due to the size of the region, its remoteness and extreme climate. High densities of records have been collected in more heavily sampled, usually more accessible areas such as along roads or in national parks, whilst harder to access areas such as ranges and escarpments, and private lands, are under-represented.

From the data which has been collected about species in our region, 748 species of native animals and 2,554 native plant species have been recorded. Of these, 5.6 percent (42) of animal species and 1.3 percent (33) of plant species are listed as rare or threatened under Queensland’s Nature Conservation Act 1992, or under the Australian Government’s Environment Protection and Biodiversity Conservation Act 1999.

Compared to the rest of Australia parts of the region have a high level of species richness for certain families of animals including wallabies and kangaroos, swallows and martins, babblers, dragon lizards, skinks, pythons, sheath-tailed and free-tailed bats, geckos, snails, water beetles and water bugs.

Levels of endemism are high for fauna families including small marsupials, native rats and mice, fairy-wrens and grass wrens, babblers, sheath-tailed and free-tailed bats, gobies, blue-eyes, eel-tailed catfish, skinks, blind snakes, snails, water beetles and water bugs.

The region is also recognised as of national and international significance for migratory birds (marine, terrestrial and wetland species).

There is high species richness for native grasses and sedges, with more than 400 species described. In addition, families of plants with high levels of endemism in the region include grasses, pigweeds, bindweeds, pipeworts and wild tomatoes.

298 regional ecosystems have been described for the region. Each has been assigned a biodiversity status after considering the extent of the ecosystem and likely threats, with 10 percent of regional ecosystems in the Desert Channels region classified as ‘endangered’, 27 percent ‘of concern” and 63 percent ‘of no concern at present’.

The region’s mound spring ecological communities are listed as endangered at a national level, as are the highly fragmented remnants of some brigalow communities.

See part 2 for further details on the range of ecosystems.
Ecosystem services

Ecosystem services are the benefits provided to humans through the transformations of environmental assets into goods and services. They are vital for our existence, our health and our prosperity. Healthy landscapes maintained for provision of ecosystem services will assist in the sustainability of our lifestyles and communities, including providing options for our future. In the Desert Channels region for example, ecosystem services are at the core of our rangelands grazing industry and are important for our rapidly developing tourism industry.

Some ecosystem services are easy to see, such as the provision of food and fresh water, whilst others are less tangible and more complex, for example climate regulation or provision of spiritual values.

The maintenance of biodiversity is crucial to ensuring that ecosystems continue to function well. Human activity often tends to modify natural systems to achieve direct benefits (such as agricultural production) but may at the same time not see, or undervalue, other essential ecosystem services that cannot be replaced once lost (for example erosion control, pollination). A useful framework for thinking about biodiversity and ecosystem services is shown below.

Most ecosystems are extremely complex and it is difficult to measure their health. There is a danger that they can unexpectedly collapse if certain thresholds are exceeded (for example fish numbers).
Ecosystems function by moving energy and materials through living organisms in cycles of growth, reproduction and death, which are influenced by disturbances such as floods and fires, stresses such as droughts, and ecological interactions such as competition and predation. Ecosystems evolve in response to these factors over millennia.

Ecosystems which have been degraded or modified are generally simpler and less resilient to pressures than complex systems. Resilient systems can maintain themselves when they are subject to external changes from natural or human-induced events.

The key to maintaining resilient ecosystems is to ensure that natural landscapes retain their connectivity and vegetation structure so that biodiversity can function across all habitats. Restoring connectivity and degraded ecosystems is also vital.

The identification and management of threats to biodiversity in our region is an essential part of maintaining our ecosystem services.

**Threatening processes**

**The key threatening processes identified for the region are:**

**Total grazing pressure**
Total grazing pressure is the pressure exerted by all animals (domestic livestock, native species and introduced feral species) on natural ecosystems.

Rangeland grazing by domestic livestock is typically low density over wide areas of pasture of variable composition and quality and is generally well managed in the region. However non-domestic species (such as kangaroos, feral goats and camels) are much more difficult to manage, or may not be managed at all, and can have very significant additional impacts on vegetation, soil and water resources over and above those caused by domestic livestock.

The development and spread of artificial waters has led to increased grazing pressure across the region as grazing species are able to spread further across what were once remote and dry landscapes.

There is the potential for long term total grazing pressure to gradually impact on large areas, resulting in soil erosion, changed vegetation composition, increased weed infestations, and degraded water supplies. Other impacts can include declining pasture productivity, negative impacts on biodiversity and loss of ecosystems services.

Riparian frontage, alluvial plains, waterholes, sand plain and desert landscapes are particularly vulnerable to this threat.

**Human impacts**

It is not only grazing animals that can cause pressure on the landscape. The increase in visitors and their concentration at specific points is an ongoing issue for our region. Areas close to water and of scenic beauty are the most impacted. Visitors and campers can cause trampling and erosion, and generate new tracks or expand old ones. Collection and burning of firewood destroys important habitat. Inappropriate fishing practices such as netting impact on native fish populations. The introduction of non-endemic aquatic species (for example red claw, sleepy cod) to the region’s waterways is an issue also.
**Introduced animals**

Introduced species in the region are of two kinds – those from outside of Australia, for example pigs or cane toads, and native species which have been translocated from other parts of Australia, for example red claw crayfish.

Twenty three introduced species are listed for the region by the Queensland Department of Environment and Heritage Protection, although there are likely to be many more, especially of smaller and more cryptic species. See Appendix for further details. Of those identified, half are mammals such as pigs, foxes, cats, camels, rabbits, and wild dogs.

Introduced species compete with native fauna for food, shelter and habitat. They also put additional pressure on the land and waterways of the region and can degrade and destroy vegetation and native fauna populations.

Introduced species generally have few or no natural predators providing natural control, and their populations can explode rapidly in the right conditions. They are also significant vectors for carrying diseases that may threaten native wildlife, domestic livestock and humans.

Eradication of most introduced species is not feasible due to the size and remoteness of the region and the costs involved. The focus is generally on management and control, with highest priority given to the most strategic areas.

Control methods include trapping, shooting (aerial and onground), poison baiting, fencing and biological control.

An important issue is that some introduced species, whilst damaging to biodiversity, may be seen as an economic resource when markets are suitable, for example wild goats.

**Introduced plants**

244 introduced plant species have been listed in the region by the Queensland Department of Environment and Heritage Protection, many of which have been deliberate introductions as garden plants or pasture species.

Weeds are a serious threat to both biodiversity and production values in the region, impacting on land and waterways. They reduce biodiversity by competing with and displacing native species. As with introduced animal species, weeds often have very few natural control mechanisms and can rapidly reproduce and then are spread by wind, water, humans, vehicles and animals.
Eleven weeds of national significance (WONS) occur and include the woody weeds prickly acacia, parkinsonia and mesquite, along with rubber vine, a range of invasive cacti species, bellyache bush and parthenium. Additional plants are identified as established serious weeds or emerging threat species. See Appendix for further details.

Some weeds are localised, such as rubber vine, whilst others are very widespread. Weed species are generally a bigger problem in the north and east of the region, where most introductions and infestations have occurred. Most species have potential to spread south and west through the region and beyond to South Australia and Lake Eyre itself.

Weeds thrive in disturbed and degraded landscapes. Some species, for example the woody weeds, have the capacity to completely alter the vegetation structure, drainage regimes and even the soils of natural systems.

Eradication of some weed threats is a possibility in the region but at huge cost and effort due to the broad geographic spread of many species and the difficulty of the terrain and climate. Other species are targeted for management and control, with the highest priority given to the most strategic areas.

The introduced pasture species buffel grass presents special management challenges as it displaces native species, but also grows so densely that it poses a significant fire threat which can result in the death of native tree and shrub layer species.

Changes in native vegetation
It is not only introduced species that impact on biodiversity values in the region. Native species also become problem plants if natural systems become out of balance. Two examples are gidgee and turkey bush, both of which can undergo thickening and structural changes if fire regimes or grazing pressures are altered, with resultant losses in biodiversity and production values.

Altered fire regimes
Fire is a vital part of the functioning of many rangeland ecosystems and is an important management tool. Appropriate fire regimes can help to conserve and improve biodiversity and production values.

Historically, much of the rangelands would have burned on an episodic basis, but since the advent of grazing production systems, fire regimes have been modified with resultant declines in rangeland biodiversity across Australia. Changes in fire season, intensity or type, together with changed intervals between fires all affect the functioning of natural systems.

Altered water regimes
The region has a wide range of surface and sub-surface water resources which are vitally important to both biodiversity and the economy, particularly in such a predominantly hot dry climate.

Mapped wetlands cover 4.6 percent (23,225 square kilometres) of the region’s land area: 12 percent of these are riverine habitats (2,779 square kilometres), and the rest consist of lakes and swamps, with more than 22,000 mapped in the region. See Appendix for further details.
Surface waters in the region are the main contributors to the inflow of water to Lake Eyre itself. The ephemeral nature of much surface water flow is a significant driver of natural boom and bust cycles, and iconic for the region in terms of tourism. Permanent wetlands and waterholes are the most important refuge points for biodiversity in the landscape in times of drought. The Great Artesian Basin is the biggest and deepest artesian basin in the world, from which the mound spring wetland complexes flow. It is the only reliable source of water for many in the region.

River health and water quality in the region are generally good, in keeping with the relatively undisturbed catchments, which is rare in today’s world. Times are changing fast however with increasing infrastructure development and gas and mineral exploration, and the region has inadequate systems in place at present to monitor changes in hydrology or water quality.

A range of activities can impact on natural hydrological flows. Some examples of key threatening processes in the region include:

Surface water extraction from permanent natural water sources can impact on their function as drought refugia. Total grazing pressure around natural water features can also change the functioning of these delicate ecosystems and the services they provide. Growth in unmanaged tourism in the region has the capacity to damage and stress natural waters and their ecosystems. Poorly located and designed roads, tracks and other infrastructure can disrupt shallow and widespread overland flows and impact on the biodiversity of very large areas.

Resource exploration and mining has the potential to interfere with underground aquifer systems. Excessive pumping of artesian water can lower groundwater tables with adverse impact on mound spring complexes. Conversely, the capping of bore drains can assist degraded springs to flow again.
Climate change
The impacts of climate change will place new and additional stresses on the ecology and productivity of the region, but these potential impacts are poorly understood and there is currently no method for assessing large scale vulnerability to climate change impacts.

In broad terms, ecosystem stress will increase on a gradient from the coast to the inland. Temperatures are rising in our region, however future rainfall projections are variable, with a general view that rainfall will decline across Queensland.

It is believed that the evolution of ecosystems through millions of years in the progressively drying arid climate of regions such as ours will ensure that our natural systems are to some extent pre-adapted to climate variability. Many ecosystems may not be threatened immediately however there will be species in the region with small ranges which are already close to their climatic limits and these will become more vulnerable. Hotter temperatures and less rainfall may see some species ranges contracting towards the coast and southward.

The key to managing for natural systems in changing climatic times is to ensure the long term resilience of the landscape, its flora and fauna. Maintaining good vegetation cover, structure and condition is core to long term resilience. Refugia such as permanent water, caves, and cracking soils for example, are also extremely important, providing habitats to which flora and fauna can retreat in times of stress.

There has been much discussion of the importance of natural corridors to assist with movement of species in response to climate change. The reality is that many species are not likely to intentionally relocate, but their populations may expand at the edge if favourable habitat is available. Corridors may assist the spread of invasive plants and animals and wildfires. Some highly mobile animal species are capable of moving large distances in response to changing food resources, but native plants will only spread during periods of good rainfall conditions.

Climate change is highly likely to further influence fire regimes with increasing fire severity acknowledged as potentially the main threat to some species, particularly where high fire loads have been introduced with non-native pasture species such as buffel grass.

Additional impacts of climate change may lead to the accelerated and broader spread of weed species, introduced animals, and diseases.
Glossary

**adaptive management**
A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.

**benchmark**
A quantitative or qualitative point of reference or standard value against which change in condition or status can be measured.

**biodiversity**
The variety of life forms: the different plants, animals, fungi, bacteria and other microorganisms, the genes they contain, and the ecosystems they form.

**connectivity**
The extent of interconnected-ness between habitat units and subpopulations in a landscape.

**conservation**
The protection, maintenance, management, sustainable use, restoration and enhancement of the natural environment.

**conservation status**
An assessment of extinction risk for a species.

**ecological community**
A naturally occurring assemblage of interacting species adapted to particular conditions of soil, topography, water availability and climate.

**ecological processes**
Dynamic interactions among and between biotic and abiotic components of the biosphere.

**ecosystem**
A dynamic complex of plant, animal, fungal and microorganism communities and the associated nonliving environment interacting as an ecological unit.

**ecosystem diversity**
The variety of ecosystems in a given place. An ecosystem is a community of organisms and their physical environment interacting together. An ecosystem can cover a large area, such as a whole forest, or a small area, such as a pond.

**ecosystem services**
The full suite of benefits that human populations gain from a particular type of ecosystem, such as maintenance of climates; provision of clean water and air; soil stabilisation; pollination of crops and native vegetation; fulfilment of people's cultural, recreational, spiritual, intellectual needs; and provision of options for the future, for example though maintaining biodiversity.

**extent**
The range, magnitude, or distance over which a thing extends.

**external forces**
Include changing land and water use, changes to regional demographics, emerging markets for carbon, water and energy, increased commitment for biodiversity protection.

**feral**
A domesticated species that has escaped the ownership, management and control of people and is living and reproducing in the wild.

**fire regime**
The intensity, frequency and extent of fire.

**fragmentation/fragmented landscapes**
The division or separation of natural areas by the clearance of native vegetation for human land uses, isolating remnants and species and affecting genetic flow.

**genetic diversity**
The variety of genes within a species. Each species is made up of individuals that have their own particular genetic composition. This means a species may have different populations, each having different genetic compositions. To conserve genetic diversity, different populations of a species must be conserved.
**habitat**
The physical place or type of site where an organism, species or population naturally occurs together with the characteristics and conditions that render it suitable to meet the lifecycle needs of that organism, species or population.

**invasive species**
Any animal pest, weed or disease that can adversely affect native species and ecosystems.

**landscape**
A heterogeneous area of local ecosystems and land uses that is of sufficient size to achieve long term outcomes in the maintenance and recovery of species or ecological communities, or in the protection and enhancement of ecological and evolutionary processes.

**natural resource management**
Sustainable management of natural resources (land, soil, geological features, water, vegetation, animals, other organisms and ecosystems, the cultural heritage or amenity of an area) that incorporates economic, social and environmental values and involves the community, industries and governments in planning and decision making.

**plants and animals**
Encompasses terrestrial and aquatic plants (vascular, non-vascular) and animals (vertebrate, invertebrate).

**protected area**
An area of land specifically dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

**threat abatement plans**
Documents that detail management and research actions necessary to stop and reverse the decline of listed threatened species or threatened ecological communities. The aim of a recovery plan is to maximise the long term survival in the wild of a threatened species or ecological community.

**resilience**
The ability of an ecosystem to withstand and recover from environmental stresses and disturbances.

**riparian**
The riparian area or zone is the interface between the land and a stream or river.

**species**
A group of organisms capable of interbreeding with each other but not with members of other species.

**threat abatement**
Eliminating or reducing a threat.

**threatened species and/or ecological communities**
Species (at national and State levels) or ecological community (at a national level) classified as being threatened by extinction and listed as either Vulnerable, Endangered, Critically Endangered or Presumed Extinct.

**threatening process**
Processes that threaten or may threaten the survival, abundance or evolutionary development of components of native biodiversity.