

5. THE COASTAL ZONE

5.1 INTRODUCTION

Noosa's coastal zone is the setting for a number of its natural icons and prominent features. The Noosa Heads section of Noosa National Park, Main Beach, the North Shore and eastern beaches are all widely recognized and appreciated for their magnificent scenery, significant biodiversity, recreation experiences and generation of economic benefits from tourism.

The areas boasting some of Noosa's most important natural values - the Noosa River estuary and its adjacent coastline - are also the setting for the most intensively settled and visited areas in Noosa. Noosa Heads section of Noosa National Park itself experiences greater than 1 million visitors per annum, which generates sizeable economic benefits and other spin-offs. It generated \$26 million for the Noosa economy in 1998 (Pearson 1999).

The boundary of Noosa's coastal zone can be determined in different ways. This report adopts the definition used in the *Coastal Protection and Management Act 1995* as *"coastal waters and all areas to the landward side of coastal waters in which there are physical features, ecological or natural processes or human activities that affect, or potentially affect the coast or coastal resources"*.

Under this definition, Noosa's coastal zone includes the Noosa River estuary and associated lakes as well as beach and headland areas. This area is shown on Figure 5.1.

The pattern of settlement on Noosa's coastal zone and consequent impacts on the natural environment range between the undeveloped areas north of the Noosa River and developed areas located to the south. In the latter area, residential development and intensive recreation use of beach areas have resulted in impacts from stormwater runoff, weed invasion, changed fire regimes, and nutrient enrichment in waterways.

The relatively good condition of the Noosa River estuary largely reflects this historic pattern, with difficulty of access and the extensive National Park system providing protection for large areas of the coast and coastal rivers.

Peregian Beach was the overall winner of the Sunshine Coast EPA Clean Beach Award, and also came second in Queensland. Sunshine Beach was the Sunshine Coast winner for the litter-free section of this competition.

5.2 DESCRIPTION

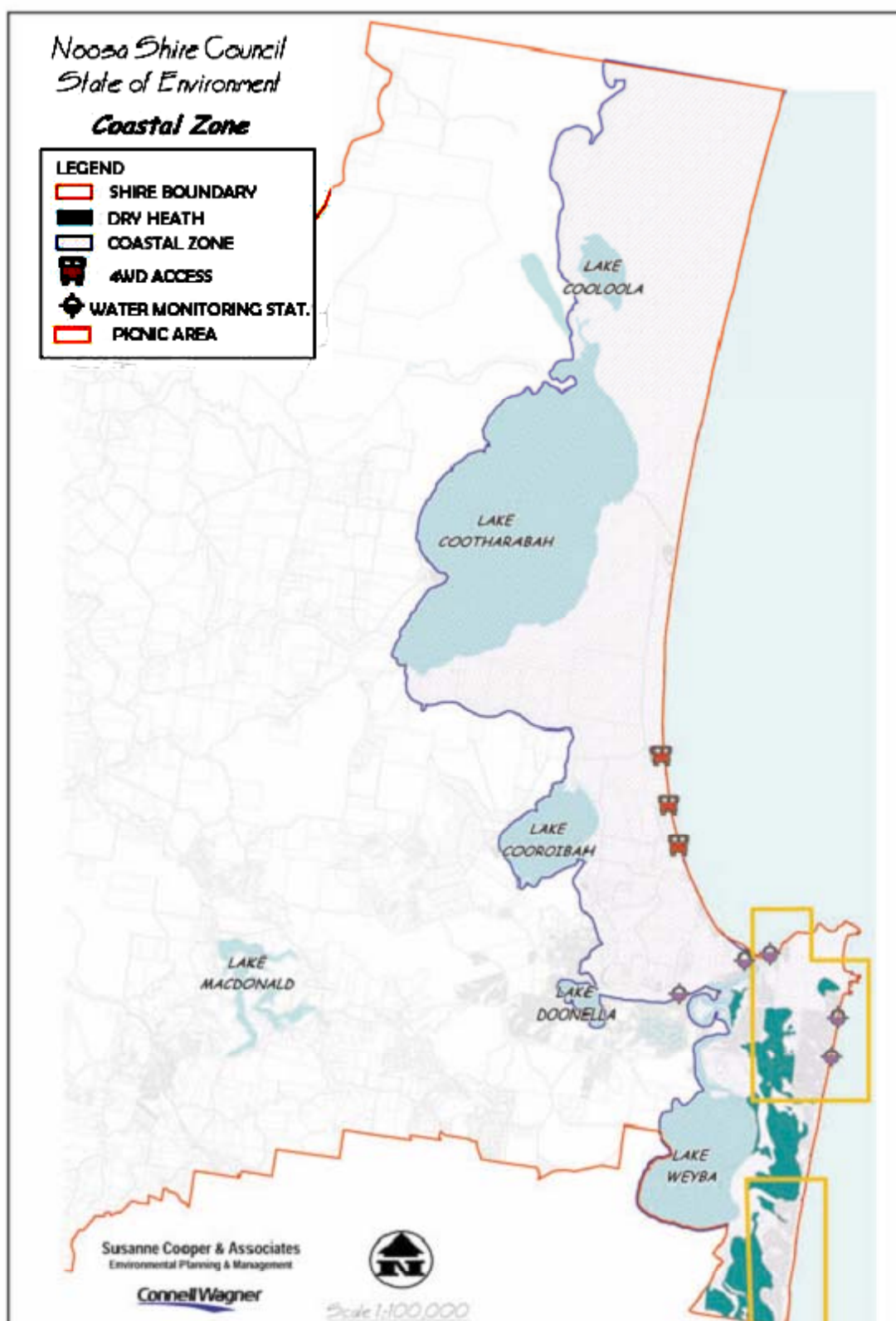
The Noosa coastline supports a mosaic of distinctive landforms, from the sweeping surf and sand dune formations along the 'North Shore' and the complex estuarine habitats of the Noosa River, to the prominent headland of the Noosa Heads section of Noosa National Park and the eastern beaches.

The geology of the coastline underpins this landscape diversity, with much of the area on sandplains originating in the Quaternary age (92 million years ago), parabolic high dunes (2 million – 10,000 years ago) to sandstones of the Triassic-Jurassic age (248-144 million years ago) which form parts of Noosa Heads.

Noosa Heads is geologically diverse, with a mix of Quaternary sand and sandstone with some igneous intrusions. The intrusions are more resistant to erosion, and therefore have formed prominent rocky points interlaced with sheltered beaches.

This contrasts with the deep peat beds adjacent to the coastal dunal system extending to the southern Shire boundary which adds to the floristic diversity along the coastal zone.

Figure 5.1 Noosa Coastal Zone



The environmental significance of many areas within the coastal zone is widely recognized. Various mechanisms protect several areas.

National Wetland Inventory

This identifies wetlands of national importance. The wetlands of the Noosa River, including Lake Weyba, described as a 'spectacular system of freshwater, brackish and saline lakes, marshes, heathlands and estuarine wetlands associated with the Noosa River. They have unique vegetation and fauna.

Declared Fish Habitat and Wetland Areas

These are mechanisms employed by the Queensland Fisheries Service (QFS) to protect important fish habitat. The following areas are protected in Noosa, where modification of the natural habitat is prohibited:

- *Wetland Reserve*: Lake Doonella; and
- *Fish Habitat Reserves*: Lake Weyba, Weyba Creek and most of the Noosa River, its tributaries and its lakes between the mouth and Harry's Hut.

National Parks

Noosa and Cooloola National Parks (protected areas under the *Nature Conservation Act 1992*) together occupy 18.5% of the Shire, with their location strongly focused along the coastal zone.

5.3 ISSUES & PRESSURES

5.3.1 Coastal Erosion

Indicator: *Cubic Metres of Sand for beach replenishment*

Beach erosion has been an ongoing and high profile issue for Noosa. Two areas are declared as 'Erosion prone' under the Coastal Management Act. Figure 5.1 on page 2 shows the location of these areas.

Main Beach

Main Beach has been experiencing accelerated erosion since 1967-8, when construction of extensive coastal development coupled with major storm events created pressure to make structural changes to the coastline. This was undertaken in order to reduce potential erosive damage to newly constructed residential estates. The resulting structural alteration of the spit adjacent to the Noosa River estuary generated changes in the wave energy and sediment transport patterns. This fundamentally altered the coastal dynamics around Main Beach and the Noosa spit, which had been relatively stable until this point.

The coastal processes operating in this area are complex, with interactions between the headland, prevailing wind patterns, sea floor topography, episodic storm events, wave action and tidal/river flow patterns in the Noosa River estuary.

The problem of erosion along the seaward margins of the Noosa Sound development close to the mouth of the Noosa River in the 1960's prompted changes to the river estuary. This was achieved through the construction of a filled groyne in the 1970's to alter the river's channel and direct wave energy away from Noosa Sound and its newly constructed houses.

This was successful in controlling the erosion threat at Noosa Sound, but had the unintended effects of :

- Changing the pattern of beach sand deposition along Main Beach in response to the depleted supply of sand and changes in wave patterns;
- In-filling of the estuary entrance and re-alignment of channels within the river;
- Irregular and unreliable inputs of beach sand to replenish Main Beach;
- Erosion caused by incoming waves not being fully aligned to the beach and hence having greater potential for erosion. This is pronounced in periods where sand reserves on the beach have been depleted, thus accelerating the problem.

Clearly the beach and estuary systems are closely linked. Following the construction of the groyne, problems of sand and beach erosion and sediment transport have been ongoing, and well documented by a series of studies and technical reports. Approximately 80,000 cubic metres of sand is supplied to the beach every 2 years through beach nourishment programs. This is not thought to be a long term solution due to the continual extraction of sand from the river estuary, and alternatives are now being investigated.

Table 5.1 Changes to the Noosa River Estuary

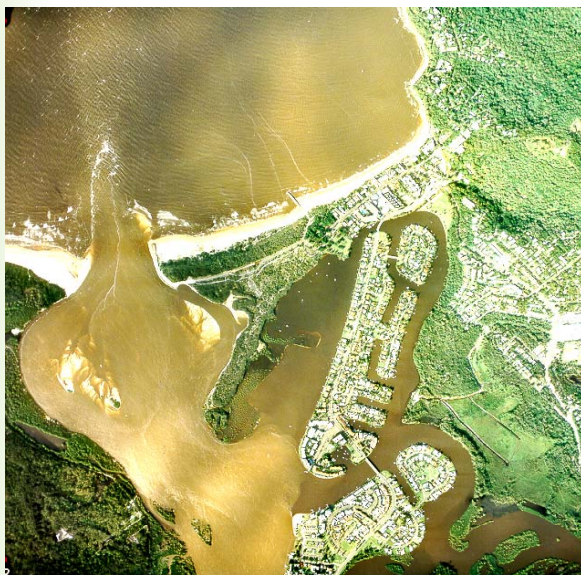
The following photographs illustrate the progressive changes to, and dynamic nature of the river mouth.



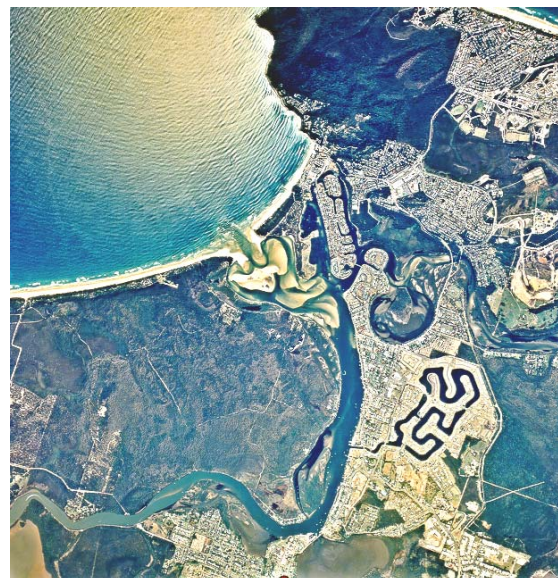
May 1978, during construction of Noosa Sound Canal Estate



October 1978, showing construction of the spit and changes underway in the river mouth



Noosa River in flood, February 1992. Note the water colour, the vegetation regrowth on the spit and changes to sandbars near the river mouth.



October 1997. A broader aerial view showing shifting sand bars of the Noosa River mouth, the protected North Shore and the increasingly modified nature of the southern side of the estuary

Realistic options for stabilization of sediment transport and reduction of erosion along the beach area are now focused toward:

- Constructing a submerged barrier which will change wave alignments and decrease wave energy around the Main Beach area and
- Realigning the rock wall along Main Beach to be more sympathetic to the coastal dynamics causing sand erosion and deposition.

5.3.2 Estuarine Health of Noosa River Estuary

Indicators: Area of seagrass

Area of mangroves

Water quality (suspended solids)

Estuarine benthic fauna

(see also Chapter 4 – Rivers and Estuaries)

Mangroves and seagrass have critical roles in the absorption of nutrients, stabilisation of river banks, providing habitat and food sources for fish as spawning grounds for a wide variety of fish species. Seagrass growth requires adequate light penetration through the water column. Its depletion is a useful indicator of increasing turbidity due to soil erosion or algal growth caused by excessive nutrient levels. Stable or regenerating areas of seagrass and mangroves are useful indicators of a healthy river system.

The dynamic nature of sandbanks around the river mouth and the erosion problem along Main Beach initiated the commencement of dredging in the 1980's to replenish intertidal areas along the Noosa Spit. A survey of the impacts of dredging on benthic fauna of the estuary and Fish Habitat Area has recently been undertaken. Preliminary results are available, and suggest that:

- Dredging has lead to changes in the nature of sediment, which has changed the nature of the benthic habitat and lead to a loss of habitat diversity;
- There have been no significant impacts on the abundance of crustaceans (eg crabs) as a result of dredging; and
- Significant changes are evident in the abundance of some polychaete worms and bivalve molluscs. These are important elements of the diet of estuarine fish and crustaceans.

The survey (Skilleter 1999) suggested that the impacts noted in dredged areas could extend into adjacent Fish Habitat Areas, and further work is currently underway to assess this. Results should be available by late 2001 and give further rigour to initial survey findings.

The results may have the following implications:

- Modifications to, or possible cessation of the dredging program; and
- Further targeted monitoring which will assess the rate and level of rehabilitation and recolonisation by benthic fauna of previously dredged areas. Possible indicators may be identified which can be used in future reports to monitor estuarine health.

5.3.3 Coastal Creeks

Indicator: Viable populations of Honey Blue-Eye and Oxleyan Pigmy Perch fish species

Several small creeks drain the southern coastal area of Noosa Shire. These five coastal wallum creeks do not drain into the Noosa River, but form part of the distinctive coastal wallum landscape along the southern beaches. They include Burgess, Castaways, Sunshine, Peregrine and Marcus Creeks. They have the similar ecological characteristics of acidic waters flowing through wallum and coastal wet heath vegetation. Protection of their significant species will also require protection of the coastal heath communities in the wider catchment. This has largely been achieved for Marcus and Castaways Creeks through the Marcus Beach Development Control Plan and Lake Weyba National Park. Their values and features are summarised below (Arthington, 1994, Noosa Council 1995):

Marcus Creek Particularly important for rare flora and fauna, with 2 significant fish and 3 significant frog species. The Honey Blue-eye fish is listed as Vulnerable and protected by State and Federal legislation. It is only known from coastal areas between Brisbane and Bundaberg. The Oxleyan Pigmy Perch is considered vulnerable to endangered.

Marcus Creek is one of only 4 known creek systems to support populations of both these species.

Three species of 'acid frogs' are also found here. These species are restricted to acidic, relatively undisturbed coastal wallum areas. They are Wallum Froglet, Cooloola Tree Frog and Wallum Tree Frog.

Castaways Creek Supports populations of the rare fish species Ornate Rainbow Fish.

Some impacts from development noted through slightly elevated phosphorus levels.

Burgess Creek A disturbed creek system with high levels of phosphorus, excessive growth of *Typha spp.* which is indicative of high nutrient status, and evidence in some locations of bacterial / algal slime.

The exotic mosquito fish was evident in many locations. Other fish fauna have not been fully assessed.

These features are not characteristic of a 'healthy' creek flowing through wallum vegetation. In particular, nutrient levels (especially phosphorus) are higher than background concentrations. Some effluent from the sewerage treatment plant flows into the creek.

Marcus and Castaways Creeks could be taken as reference points to assess the more degraded Burgess Creek. The maintenance of in-stream habitat quality is critical for conserving viable populations of the rare fish and frog species. Periodic targeted monitoring for the presence of these species would be a straightforward and inexpensive task, possibly undertaken by a community group with some initial training. A study of Burgess Creek is now being undertaken as required by the EPA.

Extensive urban development taking place in these catchments (except in the southern areas) places a high level of pressure on the maintenance of significant fish and frog species, and the distinctive characteristics of these acidic coastal creeks.

5.3.4 Recreational Use of Beaches

Indicators: Control of recreational access to beaches

(no. of controlled access points to beaches)

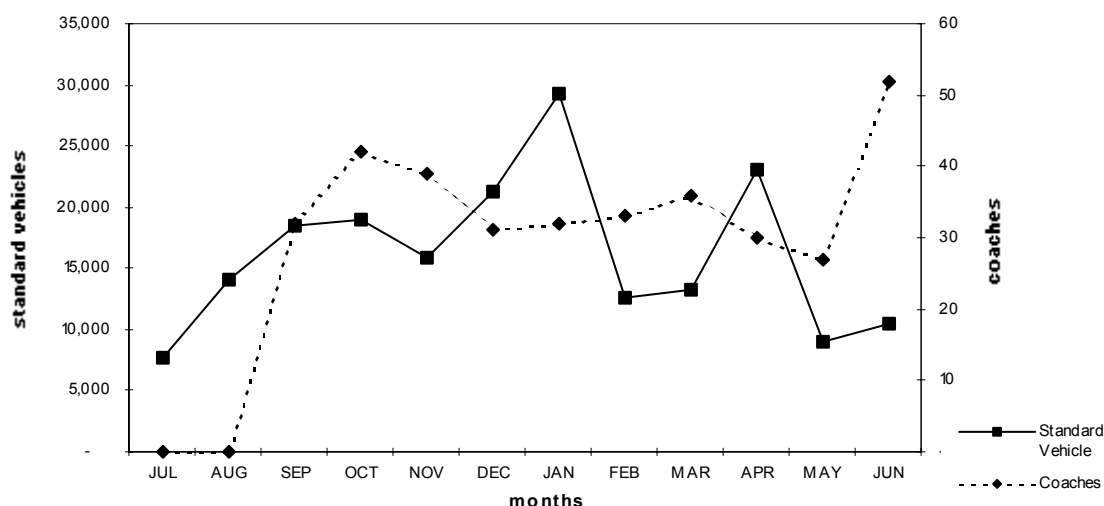
Number of vehicles crossing the Noosa River to the North Shore

There are currently 13 formal, public pedestrian access points formed by timber walkways, stairs or boardwalks along Noosa beaches. All were constructed post 1991. These access points are shown on Figure 5.2 on page 7. In addition, there are numerous informal access places.

Four wheel drive entry points onto beaches are limited to three sites, indicated on Figure 5.1 on page 2. They all occur just north of Laguna Bay.

Figures for vehicles making ferry trips across the Noosa River to access sites on the 'North Shore' in 1999-2000 indicate an annual total of 193,887 'standard vehicles' (excluding motorbikes, resident ratepayers and workers cars) as well as substantial numbers of tour buses (2,810). The seasonal pattern over 1999-2000 is shown below.

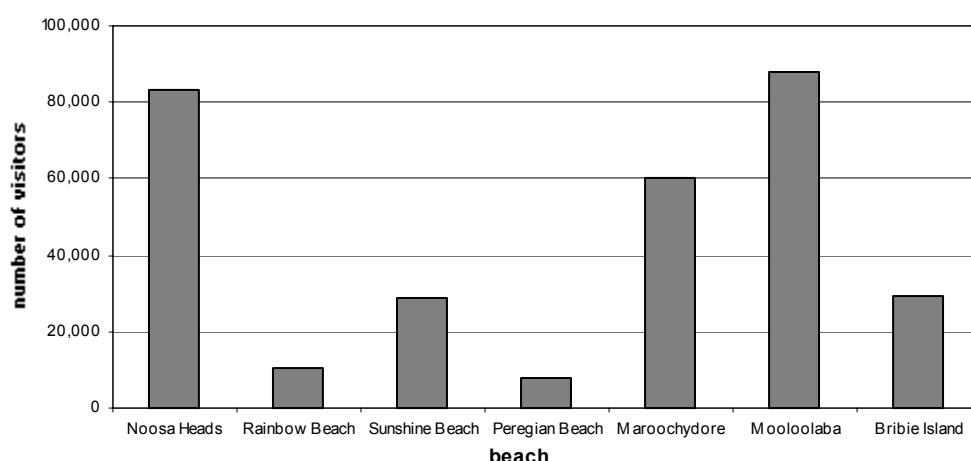
Figure 5.2 Seasonal Volume of Select Forms of Transport Using the Noosa River Ferry (1999-2000)



The seasonal pattern of use is also instructive, as it indicates pressures which are placed upon beach resources in peak periods – particularly over the Christmas holidays.

Figure 5.3 shows the popularity of Noosa's Main Beach (over 80,000 visitors) compared with others on the Sunshine Coast.

Figure 5.3 Number of Visitors to Beaches of the Sunshine Coast 1999-2000



There are currently no permits required for 4WD access to the northern beaches. Increasing use suggests more active management will be needed. The EPA is establishing an information booth on the Tewantin side of the Noosa River at the ferry crossing. This is an ideal opportunity to introduce permits for 4WD access, as it will be staffed 7 days a week, and provide permits for National Parks on the north shore.

5.3.5 Biodiversity Values

Indicator: Area of dry coastal heath

Coastal heath vegetation is naturally restricted to low nutrient sandy soils in coastal locations. The naturally small areas of this vegetation type in Noosa Shire have been depleted through extensive clearing for coastal development in the region. Dry coastal heath has been accorded an 'Endangered' status within Southeast Queensland under the recent conservation assessment review (Sattler and Williams 1999). Although considerable areas of wet coastal heath occur along the coast, areas of dry coastal heath are much more limited.

Although areas of this vegetation type are protected in the Noosa and Cooloola National Parks, significant pockets remain on unprotected lands in Noosa Shire. Its presence is therefore a useful indicator for protection and management of an increasingly rare coastal ecosystem. It only occurs in small areas in Noosa Shire, and in 2000, consisted of 311 hectares (Burrows 2000). The 1993 area of 337 ha indicates a loss over the 7 years of 26ha, or 8%.

The location of this dry coastal heath is shown on Figure 5.1 on page 2.

5.3.6 Recreation Water Quality on Beaches

Indicator: Number of events which exceeded ANZECC water quality guidelines for primary contact (swimming).

Suitable water quality on beaches is essential for recreation enjoyment and human health. In recognition of this, stormwater drains discharging onto beach areas that are used for swimming are subjected to a monitoring program conducted jointly by Council and the EPA. The monitoring program measures faecal coliforms, which are an indicator of biological sources of pollution that could cause health problems. Faecal coliforms are a common measure to indicate presence of faecal matter in water bodies, with the potential for harmful bacteria and viruses. The guideline for swimming water is a median count less than 150 E coli/100mL water.

Five outlets in Noosa Shire are being monitored, with water samples taken from near the drain outlet and from the adjacent swimming area (refer Figure 5.4 on page 9). All swimming areas complied with the guidelines, although water quality at two drains indicated problems. These were thought to be caused by road construction and soil disturbance (Gympie Terrace), and faecal matter from birds and dogs (Lions Park). The monitoring also indicates that in dry periods, water quality is acceptable, with the problems occurring only after rainfall events.

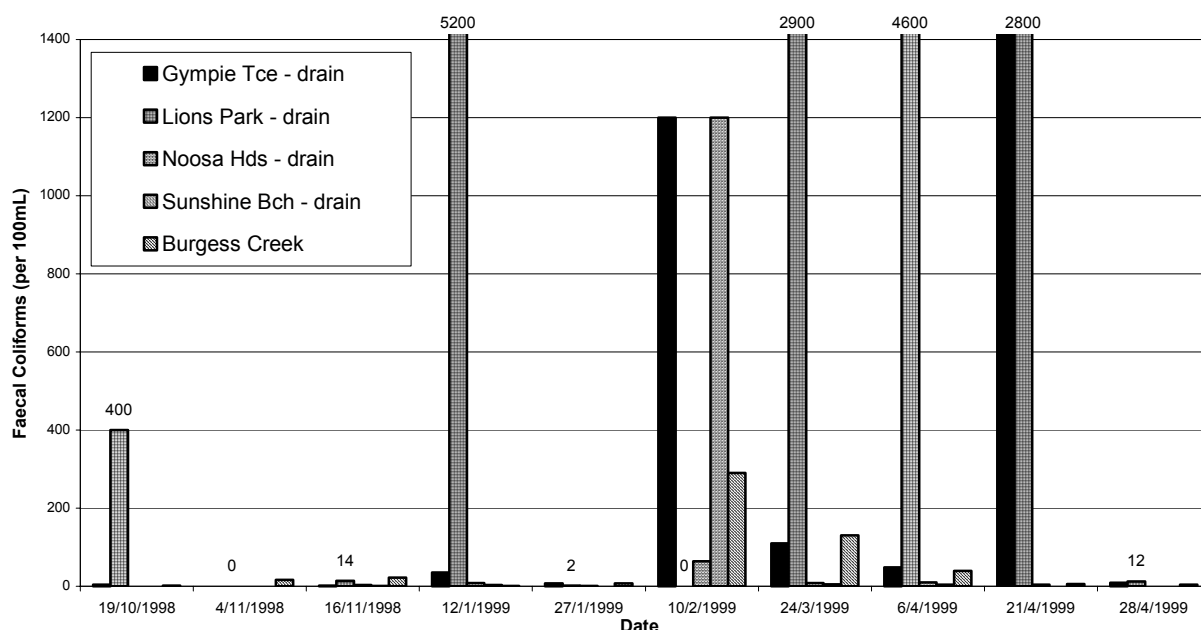
5.3.7 Commercial Fishing

Indicator: Catch weight of fish (kg) by effort per annum

Current Trends

A recent review of rocky reef fish (snapper, pearl perch, ruby snapper, flame snapper, southern fusilier, rosy jobfish, gold band snapper, teraglin) in Queensland waters (QFMA 1998) found a continuing and marked decline in the size of the snapper catch from an average weight of 1.8-2.7kg prior to 1960 to less than 1kg in 1996. Small fish increasingly make up a high proportion of the total snapper catch.

Figure 5.4 Faecal Coliform Concentrations



Stocks of snapper are considered to be over-fished and there are concerns about declining stock size and over-fishing of below size fish. Snapper is used as an indicator species as it is the most commonly caught species by offshore recreational fishers, and the most sought-after fish.

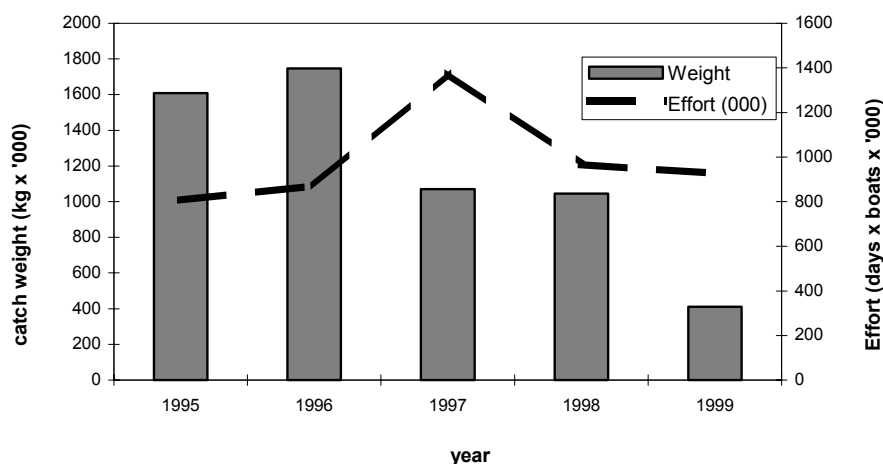
However, these trends are also evident for a range of other rocky reef fish species, mainly due to increases in population, boat ownership and access, participation rates in offshore fishing and advances in technology (QFMA 1998).

Overall, there is concern about the heavy exploitation and sustainability of offshore rocky reef fish stocks. Data specific to the Noosa locality is not available. The findings from the report indicate the issues outlined above extend along the Queensland coast, and are not confined to a specific location.

The following information concentrates on commercial fishing in the ocean areas off the Noosa coast.

Figure 5.5 shows the trend in the volume of fish caught over the past five years (data collected by the QFS). Total fish catch (all species) for 1999 was 411,334 kg. 'Effort' was calculated by number of boats multiplied by the number of fishing days.

Figure 5.5 Total Catch Weight (kg) by Effort- Commercial Fishing 1995-2000



An emerging trend in recent years is for an increasing gap between catch and effort, with 1999 showing a smaller catch for a higher effort.

Table 5.2 Catch weight (kg) of Indicator Species (QFS)

TOTAL	1995	1996	1997	1998	1999
Crab & Mudcrab	128,696	101,101	162,483	136,713	112,843
Prawn	132,037	57,248	50,248	33,812	88,022
Shark	676	5,790	3,635	1,532	5,483
Snapper	1,627	1,287	3,375	3,087	1,346
Whiting	1,093,295	1,224,425	526,606	304,681	6,782
Mullet	158,565	215,245	128,107	251,527	139,955

As discussed in Chapter 4, estimation of the total fish stocks are not available due to limited data for the area, lack of knowledge of individual species coupled with the mobility and migratory habits of fish. The information above does not necessarily indicate any significant decline in fish stocks. Sustainable levels of commercial and recreation fishing are difficult to derive without information on total fish stocks.

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

- Ecological assessment and monitoring of the Noosa River estuary which will provide further base-line data, as well as a more accurate assessment of its condition.
- The effectiveness and long term sustainability of possible solutions to address the erosion problem along Noosa Main Beach.
- The sustainable level of fishing pressure that can be applied to fish stocks in the estuaries and offshore areas of Noosa.

5.4 SUMMARY REPORT CARD AND INDICATORS

5.4.1 Summary Report Card

OVERALL COASTAL REPORT CARD			
Condition Assessment	Reasons	Pressures Assessment	Reasons
B-	- Indicators show Noosa River estuary in good condition against a range of ecological performance indicators - Small area of beach erosion - Coastal creeks degraded by surrounding development although still support significant fish species - Dredging of, and modifications to Noosa River estuary	Moderate	- Large areas protected as National Parks - Increasing recreation use of beaches and coastal National Park - Development around estuary and catchment will increase pressure on estuary condition - Effects of adjacent development (drainage, fire, weeds) on sensitive coastal ecosystems. Eg dry heath, coastal wallum creeks - Water quality of swimming areas which occasionally do not meet water quality guidelines - Impacts from development on coastal acid creeks

Although current condition is good, and the large areas in National Park set a secure base for management into the future, warning signs are present that maintaining this rating into the future will become increasingly challenging.

Key pressures which are the targets for action are:

- *** Nutrient and sediment loads from stormwater in the wider catchment degrading water quality, aquatic ecosystems and fish habitat.
- ** Unacceptable water quality from urban stormwater drains discharging onto beaches and into coastal creeks and National Parks.
- ** Maintaining the wallum creeks to the south which are in good condition.
- ** Reviewing the dredging program at the estuary due to impacts on benthic fauna.
- * Increasing recreation use with resulting social conflict and degradation of the north shore dunal areas through vehicle use on beaches.

Level of Priority and Urgency

*** highest ** * lowest

Implications

Continued dredging to replenish sand along popular beach areas is likely to impact on benthic fauna, and in turn affect the diverse fish and crustacea species which inhabit the estuary.

Water quality of popular swimming areas is only a problem on occasions after rain, but remains a human health risk.

Development adjacent to sensitive coastal ecosystems (coastal wallum creeks, dry heath) will place pressure on their condition and diversity, particularly through high nutrient levels. Conservation of the rare fish species currently inhabiting the creeks is a challenge given this scenario.

Maintaining the condition of the estuary, which underpins recreation use, fishing and general quality of coastal areas requires action linking to land management and water quality.

5.4.2 Indicators

Indicators have been selected to reflect crucial elements of the health of the coastal zone.

These include indicators from the areas of:

- Estuarine ecology (overlap with River and Catchment indicators)
- Water quality (overlap with River and Catchment indicators)
- Marine fishing
- Coastal vegetation
- Recreational use.

Table 5.3 Summary of Coastal Indicators

Indicator	Indicator Type <i>Pressure, Condition, Response</i>	Assessment
Coastal Erosion		
☐ Volume of sand for Main Beach replenishment	P	80,000m ³ 1997-1999
Estuarine health of Noosa River Estuary		
☐ Area (ha) of sea grass	C	1,352 (1995)
☐ Area (ha) of mangroves	C	368 (1995)
☐ Benthic fauna recolonisation to be decided after study completed)	C	n/a

Coastal Creeks ☐ Viable populations of Honey Blue Eye and Oxleyan Pigmy Perch species	C	Present (1994)
Recreational use of beaches ☐ Number of controlled, formal public pedestrian and 4WD access points to the beach ☐ Number of vehicles crossing Noosa R to the North Shore.	P P	Pedestrian = 13, 4WD = 3 (2000) 193,887 (standard vehicles, 1999) 2,810 (tour buses, 1999)
Biodiversity Values ☐ Area (ha) of dry coastal heath as mapped by Burrows 2000 and Olsen 1993	C	311 ha (2000) 337 ha (1993)
Recreational Water Quality ☐ Number of times ANZECC water quality guidelines for primary contact were exceeded per year on drain outlets on swimming beaches	P	4 times (1999)
Commercial Fishing ☐ Volume of commercial fish catch in off-shore waters (extends up to $\frac{1}{2}^{\circ}$ latitude off-shore) by unit effort	P	411, 334 kg = total catch 1999 5553 = total effort 1999

5.5 TOWARD ESD: ACTION PLAN FOR COASTS

The coastal zone in Noosa is the setting for many icon sites – icons of environmental, recreation and tourism significance. Sustainable management needs to address:

- Water quality – especially in swimming areas;
- On-going monitoring of biological indicators – estuarine and marine ecosystems and species;
- Physical coastal processes (beach erosion); and
- Public access and recreation use.

Noosa is extremely fortunate that most of the coastal zone lies within protected areas or national parks. The potential for inappropriate development and use is therefore considerably reduced, although land use in the whole Noosa River catchment will eventually impact upon water and ecological values at the estuary. Recreation pressures could also place increased pressure on the coastal zone in the future.

An action plan for the coastal zone must incorporate protection of both the Noosa River headwaters and the coastal areas. It is also essential that the planning scheme for Noosa continues to afford undeveloped areas protection from inappropriate development.

Indications are that previous development and disturbance in the coastal zone have had far reaching repercussions on the appearance of Noosa's beaches. Although the estuary is currently assessed as "healthy and in very good condition", the cumulative impact from recent development may be currently unrealised. These impacts could be quickly manifested in the future causing a decline in water quality or coastal ecosystems.

The next phase of the Southeast Queensland Regional Water Quality Management Strategy will deliver further baseline data on the health of the estuary. It is important that current actions are reviewed for relevance and priority in the light of results from these investigations.

Policy and Legislation Framework

The federal government has a *Coasts and Clean Seas* policy.

The *Coastal Protection and Management Act* (1996) provides for Coastal Control Districts to be developed within regional coastal management plans. Noosa is within the Wide Bay region. A regional plan is timetabled for mid 2001 which will identify key sites requiring special management. The State Coastal Management Plan is currently in draft form.

The *Vegetation Management Act* (1999) protects Endangered regional ecosystems. Any further clearing of dry coastal heath would therefore require a permit under this Act.

The coastal zone action plan includes actions for Noosa Council and the State government. It covers biodiversity, recreation and human health issues.

5.5.1 Action Plan

Action	Responsibility	Comment
Initiate works at Main Beach to reduce beach erosion and stabilise this part of the coast.	NSC EPA	Preliminary studies completed
Address drains discharging onto beaches as a priority in the forthcoming urban stormwater management plan.	NSC	Commencement planned for 2001.
EPA to establish a beach permit system for 4WD's crossing the Noosa River to enable monitoring and management of recreation use.	EPA	A new information station is planned for this site, and this should be incorporated as part of this service.
Review actions when the next phase of monitoring is completed (SEQRWQMS and the estuarine benthic survey)	NSC	Continued involvement with the SEQRWQMS is important to keep abreast of ongoing monitoring and results, and to maintain strong local input. Studies likely to be completed by late 2001.
Monitor rare fish species (Honey Blue-eye and Oxleyan Pigmy Perch) in all coastal creeks as an indicator of healthy aquatic habitat.	NSC	Assistance from the EPA may be available, as they are listed species under state and federal legislation.

