

## 4. Conservation

This text has been compiled from the proposal document submitted to UNESCO prior to Biosphere status being awarded. Therefore, please excuse any references made to the 'nominated area' and any out-dated terms (including reference to the former council) which might now appear confusing.

In order to limit the size of the document and make it easier for users to download, we have edited the original submission into sections.

This is one of eight (8) PDFs available to download from [www.noosabiosphere.org.au](http://www.noosabiosphere.org.au) :

1. Describe & Define Noosa Biosphere
2. Cultural Heritage & Settlement
3. Sustainable Development
4. Conservation
5. Flora Species List
6. Fauna Species List
7. Research Activities
8. Supporting document – Acronyms, Bibliography, Glossary

The content of all these documents is fairly scientific and designed to appeal to a more academic audience.

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# 1. INTRODUCTION TO LANDSCAPES, ECOSYSTEMS, SPECIES AND GENETIC VARIATION

## Landscape values

The proposed Noosa Biosphere incorporates approximately 83,000 hectares of land straddling the regions of South East Queensland (to the south) and the Great Sandy region (to the north which includes the Fraser Island World Heritage Area). It is situated between two Ramsar Sites (Hervey Bay and Moreton Bay), and provides connectivity between the highly significant coastal sand masses of the Cooloola/Fraser island complex and the subtropical coastal forest uplands of the Blackall Ranges.

The nominated area extends approximately 3km seaward of the coastline between the southern boundary of Noosa Shire at South Peregian to the northern boundary of Noosa Shire some 25 kms north of the Noosa River mouth.

Noosa encompasses diverse biodiversity and natural landscapes of great significance in a very confined physical area with many features (particularly geomorphological landscapes and aquatic systems) that are globally unique.

Noosa forms part of the region known biogeographically as the "Macleay - McPherson Overlap Zone", which is an area of exceptionally high biodiversity where the northern Torresian and southern Bassian faunas and floras of Australia meet and overlap. As a consequence, the region has the richest fauna in Australia for birds, bats, amphibians and snakes.

There are:

- ⇒ Many species at or near their northern limits of distribution;
- ⇒ Many species at or near their southern limits of distribution;
- ⇒ Many species that are endemic to the broader regional Macleay-McPherson Overlap;
- ⇒ Species that are more narrowly endemic and are endemic or largely endemic to Noosa; and
- ⇒ Species that have disjunct populations (i.e. may occur within Noosa and then not reported again until the Atherton Tableland some 1500kms north).

The Australian Terrestrial Biodiversity Assessment (2002 National Land and Water Resources Audit) found there are 85 bioregions in Australia, ten of which have greater than 50% of their constituent ecosystems considered threatened. The South-East Queensland Bioregion is one of those ten. Noosa in some respects provides a last stronghold for the previous biodiversity values of the entire region, and an existing "biodiversity museum" encapsulating the living biodiversity and natural history values currently present in Queensland and Australia. It is also a living museum of global importance.

Noosa has the only substantial coastal mainland remnant vegetation areas in the growing conurbation between Byron Bay (located some 300 km south in northern New South Wales) and Bundaberg (some 250 km to the north). When considered in its totality with adjacent remnants Noosa can be seen as a core biodiversity area critical to maintaining overall biodiversity representation and quality in South-East Queensland.

Noosa has a diverse and robust mosaic of interconnected remnant ecosystems linked to large vegetated areas in adjoining local authorities such as Maroochy (particularly Mapleton State Forest and Conondale Range) and Cooloola Shire (balance of Cooloola section of Great Sandy National Park and various elevated state forests).

Noosa Shire also provides an altitudinal range of fauna habitats, which incorporate both east-west and north-south stepping stones for a range of fauna taxa. Habitats range from littoral rainforest and coastal dune heath and woodlands in the east, through riverine and lake systems, wallum heath, rising through woodlands and tall open forests of the Cooroy and other plateaux and mountains to the west and north-west. Interspersed across most of the altitudinal range are pockets and creek systems containing rainforest and ecotonal forests. Extinct volcanic plugs (inslbergs) which rise to the west of Noosa such as Mount Cooroora, Mount Cooroy and Mount Cooran contain montane heaths.

This altitudinal range and the all important habitat connectivity allow for seasonal fauna migration to occur within Noosa. This is particularly important for birds, (e.g. Noisy Pitta) that have altitudinal migration requirements.

The urbanised areas of eastern Noosa have corridors or vegetation mosaics entwined through the urban fabric or are buffered by large vegetation nodes. This helps to enable part of the fauna diversity to be easily observed by the human inhabitants of the Shire and contributes an important element of what might be considered to be the Noosa cultural experience.

The northward link between Noosa and Fraser Island (WHA) via the Cooloola Section of the Great Sandy National Park is a particularly noteworthy feature of the nominated area. The Noosa River system is the southernmost boundary of the Great Sandy region (which includes Fraser Island, Cooloola National Park and Hervey Bay), which contains the oldest and largest number of independent coastal dune systems recorded in the world. The lower Noosa River is a comparatively rare example in the subtropics of a choked coastal lagoon system developed entirely on sand. (Strategic Guide to Natural Resource Management in South-East Queensland (2000)).

There are two Commonwealth Government listings for wetlands of national importance covering the Noosa River system: Listing number 133 – Lake Weyba SEQ008QL and Listing number 135 – Noosa River Wetlands SEQ010QL. These listings cover a combined 12,805 hectares and comprise 16 different wetlands types.

The Noosa River Wetlands are a spectacular and extensive system of freshwater, brackish and saline lakes, marshes, heathlands and estuarine wetlands associated with the Noosa River and have unique landforms vegetation and fauna. The Noosa River lakes and adjacent wetlands are one of few such wetland complexes on the entire Eastern Australian seaboard and as part of the Great Sandy Region are considered to have World Heritage value. The State and Commonwealth Governments are in the process

of developing a nomination for this area for World Heritage listing as an extension to the Fraser Island World Heritage Area.

In 2003, the State and Commonwealth Governments jointly funded the preparation of a report outlining the case for the inclusion of the Cooloola section of the Great Sandy National Park in the Fraser Island World Heritage area. Since that time the State and Commonwealth Governments have been in the process of negotiation about the proposed boundaries of the extension of the World Heritage Area.

The State and Commonwealth Governments are currently developing the community consultation process that is required to finalise the nomination for the extension of the Fraser Island World Heritage area.

The Cooloola area and Noosa River have been classified as a “Coastal Key Area” that provides “the only opportunity of including in a Key Area in Region 12 (SEQ) large areas of communities 1 (notophyll vine forests on sand dunes), 3 (microphyll vine forests on sand dunes) and 15 (low to medium open forest and woodland on coastal plains and low rises)”. (RAKES Stanton and Morgan 1977)

The largest and most complex areas of heath and sedge swamps and marshes of the region also occur within this area, as well as the most spectacular developments of coloured sand exposures.

The Noosa River, by its size and depth, slow flowing characteristics, the nature and size of associated lakes, and the undisturbed nature of much of its catchment, is unique in the region.

## Ecosystems

Noosa contains many ecological, biodiversity and natural history attributes that range across regional, state, national and international significance contexts. Some attributes are considered to be globally unique.

Noosa is located within two critically endangered and overlapping Ecoregions (as identified by World Wildlife Fund/National Geographic Priority and Global 200 Ecoregions) being the “Eastern Australian Rivers and Streams”, and the “Eastern Australian Temperate Forests” (AA0402). Noosa is also within a critical/endangered endemic area as defined by Birdlife International.

The terrestrial parts of the nominated area retains 40,611ha (50.6%) of its original remnant native vegetation and a further 6,109ha (7.6%) is vegetated with regrowth vegetation.

Broad vegetation associations which occur within the nominated area include sedgeland, wet heaths, dry heaths, low woodland and forest characterised by *Banksia*, *Melaleuca*, *Corymbia* and *Eucalyptus* canopy species, dunal strand communities, open heath/shrublands on rocky rises, rainforest and ecotonal communities (NSC, Sept 1995). Extensive areas of mangrove, saline saltmarsh, herb-fields and seagrass beds are associated with the lower Noosa River and its lake system. A number of dystrophic, low pH (acid) lakes, freshwater wetlands and streams associated with coastal dune systems are key feature of the area.

Within these broad categorisations, 63 different regional ecosystem types have been identified and mapped<sup>1</sup>. Ten of these regional ecosystems are classified as “Endangered” under Queensland Legislation and 24 regional ecosystems are classified as “Of Concern”. Endangered regional ecosystems cover 5,449 ha or 13.4% of the remnant vegetation within Noosa and of concern regional ecosystems cover 12,839 ha or 31.6% of the remnant vegetation. Numerous regional ecosystems have a limited distribution both within the Shire and regionally, and are a high priority for conservation. These include dry heath and montane heath communities. 58.8% of Noosa’s remnant native vegetation is in conservation reserves and State Forests.

Like Fraser Island, the Cooloola sandmass (which forms part of the core area of the nominated area) and parts of the nearby lowland sandstone hills have been refugia for lowland rainforest as the climate dried out during the Pleistocene period. These areas also include both relictual Gondwanan flora such as *Agathis* and *Araucaria* and extensive rainforests and descendents of the Gondwana flora all of which are growing on infertile sandy soils. Elsewhere in eastern Australia such forests are mostly found on more fertile soils. These communities also hold relictual animals.

Cooloola strongly illustrates both the progressive and aggradational stages as well as the retrogressive stages of ecological community development. Most ecosystems on Earth are subject to such processes, but it is unusual to find them as well documented and so clearly displayed as is present here. Cooloola has a distinctive assemblage of biota, especially invertebrates, exhibiting a high degree of endemism and unusual characteristics that come with living in a sand environment.

The high overall level of faunal diversity in the nominated area is directly attributable to the extent of vegetation cover and the range of habitats present (EES, 2003). The vegetation communities in Noosa which are predicted to have the highest abundance of association with fauna species are the tall open eucalyptus forests and melaleuca forests, particularly those with complex assemblages of canopy species and understorey species, where there are permanent or seasonal waterbodies. These ecosystems often have rainforest species within the understorey component, are complex and provide a wide variety of foraging, hunting and sheltering opportunities for a diversity of fauna species across all fauna groupings.

The ecosystems which are predicted to have the highest levels of association with rare, threatened or otherwise significant fauna taxa within Noosa only partially correspond to these overall high species abundant ecosystems. The tall to very tall open wet sclerophyll forests with rainforest understoreys provide the highest level of fauna associations for Rare, Threatened, and Significant reptiles and mammals, and melaleuca forests provide habitat for a high number of Rare, Threatened and Significant fauna taxa overall with particular emphasis on amphibian and bird species.

The lowest diversity of faunal species associations by ecosystem within the nominated area are for the harsh environments of dry and open heath on dunes, montane heath and rocky pavements, and the vegetation communities associated with exposed rocky headlands. However, the special ecosystem traits of these environments provide opportunities for a number of highly exclusive or selective faunal

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<sup>1</sup> A Regional Ecosystem is defined as “a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil” (Sattler and Williams 1999)

associations. For example, the association between raptors and the exposed rocky areas of both coastal headlands and montane heath found on rocky pavements.

The nominated area includes extensive areas with large numbers of hollow bearing trees available for the widespread hollow dependent fauna. As hollow bearing trees are present across or adjacent to most of the urban areas and in significant numbers across remnant vegetation areas, a high diversity and abundance of hollow dependant species are common across Noosa.

While previous stronghold populations of hollow dependant species (eg. gliders, microbats etc) are being impacted greatly elsewhere in South-East Queensland due to cumulative habitat loss – Noosa retains healthy populations including the Greater Gliders.

## Species Diversity

A total of 1,365 different species of higher plants have to date been identified within the nominated area. Of the species recorded within the Shire, 39 are protected under State legislation and 21 are also protected under Commonwealth legislation.

Despite low nutrient status and acidic nature of many of the soils of the nominated area, Noosa is rich in plant and animal species. Habitat diversity is high and this partly accounts for the diversity of the biota found here. There are 19 plant species at their northern limit of distribution and seven species at their southern limit in the nominated area. The Cooloola area which forms a large component of the core of the nominated area is the largest remaining area of vegetation developed on aeolian sands in South–Eastern Australia, and together with Fraser Island it represents the stronghold for the distinctive flora and fauna.

The Cooloola area and Fraser Island are home to a number of primitive angiosperm genera including *Melodorum*, *Polyalthia*, *Eupotmatia*, *Tasmannia*, *Beilschmiedia*, *Cinnamomum*, *Cryptocarya*, *Endiondra*, *Litsea*, *Neoltsea* and *Wilkea*. Fungi taxa or taxa approximating species numbering 280 have been found at Cooloola, many new to science and requiring description.

The presence of large areas of natural vegetation, including a broad range of habitat types (with high diversity of species assemblages), and restricted and endangered ecosystem types, has contributed to the high levels of fauna biodiversity in the study area.

The nominated area is considered to have very high total alpha and gamma biodiversity on an area basis and exceedingly high alpha and gamma biodiversity for the class Aves.

There are 711 species of native fauna that have been recorded within the nominated area. Amongst these there are:

- ⇒ 78 butterflies;
- ⇒ 9 crustaceans;
- ⇒ 121 marine and 22 freshwater fish;
- ⇒ 30 amphibians;

- ⇒ 75 reptiles;
- ⇒ 303 birds; and
- ⇒ 64 marine and terrestrial mammals. (EES, 2003)

There are 49 fauna species found within Noosa that are listed as significant by the International Union for the Conservation of Nature (IUCN) in the Red List of threatened species. A further 30 species found in Noosa are internationally significant and listed by the Bonn Convention on Migratory Species. 44-47% of all resident and regular migratory birds occurring in Australia are recorded from the nominated area, and there are 35 bird species frequenting Noosa that are considered internationally important and are listed by the JAMBA and CAMBA migratory bird agreements. Noosa also contains eight fauna species listed as endangered/threatened under the United States Endangered Species Act.

There are 73 fauna species found in Noosa that are considered Nationally Significant and are listed in the Commonwealth Environmental Protection and Biodiversity Conservation Act. The Queensland Nature Conservation Act lists 66 fauna species found in Noosa as rare and threatened species.

At least 229 taxa found in Noosa are listed as rare and threatened at a state or national or international level or are considered to be regionally or locally significant. This equates to over 40% of the fauna species that occur in Noosa being considered significant at varying levels.

The lower reaches of the Noosa River represent a choked coastal lagoon system with a geomorphologically unusual arrangement of freshwater delta and estuarine lakes. A distinctive fauna is associated with these wetland environments including the only two vulnerable fish species in Queensland and a distinctive group of acid frogs.

There are no other documented examples of fish occurring in peat fens outside the Noosa Plain /Cooloola and Fraser Island. These fens also support an unusual number of rare and threatened invertebrate species. In particular the crayfish, earthworms, termites, snails and other invertebrate species associated with this area exhibit a high degree of diversity and endemism.

The largely undisturbed Noosa River and the coastal plains increase in importance as refuges and strongholds for displaced species such as the Ground Parrot, Glossy Black Cockatoo and False Water Rat.

The Koala has recently been declared Vulnerable in South – East Queensland by the State Government and is listed as Threatened by the USESL and Near Threatened by the IUCN. The Koala occurs within Noosa Shire, most notably in Noosa National Park where over a million visitors annually have the opportunity to see these iconic Australian animals in the wild.

The high levels of habitat diversity, condition and extent in the study area result in Noosa being a highly important area for the long term preservation of the flora and fauna species biodiversity in the South East Queensland region, and the low invasive weed diversity in Noosa indicates a higher level of integrity of the ecosystems and remnants present.

## Significance of biological diversity conservation

The Noosa Biosphere Reserve will contribute greatly to biodiversity conservation through the conservation of rare and threatened ecosystems and landscapes. It has been identified through the joint Commonwealth/State government assessment of South East Queensland undertaken as part of the Regional Forest Agreement project (SEQCRA/RFA) as a **Centre of Endemism** and includes areas of the highest level of diversity for endemic threatened species.

The Regional Forest Agreement project (SEQCRA/RFA) identified the nominated area for Plant Species Diversity as one of the equal highest rated Gridcells in SEQ with 320-817 species. This diversity is partly attributable to the diversity of different regional ecosystems (60 RE's) that have been identified within Noosa Shire. 55.67% or 34 of these regional ecosystems are classified as either "Endangered" (10) or "Of Concern" (24) under State legislation. Noosa also contains the highest significance grid cell in SEQ for distribution of plant taxa at southern limits (identified by joint Commonwealth/State assessment SEQCRA/RFA). The Comprehensive Regional Assessment Panel also identified large numbers of Priority Fauna Taxa and Secondary Importance Taxa in Noosa.

Noosa and the Great Sandy region are located within the Macleay -McPherson Overlap, which is an area of high species richness and habitat diversity. The Overlap consists of a great many plant and animal species that reach their northern or southern limits of distribution. A range of species generally known from inland areas west of the Great Dividing Range also reach their eastern limit of distribution in the western sector of the Overlap. In addition, "Fraser Island and adjacent mainland (Cooloola) are important for species at the edge of their range" (Executive Summary: Joint Commonwealth/ State SEQ Comprehensive Regional Assessment). A large number of fauna species are either endemic or largely endemic within the range of the overlap or have distributions that reach their limits within the Overlap. The coincidence of species richness and rare species in the nominated area was also a feature recognised as giving Noosa and the Great Sandy Region particular ecological significance by the SEQ Comprehensive Regional Assessment (Executive Summary Joint Commonwealth/ State SEQ Comprehensive Regional Assessment).

The nominated area is a recognised stronghold for populations of significant fauna including the rare Glossy Black Cockatoo. Noosa Shire is recognised as having one of only three significant populations of the Glossy Black Cockatoo in Queensland. Dr Glen Ingram, in *The Glossy Black-Cockatoo In South Eastern Queensland* (2005) states..."The Glossy Black-Cockatoo *Calyptorhynchus lathami* is the rarest and most threatened of Australia's cockatoos. The species is restricted to eastern and south-eastern Australia, throughout which they are uncommon and declining. South-eastern Queensland has three of the most significant populations in Australia, occurring around Moreton Bay, hinterland of the Gold Coast, and Noosa".

The vulnerable Ground Parrot, Red Goshawk, Spotted Quoll, Mary River Cod, Richmond Birdwing butterfly, Giant Barred Frog, False Water Rat, Koala and Coxen's Fig Parrot are examples of other rare and threatened fauna that have strongholds in Noosa or whose last recorded confirmed sightings are attributed to the nominated area.

The nominated area, particularly the lower Noosa River provides important habitat for internationally important migratory shorebirds. The Noosa River estuary regularly supports 40-60,000 migratory terns.

Lake Weyba is recognised by the Queensland Government as a significant habitat for migratory waders. The whole river system in effect is an adjunct to the Great Sandy Straits Ramsar site.

The nominated area forms the major southern portion of the largest area of High Wilderness Quality existing in mainland coastal Queensland south of Hervey Bay and contains several sites of geoheritage and natural heritage significance.

The Cooloola area and Noosa River have been classified as a "Coastal Key Area" (RAKES Stanton and Morgan 1977). The area provides "the only opportunity of including in a Key Area in Region 12 (SEQ), large areas of communities 1 (notophyll vine forests on sand dunes), 3 (microphyll vine forests on sand dunes) and 15 (low to medium open forest and woodland on coastal plains and low rises)". Further, "the largest and most complex areas of heath and sedge swamps and marshes of the region occur within this area, as well as the most spectacular developments of coloured sand exposures".

Noosa is located within a Critical/Endangered Endemic Bird Area (EBA) as defined by Birdlife International). Located within Ecoregion 183, it is identified as a critical priority EBA. The area is also located within two Critically Endangered overlapping Ecoregions as defined by WWF and National Geographic, namely "Eastern Australia Rivers and Streams" and "Eastern Australia Temperate Forests" (AA0402).

The Great Sandy Region of which the nominated area forms a significant proportion contains refugia with Gondwanan linkages, has species displaying remarkable examples of co-evolutionary development, has high species richness, many species at limits of distribution, high levels of evident species adaptation, high levels of endemism and high species richness. This is within an area of viable habitat size and is an obvious ecological and biodiversity hotspot.

Noosa River and lakes system is unique among Queensland estuaries with a transition from fresh water to hypersaline waters in the lakes and contains the largest riverine seagrass beds in South-East Queensland.

The South-East Queensland Regional Water Quality Management Strategy (SEQRWQMS) (2001) identifies the Noosa River catchment as the benchmark for healthy waterways in South-East Queensland and it is considered a largely pristine catchment. SEQRWQMS have rated the catchment health as EXCELLENT - the highest rating and the only catchment in South-East Queensland so rated. The study notes that the waters of the Noosa River throughout the waterway system are clean and carry little sediment, and that there is minimal erosion across the catchment due to restricted clearing and land-use designations. The ecosystem health of the Noosa River and lakes has consistently average A- from 2001-2006 and has demonstrated strong resilience over varying climatic conditions. (MBWCP Ecosystem Health Report Card 2001-2006). The system is the best available example of a large coastal waterway in the region that retains pre-European settlement ecosystem characteristics and functions and is characterised by high species diversity and low overall biomass.

The patterned peat swamp fens of Fraser Island, Cooloola and Noosa are globally unique. They are the only sub-tropical patterned fens and the only fens flowing into tidal wetlands in the world and have distinctive faunal inhabitants such as fish, crayfish and earthworms that would not normally be found in such acid environments.

The nominated area provides an excellent opportunity for biodiversity conservation due to the presence of a unique assemblage of landscapes and ecosystems that retain extensive coverage and viable connectivity. The unique cross section of biodiversity values preserved cannot be conserved in this dynamic form anywhere else on earth.

The Noosa Biosphere Reserve will aim to showcase community based planning processes that recognize that the conservation of biological diversity is a common concern of humankind and is an integral part of all human and economic development processes. This approach will extend to all ecosystems, species, and genetic resources. The implementation of the Noosa Biosphere Reserve will also seek to establish links between traditional conservation efforts and the economic goal of using biological resources to support economically and socially sustainable human development.

Noosa Biosphere Reserve will attempt to incorporate the principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use. There are significant opportunities for the partners in the Noosa Biosphere Reserve implementation body (eg governments, universities, research institutions and business interests) to also seek to establishment a research and development program that covers the rapidly expanding field of biotechnology (as per the Cartagena Protocol on Biosafety), to help explore real life issues associated with biotechnology development and transfer, benefit-sharing and biosafety. It is envisaged that this will assist the Australian Government to meet its obligations under the Rio de Janeiro "Earth Summit" Convention on Biological Diversity 1992 (CBD).

The CBD reminds decision-makers that natural resources are not infinite and sets out a philosophy of sustainable use. The Noosa Biosphere Reserve will seek to extend conservation efforts beyond the traditional protection of particular species and habitats, to allow for beneficial human use of ecosystems, species and genes in a way and at a rate that does not lead to the long-term decline of biological diversity. The establishment of strategic links to key research institutions and community based organizations will also assist decision-makers in exercising the precautionary principle in decision making (i.e that scientific certainty is not used as a reason for postponing measures to avoid or minimize a threat to biological diversity). The Noosa Biosphere Nomination acknowledges that substantial investments are required across the planet to conserve biological diversity globally. However, it also recognizes that a long term commitment to conservation in Noosa has already borne significant environmental, economic and social benefits in return, and these benefits can be significantly increased into the future.

## 2. BIOLOGICAL CHARACTERISTICS

The way vegetation has been identified and assessed in Noosa Shire has evolved over the past 12 years and has become more complex due to the evolution of legal classifications for vegetation classification under the Queensland Vegetation Management Act (1999) for which it was necessary to micro define what were previously reasonably broad vegetation classifications and assessments. Conventional vegetation mapping for Noosa Shire was initially undertaken under the Planning Scheme Project in 1995 (NSC, Sept 1995).

The vegetation was classified into eight major types, described below among the thirteen habitat/landcover designations. During the 1990's, bioregional planning was developed and used by State conservation agencies throughout Australia to protect representative examples of all identified ecosystems within each region. A bioregion represents the primary level of biodiversity classification and is based on broad landscape patterns that reflect the major structural geologies and climate, as well as major changes in floristic and faunal assemblages (Sattler, PS & Williams, RD (1999)).

Within each of the 13 bioregions identified for the State of Queensland, regional ecosystems provide the basis for identifying and protecting biodiversity. A regional ecosystem is defined as "a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil" (Sattler, PS & Williams, RD (1999)). These have been identified at a scale of 1:100,000 to 1:250,000 by the State. The conservation status of each of the regional ecosystems within Queensland was determined based on the estimated extent to which it remains as compared with its estimated extent prior to European settlement. A regional ecosystem is classified as either:

*"Endangered"* - if less than 10% pre-European extent remains and is considered to be at serious risk of disappearing within 10-20 years if current trends continue;

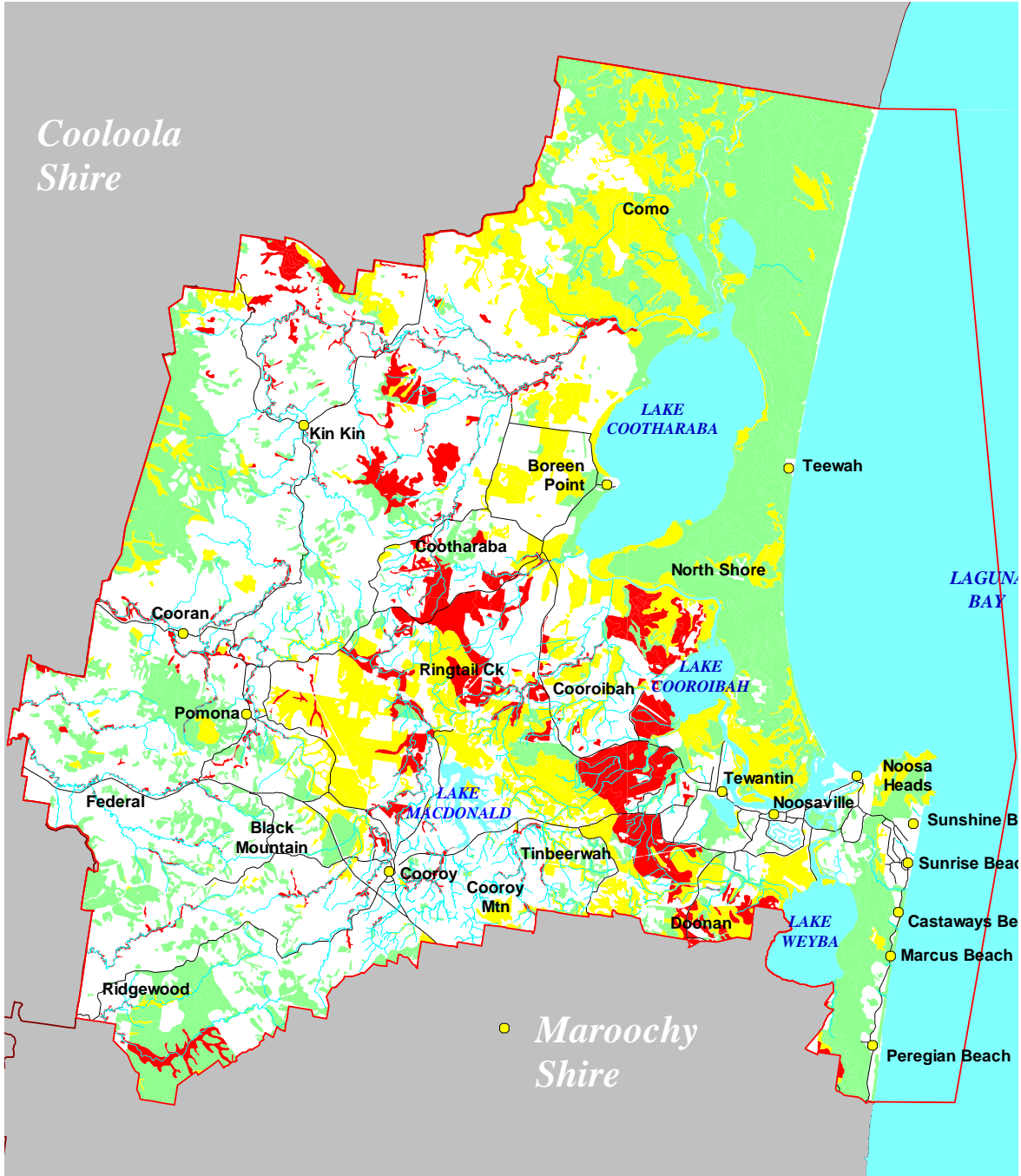
*"Of Concern"* - if 10-30% of pre-European extent remains in an intact condition in the bioregion; or

*"No concern at present"* - if over 30% of pre-European extent remains in an intact condition in the bioregion. It is important to note that the above classifications relate specifically to the Vegetation Management Act (1999), and areas that are defined as "No concern at present" for the purposes of assessment for that act, may still be of high or very high significance, but that for example, the areas may be secured within conservation reserves. Regional ecosystem conservation status is shown in Map 6.

MAP: Regional Ecosystem Conservation Status



Noosa Biosphere Reserve Regional Ecosystem Conservation Status



Regional Ecosystem Conservation Status - Threat category within the bioregion

- Endangered (< 10% Remains in Bioregion)
- Of Concern (< 30% Remains in Bioregion)
- Not Of Concern (> 30% Remains in Bioregion)
- Noosa Biosphere Reserve



Under the Vegetation Management Act, the status of a number of the regional ecosystems was altered from that given by Sattler, PS & Williams, RD (1999). These decisions were based on a variety of issues including regrowth and clearing since European Settlement.

To achieve consistency with the State Government approach to native vegetation mapping, Noosa Council embarked on a process of reclassifying the 1995 vegetation units from *Vegetation of Noosa Shire* (Edition 1 - 1995) into regional ecosystems. The vegetation types were further classified into 31 sub-types. The 31 types and sub-types of vegetation were then reclassified into regional ecosystems as defined by Sattler, PS & Williams, RD (1999).

A regional ecosystem is defined as “a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil”. The combination of geology, landform and soil is called a “land zone”. Twelve different land zones were identified as occurring within Queensland of which eight are found within Noosa Shire. These land zonations were determined using 2001 geological coverage held by the Queensland Department of Natural Resources & Mines. Land zones are grouped according to age, as well as origin and type of rock. The land zones within Noosa Shire are provided in Table 6.

**TABLE: Land Zones within Noosa Shire**

LAND ZONE NUMBER	DESCRIPTION	AREA (HA)
LZ1	Marine tidal clay plains	955
LZ2	Coastal sand dunes and swales	10,420
LZ3	Near level alluvial plains with riverine patterns, wetlands and lakeside dunes	17,692
LZ5	Remnant tertiary surfaces, deeply weathered soils	4,901
LZ8	Cones and plains on Cainozoic volcanics	1,496
LZ9 -10	Fine and coarse grained sedimentary rocks	17,619
LZ11	Folded or strongly deformed Palaeozoic or Proterozoic deposits	24,384
LZ12	Mesozoic to Proterozoic igneous rocks	2,742

Source: Adapted from: Sattler & Williams, 1999

The development of regional ecosystem equivalents from broad vegetation types and more detailed vegetation sub-types is presented below allied to the relevant land zone in which it occurs:

TABLE: Classification of 1995 Study Vegetation Types to Regional Ecosystems

Vegetation Type (NSC, Sept 1995)	Vegetation Sub-Type (NSC, Sept 1995)	LZ1 REs	LZ2 REs	LZ3 REs	LZ5 REs	LZ8 REs	LZ9/10 REs	LZ11 REs	LZ12 REs
1.1	Riparian forest			12.3.1					
1.2	Granite upland rainforest								12.12.1 , 12.12.16
1.3	Lowland rainforest				12.9-10.16x14		12.9-10.16	12.11.1 , 12.11.10	
1.4	Dune plain and high dune rainforest		12.2.1 12.2.3						
1.5 (regrowth)	Acacia spp. dominated regenerating rainforest								
1.6	Dry rainforest with <i>Araucaria cunninghamii</i>					12.8.13			
2.1	<i>Eucalyptus grandis</i>			12.3.2, 12.3.11			12.9-10.1	12.11.2	12.12.2a
2.2	<i>Eucalyptus microcorys</i> / <i>Lophostemon confertus</i> / <i>Eucalyptus pilularis</i> / <i>Syncarpia glomulifera</i>			12.3.2	12.5.6	12.8.9	12.9-10.1, 12.11.16x15	12.11.1 , 12.11.2 , 12.11.16	12.12.2 , 12.12.2a6, 12.12.15
2.3	<i>Eucalyptus tereticornis</i>			12.3.6, 12.3.11	12.5.2 (in part)	12.8.14 (in part)		12.11.9	12.12.12 (in part)
2.4	<i>Melaleuca Quinquenervia</i> / <i>Livistona australis</i>			12.3.5 (in part), 12.3.4					

Vegetation Type (NSC, Sept 1995)	Vegetation Sub-Type (NSC, Sept 1995)	LZ1 REs	LZ2 REs	LZ3 REs	LZ5 REs	LZ8 REs	LZ9/10 REs	LZ11 REs	LZ12 REs
				(in part)					
2.5	<i>Eucalyptus propinqua</i>				12.5.6	12.8.25	12.9-10.17 (in part)	12.11.3	12.12.2 , 12.12.15
3.1	<i>Eucalyptus racemosa</i>		12.2.6		12.5.3	12.8.20	12.9-10.4		12.12.14
3.2	<i>Eucalyptus pilularis</i>		12.2.8 12.2.6		12.5.6, 12.5.3		12.9-10.14		12.12.2
3.3	<i>Corymbia citriodora</i>					12.8.24	12.9-10.17	12.11.5	12.12.3
3.4	<i>Eucalyptus microcorys</i> / <i>Lophostemon confertus</i>				12.5.6	12.8.9	12.9-10.17	12.11.3	12.12.15
3.5	Undefined mixed <i>Eucalyptus</i> spp.						12.9-10.7		12.12.12
4.1	<i>Melaleuca quinquenervia</i> with heathland understorey		12.2.7 (in part)	12.3.4 (in part)					
4.2	<i>Melaleuca quinquenervia</i> with wetland understorey	12.1.1	12.2.7	12.3.4, 12.3.5					
4.3	<i>Melaleuca quinquenervia</i> monoculture		12.2.7	12.3.4, 12.3.5					
5.1	Dry heath		12.2.13						
5.2	Wet heath		12.2.12	12.3.13	12.5.9		12.9-10.22		
5.3	Sedgelands		12.2.15		12.5.9		12.9-10.22		
5.4	<i>Banksia aemula</i> /		12.2.9	12.3.1	12.5.10				

Vegetation Type (NSC, Sept 1995)	Vegetation Sub-Type (NSC, Sept 1995)	LZ1 REs	LZ2 REs	LZ3 REs	LZ5 REs	LZ8 REs	LZ9/10 REs	LZ11 REs	LZ12 REs
	<i>Eucalyptus bancroftii</i> (Wallum)			4					
5.5	Rocky heath					12.8.19			12.12.19
6.1	Mangroves	12.1.3							
6.2	Saltmarsh and herbfield	12.1.2							
6.3	Casuarina glauca open forest	12.1.1							
7.1	Coastal complex		12.2.5, 12.2.11						
7.2	Foredunes complex		12.2.14						

Source: NSC, Sept 1995

**TABLE: Remnant Regional Ecosystems of Noosa Shire**

<b>Regional Ecosystem</b>	<b>Regional Ecosystem Description [from Sattler, PS &amp; Williams, RD (1999)]</b>	<b>Remnant Area (ha.)</b>	<b>Status VMA (as at June 2001)</b>
12.1.1	<i>Casuarina glauca</i> open forest on margins of marine clay plains.	267	Endangered
12.1.2	Saltpan vegetation including grassland and herbland on marine clay plains.	109	No concern at present
12.1.3	Mangrove shrubland to low closed forest on marine clay plains and estuaries.	300	No concern at present
12.2.1	Notophyll rainforest on parabolic high dunes	26	Of concern
12.2.3.	Araucarian rainforest on parabolic high dunes	17	Of concern
12.2.5.	<i>Corymbia</i> spp., <i>Banksia integrifolia</i> , <i>Callitris columellaris</i> , <i>Acacia</i> spp. open forest to low closed forest on beach ridges in southern half of bioregion	1779	Of concern
12.2.6	<i>Eucalyptus racemosa</i> woodland on dunes and sand plains. Deeply leached soils	768	No concern at present
12.2.7	<i>Melaleuca quinquenervia</i> or <i>Melaleuca viridiflora</i> open forest to woodland on sand plains.	2588	Of concern
12.2.8	<i>Eucalyptus pilularis</i> open forest on parabolic high dunes	660	No concern at present
12.2.9	<i>Banksia aemula</i> woodland on dunes and sand plains. Deeply leached soils.	1031	No concern at present
12.2.11	Woodland to open forest on Quaternary coastal dunes and beaches.	367	No concern at present
12.2.12	Closed heath on seasonally waterlogged sand plains.	2267	No concern at present
12.2.13	Open heath on sand plains and dunes (dry heath)	53	Of concern
12.2.14	Foredune complex.	606	No concern at present
12.2.15	Swamps with <i>Baumea</i> spp., <i>Juncus</i> spp. and <i>Lepironia articulata</i> .	217	No concern at present
12.3.1	Gallery vine forest (notophyll vine forest) on alluvial plains.	1334	Endangered
12.3.2	<i>Eucalyptus grandis</i> tall open forest on alluvial plains and associated lower slopes.	1844	No concern at present
12.3.4	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus robusta</i> open forest on or near coastal alluvial plains.	2544	No concern at present
12.3.5	<i>Melaleuca quinquenervia</i> tall open forest near coastal alluvial plains.	1651	Of concern

Regional Ecosystem	Regional Ecosystem Description [from Sattler, PS & Williams, RD (1999)]	Remnant Area (ha.)	Status VMA (as at June 2001)
12.3.6	Melaleuca quinquenervia, Eucalyptus tereticornis, Lophostemon suaveolens woodland on coastal alluvial plains.	79	No concern at present
12.3.11	Eucalyptus siderophloia, Eucalyptus tereticornis, Corymbia intermedia open forest on alluvial plains near coast.	489	Of concern
12.3.13	Closed heath on seasonally waterlogged alluvial plains near coast.	878	Of concern
12.3.14	<i>Banksia aemula</i> woodland on alluvial plains near coast.	400	Of concern
12.5.2	<i>Eucalyptus tereticornis</i> , <i>Corymbia intermedia</i> grassy woodland to open forest on remnant tertiary surfaces and Cainozoic to Proterozoic sediments	300	Endangered
12.5.3	<i>Eucalyptus tindaliae</i> , <i>Eucalyptus racemosa</i> tall shrubby open forest on remnant tertiary surfaces and Cainozoic to Proterozoic sediments	1101	Endangered
12.5.6	<i>Eucalyptus pilularis</i> tall open forest on remnant tertiary surfaces	764	Endangered
12.5.9	Closed sedgeland to heathland on remnant tertiary surfaces and Cainozoic to Proterozoic sediments	136	Of concern
12.5.10	<i>Banksia aemula</i> ± <i>Eucalyptus umbra</i> low shrubby open woodland on complex of remnant tertiary surfaces and sedimentary rocks.	12	No concern at present
12.8.9	<i>Lophostemon confertus</i> tall open forest to open forest on Cainozoic igneous rocks.	25	Of concern
12.8.13	Araucarian complex microphyll rainforest on Cainozoic igneous rocks.	210	Of concern
12.8.14	Eucalyptus tereticornis, Allocasuarina torulosa grassy open forest on Cainozoic igneous rocks.	71	No concern at present
12.8.19	Montane shrubland on Cainozoic igneous rocks.	31	Of concern
12.8.20	Shrubby woodland with <i>Eucalyptus racemosa</i> or <i>Eucalyptus dura</i> on Cainozoic igneous rocks.	222	Of concern
12.8.24	<i>Corymbia citriodora</i> , <i>Eucalyptus crebra</i> open forest on Cainozoic igneous rocks.	20	Endangered
12.8.25	<i>Eucalyptus acmenoides</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus propinqua</i> , <i>Corymbia intermedia</i> , <i>Lophostemon confertus</i> open forest on Cainozoic igneous rocks.	126	Of concern
12.9-10.1	Tall mixed open forest on sedimentary rocks. Coastal.	3668	Of concern
12.9-10.4	<i>Eucalyptus racemosa</i> woodland on sedimentary rocks.	2198	No concern at present
12.9-10.7	<i>Eucalyptus crebra</i> , <i>Eucalyptus tereticornis</i> ± <i>Corymbia tessellaris</i> , <i>Angophora</i> spp. woodland on sedimentary rocks.	22	Of concern

Regional Ecosystem	Regional Ecosystem Description [from Sattler, PS & Williams, RD (1999)]	Remnant Area (ha.)	Status VMA (as at June 2001)
12.9-10.14	<i>Eucalyptus pilularis</i> tall open forest on sedimentary rocks.	393	No concern at present
12.9-10.16	Araucarian microphyll to notophyll vine forest on sedimentary rocks.	609	Endangered
12.9-10.16x1	Araucarian microphyll to notophyll vine forest on weathered material.	31	Endangered
12.9-10.17,	Mixed forest of <i>Corymbia citriodora</i> , <i>Eucalyptus siderophloia</i> , <i>Eucalyptus major</i> , <i>Eucalyptus acmenioides</i> on sedimentary rocks.	1825	No concern at present
12.9-10.22	Closed sedgeland/shrubland on sedimentary rocks. Coastal parts.	56	Of concern
12.11.1	Notophyll rainforest and/or <i>Lophostemon confertus</i> closed forest in gullies on metamorphics ± interbedded volcanics.	47	No concern at present
12.11.2	<i>Eucalyptus saligna</i> or <i>Eucalyptus grandis</i> , <i>Eucalyptus microcorys</i> , <i>Eucalyptus acmenioides</i> , <i>Lophostemon confertus</i> tall open forest on metamorphics ± interbedded volcanics.	929	No concern at present
12.11.3	Tall open forest with <i>Eucalyptus siderophloia</i> , <i>Eucalyptus propinqua</i> , <i>Eucalyptus microcorys</i> , <i>Lophostemon confertus</i> , <i>Corymbia intermedia</i> on metamorphics ± interbedded volcanics	1714	No concern at present
12.11.5	Mixed tall open forest with <i>Corymbia citriodora</i> , <i>Eucalyptus siderophloia</i> , <i>Eucalyptus major</i> on metamorphics ± interbedded volcanics.	552	No concern at present
12.11.9	Open forest to tall woodland with <i>Eucalyptus tereticornis</i> on metamorphics ± interbedded volcanics. Ridges and upper slopes.	15	Of concern
12.11.10	Notophyll rainforest ± <i>Araucaria cunninghamii</i> on metamorphics ± interbedded volcanics.	2198	No concern at present
12.11.16	Mixed tall open forest with <i>Eucalyptus cloeziana</i> on metamorphics ± interbedded volcanics.	433	Endangered
12.11.16x1	Mixed tall open forest with <i>Eucalyptus cloeziana</i> on sedimentary rocks.	590	Endangered 9
12.12.1	Notophyll/microphyll rainforest in gullies on Mesozoic to Proterozoic rocks	251	Of concern
12.12.2	<i>Eucalyptus pilularis</i> tall open forest on Mesozoic to Proterozoic igneous rocks, especially granite.	154	No concern at present
12.12.2a	Open-forest to tall open-forest of <i>Eucalyptus grandis</i> , with <i>Eucalyptus microcorys</i> , <i>Lophostemon confertus</i> , <i>Syncarpia glomulifera</i> , <i>Archontophoenix cunninghamiana</i> , <i>Eucalyptus resinifera</i> , <i>Corymbia intermedia</i> and <i>Allocasuarina torulosa</i> on soils derived from basalt.	709	No concern at present
12.12.3	Mixed tall open forest with <i>Corymbia citriodora</i> on Mesozoic to Proterozoic igneous rocks	61	Of concern

Regional Ecosystem	Regional Ecosystem Description [from Sattler, PS & Williams, RD (1999)]	Remnant Area (ha.)	Status VMA (as at June 2001)
12.12.12	Eucalyptus tereticornis, Eucalyptus crebra, Eucalyptus siderophloia woodland on Mesozoic to Proterozoic igneous rocks.	102	Of concern
12.12.14.	Mixed shrubby woodland on Mesozoic to Proterozoic igneous rocks. Canopy species include <i>Eucalyptus racemosa</i> , <i>Corymbia trachyphloia</i> , <i>Eucalyptus carnea</i> , <i>Eucalyptus tindaliae</i> , <i>Eucalyptus exserta</i> , <i>Angophora woodsiana</i>	4	Of concern
12.12.15	<i>Eucalyptus siderophloia</i> , <i>Eucalyptus propinqua</i> , <i>Eucalyptus acmenioides</i> tall open forest on near coastal hills on Mesozoic to Proterozoic igneous rocks.	702	No concern at present
12.12.16	Notophyll rainforest on Mesozoic to Proterozoic igneous rocks.	28	No concern at present
12.12.19	Vegetation complex of rocky headlands, predominantly but not exclusively. Mesozoic to Proterozoic igneous rocks.	29	Of concern
Total 60		40612	

Source: NSC June 2003

### 3. HABITAT / LAND COVER

A total of thirteen different broadscale habitat/land cover types have been identified that cover the proposed Noosa Biosphere Reserve area and are discussed in detail below and are shown in Map 7:

#### MAP: Habitat/Land Cover Categories

##### Rainforest (Type 1) Regional

This is the most readily identifiable Vegetation Type in the region with a dense canopy, which restricts the amount of light reaching the forest floor except in gaps created by tree and limb falls. Many of the component species are habitat specialists restricted to this community. Often ferns, palms, epiphytes and vines are common features of these communities. The high species diversity of this Vegetation Type ensures that it has the highest probability of occurrence of noteworthy species (particularly rare and threatened species due to their long lineage) of all of the Vegetation Types within the region. This applies to all rainforest communities throughout their range.

##### Riparian Rainforest

This vegetation is found on stream banks where alluvial enrichment has enabled the development of these species-rich communities. It is one of the most species-rich communities in Noosa Shire.

Where extensive areas of this forest type existed in the past, these lands were cleared and used for agriculture due to the fertility of such alluvial sites. The remaining areas form a restricted fringe along the more major streams on the alluvial flats on the coastal plain.

Characteristic canopy species include *Castanospermum australe*, *Argyrodendron trifoliolatum* and *Flindersia schottiana*, with many other species commonly present in the canopy. Some sites may have a greater abundance of species such as *Araucaria cunninghamii*, which characterise the less mesic end of the rainforest spectrum. The understorey of all rainforest communities is highly variable, and in this region is primarily dependant upon disturbance within and immediately adjacent to the remnant rainforest patches. The less diverse floristics in some areas is often due to a combination of lower water availability and lower nutrient status of the substrate. The palm, *Archontophoenix cunninghamii* is a common element of these riparian communities.

##### Granite Upland Rainforest

These forests are restricted in within the proposed Biosphere Reserve area with only 43 ha present on Woondum Plateau, along the fringe of the north-western boundary with Cooloola Shire and at Mt Cooroy. They contain some elements of higher altitude forests in the region with the diagnostic, *Argyrodendron actinophyllum*, replacing the common lowland species, *A. trifoliolatum*.

## Lowland Rainforest

This variant of the rainforests within the nominated area is both culturally and scientifically significant. Some remnants contain species of great cultural and biological significance such as the Bunya Pine (*Araucaria bidwillii*), which is valued by Aboriginal peoples as a species of great social significance, and by early Europeans as a valuable timber tree. The Kin-Kin Scrub was also the site of early botanical explorations by one of Queensland's leading rainforest botanists, W. D. Francis. It is unfortunate that stands depicted in Francis's landmark work on the rainforests of Queensland (1981) no longer exist today. Much of the Kin Kin Scrub has long since been cleared or degraded. The few remnants contain valuable insights into the remarkable diversity of these rainforests. Many noteworthy species, including a number of rare and threatened species, are found in these scattered remnants. A species of *Argyrodendron*, *A. sp aff trifoliolatum*, is indicative of this forest type as are a number of other noteworthy species. In particular, species such as *Xanthostemon oppositifolius*, *Floydia praealta*, and *Macadamia ternifolia* are likely to be found in remnants of the formerly extensive Kin-Kin Scrub.

## Sandplain and High Dune Rainforest

These communities are the direct analogues of the rainforests of Fraser Island to the north and have similar species composition with occurrences of *Agathis robusta* (Kauri Pine) and other diagnostic species illustrating the similarities in structure and floristics to the more extensive Fraser Island communities of this type. These communities do not have the same degree of weed invasion as most other rainforest remnants in Noosa Shire. This is considered to be largely a reflection of the lower fertility and lower water holding capacity of these sites, as evidenced by the uniform sandy substrate. The canopy of these forests commonly contains elements of the adjacent ecotonal forests with *Eucalyptus pilularis*, *E. cloeziana*, *E. intermedia*, *E. microcorys*, and *Lophostemon confertus*. Many areas have an abundance of the palm *Archontophoenix cunninghamii*. Vines such as *Flagellaria indica* and *Cissus hypoglauca* are also common, especially on the fringes of this community where fires frequently burn up to and into these rainforest areas. Drier areas of this community are diagnosed by a dominance of *Backhousia myrtifolia*.

## Dry Rainforest With *Araucaria cunninghamii*

This community represents the driest end of the rainforest spectrum found in the nominated area. It can be found on rocky, well drained substrates such as that on Mt Pinbarren and in drier western portions of the Shire on low nutrient, well drained sites. *Araucaria cunninghamii* emergents are the most diagnostic feature from a distance, with closer inspection revealing the markedly different structural and floristic differences from other rainforests in the region. Smaller stature of the component flora with smaller leaf size and an abundance of wiry vines and shrubs with thorns and prickles make this rainforest variant one of the most readily recognisable formations in Noosa Shire. The nature of the substrate of these rainforests has seen them less extensively cleared or degraded than other rainforest types.

## Characteristic species

*Waterhousia floribunda*, *Cryptocarya triplinervis*, *Cryptocarya obovata*, *Argyrodendron trifolatum*, *Ficus coronata*, *Ficus fraseri*, *Ficus macrophylla*, *Ficus obliqua*, *Aphananthe philippinensis*, *Elaeocarpus*

grandis, Castanospermum australe Dissiliaria baloghioides, and Syzigium francisii, Araucaria cunninghamii, Araucaria bidwillii, Cupaniopsis parvifolia, Rhodosphaera rhodanthema, Flindersia australis, Flindersia schottiana, Drypetes deplanchei, Diospyros germinate and Austromyrtus bidwillii, Brachychiton discolor, Beilschmiedia obtusifolia, Diospyros pentamera, Gmelina leichhardtii, Ficus spp., Argirodendron spp. (Kin Kin), Agathis robusta, Backhousia myrtifolia, Cupaniopsis parvifolia, Dendrocnide photinophylla, Olea paniculata, Syzigium Leuhmanii.

Rainforest regrowth vegetation has the following pioneer species as common:

Acacia disparrima, Acacia melanoxylon, Alphitonia petrei, Alphitonia excelsa, Flindersia schottiana and Commersonia bartramia.

Older patches develop more floral diversity as seed of rainforest species with edible

fruit is introduced to the area from frugivorous birds and bats.

## Important natural processes

Rainforest ecosystems within Noosa Shire provide habitat for rare and threatened flora species including—*Xanthostemon oppositifolius* (Southern penda), *Floydia praealta* (Ball nut), *Alyxia magnifolia*, *Macadamia integrifolia*, *Macadamia ternifolia*, *Symplocos harroldii* *Bosistoa transversa*, *Choricarpia subargentea*, *Corynocarpus rupestris* ssp. *arborescens*, *Cupaniopsis newmanii*, *Archidendron lovelliae*, *Xanthostemon oppositifolius* and *Triunia robusta*.

Other noteworthy species such as *Acacia bakeri* and *Agathis robusta* also occur in this ecosystem.

Rainforest provides habitat for a range of significant and rare and threatened fauna species including *Cyclositta diophthalma coxeni* (Coxen's Fig parrot), and *Ornithoptera richmondia* (Richmond Birdwing butterfly) *Mixophyes iteratus* (Giant Barred Frog), *Dasyurus maculatus* (Spotted-tailed Quoll), *Ramphotyphlops silvia* (Blind Snake).

Riverine or gallery rainforest plays an important role in stabilising stream banks from erosion and sedimentation, as a corridor to assist movement of fauna and flora species, and as habitat and a food resource for a large range of fauna species.

The complex nature of rainforests and their inherent biodiversity values are well documented. The nominated area also contains complex rainforests developed entirely on sands which are of global significance.

Often the most species diverse areas are found along ephemeral gullies, which due to their steepness have remained relatively undisturbed.

Natural processes of succession are visible.

## Main human impacts

Rainforests have been cleared for agriculture, settlement and horticulture. Remnants are prone to degradation by fire damage, grazing and weed invasion. Some rainforests continue to be threatened by rural residential development uses.

The major threats to rainforest in the nominated area are degradation from fire, which encourages the invasion of many weeds and the colonisation of areas by lantana, which can persist in the community and further increase the likelihood of fire invasion. Other significant weed species within Noosa Shire that are actively invading rainforest include *Cinnamomum camphora* (Camphor Laurel), *Ligustrum* spp. (Privets), *Macfadyena unguis-cati* (Cat's Claw Creeper), *Celtis sinensis* (Chinese Elm) and *Anredera cordifolia* (Madeira Vine).

Some areas of rainforest are bordered by urban development with resultant edge effects from weed invasion. Significant weed species are *Schlefflera actinophylla*, (Umbrella tree), *Asparagus* spp. (Asparagus fern), *Ochna serrulata* (Ochna) and *Sphagneticola trilobata* (Singapore daisy).

Logging practices to extract hoop pine continue within this vegetation type.

## Relevant management practices

- ⇒ Nature conservation - Areas are reserved for nature conservation;
- ⇒ Weed management programs have been established;
- ⇒ Fire protection is promoted;
- ⇒ Regeneration and revegetation programs have been established; and
- ⇒ Planning controls for non-reserved areas have been established.

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## Ecotonal Forests (Type 2) Regional

These communities frequently occur as a fringe on the rainforest communities of the ranges and foothills of the region. In some areas, they are found as stand alone communities where soil moisture or fertility, artificial fire regimes, or other non-natural factors have prevented the rainforest successional process from developing a core of "typical" rainforest.

There are many instances in the mapping process where "typical" rainforest with no emergent species such as *Syncarpia*, *Lophostemon* or *Eucalyptus* have been recorded as ecotonal communities. The rainforest is usually represented by patches too small to be delineated at the scale of the mapping, 1:25,000.

These communities, also known as "Wet Sclerophyll Forests", generally have a eucalyptus, lophostemon, melaleuca or syncarpia overstorey with rainforest species in the understorey.

The ecotonal communities are integral components of the ecological functioning of the tropical and subtropical rainforests on the east coast of Australia. The majority of species found in the ecotonal forests are obligate rainforest species or rainforest associates.

Human disturbances, particularly fire, have altered their floristics and structure throughout their range, and the implications for management and the maintenance of these communities is addressed elsewhere in this report.

The fact that there are emergent *Lophostemon*, *Syncarpia*, *Eucalyptus* or other species, which are found in less mesic, and more fire prone environments is largely irrelevant. The spatial distribution of these communities is related to the same factors which influence the distribution of the rainforest mosaic.

The majority of species found in the ecotonal forests are confined to areas of rainforest or associated communities. If undisturbed for many years, ecotonal forest may reach successional maturity as rainforest (Type 1). Ecotonal forests generally support high fauna diversity.

## Characteristic species

Canopy species can include *Eucalyptus grandis*, *Eucalyptus microcorys*, *Lophostemon confertus*, *Eucalyptus resinifera*, *Eucalyptus robusta*, *Corymbia intermedia*, *Melaleuca quinquenervia*, *Syncarpia glomulifera*, *Lophostemon confertus*, *Eucalyptus acmenioides*, *Archontophoenix cunninghamiana*, *Allocasuarina torulosa* and *Endiandra sieberi*;

The understorey can comprise species such as *Phebalium woombye* and *Oxylobium robustum*, and rainforest species in moister areas such as *Cryptocarya glaucescens* and *Synoum glandulosum*.

Regrowth of ecotonal forest communities has the following species as common: *Acacia o'shanesii*, *Acacia melanoxylon*, *Alphitonia petrei*, *Alphitonia excelsa*, *Commersonia bartramia*, *Phebalium woombye*, *Gahnia* spp., *Hovea acutifolia*, *Persoonia virgata* and saplings of various *Eucalyptus* species, *Lophostemon confertus* and *Syncarpia glomulifera*.

## Important natural processes

Ecotonal forests provide opportunities for a range of fauna species requiring tree hollows for breeding with many old growth canopy trees and a high species richness of fauna.

Ecotonal forests provide habitat for many significant and rare or threatened flora and fauna species such as *Boronia keysii*, which has a geographic distribution range confined to 12km<sup>2</sup> in an area of the proposed Biosphere Reserve west of Lake Cootharaba.

Natural processes of succession are visible.

## Main human impacts

Fire intervals between 20 and 100+ years naturally occur in these forest types, however the fire regime has been substantially altered within the nominated area due to expansion of residential development and silvicultural practices within the State and privately owned Forests.

When frequent and intense fires impact on these ecosystems, the rainforest component is removed and can be replaced by exotic species such as *Lantana camara*. This exacerbates the fire problem and reduces recruitment of rainforest species. By contrast, unless a fire retards the rate of colonisation of the understorey rainforest species and allows *Eucalyptus grandis* to regenerate, the community will eventually shift to a pure rainforest community with relict overstorey *Eucalyptus grandis*. *Eucalyptus grandis* is a non lignotuberous eucalypt species which regenerates from seed following a fire, but not in the presence of overstorey competition.

Ecotonal forests have become fragmented in some areas of the nominated area by land uses such as horticulture and rural residential development. Individual old *Eucalyptus grandis* trees with hollows (suitable for larger hollow dependent marsupials and birds), are often felled on rural residential blocks as they are seen as dangerous, with potential for dropping branches and larger limbs.

A result of loss of hollow bearing trees are follow on threats to significant fauna species such as the Glossy Black Cockatoo and Greater Glider, where competition with other species for scarce nesting hollows occurs.

Areas outside conservation reserves are subject to increasing development pressure from rural residential land use, timber extraction, clearing for grazing and weed invasion. Environmental weeds such as *Cinnamomum camphora* have spread into some areas from seed spread by fruit eating birds.

Human disturbances, particularly fire, have altered the floristics and structure of these ecosystems at some locations.

## Relevant management practices

- ⇒ Nature conservation - Areas are reserved for nature conservation;
- ⇒ Weed management programs have been established;
- ⇒ Fire protection is promoted;
- ⇒ Regeneration and revegetation programs have been established; and
- ⇒ Planning controls for non-reserved areas have been established.

## Eucalypt Forests (Type 3) Regional

The archetypal eucalypt forests are amongst the most extensive and variable vegetation types present in the region. They grade into ecotonal communities where soil fertility and moisture status of the site is enhanced and with heathlands where nutrient availability is restricted or fluctuating water tables prevent the development of several of the diagnostic species of these communities.

These are amongst the most extensive and variable Vegetation Types present in the region. The lower fertility and productivity of these sites has spared them from more extensive clearing for agriculture in the past than the vegetation types growing on more fertile sites. The variable dominance of the canopy by either a single *Eucalyptus* sp, or a mixture of species, is related to environmental variables at a scale which is not possible to delineate at a scale of 1:25000. However, the common factor which all share is the abundance of Eucalypt species in the canopy, and the occurrence of either a grassy or shrubby understorey which is regularly subjected to fire impacts as a result of the fire-prone nature of the understorey flora.

### Characteristic species

Species can include *Corymbia intermedia*, *Corymbia tessellaris*, *Banksia integrifolia* var. *integrifolia*, *Acacia* spp., *Lophostemon confertus*, *Callitris columellaris*, *Livistona australis* and *Endiandra sieberi*; *Melaleuca quinquenervia* occurs in swales; *Eucalyptus racemosa*, *Corymbia gummifera*, *Angophora leiocarpa* and *Eucalyptus pilularis*, *Eucalyptus microcorys*, *Eucalyptus resinifera*, *Syncarpia hillii*, *Petalostigma pubescens*, *Corymbia citriodora*, *Corymbia trachyphloia*, *Eucalyptus umbra*, *Eucalyptus tindaliae*, *Lophostemon suaveolens*, *Eucalyptus exserta* and *Eucalyptus tereticornis*. Understorey is generally shrubby and grassy but can include rainforest species.

Regrowth of eucalypt forest communities has the following species as common: *Acacia melanoxylon*, *Alphitonia excelsa*, *Allocasuarina littoralis*, *Acacia disparrima* and other *Acacia* species and various *Eucalyptus* species.

### Important natural processes

Eucalypt forests and woodlands provide habitats for many fauna species. Large canopy trees may provide nesting opportunities for a range of fauna species requiring tree hollows for breeding. These forests provide important habitat for significant and rare and threatened flora and fauna. Natural processes of succession are visible.

### Main human impacts

Weed invasion, visitation impacts, clearing for residential development and over frequent fire regimes are the main impact processes. Key weed species threatening the integrity of this ecosystem type include *Schinus terebinthifolia* (Broad leaf pepper tree), *Sphagneticola trilobata* (Singapore Daisy), *Asparagus* spp., *Asparagus* ferns and *Lantana camara*, (Lantana).

Extractive harvesting of timber is now a diminishing threat with greater areas moving to nature conservation regimes. Some areas have suffered from visitation impacts such as trampling of vegetation and nutrient pollution.

Frequent burning can eliminate some of the more fire sensitive species. Fire is the major cause of degradation of these areas. Where soil fertility and moisture is low, weed invasion is less probable. More fertile wetter sites can become dominated by *Lantana camara*, which exacerbates the fire-propensity of this community. Areas in close proximity to urban and rural residential development are fragmented by removal of overstorey trees.

Eucalypt forests and woodlands have been heavily cleared in southern parts of the SEQ bioregion for agriculture and urban development. Within the nominated area, these ecosystems have also been extensively cleared for agriculture, as they grow on fertile alluvial soils. Where the overstorey has been retained in grazing areas, the understorey is generally dominated by exotic grasses and legumes, which can reduce the regenerative potential of the canopy species.

## Relevant management practices

- ⇒ Nature conservation - Areas are reserved for nature conservation;
- ⇒ Weed management programs have been established;
- ⇒ Fire protection is promoted;
- ⇒ Education and awareness programs have been established;
- ⇒ Regeneration and revegetation programs have been established; and
- ⇒ Planning controls for non-reserved areas have been established.

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## Melaleuca Communities (Type 4) Regional

These communities occupied a large proportion of the coastal plain up until the last few decades. In that period, outside public lands, they have been extensively cleared or degraded. They are a vital component of the lowland coastal vegetation mosaic. Their continued reduction in area and degradation could have serious long-term implications for fauna along with their potential loss from the complex vegetation mosaic of this region. Narrow remnants traverse the exotic pine plantations that dominate large areas of the coastal plain in this region. These remnants are crucial links for fauna and flora, both locally and regionally. They form vital corridors across the coastal plain and provide critical refuge for native species in this landscape dominated by exotic species.

The *Melaleuca* communities display considerable structural variation related to the micro-topographic variation of the site which influences soil fertility, drainage patterns, height of water table, and length and

periodicity of waterlogging. These matters have only recently become the source of more intensive investigation (T. Zoete, pers. comm.). The variation in the extant remnants of these communities is difficult to interpret due to altered drainage patterns, damage to water table height and nutrient status, altered fire regimes and other factors which impact and degrade the natural values of these communities. Much of the important variation and natural attributes of these forests has already been lost over a significant portion of its former range in south-east Queensland.

The role these communities play in buffering the impacts of nutrient pollution is gaining increasing acknowledgement. Caution is needed, however, in seeking to actively utilize these communities for this purpose. There is no quantification of the amount which these systems can absorb or the limit before irreversible change occurs to structure or floristics. The most effective way to prevent such degradation is to avoid concentrating nutrients from any land use or discharging them as point sources into the natural environment.

## Characteristic species

For *Melaleuca quinquenervia* open forest to woodland on quaternary coastal dunes and beaches and seasonally waterlogged sand and alluvial plains, the associated species are: *Eucalyptus bancroftii*, *Eucalyptus umbra*, *Eucalyptus robusta*, *Corymbia intermedia* and *Lophostemon suaveolens*, *Eucalyptus tereticornis*, *Livistona australis*, *Endiandra sieberi*, *Glochidion sumatranum*, *Melicope elleryana* and *Melastoma affine*.

Regrowth of melaleuca communities has the following species as common: *Melaleuca quinquenervia*, *Lophostemon suaveolens*, *Eucalyptus tereticornis*, *Eucalyptus robusta*, *Banksia robur*, *Melastoma affine*.

## Important natural processes

Melaleuca communities, play an important role in buffering waterways from sedimentation and nutrient inputs from various land use activities, they act as an important sink for land-based nutrient loads and in addition in certain locations help to stabilise dunes and foreshores. Some communities are habitat for rare and threatened flora species including the Swamp Orchids *Phaius australis* and *Phaius tancarvilleae*.

Large canopy trees may provide nesting opportunities for a range of fauna species requiring tree hollows for breeding. *Eucalyptus robusta* (Swamp Mahogany) is an important Koala food tree.

Important habitat for significant and rare and threatened flora and fauna.

## Main human impacts

Melaleuca forests/wetlands comprised a large proportion of the coastal plain of South- East Queensland up until the last few decades. In that period, outside public lands, they have been extensively cleared or degraded.

It was estimated by Catterall, CP & Kingston, M in 1993 that without intervention to reduce the rates of clearing, all paperbark forests outside protected areas south of Noosa Shire would have been cleared

from the SEQ bioregion by 2004. This continued reduction has serious long term implications for fauna, both as habitat and as viable corridors linking protected areas.

Drainage and fire usually results in the destruction of these communities. Long term impacts result from the accumulation of nutrients within these systems, leading to invasion by weed species such as *Spagneticola trilobata*, (Singapore Daisy), *Schinus terebinthifolia* (Broad leaf pepper tree) and *Brachiaria mutica*, (Para Grass), particularly at the interface with residential areas.

Groundsel can be an active coloniser of cleared or disturbed areas.

## Relevant management practices

- ⇒ Nature conservation - Areas are reserved for nature conservation;
  - ⇒ Weed management programs have been established;
  - ⇒ Fire protection is promoted;
  - ⇒ Education and awareness programs have been established;
  - ⇒ Regeneration and revegetation programs have been established; and
  - ⇒ Planning controls for non-reserved areas have been established.
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## Heathlands & Sedgelands (Type 5) Regional

These communities are characterised by the abundance of species identified as "heath" or "sedges" in the dry and wet ends of the spectrum respectively. The feature recognised by most people is the display of wildflowers in the former communities during the springtime, although they usually have at least some species in flower throughout the year. They are characterised by high species diversity and a canopy of often less than 1.5 m in height.

Some variant heaths contain such species as *Banksia aemula* and/or *Eucalyptus bancroftii* occurring as canopy species, others occur where stunted *Melaleuca quinquenervia* or *E. signata* form a sparse tree cover over the lower statured "heath" species. The common feature to all of the sites on the coastal lowlands is the low fertility of the soils, and the fluctuating watertables and periodic waterlogging.

The wet heath communities are well known due to their role as the habitat of the Ground Parrot (*Pezoporus wallicus*). Wet and dry heaths occur in association with Quaternary coastal dunes and beaches, on seasonally waterlogged Cainozoic alluvial plains along coastal lowlands, on Cainozoic to Proterozoic sediments, and lower slopes subject to periodic waterlogging.

## Characteristic species

Species include *Banksia aemula*, *Leptospermum* spp., *Leucopogon* spp., *Ricinocarpus pinifolius*, *Strangea linearis*, *Brachyloma daphnoides*, *Persoonia virgata*, *Styphelia viridis*, *Monotoca scoparia*, *Woolisia pungens* and stunted *Allocasuarina littoralis*, *Melaleuca sieberi*, *Xanthorrhoea fulva*, *Hakea actites*, *Leptospermum* spp., *Baeckea linearis*, *Schoenus brevifloius*, *Baumea juncea*, *Banksia robur* and *Melaleuca nodosa*. Coastal sedgeland/wetland with *Baumea* spp., *Juncus* spp., *Lepironia articulata*, *Gahnia* spp.

and *Eleocharis* spp.

## Important natural processes

Heath communities are generally known as "wallum". These communities have a diverse understorey of heathland species, including significant and rare and threatened flora species such as *Macarthuria complanata*, *Gompholobium virgatum* var. *emarginatum*, *Melaleuca cheelii*, *Boronia rivularis*, *Phaius australis/tancarvilleae*, *Blandfordia grandiflora* and *Acacia baueri* ssp. *baueri*. Some communities play an important role in stabilising sand dunes. Within Noosa Shire areas of wallum with stands of Black She-oak (*Allocasuarina littoralis*) can be important feeding areas for Glossy Black Cockatoos, listed as "Vulnerable" under the State Nature Conservation (Wildlife) Regulation 1994. The heaths also provide habitat for significant, rare and threatened fauna species including the Ground parrot, (*Pezoporus wallicus*).

One of the communities RE12.2.13 is of national significance as the majority of the known distribution of this community is found within or immediately adjacent to Noosa Shire. It is a floristically rich vegetation community and is habitat for rare and threatened flora species including *Acacia attenuata*, *Acacia baueri* ssp. *baueri*, *Blandfordia grandiflora*, *Macarthuria complanata*, *Gompholobium virgatum* var. *emarginatum* and *Prasophyllum wallum*.

Some heath ecosystems occur in the low part of the coastal landscape where water collects from both overland flow and infiltration from adjoining sand dunes. Wetlands can have highly acidic waters and can be habitat for a number of rare and threatened wallum frog species, as well as important habitat for a range of waterbirds. These ecosystems can have an important role in filtering sediments/pollutants before they enter main waterways.

These communities provide important habitat for significant and rare and threatened flora and fauna.

## Main human impacts

South of Noosa Heads these ecosystems have been extensively cleared for residential development, with remaining areas within freehold tenure under threat from ongoing development. Fire and nutrient pollution can cause the understorey to become dominated by exotic grasses, leading to loss of recruitment of the diverse range of heathland species characteristic of this regional ecosystem. Fires that are too intense

can also kill mature *Allocasuarina littoralis* trees, leading to loss of essential habitat for Glossy Black Cockatoos if large areas are burnt at the same time.

Adjacent to development these ecosystems have become degraded from nutrient pollution and dumping of garden waste leading to invasion by exotic weeds such as *Sphagneticola trilobata*, (Singapore daisy), *Ipomaea cairica* (Mile-a- Minute), *Brachiaria mutica* (Para Grass) and other species.

Remaining areas within freehold tenure are under major threat from development.

This ecosystem has been extensively infilled or modified by urban development in the south of the bioregion. Eutrophication and alteration to drainage patterns and water tables are the most common source of degradation of these communities. They are susceptible to invasion by exotic macrophytes and other invasive weeds, siltation and blockage of drainage lines.

## Relevant management practices

- ⇒ Nature conservation - Areas are reserved for nature conservation;
- ⇒ Weed management programs have been established;
- ⇒ Fire protection is promoted;
- ⇒ Education and awareness programs have been established;
- ⇒ Regeneration and revegetation programs have been established; and
- ⇒ Planning controls for non-reserved areas have been established.

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## Mangrove & Saline Communities (Type 6) Regional

The ubiquitous structure form of mangal vegetation comprising mangrove and saltmarsh/claypan communities are found abundantly along the foreshores of the Noosa River estuary and associated saline, tidal waterways. These landward margins are inundated by saltwater periodically, not on a diurnal basis as is the case for the majority of the mangal communities. They have immense value to the productivity of these estuaries and the long-term stability of the coastal systems where they are found. These communities have been included in the State Fish Habitat Areas that have been declared across Noosa waterways and lakes.

### Mangroves

Whilst much of the mangrove vegetation is dominated by *Avicennia marina*, *Rhizophora stylosa* and *Brugiera gymnorhiza* with a fringe of *Ceriops tagal*, other mangrove species are also found (eg. *Aegiceras corniculatum*, *Excoecaria agallocha*, *Hibiscus tiliaceus* and *Lumnitzera racemosa*). Such diversity within the mangrove communities must be maintained, and every effort should be made to

protect the remaining areas of mangrove vegetation. Degraded mangrove areas are scarce as they are usually totally destroyed by land filling operations. Most degrading impacts remove the saline influence from the site and do not allow mangrove vegetation to re-establish on the site.

### Saltmarsh and Herbfield

These communities occur as a fringe on the landward side of the mangrove communities or occasionally as the dominant community on areas of claypan which are only infrequently inundated by saline water. Characteristic forbs and grasses present are *Suaeda australis*, *S. arbusculoides*, *Sesuvium portulacastrum* and *Sporobolus virginicus* with *Casuarina glauca* on higher sites above tidal influence, or as an ecotone with the terrestrial *Eucalyptus* spp and other communities. *Acrostichum speciosum* is occasionally found in the understorey. These communities are commonly degraded either by land filling operations, which destroy them, grazing, or recreational vehicles which tend to remove the vegetative cover and convert this Vegetation Type into a bare claypan. Where species such as *Sporobolus virginicus* persist and the tidal influence is maintained, there is potential for the system to be rehabilitated following the removal and exclusion of the degrading impacts.

### Casuarina glauca

This is essentially a variant of the previous community where a tree canopy of *Casuarina glauca* has become established over a ground cover of *Sporobolus virginicus* and sparse halophytic herb cover. In some narrow fringes, they can form a monotypic community between the mangal communities and the landward vegetation mosaic. Several of these areas have been either in-filled or degraded through grazing or other influences eg. recreational vehicles. Their susceptibility to trampling and fire damage should be considered if they are targeted as potential recreation and camping sites. Usually the propensity of this vegetation to harbour large populations of sandflies and mosquitoes ensures their freedom from regular recreational disturbance.

### Characteristic species

*Excoecaria agallocha* (Milky Mangrove) and *Hibiscus tiliaceus* (Cotton Tree) dominate, being able to withstand the lower end of the salinity gradient, *Avicennia marina* (Grey mangrove), *Rhizophora stylosa* (Red Mangrove), *Bruguiera gymnorhiza* (Orange fruited mangrove) with fringing *Ceriops tagal* (Spurred mangrove) and *Aegiceras corniculatum* (River mangrove). *Lumnitzera racemosa* is less common.

The mangrove fern *Acrostichum speciosum* is a common component of the understorey in undisturbed sites. Saltmarsh species such as Salt water couch grass (*Sporobolus virginicus*), *Suaeda australis*, *Suaeda arbusculoides*, *Sesuvium portulacastrum* and can also occur.

### Important natural processes

Spawning and nursery areas for aquatic fauna. plays an important role in buffering waterways from land use impacts, as well as stabilising stream banks from erosive forces.

This ecosystem provides habitat for a range of significant fauna species, including migratory birds.

## Main human impacts

- ⇒ Altered fire regimes
- ⇒ Boat wake erosion
- ⇒ Nutrient pollution
- ⇒ Drainage
- ⇒ Recreational use;
- ⇒ Urban development
- ⇒ Weed invasion

Within Noosa areas were cleared during the development of Hay's Island in the 1970's. Areas fringing the Noosa River upstream of Lake Doonella have been degraded by bank erosion, which is exacerbated by boat wash.

These ecosystems are susceptible to invasion by several weed species such as groundsel bush (*Baccharis halimifolia*) and Mile-a-Minute (*Ipomoea cairica*). Other areas have been degraded from the impacts of grazing and recreational vehicle usage.

These ecosystems are one of the estuarine vegetation communities which often overlie potential acid sulphate soils.

## Relevant management practices

Conservation reservation, Fish Habitat Areas, clearance restrictions, recreational boating speed restrictions, replanting and regeneration, weed removal, education and awareness.

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## Frontal Dune & Foreshore Communities (Type 7) Regional

Noosa contains significant areas of low and high dune systems as part of the area known as the “Great Sandy” complex.

The foreshore communities form the critical interface between the high energy marine environment and the terrestrial landscape. They contrast dramatically with the mangrove areas in that they are more dynamic and temporally unstable due to the high energy shorelines in which they are found. This provides them with unique values and vulnerability. Their role in providing shoreline stability has been recognised for some time with the formation of bodies such as the Beach Protection Authority and the involvement of many sectors in their management and long-term maintenance.

### Characteristic species

Strand and foredune complex comprising *Spinifex sericeus* grassland, *Allocasuarina equisetifolia* woodland/open forest with *Acacia leiocalyx*, *Acacia disparrima*, *Banksia integrifolia* var. *integrifolia*, *Pandanus tectorius*, *Corymbia tessellaris*, *Cupaniopsis anacardioides*, *Alectryon coriaceus* and *Acronychia imperforata*.

### Important natural processes

These ecosystems play an important role in stabilising the frontal dunes. It is a highly dynamic community, with periodic natural disturbances from the effects of high winds, tides and seas.

They provide important habitat for significant species and demonstrate successional processes at work.

### Main human impacts

This regional ecosystem is degraded in many areas within the shire from impacts such as littering, off road vehicle and pedestrian damage, damage from firewood collection and altered fire regimes. Areas adjacent to residential development are also degraded by a variety of environmental weeds originating as dumped garden waste. The worst of these are *Schinus terebinthifolia* (Broad leaf Pepper), *Asparagus* spp., (*Asparagus* ferns), *Bryophyllum tubiflorum* (Mother of Millions), *Lantana camara* (Lantana) and *Euphorbia cyathophora* (Painted Spurge).

These areas are also degraded by an increase in the number of tracks that have been developed from private residences to the beach, leading to erosion and creation of niches for environmental weeds to spread.

### Relevant management practices

- ⇒ Nature conservation - Areas are reserved for nature conservation;
- ⇒ Weed management programs have been established;

- ⇒ Fire protection is promoted;
  - ⇒ Education and awareness programs have been established;
  - ⇒ Beach erosion control;
  - ⇒ Visitor management;
  - ⇒ Regeneration and revegetation programs have been established; and
  - ⇒ Planning controls for non-reserved areas have been established.
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## Exposed high dune sand systems (Type 8) Regional

Over 120 hectares of exposed high sand dunes currently occur within the proposed Biosphere Reserve.

Sandblows develop due to disturbance events (eg. Severe weather) and can advance relatively rapidly.

Sandblows, particularly on parabolic systems are dynamic. The overall exposed area varies over time and successional stabilisation and regeneration develops. Sandblows can also still advance whilst areas are stabilising behind in older areas of the sandblow.

New sandblows can occur due to natural processes.

## Characteristic species

Various communities from heath and eucalypt to rainforest can establish or be denuded by the dynamic processes at work in the formation or regeneration of a sandblow over a period of many years.

## Important natural processes

- ⇒ Aeolian processes;
- ⇒ Fire; and
- ⇒ Sand deposition, wave, wind and tide.

## Main human impacts

Visitation, interruption to stabilisation and regeneration process.

## Relevant management practices

All exposed high dune sand areas within the proposed Biosphere are protected within conservation reserves;

Visitor management; and

Education/awareness programs.

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## Freshwater and Marine ecosystems (Type 9) Regional

Marine and freshwater systems within the proposed Biosphere Reserve comprising:

- ⇒ Sandy beaches;
- ⇒ Rocky beaches;
- ⇒ Intertidal rocky shores;
- ⇒ Subtidal fringing reefs;
- ⇒ Riverine seagrass beds;
- ⇒ Fish and crustacean nursery grounds;
- ⇒ Sheltered intertidal flats in Weyba Creek, Lake Weyba and Noosa River Estuary important for migratory wading birds;
- ⇒ Freshwater and tidal waterways and lakes;
- ⇒ Mangroves (included under habitat/land cover type 6);
- ⇒ Subtidal soft substrates;
- ⇒ Riverine soft substrates; and
- ⇒ Pelagic environments.

## Characteristic species

- ⇒ Australian Bass;
- ⇒ Migratory waders;
- ⇒ Humpback Whales;
- ⇒ Queensland lungfish;
- ⇒ Three species associated with or restricted to coastal acid drainage systems in south-east; and

- ⇒ Queensland/northern NSW, including the honey blue-eye (*Pseudomugil mellis*), oxleyan pygmyperch (*Nannoperca oxleyana*) and the ornate rainbow fish (*Rhadinocentrus ornatus*).

## Important natural processes

- ⇒ High riverine water quality against rest of Bioregion;
- ⇒ Sand deposition;
- ⇒ Tidal action;
- ⇒ Wind action; and
- ⇒ Wave action.

## Main human impacts

- ⇒ Nutrient and sedimentation input;
- ⇒ Urban development near shore/waterways;
- ⇒ Excessive boat traffic;
- ⇒ Wake issues; and
- ⇒ User numbers.

## Relevant management practices

- ⇒ Use management;
- ⇒ Nutrient and sedimentation minimisation from human processes;
- ⇒ Education and awareness; and
- ⇒ Planning Controls.

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## Regrowth/regenerating vegetation areas (all types) (Type 10) Regional

These are areas that are defined as regrowth and non-remnant for the purposes of the Queensland Vegetation Management Act (1999). They do not include supplemental or micro regeneration programs or natural regeneration following disturbances events within the first seven habitat/landcover types.

## Characteristic species

Example regrowth for melaleuca, eucalypt and rainforest communities:

Regrowth of melaleuca communities has the following species as common: *Melaleuca quinquenervia*, *Lophostemon suaveolens*, *Eucalyptus tereticornis*, *Eucalyptus robusta*, *Banksia robur*, *Melastoma affine*.

Regrowth of eucalypt forest communities has the following species as common: *Acacia melanoxylon*, *Alphitonia excelsa*, *Allocasuarina littoralis*, *Acacia disparrima* and other *Acacia* species and various *Eucalyptus* species.

Rainforest regrowth vegetation has the following pioneer species as common: *Acacia disparrima*, *Acacia melanoxylon*, *Alphitonia petrei*, *Alphitonia excelsa*, *Flindersia schottiana* and *Commersonia bartramia*. Older patches develop more floral diversity as seed of rainforest species with edible fruit is introduced to the area from frugivorous birds and bats.

## Important natural processes

Natural regeneration and successional processes in most cases.

## Main human impacts

- ⇒ Re-clearing of regrowth;
- ⇒ Weed colonization;
- ⇒ Inappropriate fire regimes.

## Relevant management practices

- ⇒ Nature conservation - areas are reserved for nature conservation;
- ⇒ Weed management programs have been established;
- ⇒ Fire protection is promoted;
- ⇒ Education and awareness programs have been established;
- ⇒ Regeneration and revegetation programs have been established; and
- ⇒ Planning controls for non-reserved areas have been established.

## Plantations (Type 11) Regional

The plantations of the nominated area are mainly of *Pinus elliotii* on the coastal lowlands, with limited areas of the native conifers, *Araucaria cunninghamii* and *Araucaria bidwillii* in the hinterland. Trials of native hardwood species are also found in this region. There remain areas of natural vegetation within the boundaries of this type, which are critical wildlife and flora habitat.

Many of these remnants are along drainage lines and creeks and form critical dispersal corridors for genetic transfer between remnants of the original vegetative cover in the region.

### Characteristic species

These areas are plantations of *Pinus elliotii* on the coastal lowlands, although some other *Pinus* spp. (e.g. *Pinus taeda*) have been trialed in small plots (particularly within the State Forest estate). Some small areas are privately owned and others are managed by the Queensland Forest Service for the Queensland Government. *Pinus elliotii* plantations are considered to act as a significant source of weed propagules, particularly of *Pinus* species, which are dispersed into the adjacent remnant native vegetation.

Exotic pine trees have some ecological value as a food resource for yellow tail black cockatoos. Within exotic pine plantations, there remain areas of natural vegetation which are critical wildlife and flora habitat. Many of these remnants are along drainage lines and creeks and form critical dispersal corridors for genetic transfer between remnants of the original vegetative cover in the region. Unlike the exotic pine plantations, native conifer plantations, Hoop Pine (*Araucaria cunninghamii*) provide more habitat for native flora and fauna. This is certainly less amenable habitat than the former rainforest vegetation that occupied many of the areas where these plantations have been established. However this habitat does provide a regionally significant niche for both flora and fauna in between harvest cycles.

Older plantations often have a well developed rainforest understorey providing refuge and breeding sites for fauna, although hollow-nesting and living species are not catered for with the return cycle of these plantations.

Within the nominated area 132ha of native conifer plantations are mapped, mainly within Como State Forest, smaller areas of private plantations also occur within the shire.

Plantations of native hardwood species have been established within Yurol, Tewantin, Woondum and Ringtail State Forests. Numerous private landholders within the Shire are also developing forestry plantations of native hardwood as a means of income diversification.

The State Government has embarked on a number of joint ventures with private landowners to establish hardwood plantations on freehold land within the proposed Biosphere Reserve. The main hardwood species being planted are *Eucalyptus cloeziana*, (Gympie messmate) and *Corymbia citriodora*, (Spotted Gum) although Noosa and District Landcare promote and plant a wider range of species to ensure more species diversity.

## Important natural processes

Plantation hardwoods can provide suitable habitat for a range of fauna species, although the return cycle (approx 30yrs) ensure that the trees do not develop suitable habitat for hollow-dependent fauna species.

## Main human impacts

Modified environment.

## Relevant management practices

- ⇒ Minimisation of impacts to other natural systems;
  - ⇒ Promote regeneration of native ecosystems at certain sites; and
  - ⇒ Appropriate fire management.
- 

## Agricultural areas (Type 12) Regional

Agricultural areas occur across parts of the proposed Biosphere Reserve.

These can be are highly modified environments, although they can support scattered remnants of native vegetation.

## Characteristic species

A wide range of introduced species, with a few persistent indigenous species, occupy these areas.

Remaining isolated remnant trees of various types predominantly eucalypt or closely related species.

## Important natural processes

The natural processes within isolated remnants of native vegetation are generally similar to those listed under natural land cover types, although they are often disrupted sometimes severely.

This habitat type can provide important linkage function for fauna species.

## Main human impacts

Vegetation mapping at 1:25000 can miss small isolates of vegetation.

Impacts within isolated remnants of native vegetation are generally similar to those listed under natural land cover types, and are most severe in smaller remnants, these include:

- ⇒ Clearance of fire breaks and development envelopes.

- ⇒ Clearance contrary to planning controls.
- ⇒ Edge effects upon neighbouring remnant vegetation.

## Relevant management practices

Some isolates are managed for conservation, while many are neglected at present.

Planning controls and approval processes are used to minimise impacts.

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## Urban and urban infrastructure areas (Type 13) Regional

Densely and moderately populated residential areas and localised industrial and commercial areas (and associated urban infrastructure) occur within Noosa Shire, although they support scattered remnants of native vegetation.

## Characteristic species

A wide range of introduced species, with a few persistent indigenous species, (except isolates) occupy these areas. Much of the vegetation is planted, and is water- and nutrient-demanding.

## Important natural processes

Natural processes within isolated remnants of native vegetation are generally similar to those listed under natural land cover types, although they are often heavily disrupted.

## Main human impacts

Impacts within isolated remnants of native vegetation are generally similar to those listed under natural land cover types, and are most severe in smaller remnants;

- ⇒ Clearance of fire breaks and development envelopes;
- ⇒ Clearance contrary to planning controls; and
- ⇒ Edge effects upon neighbouring remnant vegetation.

## Relevant management practices

Some isolates are managed for conservation, often by community groups, who play a significant role in their protection. Planning controls and approval processes are used to minimise impacts.

## 4. CONSERVATION FUNCTION

### Contribution to the conservation of landscape and ecosystem biodiversity

The proposed Noosa Biosphere Reserve provides the opportunity for both continued maintenance of biodiversity and a sustainable liveability for the human population of the area in the context of a bioregion where, in the coastal setting, most other similar opportunities have been lost or at best compromised. The loss of bushland and other natural areas to urban expansion within the South-East Queensland Bioregion has been widespread and has accelerated in recent decades.

In the 15 year period between 1974 and 1989, 33% of the 1974 bushland cover of SEQ was cleared. If this pattern of loss was to continue, all present bushland would be cleared by 2019 (Catterall, CP & Kingston, M (1993)). During the same period, 39% of bushland on private freehold land in SEQ was cleared. If this continues, all freehold bushland will be cleared by the year 2012 (Catterall, CP & Kingston, M (1993)).

In terms of area, most vegetation loss was dry eucalypt forest, which represented 64% of lost vegetation (Sinclair, LK; Jermyn, D; Preston, RA; Catterall, C (1993)). Particular vegetation types have been severely affected, with the losses comprising an estimated:

50% of melaleuca forests;

36% of eucalypt dry forests;

34% of heathlands;

16% of eucalypt moist forests; and

5% of rainforests [Catterall, CP & Kingston, M (1993)].

During the two year period from 1997 to 1999, the SEQ bioregion had 31,800 hectares of native vegetation cleared.

The proposed Noosa Biosphere Reserve represents a buffer to the extensive conurbation to the south and major nodal development to the north. The rich biodiversity present is due in part to nominated area being located within what is known in general terms as the McPherson-Macleay Overlap. An area of high species richness and habitat diversity that stretches in an abstract sense from a latitude around Bundaberg in Qld, south to a latitude around Grafton in NSW and West to the Great Dividing Range.

The Overlap consists of a great many plant and animal species that reach their northern or southern limits of distribution. Furthermore a range of species generally known from inland areas west of the Great Dividing Range reach their eastern limit of distribution in the western sector of the Overlap. Species reaching a southern limit (particularly fauna) are part of the Torresian influence, those reaching a northern limit are part of the Bassian influence. Those species reaching an eastern limit are part of the Eyrean influence.

As a reflection of this biogeographic factor Noosa Shire contains at least 44% of the resident and frequent migratory birds known to Australia as a whole. This is based on Queensland museum verified records. When unconfirmed or suspected species are added the total may reach to between 47 and 48% of all of Australia's bird species within the small physical area of Noosa Shire. Noosa Shire contains two wetlands areas identified by the Commonwealth as of national importance.

## IMPORTANT AUSTRALIAN WETLANDS

Noosa shire contains two extensive waterway areas identified as of national importance by the Commonwealth. They are:

*Listing Number 133* – Lake Weyba SEQ008QL containing 2,860 hectares and meeting criteria 1,2,3,4 and 5 above and consisting of 6 wetland types A8,A10,A11,A12,B14,B15.

Comprises southern section of Noosa National Park and Lake Weyba. Level sand plain on old tidal delta sand deposits and undulating sandstone rises in the East. Eight vegetation types are recognised including *Eucalyptus signata* open forest, *E.signata* woodlands, *Melaleuca quinquinervia* open forest, *Melaleuca quinquinervia* woodland, *Banksia* open forest, *Banksia oblongifolia* open/closed heath, *Banksia robur* closed heath and sedgeland.

Threatened species include Swamp Orchid (*Phaius australis*); *Allocasuarina emunia*; Christmas Bells (*Blandfordia grandiflora*); Tiny Wattle (*Acacia baueri*); Attenuate Wattle (*Acacia attenuata*); Wallum Rocket Frog (*L. freycineti*); Wallum Sedge Frog (*L. olongburensis*); Wallum Froglet (*Crinia tinnula*); Honey Blue Eye (*Pseudomugil mellis*); Oxleyan Pygmy Perch (*Nannoperca oxleyana*); Glossy Black Cockatoo (*Calyptorhynchus lathamii*); and Black necked Stork (*Ephippiorhynchus asiaticus*).

*Listing Number 135* – Noosa River Wetlands SEQ010QL containing 9,945 hectares and meeting all six selection criteria, consisting of wetland types 5,A6,A7,A8,A9,A11,A12,B1,B4,B5,B7,B9,B10,B14,B15.

Spectacular and extensive system of freshwater, brackish and saline lakes, marshes, heathlands and estuarine wetlands associated with the Noosa River; it has unique landforms vegetation and fauna. The Noosa River lakes and adjacent wetlands are one of few such wetland complexes on the entire Eastern Australian seaboard and as part of the Great Sandy Region are considered to have World Heritage value and are in the preparatory process before being nominated by the State and Commonwealth Governments.

Major habitat types include open water bodies, estuarine waters, inter-tidal mud/sand flats, mangrove forest/shrubland, saltmarsh, open forest, woodland sedgeland and heathland.

Significant species includes: **Limits of Distribution** – Club Mangrove (*Aegialitis annulata*) - Southern Limit; Swamp Sheoak (*Casuarina glauca*) - Northern Limit; Red Flowered Form –Paperbark Tea Tree (*Melaleuca quinquinervia*) Southern Limit; Broad –Leaved Paperbark (*M. viridiflora*) Southern Limit; **Threatened Plants** - Swamp Orchid (*Phaius tantervilliae*); Key's Boronia (*Boronia keysii*); **Threatened Fauna** - Ground Parrot (*Pezoporus wallicus*); Southern Emu Wren (*Stipiturus malachurus*); False Water Rat (*Xeromys myoides*); Cooloola Tree Frog (*Litoria cooloolensis*); Wallum Rocket Frog (*L. freycineti*); Wallum Sedge Frog (*L. olongburensis*); Wallum Froglet (*Crinia tinnula*); Honey Blue Eye (*Pseudomugil*

mellis); Oxleyan Pygmy Perch (*Nannoperca oxleyana*); Glossy Black Cockatoo (*Calyptorhynchus lathami*); and Black necked Stork (*Ephippiorhynchus asiaticus*).

These areas are highly valued for tourism and recreation, invaluable for research into unique flora, fauna and landscape processes, and highly Significant to Aboriginal people with numerous sites of archaeological value.

## IMPORTANT WETLANDS IN QUEENSLAND

The important wetland sites have been identified by the Queensland Environmental Protection Agency as part of the Queensland Wetland Inventory Program. Within proposed Biosphere Reserve two areas have been listed as important namely:

- ⇒ Noosa River Wetlands – QWR 6790100 (SEQ010QL) covering 9945 hectares. Consisting of 15 wetland types: A5,A6,A7,A8,A9,A11,A12,B1,B4,B5,B7,B9,B10,B14,B15 and comprising a spectacular and extensive system of freshwater, brackish and saline lakes, marshes, heathlands and estuarine wetlands associated with the Noosa River; it has unique landforms vegetation and fauna.
- ⇒ Lake Weyba QWR 6790200 (SEQ008QL) covering 2,860 hectares. Consisting of 6 wetland types A8,A10,A11,A12,B14,B15, the Lake Weyba listing comprises the southern section of Noosa National Park and Lake Weyba.

The document by Blackman, J.G. et al. Characteristics of Important Wetlands in Queensland, Environmental Protection Agency, Brisbane, 1999, provides the background data on the listings which were incorporated by the Commonwealth into the National Directory of Important Wetlands, see National Significance section for more detail.

## REGIONAL ECOSYSTEMS (VEGETATION MANAGEMENT ACT 1999)

The Queensland State Government has identified 60 different regional ecosystems present within Noosa Shire. As of 2003, twenty four of these regional ecosystems have been classified as “Of Concern” by the State and are identified under the *Vegetation Management Act 2000*. A further 10 regional ecosystems have been classified as “Endangered” under the *Vegetation Management Act 2000*.

As of 2003, the “Of Concern” and “Endangered” regional ecosystems comprise a very significant 45% or 18,288 hectares of the remnant native vegetation of the Shire (“Endangered” regional ecosystems cover 5449 hectares (13.4%) and “Of Concern” covers 12,839 hectares (31.4%)).

Significantly the “Of Concern” and “Endangered” regional ecosystems comprise 56.67% of all the recognised regional ecosystems within Noosa Shire. The following table lists only those Regional Ecosystems occurring within the proposed Biosphere Reserve that as of 2003 equated to “Endangered” or “Of Concern” as per the definitions of the Queensland Vegetation Management Act (1999).

**TABLE 9 Significant Regional Ecosystems of Noosa Shire**

Regional Ecosystem	Regional Ecosystem Description (from Sattler, PS & Williams, RD (1999))	Remnant Area (ha.)	Vegetation Management Act. Status (as at June 2001)
12.1.1	<i>Casuarina glauca</i> open forest on margins of marine clay plains.	267	Endangered
12.2.1	Notophyll rainforest on parabolic high dunes	26	Of concern
12.2.3.	Araucarian rainforest on parabolic high dunes	17	Of concern
12.2.5.	<i>Corymbia</i> spp., <i>Banksia integrifolia</i> , <i>Callitris columellaris</i> , <i>Acacias</i> spp. Open forest to low closed forest on beach ridges in southern half of bioregion	1779	Of concern
12.2.7	<i>Melaleuca quinquenervia</i> or <i>Melaleuca viridiflora</i> open forest to woodland on sand plains.	2588	Of concern
12.2.13	Open heath on sand plains and dunes (dry heath)	53	Of concern
12.3.1	Gallery vine forest (notophyll vine forest) on alluvial plains.	1334	Endangered
12.3.5	<i>Melaleuca quinquenervia</i> tall open forest near coastal alluvial plains.	1651	Of concern
12.3.11	<i>Eucalyptus siderophloia</i> , <i>Eucalyptus tereticornis</i> , <i>Corymbia intermedia</i> open forest on alluvial plains near coast.	489	Of concern
12.3.13	Closed heath on seasonally waterlogged alluvial plains near coast.	878	Of concern
12.3.14	<i>Banksia aemula</i> woodland on alluvial plains near coast.	400	Of concern
12.5.2	<i>Eucalyptus tereticornis</i> , <i>Corymbia intermedia</i> grassy woodland to open forest on remnant tertiary surfaces and Cainozoic to Proterozoic sediments	300	Endangered
12.5.3	<i>Eucalyptus tindaliae</i> , <i>Eucalyptus racemosa</i> tall shrubby open forest on remnant tertiary surfaces and Cainozoic to Proterozoic sediments	1101	Endangered
12.5.6	<i>Eucalyptus pilularis</i> tall open forest on remnant tertiary surfaces.	764	Endangered
12.5.9	Closed sedgeland to heathland on remnant tertiary surfaces and Cainozoic to Proterozoic sediments.	136	Of concern
12.8.9	<i>Lophostemon confertus</i> tall open forest to open forest on Cainozoic igneous rocks.	25	Of concern
12.8.13	Araucarian complex microphyll rainforest on Cainozoic igneous rocks.	210	Of concern
12.8.19	Montane shrubland on Cainozoic igneous rocks.	31	Of concern
12.8.20	Shrubby woodland with <i>Eucalyptus racemosa</i> or <i>Eucalyptus dura</i> on Cainozoic igneous rocks.	222	Of concern
12.8.24	<i>Corymbia citriodora</i> , <i>Eucalyptus crebra</i> open forest on Cainozoic igneous rocks.	20	Endangered
12.8.25	<i>Eucalyptus acmenioides</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus propinqua</i> , <i>Corymbia intermedia</i> , <i>Lophostemon confertus</i> open forest on Cainozoic igneous rocks.	126	Of concern
12.9-10.1	Tall mixed open forest on sedimentary rocks. Coastal.	3668	Of concern

Regional Ecosystem	Regional Ecosystem Description (from Sattler, PS & Williams, RD (1999))	Remnant Area (ha.)	Vegetation Management Act. Status (as at June 2001)
12.9-10.7	Eucalyptus crebra, Eucalyptus tereticornis ± Corymbia tessellaris, Angophora spp. Woodland on sedimentary rocks.	22	Of concern
12.9-10.16	Araucarian microphyll to notophyll vine forest on sedimentary rocks.	609	Endangered
12.9-10.16x1	Araucarian microphyll to notophyll vine forest on weathered material.	31	Endangered
12.9-10.22	Closed sedgeland/shrubland on sedimentary rocks. Coastal parts.	56	Of concern
12.11.9	Open forest to tall woodland with <i>Eucalyptus tereticornis</i> on metamorphics ± interbedded volcanics. Ridges and upper slopes.	15	Of concern
12.11.16	Mixed tall open forest with <i>Eucalyptus cloeziana</i> on metamorphics ± interbedded volcanics.	433	Endangered
12.11.16x1	Mixed tall open forest with <i>Eucalyptus cloeziana</i> on sedimentary rocks.	590	Endangered
12.12.1	Notophyll/microphyll rainforest in gullies on Mesozoic to Proterozoic rocks	251	Of concern
12.12.3	Mixed tall open forest with <i>Corymbia citriodora</i> on Mesozoic to Proterozoic igneous rocks	61	Of concern
12.12.12	Eucalyptus tereticornis, Eucalyptus crebra, Eucalyptus siderophloia woodland on Mesozoic to Proterozoic igneous rocks.	102	Of concern
12.12.14.	Mixed shrubby woodland on Mesozoic to Proterozoic igneous rocks. Canopy species include Eucalyptus racemosa, Corymbia trachyphloia, Eucalyptus carnea, Eucalyptus tindaliae, Eucalyptus exserta, Angophora woodsiana	4	Of concern
12.12.19	Vegetation complex of rocky headlands, predominantly but not exclusively. Mesozoic to Proterozoic igneous rocks.	29	Of concern
TOTAL 34			

Source: Adapted from NSC, June 2003

## Conservation of species biodiversity

### Rare & Threatened/Significant Species

Regional records exist for a number of rare and threatened or otherwise significant amphibian, reptile, bird, mammal, fish and invertebrate species that are known to occur or potentially occur in the nominated area. A total of at least two hundred and twenty-nine (229) taxa are listed as rare and threatened at a state or national level or are considered to be regionally or locally significant. Approximately 11% of the

vertebrate fauna species (excluding marine fishes) present within the Noosa are listed as being rare and threatened at national or state level.

A significant percentage (at least 40%) of fauna species of the nominated area are considered to be significant at a local, regional, state and national and international level. This percentage indicates that a relatively large number of fauna species in Noosa Shire are threatened, or exhibit low levels of natural abundance and restricted distribution.

A total of six hundred and twenty-six (626) native vertebrate fauna species have been recorded within Noosa Shire area including:

- ⇒ 30 amphibians;
- ⇒ 75 reptiles;
- ⇒ 304 birds;
- ⇒ 63 mammals;
- ⇒ 33 primarily freshwater fishes; and
- ⇒ 121 marine fishes.

At least seventy-nine (79) butterflies and nine (9) freshwater crustaceans have been recorded in Noosa Shire area.

## Amphibians

Thirty native frog species have been recorded from habitats within Noosa Shire. Thirteen of these frog species are considered to be rare and threatened/significant in Noosa. Three of these species are considered threatened nationally, four species which are considered threatened at State level and three species considered to be regionally significant species.

There are six threatened or restricted species that are associated with rainforest habitats in the coastal lowlands and sub-coastal ranges

Four amphibian species are strongly associated with coastal wallum habitats with dystrophic and low pH surface waters, known as the 'acid' frog group (Ingram & Corben 1975);

Five common species are restricted in their distribution within the Shire, or are strongly associated with habitats that are limited to restricted areas within the Shire; and

Four common species are at or near their known northern or southern geographical distribution within the Noosa/Cooloola area.

## Reptiles

Seventy-five native reptile species have been recorded from habitats within Noosa Shire. Twenty-five of these species are listed as rare and threatened/significant reptile species.

### **Significant components of the reptile fauna of the Shire include:**

Ten species which are considered threatened nationally or at state level; and

Thirteen species considered regionally significant species.

## Birds

Three hundred and four bird species have been recorded from habitats within Noosa Shire. This list includes a number of oceanic birds, birds found primarily in coastal, littoral or shore habitats, birds associated with freshwater wetlands and birds associated with terrestrial open forest, closed forest and heath habitats. One hundred and fourteen of these birds are considered to be rare and threatened/significant species. This includes forty-five species that are listed in international treaties for the protection of migratory birds.

The numbers of species recorded within the Shire are increased by the presence of east coast migratory birds, extra-limital migratory birds and wading species which migrate to the northern hemisphere. Significant components of the bird fauna of the Shire include one hundred and eleven of these birds are considered to be rare and threatened/significant species. This includes forty-two common species that are listed in international treaties for the protection of migratory species.

Bird species recorded as occurring within the nominated area display a range of biogeographic affinities, including species with Bassian, Torresian, Eyrean and east coast distributions. The numbers of species recorded within the Shire are increased by the presence of east coast migratory birds, extra-limital migratory birds and wading species which migrate to the northern hemisphere.

### **Significant components of the bird fauna of the Shire include:**

Twenty-six bird species that are considered threatened nationally or at state level and twenty-nine species considered to be regionally significant species;

Ten rare and threatened or restricted species which are associated with rainforest and ecotonal habitats in the coastal lowlands and sub-coastal ranges;

Twelve rare and threatened or regionally significant birds associated with riparian habitats and freshwater wetlands;

Six rare and threatened or regionally significant birds associated with littoral, mangrove, saltmarsh and marine habitats; and

Fifty bird species listed in international migratory species agreements (JAMBA, CAMBA, Bonn Convention), with additional management intent under the Queensland *Nature Conservation Act 1992* and listed in schedules in the *EPBC Act 1999*.

## Mammals

A total of sixty-three mammal species have been recorded from habitats within the nominated area. Twenty-nine of these mammals are rare and threatened/significant species. Significantly ten mammal species are considered threatened nationally or at state level and sixteen species considered to be regionally significant species.

The iconic Koala has recently been declared Vulnerable in South –East Queensland by the State Government and is listed as Threatened by the USESL and Near Threatened by the IUCN.

## Freshwater and Marine Fishes

A total of one hundred and twenty-one marine and estuarine fishes and thirty-three primarily freshwater fish species have been recorded from the nominated area. Sixteen of the freshwater fishes and four of the marine fishes are considered to be rare and threatened/significant species. The freshwater fishes of the nominated area include species that are restricted to or commonly found in coastal acid drainage systems in south-east Queensland, including the honey blue-eye (*Pseudomugil mellis*), oxleyan pygmy-perch (*Nannoperca oxleyana*) and the ornate rainbowfish (*Rhadinocentrus ornatus*).

The Mary River cod (*Maccullochella peeli mariensis*) is another highly significant freshwater fish species that occurs within the nominated area, also there are six species which are considered threatened nationally and one species, the Queensland lungfish, which is protected by the Queensland *Fisheries Act 1994*.

## Invertebrates

Of all the fauna species existing on the Earth, 99% are believed to be invertebrates. As well as contributing a very high percentage of overall biodiversity in natural ecosystems, these organisms are critical to the productivity of whole ecosystems and are essential to ecological functioning that in turn supports larger organisms. While the invertebrate fauna of Noosa Shire is poorly documented it is expected that invertebrates are highly species rich when compared to other biogeographic areas, due to the extent of remnant vegetation in the Shire, the diversity of habitat types present and biogeographic factors.

While invertebrates comprise a large proportion of the fauna biodiversity within the Shire, there is limited information of the taxonomy, ecology and distribution of taxa. Some of the better-known invertebrate groups, such as the butterflies, are known to include rare and threatened species, a number of which occur within the nominated area.

Many additional significant invertebrate groups and species that occur in the region are known to display high levels of endemism, high diversity of taxa and very restricted ranges.

Some of these groups or taxa are likely to be restricted to particular habitats within Noosa Shire, including the land snails associated with sub-tropical rainforests and associated ecotonal forests. Rainforest remnants within the Shire are likely to support relict invertebrate species with Gondwanan affinities, including many that are endemic to the region.

**Some of the significant invertebrate information is as follows:**

- ⇒ Regionally endemic invertebrate taxa such as the dragonfly *Hemigomphus cooloola* (no common name) and the swamp crayfish (*Tenuibranchiurus glypticus*) are also associated with coastal heath and wallum habitats and aquatic habitats in acid drainage systems.
- ⇒ The fen swamps within Noosa Shire support an unusual number of rare and threatened invertebrate species.
- ⇒ Crayfish and earthworms in such acidic conditions are unusual.
- ⇒ A distinctive earthworm fauna is associated with the podzols and humus on sand dunes with 20 species identified and many still undescribed- most are endemic with one new sub-genus.
- ⇒ The termite fauna of Cooloola exhibits a high degree of endemism.
- ⇒ Land snails in Cooloola rainforests exhibit a high degree of diversity and endemism – the composition of the community in terms of relative abundance of species in different genera is very unusual.
- ⇒ The Cooloola Monster first discovered in 1976 was a new genus and species of the first new family of Orthoptera to be described in the twentieth century.
- ⇒ Cooloola is home to another unusual sand invertebrate – the Giant Wingless Cockroach which occur from Noosa to Fraser Island.
- ⇒ The earthworm fauna of Cooloola are globally unique.
- ⇒ A new family of ancient lepidopteran described as a “living fossil” (120-150 MY BP) as been found within Noosa Shire (M.Horak, D. Sands CSIRO Pers. Comm Aug 2006) and provisionally called the Cooloola Kin Kin Larva.

Professor Niels Kristensen of Copenhagen University and the National History Museum of Denmark made the following comments in September 2006 relating to “the scientific significance of the "Cooloola Kin Kin larva””

“The finding of this larva may confidently be described as one of the most significant events in systematic/evolutionary entomology in recent decades. Indeed, its significance arguably approaches that of the discovery of the bristletail *Tricholepidon* in California (1961) and of the Mantophasmatodea in Subsaharan Africa (2002)”.

The following Table lists some of the known significant invertebrate fauna occurring within Noosa Shire.

**TABLE: Known Significant Invertebrate Fauna of Noosa Shire**

GENUS/SPECIES	COMMON NAME	COMMENTS
Acrodipsas illedgei	Illedge's Ant-blue Butterfly	Qld Nature Con Act 1992 IUCN Red List (2000)
Ornithoptera richmondia	Richmond Birdwing Butterfly	Qld Nature Con Act 1992
Argyreus hyperbius inconstans	Australian Fritillary Butterfly	Qld Nature Con Act 1992
Nesolyceana albosericea	Satin Blue	Qld Nature Con Act 1992
Euschemon rafflesia rafflesia	Regent Skipper	Dunn et al. 1994
Telicota anisodesma	Large Darter	Dunn <i>et al.</i> 1994
Acanthaeschna victoria	No common name (a dragonfly)	IUCN Red List (2000)
Papuexul bidwilli	A Camaenid Land Snail	NT (IUCN 2000); Restricted; Endemic; Close to northern distributional limit (Gympie area)
Tenuibranchiurus glypticus	Paperbark Swamp Crayfish	Endemic; Restricted; Vulnerable to disturbance; Possible northern distributional limit
Tenuibranchiurus sp 1 (Horwitz 1995)	Paperbark Swamp Crayfish	Endemic; Restricted; Vulnerable to disturbance; Possible southern distributional limit in the Cooloola area
Cherax punctatus	Land Yabby	Endemic; Restricted (Mary River Catchment)
Cherax robustus	Sand Yabby	Endemic; Restricted
Macrobrachium tolmerum	East Australian River Prawn	Locally Restricted (QM)
Amarinus sp	False Spider Crab	Locally Restricted (QM)
Corynephorina n. sp. I. (17)	Springtail	Restricted; Endemic to Cooloola area (Hill & Michaelis 1988)
Hemigomphus cooloola	Dragonfly	Restricted; Endemic; Known only from the Cooloola/Fraser Island area (Theischinger 2000)
Cicadetta stradbokensis	Wallum Cicada	Restricted; Endemic (Moulds 1990)
Cooloola propator	Cooloola Monster	Restricted; Endemic
Glycaspis wallumaris	Lerp Insect	Restricted; Endemic (Hill & Michaelis 1988)
Glycaspis surculina	Lerp Insect	Restricted; Endemic (Hill & Michaelis 1988)
Hasora khoda haslia	Narrow-banded Awl	Close to northern distributional limit
Hesperilla picta	Painted Skipper	Conservation Dependent (Sands 1999); Restricted; Close to northern distributional limit (Cooroy area)
Trapezites luteus leucas	Rare White-spot Skipper	Conservation Dependent (Sands 1999)

GENUS/SPECIES	COMMON NAME	COMMENTS
<i>Suniana sunias nola</i>	Southern Orange Dart	Close to northern distributional limit
<i>Delias harpalyce</i>	Imperial Jezebel	Close to northern distributional limit
<i>Junonia hedonia zelima</i>	Brown Soldier	Conservation Dependent (Regional Level) (Sands 1999)
<i>Tisiphone abeona rawnsleyi</i>	Varied Sword-grass Brown	Conservation Dependent (Sands 1999); Endemic ( <i>rawnsleyi</i> subspecies); Restricted; Vulnerable to disturbance; Close to northern distributional limit
<i>Danaus plexippus plexippus</i>	Wanderer	International Migratory Species Agreement
<i>Hypochrysops epicurus</i>	Dull Jewel	Conservation Dependent (Sands 1999); Endemic
<i>Hypochrysops miskini miskini</i>	Miskin's Jewel	Conservation Dependent (Sands 1999); Endemic (Race <i>miskini</i> )
<i>Hypochrysops delicia delicia</i>	Moonlight Jewel	Close to northern distributional limit ( <i>delicia</i> subspecies)
<i>Pseudodipsas cephenes</i>	Cephenes Blue	Conservation Dependent (Regional Level) (Sands 1999)
<i>Ogyris zozine zozine</i>	Purple Azure	Insufficiently Known (Dunn <i>et al.</i> 1994)

Source: NSC Nov 2003

## INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE (IUCN REDLIST).

Of the fauna species listed as occurring within Noosa Shire a notable number have been identified and rated by the IUCN Redlist (2000) as being significant. A total number of 49 species of Noosa fauna are listed by the IUCN comprising:

- ⇒ amphibian species (5);
- ⇒ reptiles (8);
- ⇒ birds (10);
- ⇒ mammals (16);
- ⇒ freshwater and marine fish (8); and
- ⇒ invertebrates (2).

## INTERNATIONAL TREATIES

Australia is signatory to a number of international Conventions and Agreements relating to the protection of the environment. Three of these relate to migratory species. The species listed by the Japan-Australia and China – Australia Migratory Bird Agreements (JAMBA and CAMBA) and the Bonn Convention are incorporated within the Commonwealth legislation – *Environment Protection and Biodiversity Conservation Act (1999)*. The following table lists bird species known to occur in Noosa Shire, which are subject to international treaty. **TABLE 11 Bird Species Known to Occur in Noosa Shire Subject to International Treaty**

GENUS/ SPECIES	COMMON NAME	GENUS/ SPECIES	COMMON NAME
<i>Anas gracilis</i>	Grey Teal	<i>Calidris tenuirostris</i>	Great Knot
<i>Puffinus pacificus</i>	Wedge- tailed Shearwater	<i>Calidris canutus</i>	Red Knot
<i>Puffinus tenuirostris</i>	Short- tailed Shearwater	<i>Calidris alba</i>	Sanderling
<i>Sula dactylatra</i>	Masked Booby	<i>Calidris ruficollis</i>	Red- necked Stint
<i>Sula leucogaster</i>	Brown Booby	<i>Calidris acuminata</i>	Sharp- tailed Sandpiper
<i>Egretta sacra</i>	Eastern Reef Egret	<i>Rostratula benghalensis</i>	Painted Snipe
<i>Ardea alba</i>	Great Egret	<i>Calidris ferruginea</i>	Curlew Sandpiper
<i>Ardea ibis</i>	Cattle Egret	<i>Himantopus himantopus</i>	Black- winged Stilt
<i>Plegadis falcinellus</i>	Glossy Ibis	<i>Pluvialis fulva</i>	Pacific Golden Plover
<i>Pandion haliaetus</i>	Osprey	<i>Pluvialis squatarola</i>	Grey Plover
<i>Haliaeetus leucogaster</i>	White- bellied Sea- eagle	<i>Charadrius bicinctus</i>	Double- banded Plover
<i>Falco cenchroides</i>	Nankeen Kestrel	<i>Charadrius mongolus</i>	Lesser Sand Plover
<i>Falco longipennis</i>	Australian Hobby	<i>Stercorarius parasiticus</i>	Arctic Jaeger
<i>Grus rubicunda</i>	Brolga	<i>Sterna caspia</i>	Caspian Tern
<i>Gallinago hardwickii</i>	Latham's Snipe	<i>Sterna bergii</i>	Crested Tern
<i>Limosa limosa</i>	Black- tailed Godwit	<i>Sterna benghalensis</i>	Lesser Crested Tern
<i>Limosa lapponica</i>	Bar- tailed Godwit	<i>Sterna hirundo</i>	Common Tern
<i>Numenius minutes</i>	Little Curlew	<i>Sterna albifrons</i>	Little Tern
<i>Numenius phaeopus</i>	Whimbrel	<i>Chlidonias leucoptera</i>	White- winged Black- tern
<i>Numenius madagascariensis</i>	Eastern Curlew	<i>Cuculus saturatus</i>	Oriental Cuckoo
<i>Tringa stagnatilis</i>	Marsh Sandpiper	<i>Hirundapus caudacutus</i>	White- throated Needletail
<i>Tringa nebularia</i>	Common Greenshank	<i>Apus pacificus</i>	Fork- tailed Swift
<i>Xenus cinereus</i>	Terek Sandpiper	<i>Merops ornatus</i>	Rainbow Bee- eater
<i>Actitis hypoleucos</i>	Common Sandpiper		
<i>Heteroscelus brevipes</i>	Grey- tailed Tattler		
<i>Heteroscelus incanus</i>	Wandering Tattler		

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), has been in effect since July 2000 and lists species of significance at the national level as a Matter of National Environmental Significance (MNES).

A local authority search of the DEH MNES database for the nominated area identifies what the Commonwealth believes is likely to be of significance within Noosa Shire. The database as of 24/8/2005 lists 53 threatened species, 28 migratory species, 62 listed marine species and 13 cetaceans as likely to occur in Noosa.

Of the 1362 species of plant thus far recorded from Noosa Shire 21 species are listed under the *Environment Protection and Biodiversity Conservation Act 1999*, which include 5 species listed as Endangered (E) and 16 species are listed as Vulnerable (V).

The following table lists plant species listed as nationally significant under the Commonwealth *Environment Protection and Biodiversity Conservation Act (1999)*.

**TABLE: EPBC Listed Plant Species Occurring in Noosa Shire**

GENUS AND SPECIES	COMMONWEALTH SIGNIFICANCE	COMMENTS
<i>Acacia attenuata</i>	V	A shrub in open forest/heath
<i>Acronychia littoralis</i>	E	Record from national park adjacent to Yalanga Station
<i>Archidendron lovelliae</i>	V	Restricted to the area between Fraser Island and Noosa; a small tree
<i>Arthraxon hispidus</i>	V	Near northern limit (Wide Bay); a grass of shady places
<i>Baloghia marmorata</i>	V	Northern limit Wide Bay; a small rainforest tree
<i>Boronia keysii</i>	V	Restricted to an 18km geographic range; a threatened shrub:
<i>Bosistoa transversa</i>	V	A rainforest tree
<i>Bulbophyllum globuliforme</i>	V	An epiphytic orchid on Hoop Pine
<i>Cryptocarya foetida</i>	V	Confined in Qld. to Moreton and Wide Bay regions; a tree in rainforest
<i>Eucalyptus conglomerata</i>	E	Confined to Moreton region; Northern limit Noosa Shire; a stringybark
<i>Floydia praealta</i>	V	Northern limit Wide Bay; a rainforest tree
<i>Macadamia integrifolia</i>	V	
<i>Macadamia ternifolia</i>	V	Confined in Qld. to Moreton and Wide Bay, Northern limit Wide Bay; a small rainforest tree
<i>Macrozamia pauli-guilielmi</i>	E	A cycad
<i>Phaius australis/tancarvilleae</i>	E	A terrestrial orchid in damper situations
<i>Prasophyllum wallum</i>	V	Hervey Bay to Coolum; terrestrial orchid:

GENUS AND SPECIES	COMMONWEALTH SIGNIFICANCE	COMMENTS
<i>Prostanthera palustris</i>	V	Restricted to Mt Tinbeerwah; a small shrub
<i>Romnalda strobilacea</i>	V	Confined to Qld. in Moreton and Wide Bay, northern limit Wide Bay; a rainforest herb
<i>Syzygium hodgkinsoniae</i>	V	A rainforest tree
<i>Triunia robusta</i>	E	Rainforest shrub
<i>Xanthostemon oppositifolius</i>	V	Southern limit Wide Bay; a rainforest tree: RE12.3.1, 12.3.2, 12.11.10, 12.9-10.16 and 12.9-10.16x1

Source: Adapted from: NSC Nov 2003.

Column "Commonwealth Significance" - are species recorded from Noosa Shire that are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Endangered (E) or Vulnerable (V).

The following table lists the total known number of fauna species based on extant knowledge to 2001.

**TABLE: Total Numbers of Taxa in Each Fauna Group Within the Shire**

FAUNA GROUP	NUMBER IN NOOSA SHIRE
Birds	304 spp.
Mammals	63 spp.
Reptiles	75 spp.
Amphibians	30 spp.
Marine and freshwater fish	153 spp.
Freshwater shrimps, long-armed prawns and crayfish	9 spp.
Butterflies	78 spp.
TOTAL	712

Source: NSC Nov 2001

## Conservation of genetic biodiversity

There is a considerable extant knowledge base on the many native plants recorded from the proposed Biosphere Reserve that have traditional Aboriginal uses. These have been documented in a variety of sources, most notably by P & S Symons (1996). These include food plants, aquatic plants, tuberous plants including, orchids and lilies, plants with fibrous roots, medicinal plants, plants containing tannins, fibre, implement plants (plants used for tools and weapons) and adhesive plants (plants used for making adhesives).

Eucalypt and other forest timbers have formed historical economies for Noosa shire, much of the extractive timber industry occurring within Noosa is now plantation based.

Recreational and some commercial fishing activities occur based on the Noosa River system.

The proposed Noosa Biosphere Reserve is likely to include bioprospecting as an area of endeavour to be investigated for impact, viability and potential opportunities. Any bioprospecting activity would be guided by the Australian “Nationally consistent approach for access to and utilization of Australia’s native genetic and biochemical resources”. Emphasis will also be placed on the need to recognize the rights of traditional owners and respect their knowledge in relation to genetic biodiversity. It is envisaged that future investigation and development of these resources would be undertaken with the cooperation and approval of the traditional owners.

## 5. SPECIAL DESIGNATIONS

### UNESCO World Heritage Site

Parts of the proposed Noosa Biosphere Reserve are also proposed for addition to the Fraser Island World Heritage Area. The Queensland State government (through the Queensland Environmental Protection Agency (EPA) World Heritage Unit) have been preparing the case for nomination for areas associated with the Cooloola section of Great Sandy National Park.

A community-based proposal also includes the majority of Noosa National Park.

### RAMSAR Wetland Convention Site

The Noosa River and lakes system is currently being considered as a possible future nomination for Ramsar status. The system already is recognised as important by both the Queensland and Commonwealth governments.

### Regional Forest Agreement

Certain State government owned forest areas within the proposed Noosa Biosphere Reserve are subject to the South-East Queensland Regional Forests Agreement (SEQRFA)

The Comprehensive Regional Assessment provided the scientific basis on which the State and Commonwealth governments agreed to the Regional Forest Agreement (RFA) for the forests of the South East Queensland CRA region.

This agreement has determined the future of the region’s forests, allowing for further public forests being transferred to the conservation estate.

Although primarily examining forest, related data over broader areas were often considered and provide useful data relating to the proposed Biosphere Reserve area.

The reports that were of relevance to Noosa in the context of this assessment are the Forest Fauna Studies and Assessments, the Wilderness and Landscape Assessments, the Geoheritage Assessments and the Natural history significance Assessments.

### Geoheritage

Seven significant Geoheritage sites were identified within Noosa Shire namely;

### **Cooloola-Noosa River**

This large area contains multiple generations of aeolian dune system landscape information, and is one of the most significant geomorphological areas in its class. It contains dune systems dating back to the late Tertiary. It contains examples of perched lake systems, development of soil profiles dating back to the late Tertiary, coastal beach ridges, active and fossil aeolian systems in clearly demarcated geomorphological zones. Careful monitoring of more ancient dune sets should be maintained in order to retain their significance.

### **Mount Pinbarren**

Tertiary age volcanic plug related to Mt. Bauple north of Gympie.

### **Mount Cooroy**

Tertiary volcanic plug intruding into country rock

### **Noosa National Park**

Granite Bay and Dolphin Point – excellent examples of regional intrusives – a series of basaltic dykes intrude into tiaro Coal Measures and Country rock with vesicular and chill margins.

### **Cooroy Xanthozem, Hillfan and xanthozem, Kin Kin Rd, Cooran**

### **Mothar Mountain podsol**

### **Great Sandy Region Aeolian Coastal Landform Sites**

### **Wilderness and landscape values**

Due to the measurement criteria and inherent naturalness that is required to define wilderness, very few areas in South-East Queensland qualified. Within Noosa Shire, Cooloola East and Cooloola West were identified as either wilderness or remote natural areas, whilst the entire Cooloola precinct was identified as a high value natural landscape.

### **Natural history significance**

South East Queensland was assessed by the Comprehensive Regional Assessment process of the Regional Forest Agreement to identify places of natural history significance. Within Noosa Shire six areas were identified as being of high regional significance, namely Noosa River and Great Sandy National Parks, Noosa National Park, Tewantin State Forest, Mt. Pinbarren National Park, and State Forest 254.

### **The Japan – Australia Migratory Bird Agreement – JAMBA**

The Japan – Australia Migratory Bird Agreement – JAMBA lists a range of migratory birds which both parties agree to protect. Noosa Shire contains at least 35 species listed by this agreement.

### **The China – Australia Migratory Bird Agreement – CAMBA**

This agreement lists a range of migratory birds which both parties agree to protect. Noosa Shire also contains at least 35 species listed by this agreement.

### **Register of the National State**

Four natural areas found within Noosa Shire are listed on the Australian Register of the National Estate as areas of importance. The Register is administered by the Commonwealth department of Environment and Heritage.

The function of the Register is gradually being superseded by other heritage lists with specific legislative support.

These areas are:

- ⇒ Cooloola Area;
- ⇒ Mount Pinbarren National Park;
- ⇒ Noosa-Maroochy Wallum Area; and
- ⇒ Noosa National Park.

### **Birdlife International Endemic Bird Areas**

Noosa Shire is located within a Critical/Endangered Endemic Bird Area as defined by Birdlife International.

The internationally recognised and recognised ecological assessment system developed by Birdlife International revolves around assessing endemism and restricted range species and assessing the relative threats to identified ecoregions.

Noosa is located within Ecoregion 183 and is identified as a critical priority ecoregion.

### **World Wildlife Fund / National Geographic Priority & Global 200 Ecoregions**

Noosa Shire is located within an Endangered Ecoregion as defined by WWF and National Geographic. The global ecological assessment program conducted cooperatively by National Geographic and the World Wildlife Fund has identified a “Global 200” list of important ecological areas.

Noosa Shire is included within two critically endangered and overlapping Ecoregions, namely “Eastern Australia Rivers and Streams” and “Eastern Australia Temperate Forests” (AA0402).