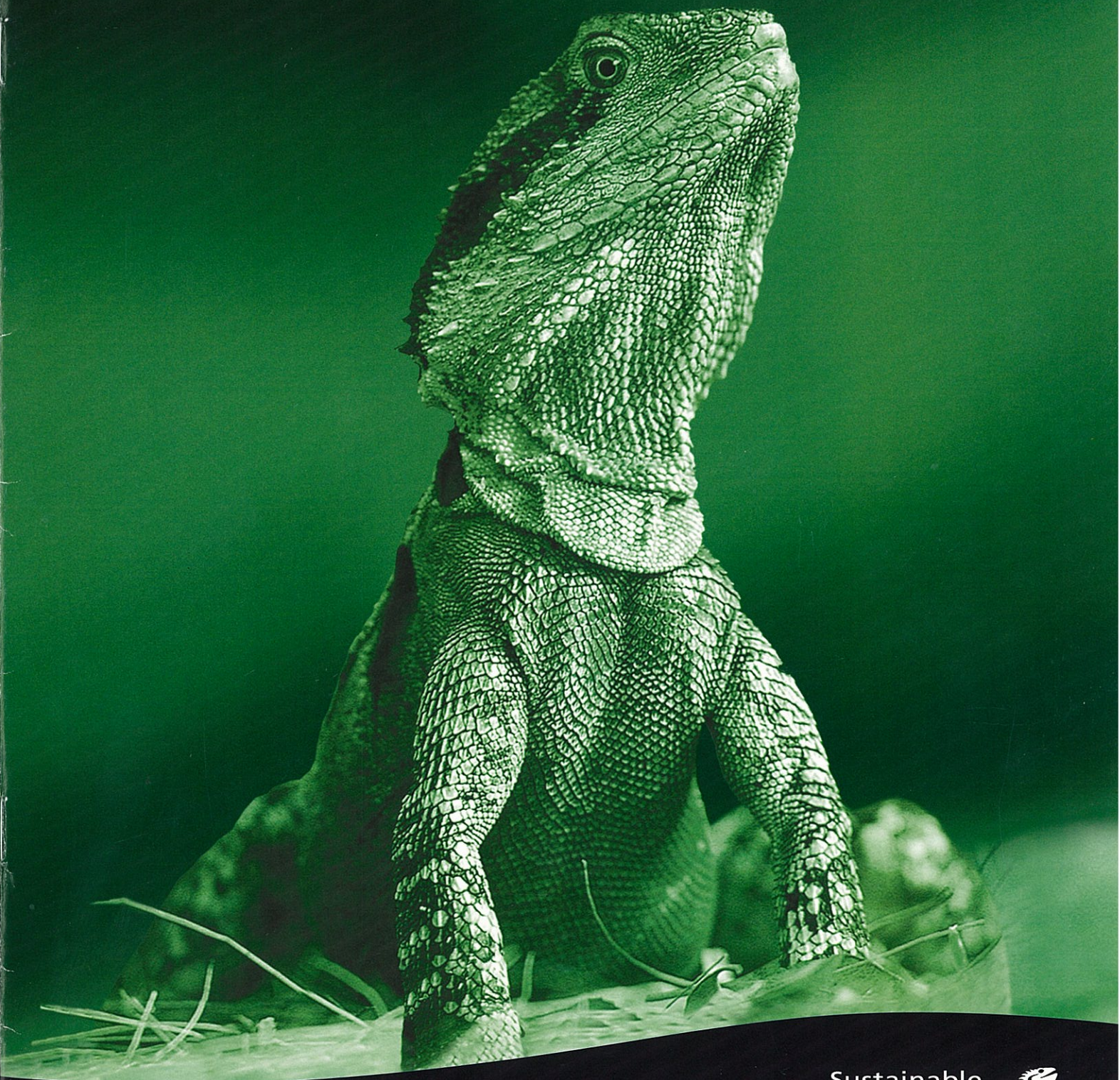


Penrith Biodiversity Strategy



Sustainable
Penrith



Principles

The following principles underpin the Strategy, and should be used to guide its implementation:

- 1. Biodiversity is best conserved in situ (ie in its natural environment)**
- 2. Collective responsibility and co-operation of all governments, business and the community is essential to conserve biodiversity**
- 3. Protecting biodiversity requires management of threatening processes by identifying, preventing and mitigating the causes of biodiversity loss**
- 4. Allocation and use of resources should be efficient, equitable and transparent**
- 5. Lack of full knowledge should not be an excuse for postponing action to conserve biodiversity**
- 6. Central to the biodiversity conservation is the establishment of a comprehensive, representative and adequate system of ecologically viable reserves integrated with agricultural and other resource production systems**
- 7. The traditional association of Aboriginal people with components of biodiversity should be recognised, as well as the desirability of sharing equitably benefits arising from the innovative use of traditional knowledge of biodiversity**

Penrith Biodiversity Strategy

Goal



The goal of the Strategy is to protect the native biological diversity of the Penrith Local Government Area and maintain ecological processes and systems.

Implicit in this goal is the recognition that:

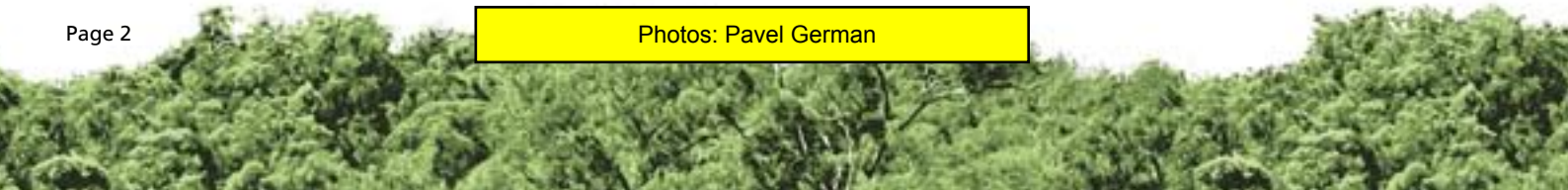
- We share the earth with many other life forms that have intrinsic value and warrant our respect, whether or not they are of benefit to us
- Biodiversity conservation provides significant cultural, economic, educational, environmental, scientific and social benefits for Penrith communities
- More knowledge and improved understanding of the City's biodiversity is needed
- Management activities need to be strengthened through broad community involvement and
- Improved planning, policies, practices and attitudes are needed to achieve conservation and sustainable use of Penrith's biodiversity

The Strategy acknowledges the objectives of the National Strategy for the Conservation of Australia's Biological Diversity, and the NSW Biodiversity Strategy.



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Introduction

Penrith City Council is committed to the principles of sustainability. That is, ensuring a high quality of life for all, both now and in the future, through economic growth, environmental protection and social equity. The protection and conservation of biological diversity, biodiversity, is part of the process of achieving a sustainable future for the City.

Biodiversity is the variety of all life forms, the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part. Biodiversity is considered at three levels: genetic diversity, species diversity and ecosystem diversity.

- Species diversity is the number of species and their relative abundance in a defined area.
- Genetic diversity is the variety of genes contained in all the species in a given area.
- The species in a given area interact with each other, and with their environment, to form complex networks known as ecosystems. These differ from place to place, thus creating ecosystem diversity.

This document describes the current status of biodiversity in the City, the threats it faces, and the management and community inputs necessary for its long term protection and conservation.

The Strategy, outlines the objectives that Council and the community should strive for and actions that should be undertaken to achieve them.

Conserving biodiversity is important for four main reasons:

- Maintenance of ecosystem processes
- Ethics
- Aesthetics
- Economics

Biodiversity provides essential ecosystem services that make life possible. Healthy functioning ecosystems are necessary to maintain the quality of the air and water, to regulate climate, cycle nutrients and assimilate wastes. Biodiversity helps ecosystems withstand stresses such as climate change and other human induced activities.

Biodiversity is essential for controlling pest plants, animals and diseases, for pollinating crops and for providing food, clothing and shelter.

Most people believe that all species have an inherent right to exist. Future generations also have the right to benefit from the continuing existence of all species.

Intrinsic values such as beauty, harmony and tranquility are inherent in biodiversity and are highly valued. These values contribute to Penrith City's cultural identity and are important for spiritual fulfillment and recreation. Conserving biodiversity is also critical for maintaining the culture of Aboriginal peoples.

The Biodiversity Strategy outlined in this document is a major step forward in formalising Council's position on the protection and conservation of the significant inherent values of biodiversity.



Penrith is fortunate in that it has a wealth of biodiversity within its 407km²

Bio



M

ore than 500 species of native plants occur within the Penrith LGA and 132 native species of fish, amphibians, reptiles and mammals.



diversity Protection and Conservation

Penrith City Council recognises that there is a need to strengthen conservation activities across the City. More than 70% of the City is privately owned, and the cooperation of landholders is essential for the success of biodiversity conservation.

The conservation objectives dealt with below include the identification of ecosystems and species, local planning and management, management for conservation, establishing and managing a comprehensive system of protected areas; and improving biodiversity conservation outside reserves.

These objectives integrate with the objectives for achieving the sustainable use of natural resources in Section 2.

1.1 Penrith's Biodiversity

Penrith is fortunate in that it has a wealth of biodiversity within its 407 km² local government area. A review of Penrith's biodiversity was undertaken by Land and Environment Planning (1997). Subsequent information on remnant vegetation communities was provided by the National Parks and Wildlife Service (2002). The species, populations and ecological communities listed by the NSW Scientific community under the Threatened Species Conservation Act (TSC Act) have also been considered in formulating an overview on the status of Penrith's biodiversity.

Over 500 species of native plants occur within the Penrith LGA, and an unknown number of introduced species. At least 132 native species of fish, amphibians, reptiles and mammals have been recorded. The number of invertebrate species is unknown.

The importance of the remnant native vegetation of Penrith needs to be considered in the context of the remaining Cumberland Plain in Western Sydney. Only 28.4% of the original area covered by Cumberland Plain vegetation communities have survived since European settlement in 1788 (NPWS, 2000) and about half of this (13.4%) has been significantly modified by agricultural, rural residential and urban development.

Penrith City contains 17.1% of the remnant vegetation of the Cumberland Plain. This is the highest proportion of remnant vegetation in any council area, and it places

Penrith Council in a position of responsibility to ensure its conservation.

Penrith City supports 13 distinct vegetation communities. All but one of these is listed as an Endangered Ecological Community under the Threatened Species Conservation Act (1995). In broad terms, only 34.1% of the original cover of vegetation before European settlement remains and of this, only 19.2 % remains relatively intact. A summary of the vegetation communities found in the Penrith LGA, and the proportions remaining are shown in Appendix 2.

One endangered population of a woody twiner has been listed under the TSC Act.

At least 27 fauna species, listed as either vulnerable or endangered under the Threatened Species Conservation Act, have been recorded in the Penrith City area. Similarly, at least six plant species listed as either vulnerable or endangered under the TSC Act have been recorded in the City.

Conserving biodiversity is difficult if the biological resources that are to be protected are not adequately described and quantified. Broad information about the type and distribution of biodiversity found in Penrith is known, but more detailed information needs to be gathered if the community is to conserve and manage it properly in the long term.

Information about the vegetation communities has been at a scale of 1:25,000. The usefulness of this information is limited, as it has not been confirmed by systematic ground survey and cannot be relied upon for site specific decisions. Similarly, information about the City's fauna was based upon previous site surveys of the past 20 years, and cannot be relied upon as a definitive record.

The limitations of the City's current biodiversity information highlight the need for thorough, ongoing assessments of the biodiversity resources and maintenance of an information database. The opportunity exists for information that Council regularly receives, such as detailed flora and fauna surveys submitted with development applications and rezoning proposals, to be collated to form a single reliable data base of the biodiversity resource of Penrith City.



A threatening process is an activity or action that singly or cumulatively results in the loss of biodiversity



1.2 Threatening Processes

A threatening process is an activity or action that singly or cumulatively results in the loss of biodiversity or adversely modifies ecosystem processes. In Penrith, a detailed assessment of locally threatening processes has not been undertaken. However, the following broad categories of threat are known to exist:

- loss and fragmentation of habitat through clearance of native vegetation
- human impacts on water resources
- salinity and soil degradation
- expanding urban and rural residential development
- introduced species and diseases
- inappropriate fire regimes and
- firewood collection.

In NSW, key threatening processes have been identified under the Threatened Species Conservation Act and the Fisheries Act. Those applicable to Penrith are listed in Appendix 3.

1.3 Management Standards

Before the adoption of the Biodiversity Strategy, Council's policies had been generally focussed on environmental and landscape protection, rather than the specific protection of biodiversity.

This Strategy will influence and emphasise the value of biodiversity protection and conservation. The objectives and actions outlined in it aim to direct and co-ordinate Council's future efforts in an integrated, corporate manner. Council's commitment to sustainability includes the protection and conservation of biodiversity as a main theme.

1.4 Implementation of Existing Biodiversity Protection Controls

Council has a major role to play in biodiversity protection and conservation, on both private and public land, through the implementation of the legislation that it administers. The relevant acts as they relate to biodiversity are described below.





Photo: Pavel German

Local Government Act

The Local Government Act requires that all Council managed land be designated either 'operational' or 'community' land. The latter is composed predominantly of parks and reserves that must, in turn, be further classified into usage types, one of which is 'natural areas'. The Act requires that all community land is covered by a Plan of Management specifying how that land is to be managed.

Council's generic Plan of Management for its natural areas applies to most of the reserves with remnant vegetation. The broad framing of this document has meant that it is not very relevant to the management of specific reserves in terms of biodiversity protection.

Environmental Planning and Assessment Act

The Environmental Planning and Assessment Act is the means by which Council controls the removal of vegetation on public and private land. It gives councils the power to create Tree Preservation Orders and Local Environmental Plans (LEPs) to control tree and vegetation removal. Tree Preservation Orders are limited as they can only control the removal or damaging of trees above a certain height and cannot prevent the removal of understorey or ground vegetation. In contrast, LEPs can be drafted to control the removal of vegetation in general.

Penrith has a number of Tree Preservation Orders in operation. The Orders generally require Council permission to remove trees above three metres in height. Smaller trees, shrubs, herbs and grasses may be removed without Council permission. Many of Council's LEPs contain a tree preservation clause which has the same intent and effect of TPOs. That is, Council permission is only required to remove a tree above a certain height.

The major Citywide LEPs include general objectives to protect and conserve natural resources primarily to maintain the character and aesthetic qualities of places. The need to maintain ecosystem services as part of the overall sustainability in the use of land for developments was not previously acknowledged.

In 2001, Council exhibited the Draft Flora and Fauna Conservation LEP with the objective of protecting and



conserving biodiversity in an holistic manner. The draft LEP identified a network of flora and fauna corridors, linking with larger conservation areas, and required Council consent for the removal of all vegetation in the rural areas. As a result of Council's extensive rural lands study, the intent of the draft Flora and Fauna Conservation LEP will be incorporated in the new draft Rural Lands LEP.

Council is required to assess development applications for their impact on threatened species. Under section 5A of this Act Council must consider the significance of the impact on species and ecological communities listed under the Threatened Species Conservation Act and Fisheries Management Act. If Council considers that the impact will be significant, a Species Impact Statement (SIS) is required, together with the concurrence of the Directors-General of the Department of Environment, and Conservation and Fisheries, before the development may be approved by Council.

Council regularly assesses development applications that impact on listed threatened species and ecological communities. If, in the opinion of Council, the impact will be significant, negotiations with the applicant will normally ensue, with a view to avoiding or minimising the impact, and therefore the need for an SIS.

Threatened Species Conservation Act and Fisheries Management Act

These Acts list those species and ecological communities that are vulnerable or endangered. They do not contain provisions requiring Council to take specific actions. Council, however, maintains a continuing awareness of the status of all species and communities to ensure that the impact of development proposals upon them is properly assessed under the provisions of the EP & A Act.

In summary, Council is actively engaged in protecting and conserving biodiversity through the implementation of the relevant Acts. Nonetheless, the importance of this role is reinforced and emphasised in the Penrith Biodiversity Strategy.



1.5 Biodiversity Reserves in Penrith

A formal reserve system that adequately represents the full biodiversity of Penrith has not been established. This is a necessary pre-requisite to the proper conservation of biodiversity within the City.

Both Commonwealth and State Biodiversity Strategies recommend the establishment of comprehensive and representative reserve systems for the conservation of the full range of ecological communities. A target of at least 15% of the former range of ecological communities is suggested, by experts, to be the minimum necessary to ensure their long-term conservation.

1.6 Council Reserve Management

Council manages at least 230 reserves that contain remnant ecological vegetation communities. These remnants provide habitat for other native plant and animal species. The remnants may also provide habitat for pest plant and animal species.

The biodiversity in reserves under Council's management is not well understood. In general, the type of ecological community found in a reserve is known only from the NPWS (2003) native vegetation maps. Flora and fauna information from ground surveys is not known.

This is reflected in the current management regime, as expressed through a generic plan of management for reserves classified as 'natural areas' under the Local

Government Act. These plans are very broad and do not deal with site specific attributes and issues that need to be addressed. There are a few exceptions to this situation, but mostly the management of reserves containing remnant biodiversity has not been tailored to ensure its effective protection and conservation. Council is, however, currently preparing specific Plans of Management for three of its reserves, and intends to progress additional Plans of Management over time.

1.7 Biodiversity Conservation on Private Land

The majority of the Penrith City's biodiversity is located on private land. The challenge is to protect and conserve biodiversity on both public and private land in an holistic way that benefits the community in the long term. Restricting its existence to public reserves will not adequately conserve the City's biodiversity.

Conservation of biodiversity on private land is primarily the responsibility of the landowner. Whilst Council has a regulatory role in controlling the removal of vegetation, the day to day management decisions are carried out by the landowner. Regulation sets the broad community standard of acceptable biodiversity management, however individual acts of landowners have a significant impact on biodiversity outcomes.

A formal information program to create awareness of the value of biodiversity on private land and encourage





Livestock grazing and horses generated \$2.36m and \$10.2m respectively in income for Penrith in 2000.

2. Integrating Biodiversity Conservation and Natural Resource Management



Biodiversity is a natural resource that is often used to derive an income. Use of biological resources by industries contributes significantly to the maintenance of the standard of living of the City's people.

Examples of industries using biodiversity in Penrith include livestock grazing, horses, bee

keeping and fishing. These and other rural industries provide employment, support secondary industries, and contribute significantly to the local economy. For example, livestock grazing and horses generated \$2.36m and \$10.2m respectively in income for Penrith in 2000 (NSW Agriculture, 2003).

good management is required. The support of bushcare projects on private land fulfils part of this need, but is limited to assisting those landowners who already value biodiversity. There is a need for Council to foster with private landowners the concept that they are stewards of the biodiversity on their land, and that they have a duty to future generations to conserve it.

To address these matters in an holistic way, the following actions are proposed in the Strategy:

These resource-based industries have both direct and indirect costs to the environment. Community and industry attitudes towards the use of biological resources are changing and there is increasing acceptance of the need to develop and apply ecologically sustainable management practices to minimise, or preferably eliminate environmental costs.

- Identify important biological diversity and threatening processes
- Improve the standards of management and protection of Penrith's biodiversity
- Implement the provisions of the EP&A Act, Threatened Species Conservation Act and Fisheries Act relating to listed threatened species, endangered ecological communities and critical habitats
- Establish and expand a comprehensive, adequate and representative system of conservation reserves covering Penrith's biodiversity
- Effectively manage conservation reserves under Council control
- Strengthen off-reserve conservation of biodiversity.

Integration of biodiversity conservation with natural resource management within all industries is essential to meet the environmental, economic and social objectives of ecologically sustainable management.

To address these matters the following actions are provided in the Strategy:

- Develop and implement local integrated policies for the ecologically sustainable use of biodiversity
- Conserve biodiversity through the adoption of ecologically sustainable management practices in agricultural, rural water use, tourism, recreation and other activities

Ma



The cumulative effect of threatening processes leads to eco-system modification and significant losses of biodiversity.



Managing Threatening Processes

Minimising the impacts of various external factors on biodiversity, as well as direct conservation by reservation, is necessary to protect biodiversity.

The cumulative effect of such factors can lead to ecosystem modification and significant losses of biodiversity.

In Penrith, the following broad categories of threat exist:

- loss and fragmentation of habitat through clearance of native vegetation
- human impacts on water resources
- salinity and soil degradation
- expanding urban and rural residential development
- introduced species and diseases
- inappropriate fire regimes and
- firewood collection

In NSW, key threatening processes have been specifically identified under the Threatened Species Conservation Act and the Fisheries Act. Those applicable to Penrith are listed in Appendix 3.

Council is required to take these threatening processes into account when planning for and making land use decisions. To manage threatening process and conserve biodiversity, the following actions are provided in the Strategy:

- Monitor, regulate and minimise activities that have been identified as threatening processes
- Ensure incentives and controls are in place to retain and manage native vegetation
- Effectively manage introduced plants and animals to reduce their spread and competition with native species
- Introduce a fire management regime that maintains biological diversity
- Minimise and control the impacts of pollution on biological diversity



Improving Our Knowledge

To achieve the conservation of Penrith's biodiversity and implement many of the actions identified in this Strategy. Considerable improvement in our knowledge will be necessary. However, implementation of many of the actions needs to start now, whilst our levels of knowledge are increasing.

Opportunities may be explored for Council to facilitate biological research in its local government area through advocacy and by providing financial support for research programs. Council can also play a role as a repository for, and disseminator of, biological research information so that the results of research are incorporated into current and future actions.

Council currently receives biodiversity information as part of rezoning and development application processes. This information is retained, but not collated, by Council or any other organisation, and is not accessible to the public. Opportunities should be explored for this information to be made available to the public through the Council's library and website.

To address this issue, the following action is provided in its strategy:

Provide the knowledge and understanding of Penrith's biodiversity, essential for its effective conservation and management.



To achieve the conservation of Penrith's biodiversity, a considerable improvement in our knowledge will be necessary



Community Involvement

The involvement of all sections of the City's communities is essential for the conservation of biodiversity. Existing community efforts, such as Bushcare groups, require ongoing support to increase awareness and involvement. Community action for biodiversity conservation occurs when its value is recognised and appreciated.

Council currently supports seven Bushcare groups within the City and there is the potential and need to support more. Other community and recreation groups could also be encouraged to assist.

5.1 Awareness and Involvement

Community awareness, understanding, ownership and support of biodiversity conservation are essential to the achievement of this Strategy. Emphasis needs to be given to the benefits of biodiversity conservation in both urban and rural contexts. Awareness and involvement needs to be engendered through appropriate education and encouragement programs that foster community support. This will require, over time, the dissemination of up-to-date, accessible and understandable information.

5.2 Education

Members of the City's communities often first encounter the concept and issues associated with biodiversity at Council. This is often precipitated by a development proposal to clear, subdivide, or erect a building/dwelling on their land. It is therefore critical that Council's staff are able to articulate clearly the nature of the biodiversity on their land, the legislative controls over it, the processes required to assess it and be able to explain the benefits of conserving biodiversity. Council's staff need to be adequately equipped to deal with such situations in a competent, professional manner. Training of staff in biodiversity conservation and protection is therefore essential.

Council's staff interact with biodiversity in the management of remnant native vegetation on public lands. Council's outdoor staff have a significant 'hands on' role to play in the physical management of these areas, and require appropriate training to assist them in undertaking their duties.

To address these issues the following actions are provided in the strategy.

- Increase public awareness and involvement in the conservation of biological diversity.
- Increase biodiversity conservation education in Council staff training.



Penrith Biodiversity Strategy

Appendix 1:

Biodiversity Conservation and Protection		
1.1	Identify important biological diversity and threatening processes	<ul style="list-style-type: none"> Identify and map the terrestrial and aquatic components Identify processes and categories of activities that produce adverse impacts
1.2	Improve the standard of management and protection of biodiversity	<ul style="list-style-type: none"> Periodically review Council's Management Plan, local environmental plans, development control plans, policies and practices to ensure a balance between biodiversity conservation and the sustainable use of land and aquatic resources
1.3	Implement the provisions of the Environmental Planning and Assessment Act relating to listed threatened species, endangered ecological communities and critical habitats	<ul style="list-style-type: none"> Require the submission of a flora and fauna survey of all aquatic and terrestrial organisms and a section 5A "eight part test" with all relevant development applications Assess the significance of the impact of development proposals on listed threatened species, endangered ecological communities and critical habitats and require species impact statements when necessary Implement the requirements of the Cumberland Plain Endangered Ecological Communities Recovery Plan
1.4	Establish and expand a comprehensive, adequate and representative system of conservation reserves covering Penrith's biodiversity	<ul style="list-style-type: none"> Undertake a review of the adequacy of the existing conservation reserve system in Penrith; Identify areas suitable for the expansion of the conservation area system; Seek dedication and acquisition of additional areas to the conservation reserve system through the local environmental plan preparation and development assessment processes under the Environmental Planning and Assessment Act
1.5	Effectively manage conservation reserves	<ul style="list-style-type: none"> Prepare, implement and regularly review plans of management for land that forms part of the conservation reserve system in the Penrith LGA that is under Penrith Council control Lobby the State government to prepare, implement and review regularly management plans for nature reserves, national parks and regional parks and other State owned land that forms part of the conservation reserve system in the Penrith LGA
1.6	Strengthen off-reserve conservation of biodiversity	<ul style="list-style-type: none"> Provide adequate, efficient and cost effective incentives to private landowners to conserve biological diversity Promote the conservation of biological diversity in Penrith's urban areas Pursue the listing of Critical Habitats and Endangered Ecological Communities on Commonwealth land under the Environmental Protection and Biodiversity Conservation Act and on the Register of the National Estate
Integrating biodiversity conservation and natural resource management		
2.1	Develop and implement integrated policies for the ecologically sustainable use of biodiversity	<ul style="list-style-type: none"> Encourage the ecologically sustainable use of biodiversity through Council's Management Plan Develop and implement local sustainable biodiversity use policies in cooperation with the State government, relevant industries and non-government organisations, Improve assessment procedures for proposals involving the use of natural resources, that fully account for environmental benefits and costs including external effects, opportunity costs and risk
2.2	Conserve biodiversity through the adoption of ecologically sustainable management practices in agriculture, rural water use, tourism, recreation and other activities	<ul style="list-style-type: none"> Improve the information base on land use activities in the Penrith LGA through the creation and maintenance of a land use and natural resources database Improve the information base on aquatic biodiversity through the creation and maintenance of an aquatic biodiversity and water resources database Initiate long term monitoring of the impacts of current tourism and recreation activities within and adjacent to the Nepean River, Blue Mountains National Park, nature reserves and regional parks Encourage landholders, government agencies and industry organisations to incorporate biodiversity conservation objectives in farm or property management and catchment planning



Managing Threatening Processes

- | | | |
|-----|---|---|
| 3.1 | Monitor, regulate and minimise activities identified as key threatening processes | <ul style="list-style-type: none"> • Measure the rate of change in the incidence of threatening processes and report the findings in Council's State of the Environment Report • Monitor the effectiveness of Council's policies and practices to minimise or eliminate threatening processes |
| 3.2 | Ensure incentives and controls are in place to retain and manage native vegetation | <ul style="list-style-type: none"> • Assess and monitor the current rate and distribution of clearing of all vegetation communities in Penrith • Ensure that planning controls relating to vegetation clearing adopt a holistic approach to biodiversity conservation in Penrith • Ensure that assessment criteria relating to land clearance includes biodiversity conservation, land protection, water management, and landscape values • Develop an integrated range of measures to encourage landowners and managers to protect and conserve native vegetation • Prepare in collaboration with relevant agencies a biodiversity conservation information program for landowners and managers focussed on the value of retaining vegetation in-situ and integrating it with major land uses |
| 3.3 | Effectively manage introduced plants and animals to reduce their spread and competition with native species | <ul style="list-style-type: none"> • Assess and monitor the type, distribution and impact of introduced 'pest' animal and plant species • Prepare an introduced animal and plant species management plan in consultation with State agencies • Implement the introduced animals and plant species management plan on Council land and through the development approval process • Develop partnerships with other stakeholders to manage introduced plants and animals |
| 3.4 | Introduce a fire management regime that maintains biological diversity | <ul style="list-style-type: none"> • Amend all planning instruments to include integrated biodiversity and fire management provisions • Amend Plans of Management under the Local Government Act to include integrated biodiversity and fire management provisions |
| 3.5 | Minimise and control the impacts of pollution on biological diversity | <ul style="list-style-type: none"> • Monitor the cumulative impacts of pollutants on biodiversity and in particular on aquatic systems • Review existing Council policies for the control of pollutants from non-point sources, industrial development, sewage discharges and accident prevention |

Improving our Knowledge

- | | | |
|---|---|--|
| 4 | Provide the knowledge and understanding of Penrith's biodiversity essential for its effective conservation and management | <ul style="list-style-type: none"> • Collate and synthesise available data and information on Penrith's biodiversity as a community and research resource • Improve the management and dissemination of information about Penrith's biodiversity |
|---|---|--|

Community Involvement

- | | | |
|-----|---|--|
| 5.1 | Increase public awareness and involvement in the conservation of biological diversity | <ul style="list-style-type: none"> • Report on biodiversity in Penrith's State of the Environment Report • Prepare and promote public information on biodiversity focussed on personal responsibility • Promote local biodiversity events in local and state based media • Provide resources to support community action groups in biodiversity conservation management programs • Encourage voluntary management of native vegetation remnants |
| 5.2 | Increase biological diversity conservation education in Council staff training | <ul style="list-style-type: none"> • Develop appropriate training for staff to equip them with the skills and understanding to plan for and manage Penrith's biodiversity |

Appendix 2: Penrith LGA Vegetation Communities

Vegetation Communities	Modelled		Proportion	
	All Codes	Pre-1750 Vegetation	All Codes	Remaining
	Total (ha)	Total (ha)	(%)	A+B+C+SA (%)
ShaleSandstone Transition Forest (Low Sandstone Influence)	161.6	438.9	36.8%	19.2%
ShaleSandstone Transition Forest (High Sandstone Influence)	468.9	596.8	78.6%	31.4%
Sub total - 1&2 ShaleSandstone Transition Forest	630.4	1,035.7	60.9%	26.2%
Cooks River Castlereagh Ironbark Forest (Low Sandstone Influence)	777.3	1,413.4	55.0%	34.4%
Castlereagh Swamp Woodland	479.4	557.6	86.0%	81.8%
Castlereagh Scribbly Gum Woodland*	3,680.1	4,873.8	75.5%	54.5%
Agnes Banks Woodland	175.6	470.5	37.3%	19.1%
Shale Hills Woodland	778.2	2,854.1	27.3%	13.4%
Shale Plains Woodland	3,683.6	17,949.1	20.5%	8.5%
Sub total - 9 & 10 Cumberland Plain Woodland	4,461.7	20,803.2	21.4%	9.2%
Alluvial Woodland	1,813.9	7,255.0	25.0%	15.1%
Riparian Forest	85.2	215.6	39.5%	22.8%
Sub total - 11 & 12 Sydney Coastal River-flat Forest	1,899.1	7,470.8	25.4%	15.3%
Western Sydney Dry Rainforest			na	na
Moist Shale Woodland	14.1	20.0	70.3%	61.2%
Turpentine-Ironbark Forest	15.9	58.2	27.4%	6.6%
Turpentine-Ironbark Margin Forest	29.8	74.3	40.1%	16.9%
Sub-total 15-43 Sydney Turpentine-Ironbark Margin Forest	45.7	132.5	34.5%	12.4%
Freshwater Wetlands*	15.7	15.7	100.0%	100.0%
Elderslie Banksia Scrub Forest			na	na
Shale/Gravel Transition Forest	898.8	1,577.6	57.0%	19.2%
Blue Gum High Forest		1.9	0.0%	0.0%
TOTAL	13,077.8	38,372.6	34.1%	19.2

* Indicates not listed on Schedule 1 of The TSC Act.

Appendix 3: Listed Key Threatening Processes

The following have been listed as key threatening processes under the NSW Threatened Species Conservation Act and the Fisheries Act:

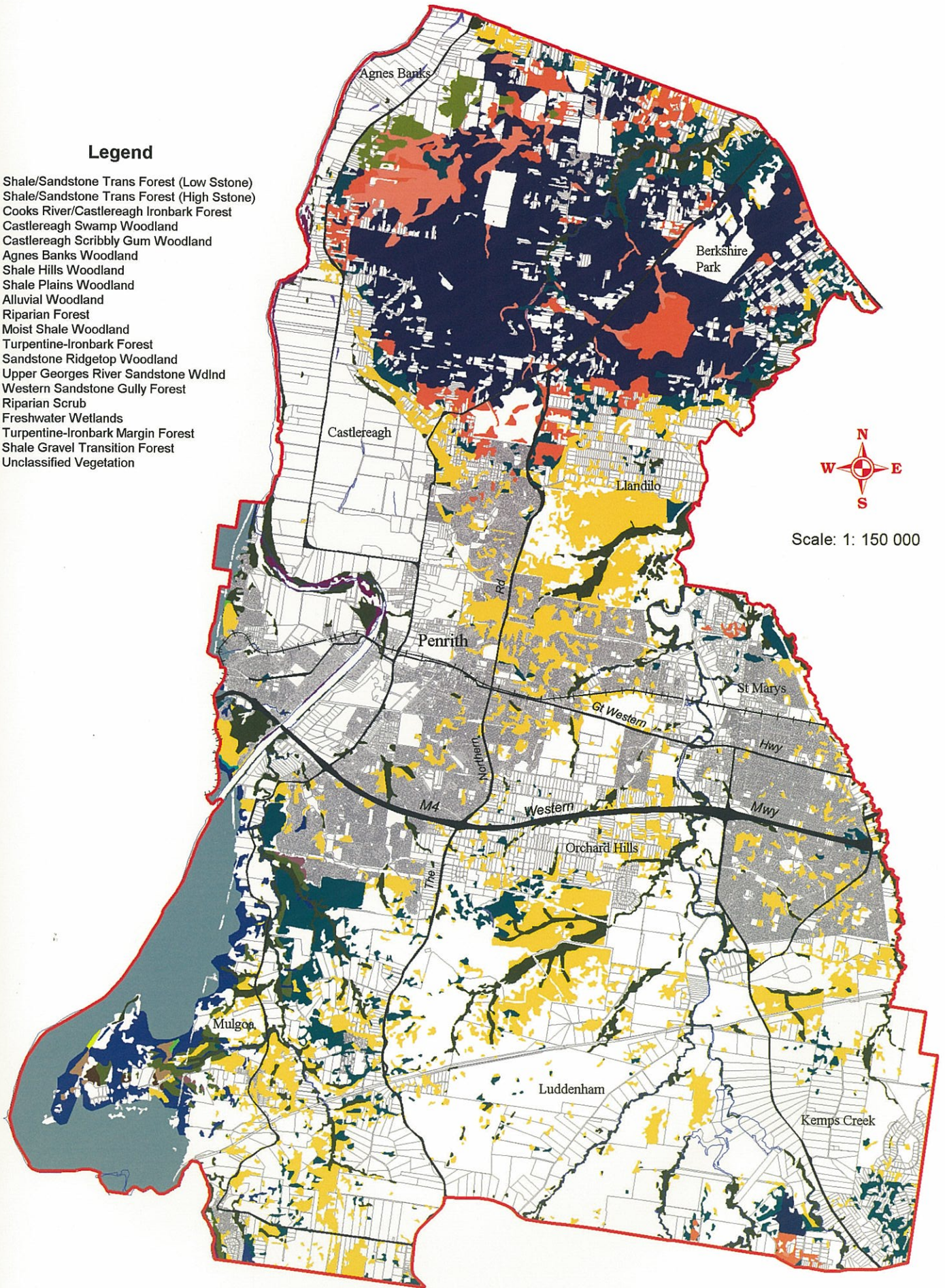
- Removal of dead wood, dead trees and logs - proposed key threatening process declaration
- Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands
- Infection of native plants by *Phytophthora cinnamomi*
- Bushrock removal
- Competition and grazing by the feral European rabbit
- Competition from feral honeybees
- Ecological consequences of high frequency fires
- Human-caused climate change
- Importation of red imported fire ants into NSW
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis
- Invasion of native plant communities by bitou bush and boneseed
- Invasion of native plant communities by exotic perennial grasses
- Loss and/or degradation of sites used for hill-topping by butterflies
- Predation by feral cats
- Predation by the European red fox
- Predation by the plague minnow (*Gambusia holbrooki*)
- The degradation of native riparian vegetation along NSW water courses
- The installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams
- The introduction of fish to fresh waters within a river catchment outside their natural range
- The removal of large woody debris



Penrith City Vegetation Communities

Legend

- Shale/Sandstone Trans Forest (Low Sstone)
- Shale/Sandstone Trans Forest (High Sstone)
- Cooks River/Castlereagh Ironbark Forest
- Castlereagh Swamp Woodland
- Castlereagh Scribbly Gum Woodland
- Agnes Banks Woodland
- Shale Hills Woodland
- Shale Plains Woodland
- Alluvial Woodland
- Riparian Forest
- Moist Shale Woodland
- Turpentine-Ironbark Forest
- Sandstone Ridgetop Woodland
- Upper Georges River Sandstone Wldnd
- Western Sandstone Gully Forest
- Riparian Scrub
- Freshwater Wetlands
- Turpentine-Ironbark Margin Forest
- Shale Gravel Transition Forest
- Unclassified Vegetation



Scale: 1: 150 000

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