

3.2.2 Bioregional Ecosystems

Indicators: Area of "Endangered" Regional Ecosystem

Area of "Of Concern" Regional Ecosystems

Area of "Endangered" and "Of Concern" Regional Ecosystems protected by conservation mechanisms.

Area of "Endangered" and "Of Concern" Regional Ecosystems outside conservation reserves

Area of dry and wet coastal heath (REs 12.2.9, 12.2.12 and 12.2.13)

Recently Queensland has been divided into a number of bioregions based on "broad landscape patterns that reflect the major structural geologies and climate as well as major changes in floristic and faunistic assemblages" (Sattler and Williams 1999). Noosa Shire falls within the South-east Queensland bioregion.

The south-east Queensland bioregion has been further divided into a number of provinces. Noosa Shire is part of three provinces:

- **Province 4, Southern Coastal Lowlands**, although centred upon sedimentary rocks of the Nambour Basin, also includes marine and estuarine sediments and the high dunes of the southern offshore islands (eg Bribie, Moreton and North and South Stradbroke). Major vegetation types are heathlands and banksia woodlands, *Melaleuca quinquenervia* forest and woodlands, mangrove forests, sedgeland and *Eucalyptus racemosa* and *E. pilularis* open forests and tall open forests.
- **Province 7, Gympie Block**, contains low, hilly landscapes on old sedimentary rocks, metamorphic and intermediate and basic volcanics with scattered acid volcanic intrusions. It includes the Wahpunga, Woondum, Beenham and Wolvi Ranges. It is moist in the south (rainfall in excess of 1500mm per year) but drier in the north (rainfall of 900mm per year). The relatively fertile soils associated with the intermediate to basic volcanics support extensive patches of araucarian notophyll and microphyll rainforest and mixed eucalypt forests. Ironbark woodlands replace the mixed eucalypt forests where rainfall is less than about 1000mm per year.
- **Province 9, Great Sandy**, includes Fraser Island and the area traditionally known as Cooloola. It contains sand masses and the sandstone hills and riverine plains of the upper Noosa River catchment and Noosa sand mass. Vegetation includes notophyll rainforest, *Lophostemon confertus*-*Syncarpia hillii* and *S. glomulifera* tall open forest, mixed eucalypt open forests, banksia woodlands and *Melaleuca quinquenervia* woodlands and heaths.

Bioregions and provinces have been further divided into many Regional Ecosystems. 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). These have been identified at a scale of 1:100,000 to 1:250,000.

The conservation status of each of the Regional Ecosystems was determined based on the estimated extent remaining as compared with its estimated extent prior to European settlement. This estimated extent is reduced if the biodiversity of the Regional Ecosystem has been greatly reduced, for example, by grazing, even if the tree layer is largely undisturbed. A Regional Ecosystem is classified as:

- "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; and
- "No concern at present" if over 30% of pre-European extent remains in an intact condition in the bioregion.

On 21 December 1999, the *Vegetation Management Act 1999* (VMA) was passed by the Queensland Parliament. (It was not proclaimed however till 15 September 2000). Under the VMA the status of a number of the Regional Ecosystems were upgraded/downgraded from that given by Sattler and Williams (1999). This is based on a variety of issues including regrowth and clearing since European settlement and is likely to change further over time. Regional Ecosystems listed as “Endangered” under the VMA, (mappable at a scale of 1:100,000) on freehold land and “Endangered” or “Of Concern” (mappable at a scale of 1:100,000) on state land covered under Part 6 of the *Land Act* may require a permit to clear from Department of Natural Resources. Proposals to clear land containing such Regional Ecosystems are now “Assessable Development” under the *Integrated Planning Act 1997* with some exceptions.

Noosa Council has reviewed the 1995 remnant vegetation mapping compiled by Olsen et al with reference to that compiled by the Environmental Protection Agency. The vegetation coverage has been adjusted based on year 2000 aerial photography for the Shire to “fine tune” the Regional Ecosystem mapping. The status of Regional Ecosystems is under constant review by the Environmental Protection Agency as further areas are either cleared or regrowth reaches 70% of mature height and 50% coverage at which point it is classified as remnant vegetation (Monteith pers comm.).

Table 3.1 lists the Regional Ecosystems that occur within Noosa Shire. The table also illustrates which Regional Ecosystems are “Endangered” or “Of Concern” as classified by Sattler and Williams (1999) and the Vegetation Management Action 2000 (4 October 2000 reprint) based on current available data.

Table 3.1 Regional Ecosystems of Noosa Shire

Regional Ecosystem	Regional Ecosystem Description (based on Sattler and Williams 1999)	Status VMA (as at April 2000)	Status Sattler And Williams	Remnant Area ha.	Regrowth Area ha.
12.1.1	<i>Casuarina glauca</i> open forest on margins of marine clay plains.	Endangered	Of Concern	379.7	1.3
12.1.2	Saltpan vegetation including grassland and herbland on marine clay plains.	Not of Concern	No concern at present	80.7	24.7
12.1.3	Mangrove shrubland to low closed forest on marine clay plains and estuaries.	Not of Concern	No concern at present	325.9	3.4
12.2.1	Notophyll rainforest on parabolic high dunes	Of Concern	No concern at present	94.9	0.4
12.2.2	Mixed microphyll/notophyll rainforest on Quaternary coastal dunes and beaches	Of Concern	Endangered	5.8	
12.2.3	Araucarian rainforest on parabolic high dunes.	Of Concern	No concern at present	4.2	
12.2.4	<i>Syncarpia hillii</i> , <i>Lophostemon confertus</i> tall open to closed forest on parabolic dunes	Of Concern	No concern at present	2.8	
12.2.5	<i>Corymbia</i> spp., <i>Banksia integrifolia</i> , <i>Callitrus columellaris</i> , <i>Acacia</i> spp. open forest to low closed forest on beach ridges in southern half of bioregion.	Of Concern	No concern at present	1697.6	1.4
12.2.6	<i>Eucalyptus racemosa</i> woodland on dunes and sand plains. Deeply leached soils.	Not of Concern	No concern at present	770.7	
12.2.7	<i>Melaleuca quinquenervia</i> or <i>M. viridiflora</i> open forest to woodland on sand plains.	Of Concern	No concern at present	116.6	
12.2.8	<i>Eucalyptus pilularis</i> open forest on parabolic high dunes	Not of Concern	No concern at present	670	
12.2.9	<i>Banksia aemula</i> woodland on dunes and sand plains. Deeply leached soils.	Not of Concern	No concern at present	1155.5	
12.2.12	Closed heath on seasonally waterlogged sand plains.	Not of Concern	No concern at present	2204.8	
12.2.13	Open heath on sand plains and dunes (Dry Heath)	Of Concern	Endangered	148.5	
12.2.14	Foredune complex.	Not of Concern	No concern at present	713.9	

Regional Ecosystem	Regional Ecosystem Description (based on Sattler and Williams 1999)	Status VMA (as at April 2000)	Status Sattler And Williams	Remnant Area ha.	Regrowth Area ha.
12.2.15	Swamps with <i>Baumea</i> spp., <i>Juncus</i> spp. and <i>Lepironia articulata</i> .	Not of Concern	No concern at present	400	0.6
12.3.1	Gallery vine forest (notophyll vine forest) on alluvial plains.	Endangered	Of Concern	1741.7	57.5
12.3.2	<i>Eucalyptus grandis</i> tall open forest on alluvial plains and associated lower slopes.	Not of Concern	No concern at present	4336.3	67.2
12.3.3	<i>Eucalyptus tereticomis</i> woodland to open forest on alluvial plains.	Endangered	Of Concern	105.4	
12.3.4	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus robusta</i> open forest on or near coastal alluvial plains.	Of Concern	No concern at present	4861.6	193.8
12.3.5	<i>Melaleuca quinquenervia</i> tall open forest near coastal alluvial plains.	Of Concern	Of Concern	714.3	4.1
12.3.6	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus tereticomis</i> , <i>Lophostemon suaveolens</i> woodland on coastal alluvial plains.	Of Concern	Of Concern	492.2	
12.3.8	Swamps with <i>Cyperus</i> spp., <i>Schoenoplectus</i> spp. and <i>Eleocharis</i> spp.	Of Concern	Of Concern	0.3	
12.3.11	<i>Eucalyptus siderophloia</i> , <i>E. tereticomis</i> , <i>Corymbia intermedia</i> open forest on alluvial plains near coast.	Of Concern	Of Concern	1327.9	143.5
12.3.13	Closed heath on seasonally waterlogged alluvial plains near coast.	Of Concern	No concern at present	362	136.3
12.3.14	<i>Banksia aemula</i> woodland on alluvial plains near coast.	Of Concern	No concern at present	1892.7	30.9
12.8.3	Complex notophyll rainforest on Cainozoic igneous rocks. Altitude <600m.	Not of Concern	No concern at present	238.7	31.4
12.8.4	Complex notophyll rainforest with <i>Araucaria</i> spp. on Cainozoic igneous rocks.	Of Concern	No concern at present	6.1	
12.8.8	<i>Eucalyptus saligna</i> ± <i>E. grandis</i> tall open forest on Cainozoic igneous rocks.	Of Concern	No concern at present	61.7	
12.8.9	<i>Lophostemon confertus</i> tall open forest to open forest on Cainozoic igneous rocks.	Of Concern	No concern at present	24.2	5.2
12.8.13	Araucarian complex microphyll rainforest on Cainozoic igneous rocks.	Of Concern	Of Concern	37.2	18.7
12.8.19	Montane shrubland on Cainozoic igneous rocks.	Of Concern	No concern at present	29.1	
12.8.20	Shrubby woodland with <i>Eucalyptus racemosa</i> or <i>E. dura</i> on Cainozoic igneous rocks.	Of Concern	No concern at present	204.2	
12.9/10.1	Tall mixed open forest on sedimentary rocks. Coastal.	Of Concern	Of Concern	1727.7	
12.9/10.4	<i>Eucalyptus racemosa</i> woodland on sedimentary rocks.	Not of Concern	No concern at present	2252.9	185
12.9/10.9	Shrubland/low woodland on sandstone lithosols.	Of Concern	Of Concern	18.2	
12.9/10.14	<i>Eucalyptus pilularis</i> tall open forest on sedimentary rocks.	Not of Concern	No concern at present	750.1	41.1
12.9/10.16	Araucarian microphyll to notophyll vine forest on sedimentary rocks.	Endangered	No concern at present	842.4	84.8
12.9/10.17	Mixed forest of <i>Corymbia citriodora</i> , <i>Eucalyptus siderophloia</i> , <i>E. major</i> , <i>E. acmenoides</i> on sedimentary rocks.	Not of Concern	No concern at present	2249.2	52.8
12.9/10.22	Closed sedgeland/shrubland on sedimentary rocks. Coastal parts.	Of Concern	No concern at present	536.8	34.7
12.11.2	<i>Eucalyptus saligna</i> or <i>E. grandis</i> , <i>E. microcorys</i> , <i>E. acmenoides</i> , <i>Lophostemon confertus</i> tall open forest on metamorphics ± interbedded volcanics.	Not of Concern	No concern at present	2223.1	83

Regional Ecosystem	Regional Ecosystem Description (based on Sattler and Williams 1999)	Status VMA (as at April 2000)	Status Sattler And Williams	Remnant Area ha.	Regrowth Area ha.
12.11.3	Tall open forest with <i>E. siderophloia</i> , <i>E. propinqua</i> , <i>E. microcorys</i> , <i>L. confertus</i> , <i>Corymbia intermedia</i> on metamorphics ± interbedded volcanics	Not of Concern	No concern at present	2061.1	17.9
12.11.5	Mixed tall open forest with <i>Corymbia citriodora</i> , <i>Eucalyptus siderophloia</i> , <i>E. major</i> on metamorphics ± interbedded volcanics.	Not of Concern	No concern at present	463.4	
12.11.10	Notophyll rainforest ± <i>Araucaria cunninghamii</i> on metamorphics ± interbedded volcanics.	Not of Concern	No concern at present	2111.5	1417.2
12.11.16	Mixed tall open forest with <i>Eucalyptus cloeziana</i> on metamorphics ± interbedded volcanics.	Endangered	Of Concern	1209.7	1.2
12.12.1	Notophyll/microphyll rainforest in gullies on Mesozoic to Proterozoic rocks	Of Concern	No concern at present	147.2	21.3
12.12.2	<i>Eucalyptus pilularis</i> tall open forest on Mesozoic to Proterozoic igneous rocks, especially granite.	Not of Concern	No concern at present	244.9	
12.12.3	Mixed tall open forest with <i>Corymbia citriodora</i> on Mesozoic to Proterozoic igneous rocks	Of Concern	Not of Concern	30.8	
12.12.15	<i>Eucalyptus siderophloia</i> , <i>E. propinqua</i> , <i>E. acmenoides</i> tall open forest on near coastal hills on Mesozoic to Proterozoic igneous rocks.	Not of Concern	No concern at present	1528.7	37.2
12.12.16	Notophyll rainforest on Mesozoic to Proterozoic igneous rocks.	Not of Concern	No concern at present	169.4	41.2
12.12.19	Vegetation complex of rocky headlands, predominantly but not exclusively. Mesozoic to Proterozoic igneous rocks.	Of Concern	Of Concern	8.9	
Total Area				43,784	2737.5

(Source -Noosa Shire Council 2001)

There are 51 of the 145 Regional Ecosystems represented in the South-East Queensland Bioregion in Noosa Shire.

There are 5 Regional Ecosystems in Noosa Shire which are listed as “Endangered” under the VMA.

There are 26 Regional Ecosystems in Noosa Shire that are considered to be “Of Concern” under the VMA.

Figure 3.2 on page 21 illustrates the distribution of “Endangered”, “Of Concern” and “Not of Concern” Regional Ecosystems within Noosa Shire as mapped by Noosa Council in 2001.

The total area covered by remnant “Endangered” (4278.9 ha) and remnant “Of Concern” (14,553.5ha) Regional Ecosystems, as defined under the VMA, is 18,832.4 ha, which represents 43% of the Shire’s 43,784ha of remnant native vegetation . . . Several Regional Ecosystems have a naturally restricted distribution within Noosa Shire, ie: RE s 12.2.2; 12.2.3; 12.2.4; 12.2.13; 12.3.8; 12.8.4; 12.8.19; 12.9/10.9; 12.12.19. None of these RE s are classified as “Endangered” under the VMA and as such are not protected.

Figure 3.2 Regional Ecosystems

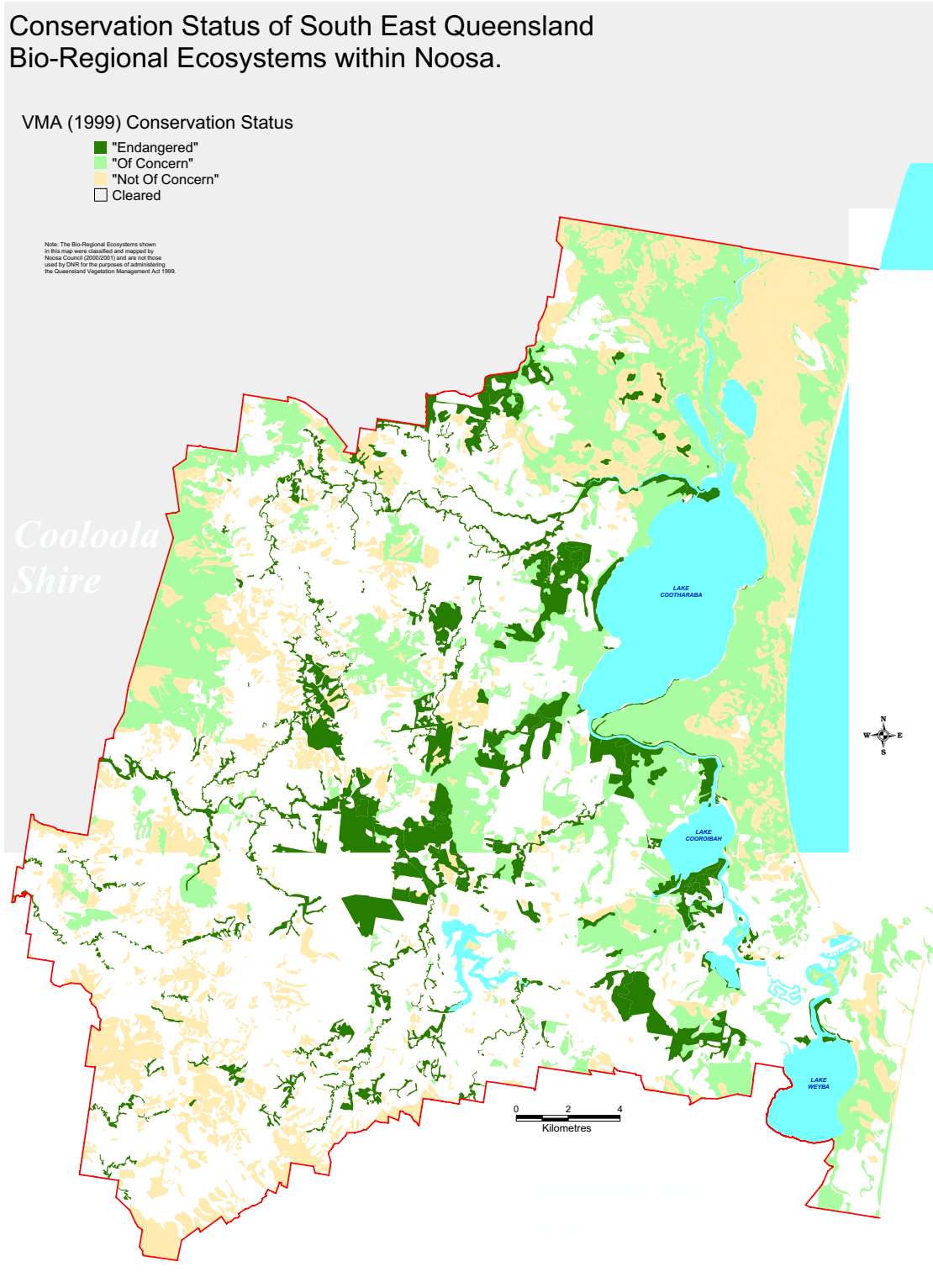


Table 3.2 Area of Endangered and Of Concern Remnant and Regrowth Regional Ecosystems and Land Tenure within Noosa Shire

Regional Ecosystem (RE)		Status Under VMA	Total Area of within Noosa Shire (ha)	Area within Freehold Land (ha)	Area in National Park	Area in State Forest	Area in other Tenures
RE Number	Description						
12.1.1	<i>Casuarina glauca</i> ± <i>Melaleuca quinquenervia</i> open forest on margins of Quaternary estuarine deposits.	Endangered	381	96.6	100.8	0	183.6
12.2.1	Notophyll rainforest on parabolic high dunes	Of Concern	95.3	4.1	89.4	0.3	1.4
12.2.2	Mixed microphyll/notophyll rainforest on Quaternary coastal dunes and beaches	Of Concern	5.8	1.9	0	0	3.8
12.2.3	Araucarian rainforest on parabolic high dunes.	Of Concern	4.2	3.4	0.8	0	0
12.2.4	<i>Syncarpia hillii</i> , <i>Lophostemon confertus</i> tall open to closed forest on parabolic dunes	Of Concern	2.8	0	2.8	0	0
12.2.5	<i>Corymbia</i> spp., <i>Banksia integrifolia</i> , <i>Callitrus columellaris</i> , <i>Acacia</i> spp. open forest to low closed forest on beach ridges in southern half of bioregion.	Of Concern	1699.1	136.7	1433.9	0	128.5
12.2.7	<i>Melaleuca quinquenervia</i> or <i>M. viridiflora</i> open forest to woodland on sand plains.	Of Concern	116.6	64.2	41	0	11.5
12.2.13	Open or dry heath on Quaternary Coastal Dunes and Beaches	Of Concern	148.5	25.8	88.9	0	33.8
12.3.1	Complex to simple notophyll rainforest on Cainozoic alluvial plains.	Endangered	1799.3	1165	71	81.8	481.5
12.3.3	<i>Eucalyptus tereticornis</i> open forest to woodland on Cainozoic alluvial plains including older floodplain complexes (Great Sandy NP 600ha; Noosa NP 130ha).	Endangered	105.4	84.6	0	0	20.8
12.3.4	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus robusta</i> open forest on or near coastal alluvial plains.	Of Concern	5055.4	1666.9	2335.2	249.7	803.5
12.3.5	<i>Melaleuca quinquenervia</i> tall open forest to woodland on Cainozoic alluvial plains in coastal areas.	Of Concern	718.4	441.7	49	25.7	202.1
12.3.6	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus tereticornis</i> , <i>Lophostemon suaveolens</i> woodland on Cainozoic alluvial plains in coastal areas (Great Sandy NP).	Of Concern	492.2	111.7	302.2	40	38.3
12.3.8	Swamps with <i>Cyperus</i> spp., <i>Schoenoplectus</i> spp. and <i>Eleocharis</i> spp.	Of Concern	0.3	0	0.3	0	0
12.3.11	<i>Eucalyptus siderophloia</i> , <i>E. tereticornis</i> , <i>Corymbia intermedia</i> open forest on alluvial plains near coast.	Of Concern	1471.4	781.3	218.8	26.1	445.2
12.3.13	Closed heath on seasonally waterlogged alluvial plains near coast	Of Concern	498.3	147	174	24.5	152.8
12.3.14	<i>Banksia aemula</i> woodland on alluvial plains near coast	Of Concern	1923.6	230.4	1222	256.1	214.8
12.8.8	<i>Eucalyptus saligna</i> ± <i>E. grandis</i> tall open forest on Cainozoic igneous rocks.	Of Concern	61.7	54.7	0	2.2	4.8
12.8.9	<i>Lophostemon confertus</i> tall open forest to open forest on Cainozoic igneous rocks.	Of Concern	29.4	21.2	3	0	5.3
12.8.13	Araucarian complex microphyll rainforest on Cainozoic igneous rocks.	Of Concern	56	31.9	0	0	24
12.8.19	Montane shrubland on Cainozoic igneous rocks.	Of Concern	29.1	2.8	1.8	24.6	0
12.8.20	Shrubby woodland with <i>Eucalyptus racemosa</i> or <i>E. dura</i> on Cainozoic igneous rocks.	Of Concern	204.2	62	0	107	35.2
12.9/10.1	Tall shrubby open forest on Cainozoic to Proterozoic sediments. (Noosa NP – small area).	Of Concern	1727.7	741.4	130.7	429.2	426.3
12.9/10.9	Shrubland/low woodland on sandstone lithosols.	Of Concern	18.2	17.4	0	0	0.8

Regional Ecosystem (RE)		Status Under VMA	Total Area of within Noosa Shire (ha)	Area within Freehold Land (ha)	Area in National Park	Area in State Forest	Area in other Tenures
RE Number	Description						
12.9/10.16	Araucarian microphyll to notophyll vine forest on sedimentary rocks.	Endangered	927.1	424	20.8	95.3	387.1
12.9/10.22	Closed sedgeland/shrubland on sedimentary rocks. Coastal parts.	Of Concern	571.4	90.5	349.4	83.6	47.9
12.11.16	<i>Eucalyptus cloeziana</i> ± <i>E. propinqua</i> , <i>E. acmenoides</i> , <i>E. microcorys</i> and <i>E. grandis</i> tall open forest on Mesozoic to Proterozoic moderately to strongly deformed and metamorphosed sediments and interbedded volcanics, especially phyllite of the Kin Kin Beds.	Endangered	1210.9	844.5	0	2.3	364.1
12.12.1	Notophyll/microphyll rainforest in gullies on Mesozoic to Proterozoic rocks	Of Concern	168.5	54.8	0	26.1	87.7
12.12.3	Mixed tall open forest with <i>Corymbia citriodora</i> on Mesozoic to Proterozoic igneous rocks	Of Concern	30.8	6.7	0	22.7	1.4
12.12.19	Vegetation complex of rocky headlands, predominantly but not exclusively, Mesozoic to Proterozoic igneous rocks.	Of Concern	8.9	0	8.8	0	0.1
Total			19,561.4	7313.1	6644.7	1497.1	4106.5

Source Noosa Shire Council 2001

Table Notes:

1. Other land use types include Crown land, Lands lease, mines tenure, railway, State land, State Forest and reserve.
2. Sattler and Williams (1999)

Of the 4,423.7 ha of and "Endangered" Regional Ecosystems within Noosa Shire, 59.1 % is in freehold ownership, 8.4 % is in National Park, 4% is in State Forest, and 32.5 % is in other tenure (Council and other agency land). Of the 15,137.7 ha of "Of Concern" Regional Ecosystems within Noosa shire, 31% is in freehold ownership, 42.6% is in National Park, 8.7% is in State Forest, and 17.6 % is in other tenure.

In addition to the Regional Ecosystems listed above there are a number of Regional Ecosystems for which conservation is recommended irrespective of current conservation status because they often have a high number of species within them, are of localised or restricted distribution and contain a high percentage of isolated and restricted populations of fauna and flora (Sattler and Williams 1999). For Noosa Shire they are:

- coastal littoral rainforest;
- vegetation of rocky headlands;
- rainforest, particularly lowland types;
- riparian (riverine) ecosystems;
- wetland ecosystems;
- mangroves; and
- inland rocky heaths.

3.2.3 Vegetation

Indicators: Loss/gain of vegetation between 1993 and 2000.

Annual clearing rate

Number of different flora species known to occur

Number of endangered, vulnerable and rare flora species known to occur

A loss/gain analysis for the Shire for the period 1993 to 2000 indicates that there was an overall net loss of remnant native vegetation of 1,719ha. This is a 3.7% loss of the 47,040 ha of native vegetation present in the the Shire in 1993. This represents an annual clearing rate of native vegetation of 0.53% (Burrows 2000). Greatest losses were as follows:

- *Banksia aemula/Eucalyptus bancrofti* wallum 23% loss
- *Melaleuca quinquenervia/Livistona australis* ecotone 10.4% loss
- *Melaleuca quinquenervia* with wetland understorey 8% loss
- Dry Heath 7.7% loss

There were net gains in a number of vegetation types including:

- Acacia dominated regenerating rainforest;
- *Eucalyptus tereticornis* (6.8% gain, mainly within Elanda Plains within National Park); and
- *Corymbia citriodora* (1% gain).

Table 3.3 shows losses and gains for all vegetation types including plantations, which are likely to be replanted following harvesting. It is important to note that these vegetation types do not directly relate to Regional Ecosystems discussed above.

Table 3.3 Vegetation Loss/Gain in Noosa Shire from 1993 to 2000 (Burrows 2000)

Vegetation Type(Based on Olsen et al 1995)	1993	2000	1993-2000	Percentage loss/gain
	Area-hectares	Area-hectares	Loss/Gain in Hectares	
1- Rainforest -not determined	399	393	-6	1.5 % loss
1.1- Riparian Rainforest	1,364	1355	-9	0.7% loss
1.2- Granite upland Rainforest	42	42	0	Nil loss
1.3- Lowland rainforest	1,236	1194	-42	3.4 %loss
1.4- Sandplain and dune Rainforest	116	116	0	Nil loss
1.5- Acacia dominated regenerating Rainforest	3,977	4010	33	0.8 % gain
1.6- Dry Rainforest with Hoop Pine	139	132	-7	5%loss
2- Ecotonal Forest-not determined	2,837	2763	-74	2.6%loss
2.1- <i>Eucalyptus grandis</i>	4,914	4769	-145	3%loss
2.2- <i>E.microcorys, E.pilularis, Lophostemon confertus, Syncarpia glomulifera</i>	1,598	1578	-20	1.2% loss
2.3- <i>E. tereticornis</i>	296	316	20	6.8 % gain
2.4- <i>Melaleuca quinquenervia, Livistona australis</i>	903	809	-94	10.4 % loss
3- Eucalypt Forest - not determined	2,540	2430	-110	4.3% loss
3.1- <i>E. racemosa</i>	2,194	2086	-108	4.9% loss
3.2- <i>E.pilularis</i>	780	749	-31	4 % loss
3.3- <i>Corymbia citriodora</i>	434	439	5	1 % gain
3.4 - <i>E.microcorys, Lophostemon confertus</i>	12	12	0	Nil loss
3.5 -Undefined mixed Eucalyptus communities	5,414	5264	-150	2.8 % loss
4- Melaleuca communities not determined	1,132	1096	-36	3.2 % loss
4.1 - <i>M. quinquenervia</i> with heathland understorey	314	309	-5	1.6 % loss
4.2 - <i>M. quinquenervia</i> with wetland understorey	4,341	3990	-351	8% loss
4.3- <i>M.quinquenervia</i> monoculture	51	48	-3	5.9 % loss
5- Heathlands and sedgeland not determined	334	334	0	Nil loss
5.1- Dry Heath	337	311	-26	7.7% loss
5.2- Wet Heath	540	525	-15	2.8 % loss
5.3- Sedgeland	1139	1077	-62	5.4 % loss
5.4- <i>Banksia aemula/E.bancrofti</i> wallum	26	20	-6	23 % loss

Vegetation Type(Based on Olsen et al 1995)	1993	2000	1993-2000	Percentage loss/gain
	Area-hectares	Area-hectares	Loss/Gain in Hectares	
5.5-Rocky Heath	35	35	0	Nil loss
6-Mangroves and Saline communities not determined	7	6	-1	14.3 % loss
6.1-Mangroves	379	378	-1	0.3 % loss
6.2-Saltmarsh and herbfield	73	73	0	Nil loss
6.3- <i>Casuarina glauca</i>	157	150	-7	4.5 % loss
7-Frontal dunes and foreshores -not determined	28	28	0	Nil loss
7.1-Coastal Complex	1,002	990	-12	1.2 % loss
7.2-Foredunes complex	186	185	-1	0.5 % loss
8-Plantations not determined	1,051	903	-148	14.1 % loss
8.1-Exotic Pine Plantation	1,452	901	-551	37.9 % loss
8.2-Native Conifer Plantations	18	23	5	28 % gain
8.3- Native Hardwood plantations	654	547	-107	16.4 % loss
Total Mapped Area	42,451	40,386	2,065	4.9% loss
Total Mapped Area Cleared			2,444	5.8 % loss
Total Mapped Area regrowth since 1993 or planted			379	0.9 % gain
Total Mapped Area - Non Plantation	39,276	38,012	1,719	4.4 % loss
Plus unmapped areas within Shire	47,040	45,776	1,719	4.1 % loss
Total Area including plantations	50,215	48,150	2,444	4.9 % loss

Analysis of clearing across land tenures illustrated in Table 3-4 indicates that most of the clearing of remnant native vegetation (1,578.3ha or 91.8%) occurred on freehold land, 110.1ha (6.4%) on Crown land and 30.8ha (1.8%) on land owned by Noosa Shire Council.

Table 3.4 Vegetation Loss By Tenure (Burrows 2000)

Vegetation Type	Freehold Land	Crown Land	Council Land	Cleared by Veg. Type
1- Rainforest -not determined	7.2			7.2
1.1- Riparian Rainforest	31.8			31.8
1.2- Granite upland Rainforest				
1.3- Lowland rainforest	49.7			49.7
1.4- Sandplain and dune Rainforest				
1.5- Acacia dominated regenerating Rainforest	136	1		137
1.6- Dry Rainforest with Hoop Pine	4.3			4.3
2- Ecotonal Forest-not determined	66		3.3	69.3
2.1- <i>Eucalyptus grandis</i>	202.9			202.9
2.2- <i>E.microcorys</i> , <i>E.pilularis</i> , <i>Lophostemon confertus</i> , <i>Syncarpia glomulifera</i>	19.1			19.1
2.3- <i>E. tereticornis</i>	1.8			1.8
2.4- <i>Melaleuca quinquenervia</i> , <i>Livistona australis</i>	84.6		3.6	88.2
3- Eucalypt Forest - not determined	133.8	51.1		184.9
3.1- <i>E. racemosa</i>	92.7	7		99.7
3.2- <i>E.pilularis</i>	27.6			27.6
3.3- <i>Corymbia citriodora</i>	1.7			1.7
3.4 - <i>E.microcorys</i> , <i>Lophostemon confertus</i>				
3.5 -Undefined mixed Eucalyptus communities	171.5	51		222.5
4- Melaleuca communities not determined	45.5			45.5
4.1 - <i>M. quinquenervia</i> with heathland understorey	5.3			5.3
4.2 - <i>M. quinquenervia</i> with wetland understorey	377.3		18.9	396.2
4.3- <i>M. quinquenervia</i> monoculture	2.9			2.9
5- Heathlands and sedgeland not determined				

Vegetation Type	Freehold Land	Crown Land	Council Land	Cleared by Veg. Type
5.1- Dry Heath	21.5		5	26.5
5.2- Wet Heath	12.1			12.1
5.3- Sedgelands	60.6			60.6
5.4- <i>Banksia aemula</i> / <i>E. bancrofti</i> wallum	6.1			6.1
5.5-Rocky Heath				
6-Mangroves and Saline communities not determined				
6.1-Mangroves				
6.2-Saltmarsh and herbfield				
6.3- <i>Casuarina glauca</i>	6.5			6.5
7-Frontal dunes and foreshores-not determined				
7.1-Coastal Complex	9.7			9.7
7.2-Foredunes complex				
Total Remnant Vegetation Clearing	1,578.3	110.1	30.8	1,719.2
8-Plantations not determined	11.3	106.1		117.4
8.1-Exotic Pine Plantation	483	21.9		504.9
8.2-Native Conifer Plantations				
8.3- Native Hardwood plantations	23.4	79.4		102.8
Total Clearing	2,096	317.5	30.8	2,444

Olsen and Drane (1995) list 1,116 native plant species for the Shire and 97 species of weeds, however the numbers in both categories can be expected to increase over time as further surveys are carried out. Indeed two native species were discovered during the course of this study.

There are 33 species of plants recorded in Noosa Shire that are listed as “Endangered”, “Vulnerable” or “Rare” under the Nature Conservation (Wildlife) Regulation 1994, with some species also listed under the Commonwealth’s Environment Protection and Biodiversity Conservation Act 1999. These species are in Table 3.5 with the associated Regional Ecosystems or vegetation type also shown.

Table 3.5 Significant Flora Species, Noosa Shire

Species	Status Qld ¹	Status C ^{wealth}	Regional Ecosystem or Vegetation Type
<i>Acacia attenuata</i>	V	V	RE 12.2.13; RE 12.9/10.4;
<i>A. baueri</i> subsp. <i>baueri</i>	V	-	RE 12.2.12; RE 12.2.13
<i>Alyxia ilicifolia</i> subsp. <i>magnifolia</i>	R	-	RE 12.11.10; RE 12.12.16; RE 12.9-10.16
<i>Archidendron lovelliae</i>	V	V	RE 12.2.1; RE 12.9-10.16
<i>Arthraxon hispidus</i>	V	V	Coastal lowlands, humid coastal and subcoastal ranges and highlands in closed forest and tall open forest, and subhumid subcoastal low ranges and basins in open forests and woodland (Tohill and Hacker 1996). (Grass of damp shady places).
<i>Austromyrtus inophloia</i>	R	-	RE 12.8.3, RE 12.11.1 (historic record Kin Kin)
<i>Baloghia marmorata</i>	V	V	RE 12.8.3, RE 12.12.16
<i>Blandfordia grandiflora</i>	R	-	RE 12.2.12; RE 12.2.13
<i>Boronia keysii</i>	V	V	RE 12.9/10.1 (Restricted to coastal lowlands west of Lake Cootharaba)
<i>Boronia rivularis</i>	R	-	RE 12.2.12; RE 12.9/10.1
<i>Bulbophyllum globuliforme</i>	V	V	RE 12.12.16 (epiphyte on <i>Araucaria cunninghamii</i>)
<i>Cryptocarya foetida</i>	V	V	RE 12.2.1
<i>Durringtonia paludosa</i>	R	-	RE 12.2.12
<i>Eucalyptus conglomerata</i>	E	E	RE 12.3.14; RE 12.9/10.22
<i>Floydia praealta</i>	V	V	RE 12.8.3, RE 12.12.16
<i>Glycine argyrea</i>	R	-	Rainforest

Species	Status Qld ¹	Status C ^{wealth}	Regional Ecosystem or Vegetation Type
<i>Macadamia integrifolia</i>	V	V	RE 12.3.1; RE 12.8.3, RE 12.11.10, RE 12.12.16
<i>Macadamia ternifolia</i>	V	V	RE 12.3.1; RE 12.8.3;
<i>Macarthuria complanata</i>	R	-	RE 12.2.9, RE 12.2.13
<i>Macrozamia pauli - guiliielmi</i>	E	E	RE 12.9/10.4
<i>Melaleuca cheelii</i>	R	-	RE 12.9/10.22
<i>Nothoalsomitra suberosa</i>	R	-	rainforest/wet sclerophyll forest-RE 12.8.3
<i>Phaius tancarvilleae</i>	E	E	RE 12.2.7, RE 12.2.12; RE 12.3.5
<i>Prasophyllum wallum</i>	V	V	RE 12.2.13
<i>Prasophyllum exilis</i>	R	-	RE 12.2.13
<i>Prostanthera</i> sp. (Mt Tinbeerwah)	V	-	RE 12.8.19 Mt Tinbeerwah
<i>Romnalda strobilaceae</i>	V	V	RE 12.8.3
<i>Scheoenus scabripes</i>	R	-	RE 12.2.12; RE 12.2.15
<i>Symplocos harroldii</i>	R	-	Rainforest-RE 12.9-10.16
<i>Syzygium hodgkinsoniae</i>	V	V	Rainforest RE 12.8.3
<i>Tecomanthe hillii</i>	R	-	Found at Tarangau: Station recently on RE 12.9/10.1
<i>Triunia robusta</i>	E	E	RE 12.8.3, RE 12.12.16, RE 12.9-10.16
<i>Xanthostemon oppositifolius</i>	V	V	RE 12.3.1; RE 12.12.16; RE 12.9-10.16

1. Olsen, Drane and Whitehead (1995)
 E Endangered
 V Vulnerable
 R Rare
 RE Regional Ecosystem

There are 4 species of plants listed as Endangered under Queensland legislation, all of which are also listed under Commonwealth legislation. There are 16 species listed as Vulnerable under Queensland legislation, but only 13 of these are listed as Vulnerable under Commonwealth legislation. There are 13 species of plant currently listed as Rare under Queensland legislation but this category is not included in Commonwealth legislation.

Table 3.6 lists Regional Ecosystems within Noosa Shire which contain flora species found in Noosa Shire listed as Endangered, Vulnerable or Rare under the *Nature Conservation (Wildlife) Regulation 1994*.

Table 3.6 Regional Ecosystems in Noosa Shire containing Significant Flora Species

Regional Ecosystem		Number of E, V, R plants recorded ¹
Number	Description ²	
12.2.6	<i>Eucalyptus racemosa</i> , <i>Corymbia intermedia</i> , <i>C. gummifera</i> , <i>Angophora leiocarpa</i> and <i>E. pilularis</i> shrubby or grassy woodland to open forest on Quaternary coastal dunes and beaches	1
12.2.7	<i>Melaleuca quinquenervia</i> open forest to woodland on Quaternary coastal dunes and beaches	1
12.2.9	<i>Banksia aemula</i> low shrubby woodland on Quaternary coastal dunes and beaches.	1
12.2.12	Closed or wet heath ± stunted emergent shrubs/low trees on Quaternary coastal dunes and beaches.	6
12.2.13	Open or dry heath on Quaternary coastal dunes and beaches.	5
12.2.15	Coastal sedgeland/wetland with <i>Baumea</i> spp., <i>Juncus</i> spp., <i>Lepironia articulata</i> , <i>Gahnia</i> spp., and <i>Eleocharis</i> spp. in wetlands associated with Quaternary coastal dunes and beaches.	1
12.3.1	Complex to simple notophyll rainforest on Cainozoic alluvial plains.	3
12.3.5	<i>Melaleuca quinquenervia</i> tall open forest to woodland on Cainozoic alluvial plains in coastal areas.	2

Regional Ecosystem		Number of E, V, R plants recorded ¹
Number	Description ²	
12.3.14	Woodland of <i>Banksia aemula</i> ± mallee eucalypt low woodland to shrubland and/or <i>E. racemosa</i> woodland to open forest on Cainozoic alluvial plains along coastal lowlands.	1
12.8.3	Complex notophyll rainforest on Cainozoic igneous rocks. Altitude <600m.	7
12.8.19	Montane shrubland on Cainozoic igneous rock.	1
12.9/10.1	Tall shrubby open forest on Cainozoic to Proterozoic sediments.	3
12.9/10.4	Open forest to woodland with <i>Eucalyptus racemosa</i> locally prominent on Cainozoic to Proterozoic sediments ± remnant Tertiary surfaces.	2
12.9/10.16	Microphyll to Notophyll rainforest on Cainozoic to Proterozoic sediments	5
12.9/10.22	Closed sedgeland to heathland with emergent trees on Cainozoic to Proterozoic sediments.	2
12.11.10	Notophyll and notophyll/microphyll rainforest ± <i>Araucaria cunninghamii</i> on Mesozoic to Proterozoic moderately to strongly deformed sediments.	2
12.12.16	Notophyll rainforest on Mesozoic to Proterozoic igneous rocks.	8

Table Notes:

1. Olsen, Drane and Whitehead (1995)
2. Sattler and Williams (1999)

Nationally Important Wetlands (Case Study)

Noosa Shire contains a number of wetlands which are deemed nationally "important" (ANCA 1996) because they meet one of the following criteria:

1. It is a good example of a wetland type occurring within a biogeographic region in Australia;
2. It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex;
3. It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought, prevail;
4. The wetland supports 1% or more of the national populations of any native plant or animal taxa;
5. The wetland supports native plant or animal taxa or communities which are considered Endangered or Vulnerable at the national level; and
6. The wetland is of outstanding historical or cultural significance.

Lake Weyba

The 2,860ha area included covers the part of Noosa National Park south of the original headland park and Lake Weyba and straddles Noosa and Maroochy Shires. It fulfils criteria 1-5 inclusive. It contains the following Endangered, Vulnerable and Rare flora as defined under the *Nature Conservation (Wildlife) Regulation 1994*:

- Swamp Orchid (*Phaius australis*) (Endangered);
- *Allocasuarina emuina* (Endangered);
- Christmas Bells (*Blandfordia grandiflora*) (Rare); and
- Tiny Wattle (*Acacia baueri* subsp. *baueri*) (Vulnerable).

It contains the following Endangered, Vulnerable and Rare fauna as defined under the *Nature Conservation (Wildlife) Regulation 1994*:

- Oxleyan Pygmy Perch (*Nannoperca oxleyana*) (Vulnerable);
- Honey Blue-eye (*Pseudomugil mellis*) (Vulnerable);

- Wallum Froglet (*Crinia tinnula*) (Vulnerable);
- Wallum Rocket Frog (*Litoria freycineti*) (Vulnerable);
- Wallum Sedge Frog (*L. olongburensis*) (Vulnerable);
- Ground Parrot (*Pezoporus wallicus*) (Vulnerable);
- Glossy Black Cockatoo (*Calyptohynchus lathamii*) (Vulnerable); and
- Black-necked Stork (*Ephippiorhynchus asiaticus*) (Rare).

Noosa River Wetlands

This 9,945ha area is contiguous with the Lake Weyba wetland. It has an extensive system of freshwater, brackish and saline lakes, marshes, heathlands and estuarine wetlands associated with the Noosa River and includes Lakes Cootharaba, Cooroibah, Como, Weyba, Cooloola and Doonella. Lake Cooloola is a permanent freshwater lake. Lake Como and the northern end of Lake Cootharaba are generally brackish, whilst the rest are saline. It fulfils all six criteria for nationally important wetlands and are one of few such wetland complexes on the Australian east coast. As part of the Great Sandy Region, they are considered to have World Heritage value. They contain the following Endangered, Vulnerable and Rare flora as defined under the *Nature Conservation (Wildlife) Regulation 1994*:

- Swamp orchid (*Phaius tancarvilleae*) (Endangered); and
- Key's Boronia (*Boronia keysii*) (Vulnerable).

They contain the following Endangered, Vulnerable and Rare fauna as defined under the *Nature Conservation (Wildlife) Regulation 1994*:

- Ground Parrot (*Pezoporus wallicus*) (Vulnerable);
- Southern Emu Wren (*Stipiturus malachurus*) (Vulnerable);
- False Water-rat (*Xeromys myoides*) (Vulnerable);
- Cooloola Tree Frog (*Litoria cooloolensis*) (Rare);
- Wallum Rocket Frog (*L. freycineti*) (Vulnerable);
- Wallum Sedge Frog (*L. olongburensis*) (Vulnerable);
- Wallum Froglet (*Crinia tinnula*) (Vulnerable);
- Oxleyan Pygmy Perch (*Nannoperca oxleyana*) (Vulnerable); and
- Honey Blue-eye (*Pseudomugil mellis*) (Vulnerable). Fauna

3.2.4 Fauna

Indicators: Number of native fauna species known to occur

Number of Endangered, Vulnerable and Rare fauna species known to occur

Within Noosa Shire 701 species of native fauna have been recorded (EMS 1999). This comprises:

- 78 butterflies;
- 9 crustaceans;
- 124 marine and 22 freshwater fish (45 freshwater species are recorded in south-east Queensland);
- 32 amphibians (45 species are recorded in south-east Queensland);
- 70 reptiles;
- 302 birds (approximately 417 species are recorded in south-east Queensland); and
- 54 mammals (marine and terrestrial) (89 species are recorded in south-east Queensland).

The high diversity of fauna in Noosa Shire essentially reflects the diversity of its Regional Ecosystems. However the information on the fauna is not complete and requires more detailed information on species abundance and distribution.

Invertebrates

As is the case with the rest of south-east Queensland the invertebrate fauna of Noosa Shire is relatively poorly documented (EMS 1999). There are four species of butterfly (but no other invertebrates) recorded in Noosa Shire, which are listed as Endangered, Vulnerable or Rare under the *Nature Conservation (Wildlife) Regulation 1994*. They are listed Table 3.7 along with their plant host preferences. None of these species are listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*.

Table 3.7 Conservation Status of Butterflies

Species	Status Queensland	Habitat/Hosts
Illidge's Ant-blue Butterfly (<i>Acrodipsas illedgei</i>) (outside known range – doubtful record)	E	Attended by the small black ant (<i>Crematogaster laeviceps</i>) in a variety of habitats including mangrove forest (Common and Waterhouse 1982).
Australian Fritillary Butterfly (<i>Argyreus hyperbius inconstans</i>)	E	Arrowhead Violet (<i>Viola betonicifolia</i>) found in coastal eucalypt forest and Melaleuca communities where the water table is high and occurs in close proximity to Casuarinas and Melaleucas (Sands 1997).
Richmond Birdwing Butterfly (<i>Ornithoptera richmondii</i>)	V	<i>Aristolochia praevenosa</i> in rainforest at higher elevations.
Satin Blue Butterfly (<i>Nesolyceana albosericea</i>)	V	Forest Boronia (<i>Boronia rosmarinifolia</i>) found in sandy soils (wallum or open forest) and Wallum Boronia (<i>B. falcifolia</i>) found in swamps and wet wallum.

E = Endangered
V = Vulnerable

In addition the Paperbark Swamp Crayfish (*Tenuibranch iuris glypticus*), although not listed under the State or Commonwealth legislation, is considered significant because of its narrow distribution in south-east Queensland. The Richmond Birdwing Butterfly is the subject of a replanting program of its host plants coordinated by the Double-Helix Science Club (TSN 1999c).

Marine Fish

The Great White Shark (*Carcharodon carcharias*) and Grey Nurse Shark (*Carcharias taurus*) are both listed as "Vulnerable" under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*. Although neither species is listed under the *Queensland Nature Conservation (Wildlife) Regulation*, both are protected species in Queensland waters under the *Queensland Fisheries Regulation 1995*.

Freshwater Fish

The following freshwater fish found in Noosa Shire are listed under State and Commonwealth legislation.

Table 3.8 Conservation Status of Freshwater Fish

Species	Queensland Legislation	Commonwealth Legislation
Oxleyan Pygmy Perch (<i>Nannoperca oxleyana</i>)	V	E
Honey Blue-eye (<i>Pseudomugil mellis</i>)	V	V
Mary River Cod (<i>Maccullochella peelii mariensis</i>)	-	E

E = Endangered
V = Vulnerable

The first two species listed are restricted to coastal acid drainage systems as is the Ornate Rainbow Fish (*Rhadinocentrus ornatus*), which whilst not listed is declining. The Mary River Cod is restricted to 3-5 tributaries of the Mary River system with one of the tributaries being Six Mile Creek within Noosa Shire (McDowall 1996). The Queensland Lungfish (*Neoceratodus forsteri*) is protected under the *Queensland Fisheries Act 1994*. Destruction and pollution of habitat and competition/predation from the introduced Mosquito Fish (*Gambusia holbrooki*) are the main threats to the Honey Blue-eye and Oxleyan Pygmy Perch. Honey Blue-eye and Oxleyan Pygmy Perch are present in the Noosa River and its tributaries and are protected within the Cooloola National Park within the Noosa Shire. These two species are also present in Marcus Creek (Arthington and Eisdale 1994). A recovery plan has been proposed for these species (Arthington and Marshall 1993).

The main threats to the Mary River Cod, which was once extremely abundant, and has its most important refuge in the Tinana Creek System (not in Noosa Shire) are changes to habitat surrounding streams, and changes to stream flows and water quality (TSN 1997). Six Mile Creek within Noosa Shire is also a major habitat for the Mary River Cod.

Noosa Council has funded the Gerry Cook Hatchery which restocks Lake Macdonald and Six Mile Creek with a number of native fish targeted by recreational anglers including Mary River Cod (NSC 2000).

Amphibians (Frogs)

The following seven species of frogs which are found in Noosa Shire are listed under *Queensland's Nature Conservation (Wildlife) Regulation 1994* and the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*.

Table 3.9 Conservation Status of Frogs

Species	Queensland Act	Commonwealth Act	Habitat
Wallum Sedgefrog (<i>Litoria olongburensis</i>)	V	V	Coastal wallum, wet heath.
Wallum Rocketfrog (<i>L. freycineti</i>)	V	-	Coastal wallum, wet heath, adjacent forests.
Wallum Froglet (<i>Crinia tinnula</i>)	V	-	Coastal wallum, wet heath, adjacent forests.
Cooloola Sedgefrog (<i>L. cooloolensis</i>)	R	-	Margins of larger coastal dune lakes.
Cascade Treefrog (<i>L. pearsoniana</i>)	E	-	Riverine Rainforest.
Green-thighed Frog (<i>L. brevipalmata</i>)	R	-	Rainforest, wet sclerophyll forest.
Giant Barred River Frog (<i>Mixophyes iteratus</i>)	E	E	Riverine Rainforest, wet sclerophyll and riparian forest.

E = Endangered
V = Vulnerable
R = Rare

The first four species listed are termed "Acid" frogs because of their preference for coastal wallum habitats, where the water is soft and acidic in pH. The other three species are generally found in rainforest or wet sclerophyll forests. Destruction of habitat is the major threat to these species.

Reptiles

Within Noosa Shire 12 species of reptiles are listed as endangered, vulnerable or rare under State and Commonwealth legislation; 2 marine turtles, 1 freshwater turtle, 3 species of terrestrial snake, 1 specie of flap-footed lizard and 5 species of skink. They are shown in order in Table 3.10 on page 32.

Table 3.10 Conservation Status of Reptiles

Species	Queensland Act	Commonwealth Act	Habitat
Loggerhead Turtle (<i>Caretta caretta</i>)	E	E	Marine
Flatback Turtle (<i>Natator depressus</i>)	V	V	Marine
Mary River Turtle (<i>Elusor macrurus</i>)	V	V	Mary River
Common Death Adder (<i>Acanthopis antaeticus</i>)	R	-	Eucalypt Forest with dense litter
Stephen's Banded Snake (<i>Holplocephalus stephensii</i>)	R	-	Tree hollows (Fitzgerald 1999) in Rainforest and wet sclerophyll forest
Blind Snake (<i>Ramphotyphlops silvia</i>)	R	-	Rainforest
Collared Delma (<i>Delma torquata</i>)	V	V	Open forest and woodland with grassy understorey and rock outcrops. Lives under rocks in soil cracks (Ryan 1995).
Three-toed Snake-tooth Skink (<i>Coeranoscincus reticulatus</i>)	R	-	Rainforest and adjacent tall open forest
Elf Skink (<i>Erotoscincus graciloides</i>)	R	-	Rainforest, Ecotonal forest (wet sclerophyll forest)
Rose-shaded Skink (<i>Saprosincus rosei</i>)	R	-	Rainforest, Ecotonal forest
Short-limbed Snake-Skink (<i>Ophioscincus truncatus</i>)	R	-	Coastal wallum, heath, tall forest
Cooloola Snake-Skink (<i>O. cooloolensis</i>)	R	-	Coastal wallum, adjacent forests

E = Endangered
V = Vulnerable
R = Rare

The main threats to two species of marine turtles are harvesting of eggs and adults (primarily outside Australia), disturbance of nest sites, collisions with marine craft and water pollution. There are major breeding sites within Noosa Shire. The major threat to other species of reptiles is the destruction or disturbance of their habitat.

Birds

Noosa Shire's diverse bird fauna includes 25 species which are listed as Endangered, Vulnerable or Rare under the *Nature Conservation (Wildlife) Regulation 1994* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. Forty one species are listed under JAMBA and/or CAMBA (including 2 species which are listed as rare and 1 listed as vulnerable under Queensland legislation). An additional 7 species are listed in the Bonn Convention.

Table 3.11 Conservation Status of Birds

Species	Queensland Act	Commonwealth Act	Habitat
Freckled Duck (<i>Stictonetta naevosa</i>) ?	R	-	Swamps, lakes – vagrant
Cotton Pygmy – goose (<i>Nettapus coromandelianus albipennis</i>)	R	-	Freshwater wetlands, deep lakes, swamps and dams
Little Tern (<i>Sterna albifrons sinensis</i>)	E	-	Saline Lakes, Coastal

Species	Queensland Act	Commonwealth Act	Habitat
Beach Thick-knee (<i>Esacus neglectus</i>)	V	-	Intertidal mudflats, reefs, beaches
Grey Goshawk (<i>Accipiter novaehollandiae</i>)	R	-	Rainforest, rainforest margins, depend on mature forest for breeding (Marchant and Higgins 1993)
Red Goshawk (<i>Erythrotriorchis radiatus</i>)	E	-	Open forest, woodland, rainforest margins, riparian forest
Square-tailed Kite (<i>Lophoictinia isura</i>)	R	-	Heathlands, open forest, woodland rainforest, urban edges
Powerful Owl (<i>Ninox strenua</i>)	V	-	Open forest, woodland, rainforest, wet sclerophyll forest
Marbled Frogmouth (<i>Podargus ocellatus plumiferus</i>) ?	V	-	Rainforest
Black-breasted Button-quail (<i>Turnix melanogaster</i>)	V	V	Rainforest, dry rainforest, vine thickets
Glossy-black Cockatoo (<i>Calyptorhynchus lathami lathami</i>)	V	-	Open forest, woodland (feed on She-Oaks – <i>Allocasuarina/Casuarina</i> spp.)
Coxen's Fig-Parrot (<i>Cyclopsitta diophthalma coxenii</i>)	E	E	Rainforest – have not been sighted in Queensland for a number of years despite intensive surveys
Black-throated Finch (<i>Poephila cincta cincta</i>)	V	V	Open forest, woodland, grasslands
Black-necked Stork (<i>Ephipporhynchus asiaticus australis</i>)	R	-	Coastal swamps, freshwater wetlands, mangroves, estuaries, rivers, streams, floodplains, dams
Painted Snipe (<i>Rostratula benghalensis</i>)	R	-	Vegetated swamps
Lewin's Rail (<i>Rallus pectoralis</i>)	R	-	Freshwater wetlands, rivers, creeks, saltmarsh grassland
Eastern Curlew (<i>Numenius madagascariensis</i>)	R	-	Estuaries, mangrove forest, intertidal mudflats, saltmarsh
Sooty Oystercatcher (<i>Haematopus fuliginosus</i>)	R	-	Rocky areas, estuaries, sandpits
Red-tailed Tropicbird (<i>Phaethon rubricauda</i>)	V	-	Coastal
Ground Parrot (<i>Pezoporus wallicus wallicus</i>)	V	-	Heath, coastal swamps with surrounding heath
Turquoise Parrot (<i>Neophema pulchella</i>)	R	-	Woodland, open forest, heathland, grassland
Sooty Owl (<i>Tyto tenebricosa</i>)	R	-	Rainforest, tall wet and open forest
Southern Emu Wren (<i>Stipiturus malachurus</i>)	V	-	Melaleuca wetlands, heathland
Red-browed Treecreeper (<i>Climacteris erythrops</i>)?	R	-	Tall wet forest, open forest
Black-chinned Honeyeater (<i>Melithreptus gularis</i>)	R	-	Open forest, woodland

E = Endangered
 V = Vulnerable
 R = Rare
 ? = Record with low level of reliability

A number of species such as the Red Goshawk and Square-tailed Kite were probably never plentiful even before European Settlement (Marchant and Higgins 1993). However, clearing and fragmentation of habitat particularly at lower altitudes have exacerbated the situation for these and other birds of prey (Grey Goshawk, Powerful Owl, Sooty Owl), which because they are at the top of the food chain, require large home ranges to hunt in. These species are also particularly sensitive to human disturbance of nest sites.

Draining of wetlands and coastal swamps has reduced the numbers and range of species such as the Freckled Duck, Cotton Pygmy-goose, Painted Snipe and Lewin's Rail. Clearing of *Allocasuarina littoralis* woodland or dry sclerophyll forest/woodland containing *A. littoralis*, the occurrence of more frequent, intense fire within these and grazing of these preferred habitats by cattle and rabbits (preventing regeneration) are threats to the Glossy Black-Cockatoo (Higgins 1999).

The destruction of lowland rainforest and tall wet forest has had a deleterious effect on Coxen's Fig-parrot, and Marbled Frogmouth. Regional Ecosystem 12.3.1 (complex to simple notophyll rainforest on Cainozoic alluvial plains) in Noosa Shire is important to fruit-eating birds, such as Coxen's Fig-parrot and others such as the native fruit-doves and cuckoo doves, which migrate seasonally from upland to lowland rainforest. Ian Gynther (EPA) has found the Coxen's Fig-parrot adjacent to Kin Kin Creek (Gynther 2001 pers. comm.). There has been a confirmed sighting of Coxen's Fig-Parrot along Kin Kin Creek (as well as numerous unconfirmed sightings along nearby Tinana Creek) (Gynther pers comm.). This species has been the subject of intensive, but until now fruitless ground surveys in south-east Queensland, over the last few years. A Coxen's Fig-parrot Draft Recovery Plan is in preparation by QNPWS (TSN 1999a).

Projected trends in clearing and fragmentation of lowland heath and wallum, which is currently taking place in south-east Queensland, is expected to further endanger the Ground Parrot and Southern Emu Wren, however this is well protected in Noosa Shire. Ground Parrots nest primarily in dry heathland with the balance in the interface between wet and dry heathland (McFarlane pers comm.). The optimum fire regime for the Ground Parrot is discussed under Fire Management within this chapter.

The shorebirds listed in JAMBA and CAMBA, including the rare Eastern Curlew and the vulnerable Little Tern, migrate annually between their breeding grounds north of Australia to over winter in Australia along the East Asian – Australian Flyway. Some species may undertake migrations of over 25,000km, with non-stop flights of over 6,000km, so need to rest and accumulate resources of fat to fuel these long flights.

Destruction of wetland feeding and roosting areas along the flyway, and disturbance of the birds when they are resting and feeding are major threats to their survival.

Mammals

Within Noosa Shire 9 species of mammal are listed as Endangered, Vulnerable or Rare under the *Nature Conservation (Wildlife) Regulation 1994* and on the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999*. Their status and habitat preference is included in Table 3.12.

Table 3.12 Conservation Status of Mammals

Species	Queensland Act	Commonwealth Act	Habitat
Spotted-tailed Quoll (<i>Dasyurus maculatus maculatus</i>)	V	V	Rainforest and wet sclerophyll forest Conondale/Blackall Range (TSN 2000)
Long-nosed Potoroo (<i>Potorous tidactylus tridactylus</i>) – SE Mainland Form	V	V	Coastal heath, wet and dry sclerophyll forest, with thick ground cover and light sandy soil
False Water-rat (<i>Xeromys myoides</i>)	V	V	Nests in area behind mangroves in reeds and marine couch, hollowed bases of decaying eucalypt stumps and in littoral bank tunnels, and inhabits the mangroves, freshwater lagoons, swamps and sedged lakes adjacent to coastal foredunes (TSN, 1999B). Recorded on Noosa North Shore in Noosa Shire.

Species	Queensland Act	Commonwealth Act	Habitat
Greater Long-eared Bat (<i>Nyctophilus timoriensis</i>)	R	-	Open forests and woodlands
Little Pied Bat (<i>Chalindobus picatus</i>)	R	-	Roosts in tree hollows (Strahan 1983), open forests and woodlands. Roosts in caves, mines and buildings (Strahan 1983)
Golden-tipped Bat (<i>Kerivoula papuensis</i>)	R	-	Rainforest, vine thickets and wet sclerophyll forests, Roosts in palms (Strahan 1983)
Humpback Whale (<i>Megaptera novaeangliae</i>)	V	-	Oceans
Indo-pacific Hump-backed Dolphin (<i>Sousa chinensis</i>)	R	-	Oceans, estuaries
Dugong (<i>Dugon dugon</i>)	V	-	Oceans, estuaries. Feeds on sea grass (<i>Zostera</i> sp.)

The main threats to the Spotted-tailed Quoll and Long-nosed Potoroo are the destruction of habitat and the introduction of exotic predators such as foxes (TSN 2000). A survey of Spotted-tailed Quolls is being coordinated by Queensland Parks and Wildlife Services. The Golden-tipped Bat is also threatened by loss of habitat. The main threat to Dugongs is the destruction of sea grass beds and mortality due to boat strikes. Whaling was the major cause of the decline of Humpback Whales but this species is now protected in Australian waters and populations are slowly recovering.

In addition to the above species the Koala (*Phascolaretos cinercus*), Platypus (*Ornithorhynchus anatinus*), and Short-beaked Echidna (*Tachyglossus aculeatus*) are listed as "Common with Special Cultural Significance" under the *Nature Conservation (Wildlife) Regulation 1994*. The Koala in particular can be considered an "icon" species because of the cultural associations for both Australian and overseas visitors.

Important information gaps, or what we don't yet know.....

- No extensive fauna study has been undertaken for Noosa Shire.
- Extent of and population size of various species of pest animals. Number of pest animals removed each year and reductions in population size per year.
- Extent and degree of infestation of various weeds (particularly declared weeds and serious environmental weeds).
- Extent of area where weeds have been reduced/eliminated.
- Local conservation issues related to species of special cultural significance, and Endangered, Vulnerable and Rare fauna.

3.3 SUMMARY REPORT CARD & INDICATORS

3.3.1 Summary Report Card

Overall Biodiversity Report Card			
Condition Assessment	Reasons	Pressures Assessment	Reasons
B	<ul style="list-style-type: none"> Noosa Shire has a high biodiversity with 49% of the fresh water fish recorded in South East Queensland, 71% of the frogs, 72% of the bird species and 60% of the mammals. Remnant native vegetation covers 43,784ha (54.6%) of the approximately 80,240ha (excluding the Noosa River, Lakes and Canals) covered by the Shire. This compares with a retention rate of 35% for South East Queensland as a whole in 1989/90. There are 51 Regional Ecosystems (REs) of which 5 are 'Endangered' and 26 are 'Of Concern' under the VMA. This represents 35% of the 145 REs described by Sattler and Williams (1999) for the South East Queensland Bioregion. 	Low	<ul style="list-style-type: none"> Some, though limited loss of native vegetation Problem weeds present, although extent and number not known Vegetation regeneration occurring in some rural areas Changed fire regimes for conserved areas Pressure from increasing recreational use of bushland areas and waterways. Increasing development means overall impacts on biodiversity occur (weeds, pests, clearing, especially of particular vegetation types located in areas suitable for development), general disturbance.
	<ul style="list-style-type: none"> Some of the biodiversity is protected within the 12,150ha of conservation reserves. 372ha (8.4%) of "Endangered" and 7770ha (51.3%) of "Of Concern" REs are contained in conservation reserves. 652.7ha of vegetation on private land under voluntary conservation agreements ("Land for Wildlife"). 378ha of mangroves are protected under the Fisheries Act 1994. Overall 13,024ha have a high level of protection which covers 32% of the remnant native vegetation. Most of this is within a 10km strip of the coastline. A further 8,175ha or 20% is State Forest in a semi-natural state (ie it has not been converted to pine plantations). Tree Preservation Local Law covers 30,204ha or 37% of the Shire. 		

The main threat to biodiversity in South East Queensland generally continues to be the clearance of native vegetation for urban development (houses, industry, roads and other infrastructure), this is also true for Noosa Shire. Generally, clearing has occurred in rural areas for agriculture and rural residential development.

Clearing of native vegetation is particularly evident in the coastal lowlands where approximately 80% of forests below 160 metres altitude on the mainland have been cleared for urban development and agriculture (Catterall 1997). Particularly affected are melaleuca wetlands, lowland rainforest, eucalypt dominated forest types of river banks, and coastal heathlands (EPA 1999b).

Inappropriate fire regimes, domestic cats and dogs, traffic, exotic aquarium fish and exotic aquarium weeds released into waterways and water pollution also pose a threat to fauna, whilst urban stormwater runoff, water pollution and weed invasion have the potential to affect native vegetation.

Key pressures requiring further action are:

- *** Clearance of "Endangered" and "Of Concern" Regional Ecosystems outside Conservation Reserves.
- *** Clearance of REs outside Conservation Reserves which provide habitat for Endangered, Vulnerable or Rare Wildlife.
- *** Fragmenting of east-west and north-south habitat connections to large remnants outside Noosa Shire.
- *** Invasion of native remnant vegetation by aggressive weeds.
- ** Changes in fire frequency, intensity, timing etc.
- ** Clearance of habitat for common wildlife particularly species which are sensitive to disturbance.
- ** Predation of native fauna by ferals such as foxes, cats etc.

Level of Priority and Urgency

*** *** highest ** * lowest **

Implications:

Further clearing of vegetation could lead to local or regional extinctions of some Endangered, Vulnerable or Rare species of native flora and fauna and reduce populations of common species to a point where they become Endangered, Vulnerable or Rare. Such effects may not become obvious for a long time, particularly for long lived species where mature individuals may persist long after recruitment of juveniles into the population has ceased. Much of the native vegetation has already been cleared throughout South East Queensland and is continuing at a fairly rapid pace. Each "insignificant" small area cleared adds up to a significant larger total.

Inappropriate fire regimes, uncontrollable domestic pets, feral animals etc are additional pressures which can contribute to the extinction of some species, particularly in a fragmented landscape.

3.3.2 Indicators

Indicators for biodiversity have been selected to highlight the current condition, pressures and responses for Noosa's biodiversity. These indicators address the following aspects of biodiversity:

- Area of remnant native vegetation;
- Regional Ecosystems;
- Voluntary conservation on private land;
- Quantity and uniqueness of fauna species;
- Number of endangered, vulnerable and rare flora and fauna species known to occur;
- Number of different fauna species;
- Area of land rehabilitated/enhanced annually; and

- Extent and relative abundance of key fauna species.

Indicator	Indicator Type <i>Pressure, Condition, Response</i>	Assessment
Regional Ecosystem²		
• Loss of each Regional Ecosystem between 1993 and 2000	P	Information not available at this stage
• Area of "Endangered" Regional Ecosystems(remnant and regrowth)	C	4,423.7ha.
• Area (%) of "Endangered" Regional Ecosystem outside conservation reserves	C	4051.8ha (91.6%) of total "Endangered" REs within Noosa Shire occur outside conservation reserves ¹
• Area of "Of Concern" Regional Ecosystems(remnant and regrowth)	C	15,137.7ha ¹
• Area (%) of "Of Concern" Regional Ecosystems outside conservation reserves	C	7,367.8ha (48.7% of total "Of Concern" REs within Noosa Shire occur outside conservation reserves) ¹
Vegetation		
• Loss/gain of vegetation between 1993 and 2000	P	1,719ha (4% loss on 1993 cover)
• Annual clearing rate	P	0.6%
• Area of remnant native vegetation (based on 2000 mapping)	C	43,784ha (54% of original cover)
• Area of Dry Coastal Heath RE 12.2.13	C	148.5 ha (2000 mapping)
• Number of different flora species known to occur	C	1,118
• Number of Endangered, Vulnerable and Rare flora species known to occur	C	33 species
Rehabilitation		
• Area of land rehabilitated/enhanced annually	R	Information not available at present
Fauna Species		
• Number of different fauna species known to occur	C	701
• Number of Endangered, Vulnerable and Rare fauna species known to occur	C	60 species
• Percent of land under feral animal control programs	R	Information not available at present
Key Fauna Indicators		
• Extent and relative abundance of key fauna species	C	Information not available at present
Conservation		
• Area of private land purchased with conservation levy funds since May 1996	R	633.6ha
• Area of retained habitat on private land under voluntary conservation agreements ("Land for Wildlife")	R	652.7ha
• Area of private land under voluntary conservation agreements ("Land for Wildlife") which contains "Endangered" or "Of Concern" Regional Ecosystems	R	207ha
• Area of private land under restoration (habitat enhancement – revegetation) as part of "Land for Wildlife"	R	108ha

Table Notes:

1. Conservation reserves only includes National Park and State Forest.
2. Regional Ecosystem status based on Vegetation Management Act.

3.4 TOWARD ESD: ACTION PLAN FOR BIODIVERSITY

3.4.1 Current Responses by Council

Tree Preservation Local Law

Noosa Shire Council has a Tree Preservation Local Law, however these provisions only cover 30,204ha of the eastern part of the Shire and township areas in the hinterland. They do not apply to the western part of the Shire where most of the clearing has already occurred (Map 2). The Local Law provides some protection to vegetation within an urban environment.

Conservation Levy

On 1 July 1995, Noosa Shire Council introduced a conservation levy, the proceeds of which are used to acquire environmentally significant land and landform features. It is used primarily to purchase those properties or features that are under threat of destruction because no other controlling mechanisms are available for protection. Since May 1996, eight parcels of land covering approximately 633.6ha in area have been purchased. A detailed policy, "Council Policy – Purchase of Environmentally Significant Land with Conservation Levy Funds", has been adopted by Council. The main objectives of this policy are:

- To work in partnership with the community to maintain a quality lifestyle reflecting the community's values and needs for environmental excellence, quality services and a healthy economy; and
- To achieve Ecological Sustainability and World's Best Practice.

Land for Wildlife / Voluntary Conservation Agreements

Land for Wildlife is a joint initiative supported by Noosa and seven other local authorities in South East Queensland. It aims to give recognition, encouragement and assistance to private landholders to protect and enhance wildlife habitat on their property. In Noosa Shire there are 84 properties currently participating in the program contributing 652.7ha of retained habitat and a further 108ha under restoration (habitat enhancement – revegetation etc) with a total property area of 1,120ha. Of this 27% or 207ha is listed as habitat classified by the Environmental Protection Agency as either "Of Concern" or "Endangered" (Petrie pers comm.).

Council has more recently commenced a program inviting landholders to develop Voluntary Conservation Agreements to provide greater levels of protection and management for the conservation values of their land.

Open Space Strategies

There is no formal open space strategy at present. (Geoghegan pers comm.). Decisions on open space contributions from developers are made on a fairly ad hoc basis and no accurate records are kept. A Planning scheme review project endorsed by Council in 1996 proposed an 'open space' network based on landform, landscape, aesthetic and environmental values. However, the definition of open space was fairly broad and included agriculture, rural subdivision, forestry etc.

Native Vegetation Rehabilitation and Management

A project is currently being undertaken by Noosa Landcare and the John's family to re-establish mangroves along an 8-9km section of the Noosa River between Lakes Cootharaba and Cooroibah. Red mangrove (*Rhizophora stylosa*) is being used because its stilt roots reduce the wave energy caused from the wash of passing boats and thus minimise further bank erosion (Burrows pers comm.).

Weed Control

Weeds are a serious and ongoing management issue for biodiversity in Noosa Shire – as in other disturbed areas in Australia. Information on problem weed species, their abundance, extent and relationship with soil or vegetation types in Noosa has not been systematically described or mapped. Information is anecdotal, although has a consistent message of severe weed infestations being a substantial management problem as articulated by the numerous volunteers and community members working in areas of remnant bushland.

Noxious or declared plants have a statutory requirement for their control. Where dense infestations of such species occur, control is obligatory. Control may also be necessary where particular weed species pose a threat to surrounding land use eg grazing or agricultural land or conservation reserves (Olsen and Drane 1995).

The re-establishment of natural vegetation on degraded sites can often be one of the most cost effective means of weed control. This is certainly true for many of the species currently controlled by herbicide spraying in the Shire. Where the site is badly degraded, it may be necessary to actively replant the area rather than rely on the dispersal and establishment of native species from remnants of natural vegetation (Olsen and Drane 1995).

Olsen and Drane (1995) identified the following weed species as representing a considerable threat to the remnant natural vegetation of the Shire:

- *Anredera cordifolia* (Madeira Vine);
- *Aristolochia elegans* (Dutchman's Pipe Vine);
- *Baccharis halimifolia* (Groundsel Bush);
- *Cabomba caroliniana* (Cabomba);
- *Celtis sinensis* (Chinese Elm);
- *Cinnamomum camphora* (Camphor Laurel);
- *Corymbia torelliana* (Cadaghi);
- *Gloriosa superba* (Gloriosa Lily);
- *Ipomoea cairica* (Mile-a-minute);
- *Lantana camara* (Lantana);
- *Ligustrum lucidum* (Broad Leaf Privet);
- *Ligustrum sinense* (Small-leaved Privet);
- *Macfadyena unguis-cati* (Cat's Claw Creeper);
- *Ochna serrulata* (Ochna);
- *Pinus spp.* (Exotic Pines);
- *Protoasparagus densiflorus* and *P. plumosus* (Asparagus fern);
- *Schefflera actinophylla* (Umbrella Tree);
- *Schinus terebinthifloia* (Broad Leaf Pepper Tree);
- *Sporobolus pyramidalis* and *natalensis* (Giant Rats Tail Grass);
- *Wedelia trilobata* (Singapore Daisy).

Another potentially serious threat to coastal ecosystems that has become established in some parts of South East Queensland is Boneseed (*Chrysanthemoides monolifera*) which has been recorded from this region. Noosa Council undertakes weed control on land under its control and recently purchased a machine which utilises hot water to kill weeds and a Cabomba Harvester (see below). Herbicides are still used, but sparingly. Control of Declared Weeds is covered under Noosa's Pest Management Plan.

Case Study – Cabomba Pilot Study

Cabomba (Cabomba caroliniana) is an exotic submerged aquatic herb which was introduced into Australia as an aquarium plant. It is a serious environmental weed and a threat to public safety and water quality. From October 1999 to March 2000 a pilot study was undertaken to investigate control of Cabomba which had infested 70% of Lake Macdonald (NSC 2000). A \$238,000 mechanical harvester was trialed, which has proven to be effective against the exotic pest and resulted in the reappearance of Hydrilla (*Hydrilla verticillata*) a submerged aquatic native herb after an absence of six years. As a result of the trial Noosa Council has purchased its own mechanical harvester.

Fire Management

Noosa Shire is represented on the “South East Queensland Fire and Biodiversity Consortium” which “aims to gather and disseminate information on fire management practices that will support conservation of SEQ’s biological diversity” (Watson pers comm./2000). It includes representatives from other local authorities throughout SEQ, the Rural Fire Service, Queensland Parks and Wildlife Service, Department of Natural Resources, Department of Primary Industries, Landcare and Tertiary Institutions. A manual is being developed by the consortium to outline best management practices for fire management.

The main issues in fire management are (Watson 2000):

- fire is vital for the renewal of many SEQ ecosystems;
- however, too frequent or infrequent fire can cause local extinctions;
- fire interval variability is important (varying the frequency and intensity of fire is important for SEQ fire-dependent ecosystems)
- a mosaic of vegetation in various stages of post-fire regeneration provides habitat for both fauna and flora; and
- minimise risk to human life and property and biodiversity.

For example, Ground Parrots generally don’t nest in heathland in which the last fire was less than 4 years. An optimum fire regime for this species appears to be a fire frequency of 6 – 13 years, with prescribed burns in winter to minimise mortality to females and young (wild fires are generally in spring and summer) and in a mosaic pattern. So frequent, hot fires, which engulf an entire area of dry heath are to be avoided if ground parrot numbers are to be maintained in the remaining habitat.

Managing fire involves a range of tools including prescribed burning, suppression of wild fires (where appropriate), fuel management, education of the public and fire managers, and law enforcement (Bradstock pers comm.). For fire management plans to be effective the frequency and types of fire across the landscape needs to be monitored so that the plans can be adjusted. Monitoring is also required to ensure that fire management plans are achieving their objectives.

Feral Animal Control

Noosa Council coordinates feral animal control through the Department of Natural Resources (DNR). Any trapping or poisoning of feral animals is carried out by the Land Protection Officer, DNR (Geoghegan, pers comm.). A pest management plan covering Declared Pest Animals (Dingo/Hybrid Feral dogs, foxes, wild rabbits, hares, feral pigs) and illegal pets is in place.

Regeneration and Farm Forestry Programs

Noosa Council provides funding to local community groups to implement bush regeneration and farm forestry programs on Council and freehold land.

Noosa Shire Fauna Study

In 1999, Noosa Shire Council commissioned Ecological Management Services (EMS) to conduct an initial literature search and review of available fauna data within Noosa Shire (EMS 1999). The "Noosa Shire Fauna Study" provides preliminary data on rare, threatened, significant fauna, their habitats in the Noosa Shire and a list of protected species recorded in the Shire. It will provide a basis for more detailed fauna studies in the future.

3.4.2 Commonwealth Responses

Environment Protection and Biodiversity Conservation Act 1999

The recently introduced Environment Protection and Biodiversity Conservation Act 1997 ("EPBC Act") represents the most fundamental reform of Commonwealth environmental legislation since the early 1970s. The Act focuses on matters of national environmental significance, which includes: World heritage properties; Wetlands of international importance (commonly known as Ramsar wetlands or wetlands declared under the Ramsar Convention); nationally threatened species and ecological communities; migratory species; Commonwealth marine areas; and nuclear actions. Noosa Shire contains nationally threatened species, marine and migratory species.

The Act prescribes that an 'action' (as defined in the Act) which has, will have, or is likely to have a 'significant impact' (also as defined in the Act) on a matter of national environmental significance is subject to a rigorous assessment and approval process coordinated by the Commonwealth.

In order to decide whether an action is likely to have a significant impact, it is necessary to take into account the nature and magnitude of potential impacts. In determining the nature and magnitude of an action's impacts, it is important to consider matters such as:

- All on-site and off-site impacts;
- All direct and indirect impacts;
- The frequency and duration of the action;
- The total impact which can be attributed to that action over the entire geographic area affected, and over time;
- The sensitivity of the receiving environment; and
- The degree of confidence with which the impacts of the action are known and understood.

The Act provides that the Minister must, in deciding whether an action is likely to have a significant impact on a matter of national environmental significance, take into account the precautionary principle.

3.4.3 State Government Responses

Conservation Reserves

Currently there is 12,150ha of land within Conservation Reserves (National Park, Fauna Park Reserve, or Conservation Park) which represents 14% of the Shire and 31% of the remnant native vegetation within the Shire. However, these are mainly confined to a narrow strip of Regional Ecosystems on Quaternary coastal dunes and Cainozoic alluvial plains in Great Sandy National Park (including Cooloola Fauna Park Reserve and Cooloola National Park) and Noosa National Park. These are largely heathland and melaleuca communities. The 25ha (approximately) Mount Pinbarren National Park, and Mt Cooroy Conservation Reserve (47ha) are the only Conservation Reserves west of Lake Cootharaba.

Fish Habitat Reserves

Fish Habitat Reserves are declared under the Fisheries Act 1994 to protect tidal wetland habitats. Under the Act, all marine plants, including: mangroves, seagrass, saltwater couch, algae, samphires, are protected regardless of the tenure of the land on which they occur. A permit from the Department of Primary Industries is required for their removal (EPA 1999). There are currently 326ha of mangroves protected under the Act in Noosa Shire..

State Forest and Regional Forest Agreement

State Forest covers approximately 10,845 hectares of the Shire (12.5%). However, 2,670ha (25%) has been converted to pine plantation leaving 8,175ha (75%) in a natural or semi-natural state. This represents 21% of the remnant vegetation within the Shire.

The following areas of State Forest in Noosa Shire have been transferred to Forest Reserve (the interim holding tenure) under the Nature Conservation Act (Don pers comm.):

- Woondum Forest Reserve 3 – abt 2.5ha (formerly SF 1683 Woondum);
- Tuchekeoi Forest Reserve – abt 384ha (formerly SF 963 Tuchekeoi);
- Tewanin Forest Reserve 3 – abt 67ha (formerly SF 1271 Tewanin); and
- Noosa Forest Reserve 1 – abt 60ha (formerly SF 989 Noosa).

These areas will remain under management by the Department of Natural Resources (Forest Management) for up to five years while the final protected area tenure under the Nature Conservation Act is determined. This final tenure could be national park, national park (recovery), conservation park or resources reserve, or a combination of these. The tenure allocation process will involve broad consultation with indigenous interests and other community interest groups, including recreational activity bodies (Don pers comm.).

Several other State Forests in or partially in Noosa Shire are to be transferred to Forest Reserve in January 2001, including:

- SF 997 Noosa;
- SF 393 Woondum;
- SF 952 Tewanin; and
- SF 959 Tewanin.

The extent of each transfer is being determined at present with Department of Primary Industries (Forestry) as some plantations are included in these forests.

Vegetation Management Act 1999

The State Government's Vegetation Management Act 1999 regulates the clearing of "Endangered" Regional Ecosystems on freehold land, and controls clearing of "Of Concern" Regional Ecosystems on State land covered under Part 6 of the Land Act. Based on the Regional Ecosystems within Noosa Shire (from Noosa Council 2001 data) there are 5 "Endangered" Regional Ecosystems in the Shire covering an area of 4,424ha, and 25 "Of Concern" Regional Ecosystems covering an area of 15,138ha.

3.4.4 Other Responses

Sunshine Coast Environment Council (SCEC) Case Study

This non government organisation is currently undertaking the Habitat 2000 Wildlife Corridor Project in the region funded by local council, Environmental Protection Agency and numerous philanthropic trusts. It has completed a study in Caloundra City, is now working on Caboolture Shire and aims to assess Noosa, Maroochy and Cooloola Shires in the future. The project involves:

Assessing vegetation into Risk of Loss categories, by comparing current zonings and the designations in the strategic plan.

Identifying and defining the major wildlife corridors throughout a shire. A wildlife corridor is a strip of remnant/replanted native vegetation which links areas of native vegetation allowing migration and recolonisation by fauna (and flora) and providing linear habitat.

Identifying major 'Areas of Concern' where fragmentation is affecting the wildlife corridor to be targeted for rehabilitation works.

Assessing wildlife underpass potential for the major roads within a shire.

Allan and Stacey Franks Case Study

Allan and Stacey Franks of Cooroy are two private individuals who are interested in installing nest boxes to replace the nest and roost hollows which are generally found in old trees such as eucalypts. These hollows are used by various types of fauna such as parrots, kookaburra, squirrel and sugar gliders, and insectivorous bats as nest or roost sites. Tree hollows tend to be scarce in developed areas due to general clearing and because older trees tend to be large and are considered a safety risk. The Franks have received a grant through Barung Landcare to install 200 artificial nest boxes in the region and monitor their usage. They have so far been instrumental in the installation of 10 nest boxes in Noosa Shire, 8 on private property and 2 at Noosaville Primary School.

Noosa Koala Habitat Atlas Project Case Study

The Koala Habitat Atlas is a GIS-based project carried out by the Australian Koala Foundation (a public organisation dedicated to the conservation of the koala and its habitat) that aims to ultimately map all remaining koala habitat throughout the geographic range of koalas. Projects are generally undertaken on a shire-by-shire or regional basis in conjunction with respective councils. The Koala Habitat Atlas maps for Noosa Shire are based on the tree species preferences and habitat utilisation identified from the field surveys and subsequent statistical analysis, together with the digital vegetation and soil landscape mapping supplied by Council (Callaghan 2000).

Field research for the Koala Habitat Atlas involved application of the AKF's faecal pellet-based survey methodology to identify koala tree species preferences and other aspects of koala habitat usage necessary to effectively rate and map koala habitat throughout the Shire.

A draft of "The Noosa Koala Habitat Atlas" was presented to Noosa Council at the annual AKF koala conference held in Noosa in October 2000 for comment. It is anticipated that the Koala Habitat Atlas will provide a sound basis for future planning efforts to protect koalas and koala habitat within the Shire. The Koala Habitat Atlas will also assist landholders and community groups with conservation, management and restoration of significant koala habitat and habitat linking areas.

Noosa Parks Association Case Study

The Noosa Parks Association was founded in 1962 and over the years has played a key role in having significant areas of the Shire added to Noosa National Park. The focus of the group is to protect large areas of intact habitat and to work through planning schemes to gain connections (ie corridor/links). The Association is currently playing a major role identifying native State Forest, through the Regional Forest Agreement, for habitat and corridor linkage.

Noosa Parks Association has been very active in Noosa Shire over the past ten years through its revegetation branch "Greening Noosa". The Association has undertaken extensive revegetation work with financial assistance from Noosa Council and the Federal Government for plants and material.

Projects include:

- replanting Noosa Woods Caravan Park;
- replanting Littoral Rainforest on Noosa Spit;
- rehabilitation of the coastal dunes between Peregrin and Sunshine Beaches; and
- roadside plantings.

The group's emphasis is now shifting from replanting to weed control targeting the following species:

- Singapore Daisy (*Wedellia trilobata*);

- Asparagus fern (*Protoasparagus* spp.);
- Broad-leaf Pepper (*Schinus terebinthifolius*);
- Umbrella Tree (*Schefflera actinophylla*);
- Lantana (*Lantana camara*); and
- Glory Lily (*Gloriosa superba*).

No figures are available for the area of land in Noosa Shire replanted or rehabilitated in the Shire by Noosa Parks Association (Hall pers comm.).

3.4.5 Action Plan

The action plan is a composite of developing a more useful information base as an important input to future decisions, as well as action for key elements of biodiversity - weeds, pests, open space contributions and retention of ecosystem diversity.

Action	Responsibility	Comment
Undertake loss/gain study of key ecosystem function areas.	NSC	To include important fauna corridors and core habitat areas.
Extend current vegetation loss/gain analysis to include Regional Ecosystems loss/gain between 1993 and 2000.	NSC	Vegetation types will need to be classified into Regional Ecosystems.
Monitor conservation status changes to Nature Conservation (Wildlife) Regulation 1994 for Endangered, Vulnerable or Rare flora and fauna in Noosa Shire.	NSC	Amend next SoE report to reflect changes.
Monitor and record area of land (ha) rehabilitated/ enhanced within Noosa Shire.	NSC Landcare other non government groups	Should include reference to Regional Ecosystem species used for cross referencing purposes. Area given as annual total. To include statutory requirements (ie part of development conditions) and voluntary rehabilitated areas.
Monitor and record habitat (RE) protected over time as Council parkland/open space/National Park.	NSC	Establish internal Council system which documents land allocated and acquired for open space purposes. The land's intended purpose should also be documented (eg recreation, habitat etc).
Establish a community monitoring program that documents the extent and relative abundance of key fauna species.	NSC Community groups Nature Search	<p>This could include rare, threatened and/or sensitive species which are easily recognisable/observable.</p> <p>Possible Indicator Species:</p> <ul style="list-style-type: none"> • Richmond Birdwing Butterfly (<i>Ornithoptera richmondia</i>); • Tusked Frog (<i>Adelotus brevis</i>); • Frilled Lizard (<i>Chlamydosaurus kingii</i>); • Glossy-black Cockatoo (<i>Calyptorhynchus lathami lathami</i>); • Black-necked Stork (<i>Ephipporhynchus asiaticus australis</i>); • Magpie Goose (<i>Anserarlas semipalmata</i>); • Brolga (<i>Grus rubundica</i>); • Noisy Pitta (<i>Pitta versicolor</i>); • Regent Bowerbird (<i>Seniculus chrysocephalus</i>); • Platypus (<i>Ornithorhynchus anatinus</i>); • Koala (<i>Phascolarctos cinereus</i>); • Spotted-tailed Quoll (<i>Dasyurus maculatus maculatus</i>); • Short-beaked Echidna (<i>Tachyglossus aculeatus</i>); • Powerful Owl (<i>Ninox strenua</i>); and • Red Goshawk (<i>Erythrorhynchus radiatus</i>).

Action	Responsibility	Comment
Identify target pest species and specific areas for a reduction program. Monitor the extent and population size of target species of pest animals in specific area.	NSC in association in the DNR and EPA	Numbers removed each year. Reductions in population size per year.
Identify threatening processes for populations of EVR flora and fauna in the Shire and develop strategies to overcome them.	NSC	
Maintain and enhance native vegetation links to large areas of remnant vegetation north, west and south of Shire.	NSC	
Ensure no net loss of all areas of "Endangered" and "Of Concern" Regional Ecosystems within the Shire.	DNR	
Continue to support the work of non-government and other organisations and individuals working towards maintaining biodiversity within the Shire.	NSC Federal Government (NHT) funding DNR	
Identify the most serious weed problems and develop a strategy for their effective control.	NSC DNR	
Develop a more systematic and strategic approach for open space contributions which can secure important biodiversity values.	NSC	
Develop a targeted education strategy and supporting materials to educate residents and visitors about distinguishing features and appropriate management of Noosa's biodiversity and the natural environment.	NSC	This action is relevant to all themes in this report, and is not confined to biodiversity issues.