Byron Biodiversity Conservation Strategy



A report prepared by Byron Shire Council

SEPTEMBER 2004



Biodiversity Conservation Strategy

Mayors Forward

The Biodiversity Conservation Strategy is a key strategic document that outlines how Council and the broader community can improve biodiversity conservation across the Shire by developing a range of actions that address a wide range of issues impacting on biodiversity.

We live in one of most biologically diverse regions in Australia, and our Shire is known to support amongst the highest number of threatened species in the State. However, we have also inherited a landscape that has been ravaged by over-clearing and now supports the greatest diversity and density of weed invasion seen anywhere in the nation. Our remaining biodiversity is still threatened by coastal development, introduced animal and plant pests and pollution amongst other things.

Our community has a responsibility to begin to actively manage our outstanding biodiversity, to protect what remains of our natural vegetation, to rehabilitate degraded ecosystems and to re-establish vegetated corridors across the landscape to increase the viability of our remaining biota. This will take time, effort and resources but will leave a lasting legacy to future generations so that they too can appreciate the natural beauty that this Shire has to offer.

The Strategy seeks to provide educational materials, landuse planning tools and incentives to guide landowners and Council staff on what needs to be done to better manage the Shires biodiversity values. The Strategy has mapped lands of high conservation value and identified wildlife corridors in order to assist the community to access scarce government funding and to also identify lands that may require improved land use planning controls. Identified corridors on cleared lands offer opportunities for the establishment of timber plantations and reconstruction of poorly conserved vegetation communities.

Better management of our high conservation value lands will reduce the impact that weeds and other pressures currently have on our significant plant and animal communities. In order to address issues such as these Council introduced a biodiversity rate that will be used to implement key actions identified in the Strategy, including undertaking on-ground actions where they are most needed. This will include the employment of a biodiversity extension officer and a bush regeneration team. It is anticipated that these services will attract further funding to enable Council to implement more actions over a greater area.

I trust that this Strategy will be useful to the whole community to better manage our Shires wonderful natural environment and preserve it and its wonder for future generations.

Cr Jan Barham Mayor Byron Shire Council

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COVER PHOTOGRAPHY

Top: Fruit of the Red Bopple Nut *Hicksbeachia pinnatifolia* by: D.R. Milledge. Middle: Bush regeneration works by Wilsons Ck Landcare Group. Bottom: Black-necked Stork's *Ephippiorhynchus asiaticus* feeding on eels at a Myocum wetland by W. Gibney.

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THE STRUCTURE OF THE BYRON BIODIVERSITY CONSERVATION STRATEGY

The Byron Biodiversity Conservation Strategy (BCS) is a long term, on-going project that is intended to provide a range of biodiversity conservation directions, on-ground actions and funding options that will work toward improving biodiversity management and practices across the Shire. The Strategy seeks to provide a framework for the provision of educational materials, landuse planning tools and incentives to improve biodiversity conservation. It seeks to deliver these outcomes through improving our understanding of the main biodiversity issues and recommending solutions that can be implemented by landholders, Council and other stakeholders.

For ease of reading and for planning purposes the Byron Biodiversity Conservation Strategy is presented in three inter related parts. Part 1 is a matter for consideration under clause 2A of the Byron Shire Local Environment Plan (1988); Part 2 is an action plan for implementation and Part 3 is background information.

PART 1 - (PLANNING FRAMEWORK & CONTEXT)

Provides the background and context for biodiversity conservation. It outlines the main messages, aims, objectives, priorities and principles that underpin the basic requirements to ensure the survival, protection and restoration of the Shire's biodiversity. Part 1 is a matter for consideration under clause 2A of the Byron Shire Local Environment Plan (1988). Part 1 includes an explanation of what biodiversity is, identification of threats to biodiversity, and an outline of the planning and legal framework for Local Government to work within to better manage and protect biodiversity.

PART 2 - (BYRON BIODIVERSITY ACTION PLAN)

Identifies a wide range of actions intended to address the diversity of issues that impact on biodiversity. Actions cover a range of topics including education and extension; the conservation, protection and restoration of biodiversity; the identification of a range of incentives and funding opportunities to implement biodiversity conservation on the ground; and recommendations for planning controls. Part 2 is an action plan for implementation.

PART 3 - (APPENDICES AND ADDITIONAL TECHNICAL INFORMATION)

Comprises appendices, technical data and the methodology and mapping behind the identification of High Conservation Value (HCV) vegetation and habitats and Wildlife Corridors. The HCV mapping in Part 3 can only be considered indicative due to the age of the aerial photos used to map vegetation in the Shire. Updating the vegetation mapping (and identification of HCV is a very high priority action in Part 2).

Part 1

Byron Biodiversity Conservation Strategy Planning Framework & Context.

A report prepared by Byron Shire Council

September 2004



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- Middle: Wallum Sedge Frog Litoria olongburensis by H. Bower.
- Bottom: Byron Bay Dwarf Graminoid Clay Heath at Paterson's Hill Byron Bay, an endangered ecological community by D.R. Milledge.

1. MAIN MESSAGES OF THE BYRON BIODIVERSITY CONSERVATIONSTRATEGY

- Biodiversity conservation is fundamental to Ecologically Sustainable Development;
- Biodiversity is best conserved in situ, through restoring degraded areas, controlling threatening processes and by not introducing new pressures;

Effective biodiversity conservation is dependent on adequate funding, sustainable land use planning and education, with particular regard to the principle of conserving and enhancing biological diversity and ecological integrity;

- Biodiversity conservation can deliver many fringe benefits and free goods and services to the wider community;
- Biodiversity is essential to the survival of all life forms;
- Cumulative impacts, footprint effects and off-site impacts must be considered when assessing the environmental effects of an activity; and
- High Conservation Value vegetation and habitats as well as Identified Wildlife Corridors require conservation and restoration (see indicative mapping in Part 3). Development in these areas will require detailed ecological assessment.

1.1 THE AIM

The *aim* of the Strategy is to:

- Identify, protect and enhance Byron Shire's native biodiversity through accessing reliable funds to educate the community about biodiversity issues and values, and to
- Protect, restore and maintain ecosystems and ecological processes through the delivery of on-ground works and planning controls.

1.2 OBJECTIVES

The objectives of this Strategy are to:

- a) Ensure the survival and adaptive capacity of species, populations and ecological communities of plants, animals and micro-organisms native to Byron Shire;
- b) To improve the condition of ecosystems and increase the extent of native vegetation cover in the Shire through targeted ecological restoration works and development of appropriate planning controls;
- c) Identify High Conservation Value vegetation and habitats and Wildlife Corridors (including the ecosystems, habitats, species and genotypes they contain) that require protection, ecological restoration and/or threat abatement;
- d) Develop a regulatory framework for the protection and management of identified High Conservation Value vegetation and habitats and Wildlife Corridors, so as to enhance their long-term ecological viability, and encourage appropriate ecologically sustainable development;

- e) Improve the integration of biodiversity conservation and management principles with social, economic and environmental considerations in Byron Shire's land use planning decision-making processes and day-to-day operations;
- f) Ensure that biodiversity conservation, restoration and management is considered in Council decision making;
- g) Encourage and promote the importance of native biodiversity protection and restoration across the Shire, strengthening existing initiatives and developing new ones in consultation with the community, industry and relevant government agencies;
- h) Develop a greater understanding of biodiversity issues, values and solutions throughout Byron Shire, utilising existing information and networks and fostering greater links between Council, the community, industry and government agencies;
- i) Identify threatening processes and develop actions that will prevent the further degradation of biodiversity values;
- j) Identify and implement appropriate management for High Conservation Value vegetation and habitats, biodiversity hotspots, areas under threat and areas with specific biodiversity issues and values within Byron Shire;
- k) To prioritise biodiversity conservation actions on lands with the highest conservation value;
- I) Identify and access funding sources and resources for biodiversity management;
- m) Improve the valuation of goods and services provided by biodiversity to our local economy and social well-being; and
- n) To monitor the success of the Byron Biodiversity Conservation Strategy.

The Biodiversity Conservation Strategy has been developed based on three key priorities. These are (in hierarchical order) to:

- 1. Avoid losses to biodiversity;
- 2. Mitigate against adverse impacts to biodiversity; and
- 3. Compensate for unavoidable losses to biodiversity.
 - (NPWS 2001 Biodiversity Planning Guide for NSW Local Government)

1.3 KEY PRIORITIES & PRINCIPLES FOR BIODIVERSITY CONSERVATION

These key priorities provide a hierarchical decision tool for biodiversity planning and must be considered when assessing the impact of an activity.

In addition, eleven key principles have been developed to guide the development and implementation of the Biodiversity Conservation Strategy. These must be considered when assessing land use proposals and Council activities. They are interrelated and have equal importance.

- 1. Collective responsibility and human involvement the protection, maintenance and restoration of biodiversity is everybody's responsibility. At the local level effective biodiversity protection and restoration is best achieved through the development of inclusive and acceptable management options that involve cooperative partnerships between Council, landholders, the community, private industry and other relevant government agencies;
- **2.** *In-situ conservation* biodiversity is best conserved in its natural environment; at the genetic, species and ecological community levels;
- **3.** Understanding threatening processes the effective protection of biodiversity requires the identification, prevention and amelioration of threatening processes that are impacting on biodiversity;
- 4. Sustainability sound management is based on the adoption of ecologically sustainable development which recognises environmental, economic, and social values and accounts for principles such as the precautionary principle, intra and inter-generational equity, improved valuation and pricing of environmental resources;
- **5.** An open and transparent consultation process biodiversity planning and management needs to ensure there is an open and equitable process whereby the broader community and various agencies are able to have input into the planning, implementation and monitoring processes for biodiversity management;
- **6.** Improvement of knowledge and education fundamental to biodiversity conservation is the improvement of knowledge and appreciation of biodiversity through public education of biodiversity issues and values and the many benefits it provides;
- 7. Connectivity and restoration the long-term viability of biodiversity in Byron Shire depends on the identification and establishment of a system of protected wildlife corridors and 'stepping stones', that link existing habitat areas. This requires establishing corridors over extant areas of vegetation and undertaking the restoration and enhancement of degraded lands and habitats in defined corridor areas, extant habitats and in local habitat links;
- 8. Identify and protect areas of regional conservation significance areas that are identified, as being of regional conservation significance must be managed in a manner that ensures they are not compromised or degraded. Areas identified as High Conservation Value must be managed for environmental protection and enhancement;
- **9.** Foster Byron's 'green' identity biodiversity and conservation are integral components of Byron's 'clean and green' image. Sound biodiversity management will enhance the Shire's green identity, whilst maintaining its local character;
- **10. Implementing a landscape approach** central to biodiversity conservation is the conservation of biodiversity across the entire landscape matrix (including natural, agricultural and urban landscapes); and

11. The precautionary principle - lack of full knowledge should not be used as an excuse for postponing action to prevent environmental degradation. In applying the precautionary principle, public and private decisions should be guided by careful evaluation to avoid, wherever possible, serious or irreversible damage to biodiversity through an assessment of the risk-weighted consequences of various options.

The Biodiversity Planning Guide for NSW Local Government (2001) lists an additional 18 key principles for biodiversity planning (see appendices in Part 3). These are useful for identifying key elements for biodiversity planning and management.

1.4 WHAT IS BIODIVERSITY?

Biodiversity can simply be defined as 'biological diversity' or 'the variety of life'. It can also be technically defined as "the variety of all life-forms and their distribution across the landscape". It includes plants, animals and micro-organisms, the genes they contain, and the range of ecosystems they form, including terrestrial, marine and aquatic/freshwater environments (Commonwealth of Australia 1996).

There are three levels to biodiversity, being:

- Genetic diversity,
- Species diversity, and
- Ecosystem diversity.

Other important biodiversity components, which are generally less well understood, include the interactions between genes, life forms and the environment and recognition of the importance of biodiversity conservation at the landscape level.

In assessing biodiversity it is essential to account for the full range of living and non-living processes and ecosystem functions responsible for maintaining biodiversity. It is also important to understand what activities can lead to losses of essential elements within a system and thus impact on biodiversity as this knowledge can help to redress impacts before they arise. Living and non-living processes, functions and elements that affect biodiversity include (but are not limited to): geology/soils, landform, topography and landscapes, climate & rainfall, fire regimes, disturbances, complex biological relationships, invasions by exotic species and the range of pressures associated with human land use and settlement. These processes, functions and elements are not always confined to areas of native habitat. They can and do occur in the broader landscape and in many circumstances involve human related interactions.

The maintenance of biodiversity relates to the sustainable use and management of biological resources such as land, air and water, which ensure that the earth's life support systems are maintained and enhanced for today's and future generations. Examples of life support systems and essential ecological services provided by biodiversity include oxygen production, climate control, carbon sequestration, soil formation and stabilisation, water purification, pest control, disposal of wastes and nutrient cycling. These benefits form the basis for healthy, functioning ecosystems, and are essential to the maintenance of human life support systems, economics, aesthetics, culture and ethics (Curran 2000) as well as providing direct and indirect benefits to human health and well-being.

1.5 WHY CONSERVE BIODIVERSITY?

Biodiversity loss is amongst the most serious international environmental problems, and one that is accelerating at an alarming rate. Habitat modification resulting from habitat clearance and drainage of wetland systems, human disturbances associated with development, removal of understorey and logs, inappropriate burning frequencies, pressures from pest species and pollution all result in declines to biodiversity through loss of genes, species, habitats and ecosystems.

1.5.1 Values of Biodiversity

Biodiversity provides society with a wide range of ancillary benefits and 'ecosystem goods and services', of which many are difficult to value monetarily. The CSIRO has calculated that ecosystems across Australia provide goods and services that equate up to \$1,300 billion per year, which is over four times our Gross National Product (Bateson 2001). Subsequently, losses to biodiversity can directly relate to economic losses, particularly to those industries that rely on natural resources provided by biodiversity such as fisheries, forestry, agriculture and tourism. Biodiversity also provides a range of non-use values, which primarily relates to the value derived from knowing that a species simply exists, rather than a financial benefit obtained through their use.

The values that biodiversity provides to human life and well-being can be broken into three main categories, which neatly align with the three main principles of Ecologically Sustainable Development (ESD), being Environmental, Social and Economic. These values are crucial elements in achieving ESD. The following table provides some of the values that biodiversity can provide.

Environmental	Social	Economic
Habitat	Research & education	Food production
Soil formation & protection	Recreation	Medical resources
Waste & nutrient cycling	Cultural values	Timber and fibre products
Water purification	Health and well-being	Pest control
Shelter	Aesthetics	Tourism
Pest control	Climate control	Water purification
Research & education	Oxygen production	Waste & nutrient cycling
Climate control	Carbon sequestration	
Oxygen production	Food production	
Carbon sequestration	Medical resources	
	Pest control	
	Water purification	
	Waste & nutrient cycling	

Table 1: Values of biodiversity

1.6 BIODIVERSITY IN BYRON SHIRE

Conservation Significance of the Shire and Regional Context

The Byron Shire exhibits an extremely high level of biodiversity at the ecosystem, species and genetic level. North-east NSW is known to support amongst the highest number of rare or threatened plant species in Australia and is equal to the wet tropics for overall fauna species diversity (NPWS 1995). North-east NSW contains the highest diversity of marsupial, frog, snake and non-*Ctenotus* skink species in Australia and is only second to the wet tropics for birds (NPWS 1995). These values are also largely applicable to Byron Shire as it supports a wide range of the habitats present throughout the region. The *Byron Flora and Fauna Study* (1999) found that the Shire supports amongst the highest number of threatened flora and fauna species in NSW. This high number of threatened species is a reflection of the region's significance as a biodiversity hotspot and the impacts of land use practices over the past 160 years. The Shire's diversity in species and habitats has been influenced by a variety of environmental factors, such as topography, altitude, aspect, geology and climate.

The Shire is at the centre of one of the richest and most diverse regions for vertebrate fauna and vascular flora in Australia (Byron Shire Council 1999), where many species reach their southern or northern limits. Byron Shire supports various ecosystems that provide important habitats for species endemic to the region (particularly from subtropical rainforests and coastal heath growing on sand). The north coast area is recognised as being ecologically significant in that three of Australia's five biogeographic areas mingle within the region, these being: Tumbanum (subtropical), Bassian (temperate) and Torressian (tropical) (CSIRO Division of Wildlife and Ecology 1996). Byron Shire supports components of all three of these biogeographical areas, as well as a narrow section of coastal plain that supports areas of a smaller biogeographical region known as the Wallum (Byron Shire Council 1999). Wallum is characterised by heath growing on coastal sand masses.

Byron Shire supports a diverse range of habitats and ecological attributes that are important to the conservation of biodiversity and threatened species. These include (but are not limited to):

- Old growth forests
- Rainforest
- Heath
- Wet & dry sclerophyll forests
- Paperbark swamp
- Sedgelands
- Swamp sclerophyll forest
- Rocky outcrops and cliff lines
- Fleshy fruited plants
- Shelter from elements & predators
- Shorebird roost, feeding and nesting sites

- Mangrove swamps
- Aquatic ecosystems
- Marine ecosystems
- Flying-fox camps
- Dune complex
- Riparian forests
- Wetlands and saltmarsh
- Vegetated Wildlife corridors
- Nectar producing plants
- Endangered Ecological Communities
- Leaf litter, standing dead trees, hollows, fallen logs, decorticating bark

Large-scale habitat modifications and other human induced impacts (both direct and indirect) that have already occurred across Byron Shire have severely depleted certain ecosystems (and many species reliant upon them) and their natural landscape context. This is particularly the case on the more fertile and flat lands. In certain circumstances this has resulted in the loss of essential ecosystem processes or the localised extinction of certain species, populations or ecological communities, including those that may be crucial for maintaining important ecosystem functions or symbiotic relationships. Small and fragmented remnants are still subject to species declines from a range of factors including

weed invasion, predation and edge effects. As a consequence many ecosystems have been afforded higher conservation value due to the level of threat still exerted on them. This means that what is remaining requires better management.

Consequently, today's generation is charged with not only conserving what biodiversity remains but also in restoring where possible those processes and functions that are essential for the continued maintenance and existence of ecosystems and life support mechanisms, and the many benefits they provide. In order to effectively restore ecosystem processes and functions we need to identify the compounding threats that directly affect an ecosystem, species or genotype or patch of habitat and work toward ameliorating against these threatening processes.

1.7 THREATS TO LOCAL BIODIVERSITY

Environmental changes resulting from human activities are significantly influencing biodiversity conservation across the world (NPWS 1999). Within Byron Shire the impact of environmental changes and imposition of various threatening processes following European settlement (and associated patterns of resource use and settlement) has led to a continual and cumulative decline in biodiversity, causing many species to become threatened and several to become locally extinct (threatened species from Byron Shire are listed in Part 3). This has been amplified due to the Shire being in an area that has been subjected to over a century of habitat modification. The full impact this has had on the biodiversity of Byron Shire is not fully known but is generally accepted to be significant, considering the degree of vegetation removal and modification.

Biodiversity can be subjected to a range of threats. Major activities and impacts that can lead to losses in biodiversity include:

- Clearing and fragmentation of native vegetation;
- Residential and industrial development;
- Land filling, drainage and other earthworks;
- Inappropriate fire management;
- Stock grazing pressures;
- Pollution and contamination;
- Alteration to hydrological systems, increased nutrients, salinity and acid sulphate soils;
- Climate change and global warming;
- Roads and traffic, and transport infrastructure;
- Soil erosion, sedimentation and compaction;
- Waste disposal and rubbish dumping;
- Introduction of exotic and invasive non-native plants and animals;
- · Loss of, or disturbance to important habitat features; and
- Recreational pressures. (adapted from NPWS 2001)

Overall, threatening processes have the potential to affect a diversity of species and ecosystems, some of which are rare, threatened or inadequately conserved. Chapter 7 of the *Byron Flora and Fauna Study* (1999) describes threats to the Shire's flora and fauna as – vegetation clearance, vegetation connectivity and fragmentation, environmental weeds, fire, grazing, predation by introduced animals and development. Threats to Byron's biodiversity are also discussed in State Of the Environment (SOE) reports in chapters regarding 'pressures'. Additional information regarding threats to biodiversity is contained in Part Two – Byron Biodiversity Action Plan.

The NSW Threatened Species Conservation Act 1995 lists Key Threatening Processes (as accepted by an appointed scientific committee) in Schedule 3 of the Act. In addition to listed Key Threatening Processes there are many other (non-listed) threatening processes that are known to adversely impact on biodiversity. The main threatening processes affecting biodiversity in Australia and also Byron Shire include:

- Loss of habitat and essential ecological functions resulting from habitat fragmentation, modification and disturbance (including human habitation, recreation and altered fire regimes);
- The introduction and establishment of exotic species;
- Loss of local genetic vigour for certain species;
- Direct exploitation; and
- Impacts associated with pollution (of air, land and water) (Curran 2000).

1.7.1 Threats associated with vegetation loss and habitat fragmentation

Ecosystems throughout the Shire have been significantly degraded and fragmented, mainly due to historical clearing (and draining) for agriculture, but also due to pressures from urban development, mining, forestry, exotic pests, continued disturbances and pollution. The degree of threat imposed upon the Shire's ecosystems is generally greatest in the most densely settled areas, in areas managed for intensive agriculture and for those habitats that have become isolated and fragmented from intact vegetation. The degree to which land clearing and urban development has impacted on native ecosystems is not always fully appreciated. The *Byron Flora and Fauna Study* (1999) found that previous land clearing and habitat modification has drastically reduced the area of native vegetation (and available habitat) through the Shire, primarily in the most fertile and accessible lands. These areas are also amongst the most productive areas in terms of biodiversity production and are in many instances the most disturbed areas (and weed impacted).

Much of the vegetation remaining within the Shire consists of disturbed and fragmented remnant or secondary regrowth vegetation. Some areas in the landscape have had over 70% of the native vegetation cover removed (eg. the Big Scrub, lowland rainforest in the Brunswick Valley and littoral rainforest). This has resulted in a significant loss to biodiversity as shown in figure 1. Highly fragmented areas that remain are termed 'relictual' landscapes and are in need of considerable repair to restore essential ecosystem functions and processes. The Byron hinterland supports between 50 - 70% native vegetation cover at the landscape scale. These areas are termed fragmented to variegated landscapes, and are typically more resilient, self-sustaining and able to support greater biodiversity than relictual landscapes. Fragmented to variegated areas need to be retained and actively managed to assist in the repair of functional ecosystems at the landscape scale as they form the building blocks for ecosystem repair into more degraded areas.

Figure 1. Diagrammatic representation of Biodiversity Loss in Relation to Habitat Loss (adapted from Smith and Sivertsen - 2001)



Figure 1: Biodiversity Loss in Relation to Habitat Loss

Important habitats continue to be adversely impacted by clearing, exotic species, human settlement, development and associated activities. This is particularly relevant where human activities impose off site impacts (or 'footprint effects') on surrounding habitats. Footprint effects are disturbances or impacts, which render seemingly suitable habitat unsuitable for certain species and affect biodiversity by reducing the area of habitat available or degrading its quality for a wide range of species. This is particularly relevant for shy, cryptic and habitat specialist species, many of which are threatened. Footprints are of particular concern in areas where development occurs in or adjacent to existing habitats and when considered in relation to the cumulative impact of such developments across the region.

Despite the degree of habitat loss, modification and fragmentation, remaining habitats in Byron Shire tend to be of high ecological significance as they support a range of important ecological values. Further degradation of the Shire's ecosystems should be curtailed to ensure there is no further loss of biodiversity. This is best achieved through:

- The protection of remaining habitats;
- Reducing or ameliorating against threatening processes;
- Restoring degraded habitats (including linking isolated or fragmented habitats with wildlife corridors [where possible]); and
- Compensating for unavoidable losses to biodiversity.

1.8 PLANNING AND LEGISLATIVE FRAMEWORK (LOCAL GOVERNMENT LEGISLATIVE RESPONSIBILITIES FOR CONSERVATION OF BIODIVERSITY)

The role of local government in conserving biodiversity has been outlined in the Biodiversity Planning Guide for NSW Local Government (NPWS 2001), as follows:

"the role of local government in biodiversity conservation is recognised in the Local Government Act 1993 (LG Act) and the Environmental Planning and Assessment Act 1979 (EP&A Act). It is also referred to in the National Local Government Biodiversity Strategy adopted in 1998. More generally, this role is a consequence of the direct and long-term influences on biodiversity by land development processes, which are substantially regulated and guided by local government.

Local councils have been required to consider biodiversity issues since at least the commencement of the EP&A Act (in 1980). Since that time, the legislation requirements have become more specific as a result of growing community concerns regarding threatened species and other issues. Under section 8 of the LG Act, it is part of each Council's charter to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible. This charter is reinforced by the objects of the EP&A Act, including:

- To encourage the proper management, development and conservation of natural and manmade resources.
- To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.

Local government has an important positive (non-regulatory) role in biodiversity conservation. For example, councils play a significant role in traditional functions such as maintaining reserves and road works. They are also able to offer incentives and other supporting mechanisms that may promote biodiversity conservation objectives. Perhaps most importantly, councils play a key role in setting the framework for the future pattern of development.

Achieving prevention rather than mitigation of adverse impacts is an important challenge for biodiversity conservation planning. Loss of biodiversity and land degradation usually reflect a failure of land use planning instruments to adequately consider biodiversity values, and at a more localised level, may also reflect poor assessment of the impacts of development". Councils can support retention of biodiversity through the planning and development consent process by reflecting biodiversity values in local planning instruments. At the development application level, councils can undertake thorough environment impact assessment, and require appropriate ongoing management of sites for which development has been approved.

Under the EP&A Act (together with associated provisions in the Threatened Species Conservation Act 1995 [TSC Act] and part 7A of the Fisheries Management Act 1994 [FM Act], local councils hold the primary responsibility for assessment of development proposals likely to affect threatened species, populations and ecological communities. By comparison, specialist agencies such as the National Parks and Wildlife Service generally play only an advisory role, except in the case of development that will have a significant effect on threatened species (and which requires a species impact statement [SIS]). In such cases, concurrence of the Director-General of National Parks and Wildlife Service is required.

It is also important to recognise that many biodiversity conservation issues extend beyond council boundaries. There are opportunities for regional co-operation between councils and with other agencies and non-government organizations".

From the above excerpt and the information available relevant to biodiversity conservation planning it is apparent that Council has a legal and moral obligation to conserve and appropriately manage biodiversity. The following section identifies the relevant State, regional and local instruments that will assist Council to manage and protect biodiversity in the Byron LGA. Enhancement of these instruments is one of the main recommendations of this Strategy. The following documents will form the "planning framework" for the BCS.

The main statutory documents relevant to the BCS are:

- Local Government Act, 1993 (NSW) (LGA);
- Environmental Planning and Assessment Act, 1979 (NSW) (EP& A Act);
- Threatened Species Conservation Act, 1995 (NSW) (TSC Act);
- > Environment Protection and Biodiversity Conservation Act, 1999 (Cth) (EPBC Act);
- Native Vegetation Conservation Act, 2003 (NSW) (NVC Act);
- National Parks & Wildlife Act, 1974 (NSW) (NP&W Act);
- Fisheries Management Act, 1994; (NSW) (FM Act),
- State Environmental Planning Policies, particularly SEPP No. 14 Coastal Wetlands Protection, SEPP No. 26 Littoral Rainforest & SEPP No. 44 Koala Habitat Protection;
- Byron Local Environmental Plan, 1988 (LEP);
- North Coast Regional Environmental Plan, (REP);
- Byron Tree Preservation Order;
- Byron Shire Development Control Plan (DCP) 2002;
- Byron Shire DCP 16.

The main strategic and resources documents relevant to the BCS are:

- Byron Flora and Fauna Study (1999);
- > Northern Rivers Catchment Management Blueprint (2003);
- NSW Biodiversity Strategy (1999);
- NSW Coastal Policy (1997);
- Biodiversity Planning Guide for NSW Local Government (NPWS 2001)
- > Environment Australia's Biodiversity Toolbox (2002).

1.9 INTERNATIONAL, NATIONAL AND LOCAL INITIATIVES TO CONSERVE BIODIVERSITY

International concerns relating to biodiversity loss led to the signing of a number of direction setting documents by more than 178 governments, including Australia at the United Nations Conference on Environment and Development held in Brazil in June 1992. These documents included the Rio Declaration, Agenda 21 and the Convention on Biological Diversity. Agenda 21 had the most impact as a program of action for sustainable development worldwide. It highlighted the pressures on the natural environment from population growth and associated poverty in the developing world, and unsustainable patterns of consumption in the industrial world.

To address the issue of biodiversity loss in Australia, the Commonwealth and States signed the National Strategy for the Conservation of Australia's Biological Diversity. The goal is to protect biodiversity and maintain ecological processes and systems. The long-term survival of the full range of biodiversity will ensure a healthy environment and produce significant benefits in science, agriculture, tourism and medicine. The National Strategy acknowledges that biodiversity conservation is not just about protecting nature from impacts but is the foundation of Ecologically Sustainable Development (ESD). Objective 7.3 of the National Biodiversity Strategy identifies that the document be complemented by State and Territory and bioregional strategies, which should be supported by effective legislation where necessary.

The NSW Biodiversity Strategy confirms a commitment to support the National Strategy. It states as priority action No. 56, that Councils will prepare biodiversity action plans. The goal of the NSW Biodiversity Strategy is to protect the native biological diversity of NSW and maintain ecological processes and systems. The primary objectives listed in the NSW Biodiversity Strategy for the Conservation and Protection of Biodiversity are to:

- Implement bio-regional assessment and planning throughout NSW;
- Establish a Comprehensive, Adequate and Representative (CAR) reserve system;
- Effectively manage protected areas;
- Implement mechanisms for the identification, recovery and rehabilitation of threatened species, populations and ecological communities; and
- Support ex-situ conservation.

The impetus for the NSW Biodiversity Strategy is the legislative requirements of the *NSW Threatened Species Conservation Act 1995* (TSC Act) which came into effect on 1 January 1996.

The Byron Local Environmental Plan 1988 specifically lists in clause 2A, the Byron Biodiversity Conservation Strategy (BCS) as a strategy that will implement the aims, objectives and guiding principles of the *Byron Local Environment Plan* (LEP) *1988: A Green print for a Sustainable Future.* The BCS provides a planning framework in which Byron Shire Council will be able to improve its commitment to achieving ecologically sustainable development. In particular, the BCS aims to implement guiding principle c) of the Byron LEP, which concerns the conservation of biological diversity and ecological integrity. This principle aims to protect, restore and conserve native biological diversity and enhance or repair ecological processes and systems.

The BCS fulfils various priority actions from the NSW Coastal Policy 1997 and the NSW Biodiversity Strategy that are fundamental to the protection and restoration of Byron Shire's rich biodiversity. The BCS is consistent with the Shire's *Green print for a Sustainable Future* and adds to the findings of the *Byron Flora and Fauna Study (1999)*.

The BCS will work toward preparing and integrating other planning initiatives that relate to biodiversity management in the Shire. This primarily relates to the various complementary plans, strategies and programs being developed (or to be developed) by Byron Shire Council as part of the *Byron Local Environment Plan (1988): A Green print for a Sustainable Future*, as well as the production of a new Shire-wide LEP.

The following table provides a brief overview of relevant planning and policy linkages to the development of the Byron Biodiversity Conservation Strategy.

Planning/Policy	Locality	Purpose
Instrument		
National Biodiversity Strategy	Australia	Sets the national framework for biodiversity conservation. Objective 7.3 states that the National Strategy requires complementing by State and Territory and bio-regional strategies, which should be supported by effective legislation where necessary.
Environment Australia's Biodiversity Toolbox	Australia	Provides benchmarks for local government biodiversity conservation strategies. Provides case studies and further information for councils.
NSW Biodiversity Strategy	NSW	Outlines the state framework for biodiversity conservation. States as priority action No. 56 that Councils will prepare biodiversity action plans.
Native Vegetation Conservation Act 2003	NSW	Provides legislative controls, planning tools and incentives for the conservation of native vegetation.
NSW Threatened Species Conservation Act 1995	NSW	Provides legislative controls and planning tools for the conservation of threatened species, endangered ecological communities, endangered populations and key threatening processes.
Conveyancing Act 1919 (section 87A)	NSW	Provides opportunities for biodiversity conservation via covenants with public positive benefits.
Noxious Weeds Act 1993	NSW	Provides for the identification, classification and control of noxious weeds.
Rural Fires Act 1997	NSW	Concerned with bush fire hazard reduction and the preparation of bush fire management plans.
Roads Act 1993	NSW	Local government has approval and management responsibilities under this Act, which can be used to influence biodiversity conservation objectives.
Protection of the Environment Operations Act 1997	NSW	Environmental protection legislation relevant to polluting activities that may impact on biodiversity.
Contaminated Land Management Act 1997	NSW	Environmental protection legislation relevant to polluting activities that may impact on biodiversity.
Rivers and Foreshores Improvement Act 1948	NSW	Regulates soil erosion and excavation, filling and other works in or near rivers, lakes and estuaries. Administered by DIPNR.
Soil Conservation Act 1938	NSW	Regulates soil erosion and excavation, filling and other works in or near rivers, lakes and estuaries. Administered by DIPNR.
Plantations and Reafforestation Act - Code of Practice 1999	NSW	Regulates the establishment, management and operation of plantations (both commercial timber plantations and environmental plantings). It repeals the Timber Plantations

Table 2: Relevant Planning and Policy Linkages to the Byron Biodiversity Conservation Strategy

		 (Harvest Guarantee) Act 1995. The Act provides for three tiers of plantation operations: ▶ 1) Exempt farm forestry (< 30 ha) ▶ 2) Complying plantation (complies with code) ▶ 3) Non-complying plantations (doesn't comply with code)
Companion Animals Act 1998	NSW	Provides opportunities for local government to impose restrictions on the keeping of dogs, cats or other pets in new urban areas adjacent to bushland.
Community Land Management Act (Community Title)	NSW	Provides advice re vegetation management, control of cats & dogs – land management generally, community ownership/management of land
State Environmental Planning Policy No. 14 – Coastal Wetland Protection	NSW	Provides legislative controls for the protection of coastal wetlands
State Environmental Planning Policy No. 26 – Littoral Rainforest	NSW	Provides legislative controls for the protection of littoral rainforest
State Environmental Planning Policy No. 44 – Koala Habitat Protection	NSW	Provides legislative controls for the protection of Koala habitat. Aims to encourage conservation and management of habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline by encouraging the identification of areas of core koala habitat and the inclusion of areas of core koala habitat in environmental protection zones as well as the need for the preparation of a Koala Plan of Management.
State Environmental Planning Policy No. 71 – Coastal Protection	NSW	Provides legislative controls for the protection of the coastal zone
NSW Coastal Policy 1997	NSW	Provides a commitment from government to manage the coast in an ecologically sustainable way. In particular to: identify coastal lands and aquatic environments with conservation values and devise and implement management strategies and controls to ensure that those values are protected.
Planning for Bushfire Protection 2001	NSW	Provides effective bushfire protection strategies for local government planners, decision makers, the building industry and the public
Integrated Catchment Management Plan for the Northern Rivers Catchment 2002	Northern Rivers	Sets regional objectives and targets for the conservation of lands of high conservation value.
North Coast Regional Environmental Plan 1988	NSW North Coast	Provides the broad planning framework for economic development and environmental protection in the North Coast Region.
NSW North Coast Draft Weeds Strategy	NSW North Coast	Aims to improve coordination between stakeholders involved in weed control. Identifies and recommends actions to improve weed management within the region. Raises awareness of weed issues within the region.
Northern Rivers Regional Strategy	Northern Rivers Region	Outlines a regional approach to achieving ecologically sustainable development

Byron Local Environmental Plan 1988 (Amendment No. 58):	Byron Shire	Provides the planning framework for economic development and environmental protection in the Byron Local Government Area. Indicates that Council shall have regard for information, guidelines and recommendations in up to fifteen strategies, policies or reports adopted by Council, including the Biodiversity Conservation Strategy. Includes the principle of conserving biological diversity and ecological integrity. This principle aims to protect, restore and conserve the native biological diversity and enhance or repair ecological processes and systems.
Byron Tree Preservation Order	Byron Shire	Provides a legislative control mechanism for the protection of trees within Byron Shire. This order restricts the cutting down, lopping, topping or wilful destruction of any species of tree, palm or fern exceeding three metres in height, except with the written consent of Council, but does provide for sensible exemptions.
Byron Rural Settlement Strategy	Byron Shire	Provides a strategy for settlement in rural areas of Byron Shire while ensuring protection of agricultural lands, ecological restoration and ecological sustainability
Byron Development Control Plans (DCPs)	Byron Shire	Provides the planning framework for the control of development in the Byron Local Government Area. Specify development and management guidelines to be considered in the assessment and determination of development applications.
Byron Flora and Fauna Study 1999	Byron Shire	Provides detailed ecological information to help deliver ecologically sustainable land use planning and decision making.
State of the Environment Report	Byron Shire	Annual requirement to assess human pressure on the environment, the condition of the environment and responses to ameliorate impacts. Useful tool, possible to incorporate indicators that monitor biodiversity conservation actions and targets.
Council's Management Plan	Byron Shire	Lists key aims and objectives and sets out performance criteria for Councils daily management, including those relating to biodiversity
Council Plans of Management for Council owned lands	Byron Shire	Used to describe specific site management requirements.
Council's Policy and Procedures Manuals	Byron Shire	Provides guidelines for Council relating to a wide range of issues
Byron Biodiversity Action Plan	Byron Shire	Outlines key actions required to conserve the Shires' biodiversity

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Part 2

Byron Biodiversity Action Plan 2004



A report prepared by Byron Shire Council

September 2004



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Cover Photography

Top Main: Dune Restoration by Greencorps at Main Beach, Byron Bay, By B. Smeuninx. Top Right: Bitou Bush *Chrysanthmoides monilifera* subsp. *Rotundata*, a serious coastal weed by J. Thomas. Middle: Ground Asparagus *Asparagus densiflours*, a serious coastal weed by T. Scanlon. Middle Right: Glory Lily *Glorisosa superba*, a serious coastal weed by T. Scanlon. Bottom Right: Educational sign alerting beach goers of community efforts to recover the Belongil shorebird breeding site by T. Griffin. Bottom Left: Beach Thick-Knee, *Esacus neglectus* by D.R. Milledge.

1. THE ACTION PLAN

The Byron Biodiversity Action Plan (BBAP) directs how Council will implement strategies and actions for biodiversity conservation and management. It provides the implementation schedule for the Biodiversity Conservation Strategy by providing a range of actions that will work toward addressing many of the issues impacting on the Shires biodiversity. The Action Plan is divided into broad issues for which background information is provided followed by key outcomes and a list of actions that will help to address the issues. The actions are listed after each broad issue but have also been collated into an action table. The action table identifies time frames, resources required, how Council should implement the action, estimated costs, priority and links to other broad issues or actions. Links to other broad issues have been categorised according to the main headings of the Action Plan but also indicate a category identifying whether the action is primarily related to onground implementation. The categories of broad issues are:

- \succ Ed = Education & extension;
- \blacktriangleright Re = Restoration;
- Org = Organisation & Management;
- PI = Planning & Development Control;
- \succ Fu = Funding;
- Imp = on-ground Implementation.

2. COMMUNITY INVOLVEMENT AND EDUCATION

The delivery of biodiversity conservation actions is best achieved through the support and involvement of the community. Harnessing community support and involvement requires the delivery of education, training, and incentives, which improve the community's knowledge of relevant issues and empowers them to deliver outcomes. Relevant training and education opportunities need to be tailored to target the community and meet the needs of Council staff.

For this reason it is proposed to deliver education and training in two streams:

- through educational materials; and
- the delivery of **extension** advice.

These two streams can then be targeted toward key user groups such as (but not limited to):

- the broader community;
- schools and educational institutions;
- landholders and community groups; and
- council staff and contractors.

2.1 EDUCATION

The most effective education projects are quite often those that are driven and implemented by the community. With this is mind a set of steps have been outlined to assist in the development of a biodiversity orientated education program:

- Analyse the issues and solutions that impact on biodiversity;
- Undertake market research on key target groups and their education needs (e.g. existing knowledge base, attitudes, needs and behaviour);
- Involve community and relevant government agencies in the development of biodiversity related educational materials;
- Develop education packages targeted toward each target group;
- Develop project time-line and schedule of works;
- Develop clear objectives and outcomes that are realistic and achievable;
- Design the best method to achieve goals considering time and budget;
- Prepare (or adopt existing) education programs and implement them; and
- Monitor and evaluate during and at the end of the project.

The development of an education program needs to be staged to make it manageable and achievable. It is envisaged that a staged education program would:

- Develop a project brief for biodiversity;
- Conduct market research;
- Raise awareness about the education programs; and then
- Deliver education packages as separate components (to each target user group).

Particular areas for targeted education include the recognition of biodiversity values, threatened species and habitat management, and weed control and bush regeneration.

The establishment of an intranet site that allows community access to various biodiversity related Geographic Information System (GIS) mapping products (e.g. vegetation mapping, threatened species mapping, ecological ranking, and wildlife corridors) will be an effective tool for delivering education and training.

2.2 EXTENSION

The delivery of targeted on-ground biodiversity extension will provide on-ground education and training and promote community involvement. It is therefore proposed to establish a Council based biodiversity extension service to assist landowners prepare Biodiversity/Property Management Plans and deliver biodiversity related training and education. Such a service should provide for:

- Property based biodiversity assessments;
- Advice on threatened species management;
- Advice on weed management, bush regeneration, revegetation and animal pest control;
- Property planning advice;
- Advice on all forms of assistance available to landowners to manage biodiversity values;
- Vegetation and other constraint mapping; and
- Provision of available data and assistance in the preparation of Property Management Plans.

The position of the 'biodiversity extension officer/s' will also be available to assist Landcare (and similar community groups) and Council staff undertaking a range of restoration and management works.

Key Outcomes

- Education and extension will be delivered to Council staff and the community.
- Increased involvement in biodiversity projects.
- Improved understanding of the biodiversity issues impacting the Shire
- Implementation of priority biodiversity actions.

Actions

- 1) Market research into current community knowledge, needs, beliefs and attitudes toward biodiversity;
- Establish an Internet site for biodiversity related GIS products (in PDF format) eg. vegetation mapping, threatened species mapping, ecological ranking, wildlife corridors, etc;
- 3) Establish a biodiversity extension service to offer (but not limited to):
 - Property based biodiversity assessments;
 - Advice on threatened species management and provision of background information;
 - Advice on weed management, bush regeneration, revegetation and animal pest control;
 - Property planning advice;
 - Provision of available data and assistance in the preparation of Property Management Plans;
 - Advice on all forms of assistance available to landowners to manage biodiversity values;
- Vegetation and other constraint mapping; and
- Employ a 'biodiversity dedicated' education officer to deliver an education program including, but not limited, to the following
- Provide information to the community on the benefits of conserving biodiversity and how groups and individuals can conserve, survey, monitor and sustainably utilise biodiversity in their own area. Develop educational materials on best practice guidelines for weed identification; management and control; fire management; establishing farm forestry plantations; habitats; environmental restoration and threatened species.
- Offer training workshops on environmental repair and enhancement and biodiversity management to encourage greater community involvement in restoration actions on Council land.
- Develop education and training program with a focus toward developing community partnerships (mentors).

3. NATURAL RESOURCE MANAGEMENT AND RESTORATION

Biodiversity is an essential component of Natural Resource Management (NRM). As such, effective biodiversity management is dependant on a balanced assessment of NRM This section outlines a range of issues impacting on biodiversity and recommends ameliorative actions. It is broken into broad headings based on key issues.

3.1 RETAINING, MANAGING AND RESTORING ECOSYSTEMS

The conservation and protection of biodiversity relies on the fundamental principle of retaining, maintaining and/or restoring ecosystem processes and functions (Bennett 1998). This is applicable at both the local and landscape levels. From an ecological and economic perspective it is preferable to prevent biodiversity decline rather than ameliorate against adverse impacts after degradation has occurred. This is fundamental to the practice of the precautionary principle. The effective implementation of on-ground biodiversity conservation actions also relies on the delivery of a mixture of planning controls, incentives, and educational materials and on ground extension.

In understanding the importance of conserving and restoring functional ecosystems it should be noted that productive agricultural landscapes and sustainable development are highly reliant on the goods and services provided by the complexities of functioning ecosystems (Lefroy and Hobbs 1992). Additionally, the costs of repairing degraded ecosystems are significant. Therefore, preventing degradation will reduce costs to future generations for undertaking rehabilitation works. It therefore makes common and ethical sense to ensure there is an appropriate level of investment in biodiversity, even in highly fragmented landscapes that are dominated by agriculture, urbanisation or weeded ecosystems.

In many instances, existing land use planning controls do not accurately reflect the true environmental values and ecological constraints of a site. This Strategy has identified significant areas of High Conservation Value (HCV) vegetation/habitat, wildlife corridors and areas to be targeted for environmental repair and enhancement and which are not necessarily currently afforded environmental protection controls.

3.1.1 No Net Vegetation Loss

In order to promote the retention, management and restoration of ecosystems, development of a no net vegetation loss policy has been identified as a priority biodiversity action. This should aim for a net gain of vegetation cover across the Shire to compensate for the 70% of native vegetation removed since European settlement. To offset losses to native vegetation cover through approved clearing, compensation through regeneration and revegetation of locally occurring plant communities is recommended. To monitor the effectiveness of the policy Council will need to assess the extent of vegetation when undertaking comprehensive State Of the Environment reporting (every 4 years).

3.1.2 Habitat Hollows

Old growth forests provide critical roost and nesting habitat for hollow dependant fauna. Hollows are a depleted resource throughout the Shire due to large-scale vegetation clearance and logging (*Byron Flora and Fauna Study* 1999). Hollows usually take over one hundred years to form and will therefore continue to be a scarce habitat resource until regrowth forests adequately mature. It is therefore important to retain and protect old growth and mature forest as well as individual hollow bearing trees. Hollow dependant fauna will utilise constructed boxes where there are limited hollows available. It is therefore possible to commence restoring roosting and breeding habitat for hollow dependant fauna in forests with little or no hollow habitat present. This will need to continue until such a time as a forest has adequately matured to the extent that it commences to produce hollows. Production and provision of information related to the construction of nest/roost boxes, has been identified as a biodiversity action.

3.1.3 Promoting revegetation within identified 'secondary' wildlife corridors.

The BCS lists connectivity and restoration as a key principle for biodiversity conservation. Habitat fragmentation has serious long-term impacts to biodiversity (see section 1.8 of Part 1) and with up to 70% of the Shires vegetation already been cleared there is a clear need to encourage the restoration of wildlife corridors through focussing revegetation efforts to cleared lands within identified wildlife corridors and to maintain and restore the highest conservation value remnants. This would best be achieved through the delivery of incentives and education. Various incentives are outlined in section 5.2 and education is outlined in section 2. Farm forestry and bush tucker plantations offer a significant incentive to plant cleared land through the provision of an economic return and potential tax breaks. Farm forestry also offers potential economic and skills development in a region with high unemployment and high land prices. Council also needs to make sure the development of planning controls for secondary wildlife corridors does not create disincentives for the establishment of vegetation (including farm forestry plantations) within identified wildlife corridors. However, these planning controls should also ensure adequate environmental protection of ecological assets.

Revegetation of cleared lands within identified wildlife corridors will provide a range of habitat resources and assist species to move across a landscape through increasing vegetation cover, which in turn reduces the distance between isolated patches of habitat. Revegetation can also help to create stepping stone habitats (stop over patches between larger patches). This is especially the case where the revegetation works aim to reconstruct the original vegetation type and structure. However, revegetation works aimed at establishing farm forestry plantations, bush tucker plantations or orchards can also provide many benefits for wildlife corridors. Even stands of camphor laurel are able to play an important role in providing wildlife corridors. Ideally stands of camphor laurel should be incrementally replaced with native species, in a manner that promotes regeneration and maintains habitat features. Benefits derived from revegetation can be variable and are largely dependant on management regimes, landscape context and species used in revegetation works.

Species selection for revegetation within identified secondary wildlife corridors would ideally be based on species native to the local soil type, known to occur naturally in the local landscape and would include a similar structure and diversity to local remnant vegetation. However, revegetation for farm forestry purposes is often not solely interested in the establishment of native ecosystems and as a result species selection is primarily based on timber qualities. Ideally, these plantings would not include species known to cause weed problems or impose a fire risk to an adjacent fire intolerant vegetation community.

3.1.4 Ecological Restoration

A range of land uses has degraded ecosystems and left many habitats in the Shire at threat from impacts associated with isolation and fragmentation; weed and pest invasions; adverse adjacent land uses; altered nutrient and hydraulic cycles; inappropriate fire regimes; loss of species and subsequent losses of symbiotic relationships. Targeted onground ecological restoration actions are required to reverse these impacts (refer to glossary for definition of ecological restoration).

Ecological restoration actions will promote the recovery of ecologically sustainable landscapes and healthy rivers, that, will in turn benefit commercial land uses, rural industries and recreational activities by buffering our natural assets against adverse impacts. Environmental repair and enhancement actions will also serve to restore wildlife habitats and corridors, improve aesthetic qualities and provide employment opportunities for the local community.

Considering the extent of ecosystem decline at the landscape level in Byron Shire it is imperative that all remaining components of native ecosystems are managed for their conservation values and where possible restored toward self-sustaining ecosystems. This would best be achieved through establishing a network of landscape scale wildlife corridors, removal of barriers to movement and undertaking targeted environmental repair and enhancement and 'active management' (*Figure 1 identifies target areas for environmental repair and enhancement. Figure 3 provides a description on the identification of wildlife corridors*). The extent to which Council can implement restoration actions is largely dependent on the availability of resources.

Figure 1: Identifying target areas for environmental repair and enhancement

Environmental Repair and Enhancement

Council has identified target areas for undertaking landscape scale environmental repair and enhancement works (see HCV vegetation and habitats, and Wildlife corridor mapping in Part 3 - Appendices and Technical Information). The identification of HCV and Wildlife corridors does not reduce the importance of restoring 'non identified or degraded areas' elsewhere in the Shire, it simply identifies where Council would allocate scarce resources should they become available.

Target areas for implementing environmental repair and enhancement are those lands that have been identified as:

- wildlife corridors (including identified reparian corridors); and
- high conservation value vegetation and habitats.

The Rural Land Release Program of the *Byron Rural Settlement Strategy* (1998) also identifies areas for environmental repair and enhancement. The Biodiversity Conservation Strategy has not accounted for these areas.

Targeted environmental repair and enhancement actions will be prioritised toward the most ecologically valuable sites (including resilient ecosystems and ecosystems at threat), identified wildlife corridors, sites with isolated infestations of serious weeds and sites with strong community capacity for long term outcomes. This will allow for undertaking restoration actions across a wide range of sites across the Shire, including the targeted reforestation of wildlife corridors.

3.1.5 Implementing restoration activities

There are significant opportunities for Council to initiate ecological restoration actions on private and Council owned and managed lands across the Shire. There are also opportunities for Council to forge links with existing programs that deliver biodiversity conservation outcomes. These include Voluntary Conservation Agreements (VCAs) (negotiated between landholders and the NSW Minister for the Environment), Property Agreements (negotiated between landholders and the DIPNR), Land for Wildlife Program (administered by DEC) and various Non Government Organisations that undertake biodiversity conservation actions on private lands (this includes Landcare).

The main ecological restoration issues that require addressing across the Shire include:

- Education and extension (community capacity building);
- Bush regeneration;
- > The control and management of environmental weeds and introduced pests;
- Establishing protected wildlife corridors;
- Revegetation of wildlife corridors and other cleared lands;
- Removal of fish barriers;
- Managing access of livestock to high conservation value habitats;
- Habitat and threatened species management;
- > The preparation of Bush Regeneration Work Schedules (ie site work plans);
- > The collection of baseline information via site assessments; and
- > Monitoring.

The necessity for on-ground actions will vary according to site circumstances, with some requiring little or no restoration effort whilst others will require a combination of the above actions. Specific restoration projects sought through this Action Plan are outlined in Table 1.
Table 1: Restoration	projects	s sought thr	ough the BCS.
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Project description and tasks	Details
 Employ Biodiversity Conservation Officer (ecological management) project manage implementation of the Biodiversity Conservation Strategy project manage updating of vegetation mapping oversee extension service, bush regeneration team and contracts relevant to biodiversity conservation (eg development of best practise guidelines) high level local ecological knowledge (flora/fauna/restoration) facilitate biodiversity/conservation agreements oversee the preparation of Biodiversity Management Plans assist in fire management issues oversee preparation of Bush Regeneration Work Schedules provide ecological advice to Council prepare reports to Council 	This position is crucial for the sound management and implementation of the Biodiversity Conservation Strategy. This position will oversee the extension service and bush regeneration team as well as be responsible for the development of management guidelines for threatened species, environmental weeds/bush regeneration, biodiversity assessment and reporting guidelines for development applications and project manage upgrading of the Shires vegetation mapping. This position will also deal with bushfire management issues, oversee the development of vegetation management plans for Council owned and managed lands as well as apply for funding. This position is essentially the project manager for the delivery of the Strategy.
 Establish Biodiversity Extension Service high level local ecological knowledge (flora/fauna/restoration) deliver education, extension and training facilitate biodiversity/conservation agreements and actions assist in the preparation of Biodiversity Management Plans (BMP's) oversee preparation of a template BMP(BMPs will include, but not be limited to, information regarding: threatened species; habitat values; weed and pest animals; weed control/bush regeneration; vegetation and weed description; restoration actions required; estimate costs; notable constraints) assist in the preparation of a template Bush Regeneration Work Schedule as part of BMP prepare funding applications conduct site assessments for all Council owned & managed lands conduct habitat & threatened species assessments 	 This service is crucial for sound delivery of on ground actions and provision of expert extension advice about ecological restoration, threatened species & biodiversity management. Extension advice would compliment Land for Wildlife program. Habitat and threatened species assessments to be an important component. Extension service will collect baseline information, direct actions and assist project monitoring. Bush regeneration Work Schedule template to be drafted for consistent collection of data. Establish a biodiversity extension service to offer (but not limited to): Property based biodiversity assessments; Advice on threatened species management; Advice on weed management, bush regeneration, revegetation and animal pest control; Property planning advice; Advice on all forms of assistance available to landowners to manage biodiversity values; Vegetation and other constraint mapping; and Provision of available data and assistance in the preparation of Biodiversity Management Plans.
 Employ skilled bush regeneration team (3 person) implement restoration actions on Council & private lands train Council staff and community supervise community groups & Greencorps collect propagation material prepare Bush Regeneration Work Schedules assist in preparation of educational materials assist in provision of extension advice for funded project sites assist in preparation of funding applications 	Council will prepare Bush Regeneration Work Schedules prior to undertaking any restoration works. Bush Regeneration Work Schedules will direct bush regeneration, habitat management and monitoring activities and ensure there will be no negative effect on threatened species or their habitat. In effect work schedules will be management plans. Skilled bush regeneration team will be able to work with community groups, Greencorp teams, landholders and Council staff (although will also work as stand alone team). They will be able to provide supervision, training/advise and on site project directives.
 Implement on-ground ecological restoration activities at identified priority restoration sites on private & Council lands establishment of wildlife corridors and revegetation of targeted cleared lands restoration of existing habitats (dunes, riparian areas, wetlands, HCV vegetation etc) weed and introduced animal pest management & control (including fencing/stock control/off stream watering points) amelioration of soil degradation issues (eg acid sulfate and saline soils, erosion control, remediation of contaminated sites) improvement of water quality and flows restore fish passage improve habitat and threatened species management promote installation of nest/roost boxes 	Works implemented according to Biodiversity Conservation Strategy, Coastline Management Plan, Estuary Management Plans, Sustainable Agriculture Strategy, Community Lands Plans etc. There is a considerable amount of Council owned & managed land impacted by weed invasion, is cleared or in degraded state due to disturbance. Need for restoration works. Lawn mowing imposes on going cost to Council and relies on fossil fuels. Need to determine what cleared land under Council management is not required as open space and can be planted back to native vegetation. A significant amount of ecological restoration work is being done on private land. Council should support this by providing extension advice and where possible allocating resources toward restoration actions via

Pr	oject description and tasks	Details
٠	extension advice.	funding application scheme.
Co pe: • •	ntrol & management of environmental weeds & introduced sts control serious environmental weeds according to best practise reduce the spread of weeds replace weed species from Council parks & gardens with locally native and/or non-invasive species facilitate weed surveys to identify locations of serious environmental weeds in HCV ecosystems, along roadsides and riparian areas develop strategic roadside weed control & management strategies prepare/adopt educational materials on weed identification, their control and management prepare best practise weed control guidelines prepare bush regeneration guidelines	The invasion of high conservation value areas by environmental weeds is a significant problem across shire, and has a negative impact on regional biodiversity. Environmental weeds can spread along road reserves, riparian zones, through dumping and slashing. To reduce the spread of weeds Council will examine options for improving organic waste recycling and prohibit planting of known weed species on Council lands and as part of approval process for development applications. Sites containing small and isolated infestations of serious weeds should be given high priority for weed control to prevent a more serious outbreak of that weed. Aim to displace weeds with natives (where appropriate). Council will investigate alternative weed control methods for Madeira Vine on roadsides, which does not involve slashing. Investigate the feasibility for developing weed wash down procedures and facilities for Council (or contractors) machinery after working in weed affected areas.

3.1.6 Prioritising Restoration Works

The implementation of any ecological restoration initiatives identified in this Strategy for both public and private lands is largely dependent upon Council attracting adequate funding. This is particularly the case should Council be in a position to fund actions on private lands. Any funding that Council receives for biodiversity actions needs to be allocated in an equitable and transparent process. Due to the extent of work required and the long-term nature of the work it is not considered feasible for Council to implement all actions arising out of the Strategy uniformly or in one process. As such, restoration actions need to be prioritised according to an adopted methodology. Some aspects of this will differ slightly between Council managed lands and private lands.

The prioritisation methodology for disseminating Council funding only applies to ecological restoration actions to be funded or implemented through Council funding. It does not apply to actions being funded and implemented by other bodies or individuals. However, the methodology will be useful for other government agencies, funding bodies, community groups and private landholders in identifying target areas for environmental repair and enhancement.

Council will prioritise funding to restoration actions arising from this Action Plan according to the following criteria:

- sites with the highest ecological value (determined according to the Relative Ecological Values Matrix Relative Ecological Values Matrix (REVM) – contained in Part 3 appendices and technical data);
- HCV areas within identified corridors (see note below);
- > areas within identified corridors that are in close proximity to resilient ecosystems;
- > ecosystems at threat within identified corridors; and
- ecosystems at threat.

HCV = all lands that scored greater than 27 on the Relative Ecological Values Matrix (REVM) and shown on HCV mapping contained in Part 3. These have been labelled as very high conservation value or extremely high conservation value on the maps contained in Part 3.

Identified corridors = areas for environmental repair and enhancement (secondary corridors)

Resilient ecosystems and ecosystems still need to be mapped. This mapping will be completed prior to prioritisation of restoration sites.

Funding will only be made available to projects in accordance with an application process and will be subject to the development of an approved work plan that has realistic and achievable targets. The work plan will ensure all restoration works have measurable outcomes. This process has been identified as a biodiversity action.

Effective assessment for ranking restoration actions must have regard to whether the site:

- contains an isolated infestation of a serious environmental weed;
- is subject to severe and active erosion;
- > is managed for environmental protection or has other formal protection status;
- has an adopted restoration work plan;
- is important for threatened species (or has been identified for actions in either a Recovery Plan or Threat Abatement Plan);
- > has social and cultural values that would be enhanced through ecological restoration;
- has an active community group already conducting works on a site;
- has a Community Land Plan (for natural areas) or other Council plan that recommends restoration works.

Development of a scoring schedule for the above criteria will assist ranking restoration projects.

Any Council funding allocated for implementing ecological restoration actions on private lands must be disseminated through an application process (Section 5.3 provides details on funding the Strategy). This will be subject to:

- 1. the site being identified as a priority for protection or environmental repair and enhancement (including local corridor areas);
- 2. the property holder entering into a binding agreement with Council (see below).
- 3. The restoration site being afforded formal environmental protection through a planning instrument or equivalent.

To be eligible for Council funding landholders will be required to enter into a Biodiversity Management Plan (BMP), which will need to be approved by Council. A BMP can cover a series of connected properties undertaking a landscape scale project, cover a whole property, a portion of a property or just a proposed restoration site. BMP's will describe how restoration areas and actions will be managed. In circumstances where Council provides funding, the BMP will provide the terms for a binding agreement between Council and the landowner on how restoration areas and actions will be implemented. BMP's will require that there will be no negative effect on threatened species or their habitat. BMP's will not be required where there is an existing approved plan or similar, which takes into account all the matters for consideration of a BMP. The extension service will provide basic assistance to prepare BMP's. Where more detailed information is required for development consent purposes, this will be the responsibility of the landholder.

It is important that applications from non-priority sites are also able to seek consideration for funding or extension assistance. However, these sites must only be considered where there has not been an adequate expression of interest from high priority sites or where a site exhibits a particularly serious problem that requires a rapid response. Such sites will be individually assessed on their merit using an adopted ranking system. Landholders outside of identified priority areas will still be able to access incentives in the form of extension advice. However, this will be dependent on Council securing adequate funding to establish an extension service.

Key Outcomes

- To reverse biodiversity decline through the restoration of degraded ecosystems and habitats and the establishment of wildlife corridors.
- To promote and facilitate the active management of High Conservation Value vegetation and habitats and the targeted restoration of degraded lands;
- To prevent processes and practises that degrades biodiversity values of lands identified as being of High Conservation Value and important for environmental repair and enhancement across the Shire.
- To access adequate funding to undertake Shire-wide restoration and habitat management actions.
- To distribute available resources in an equitable and transparent manner through an adopted methodology.
- To provide training in native plant and animal identification, weed control, bush regeneration and habitat and threatened species management.
- To provide extension advice to landholders in identified HCV vegetation and habitats.

Actions

NB: numbering follows on from previous section.

- 4) Monitor the effectiveness of the No Net Loss Policy by assessing the extent of vegetation cover when undertaking comprehensive State Of the Environment reports.
- 5) Apply for reliable funding for the implementation of on-ground ecological restoration actions at identified priority sites.
- 6) Employ a Biodiversity Conservation Officer (to co-ordinate overall project management and implementation).
- Employ a skilled bush regeneration team/s for undertaking restoration works at targeted sites.
- 8) Establish links with job creation and labour market schemes (eg Greencorps) to assist in undertaking ecological restoration initiatives.
- 9) Encourage the revegetation of secondary wildlife corridors and the rehabilitation of vegetated wildlife corridors.
- 10) Conduct biodiversity assessments for all Council owned and managed lands.
- Identify high priority sites for environmental repair and enhancement across the Shire according to the Relative Ecological Values Matrix and prioritise target sites for undertaking ecological restoration actions.
- 12) Prepare template pro-forma's for assessing ecological attributes of a site (and assist in preparing BMP's).
- 13) Prepare a template Bush Regeneration Work Schedule.
- 14) Prepare Bush Regeneration Work Schedules for sites identified for restoration works.

- 15) Produce or adapt information (ie designs etc) on the construction of nest/roost boxes for dissemination to the public and to schools.
- 16) Prepare a Roadside Vegetation Management Plan with input from Asset Management Services (AMS) staff and the community.
- 17) Investigate options for providing planting stock for identified restoration sites.
- 18) Notify property holders with identified HCV vegetation and habitats.
- 19) Encourage and promote NPWS Voluntary Conservation Agreements (VCAs), DIPNR Property Agreements and various non-government organisations that promote biodiversity conservation on private lands.
- 20) Develop an application process for distribution of Council funding.

3.2 ENVIRONMENTAL WEEDS AND INTRODUCED PESTS

Invasion by environmental weeds and introduced pests are considered amongst the most serious threats to biodiversity conservation in Australia (Tropical Weeds Research Unit, University of Queensland (undated); Natural Heritage Trust (2002); Environment Australia (2001), and have also been identified as significant threats to the Shire's biodiversity (Byron Flora and Fauna Study 1999). The impact of invasive pests varies greatly, but they all compete with native species and can change ecosystem balance (Commonwealth of Australia 2001). Due to the extent of habitat disturbance across the region, environmental weeds and introduced pests are often a common feature throughout the landscape.

There are many introduced species present in Byron Shire that are not yet considered as invasive pests. However, many introduced species have the potential to become pests under the right conditions. Such species are known as 'sleeper species', as they remain dormant until such time that conditions or adaptive responses are suitable for their expansion into native ecosystems.

3.2.1 Environmental weeds

Environmental weeds are those weeds that can invade native plant communities and ecosystems and cause modifications to species richness, abundance and ecosystem functions, resulting in a negative impact on biodiversity. Environmental weeds are not necessarily weeds to agriculture and horticulture, or those listed as noxious weeds. However, they can also be all or one of the above. In NSW noxious weeds are listed according to the Noxious Weeds Act. The North Coast Weeds Authority (Far North Coast Weeds) is responsible for implementing the Act and for the control of noxious weeds. Council will continue to work with Far North Coast Weeds in the control of noxious weeds.

Environmental weeds can compete with native plant species for nutrients; light and moisture; change the abundance of native plant and animal species; and alter geomorphological processes; hydrological and nutrient cycles and fire regimes. Each weed species has specific characteristics that allow them to dominate in certain environments. Most are benefited by disturbances, often at the expense of native species. Environmental weeds are most often spread by seed or vegetatively, depending on their method of reproduction. They can be dispersed by animals, wind, water, active planting by humans, garden and soil dumping, spread through mulch, vehicles, roadside slashing, and vegetative growth from point source infestations.

It is important to recognise that even native species can become environmental weeds when transferred outside their natural ranges. Also native species can have significant genetic variations throughout their natural distributions, meaning that even the introduction of the same species from somewhere else in its range may pollute local gene stocks.

Infestations of serious environmental weeds occur in most environments throughout the Shire, including vegetation identified as being of High Conservation Value, roadsides, riparian zones and Council parks and gardens. Riparian weed infestations are of particular concern as they continually spread reproductive material downstream. Roadside infestations of some weeds such as Madeira Vine (*Anredera cordifolia*) are spread by roadside slashing, resulting in Madeira Vine being spread into previously unaffected vegetation. Many weed infestations result from garden escapes or soil dumping or from escaping from horticulture (eg. gardens). A variety of weed species are known to be cultivated in Council parks and gardens, which have the potential to spread into natural areas.

To reduce the spread of weeds Council will:

- facilitate community surveys to assess the extent of weeds in the Shire (with emphasis on Council managed road reserves and all riparian zones). Weed mapping will focus on HCV ecosystems, Council managed road reserves and all riparian zones. This will assist Council in developing appropriate roadside vegetation management strategies and for prioritising weed management within riparian zones;
- examine options for improving organic waste recycling. This will include examination of factors including the location of facilities, the cost of disposal and whether kerb side organic waste services are a viable alternative to the current system;
- prepare (or adopt) educational materials on weed identification and control;
- commence replacing weed species from Council gardens with locally native and/or non-invasive species;
- review its current ornamental planting policy to exclude those species that have the potential to become environmental weeds or impact on native ecosystems. A list of potential weed species is provided in the Byron Flora and Fauna Study and Bushland Friendly Nursery Scheme;
- prohibit the planting of weed species as part of any development application that requires approval for a landscape plan; and
- Identify outbreaks and new infestations of environmental weeds for priority action.

Figure 2: Guidelines for the long-term management of weeds.

The effective control and management of environmental weeds will require a long-term approach that includes the following:

- A catchment approach to the control of weeds distributed by water. Aim for complete control of infestations commencing from upper catchments, and aim for containment and control where there is a known 'upstream' infestation or localised outbreak.
- Education and extension on which weeds pose a threat to the environment, their ecology and favoured habitats, and how to control them in the most effective and ecologically responsible manner.
- Mapping weed distribution, abundance and threat, developing species-specific management guidelines for serious environmental weeds, promoting early control of isolated occurrences of serious weeds and the adoption of systematic control methods.
- Fostering an understanding that control of weeds should not always be the sole aim for sustainable land management. Any weed control strategy needs to consider flora and fauna habitat requirements, adjacent land uses, soil stability and maintenance of water quality.
- Weed control should not target a single species (unless for early intervention). It should rather aim to systematically and incrementally control all weed problems within a defined management unit in a manner that disadvantages weed regrowth and favours the regeneration of native species.

3.2.2 Introduced pests

Introduced pests include feral animals such as the fox, cat, rabbit, starling, common myna, cane toad and mosquito fish, but also insects, diseases, free-ranging domestic animals and genetically modified organisms. Introduced pests place pressures on native species through competition for habitat resources, predation, grazing/browsing, and disturbance and in the case of the cane toad direct poisoning of species that attempt to prey upon it. Many introduced pests also impact on agriculture. The impact of free ranging domestic animals into areas of conservation value can also be significant. Free ranging domestic dogs and cats are known to predate upon or disturb native animals, where they can impact upon local populations of mammals, birds and reptiles etc. Where livestock have access to areas of conservation significance they are able to graze or browse on native plants, compact soil, foul waterways and accelerate erosion of creek banks and steep land. This can restrict regeneration, alter species composition and degrade habitat structure. Education and extension on what management options are available for restricting livestock access to HCV vegetation and habitats is required.

The control and management of introduced pests is complex due to the control options available, ethical considerations, problems associated with locating the target species and the costs involved. However, many introduced pests are favoured by certain habitat conditions. Alteration of these conditions to disadvantage the target species can assist in their control and management, especially when accompanied with targeted control. Genetically modified organisms (GMO) pose a new problem to biodiversity as they have the potential to become invasive or transfer genes to native species, which impact on biodiversity through the modification of natural genetic combinations. In response to uncertainty surrounding the invasiveness of GMO's a precautionary approach should be adopted.

Key Outcomes

- > To control and manage infestations of environmental weeds and introduced pests
- > To reduce the extent of weeds throughout the Shire
- To educate the community and Council staff about environmental and noxious weeds and introduced pests
- > To maintain the genetic integrity of local native species
- > To develop strategic weed control & management strategies

Actions

21) Develop best practice weed control and management guidelines for serious weeds.

- 22) Prepare or adapt educational materials on the most serious weeds and introduced pests in the region, covering their identification, effective control and management, and ways to reduce their spread.
- 23) Adopt weed management guidelines from Figure 2 of this Action Plan into weed management guidelines, restoration prioritisation schedule and planning controls.
- 24) Council will review its current ornamental planting policy to exclude those species that have the potential to become environmental weeds or negatively impact on native ecosystems.
- 25) Council will commence replacing weed species from its parks and gardens with noninvasive and locally native species.
- 26) Prohibit the planting of weed species as part of any development application that requires approval for a landscape plan through the DCP.
- 27) Examine options for improving organic waste recycling in the Shire (through Councils Integrated Waste Management Strategy).
- 28) Facilitate community surveys to assess and map the extent of serious environmental weeds.
- 29) Develop a pro-forma for the collection of details relating to the location and severity of weed infestations.
- 30) Develop training for staff and the public that covers:
- weed identification;
- weed control and management;
- bush regeneration;
- weed mapping; and
- Geographic Information Systems (Council staff).
- 31) Screen, control and monitor weeds in soil prior to and following dumping of soil.
- 32) Support community based weed identification and control initiatives such as the Bushland Friendly Nursery Scheme.

- 33) Investigate the feasibility for developing weed wash down procedures and facilities for Council (or contractors) machinery after working in weed affected areas.
- 34) Compile and regularly update a comprehensive weed list for the Council website.

3.2.3 Pollution

Pollution is a significant contributor to the loss and decline of biodiversity. How each pollutant impacts on biodiversity varies depending on the type, scale and concentration at which it is released into a receiving environment and how sensitive that environment is to each particular pollutant. There are many activities that occur in the Shire that have the potential to release pollutants into the environment. If not treated properly, if used inappropriately or when used in areas adjacent to a sensitive environment there is potential for a pollutant to find its way into the natural environment and impact adversely on biodiversity. Examples of pollutants that impact on biodiversity are shown below in Table 2.

Table 2: Pollutants that impact on biodiversity

Pollution type and impacts
Poisons - Chemicals, solvents, detergents, pesticides, herbicides, fungicides, heavy metals, petro-
chemicals, oils etc.
 Poor practise during spray application (drift, run-off or accumulation in food chains),
leaching, run-off, spillages, waste disposal, impacts to non-target species or
environments (including secondary poisoning).
Nutrients - Fertilisers, sewage (on site systems, STP's, animals), intensive animal husbandry, soil
erosion, discharge/release of poor quality water (including untreated stormwater, water
with low oxygen and acid sulfates).
Sedimentation - Soil erosion, gravel roads, development construction activities, poor agricultural
practise (eg overgrazing, clearing steep ground, excessive soil exposure etc), fire.
- Dust - unsealed roads, quarries, concrete batching plants, land fill.
Other pollution - Litter, building and garden waste, dust, weeds, discarded fishing
gear, cigarette butts, emissions (methane,
carbon dioxide, hydrocarbons), noise, Acid SulfateSoils, light.

Current legislation adequately addresses issues surrounding point source pollution but is difficult to apply in the case of non point-source pollution events (e.g. Acid Sulphate Soils). Increased education accompanied with greater compliance will help address issues surrounding non point-source pollutants.

Key Outcomes

- To reduce pollution of natural systems through effective community education programs.
- > To mitigate uncontrolled pollution effects through the establishment of buffers.
- > To undertake meaningful pollution monitoring.
- To reduce harm to the environment from pollutants by applying environment protection regulations.

Actions

35) Initiate catchment based nutrient-reduction programs.

- 36) Deliver targeted education programs that promote control and reduction of pollution.
- 37) Monitor pollution activities and events, and assess and reduce impacts for indicator species and/or ecosystems. Org, Imp
- 38) Investigate the establishment of buffers to reduce the potential for pollutants to impact on biodiversity.
- 39) Support compliance to respond to (and prevent) pollution events.
- 40) Identify and map areas where sediment enters waterways from gravel roads and drains and quantify amount of sealing required to ameliorate the problem.
- 41) Investigate options for reducing dust pollution associated with gravel roads (eg reducing road speeds on gravel roads).

3.2.4 Threatened species

Byron Shire supports amongst the highest number of threatened species of any Shire in NSW. Threatened species are those species, populations or ecological communities listed in the NSW Threatened Species Conservation Act (1995) or the Commonwealth Environment Protection and Biodiversity Conservation Act (1999). Key threatening processes are also listed under these Acts. Currently, there are at least 61 threatened plant species, 83 threatened fauna species (excluding marine species) and four endangered ecological communities listed in the NSW TSC Act that are known to occur in the Shire. A list of threatened species from Byron Shire is shown in Part 3.

Council has legal responsibility for the implementation of the TSC Act under the Environmental Planning and Assessment Act, where it is required to consider whether a development application or any of its activities will have a significant effect on a threatened species, population or ecological community. Development and other human activities have the potential to adversely affect threatened species and their habitats. It is therefore important that decision-makers and the community are appropriately informed about the many intricate issues that surround threatened species and their management. In particular, it is important that ecological consultants provide the consent authorities with the relevant information to ensure that decisions are based on the best available data, adequate survey effort and address all the relevant legal obligations. Guidelines that outline a consistent approach to threatened species survey and assessment are required. It is also important that the consent authority have the expertise to assess the information provided to them. Considering the high number of threatened species known in the Shire, extent of development pressure and the detailed knowledge that is required to adequately make an assessment of an impact, there is a real need for appropriately qualified ecologist

on staff. It is recommended that Council employ in-house ecologists to service local approvals, asset management, water and sewage and environmental planning.

The Byron Flora and Fauna Study (1999) undertook a detailed review of threatened species records, resulting in the development of the Byron Threatened Species database. This database provides Council staff with detailed baseline information on the distribution of threatened species records in the Shire up till 1999. However, this data-set is not comprehensive enough for identifying all high quality threatened species habitat across the Shire as it only accounted for lodged records and didn't assess all lands in the Shire. Habitat modelling can assist to predict the potential distribution of threatened species habitat, especially when checked against the latest threatened species records and expert advise. This Action Plan has modelled and mapped the potential habitat of 31 threatened fauna species known in the Shire (see Part 3). This model indicates that most native habitats (as well as some weedy and disturbed habitats) provide potential habitat for threatened fauna species in Byron Shire. Habitat protection and restoration are required to better manage threatened species and their habitat. This can largely be met through improved planning controls for identified HCV vegetation and habitats (including wildlife corridors). However, there are many threatened species records that fall outside these identified areas that will require further assessment. The REVM identifies how it intends to consider threatened species records in the identification of HCV lands.

There are many threatened species issues in the Shire and it is not possible that Council will be able to address all of these at any given time. However, Council would be able to improve its management of threatened species, providing there are resources available. Several areas where Council should be able to deal with specific threatened species issues are outlined in the following table.

Issue	Solutions
inappropriate protection for threatened species & their	protect threatened species through planning controls &
habitat	implement recovery actions
weed and pest invasion & competition	bush regeneration and weed/pest control
disturbance (other than weeds & pest species) to	fence habitat areas, control pets, implement planning
important habitats	controls, implement Little Tern Management Plan for
	Belongil Spit, amend dog exercise area between
	Brunswick Heads north and New Brighton to stop at
	Nature Reserve (NR) boundary (as it impacts on a
	shorebird roost site at Seagull Rocks and also prohibits
	National Parks from undertaking fox baiting programs in
	the NR).
Limited threatened species knowledge by staff	Employ in house ecologist to assist in DA assessments,
	site assessments, Council works etc. Provide education &
	training
Resourcing for implementation of Threatened Species	Liaise with NPWS in regard to Recovery Actions that apply
Recovery Plan actions	to Council – e.g. Recovery Actions 12.8 & 12.9 for
	Mitchell's RF Snail
minimise risk to threatened species (in particular plants)	provide education, roadside surveys, prepare Roadside
during roadside maintenance (mainly slashing)	Vegetation Management Plan
improve the quality of threatened species reports submitted to Council	develop/adopt survey and assessment guidelines
improve knowledge of threatened species and their habitat	employ in-house ecologists, deliver training workshops/
	extension to staff & community, establish threatened plant
	arboretum, prepare Threatened Species Action Plan,
	prepare Habitat Action Plan, produce threatened species
	location maps (PDF format) for inclusion on Council
	website, map threatened species locations and habitats.
connect fragmented habitats (including aquatic	establish wildlife corridors and remove barriers to fish
ecosystems)	passage
improve threatened species data	conduct targeted threatened species assessments, ensure
	DAs and council reports include accurate and appropriate
	locality records for threatened species for inclusion in
	database, update threatened species database every two
	years

Table 3: Threatened species issues and solutions.

Key Outcomes

- > To protect threatened species and their habitats across the Shire.
- To improve knowledge of threatened species, their habitat and the issues that affects them.
- > To support Threatened Species Recovery Plans.
- > To assist the recovery of threatened species to a secure status.

Actions

42) Identify all high quality threatened species habitat outside of identified HCV habitats.

- 43) Implement recovery actions (e.g. Actions 12.8 & 12.9 for Mitchell's Rainforest Snail) and Little Tern Management Plan for Belongil Spit.
- 44) Maintain and update threatened species database and related GIS layers every two years.
- 45) Amend dog exercise area between Brunswick Heads north and New Brighton to stop it 50 metres north of the northern boundary of the Nature Reserve (down to low water mark).
- 46) Undertake threatened species habitat assessments of all Council lands and for properties where Council prepares Biodiversity Management Plans.
- 47) Purchase survey equipment (including Anabat bat detector, harp nets, hair tubes, call playback equipment, spotlight & battery, binoculars, telescope, Elliott traps, books) to

be used for habitat assessments, training and LEP review purposes (that could also be hired out to private consultants to help recover costs).

- 48) Prepare biodiversity assessment and reporting guidelines for development applications (including minimum standards for Threatened Species Survey and Assessment).
- 49) Establish a threatened plant arboretum on Council land.
- 50) Provide the community with information on lodging threatened species records for inclusion in the NPWS Wildlife Atlas to improve the Shire's threatened species database.
- 51) Employ ecologists to carry out duties in Local Approvals, Waste and Water, Asset Management and Environmental Planning.
- 52) Create and update a comprehensive species list of threatened and/or regionally significant species within the Shire.
- 53) Prepare threatened species profiles and management guidelines for all threatened species that are known or considered likely to occur in the Shire.

4. PLANNING AND DEVELOPMENT CONTROL

Planning controls are an effective mechanism for delivering biodiversity conservation outcomes, especially where they are coupled with incentives that improve knowledge and initiate active management of the areas identified for protection. Planning controls are currently provided in the form of zones delivered through the Byron Local Environment Plan (LEP) 1988. The Byron LEP details the general restrictions on development of land to which each zone applies. In the case of biodiversity conservation these are generally afforded through environmental protection zones that identify and protect areas of environmental significance.

This Action Plan has identified a significant area of lands that support High Conservation Value vegetation and habitats that are not currently covered by environmental protection planning controls. Significant changes to local planning controls are required in order to provide effective protection for biodiversity assets on lands with identified High Conservation Value vegetation and habitats. The identified areas of High Conservation Value vegetation and habitats are at this stage considered indicative for planning purposes and will require further assessment. Any planning controls to be developed for these areas will need to ensure existing use rights are maintained.

4.1 CHANGES TO PLANNING CONTROLS

It is proposed that changes to the current planning controls occur through Shire Wide planning controls.

Changes to current planning controls and assessment processes that are required to improve the management and protection of biodiversity values and associated natural resources are:

- Amalgamation of some of the current environmental protection zones where their objectives and development restrictions are consistent;
- Introduction of new planning controls that protect areas identified as supporting High Conservation Value vegetation and habitats (that are not currently zoned for environmental protection) or as wildlife corridors (vegetated and non-vegetated);
- Draft new definitions to better describe biodiversity related matters including but not limited to; uses for active management, wildlife corridors, High Conservation Value vegetation and habitats, buffers to HCV habitats, sustainable agriculture, ecological restoration activities and minimal disturbance;
- Review current ornamental planting policies to exclude those species that have the potential to become environmental weeds or impact on a native ecosystem in a negative way;
- Develop planning controls to prohibit the planting of environmental weed species pursuant to a development application;
- Introduction of minimum standard guidelines for biodiversity assessment and reporting as a requirement for submission with a development application;
- Introduction of planning controls for buffers;
- Ensure that the development of community land plans and other Council plans and strategies must have regard to HCV vegetation and habitats mapping; and
- Development of a "no-net loss" policy in accordance with the criteria specified in Figure 4 (Section 4.2.2) below.

4.1.1 Amalgamation of Environmental Protection Zones

The current LEP provides nine zones for environmental protection. This Action Plan recommends that several environmental protection zones be amalgamated into a single 'Habitat' zone where the objectives and development restrictions are consistent. It is proposed to amalgamate the following zones:

- Zone No. 7(a)-(Wetlands Zone);
- Zone No. 7(b)-(Coastal Habitat Zone);
- Zone No. 7(k)-(Habitat Zone).

Areas within Zone No. 7(c) (Water Catchment Zone) and Zone No. 7(d) (Scenic/Escarpment Zone) that are identified as supporting HCV vegetation and habitats or vegetated wildlife corridor should also be incorporated into a new 'Habitat' zone. As such those areas would be excised from the existing zone and afforded planning controls consistent with 'Habitat' protection. All other environmental protection zones should be retained.

4.1.2 Introducing new planning controls for identified HCV vegetation and habitats and wildlife corridors.

It is proposed to introduce new planning controls for areas that have been identified as High Conservation Value vegetation and habitats (and are not already afforded environmental protection through the LEP). In drafting planning controls it will be necessary to review the types of developments permissible in environmentally sensitive areas and to determine which activities need to be regulated. Some of this detail could be addressed in the development of minimum standard biodiversity assessment and reporting guidelines to accompany development applications.

This Action Plan has identified wildlife corridors across Byron Shire. Where these are vegetated with native vegetation they have been identified as High Conservation Value vegetation and habitats. However, this Action Plan has also identified non-vegetated wildlife corridors and wildlife corridors that are vegetated with exotic vegetation (i.e. mapped as camphor laurel 51-100%, or privet). These have been identified as 'secondary wildlife corridors' and should be afforded planning controls that consider the impact of a development on the potential corridor values (including the role of exotic vegetation in providing corridor attributes). It is also proposed to target environmental repair and enhancement within identified 'secondary wildlife corridors'. As such planning controls need to be developed that require a development proposed within an identified 'secondary wildlife corridor' to undertake environmental repair and enhancement actions as part of that development. The development of an environmental repair and enhancement schedule is required. This could be modelled on the system adopted in the Byron Rural Settlement Strategy but should be expanded to allow for implementing regeneration works in existing vegetation (rather than just undertaking revegetation).

The mapping used in the development of the Draft Byron Biodiversity Conservation Strategy was based on the vegetation mapping used in the *Byron Flora and Fauna Study* (1999). It was the best available data and is significantly better than mapping used for previous Shire-wide zoning processes. Some adjustments have been made to the mapping to take into account recent land clearing. However, it is recognised that there are specific concerns with the accuracy of the mapping and that the vegetation mapping needs to be updated as a high priority prior to the development of new planning controls. Periodic updating of Council's vegetation mapping will be required to account for changes in vegetation cover and improved information. Ideally this would coincide with comprehensive State Of the Environment reporting.

Current planning controls require a development application to undertake environmental repair and enhancement works in the following zones; (Zone No. 7(a)-(Wetlands Zone); Zone No. 7(b)-(Coastal Habitat Zone) and Zone No. 7(k)-(Habitat Zone). This is effectively a disincentive to undertake ecological restoration actions. It is recommended that

management guidelines for ecological restoration/environmental weed control and threatened species management are prepared as a high priority. Ecological restoration works undertaken in accordance with the guidelines should be exempt from development application whilst ecological restoration works undertaken outside of the guidelines will still require consent.

4.1.3 Development of habitat protection planning controls

Council must have regard to the following points when developing planning controls for habitat protection.

- The need to review Councils DCP (or similar planning control) for exempt and complying development to ensure the appropriateness of any forms of development in HCV vegetation and habitats;
- All High Conservation Value vegetation and habitats need to be afforded environmental protection zoning and where possible enhanced;
- All identified wildlife corridors are to be afforded environmental protection zoning and where possible enhanced;
- Clearing, draining, filling or destruction of High Conservation Value vegetation or habitats, vegetated wildlife corridors and threatened species habitat will be controlled unless there are no other alternatives;
- Controls need to ensure that the ecological, scientific, faunal, floristic and aesthetic values and other environmental attributes of high conservation significance are not compromised;
- Development that is likely to have a detrimental effect on ecosystem's habitats, functions and connectivity for local and migratory species will not be permitted unless there are no other alternatives;
- Development of effective planning controls shall promote and allow for the active management of HCV vegetation and habitats;
- Development of effective planning controls shall maintain, protect and enhance corridor values in order to facilitate the movement and dispersal of species across the landscape;
- Appropriate buffers are required for development and other activities that have the potential to impose 'footprint effects' on HCV vegetation and habitats, these will have regard to relevant scientific literature and agency policy and procedures;
- Develop ecological restoration/weed control and threatened species management guidelines to exempt a development application for ecological restoration activities within environmental protection zones.

4.1.4 Development of planning controls for wildlife corridors

In developing planning controls for 'secondary wildlife corridors' Council must have regard to the following.

- The need to review Councils DCP (or similar planning control) for exempt and complying development to ensure the appropriateness of any forms of development in 'secondary wildlife corridors';
- All identified wildlife corridors are to be afforded environmental protection zoning and where possible enhanced;
- Clearing, draining, filling or destruction of High Conservation Value vegetation or habitats, vegetated wildlife corridors and threatened species habitat will not be permitted unless there are no other alternatives;
- Development of effective planning controls shall promote and allow for environmental repair and enhancement and active management;
- Development of effective planning controls shall maintain, protect and enhance corridor values in order to facilitate the movement and dispersal of species across the landscape;
- Development of effective planning controls that control development that will impact on potential corridor values;

To ensure that any development that occurs in a 'secondary wildlife corridor' will be required to undertake environmental repair and enhancement actions as part of that development (similar to that in the Byron Rural Settlement Strategy with 900 trees per dwelling).

Figure 3: Identification of wildlife corridors

Wildlife corridors

The NSW NPWS (now Department of Environment and Conservation - DEC) has prepared mapping of regional and subregional wildlife corridors for north-east NSW (including Byron Shire), based on key fauna habitat modelling and vegetation mapping. This mapping was refined by Council to better reflect on ground attributes (such as vegetation cover and existing environmental protection zones). Regional and subregional corridors were then amalgamated to a single layer, with mapped rivers (with a 20-metre buffer) added to include the main riparian corridors. The output of this process was a final corridor layer, which was then categorised to show 'native vegetated corridor', 'exotic vegetated corridor' and 'non vegetated corridor' are termed 'secondary wildlife corridors'. Smaller scale 'local corridors' have not yet been identified as part of this process. Individual landowners and/or community groups will be invited to identify and voluntarily nominate their own lands for inclusion as 'local' wildlife corridors. The development of planning controls for wildlife corridors has been identified as a biodiversity action. Identified wildlife corridors are mapped on Council's GIS.

5. OTHER MATTERS FOR CONSIDERATION WHEN DEVELOPING PLANNING CONTROLS.

5.1 UNDERTAKING FARM FORESTRY WITHIN IDENTIFIED 'SECONDARY WILDLIFE CORRIDORS'.

Farm forestry plantations are capable of providing a range of ecological benefits for the restoration of previously cleared lands and also offer economic incentives to implement broadscale revegetation. This is particularly the case where the plantation is composed of species local to the soil landscape into which they are being planted. However, there are instances where plantation establishment or harvesting can impact on existing vegetation and habitat values.

For example, hardwood plantations established adjacent to Big Scrub remnants impose a significant bushfire risk to this fire intolerant vegetation community. Provision of buffers and hazard management is required. Planning controls that restrict the establishment of fire prone plantations in close proximity to HCV fire sensitive vegetation need to be developed through the Bush Fire Risk Management Plan. Planning controls relating to plantation establishment and harvesting are provided through the Plantations and Reafforestation Code (1999). This code is not subject to the EPA Act and Council is therefore limited in the planning controls they can impose.

The development of planning controls for secondary wildlife corridors should not create impediments or disincentives to the establishment of farm forestry plantations on cleared land but need to ensure adequate environmental protection. Development of buffer controls for sensitive assets is required (see section 4.2.3).

5.1.2 Tree Preservation Order & No Net Vegetation Loss Policy

The Byron Shire Tree Preservation Order (TPO) aims to protect valuable stands of vegetation and significant trees and to minimise the loss of valuable wildlife habitats. The TPO achieves this by requiring development consent for the removal of all trees, palms and ferns (over three metres in height) and any species of plant within a community described as heath, mangrove, saltmarsh or sedgeland (of any height). The TPO allows for exemptions such as certain weeds, 6 regrowth trees per holding per year, windbreaks and trees grown for their fruit.

The TPO currently carries a development application fee of \$75.00 for less than 6 trees or \$170.00 for more than 6 trees. There is also a \$50 advertising fee for an application within 2 metres of an adjacent boundary but this can be avoided if Council receives written notification from the affected neighbour that they have been notified about the TPO application. The cost of making a TPO application may act as a disincentive for lodging a TPO application, particularly if there is an impression that an application will be refused. This scenario is likely to result in a higher incidence of illegal tree clearing, which could result in an increased work burden for compliance staff and losses to biodiversity. Furthermore, the application fee does not provide any benefits to biodiversity. It is recommended that Council develop a 'no net loss' policy that requires 'offsets' for any vegetation removal. Development of no-net vegetation loss policy must have regard to the criteria specified in the Figure below (Figure 4).

The establishment of a No Net Vegetation Loss Policy with a tree replacement fee for vegetation removal will act as a de-facto contribution scheme to offset losses to biodiversity through vegetation removal. Offsetting vegetation losses through vegetation replacement requires the development of a replacement/offset schedule. This should be

based on the 'lost value of the ecological/heritage/aesthetic asset' to be removed and the estimated cost of establishing and maintaining replacement trees. All funds received for tree replacement should be placed in a trust account (or allocated to a Section 94 plan) to be spent on replanting native trees at designated Council reserves or other identified sites that require revegetation. The development of a tree replacement fee must be based on the criteria specified in Figure 4 below. The tree replacement fee should only be imposed on the removal of plants and/or units of vegetation that are native to a site (ie endemic to the site). The intent of a replacement fee is to offset biodiversity losses and as such should not be imposed for judicious trimming or pruning that requires approval.

Figure 4: No Net Vegetation Loss Policy

The development of a no-net vegetation loss policy must have regard to the following three principals:

- 1. AVOID impacts (direct or indirect) on native vegetation before, during and after the development process. All available alternatives need to be considered;
- 2. MINIMISE impacts (direct or indirect) on native vegetation before, during and after the development process, where there is no alternative to the development and no alternate location of lesser environmental value;
- 3. COMPENSATE for any impacts on native vegetation if the impact is unavoidable.

The development of a tree replacement program must have regard to the following criteria:

- > 1:1 for native trees of low ecological/heritage/aesthetic value;
- > 1:5 for native trees of medium ecological/heritage/aesthetic value;
- > 1:10 for native trees of high ecological/heritage/aesthetic value.

5.1.3 Buffers

New developments or activities that occur in close proximity to ecological attributes and/or habitats can impose negative impacts to human health, safety or comfort values (e.g. where in close proximity to flying fox roost/maternity sites, bushfire prone vegetation and sites prone to sandflies or mosquito infestations). Conversely, new developments or activities that occur in close proximity to sensitive environments or habitats have the potential to impose impacts that can degrade ecosystems and habitat values. Impacts will vary according to each activity and site. For example, the establishment of hardwood plantations butting Big Scrub rainforest remnants increases the potential for wildfire to impact on this fire intolerant vegetation community. Appropriate set backs or buffers are required. Similarly, Big Scrub remnants that abut intensive orcharding are subject to spray drift that impacts on the natural invertebrate and fungal communities within the remnant. The establishment of appropriate buffers would reduce this impact. The application of general buffers for particular activities can assist in protecting environmental assets. The development of planning controls relating to buffers has been identified as a biodiversity action. The development of these shall have regard to relevant scientific literature and agency policy and procedures.

5.1.4 Property Management Plans

The role of approved Property Management Plans (PMPs) as a planning mechanism for delivering consent with strong biodiversity conservation outcomes warrants further investigation. In particular, Council will need to ascertain whether it will complicate the planning process and whether Council has the resources and expertise to approve such plans. Generally, PMP's have been used as a whole farm-planning tool, although the "Wentworth Group" of concerned eminent scientists has recommended them as a one stop planning mechanism for rural lands.

PMP's could be a useful mechanism that allow for:

- Ground-truthing of data and variation of zone boundaries and categories where this
 is solely due to data accuracy or adequacy;
- Undertaking certain activities without requiring a DA, for example environmental repair and enhancement, environmental facilities, sustainable agriculture, active management and tree removals; and
- Streamlining access to available funds for HCV vegetation and habitats and secondary wildlife corridors.

Key Outcomes

- To provide effective planning controls that conserve and enhance the Shires biodiversity values.
- > To protect all High Conservation Value habitats.

Actions

- 54) To draft new Shire-wide planning control provisions for HCV vegetation and habitats, and 'secondary wildlife corridors' in accordance with decision making criteria outlined in sections 4.1.3 & 4.1.4.
- 55) To review Councils DCP (or similar planning controls) for exempt and complying development to ensure the appropriateness of any forms of development in 'secondary wildlife corridors' and HCV vegetation and habitats.
- 56) To introduce new Shire-wide planning controls for buffers.
- 57) Adopt *No Net* Vegetation *Loss Policy* and tree replacement fee through local planning controls.
- 58) To draft new definitions for new Shire-wide planning controls.
- 59) To amalgamate Zone No. 7(a)-(Wetlands Zone), Zone No. 7(b)-(Coastal Habitat Zone), and Zone No. 7(k)-(Habitat Zone) into a single 'Habitat' zone.
- 60) Develop biodiversity assessment and reporting guidelines (minimum standard requirements) for development applications.
- 61) Amend TPO application fee and introduce a replacement schedule for tree removals.
- 62) Review the types of developments permissible in environmentally sensitive areas.
- 63) Ensure that the development of community land plans and other Council plans and strategies must have regard to HCV vegetation and habitats mapping.
- 64) Develop an environmental repair and enhancement schedule.

6. ORGANISATION AND MANAGEMENT

6.1 IMPROVING OUR KNOWLEDGE

The delivery of long-term biodiversity conservation outcomes is reliant upon improving our knowledge and understanding of biodiversity related issues. Effective biodiversity conservation needs to take account of the latest information. Ideally Council would be able to collect appropriate environmental data on a regular basis and incorporate this into its planning, management and customer service practices. This means that we follow a continuous improvement cycle where actions move through the phases of planning, implementation, monitoring and review. Continued monitoring and review will help ensure that changes in environmental data and knowledge are captured over time and reflected in decision-making. Moreover, data gaps need to be acknowledged to allow research and ameliorative actions to be prioritised.

The development of a feedback improvement cycle is particularly pertinent to biodiversity conservation, considering this is a newly emerging area that has received considerable research interest in the recent past and is constantly changing according to the latest information. There are many instances where little is currently known about a certain biodiversity-related issue, but is expected to change as better information becomes available.

For example, Byron Shire undertook Shire-wide vegetation mapping for the Byron Flora and Fauna Study (1999) that was primarily based on 1991 aerial photographs. Flora and fauna assessments submitted with development applications usually undertake detailed site-specific vegetation mapping that in some instances provides better mapping than the Byron vegetation mapping. This site-specific mapping is often presented in a format that makes it difficult to add to the Byron vegetation mapping or it identifies changes to vegetation cover (compared to mapping in the Flora and Fauna Study). All flora and fauna reports submitted to Council should use a vegetation classification system that is consistent to (or able to be adapted) to that used in the Byron Flora and Fauna Study 1999. A similar scenario applies to threatened species records. Flora and fauna reports often contain detailed information relating to threatened species at a particular site. In many instances this information is either not supplied in a manner that can be easily fed back into the Byron Threatened Species Database or is not extracted from the development application when the DA is assessed. Establishment of a reference system for all flora and fauna reports submitted to Council (via DA's etc) will assist in upgrading the threatened species database. As relevant information becomes available Council needs to be able to feed this back into the decision-making processes to improve management.

Exhibition of the Draft Byron Biodiversity Conservation Strategy identified there were specific concerns with the accuracy of the vegetation mapping and that this needs to be updated as a high priority prior to the development of planning controls. Improved vegetation mapping will also be useful for assessing changes in vegetation cover and will generally improve our knowledge of vegetation cover in the Shire.

Quite often, improving our knowledge simply relies upon developing (or adopting) guidelines for the collection and analysis of data (which can also assist in undertaking effective monitoring). The development of minimum standard biodiversity assessment and reporting guidelines for development applications will improve knowledge of biodiversity related issues in the Shire. There are also many opportunities to improve how we use information we already possess. Examples of issues easily rectifiable or open to improvement through monitoring and feedback are shown in the table below.

Table 4: Issues that could be eas	ily be rectified or improved through monitoring and
feedback.	

Issue	Suggested feedback to address issue
inconsistent vegetation mapping submitted with DA's	prepare guidelines on how vegetation mapping should be supplied with DA's (consistent approach to vegetation classification, format of map product etc)
threatened species records not extracted from DA's	prepare guidelines on method for lodging and extracting threatened species records from DA's. Require all DA's to submit data in consistent manner.
distribution of threatened species	undertake targeted threatened species surveys. Require all DA's to submit data in consistent manner.
disturbance of sensitive environmental attributes on roadsides	prepare Roadside Vegetation Management Plan in association with the community and AMS staff
inaccessibility of biodiversity related GIS mapping	set up intranet site that allows viewing of biodiversity related mapping
outdated vegetation mapping	update vegetation mapping every 4 years (to coincide with comprehensive SOE). Current mapping based on 1991 aerial photos resulting in some inaccuracies in the identification of HCV lands.
Poor knowledge regarding distribution of serious weed infestations	survey & monitor the distribution of weeds develop weed management guidelines and education
Poor knowledge of biodiversity related matters	provide education & extension, establish a biodiversity/flora & fauna reference library
Implementation of biodiversity projects recommended through this strategy	development of effective monitoring program for ecological restoration sites approved under this strategy

Key Outcomes

- > To establish effective monitoring of biodiversity related issues and projects.
- > To improve the way we manage biodiversity.
- > To improve identification and mapping of ecosystems and species

Actions

- 65) Establish monitoring and evaluation programs for all biodiversity projects undertaken as part of this strategy (ie establish feedback loops).
- 66) Encourage and provide training on survey and monitoring techniques to staff, community groups and schools.
- 67) Establish and maintain a Council database of biodiversity information (including the existing GIS database).
- 68) Establish a Council Flora and Fauna Reference Library (for access by public and staff).
- 69) Update vegetation and HCV mapping (and rectify to cadastre).

6.2 DELIVERY OF INCENTIVES

Local government is well positioned to establish incentive schemes that encourage private landowners to implement sustainable land management practices and conserve biodiversity through education and training, property agreements, partnerships, and where possible financial assistance (Bateson 2000 & 2001). Incentives can work to integrate planning, regulation, education, and encouragement of community participation between landholders and government. Incentives also provide a signal to the community that Council is committed to biodiversity conservation and acknowledge the conservation efforts of private landholders toward implementing sustainable land management practices.

The uptake of incentives by landholders is likely to increase where a Council is able to offer a diverse package of incentives rather than a single option. This will allow individuals to 'shop around' for the incentive that best suits their needs. The successful implementation of incentives increases where a Council works in partnership with the community to develop policies, and financial and administrative tools that best suit the needs for the local community and fit in with their budgetary constraints.

Table 5 provides a summary of the main types of incentives and supporting mechanisms that are available to councils across Australia. A discussion is also provided below, outlining the possible application of these incentives and supporting mechanisms to Byron Shire Council.

Table 5: Summary	v of Incentives	and Supporting	Mechanisms.

Incentives
Financial incentives
Rate rebates (including differential rates)
Grants or annual payments to individuals or groups
Financial incentives or tied grants linked to management agreements or
performance measures
Non-financial motivational incentives
Local awards schemes
Training for property management or whole farm planning
Extension services
Technical support, materials (eg weed control and plants) and use of machinery
Development Incentives
Tradeable or transferable development rights
Supporting Mechanisms
Property Right Mechanisms
Management agreements, eg VCA's, covenants and contracts
Revolving funds (acquire and resell with added environmental protection)
Revenue Raising Mechanisms
Environmental levies
Developer contributions

Adapted from Bateson 2001

6.2.1 Financial Incentives

Rate Rebates

Rate rebates or reduced rates can be a useful tool to recognise community benefit of private land management (NPWS 2001). This incentive can be used in association with management agreements, environmental enhancement works, or restrictive zoning under a LEP.

The Local Government (LG) Act provides that certain types of land are exempt from the payment of rates. Exemptions apply to National Parks, Nature Reserves, Historic Sites, land subject to a NPWS Voluntary Conservation Agreement or a State Game Reserve. Councils do not have the power to grant rate exemptions to individual properties or to categories of properties other than those specified by the LG Act, section 555. The LG Act provides that Council's are only allowed to offer rate rebates to pensioners.

However, Councils are able to offer differential rates. Council should assess the feasibility of introducing a reduced differential rate for lands managed for conservation purposes, which could be offset by a higher rate for lands that impose a greater degree of threat to biodiversity (like a user pays system). Any investigation should assess the costs and benefits of introducing a differential rate; in particular the costs of implementing and monitoring such a scheme and the amount of rate increase that would be imposed on other properties.

To cover the cost of Council's offering reduced rates in exchange for environmental protection, Binning & Young (1999) suggest that state or commonwealth government funding assistance be sought for an initial period to monitor and review existing valuation and rating structures. This trial period would allow for the evaluation of whether such a scheme would ensure no nett loss of revenue in subsequent years.

Grants

The provision of grants (eg. stewardship or incentive payments) to advance the beneficial management of areas of ecological importance provides a useful mechanism for implementing on-ground works. Grants can be used for actions such as fencing sensitive environments from livestock, reforestation, weed control and bush regeneration. The provision of grants is feasible where reliable funding can be accessed. Potential funding options include external grants (eg through the Catchment Management Authority), introduction of a special levy, developer contributions, and the establishment of a voluntary trust fund or a mixture of some or all of the above. All these funding options should be considered.

Where Council is in a position to disseminate grants to private landholders, it is recommended that the funds be allocated according to an application process and be 'tied' to specific performance measures (tied grants). This would ensure that funds only be provided to legitimate 'biodiversity conservation' projects and be provided in a transparent process. In this type of scenario it is recommended to rank applications according to their conservation value, which will be determined by a Relative Ecological Values Matrix, but also take account of sites with formal environmental protection measures in place and sites voluntarily nominated for environmental repair and enhancement or wildlife corridors. To be considered eligible for receiving funds all applications will have to prove 'active management' (see glossary).

Tied grants are used where security may be required and are often implemented for tree planting projects to obtain greenhouse credits, salinity credits or can be linked to water allocations or the like. These types of incentives are envisaged to become more common in the future as these markets develop.

Local Councils have the power to make grants subject to section 356 of the LG Act. The LG Act stipulates that the following requirements must be satisfied:

- (1) A council may, in accordance with a resolution of the Council, contribute money or otherwise financial assistance to persons for the purpose of exercising its functions.
- (2) A proposed recipient who acts for private gain is not ineligible to be granted financial assistance but must not receive any benefit under this section until at least 28 days' public notice of the Council's proposal to pass the necessary resolution has been given.
- (3) However, public notice is not required if:
 - (a) the financial assistance is part of a specific program; and
 - (b) the program's details have been included in the Council's draft Management Plan for the year in which the financial assistance is proposed to be given; and
 - (c) the program's proposed budget for that year does not exceed 5 % of the Council's proposed income from the ordinary rates levied for that year; and
 - (d) the program applies uniformly to all persons within the Council's area or to a significant group of persons within the area.

6.2.2 Non-financial Motivational Incentives

The introduction of various non-financial motivational incentives warrants further investigation by Council. Examples of non-financial incentives include the provision of

resources such as trees, fencing materials and resources that assist in weed control, the delivery of biodiversity related training and extension advice and the production of education materials. Another form of a non-financial incentive is for Council to waive fees for rezoning high conservation value lands to environmental protection. The delivery of some of these incentives would be contingent on funding, whilst some of these incentives may be met within the current budgetary framework.

Local Awards Scheme

Council will investigate adopting a local awards scheme in association with various partner organisations (eg DIPNR, NPWS/DEC, NSW Ag, Rural Fire Service, Arakwal Corporation, Landcare, Envite, local media outlets) and seek corporate sponsorships to fund the scheme. Such an awards scheme would celebrate and acknowledge the success of community efforts to improve biodiversity values and educate the community on the benefits of biodiversity conservation for sustainable land management. To be effective it must provide an equal opportunity for all participants, and should therefore include a range of categories.

Technical and Training Support

Council will investigate providing technical support to staff and the community via extension advice, training and the production of educational materials, as these are known to provide major advantages to biodiversity conservation. These motivational incentives empower the individual to initiate biodiversity actions through increasing a person's skill and knowledge base and fostering a sense of 'ownership' (as a result of improved understanding of biodiversity issues at the local level).

Technical support topics that would provide benefits to biodiversity conservation include:

- Weed identification and control;
- Feral animal control and management of free ranging domestic animal;
- Bush regeneration and reforestation (and compilation of site-specific planting lists);
- Plant and animal identification skills and surveys;
- Physical property planning and whole farm planning;
- Fire ecology;
- Aquatic ecology;
- Integrated pest management; and
- Habitat assessment and management (including threatened species issues).

Dissemination of the above topics could be achieved through the production of educational materials, the delivery of extension advice and community workshops. Training modules in many of these fields are available through TAFE, whilst 'in house' training modules could be developed for staff training purposes. These incentives could be integrated with the Sustainable Agriculture Strategy, Estuary Management Plans, Coastline Management Plans, the various Settlement Strategies, and other Council projects (eg sewage plant augmentation, roadside vegetation management).

The provision of resources and materials (eg native plant tube-stock, mulch, herbicide, fence materials) is a highly effective mechanism for initiating on ground actions in targeted areas. Habitat restoration and establishment of wildlife corridors would be greatly enhanced through such a mechanism. However, this would be completely dependent on gaining funding. If funding becomes available, Council should investigate its ability to devolve funds to approved biodiversity projects.

6.2.3 Development Incentives

These incentives allow rezoning, development approval or other concessions in exchange for conservation gains in other areas of the same property. It generally involves liaison with a landowner to forego the ability to develop a certain portion of a property or the placement of strict conditions on its use and on-going management in exchange for development rights elsewhere on the property. This incentive ideally seeks to transfer development to the most suitable site on a landholding (eg from a sensitive area to the least environmentally significant portion of the land). The implementation of such incentives needs to be consistent with other planning strategies and controls (eg Settlement Strategies, DCP's and the LEP).

The implementation of this incentive, with equitable results, requires the development of a set of clear and concise selection criteria.

6.2.4 Property Rights Mechanisms

Management Agreements or Contracts There are two types of property right mechanisms. These are:

- 1. Legally binding agreements between individual landholders and government agencies (including Councils); and
- Non-binding management agreements or contracts that are not attached to the title of the land but can be linked to financial incentives offered by Councils or government agencies.

Such agreements should set out the conditions for management that will meet agreed conservation objectives.

Binding agreements or contracts include NPWS/DEC Voluntary Conservation Agreements, DIPNR Property Agreements and management contracts (or covenants) attached to the title of a property, which are registered on the title of the land in perpetuity. Voluntary rezoning is also considered a binding agreement, although this mechanism is not as secure as the previously mentioned mechanisms.

An example of a non-binding management agreement or contract is an agreement between Council and a landholder that describes how any funding assistance would be spent on that landholder's property. Such mechanisms are recommended if funding becomes available.

Revolving Funds

Revolving funds are funds that are used to acquire land of conservation significance and re-sold (sometimes at a profit) with additional land-use planning restrictions and/or a conservation agreement or management plan prepared. Land can be rezoned to restrict or remove the development potential of the land or be linked to a property management agreement or contract. The Commonwealth Government is currently working with the NSW government to establish a NSW Government revolving funds scheme (NPWS 2001).

There are several non-government trusts that have been established to purchase lands of high conservation value and can also implement revolving funds. These trusts tend to acquire lands that are retained in their management rather than re-sold to private landholders. Council will investigate its ability to set up a voluntary land acquisition trust fund, into which donations and bequests can be lodged for Council to then purchase lands of high conservation value.

Key Outcomes

> To deliver incentives, education and on-ground extension advise within Byron Shire.

Actions

70) Investigate all options for delivering a range of incentives (as listed above) within the budgetary constraints of Council. This will include, but not be limited to:

- Assessing the feasibility of introducing a reduced differential rate for lands managed for conservation purposes (including seeking external funding to cover costs where reduced rates are offered);
- Investigating the options for offering grants to private landholders;
- Investigating Councils ability to set up a voluntary land acquisition trust fund; and
- Investigate the introduction of various non-financial motivational incentives.
- 71) Develop and nurture partnerships with other agencies that offer various incentive schemes such as NPWS/DEC Voluntary Conservation Agreements (VCA), DIPNR Property Agreements and Land for Wildlife. This will include application to DEC to implement VCA's on identified Council lands, funding for a Land for Wildlife Officer and seeking advice from DIPNR regarding Property Agreements on Council managed lands.
- 72) Use Council allocated funding and existing biodiversity related project resources as 'in kind' contributions to apply for additional external funds.

6.3 FUNDING THE STRATEGY

6.3.1 Revenue Raising Mechanisms

Councils traditionally raise revenue for undertaking works and programs that deal with issues such as roads, sewage, compliance, development assessment and general customer services. With growing community awareness toward the importance of governments delivering environmental outcomes, Councils have had to investigate other means for securing funding or to shift money from other core works etc for environmental projects. In most instances, Council's 'traditional' revenue base tends to be already committed to existing works, projects and services, making it difficult to find suitable funding resources for a range of biodiversity related projects.

Local Governments are able to raise revenue through a variety of mechanisms including: rates, annual charges, user charges, approved fees, financial assistance grants, special purpose grants, Section 94 developer contributions, borrowings and investment income (NPWS 2001). Councils are also able to seek a special rate (over and above their ordinary rate) to raise additional revenue for particular works, services or activities.

6.3.2 Funding through Council Management Plan

Council's Management Plan directs where and how Council will allocate it resources. Currently there is no specific budget allocated toward specific biodiversity related projects, although there are many Council projects funded through the Management Plan that have considerable biodiversity outcomes. To determine how much of the current budget is allocated toward biodiversity related projects Council will need to undertake an analysis of its Management Plan. Any funds that are currently spent on biodiversity related projects should then be used as 'in kind contributions' to gain external funding. In the future, consideration should be made to allocate a proportion of the Management Plan budget toward biodiversity related projects.

6.3.3 Special Rates (Environmental Levy)

Special rates are levied in relation to land value, and have to come within the rate-pegging limit. Where a Council's income is within such a limit, permission of the Local Government Minister is not required for levying a special rate. However, where a special rate exceeds the rate-pegging limit a special variation must be sought, which is assessed on a case by-case basis. When seeking a special variation, a council has to demonstrate that the project has regional significance or provides a major enhancement to community facilities or services (NPWS 2001).

Special rates may be levied on rateable land that has access to, benefits from or contributes to the need for particular works, services, facilities or activities that are provided or are proposed by a council. Any monies raised through a special rate must be spent on the activity for which the special rate was sought. Special rates have been found to provide a useful revenue raising mechanism for biodiversity actions, providing that a link between the levy and the benefit for the land to be levied can be made (NPWS 2001).

The use of an environmental levy, for conservation initiatives, has been encouraged by the NSW State Government as part of the NSW Biodiversity Strategy (NPWS 1999) and has been successfully used by several other Local Government Area's on the NSW north coast (e.g. Coffs Harbour City Council).

In June 2004, Byron Shire Council was successful in obtaining a 2% special variation to the general rate for biodiversity works over four years. It should be noted that this is not a special rate; rather it is a special variation to the general rate. Regardless, this provides a reliable funding source to implement a range of short-term biodiversity actions identified in this Strategy. Long term funding is required to ensure that short-term works can be continued and to allow long-term actions to be implemented. Council will prepare a works program to guide how the biodiversity levy will be spent.

6.3.4 Section 94 Developer Contributions

Section 94 of the *Environmental Planning* and *Assessment Act*, 1979, allows Council to recover costs of infrastructure and facilities provided by Council to meet the demands of future development such as community facilities, open space, roads, drainage. This would include a range of projects that could deliver biodiversity benefits, providing that a link to infrastructure or facilities can be demonstrated. There are a number of fundamental principles that Council is required to follow when levying contributions under Section 94:

- Council must establish a nexus (or direct relationship) between the need created by a new development and the provision of public services.
- The contributions must relate to or be imposed for a planning purpose.
- The contributions must be reasonable for the particular development.
- The contributions must be spent within a reasonable time.
- The funds collected must be accounted for in a clearly identifiable manner and in the prescribed form and manner.

Council currently collects Section 94 developer contributions for tree planting as part of the contribution plan for civic and urban improvements (landscaping and urban design improvements). Council has regulated a *de-facto* developer contribution through its Rural Settlement Strategy by requiring that 900 locally occurring native trees be planted per each dwelling constructed. Both of these contribution mechanisms deliver biodiversity benefits, providing all trees planted are native species to the location or are not potential weed species.

Council would be able to allocate developer contributions to better meet biodiversity conservation objectives by listing a broader range of biodiversity projects that can be funded through Section 94 developer contributions. Habitat restoration projects (i.e. bush regeneration, weed control, remnant fencing, reforestation etc) should be considered for inclusion in the Section 94 contribution plan.

Developer contributions should be considered as a tool to offset losses to biodiversity, where the contribution would amount to the cost of restoring or reconstructing the habitat that is lost as a consequence of the development. Money collected for this purpose should be spent on restoration actions in close proximity to the site. Council should also investigate whether it can use funding gained through developer contributions as 'in kind

contribution' to apply for external funding, thereby doubling the available monetary resource for biodiversity projects.

6.3.5 Approved Fees

Councils are able to impose a charge on any service that it provides including regulatory services. Council should establish a fee structure for the sale of its biodiversity related GIS products to consultants, however such products should be made available for free to landholders as part of Councils extension service. Ideally Council will be able to make biodiversity related GIS products available via an internet site, allowing access to all potential users in a read only format. Council should also investigate whether it is able to impose a replacement fee for tree removals that result in a loss of biodiversity, as a component of Council's Tree Preservation Order. The replacement fee should reflect the true cost of the environmental benefit being lost.

6.3.6 External Funding

There are numerous external funding opportunities that Council can apply for that deal with biodiversity related issues. These funding sources rely on 'in kind' contributions to match the grant funds sought. Council will need to provide the resources to initially prepare the funding submission, and then if successful would need to undertake project management and implementation. Environmentally funded projects can be further enhanced through programs such as Greencorps, which provide labour and training to help implement a project. Council could also offer advice and encourage landholders to apply directly for funding. A summary of Federal and State funding is provided in Figure 5 below.

There are also opportunities for Council to seek external funding through the *Northern Rivers Catchment Management Authority* for projects that involve restoring and enhancing biodiversity values on lands identified as being High Conservation Value (HCV). Any funds that Council is able to allocate toward biodiversity related projects would then be able to be used as 'in kind contributions' to apply for undertaking works in identified HCV areas. The Northern Rivers Catchment Management Authority will be allocating funding for restoration and active management at sites of Very High Conservation Value (VHCV) in north east NSW. VHCV sites have been mapped by Council according to the REVM (section 5) and are generally defined as:

- VHCV riparian vegetation;
- VHCV remnants in identified corridors;
- VHCV rainforest, floodplain forest, coastal dune and heathland, mangroves, seagrass, saltmarsh, rare and endangered ecosystems, vegetated corridors, endangered ecological communities and nest & roost sites for flying foxes and shorebirds.

Figure 5: Mechanisms for Federal and State financial assistance Commonwealth and National Funding Opportunities

Natural Heritage Trust 2

Funding will have a regional focus, emphasising the importance of partnerships between the community and local, State and Commonwealth governments. Applications for funding and allocation of funding under the Natural Heritage Trust program will be through the State Regional Bodies.

Interim funding arrangements have been established to assist with the changeover from the first to the second phase of the Trust. Nominated regional bodies can put in bids for interim regional funding. These bids will be for funding to address critical projects that cannot wait until the approval of the comprehensive regional NRM plan. They will, however, need to fit in with that region's overall natural resource management plan when it is approved.

NSW Environmental Trust. A state run funding program that is offered annually for a range of environmental projects. There is considerable scope for the Biodiversity Conservation Strategy to attract funding through this funding scheme.

Indigenous Protected Area Project

Established as part of the Nature Reserve System Program and funded through the Natural Heritage Trust, the Indigenous Protected Area Project aims to assist Indigenous landowners to manage their land and protect both cultural and natural values.

Threatened Species Network Community Grants

The TSN Community Grants is a joint program of NHT and WWF and provide funds for community organisations to undertake project work aimed at reducing the threats to populations of nationally listed species or remnants of threatening ecological communities.

Australian Bush Heritage Fund

This fund provides a unique opportunity for the community and local government to donate or bequest land so that it may be managed in the long-term for biodiversity and native vegetation conservation purposes.

Greening Australia

Greening Australia assists with grants for fencing remnant vegetation, as well as with technical advice in revegetation. Greening Australia has offices and contacts in most states.

Conservation Volunteers Australia

An association supporting and providing experienced volunteers to assist in on-ground projects. A very valuable service for those councils needing to engage people in bush regeneration activities, fencing programs, etc.

Easy Grants Information Service, Strategic Australia

A subscription-based service, easy grants provides updates on available grants and financial assistance.

Commonwealth Assistance for Local Projects

The Department of Transport and Services, an agency supporting rural and regional Australia, provides information on government departments and the financial assistance they offer.

Grantslink

Grantslink is a Commonwealth website dedicated to providing information on existing government grant programs, other funding sources and writing applications.

Philanthropy Australia

Corporate Sponsorship

Rainforest Rescue

New South Wales Funding Opportunities

Wetland Action Grant Program

Organised through the State Wetland Advisory Committee, the Wetland Action Grant Program provides funds to community groups for wetland projects.

NSW Rural Assistance Authority - Special Conservation Scheme

A financial incentive scheme devoted to improving land management practices on farms in New South Wales.

Regional Funding Opportunities

Northern Rivers Catchment Blueprint

Funding is available through the Northern Rivers Catchment Management Authority and will be disseminated in accordance with targets set out in a Catchment Action Plan (in preparation). The Biodiversity Conservation Strategy has been developed with the targets in mind and Council should actively seek funding through this mechanism. Additional Avenue's for Assistance Byron Volunteers.

Envite.

Greencorps, work for the dole etc.

Source: Environment Australia's Biodiversity Toolbox website: www.ea.gov.au/biodiversity/toolbox/index.html

Key Outcomes

> To attract reliable funding to deliver biodiversity conservation outcomes.

Actions

- 73) Investigate all aspects of Councils operations to determine which aspects are considered as having biodiversity-related benefits. These should then be used as 'in kind contributions' to apply for external funding.
- 74) Investigate whether any monies or resources allocated to biodiversity related projects (including developer contributions, existing positions etc) can be used as 'in kind contributions' to apply for external funding.
- 75) Investigate options for biodiversity projects to be funded through Section 94 developer contributions. This will include habitat restoration projects (ie. bush regeneration, weed control, remnant fencing, reforestation, etc.).

- 76) Establish a fee structure for the sale of Council's biodiversity related GIS/mapping products to consultants.
- 77) Investigate options for imposing a replacement fee for tree removals.
- 78) Seek annual biodiversity budget in Council's Management Plan.
- 79) Use all in kind contributions to apply to the NRCMA for funding assistance.
- 80) Seek funding to resource a Council grants officer.
- 81) Prepare a work schedule for implementing works identified in the special variation to the general rate (biodiversity levy).

SUMMARY OF ACTIONS

Community Involvement and Education

No	Action	Timeframe		Resources	Implementation	Indicative	Briority	Links to other issues
INO.		Start	Finish	Required	Implementation	Cost	FIOIIty	or actions
1	Market research into current community knowledge, needs, beliefs and attitudes toward biodiversity.	2005	2007	Consultant or education officer	Biodiversity Levy External funding	\$5,000	Medium	
2	Establish an Internet site for biodiversity related GIS products (in PDF format) – eg. vegetation mapping, threatened species mapping, ecological ranking, wildlife corridors, etc.	20004	2005/06	GIS and IT staff time	Management Plan	Absorbed through existing positions	Medium	Pl, Org, Fu
3	 Establish a biodiversity extension service to offer (but not limited to): Property based biodiversity assessments; Advice on threatened species management and provision of background information; Advice on weed management, bush regeneration, revegetation and animal pest control; Property planning advice; Advice on all forms of assistance available to landowners to manage biodiversity values; Vegetation and other constraint mapping; and Provision of available data and assistance in the preparation of Property Management Plans. 	2005	2010	New Biodiversity Extension Position/s	Biodiversity Levy External Funding Management Plan	\$45,000 p/a (per position) + on costs	Very High	Re, Pl, Org, Fu, Imp

Part 2 Biodiversity Action Plan

No	Action	Timeframe		Resources	Implementation	Indicative	Driority	Links to other issues
INO.	Action	Start	Finish	Required	Implementation	Cost	Phonty	or actions
4	 Employ a 'biodiversity dedicated' education officer to deliver an education program including, but not limited, to the following: Provide information to the community on the benefits of conserving biodiversity and how groups and individuals can conserve, survey, monitor and sustainably utilise biodiversity in their own area. Develop educational materials on best practice guidelines for weed identification; management; establishing farm forestry plantations; habitats; environmental restoration and threatened species. Offer training workshops on environmental repair and enhancement and biodiversity management to encourage greater community involvement in restoration actions on Council land. Develop education and training program with a focus toward developing community partnerships (mentors). 	2005	2008	New Biodiversity Officer New Biodiversity Extension Services New Education position	Biodiversity Levy Management Plan External funding	\$45,000 p/a + on costs also New Biodiversity Extension Position/s	High	Org, Fu, Imp

Ecological Restoration

No	Action	Timeframe		Resources		Indicative	Priority	Links to other issues
INO.	Action	Start	Finish	Required	Implementation	Cost	THORY	or actions
5	Monitor the effectiveness of the No Net Loss Policy by assessing the extent of vegetation cover when undertaking comprehensive State Of the Environment reports.	2005	On-going	SOE officer Biodiversity Conservation Officer GIS team	Management Plan Biodiversity Levy	Absorbed in existing positions	Medium	Org
6	Apply for reliable funding for the implementation of on-ground ecological restoration actions at identified priority sites.	2004	2010	Staff time Biodiversity Conservation officer Biodiversity Extension Services	Management Plan External funding	Able to be absorbed in existing positions	High	Fu, Org
7	Employ a Biodiversity Conservation Officer (to co-ordinate overall project management and implementation).	2004/5	2008/9	Biodiversity Conservation officer	Biodiversity Levy Management Plan	\$50,000 per annum + on costs also new Biodiversity extension officer/s	Very High	Org Fu, Re, Imp
8	Employ a skilled bush regeneration team/s for undertaking restoration works at targeted sites.	2005	2009	Bush Regeneration Team	Biodiversity Levy Management Plan External funding	\$73,000 per annum (2 staff @ \$887.88 for 3 days/wk + 1superviser @ \$512.19 for 3 days / wk for 52 weeks) or \$121,339.40 per annum for 3 person team 5 day/wk	Very High	Fu, Re, Org, Imp

Part 2 Biodiversity Action Plan

No.	Action	Timeframe		Resources		Indicative	Priority	Links to other issues
		Start	Finish	Required	Implementation	Cost	FIDING	or actions
9	Establish links with job creation and labour market schemes (eg Greencorps) to assist in undertaking ecological restoration initiatives.	2004	2009	Biodiversity Conservation Officer	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Org, Fu, Re
10	Encourage the revegetation of secondary wildlife corridors and the rehabilitation of vegetated wildlife corridors.	2004	2010	Biodiversity Conservation Officer Biodiversity Extension Services Bush regenerators Education team	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Ed, Imp
11	Conduct site assessments for all Council owned and managed lands.	2004	2009	Biodiversity Officer Biodiversity Extension Services Bush regenerators	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	High	Org, Fu, Re, Imp
12	Identify high priority sites for environmental repair and enhancement across the Shire according to the Relative Ecological Values Matrix and prioritise target sites for undertaking ecological restoration actions.	2004	2006	Biodiversity Officer Biodiversity Extension Services Bush regenerators	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Very High	Org
13	Prepare template pro-forma's for assessing ecological attributes of a site (and assist in preparing BMP's).	2005	2006	Biodiversity Conservation Officer	Biodiversity Levy Management Plan	Absorbed in existing & proposed positions	High	Re, Org
No	Action	Timeframe	e	Resources		Indicative	Priority	Links to other issues
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110.	Action	Start	Finish	Required	Implementation	Cost	Thomy	or actions
14	Prepare a template Bush Regeneration Work Schedule.	2005	2006	Biodiversity Conservation Officer Bush regenerators	Biodiversity Levy Management Plan	Absorbed in existing & proposed positions	High	Re, Org
15	Prepare Bush Regeneration Work Schedules for sites identified for restoration works.	2005	2010	Biodiversity Conservation Officer, Biodiversity Extension Services Bush regenerators	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	High	Re, Org
16	Produce or adapt information (ie designs etc) on the construction of nest/roost boxes for dissemination to the public and to schools.	2004	2006	Biodiversity Officer Biodiversity Extension Services Education officer	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Low	Ed
17	Prepare a Roadside Vegetation Management Plan with input from Asset Management Services (AMS) staff and the community.	2004	2006	Biodiversity Conservation Officer, AMS staff, Ecologist, Consultant Community	Biodiversity Levy Management Plan External funding Community support	\$30,000	High	Org, Fu, Imp
18	Investigate options for providing planting stock for identified restoration sites.	2004	2005	Biodiversity Conservation Officer Bush regenerators Parks & Gardens Manager	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Low	Re, Org

No.	Action	Timeframe	e Finish	Resources	Implementation	Indicative	Priority	Links to other issues
19	Notify property holders with identified HCV vegetation and habitats. When new mapping completed	ongoing	ongoing	Biodiversity Conservation Officer LEP Team	Biodiversity Levy Management Plan	Absorbed in existing & proposed positions	High	Org, Ed
20	Encourage and promote NPWS Voluntary Conservation Agreements (VCAs), DIPNR Property Agreements and various non-government organisations that promote biodiversity conservation on private lands.	2004	2010	Biodiversity Conservation Officer Biodiversity Extension Services Education officer	Biodiversity Levy Management Plan. Partnership between community landholders, council and other government agencies	Absorbed in existing & proposed positions	High	Ed, Org
21	Develop an application process for distribution of Council funding.	2004	2006	Biodiversity Officer Biodiversity Extension Services	Biodiversity Levy Management Plan	Absorbed in existing & proposed positions	High (if & when Council has funding available for landholders)	Org

Environmental Weeds and Introduced Pests

No	Action	Timefram	ne	Resources		Indicative	Priority	Links To Other
		Start	Finish	Required	Implementation	Cost	FIOITY	Issues Or Actions
22	Develop best practice weed control and management guidelines for serious weeds.	2005	2006	Biodiversity Conservation Officer. Planning staff consultant	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Very High	Org, PI, Re, Imp
23	Prepare or adapt educational materials on the most serious weeds and introduced pests in the region, covering their identification, effective control and management, and ways to reduce their spread.	2005	2006	Biodiversity Conservation Officer. Education officer	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	High	Ed, Re, Pl, Imp
24	Adopt weed management guidelines from Figure 2 of this Action Plan into weed management guidelines, restoration prioritisation schedule and planning controls.	2005	2007	Biodiversity Conservation Officer. LEP Team	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Ed, Pl, Imp
25	Council will review its current ornamental planting policy to exclude those species that have the potential to become environmental weeds or negatively impact on native ecosystems.	2005	2007	Biodiversity Conservation Officer. LEP Team	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	High	Ed, Pl,
26	Council will commence replacing weed species from its parks and gardens with non-invasive and locally native species.	2005	2009	Bush regenerators. Community. AMS staff input	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	High	Re, Fu, Imp
27	Prohibit the planting of weed species as part of any development application that requires approval for a landscape plan through the DCP.	2005	2006	LEP Team. Local Approvals. Biodiversity Conservation officer	Development Control Plan Management Plan	Absorbed in existing & proposed positions	High	PI

No	Action	Timefram	ne	Resources		Indicative	Priority	Links To Other
		Start	Finish	Required	Implementation	Cost	FIOIty	Issues Or Actions
28	Examine options for improving organic waste recycling in the Shire (through Councils Integrated Waste Management Strategy).	2005	2007	Waste Officer. Biodiversity Conservation officer	Organic Waste Management Plan.	Absorbed in existing & proposed positions	Medium	Org, Fu
29	Facilitate community surveys to assess and map the extent of serious environmental weeds.	2005	2009	Biodiversity Conservation officer. Biodiversity Extension Services Education officer Community volunteers	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Low	Org, Ed, Imp
30	Develop a pro-forma for the collection of details relating to the location and severity of weed infestations.	2005	2006	Biodiversity Conservation officer Biodiversity Extension Services	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Org
31	 Develop training for staff and the public that covers: weed identification; weed control and management; bush regeneration; weed mapping; and Geographic Information Systems (Council staff). 	2005	2009	Biodiversity Officer Biodiversity Extension Services Education officer. Outdoor staff input	Biodiversity Levy Management Plan External funding	\$20,000 also able to include resources from existing positions	High	Ed .
32	Screen, control and monitor weeds in soil prior to and following dumping of soil.	2005	2010	Outdoor staff Training & advice by Biodiversity Officer Education officer.	Biodiversity Levy Management Plan External funding	In house	High	Org, Ed, Imp

No	Action	Timefram Start	ne Finish	Resources Required	Implementation	Indicative Cost	Priority	Links To Other Issues Or Actions
33	Support community based weed identification and control initiatives such as the Bushland Friendly Nursery Scheme.	2005	2010	Parks & Gardens Manager Biodiversity Conservation officer	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Org, Ed
34	Investigate the feasibility for developing weed wash down procedures and facilities for Council (or contractors) machinery after working in weed affected areas.	2005	2006	Asset Management Services Consultant	Management Plan	Absorbed in existing & proposed positions	Medium	Org, Ed
35	Compile and regularly update a comprehensive weed list for the Council website.	2005	2008	Biodiversity Conservation Officer	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	High	Org, Ed

Pollution

No	Action	Timefram	е	Resources	Implementation	Indicative	Priority	Links To Other
	Action	Start	Finish	Required	Implementation	Cost	FIOILY	Issues Or Actions
36	Initiate catchment based nutrient-reduction programs.	2005	2010	W&W Education staff, Enviro health staff	Management Plan External Funding	Absorbed in existing & proposed positions	High	Ed
37	Deliver targeted education programs that promote control and reduction of pollution.	2005	2007	Education officer	Management Plan External Funding	\$10,000 for materials Absorbed in existing positions	High	Ed
38	Monitor pollution activities and events, and assess and reduce impacts for indicator species and/or ecosystems.	2005	2007	Biodiversity Conservation Officer W&W & Enviro health staff	Biodiversity Levy Management Plan External funding	Existing positions - in house, \$10,000 for on-ground actions	High	Org, Imp
39	Investigate the establishment of buffers to reduce the potential for pollutants to impact on biodiversity.	2005	2007	Biodiversity Conservation Officer LEP Team	Biodiversity Levy Management Plan External funding	Absorbed in cost of Action No.16 and 5	High	PI
40	Support compliance to respond to (and prevent) pollution events.	2004	2010	W&W AMS Local Approvals Enviro health staff	Management Plan	In house Existing positions	High	Org, Ed, Imp
41	Identify and map areas where sediment enters waterways from gravel roads and drains and quantify amount of sealing required to ameliorate the problem.	2005	2006	AMS staff	Management Plan External funding	In house Existing positions	Very High	Org, Fu, Imp
42	Investigate options for reducing dust pollution associated with gravel roads (eg reducing road speeds on gravel roads).	2006	2008	AMS staff	Management Plan External funding	In house Existing positions	High	Org, Fu, Imp

Threatened Species

No	Action	Timefram	е	Resources		Indicative	Priority	Links To Other
INU.	Action	Start	Finish	Required	Implementation	Cost	FIIOIILY	Issues Or Actions
43	Identify all high quality threatened species habitat outside of identified HCV habitats.	2005	2007	Biodiversity Conservation officer Biodiversity Extension Service GIS team NPWS/DEC	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	High	Org, PI, Imp
44	Implement recovery actions (e.g. Actions 12.8 & 12.9 for Mitchell's Rainforest Snail) and Little Tern Management Plan for Belongil Spit.	2005	2008	Biodiversity Conservation officer Biodiversity Extension Service Bush regenerators LACS Ecologist	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Org, Fu, Imp.
45	Maintain and update threatened species database and related GIS layers every two years.	2005	2009	Biodiversity Conservation officer GIS staff	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Org, Fu, Imp
46	Amend dog exercise area between Brunswick Heads north and New Brighton to stop it 50 metres north of the northern boundary of the Nature Reserve (down to low water mark).	2005	2006	Biodiversity Conservation officer Companion animals Committee	Management Plan	In House	Very High	Org, Pl, Imp

No	Action	Timeframe	Э	Resources		Indicative	Priority	Links To Other
INO.	Action	Start	Finish	Required	Implementation	Cost	FIIOIILY	Issues Or Actions
47	Undertake threatened species habitat assessments of all Council lands and for properties where Council prepares Biodiversity Management Plans.	2005	2010	Biodiversity Conservation officer Biodiversity Extension Service Bush regenerators. LACS Ecologist.	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	High	Ed, Re, Org, Imp
48	Purchase survey equipment (including Anabat bat detector, harp nets, hair tubes, call playback equipment, spotlight & battery, binoculars, telescope, Elliott traps, books) to be used for habitat assessments, training and LEP review purposes (that could also be hired out to private consultants to help recover costs).	2005	2006	Biodiversity Conservation officer Biodiversity Extension Service LACS Ecologist. Adequate funding	Biodiversity Levy Management Plan External funding	\$20,000	High	Fu, Imp
49	Prepare biodiversity assessment and reporting guidelines for development applications (including minimum standards for Threatened Species Survey and Assessment).	2003/04	2004/05	Biodiversity Conservation officer LEP Team. LACS Ecologist. Consultant/s	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions & biodiversity levy	Very High	PI, Imp
50	Establish a threatened plant arboretum on Council land.	2008	2010	Biodiversity Conservation officer Parks & gardens Staff	Biodiversity Levy Management Plan External funding	\$10,000 overhead cost. Maintenance cost	Low	Fu, Imp
51	Provide the community with information on lodging threatened species records for inclusion in the NPWS Wildlife Atlas to improve the Shire's threatened species database.	2005	2010	Biodiversity Conservation Officer	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Ed, Org

No.	Action	Timeframe	e Finish	Resources	Implementation	Indicative	Priority	Links To Other
52	Employ ecologists to carry out duties in Local Approvals, Waste and Water, Asset Management and Environmental Planning.	2005	Ongoing	Employ suitably qualified ecologist	Biodiversity Levy Management Plan External funding	\$60,000 per annum	Very High	Fu
53	Create and update a comprehensive species list of threatened and/or regionally significant species within the Shire.	2005	Ongoing	Biodiversity Conservation Officer	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Org, Imp
54	Prepare threatened species profiles and management guidelines for all threatened species that are known or considered likely to occur in the Shire.	2005	2006	Biodiversity Conservation Officer Consultant	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions & Biodiversity Levy	Very High	Fu, Imp

New Planning Controls Initiatives and Mechanisms

No	Action	Timefran	ne	Resources		Indicative	Priority	Links To Other
INO.	Action	Start	Finish	Required	Implementation	Cost	FIIOIILY	Issues Or Actions
55	To draft new Shire-wide planning control provisions for HCV vegetation and habitats, and 'secondary wildlife corridors' in accordance with decision making criteria outlined in section 4.1.3	2005	2008	LEP team Biodiversity Conservation Officer.	Management Plan	Absorbed in existing & proposed positions	Very High	Re, Imp
56	To review Councils DCP (or similar planning controls) for exempt and complying development to ensure the appropriateness of any forms of development in 'secondary wildlife corridors' and HCV vegetation and habitats	2005	2008	LEP team Biodiversity Conservation Officer.	Management Plan	Absorbed in existing & proposed positions	Very High	Re, Imp
57	To introduce new Shire-wide planning controls for buffers	2005	2008	LEP team Biodiversity Conservation Officer.	Management Plan	Absorbed in existing & proposed positions	Very High	Re, Imp
58	Adopt <i>No Net Vegetation Loss Policy</i> and tree replacement fee through local planning controls.	2005	2008	LEP team Biodiversity Conservation Officer.	Management Plan	Absorbed in existing & proposed positions	High	Re, Imp
59	To draft new definitions for new Shire-wide planning controls	2005	2008	LEP team Biodiversity Conservation Officer.	Management Plan	Absorbed in existing & proposed positions	High	Re, Imp
60	To amalgamate Zone No. 7(a)-(Wetlands Zone), Zone No. 7(b)-(Coastal Habitat Zone), and Zone No. 7(k)-(Habitat Zone) into a single 'Habitat' zone	2005	2008	LEP team Biodiversity Conservation Officer.	Management Plan	Absorbed in existing & proposed positions	Very High	Re, Imp

No	Action	Timefra	me	Resources	Implementation	Indicative Priority	Priority	Links To Other
		Start	Finish	Required	Implementation	Cost	Тпопку	Issues Or Actions
61	Develop biodiversity assessment and reporting guidelines (minimum standard requirements) for development applications	2005	2006	LEP team Biodiversity Conservation Officer LACS Ecologist Consultant	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Very High	Ed, Re, Org, Imp
62	Amend TPO application fee and introduce a replacement schedule for tree removals	2005	2008	Tree Preservation Officer LEP team	Management Plan	Absorbed in existing & proposed positions	Medium	Ed, Re, Imp
63	Review the types of developments permissible in environmentally sensitive areas	2005	2008	LEP team Biodiversity Conservation Officer LACS Ecologist	Management Plan	Absorbed in existing & proposed positions	High	Re, Imp
64	Ensure that the development of community land plans and other Council plans and strategies must have regard to HCV vegetation and habitats mapping	2005	2010	Council	Management Plan	In house	Medium	Ed, Imp
65	Develop an environmental repair and enhancement schedule.	2005	2008	LEP team Biodiversity Conservation Officer LACS Ecologist	Biodiversity Levy Management Plan	Absorbed in existing & proposed positions	Medium	Ed, Re, Imp

Improving Our Knowledge

No	Action	Timeframe	Ð	Resources		Indicative	Priority	Links To Other
110.	Action	Start	Finish	Required	Implementation	Cost	тпопку	Issues Or Actions
66	Establish monitoring and evaluation programs for all biodiversity projects undertaken as part of this strategy (ie establish feedback loops).	2005	2009	Biodiversity Conservatio n Officer. Biodiversity Extension Services. Bush regenerator s. LACS Ecologist.	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Ed, Re, Fu
67	Encourage and provide training on survey and monitoring techniques to staff, community groups and schools	2005	Ongoin g	Biodiversity Conservatio n Officer. Biodiversity Extension Services. Bush regenerator s. LACS Ecologist. Landcare	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Ed, Re, Fu

No	Action	Timeframe	Э	Resources		Indicative	Priority	Links To Other
110.	Action	Start	Finish	Required	Implementation	Cost	тпопку	Issues Or Actions
68	Establish and maintain a Council database of biodiversity information (including the existing GIS database).	2005	Ongoin g	Biodiversity Conservatio n Officer. Biodiversity Extension Services. GIS team. LACS Ecologist.	Management Plan	Absorbed in existing & proposed positions	Medium	Ed, Re, Pl, Fu, Imp
69	Establish a Council Flora and Fauna Reference Library (for access by public and staff)	2006	2010	Purchase of new books (flora and fauna field guides, etc)	Management Plan	\$2000 p/a	Medium	Ed, Re, Pl, Fu, Imp
70	Update vegetation and HCV mapping (and rectify to cadastre).	2005	20109	Biodiversity Conservation Officer. GIS team API & digital Consultant	Biodiversity Levy Management Plan External funding	\$60,000	Very High	Ed, Re, PI, Fu, Imp

Delivery of Incentives, Educational Materials and On-ground Extension

No	Action	Timeframe)	Resources		Indicative	Priority	Links To Other
NO.	Action	Start	Finish	Required	Implementation	Cost	Thomy	Issues Or Actions
71	 Investigate all options for delivering a range of incentives (as listed in section 5.2) within the budgetary constraints of Council. This will include, but not be limited to: Assessing the feasibility of introducing a reduced differential rate for lands managed for conservation purposes (including seeking external funding to cover costs where reduced rates are offered); Investigating the options for offering grants to private landholders; Investigating Councils ability to set up a voluntary land acquisition trust fund; and Investigate the introduction of various non-financial motivational incentives. 	2005	2010	C&CS financial advise. Biodiversity Conservatio n Officer	Management Plan Biodiversity Levy	Absorbed in existing & proposed positions	High	Ed, Re, Org, Pl, Imp

No	Action	Timeframe	9	Resources		Indicative	Priority	Links To Other
110.		Start	Finish	Required	Implomontation	Cost	Thomy	Issues Or Actions
72	Develop and nurture partnerships with other agencies that offer various incentive schemes - such as NPWS/DEC Voluntary Conservation Agreements (VCA), DIPNR Property Agreements and Land for Wildlife. This will include application to DEC to implement VCA's on identified Council lands, funding for a Land for Wildlife Officer and seeking advice from DIPNR regarding Property Agreements on Council managed lands.	2005	Ongoin g	Biodiversity Extension Services. Bush regenerator s. LACS Ecologist. Landcare	Biodiversity Levy Management Plan External funding	Absorbed in existing & proposed positions	Medium	Ed, Re, Org, Pl, Imp
73	Use Council allocated funding and existing biodiversity related project resources as 'in kind' contributions to apply for additional external funds.	2006	Ongoin g	In-house review of potential in kind contribution s New Biodiversity Conservatio n Officer	Management Plan External Funding Biodiversity Levy	In house	Medium	Ed, Re, Org, Pl, Imp

Funding the Strategy

No	Action	Timeframe	Э	Resources	Implementation	Indicative	Priority	
NO.	Action	Start	Finish	Required	Implementation	Cost	FIIOIIty	
74	Investigate all aspects of Councils operations to determine which aspects are considered as having biodiversity- related benefits. These should then be used as 'in kind contributions' to apply for external funding.	2005	2006	C&CS financial advise. Biodiversity Conservation Officer	Management Plan	In house	High	
75	Investigate whether any monies or resources allocated to biodiversity related projects (including developer contributions, existing positions etc) can be used as 'in kind contributions' to apply for external funding.	2005	2006	C&CS financial advise. Biodiversity Conservation Officer	Management Plan	In house	High	
76	Investigate options for biodiversity projects to be funded through Section 94 developer contributions. This will include habitat restoration projects (ie. bush regeneration, weed control, remnant fencing, reforestation, etc.).	2005	2006	C&CS financial advise. Biodiversity Conservation Officer	Management Plan	In house	High	
77	Establish a fee structure for the sale of Council's biodiversity related GIS/mapping products to consultants.	2006	2007	C&CS financial advise. GIS team Biodiversity Conservation Officer	Management Plan	In house	Medium	
78	Investigate options for imposing a replacement fee for tree removals.	2005	2006	TPO Officer C&CS financial advise	Management Plan	In house	High	

No	Action	Timeframe	e	Resources		Indicative	Priority	
NO.	Action	Start	Finish	Required	Implementation	Cost	FIIOIIty	
79	Seek annual biodiversity budget in Council's Management Plan.	2004	Ongoing	EPS C&CS financial advise	Management Plan	In house	High	
80	Use all in kind contributions to apply to the NRCMA for funding assistance.	2004	Ongoing	C&CS financial advise. Biodiversity Conservation Officer	Management Plan	In house	High	
81	Seek funding to resource a Council grants officer.	2004	Ongoing	ET Biodiversity Conservation Officer	Management Plan	In house	Very High	
82	Prepare a work schedule for implementing works identified in the special variation to the general rate (biodiversity levy).	2004	annual	C&CS financial advise. Biodiversity Conservation Officer	Management Plan	In house	Very High	

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Part 3

Byron Biodiversity Conservation Strategy Appendices and Additional Technical Information.

A report prepared by Byron Shire Council

September 2004



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Cover Photography

Top right: Southern Forest Dragon *Hypsilurus spinopes* by H. Bower Main: Riparian rainforest habitat by J. Tate. Bottom left: Red-eyed Tree-frog *Litoria chloris* by D.R. Milledge. Bottom right: Undescribed Tree Katydid from Inner Pocket, Genus Phricta by H. Bower.

MAP REFERENCE

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1. IDENTIFYING AREAS OF HIGH CONSERVATION VALUE

In order to adequately conserve biodiversity it is important to identify the relative conservation value of vegetation and habitats to determine which areas are of high conservation value. This section outlines the methodology that has been used to identify and rank the relative conservation value of the Shire's ecosystems and to prioritise these ecosystems using ecological values.

1.1 DETERMINING THE ECOLOGICAL VALUE OF NATIVE VEGETATION IN BYRON SHIRE

The method used for determining the ecological value of native vegetation in Byron Shire is consistent with the approach adopted in the Richmond and Clarence Regional Vegetation Planning regions (see Pugh 2000), the Northern Rivers Catchment Blueprint and is similar to that being used in the Tweed Local Government Area. It builds on the biodiversity criteria used to assess lands of conservation significance in the Local Environmental Study for environmentally sensitive lands at North Ocean Shores (1996).

The approach relies on readily available mapped ecological data for a region, which is then entered into a Geographic Information System (GIS) for detailed analysis and interpretation. For Byron Shire mapped ecological information includes:

- data on existing environmental zonings (Byron Shire Council);
- wildlife corridors, key fauna habitats and local corridors (including sites identified for environmental repair and enhancement - NPWS – refined by BSC);
- vegetation and/or habitat mapping (vegetation associations and forest ecosystems - BSC and NPWS, as well as Department of Infrastructure, Planning and Natural Resources (DIPNR) wetland mapping for the Tweed/Brunswick and the Richmond, and SEPP 14 and SEPP 26 mapping);
- endangered ecological communities and endangered populations;
- vegetation structure, growth stage and condition;
- threatened species habitat (BSC and NPWS);
- regionally and locally significant fauna and flora habitat (BSC and NPWS);
- areas nominated on the National Estate (assembled by the State and Commonwealth Governments for the Comprehensive Regional Assessment);
- other sensitive areas such as known and potential Koala habitat, lands subject to recovery actions (as listed in Recovery Plans), water catchments, riparian lands, areas mapped as SEPP 26 and buffers.

1.2 RELATIVE ECOLOGICAL VALUES MATRIX

Following review of the above listed environmental data a Relative Ecological Values Matrix (REVM) was developed (Table 1), which assesses the ecological significance of native vegetation (mapped as Forest Ecosystems) and other variables at a regional and local level.

The Relative Ecological Values Matrix allows for any mapped criteria to be valued for its ecological attributes on the ground and to determine its conservation status from a national, state, regional and local perspective. Values were derived by giving each mappable category (eg forest ecosystem, growth stage) a numerical value based on its conservation value (determined through adding the values for each mappable category together). This process allows areas with multiple values to score a higher ranking than areas with single values. Conservation value was partly determined by what percentage of each ecosystem on private land still requires protection to fulfil national, state and regional reservation targets set out by the Commonwealth accepted JANIS criteria for the Comprehensive Regional Assessment (Table 1). Other local, regional and state conservation criteria and constraints were also used to determine conservation significance. The relative ecological values matrix thereby applies available mappable data to identify the relative importance of areas of vegetation for biodiversity conservation within the Byron Shire in a manner that also accounts for its state and national significance.

1.3 HOW THE MATRIX WORKS

The Relative Ecological Value Matrix for Byron Shire shows the relative ecological values of different ecological criteria. Each criterion is assigned point values or scores, which are tallied according to the number of criteria mapped within a given area of vegetation. Areas of land that score a total of 27 or more are regarded High Conservation Value vegetation and habitats and are shown on the mapping provided as very high conservation value or extremely high conservation value. The REVM identifies the most ecologically significant lands and provides a framework that can allocate scarce resources to the most significant areas in order of priority (this is determined through a hierarchical process, which places a numerical value on each ecological attribute for a given area).

Figure 1: Identification of High Conservation Value Vegetation.

High Conservation Value Vegetation

High Conservation Value (HCV) vegetation was determined according to the REVM, which has taken into account the Northern Rivers Blueprint requirements for the identification of HCV vegetation. Criteria used to determine HCV vegetation is outlined in Table 1. HCV vegetation and habitats is land that scored a value of 27 or higher according to the REVM (shown on maps and REVM as very high conservation value or extremely high conservation value). Native vegetation and habitats (including rainforest with < 50% camphor laurel) within identified wildlife corridors was classified as being HCV on its own merit. This is because such areas are considered fundamental to the restoration of corridors within a fragmented landscape and because these sites are invaluable as:

- habitat (including that of threatened species);
- stepping stone habitat for nomadic and migratory fauna;
- reference communities from which to gain information on local species assemblages (important for restoration actions on previously cleared lands); and
- contain source material (fauna and flora) for dispersal into the surrounding landscape or for collection as propagation material.

Areas that scored a value higher than 80.999 have been depicted on map 2 as being of Extremely High Conservation Value. This category is regarded the same as HCV, just that it has an extremely high ranking.

1.4 REFINING MAPPING

The accuracy and availability of mappable information identified within the Relative Ecological Values Matrix is variable. Submissions made to the Draft Byron Biodiversity Conservation Strategy 2003 indicated the need for improved mapping. Where mapping data is not yet available or where further decision rules need to be applied it is recommended to 'park' these items and add them to the matrix tally as information becomes available. This will alter the output figures but will depict a truer picture of the value of any identified land parcel. In parking these currently unavailable ecological criteria, it is important to allocate them a position within the matrix until the information is made available. This will prompt action on the delivery of the required mapping products.

The identification of High Conservation Value vegetation and habitats was primarily based on the Byron Flora and Fauna Study vegetation mapping, which was largely based on 1991 aerial photographs mapped at 1:25,000 at a Shire–wide scale. This mapping has limitations, which are described in the Byron Flora and Fauna Study (1999). In some areas of the Shire there has been changes to vegetation cover (gains & losses) since the mapping was undertaken. This has resulted in some inaccuracies in the identification of HCV vegetation and habitats. Updating of the mapping is urgently required to improve the identification of High Conservation Value vegetation and habitats. Due to the inaccuracies the mapping is considered indicative. There are areas of land that have not been identified as HCV due to inaccuracies in the mapping. Areas that are known to support native vegetation but were not mapped in the Byron Flora and Fauna Study (1999) (and subsequently not considered for mapping as HCV) include but are not limited to:

- lands directly abutting southern extent of Bayside Brunswick;
- littoral rainforest community at Cavvanbah St, Byron Bay;
- > wetland communities in the Belongil catchment;
- sedgelands in the Ewingsdale to West Byron area eg adjacent to Belongil Fields; and
- small patches of regrowth rainforest.

Inclusion of threatened species criteria in the REVM has not yet been fully undertaken. Threatened species criteria that have been included are Flying-fox camps, shorebird roost sites and modelled Koala habitat. A threatened species habitat model has been developed from models developed by the NPWS/DEC, and refined by BSC to match Byron vegetation and riparian mapping (excluding camphor laurel > 50% & privet). This model has not been included in the REVM, but has instead been shown as a separate map. Inclusion of the threatened species criteria into the REVM should be undertaken in association with targeted site assessments.

Table 1: Relative Ecological Value Matrix for the Byron Shire. NB: mapping not yet completed or available for rows with light shading.

Mapping for patch/remnant size will be displayed separate to the Ecological Values Matrix and be used in association with distance from/proximity to ecologically resilient or ecologically threatened vegetation to prioritise restoration works.

Ecological criterion	Very high ecological	Relatively high	Medium ecological value	Lower ecological	Very low ecological
	value (HCV)	coological raido	ecological raide	value	value
Points Value	27	9	3	1	0
A. Forest Ecosystems					
1. Growth stage of	Old growth forest				Cleared land
vegetation					
(based on Byron Flora					
and Fauna old growin					
2 Pare endangered	Pare and	Vulnerable			
and vulnerable	Endangered forest	ecosystems (FF's			
forest ecosystems	ecosystems	with 60% target set)			
(including		or			
rainforest)	R & E FE's with	ecosystems			
(based on conservation	100 % target set	identified as being			
criterion as defined in		Severely Depleted			
JANIS)		(SD=> 55% cleared)			
3. FE with limited	< 100 & > 0 ha in	> 100 & = 500ha</td <td>> 500 & <!--= 1000 ha</td--><td></td><td></td></td>	> 500 & = 1000 ha</td <td></td> <td></td>		
extent in Shire	Shire	in Shire	in Shire		
(except introduced	io EE _ + 0.10.9/	in FE + 0.06 % of	io EE t 0.2.9/_ of		
plantations & water	IEFE = < 0.19%	IE FE = < 0.90 % 01	IE FE = < 1.92 % 01		
surfaces)	or Shire	Shire	Shire		
4. Adeguacy of	Currently verv	Currently poor. >30	Currently moderate.	Currently	Currently
reservation	poor. $> 60 \%$	& = 60 % needs to</td <td>> 10 & <!--= 30 %</td--><td>reasonable.</td><td>good.</td></td>	> 10 & = 30 %</td <td>reasonable.</td> <td>good.</td>	reasonable.	good.
(% of each forest	needs to be	be reserved to meet	needs to be	= 10 & 0 %	0 - no
ecosystem remaining on	reserved to meet	reservation targets.	reserved to meet	needs to be	reservation is
private property that	reservation	-	reservation targets.	reserved to meet	required to
needs to be formerly	targets.			reservation	meet targets.
reserved to meet CRA				targets.	
reservation targets once					
all reservation categories					
accounted for)					
5 % of FE cleared in	> 70 % cleared	> 55 & - 70 %</td <td>> 40 & < -55 %</td> <td>> 25 & < -40 %</td> <td><!--- 25 %</td--></td>	> 40 & < -55 %	> 25 & < -40 %	- 25 %</td
Upper North East	<pre></pre> / 0 % of the	cleared.	cleared.	cleared.	cleared.
(based on CRA estimates	original forest	(between 30 – 45 %	(between 45 - 60 %	(between 75 - 60	(more than 75
of original vegetation at	ecosystem in the	of the original forest	of the original forest	% of the original	% of the
1750 for the region – does	UNE region	ecosystem in the	ecosystem in the	forest	original forest
not include rainforest,	remains)	UNE region	UNE region	ecosystem in the	ecosystem in
heath or wetlands)		remains)	remains)	UNE region	the UNE
				remains)	region
6 Locally andomic FF	> 75% of EE				remains)
5. Locally endemic FE	distribution in				
distribution in Byron	Byron Shire				
Shire compared to	(excluding wattle)				
area in UNE)	(childranig hallo)				
7. FE's whose target		Ecosystems			
cannot be met		identified as being			
wholly on public		Private Land Priority			
lands		(PLP) for protection	1		

Ecological criterion	Very high ecological value (HCV)	Relatively high ecological value	Medium ecological value	Lower ecological value	Very low ecological value
B. Native Fauna					
8. Fauna corridors Mapping shown as: vegetated corridor (habitat); and non vegetated corridor (environmental repair & enhancement)	 Vegetated identified corridors (derived and mapped by NPWS and refined by BSC - incorporates escarpment zone) Rivers (20 m buffer) 	 Exotic Vegetated identified corridors Local corridors* (local corridors currently unmapped – to be delineated by local groups/landholders in consultation with Council and have long term security of title and/or landuse via zoning, covenant or property management plan) 	Non vegetated identified corridors		
 Significant animal habitats. *Key fauna habitats based on NPWS derivation (ground truthed to BSC veg mapping), *Class 1 modelled habitat 	Shorebird nest & roost sites	Key fauna habitats derived by NPWS and refined by BSC to fit to native vegetation			
based on NPWS modelling (ground truthed to BSC veg mapping), *Shorebird roost/nest sites mapped by BSC.	habitat for select key threatened fauna species				
10. Grey – headed and Black Flying Fox maternity/roost sites (both are listed threatened species)	Identified maternity/roost sites for the Grey headed Flying Fox and Black Flying Fox				
11. Koala habitat Based on Byron Veg mapping modelled using Koala Habitat Categories developed by Australian Koala Foundation.	Identified core Koala habitat (SEPP 44)	Primary habitat (FE's = 73, 102, 142) Secondary habitat (class A) (FE = 154) Secondary habitat (class B) (FE's = 26, 95, 101, 109, 152)	Secondary habitat (class C) (FE's = 23, 37, 50, 65, 71, 74, 103, 106, 147, 148)	Tertiary habitat (FE's = 22, 76, 112, 143, 151, 169)	
12. Threatened animal species (based on methodology for North Ocean Shores LES) Develop buffers for different guilds of species.	Recorded locations and known habitat of animal species listed on the Commonwealth Environment Protection & Biodiversity Conservation Act	Recorded locations and known habitat of animal species listed on the NSW Threatened Species Conservation Act	Recorded locations and known habitat of animal species identified as regionally significant (no mapping currently available)		
C. Native flora 13. Significant Byron Shire flora habitats. (based on CRA data – not available yet - to be prepared by NPWS)	Centres of endemism (habitats for plants restricted to the Tweed, Brunswick and Richmond Valleys or those that also have isolated outlying populations eg Dorrigo)				

Ecological criterion	Very high ecological	Relatively high ecological value	Medium ecological value	Lower ecological	Very low ecological
14. Subject to threatening processes within Byron (FE negatively impacted by dieback, disturbance by fire, fragmentation, high levels of weed invasion and > 10 % in 2A zone)	value (HCV) > 10% of FE in Byron Shire occurs in 2A zone.		Weed = 5, 22, 65, 112, 141, 142, 143, 152, 154, 168. Dieback = 26, 73, 154. Fire = 5, 22, 50, 77, 112, 143, 152, 154, 168.	value Subject to overall threats regionally (based on CRA data) Overall threat classes = clearing, logging, grazing, weed, burning, other)	value
15. Other significant flora habitats		Key habitats (no mapping currently available)			
 16. Rare and Threatened plant locations (point locations only – buffers to be determined) same methodology as for Nth Ocean Shores LES 1996 	Recorded locations and known habitat of plant species listed on the Commonwealth Endangered Species Protection Act	Recorded locations and known habitat of plant species listed on the NSW Threatened Species Conservation Act	Recorded locations and known habitat of plant species identified as regionally significant (no mapping currently available)		
D. Non-forest ecosystems					
17. Wetlands (wetland mapping based on combining 2 different DIPNR mapping products for Richmond & Brunswick as well as SEPP 14) Richmond mapping by Early Brunswick mapping by Lenehan/Green NB: Belongil wetland mapping in progress & to be added when available		Dunal swamps & lagoons Estuarine lakes & lagoons Floodplain complex or forest Mangrove or saltmarsh Upland lakes & lagoons Upland swamps SEPP 14 wetlands			
18. Native Grasslands (no mapping currently available)	Native Grasslands				
19. Heath and Banksia		Mapped heath and banksia	Landa manad for		
National Estate (need to get mapping)		biodiversity values (flora and fauna species richness	their naturalness values		
21. Floodplains (based on DIPNR floodplain/wetland mapping)	Woody native vegetation on floodplain				
22. SEPP 26 mapping	Lands mapped as SEPP 26				
23. Endangered Ecological Communities listed under the NSW Threatened Species Conservation Act	Lowland Rainforest on Floodplain Byron Bay Dwarf Graminoid Clay Heath				

The following Data layers are to be displayed as single maps for comparison against the map of ecological value.

	Very high ecological resilience	Relatively high ecological resilience	Medium ecological resilience	Low ecological resilience	Very low ecological resilience
Patch/remnant size – ecological resilience to threatening processes	Patch size > 1000 ha	Patch size > 250 & = 1000 ha</th <th>Patch size > 50 & <!--= 250 ha</th--><th>Patch size > 5 &</th><th>Patch size < 5 ha</th></th>	Patch size > 50 & = 250 ha</th <th>Patch size > 5 &</th> <th>Patch size < 5 ha</th>	Patch size > 5 &	Patch size < 5 ha
	Very high ecological threat	Relatively high ecological threat	Medium ecological threat	Lower ecological threat	Very low ecological threat
Patch/remnant size – ecological threat in core vegetation	Patch size < 5 ha.	Patch size < 50 & >/= 5 ha.	Patch size < 500 & >/= 50 ha.	Patch size < 1000 & >/= 500 ha.	Patch size > 1000 ha.

NB:* use distance to nearest remnant > 5ha as criteria for identifying threat/resilience (ie prioritise ecological repair and enhancement areas on distance/proximity to ecologically resilient vegetation and to ecologically threatened vegetation).

Existing Environmental zoning's	Existing Environmental Protection Zones
(according to Byron LEP)	(7a, 7b, 7c, 7d 7f1, 7j & 7k) – NB: current zones may require ground
excluding 7f2)	truthing

Table 2: Conservation Criteria of vulnerable, rare and endangered Forest Ecosystems

Ecosystem Status	
Vulnerable	 is approaching 70 % reduction in areal extent within bio-region (10 - 30% remaining & target of 60% of current distribution); remains subject to threatening processes; or not depleted, but significant threatening processes exist which may reduce its extent; includes ecosystems where threatening processes have caused significant changes in species composition, loss or significant decline in species that play major role within ecosystem, or significant alteration to ecosystem processes.
Rare	 geographical distribution involves a total range of less than 10,000 ha; a total area of < 1,000 ha and target of 100% of its current distribution;
	patch sizes < 100 ha, where such patches do not aggregate to significant areas;
	old growth forest less than 10 % of the extent of distribution;
Endangered	< 10% remaining and a target of 100% of its current distribution.
-	distribution has contracted to less than 10 % of its former range; or
	total area has contracted to less than 10 % of its former area; or
	90 % of its area is in small patches which are subject to continuing threatening processes

(Janis report 1997)

Byron Biodiversity Conservation Strategy 2004









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121 Rock
141 Swamp Mahogany
142 Swamp Mahogany
143 Swamp Oak
147 Turpentine
148 Very Wet New England Blackbutt-Tallowwood
151 Wattle (including Mixed Regrowth)
152 Wet Bloodwood-Tallowwood
154 Wet Flooded Gum/Tallowwood
165 Forestry Plantations
167 Introduced Scrub
168 Rainforest
169 Scrub
171 Water Surfaces
201 Camphor Laurel
22 Coast Range Bloodwood-Mahogany
26 Coastal Flooded Gum
37 Dry Heathy Blackbutt-Bloodwood
58 Heathy
64 Heath
65 Heathy Scribbly Gum
71 Ironbark
73 Lowland Red Gum
74 Lowlands Scribbly Gum
76 Coastal Mallee
77 Mangrove
95 Northerm Moist Blackbutt







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NPWS Estate Enviro Protect Zones

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NPWS Estate Cadastre Corridors HCV Ranking >High Very Low Ecological Value Low Ecological Value Medium Ecological Value High Ecological Value Very High Ecological Value Extremely High Ecological Value

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NPWS Estate

Council managed land Cadastre







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NPWS Estate

Threatened Fauna Model

Cadastre





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3. SPECIES OF CONSERVATION SIGNIFICANCE (In Byron Shire)

Threatened Fauna Species				
Common Name	Scientific Name	TSC Act code	EPBC Act	Occurrence (Known/Potential)
AMPHIBIANS				
Pouched Frog	Assa darlingtoni	V2		Known
Wallum Frog	Crinia tinnula	V2		Known
Loveridge's Frog	Philoria loveridgei	V2		Known
Green and Golden Bell Frog	Litoria aurea	E1	V	Known (historical record Tyagarah)
Wallum Sedge Frog	Litoria olongburensis	V2	V	Known
REPTILES				
Three-toed Snake-tooth Skink	Coeranoscincus reticulatus	V2		Known
Stephen's Banded Snake	Hoplocephalus stephensii	V2		Known
MARINE REPTILES				
Green Turtle	Chelonia mydas	V2		Known
Loggerhead Turtle	Caretta caretta	E1		Known
Leathery Turtle	Dermochelys coriacea	E1		Potential
BIRDS				
Magpie Goose	Ansranus semipalmata	V2		Known
Freckled Duck	Stictonetta naevosa	V2		Known
Black Bittern	Ixobrychus flavicollis	V2		Known
Australasian Bittern	Botaurus poiciloptilus	V2		Known
Black-necked Stork	Ephippiorhynchus asiaticus	E1		Known
Osprey	Pandion haliaetus	V2		Known
Square-tailed Kite	Lophoictinia isura	V2		Known
Red Goshawk	Erythrotriorchis radiatus	E1	V	Known
Brolga	Grus rubicunda	V2		Known

Threatened Fauna Species				
Common Name	Scientific Name	TSC Act code	EPBC Act	Occurrence (Known/Potential)
Bush-hen	Amaurornis olivaceus	V2		Known
Black-tailed Godwit	Limosa limosa	V2		Known
Terek Sandpiper	Xenus cinereus			Known
Great Knot	Calidris tenuirosris	V2		Known
Comb-crested Jacana	Irediparra gallinacea	V2		Known
Painted Snipe	Rostratula benghalensis australis	E1		Potential
Bush Stone-curlew	Burhinus grallarius	E1		Known
Beach Stone-curlew	Esacus neglectus	E1		Known
Pied Oystercatcher	Haematopus longirostris	V2		Known
Sooty Oystercatcher	Haematopus fuliginosus	V2		Known
Lesser Sand-plover	Charadrius mongolus	V2		Known
Little Tern	Sterna albifrons	E1		Known
Wompoo Fruit-dove	Ptilinopus magnificus	V2		Known
Superb Fruit-dove	Ptilinopus superbus	V2		Known
Rose-crowned Fruit-dove	Ptilinopus regina	V2		Known
Red tailed Black Cockatoo	Calyptorhynchus banksii	V2		Potential
Glossy Black-cockatoo	Calyptorhynchus lathami	V2		Known
Coxen's Fig-parrot	Cyclopsitta diophthalma coxeni	E1	E	Known
Swift Parrot	Lathamus discolor	E1	E	Known
Ground Parrot	Pezoporus wallicus	V2		Known
Powerful Owl	Ninox strenua	V2		Known
Barking Owl	Ninox connivens	V2		Known
Sooty Owl	Tyto tenebricosa	V2		Known
Masked Owl	Tyto novaehollandiae	V2		Known
Grass Owl	Tyto capensis	V2		Known
Marbled Frogmouth	Podargus ocellatus	V2		Known
Collared Kingfisher	Todirhamphus chloris	V2		Known
Albert's Lyrebird	Menura alberti	V2		Known
Rufous Scrub-bird	Atrichornis rufescens	V2		Known
Eastern Bristlebird	Dasyornis brachypterus	E1	E	Known

Threatened Fauna Species				
Common Name	Scientific Name	TSC Act code	EPBC Act	Occurrence (Known/Potential)
Regent Honeyeater	Xanthomyza phrygia	E1	E	Known
Mangrove Honeyeater	Lichenostomus fasciogularis	V2		Known
White-eared Monarch	Monarcha leucotis	V2		Known
Barred Cuckoo-shrike	Coracina lineata	V2		Known
Grey-crowned Babbler	Pomatostomus temporalis temporalis	V2		Historically known
MAMMALS				
Spotted-tailed Quoll	Dasyurus maculatus	V2	V	Known
Common (Pygmy) Planigale	Planigale maculatus	V2		Known
Koala	Phascolarctos cinereus	V2		Known
Eastern Pygmy-possum	Certartetus nanus	V2		Known
Yellow-bellied Glider	Petaurus austrlis	V2		Known
Squirrel Glider	Petaurus norfolcensis	V2		Known
Long-nosed Potoroo	Potorous tridactylus	V2		Known
Parma Wallaby	Macropus parma	V2		Known
Red-legged Pademelon	Thylogale stigmatica	V2		Known
Common (Queensland) Blossom-bat	Syconycteris australis	V2		Known
Eastern Tube-nosed Bat	Nyctimene robinsoni	V2		Known
Black Flying-fox	Pteropus alecto	V2		Known
Grey-headed Flying-fox	Pteropus poliocephalus	V2	V	Known
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	V2		Known
Eastern Freetail-bat	Mormopterus norfolkensis	V2		Known
Golden-tipped Bat	Kerivoula pauensis	V2		Known
Little Bentwing-bat	Miniopterus australis	V2		Known
Common Bentwing-bat	Miniopterus schreibersii	V2	Cons. Dep.	Known
Eastern Long-eared Bat	Nyctophilus bifax	V2		Known
Large-eared Pied Bat	Chalinolobus dwyeri	V2		Known
Hoary Wattled Bat	Chalinolobus nigrogriseus	V2		Known
Eastern Falsistrelle	Falsistrellus tasmaniensis	V2		Known
Large-footed Myotis	Myotis adversus	V2		Known

Threatened Fauna Species				
Common Name	Scientific Name	TSC Act code	EPBC Act	Occurrence (Known/Potential)
Greater Broad-nosed Bat	Scoteanax rueppellii	V2		Known
Eastern Cave Bat	Vespadelus troughtoni	V2		Known
Eastern Chestnut Mouse	Psuedomys gracilicaudatus	V2		Known
MARINE MAMMALS				
Blue Whale	Balaenoptera musculus	E1		Potential
Humpback Whale	, Megaptera novaeangliae	V2		Known
Southern Right Whale	Eubalaena australis	V2		Known
Sperm Whale	Physeter catodon	V2		Known
Dugong	Dugong dugon	E1		Known
Mitchell's Land Snail	Thersites mitchellae	E1	Crit. Endan.	Known (Recovery Plan)
Predatory carab ground beetle	Nurus atlas	E1		Potential
Predatory carab ground beetle	Nurus brevis	E1		Potential
Giant Dragonfly	Petalura gigantea	E1		Known
Laced or Australian Fritillary	Argyreus hyperbius	E1		Known - Billinudgel NR
Fisheries Management Act				
FISH		FM Act Code	FM Act Sched	lule
Grey Nurse Shark	Carcharias taurus	E	4	Known
Eastern Freshwater Cod	Maccullochella ikei	E	4	Known
Oxleyan Pygmy Perch	Nannoperca oxleyana	E	4	Potential
Great White Shark	Carcharodon carcharias	V	5	Known
Black Cod	Epinephelus daemelii	V	5	Known

Endangered Ecological Communities	TSC Act Code	
Lowland Rainforest on Floodplain	E1	Known
Byron Bay Dwarf Graminiod Clay Heath	E1	Known
Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner		Known
Bioregions	E1	
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner		Known
Bioregions	E1	
Key Threatening Processes	Schedule 3	
Anthropogenic climate change	3	
Bushrock removal	3	
High frequency fire resulting in the disruption of life cycle processes in plants and	3	
animals and loss of vegetation structure and composition		
Invasion of Native Plant Communities by Chrysanthemoides monilifera	3	
Predation by Gambusia holbrooki (Plague Minnow or Mosquito Fish)	3	
Predation by the European Red Fox Vulpes vulpes	3	
Predation by the Feral Cat Felis catus	3	
Loss or degradation (or both) of sites used for hill topping by butterflies	3	
Importation of the Red Imported Fire Ants Solenopsis invicta	3	
Alteration to the natural flow regimes of rivers and streams and their floodplains		
and wetlands	3	
Competition and grazing by the feral European Rabbit Oryctolagua cuniculus	3	
Clearing of native vegetation	3	
Entanglement in or ingestion of anthropogenic debris in marine and estuarine		
environments	3	
Introduction of the Large Earth Bumblebee, Bombus terrestris	3	
Removal of dead wood and dead trees	3	
Death or injury to marine species following capture in shark control programs on		
ocean beaches	3	
Infection of native plants by Phytopthera cinnamomi	3	
Infection by Psittacine Circoviral (beak and feather) disease affecting	3	
endangered psittacine species and populations		
Competition from feral honeybees Apis mellifera	3	
Infection of frogs by amphibian chytrid causing the disease chytridiomycocis	3	

Invasion of native plant communities by exotic perennial grasses	3	
Predation, habitat destruction, competition and disease transmission by Feral Pigs,		
Sus scrofa	3	

Threatened Flora						
				EPBC	ROTAP	Occurrence
Family	Scientific Name	Common Name	TSC Act	Act	(NSW)	(Known/Potential)
Endangered						
Species						
Rubiaceae	Knoxia sumatrensis		Х			Extinct
Euphorbiaceae	Acalypha eremorum (inc. sp. nov.)	Acalypha	E			Known
Rutaceae	Acronychia littoralis	Scented Acronychia	E	E	3ECi	Known
Casuarinaceae	Allocasuarina defungens	Dwarf Heath Casuarina	E	E	2E	Known
Loranthaceae	Amyema scandens	Rosewood Mistletoe	E			Potential
Euphorbiaceae	Baloghia marmorata	Jointed Baloghia	E		3VC-	Potential known from Tweed & Ballina
Polypodiaceae	Belvisia mucronata		E			Potential
Fabaceae	Caesalpinia bonduc		E			Potential
Caesalpiniaceae	Cassia brewsteri var. marksiana	Brush Cassia	E		2RCi	Known - planted specimens only
Euphorbiaceae	Chamaesyce psammogeton		E			Known - possibly extinct from Shire
Myrtaceae	Choricarpia subargentea	Giant Ironwood	Е		3RC-	Known
Asclepiadaceae	Cynanchum elegans	White-flowered Wax plant	E	E	3ECi	Known
Cyperaceae	Cyperus semifertilis		E		3VC-	Known
Davidsoniaceae	Davidsonia jerseyana (syn. pruriens var. jerseyana)	Davidson's Plum	E	E	2ECi	Known
Davidsoniaceae	Davidsonia johnsonii	Smooth Davidson's Plum	E	E	2ECi	Known
Ebenaceae	Diospyros mabacea	Red-fruited Ebony	E	E	2ECi	Known
Sapindaceae	Diploglottis campbellii	Small-leaved Tamarind	E	E	2E	Known
Orchidaceae	Diuris byronensis	Byron Bay Diuris	E			Known
Polypodiaceae	Drynaria rigidula	Basket Fern	E			Known
Proteaceae	Eidothea sp. "Nightcap Ra"	Nightcap Oak	E	CE		Known
Elaeocarpaceae	<i>Elaeocarpus</i> sp. 2 minyon	Minyon Quandong	E	E	2E	Known
Elaeocarpaceae	Elaeocarpus williamsianus	Hairy Quandong	E	E	2ECi	Known
Lauraceae	Endiandra floydii	Crystal Creek Walnut	E	E	2VC-	Known
Lauraceae	Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	E			Known
Orchidaceae	Geodorum densiflorum	Pink Nodding Orchid	E			Known
Myrtaceae	Gossia fragrantissima (syn Austromyrtus)	Fragrant Myrtle	E	E	3EC-	Known
Grammitaceae	Grammitis stenophylla	Narrow-leaf Finger Fern	E			Potential

Threatened Flora						
Family	Scientific Name	Common Name	TSC Act	EPBC Act	ROTAP (NSW)	Occurrence (Known/Potential)
Proteaceae	Grevillea hilliana	White Yeil Yeil	E			Known
Acanthaceae	Harnieria hygrophiloides (syn. Calophanoides)	Calophanoides or Native Justica	E			Known
Dilleniaceae	Hibbertia hexandra		E		3RC-	Known
Acanthaceae	Isoglossa eranthemoides	Isoglossa	E	E	2E	Known
Asclepiadaceae	Marsdenia longiloba	Slender Marsdenia	E		3RC-	Known
Rutaceae	Melicope vitiflora		E			Known
Sapotaceae	Niemeyera chartacea		E			Known
Orchidaceae	Oberonia complanata		E			Known — historical record from Byron
Apocynaceae	Ochrosia moorei	Southern Ochrosia	E	E	2ECi	Known
Orchidaceae	Phaius australis	Swamp Orchid	E	E	3VCa	Known
Orchidaceae	Phaius tankervilliae	Tankerville's Swamp Orchid	E	E		Known
Euphorbiaceae	Phyllanthus microcladus (syn. Sauropus albiflorus subsp. Microcladus)	s Brush Sauropus	E			Known
Lamiaceae	Plectranthus nitidus	Nightcap Plectranthus	E	E	2KCi	Known
Rubiaceae	Randia moorei	Spiny Gardenia	E	E	3ECi	Known
Caesalpiniaceae	Senna acclinis		E		2RC-	Known
Fabaceae	Sophora tomentosa	Coast Sophora	E			Known - planted specimens only
Myrtaceae	Uromyrtus australis	Peach Myrtle	E	Е	2ECi	Known
Flacourtiaceae	Xylosma terra-reginae	Xylosma	E			Known
Vulnerable species						
Mimosaceae	Acacia bakeri	Marblewood	V			Known
Casuarinaceae	Allocasuarina simulans		V		2VCa	Potential - as hybrid with A. defungens
Proteaceae	Alloxylon pinnatum	Dorrigo Waratah			3RCa	Known
Sapotaceae	Amorphospermum whitei	Rusty Plum	V		3RCa	Known
Mimosaceae	Archidendron hendersonii	White Lace Flower	V			Known
Rutaceae	Bosistoa selwynii	Heart-leaved Bosistoa	V	V		Known
Rutaceae	Bosistoa transversa	Three-leaved Bosistoa	V	V		Known
Corokiaceae	Corokia whiteana	Corokia	V	V	2VCi	Known
Lauraceae	Cryptocarya foetida	Stinking Cryptocarya	V	V	3VCi	Known
Cyperaceae	Cyperus rupicola		V		2RC-	Potential
Fabaceae	Desmodium acanthocladum	Thorny Pea	V	V	2VC-	Known

Threatened Flora						
Family	Scientific Name	Common Name	TSC Act	EPBC Act	ROTAP (NSW)	Occurrence (Known/Potential)
Doryanthaceae	Doryanthes palmeri	Giant Spear Lilly	V			Known
Lauraceae	Endiandra hayesii	Rusty Rose Walnut	V	V	3VC-	Known
Proteaceae	Floydia praealta	Ball Nut	V	V	3VC-	Known
Euphorbiaceae	Fontainea australis	Southern Fontainea	V	V	3VCi	Known
Proteaceae	Hicksbeachia pinnatifolia	Red Bopple Nut	V	V	3RC-	Known
Sapindaceae	Lepiderema pulchella	Fine-leaved Tuckeroo	V		2RC-	Known - planted specimens only
Proteaceae	Macadamia tetraphylla	Rough-shelled Bush Nut	V	V	2VC-	Known
Juncaginaceae	Maundia triglochinoides		V			Potential
Meliaceae	Owenia cepiodora	Onion Cedar	V	V	2VCi	Known
Orchidaceae	Peristeranthus hillii	an epiphytic orchid	V			Known
Orchidaceae	Pterostylis nigricans	Dark Greenhood	V		3V	Known
Fabaceae	Pultunaea maritima		V			Potential
Orchidaceae	Sarcochilus fitzgeraldii	Ravine Orchid	V	V	3VC-	Known
Orchidaceae	Sarcochilus hartmannii		V	V	3VC-	Known
Orchidaceae	Sarcochilus weinthalii	Blotched Sarcochilus	V		3VC-	Potential
Symplocaceae	Symplocos baeuerlenii	Small-leaved Hazelwood	V		2VC-	Known
Myrtaceae	Syzygium hodgkinsoniae	Red Lilly Pilly	V	V	3VC-	Known
Myrtaceae	Syzygium moorei	Coolamon, Durobby	V	V	2VCi	Known
Menispermaceae	Tinospora tinosporoides	Arrow-head Vine	V	V	3RC-	Known
ROTAP species no listed on TSC Act	t					
Mimosaceae	Acacia orites	Nightcap Wattle			2RC-	Known
Orchidaceae	Acianthus amplexicaulis				3RC-	Known
Asteraceae	Acomis acoma				3RC-	Known
Rutaceae	Acronychia baeuerlenii	Byron Bay Acronychia			3RC-	Known
Mimosaceae	Archidendron muellerianum	Veiny Lacebark			3RCa	Known
Escalloniaceae	Argophyllum nullumense	Silver Leaf			3RCa	Known
Euphorbiaceae	Austrobuxus swainii	Pink Cherry			3RCa	Known
Fabaceae	Callerya australis (syn Millettia)	Blunt-leaved Wisteria			3RC-+	Known

Threatened Flora						
Family	Scientific Name	Common Name	TSC Act	EPBC Act	ROTAP (NSW)	Occurrence (Known/Potential)
Asteliaceae	Cordyline congesta	Coastal Palm Lily			2RC-	Known
Corynocarpaceae	Corynocarpus rupestris ssp. arborescens	Southern Corynocarpus			3RC-	Known
Sapindaceae	Cupaniopsis newmanii	Long-leaved Tuckeroo			2RC-	Known
Lauraceae	Endiandra globosa	Black Walnut			2RC-	Known
Lauraceae	Endiandra introrsa	Dorrigo Plum			3RCa	Known
Cyperaceae	Gahnia insignus				3RCa	Known
Philydraceae	Helmholtzia glaberrima	Stream Lily			2RCa	Known
Orchidaceae	Liparis simmondsii				3KC-	Potential
Asclepiadaceae	Marsdenia liisae	Large-flowered Milk Vine			3RC-	Known
Asteraceae	Olearia heterocarpa				2RCa	Known
Asteraceae	Ozothamnus whitei				3RC-	Known
Aristolochiaceae	Pararistolochia laheyana	Mountain Aristolochia			2RC-+	Known
Rutaceae	Phebalium elatius	Tall Phebalium			3K	Potential
Lamiaceae	Plectranthus cremnus				3K	Known
Simarbouraceae	<i>Quassia</i> sp 'Mt Nardi'	Southern Quassia			3RC-	Known
Myrtaceae	Rhodamnia maideniana	Smooth Scrub Turpentine			2RC-	Known
Cucurbitaceae	Trichosanthes subvelutina	Silky Cucumber			3RC-	Known
Labiatae	Westringia blakeana				2RCa	Known
Rutaceae	Zieria hindii (syn species J)				2R	Potential
ADDITIONAL SPECIES OF CONSERVATIO N INTEREST						
Acanthaceae	Brunoniella spiciflora					Known
Orchidaceae	Cheirostylis notalis					Known
Orchidaceae	Liparis habenarina					Potential

Threatened Flora						
Family	Scientific Name	Common Name	TSC Act	EPBC Act	ROTAP (NSW)	Occurrence (Known/Potential)
Phytolaccaceae	Monococcus echinophorus					Known
Apocynaceae	Neisosperma poweri	Milk Bush				Known
Malvaceae	Sida cordifolia					Known Cape Byron
Araceae	Typhonium brownii					Known Inner Pocket NR

4. BIRD SPECIES

(listed under the Japan-Australian Migratory Bird Agreement and the China-Australia Migratory Bird Agreement)

Common name	Scientific name	Known or Potential	Common name	Scientific name	Known or Potential
American Golden Plover	Pluvialis dominica	Known	Grey-tailed Tattler	Heteroscelus brevipes	Known
Bar-tailed Godwit	Limosa lapponica	Known	Latham's Snipe	Gallinago hardwickii	Known
Barn Swallow	Hirundo rustica	Potential	Lesser Frigatebird	Fregata ariel	Known
Caspian Tern	Sterna caspia	Known	Lesser Golden Plover	Pluvialis dominica	Known
Cattle Egret	Ardea ibis	Known	Little Tern	Sterna albifrons	Known
Common Greenshank	Tringa nebularia	Known	Marsh Sandpiper	Tringa stagnatilis	Known
Common Noddy	Anous stolidus	Potential	Oriental Cuckoo	Cuculus saturatus	Known
Common Sandpiper	Actitis hypoleucos	Known	Pectoral Sandpiper	Calidris melanotos	Known
Common Tern	Sterna hirundo	Known	Red Knot	Calidris canutus	Known
Crested Tern	Sterna bergii	Known	Red-necked Stint	Calidris ruficollis	Known
Curlew Sandpiper	Calidris ferruginea	Known	Ruddy Turnstone	Arenaria interpres	Known
Eastern Curlew	Numenius madagascariensis	Known	Sharp-tailed Sandpiper	Calidris acuminata	Known
Eastern Reef Egret	Egretta sacra	Known	Short-tailed Shearwater	Puffinus tenuirostris	Potential
Flesh-footed Shearwater	Puffinus carneipes	Potential	Wandering Tattler	Heteroscelus incanus	Known
Fork-tailed Swift	Apus pacificus	Known	Wedge-tailed Shearwater	Puffinus pacificus	Potential
Glossy Ibis	Plegadis falcinellus	Known	Whimbrel	Numenius phaeopus	Known
Great Egret	Ardea alba	Known	White-bellied Sea-Eagle	Haliaeetus leucogaster	Known
Great Frigatebird	Fregata minor	Potential	White-tailed Tropicbird	Phaethon lepturus	Potential
Great Knot	Calidris tenuirostris	Known	White-throated Needletail	Hirundapus caudacutus	Known

5. REGIONALLY SIGNIFICANT FAUNA – FAR NORTH EAST NSW

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Byron	Comments
INVERTEBRATES						Dr Geoff Williams
rainforest worm	Heteroporodrites doubei			х		only known from Lismore area
worm	Digaster biracemea			х		only known from Lismore area
Mitchell's Rainforest Snail	Thersites mitchellae	Е		x	х	Cumbebin/Belongil Swamp, Tyagarah NR
terrestrial snail	Pedinogyra rotabilis			х		Araucarian forests of Border Ranges
terrestrial snail	Cyrocochlea vinitincta					endemic - SE Qld - NNSW
terrestrial snail	Hedleyelia falconeri jacksoniana			х	х	Booyong = holotype locality
aquatic snail	Propehyridella nepeanensis opportuna			х	х	Booyong = holotype locality
mygalomorph spider	Seqocrypta mckeowni					endemic - SE Qld - NNSW
mygalomorph spider	Namea dicalcaria			х		restricted to between Nightcap and Lismore
mygalomorph spider	Namea flavomaculata			х		restricted to MacPherson Ranges
mygalomorph spider	Bymainella terraereginae					endemic genus, restricted to SEQId -NENSW
spider	Graycassis scrub			х		endemic, only known from Big Scrub Flora Reserve
A ground beetle	Nurus brevis	Е		х		endangered/endemic
A ground beetle	Nurus atlas	Е		х		endangered/endemic, restricted Big Scrub
ground beetle	Nurus latipennis					endemic, restricted SEQId - NENSW
undescribed belid weevil	Rhinotia sp. 1			х		only known from Lismore area
monotypic christmas beetle	Triplognathus griseopilosus					endemic, very rare - possibly threatened
beetle	Anilara olivia			х		sth limit at Wilson Park
wasp	Obesulus ater			х		endemic -only known from 1 Big Scrub remnant
fly	Homoneura scolodrilos			х	х	only known from 2 Big Scrub remnants
White Nymph Butterfly	Mynes geoffroyi guerini					Sth limit - restricted food plant
Richmond Birdwing Butterfly	Ornithoptera richmondia			х	х	resticted distribution and food source

Common name	Scientific name	Concernation Statuc	Conservation Status CRA Reservation Priority Rank	Richmond	Riciiliolia Byron	Comments
lacewing	Psychopsis gracilis			х	х	Booyong = holotype locality
Giant Dragonfly	Petalura gigantea	E			х	record from Suffolk Park
Coastal Evening Darner	Telephlebia tryoni				х	
Invertebrates of interest						
spider	Oncodamus dicipiens					endemic genus that reaches sth limit in NE NSW
spider	Graycassis chichester					restricted SQld - CNNSW
scorpion	Cormocephalus monteithi					restricted SEQId - NNSW
scorpion	Cormocephalus brachycerus					restricted SEQId - NNSW
snail	Ngairea corticola					endemic - restricted SEQId - NNSW
snail	Ngairea dorrigoensis					endemic - restricted SEQId - NNSW
snail	Hedleyoconcha delta					relictual genus
snail	Fluvidona petterdi					relictual genus
predatory flightless ground beetle	Notonomus ellipticus					restricted CQId - NNSW
predatory flightless ground beetle	Notonomus opacicollis					restricted CQld - NNSW
predatory flightless ground beetle	Castelnaudia septemcostata					restricted CQld - NNSW
flightless dung beetle	Lepanus ustulatus					restricted CQld - NNSW
flightless dung beetle	Diorygopyx incomptus					endemic genus, restricted SEQId - NNSW
moth	Azaleodes micronipha					endemic genus, restricted SQId - SNSW
fly	Euphranta leichardtiae					southern limit in NNSW
Cephenes Blue	Pseudodipsas cephenes				х	rare & endemic rainforest butterfly - Broken Hd LES 97
Diggle's Blue	Hypochrysops digglesii				x	rare & endemic rainforest butterfly - Broken Hd LES 97
Miskin's Jewel	Hypochrysops miskini				х	rare & endemic rainforest butterfly - Broken Hd LES 97
Regent Skipper	Euschemon rafflesia			х	х	rare & endemic rainforest butterfly - Broken Hd LES 97
Green Awl	Hasora disclor mastusia				x	rare & endemic rainforest butterfly - Broken Hd LES 97
Laced or Australian Fritillary	Argyreus hyperbius	E			х	Recorded from Billinudgel NR

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Byron	5 Comments
			-			NPWS, CRA, NRAC
AMPHIBIANS (FROGS)						
MYOBATRACHIDAE						
Tusked Frog	Adelotus brevis	XY		х	х	NRAC
Pouched Frog	Assa darlingtoni	v	4	х	х	
Wallum Froglet	Crinia tinnula	v	3	х	х	
Fletcher's Frog	Lechriodus fletcheri	XY		х	х	NRAC
Northern Banjo Frog	Limnodynastes terraereginae	XY	5	х	х	
Fleay's Barred Frog	Mixophyes fleayi	Е	1	х		known from Nightcap Range
Giant Barred Frog	Mixophyes iteratus	E	1	х		known from Nightcap Range
Loveridge's Frog	Philoria loveridgei	v	2	х	х	
Brown Toadlet	Pseudophryne bibronii		2			Not known from Shire
Dusky Toadlet	Uperoleia fusca	х		х	х	NRAC
HYLIDAE						
Green and Golden Bell Frog	Litoria aurea	E	2		х	historical record from Tyagarah
Green Thighed Tree Frog	Litoria brevipalmata	v	1.5	х		Not known from Shire
Freycinet's Frog	Litoria freycineti		4	х	х	
Wallum Sedge Frog	Litoria olongburensis	v	1.5	х	х	
Pearson's Tree Frog	Litoria pearsoniana		4	х	х	
Whirring Tree Frog	Litoria revelata	XY	3	х	х	
Tyler's Tree Frog	Litoria tyleri	XY		х	х	NRAC
REPTILES						
GEKKONIDAE						
Northern Leaf-tailed Gecko	Saltuarius swaini		3	x	1	Not recorded from Shire

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Bvron	Comments
AGAMIDAE						
Eastern Two-lined Dragon	Diporiphora australis	Х		х		NRAC – not recorded from Shire
Southern Angled-headed Dragon	Hypsilurus spinipes	XY	3	х	х	
SCINCIDAE						
Verreaux's Skink	Anomalopus verreauxii	Х		х		NRAC – not recorded from Shire
Red-tailed Calyptotis	Calyptotis ruficauda	Х	5	х		Not recorded from Shire
Scute-snouted Calyptotis	Calyptotis scutirostrum	х		х	х	NRAC
Beech Skink	Cautula zia	XY	1			High altitude Beech forest, possible for Border Ranges. Not recorded from Shire
Three-toed Snake-tooth Skink	Coeranoscincus reticulatus	v	2	х	х	
Major skink	Egernia frerei	Х		х	х	NRAC
McPhee's Crevice Skink	Egernia mcpheei	Х			х	
Martin's Forest Skink	Eulamprus martini	Х		х	Х	
Blue-speckled Forest-skink	Eulamprus murrayi	Х	4	х	Х	
Barred-sided Forest-skink	Eulamprus tenuis (nth)	х	2	х	Х	
	Eulamprus tryoni		1			High altitude cool forest - known from Qld and Tweed. Possible for upper Richmond
Friendly Sunskink	Lampropholis amicula	х			х	
Short-limbed Snake-skink	Ophioscincus truncatus	х	3	х	Х	
Yellow-bellied Three-toed Skink	Saiphos equalis	х		х	х	
Orange-tailed Shadeskink	Saproscincus challengeri	х	3	х	х	
Gall's Shadeskink	Saproscincus galli	х	3	х	х	
Byron Bay Shadeskink	Saproscincus oriarus		2		х	
	Saproscincus rosei	х	3	х		Not recorded from Shire
TYPHLOPIDAE						
a Blind Snake	Ramphotyphlops proximus	х				Not recorded from Shire
a Blind Snake	Ramphotyphlops wiedii	х				Not recorded from Shire
BOIDAE						

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Byron	Comments
Carpet Python	Morelia spilota	Х		x	х	
ELAPIDAE						
White Crowned Snake	Cacophis harriettae	v	1.5	х		Not recorded from Shire
Dwarf Crowned Snake	Cacophis krefftii	Х	5	х	х	
Pale-headed Snake	Hoplocephalus bitorquatus	٧	1	х		Not recorded from Shire
Stephens Banded Snake	Hoplocephalus stephensii	v	1	х	x	Only known from large forested tracts from hinterland
Taipan	Oxyuranus scutellatus	Х		х		Not recorded from Shire
Blue-bellied Black Snake	Pseudechis guttatus	Х		х		Not recorded from Shire
Rough-scaled Snake	Tropidechis carinatus	Х	3.5	х	х	
MARINE REPTILES						
Loggerhead turtle	Caretta caretta	v			х	
Green turtle	Chelonia mydas	v			х	
Leathery Turtle	Dermochelys coriacea	v			?	
BIRDS						
Emu	Dromaius novaehollandiae	EP		х		Not recorded from Shire (possibly historically occurred in Shire)
ANSERANATIDAE						
Magpie Goose	Anseranus semipalmata	v		х	х	
ANATIDAE						
Plumed Whistling-duck	Dendrocygna eytoni	Y			х	
Wandering Whistling-duck	Dendrocygna arcuata	Y			х	
Blue-billed Duck	Oxyura australis	v		х		Not recorded from Shire
Freckled Duck	Stictonetta naevosa	v		х	х	Occurs in Shire during extensive inland drought
Cotton Pygmy Goose	Nettapus coromandelianus	Е		x		Not recorded from Shire
Australasian Shoveler	Anus rhynchotis	Y		х	х	

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Sichmond		5 Comments
Black-winged Petrel	Pterodroma nigripennis	v		x		?
Providence Petrel	Pterodroma solandri	v		х		?
Fleshy-footed Shearwater	Puffinus carneipes	v		х		?
Little Shearwater	Puffinus assimilis	v		х		?
Red-tailed Tropicbird	Phaethon rubicauda	v		х		?
Masked Booby	Sula dactylatra	v		х		?
ARDEIDAE						
Little Egret	Egretta garzetta	Y		х	х	
Eastern Reef Egret	Egretta sacra	х		х	х	
Great Egret	Egretta alba	Y		х	х	
Intermediate Egret	Egretta intermedia	Y		х	х	
Little Bittern	Ixobrychus minutus	Y		х	х	(
Black Bittern	Dupetor flavicollis	v	3	x	x	ι
Australasian Bittern	Botaurus poiciloptilus	v		x	x	Only known from West Byron STP in Shire
THRESKIORNITHIDAE						
Glossy Ibis	Plegadis falcinellus	Y		х	х	(
Royal Spoonbill	Platalea regia	Y		х	х	(
Yellow-billed Spoonbill	Platalea flavipes	Y		х	х	
CICONIIDAE						
Black-necked Stork	Xenorhynchus asiaticus	E	3	x	x	τ
ACCIPITRIDAE						
Osprey	Pandion haliatetus	v	3	х	х	(
Pacific Baza	Aviceda subcristata	х	3	х	х	
Square-tailed Kite	Lophoictinia isura	v	2.5	х	х	τ
Brahminy Kite	Haliastur indus	XY	4	х	х	
White-bellied Sea Eagle	Haliaeetus leucogaster	Y		х	х	

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond		Comments
Grey Goshawk	Accipiter novaehollandiae		4	х	х	κ
Red Goshawk	Erythrotriorchis radiatus	E	2	х	х	κ
FALCONIDAE						
Peregine Falcon	Falco peregrinus	Y	5	х	х	X
GRUIDAE						
Brolga	Grus rubicunda	v		х	х	x
RALLIDAE						
Lewin's Rail	Rallus pectoralis	Y	5	х	х	x
Bush-hen	Gallinula olivacea	v	4	х	х	X
Spotless Crake	Porzana tabuensis	Y		х	х	x
TURNICIDAE						
Black-breasted Button-quail*	Turnix melanogaster	Е	1	х		Not known from Shire
Red-backed Button-quail	Turnix maculosa	х		х	х	x
SCOLOPACIDAE						
Latham's Snipe	Gallinago hardwickii	Y		х	х	x
Black-tailed Godwit	Limosa limosa	v		х	х	x
Bar-tailed Godwit	Limosa lapponica	Y		х	х	X
Whimbrel	Numenius phaeopus	Y		х	х	X
Eastern Curlew	Numenius madagascariensis	Y		х	х	X
Little Curlew	Numenius minutus	Y		х		Not known from Shire
Marsh Sandpiper	Tringa stagnatilis	Y		х	х	x
Common Greenshank	Tringa nebularia	Y		х	х	κ
Wood Sandpiper	Tringa glareola	Y		х	х	κ
Common Sandpiper	Actitis hypoleucos	Y		х	х	κ
Grey-tailed Tattler	Heteroscelus brevipes	Y		х	х	X
Wandering Tattler	Heteroscelus incanus	XY		х	х	x

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Bvron	Comments
Ruddy Turnstone	Arenaria interpres	Y		x	х	
Great Knot	Calidris tenuirostris	v		x	х	
Red Knot	Calidris canutus	Y		х	х	
Red-necked Stint	Calidris ruficollis	Y		х	х	
Sanderling	Calidris alba	v		х		
Pectoral Sandpiper	Calidris melanotos	Y		х	х	
Sharp-tailed Sandpiper	Calidris acuminata	Y		х	х	
Curlew Sandpiper	Calidris ferruginea	Y		х	х	
Broad-tailed Sandpiper	Limicola falcinellus	v		х		Not known from Shire
Ruff	Philomachus pugnax	Y				Not known from Shire
Terek Sandpiper	Xenus cinereus	v		х	х	
Painted Snipe	Rostratula benghalensis australis	Е		х		Not known from Shire
JACANIDAE						
Comb-crested Jacana	Irediparra gallinacea	v		х	х	Recorded breeding at West Byron STP
BURHINIDAE						
Bush Stone-curlew	Burhinus grallarius	Е	1.5	х	х	
Beach Stone-curlew	Esacus neglectus	Е		х	х	Historically bred at Belongil Spit (1980's)
HAEMATOPODIDAE						
Pied Oystercatcher	Haematopus longirostris	v		х	х	Breeds at Belongil Spit
Sooty Oystercatcher	Haematopus fuliginosa	v		х	х	
CHARADRIIDAE						
Pacific Golden Plover	Pluvialis apricaria	Y		х	х	
Grey Plover	Pluvialis squtarola	Y		х	х	
Double-banded Plover	Charadrius bicinctus	Y		х	х	
Greater Sand Plover	Charadrius leschenaultii	v		х		
Lesser Sand Plover	Charadrius leschenaultii	v		х	х	

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Byron	Comments
LARIDAE				_	-	
Little Tern	Sterna albifrons	E		х	х	Historically bred at Belongil Spit (1980's) and TallowCk Spit (1970's)
Sooty Tern	Strena fuscata	V		х		
			_		-	
Brush Bronzewing	Phaps elegans		2	х	х	
Wompoo Fruit-dove	Ptilinopus magnificus	V	2.5	х	х	
Superb Fruit-dove	Ptilinopus superbus	V	2	х	х	
Rose-crowned Fruit-dove	Ptilinopus regina	V	3.5	х	х	Nomadic species. Commonly utilises camphor scrubs
CACATUIDAE					-	
Glossy Black-cockatoo	Calyptorhynchus lathami	V	2.5	х	х	
Red-tailed Black-cockatoo	Calyptorhynchus magnificus	V	2	х	-	No confirmed records for Byron Shire
PSITTACIDAE					-	
Musk Lorikeet	Glossopsitta concinna		3.5	х	х	
Double-eyed Fig-parrot	Cyclopsitta diophthalma coxeni	E	1	х	х	
Swift parrot	Lathamus discolor	V	3	х	х	One record from Shire
Turquoise Parrot	Neophema pulchella	V	2.5	х	_	Not recorded from Shire. Typically west of divide
Ground Parrot	Pezoporus wallicus	V		х	x	One record from Shire
CUCULIDAE						
Oriental Cuckoo	Cuculus saturatus	X	5	х	х	
Black-eared Cuckoo	Chrysococcyx osculans		5	х	_	Not recorded from Shire. Typically west of divide
Little bronze-Cuckoo	Chrysococcyx malayanus	Х	2	х	х	
STRIGIDAE					_	
Barking Owl	Ninox connivens	V	1	х	х	Recent record from Skinners Shoot
Powerful Owl	Ninox strenua	V	1	х	х	
TYTONIDAE				_	+	
Eastern Grass Owl	Tyto longimembris	V		х	х	Recorded breeding in sedgelands at West Byron STP prior to modification for effluent treatment

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Buron	Comments
Masked Owl	Tyto novaehollandiae	v	3	х	х	
Sooty Owl	Tyto tenebricosa	v	2	х	х	
PODARGIDAE						
Marbled Frogmouth	Podargus ocellatus	v	1	х	х	
APODIDAE						
White-rumped Swiftlet	Collocalia spodiopygia	х		х	х	
HALCYONIDAE						
Forest Kingfisher	Halcyon macleayii	х	3	х	Х	
Red-backed Kingfisher	Halcyon pyrrhopygia		5			Not recorded from Shire. Typically west of divide
Collared Kingfisher	Halcyon chloris	v	4	х	Х	
PITTIDAE						
Noisy Pitta	Pitta versicolor		4	х	Х	
MENURIDAE						
Albert's Lyrebird	Menura alberti	v	2	х	х	
ATRICHORNITHIDAE						
Rufous Scrub-bird	Atrichornis rufescens	v	1	х	х	
MALURIDAE						
Southern Emu-wren	Stipiturus malachurus	Y		х	х	
PARDALOTIDAE						
Eastern Bristlebird	Dasyornis brachypterus	Е	1	х	Х	
Chestnut-rumped Heathwren	Hylacola pyrrhopygia	Y	2	х	?	Not recorded from Shire
Mangrove Gerygone	Gerygone laevigaster	XY		x	Х	
MELIPHAGIDAE						
Regent Honeyeater	Xanthomyza phrygia	E	2.5	х	Х	One record from Shire
Painted Honeyeater	Grantiella picta	v	3			Not recorded from Shire. West of divide
Mangrove Honeyeater	Lichenostomus fasciogularis	v	3	х	Х	

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Dichmond	KICHMONG	5 Comments
Yellow-tufted Honeyeater	Lichenostomus melanops		2	x		Not recorded from Shire
PETROICIDAE			_			
Hooded Robin	Petroica melanodryas	v	2.5	5 x		Not recorded from Shire. Typically from west of divide
Pale-yellow Robin	Tregellasia capito	XY	4	х	Х	Hinterland, isolated in some Big Scrub remnants
Grey-crowned Babbler	Pomatostomus temporalis	v	3	х	Х	historical records from Byron Bay
PACHYCEPHALIDAE						
Olive Whistler	Pachycephala olivacea	v	2	х	Х	Potential from elevated hinterland forest
Little shrike-thrush	Colluricincla megarhyncha	Х	3	х	Х	
DICRURIDAE						
Spectacled Monarch	Monarcha trivirgatus	Х		х	Х	Seasonal migrant
White-eared Monarch	Monarcha leucotis	v	3	х	Х	Sedentary, utilises mixed camphor scrubs
Spangled Drongo	Dicrurus hottentottus	Х		х	Х	
CAMPEPHAGIDAE						
Barred Cuckoo-shrike	Coracina lineata	v	2	х	Х	nomadic
Varied Triller	Lalage leucomela	Х		х	Х	
PARADISAEIDAE						
Paradise Riflebird	Ptiloris paradiseus	Х	2.5	5 x	Х	
CORVIDAE						
Forest Raven	Corvus tasmanicus	Х	3	?		
PTILONORHYNCIDAE						
Regent Bowerbird	Sericulus chrysocephalus	х	4	х	Х	
PASSERIDAE						
Plum-headed Finch	Neochima modesta	х		х		Not recorded from Shire. Typically west of divide
MUSCICAPIDAE						
Russet-tailed thrush	Zoothera heinei	Х	4	х	Х	

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Bvron	Comments
MAMMALS		-	-		-	
ORNITHORHYNCHIDAE		_			_	
Platypus	Ornithorhynchus anatinus	Y	4	х	Х	
DASYURIDAE		_				
Tiger Quoll	Dasyurus maculatus	v	1	х	Х	
Eastern Quoll	Dasyurus viverrinus	E	е		_	Not recorded from Shire
Dusky Antechinus	Antechinus swainsonii	Y	2.5	х	?	No confirmed records from Shire
Brush-tailed Phascogale	Phascogale tapoatafa	V	1	х		Not recorded from Shire
Common Planigale	Planigale maculata	v	3.5	х	Х	
PHASCOLARCTIDAE						
Koala	Phascolarctos cinereus	V	3	х	Х	
Common Wombat	Vombatus ursinus	Y	1	х		Not recorded from Shire
BURRAMYIDAE						
Eastern Pygmy-possum	Cercartetus nanus	v	2.5	х	х	Known from hinterland forests
PETAURIDAE						
Yellow-bellied glider	Petaurus australis	v	1.5	х	Х	Only two records from hinterland forests
Squirrel Glider	Petaurus norfolkensis	v	1	х	х	
PSEUDOCHEIRIDAE						
Greater Glider	Petauroides volans		1	х	х	
POTOROIDAE						
Rufous Bettong	Aepyprymnus rufescens	v	2	х		Not recorded from Shire
Long-nosed Potoroo	Potorous tridactylus	v	1	х	Х	
MACROPODIDAE						
Black-striped Wallaby	Macropus dorsalis	Е	1	х		Not recorded from Shire
Parma Wallaby	Macropus parma	v		х	Х	
Whiptail Wallaby	Macropus parryi	х	3	х	1	Not recorded from Shire

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Bvron	Comments
Brush-tailed Rock-wallaby	Petrogale penicillata	v	1	х		Not recorded from Shire. Possibly occurred in Shire historically
Red-legged Pademelon	Thylogale stigmatica	v	2	х	Х	
PTEROPODIDAE						
Common Blossom Bat	Syconycteris australis	v	1.5	х	х	
Eastern Tube-nosed Bat	Nyctimene robinsoni	v	1	х	х	
Black Flying Fox	Pteropus alecto	v	3	х	х	
	Pteropus alecto - camp		1.5	х	х	Booyong, Tyagarah, Skinners Shoot, Booyong
Grey headed Flying Fox	Pteropus poliocephalus	v	2.5	х	Х	
	Pteropus poliocephalus - camp		1.5	х	Х	Booyong, Tyagarah, Skinners Shoot, Booyong
RHINOLOPHIDAE						
Eastern Horeseshoe-bat	Rhinolophus megaphyllus	Y	3.5	х	х	
	Rhinolophus megaphyllus - roost		2	х	х	
EMBALLONURIDAE						
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	v	3	х	Х	
MOLOSSIDAE						
Beccari's Freetail-bat	Mormopterus beccarii	v				
Eastern Freetail-bat	Mormopterus norfolkensis	v	2	х	х	
Undescribed Freetail-bat	Mormopterus sp 1	Х	3		х	
White-striped Freetail-bat	Tadarida australis		4	х	х	
VESPERTILIONIDAE						
Golden-tipped Bat	Kerivoula papuensis	v	3	х	х	Rainforest specialist
Little Bent-wing Bat	Miniopterus australis	v	4	х	Х	
	Miniopterus australis - roost		1	х	?	
Common Bent-wing Bat	Miniopterus schreibersii	v	3.5	х	Х	
	Miniopterus schreibersii - roost		1	х	?	
Eastern Long-eared Bat	Nyctophilus bifax	v	2	х	Х	

		Status	tion Priority Rank			
		ation	serva	pu	5	
		serv	A Re	ome		5
Common name	Scientific name	Con	CR/	Ricl	Bvr.	Comments
Large-eared Pied Bat	Chalinolobus dwyeri	v	2.5	х	Х	
	Chalinolobus dwyeri - roost		2		?	
Hoary Wattled Bat	Chalinolobus nigrogriseus	v	2	х	Х	
Eastern Falsistrelle	Falsistrellus tasmaniensis	v	2	х	Х	
Large-footed Mouse-eared Bat	Myotis adversus	v	3.5	х	Х	
Greater Broad-nosed Bat	Scoteanax rueppellii	v	2.5	х	Х	
Eastern Broad-nosed Bat	Scotorepens orion	х	3	х	Х	
	Scotorepens sp 1	х	3	х	Х	
Little Cave Vespadelus	Vespadelus pumilus	х	3	х	Х	
Eastern Cave Bat	Vespadelus troughtoni	v	2.5	х	Х	
	Vespadelus troughtoni - roost		2		?	
MURIDAE						
Eastern Chestnut Mouse	Psuedomys gracillicaudatus	v	1	х	Х	Arakwal NP
Hastings River Mouse	Psuedomys oralis	E	1	х		Not recorded from Shire
New Holland Mouse	Psuedomys novaehollandiae	х	2.5	х	?	No confirmed records from Shire
Grassland Melomys	Melomys burtoni	х	3	х	Х	
Pale Field-rat	Rattus tunneyi	х	5	х	Х	
CANIDAE						
Dingo	Canis lupus dingo		1	х	Х	Main Arm ridges
Marine Mammals						No data
Australian Fur Seal	Arctocephalus pusillus	MM	I			
New Zealand Fur Seal	Arctocephalus forsteri	MM	1			
Leopard Seal	Hydrurga leptonyx	MM				
Southern Elephant Seal	Mirounga leonina	MM	1			

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Bvron	<u>ර</u> Comments
Dugong	Dugong dugon	MM				
Gray's Beaked Whale	Mesoplodon grayi	MM				
Strap-toothed Beaked Whale	Mesoplodon layardii	MM				
Cuvier's Beaked Whale	Ziphius cavirostris	MM				
Dwarf Sperm Whale	Kogia simus	ММ				
Pygmy Sperm Whale	Kogia breviceps	MM				
Sperm Whale	Physeter catodon	v				
Common Dolphin	Delphinus delphis	MM				
Pygmy Killer Whale	Feresa attenuata	MM				
Short-finned Pilot Whale	Gloloicephala macrorhynchus	MM				
Risso's Dolphin	Grampus griseus	MM				
Fraser's Dolphin	Lagenodelphis hosei	MM				
Killer Whale	Orcinus orca	MM				
Melon-headed Whale	Peponocephala electra	MM				
False Killer Whale	Pseudorca crassidens	MM				
Indo-Pacific Humpbacked Dolphin	Sousa chinensis	v				
Long-snouted Spinner Dolphin	Stenella longirostris	v				
Spotted Dolphin	Stenella attenuata	MM				
Striped Dolphin	Stenella coeruleoalba	MM				
Bottlenose Dolphin	Tursiops truncatus	MM				
Bryde's Whale	Balaenoptera edeni	MM				
Blue Whale	Balaeonptera musculus musculus	Е				
Sei Whale	Balaeonptera borealis	v				

Common name	Scientific name	Conservation Status	CRA Reservation Priority Rank	Richmond	Bvron	Comments
Fin Whale	Balaenoptera physalus	v				
Minke Whale	Balaenoptera acutorostrata	MM				
Humpback Whale	Megaptera mydas	v			х	
Southern Right Whale	Eubalaena australis	v				
AQUATIC VERTEBRATES				L		
Oxleyan Pygmy Perch	Nannoperca oxleyana	Е		x		Possible from acid swamps in wallum heath
Eastern Freshwater Cod	Maccullochella macquariensis	Е	х	х	х	Wilsons River, Coopers Ck
						Conservation Status codes
						E = Endangered
						EP = Endangered Population
						V = Vulnerable
						X = Regionally Significant
						Y = Species of Threatened Habitat
						XY = Regionally Significant and Species of Threatened Habitat
			1		1	MM = Marine Mammal
						e = Presumed Extinct - but not listed as extinct
WEED LIST 6.

See www.northcoastweeds.org.au/table-key.htm for a description of noxious weed codes/categories. See www.northcoastweeds.org.au/noxiousweedstable.htm for noxious weed list.

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Abrus precatorius	Crabs-eye Creeper		Potential	Potential	Х			Alert, Native to tropical Australia
Acacia baileyana	Cootamundra Wattle		Potential	Known		Х		
Acacia karroo	Karroo Thorn	1	Potential	Potential	Х			Alert
Acacia saligna	Golden Wreath Wattle		Potential	Known		Х		
Acetosa sagittate	Turkey Rhubarb		Known	Known	Х			
Agave americana	Century Plant		Known	Known			Х	
Ageratina adenophora	Crofton Weed	3	Known	Known	Х			
Ageratina riparia	Mist Weed	3	Known	Known	Х			
Ageratum houstonianum	Billy Goat Crofton		Known	Known		Х		
Ailanthus altissima	Tree of Heaven		Potential	Known		Х		Casino district
Alocasia aroids	Elephant Ears		Known	Known			Х	
Aloe arborescens	Aloe		Potential	Known			Х	
Alpinia calcarata	Cardamon Ginger		Potential	Potential		Х		
Alternanthera philoxeroides	Alligator Weed	1	Known	Known	Х			Alert
Amaranthus spinosus	Needle Burr		Known	Known			Х	Common about
								stockyards
Ambrosia artemisiifolia	Ragweed		Known	Known			Х	Allergic
Andropogon virginicus	Whiskey Grass		Known	Known	Х			
Annona glabra	Pond Apple		Potential	Potential		Х		Alert
Anomatheca laxa			Known	Potential			Х	Naturalized in Byron Bay
Anredera cordifolia	Madeira Vine		Known	Known	Х			Spreads vegetatively
Araucaria bidwillii	Bunya Pine		Potential	Known		Х		Can dominate rainforest

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Araujia sericiflora	Moth Vine		Known	Known	Х			Wind dispersed
Archontophoenix alexandrae	Alexander Palm		Known	Known		Х		Crosses with Bangalow Palm
Ardisia crenata	Ardisia		Known	Known	Х			Bird dispersed
Aristolochia elegans	Dutchman's Pipe		Known	Known	Х			Fatal to Birdwing Butterfly larvae
Arundinaria spp.	Creeping Bamboo		Known	Known	Х			
Arundo donex	Giant Danube Reed		Potential	Potential		Х		
Asclepias curassavica	Red Head Cotton Bush		Known	Known			Х	
Asparagus africanus (syn Protasparagus)	Asparagus Fern		Known	Known	Х			Bird dispersed
Asparagus asparegoides (syn Myrsiphyllum)	Bridal Creeper,		Potential	Potential	Х			Bird dispersed
Asparagus densiflorus, (syn Protasparagus aethiopicus)	Ground Asparagus		Known	Known	Х			Bird dispersed
Asparagus plumosus (syn Protasparagus)	Climbing Asparagus Fern		Known	Known	Х			Bird dispersed
Asparagus scandons (syn Myrsiphyllum)	Asparagus Fem		Potential	Potential	Х			Bird dispersed
Asparagus virgatus	An Asparagus Fern		Known	Known		Х		Bird dispersed
Astroemeria pulchella	Parrot Astroemeria		Known	Known			Х	
Asystasia gangetics ssp. micrantha	Chinese Violet	4g	Potential	Potential		Х		Alert
Axonopus compressus	Broadleaf Carpet Grass, Compressum		Known	Known		Х		Inhibits regeneration
Baccharis halimifolia	Groundsel	2	Known	Known	Х			Wind dispersed
Bambusa sp	Running Bamboo		Known	Known	Х			
Bryophyllum delagoense	Mother of Millions	2	Known	Known	Х			Only listed as noxious in Clarence
Bryophyllum pinnatum	Resurrection Plant		Known	Known	Х			
Buddleja davidii	Buddleia		Potential	Potential		Х		Allergic
Buddleja madagascariensis	Buddleja, Butterfy Bush		Known	Known	Х			Allergic
Cabomba caroliniana	Cabomba	4g	Potential	Potential	Х			Alert
Caesalpinia decapetala	Thorny Poinciana, Mysore Thorn	2	Known	Known	Х			

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Caesalpinia gilliesii	Bird of Paradise Flower		Potential	Known			Х	Alert
Calissa fragrans	Calissa		Known	Known		Х		Vegetatively spread
Canna indica	Canna Lily, Indian Shot		Known	Known	Х			
Cardiospermum grandiflorum	Balloon Vine		Known	Known	Х			Water/gravity dispersed
Carduus nutans	Nodding Thistle	2	Potential	Potential		Х		Pasture weed
Casimiroa edulis	White Sapote		Potential	Known		Х		Bird & bat dispersed
Catharanthus roseus	Madagascar Periwinkle		Known	Known			Х	
Caulerpa taxifolia	Invasive Seaweed		Potential	Potential	Х			Alert
Cedrela odorata	Cigar Box Cedar		Potential	Potential		Х		Bird & bat dispersed
Celtis sinensis	Chinese Elm, Hackberry	2	Known	Known	Х			Bird & bat dispersed
Cenchrus incertus	Spiny Burrgrass	2	Potential	Potential		Х		Pasture weed, sandy soils
Cenchrus longispinus	Spiny Burrgrass	2	Potential	Potential		Х		Pasture weed, sandy soils
Centaurea maculosa	Spotted Knapweed	1	Potential	Potential		Х		Roadsides, wastelands & pasture
Centaurea nigra	Black Knapweed	1	Potential	Potential		Х		Roadsides, wastelands & pasture
Cestrum aurantiacum	Orange Cestrum		Potential	Potential		Х		Bird dispersed
Cestrum nocturnum	Night Jasmine, Lady of the Night		Known	Known		Х		Bird dispersed
Cestrum parqui	Green Cestrum	2	Known	Known	Х			Poisonous to stock
Chlorophytum comosum (cv. Variegatum)	Spider Lily		Known	Known		Х		
Chromolaena odorata	Siam Weed	1	Potential	Potential	Х			Alert
Chrysanthemoides monilifera subsp. rotundata	Bitou Bush	3	Known	Known	Х			Bird dispersed, Key threat process
Cinnamomum camphora	Camphor Laurel	4d ##	Known	Known	Х			Not listed as noxious in Byron Shire
Citrus X taitensis	Rough Lemon		Known	Known		Х		
Coffea arabica	Coffee		Known	Known		Х		Bird dispersed
Colocasia esculenta	Taro		Known	Known			Х	
Commelina africana			Potential	Potential			Х	Possible garden escape

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Commelina benghalensis	Hairy Commelina		Known	Known	Х			
Coreopsis lanceolata	Coreopsis		Known	Known		Х		annual
Cortaderia selloana	Pampas Grass	2	Potential	Known		Х		Weed of wastelands
Corymbia torelliana (syn Eucalyptus)	Cadaghi		Known	Known		Х		not readily naturalising
Cotoneaster glycophylla	Cotoneaster		Potential	Known		Х		Weed in temperate regions
Crocosmia x crocosmiiflora	Crocosmia, Monbretia		Known	Known	Х			
Crotalaria incana subsp. incana	Woolly Rattlepod		Known	Known			Х	Weed of roadsides & wasteland
Cryptostegia grandiflora	Rubber Vine		Potential	Potential	Х			Alert - weed in dry tropics
Cyperus eragrostis	Umbrella sedge		Known	Known		Х		
Cytisus scorparius	English/Scotch Broom	2	Potential	Known	Х			Alert - Temperate
Cuphea carthagenensis	Cuphea		Known	Known		Х		Weed of wet areas
Cuscuta campestris	Dodder	2	Potential	Potential				Listed as noxious for Coffs LGA
Delairea odorata	Cape Ivy		Known	Known	Х			
Dendranthema maxima	Shasta Daisy		Potential	Known			Х	
Desmodium intortum	Green-leaved Desmodium		Known	Known	Х			
Desmodium uncinatum	Silver-leaved Desmodium		Known	Known	Х			Dispersed by attachment
Digitaria didactyla	Queensland Blue Couch		Known	Known			Х	
Dioscorea bulbiferum	Aerial Yam		Known	Known	Х			Marshalls Ck NR, New Brighton
Duranta repens	Duranta		Known	Known		Х		Bird dispersed
Eichhornia crassipes	Water Hyacinth	3	Known	Known	Х			Alert, aquatic weed
Epidendrum spp.	Crucifix Orchid		Known	Known			Х	
Equisetum arvense	Common Horsetail	1	Potential	Known	Х			Alert
Equisetum hyemale	Horsetail	1	Potential	Known	Х			Alert
Eragrostis curvula	Love Grass		Known	Known			Х	
Eragrostis tenuifolia	Elastic Grass		Potential	Potential			Х	

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Erica lustianica	Spanish Heath		Potential	Potential			Х	Temperate areas
Eriobotrya japonica	Loquat		Known	Known	Х			Bird & bat dispersed
Erythrina crista-galli	Cockspur Coral Tree		Known	Known	Х			
Erythrina nigra	Orange Coral Tree		Known	Known	Х			New Brighton
Erythrina x sykesii	Coral Tree		Known	Known	Х			
Eugenia dombeya	Dombeya		Potential	Potential			Х	
Eugenia jaboticaba	Jaboticaba		Potential	Known			Х	Attractive to birds
Eugenia uniflora	Brazilian Cherry		Known	Known	Х			Bird dispersed
Euphorbia cyathophora	Painted Spurge		Known	Known		Х		
Euryops chrysanthemoides	Euryops		Known	Known			Х	Garden escape
Ficus benjamina	Weeping Fig		Known	Known		Х		Billinudgel NR
Ficus hillii var microcarpa	Hills Fig		Known	Known		Х		Bird & bat dispersed
Ficus elastica	Rubber Tree		Known	Known		Х		Planted
Ficus pumila	Climbing Fig		Known	Known		Х		Garden escape
Flindersia brayleyana	Queensland Maple		Known	Known		Х		Wind dispersed, invades RF
Furcraea foetida			Known	Known			Х	Naturalized at Brunswick Hds
Gazania rigens	Gazania		Known	Known			Х	Coastal dunes
Genista monspessulana	Cape Broom, Montpellier Broom		Potential	Known		Х		Temperate areas
Gladiolus sp	Gladiolus.		Potential	Potential		Х		
Gleditsia triacanthos	Honey Locust		Potential	Known	Х			
Gloriosa superba	Glory Lily		Known	Known	Х			Bird dispersed
Glycine javanica	Glycine		Known	Known		Х		
Gymnocoronis spilanthoides	Senegal Tea	1	Potential	Potential	Х			Alert
Harrisia sp.	Harrisia Cactus	4f	Potential	Potential	Х			Isolated, from arid areas
Hedera helix	Ivy, English Ivy		Known	Known		Х		Garden escape
Hedychium coxinium	Pink-flowered Ginger		Potential	Potential		Х		Fruit bird attractive

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Hedychium gardnerianum	Kahili Ginger		Known	Known	Х			Goonengerry NP
Hedychium spicatum	White-flowered Ginger		Potential	Potential		Х		
<i>Hieracium</i> spp.	Hawkweeds	1	Potential	Potential			Х	Weed of roadside & wastelands
Hydrocotyle bonariensis	Pennywort		Known	Known			Х	Coastal areas
Hygrophila costata	Glush Weed		Potential	Potential	Х			Alert
Hylocerus undatus	Night Flowering Cactus		Known	Known		Х		
Hymenocallis caribaea	Spider Lily		Potential	Known		Х		
Hypericum perforatum	St John's Wort	2	Potential	Known	Х			Temperate
Hypoestes sanguinolenta	Freckle Face		Known	Known	Х			
Impatiens walleriana	Balsam, Busy Lizzie		Known	Known			Х	
Inga edulis	Icecream Bean		Known	Known		Х		Spread by Flying foxes
Ipomoea alba	Moon Flower		Known	Known	Х			
Ipomoea cairica	Coastal Morning Glory		Known	Known	Х			
Ipomoea indica	Blue Morning Glory		Known	Known	Х			
Ipomoea purpurea	Purple Morning Glory		Known	Known	Х			
Jacaranda mimosifolia	Jacaranda		Potential	Known		Х		Wind dispersed
Jasminum spp	Jasmine .		Known	Known		Х		Vegetatively spreads from gardens
Koelreuteria paniculata	Golden Rain Tree		Known	Known	Х			Wind & water dispersed
Lagarosiphon major	Lagarisiphon	1	Potential	Potential	Х			Alert, aquatic weed
Lantana camara	Lantana	3	Known	Known	Х			Red flowered form = noxious
Lantana montevidensis	Creeping Lantana	3	Known	Known		Х		Crosses with other Lantanas
Leucaena leucocephala	Lead Tree, Coffee Bush		Potential	Known			Х	
Leycesteria formosa	Himalayan Honeysuckle		Potential	Potential			Х	
Ligustrum lucidum	Large-leaved Privet	2, 4b	Known	Known	Х			Listed 2 in Clarence & 4b in Coffs

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Ligustrum sinense	Small-leaved Privet	2, 4b	Known	Known	Х			Listed 2 in Clarence & 4b in Coffs
Lilium formosanum	Formosan Lily		Known	Known		Х		
Lonicera japonica	Japanese Honeysuckle		Known	Known	Х			
Lycium ferocissimum	African Box-thorn		Potential	Potential	Х			temperate
Macadamia integrifolia	Macadamia Nut (cultivars)		Known	Known		Х		Crosses with local threatened Macadamia
Macfadyena unguis-cati	Cats Claw Vine		Known	Known	Х			Isolated infestations
Macroptilium atropurpureum	Siratro		Known	Known	Х			
Melinis minutiflora	Molasses Grass		Known	Known	X			Inhibits regen, fire hazard
Miconia calvescens & other spp.	Micona	1	Potential	Potential	Х			Alert
Mimosa pigra	Giant Sensitive Plant		Potential	Potential	Х			Alert
Morus alba	Mulberry		Known	Known			Х	Bird & bat dispersed
Murraya paniculata	Murraya		Known	Known	Х			Bird dispersed
Myriophyllum aquaticum	Parrot's Feather		Known	Known		Х		
Nephrolepis cordifolia	Fishbone Fern		Known	Known	Х			Native in hinterland forests
Nephrolepis exaltata	Boston Fern		Known	Known	Х			Coastal areas, garden escape
Nerium oleander	Oleander		Potential	Known			Х	not spreading
Ochna serrulata	Ochna		Known	Known	Х			Bird dispersed
Olea europaea subsp. africana	Common Olive		Known	Known	Х			Bird dispersed
<i>Opuntia stricta</i> & other spp.	Prickly Pear	4f	Known	Known	Х			Bird dispersed
Panicum maximum var trichoglume	Hairy Panic		Potential	Potential			Х	
Panicum maximum var maximum	Guinea Grass		Potential	Potential			Х	
Parthenium hysterophorus	Parthenium Weed	1	Potential	Potential	Х			Alert
Paspalum conjugatum	Johnson River Grass		Known	Known		Х		

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Paspalum dilatatum	Paspalum		Known	Known		Х		
Paspalum urvillei	Giant Paspalum		Known	Known		Х		
Paspalum wettsteinii	Broad-leaf Paspalum		Known	Known		Х		
Passiflora edulis	Edible Passionfruit		Known	Known			Х	Bird dispersed
Passiflora foetida	Stinking Passionfruit		Known	Known	Х			Bird dispersed
Passiflora suberosa	Corky Passionfruit		Known	Known	Х			Bird dispersed
Passiflora subpeltata	White Passionfruit		Known	Known	Х			Bird dispersed
Paulownia tomentosa	Paulownia		Potential	Known			Х	
Pennisetum purpureum	Barner Grass		Known	Known			Х	Mainly planted specimens
Pennisetum setaceum	Fountain Grass		Potential	Potential			Х	
Pereskia aculeata	Lemon Vine, Leafy Cactus, Barbados Gooseberry		Known	Known	Х			
Persicaria capitata	Japanese Knotweed		Potential	Known			Х	
Phyllostachys nigra	Black Bamboo		Potential	Potential			Х	
Phytolacca octandra	Inkweed		Known	Known			Х	Bird dispersed
Pinus carribea	Carribean Pine		Known	Known	Х			
Pinus elliottii	Slash Pine		Known	Known	Х			
Pinus radiata	Monterey Pine		Known	Known	Х			
Pithecoteniun cynanchoides			Known	Potential	Х			Roadside sth of Uncle Toms & north west side of Brunswick River bridge
Pistia stratoites	Water Lettuce	1	Known	Known	Х			Native-Nth Territory, aquatic weed
Plectranthus verticillatis			Known	Known	Х			Urban areas, New Brighton
Prunella vulgaris	Self Heal		Known	Known			Х	
Psidium cattleianum	Cherry Guava		Known	Known	Х			Bird & bat dispersed
Psidium guajava	Guava		Known	Known	Х			Bird & bat dispersed
Pueraria lobata	Kudzu		Known	Known	Х			

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Pyracantha angustifolia	Orange Firethorn		Potential	Potential		Х		Temperate areas
Pyracantha crenulata	Nepal Firethorn		Potential	Potential		Х		Temperate areas
Pyracantha fortuneana	Chinese Firethorn		Potential	Potential		Х		Temperate areas
Pyrostegia ignea	Golden Shower Vine		Known	Known			Х	
Raphiolepis indica	Indian Hawthorn		Known	Known	Х			Bird dispersed
Raphiolepis umbellata 'Ovata'	Yeddo Hawthorn		Known	Known	Х			Bird dispersed
Ricinus communis	Castor Oil Plant		Known	Known	Х			
Rivina humilis	Coral Berry		Known	Known	Х			Bird dispersed
Rosa rubiginosa	Sweet Briar		Potential	Potential		Х		
Robinia pseudocacacia	Black Locust		Potential	Potential	Х			Temperate & arid areas
Rubus fruiticosa	Blackberry	2	Known	Known	Х			Bird & fox dispersed
Rubus rugosis	Kerry Berry		Potential	Potential		Х		
Salix nigra	Black Willow	2	Potential	Known	Х			Noxious in Clarence
Salix spp.	Willows	4g	Known	Known	Х			
Salvia coccinea	Red Salvia		Known	Known			Х	
Salvinia molesta	Salvinia, Giant Salvinia	2	Known	Known	Х			Aquatic weed
Schefflera actinophylla	Umbrella Tree		Known	Known	Х			Bird & bat dispersed
Schefflera arboricola	Dwarf Umbrella Tree		Known	Known		Х		Bird & bat dispersed
Schinus areira	Pepper Tree		Known	Known	Х			Bird dispersed
Schinus terebrinthifolia	Broad-leaved Pepper Tree	2	Known	Known	Х			Bird & bat dispersed
Schizolobium parahibum	Tower Tree, Schizolobium		Known	Known			Х	
Senecio macroglossus	Natal Ivy, German Ivy		Known	Known		Х		Vegetatively dispersed
Senecio madagascariensis	Fireweed	3	Known	Known			Х	Nox. Clarence Sth. Pasture weed
Senna alata	Candle Bush, Candlestick Senna		Potential	Potential			Х	Arid areas
Senna pendula var. glabrata	Winter Senna		Known	Known	Х			Bird & ant dispersed
Senna septemtrionalis (syn X floribunda)	Smooth Senna		Known	Known	Х			Bird & ant dispersed

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Setaria gracilis	Slender Pigeon Grass		Known	Known	Х			Bird dispersed
Setaria sphacelata	Setaria		Known	Known	Х			Bird dispersed
Solanum capsicoides	Devils Apple		Known	Known			Х	Bird & bat dispersed
Solanum hispidum	Giant Devils Fig		Known	Known		Х		Alert
Solanum mauritianum	Tobacco Bush		Known	Known	Х			Bird & bat dispersed
Solanum pseudocapsicum	Jerusalem Cherry		Known	Known			Х	Bird dispersed
Solanum seaforthianum	Climbing Nightshade		Known	Known	Х			Bird dispersed
Solanum torvum	Devils Fig		Known	Known	Х			Alert
Sorghum halepense	Johnson Grass	2	Known	Known			Х	Weed of crops & roadsides
Sorghum x almum	Columbus Grass	2	Potential	Known			Х	Weed of crops & roadsides
Solidago canadensis	Canada Goldenrod		Known	Known			Х	roadsides
Soliva pterosperma	Bindii eye		Known	Known			Х	Weed of lawns etc
Sorghum halepense	Johnson Grass		Known	Known		Х		
Spathodea campanulata subsp. rotundata	African Tulip Tree		Known	Known		Х		Not readily spreading
Sphagneticola trilobata (syn Wedelia)	Singapore Daisy		Known	Known	Х			Vegetatively dispersed
Sporobolus fertilis (S. indicus var. major)	Giant Parramatta Grass	2/3# ##	Known	Known	Х			Pasture weed
Sporobolus pyramidalis	Giant Rats Tail	2	Known	Known	Х			Pasture weed
Syagrus romanzoffiana	Cocos Palm		Known	Known	Х			Bird & bat dispersed
Syngonium podophyllum	Syngonium		Known	Known	Х			Vegetatively dispersed
Tabebuia chrysantha	Golden Trumpet Tree		Known	Known			Х	
Talinum paniculatum	Talinum		Known	Known		Х		
Tamarix aphylla	Tamarisk, Athel Pine		Potential	Potential	Х			Temperate & arid areas
Tecomaria capensis	Cape Honeysuckle		Known	Known			Х	
Tecoma stans	Tecoma		Known	Known	Х			Wind dispersed
Tetrapanax papyrifer	Rice-paper Plant		Known	Known			Х	

Scientific Name	Common Name	Noxious code	Known /Potential weed in Byron Shire	Known /Potential weed in NE NSW/SE QLD	Serious	Of Concern	Minor	Comments
Themeda quadrivalvis	Grader Grass		Potential	Potential			Х	
Thunbergia alata	Black-eyed Susan		Known	Known		Х		Garden escape
Thunbergia grandiflora	Blue Sky Flower		Known	Known		Х		Alert
Tithonia diversifolia	Japanese Sunflower		Known	Known			Х	Weed of roadsides & wastelands
Toxicodendron succedaneum	Rhus tree	2	Known	Known	Х			Poisonous/allergic
Tradescantia fluminensis	Wandering Dew		Known	Known	Х			Vegetatively dispersed
Tradescantia zebrina	Striped Wandering Dew		Known	Known	Х			Vegetatively dispersed
Triadica sebifera	Chinese Tallow		Known	Known	Х			Serious weed of wetlands
Ulex euroaeus	Furze, Gorse		Potential	Potential	Х			Temperate areas
Urochloa mutica	Para Grass		Known	Known	Х			wetlands
Vinca major	Blue Periwinkle		Known	Known			Х	
Watsonia meriana	Watsonia		Known	Known	Х			
Xanthium spp.	Burrs, Bathurst, Noogoora, Cockle	2	Known	Known		Х		Weed of crops and livestock
Yucca aloifolia	Spanish Bayonet		Known	Known		Х		
Zantedeschia aethiopica	Arum Lily		Known	Known			Х	

7. FLORA AND FAUNA RECORD SHEETS

FLORA RECORD SHEET

Observer: Date/s:	Address Phone:	s: E-mail:	
Species (Scientific Name):		Geology:	
Common Name:		Habitat/Vegetation:	
Total count of individuals: (Mature: Seedlinas:)	Other Comments: i.e. flowering, fruiting, etc	
Location:		Aspect:	Elevation (m):
Map Number: (Grid refs	to 100 m)	AMG
Easting	No	rthina	□ _{MGA}
Local Government Area:		Tenure:	

Other Notes -

FLORA RECORD SHEET

Observer: Date/s:	Address Phone:	s: E-mail:	
Species (Scientific Name):		Geology:	
Common Name:		Habitat/Vegetation:	
Total count of individuals: (Mature: Seedlings)	Other Comments: i.e. flowering, fruiting, etc	
Location:		Aspect:	Elevation (m):
Map Number:	(Grid refs	s to 100 m)	AMG
Easting	No	orthina	MGA
Local Government Area:		Tenure:	

FAUNA RECORD SHEET

Observer: Date/s:	Address Phone:	: E-mail:
Species (Scientific Name):		Observation type: i.e. visual, heard, road kill, scat, feather, etc

Common Na	ime:			Habitat/Vegetation:
Total count of	of individuals:	1	`	Other Comments:
(Male:	Female:	Juv:)	i.e. reeding, breeding, lighting etc

Location:	Aspe	ect:	Elevation (m):
Map Number: Easting	Grid refs to 100 (Grid refs to 100	m)	□ AMG □ MGA
Local Government Area:	Tenu	ire:	

Other Notes -

FAUNA RECORD SHEET

Observer:	Address:	
Date/s:	Phone:	E-mail:

Species (Scientific Name):	Observation type: i.e. visual, heard, road kill, scat, feather, etc
Common Name:	Habitat/Vegetation:
Total count of individuals: (Male: Female: Juv:)	Other Comments: i.e. feeding, breeding, fighting etc
Location:	Aspect: Elevation (m):
Map Number: (Grid refs	s to 100 m)
Easting No	orthina 🗖 MGA
Local Government Area:	Tenure:

Other Notes -

KEY PRINCIPLES FOR BIODIVERSITY PLANNING

From NPWS 2001

- Resolve compatibility of biodiversity objectives with other social, cultural and economic objectives, including equity and duty of care for landowners
- > Protect all natural areas, not only those identified of highest value
- Protect whole communities and ecosystems, and the natural processes that support them
- > Maintain and enhance existing biodiversity ('no net loss')
- > Identify the ecological setting when making site-based decisions
- Minimise landscape fragmentation
- > Recognise the different habitat requirements of individual species
- > Conserve biodiversity in-situ in its natural environment
- > Promote native species and avoid introducing non-native species
- > Protect rare and ecologically important species
- > Protect unique or sensitive environments
- > Monitor biodiversity impacts over time
- > Give clarity and certainty to landowners and developers in plan provisions
- Link plan provisions to other biodiversity conservation initiatives such as incentives or state of the environment reporting
- Apply a precautionary approach where there is a significant chance that a proposal might lead to irreversible consequences
- Link plan making to ongoing land management
- Secure landscape-scale biodiversity conservation through a comprehensive, adequate and representative reserve system
- Manage threatening processes by identifying, preventing and mitigating causes of habitat loss.

8. COMMUNITY CONSULTATION

8.1 BACKGROUND

On June 2, 1999, Council held a community workshop to identify issues and solutions to the conservation of biodiversity within Byron Shire. This workshop was held to help determine the content and structure of the BCS. Over 60 people from across the Shire attended the workshop. Further details of the workshop are contained below.

The workshop identified the main issues affecting biodiversity as:

- habitat fragmentation and a general lack of vegetation/habitat for wildlife;
- pest species (plant and animal);
- riparian and wetland degradation;
- human population;
- the need for habitat restoration; and
- the identification, restoration and implementation of a series of wildlife corridors.

The workshop identified solutions as:

- the provision of educational and extension materials;
- provision of incentives for conservation;
- development of a wildlife corridor and environmental repair and enhancement zone (*introducing new planning controls*);
- targeted environmental protection through buffers and planning tools such as the DCP and LEP; and
- the implementation of on-ground ecological restoration actions.

Prior to exhibition of the BCS Council sent a letter to all landholders that had High Conservation Value vegetation and habitats identified by Council's Geographic Information Systems (GIS) on their land. This letter advised the recipient of the public exhibition of the Draft Strategy and enclosed a template submission form.

On 16, 23 and 30 October 2003 Council held a series of open house workshops at Mullumbimby, Byron Bay and Bangalow (respectively). Each of these workshops was well attended, with between 80-100 persons present at each session. These workshops provided the community with an opportunity to review the Draft Strategy so that they could make well-informed submissions. The Strategy was also presented to a meeting of the Wilson's Creek Landcare Group during the exhibition period, in response to a request by them. In addition to this Council ensured a project officer was available for informal consultation during the public exhibition period by way of being available for counter and phone enquiries during business hours.

Council received 279 submissions in response to placing the Draft BCS on public exhibition. Of these seven (7) were from government agencies, eight (8) were from community groups and 259 were received from community members. Of the 259 community submissions 177 were submitted in the template submission form. Council has prepared a report on the submissions and these are contained in #459327.

8.2 THE COMMUNITY CONSULTATION STRATEGY

8.2.1 Project Purpose

- To identify and conserve biodiversity;
- To address the problem of biodiversity decline;
- To educate the public and Shire workers about the BCS.

8.2.2 Objectives

- To improve public and internal knowledge of biodiversity issues and solutions;
- To inform Council and the public of the BCS;
- To explain technical aspects of the BCS to the public, government agencies, Council staff and councillor's;
- To exhibit the draft BCS, including maps of ecologically significant lands and wildlife corridors; and
- To seek public views and comments on the draft BCS.

8.2.3 Main Messages of the Byron Biodiversity Conservation Strategy

- Biodiversity conservation is fundamental to Ecologically Sustainable Development;
- Biodiversity is best conserved in situ, through restoring degraded areas, controlling threatening processes and by not introducing new pressures;
- Effective biodiversity conservation is dependent on adequate funding, sustainable landuse planning and education, with particular regard to the principle of conserving and enhancing biological diversity and ecological integrity;
- Biodiversity conservation can deliver many fringe benefits and free goods and services to the wider community;
- Biodiversity is essential to the survival of all life forms;
- Cumulative impacts, footprint effects and off-site impacts must be considered when assessing the environmental effects of an activity; and
- High Conservation Value vegetation and habitats as well as Identified Wildlife Corridors require conservation and restoration (see indicative mapping in Part 3). Development in these areas will require detailed ecological assessment.

8.2.4 Target Audience

Farmers/landholders, community, progress associations, chambers of commerce, Byron Sustainable Agriculture Roundtable, farm industry groups, local Aboriginal groups, Local Area Management Plan groups, Landcare groups, environmental/conservation groups, DIPNR, NPWS, Council staff, NSW Agriculture, State Forests, NSW Fisheries, NSW Rail.

8.2.5 Tactics

- Prepare and distribute a media release advising of a public workshop on the BCS.
- Advise target audience groups and individuals of workshops etc.
- Advise each Council division of in house workshop.
- Seek expert reviewers and disseminate strategy for their review.
- Hold a public workshop to inform public on BCS and to gain further input and feedback on the draft strategy.
- Report strategy to Council for public exhibition.
- Place draft strategy on public exhibition.
- Set up display in Council foyer.

8.3 OVERVIEW OF FINDINGS FROM BIODIVERSITY CONSERVATION STRATEGY WORKSHOP. (Held on 2/6/99)

ISSUES IN ORDER OF PRIORITY

Score

• Habitat fragmentation, lack of vegetation/habitat for wildlife, habitat reconstruction, corridors and habitat linkages (including vegetation/habitat management, Koala's and their food trees)	49
Environmental weed species (including potential weed species)	22
Riparian/waterways and constructed wetlands - degradation and management	20
Free ranging and dumped/feral domestic pets and feral animals	16
Human population	16
• Using the study and strategy (acceptance, deliverance and implementation)	16
• Paucity of public education and awareness and agency networking – about	16
- appropriate plant species for particular sites	
- weed seed/propagule sources and method of dispersal	
- appropriate genetic sourcing (ie locally)	
- location of plantations near ecologically sensitive lands	
 culling/selling/using planted native plants (particularly protected and threatened species) 	
- sale of weed species by nurseries etc	
- habitat values of vegetation	
- community perceptions and expectations	
- the positive and negative aspects of neglected/unused farmland covered in mixed regrowth forests (or weed dominated vegetation)	
Economic incentives for landholders to conserve (including others)	11
Development	
Acid sulfate soils	6

ISSUES CONTINUED

Land degradation	6
- clearing and alteration of vegetation	
- grazing in sensitive areas	
- erosion/road construction	
• Roads	5
- roadkills	
- speed limits	
Enforcement issues	5
- lack of legislative intent	
- lack of competency levels for consultants and those reviewing D/As	
Landuse conflict	5
- associated with agricultural practises that degrade the environment	
• Fire	1
Pollution/Sewage effluent	1
Economic constraints	1
Chemicals (pesticides and herbicides)	0
- use in weed management	

SOLUTIONS IN ORDER OF PRIORITY

score	
Provision of educational/extension materials	50
- pollution	
- habitat requirements	
- appropriate plant species for particular sites	
- property/subcatchment planning	
- pest species (plant and animal)	
- restoration techniques	
- available incentives	
- waste management	
- water quality (riparian management)	
Incentives for conservation (inc. Landcare/community groups, taxes/rates and levies for the environment)	43
Development of conservation/corridor zone , buffers, LEP, DCP (other legislation) amend LEP	18
Investigation, design & implementation of corridors/links/ ecosystem repair	16
Population cap	15
Population cap Best Management Practise Guidelines/Standards developed for various industries (inc. survey standards for enviro assessment) and used/adopted by Council	15 14
Population cap Best Management Practise Guidelines/Standards developed for various industries (inc. survey standards for enviro assessment) and used/adopted by Council Limit road speeds	15 14 14
Population cap Best Management Practise Guidelines/Standards developed for various industries (inc. survey standards for enviro assessment) and used/adopted by Council Limit road speeds Big stick law etc compliance officer, implementation	15 14 14 8
Population capBest Management Practise Guidelines/Standards developed for various industries (inc. survey standards for enviro assessment) and used/adopted by CouncilLimit road speedsBig stick law etc compliance officer, implementationRevegetation/regeneration (reconstruction of habitat)	15 14 14 8 7
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Population capBest Management Practise Guidelines/Standards developed for various industries (inc. survey standards for enviro assessment) and used/adopted by CouncilLimit road speedsBig stick law etc compliance officer, implementationRevegetation/regeneration (reconstruction of habitat)Council owned and managed nursery to provide plants to community at wholesale pricesRegistration/micro-chipping of domestic pets control of feral animals	15 14 14 8 7 6 6
Population cap Best Management Practise Guidelines/Standards developed for various industries (inc. survey standards for enviro assessment) and used/adopted by Council Limit road speeds Big stick law etc compliance officer, implementation Revegetation/regeneration (reconstruction of habitat) Council owned and managed nursery to provide plants to community at wholesale prices Registration/micro-chipping of domestic pets control of feral animals Effective networking and community liaison/consultation/publicity between govt agencies and community groups/landholders	15 14 14 8 7 6 5
Population cap Best Management Practise Guidelines/Standards developed for various industries (inc. survey standards for enviro assessment) and used/adopted by Council Limit road speeds Big stick law etc compliance officer, implementation Revegetation/regeneration (reconstruction of habitat) Council owned and managed nursery to provide plants to community at wholesale prices Registration/micro-chipping of domestic pets control of feral animals Effective networking and community liaison/consultation/publicity between govt agencies and community groups/landholders Planning (at local, subcatchment and Shire level)	15 14 14 8 7 6 6 5 5 5

GLOSSARY AND DEFINITIONS

Abiotic: non-living components of the environment, including rocks and soil minerals, water etc. See; biotic.

Active management: Management undertaken in accordance with an approved property plan of management (DEC VCA, DIPNR Property Agreement or BCS Biodiversity Management Agreement) or similar and includes consideration of:

- Planning and protection;
- > The principle of no net loss;
- Implementation of works that restore and/or enhance the functioning of ecological processes;
- Connectivity;
- Habitat expansion;
- Monitoring and evaluation;
- > Harvesting/commercial use if determined in an approved property plan or agreement; and
- Removal of threats, including;
- > Effective management of environmental weeds and pest species;
- > Application of appropriate fire regimes to that ecosystem.

NB: a plan would outline project aims/objectives, site description, conservation value, species lists, vegetation and land use mapping, proposed works and/or activities, costings, timeframes, monitoring & evaluation and review.

Agenda 21: United Nations program of action developed at the Rio Earth Summit in 1992, which provides a blueprint for sustainable development into the 21st century.

Alliance: a series of climax ecosystems which have the same structural characteristics, related species as dominants and possibly the same or related species in the understorey.

Association: a series of climax ecosystems that have the same structural characteristics, the same species as dominants and possibly different floristic composition in the lower strata.

Biodiversity: the variety of life forms, the different plants, animals and micro-organisms, the genes they contain and the ecosystems they form.

Biomass: a productivity measure of biodiversity from a given area; ie the weight of all the flora and fauna and flora of a given area.

Bioregion: a region in which the boundaries are primarily determined by (or reflect) similarities in geology, climate and vegetation.

Biotic: A living organism or part of the system including, but not limited to bacteria, invertebrates, vertebrates and plants and fungi

Bush regeneration: rehabilitation of bushland from a weed infested or otherwise degraded plant community to a healthy community composed of native species. Bush regeneration typically relies on promoting natural regeneration through the natural germination and resprouting of plants, and focuses on weed removal, management of disturbance and maintenance of natural processes. In its strictest definition bush regeneration does not normally include replanting of vegetation, although this can be considered a component of regeneration works. Bush regeneration is also more broadly defined as 'assisted regeneration', which uses natural regeneration, but also includes other intervention actions, such as revegetation with locally indigenous seed or plant material derived from the locality (or

other similar plant communities to that occurring on the site), or controlled management of disturbance.

Catchment: the land area drained by a river and its tributaries.

Climax ecosystem: a relatively stable plant community.

Coloniser: a species that actively invades or migrates to a new environment.

Community: any naturally occurring group of different organisms inhabiting a common environment, interacting with each other and relatively independent of other groups. Is frequently used incorrectly as an alternative for an association, alliance or structural formation.

Connectivity: measure of the degree of interconnection of habitat for a certain species.

Conservation: one approach to ecosystem management that aims to maintain the continuity of a system, with or without change and refers to the process and actions of looking after a place so as to retain its natural significance.

Cumulative Impact: refers to impacts resulting from a multitude of developments or activities, and their interactions in space and time. This includes off site impacts associated with an activity.

Critical habitat: means habitat declared to be critical habitat under Part 3 of the NSW Threatened Species Conservation Act, 1995 and Part 7A of the NSW Fisheries Management Act 1994. Otherwise defined in context to conservation biology as the area required by a species for its long-term survival and development (also see minimum habitat requirement).

DEC: Department of Environment and Conservation (formerly NPWS).

Degraded land: see land degradation.

DIPNR: Department of Infrastructure Planning and Natural Resources (formerly Department of Land and Water Conservation and Planning NSW).

Ecological community: is an assemblage of species occupying a particular area. Endangered ecological community is defined under the NSW Threatened Species Conservation Act 1995.

Ecological processes and functions: living and non-living processes that play an essential role in maintaining the integrity and continuity of an ecosystem.

Ecological restoration: the process of (or end result of) reinstatement of the structure and dynamics of a pre-existing community. For the purpose of this strategy ecological restoration can include the following:

- The establishment of wildlife corridors through revegetation and vegetation management;
- Weed and introduced animal pest management and control;
- Control and/or management of domestic animals in habitat areas (livestock & pets);
- Bush regeneration and reforestation (assisted regeneration and reconstruction);
- Re-establishing locally native plant and animal species;
- Promoting the development of or re-establishment of ecological processes essential to an ecosystem, a species or a species habitat requirements;
- Amelioration of soil degradation issues (eg acid sulphate and saline soils, erosion control, remediation of contaminated sites);
- Improving water quality and flows;

- Controlling pollution and other threats;
- Implementation of ecologically based fire management regimes; and
- Increasing environmental protection via planning controls.

Ecologically Sustainable Development (ESD): using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased. Ecologically Sustainable Development is defined under Section 6 of the Protection of the Environment Act 1991.

Ecosystem: a dynamic complex of plant, animal, fungal and micro-organism communities and associated non-living environmental attributes that interact as an ecological unit.

Ecosystem diversity: Ecosystem diversity refers to the variety of habitats, biotic communities and ecological processes. An ecosystem consists of plant, animal, fungal and micro-organism communities and the associated non-living environment interacting as an ecological unit. Ecosystem diversity has two inter-related components: the diversity of communities of species; and the diversity of interactions between community members (processes).

Ecosystem goods and services: these include things such as water and nutrient cycling, break down of pollutants, water quality, soil formation, creation of oxygen, maintenance of hydrological cycles, pollination of crops etc.

Environmental weed: a plant that spreads and invades into native vegetation and habitats.

Endangered ecological community: an ecological community specified in Part 3 of Schedule 1 of the NSW Threatened Species Conservation Act 1995.

Endangered population: a population specified in Part 2 of Schedule 1 of the NSW Threatened Species Conservation Act 1995.

Endangered species: a species listed on Schedule 1 of the NSW Threatened Species Conservation Act 1995 or listed as Endangered under the Environment Protection and Biodiversity Conservation Act 1999.

Endangered species, populations and ecological community: a species, populations and ecological communities specified in Schedule 1 of the NSW Threatened Species Conservation Act 1995.

Endemic: having a natural distribution that is confined to a particular geographic region. For example a plant can be either endemic to Australia, an endemic of NSW or even endemic to basalt soils associated with the Mt Warning Caldera.

Extinct: species that have either not been found in recent years despite thorough searching, or have not been collected for at least 50 years.

Ex-situ: out of original situation, pertaining to the maintenance of live plant specimens in gardens or out of the wild.

Footprint effect: the area impacted by a development or activity. This can include both on site and off site impacts.

Fragmentation: the process of progressive loss and isolation of habitat.

Genetic diversity: Genetic diversity refers to the variety of genetic information contained in all individual plants, animals and micro-organisms.

Genetic isolation: when two or more populations or species are physically or behaviourally separated.

Geographic Information System (GIS): a computer information system that stores, analyses/manages and displays spatial and geographic data.

Habitat: the environment in which a species can occur, survive and reproduce. It is an area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community and includes any biotic or abiotic component.

Habitat loss: removal of vegetation and habitat attributes.

Habitat value: the extent to which an area is capable of supporting large numbers of a range of species. Habitat value is related to the extent of vegetation diversity (both species and structure), and the availability of resources such as nesting places, food and protection from predators, as required by each species present.

High Conservation Value vegetation and habitats: land mapped as being of high conservation value according to the ecological criteria specified in the Relative Ecological Values Matrix or by DIPNR's HCV identification methodology. Assessment of HCV values is required at the property level.

Home range: the area used by a species for day-to-day activities on a seasonal basis such as feeding, breeding and nesting.

Inbreeding: a mating system in which crosses between close relatives or selfing is common.

Introduced species: a species that is not locally indigenous.

Key threatening process: a threatening process specified in Schedule 3 of the NSW Threatened Species Conservation Act 1995.

Land degradation: a multi faceted problem encompassing a number of processes, which usually involves the accelerated removal or alteration of soils, or their surface cover, as a result of human activities. Land degradation can be divided into three main categories with a number of subtypes in each class, as follows:

- Soil erosion & deposition:
 - Subtypes:
 - Water erosion;
 - Wind erosion;
 - Mass movement of soil; and
 - coastal erosion by marine processes.
- Soil degradation:
 - Subtypes:
 - Soil salinity;
 - Degradation of soil structure;
 - Soil fertility decline;
 - Soil acidification;
 - Water repellency;
 - Waterlogging; and
 - Soil pollution.
- Ecosystem change, including changes to vegetation cover and composition, and introduction of plant and animal pests:
 - Subtypes:

- Vegetation degradation; and
- Introduction of pest species.

Landscape matrix: Describes the varied distribution and presence of different landuses and ecosystems present in an area, considers urban/suburban, agriculture, remnant ecosystems and all manner of modified and natural areas

Locally occurring: native species from general locality or similar habitat and soil type elsewhere in the Shire.

Local provenance: refers to native species with genetic origin from local catchment (ie the Brunswick Valley or the former Big Scrub or coastal sites). Local provenance will vary between plants and sites depending on individual species lifecycle requirements (eg dispersal/pollination range) and site characteristics.

Outbreeding depression: when the progeny of an outcross is poorly adapted to the parent's environment.

Migratory species: those that move from one location to another, then return to the same location on a seasonal or annual basis.

Monitoring: a systematic process involving planned and repeated data collection, analysis, interpretation, reporting and acting on the data.

Minimal disturbance: practice designed to facilitate developments in an area so long as the activity duly considers the environment in which it is to be established and proceeds in a manner that will not cause undue stress to ecosystems, especially those with identified species of conservation significance.

Minimum habitat requirement: the minimum area required to maintain a species in a given habitat.

Native species: normally refers to a species indigenous to NSW but can also be used to describe a species that is locally indigenous to a locality.

Native vegetation: vegetation that is indigenous to NSW, that is, of a species that existed in NSW or a locality within NSW that existed in that location prior to European settlement.

Natural area: a classification assigned to certain community land for the purposes of the Local Government Act 1993. Land should be categorised as a natural area if the land, whether or not in an undisturbed state, possesses a significant geological feature, geomorphological feature, landform, representative system or other natural feature of attribute that would be sufficient to further categorise the land as bushland, wetland, escarpment, watercourse or foreshore.

Nomadic fauna: species that move widely in response to available resources, such as food or nesting sites. These species do not necessarily return to the same location on a regular basis.

Noxious weed: a weed that is listed under the Noxious Weeds Act 1993.

No net vegetation loss: management practice designed to allow development in an area, but provides for the establishment of an equivalent vegetation assemblage and ecosystem in another similar area to compensate the environment for that loss.

NPWS: National Parks and Wildlife Service (NSW).

Population: a group of organisms, all of the same species, occupying a particular area.

Rare species: species represented by a relatively large population in a very restricted area or by smaller populations spread over a wider range, or some intermediate combination of this distribution pattern. Generally referred to as a species considered to be unusual or present in small numbers, usually but not necessarily due to population decline.

Recovery plan: a plan prepared and approved under Part 4 of the Threatened Species Conservation Act 1995 or Part 7A of the Fisheries Management Act 1994 providing for the recovery of a threatened species, populations or ecological communities.

Recruitment: new individuals joining a population as a result of seedling growth, asexual reproduction or immigration. Typically refers to new species establishing at a site.

Rehabilitation: general concept referring to the restoration and repair of a degraded ecosystem to its former undisturbed condition. Rehabilitation may take several forms that, depending on the degree of naturalness, ranges from regeneration, restoration, reconstruction, reclamation and stabilisation. Rehabilitation may require implementation of a range of techniques, such as revegetation and weed control. Rehabilitation is a component of ecological restoration.

Refugia: fragments of a once more common habitat that provides refuge for previously widespread species.

Reintroduction: the transplanting or re-establishment of a species back into a population from which they came.

Remnant: a fragment of a once more common habitat.

Restoration: the process of (or end result of) reinstatement of the structure and dynamics of a pre-existing community. It is a form of rehabilitation. Also see ecological restoration.

Restoration capacity: a measure of the difficulty of undertaking ecological restoration at a site. It is based on an assessment of resilience and robustness. This will determine the type of restoration or rehabilitation that is feasible to undertake.

Riparian land: means any land that adjoins, directly influences, or is influenced by a body of water. This includes land immediately adjacent to small creeks and rivers, riverbanks, intermittent streams or gullies, and areas surrounding lakes and wetlands on river floodplains which interact with the river during floods. The width of riparian land is largely determined by management objectives, and may need to be defined in terms of distances from water bodies or by mapping.

Saltmarsh: is a coastal wetland subject to tidal flooding and vegetated by grasses, herbs and low shrubs that are tolerant of high salinity.

Scrub: a structural formation where the shrubs are between two & eight metres and have a projection foliage cover of more than 30%. Also local terminology for rainforest.

Site specific: refers to native to habitats/soil types present in surrounding landscape and known from or likely to have occurred on site prior to clearing.

Species: is a group of organisms capable of interbreeding freely with each other but (usually) not with members of other species. It includes any recognised sub-species or other taxon below a sub-species, and any recognisable variant of a sub-species or taxon.

Species diversity: This refers to the variety of species on Earth. Species diversity is usually a measure of the number of species (richness) and their relative abundances for a given point in time.

Species impact statement (SIS): a statement referred to in Division 2 of Part 6 of the NSW Threatened Species Conservation Act 1995 and includes an environmental impact statement, prepared under the <u>Environmental Planning and Assessment Act 1979</u>, that contains a species impact statement.

Sub-species: a group of individuals that form a distinct group below the level of species.

State Environmental Planning Policy (SEPP): a policy prepared under the *Environmental Planning and Assessment Act 1979* dealing with matters of significance for environmental planning for the whole state.

Threat abatement plan: a plan prepared and approved under Part 5 of the NSW Threatened Species Conservation Act 1995.

Threatened (species, populations and ecological communities): is a species, population or ecological community specified in the *Threatened Species Conservation Act 1995* as either endangered, vulnerable, or presumed extinct.

Threatened ecological community: an ecological community specified in Part 3 of Schedule 1 or Part 2 of Schedule 2 of the NSW Threatened Species Conservation Act 1995.

Threatened species: a species specified in Part 1 or 4 of Schedule 1 or in Schedule 2 of the NSW Threatened Species Conservation Act 1995.

Threatened species, populations and ecological communities: a species, populations and ecological communities specified in Schedules 1 and 2 of the NSW Threatened Species Conservation Act 1995.

Threatening process: a process that threatens, or may have the capability to threaten, the survival or adaptive capacity of a species, populations or ecological communities to persist in a habitat, ecosystem or ecological community. Also see Key threatening process.

Translocation: the transplanting or movement of a species into an area where they or their parentage from which they formed did not originate.

Vegetation structure: the pattern of the height, form and density of vegetation.

Vulnerable species: a species listed under Schedule 2 of the NSW Threatened Species Conservation Act 1995.

Weed: A weed is a problem plant. Weeds invade natural ecosystems, reduce agricultural production, or threaten other species (plants and animals). Weeds are often introduced species, but they can also be native species growing outside their natural range.

Wetland: land periodically or permanently inundated with water, comprising emergent aquatic vegetation dominated by characteristic wetland species. Wetlands include areas commonly

described as swamps, mangroves, ponds, lagoons, and the like. The majority of plant species present normally comprise sedges and rushes. Two general types of wetlands are normally recognised, namely freshwater wetlands and saltwater (or estuarine) wetlands.

Wildlife corridor: an identified area of habitat or land that is managed to promote the movement, migration, colonisation and interbreeding of plants and animals between two or more larger areas of habitat. Wildlife corridors may consist of vegetated, non-vegetated and lands vegetated with weeds. For the purpose of this Strategy a wildlife corridor includes those areas mapped as a wildlife corridor in the Bryon Biodiversity Conservation Strategy but also can include areas not identified in the Strategy.

The above definitions were sourced and adapted from:

Cropper, S. C. 1993. Management of Endangered Plants. CSIRO Publications. East Melbourne Victoria.

New South Wales National Parks & Wildlife Service, 2001. Biodiversity Planning Guide for NSW Local Government, Report prepared by Fallding, M., Kelly, A.H.H., Bateson, P. and Donovan, I. For NSW National Parks and Wildlife Service, Hurstville.

NSW Threatened Species Conservation Act 1995. http://www.legislation.nsw.gov.au/viewtop/inforce/act+101+1995+FIRST+0+N