Baldwin Swamp
Bundaberg

Management Plan
2003
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Part A

Summary of Background Information
1 BALDWIN SWAMP AND ITS CATCHMENT

“Baldwin Swamp” is located approximately three kilometres from the centre of the City of Bundaberg. The original area was 58 hectares but was expanded to 77.8 hectares in 2001 with the acquisition of land extending to Telegraph Road. The area can best be described as a network of ponds and channels set in a mosaic landscape of grassland, woodland, open forest and remnant dry vine scrub extending into open sclerophyll forest and Woongarra Scrub remnants.

The wetland is the focus of a 19km sq. catchment area which is characterised by sugar cane farms, expanding suburban development, and light industry estates. The system drains into the tidal reaches of the Burnett River via the mangrove fringed Bundaberg Creek.

2 MANAGEMENT ADVISORY COMMITTEE

For a long time the Baldwin Swamp area was wild and uninviting, with poor access, overgrown with grass, the ponds choked with weeds, and even feral pigs were reported to have roamed the area.

Attempts have been made in the past to rehabilitate the wetland environment. In 1985 the Queensland Parks & Wildlife service, together with the Bundaberg City Council, constructed several walking tracks and boardwalks, and modified some of the ponds and channels. The aim was to provide a wildlife habitat and a natural area for people to enjoy. But this work was not maintained, and in time, the area once again became overgrown.

In February 1992, on the initiative of the Bundaberg City Council, a public meeting was held to discuss the future use, development and management of Baldwin Swamp. From that meeting an Advisory Committee was formed, with the brief to formulate a management plan for the area which encompassed both environmental values and human needs, within the context of the potential and the limitations of the site. The Advisory Committee included representatives from a wide range of community interest groups and private citizens.

The Committee made the recommendation that the area be officially named “Baldwin Swamp”. A logo was designed by primary school students (by way of a competition) featuring the Swamp Hen as the recognisable symbol of the area.

The first Management Plan for Baldwin Swamp was presented to Bundaberg City Council in November 1992. Copies of the Management Plan were also distributed to the Department of Education and the National Parks and Wildlife Service. The Plan was reviewed and refined in 1996. The current plan to include the expanded area was adopted by Council in 2002 -2003.

The Bundaberg City Council and Volunteers from the community have contributed labour and material resources to implement the Management Plan. Some of the tasks have been accomplished and have therefore been deleted from this revised plan. The original Advisory Committee has advised Council during the development of each Management Plan.

3 CULTURAL AND BIOPHYSICAL STUDIES

Subsequent to the completion of the first Management Plan for Baldwin Swamp, the Bundaberg and District Urban Landcare Committee received a Grant from the Save the Bush Fund (under the National Landcare Program) to undertake a series of studies of the Baldwin Swamp area.
The study topics included history, flora, fauna, hydrology, geology and water quality.

The studies were carried out by local specialists in the various fields, and were coordinated by Councillor Janet Tallon from the Baldwin Swamp Advisory Committee.

Four research reports were presented to the Bundaberg and District Urban Landcare Committee in December 1993 at a public presentation held at Baldwin Swamp. Copies of the Reports are available at the Bundaberg City Council Chambers and at the Bundaberg Library.

4 PRÉCIS OF RESEARCH REPORTS

A brief summary of the results of the Baldwin Swamp studies is given below:-

**History, Baldwin Swamp, Comments from P. Leonard's Report 1995**

Early records of the land ownership and the general distribution of the swamp area are available from 1872.

The site was named after William Baldwin a member of a pioneer family who settled the area in the 1870's. In the intervening years little information was recorded and word of mouth anecdotes are scarce.

Almost all the area is flood prone. It is known that the area has been altered by people and time. Several weirs and/or barrages have been installed to limit tidal inundation and to control a variation of water levels. An attempt was made at the turn of the 1900 century to use the site for a city water supply. The East Water Tower was built for this purpose but in a short time an alternative water source had to be found.

It has been used for gravel extraction, cattle grazing, market gardening, a rubbish dump and in 1985-6 the swamp area was dredged to create channels, lakes and islands. It is currently used as a recreational area and is gazetted Conservation Park, Drainage Reserve, Park and Recreation Reserve and Freehold Property held by Council.

**Flora, Baldwin Swamp. Comments by Jim Randall, January 1995**

Although the Flora of Baldwin Swamp has been catalogued this should not be considered definitive or concise work in regard to the past, present or future Flora content. Forces or factors either occurring naturally or unnaturally in the peripheral to the area have and will change the Flora content.

It should be realised that even pristine plant communities are subject to biological and morphological changes due to various factors e.g. Climatic variations, fire erosion and a continuous dispersement of seed according to methods employed by various species.

In areas such as Baldwin Swamp which have been modified to human usage requirements of the past, floristic changes have been such that we may now only be reasonably certain about the boundaries of the original plant communities but not the species contained within.

Flora lists of Woongarra Scrub remnants including the area on Telegraph Road were compiled by Maureen Schmitt in 1997.
**Fauna, Baldwin Swamp, Comments from E. Zillmann’s Report, 1995**

Little recorded information is available prior to Harry Frauca’s observations and records. Eric Zillmann has done listings over the years and of the current state of the area.

It can be assumed that the reptile and mammal diversity is much reduced due to the altering of the environment both by humans and nature. The introduction of domestic animals both for grazing and as pets in the adjacent suburbs has had a devastating effect.

The bird population and its differing varieties has also been affected by major changes to the water bodies, loss of specific habitats and the intrusion of people and domestic animals. 60 to 80 species of birds can be observed at almost any time of the year.

The insect population has changed with the loss of habitat and altering of the predatory species.

With careful management the area is capable of sustaining and of encouraging the increase in species varieties and numbers.

**Hydrogeochemistry, Baldwin Swamp - Comments by M. Johnson, 1995**

About one million years ago, water draining to the Burnett River began to carve a narrow valley along the edge of a lava flow from the Hummock. Eventually a build up of eroded sediment at the downstream end retarded the flow of water which resulted in the formation of the Baldwin Swamp wetland.

Today the wetland is sandwiched between industrial estates and suburban housing developments, its catchment is dominated by sugar cane fields, and most of its tributaries have been turned into concrete drains.

The wetland itself has been dredged, parts filled in, channels relocated and new ponds constructed. Consequently, the water flow pattern in the system is a complex mixture of main channel flow, side channel flow, back flow and stagnant zones. The construction of weirs across Bundaberg Creek changed the wetland from a dynamic tidal system into a relatively static freshwater system. The present weir maintains the pond water levels above the surrounding groundwater levels.

The past intrusion of tidal water into the wetland system has left salt behind in the sediments so that the groundwater in much of the Baldwin Swamp area is highly saline. However the hydraulic connection between the surface water and groundwater is variable, and the water chemistry indicates that some ponds contain only surface runoff water while a small groundwater component is evident in others.

During extreme high tides, salt water from Bundaberg Creek overtops the weir and contributes to the heterogeneous salinity regime of the system.

There is no direct relationship between rainfall and water levels in the ponds due to the effect of the weir, but groundwater levels show a direct response to rainfall. From time to time, accidental or deliberate overflows from irrigation canals in the catchment pours megalitres of “foreign” water (i.e. water from another catchment) into the swamp system. These floodings also affect groundwater level and groundwater salinity.

Bacterial concentrations were high in all of the pond waters, and the dominant algae species present are classified as “polluted water” algae.
It was concluded that the “cultural impacts” on the Baldwin Swamp system have been so great that it no longer performs many of the hydrological and biochemical functions of a natural wetland.

5 NEED FOR A REVIEW

Since 1992, Baldwin Swamp has undergone a transformation. It is now on the tourist route, it is a centre of recreational and community activity for the people of Bundaberg and it has been recognised as a valuable wildlife habitat area.

While many of the recommendations in the 1996 plan have been actioned this further review was necessitated by the expansion of the area to Telegraph Road and chronological review requirements. This newly acquired area includes remnants of Woongarra Scrub, open woodlands and grass lands all of which have been subjected to clearing, wild fires and cattle grazing for at least 120 years. Grazing Leases adjacent to Walker and Mellifont Streets will be transferred to Council when they expire so linking both areas by accessing along Steptoe Street.

Documentation of flora and fauna in the recently acquired area should be undertaken as a matter of urgency to set a base for future management, weed control, plantings and management of feral animals.
Part B

Management Strategies
6 VALUES OF THE BALDWIN SWAMP AREA

From a combination of the results of the background studies and the community interest in Baldwin Swamp, it is possible to identify the elements which give Baldwin Swamp its special values.

Scenic Values

Humans have an intrinsic affinity with the aquatic environment - the abundance of life forms, the reflections in the water surface, the symmetry of the gliding water birds, the mysterious dark reaches of the surrounding vine forest, and the primeval looking Melaleuca Swamps - all contribute to the distinctive scenic value of Baldwin Swamp.

Research has shown that for a large portion of the population, most of the enjoyment derived from wetlands is essentially aesthetic, and that the beauty of nature is a more than adequate reason for striving to conserve it.

The inclusion of the open woodlands and grasslands gives a added variety to experiences of visitors.

Biological Values

While it must be accepted that the Baldwin Swamp environment is not pristine, and that some of the essential biological functions which natural wetlands perform are no longer viable as a result of anthropogenic impacts, the wetlands still constitutes a biological treasure. The site has preserved significant remnants of indigenous vegetation and provides a diversity of terrestrial and aquatic habitats unique in the Bundaberg area.

The planting of site specific plants has increased the biodiversity of the flora community.

Recreational Values

A wetland environment within easy reach of the centre of the City is a valuable asset to the people of Bundaberg and to visitors to the City. The increased area can now link a large percentage of the Eastern suburban expansion through a Natural Corridor to the C.B.D.

Baldwin Swamp forms a contrast to the built environment. It is a place where people can come to walk, to meditate, to watch birds, to picnic, to have group gatherings and to just enjoy the scenery. The increased area, different terrain and plant communities increases its recreational values.

Educational Values

The diverse environment of Baldwin Swamp represents an educational resource for all sections of the community. It presents a ready made field laboratory which can be studied and observed to gain knowledge and understanding of ecological processes.

Community interaction with the Baldwin Swamp ecosystem also presents an opportunity to raise general awareness of the importance of all wetlands and the difference in geology and plant communities in maintaining a healthy environment for the future.

IT IS THESE VALUES WHICH THIS MANAGEMENT PLAN IS DESIGNED TO ENHANCE AND PROTECT
7 REVISED MANAGEMENT AIMS

Vision Statement

To restore and maintain an indigenous habitat for posterity.

Aims

1. To conserve what remains of the natural biological integrity of the wetland and its catchment.

2. Through rehabilitation, to restore a range of terrestrial and aquatic habitats.

3. To promote public awareness, appreciation and use of the wetland and adjacent catchment communities.

4. To establish an attractive tourist destination.

5. To encourage educational groups to use the wetland, Woongarra Scrub and open woodlands with the aim of creating understanding and interest in environmental conservation.

6. To manage the Baldwin Swamp environment so as to maintain the ecological and cultural values for posterity.
8. LAND TENURE

Land Tenure across the whole area is divided into many types eg. Environmental, Conservation, Drainage, Park & Recreation, and Water Reserves and Freehold Land.

Council is currently negotiating with the Lands Department to establish a single Reserve description for all Crown Land. The Freehold land will remain as Freehold.

9. MANAGEMENT ZONES

The area has been divided into “Zones” for ease of reference in the Management Plan (Map 1)

Zone 1

Zone 1 encompasses the area from the Steindl Street entrance to the Shelter Shed and its surrounding area. The area is the centre of recreational activity and contains structured facilities and a car parking area.

The vegetation is mainly grass, with clusters of Casuarinas, Eucalyptus and Dry Vine Scrub. The area is also regenerating indigenous, non-site specific species.

Zone 2

Zone 2 is the area off Scotland Street, backing onto suburban houses along Skyring Street. It is a slightly elevated grassed area almost devoid of trees, which slopes down to the pond area.

Zone 3

Represents an area of Melaleuca and vine forest with some rainforest adjacent to the Shelter Shed. The forest forms a continuum with a shallow, Melaleuca dominant pond.

Zone 4

Refers to a grassed hill dividing the two main lines of drainage in the wetland. The hill is a prominent feature of the Park and is a habitat for ground and grass nesting birds.

Zone 5

Zone 5 is an area adjacent to Steindl Street and is sandwiched between the residences near the entrance to the Park and the Bundaberg Creek drainage pond. The area is devoid of trees and is overgrown with tall Rhodes grass.

Zone 6

Zone 6 encompasses a patchwork of grass and woodland areas interwoven with ponds and channels.

The area has an open appearance and the grass is kept low by slashing. The trees are predominantly Melaleucas and Casuarinas.
Zone 7
A low-lying swampy area which, until recently, was dominated by Para grass but is gradually being covered with Couch grass. The water table is very close to the surface here, and during wet weather water puddles in surface depressions.

Zone 8
Zone 8 is a diverse area bounded by Totten, Hargreaves and Que Hee Streets. One part of it is an extensive area of tall Para grass which borders the ponds. This grades sharply into dense vine forest with a fern understory. The closed vine forest grades into a tall open forest near the Hargreaves Street boundary.

Suburban houses back onto the area along Hargreaves Street. Top soil has been removed from a part of this area (when it was a Gravel Reserve) and this has denuded the grass and exposed the roots of some old Eucalyptus trees.

Zone 9
This is an area of remnant Riparian & “Woongarra Scrub” on the south-eastern side of Que Hee Street. The vine forest borders Bundaberg Creek to the Port Road. The area represents many plant species in a natural setting, but is overgrown with both indigenous and exotic vines.

A series of boardwalks has been constructed in the past to enable access into the area.

Zone 10
Represents the area around a constructed pond, Lake Ellen, and includes the Hargreaves Street drain area. The area has recreational facilities and is accessible from several roads.

The vegetation is mainly grass but tree plantings of variable species has been done over the years.

Zone 11
Zone 11 is the open woodland area bounded by Sheridan, Steptoe, Mellifont Streets and Telegraph Road, it consists of partially degraded open forest with fallen trees and some environmental weeds.

It is an ideal area to give connection from the urban area of East Bundaberg through to the City using park land.

Grazing leases bordering Steptoe, Mellifont and Walker Streets when released will give this connection.

Zone 12
Zone 12 is the Woongarra Scrub remnant left on Telegraph Road. This remnant covers an area of 1.9 ha and laps into the Gympie Estate. As part of the land transfer it was agreed that this area is to be included in the greater Baldwin Swamp.
The remnant is one of the last remaining areas of Woongarra Scrub within the City. The area is degraded and invaded with environmental weeds.

It is valuable as a resource base as plant material for regeneration of a specific plant community almost destroyed since European settlement.

**Waterways**

The Baldwin Swamp waterways have been dredged, relocated and constructed. For the purpose of this Management Plan, the management of the waterways will be treated under a separate management strategy.

**ACTIONS TO DATE WITHIN EACH ZONE SINCE ADOPTION OF THE 1996 PLAN**

**Zone 1**

Extensive tree planting with Dry Vine Scrub species and *Eucalypts* has been done.

**Zone 2**

Tree planting has been commenced in this area.

**Zone 3**

Unchanged.

**Zone 4**

Approximately one third of the area has been planted with trees. This completes tree planting in this area.

**Zone 5**

Extensive tree planting has been done in this area with Woongarra Scrub species.

**Zone 6**

Plantings on one of the islands has increased the variety of trees on the islands.

**Zone 7**

Extensive plantings of “water tolerant” trees to 50% of this area has been done.

**Zone 8**

The areas of Para grass are gradually being decreased by spraying allowing the residual fern beds to re-establish.

**Zone 9**

An attempt to control the Para grass and some tree plantings have been undertaken. "Environmental weeds" and dumping of exotic species from adjacent properties is an ongoing problem. The dominant fig tree has died leaving a large “hole” in the canopy.
Zone 10

The edge of the lake has been re-stabilised with rocks and concrete and the lake deepened to allow easier access for users and weed control.

Log barriers have been installed to restrict vehicle traffic.

10 SUMMARY OF INCLUSIVE ISSUES AND MANAGEMENT ACTIONS

Some of the activities and achievements relating to the overall management of Baldwin Swamp are summarised below. The listing is not in any specific order of priority.

Advisory Committee

The Baldwin Swamp Advisory Committee has been retained by the Bundaberg City council to continue acting in an advisory capacity on issues relating to the management of Baldwin Swamp.

The Committee meets on an "as needs" basis to discuss progress, make inspections and report to and assist Council when requested.

Friends of Baldwin

At a public meeting in July 1994, volunteers from the community formed the "Friends of Baldwin" to assist with the care and management of Baldwin Swamp.

Under the guidance of the Advisory Committee members of the "Friends" carry out regular tree planting, weed removal, indigenous tree propagation and monitoring of the rehabilitation progress. Their effort has greatly increased the tree cover within the area.

A Newsletter on Baldwin Swamp activities and related topics of interest, is produced regularly by members. The first issue was produced in August 1994.

Shelter Shed

A large shelter shed was already on site, in Zone 1, when Council acquired the land from private ownership.

The shed has toilet facilities, gas barbecues and seating. The Shed forms the focus of much of the human activity in the Park, accommodating events such as group meetings, school camps, wedding receptions etc.

Vandalism has been a problem, so now some of the toilets and gas barbecues are kept locked and the Council has to be contacted to book the use of the facilities.

Staff

Permanent on-site staff has been employed by the Council. This person has been employed since 1993. Other staff for specific tasks eg. Slashing and weed spraying come on-site as needed.
Security

In 1994 a private Security Agent was employed to regularly patrol the area and is used on an “as needs” basis when activities warrant supervision. This has been successful in reducing the incidence of vandalism, controlled car and motorbike activities and dog handling in the area.

The presence of the Security Agent also provides a level of personal safety for people using the area.

As usage has increased the presence of people regularly using the area has decreased vandalism.

Government Employment Schemes

A significant amount of work has been carried out by people employed under government employment and training schemes. The participants have planted trees, constructed pathways and boardwalks and installed log barriers and signs.

This work has been enthusiastically carried out but it should be noted that the activity needs to be well supervised. It is suggested that there should be a prior education period to explain the purpose of the work before it is undertaken.

Youth Groups

Youth Conservation Corps groups, under the supervision of the Queensland Parks and Wildlife Service, rehabilitated the original walking track in Zone 9, built boardwalks, planted trees and removed weeds.

Local Schools

Letters were sent to schools in the surrounding area inviting participation in tree planting and educational activities in the Park. Many schools expressed interest and use the area on an ongoing bases for school environmental and citizen ship courses.

Some schools have carried out tree planting, several schools have built bird breeding boxes, and should be encouraged to propagate site specific species for planting.

Lake Ellen

Lake Ellen was constructed in 1982 by the East Rotary Club to accommodate model sail boats. The lake was repaired in 1998 and the whole of the bank rock walled. The rock walls were totally refurbished in 2002.

Facilities at the site include a mobile toilet, barbecues and picnic shelters.

Newly Acquired Area

Specific planning to protect the remnant of Woongarra Scrub is urgently needed. Specific management of the area is to be undertaken. Other plant communities and degraded areas require rehabilitation.
Bundaberg City Council

Bundaberg City Council has continued to support the rehabilitation and management of Baldwin swamp by providing personnel, machinery, materials, plants from Council nursery and commercially, and carrying out the major maintenance tasks in the area.
11 TERRESTRIAL VEGETATION AND HABITAT MANAGEMENT PROGRAM

Objectives

To conserve what is left of the indigenous flora in the area
To re-establish indigenous flora in suitable areas of the park
To provide effective wildlife habitats
To rehabilitate degraded areas
To enhance the visual quality of the area
To establish an educational environment
Overview of Actions to Date

Vegetation planting has been restricted to a species list composed of the indigenous vegetation found at the site in 1993 and to species found in the remnant Woongarra Scrub sites throughout the district.

Before 1996 the planting activity was somewhat ad hoc but since that time plantings have been done within the recommendations of the Management Plan.

Generally, in the drier areas the main species planted have been open Sclerophyll forest plants.

In wetter areas, water tolerant *Eucalypts, Melaleucas, Casuarina* etc have been used.

*Melaleucas* are being planted progressively around the edges of the ponds. Some seedlings are actually in the water when the water level is high.

Some rainforest species have also been planted, these include available and listed flora as detailed in the Baldwin Survey Flora Unit and Woongarra Scrub species. When possible plants propagated from seed collected on site are used.

The planted seedlings were protected with plastic collars and wooden stakes but as the methods used have been refined to suit the site this practice has been discontinued. It has been found that preparation of the site gives the best results. All areas are now ripped and where appropriate mulched prior to planting. The Council Staff assist with digging of the holes and with the assistance of a dedicated volunteer post watering has seen an almost 100% success in some areas.

Vandalism has caused losses at some sites.

Heavy loss in some areas from wildfires has occurred on several occasions. Those plants which develop lignotubes have survived.

Attempts at direct seeding was unsuccessful - destruction of seeds by ants and insufficient rain fall appear to be the main problem. Large seed species appear to be the only survivals of this exercise.

Natural regeneration is also occurring well in areas where slashing is restricted.

Department of Environment “Project Area” below the Council Depot in Zone 6 was planted in November 1993 and now screens the Depot from the Park.

Problematic weeds and exotic plants in the area include:-
- Paspalum
- Para Grass
- Broad Leafed Pepper Tree
- Morning Glory
- Camphor Laurel
- Madeira Vine
- Mother of Millions
- Leucaena and other invasive garden species of weeds and exotic grasses.

Many of these propagate from garden refuse dumped from adjoining properties into the Park. Those which seed profusely and are eaten by birds occur throughout the entire area. Letter box drops have been made to the adjacent property owners and as needed visits have been made by Council Staff. This is an ongoing issue as properties change hands and tenants need frequent reminders of not only the impact on the plant communities but also the water quality in the ponds and channels.

Attempts to remove Camphor Laurel trees, Broad Leafed Pepper Tree and exotic vines, have involved a “slash and swab” method, using herbicides. This has been carried out by Council Staff and volunteers, has been marginally successful and requires long term management.
Manual removal of weeds has also been carried out by the Friends of Baldwin and other volunteers. The refuse is disposed off site to prevent spreading.

There has been considerable success in the elimination of Para grass through constant slashing to enable couch grass to establish in Zone 8. Para grass is progressively being removed from channel and pond edges and banks stabilised with sedges and couch grass to provide habitat and slashed were strategic viewing area are being established.

An extensive grass slashing program has been conducted by Council. Walking tracks have been cut through heavily grassed areas and fire control routes have been slashed in strategic places. Generally tracks are 3 metres wide. Tall grass is retained East of the Totten Street alignment to provide habitat for ground and grass breeding fauna. To the West of the Totten Street alignment the grass is kept low to maintain a recreational environment.

Watering of planted seedlings has been carried out by Council staff and volunteers. Water taps have been installed at three points in the park. Where taps are not available, watering has been by a truck mounted water tanker and buckets. The Council has a small water winch which can use channel water when needed.
**Future Management Strategies**

The current list of indigenous vegetation to be extended to include other species found in the surrounding region which can be assumed to have been present at Baldwin swamp before the area was cleared. Information to be obtained from the Herbarium species lists. In addition, upstream remnant areas in the catchment to be inventoried for information on existing indigenous species and their environmental requirements.

**Responsibility** Friends of Baldwin Advisory Committee

Regenerated species - Friends of Baldwin identify the need of seeds and cuttings to be propagated.

**Responsibility** Friends of Baldwin to apply for supervised Government Job Schemes or Bundaberg City Council for assistance in propagating species

The tree planting guide prepared by the Advisory Committee to be adopted as a long-term plan. Plantings to be carried out as resources become available, but priority should be given to perimeter screen planting.

Bundaberg City Council is to carry out watering programs in the area covered by the water winch. Friends of Baldwin and any supervised government jobs scheme can carry out watering as required in any expanded areas. If other groups conduct planting programs, they are required to carry out a watering program until the trees are established.

**Responsibility** Bundaberg City Council Friends of Baldwin Government Job Schemes

Research is needed into the habitat needs of the native fauna of the Baldwin Swamp area. It is also necessary to increase our knowledge of past and present indigenous flora of the region. There is a need to make Tertiary Institutions aware of the sites potential for post graduate works.

**Responsibility** Application for Research Grants by Landcare Bundaberg City Council Central Queensland University
Vegetation Planting Guide

Zone 1

Area around the immediate vicinity of the residential house and Shelter Shed to be left grassed, but where possible, plant with Dry Vine Scrub species and *Eucalypts* to provide continuity with the vegetation community in adjacent Zone 3.

Intensive planting is needed in the Steindl/Scotland Street corner area to hide from view the elevated industrial area along Steindl Street.

The gully area below the house to be planted up with Woongarra Scrub species.

Zone 2

This area has been cleared of most trees and the grass is regularly slashed which is preventing rehabilitation. Erosion is a problem in parts of this area.

Pond perimeters to continue to be planted with *Melaleucas* and *Eucalypts* to the flash flood level.

Rainforest species such as *Jagera pseudorhus*, *Cupaniopsis anacardioides*, *Flindersia australis*, *Pleogynium timorense*, *Sterculia quadrifida*, *Ficus obliqua*, and *Macaranga tanarius*, could be planted in an area further away from the water but still on the lower, gentle slopes. A defined track is necessary above this area to allow controlled access.

A walking track would allow visitors to enjoy the area once it is established.

The eroded and unsightly stormwater drain at the site should be rehabilitated with wet rainforest species.

Zone 3

This area to be left untouched. All tracks into the area should be rehabilitated with wet rainforest species. The consequences of minimal intervention to be monitored.

Zone 4

This grass hill has been inadvertently burnt, making regeneration very slow. The ridge is rocky and dry so that planted species should be fairly hardy. Suitable species include:-

*Eucalyptus exserta*, *Cupaniopsis anacardioides*, *Melaleuca bracteata*, *Alphitonia excelsa*, *Eucalyptus tereticornis*, *Acacia aulacocarpa*, *Acacia leiocalyx*, *Eucalyptus moluccana* and Woongarra Scrub species.

In addition, nectar bearing species could be planted.

Sufficient trees have been planted in the area and these trees should only be used as replacement after tree loss. The grassed areas are to be left untouched other than for fire control tracks.
Zone 5
This area has been heavily planted with Woongarra Scrub species which have established well. The margin of the channel has been planted with Melaleucas and a walking track is kept slashed to allow pedestrian access through the area.

A narrow grassed area to be left along the Steindl Street edge.

Sufficient rehabilitation work has been undertaken here, this area now only requires maintenance.

Zone 6
The area is a mosaic of ponds, channels and grassed areas. It includes the grassed strip backing onto Skyring Street and continues on west to the weir.

Extensive tree planting has been done adjacent to the Depot and has established well.

The island areas are being systematically planted. The Hibiscus trees will be gradually removed as the plantings continue.

Fig trees and Melaleucas are being planted on the Western island to reestablish the original vegetation.

The pond edges are now well grassed and stabilised.

Zone 7
This is a low-lying swampy area which is presently grassed with Couch grass. The areas which held water have been filled and grassed. Large clumps of trees are now well established.

The area around the Bush Chapel has sufficient tree cover.

Further plantings with figs in this area will complete the tree cover.

Zone 8
This beautiful area needs to be conserved with care. It contains a variety of vegetation communities including a significant area of Dry Vine Scrub, a remnant of the original Woongarra Scrub.

Continue to plant suitable open forest and rainforest species where open areas occur, and to rehabilitate unused walking tracks.

Gradually remove the Para grass and allow fern beds to reestablish and plant pond edges with Melaleucas and sedges.

Leave as is the open forest above the Dry Vine Scrub, but rehabilitate the area where the soil has been removed. Erosion management was investigated and logs were placed across the erosion washes. The soil has accumulated above the logs and trees are beginning to grow.
Zone 9

This major remnant of Riparian and Woongarra Scrub is badly degraded. Discriminate use of herbicides is gradually allowing the fern beds to regenerate.

Rehabilitation with Dry Vine Scrub species, *Melaleucas, Ficus, Macaranga* and vines specific to the area is needed. The major fig tree has died opening a large hole in the canopy.

Continual removal of environmental weeds is needed to assist regeneration. Palm trees which seed in adjacent properties are the major problem.

Zone 10

The area remains as an open grassed area with some shade trees. The East Bundaberg Rotary Club has undertaken to landscape the Lake Ellen surroundings. Plant mounds were installed but due to lack of water most of the plantings failed.

The Hibiscus need to remain along the drain line as they create a very effective filter trap for rubbish which washes down the drain during rain.

Zone 11

The newly acquired area has had no maintenance and occasional wild fires and has been used for grazing.

The area to remain unchanged as open forest. Weed removal should commence.

Zone 12

The area of Woongarra Scrub to be fenced off to protect it from cattle. A fire break to be cut around the outside of the fence.

Removal of environmental weeds to be done as soon as possible after which the planting of site specific trees to be started.

**Note**

When information comes to hand, additions to the vegetation planting list will include species which provide habitat and a food source for specific fauna species. These plantings need to be made in consideration of habitat safety and continuity.

Planting sites selected are dependent on season and water availability.
12 RECREATION AND EDUCATION MANAGEMENT PROGRAM

Objectives

To promote visitor use of the Baldwin Swamp area for appropriate activities

To provide the infrastructure which will facilitate the enjoyment of the Park environment

To foster an awareness and appreciation of wetland and catchment values through the dissemination of educational material

To enhance the opportunities for on-site environmental studies and education

To ensure that the human activities in the Park are compatible with the Vision Statement.
Overview of Actions to Date

Community use of the Baldwin Swamp area for a range of purposes has increased significantly during the past eight years.

There is also community involvement in the care and rehabilitation of the Baldwin Swamp environment.

Baldwin Swamp is now on the tourist route. Information brochures describing the area were compiled by the Department of Environment and now Council has developed an appropriate brochure. Articles featuring the area appear regularly in the Newspapers. World Environment Day, National Tree Day and like day celebrations are held at the site.

Footbridges have been constructed across waterways, linking all areas, seats have been installed at various vantage points. Boardwalks are being built using job creation programmes when available.

Members of Hinkler Lions Club have built a Bush Chapel in the shelter of a cluster of Syzygium and Eucalypts, in the North-west corner of Zone 7. The immediate surroundings have been paved with clay pavers. Trees from the Forestry Department have been planted around the Chapel and are now well established. Weddings are often held at the Chapel.

Numerous walking tracks have been slashed and cement paths leading from the Shelter Shed to the Melaleuca Pond and the footbridge to the west enables wheelchair access.

Several local schools take advantage of the educational opportunities at the site as well as making a contribution to the rehabilitation of the Park.

Information Boards have been placed at the Shelter Shed, the Steindl Street gate and near Lake Ellen featuring walking tracks, vegetation zones and rest areas.

A visitors car parking area has been constructed near the entrance gate on Steindl Street. Logs have placed around trees and at the top of the bank near the Shelter Shed to confine parking.

Logs barriers have been built around areas near Lake Ellen to limit vehicular intrusion.
Future Management Strategies

Walking Tracks

Maintain existing walking tracks, with the exemption of Zone 3 (where all but the maintenance track should be allowed to grow over).

A walking track connecting Telegraph Road to the rest of Baldwin Swamp to be marked with logs and constructed of aggregate.

As common tracks become obvious, these to be maintained and improved to discourage random tracks being formed.

Indicate track entrances. Barriers to be placed to protect sensitive areas.

Responsibility    Bundaberg City Council when funds are available.

Picnic Areas

Install picnic tables and chairs at new areas which will be identified over time.

Responsibility    Bundaberg City Council in liaison with Advisory Committee

Plant Identification Labels

Preparation and placement of vegetation identification labels along main walking tracks.

Responsibility    Bundaberg City Council in liaison with Advisory Committee

Park Entrances

Present entry points to the Park are at:-

- Totten Street    foot entry and service vehicles
- Steindl Street    main entry to Shelter Shed and car park
- Quee Hee Street    foot entry to Bundaberg Creek area
- Lathouras Crt. & Hargreaves St.,    foot access only
- Bell Street    foot access with street parking
- George Street    car access to Lake Ellen, foot access across the drain to the Bush Chapel area
- Scotland Street    foot access
- Skyring Street    foot access and service vehicles
- F. E. Walker Street    foot access when walking track developed
- Sheridan Street (off Telegraph Road)    foot access when walking track developed

The main entrance at Steindl Street is dangerous due the proximity to the crest of a hill on the road. There should be prominent traffic warning signs. Consideration could be given to relocating the main entry point.

Provision should be made for a future entrance off Scotland Street to link that area with the Shelter Shed across the walking bridge.

Responsibility    Bundaberg City Council

Visitor Movement
Visitor car and motorbike traffic in the Park is restricted to the designated car parking area through the Steindl Street entrance and adjacent to Lake Ellen.

There is service vehicle access to Zone 9 on the Eastern side of Bundaberg Creek. A gate within an easement controls access.

Street parking near the Totten Street entrance should be kept maintained.

In the future planning of Zone 2, provision should be made for a parking area off Scotland Street.

Zone 11 will require parking facilities when the walking track is developed.

Foot traffic in the Park should adhere to the walking tracks shown on Map 2 and to the picnic facility sites. Venturing off designated tracks can be discouraged through the use of log barriers and the judicious planting of vegetation.

**Responsibility**
- Advisory Committee
- Friends of Baldwin
- Government Job Schemes
- Bundaberg City Council

**Signage**

As a principle, signage in the Park should be kept to a minimum. There are some necessary signage e.g. “Dogs must be on Leash”.

Locality signs and plant variety names should be gradually introduced.

Signs should convey a positive message. There should be no swimming or fishing or boating in the ponds, but signs should explain that:
- ponds too shallow for swimming
- fish too small for catching
- ponds too small for boating etc.

Regular maintenance of signage relevant to current legislation needs to be undertaken.

**Responsibility**
- Bundaberg City Council in conjunction with
  - Advisory Committee

**Kiosks**

In the Lake Ellen area, mobile kiosks have been known to operate at public functions. Approval is to sought from Council to operate mobile food kiosks in the Baldwin Swamp area. Such kiosks to be restricted to the immediate area surrounding Lake Ellen, and operated in conjunction with public functions.

**Responsibility**
- The setting up, removal, litter clean up and any other issue in relation to the safe operation of the kiosk is to be the responsibility of the Operator of the kiosk.
Lake Ellen

The East Bundaberg Rotary Club has undertaken to stone pitch the banks of Lake Ellen and to landscape the surrounds. During 1996 the lake banks were refurbished and the lake deepened. Further stabilisation of the rock walls was undertaken in 2002.

The lake is intended to be used only for model sailing boats.

Responsibility
East Bundaberg Rotary Club
Bundaberg City Council

Bird Boxes and Bird Hide

Bird boxes have been constructed at one of the local schools and were installed in suitable locations in the Park.

The area has become popular as a Birdwatching area. A bird hide has been constructed overlooking the channels in Zone 8.

Responsibility
Friends of Baldwin
Bundaberg City Council

Distribution of Reports

A Copy of the completed Management Plan to be sent to the Education Department for use as resource material. The Report to be sent to High Schools, Central Queensland University, The Department of Natural Resources and Mines, the Bundaberg Library, Landcare and the Department of Primary Industries.

Responsibility
Bundaberg City Council
Advisory Committee
13 WATERWAY MANAGEMENT PROGRAM

Objectives

To ensure the viability of the wetland as an aquatic habitat

To prevent any further degradation of wetland values

To re-establish a continuum of habitats between the terrestrial and aquatic environments

To encourage and where possible, ensure, that surrounding land use activities do not adversely affect the wetland

To eradicate exotic fauna and flora from the waterway

To ensure a water quality which will maintain the health of the wetland ecosystem

To provide a pleasing and accessible water-scape for the enjoyment of visitors to the Park
Overview of Actions to Date

Major dredging and relocation of ponds and channels took place in 1985-1986. Later, in 1992, the Scotland Street arm of the waterway was dredged and reconstructed. The main purpose of the dredging and reconstruction was to facilitate drainage and to beautify the swamp area, but in some cases it was an attempt to eradicate aquatic weeds from the ponds and as a mosquito control. Dredging has not been a successful control measure.

Lake Ellen was partially drained in 1993. It was intended to replace the fresh water with salt water in an attempt to clear the pond of nuisance vegetation which was hampering model sailing boat activities. However, fresh water refilled the pond during a subsequent storm, and a heavy growth of aquatic vegetation resulted.

The pond is presently kept clear of vegetation by mechanical removal. In 1996 a total reconstruction of the Lake, stone pitching of the edges and the placement of vegetation mounds was undertaken by East Bundaberg Rotary Club and Skill Share. In 2002 the City Council drained and dredged the Lake and stabilised the undermining of the rock walls.

Excessive growths of Water Hyacinth and Salvinia are the major problems in the main waterways. Mechanical removal has been carried by the Bundaberg City Council and Volunteers, but the task is too great, and re-infestation occurs rapidly.

Biological control was tried in 1993, using the Salvinia Weevil. The result was not encouraging. There was some success but the infestation appeared to be too excessive for the Weevil and there were also seasonal factors involved.

The only successful method of Hyacinth and Salvinia control to date is the use of herbicides sprayed by Council employees onto the vegetation mats on the water. The herbicides used are kerosene based for the Salvinia and water based for the Hyacinth. No residual herbicide has been detected in the water, but large quantities of kerosene are used and there does appear to be some contamination of the sediment. The impact of the herbicide is immediate and drastic. All the vegetation in the ponds is killed, and the subsequent decay of the dead organic matter causes a deoxygenation of the water. However, the ponds appear to recover within a relatively short time. Currently, the Salvinia and Hyacinth are kept in check through regular “spot” spraying and keeping the cover to less than 10%.

Reduction of Para grass thickets fringing the ponds and channels from extending into the water has been achieved by gradual and consistent spraying with Roundup Biactive. The edges are then stabilised by replanting with sedges and Melaleucas.

Baldwin Swamp is sometimes flooded with water from the irrigation canals in the catchment. The water is discharged from the canals as a result of vandalism and also deliberately by Sunwater during their canal maintenance program. While the canals are not directly connected to the Baldwin Swamp waterways, the discharged irrigation water flows overland into creeks draining to the wetland.
Flooding with irrigation canal water brings “foreign” water, that is, water from a different catchment, into the wetland and affects the chemistry of the native water in the wetland system. In addition, Sunwater uses a kerosene based herbicide, Acrolein, to periodically kill submerged weeds in the irrigation canals. The canals are subsequently flushed with large quantities of water which overflow into the Baldwin Swamp system.
**Future Management Strategies**

**Catchment Management**

Major activities in the catchment which will affect the wetland area of the reserve, such as land clearing, agricultural irrigation schemes, suburban subdivisions etc. have an impact on hydrology, water quality and habitat value of the wetland.

All development proposals within the catchment area of Baldwin Swamp should take into consideration the potential impact on the wetland. This can be incorporated into the Development Application criteria. (See Bundaberg Creek Drainage Plan).

While it has not been proven that herbicide treated canal water is a source of contamination in the wetland, it does present potential hazards. Monitoring of its long term effect should be undertaken.

As a management strategy, Sunwater should be approached to discuss possible modification to the irrigation canal maintenance procedures to reduce the impact on the water quality of the wetland.

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<th>Responsibility</th>
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<td>Department of Natural Resources &amp; Mines</td>
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<td>Environmental Protection Agency</td>
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<td>Department of Primary Industries</td>
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<td>Bundaberg City Council</td>
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<td>Advisory Committee</td>
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**Rehabilitation**

Re-establish vegetation around pond perimeters. This is a major rehabilitation project and considerations include:-

- appropriate vegetation for specific habitats
- sufficient cover for safety of wildlife from predators
- diversity of vegetation height and structure
- continuity of terrestrial and aquatic vegetation to accommodate different life stage requirements of fauna

Suggested species include:- Marsh Clubrush
- Swamp Millet
  - *Baumea articulata*
  - *Lepironia articulata*

There is difficulty in obtaining supplies of suitable water plants. Some are available at local nurseries, but transplanting from existing wetlands will probably be necessary. Natural regeneration could also contribute to the rehabilitation.

The progress of the riparian zone rehabilitation should be monitored and recorded. Pond edges are now stable but require careful supervision.

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<th>Responsibility</th>
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<td>Advisory Committee in conjunction with Bundaberg City Council</td>
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Slashed Paths

Slashed paths to be diverted from immediate pond perimeter area with allowance for sufficient access points to the pond banks.

Planting of fringing vegetation to be coordinated with placement of access points.

**Responsibility**
- Bundaberg City Council
- Friends of Baldwin

Islands

Islands in the ponds to be managed as a habitat sanctuary. No chemical sprays to be used on the island perimeters and no burning.

Planting of a diversity of vegetation

Suggested species include: - Fig Trees
- *Syzygium*
- *Eucalypts*

**Responsibility**
- Bundaberg City Council

Lake Ellen

Lake Ellen to be kept clear of vegetation to facilitate model sailing boats. To be achieved through a combination of draining, dredging, herbicide spraying and mechanical removal.

**Responsibility**
- East Bundaberg Rotary Club
- Government Job Schemes
- Bundaberg City Council

Research

Application for a research grant to survey the status of fish, amphibian and invertebrate populations in the wetland should be encouraged.

Preliminary work has been done by John Newby.

**Responsibility**
- Landcare
- Conservation Groups
- Sunfish Organisation
- Central Queensland University

Herbicide Research

Updating of research material on herbicides should be maintained and as alternative and safer products become available these should be used.

**Responsibility**
- Bundaberg City Council
PART C

MAINTENANCE PROGRAMS
14 FIRE MANAGEMENT PROGRAM

Objectives

To reduce the occurrence of fire in the wetland area and to minimise the impact of fire management practices on the fauna and flora.

Discussion

There are frequent occurrences of fire in the wetland area. The fires are usually lit deliberately, often by children. Some fires are grass fires and some have been high intensity crown fires.

The high fire risk areas are Zone 3, 4, 8 and 10 (Map 2)

A fire management strategy for the Baldwin Swamp environment needs to take account of the negative aspects of common fire prevention and suppression practices, and ensure that the measures taken are compatible with other management objectives for the area.

Strategies

Pond Perimeters

It is essential to restore riparian zone vegetation for habitat, bank stability and aesthetic reasons. However, continuous strips of tall grass or bushes or reeds around a pond are vulnerable to destruction by fire. To minimise fire impact, fringing vegetation should be segmented, either by slashed tracks or by alternate planting of tall and low-level vegetation. This will contain the fire to a smaller area and prevent it spreading along the whole length of a bank.

Encourage, through planting and transplanting, the growth of “difficult to burn” reeds near the banks. Species such as Lepironia articulata or tall Spikerush, are recommended. Avoid plants such as Typha as they are more flammable.

Islands

Islands in the ponds have been frequently burnt. How this happens is not clear, and is difficult to avoided. There should be no control burning on the islands.

Zone 1

The area between the entrance at Steindl Street and the board walk north of the Shelter Shed. This area has not been particularly fire prone, possibly because of the high visibility. However, because long unbroken areas of tall grass are a potential fire hazard, the grassed area between the entrance road and the adjacent pond has been segmented.

The existing side track from the entrance road to the pond edge and the track closer to the Shelter Shed should be maintained as fire breaks.
Zone 3

The *Melaleuca* and vine forest area just to the west of the Shelter Shed. This area is vulnerable but any fire reduction activities here would be detrimental to the ecosystem.

The strategy is to discourage entry to the area through lack of defined tracks and a generally "wild" appearance.

Zone 4

The grassed area to the south of the Shelter Shed, between the Melaleuca Pond and Que Hee Street pond. Numerous trees have been planted here and the tall grass is a habitat for ground and grass nesting birds.

To reduce the effect of a fire in this area fire control tracks have been cut across the hill and zigzaged to prevent erosion on the steeper northern slopes, a track has also been cut along the centre of the ridge.

Zone 5

A previously grassed area in which extensive tree planting has been undertaken is in close proximity to the main road and is vulnerable to fire.

The grassed area close to Steindl Street should be separated from the planted area. Slashed access tracks have been cut through the earlier plantings and a pond perimeter track is well established. These should be maintained.

Zone 8

An extensive area of tall Para grass between the Que Hee Street pond and the thick vine forest near Totten Street. This is a fire prone area, with tall grass extending to the pond edges.

The area is boggy and difficult to access with machinery. After a wildfire in the area the re-emerging Para grass was sprayed with Roundup allowing the indigenous sedges and ferns to regrow. Numerous self seeded *Melaleucas* are now growing in the site.

The boundary area between Baldwin Swamp and the residential houses along Hargreaves Street is used by the residents as an extension of their back gardens and they maintain the area in a neat and low-grass state.

Council needs to monitor the area as a few of the properties which do not maintain the buffer zone are a potential fire hazard. A buffer zone of 4 metres cannot be achieved in all areas, but Council will endeavour to maintain such a buffer, where possible.

Zone 9

Remnant of the original Woongarra Scrub.
This area is also bounded by residential gardens and some have extended their gardens into the parkland area.

The area does not appear to have a fire problem and should be left as it is in respect to fire control, for the time being.
Zone 10
Zone 10 does not have a fire risk.

Zone 11
Review of this area will be undertaken when the location of the walking track is established and a Fire Management Strategy will be formulated.

Zone 12
A fire control track to be slashed in Zone 11 when the Fire Management Strategy for that area has been formulated.

Fire Control Tracks
As tree stands become more mature and the need for access is reduced tracks to be closed and allowed to revegetate.

Responsibility
Bundaberg City Council for the slashing program
Friends of Baldwin for riparian zone management
15 GRASS SLASHING PROGRAM

Objectives

To control excessive grass growth and maintain access routes, recreational areas and safety zones.

Discussion

Grass slashing is a major element of the maintenance of the Park. It serves as a weed control measure as well as maintaining an accessible environment for visitors. A grass slashing program must, however, be compatible with the diversity of management aims for the Park.

It is necessary, therefore to strictly adhere to a well considered clearly defined program.

Strategies

Council maintenance staff and participants of Government employment programs to be instructed on the aims and purpose of the maintenance program prior to commencing work in the Park.

Fire management access routes to be slashed and maintained as described in Section 14. Recommended width 3 metres.

With the exception of Zone 3, all existing walking tracks to be maintained. Width of walking tracks to be no more than 2 metres.

Car access tracks for maintenance purposes to be maintained at an appropriate width.

Where possible, at least 4 metre wide strips to be slashed along residential property and Park boundaries as a protection measure for adjoining properties against fire, snake and vermin intrusion.

Slashed areas around pond perimeters to be of sufficient distance from the pond banks to allow for riparian vegetation growth.

Wide buffers may be needed if adequate cover is to be provided between tree nesting sites and wetland rearing sites for some wetland species. This situation should be reviewed as more knowledge of specific habitat requirements come to hand.

At appropriate points, slashed tracks to radiate to the pond edges from the main tracks. To be coordinated with the fire management strategy. Section 14.

To protect clusters of planted trees from damage by the slasher, weeds can be removed from around the plants with a whipper snipper and appropriate spraying.

Zone 1

Area around the immediate vicinity of the Shelter Shed to be maintained in a neat, low-grass state.

The tall grass buffer between the entrance road and the adjacent pond to remain, and the existing slashed side tracks to the pond edge to be maintained.
The width of the existing slashed track around the pond perimeter should be maintained at 2 metres to allow establishment of the riparian zone.

Zone 2

This area has been regularly slashed and is almost clear of vegetation, intensive rehabilitation is needed to reestablish riparian vegetation. Those plantings undertaken have been successful.

Until plans are formulated for the future of this area, slashing should be reduced to enable natural regeneration.

An area immediately adjacent to Scotland Street (opposite the school) can continue to be slashed.

A slashed boundary between the Park and residential properties along Skyring Street to be maintained.

Zone 3

No slashing in this area, except for one maintenance access track. All other tracks are gradually growing over. The area has a barrier fence and chain to exclude access.

Zone 4

The walking track at the top of the hill under the power line, the two fire management tracks zigzaging down the hillside and the one along the centre of the ridge to be maintained.

A vehicle access track near the Melaleuca Pond to remain as a maintenance track.

Zone 5

The planted blocks in this area to retain the slashed tracks. Retain a 3 metres slashed margin abutting Steindl Street.

Zone 6

Pond perimeters to be maintained and only selected locations to be slashed for access to pond edges.

Tree plantings to be gradually introduced with reference to the plant lists. Removal of the Hibiscus when plantings are dense enough.

The area should continue to be slashed when necessary for people access.

Zone 8

Minimum slashing in this area. The existing walking track between the vine forest near Totten Street and the tall Para grass area bordering the pond to be maintained. Gradual reduction of the Para grass to be continued.

In cooperation with the residents, the boundary area between the Park and residences along Hargreaves Street, to be maintained as a clear zone.

Zone 10
Whole of this area to be kept slashed.

**Zones 11 and 12**

No slashing in these areas until longterm management is formulated.

| Responsibility          | Bundaberg City Council Advisory Committee to provide educational material for Council Staff. |
16 NUISANCE VEGETATION CONTROL PROGRAM

Objective
To prevent and control infestations of terrestrial and aquatic nuisance vegetation in the Park

Discussion
Introduced plant species are a particular problem in the Park because of their effect on indigenous flora populations.

It must be accepted that it is not realistically feasible to completely prevent or eliminate exotic plants from the Park. The aim is to control the invasion at an acceptable level with methods that have the least detrimental impact on the ecosystem.

Strategies

Salvinia and Water Hyacinth
Chemical spraying together with mechanical removal of the bulk of the dead plant matter, has proven to be the most effective control method to date.

Continue to control Salvinia and Hyacinth on the waterways with the use of herbicides on a regular "spotting" basis.
Allow no more than 10% cover before undertaking the control measure.

Keep abreast of advances in herbicide research and trial any new products which may be less environmentally damaging than the current kerosene based herbicide.

Trial annually the use of Weevils and monitor the effect in preference to the long term use of herbicides.

Investigate the possibility of having a private contractor harvest the Salvinia and Hyacinth for compost, on a regular basis.

Encourage upstream landholders to control the source of the infestation.

Riparian Zone
Gradual removal of the Para grass from around pond edges.

Islands
No chemicals to be used on any of the small islands in the pond.

Extension of grasses from the islands into the water should be carefully assessed before any control measures are undertaken.

Vines
Both exotic and native vines can be a problem as excessive growth can smother host vegetation.
General spraying of heavy infestation of blanketing vines can result in an unacceptable visual impact on the landscape.

A less dramatic method is to treat the vines individually using the “slash and swab” method, and spacing the treatment over time.

Native vines should be monitored. If there is a potential for damage to the host tree only then should the vine be removed.

Para grass

Continue to control Para grass by regular slashing as described in Section 15.

Control of bank side Para grass to be continued gradually and carefully monitored.

Pepper Trees and Camphor Laurel

Council to continue with the program of “slashing and swabbing” with herbicides, to eliminate these plants from the Park.

Presently the trees, as they die, are left to fall and remain on the ground. The possibility of having Wood Turners use the trees should be investigated.

Other Weeds and Invasive Garden Species

Reduce the incidence of the spread of weeds into the Park through the dumping of garden refuse, by regular communication with adjacent residents in reference to the amenity value and the advantages of the Park.

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<tr>
<th>Responsibility</th>
<th>Herbicide Program: Trained Council Officers</th>
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<tr>
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<td>Salvinia and Hyacinth monitoring: Council</td>
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<td>Monitoring of vine growth: Friends of Baldwin</td>
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<td>Advances in Herbicides: Advisory Committee</td>
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<td>Use for water weeds: Advisory Committee</td>
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<td>Use for hard wood trees: Advisory Committee</td>
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<td>Para grass monitoring: Advisory Committee</td>
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17 NUISANCE FAUNA CONTROL PROGRAM

**Objective**

To remove feral animals from the Park, to control the presence of domestic animals and to protect neighbouring properties from nuisance insects and dangerous animals.

**Discussion**

Uncontrolled domestic pets and feral animals have a detrimental impact on native fauna. Some insect populations and animals such as snakes, which breed in the Park, can pose a danger or have a nuisance value to surrounding residents.

The objective is to control the pests and manage specific native fauna with methods that have the minimum impact on the Park environment.

Current methods of animal control used by Council appear to be successful.

**Strategies**

**Cats and Foxes**

On-going trapping program (wire traps with bait) as numbers require with populations monitored by Council staff.

The foxes are euthanased by a Veterinary.
Cats are held for 2 days, and if unclaimed, are destroyed.

**Dogs**

Signs in the Park indicate that dogs brought into the Park must be on a leash. Signage to be kept under review as currently people are not adhering to the directions.

The access of dogs into the Park is to be kept under review.

Unsupervised dogs are removed from the Park by the Council Animal Control Officer, as needed.

**Nuisance Insects**

Buffers of native vegetation assist in reducing the amount of movement of nuisance insects from the wetland area to nearby residences. Sufficient buffer vegetation forms a physical barrier and also provides habitat for insect predators such as web-building spiders. In addition, a vegetation buffer screens residential lighting which otherwise act as an attractant.

The vegetation planting program in the Park should therefore consider this aspect of insect control in relation to nearby residences.

Dense stands of *Typha* along pond banks should be avoided as they provide a breeding habitat for mosquitoes.

**Snakes and Vermin**
To prevent intrusion of snakes and vermin into adjoining properties, a slashed strip of at least 4 metres wide, should be maintained along the boundary of the Park and residential properties, as described in Section 15.

Aquatic Fauna

There is insufficient knowledge of the aquatic fauna in the pond system to determine whether there is any problem with exotic species.

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<th>Responsibility</th>
<th>Council for animal trapping and impounding</th>
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<td>Friends of Baldwin for vegetation buffer management</td>
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18 WATERING PROGRAM

Objective

To ensure that the plants which have been planted receive adequate watering for as long as necessary.

Discussion

A great deal of time, effort and cost is expended in the planting program. Inadequate watering of the plants during the early stages of growth can result in the failure of the enterprise.

An effective watering program is therefore essential to the success of the rehabilitation of the Park.

Strategies

Progress of the tree planting program should be determined by the resources and capacity to maintain a long term watering program.

Taps delivering reticulated water have been installed in Zone 1 and 6, to facilitate the tree planting program.

Watering in other areas has been carried out by Volunteers and Council Staff with a truck mounted water tank and buckets.

A small water winch which can use pond water is used when necessary.

Anybody who participates in the planting program must undertake to regularly water their plantings until plants become self sufficient.

Council to continue watering their plantings.

An approximation of watering requirements can be made from a compilation of data on rainfall, temperature, wind strength and ground slope. Meteorological data can be obtained on a regular basis. From the data an assessment can be made of the effective frequency of watering during different seasons in various parts of the Park.

This could be a project for a school science group. In the long term this would be a valuable data base.

Responsibility

Bundaberg City Council for watering
Friends of Baldwin for watering
Advisory Committee for data acquisition
School Groups data collection

Groups who participate in planting programs must undertake to water their plantings until they are self sufficient. If resources permit, Council, where possible, will endeavour to carry out a watering program if groups cannot continue.
PART D

MONITORING AND REVIEW
19 MONITORING

The purpose of monitoring the Baldwin Swamp environment is to enable evaluation of management strategies. However measuring success or failure is difficult because the results may not be evident for some time and the environment is dynamic so that natural changes will also occur with time.

It is also recognised that the resources are not available to implement all the proposed management strategies immediately.

The choice of parameters to monitor is difficult, and there is insufficient knowledge of the range of natural variations in various parameters to confidently interpret the results.

Nevertheless, it is important to obtain as much data as is practicable to assist in future management decisions.

Catchment Monitoring

Monitoring changes or proposed changes in the Baldwin Swamp catchment is an effective way to gain forewarning of potential impacts on the wetland environment. Steps can then be taken to mitigate or avoid the impacts.

The monitoring can consist of a twice yearly drive around the catchment area to note any significant activities which have the potential to impact on the wetland.

In addition, a constant watch can be kept on real estate advertisements, Council Minutes etc. for proposed developments in the catchment and conditions on development.

Council to inform the Advisory Committee of relevant agenda items for forthcoming Council meetings so that a Committee member can attend the meetings.

Responsibility
Advisory Committee
Bundaberg City Council

Biological Monitoring

Fauna populations in the Park should be monitored four times a year.

While it may be difficult to interpret the data in the short term, the information will add to a valuable bank of data for future reference.

Attempts should be made to gain more information on aquatic fauna and to monitor population and species variations.

Availability of Research Funding should be constantly monitored.

Responsibility
Friends of Baldwin
Conservation Groups
Bundaberg City Council
Birdwatching Groups
Central Queensland University
**Water Quality**

Water quality in the ponds varies to such an extent and is determined by a complex combination of factors, that it would not be of benefit to incur the expense of monitoring chemical parameters.

Visual assessment of the condition of the waterways is sufficient to give an indication of the health of the system.

**Responsibility**
- Friends of Baldwin
- Bundaberg City Council
- Department of Natural Resources and Mines
- Environmental Protection Agency

**Vegetation Monitoring**

It is important to monitor, record and assess the progress of the vegetation planting program.

This can be achieved through the use of a computer program designed to assemble data such as number and types of plantings, rate of growth, number survived, watering regime, meteorological data etc. on a location by location basis.

**Responsibility**
- Friends of Baldwin
- Advisory Committee
- Bundaberg City Council

**20 REVIEW**

Regular review of the monitoring information will give an indication of the effectiveness of the management strategies and reveal the emergence of any new management issues.

This information would be a valuable tool for research students.
ACTIONS LISTS

BUNDABERG CITY COUNCIL

P 11  Land Tenure
P 20  Pool of seeds and trees for cutting material for regeneration program
P 20  Implementation of tree planting guide
P 20  Communication with Tertiary Institutions
P 26  Walking Tracks
P 26  Picnic Facilities
P 26  Vegetation Identification Labels
P 26  Park Entrances
P 27  Car Parking Facilities
P 27  Signage in the Park
P 28  Maintenance of Lake Ellen
P 28  Location and construction of Bird Hides
P 28  Distribution of Management Plan
P 32  Sunwater and irrigation canal maintenance
P 32  Catchment management
P 32  Riparian Zone rehabilitation and management of pond banks
P 33  Slashing of pond edge paths
P 33  Vegetation planting on pond islands
P 33  Weed management in Lake Ellen
P 33  Implementation of updated aquatic weed eradication methods
P 35-37 Slashing Program for fire management
P 33, 38-40 Grass slashing program
P 42  Herbicide program
P 42  Monitoring Salvinia and Hyacinth infestations
P 43-44 Animal trapping and impounding
P 45  Watering program
P 47  Communication with Advisory Committee on Council agenda items

ADVISORY COMMITTEE

P 20  Monitoring Herbarium species lists
P 26  Monitoring need for Picnic Facilities
P 26  Vegetation identification labels
P 27  Monitoring visitor movements
P 28  Distribution of Management Plan
P 32  Monitoring of catchment activities
P 32  Update plant lists for pond edges
P 40  Management of Zones 11 & 12 ongoing formulation
P 40  Preparation of educational material for Council Staff
P 42  Update information on the development of Herbicides
P 42  Investigate the use for Water Weeds and hard wood trees
P 42  Monitoring of Para grass management
P 45  Data acquisition
P 47  Twice yearly survey of catchment activities
P 48  Assembling data for computer program
P 48  Preparation for review reports for Council

Maintenance of data bank
P 48  Monitoring of water quality
P 48  Design and operation of computer program on vegetation data
GOVERNMENT JOB SCHEMES

P 20 Regeneration of Woongarra Scrub
P 20 Tree planting program
P 27 Erection of log barriers
P 33 Weed management in Lake Ellen area

GOVERNMENT DEPARTMENTS

P 11 Department Natural Resources & Mines Land Tenure
P 32 Environmental Protection Agency
Department Natural Resources & Mines
Sunwater Catchment Management

FRIENDS OF BALDWIN

P 20 Herbarium species list & upstream remnant area survey
P 20 Regeneration of Woongarra Scrub
P 20 Implementation of tree planting guide
P 27 Deterrent vegetation planting
P 28 Location of Bird Hides and bird boxes
P 28 Promotion of birdwatching
P 32 Riparian zone rehabilitation
P 37 Fire management in the riparian zone
P 42 Monitoring growth of vines
P 44 Buffer vegetation management
P 45 Watering program
P 47 Monitoring of fauna population
P 48 Monitoring of water quality
P 48 Monitoring of vegetation
P 48 Monitoring of riparian zone

VOLUNTEERS

P 15 Tree planting program
P 20 LANDCARE Application for research grants - terrestrial habitats
P 25 HINKLER LIONS CLUB Maintenance of the Bush Chapel
P 28 EAST BUNDABERG ROTARY CLUB maintenance of Lake Ellen
P 28 CENTRAL QUEENSLAND UNIVERSITY Research possibilities
P 33 LANDCARE Application for research grants for aquatic habitats
P 33 EAST BUNDABERG ROTARY Weed management Lake Ellen
P 33 SUNFISH ORGANISATION Aquatic fauna survey
P 33 CONSERVATION GROUPS Aquatic environment studies
P 33 CENTRAL QUEENSLAND UNIVERSITY Research opportunities
P 45 SCHOOL GROUPS Science projects
P 47 CONSERVATION GROUPS Monitoring of terrestrial & aquatic fauna populations
P 47 BIRDWATCHING GROUPS Continued updating of bird list
P 47 CENTRAL QUEENSLAND UNIVERSITY Research - biological monitoring
ANNEXURE “A”

Amendment of Guidelines for maintenance of Zone 2

1. A mowed buffer of at least two (2) slasher widths between the rear allotments of houses facing Scotland Street and Skyring Street.

2. Walking tracks of approximately two (2) slasher widths to be mowed around areas under regeneration. This is to allow easy access for public use.