

Ballina Coastal Reserve Plan of Management

Volume 2

Background Information

Resources and Values

Appendices



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INTRODUCTION

The NSW North Coast Crown Reserve Management Strategy emphasises a value based approach to Coastal Reserve management which aims to protect and enhance the intrinsic values of the area.

This section describes the social, recreation, cultural heritage and environmental values of the Ballina Coastal Reserve area. The study area includes the beaches, headlands, parks, dune and hind dunes and foreshores down to low water mark, within Crown Land.

Coastal Reserves and vacant coastal Crown Land occupy 18 kilometres of Ballina's northern coastline, covering an area of approx. 320 hectares. The area represents a significant 85% of all land east of the Coast Road from the Richmond River to the Shire's northern boundary at Seven Mile Beach. The reserves contain a diversity of sensitive and dynamic landscapes and natural systems, and are strongly valued for their recreational opportunities for residents and visitors.

1. PHYSICAL ENVIRONMENT

1.1 *Climate*

Ballina is situated in the Richmond Catchment in northeast NSW and has a warm temperate climate, with wet summers and mild dry winters. Temperatures range from 19° to 27°C and rarely exceed 32°C. Maximum temperatures occur from December to March, and minimum temperatures from June to August. March is usually the wettest month, and August the driest. The Richmond Catchment is one of the wettest areas in NSW, and has some of the most intense and erosive rainfall in NSW. (Morand, 1994). Average rainfall fluctuates between 1600 and 1700 millimetres per year, with the highest falls in summer (November to April) (Anderson, 1999 cited in Erskine, et. al., 2001). The prevailing wind is from the southeast, however there are strong northerly winds throughout the summer months.

1.2 *Coastal Soils, geology and geomorphology*

Ballina Coastal Reserve is bounded by the North wall of the Richmond River in the south and Ballina Shire Council boundary in the north. There are four main landscape types along the Ballina Coastline - beaches, headlands, alluvial & estuarine deposits, and the sand sheets or sandplains. Nearby Broken Head forms the oldest rocks of the area. These are Palaeozoic age rocks of the Neranleigh-Fernvale group. The Tertiary age Lamington volcanics, consisting predominantly of basalt, overlay these metasediments (Morand, 1994).

The headlands between Lennox Head and Ballina are basalt outcrops resulting from lava flows from the Mount Warning Shield Volcano. The lower Richmond River Catchment is an accumulation of Quaternary alluvium (Morand, 1994). The sediments that have accumulated in the Richmond River estuary have created a mature infilled barrier-type estuary (Roy cited in Earley, 1996).

Ballina Shire beaches are predominantly Quaternary (Holocene) beach and dune sand, except for Boulders Beach which is dominated by rounded basalt small boulders and stones. The beach, foredunes and most of the hindunes are deep siliceous and calcareous sands (Morand, 1994). Lighthouse beach is a recently accreted landform, occupying the original Richmond River mouth. Prior to the construction of the northern training wall, the river mouth was very mobile and transient, part of a broad meandering marine tidal delta forming the mouth of the Richmond River (Readford, cited in Erskine, et. al., 2002).

Boulder beach is bounded by basalt headlands; basalt boulders cover the beach, with the only significant sand deposit on the northern half of the beach. Boulders become more rounded with distance from the southern headland. The southern cliff face at Boulder Beach is being undercut through physical and chemical weathering processes. (Walsh cited in Erskine, et. al., unpub.).

The Newrybar Sand Plain north of Lennox Head adjacent to Seven Mile Beach is a Pleistocene beach ridge plain containing siliceous sands. Lake Ainsworth, located south of the sand plain, is a freshwater coastal lowland dune lake consisting of aquifer fed water trapped above a layer of impervious coffee rock. Groundwater to the west of the lake flows to the Newrybar Swamp (AWACS, 1996). High recreational use and blue green algae is an issue for Lake Ainsworth and these issues are addressed in the Lake Ainsworth Plan of Management.

1.3 Coastal Erosion

Beaches and dunal profiles are subject to continual change in response to wave and wind energy, tides and currents. Many parts of the beach including dunes are also prone to water and wind erosion, particularly where sand is exposed and lacking a protective vegetation cover. Erosion can result in overall loss of dune stability, blowouts (often aggravated by inappropriate or unmaintained accessways), and significant loss of sand.

Beach and dune erosion is an issue for much of the East Coast of Australia. Destructive storm events on the eastern seaboard most recently occurred during the 1960's and early 70's. Erosion of coastal landforms can present a significant threat to existing public and private property impacting on recreational and development opportunities, scenic quality and wildlife habitat values (NSW Government, 1997).

The threats of beach erosion and long-term coastal recession at Lennox Head village have been addressed by Council's Lennox Head Beach Management Plan that was substantially implemented in 1993, and is now the subject of further investigation under the Ballina Coastline Hazard Definition Study.

At Boulder Beach, a part of the foredune is eroding at its southern end near the old carpark area. Some soil erosion is evident on parts of the exposed upper headlands at Lennox Point (Shag Rock), Iron Peg and Skennars Head. The soil types there are of basalt origin, are easily eroded when exposed, and prone to slippage due to the steepness of slope and proximity to the cliff edge.

Ballina Shire Council is currently addressing coastline hazards along the whole of the Shire's coast through the Ballina Coastline Hazard Definition Study. The study will define those hazards that potentially impact on existing and future development and infrastructure along the Ballina Coastline, and evaluate them in the context of future planning needs.

2. ECOLOGICAL ENVIRONMENT

Ballina Shire Coastal Reserve is a unique coastal environment which exhibits a high level of plant and animal species diversity. The ecological features of the area are valued in many ways, including intrinsic, cultural, environmental, economic, aesthetic and recreational.

The Ballina coastal area forms part of the Tweed-Morton Bioregion. The Far North Coast of NSW is regarded as one of the highest areas of biodiversity in Australia. This diversity in species and habitats can be attributed to the unique geological and climatic conditions of northeast NSW. The area contains species of both temperate and tropical origins that may reach their southern or northern distributional limits respectively. The diverse vegetation types in the reserve include; coastal dunes, littoral rainforest, heathland, sclerophyll forest, wetlands, and woodlands. These vegetation types provide habitat for a diverse number of

native animal species and their populations. Some species are specifically reliant on the habitat types that occur in the reserve.

In addition to the value of high biodiversity, the maintenance of natural processes and ecosystem function is important for air and water quality, nutrient cycling, soil stability and pest control. A healthy ecosystem provides a sound basis for ecological sustainability and sustainable use.

The significant ecosystem values of the Ballina Shire Coastal Reserve have been threatened by the impacts of past and present human activity, which include sandmining, vegetation clearing, uncontrolled use and access, introduction of exotic plant and animal species, and adjoining urban / tourist development. These impacts have led to habitat fragmentation and degradation, endangerment of species, a decline in biodiversity, erosion and threats to water quality.

2.1 Terrestrial Flora

The vegetation in the Ballina Shire Coastal Reserve is broadly classified into Littoral Rainforest, Coastal Banksia, Heathland, Coastal Cypress, Melaleuca Swamp Forest, Dune Vegetation, Wetlands and Disturbed areas following a preliminary study by DLWC (2000). The natural condition of the vegetation varies greatly from highly disturbed (especially weed infested) to relatively undisturbed. Large portions of undisturbed heathland and wetlands occur in the Newrybar Sandplain, as well as Banksia forest and heathland vegetation west of Flat Rock Tent Park. A map of vegetation types over the study area have is provided in Appendix G.

Littoral rainforest is a form of sub-tropical rainforest that occurs close to the sea. It may grow on beach sands, quartz rich sediments and soils derived from a range of rock types (Floyd, 1990). In the reserve the main rock type is basalt, which forms a red clayey soil and at times is shallow and rocky. The areas of littoral rainforest are floristically distinct and comprise three main types: : Tuckeroo, Brushbox and Lilly Pilly associations (DLWC, 2000). Littoral Rainforest at Boulders Beach is protected by a State Environmental Planning Policy Number 26 (Littoral Rainforest) and is listed on the Register of the National Estate, due to the rarity of its form and species composition (Erskine, et. al., 2001).

Tuckeroo dominated littoral rainforest occurs at Boulders Beach, on Lennox Headland, on the southern end of Angels Beach, in small remnants in the vicinity of Shag Rock, and to the north of the road at Flat Rock. There are also remnants at Black Head, Ocean Parade North of the overpass, and on the hill slope north of Compton Drive, Shaws Bay. Brush Box associations occur on hillsides near the Ballina Lighthouse. Lilly Pilly Associations occur along the Coast Road near Boulder Beach (DLWC, 2000). All of these remnants are threatened by fire and weed infestation , in particular from invasive weeds such as Bitou Bush, Asparagus Fern, Lantana, Fishbone Fern and exotic grasses. A Restoration Plan which has been prepared for Boulders Beach Rainforest Remnant, and Angels Beach, provides a basis for rehabilitation works.

Coastal Banksia Forest occurs in exposed areas, where salt spray and on-shore winds ensures a wind shorn canopy.; This occurs at the north-east end of Lighthouse Parade, on the hillside west of Flat Rock Tent Park, and north of the Car Park at Lennox Head. In more protected areas Coastal Banksia Woodland occurs. Examples of this are seen adjacent to the open space along Compton Drive, southwest of Norfolk Street and northwest of Hindmarsh Street East Ballina, and near the Anglican College, Black Head. Coastal Banksia Woodland occurs next to the Coast Road near Skinners Head Road and in the Boulders Beach area (DLWC, 2000). Where fire is excluded and canopy closure of Coastal Banksia occurs, littoral rainforest species colonise (Gilmore, 1983, cited in DLWC, 2000).

Coastal Cypress Pine occurs in Richmond Park and on Pine Avenue, however is in fairly poor condition. Although Coastal Cypress communities are locally and possibly regional significant

they are poorly conserved and have a limited distribution on the North Coast, being near the southern distributional limit (Griffith, 1993, cited in DLWC, 2000). Coastal Cypress Pine is threatened by clearing, weed invasion, particularly by garden escapees and rubbish dumping.

Melaleuca Swamp Sclerophyll Forest occurs in the vicinity of Shelley Beach Road, Flat Rock and on the Newrybar Sandplain north of Lake Ainsworth (DLWC, 2000). This community is recognised for its high conservation value and is threatened by weed invasion, urban runoff, dumping of green waste, an inappropriate fire regime, clearing for development, and clearing of protective vegetative buffers (DLWC, 2000).

The **foredune vegetation** communities of Ballina Shire Coastal Reserve are dominated by Bitou Bush, an environmental weed introduced from South Africa and in many areas planted on the dunes following sand mining for rapid soil stabilisation. Local Dunecare groups in cooperation with DLWC, Local Council staff, and weed control authorities, have made significant progress in controlling Bitou Bush and replacing it with native vegetation.

Dunal vegetation leeward of the foredune (as seen along the coast south of Flat Rock and north of Lennox Head) has a higher diversity and is structurally more complex than that of the foredunes. Species present include Coastal Banksia, Coastal Wattle and Coastal Tea Tree. Pedestrian access in these areas increases the edge to area ratio and encourages further weed infestation.

Heathland communities occur throughout the Ballina coastal area and vary in both floristics and structure, the best example being the low heath on the Newrybar Sand Plain. The major threat to heath communities is an inappropriate fire regime, particularly frequent fires.

Wetlands surrounding the Boulders Beach rainforest, south of the Flat Rock Tent Park, and in several sites near Lennox Head, are dominated by Cumbungi and Paperbarks. Wetland communities exist in areas subject to periodic or frequent inundation and where the water table is higher. Threats to this community are hydrological changes, urban encroachment and runoff, and weed invasion. A Vegetation Management Plan has been prepared for the Boulders Beach Wetland to address threats to the conservation of this wetland.

A large part of the Ballina Shire Coastal Reserve is disturbed and has been colonised by exotic grasses, and weeds, largely as a result of past grazing activities, frequent fires and sand mining (DLWC, 2000). Highly disturbed areas occur between Flat Rock and Lennox Head. Between Lennox Head and Skinners Head, littoral rainforest occurs only as remnants in a disturbed landscape. These pockets of littoral rainforest provide stepping stones for wildlife in an otherwise degraded landscape, and could form the basis of an ecological corridor between more intact areas.

A list of plant species for Angels Beach was compiled by Consultant Peter Parker for the Angels Beach Cycleway Assessment (BSC 2001). A list of flora and fauna in the Angels Beach and Flat Rock areas was compiled by the Angels Beach Dunecare and Reafforestation Group (2000), and a list of native plants and weeds is provided in Vegetation Management Plans developed for most coastal communities within the Reserve (EnviTE 2002).

Threatened Flora is protected under the Threatened Species Conservation (TSC) Act 1995. Recovery Plans under the TSC Act will be prepared over time for species shown in Appendix E. These plans will offer a range of management actions to protect and increase the populations of threatened plants in the Reserve area.

Other threatened species that may occur in the Ballina Coastal Reserve include *Phaius tankervilleae* (Swamp Orchid), *Psilotum complanatum* (Flat Fork Fern), *Pterostylis nigricans*, and *Xylosma terrae-reginae*. Other significant species occurring on the Ballina Coast are listed in the native Vegetation report compiled for the study area.

The Ballina Shire Coastal Reserve forms an almost continuous strip of vegetation. Although previous land use activities and practices have led to a high degree of habitat fragmentation along the coastal fringe (BSC, 2000a), there is potential to link areas of remnant vegetation, building on existing programs and efforts aimed at ongoing restoration and enhancement planting of native species. For example, the area between Flat Rock and Lennox Head would function well as a wildlife corridor continuous to the Broken Head Nature Reserve in the north and Richmond River Nature Reserve in the south.

2.2 Terrestrial Fauna and Habitat

The vegetation communities of the Ballina Coastal Reserve are floristically and structurally diverse, high in habitat value, and support a range of dependant fauna. As previously detailed, these vegetation associations are classified into Littoral Rainforest, Coastal Banksia, Heath, Coastal Cypress, Melaleuca Swamp Forest, dune vegetation, wetlands and disturbed areas (DLWC, 2000).

Whilst no comprehensive fauna study has been undertaken for the Ballina Shire Reserve, detailed lists of fauna existing (or likely to exist in the area) have been provided through a number of sources - NPWS, through its Wildlife Atlas, a species compiled for the Angels beach Cycleway project (Parker 2000), and a fauna list compiled by Angels Beach Dunecare and Reafforestation Group (2000).

A list of threatened fauna species within the Coastal Reserve, protected under the Threatened Species Conservation Act, 1995 is provided in Appendix E.

Littoral rainforest is of high conservation value, very diverse, poorly conserved, hosts many threatened species, and has a high level of endemism (supporting many species unique to that area). It is important habitat particularly for frugivores (fruit-eating) animals, and leaf litter, bark and epiphyte foragers. Birds utilise littoral rainforest areas for feeding, resting and roosting. Mammals, reptiles and amphibians are present in the understorey particularly where there are habitat features such as logs, rocks, leaf litter and water.

Coastal Banksia and heath is of high conservation value, extremely diverse, and is poorly conserved. Heathlands are particularly important to nectivorous species such as birds and bats.

The Melaleuca Sclerophyll swamp forests are important communities for nectivorous and frugivorous birds, as well as ground dwelling and arboreal mammals. Wetlands areas dominated by Melaleuca and Cumbungi provide important habitat for reptiles and amphibians.

2.3 Shoreline Habitat

Shore bird habitats in Ballina Coastal Reserve include beaches, rocky shores, and around the edges of Lake Ainsworth and wetlands. Shorebirds essentially have three main requirements: access to suitable feeding, roosting and breeding grounds. Some species are residents, others migratory. The Ballina coastline is important for migratory wildlife which are protected by Federal conservation agreements with Japan and China under the *Environment Protection and Biodiversity Conservation Act, 1999*. These agreements are the Japanese and Chinese Australian Migratory Bird Agreements, Jamba and Camba. Of the 30 species of migratory shorebirds commonly occurring in NSW, all are listed in either Jamba or Camba, most of them are in both (Rohweder, 1991). In order for these international agreements to be honoured, migratory shorebirds need to be managed on the Ballina Coast.

Flat Rock is utilised regularly by migratory and non-migratory shorebirds and is significant because it provides a diversity of habitat unavailable within the estuary. Also, the proximity to Angels and Sharps beaches enable birds that use Flat Rock to also feed on these beaches (Rohweder, 1991). The uniqueness of the habitat of Flat Rock, and the proximity of nearby

beaches, ensure that Flat Rock is an important feeding ground. The migratory shorebirds that commonly utilise the habitat are Red-necked Stints and Ruddy Turnstones. Flat Rock is the preferred feeding ground of the Ruddy Turnstone and Sooty Oystercatcher (Rohweder, 1991). Flat Rock also provides a vital roost for such species as Ruddy Turnstones, Sooty Oystercatchers, Red-necked Stints and Crested and Little Terns (Rohweder, 1991).

Disturbance to nesting birds, harvesting and collection of organisms from rock pools, and dogs on Flat Rock and Sharps and Angels beaches have an impact on the shorebirds of Flat Rock. Key threatening processes applicable to the Ballina Coastline are predation by foxes and feral cats, clearing of native vegetation, habitat modification, and high frequency fire resulting in disruption to the life cycle of flora and fauna (BSC, 2000a).

Species Recovery Plans have been prepared for the Red Goshawk, Little Tern, and Mitchell's Rainforest Snail (BSC, 2000a). These plans identify management strategies and actions to enhance the survival of the species. These plans and any relevant Threat Abatement Plans, which address key threatening processes, require consideration in the management of the Ballina Coastline.

Native fauna habitat can be significantly adversely affected by human disturbance such as sandmining, urbanisation, vegetation clearing, pest species predation (including domestic pets), and weed invasion. These disturbances impose threatening processes, and reduce the habitat values and ecological function of coastal ecosystems.

The protection and enhancement of habitats in Ballina Coastal Reserve requires will require an integrated approach, addressing threatening processes, restoration of degraded habitats, creation of wildlife corridors, and education and awareness programs about wildlife and habitat values.

2.3 Intertidal habitats

The intertidal zone of Ballina Coastal Reserve consists of sandy beaches and rocky shores, including reefs and platforms. The intertidal zone hosts a diverse range of species due to the overlap between sub-tropical and temperate zones; thus there is a mix of species comprising the ecotone. The intertidal ecology is dependent on physical features such as tides, solar radiation, wave action, rainfall, aspect and sediment movement. Biological factors determining habitat are the physical and chemical requirement of the species, and the timing and pattern of reproduction and predation (BSC, 2000c).

Two prominent features of the intertidal zone of Ballina are the rock platform at Flat Rock, noted for its shorebird populations, and the rocky intertidal reef at Lennox Head. The intertidal reef at Lennox Head is a sheltered shallow and accessible marine area with diverse marine organisms. The reef is to be included in the proposed Marine Park for Byron Bay between Lennox Head and Brunswick Heads. This type of reef is poorly conserved in the current marine reserve system (MPA, 2001). Management of this area will require consultation and cooperation with the Marine Parks Authority.

Other smaller but significant rocky shores occur at Iron Peg, Shelley Beach, and to a lesser extent at exposed parts below Lennox Headland, Skennars Head and Black Head.

The intertidal zone provides shore protection from storm activity. Species that live on sandy shores tend to be cryptic. A range of worms, molluscs and crustaceans inhabit the sandy shore, unlike the distinct and prominent zonation of marine organisms and seaweeds of the rocky shore. Although there is no comprehensive study of the intertidal organisms of Ballina Coastal Reserve, the following data shown in Table 3 was collected from South Ballina Beach. It is likely that similar results would be found on other Ballina Beaches.

Table 3: Organisms found on northern NSW sandy shores

Sandy Beaches	Ecozones	Organisms recorded at South Ballina
Dunes	Crabs insects	Unknown no. species (incl. Ghost crabs)
Intertidal	Crabs, Molluscs, Polychaetes, Isopods	3 Amphipods, 1 Isopod, 2 Ribbon worms, 1 Pheronid worm, 5 Segmented Worms, 2 Carnivorous beach snails, 2 bivalves (inc.pippies), Ghost Crabs
Surf zone (benthos)	Pippies	Possibly as above plus sub-tidal spp.

Source: BSC, 2000c.

Rocky shores consist of a vast number of species of seaweeds, sea mats and mosses, sponges, molluscs, crustaceans, worms, echinoderms (sea stars, sea urchins and sea cucumbers); and sea squirts and their allies. Rocky shores can be divided into three distinct zones; (Bennett, 1992) each dominated by specific organisms and seaweeds. This zonation is due to the adaption of the species to wave impact, exposure to heat and hydration, competition and predation.

The list in Table 4 below was compiled by studies available from Southern Cross University (SCU) from data collected in Ballina and Tweed Shires.

Sea Turtles are known to nest on sandy shores in the Ballina Reserve, particularly Loggerhead turtles, but occasionally Green turtles. There are also records of Leatherback turtles nesting on Lighthouse beach. The occurrence of Leatherback turtles is particularly significant with less than 40 Leatherback records in Australia. Leatherback Turtles are a vulnerable species and Loggerhead Turtles are endangered under the Threatened Species Conservation Act, 1995.

Sea turtles nest over the summer months on sandy beaches and the hatchlings emerge after an incubation period of about 10-12 weeks. The hatchlings can be confused by artificial light in built up areas when they emerge from their nest and head to the sea. Threats to turtles include disturbance from human activity, dogs and foxes, as well as episodic sand erosion from storm events in the breeding season. (Tarvey, Pers. Comm. 2002).

Management considerations for intertidal habitats

Rocky and sandy intertidal habitats provide a rich source of food for fish, which come in to feed at high tide. Grazing and predation by fish may influence the biota of the shore. Intertidal habitats are also known to be important feeding, roosting and nesting habitats for shorebirds, which can be disturbed by feral and domestic animals. Refer to terrestrial fauna for information regarding shorebirds.

The main threats to the intertidal ecosystem are habitat modification, vehicular traffic, shore protection works, harvesting of species, shell collection, disturbance to wildlife from general recreation activity, trampling of marine organisms on rocky platforms, pollution from sewage, stormwater, oil and litter, and long term shoreline recession.

Table 4: Organisms found on northern NSW rocky shores

Rocky Shores	Ecozones	Species within general family groups
Splash zone	Nodilittorina	4 Periwinkles
Upper intertidal	Barnacles	4 barnacles, 3 limpets, 4 periwinkles, 5 chitons
Mid intertidal	Gaeleolaria	Gaeleolaria, plus those stated above
Lower intertidal	Cunjevoi	2 solitary ascidians incl. Cunjevoi, 15 sea weeds (refer below) and possibly all of above spp.
Intertidal/sub tidal transition	Sea weeds	2 solitary ascidians incl. Cunjevoi, various ascidians, 3 green algae incl. Ulva spp., 5 brown algae Ecklonia spp. (kelp), Sargassum spp., 5 red algae incl. 2 coralline algae, 1 turf algae, 1 encrusting sponge, 1 colonial hydroid, 1 colonial zoanthoid, 4 sea anemones, 4 flat worms, 37 marine snails incl. 2 turbin, 25 periwinkles, Cerith, 3 cowries, 1 whelk, Brown Triton, 1 sea hare, 10 nudibranchs, 2 starfish, 1 brittle star, 1 feather star, 6 sea-urchins, 1 sea-cucumber, 2 oysters, 1 mussel, 1 octopus, 5 tube worms, 2 errant worms, 1 shrimp, 2 hermit crabs, 2 crabs.

Source: Wilson, 1988, Bent, 1990, 1996 cited in BSC, 2000c.

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3. SOCIAL AND ECONOMIC ENVIRONMENT

3.1 *Recreational opportunities*

The Ballina coastline is a place for leisure and recreation, and appreciation of the natural environment. The coast is an important part of the Australian ethos and culture, and a major contributor to the lifestyle of a high percentage of the population. Approximately 90% of the Australian population live in the coastal zone (RAC, 1993), and the North Coast continues to grow in popularity as a place to live, visit and use for recreation.

3.1.1 **Types of recreational activities and facilities**

Although no comprehensive assessment of recreational use has been undertaken, the views and desires expressed during community consultation for this Plan have revealed a strong emphasis on the recreation value of the Ballina coastline area. There is a diversity of recreational settings and opportunities for active and passive recreation. Passive pursuits include relaxation, sightseeing, bush and beach walking, meditation, art and photography, natural and cultural appreciation, whale watching and picnicking. Active recreational pursuits include land-based activities such as jogging, horse riding, ball games, kite flying, animal exercising, cycling, camping and four-wheel driving; and water-based activities such as swimming, surfing, sail boarding, canoeing, snorkelling, diving, shell fossicking, bait collection, boating and fishing.

Occasionally large number of people visit the beach and foreshore areas to attend surf carnivals and competitions, New Years Eve celebrations and the Lake Ainsworth markets every month.

Facilities provided in the Ballina Coastal Reserve include picnic tables and barbecues, viewing platforms and lookouts, walkways and cycleways, parks and playgrounds, and camping at Lake Ainsworth and Shaws Bay. There is a tent park adjacent to the reserve at Flat Rock and a caravan park adjacent to Lake Ainsworth. Other commercially-run caravan parks operating just outside the Coastal Reserve benefit from proximity to the nearby natural and recreational amenity values of the Reserve These camping facilities experience peak periods during NSW and Qld school holidays.

Formalised picnic areas are at Flat Rock, Pat Morton Lookout, and the Boat Channel Reserve at Lennox Head; and in various other locations at Lennox Village, Shelley's Beach, Shaws Bay and near Lighthouse Beach.

There are formalised lookouts at Lighthouse Hill (Ballina Head) and Pat Moreton Lookout at Lennox Point whilst observation decks are provided at Lighthouse Beach, Angels Beach and Flat Rock. Many informal vantage points are scattered along the coast, including North Wall, Tressels Beach (rock platform below Black Head), Skennars and Whites Heads, Boulder Beach/Iron Peg, Shag Rock, Lennox Headland, and Flat Rock Reef/Platform. During the whale watching season enthusiasts frequent Skennars Head, Boulder Beach, Lennox Point and Lighthouse Beach lookouts.

Parks and open space areas are provided throughout the area, including Shaws Bay, Lighthouse and Shelley's Beaches, Boulders Beach, Skennars Head and several parts of Lennox Head.

Amenity blocks are provided near Lighthouse Beach and at Shelley's Beach, Flat Rock, Lennox Village, Lennox Point Surf Break, Lake Ainsworth and the Lennox Head Surf Club.

There is a high demand for parking in the Ballina Coastal Reserves. A mix of formal and informal parking areas are available along the coast, however many of them approach or exceed capacity during peak visitation periods and on many weekends.

3.1.2 Access

3.1.2.1 Vehicle access to beaches

Off-road vehicles are used on the beach by anglers, dog owners, and various other recreational users, as well as agency staff and commercial fishers.

Vehicles are currently permitted at Lennox Head on Seven Mile Beach from Lake Ainsworth to the Ballina Shire's northern Boundary. Vehicles for emergency services, patrol, surf life-saving, commercial fishing, and police are permitted on all beaches.

There is a total ban on four-wheel drive vehicles at Lighthouse and Shelley's Beaches, and partial restriction at Sharpes and Angels Beaches, and at Flat Rock where four-wheel driving is banned during the daytime hours of 5am - 5pm.

A four-wheel drive access point is provided near Lake Ainsworth for the general public. A boat ramp exists at the Boat Channel, where vehicles and trailers are permitted for launching and loading, however vehicles are required to park off the beach. Access on Seven Mile Beach is prohibited north of the Ballina Shire boundary into Byron Shire.

Concern expressed during community consultation about vehicles on beaches relates to potential detrimental impacts on sensitive coastal habitat and damage to dunes, safety concerns and perceived conflicts with other beach users especially in high use areas of the beach. There is a high demand for beach access on Seven Mile Beach, which is the first northern, legally accessible beach in NSW, and could therefore be attractive to vehicle users from north of the Shire where vehicle use is totally restricted in Byron, Tweed and the Gold Coast.

Management of beach vehicles varies across north coast Shires. Tweed Shire has Policy in place permitting access to less sensitive areas, and strict regulation of the number of licences for the public. Byron Shire has a total ban on all recreational users, permitting only emergency and disabled access and a limited number of licences to professional anglers.

3.1.2.2 Walkways and Cycleways

Formal pedestrian access to beaches is provided at a number of points at Lighthouse, Shelleys and Angels Beaches, and at Lennox Head. There are several informal access tracks to beaches in the Reserve which contribute to erosion and pest species invasion.

Existing shared walkway/cycleways in the Ballina Coastal Reserve extend from Angels Beach underpass to Shelley's Beach and Lighthouse Beach parallel to the Coast, and along the Richmond River to Shaws Bay. There is also a cycleway / walkway connecting Angels Beach pedestrian overpass to the existing carpark. A proposal is in place for a shared footway to extend north from Angels Beach along the Coast, to connect with Seven Mile Beach at Lennox Head, and aimed at improving the recreational amenity and general appreciation of the coastal environment.

The proposal raises community concerns regarding safety, impacts on threatened species, fragmentation of habitat and pest species invasion.

3.1.2.3 Animals on Beaches

Dogs

Dog exercising and companionship in open space areas is a strongly held value by many in the community. Ballina Shire Council's current regulation on dog access and management provides a number of options for exercising dogs on Ballina Shire's northern beaches. There are designated areas for dog access, including on-leash, off-leash and some total restriction zones in high use areas, in consideration of such factors as health, safety, amenity and community values, listed below.

Dogs allowed on

Sharpes Beach	leash required
Angels Beach	leash required
(off-leash)	North of Lake Ainsworth with effective control

On all other beaches, dogs are prohibited (Lighthouse, Shelley, Seven Mile Beach south of Lake Ainsworth). There is also a dog exercise area in open parkland along Compton Drive, Shaws Bay.

The current regulation is generally well accepted, however some concerns were expressed during consultation about a lack of responsible dog ownership or compliance by some owners, the need for facilities for dog litter control, and potential impacts on wildlife (shorebirds) which depend on remaining undisturbed in their natural habitat.

Horses

Horse riding and exercising on Seven Mile and other beaches are enjoyed by only a few people, but on a regular basis. It occurs mostly on Seven Mile Beach, where there has been recent interest in establishing a commercial horse riding venture.

Issues regarding commercial and private horse riding include potential conflict with other users, especially during peak periods, safety, further deterioration of access tracks, disturbance to sensitive dune habitat, and impact on shorebird species and their habitat.

3.1.2.4 Emergency access

Emergency vehicles are permitted on most beaches, although access ramps are sometimes damaged by wave attack, at times making access hazardous.

3.1.2.5 Surf Life saving

Surf Life Saving Clubs are at Lennox Head near Lake Ainsworth, Shelley Beach, and Lighthouse Beach. Beaches are regularly patrolled at Lennox Head and Shelley Beach, and patrolled during peak periods at Sharpes and Lighthouse Beaches and Flat Rock.

3.1.3 Management considerations

Issues for management of recreation include impacts on natural and cultural values, equity between users, conflicts of use, preservation of the uniqueness of the Ballina Coast, safety, community expectations regarding commercial use and provision of facilities, and public awareness and education. Managers need to understand visitor use and motivations, expectations and perceptions, and the potential and limitations of the natural environment, known as carrying capacity. Carrying capacity refers to the number of people that a site can withstand without unacceptable decline in the quality of the experience. There is scope for further study of the management of the recreational resources of Ballina.

The continued enjoyment of recreational activities is dependent on the maintenance of ecological systems, good water quality, and management of people and associated impacts.

The regulation of commercial activity and management of access and associated impacts is vital for the maintenance of coastal ecosystems, which form the basis of continued enjoyment of many recreational activities on the Ballina Coast.

3.2 Economic opportunities

Coastal areas have economic values that can often be attributed to tourism, recreation and intrinsic or existing values. There has been no comprehensive study of the economic value of Ballina Coastal Reserve or for the Ballina Shire. The Resource and Conservation Assessment Council undertook an economic study on the upper northeast NSW in 1996 and estimated the value of recreation and tourism at \$682 million for the region which includes, Richmond, Brunswick, Tweed and Clarence Catchments (RACAC, 1996).

Ballina Shire's population has grown steadily in recent times, particularly since 1971, with the growth higher than the NSW average of 3% per annum between 1991 and 1996 (BSC, 2000a). Population growth at Lennox Head was 7.3% per annum over the same period (BSC, 2000a). Major growth areas immediately adjacent to the coastline are Lennox Head (including Headlands) and East Ballina, both of which have been identified in the Ballina Shire Council Urban Land Release Study, 2001, for further land release to accommodate future growth in Ballina. Constraints to further land release in East Ballina and Lennox Head include impacts on natural amenity and environmental limitations, for example parts of the North Creek floodplain and SEPP 14 Wetlands (Early, 1996).

The environmental, social and economic impacts of further urbanisation are a significant issue in any planned growth areas of the coastline. Population growth in Ballina Shire is expected to continue at 3.2% per annum over the next four years (BSC, 2000c), increasing pressure on Ballina's beaches which are considered to be the Shire's prime recreational resource.

The population of Ballina Shire consists of a large number of retirees, at 19.2%, with 59.5% between the ages of 15-64, and a low 21% under 15 years. This trend, which is also reflected in the Tweed Shire, is expected to continue and can be attributed to an aging population and northward migration of retirees to Ballina. This steady influx of retirees has implications for increased demands for access and amenity along the coast.

Ballina Shire is an important visitor destination within the Richmond-Tweed Region (BSC, 2000a). The Shire has received more than 400,000 visitors annually since 1994/5, representing 20% of the total visitors to the region. The average length of stay is around three nights (ABS and Ballina Tourist Information Centre Cited in BSC, 2000a).

Ballina's beaches are a major drawcard for tourists and visitors to the Shire. Recreational and tourism based spending in the region is generated largely by beaches (RACAC, 1996). It is almost impossible to estimate the precise value of the Ballina Coastal Reserve to the economy. The RACAC, 1996 study estimates that public lands of the upper northeast contribute 17% of the region's economic activity and 20% of its jobs. Since the two major employment industries in Ballina are wholesale and retail at 28.3%, and community and welfare service industries at 20.5% (ABS, 1996 cited in BSC, 2000a), this is indicative of the importance of Ballina as a centre for tourism, retail and regional services.

Increased resource use in the coastal zone has significant direct, indirect, and cumulative impacts on the environment. Impacts include the degradation and loss of coastal habitats, introduction of exotic pests, increased erosion, and declining water quality (RAC, 1993). Coastal resources are impacted on by inappropriate resource use which can threaten ecosystems, recreational amenity, economic growth, and employment opportunities. Pro-active management of recreation and tourism is essential for the maintenance of ecological function and integrity, upon which recreational activity, the tourism industry, and the economic viability of coastal communities greatly depend.

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4. CULTURAL HERITAGE

The heritage significance of the Ballina coastline lies in both its indigenous heritage, which include the Aboriginal archaeological and mythological sites, artefacts and stories of the people, to the various relics, sites and historical events of European settlement of the area since the early 1800's.

While much of the evidence of past events have been largely lost from the landscape through damage, decay and development, our knowledge of heritage items, places and past events are important in defining the evolution of today's social, economic and cultural development.

There are four main types of heritage : Aboriginal or indigenous heritage; natural heritage (which includes important landforms, flora and fauna, and ecosystems; built heritage (which relates to rarity, and may range from a simple small artefact to a large mansion); and cultural / social which reflect the lifestyles of past cultures.

There is a substantial volume of information, documented and unwritten, about the cultural and heritage values of the local area, and there are many people committed to the research, recording, presentation and preservation of our local heritage. Following is a brief abstract outlining some of the better known items and events of cultural heritage significance along the Ballina coastline.

4.1 *Aboriginal Culture and Heritage*

The information provided below has been prepared in consultation with local Bundjalung Elders Artie Ferguson and Bertha Kapeen and Jali Local Aboriginal Land Council, and with assistance from Adam Faulkner of Southern Cross University. It is acknowledged that Aboriginal descendants who still live in the area have details of their past life and traditions in the study area, passed on to them from stories told by the Elders. Details of these stories are the responsibility and intellectual property of the remaining knowledge holders.

The natural environment is considered an important part of Aboriginal people's cultural and spiritual integrity. There are various ways in which the landscape, the environment and sites are recognised, interpreted and defined by Aborigines and it is important for non-indigenous people to respect this.

The People and their Country

The traditional Aboriginal people that inhabited the Ballina coastal area were of the Nyangbal tribal group who were part of the larger Bundjalung linguistic group. People of the Bundjalung (nation) shared a common culture and occupied an area stretching from the Nerang Valley in Queensland, south to the Clarence River, and west to the Great Dividing Range.

According to the most recent detailed account by linguist/historian T. Crowley (1978), the Nyangbal tribal area extended from Suffolk Park in the north to the Evans River in the South, their western boundary from Coopers Shoot in the north along the Blackwall Range, south across the Tuckean Broadwater and down to Woodburn.

Neighbouring Bundjalung tribal groups were the Arakwal and Minjungbal to the north, and Bandjalang to the west and southwest. Further south in the lower Clarence region is Yaegl country. Boundaries between adjoining groups or clans were often based on natural features such as rivers and mountain ridges, however some boundaries were along more amicable lines

such as common hunting grounds. The Richmond River would have been a likely boundary between neighbouring divisions or clans of the Nyangbal people occupying the Ballina coastline area.

It is generally accepted that the northern coastal environment supported a higher Aboriginal population density than other areas, most likely because of the abundance of food, fresh water, marine and estuarine resources, natural resources for tools and clothing, and favourable climatic conditions (RACAC, 1996). Ainsworth (1922) estimated the Aboriginal population in 1847 between Ballina and Byron Bay to be roughly at 500, which would have given a population density of 4 to 6 persons per square km.

Various accounts of the traditional inhabitants of the Richmond River area described a diverse and abundant food source including salmon, mullet and other fish, oysters and other shellfish, and various game including pademelon, bandicoot, flying fox, lizard, snake and various water birds. Plants and their fruits were also a significant resource for food, medicine, fibre, tools, weapons and shelter materials (Mitchell, 1978; Ainsworth 1922; Keats, 1988).

Settlement / migration patterns along the coastal plain around Ballina involved a well-established seasonal movement of Aboriginal groups between the coast and foothills in response to available resources. However, it has also been suggested in some early historical accounts that tribal movement away from these northern coastal areas may have been a lot less frequent, if not sedentary, and that the coastal groups moved north and south within the coastal plain (mainly along beaches), possibly because of the relatively stable food sources and mild climatic conditions. As such, small family groups would have remained within a defined territory, and combined en masse at times of abundant food resources.

The area was thus an important place for large group gatherings and ceremonies, for joint harvest activities, trade between tribal groups, and for kinship. Evidence of this still persists at a valuable and protected midden site on North Creek, which, although now severely damaged, is significant in terms of being a record of the native people's ability to manage the areas natural oyster beds.

The Land

The landscape supporting the Nyangbal people was diverse, encompassing beaches, headlands and rocky shores, an estuary, a diverse range of wetland types, heathland, rainforest and tall sclerophyll forest.

The concept of value as it relates to Aboriginal land and the broader landscape and resources can only be determined by local Aboriginal Elders. These values include spiritual, cultural and economic aspects. The land provided Australia's indigenous people with a fundamental sustainable existence, as well as a means for spiritual power, one which is revered in modern society. The recognition of these values in both the past and the present is considered an important element in the future management of coastal lands along the Ballina Shire.

Post contact

The years of early European settlement around Ballina and further to the north, by squatters and cedar getters during the 1840's and 50's, saw emergence of a 'dual occupation' of land, a coexistence, where working relations were established between Aboriginals and European station owners and timber cutters. During this period Aboriginal people remained on their land and occasionally provisions were supplied in exchange for work.

The Robertson Land Acts which came into effect in 1862 marked the rapid demise of subsistence Aboriginal lifestyle, with removal of most of the best timber from the forests, much of the remaining bush cleared and burnt, and farms established, all which generally

denied the traditional owners access to their hunting and gathering areas and camps and severely diminished their ability to derive a traditional living off the land.

A significant but unfortunate event in these years of early contact was the unprovoked massacre of 30 to 40 Nyangbal people in 1853/54 by visiting Queensland Native Police at a campsite in the location of the old East Ballina golf course. Events surrounding the massacre are documented in accounts by Ainsworth (1922), and Medcalfe (1989) and are kept in Bundjalung oral tradition. There was also a massacre at South Ballina in the 1860's from poisoning of rations given to a group camping on the beach (told by Glen Cook in Medcalfe 1989).

The gradual change of much of the area under settlement to farmland after 1860, resultant loss of traditional food supply and access to land for the Aborigines, resulted in their movement to nearby reserves, mainly to Cabbage Tree Island. "The move of the Cook, Combo and Yuke families onto Cabbage Tree Island in the 1880's was one attempt to retain access and 'economic' use of land, where they cleared, grew sugar cane, grew vegetables, still hunted as part of their subsistence, and later worked for income (Inge Rebe, NPWS, 2000)

Aboriginal Sites

Aboriginal culture and heritage values are recognised in a number of ways, from important sites and artefacts to the natural landscape which existed before European settlement, and the mythology and traditions associated with them (Baker, 2000).

Aboriginal archaeological sites, relics and places of significance to contemporary Aboriginal people are protected under the *National Parks and Wildlife Act 1974 (NSW)*, the NSW National Parks and Wildlife Service having primary responsibility for their management. Details regarding their location and description are restricted.

Most of the sites of Aboriginal cultural and heritage significance along the Ballina coastline have been destroyed by various disturbances including sand mining, extractive industry, residential and recreational development, clearing and souvenir collecting. A number of areas in the East Ballina area have been investigated in term of their archaeological significance and presence of Aboriginal sites, mostly in relation to proposed residential and infrastructure development. A record of these studies is kept by the Jali Local Aboriginal Land Council and by the National Parks and Wildlife Service.

The local Aboriginal people have expressed their wish not to have the details of these findings published, for the purpose of protecting their location and preserving their condition.

The range of site types present within the study area are listed below :

Middens – usually open camp sites containing shellfish remnants.

Open camp sites - usually devoid of shells

Natural Landscapes (Natural Mythological Sites) – Aboriginal people have strong and enduring spiritual and economic ties to the landscape. Some features of the landscape, for example mountains, headlands, rocks, rivers relate to mythical events.

Ceremonial Places

Burial sites - Aboriginal ancestral remains represent a deep spiritual significance to today's people. Burial locations usually were near water, and often dunes associated with a prominent landform feature.

Scarred trees – trees carrying scars usually resulting from removal of bark or branches during the making of equipment, for example: canoes, shields, weapons and coolamons (a carrier to hold food or baby). The scars may also be foot holes for climbing trees.

Carved trees – where specific design work has been carved into the tree for ceremonial or other purposes.

Contemporary context, current and future management of Aboriginal heritage

The Bundjalung people still retain a strong cultural identity and a concern for their land, and it is generally considered that they have remained tribally distinct. There is a strong Aboriginal community that resides at Cabbage Tree Island near Wardell, where the Jali Local Aboriginal Land Council is located, and there are a number of Aboriginal families residing in Ballina and surrounding areas. Members of the Land Council have been actively involved for many years in safeguarding their heritage.

A significant area of the heathland north of Lake Ainsworth is under ownership of the Jali Aboriginal Land Council (refer map in Figure 1). Land to the east of this is currently the subject of an Aboriginal Land Claim. A Native Title Claim over the study area is in process, and a defined area of coastal land from Flat Rock to Black Head has been nominated for declaration as an Aboriginal Place under the National Parks and Wildlife Act (NPWS June 2000). An Aboriginal Cultural Centre has been proposed for location within or near the Coastal Reserve, its primary objectives to provide a medium for better recognition and understanding of traditional Aboriginal cultural values within the community, and a means of developing greater involvement by Aboriginal people in the management of their traditional lands along the coast.

The key issues of concern which have been raised during plan development, regarding protection of Aboriginal cultural values in the study area are :

- the need to protect and preserve all remaining sites, artefacts, relics and indigenous landscapes
- the need to increase understanding and recognition of Aboriginal cultural values
- provision for greater involvement by Aboriginal people in management of the traditional native landscape (both in the planning and implementation stages)
- the need to ensure that local Aboriginal people maintain their traditional relationship with the coastal landscape and resources (eg. indigenous fisheries)

The strategies, actions and initiatives so far developed to address these concerns are provided in the main body of the Plan of Management.

4.2 *European heritage*

The Ballina coast and its immediate hinterland were a significant part of the early European economic and social development of Ballina and Richmond River district. The area provided fertile agricultural land in close proximity to the early settlement camps, a rich supply of protein through its fish and other seafood, a direct access route to other coastal settlements along the beaches, and a source of gold from the beaches.

The Richmond River and port of Ballina played a key role in the early development of the hinterland and surrounding economy, as shipping was clearly the major mode of transport between the coast and its hinterland and between Ballina and the other coastal centres.

The first European occupants came to the area in the early 1840's in search of the rich cedar resource available over much of the north coast. Original settlement was focussed on Shaws Bay (originally New Chums Bay) due to its higher ground, freely available drinking water, and proximity to the mouth of the Richmond River. By 1847 an estimated 400-500 people were living in the camp, from which the cedar getters obtained supplies and disposed of their timber.

The first cedar was cut at Prospect in the lower North Creek, after which camps quickly spread up the Richmond River where access was available to larger areas from where the cedar was cut and rafted downstream from the camps to the first sawpits located at Shaws Bay and North Head.

It is believed that the name Ballina was derived from the Aboriginal word 'Bullenah' which related to the plentiful supply of fish and oysters, corrupted to 'Ballina' after a town in Ireland with the same name (Ainsworth, 1922).

Introduction of the Robertson Land Acts in the early 1860s prompted the selection of small holdings and the cutting up of the North Creek area into farms ranging in size from 40 to 320 acres. This created a rapid development of agriculture through the North Creek catchment, which became the main impetus for wider settlement of the area north of Ballina. Typically the country was cleared, fired, grown to a quick cash crop like maize, and then planted to sugar cane, which was generally milled locally. The first sugar mill in the area was established in the 1860's by John Sharpe landward of the present Sharpes Beach and Skennars Head.

By end of the 1800's the local economy in the area was broadly based on three fronts :

- The busy commercial and shipping centre of Ballina at the mouth of the Richmond River.
- the rapidly expanding agricultural settlement through North Creek and onto adjoining fertile country near Sharpes Beach, Skennars Head and Lennox Head
- gold mining along the beaches both north and south of Ballina. The gold was sourced from the rutile deposits that became exposed after heavy ocean storm activity.

Shaws Bay was the first place in New South Wales where gold was found in beach sands in payable quantity, in March 1875 (Carne 1896). The industry thrived through the 1870's to the turn of the century, and provided a good source of income for many workers, several of whom were also the labourers from the nearby sugar cane industry. The beaches also provided an important transport route to the towns north and south of Ballina, although sometimes treacherous and unpredictable during heavy seas.

The village of Lennox Head was not established until the early 1920's when a sub-division was created out of private land. Prior to that it was a relatively small retreat for recreation. Earlier in 1887 an area north of Lake Ainsworth had been established as a government reserve for the purpose of developing a village, but was never pursued. The shoreline fronting the Lennox Village had also been declared a Crown Reserve in 1884 and Lake Ainsworth (the 'Lagoon') and surrounds was proclaimed Crown Reserve in 1893.

Some landmarks of heritage significance remaining as part of the landscape within the study area include :

- Fenwick House, built in 1886 by Capt. Thomas Fenwick, overlooking Shaws Bay
- The northern training wall, commenced in 1889 (extended in 1967) in an effort to stabilise the treacherous entrance to the Richmond River which was becoming a threat to the future of the settlement as a port.
- Ballina Lighthouse and cottage, built in 1879, one of the oldest lighthouses in NSW, (built 22 years before the lighthouse at Cape Byron).
- The remaining Shaws Bay water body which was part of the original main channel of the Richmond River, which skirted the base of North Head (present day Lighthouse Hill or Ballina Head)
- Remnants of the Skennars Head settlement (now Boulder Beach headland) which was relocated in the 1920's when the first Lennox Head village was established, and the 'Iron Peg' located at the outermost rocky point below Boulder Beach headland, installed by resident Charles Bulwinkel in the early 1900's as a safety measure.
- The Boat Channel and a number of smaller channels at the southern end of Seven Mile Beach, most built by local families since the 1930's.
- (much more recently) – remnants of the sand mining activity of the 1930's to the late 60's, which had a significant impact on the dune and foreshore of much of the coast. (eg. early photos indicate a dune formation at Boulder Beach in excess of 5 metres high)
- Remnants of the old coast road from Lennox Head to Broken Head behind Seven Mile Beach, used to transport vegetables bound from Byron Bay to Sydney.
- Remnants of the old sand mining road which is still prominent south of Flat Rock and behind Sharpes Beach, but now hidden amongst regrowth. Early photos show the road stretching from behind Angels Beach to Skennars Head and on to Boulder Beach as the main service road to the industry.
- The ti-tree fence along the Lennox Village foreshore, built in 1967 to stabilise the rapidly eroding beach following cyclonic storms, remnants of which still stand.
- Lake Ainsworth National Fitness Camp built in 1944 (now NSW Sport & Recreation).

A significant 'event' referred to by local historians was the sighting and recording in 1770 by Joseph Banks, whilst aboard the Endeavour on its historic east coast voyage, of a small group of Aborigines ascending a hill near the beach, presumed to have been between the Richmond River and Broken Head based on bearings recorded in the ship's log, and considered to have probably been Lennox Head.

Maritime History

Ships traded to and from the Richmond River for nearly 100 years. They were the 'lifeline' of the district, particularly when timber was at its peak, where up to 30 vessels were regularly visiting the river, each carrying away between 8000 and 12000 feet of cedar and pine logs on each trip. In 1870 alone, ships carried more than 9,000,000 feet (25,000 cubic meters) of timber from the Richmond River, and on one day in 1873, 19 schooners crossed out of the river mouth. (Gallagher, 1972).

Prior to construction of the breakwaters late in the 1800's, ships had to contend with a shifting river entrance, which migrated up to 3 km south of Lighthouse Hill. The unpredictable nature of this, and of the treacherous bar, resulted in the loss of many ships and cargo, and loss of several lives.

Recorded losses of ships on the Richmond River entrance bar and nearby shoals include :

- 1845 - the schooners Hope and Northumberland
 - 1847 - schooner Enterprise which ran aground on the bar
 - 1851 - schooner Columbine, struck the bar, leaked and sank, and the schooner Madge Wildfire, careened across the bar and sank
 - 1865 - schooner Alexander wrecked on the bar
 - schooner ranger lost on the north spit
 - schooner Josephine lost on south spit (all three lost in the same year, some believe on the same day)
 - 1872 - s.s. Waimea and the tug Culloden
 - 1874 - Wallaby
 - 1878 - Alchemist (early paddle steamer)
 - 1907 - Tomki (after the breakwater was constructed).
- (information courtesy of Mr Ted Trudgeon, Richmond River Historical Society, Lismore. 2002)

Other ships had put out from Ballina never to be heard of again, while others failed to arrive. J.K. Lowry in "Wrecks on the NSW Coast" claimed that there were at least 49 ships lost at Ballina and 27 lives lost.

A comprehensive list of these and the other wrecks is kept as part of a detailed account of maritime history of the Richmond River at the Richmond River Historical Society's Regional Museum at Lismore. The Maritime Museum at Ballina also includes some valuable insights into the maritime history of the river and Ballina port.

Management of Heritage

Many of the sites and items of heritage value have significant educational potential, providing historic evidence of previous land uses, settlement and cultures. Many of the sites of both European and Aboriginal value were lost during recent sand mining operations, which places even more emphasis on the need to preserve what is remaining.

The Ballina Coastal Reserves Plan of Management provides management strategies which aim to preserve heritage and historical sites, raise awareness of their importance, and suggests a code of practice to ensure that no further unnecessary losses are incurred.

Special Provisions 18 to 22 of the Ballina LEP protects significant items of environment heritage through a range of assessment procedures and restrictions on development and other activities.

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5. LANDSCAPE VALUES



The scenic quality of the Ballina coastline is considered by many to be the Shire's most valuable asset, providing a spectacular array of prominent headlands, rocky shores and reefs, and open sandy beaches.

The natural landscapes visible from the coast are considered an important component of Aboriginal cultural values. The coastline and its hinterland, the mountains, rivers, lakes and hills often relate to Aboriginal mythical events, while the land itself provided indigenous people a fundamental sustainable existence, as well as providing them with a means for spiritual power.

The landform types that combine to give the Ballina coastline its character are the headlands, beaches, foredunes, offshore and nearshore water environment, the forested and sometimes cleared hinterland, coastal escarpment, and the 'built' environment. Prominent built or artificial landscape features in or near the coast include the villages, isolated buildings, training walls and seawalls, roads and cuttings.

Prominent historical landscape features include the Richmond River training walls, Fenwick House at Shaws Bay, Ballina Lighthouse and its Keepers Cottage, and the large lone Norfolk Island pine at Ballina Beach (planted in the early 1900's).

Significant views and their vantage points) along the Ballina coastline (mainly located in the Plan area) include -:

- **From Pat Morton lookout northward** – to Lennox Head Village, Seven Mile Beach sweeping up towards Broken Head with the backdrop of heath on the Newrybar plains and the escarpment, the reef, and often dynamic near shore surf zone.
- **From Lennox Point and Shag Rock looking southwards** – over Boulder Beach and its rainforest, Iron Peg and Skennars Head (also a spectacular walk).
- **From Skennars Head looking northwards** – Boulder Beach/Iron Peg, Shag Rock and the tall cliff face of Lennox Head, with Broken Head and Cape Byron in the distance.
- **From Skennars Head southwards** over Sharpes Beach and Flat Rock.
- **From Angels Beach and Black Head northwards** over Flat Rock, and southwards to the mouth of the Richmond River.
- **From Lighthouse Hill (Ballina Head) parking lookout southwards** over Lighthouse Beach, the Richmond River and its entrance, to South Ballina, Broadwater and Evans Head in the distance (on a clear day).



Management of the Landscape

Landscape is considered important because it is -:

- an essential part of our natural resource base
- a reservoir of archaeological and historical evidence
- an environment for plants and animals
- a resource which evokes sensual, cultural, recreational, and spiritual responses, an important part of our quality of life
(IEA 1995)

The protection of Ballina's coastal landscape is vital to our recreational and social appreciation and spiritual connection to the coast.

Ballina Shire Council's LEP 1984 provides for the "protection and enhancement of areas of particular scenic value to the Shire of Ballina" through zone 7(d) - Environmental Protection (scenic/escarpment) Zone.

The LEP has as one of its particular aims "...to take account of the physical nature of the environment of the Shire of Ballina so that development is in harmony with scenic and ecological resources" (Ballina LEP 1984 Part 1 Aims, Objectives, 2 (2)(f))

Management issues that have been raised during consultation for the POM include

- the need for improved viewing amenity in prime viewing areas (in particular at Skennars Head & Pat Morton Lookout)
- protection against environmental damage at viewing sites, caused by unauthorised access
- improved pedestrian access and parking amenity near prime viewing areas,
- traffic safety concerns in areas where popular scenic views are visible from, or very close to the busy Coast Road
- some comments have also been expressed about perceived proliferation of exotic Norfolk Island pines along the Lennox Head foreshore in the absence of locally indigenous native vegetation.

The objectives for Scenic Amenity under the Ballina Coastal Reserve Plan of Management provide a clear direction for preservation of scenic quality and indigenous landscapes, and for enhancement of viewing amenity along the coast, such that any planning for infrastructure or public utility along the coast should aim to maintain the integrity of the Ballina coastal landscape.

References

Ballina Local Environmental Plan 1987. Ballina Shire Council

IEA (Institute of Environmental Assessment) 1995. *Guidelines for Landscape and Visual Impact Assessment.* E & FN Spon, London.

APPENDICES

- A. Current Land Status – Ballina Coastal Reserves**

- B. Ballina LEP - Zones within or adjacent to the Ballina Coastal Reserve**

- C. Ballina Bush Fire Risk Management Plan (excerpts)**

- D. Stakeholder Groups, organizations and individuals consulted during Plan development.**

- E. Threatened Flora and Fauna within Study Area
- Threatened Species Conservation (TSC) Act 1995**

- F. DLWC comments on draft Cycleway Route, for sections proposed within Crown Land**

- G. Vegetation Types, Ballina Coastal Reserve – Preliminary Mapping**

APPENDIX A

LAND STATUS – BALLINA COASTAL RESERVES

Reserve Description	Location	Purpose
R.84109 NSW Sport & Recreation	LAKE AINSWORTH	National Fitness
R.82783 Ballina Shire Council	Lake Ainsworth	Public Recreation
R.83506 Ballina Shire Council	Lennox Head	Public Recreation
R.83506 Ballina Shire Council	Boulder Beach, Skennars Head	Public Recreation
R.32714 No Trust	Shelley Beach (West of Village)	Protection from Sand Drift
R.82765 Ballina Shire Council	Black Head, Shelley Beach	Public Recreation
R.73879	Shaws Bay	For Future Public Requirements
R.91507 Ballina Shire Council	Shelley Beach	Public Recreation
R.69266 Ballina Shire Council	Shaws Bay	Public Recreation
R.65048 Ballina Shire Council	Lighthouse Beach, Lighthouse Hill	Public Recreation
R.90859 Ballina Shire Council	Lighthouse Beach	Parking
R.94492 Ballina Shire Council	Public Recreation	Shaws Bay
R.84107 Ballina Shire Council	Public Recreation & Resting Place (includes Dedication for Public Park vide East Ballina Cemetery Act 1957)	Shaws Bay
Vacant Crown Land	(various locations) - Beach to Low Water Mark 7 Mile Beach, Pacific Parade, Lennox Head, Shag Rock, Boulder Beach, Sharpes Beach, Flat Rock, Angels Beach Shelley Beach, Compton Drive (Shaws Bay)	

APPENDIX B

BALLINA LOCAL ENVIRONMENTAL PLAN Zones within or adjacent to Ballina Coastal Reserve

ZONE NO. 6(a) - OPEN SPACE ZONE

1. Objectives of zone

A. The primary objectives are -

- (a) to identify land that is used or capable of being used for active or passive recreation purposes;
- (b) to encourage the development of open spaces in a manner which maximises the satisfaction of the community's diverse recreation needs; and
- (c) to enable development associated with, ancillary to or supportive of recreation use; and
- (d) to enable development that assists in meeting the social and cultural needs of the community.

B. The exception to these objectives is development of land within the zone for public works and services, outside the parameters specified in the primary objectives.

2. Without development consent

Drainage; roads; works for the purposes of gardening, landscaping or bush fire hazard reduction.

3. Only with development consent

Agriculture; camping areas; cycleways; forestry; picnic grounds; racecourses; recreation areas; recreation facilities; recreation vehicle areas; surf lifesaving facilities; telecommunications facilities; utility installations (other than gas holders or generating works).

4. Advertised development - only with development consent

Any purpose other than a purpose specified in item 2 or 3.

5. Prohibited development

Nil.

Ballina LEP (cont.)

ZONE NO. 7(a) - ENVIRONMENTAL PROTECTION (WETLANDS) ZONE

1. Objectives of zone

A. The primary objectives are -

- (a) to protect and conserve significant wetlands; and
- (b) to prohibit development which could destroy or damage a wetland ecosystem.

B. The exception to these objectives is development of public works and services, outside the parameters specified in the primary objectives, only in cases of demonstrated and overriding public need and subject to the impact on the wetland ecosystem being minimised as much as is reasonably practical.

2. Without development consent

Nil.

3. Only with development consent

Agriculture; bed and breakfast establishments; bush fire hazard reduction; environmental educational facilities; environmental protection works; open space; roads; telecommunications facilities; utility installations.

4. Advertised development - only with development consent

Nil.

5. Prohibited development

Any purpose other than a purpose specified in item 3.

Ballina LEP (cont.)

ZONE NO. 7(d) - ENVIRONMENTAL PROTECTION (SCENIC/ESCARPMENT)

1. Objectives of zone

A. The primary objectives are -

- (a) to protect and enhance those areas of particular scenic value to the Shire of Ballina; and
- (b) to minimise soil erosion from escarpment areas and prevent development in geologically hazardous areas.

B. The secondary objective is to enable development as permitted by the primary and secondary objectives for Zone No. 1(b), except for development which could conflict with the primary objectives of this zone.

C. The exception to these objectives is development of public works and services, outside the parameters specified in the primary and secondary objectives, but only in cases of demonstrated and overriding public need and subject to the visual impact being minimised as much as is reasonably practical.

2. Without development consent

Agriculture (other than feed lots, piggeries, poultry farms, stock homes and other intensive keeping of animals and not including the erection of buildings).

3. Only with development consent

Any purpose other than a purpose specified in item 2 or 5.

4. Advertised development - only with development consent

Nil.

5. Prohibited development

Bulk stores; caravan parks for permanent occupation; industries (other than rural, extractive, offensive or hazardous industries); mineral sand mining; mines; motor showrooms; recreation vehicle areas; residential buildings (other than dwelling-houses or dwellings); shops (other than general stores); warehouses.

Ballina LEP (cont.)

**ZONE NO. 7(f) - ENVIRONMENTAL PROTECTION
(COASTAL LANDS) ZONE**

1. Objectives of zone

A. The primary objectives are -

- (a) to protect environmentally sensitive coastal lands; and
- (b) to prevent development which would adversely affect or be adversely affected, in both the short and long term, by the coastal processes.

B. The secondary objective is to enable the development of public works and recreation amenities where such development does not have significant detrimental effect on the habitat, landscape or scenic quality of the locality.

C. The exceptions to these objectives are -

- (a) to permit the development of public works, outside the parameters outlined in the primary and secondary objectives, only in cases of demonstrated and overriding public need and subject to the impact on the coastal lands being minimised, as much as is reasonably practical; and
- (b) development of surf lifesaving, environmental education facilities and like facilities.

2. Without development consent

Nil.

3. Only with development consent

Agriculture; beach amenities; bed and breakfast establishments; bush fire hazard reduction; camping grounds; caravan parks; community buildings; drainage; dwelling-houses; environmental educational facilities; environmental protection works; forestry; golf courses; helipads; home industries; open space; pipelines associated with aquaculture; picnic grounds; recreation establishments; recreation facilities; refreshment rooms; roads; surf club houses; utility installations.

4. Advertised development - only with development consent

Nil.

5. Prohibited development

Any purpose other than purpose specified in item 3.

Ballina LEP (cont.)

ZONE 7(I) - ENVIRONMENTAL PROTECTION (HABITAT) ZONE

1. Objectives of zone

- A. The primary objective is to protect areas of particular habitat significance.
- B. The secondary objective is to enable development of a similar nature to that intended as being the primary and secondary objectives of Zone No. 1(b), except for development which would conflict with the primary objective of this zone.
- C. The exception to these objectives is development of public works and services, outside the parameters of the primary and secondary objectives, but only in cases of demonstrated and overriding public need and subject to the impact on the habitat area being minimised as much as is reasonably practical.

2. Without development consent

Nil.

3. Only with development consent

Agriculture; bed and breakfast establishments; bush fire hazard reduction; camping grounds; community buildings; dwelling-houses; environmental educational facilities; environmental protection works; forestry; home industries; open space; roads; telecommunications facilities; utility installations.

4. Advertised development - only with development consent

Nil.

5. Prohibited development

Any purpose other than a purpose specified in item 3.

APPENDIX C

Bushfire Risk Management Plan - Ballina Shire Council 1997 (excerpts)

Section 3.4.1

(b) Environmental/Ecological Assets

Fire poses a risk to environmental assets within Ballina Shire where the fire regime exceeds the fire frequency thresholds identified for the vegetation communities that exist. The fragmented and discontinuous distribution of fire supportive vegetation across the Shire also reduces the risk to environmental assets as this combination does not support large, high intensity fires.

Rainforests are generally at lower risk where they are surrounded by cleared agricultural land, orchards or water bodies and are isolated from fire supportive vegetation or ignition sources. Rainforest communities are at higher risk where they interface with more fire supportive vegetation including sugarcane.

Pockets of littoral rainforest are at a higher risk as they are small in area, contain fire sensitive species and are interspersed within fire supporting coastal vegetation communities which are more likely to be ignited.

Tuckean Nature Reserve is at higher risk as it has been significantly degraded by high intensity fire in the past and requires further fire free regime to recover.

Ballina Nature Reserve is at moderate risk, having minimal recent fire history.

Risk to threatened flora and fauna species is varied, depending on whether the current fire regime is within or exceeds the fire regime thresholds for the habitats they occupy.

Large areas of coastal heath within the Shire are at higher risk of fire. In some areas the fire regime has been exceeded over the past 20 years. Increased frequency of major fires will result in a decline in the bio-diversity and possible species loss.

The Blackwall Range is a high risk area with a frequent fire history. This area supports threatened species, such as a large Koala population and habitat. The wet gullies of the Blackwall Range are important fire refuges for animals and are habitat for the Albert's Lyrebird, a threatened species.

There may also be other bushland areas which may be at risk from single individual fires.

Individual bush fire events are likely to have a short term impact on the scenic quality, soil stability, and a number of threatened species existing in some areas. The risk to environmental assets from individual fire events is considered to be minor, however it is the cumulative impact of inappropriate fire regimes that are likely to pose a higher risk.

CHAPTER 4 - BUSH FIRE RISK MANAGEMENT STRATEGIES

4.1 Introduction

This chapter details:

- The bush fire risk management strategies which will be put in place to manage the bush fire risk across the Ballina Council area;
- How the bush fire risk management priorities were determined; and
- The types of bush fire risk management options available.

4.2 Bush Fire Risk Management Priorities

Bush fire risk management priorities have been allocated according to the bush fire risk ratings. Those areas faced with an extreme bush fire risk have been given the highest management priority, while those areas with an insignificant risk have the lowest management priority.

The bush fire risk management priority influences:

When the risk is likely to be treated as high - high priority areas will be addressed first;

The resources allocated to the treatment - more resources will be allocated to manage the risk in high priority areas, as more work will be needed to reduce the risk; and

The range of treatment strategies required to manage the risk - a greater range of management strategies will be implemented to manage the risk in high priority areas, as more factors contribute to the risk.

4.3 Bush Fire Risk Management Options

Table 4.1 describes the various options available to minimise the bush fire risk. It is important to recognise that, particularly for extreme and major risk areas, no single option is likely to provide sufficient protection from bush fires. A range of options needs to be implemented to reduce the bush fire risk to an acceptable level. For example, while hazard reduction will reduce the severity of a bush fire and therefore improve the chance of survival, houses will have an even better chance of survival if the people living in them have taken steps (such as cleaning out gutters and not storing combustibles near the house) to make their own house less vulnerable to bush fire attack.

Avoid the Risk	By deciding not to proceed with the activity likely to generate the bush fire risk. This option is relevant to future land use and development decisions. Examples of risk avoidance strategies include, prohibiting certain types of development in bush fire prone areas, and requiring adequate fire protection zones to be established between developments and the bush fire hazard.
Reduce the Hazard	Programs to reduce the level of fuel available to burn in a bush fire. Examples of hazard reduction strategies include hazard reduction burning, slashing or ploughing of fire breaks, or manual clearing of bush fire hazards. Planting of rainforest species on interfaces.
Reduce Ignitions	Programs to reduce the number of deliberate and accidental man made ignitions. Examples of ignition reduction strategies include total fire bans, arson investigation programs, and issuing of permits to burn during the bush fire danger season.
Reduce Vulnerability	Programs to increase the resilience of community and environmental / ecological assets to bush fires. Examples of vulnerability reduction strategies include community education programs, and building restrictions in bush fire prone areas.
Residual Risk	Bush fire risk management strategies are designed to reduce the level of risk, but will not eliminate the risk entirely. Some level of residual risk may remain, which will be managed with fire response strategies such as fire suppression operations, early fire detection and evacuation.

Table 4.1 - Bush Fire Risk Management Options

4.4 Bush Fire Risk Management Strategies for Ballina Council Area

(The bush fire risk management strategies which have been identified in the Ballina Council area are outlined in Appendix VIII of the document)

4.5 Bush Fire Hazard Management

4.5.1 Introduction

Hazard reduction programs aim to reduce the severity of a bush fire, by reducing the amount of fuel (vegetation) available to burn during a bush fire. This makes the bush fire easier to control and reduces the level of bush fire damage to community and environmental/ecological assets. Hazard reduction burning is the most common way to reduce the bush fire hazard, as it is the most cost effective method available. However, other methods of hazard reduction such as slashing or mowing, ploughing, grazing or hand clearing are used when appropriate.

Hazard reduction must be conducted with due regard to the principles of Ecologically Sustainable Development (ESD). ESD principles have been taken into account the preparation of this plan. In addition, Chapter 5 of this plan identifies how ESD principles will be taken into account by the land managers who have responsibility for implementing this plan.

It is important to recognise that situations may arise where the necessary objectives for life and property protection are in conflict with ESD objectives. Wherever possible, solutions which achieve both life/property protection and ESD principles will be sought. However, where both cannot be achieved, protection of life and property shall take priority.

4.5.2 Bush Fire Hazard Management Zones for Ballina Council Area

The bush fire management zones identified in the plan are described below. (More detail regarding the specifications of each zone is contained in Appendix IV.)

Asset Protection Zone:	To protect human life, property and highly valued public assets.
Strategic Fire Advantage Zone:	To provide strategic areas of fire protection which will reduce the speed and intensity of bush fires, and reduce the potential for spot fire development.
Land Management Zone:	To meet relevant land management objectives in areas where Asset Protection or Strategic Fire Advantage Zones are not appropriate.
Fire Exclusion Zone:	To exclude fires (both bush fire and hazard reduction burning) due to the presence of fire intolerant assets such as rainforest or pine plantations.

5.3.5 Use of Appropriate Fire Regimes

In accordance with the principles of Ecologically Sustainable Development, and Bush Fire Coordinating Committee Policy, the use of inappropriate fire regimes is to be avoided wherever possible.

A fire regime is essentially the combination of fire frequency (usually measured by the number of years between fires both wild and prescribed), fire intensity, and season of fire occurrence. To identify the fire regime of an area requires assessment of the above fire attributes over a long period of time (normally decades but in some cases centuries).

For fire regime information to be useful in planning, the range of variation for each fire attribute over time needs to be identified, rather than simply identifying averages (e.g. useful information for fire frequency is both the minimum and maximum periods between fires and the median for the period between fires). Very few areas in NSW have adequate information on fire frequency, intensity and season of occurrence, collected over a sufficient time period, to enable fire regimes to be determined with any accuracy. In many areas an 'adaptive management' approach is used by land managers such that the fire regimes applied are determined from a combination of the best fire history and fire ecology information available.

An inappropriate fire regime is considered to be one where (usually through the decisions or actions of humans) one or more of the fire attributes is occurring outside its historic range of variation for the area. Where such a change is allowed to continue, changes to the environment are likely to result. Examples of this include areas where prescribed fire is applied too frequently, areas where fire occurrence is reduced (through wildfire suppression and cessation of prescribed burning) such that fires are less frequent and more intense, and areas where the season of burning is changed.

Whilst every effort has been made in this plan to select bush fire protection strategies which achieve the dual objectives of protecting life and property, and protecting environmental values, there will inevitably be areas where both objectives cannot be achieved. In these areas, in accordance with the *Rural Fires Act 1997* and *Bush Fire Coordinating Committee Policy*, management priority is necessarily given to the protection of life and property.

The areas in which these conflicting objectives occur are restricted to hazard management zones (asset protection, and strategic fire advantage zones). These zones represent a relatively small proportion of the bush fire district.

In many cases, the implementation of inappropriate fire regimes are necessary to avoid the application of inappropriate fire regimes over much broader areas (primarily where inappropriate fire regimes have resulted, or are likely to result from arson or frequent accidental human ignition sources).

Land managers are generally responsible for ensuring that fire regimes are implemented which optimise land management objectives and biodiversity outcomes. Where opportunities are available to achieve fuel management objectives without compromising appropriate fire regimes, these will be implemented.

Plant Community	Threshold
Rainforest	No fire acceptable
Mangroves	No fire acceptable
Chenopod shrubland	No fire acceptable
Wet Sclerophyll forest	Decline expected if successive fires, of any intensity, occur less than 50 years apart. Decline predicted if no fire for more than 200 years.
Dry Forest complex	Decline expected if more than two successive fires occur at intervals of less than 5 years. Decline expected if there are no fires for more than 30 years. Decline expected if successive fires occur which totally scorch or consume the tree canopy.
Shrubland - heath complex	Decline expected if more than two successive fires occur at intervals of less than 8 years. Decline expected if more than two successive fires occur at intervals of more than 15 years. Decline expected if no fire occurs for more than 30 years.
Grassland/herbfield complex	Decline expected if more than two successive fires occur at intervals of less than 5 years. Decline expected if more than two successive fires occur at intervals of more than 15 years.

Table 5.2 Fire frequency thresholds for vegetation communities (Bradstock et al).

APPENDIX D

Stakeholder groups, organisations and individuals consulted during development of the Ballina Coastal Reserve Plan of Management

All Girl Surfriders
Angels Beach Dunecare and Reafforestation Group
Ballina Environment Society
Ballina Fisherman's Co-operative
Ballina-Lighthouse Beach Dunecare Group
Ballina Lighthouse and Lismore Surf Lifesaving Club
Beachfront Parade Dunecare Group
Byron Bay Hang Gliding / Paragliding Club - Michelle Batterham
Dorroughby Environmental Education Centre - Alan Watters on
EnviTE (Environmental Training and Employment)
Jali Local Aboriginal Land Council
LeBa Surfriders
Lennox Head- Alstonville Surf Lifesaving Club
Lennox Head Chamber of Commerce
Lennox Head Dunecare Group
Lennox Head Heritage Society
Lennox Head Landcare Group
Lennox Head Residents Association Inc. (and Heritage Committee)
National Trust of Australia (NSW)
Richmond River Historical Society
Shelley Beach Coastcare Group
Alister Somerville
South Ballina Beach Coastcare
Tara Downs Landcare Group
W.A.T.E.R. (Water Access To Enhance Recreation)

Jali Local Aboriginal Land Council
(Cabbage Tree Island)
Lee Andresen
Dr Harvey Bell
John Carr
Fiona Folan
M & B Heagney
Marelle Lee
Don Page MP
Alan Rich
Jean Ringland

Ballina Shire Council
Coastcare NSW
Mineral Resources NSW
NSW Sport and Recreation (Lake Ainsworth)
NSW Fisheries
NSW National Parks and Wildlife Service

APPENDIX E

Threatened Flora and Fauna within the Ballina Coastal Reserve under the Threatened Species Conservation Act 1995

Table 1: Threatened Flora known to occur within the Ballina Coastline

Species Name	Common name if known	Conservation Status
<i>Acronychia littoralis</i>	Scented Acronychia	Endangered
<i>Cryptocarya foetida</i>	Stinking Cryptocarya	Vulnerable
<i>Davidsonia spp.</i>	Smooth Davidsonia	Endangered
<i>Fontainea oraria</i>		Endangered
<i>Macadamia tetraphylla</i>	Rough-leaved Queensland Nut	Vulnerable
<i>Phaius australis</i>	Swamp Orchid	Endangered
<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly	Vulnerable
<i>Tinospora tinosporoides</i>	Arrow Head Vine	Vulnerable

Source: NSW NPWS Wildlife Atlas, 2002.

Table 2: Threatened Fauna known to occur within the Ballina Shire Coastline

Species Name	Common name if known
<i>Amaurornis olivaceus</i>	Bush-hen
<i>Balaenoptera physalus</i>	Fin Whale
<i>Botaurus poiciloptilus</i>	Australasian Bittern
<i>Cacophis harriettae</i>	White-crowned Snake
<i>Calidris alba</i>	Sanderling
<i>Calidris tenuirostris</i>	Great Knot
<i>Caretta caretta</i>	Loggerhead Turtle
<i>Charadrius leschenaultii</i>	Greater Sand Plover
<i>Charadrius mongolus</i>	Lesser Sand Plover
<i>Crinia tinnula</i>	Wallum Froglet
<i>Dermochelys coriacea</i>	Leathery Turtle
<i>Diomedea exulans</i>	Wandering Albatros
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork
<i>Esacus neglectus</i>	Beach-stone Curlew
<i>Grus rubicunda</i>	Brolga
<i>Gygis alba</i>	White Tern
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher
<i>Haematopus longirostris</i>	Pied Oystercatcher
<i>Irediparra gallineacea</i>	Comb-crested Jacana

Threatened Fauna (continued)

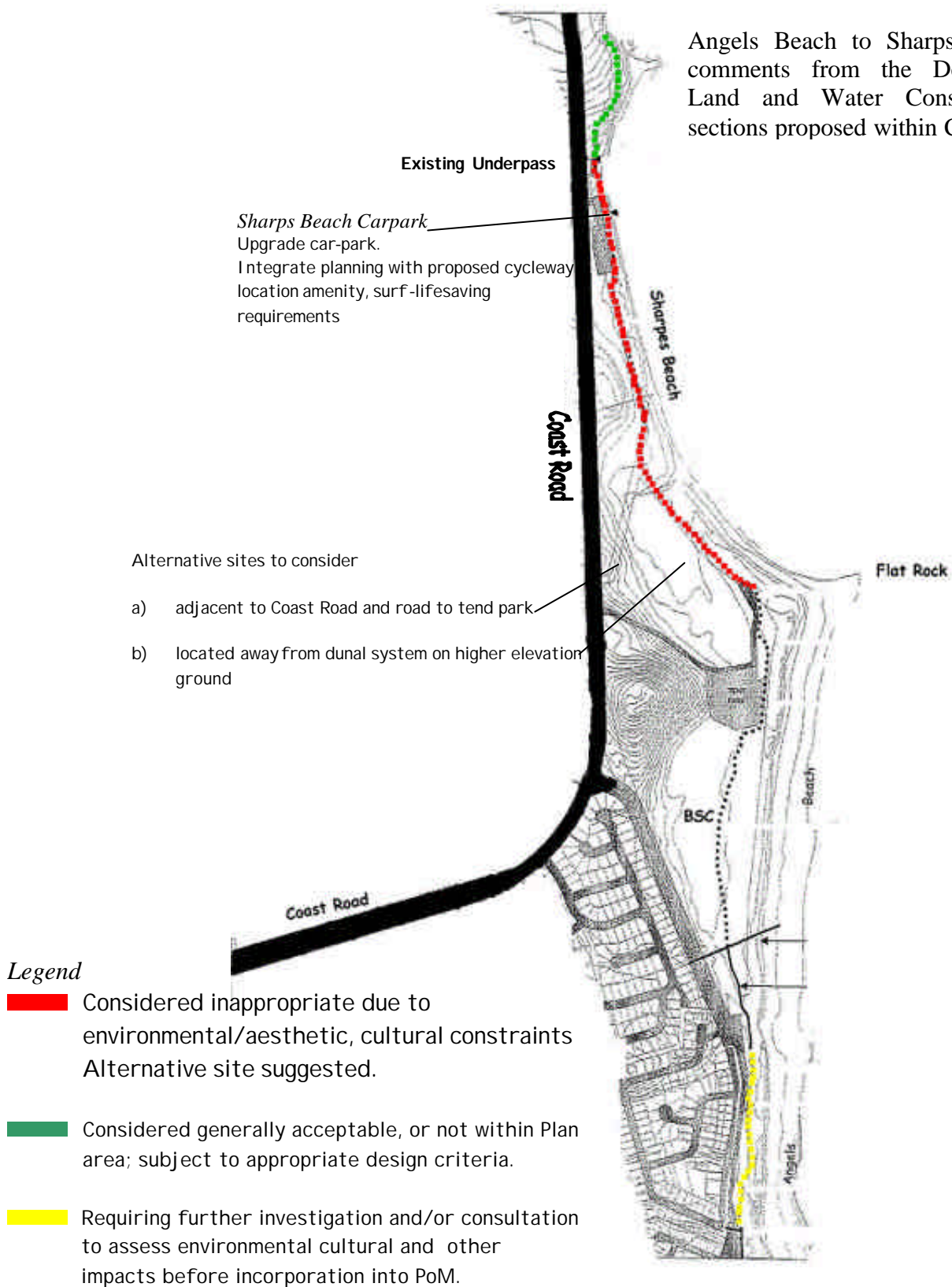
Species Name	Common name if known
<i>Lichenostromus fasciogularis</i>	Mangrove Honeyeater
<i>Litoria ologburensis</i>	
<i>Megaptera novaeangliae</i>	Hump Back whale
<i>Miniopterus Australia</i>	Little Bent-wing Bat
<i>Pandion haliaetus</i>	Osprey
<i>Pezoporus wallicus</i>	Ground Parrot
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird
<i>Phascolarctos cinereus</i>	Koala
<i>Phoebetria fusca</i>	Sooty Albatrosa
<i>Physeter macrocephalus</i>	Sperm Whale
<i>Planigale maculate</i>	Common Planigale
<i>Procelsterna cerulean</i>	Grey Ternlet
<i>Pterodroma nigripennis</i>	Black-winged Petrel
<i>Pterodroma salndri</i>	Providence Petrel
<i>Ptilinopus regina</i>	Rose-crowned Fruit Dove
<i>Puffinus carneipes</i>	Flesh-footed Shearwater
<i>Sterna albifrons</i>	Little Tern
<i>Sterna fuscata</i>	Sooty Tern
<i>Sula dactylatra</i>	Masked Booby
<i>Syconycteris australis</i>	Common Blossom-Bat
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail
<i>Todiramphus chloris</i>	Collared Kingfisher
<i>Tyto capensis</i>	Grass Owl
<i>Tyto novaehollandiae</i>	Masked Owl
<i>Xenus cinereus</i>	Terek Sandpiper

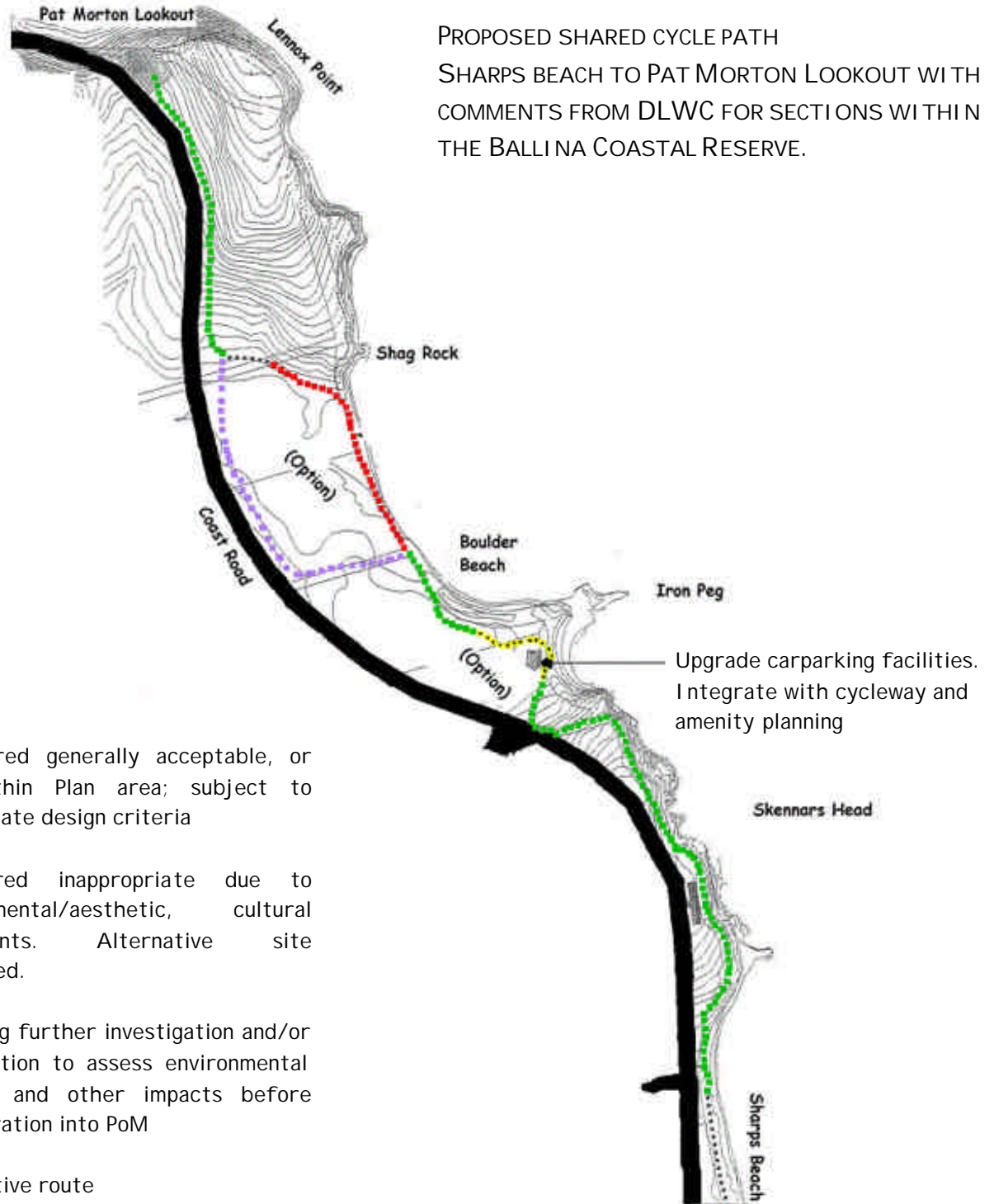
Source: NSW NPWS Wildlife Atlas, 2002.

Appendix F1

PROPOSED SHARED CYCLE PATH BALLINA TO LENNOX HEAD (DECEMBER 2000)

Angels Beach to Sharps Beach with comments from the Department of Land and Water Conservation for sections proposed within Crown Land.





PROPOSED SHARED CYCLE PATH BALLINA TO LENNOX HEAD
(DECEMBER 2000)

Pat Morton Lookout to Lennox Head with comments from the Department of Land and Water Conservation for section proposed within Crown Land.



Legend



Considered generally acceptable, or not within Plan area; subject to appropriate design criteria

