ABATTOIR SWAMP MASTER PLAN

Remediation and Management Actions for Productive Ecosystem Functions

2018-2019 | v0.8

Mareeba SHIRE COUNCIL

JAMAR
Julatten & Molloy Association of Ratepayers & Residents, Inc

The 5 Agreed Principles

1. The wetland is not intended to be a “pristine, natural environment”, insulated from humans and their influences.

2. The wetland should provide habitat and amenity for as much biological life as possible, both in quantity and diversity, supporting endemic, native, and exotic species (within legal constraints).

3. The wetland should be a “collaborating partner” with the primary producers who neighbour it, both offering ecosystem services to, and benefiting from, the ongoing grazing and cane operations.

4. The facilities should be designed to encourage use of the Park as an observation and learning site for our community and visitors.

5. The Management Strategies in this Plan and in future Works must seek to minimise ongoing maintenance while maximising the amenity of the Park.

Acknowledgment of Country

We acknowledge that this is Koko Muluridji country, and offer respect to the elders past, present and future.

Contributors

Mareeba Shire Council generously provided Council staff time and access to the site for the purposes of developing this management plan. Northern Gulf Resource Management Group, with funding from the National Landcare Program, provided the necessary budget and encouragement. The neighbours, Matt Allen and Anne Gallagher (grazing), and Andrew Warland (cane), both encouraged and supported a renewed interest in making the wetland a more functional ecosystem.

This document would not have been possible without the generous contributions, advice and support of: Sid Clayton, Carol Iles, Lloyd Nielsen, John Clarkson, Rupert Russell, Claire Baker, and Nipper Brown.

Special thanks to Ann-marie Keating and Duncan McInnis for providing insights on the Koko Muluridji regard for wetlands in the Rifle Creek catchment.

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Citation: (...)

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Foreword & onwards

(**Gerda**: "... glad that JAMARR can do this ... great expression of the community ..."

(**Tom**: "...cultural and environmental heritage...community taking leadership...MSC pleased to support..."

(**signatories**)

- JAMARR President/Gerda Domen
- Mareeba Mayor/Tom Gilmore

1 Understanding Abattoir Swamp and this Plan

1.1 Looking back: where we came from

According to the Management Plan prepared for Mareeba Shire Council (Newton and Barnes 1993), Abattoir Swamp was named after the slaughterhouse that Philip "Sonny" McDowall built in 1952, later purchased by Kevin Gadd, a Mt Molloy butcher who also grazed cattle on the land and used the abattoir to supply his business. Gadd's operation closed in the early 1960s and the land transferred to James Lenehan for grazing until 1989 when he sold it to the Mossman Central Mill.

In 1989-1990 the Mill cleared the remaining trees on the surrounding grazing land as well as felling a line of mature gums north of the swamp in order to plant cane. Plans were drawn up to completely in-fill and level the site for additional cane when a local resident, Maureen Clayton, began to agitate for the wetland's conservation.

Under public pressure, and with the advent of a World Heritage tree-planting scheme, the Mill decided to donate the land to Mareeba Shire for management as a conservation reserve in 1991. A survey of the wetland's natural features, flora, and fauna was undertaken and a set of Management Guidelines were developed (Newton and Barnes 1993). The Council's Tree-Planting Scheme funded the establishment of a boardwalk, bird-watching hide, parking lot, and access track.

The preliminary Management Plan set out three objectives:

I. *To preserve and protect the natural environment at the site and thus allow natural processes to continue with minimum disturbance. Where suitable, this may require some manipulation of the site where this facilitates natural processes.*
II. *To provide a limited range of opportunities for visitors to use and enjoy the site consistent with objective (I) outlined above, and thereby promote a better understanding of the natural environment by the general community.*
III. *To conduct ongoing research and monitoring of the site to assist in its future management.*

Those early Management Strategies state that the overall objective was to establish a sort of perimeter, or buffer, to preserve this remaining fragment of the "natural environment". The idea was to conserve a bit of wildness where visitors might catch a glimpse of what the country was like before settlers arrived.

Even human presence was to be restricted so as to allow natural processes to continue in as undisturbed a state as possible. It was noted, however, that the ubiquitous cane toad had established itself in considerable numbers and that "control may be very difficult." The Strategies further advised that where exotic grasses were providing good habitat and ecological function it would be preferable to leave the area alone. This suggests an important principle of fitness for purpose which is supported later in this Plan.

Council's management of the wetland continued for several years until the conclusion of the World Heritage Tree-planting Scheme. At this point funding for the management committee ran out and the Park was transferred to normal maintenance and works program.

Unfortunately, the environmental requirements of the wetland were no longer prioritised. Grasses were burned off, native saplings were cleared, and Olive Hymenachne became established. The sharp-eyed

John Clarkson noted that the exotic Hymenachne had jumped the fence and interbred with a native variety. Thus, three distinct lines of the aggressive weed gained traction.

Within a decade the wetland's open waters were closed in by overwhelming growth of hymenachne, the boardwalk was deteriorating rapidly, bird diversity plummeted, and the Park began to acquire the reputation of a lost cause.

1.2 Looking forward: the purpose of this Plan

In 2014 Council initiated a plan to refurbish the boardwalk. By 2015, under the leadership of Ken Brown and using Council-supplied materials, JAMARR volunteers replaced the worst of the rotted sections. In the process, however, more structural problems were identified.

In late 2015 JAMARR hosted *A Day at the Swamp*. The event drew on the skills of local experts who donated their time and led tours around the swamp, giving more than a dozen presentations to the community during the event.

Over 100 people turned out to learn more and to participate in a vision-setting workshop focussed on what the future of the wetland should be. Maureen Clayton, the tenacious agitator for conserving the wetland, attended and gave a few words. Likewise, original management committee members Geoff Nicholson, Lloyd Neilsen, and long-time supporter Del Richards offered insights.

Key concerns were the choking, oppressive hymenachne, the lack of open water, and the shabby state of the boardwalk. Several of the birding community said that they had given up hope of the wetland coming back to life. Others were keen to poison the hymenachne and get big machinery in to dredge out a permanent lagoon. Concerns were raised about the cost of rehabilitating the Park and how it would be maintained into the future. It was recognised that re-introduction of hymenachne would be a virtual certainty once waterbirds started to frequent the wetland again, thus presenting a constant management problem.

At conclusion there was no decision about a specific path forward, but there was clearly a lot of community and institutional support to do something...the question was: what? This Plan is an effort to

answer that question.

1.3 Situation and significance

The Julatten region is approx 350km2, comprising a series of creeks and drainages that flow off the Mt Fraser and Mt Perseverance ranges to the north, and from the Great Dividing range to the east and Mt Danbulan to the south. Waters collecting across this catchment join up to Rifle Creek which, just west of Milgee (Lighthouse Rock) becomes the main channel of the Mitchell River, a system that defines the ecosystems of the lower Cape as it proceeds 550km westward to reach the Gulf of Carpentaria at Kowanyama.

The Julatten region and adjoining Wet Tropics World Heritage areas are recognised internationally as biodiversity hotspots. The ranges and wetlands that frame the country are renowned for high flora and fauna endemism.

The Park's location makes it an important fragment of the ecotone between the wet tropics and the wet-dry Gulf Savanna country. In recent times the wetland has been frequented by the buff breasted paradise kingfisher, and the black-throated finch has been recorded within 2km. The rare blue faced finch is endemic to the immediate area.

The Abattoir Swamp Environmental Park is located at the western end of the Julatten district, just off the Mossman-Mount Molloy Road which connects Port Douglas and the Tablelands. Established in 1993 on 9HA of land in trust to Mareeba Shire Council (MSC), the Park features a 75m long boardwalk to a large, well-built bird hide.

The facility is the only one of its sort in the area and, despite years of relative neglect, continues to attract tourists and locals. Forestry and agricultural developments have resulted broadscale clearing across much of the upper Rifle Creek catchment. Grazing and cane operations now border the Park.

The reduction and fragmentation of habitat across the Julatten area is typical of many other landscapes in North Australia. The significance of primary production in such close proximity is a key feature of this Park.

A central goal of this project is to ensure that the Park contributes ecosystem benefits across this diverse region, starting with the immediate neighbours. As learnings arise from this project, it is expected that these new insights could benefit the management of other modified and novel ecosystems.

The Park can offer observation opportunities, field-testing, and on-ground experience via a showcase of wetland rehabilitation and management strategies. This real-world outdoor classroom and laboratory would have something to offer local residents, regional and international visitors, school children, birding enthusiasts, ecological researchers and local businesses.

With continuous improvement and external promotion we expect visitor numbers to the facility will increase 50% at a minimum. This translates to total visitor numbers that should run well over 3000 per year once the project is fully realised.

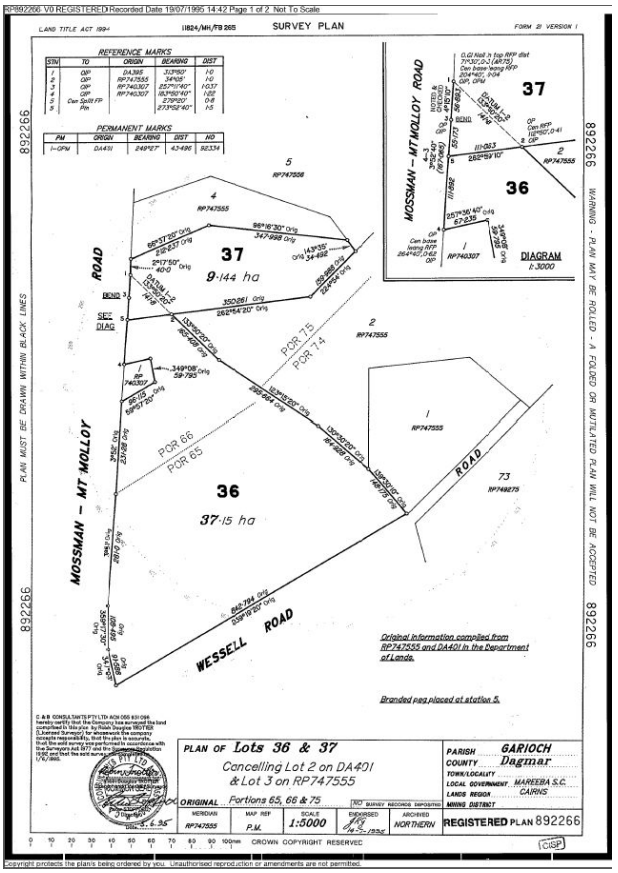
This visitor activity will benefit the nearby villages of Mt Molloy and Julatten as well as the various regional tourism and science-education consultancy operators who serve this area.

1.4 Site Description

The physical site for the Park is surveyed and pegged. Historical photos show the location of the main features in their current locations.

The car park at the west entrance begins at the same elevation as the Mossman-Molloy Road, and slopes gently toward the east. The car park is the high, flat land of the site, which then slopes sharply on all three sides to roughly the same elevation across the expanse of the wetland.

According to the Site Description, CSIRO soils mapping (Kerridge, Andrew, and Murtha 1972) notes that the principal soils are a combination of the weathered granites of Mt Lewis and the metamorphic sedimentary layer known as the Hodgkison Plate. Alluvial deposits along Bushy Creek are clay loams of a mixed origin while alluvial plains swamps like Abattoir Swamp are characterised by “a variable peaty organic surface layer over a heavy clay subsoil which restricts penetration of water and results in the formation of the swamp.”(Newton and Barnes 1993).



1.5 Mapping of Broad Vegetation Groups and Regional Ecosystems

According to Version 3 of the Queensland Herbarium’s definitive publication:

> Broad Vegetation Groups (BVGs) are a higher-level grouping of vegetation communities and regional ecosystems. BVGs provide an overview of vegetation across the state or a bioregion. They are a useful addition to the regional ecosystem framework by providing an overview of major ecological patterns and relationships across Queensland, independent of bioregions and land zones, and facilitate comparisons with vegetation in other states and internationally.

(Neldner et al. 2017)

For our purposes, the BVGs are used by Government to delineate areas of vegetation that have common values under policy. For example the BVG mapping has determined that so many of the wetland ecosystems in Queensland have been modified or lost that the remaining BVGs are classified as either *Of Concern* or *Endangered*.

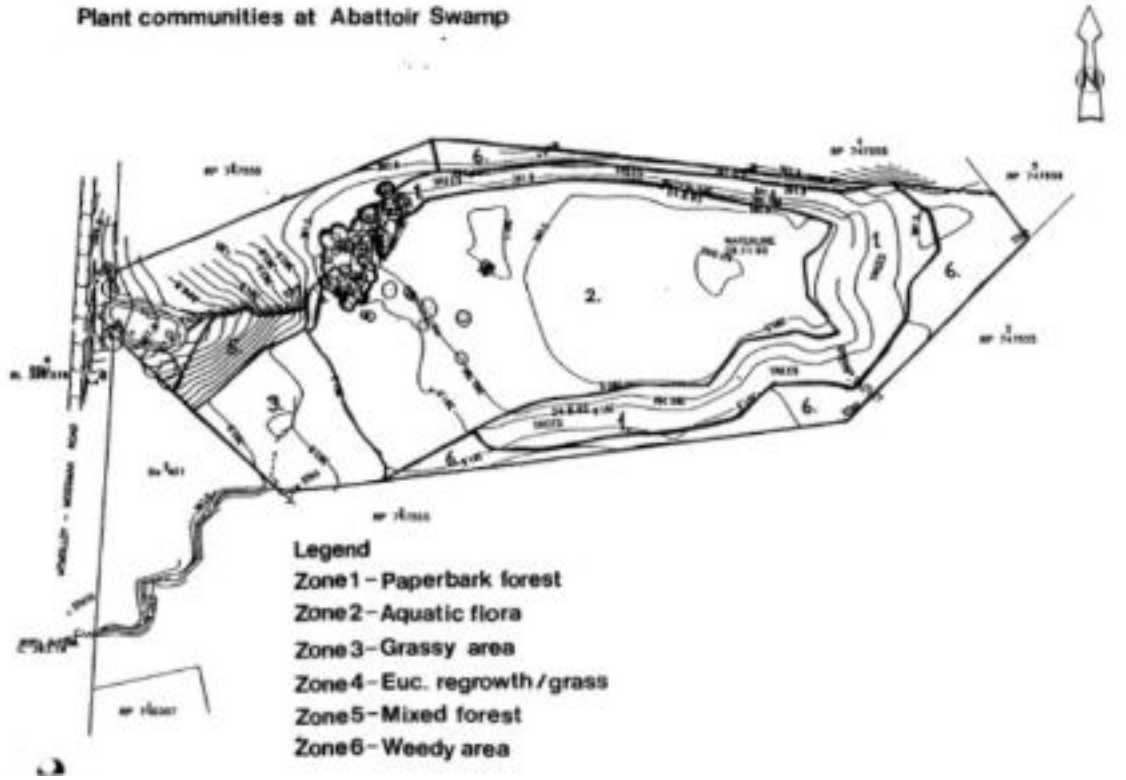
Using the Queensland Globe online mapping tool we are able to determine the BVG and ecosystem classifications for Abattoir Swamp. The main types include:

- 7.3.5a: Melaleuca quinquenervia open forest, woodland and shrubland, on poorly drained alluvial plains (Endangered)
- 8: Melaleuca open woodlands on depositional plains
- 21a: Melaleuca spp. dry woodlands to open woodlands on sandplains or depositional plains
- 22a: Open forests and woodlands dominated by Melaleuca quinquenervia (swamp paperbark) in seasonally inundated lowland coastal areas and swamps. (land zones 2, 3) (CQC, CYP, SEQ, WET)
- 34d: Palustrine wetlands. Freshwater swamps/springs/billabongs on floodplains ranging from permanent and semi-permanent to ephemeral. (3.2% of pre-clearing area in Protected Areas)

The State considers these BVG classifications and then makes policy and law with reference to them. The Vegetation Management Act 1996 (currently before Parliament for amendment) defines several categories of vegetation that are subject to controls of various types. In the case of Abattoir Swamp, there are sections classed as Category A or B, containing Of Concern regional ecosystems and RVM Category B - Remnant Vegetation.

	
Regional Ecosystem: Of Concern	RVM Category B

The survey work undertaken for the Site Description(Newton and Barnes 1993) defines zones of vegetation in quite good detail and gives excellent descriptions of each zone. Unfortunately there have been significant changes to both the drainage and the vegetation mix since 1993, but the general layout is still relevant and useful.



Zone 1: A ring of trees around the swamp,the dominant tree-type being Melaleuca spp.,with a range of rainforest species under the canopy at the eastern end of the swamp.

Zone2: The area covered by water, which includes the aquatic flora, and plants growing along the waterline (the area covered by water fluctuates through the year,thereby having a significant effect on the aquatic flora).

Zone3: A grass-dominant flat area around the main inlet to the swamp.

Zone 4: The northern boundary of the s e. consisting of Eucalyptus spp. regrowth and groundcover of

numerous weed and grass species.

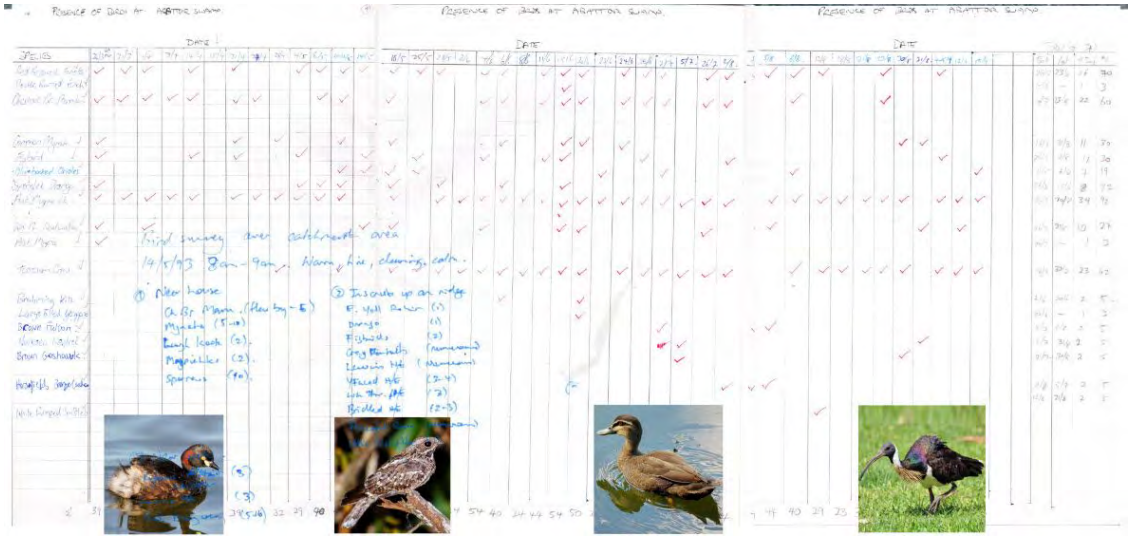
Zone 5: A mixed stand of young trees located on the southern slope of the small hill directly west of the swamp.

Zone 6: A thin perimeter of mixed grass and weed species that fringes the paperbarks which is at its thickest at the eastern end.

1.6 Historical species observations

The wetland has long been a focus for the community. When the Park was declared at the time of establishing the Wet Tropics, volunteers undertook a range of species surveys. The complete records are available in paper version and a digitisation effort could be organised.

There are relevant bird spotting records held by various enthusiast groups. It is hoped that these can be assembled at some point to form a credible assessment of historical avian diversity and frequency.



At least 165 species of bird have been recorded at the wetland. A similar level of plant diversity, and the attendant invertebrate richness have been suggested.

A water quality testing program was undertaken by the Mitchell River Watershed Management Group as part of the Streamwatch program. These records have not (yet) been recovered.

When taken as a whole, there is an impressive history of biological wealth in this modest fragment of habitat.

1.7 Summary

From a pragmatic viewpoint, this Plan needs to give succinct and effective advice on these questions:

- What is the ideal hydrology (standing and/or seasonal waters) for the wetland?
- How can the hymenachne be productively managed?
- What management actions will accelerate biological abundance and ecosystem function?
- How can the community contribute toward the wetland's ongoing management?

Due to the profound alterations to the ecological functions of the surrounding areas, the wetland has to deal with a predictable range of issues and compounding factors, including:

- Modification of habitat particularly through the dominance of weed species
- Presence of exotic predators and/or competing non-native species
- Decline and alteration in water quality (eg. sediment load, pH, influx of pollutants)
- Nutrient loading
- Altered drainage and hydraulic regimes

There are contradictory and mutually exclusive factors enmeshed in the wetland's future. It is not possible to offer simplistic solutions without acknowledging the complex and often unintended consequences that can follow.

This Plan is structured as a living document. Instead of trying to dictate a recipe for success, this Plan provides a framework to track the ongoing journey. Management actions are discussed in this document to provide the community with a record of the process and the reasoning involved.

Agreed Principles

Management actions are always developed with regard to **5 Agreed Principles**:

1. The wetland is not intended to be a "pristine, natural environment", insulated from humans and their influences.
2. The wetland should provide habitat and amenity for as much biological life as possible, both in quantity and diversity, supporting endemic, native, and exotic species (within legal constraints).
3. The wetland should be a "collaborating partner" with the primary producers who neighbour it, both offering ecosystem services to, and benefiting from, the ongoing grazing and cane operations.
4. The facilities should be designed to encourage use of the Park as an observation and learning site for our community and visitors.
5. The Management Strategies must seek to minimise ongoing maintenance while maximising the amenity of the Park.

The ongoing development of this Management Plan should help ensure that the wetland is enlivened, the region is improved, and the community is entrusted to act as caretakers and cultivators of a functional and healthy ecosystem.

2 Baseline Assessments Of Condition & Function

The wetland contains and expresses a multitude of meanings. In this section, some of the most relevant and insightful perspectives are expressed. These statements form a baseline for 2017-18, at the start of implementation of this Management Plan. As actions are undertaken (see later schedule) fresh assessments will be made and added to updated versions of this Plan.

2.1 Bird life

Provided by Lloyd Nielsen, internationally recognised ornithologist and long-term supporter of the Abattoir Swamp wetland.

Abattoir Swamp is an attractive site for visiting and local birdwatchers alike. With its edging of paperbarks, it attracts an interesting variety of open forest birds. Several tropical honeyeaters are to be found there. Brown-backed Honeyeaters which arrive from New Guinea through July and August breed at various spots in the melaleuca fringe. White-throated Honeyeaters with their starch-white fronts and olive-green backs are present throughout the year. The beautiful golden-backed form of Black-chinned Honeyeater has been seen on several occasions while Forest and Azure Kingfishers occur through the paperbark fringe.

At one time, when open water was present, Green Pygmy-Geese were often seen along with other ducks, grebes and aquatic species. Pale-vented Bush-hens occur from the late Dry and breed over the following Wet season. They build nests in tops of clumps of rushes around the edges.

White-browed Crake is fairly common. Nests have been seen in several places, including immediately in front of the bird hide which provided an interesting birdwatching event of these sometimes difficult-to-see birds.

The migratory Black Bittern usually arrives each year and usually a pair will breed in the melaleuca frings. Black Bitterns need a large territory and there is room for one territory only.

Some rarities have occurred there over the years, most notably Australian Little Bittern, a skulking water bird which is very rare in many tropical areas. Baillon's Crake, a tiny bird of the reed-beds has been seen on several occasions.

In the open forest at the entrance, a pair of Northern Fantails have been in residence for many years. Chestnut-breasted Mannikins and Red-backed Fairy-wrens are often seen about the car park.

In all, Abattoir Swamp is always an interesting birding site with the anticipation of an unusual species turning up.

White-necked Heron

2.2 Plant life (John Clarkson??)

2.3 Aquatic life

Provided by Mel Ellis, consulting Wetland Ecologist and certified AusRivAs practitioner.

The starting point is a stable methodology for assessing the wetland that gives both a baseline picture of wetland health and the opportunity to detect changes in health as the project progresses.

Sampling should be established at key points in the system, ideally one near where water comes in and one near where water leaves the system, though this isn't always as easy as it sounds. A site condition assessment would be recorded at the time of sampling, photo points established and photographic records recorded at each visit. Samples would be collected from clearly identified areas for the purpose of future replication.

Ideally the system should be sampled at least twice per year: once early in the wet season and once late in the wet season. They key is to sample at the same time each year as there are often natural seasonal successions in the macroinvertebrate assemblages. For the late-wet season sampling it's important to try and time sample collection to be at least 4 weeks following any significant flooding. This allows time for

the bugs to recolonise and stabilise after habitat disturbance. If it's possible to collect additional samples, the idea would be to try to match the timing in subsequent years so as to compare similar conditions.

For the macroinvertebrate collection it is recommended to use the AusRivAs methodology as closely as possible. The recommendation is to sweep samples along a 10m transect using a triangular macroinvertebrate net. Given the current condition and arrangement of Abattoir Swamp, this may not be strictly feasible.

It is important that 3 replicate samples are collected at each of the sampling locations. There is usually lots of variability in bug communities and replicate samples enable ecologists to distinguish the true changes in population from the natural variability in the macroinvertebrate assemblages.

The aquatic macroinvertebrate samples would be live pickled in the field for 30 min, which is a slight modification of the standard AusRivAs protocol that improves results for northern Australian sites. Bugs should be preserved in methylated spirits, then sent to the lab for identification to the appropriate taxanomic level, usually family.

The following macroinvertebrate indicators should be tracked: total abundance, taxa richness, PET richness and SIGNAL2 score. The above approach will give a baseline that can be used to measure changes in macroinvertebrate communities over time. It will also provide data of a suitable quality that more advanced statistical and scientific analysis could be undertaken in future years, if desirable and may provide data that could be used in programs such as the healthy waterways report card.

In terms of water quality, the key physico-chemical parameters are: pH, conductivity, turbidity, dissolved oxygen and temperature, which can be measured in the field during sample collection. It is recommended to collect a water sample for laboratory analysis at each of the macroinvertebrate sampling sites. Parameters to be measured include total suspended solids, total phosphorus, total nitrogen, nitrate, phosphate.

Pesticide testing is difficult, expensive and of limited value if only one or two samples can be collected and analysed annually. It would be more efficient to work with the neighbouring farmers and develop a sense of what their chemical regime is like. In any case, if pesticides or other catchment landuse factors are impacting on the system it should be apparent in the SIGNAL2 scores and macroinvertebrate community assemblages.

2.4 Grazing and Productivity

Provided by Matt Allen, grazier on southern side of the wetland

We rely on the swamp for grazing in the peak of the dry season. The area provides an important source of fodder for our herd when other sources of grass have become scarce.

At the moment, when the ground dries out, gates are left open for the cattle to come and go and eat what tastes good at the time. We have always thought this minimises impact in the swamp, but keeps the grass down, so it doesn't become too overgrown. Cattle are encouraged to return to the house yards each evening with molasses.

Cattle are locked out in the wet months. This minimises damage to the wetland. It also reduces the

opportunity for animals to become bogged.

There is no “timed grazing” or “crash grazing” at the moment. These methods may have some value, but have not yet been trialled. We would be happy to participate in any intensive grazing trials of the swamp to keep hymenachne and other cattle grasses managed and controlled.

Fence repair and maintenance is paid for and done by us. We inspected the recent fence work. A flood gate should ideally be put in where the drain runs into the swamp, as this gate needs to be replaced when we have a decent wet season so as to avoid damage to the gate and fittings. We are looking at what would work best.

We would love to see the swamp full of native life with good water quality and hope that our cattle can play a part in this.

2.5 Drainage and biological function

Contributed by Andrew Warland, Warland Bros Farming, cane growers to the north and west.

- In what way is the wetland important to our operations?

The swamp is in the middle of the farm so whatever happens there impacts the rest of the property. This goes for pests, weeds and water. The wetland is critical in the water cycle/movement of the area. This in turn impacts on our productivity.

- What makes the wetland a good neighbor? A bad neighbor?

Farming profitably means keeping losses to an absolute minimum. There are both animal and plant pests that need to be managed on any property. Having a wetland next door increases the pest threats. The worst animal pests for sugarcane in the Hunter’s Creek area are pigs, rats, wallabies, and cockatoos. All take refuge in the wetland.

We have invested heavily in the cane property to improve on-farm drainage to reduce sediment and keep water in the profile longer. This work included a large, shallow detention basin for water entering the swamp. Also we have applied compost and biological fertilizers on the paddock next to the swamp to improve the sandy soils. We hope that these works can benefit both sides of the fence.

- What will we be watching to tell if we're headed in the right direction?

It will largely come down to whether or not there is a change in pressure and prevalence of pests and weeds. As far as being a good neighbour I could hope that any management actions leads toward less pressure from pests and weeds. We also want to ensure that the farm does not cause damage to the wetland through altered drainage.

Andrew Warland and Gavin Kay consider the hymenachne problem, early Wet 2017.

2.6 Ecotourism potential

Provided by Carol Iles, Kingfisher Park Birdwatching Lodge

When we first visited Julatten in the '80s, everyone involved in birding directed us to visit Abattoir Swamp. Even when we finally settled here in 1998 it was easy to spend several hours at the Swamp, watching waterbirds from the hide, strolling along the boardwalk to see nesting birds up close, and admiring the Great Bowerbird's bower and the flowering bushes in the car park area. As guides, we would always take guests there and still do, though we now frequently find it embarrassingly disappointing, and rarely make more than a fleeting visit, explaining that we desperately need funding to restore the swamp. It is a tragedy that, over the years, due to a combination of drought, rot, neglect, natural attrition, ill-suited and/or lack of grazing, sediment run-off, and invasive wetland grass species, the habitat has changed, resulting in a drop in species diversity and attendant drop in popularity with visitors.

Historically, as the only wetland in Julatten/Mt Molloy area offering easy public access, Abattoir Swamp quickly became established as a must-see for birdwatchers to this area, mentioned in every variety of published "where to watch birds in Australia" books, and when the Internet emerged, featuring in virtually every North Queensland trip report. It provided a major drawcard, inevitably resulting in many birders also bringing their tourist dollars into the little town of Mt Molloy, only a few kms south. The Swamp became part of a now well-known birding circuit, beginning in Cairns, taking in Kuranda or the Atherton area, Mareeba Wetlands, Lake Mitchell, Mt Molloy school grounds and town gardens, Abattoir Swamp, Kingfisher Park Birdwatchers Lodge, Mt Lewis National Park, Daintree Village and by ferry into the National Park, then the coast road back to Cairns.

International birding tour groups (over 20 per year staying at Kingfisher Park alone, with many others staying elsewhere), about two thousand individual guests from the Lodge, plus many other visitors, tourists and day-trippers would all visit Abattoir Swamp. 446 lists for Abattoir Swamp, listing 201 species of birds, have been submitted to E-bird which is the internationally viewed site for recording lists of bird species seen - a valuable tool and great free publicity, so long as the lists show good numbers to attract future birders.

With the ever-increasing popularity of bird photography, Abattoir Swamp, if restored to its former glory, could provide hours of enjoyment for photographers, birders and nature-lovers. Assets currently include:

- a covered picnic table surrounded by low, flowering callistemons and grevilleas for day-long honeyeater activity;
- a combination of wetland, dry country and rainforest tree species which have over the years partly accounted for the area's unique and surprising mix of bird species;
- large trees with rough bark, still favoured on occasion by uncommon Varied Sittellas and used by numerous other species;
- wheelchair access along an excellent, newly-renovated, all-weather boardwalk which allows close observation of many species of birds - both nesting and feeding - plus frogs, butterflies and dragonflies;
- the recently restored hide which provides all-weather seating, though currently just a view of grass and a few honeyeaters in the surrounding trees;
- quiet pools always under the trees to the left of the hide entrance - a hotspot for Spotless Crakes and bathing birds, and regular nest sites for Large-billed Gerygone and Brown-backed Honeyeaters.

It is to be hoped that future funding will allow for:

- the vitally important resurrection of a wide expanse of open water, (currently lost to infill and ungrazed invasive ponded pasture grass) to ensure the return of long-absent ducks, herons, kingfishers and cormorants;
- maintenance of a foreground of grass clumps which have in the past encouraged nest-building, viewable from the hide, by species such as White-browed Crake and Tawny Grassbird;
- creation of shallow edges to the water to encourage waders such as Snipe;
- creation, perhaps by grazing horses, of corridors in the reeds which may encourage visits once more from Bitterns and Purple Swamphens;
- islands, made from the spoil dug out of the swamp, to provide safe nesting areas for species such as Black Swans;
- better-defined, shady parking spots, limited so as not to damage existing habitat, with some investment in replanting;
- planting of low bush cover (in the bald areas we now have) to encourage Great Bowerbirds back into the car park;
- better positioned and maintained signage from the highway.

Unfortunately as there is currently no toilet on site, which has caused occasional problems in the past, I consider it essential to add signage directing visitors to the nearby Hunters Creek picnic spot or Rifle Creek/Mt Molloy for facilities.

If all of the above could magically be there, Abattoir Swamp could once more be the green jewel at the heart of Mount Molloy/Julatten, a feather in the cap of our local community and Council, declaring to all that there are people here who care for and value our wild places.

To sum up, Abattoir Swamp, once renowned as a clear, clean swimming hole before being surrounded by sugar cane and becoming a reserve, still needs some serious work to return to those glory days.

If we could once again see clear water, with flotillas of ducks and coots, edges patrolled by crakes and jacanas, reeds with the necks of egrets and herons protruding, harriers floating over the distant marsh, and be surrounded by the sounds of a healthy wetland with frog numbers once again so large that the cables of the boardwalk were lined with them, it would be a great achievement which I can guarantee would be applauded and enjoyed by visitors from all over the world.

Carol Iles and Lloyd Nielsen, early Dry 2017

2.7 Council management

Provided by Sid Clayton, long-term supporter and Council's Senior Land Protection Officer

With Myrtle rust, forest die-back, pathogens, and diseases that are here now I think one of the best things we can do is help raise people's commitment to prevention of weed seed spread. We could facilitate this at the Swamp by providing a bowl of disinfectant (eg, a 20 titre refiller bottle left on site) together with a boot scrub in the car park. Put that along with an interpretation board telling why folks should use it. Might be a cheap and effective preventative tool to be installed now. If people get the idea, we can use a similar system at other sites.

The hymenachne is the most obvious management problem. The crash grazing could be useful. We might also follow-up with selective treatment of the introduced and hybrid varieties. There are more treatments being developed for aquatic pest plants and I am in touch with some developers. Aquatic weeds are a growing problem in our region. We will keep a watching brief for a treatment that is

sufficiently nontoxic to allow us to use it in the context of trying to keep as much living matter in the Swamp as possible.

In time we might have a big interp board--like the bird chart down at the Hide--that will help people ID the endemic plants and I can make up another board to show unwanted plants in the park.

It would be a fine thing to see the wetlands looking like a healthy, natural system. Perhaps with the experts and community support we have a chance to achieve this!

2.8 Indigenous vision (Ann-marie Keating??)

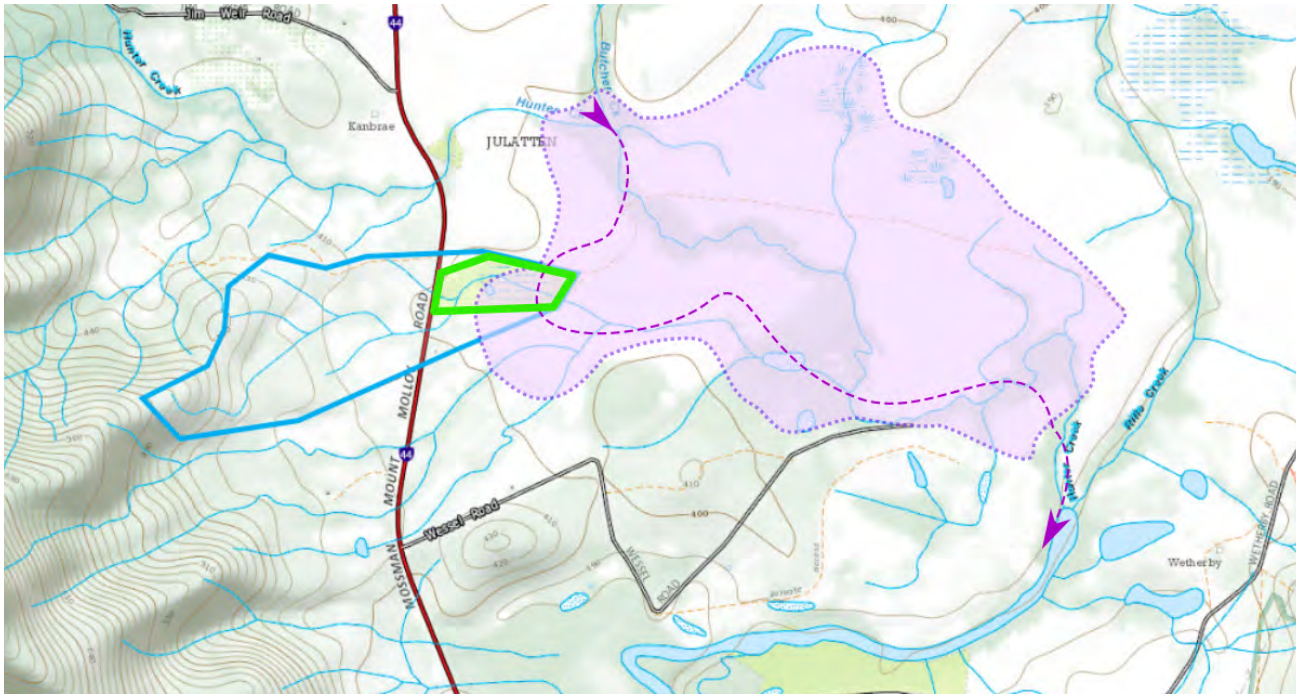
3 Hydrology: how to manage water in the wetland

How do we describe this bit of country: wetland, swamp, bog, marsh? We recognise that water plays a central role in what plants will grow and what animals will call the area home. It also makes a big difference to how we can interact with the land.

3.1 Overview of the Wet-Dry system

The rainfall for this area can be described as 1350mm average per year. But this misses the fact that nearly all of that rain falls over the 4 summer months, and often in isolated, episodic events such as cyclone or the appearance of a week-long monsoonal trough.

During these time, massive water flows can be observed. The joined-up Butcher Creek and Hunter Creek top the banks and create a sheet flow that encompasses the wetland and joins up with Rifle creek toward the end of Wessel's Road.



Flood-out area in purple with general flow direction indicated

Depending on the nature of the rain event, the floodplain can experience quite strong currents followed by several days of slow and standing waters. These events serve to saturate and flush the wetland.

Flood waters receding at south-eastern corner. (photo: G Kay)

North-eastern cornerpost and tell-tale grasses hung up on top wire (photo: J Brisbin)

3.2 Historical observations

Using the online aerial photo library("QImagery" n.d.) we have been able to assemble a collection of images from 1955 to 1998, providing some insight as to how the area performed from a hydrology perspective.

1955-January

1960-January

1968-January

1982-July

1990-January

1994-June

1997-Dec

1998-August

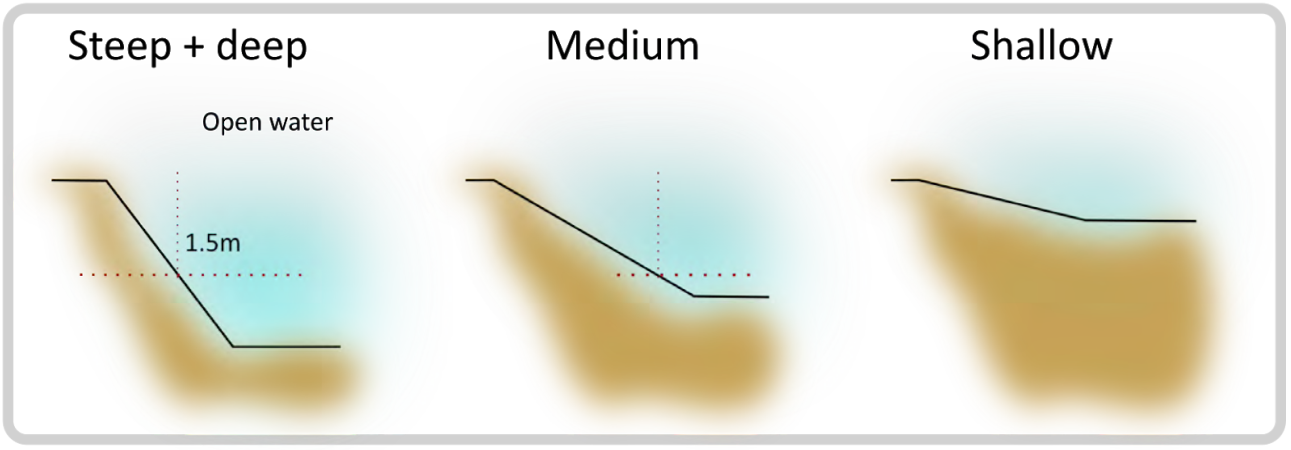
An analysis of these photos has yet to be undertaken by a qualified interpreter. On face value, it seems reasonable to suggest that the wetland has been drier and wetter at different times since the first aerial photos (1955). A current image (Feb 2018) shows no open water at all.

3.3 Drainage and vegetation patterns

In order to better understand how hydrology defines the wetland, let's look at the broad types of variable involved:

- Depth: How deep is the water and what are the bank profiles.
- Duration: How long do areas stay inundated.
- Flow: General behaviour of flow (fast/slow/standing)
- Distribution: How much of each factor is present across the wetland.

Depth and bank profile



Steep and deep provides the most likelihood of permanent, open water. The steep banks however are prone to faster collapse, and they can present a hazard to grazing stock. Heavy machinery is required for maintenance of the profile, and pontoon-mounted equipment would be needed for managing the deep water areas. If the wetland never completely dries out, flora and fauna species that require permanent inundation will have an opportunity to establish.

Medium slope and depth does not offer much protection for the open waters. However it is less danger to stock and will require less-frequent dredging. At approx 1.5m depth, it is likely that most of the profile will be exposed by the end of the Dry, allowing weeds and other plants to establish on the bank. This profile is also easier to manage with lighter machinery.

Shallow is the default situation. Hymenachne completely dominates this environment, creating a very effective water filtration system but at the cost of very low biodiversity. The shallow profile will reliably dry out, and earlier. It could be easier to mechanically harvest the grasses to use them for composting operations. Potential exists that the dispersal of the water over a broader area results in a more difficult to negotiate traverse for heavy machinery to the maintenance zones.

Duration and Flow

Continuously running water is not an option for the wetland as the gradients across the site are too slight to accommodate anything other than a steady seepage. However, works could be undertaken to retain water, ponding it during high flows, and then allowing slow release through semi-porous embankments.

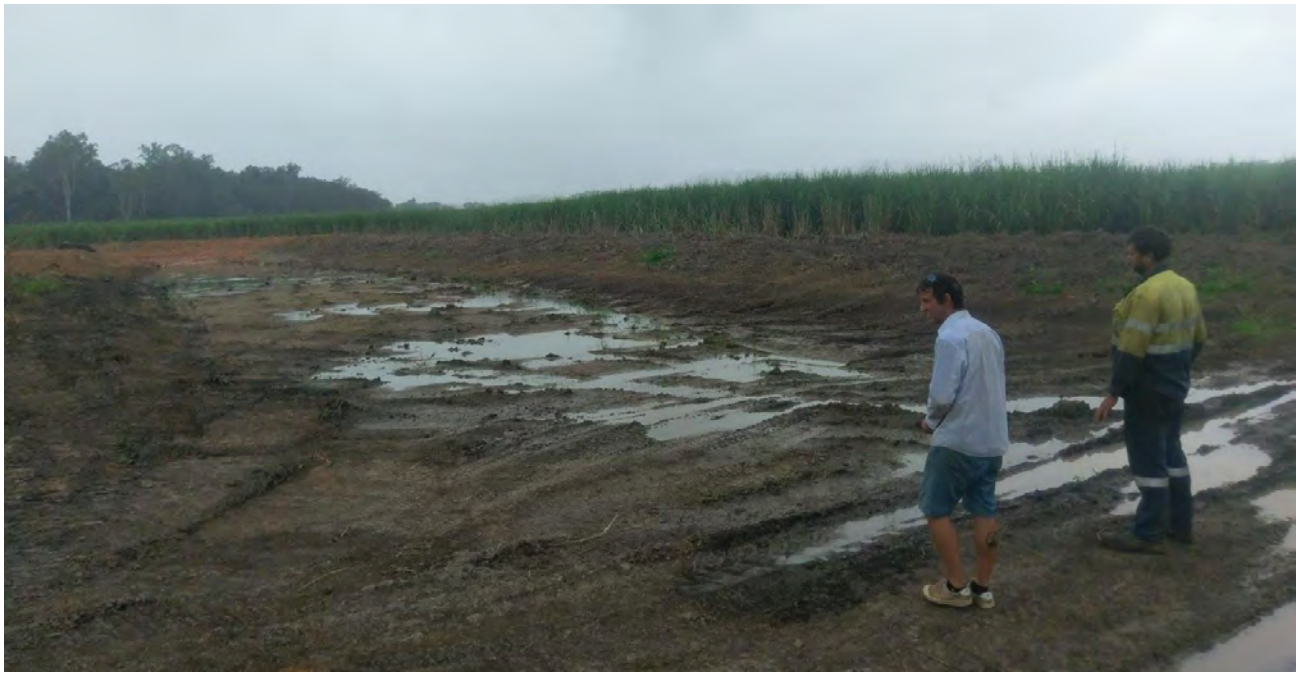
Distribution

The above factors can be further combined as a mix of systems across the wetland area. It is conceivable to encourage a shallow profile across much of the open country and connecting a series of deep and medium ponds along the natural drainage contours. The location of these ponds can be oriented so that they enhance the amenity of observation points, providing a diverse visual perspective and habitat mix. The proportion of shallow to deep areas will result from decisions about the level and type of maintenance that can be afforded to the wetland.

3.4 Effects of surrounding landuse

The drainage patterns of the area to the north of the wetland have changed significantly in the past several years. The cane farmer, seeking to improve yields, has developed a long drainage channel that wraps around the adjoining hill (site of the original abattoir) and collects waters toward a broad channel that enters the wetland from its eastern end.

This drain will provide the wetland with a larger volume of flushing water and more continuous input as the channel drains a number of small but permanent springs located in the canefield.



The channel is also a new accumulator of farm residues. In the past, most of the residues washed to the north and east, more directly into Hunter Creek. The new channel is a more direct vector of contributing waters.

The channel also has the potential to build up weeds with seed dispersal delivered to the wetland. Potential impacts of adjoining land use on water quality include:

- Increases in water turbidity;
- Increased flow rates resulting in erosion and sedimentation of waterbodies and scouring of vegetation;
- Increases in organic and inorganic nutrients, resulting in eutrophication of waterbodies.

4 Hymenachne: cultivating a systemic solution

Hymenachne (Hymenachne amplexicaulis) is a semi-aquatic perennial grass native to the seasonal, freshwater wetlands of South and Central America. It was released in Queensland in 1988 for use as 'ponded pasture'. Together with two other ponded pasture species, para grass and aleman grass, hymenachne is (was) considered to be a valuable source of dry-season cattle fodder.

The plant generally fails to persist in areas where the sub-soil dries out completely during the dry season. It is well adapted for survival in flooded areas and can withstand a maximum flooding level of 1.2 m and 297 consecutive days of flooding.(Csurhes, Mackey, and Fitzsimmons 1999)

There is no question that the most apparent and immediate problem is rampant Hymenachne infestation. The plant has colonised at least 75% of the entire reserve, and is dominant across 100% of the central section away from the fringing paperbarks. The plant's aggressive habit has created an ecological monotone. Although some biological activity is promoted through the abundant growth and reliable conditions, it is also true that diversity (and the attendant system-level resilience) has been greatly reduced.

The dangerously invasive habit of Olive Hymenachne was noted by plant specialist John Clarkson in the early 1990's. About the same time, Sid Clayton, a local bushie and Mareeba Shire's Environment Officer, raised the alarm that Olive Hymenachne was not only thriving at Abattoir Swamp, but that it had hybridised with the native variety.

Over the past 30 years there has been little to no coordinated action to remove the aggressive exotic species from Australia. To the contrary, beef producers have been allowed (and encouraged) to explore the potential of the plant to provide reliable dry-season fodder (ponded pasture) in an effort to boost production. Inevitably, through dam failure, floods, and waterbirds, the exotic Hymenachne has spread.

Hymenachne from side to side of the main "paddock" at Abattoir Swamp. (Oct 2017)

At this point in time, there is so much Hymenachne in the environment that eradication is not considered practical. There are thus two lines of approach: direct minimisation within high-value conservation areas, and systemic integration within mixed environments.

In “natural” and conservation areas, control efforts are aimed at minimisation (asset protection) since Hymenachne directly threatens amenity and ecological values. The custodians of these areas have (or should have) access to budgets and resources that are intended for this purpose. This is an expensive, yet well-understood line of approach and there are numerous case studies that provide guidance on how to locally eradicate.(Doak 2006)

On the second line, there is a frontier of potential, but not much demonstrated efficacy. The core of the idea is to develop systems-driven strategies to reduce the dominance of the plant and to forcefully integrate it into a more diverse ecological profile. This effort has to also comply with the legal requirements of State and Commonwealth biosecurity legislation.

Abattoir Swamp may be an ideal “proving ground” for an innovative solution. It is a small area entirely surrounded by primary production activities.

The cane grower does not want Hymenachne to become an agricultural pest, but the grazier appreciates the dry-season fodder. The bird-watchers would like some diversity and open water, but Council does not have the resources to undertake a continuous control program, nor can volunteer efforts from the community be relied on to provide long-term management.

It is not practical or desirable to just drench the wetland in herbicide every few years to keep it clear of this persistent weed. Nor is it responsible, legal, or deireable to allow the wetland to go feral, continuously pumping Hymenachne seed and propagates into the surrounding paddocks and public reserves. Between these divergent positions we are pressed to find innovative strategies.

As the old permaculture adage advises, we need to find a way to “*let the problem become the solution.*”

4.1 Hymenachne control: harvest/compost

Hymenachne thrives on the nutrient run-off from cane paddocks, and the shallow collection drain coming into the wetland will serve as a highly-functional (if problematic) cultivation zone. The abundant growth of the plant represents a transformation of runoff waste into plant matter. The hymenachne serves to significantly reduce nutrient run-off, and the plant’s roots function a mechanical scrubbers to reduce suspended solids from waters moving into the wetland.

The nutrients stored in the plant’s biomass represent a valuable potential resource as compost feedstock, and the value of composting would be a potential gain instead of the certain cost of herbicide treatment.(Doak 2006, 57)

The idea of periodically removing great quantities of the weed using mechanical harvesters has been suggested, though not trialled. To keep possibilities open, the decision was made to provide two machinery gates so that heavy equipment could have easy access to the most likely harvest points.

A biological farming consultant has been working with the cane farmer to establish large-scale composting facilities in marginal paddocks adjacent to the wetland. This would facilitate efficient

transport of harvested weed to a compost site.

The cane farmer also has the opportunity to seasonally clean hymenachne out of their drainage channel to reduce the seed and propagates flowing into the wetland. The ideal time for such removal would be prior to Wet season rains. Hymenachne typically flowers and sets seed during the Wet (Nov-Mar) so if the drains were cleared out by late Oct there would be a minimum re-infestation load flowing into the wetland (and onward down the Rifle Creek system). This management approach would, ideally, be coordinated with a similar effort in the wetland itself in order to achieve a system-wide effect.

First wet season after drainage channel established. Shallow profile makes ideal cultivation habitat for Hymenachne, and also facilitates easy mechanical clearing. The drain flows into the wetland, see paperbark fringe in the middle distance. (Oct 2017)

4.2 Hymenachne control: crash grazing

Crash grazing, or cell grazing, is a technique that can be used to improve the quality of grazing land, controlling weeds and improving livestock health. In simplest terms, the idea is to use livestock as an intensive, limited duration, forcing event in a given ecosystem. Fencing is used to control access. A very high density of animals is introduced to an area so that grazing is aggressive and thorough. Manure is accumulated quickly. Then the animals are removed and the system re-calibrates itself. There are many case studies available exploring the potential benefits and pitfalls of the method.(NQ Dry Tropics NRM 2012; Burtner 2013; Spearpoint 2006)

In the current context, crash grazing could be used as a later Dry technique to lower the volume of Hymenachne in both the wetland and the new drainage channel. Electric tape can be used as temporary fencing to force targeted grazing or to undertake control trials. This is an inexpensive way to test control methods.

There are many questions to answer, including:

- Is the Hymenachne sufficiently palatable in the Sept-Nov timeframe to permit effective grazing? (or can its palatability be practically improved eg through the use of molasses or choice minerals)
- How would water be supplied to stock if they are intended to remain onsite?
- How to protect excavated areas, allowing cattle access across the wetland so they don't get bogged but can still get a feed?
- How to manage a biosecurity “buffer zone” so they can empty out their guts after a grazing cycle and not spread the hymenachne seed?
- How many head are available to put into the system (ie, what’s the minimum density for an effective “crash”, and is this practical with the available herd)?
- What are the consequences for native flora and fauna regeneration?
- Does the seasonal deposition of nutrients fundamentally harm the wetland’s ecological function? Can the cattle be managed so that they are a driver of improved wetland health?

Cattle crash-grazing Hymenachne: trial with temporary electric tape fence.(NQ Dry Tropics NRM 2012)

4.3 Weed (?) Invasion

One of the persistent concerns for both conservationists and producers alike is the loss of good country to weeds. We spend a lot of time being anxious about weeds, and a lot of resources trying to control them. Generally we think of weeds as “invaders” and try to do battle with them at our frontiers. However, from a systems point of view, the appearance of weeds is more profound than a simplistic fear of strangers might suggest. Weeds are a signal that the underlying system is out of balance.

Weeds are disturbance specialists: they thrive in environments that have become “disturbed” and they function (over various timeframes) to create conditions where more stable species once again come to dominate. When too many nutrients have been removed, nutrient-fixing (weed) plants arrive and take over. Where too many nutrients have been added, nutrient-absorbing (weed) plants arrive to take over. As systems become more balanced and mature, weeds are generally out-competed. In this view, there is little difference between “exotic” weeds and “native” weeds. Both types of plants show that the underlying system is falling short.

Thus, for a long-term strategy at Abattoir Swamp, our goal is to (a) observe the larger context in which the wetland is situated; and (b) develop the most efficient path toward a self-stabilising environment.

5 Habitat: encouraging diversity and abundance

The community have agreed that they want Abattoir Swamp to be vibrant, healthy, and attractive. In order to achieve this outcome, we need to understand what sort of situation we're dealing with. Abattoir Swamp is a highly modified and largely unstable system. In the past 100 years:

- Traditional land management techniques have ceased
- 80% of the mature forest cover has been removed
- Exotic life forms have been introduced (vertebrate, invertebrate, plants, microbes)
- A majority of the native (customary) plant and animal relationships have been disrupted

In the past 30 years:

- Major alterations to the drainage and flows have occurred
- A single weed species has overwhelmed the wetland ecosystem
- Active management of the surrounding production land has increased significantly
- The effects of climate variability are increasingly expressed in local phenomena

In this context it would be fair to say that we are all working in a high level of uncertainty...what "should" be done...what "could" be done...there are very few guidances that we can be certain about. If the goal is to bring the wetland toward stability while maximising the level of biological activity, then (within the limits of legislation) we should probably consider all options for how to best proceed.

5.1 "Weedy" fauna

Animals can present similar problems as weeds. There are disturbance specialists who thrive in systems that are out of balance. These "weedy" animals can be native or exotic. Typical exotic pests occurring in the wetland and surrounds include pig, cane toad, and Gambusia (Mosquitofish)

5.2 Unproductive fire

Although large parts of the tropical savannas, and Australia generally, have been tuned by thousands of years of "firestick farming"(Jones 2012; Gammage 2012), there are ecological communities very much ill-suited to fire, and which should never, or very rarely, be burned. Abattoir Swamp is one such environment. Fire may be considered, especially across the main paddock following a Hymenachne eradication effort. However, it is critical to note that alterations to vegetation may include modification of the floristics and structural complexity of the community, and natural recruitment may be suppressed by inappropriate fire regimes.

Vegetation within the wetland is largely comprised of hydrophytic, fire-retardant species. Additionally, free standing water is present beneath the vegetation. It is therefore considered that the wetland is unlikely to be at high risk of fire. The importance of keeping the wetland fire-free should nevertheless be made clear to both the surrounding land managers and the caretakers of the wetland itself. The portion of the reserve in dryland scrub is a different matter. Its current condition is poor, with high density of stems/ha. It could benefit from a careful process of thinning and selective re-planting. Fire would have to be handled very carefully with respect to the ground-nesting birds, reptiles, amphibians, and invertebrates currently making use of the area.

6 Amenity and engagement

We have discussed various bio-physical aspects of the wetland in the context of managing the system toward improved health and function. There are highly technical matters in this area, and vast regions of unknown causation, dynamics, and consequence.

However, it is essential to note that the wetland is ultimately a social project undertaken by people. Thus, it is essential that we deal directly with community perceptions and expectations of the reserve.

6.1 Paperbark trail

One of the ways to encourage more exploration and engagement is to provide more experience opportunities than just the boardwalk and hide.

A proposed walking trail has been slashed along the northern fenceline. This allows visitors to stroll nearly 300m along the northern fringe of the wetland, tracking the ti-tree and paperbarks that gradually thicken toward the eastern end of the reserve. Just before a large gum tree the trail reaches a quiet, shady spot that would be ideal for a small viewing platform that looks into the trees growing in that permanently wet section of the reserve.

6.2 Dryland scrub (carpark area)

The reserve has the great good fortune of incorporating not just wetland biomes, but a fragment of much drier country as well. Surrounding the carpark is a ring of mixed forest scrub that was once interspersed with healthy stands of native grasses.

As this area is the visitors' first encounter, and it is not submerged in Hymenachne, it makes a good starting point for the whole reserve. Bird guides already take their guests into this area, but there are no formed trails or explicit guidelines on where to walk and not walk. This leaves the entire area open to tramping, which discourages ground-nesting birds that might otherwise be tempted to take up residence.

6.3 Storyplace

A third potential for expansion is the area deep under the paperbarks at the eastern end of the reserve. This may be developed as a restricted access "storyplace" available to traditional owners and their guests for cultural purposes.

6.4 Interpretive assets

There are many opportunities for interpretive materials to be placed at the Park and to be integrated into other guides, tours, etc.

6.5 Online presence

The Park would benefit from a dedicated online presence. At the moment there is a dedicated page on the JAMARR website under the EnviroGroup heading.

7 MANAGEMENT ACTIVITIES & REPORTING

The construction of the Plan is intended to encourage at least annual updates as new activities, plans, and observations are undertaken. Following are the proposed methods for updates:

7.1 Annual Activity Plan

Each year at the end of the Wet the JAMARR membership, Council, and other interested stakeholders (Landcare, Regional NRM, Traditional Owners, etc) should be invited to the most appropriate regular JAMARR meeting in order to review the year's progress and support a plan of works for the year ahead. This might typically be the June meeting in Julatten or the April meeting in Molloy (although this is normally the AGM as well).

7.2 Monitoring: water quality and invertebrates

One of the key outcomes for the wetland is improving water quality and biological abundance and diversity at the invertebrate level. Sampling will be undertaken as budget permits. The dataset and analysis will be stored on the JAMARR website and file server, available for public reference.

7.3 Monitoring: birdlife

There is an active birdguiding network who maintain various observation databases. An arrangement with this network is to be made with a view to receiving an annual report of observations for the Abattoir Swamp reserve. This report will then be published on the JAMARR website.

7.4 Monitoring: weeds and ferals

An annual survey for weeds and feral animal activity should be undertaken as part of the overall monitoring program.

7.5 Monitoring: community engagement and utilisation

A method for assessment of the community's awareness of the reserve, and its utilisation by locals and visitors would greatly assist the effort to provide long-term management to the reserve.

7.6 Annual report: State of the Swamp

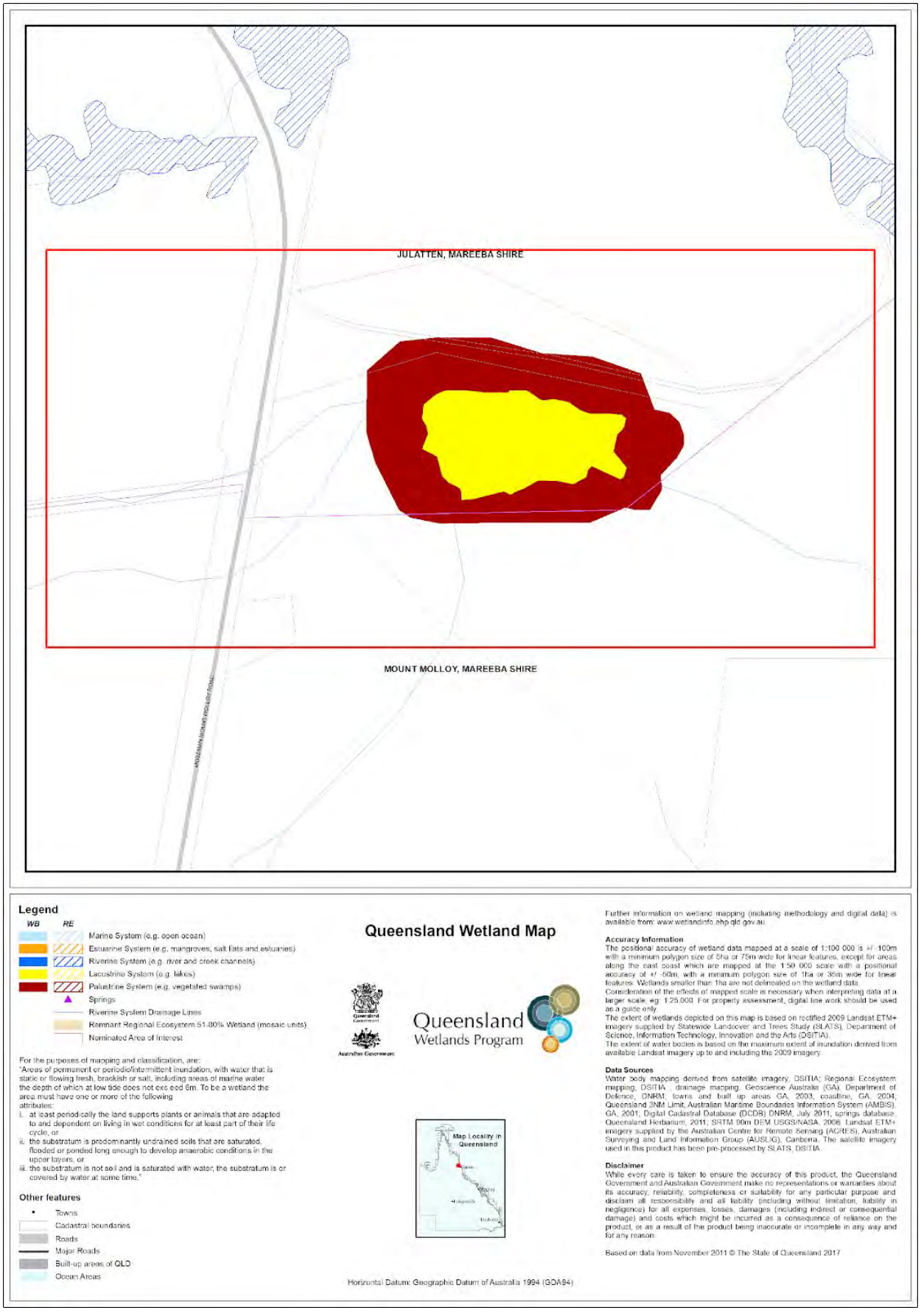
A State of the Swamp Report should be produced as soon after the annual planning meeting as possible. This report will then be available for pursuing the agreed management activities for the year.

The Report should be published on the JAMARR website and copies provided to Council, Mitchell River Watershed Management Group and the Northern GUlf Resource Management Group.

The key attributes of the Report should include:

1. An update on all monitoring indicators (above) and analysis of year-on-year trends
2. A proposed schedule of Works for the year
3. A list of people and organisations involved with and endorsing the Report
4. Assessment of critical views and contrary activities or initiatives.

APPENDIX 1 – Wetland Map



APPENDIX 2 – Observation List: Flora & Fauna Recorded

TYPE	LATIN	COMMON
AMPH	Bufos marinas	Cane Toad
AMPH	Litoria bicolor	Dwarf Tree-frog
AMPH	Litoria nasuta	Rocket Frog
AMPH	Litoria rothii	Roths Tree-frog
BIRDS	Acanthorhynchus tenuirostris	Eastern Spinebill
BIRDS	Accipiter cirrhocephalus	Collared Sparrowhawk
BIRDS	Accipiter fasciatus	Brown Goshawk
BIRDS	Acrocephalus stentoreus	Clamorous Reed Warbler
BIRDS	Alcedo azurea	Azure Kingfisher
BIRDS	Alcedo pusilla	Little Kingfisher
BIRDS	Anas gibberifrons	Grey Teal
BIRDS	Anas superciliosa	Pacific Black Duck
BIRDS	Anhinga melanogaster	Darter
BIRDS	Anseranas semipalmata	Magpie Goose
BIRDS	Anthus novaeseelandiae	Richards Pipit
BIRDS	Aprosmictus erythropterus	Red-winged Parrot
BIRDS	Apus pacificus	Fork-tailed Swift
BIRDS	Aquila audax	Wedge-tailed Eagle
BIRDS	Ardea alba	Great Egret
BIRDS	Ardea garzetta	Little Egret
BIRDS	Ardea intermedia	Intermediate Egret
BIRDS	Ardea novaehollandiae	White-faced Heron
BIRDS	Ardea pacifica	Pacific Heron
BIRDS	Aythya australis	Hardhead
BIRDS	Burhinus grallarius	Bush Thick-knee
BIRDS	Cacatua galerita	Sulphur-Crested Cockatoo
BIRDS	Caprimulgus mystacalis	White-throated Nightjar
BIRDS	Centropus phasianinus	Pheasant Coucal
BIRDS	Chenonetta jubata	Wood Duck
BIRDS	Chlidonias hybrida	Whiskered Tern
BIRDS	Chrysococcyx russatus	Gould's Bronze-cuckoo
BIRDS	Circus aeruginosus	Marsh Harrier
BIRDS	Circus approximans	Swamp Harrier
BIRDS	Circus assimilis	Spotted Harrier
BIRDS	Cisticola exilis	Golden Headed Cisticola
BIRDS	Collocalia spodiopygia	White-rumped Swiftlet
BIRDS	Colluricincla megarhyncha	Little Shrike-Thrush
BIRDS	Coracina novaehollandiae	Black-Faced Cuckoo-Shrike
BIRDS	Coracina papuensis	White-Bellied Cuckoo-Shrike.
BIRDS	Coracina tenuirostris	Cicadabird
BIRDS	Coturnix australis	Brown Quail
BIRDS	Cuculus flabelliformis	Fan-tailed Cuckoo
BIRDS	Cuculus saturatus	Oriental Cuckoo
BIRDS	Dacelo leachii	Laughing Kookaburra
BIRDS	Dacelo leachii	Blue-winged Kookaburra
BIRDS	Daphoenositta chrysoptera	Varied Sitella
BIRDS	Dendrocygna arcuata	Wandering Whistling Duck
BIRDS	Elanus notatus	Black-shouldered Kite
BIRDS	Elseyornis melanops	Black-fronted Plover
BIRDS	Entomyzon cyanotis	Blue-faced Honeyeater
BIRDS	Ephippiorhynchus asiaticus	Black-headed stork
BIRDS	Eudynamis scolopacea	Common Koel
BIRDS	Eurystomus orientalis	Dollarbird
BIRDS	Falco berigora	Brown Falcon
BIRDS	Falco longipennis	Australian Hobby
BIRDS	Falco longipennis	Australian Hobby
BIRDS	Fulica atra	Eurasian Coot
BIRDS	Gallinago hardwickii	latham's Snipe
BIRDS	Gallinula olivacea	Bush-hen
BIRDS	Gallinula tenebrosa	Dusky Moorhen
BIRDS	Gallirallus philipensis	Buff-banded Rail
BIRDS	Geopelia humeralis	Bar-shouldered Dove
BIRDS	Geopelia placida	Peaceful Dove
BIRDS	Gerygone magnirostris	large-billed Gerygone
BIRDS	Halcyon macleayii	Forest Kingfisher
BIRDS	Halcyon pyrrhopygia	Red-backed Kingfisher
BIRDS	Haliaeetus Leucogaster	White-bellied Sea-eagle
BIRDS	Himantopus himantopus	Black-winged Stilt
BIRDS	Hirundapus caudacutus	White-throated Needletail
BIRDS	Hirundo neoxena	Welcome Swallow
BIRDS	Hirundo nigricans	Tree Martin
BIRDS	Irediparra gallinacea	Jacana
BIRDS	Lichenostomus flavus	Yellow Honeyeater
BIRDS	Lichenostomus chrysops	Yellow-Faced Honeyeater
BIRDS	Lichenostomus frenatus	Bridled Honeyeater
BIRDS	Lichmera indistincta	Brown Honeyeater
BIRDS	Ixobrychus flavicollis	Black bittern
BIRDS	Malurus melanocephalus	Red-Backed Fairy-Wren
BIRDS	Megalurus timoriensis	Tawny Grassbird
BIRDS	Megapodius reinwardt	Orange-footed Scrubfowl
BIRDS	Meliphaga lewinii	Lewin's Honeyeater

BIRDS	Meliphaga notata	Yellow-Spotted Honeyeater
BIRDS	Melithreptus albogularis	White-Throated Honeyeater
BIRDS	Melithreptus gularis	Black-chinned Honeyeater
BIRDS	Merops ornatus	Rainbow Bee-eater
BIRDS	Microeca flavigaster	Lemon-Bellied Flycatcher
BIRDS	Milvus indus	Brahminy Kite
BIRDS	Milvus migrans	Black Kite
BIRDS	Milvus sphenurus	Whistling Kite
BIRDS	Monarcha melanopsis	Black-faced Monarch
BIRDS	Monarcha trivirgatus	Spectacled Monarch
BIRDS	Myiagra rubecula	Leaden flycatcher
BIRDS	Myzomela obscura	Dusky Honeyeater
BIRDS	Myzomela sanguinolenta	Scarlet Honeyeater
BIRDS	Ninox connivens	Barking Owl
BIRDS	Ninox novaeseelandiae	Southern Boobook
BIRDS	Nycticorax caledonicus	Rufous Night Heron
BIRDS	Pachycephala rufiventris	Rufous Whistler
BIRDS	Pelicanus conspicillatus	Australian Pelican
BIRDS	Phalacrocorax melanoleucos	Little Pied Cormorant
BIRDS	Phalacrocorax sulcirostris	Little Black Cormorant
BIRDS	Philemon citreogularis	Uttle Friarbird
BIRDS	Philemon corniculatus	Noisy Friarbird
BIRDS	Phylidonyris nigra	White-Cheeked Honeyeater
BIRDS	Piatatea flavipes	Yellow-billed Spoonbill
BIRDS	Platalea regia	Royal Spoonbill
BIRDS	Platycercus adscitus	Pale-headed Rosella
BIRDS	Platycercus adscitus	Pale-headed Rosella
BIRDS	Podargus strigoides	Tawny Frogmouth
BIRDS	Poliolimnus cinereus	Whlte-browed Crake
BIRDS	Porphyria porphyria	Purple Swamp-Hen
BIRDS	Porzana tabuensis	Spotless Crake
BIRDS	Ramsayornis modestus	Brown-Backed Honeyeater
BIRDS	Rhipidura fuliginosa	Grey Fantail
BIRDS	Rhipidura leucophrys	Willie Wagtail
BIRDS	Rhipidura rufiventris	Northern fantail
BIRDS	Scythrops novaehollandiae	Channel-billed Cuckoo
BIRDS	Tachybaptus novaehollandiae	Australasian Grebe
BIRDS	Threskiornis aethiopica	Sacred Ibis
BIRDS	Threskiornis spinicollis	Straw-necked Ibis
BIRDS	Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet
BIRDS	Trichoglossus haematodus	Rainbow Lorikeet
BIRDS	Tringa glareola	Wood Sandpiper
BIRDS	Tringa nebularia	Greenshank
BIRDS	Tringa stagnatilis	Marsh Sandpiper
BIRDS	Turnix maculosa	Red-backed Button-Quail
BIRDS	Tyto alba	Barn Owl
BIRDS	Vanellu miles	Masked lapwing
BIRDS	Xanthotis macleayana	Macleays Honeyeater
GRASSES	Cyperus spp.	Large Sedges
GRASSES	Cyperus spp.	Small sedges
GRASSES	Eleocharis sp.	Spikerush
GRASSES	Fuireana sp.	Sedge
GRASSES	Fumbrislysis sp.	Sedge
GRASSES	Scleria poaeforrnis	-
MAMMLS	Acrobates pygmaeus	Feathertail glider
MAMMLS	Bos indicus	Cattle
MAMMLS	Canis familiaris	Dog
MAMMLS	Equus caballus	Horse
MAMMLS	Macropodus agilis	Agile wallaby
MAMMLS	Order Chiroptera	Bats
MAMMLS	Petaurus breviceps	Sugar glider
MAMMLS	Pteropus conspicillatus	Spectacled flyingfox
PLANTS	Azolla pinnata	Ferny Azolla
PLANTS	Caldesia sp.	Caldesia
PLANTS	Commelina sp.	Wandering Jew
PLANTS	Marselia sp.	Nardoo
PLANTS	Monochoria cyanea	Monochoria -
PLANTS	Nymphaea sp.	Water Lily
PLANTS	Nymphoides crenata	Yellow Snowflake
PLANTS	Nymphoides indica	Water Snowflake
PLANTS	Persicaria sp.	Knotweed
REPTILES	Carlia spp.	Sunskinks
REPTILES	Ctenotus spp.	Striped skinks
REPTILES	Dendrelaphis punctulata	Common Tree snake
REPTILES	Elseya sp.	Tortoise
REPTILES	Oxyuranus scutellatus	Taipan
REPTILES	Physignathus lesseuri	Eastern Waterdragon
REPTILES	Tiliqua scincoides	Eastern Bluetongue
REPTILES	Varanus varius	Lace Monitor
TREES	A. crassicarpa	Northern wattle
TREES	A. holoserica	Silky Wattle
TREES	A. polystachya	-
TREES	Acacia aulacocarpa sp.aff.	Hickory wattle
TREES	Alphitonia excelsa	Red Ash
TREES	Alphitonia petrei	Sarsaparilla
TREES	Alphitonia petriei	Sarsaparilla

TREES	Alstonia muelleriana	Hank Milkwood
TREES	Beilschmedia obtusifolia	Blush Walnut
TREES	Breynia stipitata	
TREES	Calamus radicalis	lawyer vine
TREES	Canarium australasicum	Scrub Turpentine
TREES	Carallia brachiata	Corky Bark
TREES	Carallia brachiata	Corky Bark
TREES	Casuarina torulosa	Rose She-oak
TREES	Chionanthus ramiflorus	Native Olive
TREES	Coelospermum reticulatum	
TREES	Cryptocaria hypospadia	Northern Laurel
TREES	Cryptocarya laevigata	Glossy Tamarind
TREES	Cryptocarya mackinonniana	Rusty laurel
TREES	Cryptocarya triplinervis	Brown laurel
TREES	Cyclosaurus interruptus	Fern
TREES	Delarbrea michieana	Blue Nun
TREES	Dendrobium canaiculatum	Tea-Tree Orchid
TREES	E. platyphylla	Poplar Gum
TREES	E. torrelliana	Cadaga
TREES	Elaeocarpus amhemicus	Quandong
TREES	Elaeocarpus augustifolius	Silver Quandong
TREES	Eucalyptus papuana	Ghost Gum
TREES	Eucalyptus tereticornis	Blue Gum
TREES	Euodia elleryana	Corkwood
TREES	Euroschinus falcata	Pink Poplar
TREES	F. congesta	Cluster Fig
TREES	F. obliqua	Small-leaved Fig
TREES	F. opposita	Sandpaper Fig
TREES	F. virens	Banyan
TREES	Ficus benjamina	Weeping Fig
TREES	Gl. harveyanum v. harveyanum	Cheesetrees
TREES	Glochidion bentharnianum	Cheesetrees
TREES	Guioa acutifolia	Glossy Tamarind
TREES	Guioa acutifolia	Glossy Tamarind Mod.
TREES	Jagera pseudorhus	Foambark Mod.
TREES	L. leefeana	Brown Bollywood
TREES	Litsea breviumbellata	Bollywood
TREES	Lophostemon sauveolens	Swamp Mahogany
TREES	Lygodium microphyllum	Climbing Maidenhair
TREES	M. viridiflora	Broad-leaved Paperbark
TREES	Macaranga involucrata	Macaranga
TREES	Mallotus philippensis	Red Kamala
TREES	Mallotus philippensis	Red Kamala
TREES	Mangifera superba	Mango
TREES	Melaleuca quinquinervia	Paperbark Tea-tree
TREES	Nauclea orientalis	Leichardt tree
TREES	Omalanthus novo-guineensis	Bleeding Heart
TREES	Pandanus sp.	Pandanus
TREES	Pandanus sp.	Pandanus
TREES	Pelatostigma pubescens	Quinine Bush
TREES	Persoonia falcata	
TREES	Planchonia careya	Cocky Apple
TREES	Premna serratifolia	Creek Premna
TREES	Premna serratifolia	Creek Premna
TREES	Schleffera actinophylla	Umbrella Tree
TREES	Scolopia braunii	Brown Birch
TREES	Syzygium tierneyanum	River Cherry
TREES	Terminalia sericocarpa	Damson
TREES	Terminalia sericocarpa	Damson
TREES	Timonius timon	False Fig
WEEDS	Aeschynomene indica*	Buddha Pea
WEEDS	Ageratum houstonianum*	Blue top
WEEDS	Bothrolchlea bladhii	Forest Bluegrass
WEEDS	Brachiaria mutlca*	Para grass
WEEDS	Centrosema pubescens*	Pea Vine
WEEDS	Eleusine indica	Crowsfoot
WEEDS	Heteropogon contortus	Black Speargrass
WEEDS	Lantana camara*	lantana
WEEDS	Leersia hexandra	Swamp Ricegrass
WEEDS	Ischameum australe	
WEEDS	Ludwigia spp.	Primrose
WEEDS	Mimosa invisa*	Giant Sensitive Weed
WEEDS	Mimosa pudica*	Common Sensitive Weed
WEEDS	Panicum maximum*	Guninea Grass
WEEDS	Paspalum sp.*	Paspalum
WEEDS	Salvia plebeia*	Common Sage
WEEDS	Sida cordifolia*	Flannel Weed
WEEDS	Sida rhombifolia*	Sida Retusa
WEEDS	Solanum torvum*	Devils Fig
WEEDS	Sporobolus jacquemontii	
WEEDS	Stachytarpheta sp.*	Snakeweed
WEEDS	Themeda triandra	Kangaroo Grass
WEEDS	Urena lobata*	Urena Burr

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8 Works Schedule: 2017

This is a list of works undertaken in the 2016-2018 period while the Master Plan was being developed.

8.1 Fencing

A contract was let by Mareeba Shire Council in 2017 to re-fence the perimeter of the wetland. This work was undertaken by work-for-the-dole crew learning trade skills and gaining valuable on-ground experience.

The fencing layout was designed to accommodate machinery access at the eastern end of the property and a second machinery entrance was proposed for northern boundary near the western leg of the fenceline.

An access gate was installed next to the boardwalk entrance to facilitate the utilisation of a paperbark trail walk along the northern boundary.

New gates were also supplied for the southern access point connected to the grazier's property.

The grazier took responsibility for labour and material costs to make good on the new fencing where required to ensure proper control of the herd.

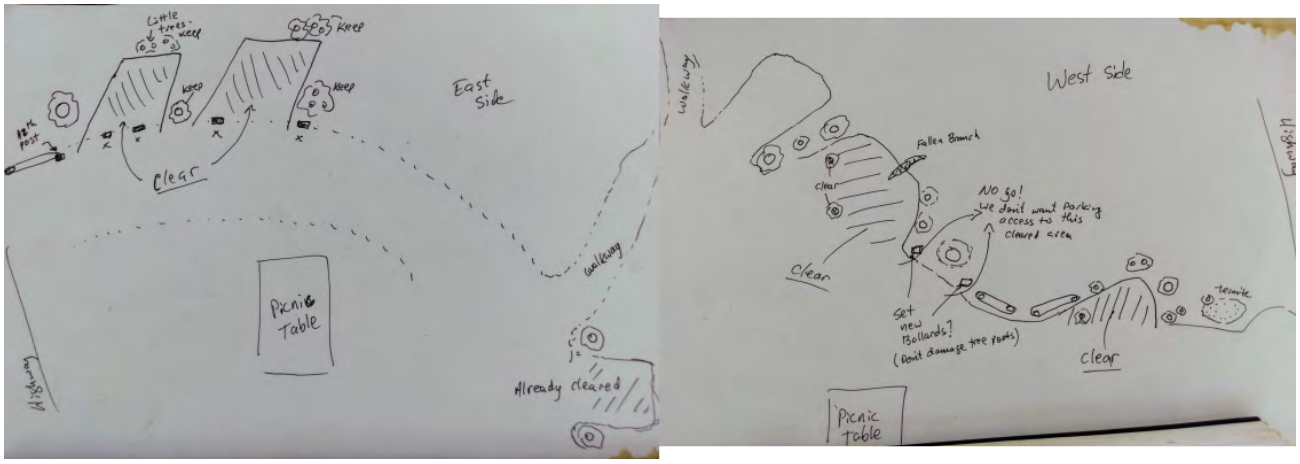
8.2 Boardwalk restoration

A contract was also let to the work-for-dole team to repair the boardwalk. The JAMARR volunteer team had previously undertaken significant works, but in the process had identified that there were far more problems than could be sorted by that small team.

The new repairs utilised recycled composite plastic planks and new structural members across much of the boardwalk. The access path was also cleaned up and brought to high condition.

8.3 Parking lot clean-up and expansion

While the boardwalk work was being undertaken, there were additional efforts to clean up and expand the parking arrangements. This resulted in the addition of 5 new parking spots without damage to any significant trees.



8.4 Slashing/mulching trial

One of the ideas for knocking the Hymenachne back without using herbicides is to slash it with a flail mower and then immediately apply a biological treatment to accelerate decomposition.

A partial trial was undertaken in Sept 2017. However, early rains made the mowing too difficult to complete and gave the hymenachne a boost as well. Although decomposition was rapid, the Hymenachne was quick to re-shoot and fill in the mown areas.

Green shoots power through the decomposing mass of mown weed. (Sept 2017)

9 Works Schedule: 2018-2019

((to be developed: 09 Aug 2018 JAMARR meeting))