13 Appendices

13.1 A summary of existing plans, strategies and studies and their relationship to the WLEMP

13.1.1 Wallis Lake catchment management plan

The WLCMP advocates an integrated catchment management approach to 'protect and enhance the natural resources and biodiversity of the Wallis Lake catchment and estuary'. Integrated catchment management recognises the inextricable link between land use and water quality and aims to provide holistic solutions that are concurrent with the goals of maintaining estuarine health, human health and local industries. The motto 'healthy catchment = healthy seagrass = healthy future' is born from this philosophy.

The broad objectives of the WLCMP are to ensure that:

- *productive capabilities of the catchment are maintained for the long term*
- *ecosystem services continue to operate in the long term, and*
- *water is of a suitable water quality for all its uses.*

A major concern identified by the catchment community is declining water quality, especially problems associated with increased nutrient and sediment loads to the Lake. Current nutrient loads are unsustainable in the long term and thereby have the potential to adversely impact on estuary functioning in the future resulting in increased occurrences of algal blooms and fish kills.

Other pressures on the sustainable use and ecological functioning of the catchment and estuary identified in this plan include faecal contamination, acid sulfate leachate, habitat loss, weed invasion, sedimentation of waterways and erosion.

Some of the resultant actions from the WLCMP include:

- implementation of waterskiing and wakeboarding restrictions on the Wallamba River
- an oyster lease maintenance dredging program is close to completion
- establishment of a riverbank erosion program on the lower Wallamba River
- water and sediment quality studies during spring and summer months
- development of a seagrass monitoring program
- ensuring all new houseboats contain greywater holding tanks
- increasing community awareness of estuarine biodiversity conservation (through avenues such as the HLP)
- mapping of catchment vegetation
- development of property agreements for areas of regionally significant vegetation or habitat
- implementation of the Wallis Lake stormwater source control study, and
- providing financial assistance to landholders to fence off cattle from riparian zones through a devolved grant system.

13.1.2 The Lower Wallamba River rivercare plan

The Lower Wallamba River rivercare plan, 2003, is designed to assist landholders with the restoration and sustainable management of the estuary for future generations. Recommendations for on-ground works for each property and broad estuary management strategies and options are communicated for the ~27 km of estuary and surrounding land the plan covers.

This plan aims to address existing problems along the Wallamba River and assist landholders in making educated property management decisions that are consistent with the objectives of the business as well as the long term ecological health of the estuary. More specifically, the plan seeks to identify strategies to restore, rehabilitate and maintain the estuarine environment by:

- reducing the impact of stock on the riparian zone by fencing and providing alternative shade
- determining best management practices of foreshore reserves to improve and protect natural values of the river and lake system
- recommending GLC investigate the possibility of dedicating all foreshore reserves for environmental protection
- recommending Waterways develop a boating management plan
- assessing the long term impacts of waterskiing and wakeboarding on the Wallamba River and mitigating these effects as necessary, and
- improving fish passage in the Wallamba River.

All stakeholders from the community, local government and state authorities were involved in the development of the plan and hence implementation of the plan is a collaborative effort from all of these groups. Every 5 yrs the plan will be formally reviewed by GLC to assess the effectiveness of the rivercare planning process. This plan will replace the Wallamba River Bank Erosion Management Plan that was prepared in 1997.

13.1.3 Wallis Lake foreshore management plan

At present there is no plan to manage the Wallis Lake foreshore on an estuary wide basis. As recommended in the WLCMP, a holistic foreshore management plan needs to be developed and implemented for Wallis Lake to protect important and sensitive areas such as mangroves, salt marshes and areas susceptible to erosion.

Foreshore management plans already in existence for certain areas of the Lake would be reviewed and become chapters of the Wallis Lake foreshore management plan.

13.1.4 Great Lakes waterways recreation strategy study

The Great Lakes waterways recreation strategy study was conducted to coordinate recreational use and the provision and maintenance of infrastructure to facilitate recreational waterway usage. This strategy aimed to:

- establish an inventory of existing facilities
- identify present and future demand for recreational boating facilities
- determine the adequacy of the current facilities, and
- determine suitable sites for new facilities.

The 'facilities' managed in this strategy were public boat launching ramps and jetties, and the ancillary facilities associated with these including: lighting, toilets, play areas, car parking, fish cleaning tables, taps, signs, picnic tables, BBQs, shelters, rigging areas and fish weighing structures. In addition to this the issues of dredging for navigation or access purposes, pumpout facilities and the provision of moorings were addressed.

With boat ownership and population growth increasing and road conditions improving from major city centres, demand on these facilities and use of the Lake is set to increase especially during peak periods. An important action to emerge from this strategy for Wallis Lake was to determine the sustainable carrying capacity of the Lake for recreational boat usage. Once this is known recreational boat usage can be managed at a sustainable level by limiting facilities such as ramp parking space and controlling overflow parking during peak periods.

The Parks and Recreation Department of GLC are currently updating this strategy.

13.1.5 Wallis Lake stormwater management plan

The Wallis Lake stormwater management plan was determined how best to allocate council funds in addition to the $400,000 grant provided to GLC by the Commonwealth Government under the *Commonwealth Coasts & Clean Seas Program*. This plan recognises that in addition to 'end-of-pipe' stormwater pollution control measures at the Lake interface, management must occur at the source for long term significant reductions in stormwater pollutants to occur.

The overall objectives of this plan are:

- to identify and rank land uses and sub-catchments which are significant contributors of pollutants to sensitive waterways, and
- to identify, evaluate and rank stormwater quality control options for reducing pollution from sub-catchments identified as being significant contributors of pollution.

The *Wallis Lake stormwater source control study* helped to rank and prioritise sub-catchments for stormwater management purposes. For this study the export of nitrogen, phosphorous, sediments and *Escherichia coli* from various sub-catchments was determined using the catchment model AQUALM-XP.

Special priority was given to environmentally sensitive areas and areas where the receiving waters had considerably long residence times. Long residence times mean that organisms are exposed to pathogenic and heavy metal pollution for a longer period of time, and that nutrient pollution is biologically available for a longer period of time increasing the risk of excessive plant growth in receiving waters.

Areas of highest priority for stormwater quality management were sub-catchments in Forster that drain the more densely developed parts of Forster, including the golf course. These sub - catchments drain into Breckenridge Channel and Pipers Creek which are areas used for primary contact recreation and oyster growing, and sensitive areas with confined flow respectively.

Recommendations made in this plan include major and minor-engineered measures, economic and community based measures and infra-structural measures.

Actions that were a direct or integrated result of this plan include:

- the construction of artificial wetlands at Townsend Street, Bramble Parade, Goldens Road and Kularoo Drive
- installation of GPTs in Pipers Creek, and on Little Street in Breckenridge Channel
- the employment of a stormwater education Officer, and
- development of a stormwater strategy for the Pipers Creek catchment L leg.

It is recommended in this plan that stormwater pollution in Wallis Lake that is diffuse (or non-point) in origin is best managed by following the actions of the WLCMP.

This plan is to be updated by GLC in 2004.

13.1.6 Healthy lakes program

The healthy lakes program was initiated by GLC in mid 2001. The program was initially designed as an educational tool for the entire community to convey information on the health of the catchment and estuarine system. It has since evolved into a partnership between the community and council and now oversees a number of self-sustaining community-run projects designed to monitor, maintain and improve water quality in the Wallis Lake estuary system.

The program is primarily directed at businesses, builders and residents, as a coordinated approach to environmental best practice by these community groups could potentially result in considerable improvements to water quality.

At present there are approximately 120 participants in the healthy lakes business program (HLBP) that is designed to assist a range of businesses in developing and implementing best environmental management strategies.

The development of residential sub-catchment programs has facilitated the dissemination of information regarding the environmental issues of individual sub-catchments. Residents are educated on the areas within their sub-catchment that need addressing and the possible impacts that activities of individual households can have on Wallis Lake water quality. Workshops run by council concerning issues such as gardening practices, residential carwash and revegetation programs are to begin in 2004 with the aim of providing each group with the tools to manage their own sub-catchment.

As part of the HLP, members of the building and development industry are working with GLC to produce a DCP regarding water sensitive urban design. The plan will cover the scale from the entire development to the individual allotment. The need to produce a DCP that is workable with the industry is recognised and has resulted in regular site tours and training groups by council. Further, both internal and external reference groups have been set up as part of this process and collectively decisions will be made on the type of DCP and what it will include.

An extension of the HLP is the seagrass monitoring program initiated in 2002. Seagrass is a very sensitive indicator of pollution and hence serves as a barometer of catchment health. This program is coordinated by GLC and has overseen the training of members of the community, industry, Great Lakes Environmental Association and GLC in techniques and equipment to monitor seagrass beds within Wallis Lake on a seasonal basis.

In addition to the above mentioned programs and projects a number of constructed works and services are also coordinated under the HLP, such as the provision of litter baskets and construction of artificial wetlands and gross pollutant traps.

13.1.7 Darawakh drainage management plan

The Darawakh drainage management plan was recently drafted in September 2003 to improve water quality discharges which are adversely affecting the estuary ecology, recreational amenity, oyster aquaculture and fishing industries. Past drainage works in the Darawakh wetland and Frogalla swamp have disturbed acid sulfate soils, exporting acid products and resulting in severe water acidity in the mid to upper reaches of the Darawakh drainage system (Curlew Biological Services, 2000). This water, along with large quantities of iron mobilised by the acid, ultimately makes its way into the Wallamba River, which is significantly impacted especially during periods of heavy rain and hence high flow.

This project was critical in providing landholders with an understanding of the water quality issues they currently face. Community engagement was an integral part of this plan in order to gain knowledge of local drainage patterns and drainage requirements and devise a range of remediation works and management strategies that will be embraced by landholders. Much of the outcomes of this plan rely on voluntary landholder adoption of the recommended management strategies, therefore emphasis was placed on developing 'home-grown', low cost and low impact solutions over highly engineered, costly measures.

Some of the proposed management actions are to:

- block the flow of acid groundwater leaving the study area via the constructed drains
- reinstate the natural overland flows of surface water leaving the study area via the original channel and floodway of Darawakh Creek
- reinstate tidal exchange and natural flood flows through the lower reaches of Darawakh Creek by removing the derelict floodgate headwall at the mouth
- remove all cattle from the wetland
- consolidate the wetland into a single landholding for environmental management purposes, and
- establish a process whereby landholders can achieve increased development entitlements on the dryland parts of their holdings as an equitable offset for dedicating their wetlands to Great Lakes Council for acid drainage remediation purposes.

However, in addition to the above actions it was acknowledged in the plan that the most cost-effective option in the long term may be land acquisition or some other means of transferring use rights.

13.1.8 Estuary general fishery management strategy

The estuary general fishery management strategy was prepared by NSW Fisheries in 2003 to comprehensively manage the State's commercial estuarine general fishery. This fishery targets around 80 species using 17 different types of fishing gear in approximately 100 estuaries that are either permanently open or temporarily open and closed on the NSW coast. The long term goal of this strategy is:

> *To have a more profitable Estuary General Fishery with a smaller number of operators which provides the community with fresh local seafood and bait, and uses fishing gear in an ecologically sustainable manner.*

Although not specific to Wallis Lake, many of the recommendations in the strategy will significantly affect the manner in which the Wallis Lake fishery is conducted due to the habitat values in the area. Fore example, it is recommended that a code of conduct be developed for activities operating on or near seagrass, saltmarsh or mangrove habitat. Given that Wallis Lake contains 20% of the State's seagrass and 7% of the State's remaining saltmarsh communities, a recommendation such as this will more greatly affect the Wallis Lake general fishery.

This strategy comprehensively addresses many of the issues faced by the commercial estuary general fishery, however at this stage very little is known about the recreational fishery. Recreational fishers target many of the same species as commercial fishers, yet the recreational fishing effort and catch is not known. This will need to be assessed in Wallis Lake and the rest of the State's estuaries in the near future to holistically manage the resource.

13.1.9 Forster/Tuncurry conservation and development strategy

The conservation and development strategy represents a 20 year framework for future development in the Wallis Lake area. Recently drafted in September 2003, it aims to:

- identify and protect significant environmental assets (the conservation framework)
- identify land suitable for future urban growth (urban development strategy), and
- provide a framework for providing orderly, efficient and qualitative growth.

This strategy was strongly influenced by the principles of ecologically sustainable development. Hence it presents a vision for urban growth to occur within the limits of the regional carrying capacity and for all community members now and in the future to maintain and improve their quality of life. In the Wallis Lake context, future urban growth must also be concurrent with the GLC policy of ensuring no nett increase in pollutants to Wallis Lake.

Land suitable for future growth was identified by a stepwise process of first removing areas of significant conservation value such as National Park; State Forest; corridors; key, high and medium habitat value areas; aquifer and recharge areas; SEPP 14 and SEPP 26 areas. Then the land left over from this step was assessed for its suitability for development based on the location or capacity to provide community services and infrastructure.

Based on this process, areas with high potential for future development are:

- Nabiac
- Point Road, Tuncurry
- Pipers Creek, Forster

- South Forster
- Green Point, and
- Smiths Lake.

This strategy will ensure that any future development that occurs in these identified areas will be strategic in terms of the timing of release of land and design to ensure maintenance of green areas, thus preventing urban sprawl.

Recommendations from the conservation strategy were employed in the CDS, however this will soon be replaced by the biodiversity strategy that is currently being prepared. When this occurs it is recommended that the conservation zones of the CDS be reviewed.

13.1.10 Wetland management strategy

GLC aims to begin preparing a wetland management strategy in 2004 to addresses the recommendations made in the wetlands action plan of the WLCMP. The anticipated goals of this plan will be to identify the wetland areas in Wallis Lake, apply for RAMSAR listing of the wetlands under the international convention, and then implement best practice management guidelines and management criteria under the RAMSAR convention to conserve and enhance existing wetlands.

13.1.11 Identification of urban and rural inputs to sediments in Wallis Lake – Chief Investigators: Logan G. A., MacPhail M., Fredericks D., Smith C. and Heggie D. (2001)

This study was conducted in response to the identification of nutrient and animal faecal pollution in areas of Wallis Lake during the estuarine processes study (Webb, McKeown and Associates). In order for adequate management controls to be implemented addressing this issue more information was required on the sources and sinks of this pollution. This is typically a difficult task due to the physical processes of tides and run-off as well as other climatic and biological factors contributing to the complex movement of pollutants once they have entered the estuarine environment.

Lipid biomarkers and pollen analysis were used in this study as tracers of nutrient and faecal pollution. Lipid biomarkers are of biological origin and can be very specific to groups of organisms such as types of phytoplankton or terrestrial plants. In addition to this certain biomarkers can be used to assess the source and degree of faecal contamination.

Different types of pollen can be visually distinctive, and can therefore be traced back to the parent plant or plant communities. This allows an indication of various sediment sources and sedimentation rates within Wallis Lake.

The composition of lipid biomarkers and pollen in sediment samples at potential end members of rural and urban inputs was assessed. The lipid biomarkers and pollen composition was found to be indicative of certain catchments, thus allowing the input of organic matter into the Lake from these areas to be mapped.

No evidence of faecal input was found at any of the sites surveyed. However, herbivore faecal contamination was detected in sediments at the end member sites of the Wallamba and Coolongolook/Wang Wauk Rivers.

This study identified a number of indicators that can be used to monitor faecal contamination in sediments and sedimentation rates. These indicators will prove to be very useful when assessing any potential benefits from implementation of estuary and catchment management programs for erosion or nutrient/faecal pollution control.

13.1.12 Benthic nutrient fluxes in Wallis Lake – Chief Investigators: Smith C. S., Heggie D. T., Fredericks D. J., Palmer D. W. and Logan G. A. (2000 and 2003)

Benthic nutrient fluxes are a measure of the transport of nutrients between the bottom sediments and the overlying water column. By quantifying these transports we can calculate the denitrification efficiency of benthic sediments.

Denitrification is an important natural way for estuaries to cleanse themselves of excess nitrogen. It is a process by which nitrogen from plant organic material is converted to nitrogen gas by denitrifying bacteria and lost to the atmosphere. If this process is not operating efficiently, the organic nitrogen is instead converted to dissolved inorganic forms (nitrate, nitrite and ammonia) and is available for plant growth.

If the dissolved inorganic nitrogen concentration exceeds the assimilative capacity of the system, eutrophication can occur. Eutrophication is a process of excess plant growth resulting in algal blooms, particularly of phytoplankton and free floating macroalgae. This is particularly detrimental to seagrasses, which can then be out-competed due to shading.

Therefore by measuring the benthic nutrient fluxes of Wallis Lake sediments assessments can be made on the trophic state of the water body and risk of eutrophication at specific study sites.

Two studies were conducted whereby the benthic nutrient fluxes were measured under winter conditions (June 2000) and summer conditions (Feb 2003) at 6 sites in total (Pipers Creek, Wallis Creek and Central Basin, Muddy Creek, Coolongolook and Wallamba Rivers). In winter sediments from all sites were found to have high denitrification efficiencies (66-100%), especially in comparison with other Australian estuaries. However, during summer the denitrification efficiencies measured were reduced with higher amounts of ammonia being released from sediments. This was particularly the case at the Pipers Creek site with a summertime denitrification efficiency of just 38%. This value is below the 40% value that is thought to be an important indicator of deteriorating water and sediment quality.

A number of processes are thought to influence denitrification efficiencies in sediments including the oxygen concentration of the overlying water, irrigation by infauna, carbon loads to the sediments and the presence of benthic algae and vascular plants. In Wallis Lake, particularly at Pipers Creek, it is likely that one or more of these factors is altered under summertime conditions and detrimentally affects denitrification efficiencies.

Therefore during summer there is a greater flux of ammonia out of the sediments into the water column increasing the risk of algal blooms and eutrophication. This risk is enhanced even more with the warmer water temperatures experienced during summer.

13.1.13 The Wallis Lake catchment assessment – Water quality program – Chief Investigator: Carter G. (1998 – ongoing)

This study was designed and is conducted by DIPNR to assess water quality entering the Wallis Lake estuary system from the freshwater catchment. The program involves sampling the freshwater end point of the Coolongolook, Wang Wauk and Wallamba Rivers for nutrient, sediment and faecal material on a monthly basis. Event based sampling is also conducted to assess the water quality entering the system during periods of heavy rainfall.

Under dry base flow conditions, water quality parameters meet the criteria of the ANZECC (2002) guidelines and faecal coliform levels are low. During periods of heavy rainfall total nitrogen and total phosphorus concentrations double and faecal coliform levels increase by up to ten fold that of base flow conditions. The two more agriculturally developed catchments, the Wallamba and Wang Wauk, demonstrated the highest values.

This program provides a valuable long-term data set to characterise baseline conditions of water quality. It will also serve as a useful monitoring program to assess improvements in water quality resulting from the implementation of remedial measures in the catchment. However, at this stage the program does not allow determination of the nutrient, sediment and faecal coliform dynamics once they have entered the estuarine system.

13.1.14 Nutrient tracing and performance testing of water quality for catchment management in NSW estuaries – Chief Investigators: Moore S. K. and Suthers I. M. (2001 – 2004)

Water quality in estuaries is a major component of all Estuary Management Plans, with implications for tourism and human health. The aim of this project is to develop water quality testing methods to assess nutrient flows under flood and low flow regimes, and thereby develop general tools for assessing environmental rehabilitation efforts. This is a collaborative project with the University of New South Wales and will be completed towards the end of 2004.

The project focuses on identifying nutrient sources in impacted catchments and determining the extent to which these nutrients are entering the estuarine food chain. The flow of nitrogen has been traced using a technique called stable isotope analysis. This technique uses the ratio of the heavy to light isotopes of nitrogen (^{15}N:^{14}N) to provide a 'marker' to trace energy transfers through food chains. Being stable, the isotopes do not degrade, are not radioactive and occur naturally in the environment.

To determine the contribution of nutrients from the Wallamba River catchment to the estuarine food chain, the Pygmy mussel is used as a biological indicator. The nitrogen stable isotope ratio for various man-made nutrient sources is compared with that of the Pygmy mussel. It has been found that dense beds of Pygmy mussels are acting as a sink for much of the nutrient load entering the river. Both the stable isotope work and the results of a simple coupled physical-biological model developed for the Wallamba River support this. Therefore the Pygmy mussel could be playing a substantial role in the ability of the Wallamba River to assimilate much of the nutrient loads entering the estuary from this sub-catchment.

The development of the Pygmy mussel as a biological indicator will be beneficial for the cost/benefit of the rehabilitation and preventative management of Wallis and Smiths Lakes by GLC.

This project is also assessing zooplankton size frequency distribution as an indicator for nutrient enrichment in Wallis Lake. Zooplankton are microscopic animals, mostly crustaceans, that live in the water column and have little control over their position in the water column. As a result of their poor swimming ability they are largely at the mercy of the tides and currents.

The number of zooplankton in different size classes can be an indicator of nutrient enrichment. Part of this research is to determine if this technique can be applied to Wallis Lake. If successful it will allow monitoring bodies the ability to obtain real time information on the productivity (and hence nutrient status) of the Lake using a towed body called the Optical Plankton Counter.

13.1.15 Seagrass change assessment using satellite data for Wallis Lake – Chief Investigators: Dekker A. G., Anstee J. M. and Brando V. E. (2003)

Seagrasses are important in maintaining the healthy functioning of estuarine ecosystems. Nutrient cycling, provision of habitat for larval fish and crustaceans and stabilisation of sediments are just some of the benefits of seagrass beds. Seagrasses are also very sensitive indicators of pollution and are hence considered to be a barometer of catchment health.

Before the distribution of various seagrass species can be used in the ongoing assessment of catchment and estuarine health the natural variability in seagrass coverage must be known. To assess this long term data sets are required to achieve this as seagrass coverage can change naturally following wet years with higher frequencies of storms. This increases sediment loads to the seagrass causing shading and scouring.

This study used 14 years of satellite imagery of Wallis Lake to assess long term changes in seagrass communities due to both natural and anthropogenic causes. Landsat satellite images are 'calibrated' with advanced processing methodologies using *in situ* field data to achieve optical closure.

Between 1988 and 2002, there seems to be a gross loss *Zostera* spp, and little change in coverage of other seagrass species such as *Posidonia australis*, *Ruppia* sp and *Halophila* sp. Therefore future management and research efforts should be invested in determining the reasons for this change, be it natural or anthropogenic. This methodology is now a valuable tool in estuarine management and can be used to assess and predict any effects of current and future management practices.

13.2 The Wallis Lake Estuary Management Committee

The following is a list of the major stakeholder groups represented by the Wallis Lake Estuary Management Committee as of February 2004.

Amateur and Recreational Anglers

Department of Environment and Conservation (formerly National Parks and Wildlife and the Environment Protection Authority)

Department of Infrastructure, Planning and Natural Resources

Department of Lands

Forster Local Aboriginal Land Council

Great Lakes Council representatives

Great Lakes Environment Association

Local community representatives

MSB Waterways

NSW Fisheries

Oyster Farmers Association

Wallis Lake Commercial Fishing Cooperative

13.3 Submissions and consultations

Stakeholder consultations			
Adrian	Clayton	Pacific Palms Kayak Tours	Pacific Palms
Andrew	Read	NSW Fisheries	Taylors Beach
Anna	Kaliska	Midcoast Water	Taree
Anthony	Sciacca	Sciacca MW & EA P/L Oyster Farmers	Tuncurry
Ashley	Love	National Parks and Wildlife Service	Coffs Harbour
Bill		Amaroo Cruises	Forster
Bob	Watson	Boatshed No 1	Forster
Bob	Williamson	MSB Waterways	Forster
Brian	Brooker	Manager Environmental Services, Great Lakes Council	Forster
Brian	Hooper	Community Representative	Coomba
Brian	Salvia	Community Representative	Tuncurry
Brian	Semple	Department of Infrastructure, Planning and Natural Resources	Taree
Bruce	Nelon	NSW SafeFood	Newington
Cam	Cocchini	Department of Lands	Taree
Charlie	Hewitt	Oceanwatch	Pyrmont
Chris	Atchison	Department of Lands	Taree
Chris	Maconachie	Forster Marina Harbour Master / Forster Beach Caravan Park	Foster
Col	Worth	Wang Wauk Landcare Group	Coolongolook
Colin	Malakou	Tikki Boatshed	Forster
Damian	Ogburn	Principal Manager Aquaculture, NSW Fisheries	Taylors Beach
Dave	Rissik	Estuaries Branch, Department of Infrastructure, Planning and Natural Resources	Sydney
David	Bortfield	Manager Parks and Recreation, Great Lakes Council	Forster
David	Turner	Department of the Environment and Conservation	Booti Booti
Deb	Dixon	Economic Development Manager, Great Lakes Council	Forster
Don	Scifleet	Community Representative	Tuncurry
Don	Sheffield	Forster Keys Progress and Ratepayers Association	Forster
Donna	Donovan	Community Representative	Coomba
Fay	Logan	Community Representative	
Geoff	Foster	Department of Infrastructure, Planning and Natural Resources	Taree
Gerard	Tuckerman	Manager Natural Systems, Great Lakes Council	Forster
Glenn	Handford	Director Planning and Environmental Services, Great Lakes Council	Forster
Graeme	Watkins	Midcoast Water	Taree
Greg	Donovan	Community Representative	Coomba
Greg	Golby	Community Representative	Forster
Gus	Pelosi	Estuaries Branch, Department of Infrastructure, Planning and Natural Resources	Sydney
Ian	Andrews	Community Representative	
Janet	Hardacre	Green Point Landcare Group / Green Point Progress Association	Green Point
Jim	Hamilton	Shalimar Ski and Caravan Park	Tuncurry
Jolanda	Nayutah	Forster Local Aboriginal Lands Council	Forster
John	Martindale	National Parks and Wildlife Service	Coffs Harbour
John	Murrell	Forster Keys Progress and Ratepayers Association	Forster
Kath	Smith	Great Lakes Environment Association	Forster
Kerrie	Simmons	Parks Officer, Great Lakes Council	Forster
Lynn	Duffy	Recreation Officer, Great Lakes Council	Forster
Malcolm	Thompson	Royal Volunteer Coastal Patrol	Forster
Martin	Angle	District Inspector, NSW Fisheries	Foster
Mathew	Bell	Environmental Officer, Great Lakes Council	Forster
Matt	Periera	Wallis Lake Fishermen's Cooperative	Tuncurry
Peter		Free Spirit Cruises	Forster
Phil	Foggerty	Department of Infrastructure, Planning and Natural Resources	Taree
Richard	Bath	Department of the Environment and Conservation	Newcastle
Richard	Pratten	Paradise Marina	Forster
Rob	Yettica	Forster Local Aboriginal Lands Council	Forster
Roger	Busby	Manager Strategic Planning, Great Lakes Council	Forster
Ross	Bowen	Great Lakes Environment Association	Charlotte Bay
Scott	Carter	NSW Fisheries	Taylors Beach
Stacey	Tyack	Stormwater Project Officer, Great Lakes Council	Forster
Steve	McCorrie	NSW Fisheries	Taylors Beach
Steve	Verdich	Verdich MS & Sons P/L Oyster Farmers	Tuncurry
Vicki	Simpson	Coomba Progress Association	Coomba
Warren	Ireland	Wallamba Ski Lodge	Tuncurry

Registered oral submissions during public meeting			
Bob	Porter	Community representative	Forster/Tuncurry
Bruce	Parsons	Community representative	Forster/Tuncurry
Bryon	Boyd	Community representative	Forster/Tuncurry
Danny	Elliott	Wallis Lake Fishermen's Cooperative representative	Tuncurry
Don	Sheffield	Community representative	Forster/Tuncurry
Garry	Cain	Community representative	Forster/Tuncurry
George	Beverly	Community representative	Forster/Tuncurry
Gerard	Tuckerman	Manager Natural Systems, Great Lakes Council	Forster
Greg	Golby	Community representative	Forster/Tuncurry
John	Weate	Councillor, Great Lakes Council	Forster
Kath	Smith	Great Lakes Environment Association	Forster
Naomi	Stephenson	Assistant Environmental Officer, Great Lakes Council	Forster
Phil	Baker	Community representative	Forster/Tuncurry
Ronald	Cook	Community representative	Forster/Tuncurry
Ross	Betts	Community representative	Forster/Tuncurry
Thomas	Keys	Community representative	Forster/Tuncurry
Registered written submissions			
Greg	Graham	Community representative	Coomba
Jim	Fletcher	Community representative	Failford
Roy	Simon	Community representative	Forster
Trevor	Cooper	Community representative	Green Point

13.4 Letter to landholders

Contact: Ms Stephanie Moore
Telephone: (02) 6591 7301

21 November 2003

Dear Sir/Madam

RE: WALLIS LAKE ESTUARY MANAGEMENT PLAN

Great Lakes Council is currently developing an Estuary Management Plan for Wallis Lake. This plan will be undertaken in partial fulfilment of the New South Wales Government's Estuary Management Policy (1987) which aims to achieve integrated, balanced and ecologically sustainable use of the State's estuaries.

The Wallis Lake Estuary Management Plan will serve as a framework to guide all 'on- and in- water' and water edge management actions for the Lake and its associated tributaries.

The ultimate goal of the plan is to produce a schedule of workable management strategies that have been developed with and are endorsed by all stakeholders in the Lake including the community, local government and state authorities. For this goal to be achieved it is important that consultation occurs so that any community concerns regarding the social, environmental, recreational and commercial amenity of the Lake can be dealt with in the Estuary Management Plan.

All values and users of Wallis Lake are to be considered when developing strategies to achieve the following objectives:

- *conservation of aquatic and other wildlife habitat*
- *conservation of the aesthetic values of estuaries and wetlands*
- *prevention of further estuary degradation*
- *repair of damage to the estuarine environment, and*
- *sustainable use of estuarine resources, including commercial and recreational uses as appropriate.*
  [New South Wales Government (1992) Estuary Management Manual]

As a business-owner or property-owner with land bordering the Wallis Lake estuarine area, Great Lakes Council invite submissions and/or the opportunity for direct consultation with Environmental Officers on matters relevant to the development of the Estuary Management Plan.

If you would like to meet with consultants to discuss matters relevant to the plan please contact us before Monday 29 December 2003.

Regards,

Stephanie Moore
Environmental Officer, Natural Systems & Estuaries

13.5 Background to the Wallis Lake region

13.5.1 History of Wallis Lake and cultural significance

Two Aboriginal tribes are known to have inhabited the Wallis Lake region prior to European settlement; the Biripi, who occupied the area between Tuncurry, Taree and Gloucester, and the Worimi, who occupied the land between Barrington Tops and Forster and Maitland and the Hunter River in the south. The local Aboriginal groups were first disturbed by early exploring European timber cutters at the beginning of the nineteenth century after permission was granted to remove cedar from the Great Lakes region in 1816. At this stage no attempt was at settlement and the interaction between the early explorers and Aboriginal people was favourable, with the Aboriginal people guiding some of the explorers over the mountains on occasions.

In 1826 the Australian Agricultural Company trialed a variety of agricultural activities on one million acres of land selected by the Director, John Macarthur, entirely encompassing the Great Lakes district. Many of these trials were unsuccessful due to the moist coastal conditions and in 1832 much of this land, including the Wallis Lake catchment, was surrendered to the Crown in exchange for grazing land in the Tamworth district.

Land was first granted in Nabiac in 1855, and the area was established as a timber shipping site. Land grants occurred in Forster in 1856 and in Tuncurry in 1875, with the area supporting the early industries of fishing, timber cutting and milling, and boat building. The local Aboriginal people contributed a considerable workforce to these early industries in the late 1800s and early 1900s, especially the sheep, cattle, fishing and timber industries. Much of this early Aboriginal workforce was coordinated through missions and stations and wages were paid into accounts controlled by successive Governments. But much of this money never actually went to its rightful owners and the whereabouts of this trust is yet to be located and is currently the subject of a court case between Aboriginal Elders and the Governments of New South Wales, Queensland and Victoria.

After a brief, albeit unsuccessful attempt at mining gold in the area in 1876, harvesting of natural oyster beds and leasing of cultivating territories became an important industry for the local economy in the early 1880s. Oyster aquaculture remains a valuable industry in Wallis Lake today.

Early tourism began in the area in the 1930s with the local Aboriginal people showing European residents in the Forster/Tuncurry area where to dive for lobster and abalone. The tourism industry has since experienced rapid growth, especially following the construction of the Forster/Tuncurry road bridge replacing the punt in 1959. The tourism and retirement industries now dominate the local economy (Marr 2000).

Today over 100 Aboriginal sites have been identified by the Forster Local Aboriginal Lands Council along the waterway and foreshore areas of Wallis Lake. These sites include scarred trees, shell middens, fish traps, campsites, burial sites and tool sites. However, a complete heritage study of the area is necessary to fully realise the rich Aboriginal cultural significance of the Wallis Lake region and foreshores and to formulate protocols with the Aboriginal community to best protect these areas from future developments.

Sites of significant European heritage in the Wallis Lake catchment and foreshores are currently being assessed by GLC through a heritage study to be completed in 2004.

The coastal and estuarine area is highly valued by Forster/Tuncurry residents and visiting tourists alike, and continues to feature prominently in the local Aboriginal culture.

For a more detailed summary of the cultural history of the Wallis Lake region see *The Great Lakes Community Profile* produced by Great Lakes Council (1999). Alternatively, consult the following references:

Doust J. *Past days around Wallis Lake, its rivers and villages*. Great Lakes Historical Society, Tuncurry.

McMaster D. E. *John Wright the settler*. Produced by the Wallamba District Historical Society.

Wright J. *The history of Forster – Tiona, Pacific Palms, Smiths Lake, Coomba, Bungwahl*. Great Lakes Historical Society, Tuncurry.

13.5.2 Natural significance

The Wallis Lake region is of considerable natural significance due to the presence of large areas of diverse terrestrial and aquatic ecosystems. 20% of the State's seagrass beds are located in Wallis Lake, representing the largest single area in New South Wales at 30.8 km^2 in 1985 (West *et. al.* 1985). Seagrasses play a major role in the estuarine processes of nutrient cycling, stabilisation of sediments and in the provision of habitat for many commercial species larval fish and invertebrates. Therefore the presence of such large beds of seagrass in Wallis Lake is most certainly an asset that must be protected and enhanced.

In addition to the presence of significant beds of seagrass, Wallis Lake is home to 7% of the remaining saltmarsh in NSW, 0.786 km^2 of mangroves and 70 areas of SEPP 14 wetlands (West *et. al.* 1985). These areas play a very important role in filtering sediments and nutrients from land based run-off before it enters the estuary, stabilising coastal sediments, provision of detrital matter for coastal food chains, and as habitat for many species of birds, fish and invertebrates.

An extremely diverse community of bird life can be found in Wallis Lake with over 140 species being regularly observed. Of these 12 species are classified as vulnerable and 2 as endangered under the Threatened Species Conservation (TSC) Act (1995). A further 52 species are protected under the international agreements of the Japanese Australia Agreement for the Protection of migratory Birds, Birds in Danger of Extinction and their Environment (JAMBA) (1974), and the Agreement between Australia and the People's Republic of China for the Protection of Migratory Birds and their Environment (CAMBA) (1986) (Webb, McKeown and Associates 1999).

In addition to the vulnerable bird species of Wallis Lake, 2 species of reptiles and 9 species of mammals that regularly use the Wallis Lake estuary adjacent land are identified as vulnerable under the TSC Act 1995 (Webb, McKeown and Associates 1999). A further 2 plant species are classified as vulnerable and 1 plant species listed as endangered.

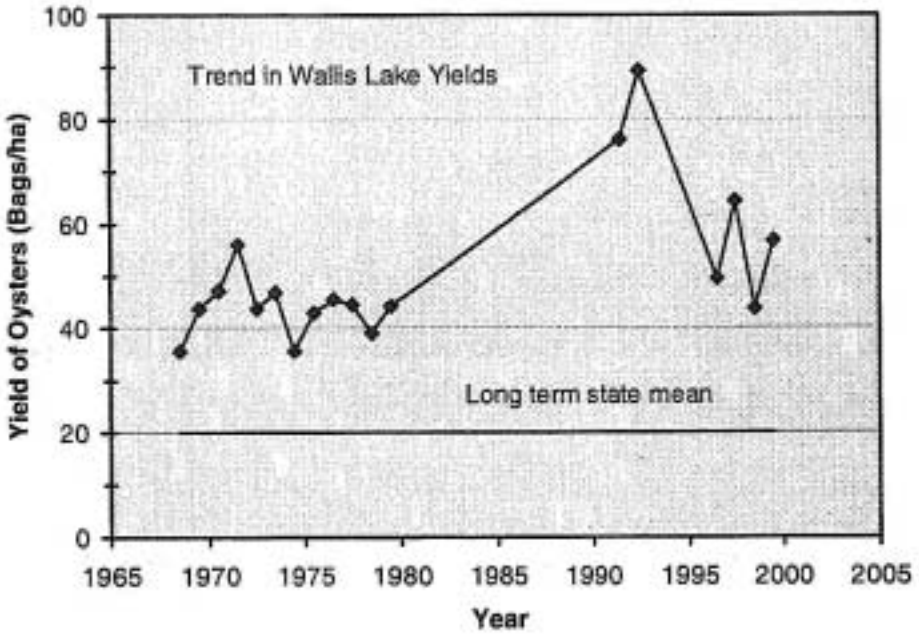
13.5.3 Industry

The aquaculture, fishing, and tourism industries continue to grow in the Wallis Lake area. As of 2001 the local commercial fishing industry was valued at $2 million pa, oyster aquaculture industry at $8 million pa, the dairy industry at $3 million pa, beef production at $1.5 million pa, and the tourism industry in excess of $124 million pa (Great Lakes Catchment Management Steering Committee 2001; Australian Bureau of Statistics). Most of these industries directly depend upon the health of the Lake system.

Further to these industries, urban development remains a growth area for the region meeting the needs of the growing population. As of the 2001 census, the population of the twin towns of Forster/Tuncurry and the surrounding villages was 21,000 and growing at rate of 2.1% pa. One of the goals of this plan will be to allow the growth of all of these industries to continue in a sustainable way with no nett increase in pollutants to the Lake.

13.5.4 Estuary Productivity

There are 327 oyster leases in Wallis Lake contributing 30.3% (or 20,691 bags) of NSW's oyster production for the period 1995 to 2000, making Wallis Lake the top producing area in the state (White 2001). For the period 1968 to 2000, the average yield for Wallis Lake is 50.3 bags.ha^{-1} *(±14 standard deviation), 250% greater than the state average (White 2001). The peak in 1991/92 is likely due to a temporary shift to selling younger, lower value oysters.



[Figure 12.4.1: The trend in yield of oysters in Wallis Lake for the period 1968/69 to 1999/2000 (Source: White 2001)]

Approximately 8% (or 437 tonnes) of the annual commercial estuarine catch of fish and crustacea in NSW comes from Wallis Lake, making the area the 3rd most productive in the state and supporting

* These figures are slightly biased as an uncertain amount of oysters are transferred to the lake for 'finishing-off' and are reported as a product of Wallis Lake.

84 registered commercial fishermen (NSW Fisheries 2001). This catch is mostly comprised of sea mullet (90,904 kg), dusky flathead (46,384 kg), luderick (33,741 kg), blue swimmer crab (85,703 kg) and school prawn (36,919 kg).

Recreational fishing is a popular activity in the area, especially during the peak Christmas/New Year period. However, although the recreational harvest in Wallis Lake is likely to be quite substantial it is largely unknown. In Lake Macquarie for example, the daytime recreational harvest is 295 tonnes.yr^{-1}, 21 tonnes.yr^{-1} less than the declared commercial production (excluding prawns, pipis and cockles) (Steffe & Chapman 2003).

13.6 Best practice guidelines for human – dolphin interactions

13.6.1 In water guidelines

- maintain a small number of people to dolphins in the water
- do not enter the water abruptly when dolphins nearby
- keep activity minimal, especially if dolphin nearby
- no loud noises or sudden movements
- no touching dolphins – if touch is inevitable avoid touching blowhole, eyes/face, genital region, flippers, dorsal fin, flukes, and don not wrap arms around or restrict dolphin movement in any way
- never chase dolphins
- leave the water immediately if dolphin exhibits sexual or agonistic behaviour directed at humans
- do not present inorganic objects or rope to dolphins, and absolutely no feeding
- no flash from camera, sunscreen, repellent or jewellery

13.6.2 Vessel operator guidelines (eg motor boats, yachts, kayaks, canoes, surfskis, inflatable craft)

- do not travel faster than dolphins when within caution zone of 150m
- do not approach closer than 50m to any dolphin
- no sudden increase or decrease in speed
- no cast fishing lines or setting nets nearby
- do not operate twin engines in opposite directions
- watch for dolphins before engaging in gear
- do not cut off dolphins (ie no leap frogging to get ahead of animals) parallel or behind follows are recommended
- do not permit more than one boat near a group of dolphins in order to minimise underwater acoustic disturbance
- special care should be taken if a calf is observed with the group, as a dolphin calf cannot dive well to avoid collision with a boat

13.6.3 Craft prohibited for dolphin interactions

- personal motorised craft (jetskis and similar craft), hovercrafts and parasails are prohibited for all cetacean – human interactions
- if using a prohibited craft and a person finds him/herself in the vicinity of a dolphin, he/she should slow down and avoid the dolphin, giving 300m distance between the vessel and the cetacean
- a person on a surfboard should not approach a cetacean within 30m for safety reasons

(Frohoff T. and Frohoff J., 1995; ANZECC, 2000)

13.7 Considerations for assessing boat launching facilities

Tuncurry Point Road
- Progress upgrading as per the *Tuncurry public boat ramp precinct redevelopment*

Forster Regional
- Sealing of trailer parking area

Little Street
- Investigate provision of reserve area
- Sealing of trailer parking area
- Manage conflicts with pedestrian access
- Manage conflicts with swimmers
- Investigate provision of better lighting

Forster Keys
- Investigate provision of better lighting

Green Point
- Maintain gravel access road and ramp (DEC)
- Provide adequate recreational facilities
    - Council approved BBQ
    - Picnic tables

It is recommended that this facility remain gravel and informal due to the shallow waters immediately adjacent to the ramp. A concrete ramp would encourage larger boats to use the facility and this would then require a channel to be dredged through shallow seagrass beds for access.

Pacific Palms
- Excavate sediment that has built up directly in front of the ramp

This sediment has likely built up as a result of the practice of driving boats onto trailers. The propeller pushes sand out from the ramp and piles it up immediately off the ramp causing a deeper hole and then a small shallow 'bar'. This is restricting the size of the boats that can use this facility at present. If the work is done it may decrease the pressure on the Tuncurry Point Road and Forster Regional boat ramps. It is thought that the amount of sediment to be removed is less than 1000m^3 therefore an EIS would not be required (SEPP35).
- Erect a sign advising people to avoid driving boats onto trailers

Coomba
- Provide a fish cleaning area
- Upgrade toilet facilities

The toilets currently at Coomba were relocated from the Forster sports ground and were intended to be a temporary facility only. At present they are overdue for upgrade.

Manns Road
- Maintain gravel ramp

Darawakh Riverview Road
- Repair concrete blocks on ramp that are buckling

Nabiac

- Upgrade to concrete ramp only after agreement formalised restricting water ski and wakeboarding activity to the area between Gereeba Island and the cattle crossing. Once formalised, reassess the 8 knot zone above the cattle crossing (reduce to 4 knot or idle speed only zone)

Once this is completed decommission ***Willow Point Road ramp***