



Biodiversity Strategy

Sutherland Shire Council

Document review and approval

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1.0 INTRODUCTION

1.1 What is Biodiversity?

Biodiversity is a term used to describe the variety of living things: including plants, animals and micro-organisms: the genetic material contained within these organisms; and the ecosystems in which they live. Biodiversity is usually considered on three levels, genetic diversity, species diversity and ecosystem diversity.

Genetic Diversity - refers to the variations in the genetic material within a species. Genetic diversity gives rise to variations between individuals of the same species and accounts for things such as why some people have blue eyes and others have brown eyes. A pool of genetic material within a species helps enable the species to adapt to changes in the environment.

Species Diversity - refers to the variety of living species, and is generally the level at which biodiversity is considered. This is because species are a more easily defined unit, and accord with the way organisms are generally classified. There are many species that are still to be identified and named.

Only about 1.7 million of the estimated 5 to 100 million species in existence have been identified to date (NSW EPA 1994)

Ecosystem Diversity - refers to the variety of different habitats in which species and communities exist, and includes ecosystems such as Eucalypt woodlands and rainforests. Ecosystem diversity is harder to define than species diversity or genetic diversity as the boundaries between ecosystems are not clearly defined.

1.2 The Value of Biodiversity

Humans are dependent on biological systems for their health, well-being and enjoyment of life. All our food and many of our medicines and industrial products are derived from wild and domesticated components of the Earth's biological diversity (Department of the Environment Sport and Territories (DEST) 1993).

Biodiversity has many environmental, social and economic benefits, as shown below. These reasons combined with other values such as ethical considerations and our duty to other life forms, aesthetics, and the avoidance of rising costs to repair degraded ecosystems, provide a powerful case for the conservation of biodiversity (ANZECC 1994).

The need to preserve biodiversity is also a key component in achieving ecologically sustainable development and is one of the three core objectives of the national Strategy for Ecologically Sustainable Development (ANZECC 1994).

The Value of Biodiversity

Environmental

- * Protection of water resources.
- * Soil formation and protection.
- * Nutrient storage and cycling.
- * Pollution breakdown and absorption.
- * Increased biodiversity helps recovery from unpredictable events.

Social

- * Research and education.
- * Recreation.
- * Cultural values.

Economic

- * Food production.
- * Medical resources.
- * Wood and timber production.
- * Ornamental plants and gardens.
- * Breeding stock and population reservoirs.

Source: Department of the Environment, Sport and Territories (1993).

1.3 Threats to Biodiversity

Biodiversity declines when individual species become extinct and when the variety within a species is reduced. Plant and animal extinctions do occur naturally, but the rate of extinctions has risen dramatically in recent times. Species are now being lost at a rate some 400 times faster than at any other period during recent geological time (Goldsmith & Hildyard 1993), with Australia having one of the highest rates of extinctions in the world (EPA 1994).

The rate of mammal extinctions for Australia is the highest in the world, accounting for nearly half of all mammal extinctions. Australia also has one of the highest rates of plant extinctions (NSW EPA 1994).

The main threat to biodiversity in Australia comes from habitat loss and alteration, due to clearing for agricultural, urban and industrial development. Other factors impact and alter the environment resulting in species loss, these include, logging, prescribed burning, road construction, cultivation, grazing and pollution. The introduction of exotic plant and animal species have also resulted in the loss of species through direct predation, competition and displacement of native species.

1.4 Australia's Biodiversity

Australia remains one of the most biologically diverse countries in the world (NSW EPA 1995). The isolation of our continent for much of our evolutionary history has meant that a high proportion of the organisms found in Australia are found nowhere else in the world.

At the species level, approximately:

- * 92% of our mammals,
- * 70% of our birds,
- * 85% of our flowering plants,
- * 89% of our reptiles, and
- * 93% of our frogs

are found only in Australia (NSW EPA 1995).

This high level of biodiversity places a responsibility on Australian's to manage and conserve this biodiversity. In order to help meet these obligations, Australia became a signatory to the Convention on Biological Diversity, at the Rio Earth Summit on 5 June 1992, and ratified (adopted) it at home on 18 June 1993 (DEST).

1.5 Biodiversity in New South Wales

New South Wales contains a wide variety of ecosystem types, ranging from arid zones, to alpine regions and rainforests. This variety of ecosystems supports a large range of biodiversity. However this diversity is under pressure from a range of activities. The NSW State of the Environment Report 1997 notes the main threats as:

- Habitat loss and fragmentation
- Impacts of introduced species
- Unsustainable use of resources
- Pollution impacts
- Global climate change and ozone depletion
- Lack of knowledge, education and communication.

In NSW in the past 200 years:

- * 22% of our mammals have become extinct, and a further 41.5% are considered threatened.
- * 2% of our birds have become extinct and a further 17% are considered threatened.
- * No reptiles are considered extinct but 6.5% are considered under threat.
- * One amphibian species is considered extinct and 20% are considered threatened.
- * 3 species of fish are endangered and 11 species threatened.

Source: NSW EPA 1994.

1.6 The Sutherland Shire's Biodiversity

The Sutherland Shire is located on the southern outskirts of Sydney. It is a region rich in biodiversity. The Shire contains a variety of ecosystem types, including marine and freshwater wetlands, woodlands, heathlands, forests, rainforests and dunal communities. These ecosystems support a diverse array of plants and animals, including many rare and endangered species.

The Shire is a species diverse area containing many threatened species. While a complete inventory of the shires biota has not been completed current minimum figures are:

- * 56 species of regionally significant or threatened plants.
- * 253 species of birds of which 24 are threatened.
- * 41 species of mammals of which 17 are threatened.
- * 76 species of reptiles and amphibians of which 10 are threatened.

Source: Sutherland Shire Council 1995.

Large areas of the Shire are maintained in their natural state, with over 200 km² of the Shire's 370 km², or 54%, being contained in some form of park or reserve system. This represents a significant proportion of the remaining, unique Hawkesbury Sandstone biota. The Sutherland Shire therefore has a special role to play in conserving biodiversity on a regional, state and national level.

1.7 Management of Biodiversity in the Sutherland Shire

There are a number of key players in the management of biodiversity in the Sutherland Shire. We are fortunate in having an extensive reserve system of National Parks (Royal, Heathcote, Georges River, Botany Bay) and Nature Reserves (Towra) that are managed by the NSW National Parks and Wildlife Service. Extensive natural lands are also managed by the Department of Land and Water Conservation. These Agencies, along with Council, have an obligation to manage these lands in a integrated and sustainable manner.

Sutherland Shire Council is committed to the principles of ecologically sustainable development of which conservation of biodiversity is one of the key components. The importance of the role of local governments in conserving biodiversity is acknowledged in the Intergovernmental Agreement on the Environment (Commonwealth of Australia 1993).

Local Government has a key role to play in the conservation of biodiversity, for a number of reasons:

- 1) Councils are responsible for the care, control and management of significant areas of land and water, and can therefore implement management practices for these areas which support biodiversity;
- 2) Councils carry out many activities, such as fire hazard reduction, road and other construction, which may adversely impact on biodiversity;
- 3) Councils are the determining authority for the majority of private development which may directly or indirectly impact on biodiversity.

- 4) Councils have the ability to influence community behaviour through public education and awareness campaigns on the value of biodiversity (The Council of the Municipality of Kiama 1995).
- 5) Councils have the ability to identify and assess change in the environment through environmental monitoring and State of the Environment Reporting.
- 6) Councils are key stakeholders on regional management bodies, such as Catchment Management Committees, and Regional Organisation of Councils, where conservation of biodiversity is discussed.

Biodiversity is a key consideration in the following Council policies and documents.

- * Sutherland Local Environment Plan 1993, eg Clause 24 Urban Bushland.
- * Plan of Management for Natural Areas.
- * Tree Preservation Order.
- * State of the Environment Report 1995.
- * Sutherland Shire Urban Bushland Plan of Management 1990.
- * Sutherland Shire Urban Tree Policy 1991.

The biodiversity of the Shire is under threat from increased human activity, such as urbanisation, pollution, tree removal and recreational pressures. This policy recognises the need to coordinate and manage the activities of Council and the community in order to conserve the Shire's biodiversity.

This policy considers the management of biodiversity in five key areas:

- 1) habitat protection
- 2) habitat corridors
- 3) threatened species
- 4) management and control of exotic species, and
- 5) bushfire management

These areas overlap, are complementary and must be integrated to achieve the goals of biodiversity conservation. For instance, preserving an endangered species may involve: the preservation of its habitat; the control of exotic species which compete with it for resources or prey on it; the maintenance or establishment of a system of corridors to enable it to find breeding partners; and the management of fire regimes to ensure that vulnerable populations are not destroyed by too few or too frequent fires.

In recognition of the need to consider impacts and coordinate activities beyond our Shire boundaries, this strategy compliments regional, state and national strategies, such as the National Strategy for the Conservation of Australia's Biodiversity. NSW Biodiversity Strategy and the Green Web Sydney – A Vegetation Management Plan for the Sydney Region.

Principles of the National Strategy for the Conservation of Australia's Biological Diversity (1996), include:

- 1) Biological diversity is best conserved *in situ*.
- 2) Cooperation between governments and the community is critical to the conservation of biodiversity.
- 3) It is vital to anticipate and prevent the causes of significant reductions in biodiversity.
- 4) Decisions relating to the 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 (precautionary principle).
- 6) The establishment of a comprehensive, representative and adequate system of ecologically viable protected areas, and the sympathetic management of other areas is central to the conservation of biodiversity.
- 7) Traditional links between indigenous people and biodiversity should be recognised.

This Biodiversity Strategy identifies three key roles of Council in managing the biodiversity resources of the:

- 1) as a manager of land under its care, control and management, and
- 2) as an approval authority.
- 3) as an educator and information provider for the community.

1.8 Integration with Other Agencies

There are several parts of the Sutherland Shire where Council has a secondary management role, such as Royal, Heathcote and Botany Bay National Parks and the Towra Point nature reserve. In these areas the role of Council will be as a support role, and in ensuring that the activities of Council and those approved by Council complement the conservation measures in areas adjoining these nature reserves.

The NSW Government has recently released the NSW Biodiversity Strategy. This document aims at coordinating various statewide stakeholders in the conservation and management of

biodiversity of NSW. While the NSW National Parks and Wildlife Service (NPWS) will be responsible for administering the Strategy it outlines a number of key actions required to achieve the objectives of the Strategy.

Council is identified as a key stakeholder in the management of biodiversity in NSW and has been allocated a number of actions in the Strategy. These actions have been integrated into Sutherland Shire Council's Biodiversity Strategy

The Sydney Regional Organisation of Councils has also developed "A Vegetation Management Plan for the Sydney Region". This Plan recognises the key role of Council's as managers of biodiversity. It contains a range of actions and recommendations for Sydney Councils to follow, to ensure consistent and effective approach to vegetation management.

Catchment Management Committees also lay an important role in integrating catchment practices across Council boundaries, this includes management that impacts on biodiversity. The Hacking River Catchment Management Committee has been active in coordinating biodiversity surveys throughout the catchment, providing a sound information base on which to make management decisions. A similar approach and survey is planned for the Georges River catchment.

To ensure an integrated and holistic approach to the management of biodiversity both within and beyond the Sutherland Shire, this strategy integrates the recommendations from these federal state and local strategies into a defined strategy for the Sutherland Shire.

1.8 GOAL

The goal of this strategy is to preserve and maintain biodiversity, both within and outside the Sutherland Shire, consistent with the principles of ecologically sustainable development.

2.0 HABITAT PROTECTION

2.1 Objective

- * **To retain bushland in parcels of a size and configuration which will enable the existing plant and animal communities to survive in the long term.**
- * **To protect the habitats of native flora and fauna, including threatened species.**
- * **To protect wildlife corridors and vegetation links with other bushland.**
- * **To protect bushland as a natural stabiliser of the soil surface, and protect existing landforms such as natural drainage lines, water courses and foreshores.**
- * **To protect bushland of scenic value and retain the unique visual character of the landscape.**
- * **To protect the recreational and educational value of bushland.**
- * **To encourage and promote community involvement and cooperation in the management of the Shire's bushland.**

2.2 Habitat Types of the Shire

The Sutherland Shire contains a wide range of natural areas that comprise a variety of habitat types. Each of these habitat types contain a diverse range of species, and together they help make the Sutherland Shire one of the most biologically diverse areas of the Sydney Basin. The preservation of each of these habitat types are essential to the overall preservation of the Shire's biodiversity.

Habitat types are usually classified according to the vegetation type. This is because they are the dominant lifeforms in the community, and accompanying assemblages of lesser plants and animals tend to be dependant on the dominant vegetation.

The following table summarises the dominant vegetation types of the Sutherland Shire.

<i>Ecosystem</i>	<i>Location and abundance</i>	<i>Species present</i>
Tall Open Forest	The broad Wianamatta shale-capped ridge which extends from Lucas Heights to Alfords Point and similar ridges in Engadine	Dominant canopy species Turpentine (<i>Syncarpia glomulifera</i>), Grey Ironbark (<i>Eucalyptus paniculata</i>), Sydney Blue

	and Heathcote, would have supported Turpentine-Ironbark forest prior to development, however this plant association is now extremely rare, the only fragments remaining in Menai. A rare variation occurs in an isolated stand at East Heathcote.	Gum (<i>Eucalyptus saligna</i>)
Closed Forest	This type is restricted to sheltered steeper gullies on deeper alluvial soils. There are pockets in the Woronora Valley, Prince Edward Park and the Royal National Park.	Coachwood (<i>Ceratopetalum apetalum</i>), Christmas Bush (<i>Ceratopetalum gummiferum</i>), Black Wattle (<i>Callicoma serratifolia</i>), River Lomatia (<i>Lomatia myricoides</i>)
Low Woodlands	This Hawkesbury Sandstone ridgetop ecosystem is rapidly disappearing in urban areas due to development pressures, however it is well represented in the Royal National Park	Canopy species include Scribbly Gum (<i>Eucalyptus haemastoma</i>), Red Bloodwood (<i>Eucalyptus gummifera</i>), with a shrub cover including Heath Banksia (<i>Banksia ericifolia</i>), Dwarf Apple (<i>Angophora hispida</i>) Dagger Hakea (<i>Hakea teretifolia</i>), Bushy Needlebush (<i>Hakea sericea</i>). This diverse ecosystem also supports a number of rare and endangered species, including Scaly Bark (<i>Eucalyptus squamosa</i>), <i>Darwinia diminuta</i> and Yellow-top Mallee (<i>Eucalyptus luehmanniana</i>)
Woodlands	On nutrient-poor, sandy soils of Hawkesbury sandstone soil landscape. These communities are well represented in the Shire's National Parks and Crown Lands and comprise most of the area's remaining natural vegetation. There are also areas of remnant woodland on some north-facing slopes of Kareela, Oyster Bay, Como, and Bonnet Bay	Canopy of Scribbly Gum (<i>Eucalyptus haemastoma</i>), Sydney Red Gum (<i>Angophora costata</i>) Old Man Banksia (<i>Banksia serrata</i>) and Red Bloodwood (<i>Eucalyptus gummifera</i>) with a diverse shrub layer
Heathland	Heathland replaces woodland on nutrient-poor, sandy soils where drainage is impeded or on coastal headlands where shallow soils and salt-laden winds stunt growth	Heath Banksia (<i>Banksia ericifolia</i>), Tea Tree (<i>Leptospermum</i> spp.) Coastal Rosemary (<i>Westringia fruticosa</i>), Dwarf Apple (<i>Angophora hispida</i>), Dagger Hakea (<i>Hakea teretifolia</i>)
Open Forest	Open forest occurs on east- or south-facing slopes, along drainage lines or in places with deeper, though nutrient-poor, sandy soils	Dominant canopy species; Smooth-barked Apple (<i>Angophora costata</i>), Sydney Peppermint (<i>Eucalyptus piperita</i>) Grey Gum (<i>Eucalyptus punctata</i>), Bangalay (<i>Eucalyptus botryoides</i>)

Littoral Rainforest	In moister coastal areas within Royal National Park and Towra Point Nature Reserve. Poorly represented outside of these areas however small remnants exist at Lilli Pilli Point, Burraneer Point, Darook Park, Grays Point and Yowie Bay.	Dominant canopy species; Celerywood (<i>Polyscias elegans</i>), Red-fruited Olive Plum (<i>Cassine australis</i>), <i>Sarcomelicope simplicifolia</i> , Corkwood (<i>Endiandra seiberi</i>). These remnants contain examples of the rare and endangered Magenta Lillypilly (<i>Syzygium paniculatum</i>) Blue Lillypilly (<i>Syzygium oleosum</i>) Deciduous Fig (<i>Ficus superba</i> var <i>henneana</i>) and <i>Celtis paniculata</i>
Sub-tropical Rainforest	In moist protected gullies. Several areas in Upper Hacking and tributaries. Elements of these forests found in Ewey Creek, and Gynea Bay	Dominant canopy species; Crab Apple (<i>Schizomeria ovata</i>), Coachwood (<i>Ceratopetalum apetalum</i>) Lilly Pilly (<i>Acmena smithii</i>) and the less common Ribbonwood (<i>Euroschinus falcata</i>)
Dunal Communities	On the sand dunes of the Kurnell Peninsula and north eastern areas of the RNP. Areas with deeper soils support open forest with heathland on more exposed dunes. These communities are diminishing with increased activity on the peninsula.	Dominant canopy species; She-Oak (<i>Casuarina glauca</i>), Red Bloodwood (<i>Eucalyptus gummiifera</i>), Scribbly Gum (<i>Eucalyptus haemastoma</i>), Smooth-barked Apple (<i>Angophora costata</i>) Coastal Banksia (<i>Banksia integrifolia</i>)
Estuarine Communities	The silt/clay sediments which occur along the Georges River support saltmarsh on the landward side of the mangroves. The only large expanse of saltmarsh still remaining in Sydney occurs at Towra Point, however small fragile pockets also exist in Oyster Bay, Coronation Bay and Bonnet Bay.	Canopy of Grey Mangroves (<i>Avicennia marina</i>) River Mangroves (<i>Aegisceras corniculatum</i>), Samphire (<i>Sarcocornia quinqueflora</i>), Seablites (<i>Suaeda australis</i>), Sea Rush (<i>Juncus kraussii</i>)
Seagrasses	The largest beds are located in Quibray Bay, Woollooware Bay, and off Silver Beach, Kurnell. Small pockets of both species are present in the Hacking River and Port Hacking, and stands of <i>Zostera</i> are found in the Georges River as far upstream as Alford's Point. Seagrass will not usually be found in our waterways at depths greater than 3 metres as, given the water quality, light penetration is not adequate beyond this depth.	Only 2 species; <i>Zostera capricorni</i> and <i>Posidonia australis</i> .

SSC, State of the Environment Report 1996

While none of the above habitat types have been lost from the Sutherland Shire, there have been substantial losses of each type of habitat since European occupation. Some have been harder hit than others, particularly the ridgetop communities, which have been extensively developed for urban and industrial uses, and estuarine communities which were extensively filled for playing fields and landfills.

2.3 Habitat Protection Legislation

Protection for habitats is provided under several pieces of legislation.

The Environmental Planning and Assessment Act (EP&A Act) (1979) as modified by the Threatened Species Conservation Act (1995), requires consideration of the impact of development proposals and planning on scenic quality, threatened species, populations and ecological communities, and other indirect impacts such as soil erosion.

Habitat for endangered species is protected under the Threatened Species Conservation Act (1995).

SEPP 19 - Bushland in Urban Areas, provides protection for remnant bushland in urban areas of the Shire, which are zoned as “open space” or are adjacent to areas zoned as open space. The SEPP recognises the need to retain bushland, and protect and preserve bushland from adjacent development. These impacts must be taken into consideration when assessing development in these areas.

A Tree Preservation Order (TPO) is in force throughout the Sutherland Shire. Under the TPO permission must be gained from Council to removal or damage trees and bushland.

Clause 24 of the Sutherland Shire Local Environmental Plan 1993, provides protection to bushland, in a similar manner to that of SEPP 19. It requires consideration of a number of impacts on bushland, in the assessment of developments in residential zoned land.

A Plan of Management for Natural Areas has been formulated by Council under the Local Government Act (1993). This Plan of Management outlines objectives, management strategies and activities that are permissible within public lands.

More land has been cleared in
Australia in the past 50 years than
in the preceding 150 years.
DEST 1995

2.4 Council's Role

There are a number of actions and tasks that Council may implement to conserve the range of habitats within the Shire.

Action 1.

Develop and maintain an accurate inventory of habitat types within the Sutherland Shire.

Tasks:

- * Identify and obtain relevant existing databases, eg soils, vegetation, asset management studies.
- * Identify data gaps in existing databases.
- * Initiate required studies, and build upon existing databases. Information should include, habitat size, location, type and condition and species inventories.
- * Identify habitats of conservation significance, including critical habitat for threatened species.
- * Map the areas of significant habitat identified above.
- * Update database on a regular basis (minimum yearly, to coincide with State of the Environment Report).

Action 2.

Identify key processes and actions that threaten the long term viability of various habitat types within the Shire.

Tasks:

- * Examine historical trends in areas of habitat types, to identify threatened habitat types, or those that have suffered the greatest loss.
- * Identify the threatening processes, ie urbanisation, pollution.
- * Prioritise the threatening processes for ameliorative action, based on magnitude of identified impact, viability of impacted habitats, environmental benefit, and cost to the community.

In the Sydney region about 80% of coastal saltmarsh has been lost since European settlement.
NSW EPA 1995

Action 3.

Develop management policies and practices that promote the conservation of a range of habitat types, and ameliorate or eliminate processes that threaten these habitats.

Tasks:

- * Develop a generic plan of management for natural areas under Council's care control or management.
- * Develop specific plans of management for significant habitat areas under Council's care, control or management.
- * Provide appropriate statutory protection for habitat types within the Sutherland Shire.
- * Ensure adequate ecological assessment of development proposals and rezonings in natural areas.
- * Investigate the potential for land swaps, to obtain areas of significant habitat in private ownership.
- * Develop a Landscape Development Control Plan that encourages maintenance and preservation of habitats in urban areas.
- * Enforce Council's Tree Preservation Order.
- * Propagate endemic plants at Council's nursery, for use in Council planting programs and supply to the community.
- * Continue to identify and recommend areas for dedication as marine, or intertidal protection zones.
- * Maximise opportunities for endemic street tree planting in accordance with Council's Urban Tree Policy.
- * Appropriately manage weeds in areas of Council care, control or management.
- * Ensure that Council staff are adequately trained or informed of potential impacts of their work on the environment, and are aware of their obligations under various environmental legislation.
- * Develop Stormwater Management Guidelines that minimise the impact of stormwater discharge on aquatic and bushland environments.
- * Investigate cat controls and regulations to minimise native animal predation.

Action 4.

Encourage community participation in the protection, restoration and conservation of habitat types within the Shire.

Tasks:

- * Promote community involvement in the restoration and management of habitat types through programs such as Bushcare, through provision of appropriate materials, advice, staff, training and other resources.
- * Make information on habitat types and values available to the public through the State of the Environment Report, and other educational material, and displays.
- * Promote the value of various habitat types through education and advice on weed control, appropriate garden planting, habitat value of bush rock and dead trees, and the impact of rubbish dumping.
- * Education of builders and developers to achieve better control of sedimentation from building sites.

3.0 HABITAT CORRIDORS

3.1 Objectives

- * To protect existing wildlife corridors and vegetation links with other bushland.
- * To establish a viable network of corridors linking areas of bushland.
- * To increase the effective population size of bushland reserves through a network of linking corridors.
- * To encourage and promote community involvement and cooperation in the management of wildlife corridors.

3.2 Habitat Corridors in the Sutherland Shire

Much of the bushland of the Sutherland Shire does not exist in isolation. It is connected to other areas of bushland to some degree by a series of vegetated links. They may include public and private bushland, gardens, creekline vegetation or street trees. These links or corridors enable animals to interact and allow access to larger breeding groups. They allow animals to recolonise areas following disturbances such as fire in bushland areas. Habitat corridors also contribute to plant biodiversity as animals are often the agents of seed and pollen dispersal.

Major Habitat Corridors of the Sutherland Shire

- * **Bushland link between Royal National Park, Garrawarra State Recreation Area and the bushland of the Illawarra.**
- * **Bushland link between Royal National Park, Heathcote National Park, Holsworthy Military Area, Sydney Water Catchment, and the bushland of Wedderburn and the south west.**
- * **Bushland link along the Woronora River Valley linking Heathcote and Georges River National Parks.**
- * **Bushland linking Woronora Valley with West Menai, and Holsworthy Military Area**
- * **Sydney Water land linking Woronora Valley and Forbes Creek.**
- * **Wetland Corridor linking Woollooware Bay, Weeny Bay and Quibray Bay.**
- * **Several smaller corridors along foreshore areas and creeklines.**

Sutherland Shire Council 1995

Very little information is available on the movement of fauna throughout the Sutherland Shire. However it can be assumed that all bushland linkages will provide a corridor of some sort. Disjointed linkages may also form corridors for the movement of more mobile species such as birds.

3.3 Legislation Protecting Habitat Corridors

There is no specific legislation that provides protection for habitat corridors. However some protection is provided in legislation designed to protect urban bushland generally, such as SEPP 19 and Clause 24 (SSLEP).

Clause 24 of the Sutherland Shire Local Environment Plan 1993, requires that approval not be given for developments that have an adverse impact on wildlife corridors and vegetation links with adjacent areas of bushland.

The rate of native vegetation clearance in Australian in 1990 was more than half that cleared in the Brazillian Amazon.
DEST 1995

3.4 Council's Role

There are a number of actions and tasks that Council may implement to conserve and protect habitat corridors within the Sutherland Shire.

Action 1.

Develop and maintain an accurate inventory of the habitat corridors within and through the Sutherland Shire, including species usage patterns.

Tasks:

- * Identify, obtain and map any existing information.
- * Identify data gaps in existing databases.
- * Undertake required studies to complete database. Information should include size, location, condition and habitat or vegetation type, as well as an inventory of species utilising the corridor.
- * Map the location and extent of the corridors identified above.
- * Update database on a regular basis (minimum yearly to coincide with State of the Environment Report).

Action 2.

Identify opportunities for the establishment of corridors to link disjointed areas of bushland.

- * Identify existing habitat corridors of greatest conservation significance.
- * Identify isolated areas of bushland not adequately serviced by habitat corridors.

- * Determine species likely to benefit from linking of the isolated bushland.
- * Identify barriers to faunal movement through potential corridors.
- * Identify minimum requirements for establishment of vegetated links between isolated areas of bushland to facilitate the movement of these species.

Action 3.

Develop management policies and practices that promote the conservation of habitat corridors.

- * Ensure that areas of significant habitat corridor value are appropriately zoned or identified in other planning instruments (eg. DCPs).
- * Investigate the potential for land swaps to obtain areas of potential significant habitat corridor value in private ownership.
- * Ensure that ecological assessments address the potential habitat corridor value of bushland for developments and rezonings in natural areas.
- * Maximise the potential for endemic street tree planting corridors and potential corridors in accordance with Council's Urban Tree Policy.
- * Appropriately manage weeds and feral animals in areas under Council's care control and management.
- * Develop incentives and strategies for encouraging owners to appropriately manage private land identified as corridors.

Action 4.

Encourage community participation in the protection, restoration and conservation of habitat corridors within and through the Sutherland Shire.

- * Promote community involvement in the restoration and management of habitat corridors through programs such as Bushcare, through provision of appropriate materials, advice, staff, training and other resources.
- * Make information on the location extent of usage and importance of habitat corridors available to the public through the State of the Environment Report, and other educational material and displays.
- * Promote the value of habitat corridors through education and advice on weed control, appropriate garden planting, habitat value of bush rock, and the impact of rubbish dumping.

4.0 THREATENED SPECIES

4.1 Objectives

- * **To prevent the extinction and promote the recovery of threatened species and communities.**
- * **To protect the critical habitat of threatened species and communities.**
- * **To eliminate or manage processes that threaten the survival and development of threatened species and communities.**
- * **To ensure that the impacts of any action affecting threatened species and communities is properly assessed.**
- * **To encourage community involvement and cooperation in the management of threatened species and communities.**

4.2 The Shire's Threatened Species

The Shire has a significant number of threatened fauna species, with over 50 threatened animals occurring in the Sutherland Shire. Many of these have not been observed for a number of years, such as the Tiger Quoll (*Dasyurus maculatus*), which was last observed in the Royal National Park in 1984. In contrast to this, new species are being located, such as the Tinkling Frog (*Crinia tinula*), which was recorded for the first time in the Shire in early 1996.

There is also a range of threatened flora species, with over 56 protected and regionally significant species occurring in the Shire. The term Rare or Threatened Australian Plants (ROTAP) generally refers to plants protected under National or State legislation. Regionally significant plants refer to those species that may be adequately preserved elsewhere in the State but are rare or uncommon in this region. Conservation of these species is important if the biological diversity of the Shire is to be maintained. While ROTAP species may generally rely on legislative protection, regionally significant plants rely on local environmental planning instruments for protection.

ROTAP Species of the Sutherland Shire

Species	ROTAP Listing	Habitat	Location
<i>Acacia bynoeana</i>	3VC-	Heath & woodland on sandstone	Heathcote, RNP
<i>Acacia pubescens</i>	2VCa	Exposed ridge tops on Wianamatta shale	Barden Ridge
<i>Bertya brownii</i>	2RC-	Sheltered sandstone gullies	Mill Cr
<i>Boronia serrulata</i>	2RC-	Heath	RNP, Heathcote NP
<i>Darwinia diminuta</i>	2RCi	Ridgetop woodland with ironstone influence	Engadine, Heathcote, Woronora Hts, RNP, Heathcote NP
<i>Darwinia grandiflora</i>	2RCi	Ridgetop heath & woodland	Holsworthy MA, RNP, WBCA
<i>Eucalyptus camfeldii</i>	2VCi	Exposed sandstone ridges	RNP
<i>Eucalyptus leuhmanniana</i>	2RCa	Exposed sandstone ridges	Engadine, Heathcote, Heathcote NP, Holsworthy MA, Woronora Hts, WBCA
<i>Grevillea longifolia</i>	2RC-	Along creek banks	Woronora Valley, Mill Cr, Heathcote Cr
<i>Hibbertia nitida</i>	2RC-	Sheltered sandstone gullies	GyMEA Bay, Holsworthy MA, Woronora Valley, Still Cr, WBCA
<i>Leucopogon exolasius</i>	2VC-	Sheltered dry sandstone slopes	Heathcote NP, Woronora Valley, Holsworthy MA
<i>Lomandra fluviatilis</i>	3RCa	Rocky creek beds	Heathcote Cr, Woronora River, RNP
<i>Melaleuca deanei</i>	3RC-	Sandstone ridges in heath & woodland	RNP, Heathcote NP, WBCA, Holsworthy MA, West Menai
<i>Monotoca ledifolia</i>	3RC-	Heath	Heathcote NP, RNP, Woronora Hts, Waterfall
<i>Persoonia hirsuta</i>	3KCi	Exposed sandstone ridges	Jannali, RNP
<i>Platysace stephensonii</i>	3RC-	Heath	Cronulla, RNP
<i>Prostanthera densa</i>	3VC-	Heath	Cronulla, RNP
<i>Rulingia hermanniifolia</i>	3RCa	Heath	Botany Bay NP, RNP
<i>Syzygium paniculatum</i>	3ECi	Littoral rainforest	Towra Pt, Cronulla
<i>Tetradlea neglecta</i>	2RC	Heath, woodland & open forest	Barden Ridge, Illawong, Jannali, Loftus, Menai, Woronora Heights, RNP, Heathcote NP, Holsworthy MA, WBCA
<i>Thysanotus virgatus</i>	3RC-	Open forest on sandstone	RNP

Plant Codes:

Distribution

- 1 Known from type collection only
- 2 Geographic range < 100km
- 3 Geographic range > 100km

Conservation

- E Endangered (at risk of disappearing in 1 or 2 decades)
- V Vulnerable (at risk of disappearing in 20 - 50 years)
- R Rare (rare in Australia but currently not endangered or vulnerable)
- K Poorly known

Reservation

- C Population reserved
- a Adequately reserved (>1000 plants)
- i Inadequately reserved (<1000 plants)
- Adequacy of reservation unknown

Source: Briggs, J.D. & Leigh J.H. Rare or threatened Australian plants. Updated annually in the SOE for the Sutherland Shire.

Locally Significant Plant Species of the Sutherland Shire

Species	Status	Habitat	Location
<i>Acacia rubida</i>	Si	Protected sandstone benches	Grays Pt, Gymea Bay, Jannali, Woronora Valley, RNP
<i>Acianthus caudatus</i>	Sa	Protected sandstone benches	Gymea Bay, Lilli Pilli Pt, Grays Pt, Jannali, RNP
<i>Allocasuarina dimimuta</i> <i>ssp diminuta</i>	Si	Heath & woodland	West Menai
<i>Angophora costata</i> x <i>hispidata</i>	Si	Heath & woodland	West Menai
<i>Angophora floribunda</i>	Si	Moist valleys, deep soil	Woronora Valley, RNP
<i>Astrotricha latifolia</i>	Si	Sheltered gullies near streams	West Menai
<i>Blechnum indicum</i>	Sa	Freshwater swamps	Kurnell
<i>Boronia floribunda</i>	Sa	Sheltered moist places in woodland	Engadine
<i>Cassine australis</i>	Sa	Subtropical rainforest	Lilli Pilli Pt, RNP
<i>Caustis recurvata</i> var <i>hirsuta</i>	Sa	Dry sandy soil in heath	RNP
<i>Caladenia caerulea</i>	Sa	Forest & scrub	Sutherland, RNP
<i>Caladenia picta</i>	Si	Woodland on sandstone	Illawong, Jannali
<i>Caleana major</i>	Sa	Exposed sunny sandstone ridges	Engadine, Jannali, Woronora Valley, RNP
<i>Callistemon subulatus</i>	Sa	Rocky creek banks	Woronora Valley, Heathcote NP
<i>Callitris muelleri</i>	Sa	Rocky gully sides	Gymea, Woronora Hts, Heathcote NP
<i>Chiloglottis trilabra</i>	Si	Sheltered damp gullies on sandstone	Miranda
<i>Celtis paniculata</i>	Si	Moist forest	Lilli Pilli Pt, Grays Pt, RNP
<i>Cupaniopisi anacardioides</i>	Sa	Littoral rainforest	Kurnell, Bundeena, Cronulla, Lilli Pilli Pt, Burraneer Pt, RNP
<i>Cyclosorus interruptus</i>	Si	Freshwater swamps	WBCA, Woronora Valley, Still Cr
<i>Cyrtostylis reniformis</i>	Si	Dark shady places in sandy soils	Gymea Bay, Grays Pt
<i>Dendrobium speciosum</i>	Sa	Lithophyte, cliffs and rock ledges	Burraneer Pt, Grays Pt, RNP
<i>Dendrobium teretifolia</i>	Sa	On swamp oak or rocks	Illawong, RNP
<i>Dillwynia parvifolia</i>	Si	Open forest on dry clay soils	Menai
<i>Dipodium punctatum</i>	Sa	Dry sandy soils	Caringbah, RNP
<i>Diuris sulphurea</i>	Si	Dry clay soils	Jannali, Lucas Hts
<i>Endiandra sieberi</i>	Si	Rainforest on sandy soil	Gymea Bay, Cronulla, RNP
<i>Epacris crassifolia</i>	Si	Rocky cliff faces	Burraneer Pt
<i>Erythrorchis cassythoides</i>	Si	Woodland adjacent to rainforest	West Menai
<i>Eucalyptus consideniana</i>	Sa	Exposed heaths on sandy soil	Engadine RNP
<i>Eucalyptus longifolia</i>	Si	Heavy alluvial soils	Woolooware
<i>Eucalyptus multicaulis</i>	Sa	Mallee, rocky, poorly drained sandstone ridges	Woronora Hts, RNP
<i>Eucalyptus obstans</i>	Sa		Burraneer Pt, RNP
<i>Eucalyptus saligna</i>	Sa	Wet woodlands on shale ridges, or alluvial valleys	East Heathcote, RNP
<i>Eucalyptus squamosa</i>	Sa	Lateritic tops	Kareela, Loftus, Yarrawarrah, Woronora Hts, RNP
<i>Eupomatia laurina</i>	Sa	Subtropical rainforest	RNP, Turriel Bay
<i>Euroschinus falcata</i>	Si	Subtropical rainforest	Gymea Bay, Grays Pt, RNP
<i>Ficus superba</i> var <i>henneana</i>	Si	Subtropical rainforest	Dolans Bay, Grays Pt, RNP
<i>Ghania aspera</i>	Sa	Sandy soils enriched with clay	Menai, RNP

<i>Gompholobium pinnatum</i>	Si	Heath & woodland on sandstone	GyMEA Bay, RNP
<i>Gonocarpus tetragynus</i>	Sa	Woodlands	Menai
<i>Grevillea diffusa x sericea</i>	Si	Sandstone heaths	West Menai
<i>Guioa semiglauca</i>	Sa	Subtropical rainforest	Burraneer Pt, Lilli Pilli Pt, RNP
<i>Legnephora moorei</i>	Sa	Subtropical rainforest	Lilli Pilli Pt, RNP
<i>Lepospermum parvifolium</i>	Si	Dry heath & woodland	Engadine
<i>Linum marginale</i>	Si	Grasslands on clay	Kirrawee, Menai
<i>Liparis reflexa</i>	Sa	Rocks in humid gullies	Grays Pt, GyMEA Bay, Lilli Pilli, Still Cr, Lucas Hts, RNP
<i>Lomandra micrantha ssp tubercula</i>	Si	Cool damp areas in woodland	Menai
<i>Maclura cochinchinensis</i>	Si	Edge of rainforest	Towra Pt, RNP, Lilli Pilli Pt
<i>Microtis uniflora</i>	Si	Swampy ground	Lucas Hts
<i>Mirbelia speciosa</i>	Sa	Heath & woodland	RNP, WBCA, Woronora Valley, Still Cr
<i>Olearia tomentosa</i>	Sa	Shady gullies & seaside cliffs	Woronora Valley, RNP
<i>Ottelia ovalifolia</i>	Si	Slow moving creeks	Mill Cr
<i>Peperomia tetraphylla</i>	Sa	Subtropical rainforest	RNP, Bundeena
<i>Polyscias elegans</i>	Sa	Humid woodland & rainforest	RNP, Lilli Pilli Pt
<i>Prasophyllum elatum</i>	Si	Marshy heath to dry forest	Yarrawarrah, Jannali
<i>Prostanthera saxicola</i>	Si	Sheltered woodland	West Menai
<i>Pseudanthus pimelioides</i>	Sa	Along creek banks	RNP, Woronora Valley
<i>Pterostylis acuminata</i>	Si	Sheltered sandy soil	Burraneer Pt
<i>Pterostylis erecta</i>	Si	Sheltered woodland	Burraneer Pt, Caringbah
<i>Pterostylis pedunculata</i>	Si	Ferny gullies	Lilli Pilli Pt
<i>Rapanea howittiana</i>	Sa	Subtropical rainforest	Yowie Bay, Lilli Pilli Pt, RNP
<i>Rulingia dasyphylla</i>	Si	Clay ridge tops	Menai
<i>Sarcomeliope simplcifolia</i>	Sa	Subtropical rainforest	Lilli Pilli Pt
<i>Schizomeria ovata</i>	Sa	Subtropical rainforest	GyMEA Bay, Miranda, RNP
<i>Stenocarpus salignus</i>	Sa	Subtropical rainforest gullies	Woronora Valley, RNP
<i>Synoum glandulosum</i>	Si	Moist sheltered gullies	Dolans Bay, Cronulla, Burraneer Bay, Maianbar, RNP, Botany Bay NP
<i>Thelymitra carnea</i>	Si	Moist, sunny heathland	Jannali, Prince Edward Park
<i>Thelymitra nuda</i>	Si	Heath & woodland	Lucas Hts

Sa Occurring in less than 10 urban locations but adequately reserved in a regional National Park

Si Occurring in less than 10 urban locations but inadequately reserved in a regional National Park

Source:: Reported and updated annually in SOE for Sutherland Shire.

Threatened Fauna of the Sutherland Shire

Name	Status	Habitat	Where Recorded
Green & Golden Bell Frog <i>Litoria aurea</i>	T	Freshwater ponds or creeks, with reed growth	Kurnell, Menai
Green Thighed Frog <i>Litoria brevipalmata</i>	V&R	Ground dwelling in warm temperate forest	Darkes Forest
Tinkling Frog <i>Crinia tinula</i>	V&R	Freshwater ponds	Kurnell
Giant Burrowing Frog <i>Heleioporus australiacus</i>	V&R	Banks of small creeks in coastal ranges	Waterfall, Heathcote, Menai, Engadine
Red-Crowned Toadlet <i>Pseudophryne australis</i>	V&R	Creek banks and crevices in Hawkesbury sandstone	Waterfall, Menai, RNP
Great Barred Frog <i>Mixophyes balbus</i>	V&R	Wet sclerophyll forests on eastern ranges	RNP
Broad Headed Snake <i>Hoplocephalus bungaroides</i>	T	Sandstone outcrops	Waterfall, Bundeena, RNP
Green Turtle <i>Chelonia mydas</i>	V&R	Open ocean, coastal waters	Cronulla Beach
Heath Monitor <i>Varanus rosenbergi</i>	V&R	Coastal heaths to wet sclerophyll forests	Loftus, Waterfall, RNP, Menai
Red Goshawk <i>Erythrotriorchis radiatus</i>	T	Rain forest and open forest near waterways	RNP
Little Tern <i>Terna albobifrons</i>	T	Inshore waters and sand banks, nests in sand	Botany Bay, Boat Harbour
Great Knot <i>Calidris tenuirostris</i>	V&R	Estuarine and tidal mud-flats	Kurnell
Little Shearwater <i>Puffinus assimilis</i>	V&R	Coastal, breeds on offshore islands	Big Marley, Nth Cronulla Beach
Grey Falcon <i>Falco hypoleucos</i>	V&R	Open areas, rock outcrops	Pt Hacking
Australian Bittern <i>Botaurus poiciloptilus</i>	V&R	Streams, lakes, swamps	Kurnell
Sooty Oyster Catcher <i>Heamatopus fuliginosus</i>	V&R	Coastal rock ledges, reefs and tidal pools	Boat Harbour
Sooty Owl <i>Tyto tenebricosa</i>	V&R	Tall forest, particularly gullies	RNP, Engadine, Woronora, Gynea
Providence Petrel <i>Pterodroma solandri</i>	V&R	Coastal, breeds on offshore islands	Cronulla Beach
Wandering Albatross <i>Diomedea exulans</i>	V&R	Sea, occasionally bays and harbours	Botany Bay NP
Osprey <i>Pandion haliaetus</i>	V&R	Rivers, lakes coastal inlets	Botany Bay NP
Broad-billed Sandpiper <i>Limicola falcinella</i>	V&R	Tidal mud-flats	Botany Bay NP, RNP
Masked Owl <i>Tyto novaehollandiae</i>	V&R	Dense forest in coastal regions	RNP
Powerful Owl <i>Ninox stenua</i>	V&R	Mountains, forests and scrub	RNP
Sooty Tern <i>Sterna fuscata</i>	V&R	Coastal waters	Cronulla Beach
Pied Oyster-catcher <i>Heamatopus longiristris</i>	V&R	Beach intertidal zones	Towra Beach
Terek Sandpiper <i>Tringa terek</i>	V&R	Coastal mud-flats, creeks, estuaries	Woollooware Bay
Sanderling <i>Calidris alba</i>	V&R	Ocean beaches	Boat Harbour
Sand Plover <i>Charadrius leschenaulti</i>	V&R	Mud-flats in coastal regions	Boat Harbour
Mongolian Plover <i>Charadrius mangolus</i>	V&R	Tidal sand and mud flats	Kurnell

Square-tailed Kite <i>Lophoictinia isura</i>	V&R	Open forest, scrub, near water	RNP
Tiger Quoll <i>Dasyurus maculatus</i>	V&R	Wet sclerophyll forest, and rainforest	RNP
Yellow-bellied Sheath-tail Bat <i>Saccolamius flaviventris</i>	V&R	Woodland, sclerophyll forest and rainforest	Sutherland
Yellow-bellied Glider <i>Petaurus australis</i>	V&R	Sclerophyll forests	RNP
Brush-tailed Rock Wallaby <i>Petrogale penicillata</i>	V&R	Sclerophyll forests on slopes with grassy understorey	Woronora River
Brush-tailed Phascogale <i>Phascogale tapoatafa</i>	V&R	Open forest, often on ridges	RNP
Large-eared Pied bat <i>Chalinobolus dwyeri</i>	V&R	Dry sclerophyll forests and woodlands	RNP
Koala <i>Phascolarctos cinereus</i>	V&R	Sclerophyll forest	Heathcote NP, Menai
Large-footed Mouse-eared Bat <i>Myotis adversus</i>	V&R	Rainforest near water	RNP, Taren Point
Greater Broad-nosed Bat <i>Nycticeius rueppellii</i>	V&R	Wet sclerophyll forest and rainforest	Taren Point
Potoroo <i>Potorous tridactylus</i>	V&R	Forest, woodland, heath with dense grass	RNP

Source: Reported and updated annually in the OE for Sutherland Shire.

Due to Australia's high rate of extinctions and the large number of threatened species located within the Sutherland Shire, we have a vital role to play in preserving Australia's threatened species.

The lack of accurate historical records for the Shire mean that it is difficult to determine if there has been any local extinctions since European settlement, however it is likely that a few species, such as the Eastern Quoll and the Regent Honeyeater, have disappeared from the area.

Changes in Urban Birds

Prior to European settlement it is estimated that the County of Cumberland supported 283 species of birds. Today 11 of these are extinct and 76 have decreased in range or abundance.
(DEST 1996)

4.3 Threatened Species Legislation

Threatened species are listed under several pieces of legislation. The most relevant ones for the Sutherland Shire are the NSW Threatened Species Conservation Act 1995 and the Commonwealth Endangered Species Protection Act (1992).

The Threatened Species Conservation (TSC) Act (1995) amends the Environmental Planning and Assessment (EP&A) Act (1979) to require the consideration of endangered species in planning matters. The TSC Act places a responsibility on Council to consider the impact of its decisions and actions on threatened species. Consideration needs to be given to threatened species during the development control process, during the formulation of planning instruments and during the management of Council controlled lands.

4.4 Council's Role

There are a number of actions and tasks available that Council may implement to conserve the Shire's threatened flora and fauna.

Action 1.

Develop and maintain an accurate database of threatened species within the Sutherland Shire.

Tasks:

- * Identify and obtain relevant existing flora and fauna databases.
- * Identify data gaps in areas of knowledge.
- * Complete studies to complete database.
- * Update database on regular basis (minimum yearly, to coincide with State of Environment Report).
- * Identify species most at risk for priority action.

Action 2

Identify critical habitat for threatened species.

Tasks:

- * Identify, describe and map areas where habitat and potential habitat exists for identified threatened species.
- * Identify and describe areas that constitute habitat critical for the survival of these threatened species.
- * Apply for listing of these areas as critical habitat under the Threatened Species Conservation Act.

Action 3

Identify key processes and actions that threaten the long term viability of threatened species and communities.

Tasks:

- * Examine trends in populations of threatened species to identify key threatening processes.
- * Prioritise threatening process for ameliorative action, based on magnitude of identified impact, viability of impacted populations and communities, environmental benefit, and cost to the community.
- * Apply for listing of these threatening processes under the Threatened Species Conservation Act.

Action 4

Develop management policies and practices that promote the conservation of threatened species, communities and their habitat, and ameliorate or eliminate processes which threaten these species or communities.

Tasks:

- * Propagate threatened and significant plants at Council's nursery, for use in Council planting programs and supply to the community.
- * Assist and cooperate with the NPWS in the formulation of Recovery Plans and Threat Abatement Plans.
- * Enforcement of Council's Tree Preservation Order.
- * Assist NPWS by controlling fox and feral cats on Council managed and controlled land.
- * Effectively manage weeds in areas of private and public ownership, through direct action, regulation, and education.
- * Ensure that adequate ecological assessments are performed for developments, rezonings and Council actions in natural areas, including the consideration of impacts on threatened species, communities or threatened species habitat.
- * Provide appropriate statutory protection for threatened communities and threatened species habitat.

Action 5

Encourage and co-ordinate community participation in the conservation of threatened species and communities, and their habitat.

Tasks:

- * Promote community involvement in restoration and protection programs for threatened species habitat and threatened communities, through programs such as Bushcare.
- * Make information on threatened species, communities and their habitat available to the community through the State of the Environment Report, and other educational material.
- * Encourage planting of threatened plant species by providing these plants to the community as part of the tree issue program.

5.0 MANAGEMENT AND CONTROL OF EXOTIC SPECIES

5.1 Objective

- * **To manage the degradation of natural habitats by the invasion of exotic plant species.**
- * **To manage the impacts of predation and competition on native fauna by introduced species.**
- * **To effectively implement the Noxious Weeds Act 1993.**
- * **To encourage community involvement and cooperation in the management of exotic species.**

5.2 Exotic Species of the Sutherland Shire

Exotic species fall into two major categories, these being plants and animals. Exotic plants are more commonly known as weeds, while exotic animals are known as feral animals. While non invasive exotic plants may be acceptable in urban gardens away from bushland areas, invasive garden escapes are causing increasing problems in the Shire's bushland.

5.2.1 Weed Species of the Sutherland Shire

While the Shire is blessed with vast areas of natural bushland, it is under threat from invasion by weeds. Weeds are entering bushland from urban fringes, along roadways and creeks, waterways and drains. Once weeds become established in an area they become increasingly difficult to control and remove.

Weeds invade bushland, decreasing the habitat value of the area, displacing native species and decreasing the visual amenity of the area. They choke streams and drainage lines, resulting in increased flooding. They may also cause health problems such as poisoning and asthma.

Several weeds are classified as noxious under the Noxious Weeds Act 1993. These are listed by the NSW Department of Agriculture for regions in NSW. Other weeds that cause specific problems in the Sutherland Shire have been listed as environmental weeds.

Noxious Weeds of the Sutherland Shire		
Scientific Name	Common Name	Category

Alternanthera philoxeroides	Alligator Weed	W1
Cannabis sativa	Indian Hemp	W1
Cestrum parqui	Green Cestrum	W2
Chromolaena odorata	Siam Weed	W1
Cortaderia selloana.	Pampas Grass	W2
Eichhorina crassipes	Water Hyacinth	W1
Equisetum arvense	Horsetail	W1
Erythroxylum coca	Cocoa Leaf	W1
Gymnocoronis spilanthoides	Senegal Tea Plant	W1
Hypericum perforatum	St John's Wort	W2
Kochia scoparia	Kochia	W1
Lagarosiphon major	Lagarosiphon	W1
Lantana camara	Lantana (pink flower)	W2
Lantana camara	Lantana (red flower)	W2
Ludwigia peruviana	Ludwigia	W2
Papaver somniferum	Opium Poppy	W2
Parietaria judaica	Wall Pellitory	W3
Parthenium hysterophorus	Parthenium Weed	W1
Pistia stratiotes	Water Lettuce	W1
Ricinus communis	Castor Oil Plant	W2
Rubus fruticosus (agg) sp.	Blackberry	W2
Salvinia molesta	Salvinia	W1
Toxicodendron succedaneum	Rhus Tree	W2

Categories of Noxious Weeds

W1	the presence of the weed on land must be notified to the local control authority immediately, and the weed must be fully and continuously suppressed and destroyed.
W2	the weed must be fully and continuously suppressed and destroyed.
W3	the weed must be prevented from spreading and its number and distribution reduced.
W4	the action specified in the declaration must be taken in respect of the weed.

Councils are able to nominate specific weeds that are threatening their area under the W4 Category, however Sutherland Shire Council is yet to nominate any weeds under this category. Instead Council have noted several weeds as environmental weeds. These are weeds that cause problems within bushland in our area. While there is no legislative requirement to control these weeds, active management to eradicate and manage them is encouraged.

Environmental Weeds of the Sutherland Shire

Scientific Name	Common Name
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Acetosa sagittatus	Potato Vine
Ageratina adenophora	Crofton Weed
Anredera cordifolia	Madiera Vine
Araujia hortorum	Moth Vine
Bidens pilosa	Cobblers Peg
Cardiospermum grandiflorum	Balloon Vine
Chrysanthemoides monilifera	Bitou Bush
Cinnamomum camphora	Camphor Laurel
Conyza canadensis	Fleabane
Cotoneaster glycyphylla	Cotoneaster
Ehrharta erecta	Veldt or Panic Grass
Erogrostris curvula	African Love Grass
Ficus elastica	Indian Rubber Plant
Hydrocotyle bonariensis	Kurnell Curse or Pennywort
Ipomoea indica	Morning Glory
Ligustrum lucidum	Large-leaved Privet
Ligustrum sinense	Small-leaved Privet
Lonicera japonica	Japanese Honeysuckle
Myrsiphyllum asparagoides	Bridal Veil Creeper
Nephrolepis cordifolia	Fishbone Fern
Ochna serrulata	Ochna or Mickey Mouse Plant
Protoasparagus aethiopicus	Asparagus Fern
Senna bicapsularis	Cassia
Sida rhombifolia	Paddy's Lucerne
Tradescantia albiflora	Wandering Jew
Tropaeolum majus	Nasturtium

The exact extent of the weed problem in the Shire is not known, but it is estimated that an average of 12% of the total reserve area of the Shire is weed infested. The lack of detailed historical records makes it difficult to determine how much the problem has increased in recent years. However, it is acknowledged that the problem is increasing every year. For example, in 1988 there were only 5 known sites of Asthma Weed in the Shire, but by 1993 there were over 40 known sites (Rogers pers com).

5.2.2 Feral Animals of the Sutherland Shire

There are a number of feral animals that inhabit the bushland areas of the Sutherland Shire. Just like weeds these feral animals reduce the habitat value of an area of bushland. They may prey directly on native species, or out compete them for food, shelter and other resources. Feral animals may also graze on or damage many of the Australian native flora or prevent effective pollination.

Feral Animals of the Sutherland Shire

Feral Animal	Impact
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Fox	Prey on native birds, marsupials and reptiles. Out competes native
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	carnivores.
Cat	Prey on native birds, marsupials and reptiles. Domestic cats hunting in bushland are a major problem.
Deer	Graze on young shoots and seedlings disrupting revegetation after fire. May ringbark trees when scraping juvenile skin from antlers.
Rabbit	Compete with native wildlife for food and shelter. Graze on shoots and seedlings disrupting regeneration. Reduce ground cover and promote soil erosion.
Rats & Mice	Displace native marsupial mice and rats.
Pig	Prey on small ground dwelling birds. Destroy habitats around watercourses by rooting and wallowing.
Mosquito Fish	Prey on young native fish and tadpole species.
Carp	Bottom feeding habit increases water turbidity, making it unsuitable for many native species. Out competes native fish.
Mallard	Breeds with native duck species decreasing genetic integrity.
Myna Bird	Out competes native birds for food and shelter.
Bees	Compete with native bees birds and marsupials for food and shelter. May not effectively pollinate plants.

There are no accurate records of the number and distribution of feral animals in the Sutherland Shire. Most of the feral species have been present for many years with few if any new introductions in the past few years. There are however likely to be increased impacts from predation by cats as new areas are developed and the domestic cat population in these areas increases.

5.3 Exotic Species Legislation

Legislation relating to exotic species is largely confined to the Noxious Weeds Act 1993, with little other specific legislation.

The Noxious Weeds Act 1993, enables plants to be declared noxious throughout the whole or part of the State. The Act requires varying levels of control and eradication to be applied to noxious plants depending on their classification. Public Authorities may serve notice on occupiers of weed infested sites requiring them to carry out their weed control responsibilities. Public authorities have a lesser responsibility to control weeds to the extent necessary to prevent them invading adjoining lands.

Legislation relating to the control and management of noxious animals (Rural Lands Protection Act 1989) applies in rural lands protection districts only and does not include the Sutherland Shire.

The Local Government Act 1993, makes provision for the issuing of order to restrict the number of certain animals that may be kept on a property. The Companion Animals Act (1998) provides Council with the responsibility for dog and cat registration and control of a range of companion animals.

Introduced plants now account for about 15% of our total flora.
DEST 1996

5.4 Council's Role

There are a number of actions and tasks that Council may implement to manage and control the impacts of exotic species in the Sutherland Shire.

Action 1.

Develop and maintain an accurate database of weeds in the Sutherland Shire.

Tasks:

- * Identify and obtain existing databases, relating to noxious and environmental weeds.
- * Identify data gaps in existing databases.
- * Commission and complete studies to address knowledge gaps. Information should include location, species involved and extent of infestation.
- * Update database on a regular basis (minimum yearly to coincide with State of the Environment Report)

Action 2.

Identify key processes and actions that contribute to weed invasion and infestation.

Tasks:

- * Examine trends in weed invasion and infestation to identify key processes and actions (ie, increased nutrient runoff, dumping of garden refuse).
- * Prioritise key contributing processes for ameliorative action based on, magnitude of impact, viability of impacted ecosystems, environmental benefit, and cost to the community.

Action 3.

Effectively manage weed invasion of bushland areas.

Tasks:

- * Prioritise areas for weed control on the basis of existing degree of impact on bushland, and potential future impacts.
- * Council to fulfil its statutory obligations for weed control on Council managed land, under the Noxious Weeds Act.
- * Issue notices for weed control on privately owned land, in accordance with the Noxious Weeds Act.
- * Encourage, through the provision of guidance, equipment, and training, community participation in weed control in bushland areas through Bushcare.

Goldfish are the most common of the exotic fish in Australia, being found in every major drainage system from the Fitzroy River in Queensland to south western Australia, and Tasmania.
(DEST 1996)
DEST 1996

Action 4.

Develop and maintain an accurate database on feral animals within the Sutherland Shire.

Tasks:

- * Identify and obtain relevant existing feral animal databases.
- * Identify data gaps in existing data.
- * Commission and complete studies to address data gaps.
- * Update database on a regular basis (minimum yearly to coincide with State of the Environment Report).

Action 5.

Effectively manage feral animals in bushland areas.

Tasks:

- * Prioritise areas for feral animals control on the basis of existing degree of impact on bushland and future potential impacts.
- * Prioritise feral animals for control on the basis of degree of impact on bushland and potential future impacts.
- * Development of policies for the control of potentially feral animals such as cats and dogs, including compulsory registration, limitations on numbers, desexing programs.
- * Educate cat and dog owners on appropriate controls and the need to keep their pets secure at night.
- * Investigate options for the control of feral animals in bushland, including trapping and poisoning.

Action 6.

Encourage community participation in the control and management of introduced species.

Tasks:

- * Promote community involvement in management and control of weeds through programs such as Bushcare.
- * Make information on the impacts of introduced species available to the public through the State of the Environment Report, Landscape Development Control Plans and other educational material.

**In NSW alone 400,000 feral cats kill 400 million native animals every year.
(New Scientist 1993)**

6.0 BUSHFIRE MANAGEMENT

6.1 Objectives

- * **To manage fire within the Sutherland Shire in a way that maintains, or does not compromise, the ecological integrity of the bushland.**

6.2 Fire Communities in the Sutherland Shire

The range of habitat types within the Shire respond to fire in different ways. While some require frequent fire to maintain their diversity others may be destroyed by fire. Through its responsibility as a Fire Control Authority, Council impacts on bushland habitats through their fire management strategy. It is therefore necessary to know how a vegetation community will respond to fire, and to take this into consideration when developing a fire management strategy.

While the protection of life and property is the main aim of hazard reduction burns, fire is becoming an increasingly important tool in the management of bushland. Fires may be used to reduce weed infestations and to promote the regeneration of bushland. However where fire frequencies are too short, some plants may not have enough time to set seed, and may become locally extinct.

Fire Regimes of Habitat Types within the Sutherland Shire

Community Type	Minimum Interval (yrs)	Maximum Interval (yrs)
Tall Open Forest	80	300
Closed Forest	60	250
Low Woodlands	8	120
Woodlands	8	120
Heathland	8	80
Open Forest	6	100
Littoral Rainforest	100	400
Sub-tropical Rainforest	200	400
Dunal Communities	5	50
Estuarine Communities	10	100
Seagrasses	-	-

For example, *Banksia ericifolia* has disappeared from many bushland areas around Sydney, including areas of the Royal National Park and the Sutherland Shire. This shrub first flowers eight years after a fire and sets seed in the ninth year. Where the interval between fires has been repeatedly less than eight years, this species has been unable to set seed and has become extinct in that locality.

Studies following the 1994 fires in the Royal National Park have shown that numbers of native marsupial mice such as the Brown Antechinus, have decreased dramatically since 1994, whereas numbers of the introduced house mouse increased dramatically after the fire.

6.3 Bushfire Legislation

While some legislation, such as the Environmental Planning and Assessment Act 1979, requires bushfire impacts be considered as part of the assessment process, the only piece of legislation controlling the management of bushfire is the Rural Fires Act (1997).

The Rural Fires Act (RFA) (199) gives powers to Fire Control Authorities, such as local councils, to control and manage bushfires in areas under their control. The RFA requires the production of Bush Fire Risk Management Plans that identify bushfire risk and outline practicable steps to prevent fires and to avoid fires spreading onto any land owned by them or under their control or management, including the ordering of hazard reduction works on private property. Hazard reduction activities carried out under the Rural Fires Act, do not require formal development consent, provided they are carried out in accordance with an approved Bush Fire Risk Management Plan

6.4 Council's Role

There are a number of actions and tasks that Council may implement to ensure that bushfire management does not compromise the ecological integrity of habitats within the Sutherland Shire.

Action 1.

Develop and maintain an accurate record of the fire history of the bushland of the Shire.

Tasks:

- * Compile existing data on fire histories of bushland, including hazard reduction burns.
- * Identify data gaps.
- * Undertake required studies to attempt to complete database. This will mainly comprise studies of vegetation type, flowering frequency, seedling emergence etc.
- * Update database on a regular basis, minimum yearly.

Action 2.

Develop management policies and practices that do not compromise the ecological integrity of the bushland.

Tasks:

- * Continue environmental checklist procedure for each hazard reduction burn or clearing operation.
- * Development of an annual hazard reduction program.
- * Proposed burns and operations to be reviewed by the Environmental Science Unit, Bushcare and other relevant departments, to identify potential environmental constraints.
- * Where possible ensure that burn frequency is compatible with the vegetation type.
- * Conduct burns so as to ensure a mosaic of vegetation regeneration.
- * Where possible ensure a variety of burn intensities and seasonality are employed.
- * Where possible avoid burning bushland during periods of flowering for threatened plant species.
- * Where possible avoid burning bushland during periods of breeding for threatened animals.
- * Consideration should be given to alternative means of fuel reduction, such as mechanical and manual methods, where appropriate.
- * Where manual methods of hazard reduction are employed ensure that personnel receive adequate training to identify threatened species that may inhabit the site.
- * Hazard reduction burns adjacent to waterbodies should not contribute to unacceptable levels of sediment pollution.
- * Liaise with NPWS to ensure that sufficient representative habitat types and plant communities are maintained unburnt each year.

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