

4. CATCHMENT, RIVERS & LAKES

4.1 INTRODUCTION

The waterways of the Noosa River, the extensive fresh and saltwater lakes systems and fresh water creeks of Noosa Shire distinguish its character and physical setting from surrounding areas.

This chapter examines the river systems, their catchments and associated lakes and wetlands. The lower reaches of the Noosa River are tidal from its mouth to Lake Cootharaba, and therefore also form part of a coastal, estuarine system. However, it has been decided to discuss the whole Noosa River system – from the upper reaches to the mouth as part of this section, rather than separating all estuarine elements for a discussion as part of the coastal theme.

This decision reflects community sentiments that the lower reaches of the Noosa River be viewed within their full context as part of a *river*, rather than just a coastal estuarine system. Analysis of the catchment and illustration of the interdependence of many elements of the river and associated lake system is also strengthened by discussing it wholly within the one theme. Assessment of catchment health also requires a full appraisal of the whole river catchment. However, studies and assessments specifically of estuarine quality and health will be discussed in this section as well as being mentioned in the coastal theme.

The scope of this theme includes the important parameters of river and catchments relevant to state of the environment reporting:

- quality of water for recreation and aquatic ecosystems;
- aquatic ecology of the river systems;
- quantity or flow regimes of rivers, including the contribution of underground water;
- condition of the surrounding catchment;
- use for commercial fishing; and
- the use of the rivers and lakes for recreational purposes.

The indicators have been selected to identify important trends and condition linked to each of the main areas described above.

Noosa Shire is dominated by two river systems and their catchments: the Mary and Noosa Rivers, with the Noosa River catchment occupying around two thirds of the Shire's area, and Mary River one third, although the Mary River itself is located outside Noosa Shire. The Noosa River catchment can be divided into two main sub-catchments – that of the upper and coastal Noosa River, and that of Kin-Kin Creek and Lake Cootharaba.

The following three catchment areas have been identified as a useful scale and geographic unit upon which to base much of the analysis and discussion for this theme. They are:

- the Mary River (specifically Blackfellow Ck, Skyring Ck and Six Mile Ck),
- the upper and coastal Noosa River, and
- Kin-Kin Creek - Lake Cootharaba.

Figure 4.1 on page 2 illustrates the location and extent of these three sub-catchments.

Figure 4.1 Sub-Catchments of Noosa Shire



4.2 INTRODUCING THE NOOSA & MARY RIVER SYSTEMS

The **Noosa River** is one of the few Queensland rivers which enjoys a year round freshwater flow (many rivers cease to flow in the dry season). It is unregulated, and experiences tidal effects upstream from its mouth to Lake Cootharaba. The river's source is located in the large sand mass of Cooloola sands and escarpment, which lies to the north of Noosa Shire.

Of the entire Noosa River catchment area, 70% is located within Noosa Shire.

The lakes connected to this river system – especially Lakes Cootharaba and Cooroibah – are unique, being the only large coastal lakes in Queensland.

The Noosa River supports regional, national and international ecological values which are derived from :

- Its geomorphic importance as an unusual and largely intact coastal lagoon system;
- A diversity of bed and bank habitat types;
- The range of fish species – some of conservation significance;
- An integral part of the ecology and drainage system of the Cooloola-Teewah section of the Great Sandy Region; and
- Its role in providing regional habitat linkages.

(ES&S 1996 p.22).

The regular occurrence of freshwater flushes are an important element in maintaining the dynamics and characteristics of the Noosa River system, as high rainfall events filtered through sandy systems ensure inputs of clean water.

Aquatic, estuarine and riparian habitats include wetland habitats of sea-grass meadows, mud flats and sand banks, mangroves and saltmarsh-claypan together with wallum swamps and riparian communities of melaleuca, eucalyptus and rainforest associations.

Small areas of seagrass communities are largely restricted to lower estuarine reaches.

The high water quality, diversity of in-stream habitats and largely unmodified condition together support fish habitats of regional importance, with spawning areas for whiting, bream and flathead as well as high levels of productivity generally for fish species – especially in the upper reaches.

The river is unusual in that large areas of its headwaters and upper catchment are protected in an undisturbed, vegetated condition as State Forest or National Park. This has undoubtedly been a key factor in maintaining its outstanding natural values.

The **Mary River** drains a diverse catchment, extending across twelve Shires in total. Only 3% (or 30,926 ha) of its catchment is located within Noosa. Although extensive areas have been cleared largely for agricultural activities, the river supports the Endangered Mary River Cod (protected under State and Federal legislation) as well as 260 flora and fauna species listed under State legislation as Rare, Vulnerable to Extinction or Endangered.

In contrast to the Noosa River, the Mary River catchment has less than 1% of its whole catchment area in National Parks, with a further 35% in State Forests, Timber Reserves and forestry plantations.

The Mary River enters the sea in the Great Sandy Strait, behind Fraser Island.

Recent Condition Assessments - South-East Queensland Estuary Quality

Two recent assessments of rivers and estuaries provide an insight into the status or condition of Noosa River when compared with others in the region and nationally.

The **A rating** was recently awarded to the Noosa River estuary on the basis of comparison with other estuaries in South-east Queensland through initial monitoring undertaken by the Southeast Queensland Regional Water Quality Management Strategy (SEQRWQMS). This rating is the synthesis of many measures of water quality indicators, including turbidity, suspended solids, nitrogen uptake in mangrove leaves etc. All indicated a high level of water quality suitable for sustaining aquatic ecosystems, as well as recreation activity.

Noosa River was the only river in South-east Queensland to attain such a high rating. Others, for comparison are:

Maroochy River	C+	Tweed River	C+
Pine River	D	Mooloolah River	B
Bremer River	F	Pumicestone Passage	B-
Coomera River	C+	Brisbane River	D
Logan River	D	Nerang River	C+

The Mary River system was not rated as part of this study.

National Land and Water Audit Estuary Assessment

A national assessment of estuaries ranked the Noosa estuary as '**largely unmodified**', although some modification has occurred at the river mouth and through urbanisation. It did not attain a classification of 'pristine' – in fact no estuaries in South-east Queensland reached this status.

Of Australia's 970 estuaries, 50% were found to be 'pristine', 22% 'largely unmodified', 17% 'modified' and 11% 'severely modified'.

4.3 ISSUES & PRESSURES

4.3.1 Land Protection

Indicator: % of land in protected tenures per sub-catchment

Land tenure provides a useful indicator for the protection of an effective vegetation cover across the catchment. Although logging can still occur in State Forests, and some DNR Reserves may be cleared for other uses, vegetation cover is more secure than on leasehold and freehold tenures.

Table 4.1 Catchment Areas in Noosa Shire by Tenure

Tenure Category	Upper and Coastal Noosa R ha %		Kin-Kin Ck L. Cootharaba ha %		Mary R ha %		Other ha*
National Park	7,800	27	4,327	16	22	0	0
State Forest	3,128	11	2,484	9	5,233	17	0
Department of Natural Resources Reserves*	2,667	9	237	1	212	1	51
Leasehold	170	1	83	0	125	0	571
Freehold	9,088	32	16,367	62	23,593	76	33
Other**	5,983	20	2,791	12	1,739	6	0
TOTAL	28,836	100%	26,290	100%	30 927	100%	655

* parks and reserves managed by Noosa Council.

** Other includes industrial development, State land, railways, ports and harbours.

 = tenures which provide some protection or security for retention of vegetation cover.

Discussion

Differences in tenure between the three sub-catchments are immediately evident from Table 4.1:

- The low levels of fully protected areas (National Parks) in the Mary River;
- The high level of secured land (47%) in the upper and coastal catchment of the Noosa River;

- The dominance of freehold land as the key tenure type in all three sub-catchments, although this dominance is less pronounced in the Noosa River catchment.

Clearly, achievement of catchment outcomes is assisted by a core of protected, vegetated land.

4.3.2 Vegetation Cover

Indicator: Area of bushland cover per sub catchment

There is a relationship between catchment areas supporting native vegetation cover, and healthy catchments and aquatic ecosystems. Vegetation cover across the catchment is an essential element in the management of erosion, bank stability, water quality and maintenance of ecological processes.

Vegetation clearance is the single most important pressure upon catchment health, as its removal can trigger degradation across multiple attributes, including salinity, erosion, bank instability, decrease in water quality and decline in biodiversity. Therefore, retention of catchment areas' vegetation is critical for the ongoing maintenance of the catchment and hence river condition.

Table 4.2 % of Sub-catchments Supporting Vegetation Cover, Excluding Plantations

	Upper and Coastal Noosa R.	Kin-Kin Ck	Mary R.
% vegetation cover	46%	46%	40%
(1995 vegetation mapping)	12,083	12,314	12,645

Table 4.2 indicates all catchment areas in Noosa Shire have consistent levels of vegetation cover – around the 40% - 46% range. This reflects the substantial area of protected tenures in the Noosa River in addition to the essentially rural character and areas of steep terrain which retain a permanent bushland vegetation cover (Mary River).

Within these three catchments, there are clearly small sub-catchments which are more urbanised, and which have experienced greater vegetation clearing. These will become pressure points for future management of sediment and nutrient loads (refer section 4.5.4 for more discussion).

4.3.3 Riparian Vegetation

Indicator: Area (ha) of riparian vegetation present in riparian buffer areas designated as Open Space – Conservation and Waterway Protection on the strategic plan.

The area of riparian vegetation should not decrease from 'baseline' levels (i.e. 1995 vegetation mapping), with a 'no net loss of riparian vegetation' goal, and preferably a marked increase over time. Overlaying vegetated areas of native vegetation as identified on the vegetation mapping with those areas identified as riparian buffer widths on the Conservation and Waterway Protection designation on the strategic plan gives the following result: 5, 134 ha, or 19.6% of the open space – conservation and waterway protection area supports riparian vegetation.

The presence of riparian vegetation has been extensively documented as critical to river health. It performs multiple functions in the landscape, including filtering of nutrients, stabilizing banks, nutrient cycling for aquatic organisms, in-stream habitat, shade and habitat for a diversity of land flora and fauna species.

Some protection of riparian vegetation has recently been introduced through the *Vegetation Management Act* 1999, with riparian buffers encouraged and in some cases required through the clearing application process.

The maintenance and repair of riparian vegetation can be achieved through support programs to landholders (as in the Mary River catchment), through awareness programs and regulation through the planning scheme or local laws. For Noosa Shire, the planning scheme is an important tool in achieving the retention of riparian vegetation, as it identifies, maps and recommends buffer widths for various types of streams and rivers.

4.3.4 Water Quality

Indicators: Total Suspended Solids (TSS) in the Noosa River estuary

Total Nitrogen Concentration or Loads**Total Phosphorus Concentration or Loads**

The following discussion draws upon a number of studies and surveys assessing water quality which together provide a useful picture of overall trends and condition of water quality in the Noosa River and its tributaries. The most useful indicators of river health lie in biological monitoring, undertaken by the South-East Queensland Regional Water Quality Management Strategy (SEQRWQMS). Selection of appropriate ecological indicators and a specifically designed monitoring program will be in place by 2001. This will provide excellent and robust water monitoring data for an assessment of the health of the river and estuary, as well as indicators to be used in future SoE reports. Further results will be available in 2001, and will set baselines against which changes can be measured.

An additional study important to assessing river health is one of modelling sediment and nutrient loads from various sub catchments of the Noosa River as part of the SEQRWQMS. The development of a theoretical model can be applied and refined over time, which will assist in targeting areas of sediment and nutrient laden runoff. It may be possible to identify areas with high discharges originating from septic and effluent disposal systems. This study will be completed by 2001, and will form useful indicator and monitoring data for future reports.

Studies of water quality available for this report include:

- Summary of the extensive collection of water quality data extending over 25 years (Water Studies 1995).
- Review of recent EPA water quality monitoring data in 7 sites (WBM 2000)
- EPA water quality monitoring reports (EPA 1999)
- Waterwatch data (WBM 2000)
- Water quality data collected as part of the South-East Queensland Regional Water Quality Management Strategy (SEQRWQMS 2000).

A water quality assessment in 1995 (Water Studies 1995) indicates that water quality in the Noosa River is good, with survey data from the EPA and Waterwatch indicating that the ANZECC guidelines for protection of aquatic ecosystems in rivers and streams are generally met. Exceptions are:

- 1 site in Lake Weyba
- 2 sites in Kin Kin Creek. In these locations, readings for total nitrogen were frequently above ANZECC guidelines.
- pH levels, which are lower than what would be reasonably expected for estuarine waters. This suggests some acidic flows have been generated through disturbance of acid sulphate soils. Many readings were lower than the recommended ANZECC guidelines of 6.5, although most of these were between 5.0 and 6.5.

A scoping study of sediment and nutrient loads in the Noosa River (WBM 2000) states that “catchment loads to the Noosa River appear to be the main source of pollutants” and that “there were very few point source discharges located within the Noosa River catchment that impact on the water quality of the river” (Noosa River Scoping Study Report p.12).

Although a detailed follow-up study on nutrient and pollutant loads to the river (completed mid 2001) will contain more specific findings and recommendations, these preliminary findings indicate that the key to managing water quality in the Noosa River is management of water quality from catchment runoff.

Sub-catchments where modelling has identified high sediment/pollutant loads (WBM 2000) include :

- Ringtail Creek;
- Lower Noosa River;
- Lake Weyba;

- Lake Cooroibah; and
- Lake Cootharaba.

These all contribute a greater proportion of pollutants to the Noosa River when compared to their relative area (refer Table 4.3). For example, the lower Noosa River has only 4% of the total catchment area, but contributes 18% of nitrogen and 17% of all phosphorus loads to the Noosa River.

Table 4.3 Nutrient and Pollutant Load of the Noosa River Catchment (estimated)

Sub Catchment	% of Noosa R. Catchment Area	Relative Nutrient Loads % (estimated)		Total Suspended Solids (est)
		Phosphorous %	Nitrogen %	
Ringtail Creek	5	8	10	9
Lower Noosa River	4	17	18	21
Lake Weyba	4	9	11	12
Lake Cooroibah	5	6	7	8
Lake Cootharaba	18	28	14	11
Kin Kin Ck		19	25	21
Total	64%	87%	85%	82%

Source: WBM, 2000

Lake Macdonald Case Study

Lake Macdonald is a shallow lake and the major potable water source for Noosa Shire. The water quality of the lake has been causing concern for many years, indicated by:

- Excessive growth of macrophytes, especially the aquatic weed cabomba
- High levels of manganese at certain times.

Monitoring of a rainfall event over four weeks in 1995 showed that 2.7 tonnes of phosphorus and 20.5 tonnes of nitrogen were washed into the lake. This is equivalent to the median annual nutrient load for this lake. It illustrates the main problem with water quality – the potential for eutrophication (excessive growth of algal and macrophytes) caused by excessive nutrient loads.

Management of inflows of nitrogen and phosphorus will be critical to maintaining appropriate water quality. An aggressive strategy for addressing the cabomba weed problem is also required.

Cabomba Weed

Cabomba (*Cabomba caroliniana*) is a fully submerged aquatic weed prevalent in many east-coast waterways. Infestations appear isolated and confined to relatively few water bodies but potentially, it could impact on waterways from Cape York to Hobart, and from Sydney to Perth.

The large biomass produced by the fast-growing infestations impacts on the capacity of water storages, reduces the water quality and increase the maintenance costs of water delivery systems. The infestations develop as monocultures, reducing the abundance and species richness of aquatic plants and indirectly impacting on associated aquatic fauna. Fishing, swimming and boating are all impeded by the dense biomass to the point of posing as a safety hazard.

Weed control on aquatic environments is difficult, and control options are very limited by social and environmental pressures. Cabomba has been successfully marketed throughout Australia as an aquarium plant but is now restricted in a number of states. The Cabomba genus is declared a P3 weed in Queensland, which means the plant cannot be sold and the plant is to be reduced in numbers and distribution throughout the state where applicable. Mechanical harvesting has been

successfully employed on the lake, resulting in the re-establishment of native aquatic species.

In April 2000, the Queensland Department of Natural Resources brought together the practical experience of industry, community and government to develop the **National Strategy for Cabomba Weed Management**.

Records of sewage overflows into creeks and waterways are kept by Council, with 68 incidents occurring in 1999. The volume of spills is important to interpret possible impacts, with many incidents of a minor nature. Volumes are not always available for each overflow, but the total recorded volume for 1997-8 year was 206 kilolitres.

Of concern is the practice of emptying sewage and greywater into the river from houseboats and other occupied craft. Clearly from aesthetic, health and water quality viewpoints, this practice is unacceptable. Although there has been a requirement since 1991 for all boats to have holding tanks for waste, there is a strong perception that this is poorly enforced, and that the pump-out facilities available are not always used.

4.3.5 Recreational Use

Indicator: Numbers and intensity of motorised recreational activity (data not available)

The natural condition and setting of the Noosa River and the scenic vistas it provides has spawned a flourishing tourism industry and intensive recreation activity. This has generated multiple economic benefits to the Shire, but has also caused conflict between users who value the river's tranquil and natural setting, and those who see it as a resource to be enjoyed for a variety of recreation pursuits.

Concerns have been raised in a number of reports (eg. Queensland Transport 2000, ES&S 1996, NICA 2000) as to unregulated recreation use especially:

- Water-skiing;
- Jetskis;
- Powerboats causing wash and accelerated bank erosion;
- Hire craft and houseboats;
- Fishing(over-fishing); and
- Intensive camping (eg at John's landing).

Increasing concern is noted about recreation uses in the shallow lakes, particularly Lake Weyba and Lake Doonella. Horseriding through seagrass beds on Lake Weyba and net fishing under licence are thought to damage sea grass beds and increase turbidity levels. Undertaking seagrass mapping and monitoring (perhaps as part of the SEQRWQMS ecological monitoring program) will enable trends to be identified and appropriate responses implemented.

In recognition of these concerns, the draft Waterway Transport Management Plan for Sunshine Coast Waterways recommends restrictions and conditions placed upon areas for water-skiing, 'wave jumping', waste holding systems, and occupying boats longer than 7 days, with some activities confined to specific areas. However, this plan has yet to be adopted and implemented, with Noosa Council submitting a number of comments and concerns. It is noted that jetski use continues unrestricted, with unacceptable practices of 'free styling, wave jumping and surfing' on a jetski. This is not consistent with recommendations of the draft Noosa River Plan (ES&S 1996), which recommended restricting jetski use to hire craft only, and to a specific section of the river.

Moreover, it is recognised that jet skis are a significant source of air and water pollution. A two hour ride on a jet ski emits as much pollution as an average car over 22,300km. Older jetskis can have up to 30% of their fuel escaping through the exhaust unburnt into the air and water.

Little accurate or reliable information is available to illustrate the intensity, amount or types of recreation use for the Noosa River, with any records kept by the Queensland Department of Transport based on a regional, rather than specific river basis. There have been no recent surveys on the Noosa River to ascertain usage. Figures from a previous survey (1996) on occupied boats (houseboats and other permanently occupied craft) found over 60 of these vessels on the river, and a total of 210 hire craft of all types. During the period 1998-9, an additional 831 recreational boats were registered on the Sunshine Coast, indicating a 5.6% increase (Queensland Transport 2000 p.5).

The Waterway Transport Discussion Paper (Queensland Transport 2000 p.5) does state that “the section of the Noosa River near Noosaville is one of the busiest waterways in Queensland”.

This significant and highly valued river system has no overall management plan in place to guide and direct decisions regarding recreation and other uses. Construction of jetties, boat ramps, use of hire-craft and motorised water sports occur in a haphazard manner with little coordination between the relevant authorities.

4.3.6 Fish and Fishing

Indicator: Commercial fish catch (kg/annum) by effort (number of fishing boats x number of days boats operated)

Fishing is an important and regionally significant activity on the Noosa River – both for commercial and recreational fishing. The spatial mosaic of diverse structural fish habitats – mangroves, sea-grass, salt couch – which are critical spawning and breeding grounds and habitat for juvenile fish species – make the area highly regarded for fishing. The Noosa River system is still in ‘good’ condition, despite development adjacent to important habitat areas.

Fish Stocks

Generally, fish stocks are diverse, and estimates of increasing, stable or declining stocks are difficult to determine. Part of the reason lies in the migratory nature of fish species. For many, especially sea mullet, their range extends from Newcastle in New South Wales to the tip of Fraser Island. Therefore, changing and cyclical patterns in migratory movement make fish population estimates for specific river systems challenging.

More resident species are bream, whiting and flathead.

Commercial Fishing

Commercial fishing in the river is centred on net fishing for sea mullet, which is a seasonal activity, and beam trawl fishing for school prawns. Estimates suggests that 70-80% of the total commercial fish catch in the Noosa River is sea mullet.

Parts of the Noosa River have been closed to commercial fishing due to incompatibilities with increased recreation use.

School prawns are another important commercial species, with Lake Cootharaba and nearby waters in the Noosa River the most important sites in Queensland. Catches have oscillated between 120 tonnes. to 40 tonnes p.a., with the average being around 70 tonnes p.a. They are captured by small trawlers.

Records maintained by the Queensland DPI Fisheries illustrated in the following graphs show an active commercial fishing industry, as well as some trends in commercial fishing in the Noosa River. Overall fish stocks in the river are unknown, so that no estimate of sustainable harvesting can be made from these figures alone. However the decreasing size of fish catch over the three years from 1995 to 1998 is noteworthy (Figure 4.2 on page 10).

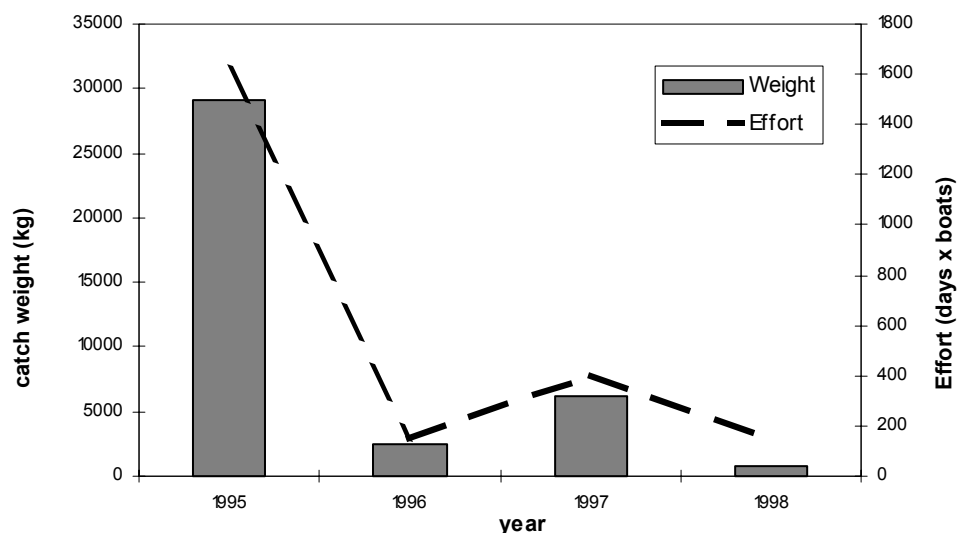
The information available on fishing effort, catch, natural abundance and seasonality of stocks is insufficient to support any estimation of sustainable harvesting levels.

Catch volume and effort (measured by number of boats multiplied by number of days fishing occurred) are closely correlated.

Recreation Fishing

Records are not kept for recreational fishing on the Noosa River. They are compiled on a regional basis, and whilst regional trends can be identified, the level of activity in a particular river system cannot.

Figure 4.2 Total Catch Weight (kg) by Year in the Noosa River



Recent surveys (QFMA, 1999) have yielded the following results

Profile of Queensland Fishers

- 32.8% of Queensland households are "fishing households" – they have at least 1 members who went fishing over the past 12 months
- The Sunshine Coast was the second most popular location in Queensland for saltwater fishing, especially fishing from a shoreline when compared with boat fishing;
- The typical Queensland fisher is a male aged 15-49 years, or a 5-14 year old male or female.
- Only 6.8% went fishing at least weekly, with most fishing once per month (22.2%)
- 1/3 of Queensland recreation fishing households own a boat used for recreation fishing.

There are about 125 000 power boats registered in Queensland for recreational use, with the greatest increase in boat ownership occurring in South-east Queensland. Approximately 70 per cent of these boats are used for recreational fishing at least once a year. The number of unregistered boats used for recreational fishing is unknown.

Australian Bass are a freshwater fish occurring in the upper reaches of the Noosa River of interest to recreational fishermen, as they are not available for commercial capture. While the stock status for Australian Bass is unknown, concern about fishing pressure has led to a bag limit of 2 fish per person being applied to this species. The Noosa River represents the most northern limit of its range, and is also the only part of Australia where they naturally exist in a largely undeveloped and unregulated river system.

There is a perception amongst fishermen that catches have declined over the years, although the accuracy and basis of such perceptions are difficult to interpret.

Important issues still to be resolved for recreation fishers are:

- Implementing restrictions on fishing when fish are most vulnerable to capture. This includes identifying spawning times and locations, with corresponding restrictions on fishing activity;
- Separating fishing and other incompatible recreation uses on the river, to introduce a manageable and sustainable recreational use regime; and

- The possible introduction of bag limits for particular species in the future.

4.3.7 Bank Erosion

Erosion of river banks particularly between Lake Cootharaba and Cooroibah has been well documented (Thorogood 1996, ES&S 1996). Erosive waves from boat wash have been identified as a primary cause, with the design of the boat hull, coupled with boat speed as key contributing factors. At present the section of river directly adjacent to Johns' Landing has a six knot speed limit, but along the rest of the reach the limits is 40 knots.

John's Landing Repairs Underway - by Colin Hastie

One of Noosa's best known picnic and camping spots, Johns' Landing, located on the Noosa River, is undergoing a facelift through a partnership between the Johns' family and Noosa Landcare's Noosa River Bank Restoration Scheme. The Johns family approached Noosa Landcare last year for advice on how to deal with a bank erosion problem at the site, and the result is a revegetation project which covers several hundred metres of river frontage on Cyril Johns' property. The banks of the river are suffering for several reasons, mainly due to the spot having been enjoyed by many people for so long. Over-use by visitors and their vehicles combined with cattle grazing has depleted the site's vegetation, and swimmers and fisherman have trampled scars into the river bank causing erosion.

Another major problem is undercutting of the bank by ever increasing river traffic which constantly batters the banks with waves. Cyril Johns says at least five metres of bank have been lost over the last ten years. Noosa Landcare said the plan for the site had been worked out with the Johns' and involves dividing the site in two and applying different management techniques to the two sections.

Noosa Landcare said "At the first section, (ie the most used and therefore most degraded part), we will be planting several hundred mangroves and about one thousand other species such as blue gums, paper-barks, tuckeroos and lomandras in an effort to stabilise the river bank, the main mangrove species to be planted is the Red Mangrove *Rhizophora stylosa* which has stilt roots and hopefully will prove effective in reducing wave energy, therefore protecting the bank. Natural regeneration will also be encouraged by fencing the site to prevent cattle and vehicle access, and signs will be erected to tell visitors what we are doing, and how they can help. In the second section fencing will prevent vehicle access, but this time we will be allowing limited access for cattle, and more signs will be erected."

These measures will hopefully reduce the damage from visitors, However the boat-wash problem will only be solved through the of co-operation of the many river users who pass by the site. At present the section of river directly adjacent to Johns' Landing has a six knot speed limit, but along the rest of the reach the limits is 40 knots, and the resulting waves are damaging the banks. Landcare have requested signs to be erected facing the river asking people to slow down, in the hope people will co-operate and help reduce the damage.



Bank erosion at John's Landing

4.3.8 Groundwater Extraction

Indicator: Extraction of groundwater from Noosa River headwaters and Catchment

Groundwater extraction in the Noosa River catchment is unregulated and unmonitored. Bores and groundwater extraction do not require a licence and are causing some concern.

The source of the Noosa River is located in the sandmasses of the Cooloola sands which contain extensive reserves of high quality groundwater. The Cooloola coast and other settlements in the area draw upon these reserves for their water supply. The proposed population expansion in this area to around 20,000 from a current population of 4,500 suggests that management of groundwater extractions is required to achieve ecologically sustainable levels. The total annual extraction by Cooloola Shire for the Tin Can Bay areas is 377ML.

In this area, the directions and flows of groundwater are dynamic and changeable, although little is known and documented about the extent of the reserves. Anecdotal information suggests changes are occurring in the behaviour of reliable freshwater springs in recent years. This could indicate more widespread alterations to the groundwater resource.

Groundwater extractions in the lower reaches of the river by pumps to service rural residential properties or 'hobby farms' are thought to be proliferating. Again, no reliable data are available to track any increase. Links between cumulative groundwater withdrawals and decreased surface water or river flows have been well documented elsewhere in Australia.

4.3.9 Stormwater Management

Indicator: Completion and Implementation of the Urban Stormwater Quality Management Plan.

Urban areas and rapid urban expansion in Noosa have the potential to generate high pollutant loads into waterways through surface runoff after rain – a trend which is well documented in other urban areas. Pollutants including suspended solids, eroded soils, oil, grease, animal faeces, food waste, and toxic chemicals all find their ways into waterways via the stormwater system.

In recognition of this problem, all local governments which have an urban stormwater system are required to develop Urban Stormwater Quality Management Plans as a requirement of the Environmental Protection (Water) Policy (1997). Section 42 requires Council "to prioritise the plans and determine a timetable for developing and implementing such plans".

Issues requiring consideration include links to catchment management and land use planning, reduction of contaminants, maximising infiltration and reducing ecological impacts on receiving waters.

The stormwater plan for Noosa Shire is yet to be developed, but the process has been initiated. The State Planning Policy establishes a timeframe of June 2002 for commencement of implementation of USQMP's.

Other initiatives employed by many local authorities include labelling all stormwater inlet points with the name of the river or waterway to which they drain – to raise community awareness that they actually connect to valued river systems. This practice is occurring in Noosa Shire.

4.3.10 Impacts of Extractive Industry

The location of extractive industry at Johns Landing close to shores of the Noosa River and Lake Cooroibah has been the cause of community concern regarding unauthorised dumping of waste, water contamination and the potential for water pollution of nearby water bodies.

These activities are subject to a licence under the *Environmental Protection Act 1994*; it is unlawful to operate such an activity without one. The licence agreement requires a site based management plan, outlining strategies implemented on the site to address a range of issues, including stormwater management, noise, dust, and reporting. The site operations must comply with conditions set for surface water/ stormwater quality, control of airborne emissions and potential noise sources.

These requirements are in place to ensure this and similar operations do not degrade the integrity of the Noosa River.

4.3.11 Catchment Management

Indicator: Progress in implementation of Noosa and Mary Rivers Catchment Management Plans

Management of catchments is essential to river health; any problems with river quality often reflects inappropriate activities and mismanagement in the wider catchment.

Noosa Shire is fortunate to have large areas of the catchment under protected tenure, which generally secures vegetation cover.

Catchment Management Plans have been developed for both the Noosa and Mary River catchments by the relevant catchment co-ordinating committees. Both documents are soundly grounded with community support, and have a consultative, positive tone which is deliberately inclusive of all land holders. They are essentially voluntary based documents, as there is no legislation in Queensland requiring catchment management plans.

It is important therefore that Council, the Department of Natural Resources demonstrate support and intent to achieve the planning objectives developed from wide ranging consultation with community groups.

Many of the issues highlighted in the plans have also been identified in this chapter.

Although there is considerable potential for development (particularly rural residential development) in Noosa, the Shire's Strategic Plan provides timely and justified constraints regarding catchment management, given the issues of slope, effluent disposal, land capability and suitability.

There is therefore limited capacity under existing planning measures for more intensive development from rural uses to occur. However, the potential does exist for more intensive types of rural landuse to emerge, with specialist horticulture crops, sugar cane and 'boutique' animal husbandry (eg llamas) to replace the more traditional rural pursuits of dairying, grazing and mixed farming. Whenever land use change occurs, potential exists for land management to either improve or degrade the health of river systems.

Assessment of the effectiveness of catchment management processes can be made by monitoring progress as to the extent of implementation and the benefits achieved as a result.

4.3.12 Community Involvement

Indicators: Effective involvement of the community in catchment management activities initiated by the Noosa and Mary River Catchment Management Committees.

Noosa Integrated Catchment Association (NICA)

The Noosa Integrated Catchment Association was formed in 1996.

NICA's committee represents 22 sectors of the community. Its role is becoming more pro-active as it moves towards implementation of the Noosa River Catchment Management Strategy.

After three years of consultation with a broad cross-section of the local community, a draft strategy was produced. The primary focus of the plan is the protection and improvement of the Noosa River's A minus "A-" water quality rating via various collaborative on-ground projects.

The Association's office is situated within walking distance from the Noosa River, thanks to the strong support of the Noosa Council. It aims to maintain and build upon this relationship so that a collaborative approach to natural resource management issues within the Shire and catchments is possible.

The NICA conducted a series of "community consultation workshops", "information gathering field days", and "strategy development workshops", and made several media releases.

The culmination of this process has seen the collation of a truly representative document. As well, a series of cooperative on-ground projects have been undertaken which have included "Boatwash Awareness Signs", Catchment Road Signs, a Stormwater Runoff Trial, Stormwater Awareness Signage, Mangrove Restoration and soon, a Riparian Revegetation Demonstration Project as part of the SEQRWQMS process.

Mary River Catchment Committee (MRCC)

The Mary Catchment was chosen for inclusion as one of five pilot areas for the State Integrated Catchment Management program. This choice was on the basis of flooding, severe stream bank erosion, land degradation and rapid land use changes within the catchment.

MRCC presently comprises community and industry membership including: grazing, beef; landcare, irrigation, dairying, horticulture, environment, sugar, timber, education, extractive industry, farm forestry, commercial fishing, and the general community. Government membership comprises Cooloola Shire Council, Tiaro City Council, Maroochy Shire Council, Environmental Protection Agency, Department of Primary Industries and the Department of Natural Resources.

The MRCC has developed a Catchment Management Strategy for the whole catchment. Key issues were identified through community and committee workshops. The Catchment Management Strategy includes Implementation Plans. Meaningful consultation will continue to shape the Strategy.

Effective involvement by the catchment committees includes on-farm demonstrations, involvement in research, planning, landuse and policy bodies or committees, and production of useful educative material.

A River Ranger program has been successfully adopted by Maroochy Shire Council and NICA is currently managing a trial river ranger project in the Noosa River. The trial is supported with funding from Noosa Council and SEQRWQMS.

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

- Biological indicators of aquatic ecosystem health. These are often the most reliable guide as to the condition of the river system, as they reflect combined impacts of water quality, water flows, in-stream habitat, species imbalances and other changes. These indicators and benchmark assessments should be available through SEQRWQMS in 2001.
- The impact of discharges from septic systems in rural areas on water quality in river systems.
- Nutrient and pollutant loads from various diffuse sources, including runoff from urban and industrial areas, acid sulfate soils runoff, agricultural runoff in Kin-Kin catchment etc.
- Reliable data on recreation activities – their intensity and frequency.
- Groundwater extractions – the rate, amount and potential implications.
- Estimated fish stocks in the Noosa River and information on the volume of stock taken through recreational fishing. An estimate of sustainable fishing levels cannot be assessed without such information.
- Pollution impact from jet skis and 2-stroke motors.

4.4 SUMMARY REPORT CARD AND INDICATORS

4.4.1 Summary Report Card

OVERALL CATCHMENT, RIVERS AND LAKES REPORT CARD			
Condition Assessment	Reasons	Pressures Assessment	Reasons
A	- Indicators show river estuary in good condition - Healthy aquatic habitat evident - Appropriate water quality to support sensitive ecosystems - Active catchment groups	Moderate	- No overall plan for the Noosa River implemented - Urban development and land-use intensification occurring in catchment – incremental impacts on river likely - Potential for cumulative impacts from septics and other water based disposal systems - Increased recreational pressures on river and lakes - Potential increase in groundwater extraction in headwaters and catchment
Key Issues The Noosa River has received an 'A-' condition rating on a recent assessment for waterways in South-east Queensland. It has good water quality which meets ANZECC guidelines for aquatic ecosystems, low nutrient concentrations as well as indicators of robust aquatic health through seagrass and mangrove areas. Much of this has been achieved through protection of the river headwaters and other areas in National Parks, State Forests or as Fish Habitat Reserves. Warning signs are present that retention of this rating into the future will become increasingly difficult. The future challenge will be to maintain current benchmarks of water quality and river health derived from the South-East Queensland Regional Water Quality Management Strategy. Key pressures which are the targets for action are: *** Nutrient and sediment loads from rural sub-catchments (Lakes Cooroibah, Cootharaba, and Ringtail Creek, Kin-Kin Creek) through vegetation clearing and land use change to more intensive forms of land use. *** Nutrient and sediment loads from stormwater in urbanising catchments (lower Noosa River, Lake Weyba, Ringtail Creek). *** The impact on water quality of discharges from septics and water based disposal systems (still undetermined). ** Extraction of groundwater at headwaters and in rural/rural-residential areas. ** Increasing recreation use with resulting social conflict and degradation of sections of the river through bank erosion, poor effluent disposal, littering and vehicle damage and possible pollution from 2-stroke engines. Level of Priority and Urgency *** highest ** * lowest			

Implications

The good level of water quality at present is a reflection of low levels of development, extensive vegetation cover, large areas protected in National Parks or State Forests and sandy geology in the catchment.

Increasing development in Noosa and the intensification of many rural land uses implies that water quality will deteriorate unless active measures are taken. The historic reasons for achieving good water quality assessments apply to a decreasing extent into the future as the cumulative effect of increasing clearing and development occur.

4.4.2 Indicators

Indicators of rivers and catchments which have been selected provide insights as to the five critical parameters of river health:

- River flows;
- Water quality;
- In-stream aquatic ecosystems;
- Catchment (including riparian) condition; and
- Recreational use.

Table 4.4 Summary of Catchment, Rivers & Lakes Indicators and Indicator Status

Indicator	Indicator Type Pressure, Condition, Response	Assessment
Land Protection		
☐ % of Mary River catchment in protected tenure		18%
☐ % of Upper Noosa catchment in protected tenure	R	26%
☐ % of Kin-Kin Creek catchment in protected tenure	R	47%
Water Extraction		
☐ Total extraction of groundwater from Noosa River headwaters	P	377ML p.a. (1999) for Tin Can Bay
Water quality (indicators based upon SEQRWQMS monitoring for Noosa River estuary)		
☐ Total Suspended Solids	C	7.33 mg/L average (2000)
☐ Total Nitrogen concentration	C	15uM (2000)
☐ Total Phosphorus concentration	C	1 uM (2000)
☐ Ecological measures of estuarine water quality	C	Indicators to be specified and monitoring will commence in 2001.
Area of Bushland per Subcatchment:		
☐ % (and ha) of Mary River catchment vegetated	C	46%
☐ % (and ha) of Upper Noosa catchment vegetated	C	46%
☐ % (and ha) of Kin-Kin Creek catchment vegetated	C	40%
Riparian Vegetation		
• Riparian buffer areas designated as Open Space Conservation – Waterway Protection supporting native vegetation	R	20,964ha (78.8%)
Recreational use		

Number and intensity of motorised water-craft (boats, jet-skis) using the river in a selected number of stretches.	P	Not available
Fish and Fishing Commercial fish catch (kg) per annum for Noosa River	P	794 kg (1998)
Catchment Management Progress in the implementation of Noosa and Mary River Catchment Management Plans	R	Underway
Stormwater Management Completion and implementation of the Urban Stormwater Quality Management Plan	R	Not yet completed
Community Involvement Effective community involvement by the Noosa and Mary River Catchment Groups	R	

4.5 TOWARD ESD: ACTION PLAN FOR RIVERS & CATCHMENTS

The health and sustainable use of Noosa Shire's river and estuarine systems are essential to the economy, landscape aesthetics, lifestyle and ecological health of the Shire.

Degradation or unsustainable use of these systems is simply not an option for Noosa, as the repercussions would permeate many facets of its environmental, social and economic wealth. Sustainability for the Noosa and Mary River systems involves maintaining freshwater inflows and environmental flows, the diversity and populations of aquatic ecosystems, and a water quality which allows enjoyment of swimming and recreational pursuits compatible with a significant and valued natural resource.

Action is needed on a number of fronts to:

- Address important information gaps which will assist in identifying the nature, extent and severity of perceived problems, and the scope and urgency of resulting action; and
- Initiate responses to known issues and problems.

Pressures, condition and responses to managing the health and amenity on or within the river channel itself lie very much with State agencies, which is reflected in the following response and action plan.

National and State Frameworks

National Principles for the Provision of Water for Ecosystems 1996

Australian and New Zealand Environment and Conservation Council and the Agricultural and Resource Management Council of Australia and New Zealand released a set of nationally agreed principles to provide policy direction to deal with the issue of provision of water for environmental purposes. The goal is to provide water to sustain, and where necessary, restore ecological processes and biodiversity of water-dependent ecosystems

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (draft) 1999.

Guidelines for setting water quality targets to sustain identified environmental values of natural and semi-natural marine and freshwater resources in Australia and New Zealand. The six environmental values are:

- Aquatic ecosystems;
- Aquaculture and human consumers of aquatic foods;
- Agricultural water;

- Recreation and aesthetics;
- Drinking water; and
- Industrial water.

National Wetland Policy 1997

A national set of principles, objectives and policies to guide wise use of wetlands in Australia.

Strategy for the Conservation and Management of Queensland Wetlands 1997

A framework to guide State agencies responsible for wetland management, and to encourage and assist landholders for sustainable management of wetlands under their control.

The following action plan for catchments, rivers and lakes involves both Noosa Council and many State agencies. Many of the river recreation and river health issues are within the jurisdiction of the relevant State departments, or are being addressed by specific initiatives.

A key response for the Noosa Shire is to assess the findings and recommendations from the ecological health monitoring programs and loads and impacts study commissioned by SEQRWQMS, and to take appropriate action.

4.5.1 Action Plan

Action	Responsibility	Comment
Adopt and implement the amended Waterways Transport Management Plan for Sunshine Coast Waterways	Q'land Transport	Important to provide an integrated and consistent framework for managing the river and its uses.
Develop and adopt an overall plan for the Noosa River, which clearly articulates a vision and objectives.	GT/EPA/NSC/DNR /DPI	The current draft Noosa River Plan is a useful basis.
Initiate a system of appropriate records together with a survey of recreational activities and intensity in appropriate sections of the Noosa R.	Q'land Transport NSC	This will produce information on which to track trends and develop appropriate guidelines.
Monitor groundwater and surface extractions in the Noosa River headwaters and lower catchment to develop an assessment of sustainable groundwater extraction.	DNR	To provide information relevant to planning of new residential communities around Rainbow Shores, Rainbow Bay, Tin Can Bay.
Monitor the results of the SEQRWQMS studies and address the impact of effluent discharge from septic and water based effluent disposal systems on the Noosa River	SEQRWQMS NSC	This study will be completed in 2001, and will provide input to sediment and nutrient loads into the Noosa River, as well as ecological monitoring data. Implementation of recommendations will require resources from NSC.
Develop a refined set of ecological indicators to form the basis of an ongoing monitoring program to assess and monitor Noosa River health.	SEQRWQMS	Indicators and baseline data available in 2001. Substantial monitoring data should be available for the next SoE report.
Include as part of the ecological monitoring an indicator to assess recreational impacts in the shallow lakes. Sea grass mapping would be a likely indicator.	SEQRWQMS	Consideration of this issue included in the study, currently underway - SEQRWQMS.
Investigate capacity for monitoring Volatile Organic Compound (VOC) levels from jet skis.	EPA, NSC	

Action	Responsibility	Comment
Improve water quality from urban stormwater outlets draining into river systems.	NSC	Urban Stormwater Quality Management Plan to commence by 2002. Implementation timetable needs to be examined and progress monitored for next SoE report
Support catchment, waterwatch and landcare groups for the following initiatives: • River Ranger program • Implementation of Noosa River Catchment Management Plan • Bank rehabilitation	NSC NHT & Government funding The community	
Catchment groups initiate recording of their activities and achievements for future SoE reports.	Mary R. CCC NICA	To develop a catchment health score card.
Advancing progress toward the listing of the upper Noosa River wetlands as a RAMSAR listed site (wetland of international importance)	NSC	This area was nominated in 1997 by NSC. The outcome of this nomination is currently unknown.
Develop more accurate estimates of fish and prawn populations and sustainable harvesting levels.	DPI	

