A REVIEW OF PROGRESS AND CHALLENGES to DECEMBER 2016

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1 EXECUTIVE SUMMARY

Moggill Creek Catchment Management Group Inc.

Incorporated on 8 December 1997, the Moggill Creek Catchment Management Group Inc. (hereinafter referred to as MCCG) is a volunteer community action group aiming to conserve native ecosystems on private and public land, and to provide information to landholders responsible for land management. Moggill Creek and its tributaries are situated in the foothills of the D'Aguilar Range, in the outer western area of Brisbane. It comprises significant areas of conservation parks, acreage properties and urban areas.

Review Rationale

A Review of Progress and Challenges from 1999 to December 2010 was published in 2011. The MCCG Management Committee decided in 2016 to update that review and its strategic and action plans to ensure that our achievements are recorded and monitored against the objectives we have set and to plan our future activities. This review is predominantly concerned with activity up to the end of December 2016, although in a few instances, some early activity in 2017 is included.

Objectives

This Review has been prepared for members and other stakeholders with the following objectives in mind:

- To critically review activities of the group since the 1999-2010 review;
- To provide an objective assessment of the challenges ahead and identify probable future directions;
- To provide information about the group to potential sponsors and funding bodies.

Methodology

The methodology comprised:

- An evaluation of the land and creek condition in each of the 13 sections (Figure 4.1.1, p. 15) across the catchment. This was compiled by the corresponding section leader for each section and other informed MCCG members.
- Seeking information from experienced landholders on issues and solutions, followed by a meeting of key MCCG members, and collaborating groups in the Brisbane City Council, Healthy Land and Water, Seqwater, and Biosecurity Queensland.
- An assessment of the range of activities carried out by the MCCG with reference to the broad goals and strategies in Version 3 of the Strategic Plan developed in 2003.

1.1 Major Conclusions

The assessment of the condition of the land and water resources of Moggill Creek and the achievements of MCCG since 1997 outlined in this document have led to the following conclusions:

1. The Moggill Creek catchment is a valued natural asset to Brisbane; the natural environment is unique and deserves our care.
2. Remnant vegetation in the higher parts of the landscape of sections 6 (Upper Brookfield), 7 (Gold Creek Reserve), 8 (Wonga Creek), and 13 (Mt Coot-tha Park) is in relatively good condition.
3. However, little has been achieved in restoring habitat corridors from riparian areas across the largely cleared lower lands to the hills. There is currently no clear strategy to address this important goal anywhere in the catchment. Most of these lands are

privately owned and many owners do not have the resources and/or motivation to sustain the efforts required to achieve progress in restoring corridors.

4. Flooding in the lower reaches of the catchment has caused severe damage to the stream banks and beds and the restored riparian vegetation in parts of the lower banks and made weed control extremely difficult. As a result, there have been major set-backs to extensive sustained revegetation activities on several of the parklands and other public lands in the catchment. The strategies used in these flood prone areas by bushcare groups should be documented and reviewed to ensure that better practices are introduced across all sections.
5. Aquatic weeds pose serious threats to aquatic fauna and water quality. Improvements in the reduction of nutrient levels from businesses and private properties, and restoration of riparian zones would reduce these threats.
6. Based on limited data, the threats from weeds appear to have increased on many rural properties, on public land along roads and power transmission lines, and along the riparian zones. Continued lack of effective management of exotic weeds poses the greatest threat to retention of existing vegetation communities in the catchment.
7. Biological control agents are available for some weeds, notably lantana, salvinia and cat's claw creeper, but their effectiveness is generally limited.
8. The MCCG recognises there has been a cultural change in the catchment in recent times with increasing community awareness of the benefit of habitat restoration. MCCG contributes to this through free and expert advice from its Landcare Adviser, the distribution of local native plants and the extensive project work managed by the MCCG throughout the catchment. In addition, the uptake of the Wildlife Conservation Assistance program is the highest of any Brisbane catchment.
9. MCCG's nursery has supplied tens of thousands of plants to private land owners at no charge and has been a major success in supporting MCCG's activities. However, there is a need to ensure that seed collection keeps pace with the demand for species.
10. Numbers of plants distributed by the MCCG nursery (c. 85,500) exceeds the number planted by volunteers on public land (c. 49,000), so a larger area of private land should have been revegetated overall. However, it is difficult to determine accurately:
    - how much sustained progress has been made in revegetation in many of the acreage properties of the catchment;
    - what impact the restoration efforts have had on fauna habitat.
11. Bushcare volunteer groups in the sections have carried out thousands of hours of habitat restoration activities. Community groups such as the Pacey Road Group and the Upper Brookfield Working Group, supported by the MCCG have proven to be a valuable means of encouraging cooperative works on public and private lands and where bushcare groups are not operating.
12. As a result, there are several very good examples of restored riparian zone restoration that appear to be relatively stable, in the upper and lower Gold Creek catchment, in the McKay Brook and Gap Creek catchments and on parts of the Moggill Creek riparian areas from above the Brookfield Road bridge near the showgrounds down to and including Huntington Park. These have been achieved mainly by volunteer input with significant contribution from Council.
13. MCCG is well administered, financially stable, and has considerable support indicated by steadily increased membership since it was formed, and by collaborative inputs from the Brisbane City Council, and the Queensland and Commonwealth Governments.
14. MCCG's educational and community engagement programs have developed well over the past six years: The web page has been further developed and the means of community involvement through Facebook has been created; talks on environmental issues and displays are well patronized and presented; and the Photographic Competition has been a growing success.

15. Brisbane City Council's support through the Creek Ranger program has reduced since the last review, but continues to assist MCCG's activities. The Community Conservation Assistance program introduced by the Brisbane City Council is a very valuable addition to the ability to conduct works on private land through the Wildlife Conservation - Partnerships program.
16. Friends of Moggill Creek forums commenced in late October 2009 and were successful in encouraging more members of the catchment group to discuss the key topics of Landcare and Biodiversity, Watercare and Community. As a result several new projects have progressed, including creek health monitoring, bird monitoring, dragonfly monitoring, and frog monitoring.
17. The leased cottage at the end of Gold Creek Road is an asset as the MCCG administrative centre and the venue for an increased range of promotional and educational activities such as the monthly series of talks.
18. MCCG considers the Brisbane Catchments Network to be a useful forum for interaction between the city's catchment groups.
19. Despite Federal, State and Council financial support and the thousands of hours of volunteer work, the catchment remains under environmental stress. Continued financial support from government agencies will be essential in the future to achieve greater environmental restoration outcomes.
20. The key recommendations of the 2010 Review have guided the main activities within the catchment group for the last 6 years, and were developed to ensure alignment with State and Commonwealth funding priorities at the time. The level of achievement within each of the strategies has been subjectively rated by members of the Management Committee. These ratings and the conclusions listed above will be inputs to the deliberations on future priorities.

1.2 Major Recommendations for the Future Direction of MCCG

In response to the conclusions from the review, the following recommendations are proposed to guide the group over the next 5 years and to assist in consultation with stakeholders and likely partners, particularly those who might assist with resources.

1. MCCG should regularly review its Strategic Plan to ensure that our resources in conjunction with those of BCC and State entities are focussed effectively on the highest priorities in the Moggill Creek catchment.
2. MCCG should actively seek commercial sponsors, and partner with Governments at all levels for specific support arrangements.
3. MCCG should continue to review the revegetation methods in flood prone areas of the catchment, particularly in the higher parts of the catchment where the stream gradients result in very fast runoff velocities and turbulence.
4. The MCCG should continue to assist private land owners in their efforts with revegetation and weed control, and to identify opportunities for protecting unique remnants and the development of habitat corridors.
5. The MCCG should continue to assist the formation of community led bushcare groups in areas not covered by Habitat Brisbane.
6. Bushcare groups should be developed and supported in sections 1 and 10.
7. As a priority, MCCG should:
    a. Undertake riparian zone condition assessments to evaluate outcomes of restoration activities.
    b. Ensure assessment of the last 6 years of data collected in the Creek Health Monitoring Program.

   c. In conjunction with landholders, commence assessment of weed invasion and associated weed management activities in remnant areas, particularly those fringing conservation areas such as the Brisbane Forest Park and Mt Coot-tha Forest Park.
   d. Continue to develop a monitoring program of bird species and numbers in remnant vegetation as an input to designing strategies for revegetation activities.

8. Several improvements are required to enhance the nursery's capability to keep pace with demand for plants by the catchment members. These enhancements are:
   a. Better targeted and increased seed collection to widen the variety of species grown for use by catchment members.
   b. Studies on seed dormancy and storage requirements to increase the availability of plants throughout the year.
   c. Development of vegetative propagation options that could be employed as an alternative approach to supplying some of the species sought by members.
   d. Development of an improved inventory system.
9. Given the very high uptake of the Wildlife Conservation Partnerships Program in the catchment, the MCCG should make every effort in its project activities to complement the activities of this valuable program.
10. The MCCG should develop an explicit succession and volunteers program to ensure that the group's activities continue to be relevant and effective.

2 INTRODUCTION

2.1 Earlier Strategic Plan and Reviews

In June 1997 Brisbane City Council published the 'Moggill Creek Catchment Management Plan'. Subsequently, a Moggill Creek Catchment Management Plan Supplement was published for the Planning Section, Waterway and Asset Management of BCC. These reports generated considerable community interest and as a result, at a community meeting in October, it was decided to form and subsequently incorporate the Moggill Creek Catchment Management Group Inc. (MCCG). MCCG was incorporated in December 1997.

In late 2003, it became apparent that MCCG needed to demonstrate to its stakeholders and in particular to funding bodies such as the Natural Heritage Trust (NHT) and BCC, a program and direction based on a strategic plan. Such a plan was formulated and approved by MCCG in September 2003. In addition, in 2004, the MCCG published "A Review and Business Plan for 2005 - 2008". This report addressed issues relating to land care, water use, finance, administration and public relations. Finally, it addressed the concerns and challenges that confronted MCCG and presented its plans for the coming years.

A Review of Progress and Challenges from 1999 to December 2010 was published in 2011. The review concluded:

1. MCCG should redevelop the existing Strategic Plan using information from this review, and ensure there is better communication with Council and State entities on environmental issues relevant to Moggill Creek catchment.
2. MCCG should actively seek commercial sponsors, and lobby Governments at all levels for specific support arrangements.
3. MCCG should continue to review the revegetation methods in flood prone areas of the catchment, particularly in the higher parts of the catchment where the stream gradients result in very fast runoff velocities and turbulence.
4. A more strategic effort should be pursued by the MCCG to identify ways of assisting private land owners in their efforts with revegetation and weed control, and to identify opportunities for development of habitat corridors.
5. Bushcare groups should be developed and supported in sections 1, 6 and 10.
6. As a priority, MCCG should endeavour to undertake long term monitoring of:
    a. Riparian zone conditions, and the associated flora and fauna
    b. Creek health, using methods compatible with the Healthy Waterways Program
    c. Weed invasion in remnant areas, particularly those fringing conservation areas such as the Brisbane Forest Park and Mt Coot-tha Forest Park
    d. Bird species and numbers in remnant vegetation as an input to designing strategies for revegetation activities.
7. Several improvements are required to enhance the nursery's capability to keep pace with demand for plants by the catchment members. These enhancements are:
    a. Better targeted and increased seed collection to widen the variety of species grown for use by catchment members
    b. Studies on seed dormancy and storage requirements to increase the availability of plants throughout the year
    c. Development of vegetative propagation options that could be employed as an alternative approach to supplying some of the species sought by members
    d. Development of an improved inventory system.

2.2 The 2016 Review

The MCCG Management Committee decided in 2016 that it was time to review our progress since 2011, and to update the Strategic Plan to ensure that our achievements are recorded and monitored against the objectives we have set and plan our future activities. The new strategic and action plans were adopted in 2017, and are shown in Appendices 1 and 2 respectively.

This Review describes:

- The environmental condition of the catchment to December 2016
- MCCG's activities and achievements relating to revegetation, community involvement, weed control and creek health
- How MCCG is managed and financed
- The educational and other awareness raising activities conducted by MCCG which promote environmental issues within the catchment
- The major challenges facing the group in achieving its objectives, and
- A number of recommendations for the Management Committee to consider.

This Review also attempts to make an assessment of whether:

- MCCG has made progress in improving the environmental condition of our catchment
- The levels of funding and volunteer participation are sufficient to allow progress at the desired level
- MCCG has made progress in promoting environmental issues and raising environmental awareness within the catchment
- Communication between MCCG and its stakeholders could be improved
- The recommendations of the previous review have been actioned.

2.3 Description of Catchment and Introduction to Environmental Issues

In Brisbane, our catchment is unique and deserves our care. Its 57.6 km^2 represents about 7.6% of the total area of Brisbane City and it has more bushland than any other catchment in the city. Rural, public and urban areas constitute 69%, 23% and 8% respectively of the catchment.

The catchment has many significant ecological attributes. Its meandering creeks and rolling hills reaching up into the surrounding mountains are scenically very attractive. The rich variety of flora and fauna in the catchment is unusual, given the development history of the catchment and its proximity to the centre of Brisbane. This catchment is on the doorstep of a wilderness. Beyond the Gold Creek Reservoir is Brisbane Forest Park which immediately adjoins the D'Aguilar National Park. The proximity of this heritage and its unique natural environment close to a major city should not be taken for granted. It remains semi-rural, probably because no main road leads through the catchment out to the north or west. In recent legislation (DERM, 2009) much of the catchment is classified for koala habitat value as "Bushland Habitat Low Value Eastern SEQ LGA" with restricted areas of "Bushland Habitat Medium Value Eastern SEQ LGA" (source AKF mapping).

When the MCCG was founded, it was estimated that over 80% of the private acreage landholdings had a minor to major environmental weed problem. The only exceptions were properties very recently subdivided from upland eucalypt woodland and properties that were mown overall. Creeks and riparian zones in the lower catchment have a high percentage of public land. In the last 20 years much revegetation work has taken place with good effect, with the removal of threatening weeds and their replacement with local indigenous species. The cooperative effort of volunteers, landowners, Brisbane City Council, and State and Federal

governments has been critical to these achievements. We know however that this work must continue so as to avoid losing the gains we have made and to be able to address further serious challenges.

These challenges arise from the effects of past inappropriate agricultural and horticultural practices that included excessive tree felling and the introduction of many invasive plants that are proving very difficult to manage. Creeping urbanisation, often with poor land management, has also resulted in excessive land clearing and proliferation of hard and impervious surfaces. Consequently, severe flash flooding is more frequent and erosion is more prevalent.

Lengthy stretches of creek bank remain heavily infested with weeds, and only limited improvements have been achieved in restoration of habitat corridors.

Loss of native habitat has forced fauna, particularly birds, to seek food on alternative exotic species such as asparagus vine, Chinese celtis, broad leaved pepper and privets; this process is regarded as one of the main drivers in the invasive spread of the introduced weed species into recovering remnant forests. In much of the cleared landscape, exotic species like lantana have provided refugia, and erosion control has been needed following changes in land use from farming. Fortunately, native species such as white cedar, soap tree and wattle were among the species that provided some landscape stability and some alternative feeding habitat.

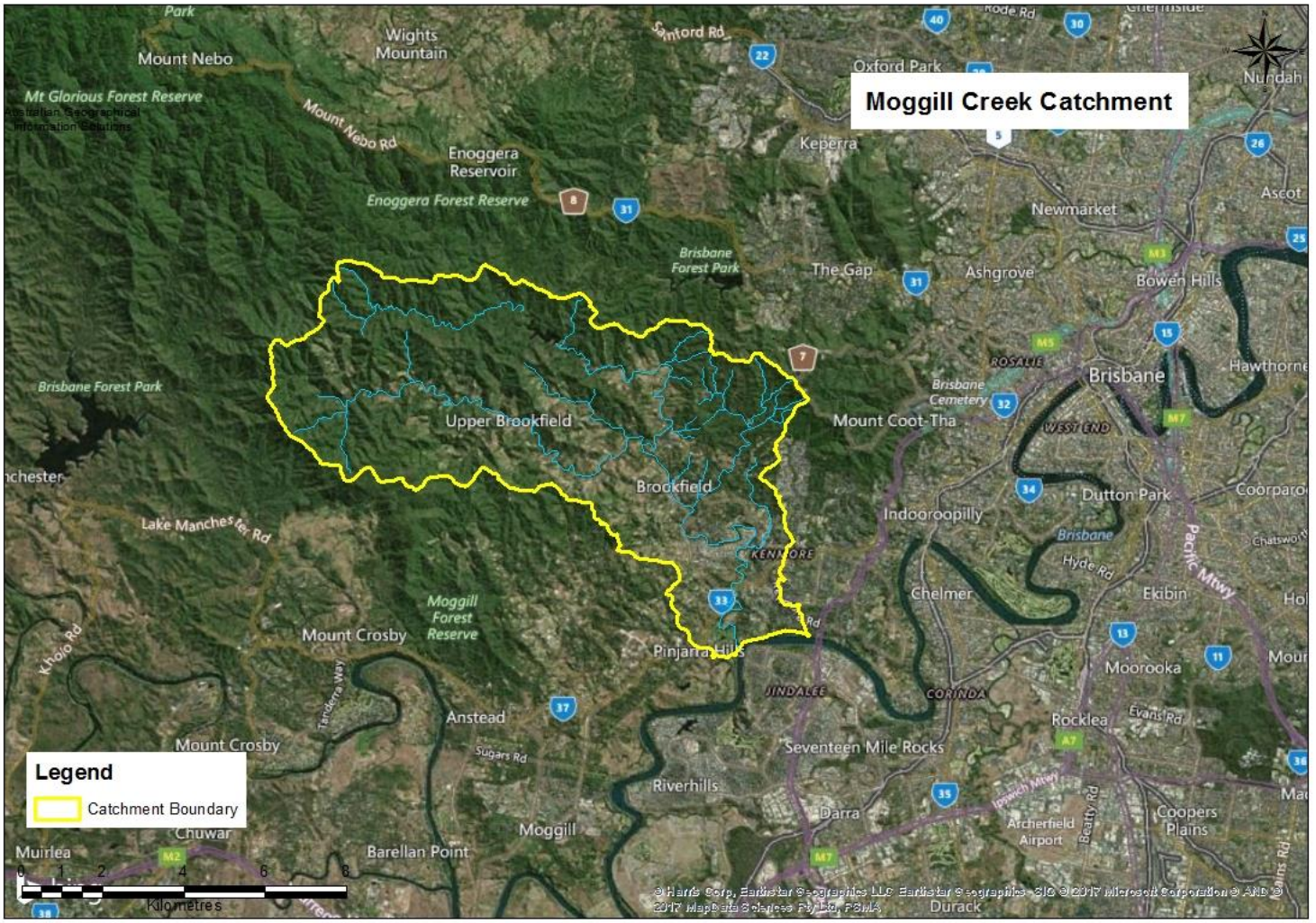


Figure 2.3.1 Moggill Creek Catchment

3 FINANCE

3.1 Annual Income and Expenditure

A summary of the Audited Income and Expenditure figures for MCCG from 30 June 1998 – 2016 is presented in Appendix 3 and Figure 3.1.1

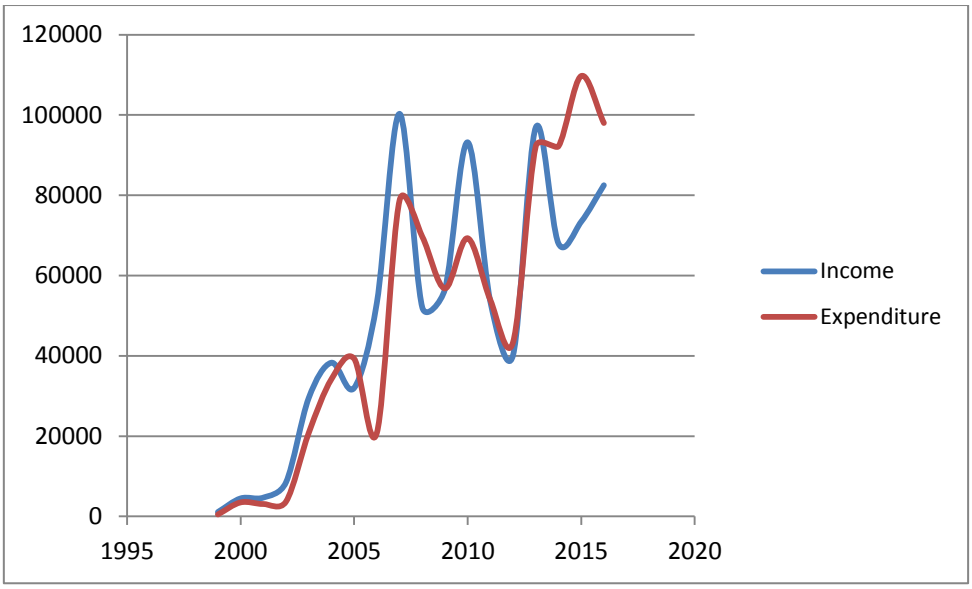


Figure 3.1.1: Income and Expenditure 1998-2016

Annual profits or losses are dependent on the timing of grant receipts and subsequent expenditure, as some projects are carried over to the next financial year. From these figures, it can be seen that both income and expenditure have risen significantly and fluctuate greatly from year to year.

Income has generally increased since 2005, mainly due to the size of grants received, and also to the rise in membership numbers, donations and interest earned, though these latter have declined in the last few years. Interest received has been reduced both by the reduction of funds in our interest-bearing accounts with ING (as long-standing grants have been finalised), and by lower bank interest rates.

The main increase in expenditure, apart from work directly associated with income from grants and the provision of our own Small Grants to members in 2013-14, has been in public relations and administration. The cost of printing our newsletter continues to rise with large numbers being ordered – from $640 an issue in 2010 to an average of $900 in 2015. Printing alone peaked at $1080 in January 2015 when 900 booklets were ordered and there are now significant stockpiles of past editions held at the cottage for distribution at PR events. Together with Australia Post increases in postage per newsletter 4 times a year, this continues to be a major expense for MCCG, which is not covered by membership fees. Price rises in the provision of electricity and telephone services to the cottage, insurance, and auditing have also added to administrative expenses. There are always unbudgeted, unforeseen outlays in the upkeep of the cottage from such items as computer and modem problems, telephones, door locks, plumbing issues, etc which cannot be factored into any potential administrative grant, and so must be covered by cash reserves.

The more detailed income and expenditure figures shown in Appendix 4, do not reflect the total sums expended within the catchment, but only those which are under direct control of MCCG. No details are provided of the significant financial support that is provided by BCC.

MCCG was registered as a charity in 2009 and can offer a tax deduction for donations over $10. Three Trustees were appointed to oversee the Trust. A separate Trust Fund bank account

has been set up to accept such donations and monies are spent according to Management Committee recommendations. Donations to the Trust are included in the group's total donations income figures.

Plants have been sold at many promotional and educational events, and also to BCC and schools for revegetation projects etc., generally at $2.00 each. Richmond Birdwing vines are sold at $8.00 each, even to members, to meet with regulations regarding their distribution as an endangered species.

For the period from 1999 to April 2015, the value of plants donated from the nursery to members (based on a nominal value of $1.50 each) is as follows:

Table 3.1.1 Value of Plants Distributed from the MCCG Nursery

Year	**Value**
1999	$4,680
2000	$5,860
2001	$4,732
2002	$13,904
2003	$16,065
2004	$23,389
2005	$24,336
2006	$17,853
2007	$23,514
2008	$23,307
2009	$19,895
2010	$20,299
2011	$18,736
2012	$17,313
2013	$18,765
2014	$20,626
2015	$20,754
Total	**$282,705**

Grants for specific projects for the period 2010 - 2016 are shown in Appendix 4.

4 MANAGEMENT AND ADMINISTRATION

4.1 MCCG's Current Management

MCCG is an incorporated volunteer organisation and operates under Articles of Association. As a result, MCCG is managed through a Management Committee consisting of a Chairman, a Treasurer, a Secretary, a Public Relations Representative and committee members responsible for operational areas such as the nursery, grants administration, landcare advice, landscape and water quality management as well as section leaders. The educational activities have become increasingly important and have increased over the last few years. The Management Committee meets every month and two public meetings are held each year.

Due to the size and diversity of the catchment, the 57.6km^2 area was split into 13 sections by MCCG (Figure 4.1.1). It was planned that each section was to be led by a section leader- a volunteer responsible for coordinating and managing restoration activities within that part of the catchment.

Seven of these sections contain public land which is being improved through bushcare activities supported by the BCC Habitat Brisbane Program and this support includes insurance cover. As each section is classified as a landcare group they are also covered by insurance when involved with landcare activities on private land. Each section has a leader except for section 10. Every section of the catchment, excluding section 7 (D'Aguilar National Park) and 13 (Mt Coot-tha Forest Park), contains extensive areas owned by private land owners.

On public lands, decisions on the details of restoration programs, their methodology and resources required (plants, mulch, large scale clearing etc.) are usually made directly and independently between BCC's Habitat Brisbane Program and individual section leaders. The support that BCC has supplied through the Habitat Brisbane Program to seven of the sections has been significant; without it, MCCG would be much less effective with regard to its work on public land. The MCCG also supports these groups with expert advice and publicity.

In addition to the combination of working on BCC owned land and privately-owned land, MCCG's management is made more diverse through the catchment extending into the edge of the D'Aguilar National Park and Mount Coot-tha Forest. The former is managed by the Department of National Parks, Recreation, Sport and Racing (NPSR), the Gold Creek catchment area is managed by Seqwater, and the Mount Coot-tha Forest by BCC. Although representatives from State Government departments and Council were initially active in MCCG's management, this has been discontinued. This is disappointing as MCCG considers communication regarding environmental issues and activities between the upper and lower reaches of the catchment very important.

Since 2013 the dedicated Creek Ranger service was discontinued and replaced with Creek Catchment Officers whose role is to "*help groups to further develop their capacity through skills development and training, assisting in planning of catchment restoration projects, and support in the delivery of project funding through the Community Conservation Initiatives Assistance*."

Each officer works with up to 4 catchment groups at a time. This has required some adjustment by the MCCG as the group had enjoyed an elevated level of operational assistance at the project level by the appointed Creek Ranger.

Membership of MCCG has increased steadily over the years. We now have more than 500 members with about 25% involved in our activities each year. Keeping in touch with our members continues to be a major challenge. As well as our quarterly newsletter and regular emails, we have upgraded our social media capacity with a new website and a Facebook page and have appointed people to manage each channel.

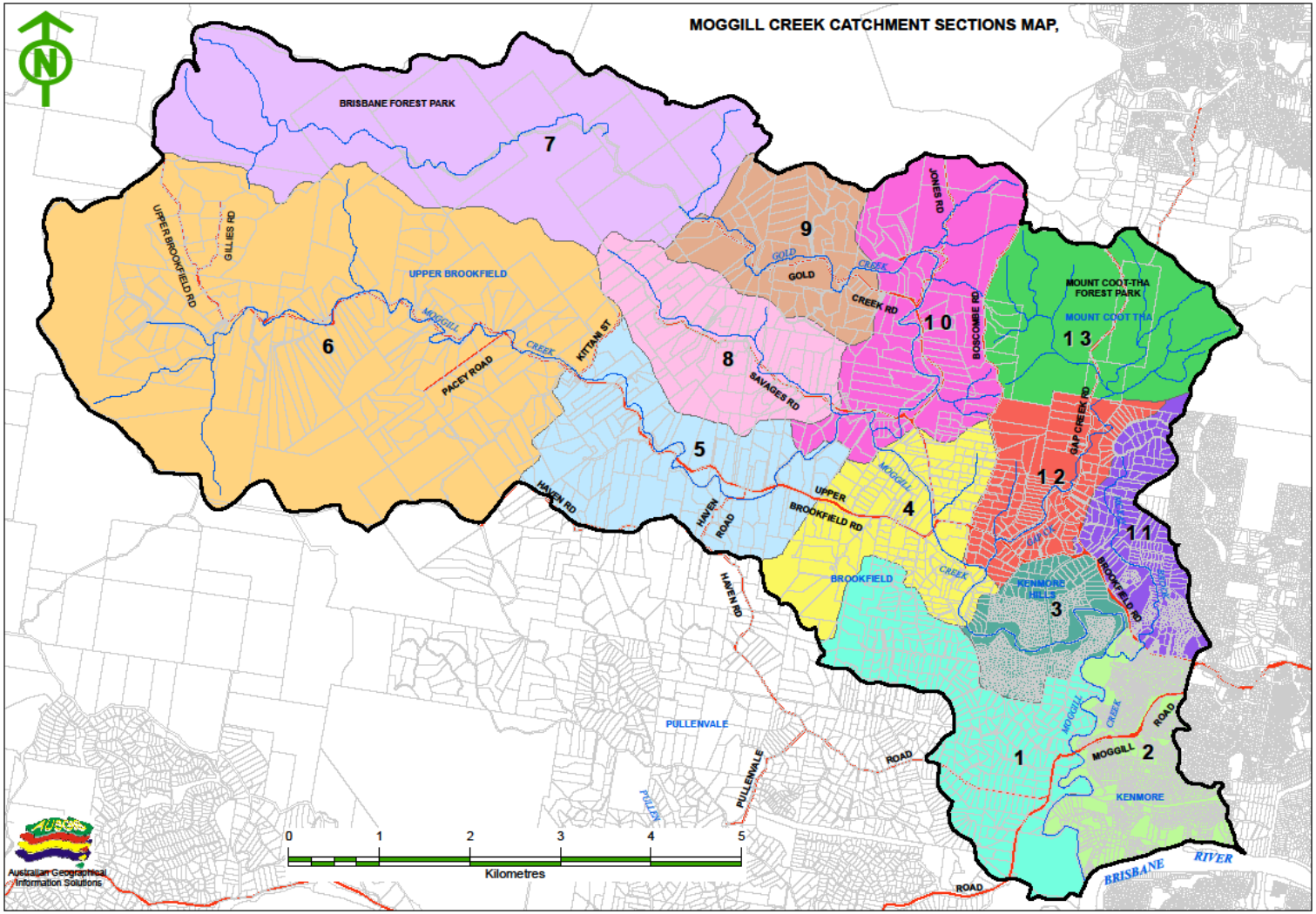


Figure 4.1.1 Moggill Creek Catchment Sections Map

In 2008 Brisbane City Council gave the MCCG a licence to use the caretaker's cottage below the Gold Creek Dam. In 2015 the Brisbane City Council agreed to hand over the cottage and associated lands to Seqwater. A lease agreement between the MCCG and Seqwater was signed in late 2016 allowing the group to continue occupying the cottage and nursery. Both are valued assets for the MCCG.

4.2 MCCG's Strategic Planning

In 2003 MCCG published its first comprehensive strategic plan. In 2004 MCCG published a Review and Business Plan for 2005 – 2008 and made recommendations on future directions. In 2010 the MCCG conducted a comprehensive Review of Progress and Challenges from 1999 to December 2010. The recommendations are listed in Section 2.1 and will form a basis for evaluating our achievements in this 2017 Review.

Many of the recommendations were actioned with the appointment of a Catchment Coordinator who was replaced subsequently by a BCC Creek Ranger for the Moggill Creek catchment, and the election of secretaries as required. Since 2008 the positions of Landcare Advisor, Landscape and Water Quality Advisor and Grants Administration Officer have been included on the Committee.

In 2016, the MCCG undertook an extensive strategic planning exercise involving stakeholder interviews, a one-day workshop and subsequent discussions with key people with experience in the various activities carried out by MCCG. The strategic and action plans were adopted in early 2017, and are presented in Appendices 1 and 2.

The current plan lists 5 goals:

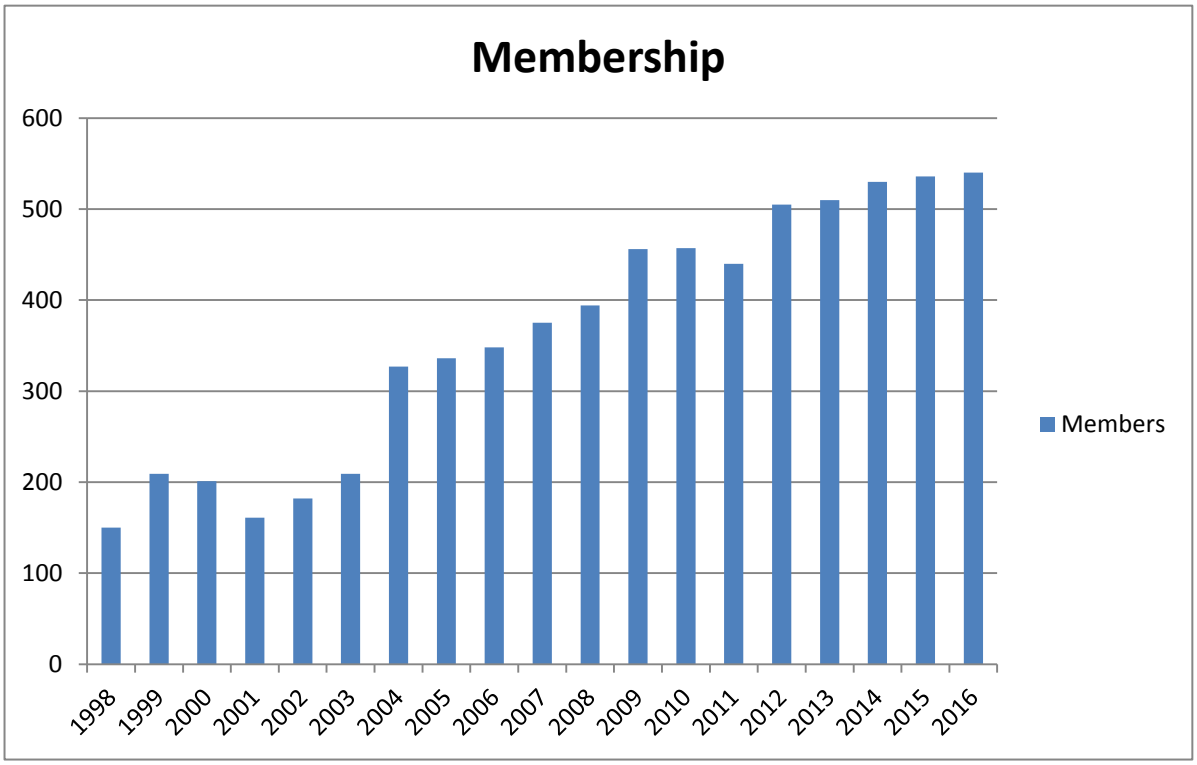
1. To retain and restore local native biodiversity in the catchment
2. To protect and restore the health of the catchment watercourses
3. To support and promote conservation and sustainable use of land
4. To engage the community and enhance their understanding of the natural ecological processes in the catchment
5. To ensure the continued effectiveness of the MCCG.

These goals are supported by seventeen strategies and a range of specific actions. These will be used in the next review to evaluate our achievements.

5 PROMOTING MCCG AND OUR EDUCATIONAL ACTIVITIES

5.1 Developing our Membership

From the first year, 1998, MCCG recognized the value of educational activities in gaining recognition for the group, its identity, its aims and its outcomes. The emphasis has been on keeping the community aware of MCCG events, talks, displays, guest speakers and newsletters all with a focus on the local environment, and on-ground work and activities. Membership has increased to over 500 since 2012.



MCCG greatly values its members. They offer a direct link into the community, allowing information to be provided and received on matters relating to environmental issues within the catchment.

5.2 Friends of Moggill Creek

Prior to the 2010 review, MCCG decided to introduce the idea of Friends of Moggill Creek (FMC). As an initial strategy, invitations were sent out to those members identified by members of the Management Committee as having demonstrated particular interest in the activities of the group and having an interest in environmental conservation. The aim was to encourage a wider group of members to become more involved in MCCG's activities and particularly to encourage a willingness to contribute a small amount of time, expertise or knowledge to make our group more effective. In the initial drive to get more active participation, 130 members were invited to participate in some forums to identify and discuss topics of interest to members. The forums commenced in late October 2009 on the key topics of Landcare and Biodiversity, Watercare, and Community. These forums gave participants an opportunity to develop and share ideas on how the group could expand its interests, as well as further our current activities. Our expectation was that developing from the forums there would be ongoing groups that would identify and address catchment issues of specific interest to them.

5.3 Newsletter

The quarterly newsletter is a flagship for our group. Starting as a single A4 sheet in 1997, it evolved into a printed 8-page newsletter with colour photos and a mix of scientific and general information about our catchment and ways of caring for it.

The aim of the newsletter has always been to inform and motivate the community to actively participate in improving the local environment. There has been a wide variety of articles ranging across the various weeds and advice on control methods, descriptions of native plants, planting techniques, general interest articles on local fauna, specific articles on riparian zone conditions and management advice, results from various studies and surveys such as the Platypus Survey, articles on quiet achievers, and annual results of our Photography Competition.

Newsletters since 2000 can be seen at the cottage, and issues since November 1999 have been placed on the MCCG website and an index provided.

Until 2017, the newsletter was Print Posted to the current membership and to a PR list from the wider community, including groups, schools, libraries and people with environmental interests. In 2017 the newsletter style was updated and made available to members electronically. It continues to be produced in hard copy and Print Posted to members who specifically request it in this form.

The late Dr Graeme Wilson edited the newsletter from 2003 to the end of 2016. Dr Cathi Lawrence is the current editor.

5.4 Publications and Reports

Several reports and publications relating to the Moggill Creek catchment have been published since the formation of the MCCG; many are listed below. Several of these relate to projects funded by the Commonwealth NHT Fund or its replacements. There have been two strategic plans/business plans that described in detail the objectives and strategies of the group and identified the specific issues and challenges facing the catchment community.

There have been three University Honours Thesis reports from students supported by the MCCG and partly supervised by group members. These were particularly useful in bringing together information about the catchment's land and water resources, and the conclusions of the research provided useful insights into specific matters, which have subsequently been used by the group.

The most recent reports or publications have provided practical guidelines on managing the land and water resources and horses in the Moggill Creek and Pullen Pullen catchments.

1. Moggill Creek Catchment Management Plan, 1997. BCC, Department of Works.
2. Monitoring of Moggill Creek Catchment Management Group Rehabilitation Sites on Public Land. 1999, M. Reif and S. Cumming.
3. A Preliminary Study of Land Use Impacts on the Water Quality in the Moggill Creek Catchment. 2000, Lucinda Eykamp, University of Queensland.
4. Butterfly Checklist for the Moggill Creek Catchment 2004. D.P.A. Sands. Publisher MCCG
5. Know Your Creek – Moggill Creek. 2005. Produced in conjunction with BCC Water Resources.
6. Ecologically Sustainable Fire Management: an Advisory Code for Brisbane's Western Suburbs. 2005. D.P.A. Sands and C.M. Hosking. Publishers MCCG, PPCG and THECA.
7. Managing Horses on Small Properties in the Moggill Creek Catchment, 2007. Supported by BCC.
8. Our place in the country: Managing your acreage property in West Brisbane, 2009. In conjunction with Pullen Pullen Catchment Group with the support of the Gambling Community Benefit Fund.

9. Chair's Annual Reports to the Annual General Meeting. These are an annual compilation of our activities/projects for the preceding financial year. The last 2 reports are on the website.
10. A Review of Progress and Challenges from 1999 to December 2010.
11. Cat's Claw Review 2015. See 6.3.

5.5 Events, Education and Communications

MCCG has organised and provides a variety of presentations, exhibits and media material which are outlined below.

Exhibits in Kenmore Village – as well as the Photography Competition, each year MCCG provides a week-long exhibit in Kenmore Village covering environmental issues.

Major family events – an annual family day at the Brookfield Hall was initiated with 'Life in a Gum Tree', in 2005. With the participation of a range of wildlife groups, these events have attracted up to 300 people.

Contributions to other events – MCCG has frequently spread its message at other events. These include the THECA Forum, Teddy Bear's Picnic, Brookfield Country Market, the Brookfield Show and Opera at Brookfield.

Childrens' Education– experienced MCCG members have assisted with lessons on environmental issues at primary and secondary levels in the catchment. Increasing use is being made of the cottage for hosting events for children such as Kids' Day at the Cottage.

Public meetings – MCCG holds two public meetings a year, one of which is the AGM, featuring guest speakers. These generally attract 50-70 people and are held in the Brookfield Hall, which can accommodate larger groups than the cottage.

Media Articles - MCCG has contributed press articles in The Local Bulletin and Westside News – in some years ten or more articles have been accepted; they are aimed at promoting our objectives and activities to the wider community. More recently Jim Butler has contributed a regular feature on birds in the catchment - "Feather Fascination".

5.6 Photography Competition

The MCCG established a photography competition in 1999. The objectives for this annual event are:

- To promote both awareness, and the objectives, of the MCCG
- To encourage membership recruitment, and
- To raise awareness of local environmental issues, especially with children.

The event is a very public presentation of the group and its work to the community, reminding residents of the area's natural beauty, and the need to address the many environmental issues.

The competition format is simple: labelled photographs can be submitted by adults and children for a nominal entry fee. Categories encourage photographs which focus not only on native flora and fauna, but also raise environmental issues. When first launched, all photographs had to be taken within the Moggill Creek Catchment, but the competition has now expanded to allow the entry of photographs taken in nearby Brisbane catchments.

Except for the publicly voted People's Choice winners, all prizes are awarded by an independent judge, University photography lecturer, Dr Joseph McDowell. Photographs are prominently displayed at the Kenmore Village Shopping Centre, culminating in a public presentation to the prize-winners. The display in the shopping centre attracts significant attention, and the People's Choice prize attracts many hundreds of votes during the week.

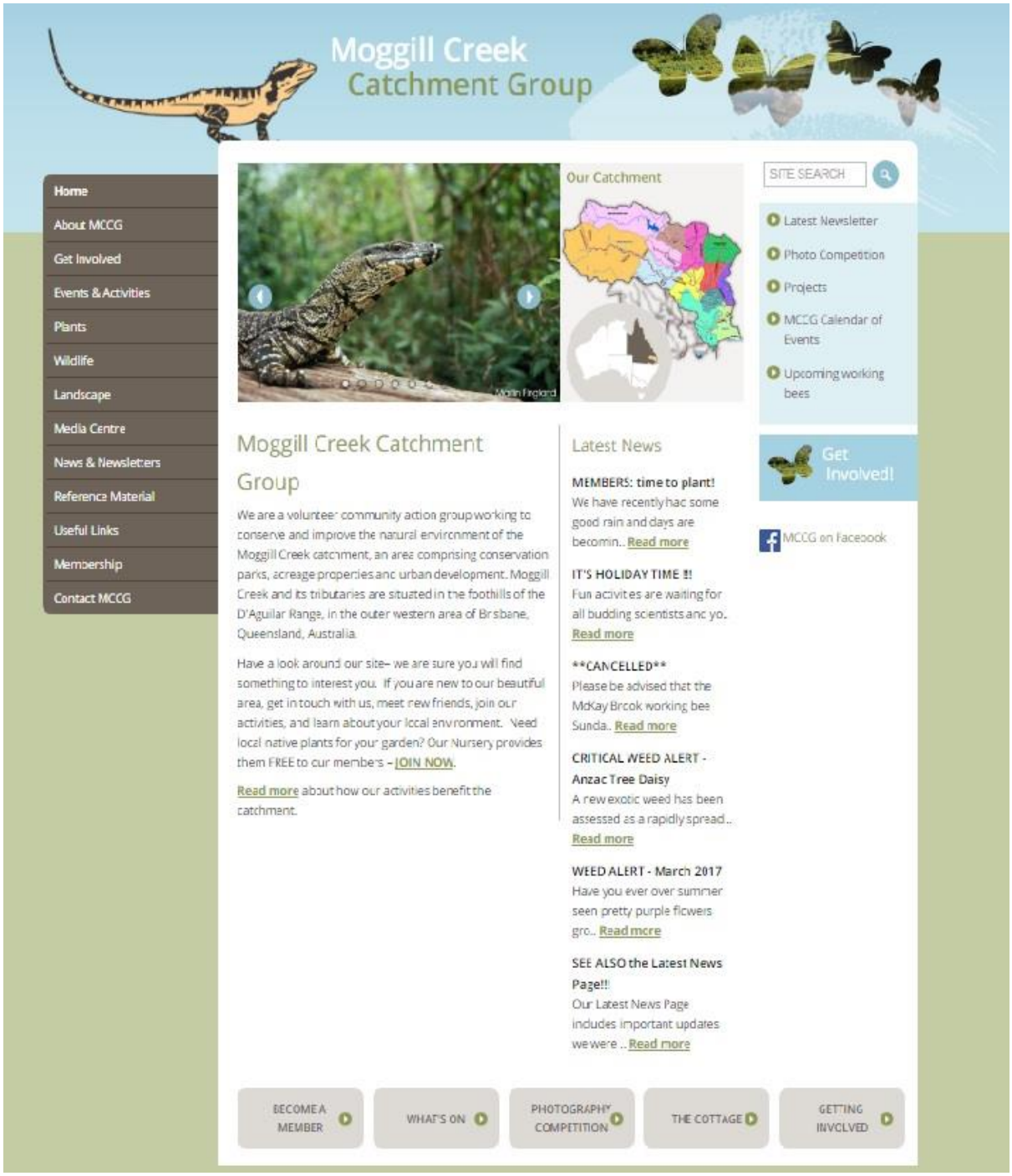
Local companies are involved in the event. Many have remained supporters since its inception. Due to their generous support, cash prizes totalling approximately $1,600 are presented to the winners each year. The competition receives good local media coverage in the months leading up to the event, particularly in The Local Bulletin.

5.7 Website

The MCCG website is an important mechanism for MCCG to communicate with its members, local residents and prospective volunteers. The aim of the site is to provide accurate and relevant information regarding the diversity of the catchment and the activities of the MCCG and its supporting organisations. Our objective is to keep the MCCG website as fresh, interesting and accurate as possible, supporting MCCG's place in the community as a "go-to" repository of information on local bushcare and revegetation issues.

In September 2014 MCCG acquired a grant of over $9,000 from the Gambling Community Benefit Fund which enabled a contract with Kingfisher Creative to totally redesign the website. Michelle Johnston currently manages the website for MCCG jointly with Adrian Mortimer. Unique visits to the website from February to April 2017 averaged 5745 per month.

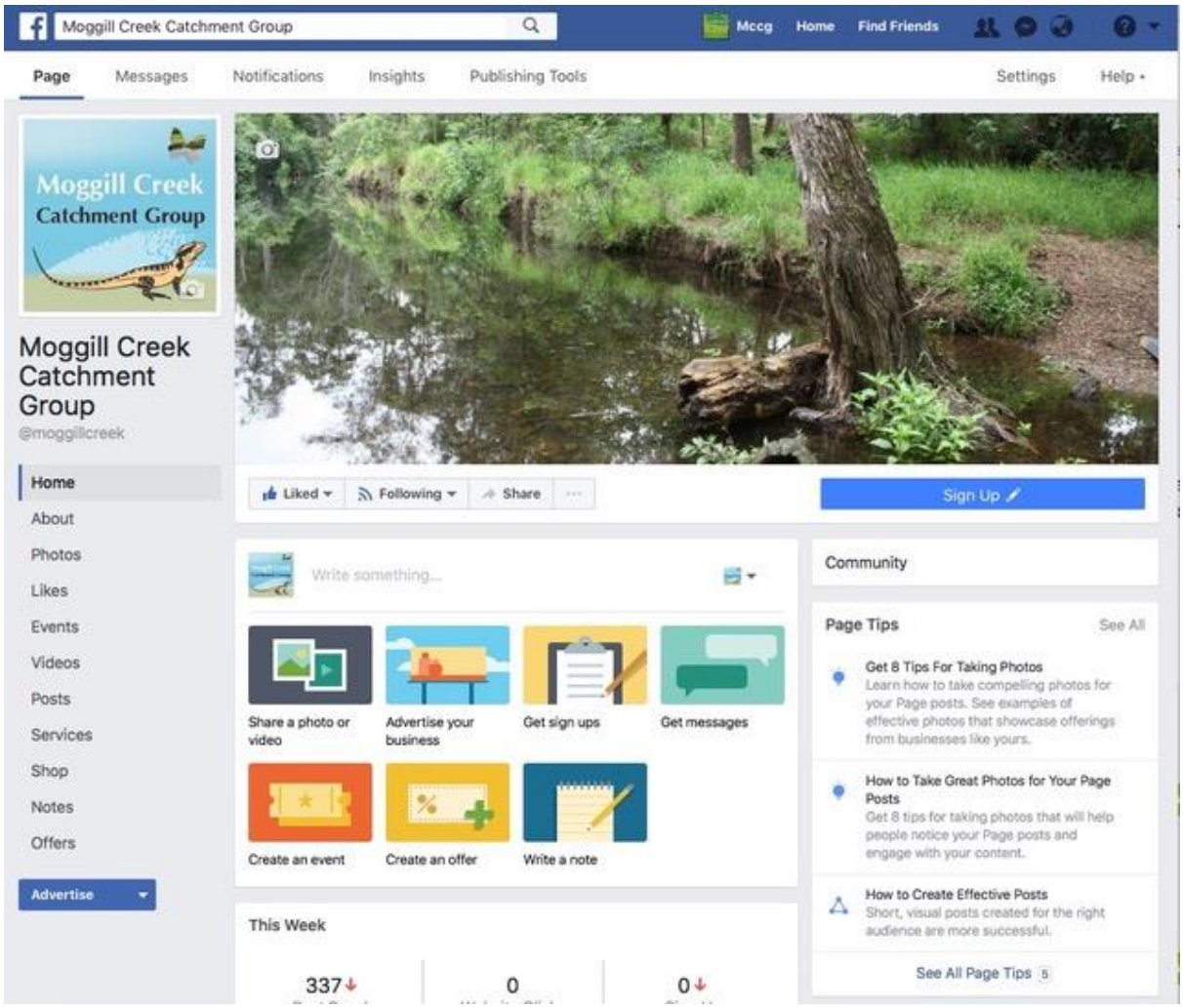
A screen shot of the Homepage of the website during March 2017 is presented below:



5.8 Facebook

In June 2015 MCCG decided to create a Face book page to improve communication between members and the community. Janine Nicklin now manages the Facebook page for MCCG. It has been well received and "likes" have risen to over 400. There are currently 3 sub-groups on our Facebook page, one for the Creek Health Monitoring Program, the second for the Fortrose Street group and the third for the Platypus Survey.

The front page of the Facebook page is presented below:



5.9 The Cottage

In 2008, the Lord Mayor opened "The MCCG Environmental Centre" fondly called "The Cottage". This excellent facility close to Gold Creek dam was generously made available by the City Council, and is proving invaluable as an educational centre. Since 2009 regular "Talks at the Cottage" have been held, covering topics as varied as local bats and butterflies, figs and frogs, botanical art and dung beetles, grasses and gliders, water quality and photography, plant reproduction and park ranger duties. The focus is on locally relevant topics which raise awareness and encourage participation. The availability of the cottage as an environmental centre has also made it possible to host larger events, such as the Kids' Day at the Cottage that has been successfully held each year. It is not unusual to attract crowds in excess of 300.

After the ownership of the cottage was transferred to Seqwater in 2016, the MCCG negotiated a new lease and cooperation agreement with the new owners.

The cottage garden established in 2008 displays many of the lower-growing native plants of the district, each labelled. Most are now well established and offer an opportunity for visitors to observe how such plants perform in a garden. At last count in 2016, the number of plant species had grown to 116. These are listed in Appendix 5.

Figure 5.9.1– Establishing a native garden at "The Cottage"

5.10 MCCG and Other Environmental Organisations

Within Brisbane there are 10 active catchment groups with very diverse objectives and administrative organisations. MCCG has informal links with these catchment groups through the Brisbane Catchments Network (BCN), initially set up by Brisbane City Council to foster partnerships, communication and information sharing.

MCCG interacts closely with Pullen Pullen Catchments Group (PPCG), members of which contribute to nursery activities and benefit from free local native plants, as do MCCG members. The two groups also collaborated in producing the booklet "Our Place in the Country" and "Ecologically Sustainable Fire Management: an Advisory Code for Brisbane's Western Suburbs", the latter also with The Hut Environmental and Community Association (THECA). In the past, there have been shared projects with the Cubberla/Witton Catchments Network (CWCN) and Save our Waterways Now (SOWN). MCCG members have been staunch supporters of THECA, giving talks at their annual forum and running workshops. THECA, MCCG and Rural Environment Planning Association (REPA) members have been active in community consultation groups relating to local developments – viz. upgrading Gap Creek Road and Rafting Ground Road, and contributing to Griffith University studies on road-kills along the former road. CWCN, THECA, REPA and MCCG also combine forces in producing and marketing an annual calendar. For many years MCCG members have actively collaborated with SEQ Catchments (now Healthy Land and Water).

6 BIODIVERSITY, LAND AND WATER CARE

6.1 Overview

This Chapter provides a brief description of the catchment, its location and importance from an ecological viewpoint; reports on the weed management challenges, creek health monitoring and the plant nursery follow. These plus summaries of the condition of biodiversity, land and water and of achievements in each of the 13 sections of the Moggill Creek catchment, identify the main aspects affecting catchment health and some of the challenges facing the landholders in their maintenance and remedial activities.

Location

Our location on the doorstep of the major conservation parks to the north and west of Brisbane bestows many lifestyle benefits and wonderful recreational areas; it brings with it a responsibility for all the public and private managers and service providers to take account of the many factors that threaten these assets. Some of these matters are reflected in our review conclusions and our strategic plan and associated activities.

Moggill Creek catchment is located to the west of Brisbane, adjoining the south-eastern edge of the D'Aguilar National Park; it is approximately 57 square kilometres in size, contains the Brisbane Forest Park, the Gold Creek Water Reserve and forms a buffer zone between the expanding urban zone and major conservation areas of the D'Aguilar National Park to the north and west. It also provides a corridor from these conservation zones to the lower Brisbane River and Moreton Bay. The main pathways are via the remnant forests to the Brisbane River, and via the riparian zones associated with Moggill Creek, and its sub-catchments of Wonga, Gold, and Gap Creeks and McKay Brook.

Development Impacts

In common with early development in most parts of Australia, landscape degradation went hand in hand with the conversion of natural areas to grazing, agriculture, production industries, infrastructure provision, and mining and processing of a wide range of resources. As land use changed from one stage to another, different impacts occurred. Hence the condition of the natural resources has been modified to varying degrees along with the land use and management practices over time.

Many ecosystems were destroyed by initial harvesting of magnificent timber resources, which opened the landscape for agricultural pursuits, with an emphasis on food production. Photographic evidence reflects whole hillsides and plains stripped of most natural vegetation in these early phases. "Time heals many wounds" and the extent of erosion on slopes and the impacts of extreme runoff events have largely been covered, or softened. Relic diggings and structures of the brief mining period are still obvious in the eastern part of the catchment. Severe scouring of some creeks, associated with rapid run-off from housing and shopping areas, has resulted in down-cutting by up to 2m, and in other cases deposition of silt and coarser material is evident in-stream. Long-time residents have indicated that many of the deeper waterholes that formed Moggill Creek in the lower half of the catchment have suffered very considerable sedimentation since the early 1950s, and loss of amenity and off-stream water use.

Currently, most of the remnant vegetation is found along creeks and drainage gullies and in upland areas of the catchment. Connectivity between upland and lowland areas was initially lost through the widespread clearing more than 80 years ago, and subsequently by residential development and rural land management practices. Riparian corridors are generally narrow and severely fragmented. However, plant species lists for specific areas within the catchment still indicate relatively high species diversity. These have been made available on the MCCG website. Many areas in the steeper lands managed to regain vegetative cover over the periods following the early logging or clearing, and these along with surviving fragments of the mature forest have given us the recovering forests we see today.

Soil and Landscape Features

General descriptions of the soil and landscape features of the Moggill Creek catchment have been provided in *The Soil Landscapes of Brisbane and South-eastern Environs* (Beckmann, Hubble and Thompson 1987). The hills and slopes on metamorphosed sediments and interbedded meta-volcanics of the Neranleigh–Fernvale group have a variety of lithologies (rock types) related to the sediments in the different beds; the weathering of these different lithologies has resulted in a range of different soils which may occur in similar topographic positions.

In the Gold Creek sub-catchment, the Wonga Creek sub-catchment and much of the main Moggill Creek catchment the remnant ecosystems are dominated by open forests of spotted gum (*Corymbia citriodora*) and grey ironbark (*Eucalyptus siderophloia*), with brush box (*Lophostemon confertus*), tallowwood (*E. microcorys*) and grey gum (*E. propinqua*) common in moister positions of the landscape. Pockets of vine forest also occur in these moister lower slopes and riparian zones.

On the eastern edge of the Moggill Creek catchment which includes the Gap Creek sub-catchment, there is a major change of geology to the Bunya Phyllites which are also metamorphosed sediments. Many of the soils are like those on the Neranleigh-Fernvale beds. The most common remnant ecosystems are the open forests dominated by spotted gum, and ironbarks. Open forests of brush box with tallowwood and grey gum occur in gullies and exposed ridges.

On the south-western part of the catchment the Brookfield volcanics underlie the shallow gravelly clayey soils. There are small areas of remnant grey gums, grey ironbark and bloodwood (*Corymbia intermedia)* open forest, with brush box open forest and sometimes tallowwood, grey ironbark and grey gum and small patches of Araucarian vine forest in the gullies and exposed ridges.

In the upper catchment on Neranleigh-Fernvale beds, are a similar suite of soils to those found in the other parts of the catchment, with spotted gum, grey ironbark, narrow leafed ironbark (*E. crebra*) open forests, with open forest of brush box and tallowwood in gullies and exposed ridges. Auracarian microphyll vine forests occur on interbedded volcanics and metamorphics.

Most waterways in the catchment consist of a series of water holes, with varying degrees of permanency. However, water flows in all the creeks following heavy rainfall events or extended wet periods. In these events the steep gradients in the creek beds ensure very rapid flows with resultant entrainment of sediment which progressively moves downstream to the lower catchment. Much of the creek bank and bed degradation occurs during and following these large runoff events. In other times flows in the creek beds can be quite slow and in mid-upper parts, often stop. It is in these periods when aquatic vegetation, usually exotic weeds, build up on the riffle or sediment bars at the lower end of pools or runs.

Biodiversity Significance

The blue areas in Figure 6.1.1 illustrate that about half of the catchment is classified as having significant biodiversity values with respect to endangered, vulnerable and near threatened taxa; approximately half of that is in private land, while the rest is in State conservation reserves of several types. Much of the land along the northern boundary abutting the D'Aguilar National Park is protected by reserves or Land for Wildlife agreements.

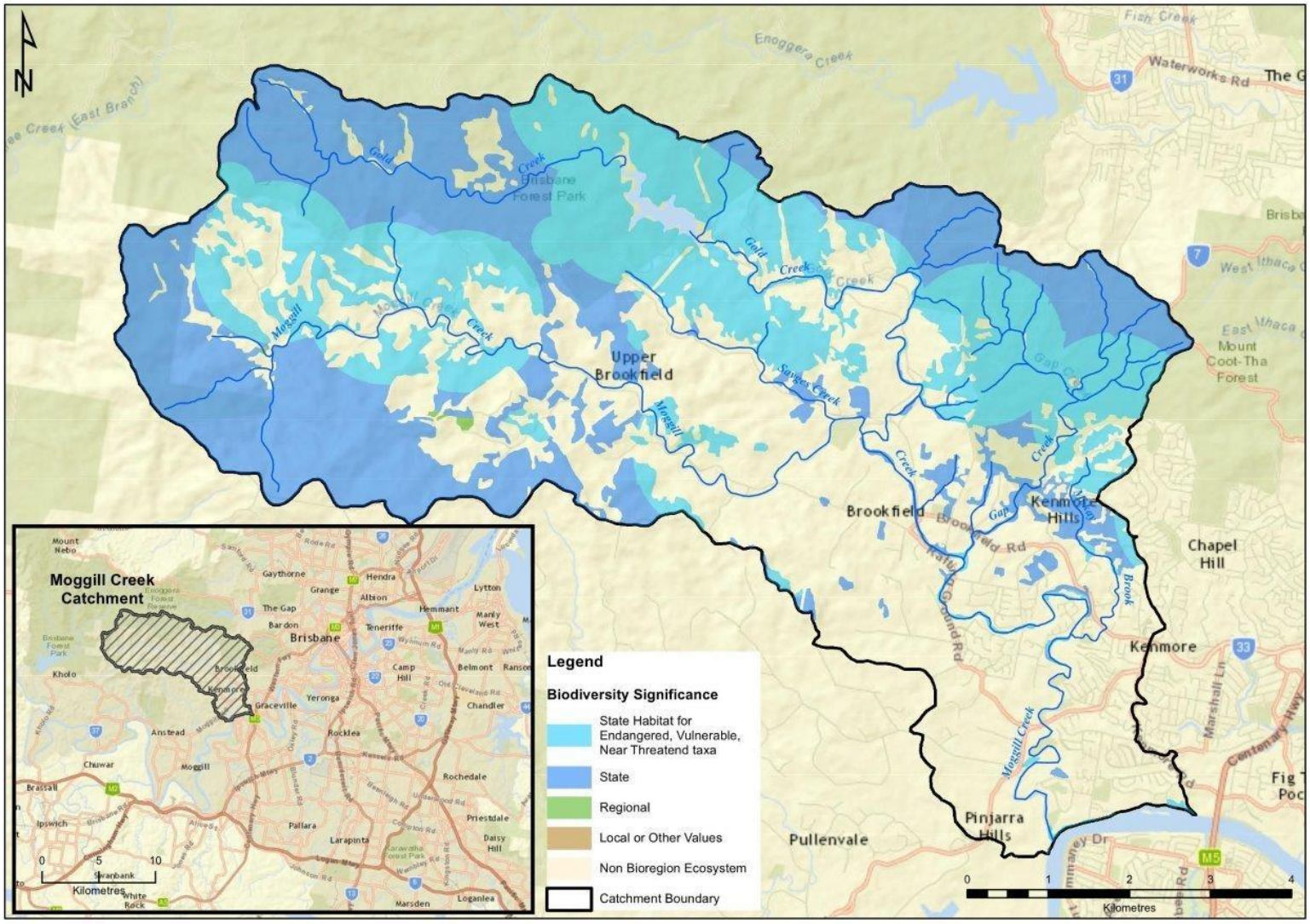


Figure 6.1.1 Biodiversity Significance of Remnant Forests of Moggill Creek Catchment

Catchment residents have commented that surface and ground water extraction through pumps and bores appears to reduce water availability during periods of low runoff. The MCCG is not aware of any data that may allow an assessment of the interaction of pumping impacts on creek flow; to our knowledge, there has been no monitoring of groundwater usage and its impacts since the MCCG was formed. Water quality varies within the catchment and there have been some concerns regarding stormwater management and the nutrient levels in at least two waste water outfalls to creeks. Despite this, platypus have been recorded regularly in downstream reaches of Moggill Creek as well as Gold Creek. Aquatic weeds have been a concern for several years, particularly during the drier periods.

Since the formation of the Moggill Creek Catchment Group, considerable community effort has improved the condition of public and private land within the catchment. MCCG members with appropriate skills in aspects related to native and exotic vegetation and land management have contributed by providing technical information and hands-on assistance to landholders and other community members. The Committee position of 'Landcare Adviser' was set up in 2008. The Landcare Adviser responds to enquiries, visiting properties, identifying species and recommending procedures for revegetation and weed control. Most years 10-15 properties are visited.

MCCG's section leaders provide a focal point for contact within sub-catchment areas and several also manage Habitat Brisbane groups. There are currently 11 bushcare groups within the catchment. Work with private landholders has been supported, and since 2013 specific funding by the BCC through the Community Conservation Partnership Program, and specific funding by the Commonwealth and State Governments through Healthy Land and Water (previously SEQ Catchments) has been provided.

In more recent years a catchment wide landscape approach has been adopted within the MCCG in conjunction with the BCC and SEQ Catchments to identify and assess the threats to the various ecosystems and the opportunities for protection and enhancement. This has helped us to source external funding for exotic vine management in the high priority forests of the upper catchment, and to gain synergies in restoration by locating activities around similar activities on Land for Wildlife member properties. In taking this landscape approach, the key ecological challenges have become clearer, and are influencing our assessments and selection of priority activities.

The map in Fig 6.1.2 (below) demonstrates the status of the remnant vegetation of the catchment in terms of its viability or potential to provide habitat corridors. Approximately 60% of the ecosystems have been lost, with most of the loss on the lower sloping, more intensively used, bottom half of the catchment. The buffering of the major conservation lands outside the catchment by the remnant forests on private and Government lands in the Moggill Creek catchment, is clearly shown in the map. A recent assessment of the remnant vegetation status shows the core remnant forests are in the upper parts of the catchment, with some smaller areas classed as nodes and stepping stones being scattered in between; fragments are all that are left of the native riparian zones and most intensively used lands. Most of the riparian zones in the lower lands are not near other native vegetation remnants and are unlikely to provide effective linkages in habitat corridors unless a major program of restoration of riparian zones is undertaken to link them.

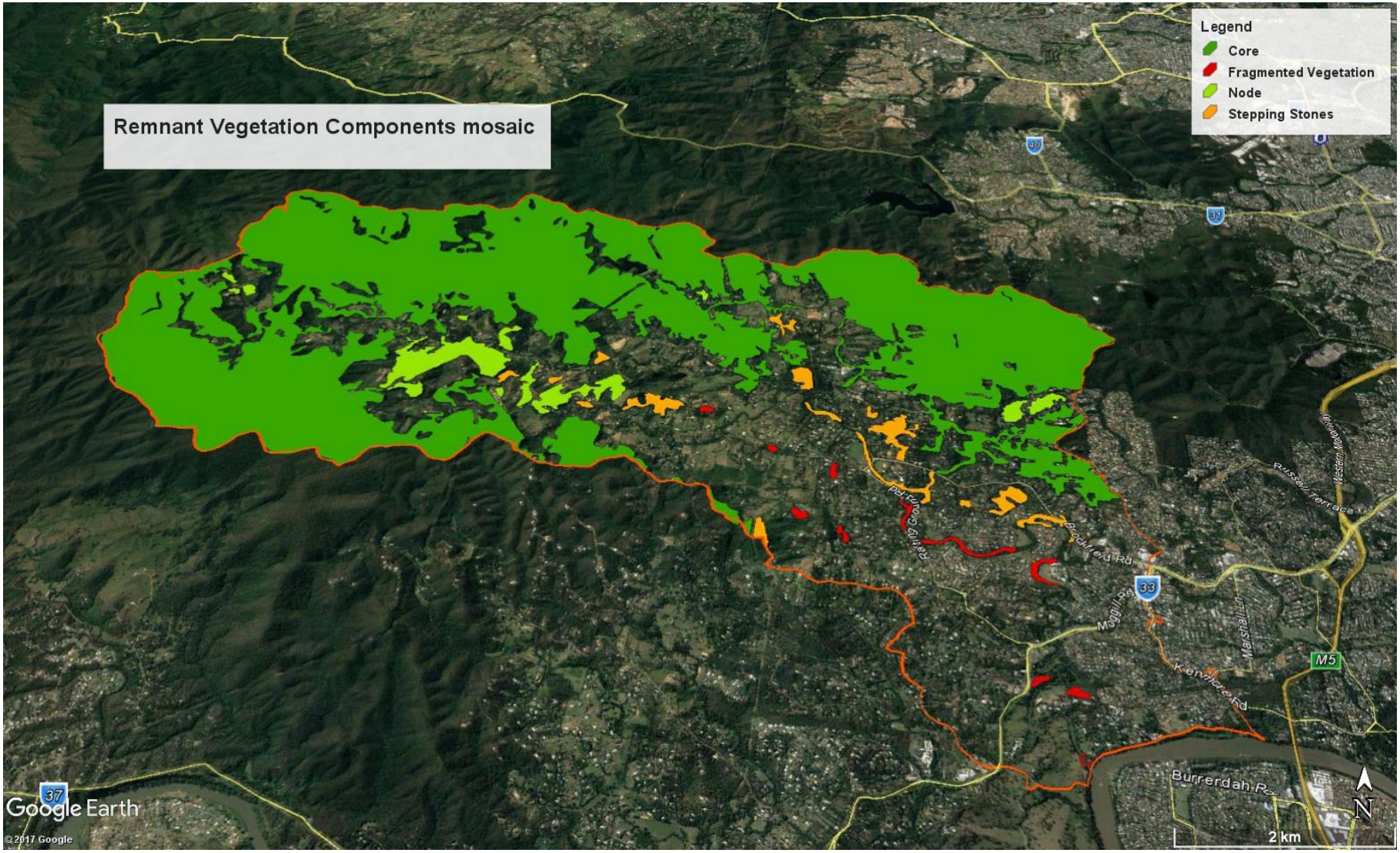


Figure 6.1.2 Habitat Corridor Remnants

MCCG is attempting to use this type of information to identify high priority remnant forests for longer term protection and restoration for fauna corridors from the mountains to the lowlands.

Although the original ecosystems in the lower lands have been destroyed, the diversity existing in the fragments is potentially valuable. Strategies are required to ensure the species in fragmented pockets are not lost, and that assessments are made of the feasibility of restoring riparian corridors to link these areas in the lower catchment. Such strategies will almost certainly require coordination across tenures and involve discussions with private landholders and the BCC who are the major land owners in this part of the catchment. This will require long term commitment to implement.

Ecological Challenges

It is clear from the specific reviews MCCG has carried out through 2015 and 2016 with our key collaborators (Brisbane City Council, Healthy Land and Water, Biosecurity Qld, Seqwater), and from the catchment section reviews, that there are some serious challenges that are *catchment wide*. Overall, the greatest challenge is to identify where we can make the most effective improvements in *protecting the functions* of the remaining ecosystems in our landscape.

The key ***ecological*** aspects are:

- Loss or degradation of habitat and corridors
- Recognition of the main drivers of the degradation, and the options for management
- Information on the location and rate of change of key functions in riparian zones and corridors
- Challenges in influencing responses across the various tenures and land use.

We have a reasonable understanding of what functions have been degraded, but have great difficulty in getting a mutual understanding across the various stakeholders about what actions to take. Part of this difficulty is related to differences in how we value the assets (the benefits) and the costs in managing the degradation or loss of functions.

A good example is facing us in the riparian zones. We know that in many areas invasive exotic plants (weeds) have replaced to varying degrees, the native plants. Some of these exotic species also provide creek bank stability, habitat, food, shade and temperature control to the creek environment.

What are the consequences of these changes with respect to providing suitable habitat for everything from microbiota to large vertebrates? What is lost or added by these changes in habitat?

These questions become highly relevant *w*hen we consider the rate of invasion of the riparian zones by species such as Chinese celtis, ruellia, aquatic weeds, ochna, and exotic vines, in conjunction with our limited understanding of the physical and biological degradation that might be occurring.

The continuing loss or degradation of ecosystems is clearly predicated on all the land use decisions made over 100 years or more, some of which were aimed at protecting the environmental resources or functions of our landscapes, while others were clearly made to provide development opportunities, in some cases with limited understanding or concern about natural resource protection.

The greatest threats to our ecosystems and their functions *currently* are coming from:

- **Exotic weed invasion in remnant forests.** These forests have values both within the catchment and outside, particularly for protection of conservation lands and habitat across the region. There is a wide range of weeds on our list, but the key ones are the canopy killers like cat's claw creeper, asparagus vine, madeira vine, Dutchman's pipe, glycine. These vines also smother naturally regenerating trees, shrubs and vines on the degraded lands, as well as on the forest floors. Chinese celtis is arguably one of the greatest invasive threats to ecosystems in the mid to lower parts of the catchment.

Other species that have been identified recently as highly invasive and of-concern are yellow bells (*Tecoma stans*), and Anzac tree daisy (*Montanoa hibiscifolia*). Common understorey weeds include ochna, lantanas, embu panic and lantana on or near previously cleared lands.

- **Exotic weeds that replace natives in the moister parts of the creek banks.** Common ones are introduced pasture grasses and legumes, ruellia, Singapore daisy, castor oil plants, Anzac tree daisy, and more recently dyschoriste. Glycine is of particular concern because it is extremely difficult to manage in newly revegetated areas.
- **Aquatic weeds**. Senegal tea, glushweed, sagittaria, purple taro, dyschoriste, yellow flowered water lilly and salvinia infestations have become a problem in some parts of Moggill Creek and Gold Creek and in farm dams. Water hyacinth has been a major problem in Gold Creek reservoir and occasionally in Gold Creek below the dam wall.
- **Infrastructure and planning decisions by Government and businesses.** Drainage from urban areas, roads and other infrastructure is a major threat to the quality and function of creek health. For example - dyschoriste has invaded Gold Creek through surface runoff from roads and associated drains, and from urban lawns. The plant can grow into a very substantial size in aquatic environments particularly in disturbed areas with little overhead shade. Another example is where high nutrient wastewater is drained into creeks.
- **Climate change.** Clearly, these threats are likely to be very difficult for MCCG to manage, but they need to be considered with respect to our long-term planning.
- **Wild fires**. Wild fires have not been a problem in the catchment in recent years; however, with the forest regeneration that has occurred, and the substantial increase in fuel load on the forest floors over more than 30 years, and invasions of exotic grasses such as molasses grass and signal grass, the risks are now very high during the drier and hotter months. All ecosystems are at risk; fires destroy the connectivity so essential for functioning habitat corridors. Fire intensity will determine if there are benefits or severe degradation. 2016 Fire Management Information for Ecosystems can be downloaded from https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/fire-management

6.2 Established and Emerging Weeds of the Moggill Creek Catchment

As noted above, weeds are a continuing and increasing threat to biodiversity in the Moggill Creek catchment. It is appropriate in this review to discuss briefly a few of the current species which are **major threats** and to outline potential weed species which have come to our attention since the last review.

Vines and climbers

Macrotyloma axillare

With little doubt, vines and climbers pose a major threat in our catchment. MCCG is currently working hard to control cat's claw creeper (*Dolichandra unguis-cati*), now a Weed of National Significance, as also is another problem vine in our area, Madeira vine (*Anredera cordifolia*). Other major threats include glycine (*Neonotonia wightii*), balloon vine (*Cardiospermum grandiflorum*) and climbing asparagus (*Asparagus africanus*). Emerging weedy vines/climbers include perennial horse gram (*Macrotyloma axillare*), velcro plant (*Desmodium uncinatum*) and Siratro (*Macroptilium atropurpureum*).

Trees

Tipuana tipu

Chinese celtis (*Celtis chinensis*) is the most invasive tree in the Moggill Creek catchment. Other invasive trees include camphor laurel (*Cinnamomum camphora*), broad-leaf privet (*Ligustrum lucidum*) and tipuana (*Tipuana tipu*). Leucaena (*Leucaena leucocephala*) and golden rain tree (*Koelreuteria elegans*) are becoming increasingly abundant.

Shrubs

Murraya paniculata

Lantana (*Lantana camara*), a Weed of National Significance, is widespread in the Moggill Creek catchment, but provides significant habitat value. Where there are requirements for its removal, replacement with comparable native understorey is recommended. Another widespread weed, more difficult to control, is ochna (*Ochna serrulata*). Emerging weed species include murraya (*Murraya paniculata*), popularly planted as a hedge species, and two species as yet of restricted distribution – sickle bush (*Dichrostachys cinerea*) in the Rafting Ground Park area and shrubby yellowcrest (*Heimia salicifolia*) along Moggill Creek, close to the Show Ground.

Heimia salicifolia

Sickle Bush

Herbaceous and ground-cover species

Numerous herbaceous weeds make restoration of the understorey challenging. Along riparian zones two of the most invasive weeds are Mexican bluebell (*Ruellia tweediana*)) and the stoloniferous Embu panic (*Megathyrsus maximus* cv. Embu).

Ruellia

Embu panic

Two further exotic ground-cover species which are increasing rapidly in riparian and moister zones are dyschoriste (*Dyschoriste depressa*) and creeping inch plant (*Callisia repens*). Both species are extremely invasive, eliminating any native herbaceous species in the surrounding area.

Dyschoriste

Creeping inch plant

Fireweed

Another herbaceous plant, of particular concern to horse-owners, is the toxic plant fireweed (*Senecio madagascariensis*). This species only quite recently became apparent in the Moggill Creek catchment, and MCCG accepted a request by Council to provide appropriate information for its recognition and control in a leaflet, which was published and widely distributed.

Glushweed

Also in the riparian zone the Class 1 aquatic plant glushweed (*Hygrophila costata*) is likely to become a serious threat.

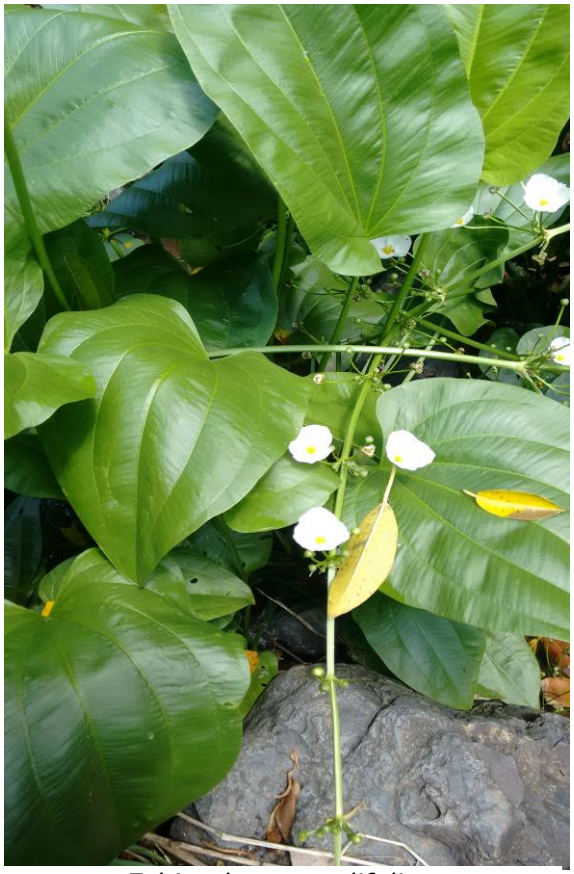
Senegal tea (*Gymnocoronis spilanthoides*) is a Queensland declared class 1 aquatic exotic weed which is well established in the lower part of Gold Creek and in Moggill Creek downstream of the confluence with Gold Creek as far as Tuckett Park and Dumbarton Drive Park. The photo on the next page is from the first main infestation immediately upstream of Adavale Street crossing.

Senegal tea infestation in Gold Creek near Adavale Street crossing

Sagittaria platyphylla

Sagittaria (*Sagittaria platyphylla)* another invasive exotic weed is also well established in Gold Creek from the Gold Creek dam wall down to the confluence with Moggill Creek and then down to Tuckett Park.

Sagittaria platyphylla



Echinodorus cordifolius

Yellow burrhead (*Echinodorus cordifolius*) is another class 1 listed aquatic weed identified in Moggill Creek near Smith's Scrub in late 2016. It is similar to *Sagittaria platyphylla*, except that the leaves are bigger, spade-like and the flower stem is quite long. It is difficult to remove once well-established on the edge of the stream

Echinodorus cordifolius

6.3 Review of Cat's Claw Strategy

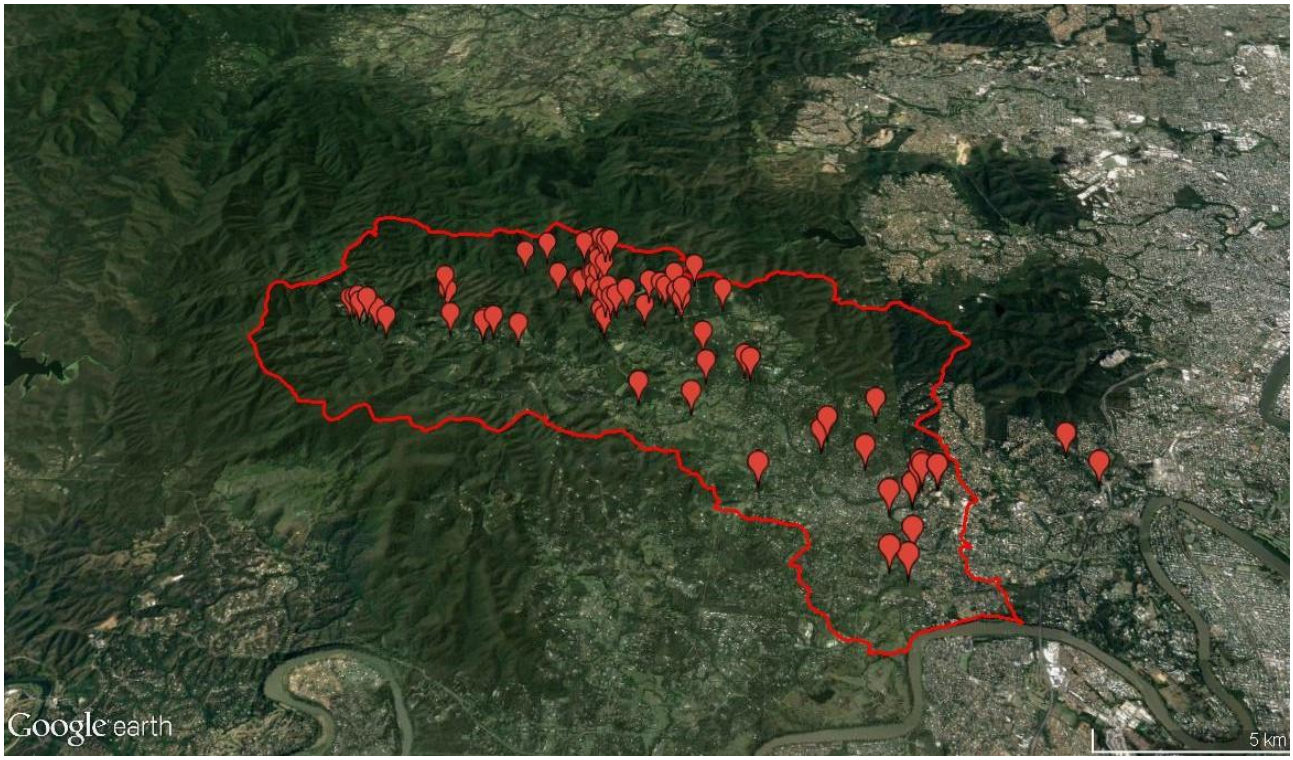


Figure 6.3.1 Cat's claw distribution

Many landholders in the Moggill Creek catchment are already aware of the threats from cat's claw creeper (a Weed of National Significance) to remnant forests and riparian zones. The vines climb to the tree canopy where they slowly smother it, killing the trees. It also completely smothers bushes and smaller native plants and can create a thick carpet that covers the ground surface.

Some landholders have been battling this aggressive exotic vine from South America for several years, and have learned how difficult it is to remove or control.

The MCCG committee has been working with SEQ Catchments (now called Healthy Land and Water), Brisbane City Council, Seqwater and officers of Biosecurity Queensland to bring together information on the ecological threats from this transformer weed; in addition, they are collaborating in efforts to support landholders to control its spread particularly in our remnant forests. A comprehensive fact sheet compiled by Biosecurity Queensland outlines much of what is known about this vine including methods of control. It is available through the Biosecurity Queensland website.

Cat's claw is distributed across many areas of remnant vegetation in Moggill Creek catchment and some infestations are known to have been there for 30 years or more. The most severe infestations are in the moister lower slopes and drainage lines where the denser vegetation occurs. Although several of the exotic transformer vines are known to be degrading ecosystems in the Moggill Creek catchment, specific attention is being given to cat's claw because it is not only one of the worst threats to tree canopies, it is also regarded as one of the most difficult to control and eradicate.

How do we respond?

The general strategy being followed is to identify infested sites and then direct control efforts into limiting further spread into important remnant vegetation. Where it is possible, treating the weed across neighbouring properties has some benefits in reducing the level of further infestation in an area. We are particularly aware of this in those areas where infestations are on properties adjacent to or close to major conservation areas such as the Mt Coot-tha Forest and the adjoining D'Aguilar National Park. Because the vine tends not to flower until it gets

into tree canopies where there is plenty of sunlight, the first step in any control program needs to be cutting of any vines already on the tree trunks. This reduces the threats of seed production and dispersal by wind or water. In urban areas cat's claw creeper often gets sufficient sunlight to flower prolifically on fences and other low structures.

This region includes several identified conservation corridors supported by Brisbane City Council collaborative conservation agreements. Approximately forty percent of the Land for Wildlife Partnerships in the wider Brisbane City area are in the Moggill Creek catchment, including several properties that have signed Voluntary Conservation Agreements or Voluntary Conservation Covenants. By focussing on those parts of the catchment where community engagement is already well advanced, significant environmental benefits can be achieved more efficiently in aspects such as more effective weed management, habitat enhancement and restoration of corridors.

MCCG has established a good working relationship with Healthy Land and Water, BCC, Biosecurity Queensland and latterly with Seqwater with respect to Gold Creek water reserve. Collaboration on selecting weed infestations for management using various funding sources, has resulted in adjacent areas being controlled on private and public lands.

Recent on-ground achievements

- 153 LfW properties and 20km of road verge received BCC CCA funding in the last three years.
- A further nine properties received Queensland Government, or Commonwealth funding for vine weed management (principally cat's claw creeper) in proximity to BCC CCA grants in Upper Brookfield, Upper Wonga Creek and Gold Creek sub-catchments. One of the sites was supported by a CVA team and MCCG. Tingid bug and Jewel beetle populations have been monitored for the last few years at nine sites in Moggill Creek catchment. The populations have survived in most sites and spread quite well in at least four. Damage to vines has been observed in several sites but there is no obvious reduction in the spread of vines.
- Green Army teams have been involved in weed management in three areas over the 2016-17 financial year. Cat's claw infestations occur in two of these areas.

Conclusions from the recent review

- Greatest threats to remnant forests are in the upper half of the catchment
- Cat's claw creeper occurs across all tenures (private properties, public land, Government water reserve, power line easements and conservation areas)
- Current strategic approach involves minimising the spread of infestations across all tenures; in our case that means our top priority is to prevent vines flowering/seeding in the canopies
- Regular follow up spraying is required to reduce the prolific tubers on the roots.

Proposed activities

- Provide useful information on the skills and other resources needed to manage the infestations in the catchment. Healthy Land and Water, BCC and Biosecurity Queensland are supporting communication and training activities for landholders seeking information on cat's claw creeper management practices.
- Sharing information about new infestations with Healthy Land and Water, BCC and landholders to help identify priority areas for assistance. Although we have already quite a bit of information on infestations in the catchment, the MCCG Committee wants to contact all landholders in the catchment who have cat's claw infestations. The better the information we have, the better the chance of getting on-ground support to battle this canopy destroyer.
- Support landholders in gaining funds for on-ground treatment of cat's claw creeper.
- Continue to focus on protection of remnant vegetation in the upper catchment.

6.4 The Nursery

Soon after the formation of MCCG, a representative of Brisbane Forest Park (BFP) who was also a member of the MCCG Management Committee, offered to build a nursery which is now one of our major assets. The nursery is managed by MCCG volunteers. The well-equipped nursery comprises bench space, an automatic irrigation system and a building including office, storage room and covered working space. More recently MCCG was given a shade house which had been used by the Richmond Birdwing Recovery Network (RBRN). This structure had been seriously damaged by a flood but most of the materials were recovered by our members and reconstructed adjacent to the nursery compound. We installed benches and extended our irrigation system to it. It has become our greatly valued seedling raising area.

An area around the nursery has progressively been planted with a range of local native species. These serve to inform customers and some provide a source of seed.

With increasing seed collection, increased numbers of volunteers at regular working bees and more demand from landholders, plant production and distribution increased after Michael Reif took on management of the nursery in 1999. Since 2002, numbers of plants produced and distributed have ranged from 10,710 to 16,224. Demand in each year has varied generally in relation to the rainfall conditions experienced.

Figure 6.4.1 Volunteers potting up plants

Plants have been widely distributed (Figure 6.4.2) across Moggill Creek catchment and to a significant number of the Pullen Pullen Catchments Group (PPCG) members, with whom MCCG has a close association. Records show that over the years, we have given out 428 species. Grasses, lomandras and dianellas together comprise approximately 15,000 of the total plants distributed, while a few trees predominate; the widely adaptable tulipwood and native frangipani totalling 4,000, with 1,500 creek sandpaper figs, much in demand for stabilizing creek banks.

Independent of the core business of the nursery, the nursery has also grown and distributed the protected Richmond Birdwing vine as a contribution to the Richmond Birdwing

Conservation Network (RBCN) (this Network replaced the RBNR mentioned above under the umbrella of Wildlife Preservation Society of Queensland). Because this is a protected species, a permit is necessary to propagate it, and is currently held by our Nursery Manager. The nursery gives plants to RBCN projects and sells them to MCCG and PPCG members. This charge is to cover the additional costs of growing plants to a larger size than our other stock, which generally takes two years. The price is well below that at commercial nurseries.

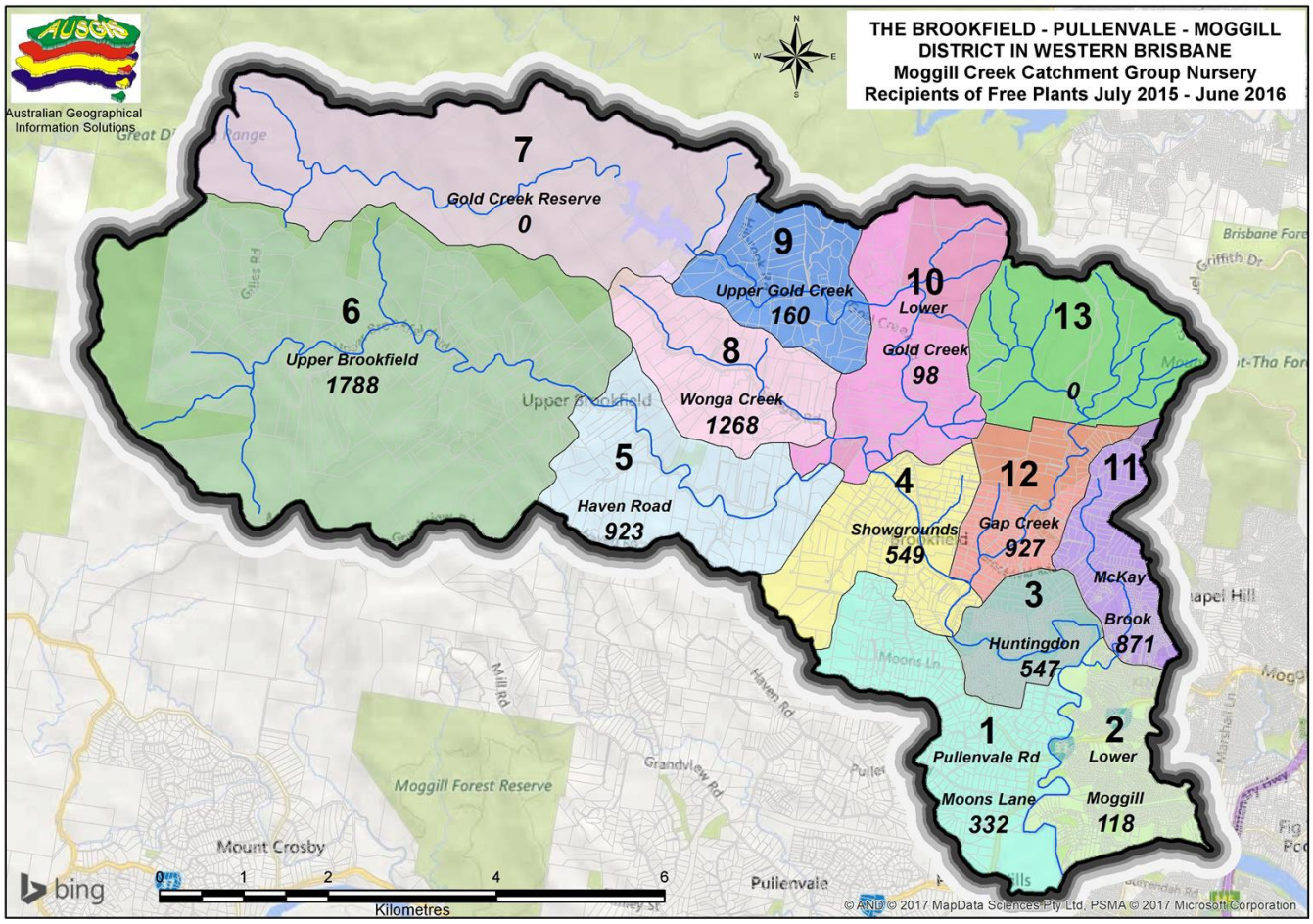


Figure 6.4.2 Number of plants distributed to members in each section 2015-2016

Main Concerns

There are some refinements MCCG would like to add to the nursery capabilities. These cannot be addressed adequately without increasing the number of volunteers involved in the nursery.

Several factors impact on our ability to supply a wider range of plants suitable for our needs. These are outlined below. The main limitation is the low supply of seeds from local native species, which is a result of only a few volunteers actively collecting seed over the years. It is also exacerbated by irregular flowering of some species, and by failures in germination. We may be able to address the germination issues by close examination of our records of seed collection and potting of seedlings.

Seed collection and storage

At present, seed collection for the nursery depends on the interest and alertness of only a handful of people, not enough to sustain adequate seed stock. Several appeals have been made to members for volunteers to manage seed collection, storage, and inventory developments. This would improve the running of the nursery and assist in meeting requests from members for the variety of species suited to the range of situations in the catchment. To

date, these appeals have been unsuccessful in recruiting more volunteers to assist with these activities.

The seeds of many species have long periods of dormancy, some taking years to emerge after planting, often doing so very erratically. A search of the literature is required to provide further information on this. It could lead to a person carrying out tests on other species.

As a general rule, species seed once a year. Seedlings are raised at that time but supply needs to be maintained at other times of the year. Those that are not distributed when they are seedlings may deteriorate or grow too large for the nursery to maintain or retain.

The seed of some species remains viable long enough to allow follow-up planting, but for many it does not. There are practicable methods whereby storage of some of these can be carried out. A search of the literature for methods known for some species is required, to apply them when seed is available. Where large numbers of seed are collected, low-temperature storage is used to facilitate future supply of seedlings.

Vegetative propagation

In cases where improvements in seed storage for follow up plantings cannot be organised, there may be suitable vegetative propagation options that could be developed and employed as an alternative approach to supplying some of the species sought by members. This is another aspect that warrants investigation and evaluation. Vegetative propagation has already been initiated on a small scale for a few species difficult to source as seed.

Inventory enhancement

It has been suggested that an improvement is required in inventory management. Whilst there are records of what is put on benches and what is given out, a better inventory system would allow easier tracking of the species available, where and when the seeds were sourced, and how they have been stored or treated.

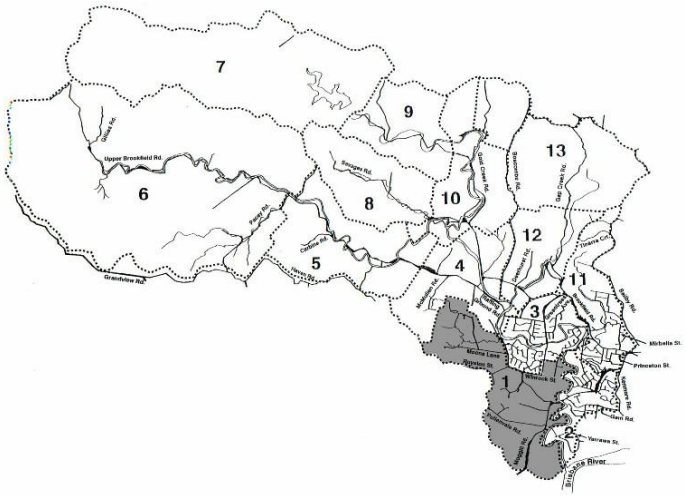
6.5 Summary of Section Achievements and Challenges

Every effort has been made to present accurate data for plants supplied by both Habitat Brisbane and MCCG but inaccuracies may occur through the planting and reporting each month.

Section 1: Pullenvale Road / Moons Lane

Section Leader: Malcolm Frost

Description of Section



The boundary between sections 1 and 2 have been slightly redrawn so as to include in section 1 both *Rafting Ground Reserve* and *Rowena Park*. In the area west of Moggill Creek and Moggill Road, apart from the Moons Lane reserve which largely consists of a stand of mature hoop pines, most of the land has been cleared of native vegetation and is mainly large private residences with wide expanses of lawn. Moggill Creek meanders directly south from Kintyre Street for about 2.5km to the Brisbane River. The more southerly meander forms Rowena Street Park which can be entered either from Rowena Street or from the Reserve by a foot bridge. The south bank of this meander forms Rafting

Ground Reserve, the second and larger meander. South of the Reserve the land has been cleared with only a thin riparian edge by the creek.

Biodiversity

Remnant vegetation in the section is estimated to be less than 5% of the original coverage. Whilst there are some patches that have relatively mature native vegetation it no longer represents the species diversity and coverage of the regional ecosystems. A survey in 1981 carried out by L.H.Bird for BCC recorded 58 different tree species in Rafting Ground Park (*Queensland Naturalist* 1992, 31, 132-136).

Some native vegetation exists at the back of larger properties, or in gullies and ridges. Rafting Ground Reserve exhibits remnants of the rainforest species, with a stand of mature trees including black beans (*Castanospermum australe*) and several other species. Recently over 20 *Brachychiton acerifolius* have been planted throughout the Reserve.

A narrow strip of riparian vegetation occurs in parts along the creek, but it is estimated that about 90% of the riparian zone is severely degraded in terms of vegetation, stream bank and stream bed conditions. Major weed infestations occur along the creek bank opposite to the Reserve extending down to the Brisbane River. A major infestation of cat's claw has become established in this area opposite the eastern end of the Reserve's riparian zone. Other weeds include intensive Chinese celtis, privet, broad-leaved pepper, Singapore daisy, glycine, castor oil, green panic, Madeira vine and lantana.

MCCG carried out a detailed botanical survey of Rowena Street Park and the land between Rowena Street and the creek. The complete lists can be seen on MCCG's web page. Over 135 native species and about 80 weed species were recorded.

Platypus are known to occur in Moggill Creek near Kilkivan Street and Dumbarton Street.

Near the mouth of Moggill Creek, stands of mangroves (*Aegiceras corniculatum*) occur. A narrow strip of riparian vegetation occurs intermittently along the creek.

Water

Moggill Creek is tidal from the Moggill Road crossing to the junction with the Brisbane River. From Moggill Road upstream to the section boundary, the creek is a permanent watercourse. Other ephemeral watercourses in the section feed into Moggill Creek. Two small dams are known to have been constructed on ephemeral water courses/gullies.

Most of Moggill Creek flows through private properties. Rafting Ground Reserve and Rowena Park provides the only public access to the creek in this section.

When heavy rain occurs in the region the area is subjected to severe flooding. Brisbane River broke its banks in 2013 causing the Reserve and Rowena Park to be inundated and Moggill Road was cut for over a week. Flash flooding of the creek causes severe erosion of the north side of Rowena Street Park.

Land

City Plan (Brisbane City Council, 2000) designates most of the section as Rural Area. Rural Areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha. (It should be noted that all existing properties are smaller than this.) The section is mainly undulating land bordering the Brisbane River to the south and Moggill Creek to the east.

Moons Lane Reserve, owned by the National Trust of Queensland, is an area which comprises a hoop pine plantation, monuments, grassland and some naturally regenerating forest. The Reserve lies to the north of Moons Lane. The National Trust give a low priority to maintenance of this asset. Weed infestations have been a major problem for many years on this site.

Community

In past years the section has been without a leader, although recently Malcolm Frost has taken on this responsibility. This is largely because MCCG has become active through a SEQC grant

(see details under Achievements after 2011). MCCG does not have a Habitat Brisbane supported bushcare group in the section.

Achievements prior to 2011

In 1959 volunteers formed the Rafting Ground Memorial Committee with the aim of creating a recreational park and restoring the area now named Rafting Ground Reserve. A post and rail fence was constructed and completed in the early sixties and a children's playground was built and some restoration work began.

Since about 1959 BCC carried out intermittent maintenance of the Park including replanting and some weed control. In 1991 and 1992 the Rural Environment Planning Association (REPA), supported by BCC, carried out two major plantings; a number of trees then planted are now mature. Overall the Park is in reasonable condition, and is a popular community recreation asset.

In 2004/2005 MCCG held a working bee to reduce the weed infestation in Moon's Lane Reserve and Greening Australia also did some spraying work. Despite attempts to get a special section running and a public meeting to discuss future maintenance there appeared to be no suitable arrangements for ongoing maintenance of the Reserve. There was no support from BCC as it was classified as private land. Richard Woodhead, an MCCG member, negotiated a lease with the National Trust and took over responsibility in 2005 for weed control and general maintenance. "Wet Wednesday" in May 2009 did a substantial amount of damage. It shredded the hoop pines and a large upstream dam broke causing a wave of water to sweep through the Reserve causing erosion and depositing silt. Recently the Woodheads sold their property to D and C Rylance.

Early in 2010 a public meeting was held in which all interested parties put forward their ideas on how the Reserve might be managed in the future. Since there was appreciation that the leasehold arrangements negotiated with Richard Woodhead had been so successful, a continuation of a leasehold arrangement was supported. It is the MCCG's understanding that the Rylance family is negotiating to take over the lease. None of the Reserve has been resumed for house building. Despite the work carried out by Richard Woodhead, weeds remain an ongoing concern, particularly cat's claw and asparagus vine.

Section 1: MCCG provided the following number of plants to landowners:

1999	2000	2001	2002	2003	2004
347	ND	236	302	452	113
2005	2006	2007	2008	2009	2010
574	335	237	73	46	246
	Total	2724			

Achievements after 2011

MCCG ran one working bee in the Moon's Lane Reserve in 2016.

As part of the Brisbane wide *What's your nature?* urban waterway restoration initiative (funded by SEQ Catchments through the Australian Government's Caring for Our Country program) MCCG was awarded $90,000 over four years to assist in the restoration of Rowena Street Park. Over 2,000 native plants have been planted replacing weeds along the riparian zone and extending the breadth of the zone. The project is due for completion in 2018.

The Moggill Creek Catchment Group creek health monitoring program commenced in 2011 with one of the twelve sites situated on the western edge of Rowena Park. This has been monitored for water quality, fish and macroinvertebrate diversity, and creek bed and bank stability. The site is the lowest site in the catchment and is often saline during high tides. The creek health is generally good in terms of water quality, fish and macroinvertebrate diversity; however during floods, bank erosion is severe, and steep unstable banks have developed.

Section 1: MCCG provided the following number of plants to landowners:

2011	2012	2013	2014	2015	2016
231	272	121	112	85	361
	Total	1182			

In August 2016, there were 12 catchment group members living within the section.

Issues of Concern

The major concerns identified are:

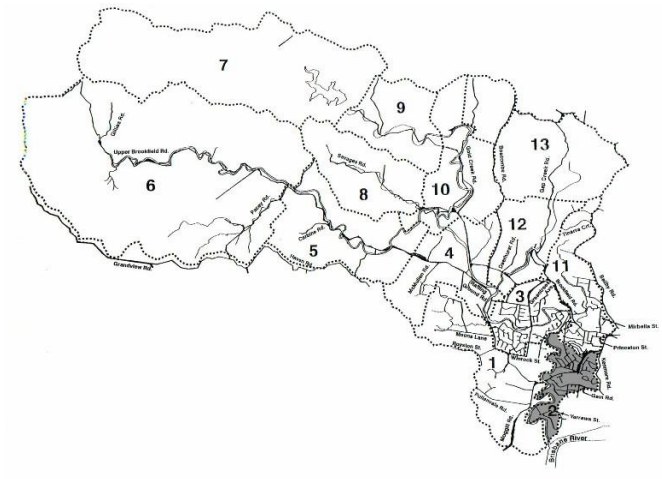
- There is no MCCG bushcare group supported by Habitat Brisbane in section 1. Since the funding by SEQC for restoration work within Rowena Park, MCCG has approached Habitat Brisbane for their support to form a Habitat Brisbane bushcare group but no decision has been made.
- Cat's claw occurs sporadically through the section but a major infestation occurs at the end of the footpath leading from Rowena Park near the Pony Club paddock. This Cat's claw infestation is of concern since it occurs adjacent to the western end of Rafting Ground Reserve, the only area of fine mature native trees. There is also a significant infestation along the creek bank behind Ross Evans Garden Centre near the Pullenvale Road / Moggill Road junction.
- Major flash floods result in significant bank erosion particularly along the north-west bank of Rowena Park. Council are encouraging a wide area of weeds and natives to deter public from approaching the steep cliffs.

Section 2: Lower Moggill Creek

Section Leader: Judy Petroeschevsky

Description of Section

This Lower Moggill section covers the areas along Moggill Creek from the boundaries of the Kenmore State High School (KSHS) to where Moggill Creek crosses Moggill Road by the nurseries. Apart from a few larger properties on the western part, the area is mostly covered by suburban housing development or parks and school grounds. Being the lower section of the creek, much of the area is flood prone and as such most of the land along the creek itself has been left as open space. Moggill Creek is publicly accessible via reserves from Kenmore State High School (KSHS).



Biodiversity

Remnant vegetation in the section is estimated to be less than 5% of the original coverage and this is restricted to parkland along Moggill Creek. Within this there are a few small pockets of remnant native vegetation; however, the bulk of the flora along the creek consists of introduced weed species. There are some fine examples of mature native trees in the area, but very few native seedlings can be found because of the dominance of weeds. Isolated trees are all that remain in the remainder of the section.

Major weeds along the creek include bamboo, giant reed (*Arundo donax)*, glycine, Madeira vine, Chinese celtis, castor oil and guinea grass. The level of infestation varies, with some areas 99% weeds; weed control is an ongoing battle.

Lantana occurs in the section but is limited to the east side of the creek below Moggill Road, where in parts it comprises 30% of the vegetation. Taro is rapidly increasing, extending further up the creek.

Water

Moggill Creek is tidal to the Moggill Road crossing. From Moggill Road, upstream to the section boundary, the creek is a permanent watercourse. Substantial stormwater and road runoff are channelled through a gully parallel to Kilkivan Street and into Moggill Creek. Flash floods cause the creek to frequently overflow onto the parks and on occasions, have flooded houses and prevented passage along roads.

Several permanent waterholes support both native and introduced species of fish, waterfowl (ducks, spoonbills, herons and cormorants), reptiles (long-necked and saw-shelled turtles and water dragons) and aquatic mammals such as platypus and water rats. Platypus have been seen near Kilkivan Street and Dumbarton Street.

Water levels in the creek vary as a result of variable rainfall and evaporation from year to year; however, water extraction by large properties along the western side may also contribute to the variations. No studies have been done to evaluate this.

Being the lower reach of Moggill Creek, this area tends to accumulate water quality problems from the upper reaches. While water quality appears "fair" and supports a reasonable variety of invertebrates and larger wildlife, there has been strong evidence of sewage pollution. Sewage pollution of the Creek results from stormwater intrusion into the sewage system during heavy rain and overflow from manholes in the park (Brisbane City Council is aware of this problem). Occasionally some scum is visible on the water surface but the nature of this is unknown. Despite these circumstances, monitoring information associated with the MCCG creek health program has commonly indicated that water quality is "fair". One site in this section has been monitored for the last six years in Fortrose Park near the waste water treatment facility.

Salvinia accumulates in calmer sections of the creek, often smothering the surface after prolonged low-flow periods, but is usually cleared out by occasional flooding. Infestations of the waterweed *Myriophyllum aquaticum* and Senegal tea (*Gymnocoronis spilanthoides*) also occur.

Rubbish in the creek from nearby KSHS is minimal and mainly due to crows and ibis raiding rubbish bins. Concern has also been expressed about the possibility of "grey water" from cleaning activities at the High School entering the Creek.

Kenmore State High School grade nine and ten science programmes have conducted water quality monitoring activities every year for the last ten years (2000-2010). However, the technical results and data each year are not retained.

Land

In general soil quality is very variable as it is made up of clay and other fill which was generated by past land developments and road construction in the area. As home sites were established, the waste soil generated was often pushed down along the creek banks. However alluvial soils in the parks away from house construction is of very high quality. Some riparian soils consist of gravel and sand scoured out of the creek itself by various floods, resulting in nutritionally poor soil. City Plan (Brisbane City Council, 2000) designates most of the section as a Low Density Residential Area, with a small Emerging Community Area yet to be developed. Such areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Urban Footprint. Kenmore State High School (KSHS) and Our Lady of the Rosary School are the two Community Use Areas within the section. A strip of Parkland Area adjoins Moggill Creek from south of KSHS to the Brisbane River.

Kenmore State High School (KSHS) is involved with weed control and revegetation along Moggill Creek and McKay Brook (section 11).

Achievements prior to 2011

Monthly working bees are regularly attended by the same six people, with activities supported by Habitat Brisbane. A BCC-supported group called Billabong Bushcare Group is active immediately upstream from Moggill Road, but it is not associated with MCCG.

Section 2: Habitat Brisbane provided the following number of plants for revegetating public land (financial year ending):

1999	2000	2001	2002	2003	2004
N/A	N/A	585	577	500	210
2005	2006	2007	2008	2009	2010
0	110	120	70	0	335
	Total	2820			

Section 2: MCCG provided the following number of plants to 11 private landholders:

1999	2000	2001	2002	2003	2004
N/A	N/A	236	N/A	45	54
2005	2006	2007	2008	2009	2010
21	N/A	194	70	191	358
	Total	1196			

Kenmore State High School

Kenmore State High School (KSHS) occupies a considerable area of ground, covering portions of sections 2, 3 and 11. For convenience it is covered in this section and is discussed as a separate entity owing to the considerable amount of work undertaken, including advice, training and plants to KSHS through a Green Corps project in 2004. MCCG committee members have taught classes at KSHS and Our Lady of the Rosary School and led walks along nearby sections of Moggill Creek.

The Student Stream Savers Project of 2009 conducted fish monitoring activities by the grade nine students, supervised by Griffith University PhD Student Leo Lee, for a ten-week period. The overall result of the survey was that numbers of small native fish in Moggill Creek were very high, but no significant numbers of larger native fish were observed.

Kenmore State High School is actively involved in managing its approximately one kilometre of creek frontage (onto McKay Brook and Moggill Creek). A major expansion of revegetation work occurred during August 2004 with funding and volunteer help from ANZ Bank and a six-month Green Corps project. Catchment group members were on the steering committee for this project.

This northern site occupies some 600 linear metres of old growth riparian dry rainforest extending from the western side of the sewerage pipe line crossing McKay Brook to downstream Moggill Creek (100 metres) then upstream 500 metres to Branton street car park, opposite the SPACE centre. The last 50 metres is BCC owned land.

Revegetation work was started with KSHS cooperation in the year 2000 when 220 plants were planted on National Tree Planting Day (NTPD) along a five metre wide strip of the creek bank opposite the tennis court. Since then cooperative plantings on NTPD further along this section have taken place, and by 2010, 11,000 trees had been planted and 600 linear metres of creek bank restored.

With the funds from the Youngman Trust Grant the last 150 metres of creek face are currently being revegetated as a project for KSHS grade nine students health and physical education activity titled 'Student Stream Savers' project. This effort is supported by Habitat Brisbane, MCCG members and KSHS staff and students.

While this has been a tremendous effort for KSHS and MCCG, previous restoration work on the Mckay Brook / Moggill creek junction by Green Corps and corporate volunteers in 2004 has largely reverted back to its earlier weed infested state. Also, the floods of November 2008 and May 2009 severely set back the ongoing weed control maintenance of this section by several years.

Achievements after 2011

While we have only a small membership in this group, they are committed and hardworking, and recently have had a productive period. Planning has been governed mainly by this part of the creek being a flood plain. Work has been aimed at minimising flood damage, mainly damage from severe erosion, loss of plantings and flood debris deposits from the force of the waters coming down Moggill Creek. Habitat Brisbane has given solid support to the planting of specific areas and using different mattings and mulches to test their resilience to severe flooding. This has been very successful. This was helped by advice on appropriate measures to minimise flood damage from Grant Witheridge, a hydrologist. The Moggill Creek Catchment Group Nursery has also provided support.

The group is trying a few different methods to recruit new members. Recently members did a letter box drop in the section and have started a Facebook page featuring the Fortrose Street section of Moggill Creek catchment. This page has created some interest. They featured the wild life in the area, mainly echidnas, wallabies, platypus and snakes, and placed information on Facebook about their working bee activities, starting time etc. Hopefully, while we have been getting responses, it will generate new membership for our working bees.

In 2014 School support allowed restoration along the path by KSHS.

Monthly working bees are regularly attended by the same six people, with activities supported by Habitat Brisbane.

Continued search and rescue weed maintenance / watering (Butterfly plants) of established areas for Student Stream Savers Stage 2 Project.

NTD planting with years 10, 11 and 12 students established 800 plants within McKay Brook section of the school tennis courts.

Figure 6.5.1 Before Restoration

Figure 6.5.2 Hard Work

Figure 6.5.3 Job Done

Section 2: Habitat Brisbane provided the following number of plants for revegetating public land (financial year ending):

2011	2012	2013	2014	2015	2016
457	653	600	638	465	356
	Total	3035			

Section 2: MCCG provided the following number of plants to 11 private landholders:

2011	2012	2013	2014	2015	2016
180	127	63	288	189	114
	Total	961			

As of August 2016, there were 25 catchment group members living within the section.

The area of this section has been reduced to allow both Rowena Street Park and Rafting Ground Reserve to be included into the one section (section 1). The reasoning is that it simplifies the communications on management between the BCC and MCCG.

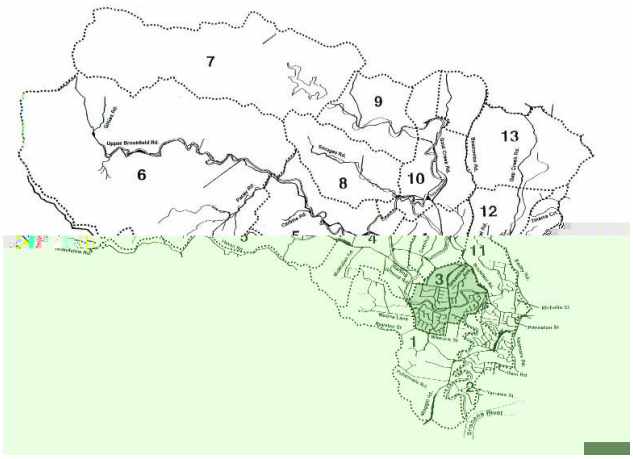
Issues of Concern

- Flood damage to the creek causing losses of new areas of major restoration work
- Ongoing battle to prevent weeds re-infesting newly planted vegetation, and dealing with weeds brought in by periodic floods.

Section 3: Huntington/Tuckett

Section Leader: Jim Pope

Description of Section



This section consists predominantly of housing estates surrounding Moggill Creek (Huntington Estate to the south, Kenmore Hills to the north and Kensington Estate to the east); however, some larger properties occur in the north and west. Moggill Creek meanders through parkland in the middle of housing, from the western border defined by Rafting Ground Road to the eastern border at the Kensington Estate and Brookfield Road. At an earlier time the creek has cut to a depth of 3-5m through an alluvial terrace which is now the Huntington and Creekside Parks. The creek banks to the water edge are normally steep but there are two areas where extensive erosion of the terrace has resulted in broad, sometimes 40m wide lower areas about one metre above normal creek height which are flooded regularly.

Biodiversity

In 1998 about 20-30% of the section had degraded remnant vegetation; approximately 10-15% and the section in the northern part east of Greentrees Avenue was partly degraded remnant *Eucalyptus crebra*, *E. tereticornis* grassland, with smaller areas of open forest of

spotted gum *Corymbia citriodora* and *E. siderophloia* or *E. crebra*. Approximately 5% was a narrow highly degraded riparian zone along Moggill Creek with remnant specimens including a few very large *Eucalyptus tereticornis* (one likely to be the largest in the catchment), several *Casuarina cunninghamiana* and rare *Castanospermum australe*. *Ficus coronata* and *Melaleuca salignus* were often found on the edge of the creek bank. One large *Ficus macrophylla*, and several *Grevillea robusta* were also present. *Lomandra longifolia* were common along the edge of the creek. The riparian zone was heavily infested with weeds including hundreds of mature and juvenile Chinese celtis. These together with camphor laurels were the predominant tree in most areas and completely dominated all other species. Ochna and castor oil were also common with one large infestation of broad leafed privet. Glycine, arguably one of the most destructive vines, and Madeira vine commonly covered the creek banks and trees. Other abundant weeds included Singapore daisy and climbing asparagus. Over 21 weed trees were growing on parkland. Casual inspection of gardens about the parks suggests that most gardens contain numerous exotic weeds such as ochna, Singapore daisy, Chinese celtis, cat's claw and asparagus vine.

Turtles, platypus and native fish have been sighted frequently in the creek and waterholes. Recently, large numbers of the exotic fish species *Tilapia* were identified in the large waterhole in Creekside Park.

Water

Moggill Creek meanders for about 3.25km through this section with lower creek banks ranging from 10m to 40m wide. On the eastern boundary, the creek bends sharply south below a steep 30m bank below Brookfield Road and the terrace opposite Cromwell Close drops very steeply 20m to the creek.

There are several large water holes along this section of Moggill Creek. During dry times, such as over 2003-2004, the creek appeared to stop flowing for lengthy periods but the numerous water holes did not completely empty; more recently when flow of the creek has ceased, such as April/May 2016, the periods have been short.

Several very heavy rainfall events have occurred over the last 16 years. In 1996 water levels rose between 5 and 10m. In November 2008 and May 2009 severe flash floods caused extensive soil erosion and damage to revegetation work along this part of Moggill Creek. The May 2008 flood caused the water to rise to the level of Creekside Street and extend from this street to the houses adjacent to Huntington Park on the other side of the floodplain. Water flow rates at the peak were estimated at about 1m/s. Soil erosion from the lower creek banks was extensive and large casuarinas were swept away. Some new shingle banks were formed but overall the stream bed did not change shape and the water holes were neither in-filled nor scoured. It is estimated that these flash floods put back revegetation work by about two years. Significant flood events also occurred in January 2011, January/February 2013, March 2014, and January/February 2015 and March 2017 (see pictures).

Figure 6.5.4 Submerged bridge in Creekside Park

Figure 6.5.5 Rafting Ground Road

Figure 6.5.6 Creekside bridge after flood partially subsided

Figure 6.5.7 Effects of relatively minor flood on plantings

Rapid discharge of street water has been exacerbated through the installation of large drains along Creekside Street and in parts of the Huntington Estate. At the eastern end of Huntington Park there is one swale which allows storm water to be filtered through the park.

Land

There are about 600 households in the area. The City Plan (Brisbane City Council, 2000) designates most of the section as a Low Density Residential Area, however Rural Areas occur across the north of the section and in the west. The Rural Areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha. (It should be noted that all existing properties are smaller than this.) The six square kilometres of cleared land west of Jacaranda Avenue and bounded to the south by Brookfield Road is made up of properties between one and several hectares in area. Kensington Estate has been almost completely built during the last twenty years.

Community

The Huntington and Kenmore Hills Bushcare Group was created in 1998. Local volunteer support with much financial encouragement by Habitat Brisbane gradually saw working bee attendances rising to as many as 20 volunteers. After 2004 the section took part in Planet Ark's National Tree Day which has grown in popularity; as a result, over a hundred volunteers have planted over 1,000 plants in this section as part of these events. Now usually 12-16 volunteers take part in monthly working bees.

At the end of 2016 there were 35 catchment group members within the section.

Achievements prior to 2011

Prior to 1998 it was unlikely that the community was aware of the poor state of the riparian zone. Weed infestation often made it almost impossible to reach the water's edge although the main water hole in Creekside Park, sometimes named Tuckett's Hole has for many years been used for swimming and still is today.

Removal of the severe weed infestation along the whole creek bank that is adjacent to Huntington and Creekside Parks was carried out. This also includes the ditch that runs from the swale to the far eastern end of Huntington Park and within the gully that runs from the bottom of Willowbank Street to the creek. In addition, removal of severe weed infestation was carried out from the end of Creekside Street to the beginning of Tuckett Park. Habitat Brisbane and the National Heritage Trust supported this clearing by funding the removal of the numerous large weed trees (Chinese elms and camphor laurels).

As stretches of creek bank were cleared of weeds, so native trees, shrubs and grasses were planted. The table below presents the number of plants provided by Habitat Brisbane which were planted throughout the riparian zone. Planting occurred throughout the year and plant fatalities during the first six months of planting were well below 10%. However, severe flooding has caused some plant losses, particularly on the lower banks in Tuckett Park, although losses have been limited by prompt action to re-stake the affected trees following each flood event.

Section 3: Habitat Brisbane provided the following number of plants (financial year ending):

1999	2000	2001	2002	2003	2004
		120	1691	1000	631
2005	2006	2007	2008	2009	2010
4379	2649	3189	4338	5460	2204
	Total	25,661			

With the assistance of HB and NHT funding, most of the several hundred large weed trees have been removed or poisoned. However, the creek banks up and down stream contain many large weed trees that will, if permitted, infest the areas already cleared.

Section 3: MCCG provided the following number of plants to private landholders:

2005	2006	2007	2008	2009	2010
166	136	182	225	225	68
	Total	1726			

Water holes were infested with weeds including salvinia and exotic water lilies. While some of these were washed out by the floods, many still remain. The banks are dominated by taro, and Singapore daisy. MCCG has undertaken no restoration work related to waterweed infestation or water management. Habitat Brisbane initiated some weed control within Tuckett Waterhole and released some salvinia weevils in the waterhole at the west end of Creekside Street but there has been no coordinated approach to its eradication.

MCCG provided 1726 plants to larger properties and it is anticipated that a high proportion of these would have survived to the present.

Achievements after 2011

This part of Moggill Creek catchment has been significantly affected through storm damage. The heavy rain at the end of January 2013 caused significant damage, including to the trees planted on the upper bank of Tuckett Park, but volunteers worked quickly to right the trees and they are growing well now. Similar responses by the volunteers significantly mediated damage by flash flooding in 2014, 2015, 2016 and 2017.

A CCA grant application in 2011 was successful. This resulted in the removal of many large Chinese celtis. After the flash flooding subsequent to Cyclone Oswald, Habitat Brisbane commissioned Grant Witheridge (Catchment and Creeks Pty Ltd) to review the restoration work along this part of the creek. His recommendations in July 2013 were that no further removal of large weed trees and underlying weeds be undertaken for about 200m downstream. Subsequently an application for further CCA funding in 2014 to continue restoration for several hundred metres downstream was refused. At that time, HB considered that the wholesale removal of large woody weeds such as Chinese celtis should be halted until the natives that were planted to replace these trees had significantly grown. Consequently the riparian bank onwards from the eastern side of Tuckett Park near the playground has not been restored, although recently (2017) HB have supported a CCA application to continue the clearing of large Chinese celtis in this area.

Maintenance of revegetated areas is essential as the seeds of the main weeds remain in the ground for many years; as an example, glycine is probably the most difficult weed to eradicate because of the seed bank. As well as smothering the native trees and shrubs, weed vines such as glycine, Madeira vine and balloon vine create an additional burden that makes the native plantings more vulnerable to flood damage. Exotic grasses also smother the young trees and shrubs. Consequently the eradication and control of weed vines and removal by brush cutting of exotic grasses has become an increasing priority for bushcare volunteers during working bees. In addition, several areas of the riparian zone along Creekside Park have been widened by planting more natives. This process, which helps to moderate erosion of the creek banks during major floods, was advanced and accelerated by receipt of a CCA grant in 2015/2016.

MCCG monitoring of a creek health site at the upstream end of Tuckett Park since 2011, has found water quality and health has been fair to good. The biggest issues have been the development of a severe infestation of Senegal tea, a listed exotic aquatic weed, with associated patches of purple taro and *Sagittaria platyphylla*, another listed exotic aquatic weed. Creek bank and bed conditions of the creek in that reach have been quite stable even though the higher banks are steep. However Singapore daisy and Senegal tea infestations have become an unwanted feature of the creek bed in this area.

Section 3: Habitat Brisbane provided the following number of plants (financial year ending):

2011	2012	2013	2014	2015	2016
1628	653	1722	650	640	235
	Total	5528			

Section 3: MCCG provided the following number of plants to private landholders:

2011	2012	2013	2014	2015	2016
68	466	288	633	543	447
	Total	2445			

Altogether 71 working bees were run during the period, amounting to 2,088 hours of volunteer and 940 hours of work outside working bees.

In 2016 there were 27 members of MCCG in the section.

Activities planned over the next five years

Priorities over the next five years include:

- Widening of the riparian zone, particularly adjacent to areas of the creek banks that are subject to erosion
- In-fill planting of gaps in the canopy and restoration of the mid-storey to provide a more secure habitat for wildlife
- Extension of the section in Tuckett Park up to the bend in the creek below Clarkson Place is also a priority. Contractor assistance will be required for a staged removal of large weed trees (Chinese celtis) from this area, prior to re-planting. Funding for this is the subject of a current CCA grant application.
- Ongoing control of weed vines (glycine, Madeira vine, balloon vine) and exotic grasses will also continue to form a major component of bushcare group activities.

Issues of Concern

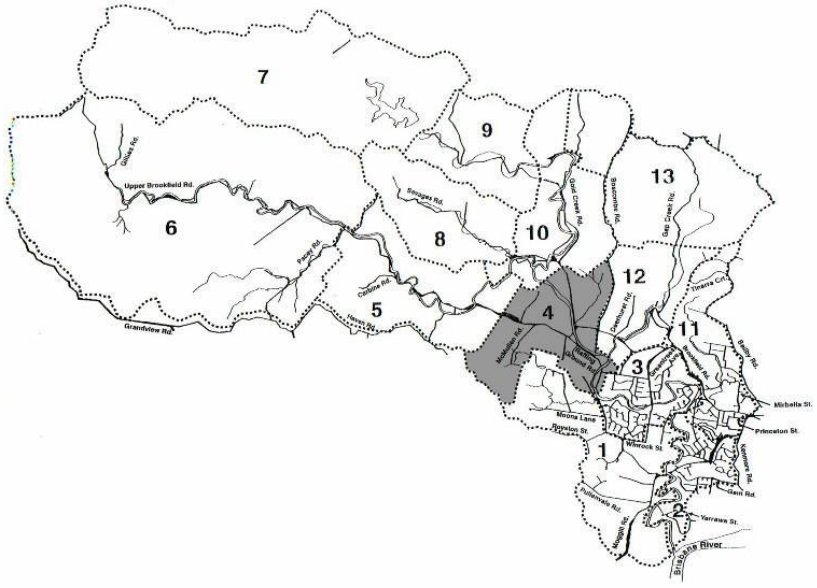
- Flooding is a major risk to revegetation work carried out by volunteers and Habitat Brisbane. Unless native trees are mature they commonly are swept away or flattened on the lower banks. When this occurs weeds become established once more. These weeds then move up to the higher banks.
- Volunteers or Habitat Brisbane personnel must continue maintenance or weeds will return and eventually over-run native plants. If the bushcare group became inactive, the riparian zone would be likely to revert to the degraded condition that existed in 1998.
- Glycine, Madeira vine, balloon vine and Celtis represent the greatest threat to revegetation of this part of Moggill Creek.
- Cat's claw occurs in small isolated areas across the section but at the moment none are serious infestations.
- After 10 years of revegetation work with support of Habitat Brisbane, parts of the public land along Moggill Creek are approaching a restored state, but much still needs to be done.
- As far as can be observed private land owners to the north of Rafting Ground Road, upstream to section 3, do not significantly control infestation of many weeds. Unless these creek banks are revegetated, weeds will be spread downstream.

Section 4: Showgrounds

Section Leader: Damien Egan

Description of Section

Section 4 is the central section of the Moggill Creek catchment and includes the Brookfield Showground and associated public land, the Brookfield State Primary School, the Brookfield Produce Store and Brookfield Shop. It covers the stretch of Moggill Creek between the new (2010) culvert crossing by Wilunga Street and a location about 400 m south of Adavale Street. Considering local roads, the section extends from Ballard's Hill on Upper Brookfield Road to the



junction of Brookfield Road and Boscombe Road in the east and on Gold Creek Road from the Brookfield Retirement Village in the north to Wilunga Street in the south.

The Brookfield Showgrounds bushcare site, supported by Habitat Brisbane, potentially covers about one kilometre of riparian rainforest from along Gold Creek Road, opposite the Brookfield Cemetery, downstream from the Brookfield roundabout bridge, behind the Brookfield Produce Store and along Rafting Ground Road to Boscombe Road. Below the Brookfield Road bridge, the creek is, except during major flooding, only about ten meters wide or less, with low banks of approximately two meters in height. In times of drought only a few deeper pools survive with water in them. During recent floods (2009, 2010) some new water channels have formed, but overall the creek banks and channels are largely intact. There is only one private property owner along this reach (Brookfield Produce Store). However, this site forms a very important natural boundary to the Brookfield Showgrounds and the Brookfield Primary School. There are a number of wooded acreage home sites in this section, generally about one hectare in area.

Biodiversity

Much of this section has been cleared, leaving comparatively few areas of intact native vegetation. Spotted gum forest occurs on the upper hillsides, particularly on the boundary with Boscombe Road. This changes to a forest red gum community closer to the Creek; dry rainforest occurs on the creek banks and their immediate proximity, dominated by *Casuarina cunninghamiana, Melaleuca bracteata, Cryptocarya triplinervis, Castanospermum australe* and *Ficus coronata*. Infestation with Chinese celtis, Madeira vine, glycine and ochna is extreme throughout the stretch alongside Brookfield State Primary School, situated on the corner of Rafting Ground Road and Boscombe Road.

Most of the floodplain has been cleared, with only a narrow strip of riparian vegetation along the creek. The extent and health of other vegetation depends on individual private landholders.

A decline and current loss of small birds, such as wrens and finches, in the local area was observed in 2003. This is presumably due to a combination of habitat loss and fragmentation and increased numbers of predatory birds (e.g. butcherbirds, kookaburras, crows), some of which are fed by residents.

Major weeds in the section are Chinese celtis, Madeira vine and glycine. Though the level of infestation is moderate overall, Chinese celtis are particularly bad on Council land between the Produce Store and Boscombe Road along the creek.

Brookfield Produce maintains their section of creek front, predominantly for access by horse riders. There has been very limited involvement by the School in catchment related activities other than the occasional excursion to the creek for Waterwatch type activities.

No viable farming properties remain.

A variety of native fish still occur in the Creek, e.g. gudgeons, mullet, catfish, and eels. Platypus are seen occasionally.

Water

There are some deep permanent waterholes, but in dry times the creek dries up in between. Some salvinia occurs at times upstream from the bridge, as well as the Class 2 weed, Senegal tea. Associated patches of purple taro have become established in recent years.

The areas alongside the creek including the Brookfield Showgrounds are subject to flooding. The November 2008 and May 2009 floods caused major damage to the revegetated riparian zone on both sides of the bridge. Large ten-year-old trees were uprooted, new plantings washed away and the lower section fence of the Produce Store was flattened. These events have put back the restoration of this site by some two years.

Land

Brisbane City Plan 2000 designates most of the section as a Rural Area. A band of Environmental Protection Area runs around the south-western boundary of the section and another lies in its north-eastern corner. Both the EP and Rural Areas are now covered by the

SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha. (It should be noted that all existing properties are smaller than this.) Community Use Areas within the section are the Brookfield Showgrounds, the General Store, the Cemetery and adjoining Council Park, Brookfield State School, and a small reserve at the south-western boundary of the section.

Community

The section has had a succession of leaders since 1997 with very slight improvement until a new section leader was appointed in May 2006. Now, it has regular monthly working bees on the last Sunday of every month, which are attracting an average of two workers to the bees. Some good progress was made until the devastating 2008/2009/2010/2011floods which have put the project work back several years.

With funds from the Water and Open Garden grants and in-kind support from the Brookfield Produce Store, two twenty thousand litre water tanks were installed inside the Produce Store grounds and an open bush tucker garden was established along the creek side fence of the Produce Store.

The water tanks proved to be an asset particularly during the recent drought period, allowing watering of newly established plantings in the site and assisting all MCCG sites in general.

The bush tucker garden has 34 species of bush tucker plants within it, and this will be extended over time to include more species and an area will be established along rock borders (provided by BCC Habitat Brisbane) on the lower creek side area.

With the old management team from the Produce Store now returned, weed maintenance of the garden will return to normal efforts from both MCCG / Produce groups.

In 2016 there were 20 members of MCCG in the section.

Achievements prior to 2011

Very little restoration work was carried out on public land prior to the formation of MCCG.

MCCG working bees started in 1997 directed by Habitat Brisbane and a small riparian area at the back of Brookfield Produce was revegetated. Since then, Envirofund and Water Grant monies have provided assistance to help with contracted clearing of the woody weed species and have eradicated most of the larger weed trees (camphor laurel, Chinese celtis, broad-leaved pepper) in 50% of this area. Weed control and revegetation activities are concentrated on public land adjoining Moggill Creek both downstream and upstream from the bridge.

Members of MCCG have been working since 2006 at weed control and have planted approximately 6000 trees, shrubs and understorey plants on this site. This only accounts for 50% of this area; 50% is still in urgent need of controlled weeding. Some older plantings exist on the downstream side of Brookfield Produce and search and rescue working bees are still in progress since the damage caused by flooding in 2009/2010/2011. MCCG nursery and BCC Habitat Brisbane have supported this project by providing plants, mulch and workers.

Section 4: MCCG provided the following number of plants to private landholders:

1999	2000	2001	2002	2003	2004
88	490	104	1260	406	962
2005	2006	2007	2008	2009	2010
504	225	594	1226	1077	1093
	Total	8029			

Section 4: Habitat Brisbane provided the following number of plants (financial year ending):

1999	2000	2001	2002	2003	2004
ND	ND	100	500	210	1
2005	2006	2007	2008	2009	2010
150	1,257	1,177	1,880	1019	500
	Total	6794			

In addition, during 2003, nine private landholders within the section received assistance from MCCG, comprising advice, 12 bales of mulch and two litres of herbicide.

Achievements after 2011

Weed management is continuing about the Brookfield roundabout and with the new bollards in place and mulch around the big figs the area is looking wonderful and is a beautiful natural backdrop to the Brookfield Showgrounds opposite.

Weed management continues behind the Produce Store and in the bush tucker garden with slow progress due to vegetation damage from January's flash flooding.

Altogether 44 working bees were run during the period, amounting to 497 hours of volunteer and 1733 hours of work outside working bees.

During 2013 a further 20 x 20 metre area has been cleared / mulched / planted from the Boscombe Road culvert adding to a 120-linear metre area already revegetated.

During 2014 a further 60 x10 metre area was cleared and planted with 30 long stem plants by BCC contractors. Our group has already added another 250 plants from MCCG with infill plantings at this site. Weed maintenance continues upstream towards the Produce Store and the bush tucker garden is now sadly overgrown. A work in progress?

BCC Habitat Brisbane West has been proactive in establishing long stem plantings in the creek areas previously maintained by contractor mowing. From 2014 – 2016, 60 long stem plants have been established with only a 2% failure rate which was due to extreme hot weather conditions.

In 2016 BCC agreed to cut down and mulch small to medium Chinese celtis and other woody weeds along the creek bank adjacent to the long stem plantings.

The MCCG creek health monitoring program has a site immediately upstream of the main bridge for Upper Brookfield Road near the Showgrounds. This site has had considerable input by the section team over time and this has contributed to some parts of the riparian zone having reasonably good condition. Water quality has been good over the last six years, despite the infestations of Chinese celtis, Senegal tea and ruellia that have displaced native species.

During 2016-2017 a Green Army team provided sustained weed management over the Habitat Brisbane site removing weeds on the creek banks and in the bed. The main species were Chinese celtis, glycine, Embu panic and other exotics, and cat's claw creeper on the Rafting Ground Road side of Moggill Creek. In the creek, the main targets were Senegal tea, ruellia, purple taro, and castor oil plant.

Section 4: MCCG provided the following number of plants to private landholders:

2011	2012	2013	2014	2015	2016
1569	636	563	1222	454	599
	Total	5043			

Section 4: Habitat Brisbane provided the following number of plants (financial year ending):

2011	2012	2013	2014	2015	2016
150	639	30	228	600	170
	Total	1817			

Activities planned over the next five years

- Maintain the bush tucker garden and establish more plantings on adjacent creek bank
- Regenerate flood damaged areas of established plantings
- Continue regeneration of areas upstream from the bridge
- Continue regeneration of areas downstream to Boscombe Road including co-operative support from the Brookfield State Primary School to regenerate both sides of the creek and grounds.

Issues of concern

- Our major concern is a lack of on the ground volunteers to our working bees.
- With a kilometre of riparian creek bank to maintain this small group is finding it increasingly difficult and the area is showing signs of neglect.
- There has been a lack of co-operation / coordination between MCCG members of this section and the Brookfield Primary School with respect to revegetation of the bank areas of the creek on the school side, which occupies a significant portion of the creek-side in the area.
- Flooding is a major risk to revegetation work by volunteers and Habitat Brisbane. Unless native trees are mature they are commonly swept away or flattened on the lower banks. Once this occurs weeds become established once more. These weeds then move up to the higher banks.
- Volunteers or Council staff must continue maintenance on Council land or weeds will return and eventually over-run native plants. If the bushcare group becomes inactive, the riparian zone would be in danger of reverting to its earlier state similar to that occurring in 1998.
- After 10 years of revegetation work with the strong support of Habitat Brisbane, parts of the public land along Moggill Creek are approaching a restored state, but much still needs to be done.

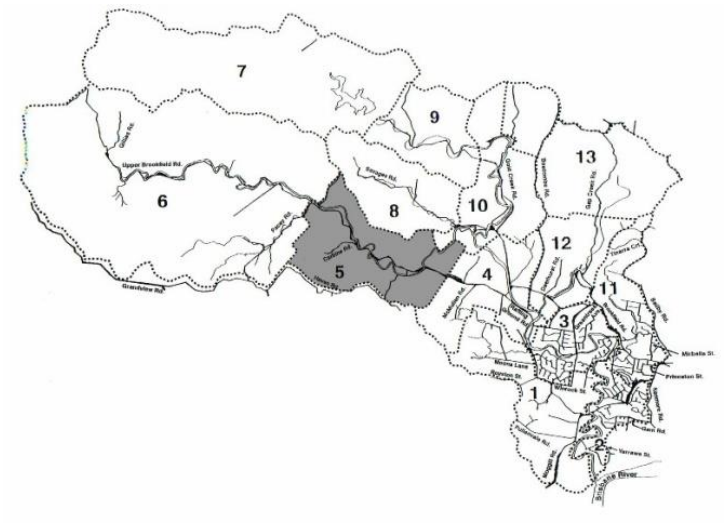
Figure 6.5.8 Weed management in Moggill Creek near Boscombe Road (top photos are before, bottom photos are after)

Section 5: Haven Road

Section Leader: Richard Woodhead

Description of Section

Eastern boundary starts at the top of Ballard's Hill running west around 3.6km to the Upper Brookfield School. The northern boundary is midway between Upper Brookfield Road and Savages Road. The southern boundary mainly follows Haven Road, making the section approximately 2.5km wide. Upper Brookfield Road runs through the middle of the section, with side roads including Haven and Carbine Roads and Kittani Street, as well as Smiths Lane. Fig Tree Lane runs off Haven Road. A few private unnamed roads occur in the section.



Biodiversity

Creek vegetation is characterised by a mix of river she oak (*Casuarina cunninghamiana)*, black bean (*Castanospermum australe*), *Melaleuca* spp. and weeping bottlebrush (*Melaleuca viminalis*). Adjoining vegetation is dominated by forest red gum (*Eucalyptus tereticornis*), wattles (*Acacia* spp.) and brush box (*Lophostemon confertus*). Patches of simple notophyll closed forest as well as cleared areas occur along the creek.

On the south side of the creek, some dry rainforest scrub is regenerating on the historically cleared slopes. There is a small portion of intact scrub off Smiths Lane. The ridge along Haven Road is open forest and though trees were removed for timber, it remains relatively undisturbed.

Vegetation along Moggill Creek (as viewed from Upper Brookfield Road) is overgrown with lantana, Madeira vine and many other weeds. Some landholders have cleared and replanted the creek banks.

Plant species, and a bird and spider list exists for Smith's Rainforest Nature Refuge, an area that has never been cleared and which has not been logged since the 1940s. Bird lists also exist for at least six properties on Haven Road. Fauna known to occur in the area include water dragons, moorhens, rails, bandicoots, koalas, phascogales and platypus.

Water

Moggill Creek generally runs west to east through the middle of the section. There are numerous tributaries that flow from privately owned land.

There is very little public access to the creek as it runs mainly through private property.

Siltation of the creek started in approximately 1931 and has continued particularly in the flooding events of 1974 and wet Wednesday in May 2009. The major cause seems to be exotic grasses which are now the predominant plant species in the creek and run off caused by overstocking and running stock on steep land not suitable for grazing without specific conservation grazing management practices.

Flow in the creek usually ceases in the dry season each winter with only larger pools retaining any water. There are approximately 12 pumping licences from the creek but not all are used. The pumps are used for domestic and stock purposes and are generally used quite sparingly. It is highly probable that there is other unlicensed pumping but this is hard to determine due to the creek mostly running through private property. There are also approximately 15 farm dams, 11 bores and three wells which are located on private property.

At the bridge downstream of Haven Road junction with Upper Brookfield Road is another of the creek health monitoring sites. This site has been monitored for water quality, macroinvertebrate and fish diversity since 2011. The site is very stable with a rock base, and despite the amount of grazed land nearby and the very poor condition of the upstream riparian zone, often has a good diversity of macroinvertebrates and fish. Water quality can often be poor during drier periods.

Land

City Plan (Brisbane City Council, 2000) designates approximately half of the section as a Rural Area (predominately the lower slopes and creek flats) and the remainder as Environmental Protection Area. Both the EP and Rural Areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha. (It should be noted that all existing properties are smaller than this.) Private Conservation Areas occur at the north-eastern end of Kittani Street and in Haven Road. These areas cover approximately 10 hectares and 13 hectares respectively totalling 23 hectares and are for dry eucalypt forest with the Brisbane City Council. There is also a Nature Refuge covenant of approximately 7.5ha for rainforest and a conservation agreement of approximately two hectares for remnant rainforest. Upper Brookfield State School is the only Community Use Area within the section.

Before 1900 timber was harvested from the area by timber getters, prior to clearing for crops such as pawpaw, pineapple and bananas. Some grazing and dairying occurred in upland areas. By the mid-1960s most farms had become unprofitable and were subdivided.

Community

Approximately 110 landholders live within the section, most with four hectare blocks. Most blocks are regenerating from the previous farming practices. Most landholders have cleared around their houses; much of the land is covered in lantana, Madeira vine, glycine and a range of other weeds, including Anzac tree daisy.

Achievements prior to 2011

Most of the work within the section has been performed by private landholders on their properties.

Most subdivision likely to occur in the section has already taken place. Early farming activities, where steep slopes were cleared for cultivation of bananas or pawpaws, would inevitably have led to erosion of topsoil.

Section 5: MCCG provided the following number of plants to private landholders:

1999	2000	2001	2002	2003	2004
750	763	537	603	1010	1267
2005	2006	2007	2008	2009	2010
925	481	445	443	230	764
	Total	8218			

Section 5: Habitat Brisbane provided the following number of plants (financial year ending):

1999	2000	2001	2002	2003	2004
N/A	N/A	100	500	210	150
2005	2006	2007	2008	2009	2010
N/A	N/A	N/A	100	N/A	0
	Total	1060			

Public land within the section is mainly restricted to road reserves, and opportunities for local landowners to contribute to weed management on public land is not feasible. The prospects of developing an active workgroup in this section are quite remote as most properties are 10 acres or larger, and all have an abundance of their own weed and revegetation challenges. Landowners regularly criticise local authorities for allowing weeds to flourish on road reserves which then provide ongoing infection to nearby private land. Further rounds of BCC pest notices have increased most landowner's requirements for work on their properties and created a degree of resentment which prejudices their willingness to work on public lands. In 2003 a local bush care group was formed but it lasted only two or three years.

Assistance by education, encouragement and the supply of plants seem to be the most successful ways MCCG might respond to landowner needs within this section. To this end targeted community field days should be considered to provide demonstrations and updates on preferred management methods and the benefits to the ecosystems.

Achievements after 2011

Much of the Upper Brookfield Road reserve is part of, or very close to the riparian zone; weed seed dispersal directly into the creek is a high probability in locations where flowering is allowed to occur. In 2015, BCC funded a community conservation assistance project for contractor weed management of the road reserves from Haven Road upstream to the top of Upper Brookfield Road. This was particularly beneficial in reducing the flowering of cat's claw and Madeira vine up many of the mature trees along the road reserve, and in removing other weeds bordering private properties. There is a clear need for follow up management to prevent vines once again getting up to the canopies.

Section 5: MCCG provided the following plants to private landowners:

2011	2012	2013	2014	2015	2016
572	640	870	644	709	1022
	Total	4457			

No plants were provided by HB to this section after 2004.

There is scope to increase the involvement of Upper Brookfield State School in catchment activities. There are currently 30 catchment group members within the section.

Issues of concern

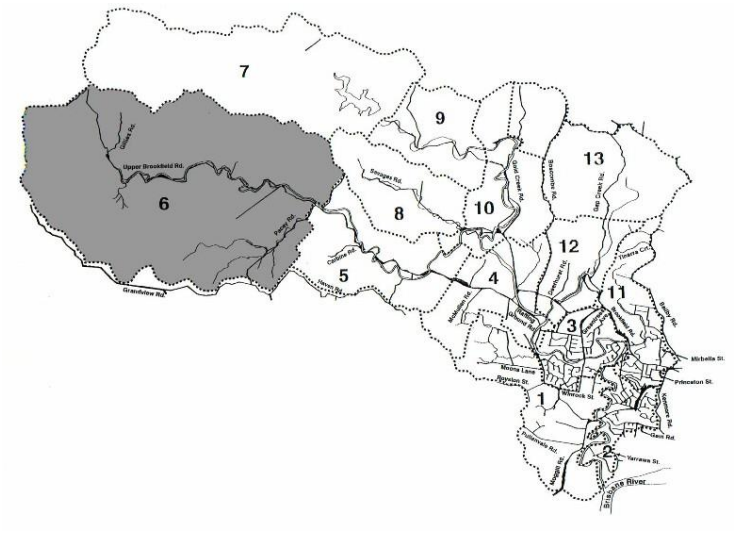
The main issues are:

- Weeds
- Livestock management issues particularly overstocking and the impacts on surface protection and effects on water quality in the creek.
- The Brisbane City Plan 2014 has seen a further expansion of the Rural Residential zoning to the boundary of section 5. As the City of Brisbane grows there will be further pressure on the lands in section 5 which are zoned Rural. A rezoning of lands to Rural Residential will see sub divisions of the 10+ acre lots down to 2.5 acre lots.
- Since the last review approaches were made for assistance to re-establish a working group in the section. This should be discussed again with the BCC.

Section 6: Upper Brookfield

Section Leader: Kate McVicar

Description of Section



Section 6 is the largest section within the Moggill Creek catchment. The section extends westward from the Pacey Road and Upper Brookfield Road junction to the end of Upper Brookfield Road. This area includes Galvin and Gillies Roads, Box Lane, Pacey Road South and Pacey Road.

The area is flanked by steep hillsides with ephemeral gullies flowing into Moggill Creek. The area is zoned as rural, environment and conservation protection with landholders occupying a variety of property sizes ranging from less than 0.5 hectares up to 150-hectare blocks. Property land uses vary significantly within this area from agricultural, pastoral, lifestyle, environmental and hobby farms.

This section contains the headwaters of Moggill Creek and a significant percentage of the remnant forests in the catchment. These forests abut other catchments with high conservation values and provide habitat corridors to the north, south and west.

Historic land uses are contributing factors when it comes to understanding the condition and the values of this area. The area has been previously logged and farmed. The areas where agriculture was carried out in the 1900s are now mostly not farmed and regrowth is occurring. These areas have higher infestations of weeds due to past disturbances. However, generally the west facing slopes which were not farmed are in above average condition.

Biodiversity

Forest communities in the area range from:

- Open Eucalypt forest of *Corymbia citriodora* (spotted gum) with a healthy ground layer of natives
- Open Eucalypt forest of *E propinqua* (grey gum) with healthy diverse grassy ground layer
- Open Eucalypt forest with rainforest species emergent
- Whip stick *Lophostemon confertus* ecosystems
- Dry vine forest
- Creek margin vegetation with *Casuarina cunninghamii* and *Callistemon salignus*
- Acacia regrowth with *Mallotus philippensis*, *Acacia leiocalyx* and *Alphitonia excelsa* (soap bush) being the dominant species.

The vegetation in the area is highly diverse and significant. Pockets of unrecorded environmentally significant regional ecosystems have not been mapped on state and local government layers due to the areas being too small. However these areas are being recognised and protected through the Wildlife Conservation Partnerships Program (Land for Wildlife) through private property ownership.

Significant flora species found to date in this area include but are not limited to Cunningham's jute and socket wood.

The significant weeds within the areas that were previously cleared are: elephant grass, dyschoriste, kidney leaf, mud plantain, saggitaria, Chinese celtis, cat's claw creeper, Madeira

vine, glycine, green panic, climbing nightshade, climbing asparagus, lantana, ochna, zebrina, freckle face, salvinia, mother of millions, morning glory, siratro and *Tecoma* (yellow bells).

The significant weeds that are found within the bushland areas are: corky passion vines, Dutchman's pipe, mothvine, climbing nightshade, cat's claw creeper, climbing asparagus, Chinese celtis, lantana, ochna, coral berry.

Significant fauna species that have been found in this area are: red-necked pademelon, greater glider, tusked frog, powerful owl, whip tail wallaby, glossy black cockatoo, brush tailed phascogale, buff banded antichinus, koala, platypus, bush stone curlew, regent's bowerbird, painted quail, black-breasted button-quail, rose-crowned fruit dove.

Feral animals are also a community concern and species include: rusa deer, fallow deer, dogs, cats, fox, pig species, hares, cane toads and tilapia. Species are being monitored and trapped with different methods in this area by private property owners, BCC and Seqwater.

Water

Moggill Creek is a gravel based creek and therefore it is forever changing. Gravel based systems have changing waterholes, slugs, and high sediment movement. This system is also very susceptible to human activity. Planting trees, removing vegetation, animal use, development, road changes, weirs, dry spells and high dumps of rainfall will alter the flow and shape of the creek system.

A small weir exists near Upper Brookfield State School. Some of the more open pools along the Creek become "green and slimy" during extended dry periods, but this disappears after creek flows recommence.

The floods in May and November of 2009 resulted in severe loss of topsoil and vegetation, significant bank erosion, and large movements of sediment, gravel and rocks downstream. Many culverts and bridges were damaged, some catastrophically as was the case in Upper Pacey Road. One significant issue was the large masses of uprooted elephant grass which wrapped around large established trees and creekside plants, ripping them from the ground and adding to the flood debris. This included large Callistemon and Casuarina species. During both flood events, Upper Brookfield Road was flooded and access beyond Pacey Road was temporarily closed.

In late 2015 there was a storm that affected an area approximately 20 hectares in size over about 10 properties that snapped mature eucalypt and lophostemon species at the base, and devastated the bushland area.

Land

City Plan (Brisbane City Council, 2000) designates most of the section as an Environmental Protection Area. Rural Areas are scattered on the lower slopes and creek flats. Both the EP and Rural Areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha.

Community

Towards the end of Upper Brookfield Road there is an area that is owned by Council that previously had an active Habitat Brisbane group; however this is no longer active. There is educational signage in this park and it is open to the public. In 2012 another Habitat Brisbane site was established, which is active. Two communities within this section have also established working groups (see achievements below for full details). Around 95% of private property has had some sort of weed control activities carried out. Approximately 10 residents are doing ongoing feral animal control on their properties.

There is one Nature Refuge property within this area – Feathertail Nature Refuge. This section has 80 properties registered with the Land for Wildlife Program.

Achievements prior to 2011

There is no holistic view of the restoration that has been taking place in the section, so it is difficult to describe its achievements accurately. However, many MCCG members from this section have been receiving large numbers of plants from the MCCG nursery, which indicates that improvement is taking place on private land. This does indicate a considerable level of activity.

A number of local landholders, particularly along the creek, have been making considerable progress with weed removal and revegetation. In one case, 100% restoration has been achieved on a one hectare creek side property, which is now in maintenance phase. Further upstream, a resident has been working along the creek on her property. Assistance was received from BCC in weed removal and planting, however much of the recent and earlier work was lost in the 2009 floods. Remedial planting and staged restoration is currently underway with flood mitigation and erosion control being the primary focus.

Between 700 and 800 Upper Brookfield Road, the owners of four properties, totalling 17 ha, have made good progress removing groundsel, lantana, glycine, cat's claw, Madeira vine, asparagus vine and weed grasses, and have planted c. 14,000 native plants, over time.

A report from another landholder provides an overview of experiences of environmentally committed residents in this section:

"Since 2005, we have been rehabilitating the area around the creek and controlling weeds in the dry rainforest areas. Last year we signed a Land for Wildlife voluntary agreement which covers the creek and dry rainforest areas of about 1.3 hectares. The creek area was covered with bana grass, lantana and several weed vines including glycine and Madeira. Some of this had been removed by BCC when we moved in and complete removal occurred about three years ago. Since then we have planted this area out with some help from corporate volunteers. Plants were provided by MCCG, Habitat Brisbane and recently LfW.

During the floods last year the creek banks were badly eroded. We have started to have the creek banks "restored" following the guidelines from natural stream designs with help from BCC. We are hoping to complete the bank restoration work over the next year."

On public land, significant restoration has been achieved along 400m of the creek near Galvin Road, a local resident having paid workers to do this restoration.

Section 6: MCCG provided the following number of plants to private landholders:

1999	2000	2001	2002	2003	2004
N/A	N/A	N/A	N/A	100	870
2005	2006	2007	2008	2009	2010
	N/A	360	1880	3590	N/A
	Total	6800			

Achievements after 2011

In 2013 the creek water came down with more velocity and height than in 2011 - this is an anecdotal assessment based on conversations with locals and our own experience. The result was a lot of scouring along the creek banks, undercutting some areas, and of course a lot of debris - the size of the logs coming down was very large! Lots of gravel was dumped. In our area the biggest issue was the falling of a large power line across Upper Brookfield Road. This blocked all the logs and a very large pile built up on the bridge, with power lines intermingled.

In the Habitat Brisbane site there was a surprisingly moderate loss of plants due to a strategy of letting the weeds grow around them. A lot of sand and gravel was dumped on our plantings, plus many trees (large and small) were pushed over by the water. Most of them were staked (stakes made from all the sticks and logs washed down the creek).

Figure 6.5.9 Flood Debris – Section 6

Habitat Brisbane (HB) Bushcare Site

In 2012 HB officially declared a bushcare site upstream from the school. The site is called The Upper Brookfield Bushcare Group (UBBG). This site has been worked on and off since 2005 but due to factors such as drought and floods it suffered many setbacks. With HB support, Contactor help and volunteering neighbours (4 in total), this area is gradually being restored.

In 2014 a CCA grant was awarded to the site for contractor assistance with a major elephant grass infestation. There were 73 members of MCCG in this section in 2016.

In 2011, two creek health monitoring sites were set up in this section. The water quality is generally very good. One site suffered severe sedimentation in the first two years, and has very shallow flow in wet periods. The main concern is the velocity of the runoff in high rainfall events. These often lead to serious erosion of creek banks in disturbed areas, and transfer downstream of large amounts of the tall exotic grasses that are rampant in the upper reaches.

Kids' Planting Days

The UBBG site hosted two separate Kids' Planting days with Upper Brookfield State School pupils.

Section 6: MCCG provided the following number of plants to private landholders:

2011	2012	2013	2014	2015	2016
2262	1611	2102	1402	1670	2241
	Total	11288			

Section 6: Habitat Brisbane provided the following number of plants:

2011	2012	2013	2014	2015	2016
218	130	0	1370	550	411
	Total	2679			

Issues of concern

- In the previous Review it was mentioned that there is no section leader to co-ordinate activities within the section. It also stated that "*whilst it seems that people in this section prefer to work on their own properties, they would benefit from having someone who proactively supports their efforts through education, arranging visits to properties, exploring possibilities for reciprocating working bees, looking at corridors etc."*
- It has now become clear that the biggest issue with the management of this site is the sheer size of it and the fact that all its residents are acreage holders. To manage a section this size, as suggested above, and do the reporting, would be a huge and time-consuming role. It would need more than a volunteer team leader to take on all the responsibilities proposed above, particularly as a team leader would be trying to manage their own property.
- A more practical model in this area would be to continue to develop small localised working groups such as the Pacey Road group and the fledgling Phil Bird group. Ideally these groups should be overseen by the Creek Ranger.
- The escalating weed problem is a definite concern. There is no weed management strategy for this section and the areas of major glycine, Madeira vine and cat's claw infestation are increasing in size each year. Elephant grass (bana grass) continues to march down the creek and in some areas is impenetrable. It is encroaching also upon the road.
- Flooding and erosion cause damage to rehabilitation work as was demonstrated during the recent 'significant rainfall events'. Especially vulnerable are the areas cleared of all weeds, where the new plants have not established well enough to withstand flood flows.
- There is no information on the impacts of pumping from the creek.
- Driveway erosion occurs from some properties, with sediment observed flowing directly into the creek.
- There is concern that illegal dumping occurs at the end of Upper Brookfield Road.
- Groups of trail bikers visit the area on the weekends and are also causing erosion and degradation of forested areas, particularly on hill slopes.
- Two major subdivisions in this section have resulted in large clearing of the areas including hillsides.
- Loss of habitat through clearing, and degradation by canopy killer vines like cat's claw, and the resultant serious soil erosion are the major threats to the ecosystems.

Section 6a: Pacey Road

Section Leader: Brian Krieger

Description of Section

Section 6a is situated on the south-western side of the Moggill Creek catchment. The section is defined in the main by private land holder properties that are connected to the unnamed creek and or have driveway access to Pacey Road. The section extends from Pacey Road for one km to the west along Upper Brookfield Road, then follows the hill ridge south-westerly. The furthermost private land holder sets the western boundary of the valley. At this point the valley boundary turns south-easterly meeting up with Haven Road. The valley boundary follows Haven Road east for around one km to its most southern point and then follows the eastern property boundaries back to Upper Brookfield Road.

The upper end of the valley is flanked by steep hillsides, becoming less steep downstream. There are several dry steep gullies that feed the creek when there is sufficient rain. The unnamed creek which follows Pacey Road for most of its length runs only during the wet season and high rainfall, but contains various pools and rock formations which hold water nearly all year round.

This semi-rural area is sparsely populated with most landholders occupying large properties more than four hectares, with the maximum size being 27 hectares. The properties at the top

of ridge on the valley's western boundary have landholdings that extend into the adjacent valley, but have been included as the houses are located on the edge of the valley along with the road access and therefore can impact on the valley's water quality and cause the introduction of invasive weeds.

This section includes the headwaters of Moggill Creek and therefore can have significant downstream environmental impacts on the entire creek.

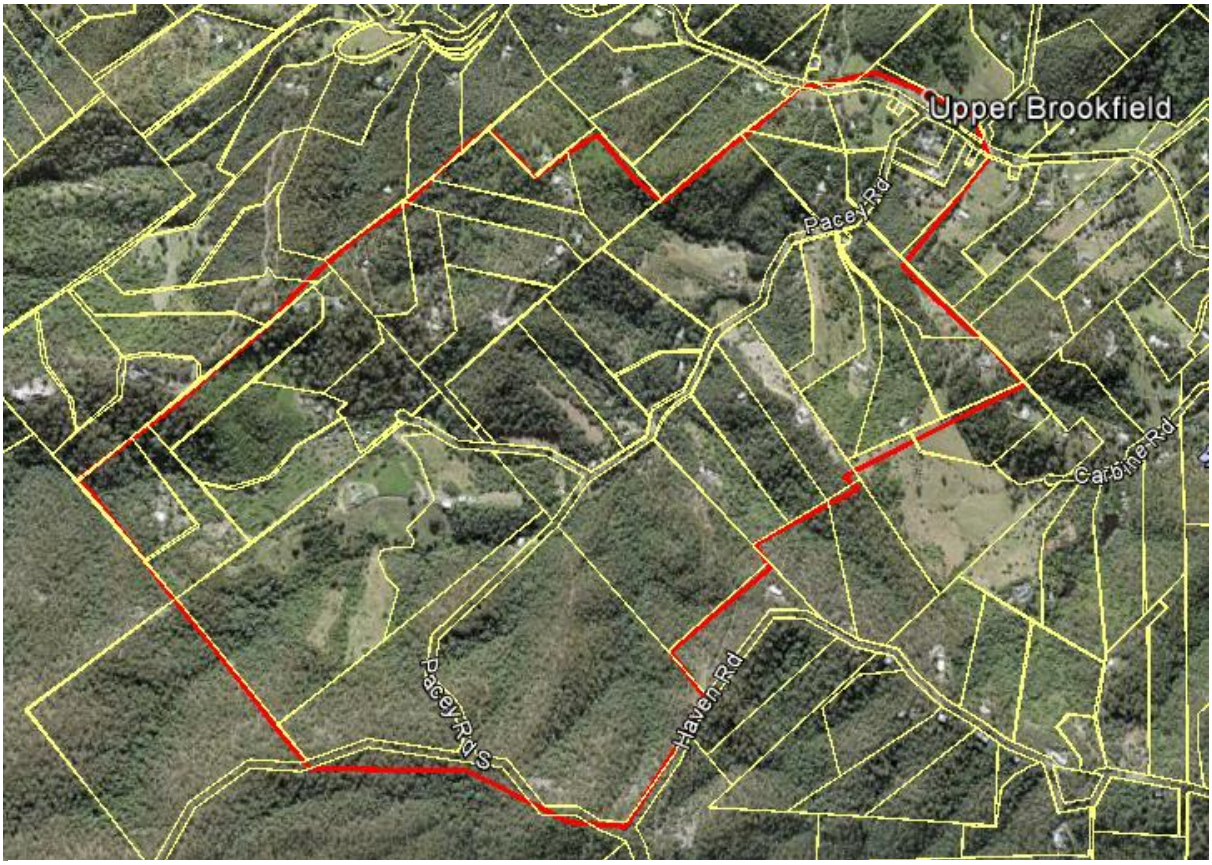


Figure 6.5.10 Property Map of the Pacey Road Area - red margin indicates active group

Biodiversity

High quality forest and woodland exists, particularly in the upper reaches. Creek vegetation is characterised by a mixture of black bean (*Castanospermum australe*), *Melaleuca* spp. and weeping bottlebrush (*Melaleuca viminalis*). The adjoining vegetation is dominated by forest red gum (*Eucalyptus tereticornis*), wattles (*Acacia* spp.) and brush box (*Lophostemon confertus*), but also contains rainforest pioneer species such as celerywood (*Polyscias elegans*) and remnant dry rainforest. Patches of simple notophyll closed forest, with *Syzygium* spp*,* as well as cleared areas occur along the creek.

Vegetation is generally heavily weed infested (but variable depending on the landholder), particularly along the creek banks where weeds comprise more than 50% of the vegetation.

Major weed species include elephant grass (bana grass), velcro weed, lantana, glycine, camphor laurel, asparagus vine, asparagus fern, morning glory, Singapore daisy, black eyed susan, corky passion flower, Easter cassia, molasses grass, ochna, wandering jew, wild tobacco and zebrina. Also present are cobblers peg, purple succulent and mother of millions. Notably, the Pacey Road Valley does not have evidence of Madeira vine or cat's claw. However, the weed issue is likely to worsen with landholders continuing to plant environmental weeds such as large baby's tears and purple succulent.

Water

The Pacey Road Creek in this section is often dry from June to October, depending on rainfall. Historically, there were several deep pools upstream from the Upper Brookfield State School, however silting due to topsoil erosion has filled in these pools. Whilst there have been significant rain events in 2011, 2012, 2014 and 2015 which have flooded the creek cutting off access to Pacey Road from the first creek culvert, there has been insufficient flow to scour out these water holes. Underground flows occur through sand and gravel in the creek bed.

In the drier periods, some of the more open pools along the creek become "green and slimy" with reduced water flow; this is similar to what happens in the other creeks in the catchment. Community members have occasionally been concerned it may be caused by sullage from older properties upstream, where increased resident numbers may cause septic systems to exceed capacity and overflow into the creek.

At the school, the creek bed appears to have been mechanically shaped with a long straight section with high side walls. Despite some concerns that this may result in high erosion rate, the shape of the creek here has changed little in the last six years.

Community

For several years MCCG has been aware that if restoration is to be successful much more work is needed on privately owned land which represents over 50% of the catchment. In 2009/2010 several land owners were encouraged by MCCG and Land for Wildlife to form a volunteer group like the HB groups, who work on public land. Plants, advice and direct assistance have been provided by MCCG.

This group of 14 landowners is co-ordinated by the landowners, under the guidance of the Moggill Creek Catchment Group.

The group is known as the Pacey Road Working Bee and holds a four-hour working bee once a month, for 11 months of the year. On average, around 10 people will be present at each working bee, however this can increase to 20 people plus children from time to time.

The Pacey Road group has also engaged the P&C of the Upper Brookfield State School at the end of the sub-catchment, to ensure valuable lessons are passed on to the younger generations.

The working bee's success appears to be based upon the core community values of inclusiveness, non-authoritarian, community self-determination and community ownership. The principles of the group are really focused on helping each other and caring for the environment.

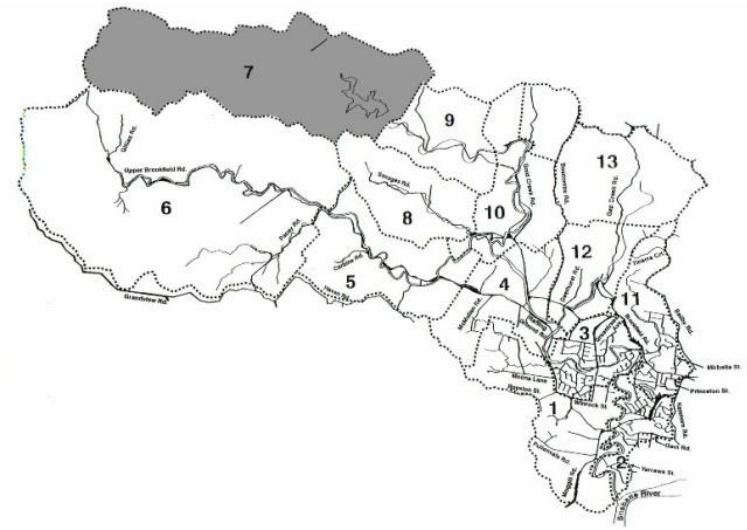
Issues of concern

- Fragmentation of work – as each area within the valley is small and as there is no overall approach to the valley, each individual area is in danger of invasive weeds returning quickly. Disillusionment of individuals is a cause for some concern.
- Loss of individuals – there are as with most organisations the threat of two or three individuals leaving which could impact the group's function. This is identified as a low risk issue as there is no foreseeable cause of concern with age or relocation.
- Some projects have been poorly thought through leaving the individual property owners with unrealistic maintenance tasks. The areas have fallen back to weeds as a result.
- Rotation for individual street owners is over one year. This could lead to less participation due to the period between. The working bee members have looked at a number of alternatives, but so far no other options appear suitable.

Section 7: Gold Creek Reserve

Section Leader: Seqwater – Justin Lee

Description of Section



This section comprises the headwaters of Gold Creek and includes the Gold Creek Reservoir. The whole area is managed by Seqwater.

Biodiversity

High quality forest and woodland occurs throughout most of this section. Vegetation around the Gold Creek Reservoir contains many rainforest species and a species list exists for the area. A variety of fauna species has also been observed, noticeably bettongs, other small mammals and death adders, which have all increased their presence since 2009. Whip-tail wallabies were seen on the north side of the Reservoir around 2000, but haven't been seen recently. Some fauna surveys were undertaken by Brisbane Forest Park staff in the 1980s.

Major weeds in the section are horse gram, white moth vine and exotic grasses such as signal grass. Lantana, glycine, coral berry and mistflower can also be found. Feral pigs and some wild dogs are present in small numbers.

Trail bikes, horse access and spray painting of the spillway are identified by Seqwater as further issues they are addressing in this section.

Water

Gold Creek rises within Enoggera State Forest above Gold Creek Reservoir. The creek is ephemeral above the Reservoir.

Gold Creek Reservoir was constructed in 1885 for the purpose of water supply, with a pipeline joining the Reservoir to Enoggera Reservoir for water treatment. The catchment area of the dam is 10.5km^2 and its full supply capacity is 801ML. The pipeline has now been decommissioned and water in Gold Creek Reservoir is no longer used to supplement Brisbane's water supply.

The Reservoir and surrounding natural areas have been owned and managed by the Queensland Bulk Water Supply Authority (Seqwater) since July 2009. Seqwater are responsible

for the holistic management of the dam and surrounding natural areas through catching, storing and treating the water as appropriate. Since the large floods of 2009, the water level in the dam has been maintained at a low level, presumably as a flood mitigation measure. An environmental flow is maintained in Gold Creek throughout the year.

Land

This section is contained within D'Aguilar National Park (formerly Brisbane Forest Park), which is a designated Conservation Area and allows for conservation and limited recreational use. However, the land has been owned by the Queensland Bulk Water Supply Authority (Seqwater) since July 2009. This includes the land on which "The Cottage" is situated.

Community

The Queensland Bulk Water Supply Authority is the only landholder within the section.

There is one member of MCCG within this section.

Volunteers visit the section weekly to maintain the track around the Gold Creek Reservoir. The fire trails and track around the reservoir are used recreationally for walking and horse riding by local residents.

Achievements to 2016

MCCG has not run working bees in this section. Seqwater and D'Aguilar National Park have managed the area to control weeds and feral animals, as well as addressing fire management, flood mitigation and water quality in the dam.

Seqwater has been conducting both aquatic and terrestrial weed control in the section since July 2009 as per the Gold Creek Reservoir pest management plan from 2005. This has included recently spraying the horse gram on the eastern side of the dam. In 2016, Seqwater carried out management of the large cat's claw infestation in the northern side of the reserve above the reservoir wall. They have also been conducting feral animal programs in this section, targeting wild pigs. There has been no active revegetation in this section by Seqwater.

In the past, both Brisbane City Council and the Queensland Parks and Wildlife Service have undertaken weed control in the section. They have particularly focused on horse gram, white moth vine and exotic grasses that have spread from road verges. They have also undertaken pig trapping and wild dog monitoring in the past.

In recent years MCCG volunteers have assisted in identifying cat's claw infestations in the water reserve and carried out some vine management in small infestations. The main benefit has come from the flow of information to agencies that have responsibility for management.

Burning is conducted around the dam every five to seven years. There was a bad wildfire around 2002, particularly around Browns Scrub, and some arson a few years ago. Regular road and fire trail maintenance is undertaken by D'Aguilar National Park rangers.

Issues of concern

The main issues of concern to the MCCG are:

- Fire, weed and feral animal management, especially pigs
- Trail bikes, off-leash dogs
- Graffiti on the dam wall
- Since the walking track around the dam is open to the public, there can be issues associated with public safety.

Section 8: Wonga Creek

Section Leader: *John Crowley*

Description of Section

Wonga Creek sub-catchment is approximately four square kilometres in area and is situated in the central part of the greater Moggill catchment. Savages Road runs the full length of the sub-catchment following the creek. There are 6-7 small culvert crossings of the creek which commonly are flooded in heavy rainfall runoff events.

Landscapes of the Wonga Creek sub-catchment

Steep hills of basic volcanics in the upper western part of the sub-catchment with stony friable red soils and lithosols (shallow stony soils). This landscape was mapped by Beckmann, Hubble and Thompson (1987) as Elphinstone Soil Landscape.

Low hilly lands of basaltic rock on the middle and upper part of the Wonga Creek sub-catchment have gravelly friable soils on crests and upper slopes and associated red friable soils on slopes. This landscape was mapped as the Brookfield Soil Landscape. This unit's influence occurs as far down as the junction of Wonga Creek and Moggill Creek.

Moderately sloping hilly lands formed on the Neranleigh – Fernvale weakly metamorphosed sedimentary rocks with inter-bedded volcanics on the northern side of the sub-catchment; soils vary from shallow loams on hill crests to shallow to moderately deep reddish chromosols and sodasols on weathered shale and phyllite on slopes, to a range of yellow and grey soils on shales and greywacke. A range of grey soils occur on some lower slopes and along creek flats. This landscape was mapped as the Kenmore Soil Landscape.

Approximately 70% of the sub-catchment has been cleared. Most of the cleared land is on elements of the Elphinstone and Brookfield Soil Landscapes on the southern side of Wonga Creek where the land tends to have lower slopes and more fertile soils. Original vegetation is reported to have been a mixture of dry open forests and dry rainforests on the southern side of the creek. Remnant open sclerophyll forests occur on the higher slopes and ridges on the Kenmore Soil Landscape on the northern side of the sub-catchment, and dry rainforests occur in several of the steep gullies draining down to the creek. Sub-tropical riparian rainforest occurred along the creek. Species typical of both moist and dry sub-tropics were included.

History

Up to the 1950s farming was conducted on the volcanic soils found on the lower slopes on the southern side of the sub-catchment. Since then land use has changed progressively to rural residential. Only one farm is left in the area. There are approximately 80 properties in the section, five have Voluntary Conservation Agreements (four at the top of the catchment) and some others are with Land for Wildlife.

Biodiversity

There has been a dramatic loss of vegetation and connectivity throughout the sub-catchment because of clearing for agricultural land uses and timber getting in the early 1900s. Biodiversity has been severely degraded through loss of habitat, soil erosion, loss of soil fertility, weed invasion and stream degradation.

Wildlife corridors across the landscape have all but disappeared on the southern side of the creek. Subsequent land use involving removal of natural regeneration has reduced the potential to develop a habitat corridor to link the northern side of the sub-catchment with Smith's Rainforest Nature Refuge in the main Moggill Creek catchment. This would have provided opportunity to develop a northern link across to the Gold Creek sub-catchment and to the D'Aguilar National Park. The remnant vegetation and volunteer native species have been removed and the area is heavily infested with weeds.

Riparian zones have been very severely degraded in over 75% of the length of Wonga Creek. The remaining 25% of the riparian zone could be classed as highly degraded because of

ingress of weed species, lack of vegetation cover over the streambed, stream bank erosion and sedimentation of water holes. In a heavily grazed area in the middle section of Wonga Creek the banks have been degraded over a long time, and consequently the channel is difficult to define and pasture has replaced all original species. Total clearing of native vegetation and unconstrained grazing are probably the main causes.

Where the creek runs along the lower slope of the northern ridges, weed infestation is severe; climbing weeds such as glycine, *Ipomoea* species (eg morning glory), and climbing asparagus are partially covering tree canopies.

Throughout the sub-catchment weeds are the most serious issue for remnant vegetation; they are escalating in number and extent of species. Pasture species such as green panic, signal grass and legumes such as glycine suppress natural regeneration of native species in the previously farmed or grazed land.

Replanting of old pasture, cropped areas or denuded riparian zones with tree and shrub species has been attempted on several properties with mixed success. Drought, floods and weeds have proved major challenges to broad area revegetation of agricultural land.

In the Wonga Creek section, better results have been observed from weed control and natural regeneration in scattered remnant vegetation than from full scale replanting. Mature trees provide roosting sites that are invaluable for regeneration of species dispersed by fruit-eating birds.

A wide variety of birds are common in the forests of the section including large birds such as the Pacific baza, emerald winged dove, wonga pigeons, channel billed cuckoo, whip birds and tawny frogmouth. Small birds and reptiles (lace monitors, snakes) have declined noticeably in numbers possibly because of the numerous cane-toads. Removal of the few remaining dead old trees is likely to be affecting hollow-dependent species such as gliders and kingfishers.

As in other sections, foxes, cane toads and hares are pest species common in this section. Feral deer have had an impact on vegetation in the forested areas. No specific species list is available for this section; in past years, platypus were sighted in a waterhole in Wonga Creek just upstream from the confluence with Moggill Creek. No recent sightings have been reported.

Water

Wonga creek is ephemeral with very few semipermanent waterholes. In the middle parts of the sub-catchment the creek becomes rather diffuse and lacks easily distinguishable banks and bed. Pastures and weeds predominate and are grazed by cattle and horses.

Past farming practices and more recent land-development activities have led periodically to serious erosion and consequent sediment inflow to the stream. A land owner has attempted to create silt barriers to stop further erosion damage. MCCG volunteers are providing nursery plants to stabilise property banks.

Mismanaged septic systems are a potential source of pollution, but there are no data on this aspect.

Some properties have small off-stream dams. An issue that has been raised several times relates to impacts on environmental flows from water pumping from the creek or from bores very close to the creek, during very low flow periods.

Recently, weed removal from large areas of streambed and bank with herbicide has been of concern in relation to compromised bank and bed stability in high runoff events and to impacts on water quality. Since 2016, a revitalised Savages Road Bushcare Group has had support from the BCC Habitat Brisbane program.

Land

City Plan (Brisbane City Council, 2000) designates most of the section on the northern side of Savages Road as Environmental Protection Area. Rural Area designation covers most properties on the southern side of the road, except for a small Conservation Area. Both the EP

and Rural Areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha. (It should be noted that all existing properties are smaller than this.) Savages Road Group is keeping informed of Land for Wildlife and other such programmes on individual properties in order that an overall plan for the area is established.

Habitat Brisbane sites are located between the lower end of Wonga Creek along Savages Road to the end of the road.

Achievements prior to 2011

There is limited information on the success of vegetation replanting, weed management, and changes in land management on the 80 private properties in the sub-catchment. There have been over 6000 plants provided by the MCCG nursery for activities on the properties since 1999. The variation in the numbers of plants supplied in each year (see the Table below) is to a large extent related to the weather experienced over each year. In those years where there was sufficient rain to encourage planting, the numbers have increased. Changes in property ownership may also be a factor.

In a mail survey of members in 2010, information was sought on revegetation achievements and on aspects considered to be high priority for the catchment group. The responses indicated that achievements related mainly to replanting of degraded remnant areas and weed management to foster natural plant regeneration.

Weed control, floods, fire risks, unreliable rainfall and lack of resources, particularly time, were identified as the main issues affecting achievements of the respondents.

The major weeds of concern to members include: Broad leafed pepper, cat's claw creeper, Chinese celtis, climbing asparagus, coral berry, Dutchman's pipe, elephant grass (particularly on the stream bank and in the stream bed), glycine, *Ipomoea* species, lantana, Madera vine, mother-in–law's tongue, ochna, privet, thorny apple and Anzac tree daisy.

Property owners had put considerable effort into managing these weeds, but for some species such as climbing asparagus, Chinese celtis and privet, eradication is not likely to be achieved because birds inevitably bring seeds in from other infected areas. Madeira vine is also a problem because of the viable propagules that remain on dead treated vines in the tree canopy; these provide a source of regrowth over time as they drop.

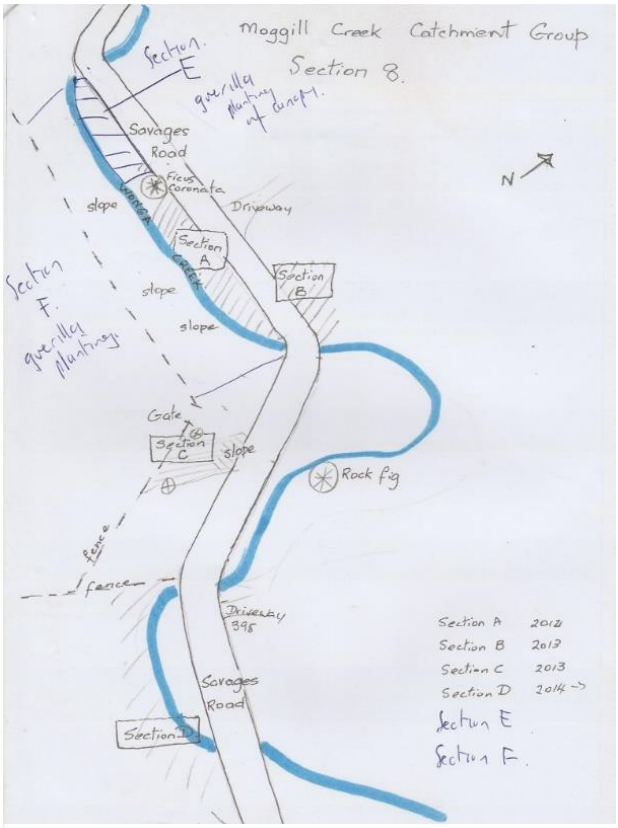
Historically, work on public land by section volunteers at two bushcare sites (supported by Habitat Brisbane) and a few other roadside sites had been restricted to areas of remnant vegetation; the activities had been aimed at weed control and targeted planting to increase the density and diversity of species. These sites were managed regularly from 2000 to 2007 but have had limited input since.

More than half of the team have Voluntary Conservation Agreement responsibilities. At the bushcare sites establishment and growth of replanted species has been successful, despite the losses caused by drought, flood and weed competition. Weed control was relatively good until the drought broke in 2006. Since that time weeds including grasses have been a major issue.

Section 8: MCCG provided the following plants to landowners:

1999	2000	2001	2002	2003	2004
270	558	286	427	1127	457
2005	2006	2007	2008	2009	2010
651	181	479	861	948	1101
	Total	7346			

Achievements after 2011



Mud Map of Sectors A - F

Over the last five years, creating continuous wildlife corridors has been the focus along the upper reaches of Wonga Creek. Two NRMA Community Grants in 2014/15 and 2015/16 have been won for $3,880 and $4,500 respectively to develop riparian zones along Savages Road and Wonga Creek from 395 Savages Road onward. Along with infill planting and weeding of the six sections, lower and middle storey planting has been done in sectors D and F. It is hoped this area can be expanded with future grants.

Techniques such as meshing mulch on steep banks and using coir logs to stop erosion of banks in serious flood events has proved very successful. Habitat Brisbane have been very helpful and co-operative, especially with de-silting work on the upper reaches of the creek.

Climate change has meant that normal heavy rains over Christmas 2015 were not forthcoming. However, much rain has fallen in the usually drier months of winter 2016. Also, winters are becoming milder and this may affect the growing and hence regenerative planting done in the future.

Sector D - Before

Figure 6.5.12 Sector D – After Lower and Middle Storey Planting

In 2013-14, jute meshing, mulching and planting along the south-eastern section of sector F was continued, with a similar extension in 2015-16.

With Habitat Brisbane co-operation and with our own volunteers we have been able to extend the riparian zone on the southern side of the creek also bordering Savages Road. Jute meshing and jute logs have kept deep mulching in place and this has contributed to very

successful growth along the bank. Watering was also possible with the purchase of a Tilkey Tank, and a very useful one hp pump from Habitat Brisbane. $500 of this grant was used in the purchase of a water transfer/bush fire pump which is available for use by all MCCG members.

The bank area between the road and the creek (sectors A and E) has been planted with a row of taller trees.

The riparian corridors are extending along Savages Road and Wonga Creek thanks to the efforts of our wonderful volunteers and those of Habitat Brisbane and the NRMA Community Grant members. An initial planting between Savages Road and the creek has become well established and weeding is a priority with the growth of vines and common weeds such as cobbler's peg. Two new areas have been planted adjacent to the primary planting following clearing and spraying of the patches and the spreading of a thick layer of mulch. A further zone has been planned for next year, but progress is slow given season flooding of this zone, the steep nature of the banks and overhead power lines.

Thanks to the hard work of volunteers and the contribution of Habitat Brisbane for resources and advice, weed clearing and reforestation beside the creek will continue.

No specific in-stream activities have been carried out beyond platypus monitoring on an annual basis at a site near the junction of Wonga and Moggill Creeks. This same part of the riparian zone was a target for very successful revegetation at the first bushcare site and the boundary of a private property.

The main activities involved in reducing land degradation in the sub-catchment have been through actions by land holders on their own land.

The number of working bees has increased recently to a total of 20 with 238 hours of work and 7 to 9 volunteers taking part. In addition, 542 hours outside working bees were contributed.

Section 8: Habitat Brisbane provided the following numbers of plants:

2011	2012	2013	2014	2015	2016
N/A	543	586	651	1240	936
	Total	3956			

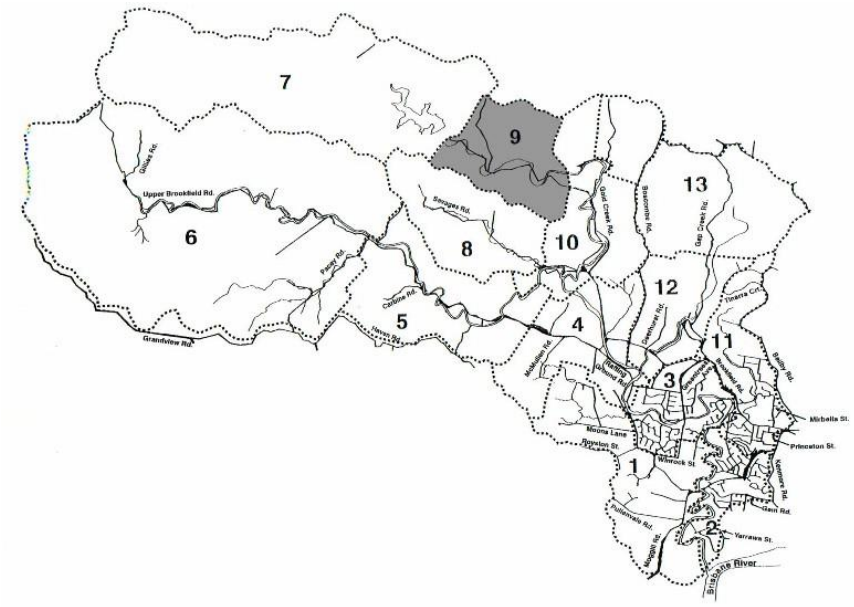
Section 8; MCCG provided the following number of plants to private landowners:

2011	2012	2013	2014	2015	2016
N/A	240	150	N/A	270	340
	Total	1000			

There were 22 catchment group members within the section in September 2010; in 2016 the number has grown to 26.

Section 9: Upper Gold Creek

Section Leaders: Gordon Grigg and Des Scherman



Description of Section

Section 9 sits below Gold Creek Reservoir and includes the area down to about half way to the confluence of Gold Creek with Moggill Creek.

Biodiversity

A variety of rainforest species grow along Gold Creek in this section. Dry sclerophyll is found on the ridges, whilst on the slopes eucalypt forest has a rainforest/vine forest understorey, particularly on south slopes. The native flora is reasonably well known; most species can be found on the MCCG website's plant list or in "Putting Back the Forest". The Queensland Parks and Wildlife Service has conducted fauna surveys in the area. Notable species include both species of brushtail possums, a single koala, Regent bower birds, bandicoots and swamp wallabies. The fauna includes the recently (2012) described new species *Antechinus mysticus*, the Buff-footed Antechinus. About a hundred species of birds inhabit the area and the end of Gold Creek Road and the reservoir are visited frequently by birdwatchers.

Water

Gold Creek traverses this section. Until a few years ago it was a chain of pools, disconnected except after rain. As a result of representation by members of section 9 Seqwater now maintains a small flow from the reservoir year-round. After heavy rain causeways over the creek may become flooded. There are no weirs or dams below the reservoir, but there are bores, including some sunk very recently, and these can affect the level of pools.

During dry periods pumping from the creek drops the water level rapidly. Occasionally there is algal growth in creek, but the creek is essentially unpolluted. *E. coli* counts were low but not zero, and thought to come from feral pigs. Aquatic weeds are building up in several reaches of the creek down to the junction of Gold Creek and Moggill Creek. In 2015, weeds such as water hyacinth, sagittaria, and purple taro were removed by the section team for about a kilometre-long reach below the reservoir wall. At the time of writing in March 2017, sagittaria and purple taro are building up again on shallow areas near banks particularly in the drier periods.

A site immediately below the dam wall has been monitored twice a year since 2011 as part of the creek health monitoring program. The water quality, macroinvertebrate and fish diversity and abundance data indicate that the creek is in good health. There are two more sites on Gold Creek in section 10.

Land

City Plan (Brisbane City Council, 2014) designates most of the section as Environmental Management, with Rural Area designation covering some areas close to Gold Creek Road. Both the EP and Rural Areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha. (It should be noted that all existing properties are smaller than this.)

Clusters of large lot estates and acreage properties, ranging in size from 2-25 hectares but mostly 5-10 acres, dominate this section. Downstream from the junction of Hillbrook Road with

Gold Creek Road most of the land has been cleared except for a narrow but reasonably intact riparian corridor, and is used for horse grazing. There is one commercial property (a dairy farm).

Community

There were 14 catchment group members within the section at the end of 2016. However, what was then a core group of about a dozen regulars has declined to about half that number, partly through ageing. The group was formed in 1997 and has been active particularly along roadsides and creek sides, clearing and controlling weeds and planting native species. Maintenance of the sites already worked is a continuing activity, and that is much aided by landholders looking after their own road frontages. We believe that the activity of the group has assisted landholders in techniques and information, which has been useful for work on their own properties, and may even have stimulated them to do so. Many property owners have a positive interest in revegetation and most are in Land for Wildlife.

Our section operates simultaneously as a section of MCCG and as one of BCC's Habitat Brisbane groups, and we are grateful for considerable support, when sought, from that source.

The population in the valley has at least doubled in the last 10 years, but further subdivision opportunities are few under current regulations, with the minimum size having increased to 100 ha.

The group has made a contribution to the community, not only by improving the appearance of the area through plantings and the removal of weedy species, but because we have helped spread information about tackling weed control and bushland regeneration; some of our 'lapsed' members are busy now on their own properties, so that is a good result.

Achievements prior to 2011

Cat's claw creeper is a serious smothering weed, with several large infestations, which act as a continuing seed source. Our section members and also some landholders are working to remove it. More about this below. Glycine is a continuing problem, though less so than five years ago for reasons not understood. Dutchman's pipe (*Aristolochia elegans*) is common. Lantana removal has been a priority for many landholders, but much remains. There are not many areas of Madeira vine, but these are increasing. There are also localised infestations of Easter cassia, coral berry, freckle face, signal grass, coffee, morning glory and *Caesalpinia decapetala*. Coral berry seems to have been getting worse during the last 3-4 years, and often follows the removal of lantana.

Weed problems are less than in either Upper Brookfield or Savages Road valleys and our section can take some of the credit.

Hares, foxes, wild dogs/dingoes, cats and pigs occur in the section. Pigs have caused major damage in the past but seem now to be less of a problem, perhaps as a result of pig traps set periodically in the reservoir area. Foxes and wild dogs are seen periodically, cats more commonly, especially on camera traps, and ground dwelling Noisy Pittas are known to be taken by them. The exotic fish *Gambusia* occurs in the Creek.

Section 9: MCCG provided the following number of plants to private landowners:

1999	2000	2001	2002	2003	2004
256	666	345	1530	690	286
2005	2006	2007	2008	2009	2010
341	328	351	405	614	409
	Total	6221			

Section 9: Habitat Brisbane provided the following number of plants:

1999	2000	2001	2002	2003	2004
N/A	N/A	1060	704	1060	N/A
2005	2006	2007	2008	2009	2010
158	N/A	220	282	120	N/A
	Total	3604			

Altogether 37 working bees took place, with 272 registrations and a total of 857 hours of work undertaken. In addition 105 hours of restoration work were recorded outside the working bees.

The scope of work has not been recorded.

Achievements after 2011

During 2013 working bee activities focused on maintaining previously planted areas along our half of Gold Creek Road. We also had three new plantings totalling about 130 plants and two working bees attacking cat's claw. The so-called Top Paddock at the end of the road was neglected in 2013, but the canopy is gradually improving all the time.

In 2013 there was greater attention to dealing with patches of cat's claw within the valley, most of which are on private land. We have been working on one large patch, and did follow up work there in 2014. Additionally, through Land for Wildlife we gained support from the SEQ Catchments Network for work by contractors on a patch of cat's claw straddling two properties. We also collaborated with landholders in their application for CCIA funding from BCC for cat's claw control by contractors on three additional properties. Using public funds for work on private land has been an important policy shift for BCC, and a very large step forward because it allows weed infestations to be attacked at source. MCCG was involved in a major effort to gain funding to control cat's claw within the whole catchment, and section 9 played a supporting role in this action.

BCC has in the last couple of years embarked on a programme of helping landowners to manage weeds, through the Community Conservation Assistance programme. Funding to support work by contractors is available competitively for landholders in the Land for Wildlife programme, and many properties in our section have been beneficiaries of this, which complements our voluntary work very considerably.

Section 9: MCCG provided the following number of plants to private landowners:

2011	2012	2013	2014	2015	2016
346	294	495	154	267	26
	Total	1582			

Section 9: Habitat Brisbane provided the following number of plants:

2011	2012	2013	2014	2015	2016
170	N/A	60	40	N/A	N/A
	Total	270			

Issues of Concern

Our main concern is that our workforce is ageing and we have so far not been successful in recruiting younger participants as replacements. Whereas we once had 12-15 participants

routinely, we now regard a roll up of half that number as a good showing. It is an issue we need to tackle, somehow.

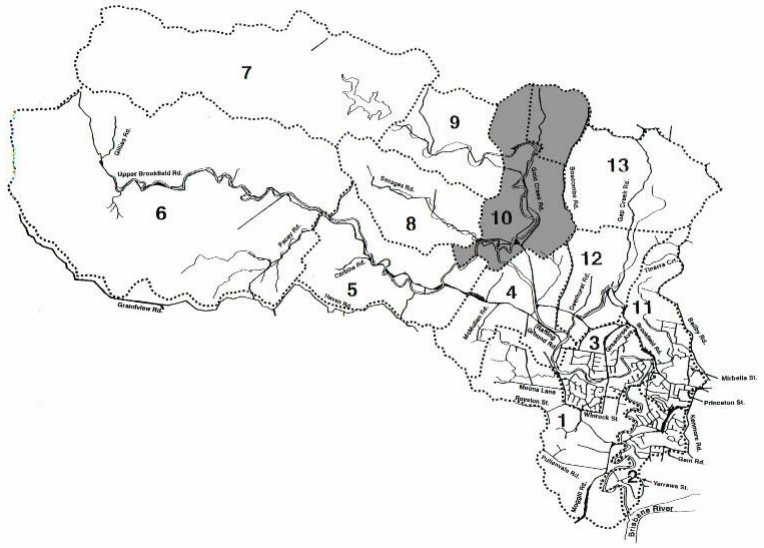
Most of the places that were available for new plantings have now been attended to and our work in those is only maintenance. However, we have become much more involved in controlling cat's claw. This is a major problem at a number of locations where there are large infestations which form a seed source which, blowing in the wind, threatens to spread it throughout the valley.

Section 10: Lower Gold Creek

Section Leader: vacant

Description of Section

This section is located in the mid-northern part of the Moggill Creek catchment. It forms the lower part of the Gold Creek sub-catchment and part of the Moggill Creek catchment below the junction with Gold Creek.



Biodiversity

Approximately 50% of the section has remnant vegetation mainly on the hills and lower slopes. The two main vegetation communities are mixed tall open forest of *Corymbia citriodora*, *Eucalyptus siderophloia* and *E. propinqua* on metamorphics and interbedded volcanics, or open forests of *Corymbia citriodora* and *E. crebra* on Mesozoic-Proterozoic igneous rocks.

Approximately 35% of the riparian zone vegetation in section 10 is highly degraded. That part of the creek that fringes the remnant vegetation of the eastern side of the creek (approx. 25%) is in relatively good condition. However, much of the remainder (approx. 40%) is in poor condition with very narrow strips of vegetation along the edge of the creek.

The major weeds in remnant vegetation on the lower slopes and alluvial flats include lantana, broad leaved pepper, privet and ochna. Ochna is prevalent in the lower slopes of the remnant vegetation in the forest park adjoining Jones Road. Climbing vines such as glycine, climbing asparagus and Madeira vine are prevalent in some areas along the creek.

Most of the cleared land has pasture and is used for grazing of horses (and a few cattle). Consequently there is little natural regrowth of native species. There appears to be little effort on these properties to encourage natural regeneration.

Water

Section 10 contains the confluence of Gold and Moggill Creeks. Gold Creek can be ephemeral in prolonged dry periods with water collecting in pools. The dam in the upper reaches is managed to reduce the period of no flow and in some years the flow can be maintained to allow water to flow into Moggill Creek for the whole year.

Waterholes above the junction with Moggill Creek are often infested with aquatic weeds such as Senegal tea, purple taro, and Sagittaria. These are flushed out or thinned out in episodic flooding events.

In general the water quality in lower Gold Creek meets the ANZEC Guidelines and is considered quite suitable for aquatic fauna. However recent monitoring associated with the creek health

monitoring program identified nitrogen and phosphorus levels well above the ANZEC guidelines.

These were due to wastewater inflows from two properties, and the issue has been addressed by the appropriate Government and BCC groups.

Land

This is a predominantly rural residential area where many properties graze horses on managed pastures. An aquatic plant nursery is located just upstream of the junction of Gold and Moggill Creeks. City Plan (Brisbane City Council, 2000) designates most of the section as a Rural Area. Rural Areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha. (It should be noted that all existing properties are smaller than this.)

Serious sedimentation of the creek has been noted over the last few years at the Jones Road culvert over Gold Creek. The access track from Jones Road to the culvert/crossing has been very seriously eroded several times in recent years and all of the gravel used to repair previous damage was transported into the creek due to uncontrolled runoff from the road and grazing land. The sedimentation in the creek has been exacerbated by the transport of large gravels and rocks from a narrow gully draining the forest park. Brisbane City Council has recognised part of the problem and has built a concrete access track to the crossing and provided controlled delivery of water into the creek.

Community

In September 2016 there were 11 catchment group members within the section.

There has been very limited volunteer work in this section for more than five years.

Achievements to 2016

Volunteers from section 10 and 7 carried out vegetation rehabilitation activities at two sites in lower Gold Creek section. One is on Gold Creek Road opposite Brookfield Village, and just north of the junction with Savages Road. The other is at the bridge over Gold Creek at the beginning of Savages Road. In the first site an area that had been severely slashed for lantana and other weed removal beside Gold Creek Road was replanted in approximately 2002 with assistance from Habitat Brisbane. It involved planting an area approximately 400 m^2 at about one m^2 spacing, heavily mulched and watered up to four times over the first four months. This was a high input project on very good soils adjacent to a riparian zone that although narrow in places, was in reasonably good condition. Subsequently, a nearby infestation of Chinese celtis in the riparian zone was removed. The project area has been restored very successfully, helped in the last couple of years by extra weed control carried out by the BCC. The density of the planting has prevented/limited the establishment of weeds. In a neighbouring area of approximately one hectare of remnant vegetation, Habitat Brisbane has carried out extensive weed control and replanting since our previous review.

An earlier replanting program in the late 1990s at the site immediately upstream from the bridge at the beginning of Savages Road, was plagued with weed invasion on the highly fertile and moist alluvial site. A loss of volunteers made further progress difficult for several years. Subsequently an intensive effort was made using volunteers from sections 10 and 8 to extend the restoration effort downstream. Drought, floods and frosts over the subsequent few years severely damaged the young seedlings, and glycine has proved extremely difficult to control. Despite some ongoing work by Habitat Brisbane success has been very limited.

This zone is one of the few in the catchment where there is good potential for establishment of a vegetation corridor from one ridge with remnant vegetation on the south-western edge of the Gold Creek sub-catchment along Gold Creek to the eastern edge linking up with the Forest Park.

The creek health monitoring program has two sites in section 10. One is upstream of the bridge at the junction of Jones Road and Gold Creek Road and the other is at the crossing of Adavale Street and Savages Road.

The Jones Road site is just downstream of the forest park and despite having a very degraded and thin riparian zone, the site generally has had good water quality. The fish and macroinvertebrate data indicate a reasonably healthy aquatic ecosystem. The main issues at the site are the exotic weeds (ochna and camphor laurel), the ingress of purple taro in the creek bed, and the instability of the creek banks. Apart from both sides of the creek having very narrow riparian vegetation, surrounding land use is mown or grazed pastures.

The site on Adavale street has had high nutrient inflow until 2016, and large infestations of exotic aquatic weeds such as Senegal tea, glushweed, purple taro and Sagittaria. Since the wastewater inflow issue was resolved, the levels have been within acceptable levels for this region.

However the aquatic weed infestations have persisted. From mid-2016 to early 2017 dissolved oxygen levels were very low. Algal blooms had established in the creek at several sites. Monitoring is continuing.

The main volunteer effort has been at the two creek health monitoring sites.

Section 10: MCCG has provided the following number of plants to private landholders:

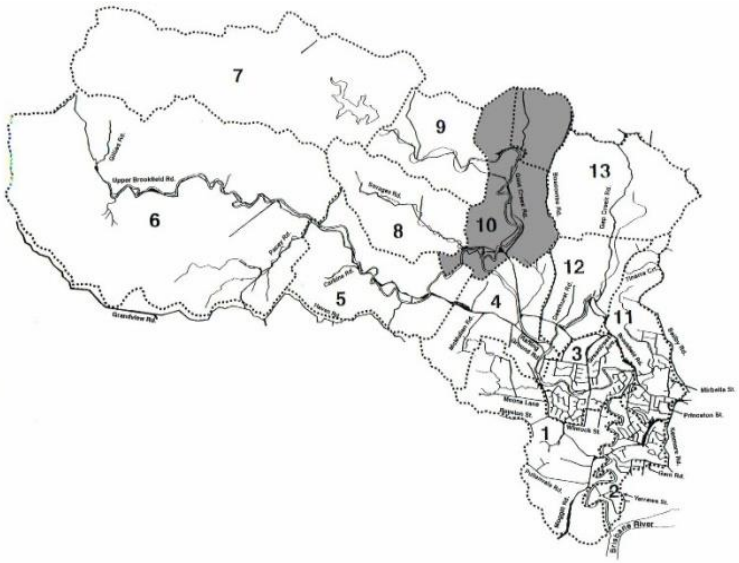
1999	2000	2001	2002	2003	2004
502	188		166	543	610
2005	2006	2007	2008	2009	
398	72	356	63	293	
2010	2011	2012	2013	2014	2015
156	71	221	337	125	16
2016					
303		**Total**	4420		

Issues of concern

- The lack of a section leader limits the opportunities for communication of issues in the section and this has resulted in little work on public lands.
- Water weeds have been a concern for many years in the lower part of Gold Creek in the vicinity of the junction with Moggill Creek.
- The riparian zone condition is severely degraded through much of the section.
- There appears to be little revegetation activity on private land throughout the section.

Section 11: McKay Brook

Section Leader: Bryan Hacker



Description of Section

McKay Brook rises on Mt Coot-tha and flows southwards for about four kilometres into Moggill Creek close to the northern extremity of

Kenmore State High School. Bielby Road comprises the eastern watershed whereas the western watershed is a north-south ridge running a little to the east of Gap Creek Road. The southern part of the catchment is closely settled while the northern half mostly comprises acreage home sites on moderately steeply sloping eucalypt woodland on infertile skeletal soils.

There are four Council parklands in this section:

- Park 1. A small grassy park/playground close to McKay Brook and just to the northwest of Mirbelia Street.
- Park 2. An irregularly shaped and generally narrow park running either side of the Creek from the bridge on Mirbelia Street to below Pamela Place.
- Park 3. A park extending from the Brookfield Road bridge across McKay Brook to Kenmore State High School (below Mabb Street). This park area includes a small playground adjacent to Brookfield Road. The park varies in width from a few metres at the end of Belford Street to perhaps 70 metres wide in the southern portion.
- Park 4. A more or less square park to the west of Bozzato Place (Shaw Place) and contiguous with the irregularly shaped park mentioned above. This area was passed over to the Council by developers of associated blocks in about 2005. The area includes a retention basin in a northerly extension.

Biodiversity

The woodlands in the north of the catchment are generally dominated by *Eucalyptus crebra* and *Corymbia citriodora*, with a range of other eucalypt species, and limited patches of rainforest in gullies. In general this woodland is not particularly weedy. Parks 2 and 3 each contain forested areas along the creek (adjoined by grassy areas for walking and other recreation). Species found in the northern park (prior to work started by the Mirbelia Street Bushcare Group in 1998) include a number of trees of *Casuarina cunninghamiana, Jagera pseudo-rhus, Ficus coronata, Glochidion ferdinandi, Melaleuca bracteata, M. viminalis* and *Melia azedarach*. The southern park also had a number of mature native trees including numerous *Lophostemon suaveolens* and *Aphananthe philippinensis*, as well as *Eucalyptus tereticornis, Corymbia henryi, J. pseudo-rhus* and *Mallotus philippensis*.

Park 4 includes *Cryptocarya triplinervis, Guioa semiglauca and Syzygium smithii* close to the creek and a large *Ficus rubiginosa* up the slope. Plantings by the developer in 2005 are not sustainable but some natural regeneration is occurring.

Woodland in the northern part of the section is not particularly weedy, as infertile soils prevented clearing for dairying or horticulture. There has, however, been increasing pressure for development over the last 10-20 years, but minimum property sizes are restricted to acreage sites as a measure to preserve the integrity of the bushland area incorporating Mt Coot-tha. Areas of Mt Coot-tha are under increasing threat from exotic grasses such as *Urochloa decumbens* and *Melinis minutiflora*.

Platypus were observed in 2003 in McKay Brook near Mirbelia Street and a satin bower bird making a bower in a residential property in 2009. Bush hens are occasionally seen in the vicinity of the Mirbelia Street bridge and a nest has been observed.

Water

McKay Brook was re-routed below Hillcrest Place about 1990, resulting in destruction of a native vegetation community. Land management (excessive mowing/poisoning weeds) upstream from Billabong Street properties is believed to have been responsible for filling in of water holes. At the Brookfield Road bridge, two approximately 80-centimetre drains and a 30 cm drain bring runoff into the creek. One of the drains comes from the large sealed area of Kenmore Village Shopping Centre. These drains result in extremely rapid rises in water level in McKay Brook and consequent erosion with storm events. Below Belford Street, two sewerage manholes used to discharge raw sewerage down to the creek during storms. An ancillary sewerage line has been installed c. 2008 and overflow problems have not subsequently occurred.

The development at Bozzato Place/ Shaw Place includes a retention basin which collects run-off water from the new residential area. Whilst this successfully avoids excessive run-off into McKay Brook it also serves as a breeding ground for cane toads. On the positive side, various water birds may be seen on this pond.

There is little doubt that water quality in McKay Brook is deteriorating with increasing urban development. The three aforementioned drains at the Brookfield Road bridge undoubtedly carry various pollutants as well as grosser rubbish and cause erosion that would be unlikely to occur in a natural creek. Visual signs of pollutants are reported to Council when seen.

Fortunately, the flooding events of November 2008, May 2009 and January 2011 did not cause extensive damage to plantings. This was probably associated with the small size of the McKay Brook catchment – about 6 km^2 and hence the more limited runoff.

Land

The land forming the catchment of McKay Brook covers a variety of land uses. City Plan 2014 became effective on 30 June 2014 and includes the Rural Residential Zone, which covers the land around Billabong Street. North of Elwood Street, land is in the Environmental Management zone. South of Advanx Street, land is ether in the Low Density Residential zone or the Open Space (Local) zone, which includes the four parks mentioned above. Around the junction of McKay Brook with Moggill Creek, where the brook passes through Kenmore State High School land, it is in the Community Facilities (education purposes) zone. The adjacent Iona Retirement Village and nursing home, occupying about 7 ha, is in the Community Facilities (health care) zone. The Churches of Christ land on the eastern side of the catchment is currently (2016) being redeveloped to provide offices and an event centre; it is unsure how this will affect Mckay Brook. Between the Churches of Christ land and the brook itself the land is being redeveloped for town houses. Again the future effects of this on the brook are unclear. There has been useful discussion with the vegetation management contractors which will hopefully lead to good outcomes. Kenmore Village Shopping Centre, occupying five hectares, is zoned DC1 District Centre and water from the Centre drains directly into Mckay Brook by the bridge at Brookfield Road.

City Plan 2014 has introduced many overlays which provide advice on land use covered by these overlays. Of particular relevance for McKay Brook are the Biodiversity overlay and the Waterway Corridor overlay; both are designed to protect attributes covered by those overlays. Of concern is the fact that in many areas along McKay Brook, the Biodiversity overlay has been removed in areas covered by the Waterway Corridor overlay; this matter has been taken up with the City Council and advice has been received (May 2017) that this anomaly is being corrected.

Community

Prior to 1999 there was little volunteer work on Council land within this Catchment, other than that noted for Damien Egan (below), although local residents who were members of the Rural Environment Planning Association Inc. contributed to revegetation work in nearby Rafting Ground Park in 1991-94. The formation of the McKay Brook Bushcare Group in 1999, shortly followed by the Mirbelia Street Bushcare Group, and both supported by BCC's Habitat Brisbane, has led to a substantial improvement in biodiversity values along the c.900 m length of McKay Brook in Council hands. From July – September 2008 the Council instigated a trial Urban Wildlife Corridors project, involving residents of smaller acreage blocks towards the north of the catchment. Advice and 20 plants were provided to landholders. This project was of short duration and was discontinued. No contact was made with MCCG. As elsewhere in the Moggill Creek catchment, many larger properties are included in the Council's Land for Wildlife scheme, which has been more strongly promoted since c. 2008.

Two bushcare groups supported by Habitat Brisbane operate in the area: McKay Brook and Mirbelia Street. These merged in 2016. Each group meets 12 times annually, generally alternating between Saturday afternoons and Sunday mornings. Advice on land and vegetation management has been provided to many of these members through MCCG's Landcare Adviser.

In 2016 there were 54 members of MCCG within this section.

Achievements prior to 2011

A townhouse development at 78 Brookfield Road was permitted about 2000, with the requirement that the developer revegetate the section of creek that ran across the company's land. The developer failed to do this, so forfeiting a $20,000 bond, which was made available to the McKay Brook Bushcare Group to undertake the work, in partnership with Habitat Brisbane. This work, predominantly associated with the removal of the aforementioned camphor laurels, had been completed successfully before 2008.

By 2008 about 900 m along McKay Brook had been largely revegetated with local native species. The improved habitat value has supported a range of bird and mammal species, including the aforementioned satin bower bird, brown pigeons, barking owls and orioles. In 1996, Damien Egan started work on land below his property in Mondra Street, single-handedly clearing and replanting a substantial area with 4177 trees by November 2001, with support from Habitat Brisbane. In 1998 priorities for the McKay Brook catchment were determined at two public meetings and work started in the park below Mabb Street. Prior to the start of the group's work, *Celtis sinensis*, *Lantana camara*, *Neonotonia wightii* and *Caesalpinia decapetala* were common along the creek. Around 20 large camphor laurels were present but had been removed by 2010. *Pennisetum purpureum* was dominant in some areas. By 2010, these weeds had been replaced by a mixed rainforest planting, then c. 7m in height and by 2016 many trees had approached their full height of 15-20m. Major weeds persisting in 2010 included *Neonotonia wightii*, *Anredera cordifolia* and some restricted areas of *Dolichandra unguis-cati*. A major infestation of this species on state-government owned land adjoining Brookfield Road is a probable source of seed to many nearby properties. While in 2016 there continues to be occurrences of these species, there is also increasing concern over the herbaceous weeds *Dyschoriste depressa, Ruellia tweediana, Callisia repens* and *Sphagneticola trilobata*. *Cardiospermum grandiflorum* is also increasingly evident.

Together with Damien's plantings, the McKay Brook Bushcare Group had by 2010 removed weeds and revegetated almost the entire area between Kenmore State High School and Brookfield Road, with the exception of c. 20 m upstream from Belford Street on the eastern side which has been revegetated in 2016.

Students from Kenmore State High School up to 2010 crossed McKay Brook between Brookfield Road and Belford Street. This caused damage to the creek banks and was potentially dangerous when the creek was in flood. About 2011 a culvert crossing was constructed at this point, taking into account regulations regarding fish passage. At this time a concrete path was constructed leading from the culvert crossing north to Brookfield Road and south to Mabb Street. Alignment of the concrete path was discussed with BCC staff as well as with Cr. Margaret de Wit and a mutually satisfactory route was determined.

In 1999, a decision was made to start work on the park at Mirbelia Street and Pamela Place and a second bushcare group was formed. Weeds were abundant in the park prior to the start of the group, with *C. sinensis*, *L. camara*, *N. wightii* and *C. decapetala* dominating. This group had largely completed the area from Mirbelia Street to Pamela Place by 2010, just omitting a steep corner of land to the west of this park, which by 2016 was also being effectively managed. In addition, by 2011 revegetation of the c. 100m of riparian land immediately downstream from Pamela Place had been completed. The area around the retention basin and small park (Park 4 – see above) has needed continuing attention but natural regeneration in Park 4 is progressing well.

Ongoing maintenance of bushcare group sites is required on a continuing basis following planting. Prior to c. 2005, dumping of garden rubbish has resulted in infestations of Singapore daisy as well as re-infestations of Madeira vine. Provision of a locked bar gate before 2010 minimised re-infestations. Monthly working bees for each group, usually comprising 6-8 people, are largely concerned with controlling climbing weeds, particularly along margins of revegetated areas.

Section 11: MCCG provided the following number of plants to private land owners:

1999	2000	2001	2002	2003	2004
504	524	241	1672	1898	866
2005	2006	2007	2008	2009	2010
2780	2192	1329	1151	2047	1035
	Total	16,239			

Section 11: Habitat Brisbane provided the following number of plants (financial year, June, ending). Number in parentheses indicated additional plants supplied by the Moggill Creek Catchment Group):

1999	2000	2001	2002	2003	2004
		2238	3862	6100	1530
2005	2006	2007	2008	2009	2010
1600 (387)	409 (272)	94 (73)	268 (102)	940 (48)	80
	Total	17,121 (882)			

Achievements after 2011

From 2010 to 2016 revegetation primarily focussed on planting shrubs and *Lomandra* spp. along planted forest margins to provide a clear edge to minimise chances of damage by contractors.

An elongated and narrow area below Paley Street, about 2013 included by BCC as a component of the McKay Brook Bushcare Group, is under the separate management of Damien Egan. This area had been partly revegetated with native species by neighbours prior to incorporation by BCC in the McKay Brook Bushcare Group and further improvement has continued under the auspices of Damien Egan, supported by Habitat Brisbane.

Natural regeneration has also been observed: from existing trees of *Guioa semiglauca, A. philippinensis, J. pseudo-rhus, Alchornia ilicifolia* and *Eucalyptus* spp. at the Mabb Street site; of *Grevillea robusta* and *Sterculia quadrifida* at the Mirbelia Street site; and from planted *Hibiscus heterophyllus* at both sites.

In 2015 Habitat Brisbane provided a set of steps from Bozzato Place to the square park (mentioned above), this substantially improving access for volunteer workers. In 2015-16 a townhouse development in land adjoining the square park included revegetation of an area adjoining the park as well as along the east bank of the creek. It is anticipated that this area will in time be included in the area managed by the Habitat Brisbane group.

Also in 2016 Habitat Brisbane made the decision to merge the McKay Brook and Mirbelia Street Bushcare Groups. The intention is to continue with bi-monthly working bees.

A number of private acreage landholders in the section are also actively involved in revegetation.

Section 11: MCCG provided the following number of plants to private landowners:

2011	2012	2013	2014	2015	2016
1167	997	906	1567	971	719
	Total	6327			

Section 11: Habitat Brisbane provided the following number of plants (financial year, June, ending). Number in parentheses indicated additional plants supplied by the Moggill Creek Catchment Group):

2011	2012	2013	2014	2015	2016
600	0	0 (184)	108 (45)	480 (41)	320
	Total	1508 (270)			

MCCG conducts a creek health monitoring program across the catchment, including for McKay Brook. Results generally show that water quality in McKay Brook is inferior to that in upper reaches of the Moggill Creek catchment, and at times has elevated conductivity, very low dissolved oxygen, is turbid, with a smell of rotting vegetation in the creek bed. Macro-invertebrate and fish diversity are commonly very low, and sometimes have not been captured in nets or traps.

The number of working bees over the 2011-2016 period was 144, with 463 attendances and 3999 hours of volunteer work. 852 hours outside working bees were also recorded.

Activities Planned

- Continued control of environmental weeds, especially vines, will be necessary to ensure the lasting benefits of the work done over the past 18 years
- Revegetate area on both sides of creek upstream from Pamela Place
- Revegetate hilly grassed area downstream from Pamela Place (currently dangerous for access on foot and HB planning to work on this area defined as an 'easement')
- Take responsibility for new area beside square park when permissible.

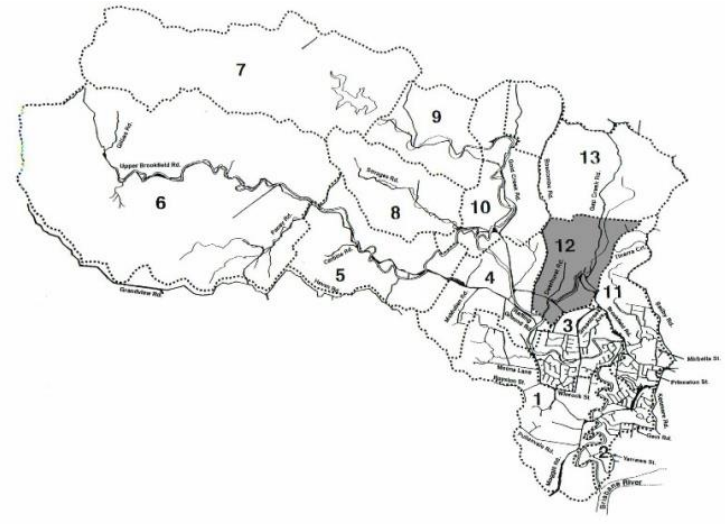
Issues of Concern

- As indicated above, there is increasing concern over the herbaceous weeds *Dyschoriste depressa, Ruellia tweediana, Callisia repens* and *Sphagneticola trilobata*. *Cardiospermum grandiflorum* is also increasingly evident.
- Council contractors charged with weed control frequently cause extensive damage to plantings.
- Group numbers are small and extra reliable members would be advantageous.

Section 12: Gap Creek

Section Leader: Michael Humphreys

Description of Section



This section consists of acreage properties. Most of them are one hectare in size but there are larger properties on the upper half of Brookfield Road, the top of Deerhurst Road, and on Gap Creek Road near Brisbane Forest Park. Gap Creek leaves Brisbane Forest Park and runs past several of the properties before joining Moggill Creek. Much of this section of Gap Creek is very rocky with some deep waterholes and natural stone weirs. The banks tend to be steep though some of the banks in the lower reaches are low. Deerhurst Road Park follows both sides of Gap Creek from Brookfield Road to private properties on both sides of the creek a little

beyond Kookaburra Street. The total area of the public land on the northern and western side of the creek is approximately two hectares. On the eastern and southern side of the creek there is approximately four hectares. Some of the public land is identified as road reserve but with the upgrading of Gap Creek Road it appears very unlikely that it will ever be needed for a road. At the Brookfield end of the park there is a small area with water, a barbecue and a picnic table. In addition, a trail has been created on the southern and eastern side which is attracting walkers, bike riders and some horse riders.

Biodiversity

Gap Creek is a potentially significant corridor between Brisbane Forest Park (Mt Coot-tha) and Moggill Creek. However, this section was largely cleared with Gap Creek lined with a mix of river she oak (*Casuarina cunninghamiana*), black tea tree (*Melaleuca bracteata*), *Syzygium smithii, Syzygium australe* and weeping bottlebrush (*Melaleuca viminalis*). *Cryptocarya obovata, Notelaea longifolia, Hymnospermum flavum, Rhodosphaera rhodanthema, Cryptocarya triplinervis, Aphananthe phillipinensis, Mallotus philippensis, Trema aspera, Streblus brunonianus, Ficus coronata, Ficus fraseri, Ficus macrophylla, Ficus rubiginosa*, and *Alchornia ilicifolia* were also present along the creek and in the surrounding bush, though generally in very small numbers. Dense vegetation was found along the creek though only ~10% remnant native species (scattered individuals) occurred; the remainder were weeds.

Scattered forest red gum *(Eucalyptus tereticornis*), wattles (*Acacia* spp.) and brush box (*Lophostemon confertus*) remain away from the creek. Pockets of bush also occurred in larger acreage blocks, though their condition was unknown.

Major weeds along Gap Creek included camphor laurel, Chinese celtis, broad-leaved privet, broad-leaved pepper, lantana, ochna, silver-leaf desmodium (velcro weed), glycine, Singapore daisy, asparagus vine, Brazilian nightshade (*Solanum seaforthianum*), some Madeira vine, Easter cassia and mulberry. Cat's claw has been found in four places in or adjacent to the park. However, it appears to be controlled in all of these places. Additional cat's claw has been found high up on Boscombe Road. and between the park and Moggill Creek.

Wildlife is abundant in this section, with red-necked and swamp wallabies, lace monitors and various species of glider being locally abundant. Koalas are to be seen occasionally. The bird life in the park is extensive.

Water

Gap Creek is the major waterway through the section and is joined by a significant tributary near the intersection of Deerhurst and Brookfield Roads. This tributary is an ephemeral stream that arises in Brisbane Forest Park and flows between Boscombe and Deerhurst Roads. In places it has carved an impressive gully. Gap Creek doesn't flow continuously, comprising a chain of waterholes for most of the year. Flooding occurs in heavy rain, particularly with the backing up of Moggill Creek during high tides.

Road culverts restrict water flow in some areas. Water quality monitoring in the park has generally found the creek to be in reasonable shape.

Land

City Plan (Brisbane City Council, 2000) designates most of the section as Environmental Protection Area, with Rural Area designation covering southern and south-western areas. Both the EP and Rural Areas are now covered by the SEQ Regional Plan 2009-2031 (2009) as Regional Landscape and Rural Production Area, with minimum property size of 100 ha. (It should be noted that all existing properties are smaller than this.) One commercial property, Mappin Nursery, was located in the section, but was closed in 2010.

Council zoning offers a measure of protection to most of the section; however, subdivision of larger properties at the northern end of the section along Gap Creek Road is a potential threat to the creek's corridor function, although current zoning disallows subdivision unless permits have already been granted.

Encroachment into public land by park neighbours is a concern and clear delineation of boundaries is needed.

Community

Between Kookaburra Street and Moggill Creek all of the properties bordering the creek or the park are close to one hectare in size. Only a few of the older generation that were in the area were interested in removing weeds and replanting with native vegetation. Many people kept horses on their property or they simply used their relatively large blocks and their weed species to screen themselves from their neighbours. Over the last 35 years there has been an increasing number of landowners who have been interested in clearing and revegetating. However, relatively few of the local landowners have ever come out to a working bee or even to some of the information sessions that have been held.

There are 45 members of MCCG within the section.

Achievements prior to 2011

In 1990, a BCC work crew removed weeds from the south-east side of the park and planted about one hectare of land. However, with no maintenance many of the plants died and weeds have regrown. Some *Grevillea robusta*, *Toona ciliata*, and *Acacia* spp. survived.

The current Habitat Brisbane project started in 1999. Since then the bushcare group with the cooperation of Habitat Brisbane has cleared all four hectares on the southern and eastern side of the park. Habitat Brisbane also removed a number of large camphor laurels and a National Heritage Trust Grant in 2008 and 2009 was also used to remove and mulch a very large number of camphor laurels and privets from the area at the northern end of Kookaburra Street. The grant was also used to partially support three private landowners to remove large weed trees. As part of the NHT grant the bushcare group planted over 100 Richmond Birdwing Butterfly vines in the Park. Unfortunately, a significant number of these were washed away in the floods of 2008 and 2009 but 35 new vines were planted. The flood events that started in 2008 severely damaged many of the creek banks and new weeds, especially Embu panic, took over. There was also erosion in several areas removed from the stream. With the help of Habitat Brisbane the eroding gullies have been sandbagged and the density of planting has been increased. Planting density in the damaged areas along the creek has also been increased. Some additional infill planting is also required. However, the clearing and revegetation of this side of the creek is largely finished though ongoing maintenance is still required. We have also worked with with four landowners on this side of the park.

Section 12: MCCG provided the following number of plants to private land owners:

1999	2000	2001	2002	2003	2004
87		614	786	1223	1542
2005	2006	2007	2008	2009	2010
1646	795	1538	692	815	1122
	Total	10,860			

Achievements after 2011

In 2011 and 2013 the remaining large weed trees were removed from the section of the park upstream from Kookaburra Street. In 2011 Habitat Brisbane arranged for the trees to be removed and in 2013 we obtained a CCA grant from the Brisbane City Council for the removal of the remaining trees. Since 2011 an area of approximately 0.5 hectare has been replanted. During this period we have also been doing infill planting, especially along the creek bank, on the Kenmore Hills side of the park. We have also been maintaining our four hectares of planting on the Kenmore Hills side of the park during 2011 to 2016. In 2012 we obtained CCA funding to remove and mulch the large weed trees.

In 2012 we obtained a CCA grant in conjunction with two private landowners on the Deerhurst Road side of the Park. The grant supported the removal and mulching of most of the large

weed trees on a 0.5-hectare section on the park land and the adjoining private properties. That area has been replanted and is now being maintained. In addition we have cleared the ochna and small weed trees from another 0.5 hectare of park and private land upstream of the earlier clearing. We have helped two of the private landowners to replant their land and are waiting on additional support from Habitat Brisbane and CCA funding to clear and mulch the large weed trees on the public land. Since 2011 we have cleared and replanted about 150 m of creek side land upstream from Brookfield Road on the Deerhurst Road side of the park. Some of the large weed trees had been removed prior to 2011 and the remainder have been left in place while we planted under them. Once the creek bank has been stabilised by the new plantings the remaining large weed trees will be removed. We have also been helping another private landowner adjacent to the park on the Deerhurst Road side clear and replant 0.5 hectare of his property.

In 2015 we persuaded Energex to remove the large weed trees under power lines on Kookaburra Street. The seeds from these trees were washed into the park during rains. The next step is to clear the remaining weeds and replant with native vegetation that will stay well below the power lines. This was a win for Energex since it will reduce the need to trim the trees every few years. It was also a win for the park and the landowners along Kookaburra Street as it reduced the number of weed seeds coming onto their property.

Section 12: MCCG provided the following number of plants to private landowners:

2011	2012	2013	2014	2015	2016
821	953	1030	1180	1028	1004
	Total	6016			

Section 12: Habitat Brisbane provided the following number of plants:

2011	2012	2013	2014	2015	2016
920	777	1144	912	1421	1113
	Total	6287			

Altogether 72 working bees were held from 2011 to 2016. Volunteer work hours totalled 1071. Outside working bees, 3999 hours of work was undertaken.

Section 13: Mt Coot-tha Park

Section Leader: Tom McHugh (BCC)

Description of Section

An area of approximately 546 ha of Mt Coot-tha Forest (Brisbane's largest natural area and part of Brisbane Forest Park) lies within Moggill Creek catchment, covering most of section 13. The area of forest within the section is freehold land owned by Brisbane City Council. A significant creek corridor exists in this section between Gold and Gap Creeks.

Biodiversity

The eucalypt woodland and open forest communities found throughout this section are in relatively good condition, with weed infestations mostly restricted to riparian areas and road- and track-sides. Areas of the exotic signal grass (*Urochloa decumbens*) and other grasses are

increasingly evident in some areas. Dominant tree species include: *Eucalyptus propinqua , E. microcorys, E.siderophloia, E. acmenoides, E. crebra, Corymbia henryi, C. citriodora* and *Lophostemon confertus*.

A small area of *C. citriodora - E. siderophloia* woodland opposite Gap Creek Road, is the only area of this community found within Mt Coot-tha Forest. Though cleared in 1949, the area has revegetated. Pockets of *E. moluccana* open forest occur on northerly slopes at three locations in the southwest of the section. A total of 456 species of plants, lichens and cyanobacteria and 362 vertebrate fauna species have been recorded from Mt Coot-tha Forest (species lists are contained in the Mt Coot-tha Forest Management Plan, BCC 2003). These include rare and threatened species such as the powerful owl, as well as goshawks, eagles, koalas, wallabies, gliders, antechinus and bats. Weeds threaten the integrity of natural vegetation, reduce biodiversity and increase the risk of fire. Within the section, lantana (*Lantana camara*) dominates or is co-dominant with *Megathyrsus maximus* (*Panicum maximum*) in weed communities found in many of the gullies and along some ridges. Dumping of garden waste and general rubbish is a problem, particularly along Gap Creek Road. Encroachment of weeds from adjoining land, and from roads and traffic, is an issue in some areas.

Water

Flooding in the storms of November 2008 and May 2009 caused extensive erosion, and high winds in the 2008 storm caused major damage to tree canopies along ridge lines in the vicinity of Highwood and Boscombe Roads. The extensive track and trail networks of Mt Coot-tha Forest Park are potential sites for erosion due to exposure of the soil surface and continual use or disturbance. To some extent this is mitigated by regular maintenance of the track and fire access trail network, however inappropriate and illegal use counteracts these efforts to some degree. Prior to 1996 there was limited success in the management of off road vehicles in this section. In the two years to 1998, through a combination of recurrent and capital funding, Local Asset Services had managed to secure the boundaries of the park and unauthorised vehicular activity decreased significantly. In order to facilitate service vehicle movement and improve water quality, culverts were installed at all vehicle crossings. This negated the former practice of fording creeks, disturbing the bed, damaging creek banks on the approach and exit and therefore led to a significant reduction in sediment loading. From 1998 to 2002, a total of eight culverts and a timber footbridge were installed in the Gap Creek, Boscombe and Jones Road areas.

Opportunities for further improvement include closing of tracks that cross creek lines, or providing simple bridges. MCCG sees protection of creek lines from traffic and burning, together with sensitive weed control, as essential for local wildlife.

Land

The Mt Coot-tha Forest Management Plan (BCC, 2003) identifies the underlying geology of the Park as predominantly Bunya Phyllite (slate, phyllite, arenite, metabasalt), with Neranleigh-Fernvale Beds (mudstone, shale, arenite, chert, jasper, basic metavolcanics, pillow lava, conglomerate) in the south-western corner. Soils in the Mt Coot-tha Forest Park are mostly a mix of lithosols and red podzolic soils (BCC, 2003). City Plan (Brisbane City Council, 2000, Feb 2010 update) designates almost all of this section as Conservation Area, with a small area of Environmental Protection Area between Boscombe Road and the forest in the southwest of the section.

Gap Creek Road, which passes through Mt Coot-tha Forest Park, underwent an upgrade during January - July 2010. The gravel section through Mt Coot-tha Forest Park was sealed and the single-lane bridge near Gap Creek Reserve widened to two lanes, sharp bends were re-aligned, crests lowered, and the junction between Kookaburra Street and Gap Creek Road modified. The road is signposted to 50km/hr. In part in response to community consultation, including representatives of the Moggill Creek Catchment Group, the design of the Gap Creek Road project also includes speed platforms and slow points to reduce traffic speeds and protect fauna, and five under-road culvert fauna crossings (including the creek crossing). In addition entry statements identifying the environmental significance of the area, and five tonne load limit signs to restrict heavy vehicles using the road are included. Areas disturbed by

construction have been revegetated, and a Fauna Monitoring Program managed by Griffith University ecologists and supported by MCCG members is in place to identify any impacts as a result of the upgrade. MCCG has provided close to 2000 seedlings of local species for revegetating disturbed areas.

Members of the catchment group are concerned over the environmental impact of the upgrade, specifically (i) the insistence by the Council that all slow-down devices through the Forest Park should be lit at night; (ii) the construction of a 100 m long, 2-3 m high, vertical concreted wall opposite the car park, considered potentially lethal to local wildlife and (iii) reluctance of the Council to provide a slow-down device along a straight stretch of road a little to the south of Mt Coot-tha Forest Park.

Community

Gap Creek Reserve contains a picnic area with a toilet block and an extensive track network. The carpark has been sealed to stop the ingress of sediment and dirt into waterways. The track network as recognised in the Mt Coot-tha Forest Management Plan is comprised of multi-use, walking and mountain bike single-use tracks. The multi-use tracks are designed to allow for maintenance vehicles including wild fire suppression crews, horse riders, walkers and mountain bikes.

Privately managed lands outside the boundaries of Mt Coot-tha Forest are subject to development pressure, however the Conservation Area designation over public land within the section mitigates this. Some conflicts occur. Studies by Griffith University scientists over 2009-2010 revealed a particularly high level of biodiversity amongst cryptic local wildlife. Some conflicts occur over track use, however, these have been reduced following installation of signage identifying the purpose and allowed users of different stretches of the track network. Substantial areas of Mt Coot-tha Forest Park are now committed solely to mountain biking use. A draft vision for the future of Mt Coot-tha has been developed as a result of an extensive visioning process and community consultation with over 2,700 residents and stakeholders. The Mt Coot-tha 2030 draft vision will build on the unique and valued qualities of the Mt Coot-tha precinct, identifying key changes to transform Mt Coot-tha into a world-class area and guiding future sustainable investment. Community consultation included meetings of the Community Visioning Group; three general surveys that elicited over 2,000 responses; youth engagement through the Lord Mayor's Youth Advisory Council, primary school students and scout groups; and interactive community workshops with 102 participants. Results from the consultation show that the public values Mt Coot-tha's cultural significance, creating a sustainable environment and sustainable recreation, as well as ensuring safe access and a unique visitor experience. Respondents were keen to avoid overcommercialisation and development, instead choosing landscape and views, natural environment and sustainability as the guiding values for Mt Coot-tha's future planning. Bush walking and bird watching were the most popular nature based activities in the park, and many respondents cited observation decks and/or viewing places as their preferred facility improvements. "A Sustainable Retreat and Refuge" is one of the key values put forward in the Mt Coot-tha 2030 draft vision statement. A blog on Mt Coot-tha memories and stories is available at http://202.148.140.187/blogs/mountcoottha/

A specific Mountain Bike Trail Care Coordinator was recruited around 2003. This officer is responsible for the ongoing education of mountain bike users in the forest, as well as recruiting and training trail care volunteers directly from the mountain bike user group. These groups work on general track upgrades and sustainability as part of the BCC Mountain Bike Program. No new trails are expected to be approved.

A capital works project in 2003-2004 enabled BCC to install regulatory, directional and totem signage across Mt Coot-tha Forest, including the Gap Creek area. This has provided for a more informed public. A guiding Outdoor Recreation Strategy was released in 2010, which covered many of the activities in the Mt Coot-tha Forest Park. There is some concern amongst MCCG members that over-use of Mt Coot-tha Forest as a mountain biking venue is in marked conflict with the aspirations expressed in Our Shared Vision Mt Coot-tha 2030, referred to above.

There are two members of MCCG within this section.

Achievements to 2016

The Mt Coot-tha Forest Management Plan was released in 2003, and stated actions included "continued identification of threatening processes; restore and manage the vegetation and watercourses of the forest to provide a variety of habitats required by the species which occur there; and continue data gathering, monitoring and research to facilitate the long-term management of the forest."

A draft vision statement "Our Shared Vision Mt Coot-tha 2030" (BCC May 2010) reinforces the Council's commitment to sustainable management practices. Studies by Griffith University scientists over 2009-2010 revealed a particularly high level of biodiversity amongst cryptic local wildlife. Further, there were a number of sightings of koalas over 2006-2010 on properties on the southern borders of the forest, as well as feather-tailed gliders during the Gap Creek Road upgrade. It is to be hoped that management practices in the future will ensure the continued survival of these species.

Fire Management

Prescribed burns are held each year from February to August in Mt Coot-tha Forest Park. The Brisbane City Council aims to burn each section every 7-25 years, in their view to maintain the health of forests and lessen the impact of wild fires. Council aims to reduce the amount of fire fuel, such as dead wood, by 75 per cent in 60 to 80 per cent of the land being burned. Some areas of the forest are left untouched, which can be used by wildlife as a refuge and as seed sources to aid in re-establishment of vegetation in the burnt sections. Details of upcoming burns can be found on the Brisbane City Council website, and local residents are notified by letterbox drop. Council staff use weather and air-quality forecasts to determine the best day for each planned burn.

Whilst the Council seeks expert advice from the South-East Queensland Fire and Biodiversity Consortium in relation to burning practices, a number of MCCG ecologists favour micro-mosaic burning as a tool for retaining biodiversity, avoiding excessive weed regeneration and retaining safety considerations in this sub-tropical environment. Details are available in "Ecologically Sustainable Fire Management: An Advisory Code for Brisbane's Western Suburbs" (Sands, D.P.A. and Hosking, C.M., 2005, available on www.moggillcreek.org.au).

6.6 Land for Wildlife in Moggill Creek Catchment

Land for Wildlife (LfW) began in Brisbane in 1998, with the aim of assisting landowners to retain and enhance wildlife habitat on their properties. By the end of that year, 21 properties had joined the program, some of which already had voluntary conservation agreements with Brisbane City Council. Of the 21 Land for Wildlife properties in 1998, 11 were in the Moggill Creek catchment. Almost 20 years later, ten of those properties are still part of Land for Wildlife, although some have new owners.

In December 2016, there were 670 Land for Wildlife partners in the Brisbane City Council area. Of these, around 280, or 41% of all our current partners live in the Moggill Creek catchment, concentrated in the suburbs of Brookfield and Upper Brookfield. Moggill Creek catchment was a mainstay of the Land for Wildlife program in Brisbane from its inception, and remains so to this day.

Around 40% of properties within the Moggill Creek catchment that are eligible for Land for Wildlife membership have joined the program. As new residents drive through the area, the high concentration of Land for Wildlife signs on neighbour's fences and gates often leads them to find out more. During a citywide Land for Wildlife recruitment campaign in 2008, an astonishing 64 new properties in the catchment joined the program. While this exceptional result has never been repeated, since 2012, new Land for Wildlife registrations in the catchment have averaged around 15 per year.

Another stand out success for Land for Wildlife in the Moggill Creek catchment has been Council's Community Conservation Assistance funding (CCA). Commencing in the 2012/13

financial year, CCA is open to Land for Wildlife members, as well as Habitat Brisbane and catchment groups. The funding is designed to assist land owners or groups to undertake bushland restoration works that are too difficult or expensive works for individuals or volunteers. Once the initial project works are complete, ongoing management of the project site reverts to the land owner or local Habitat Brisbane or catchment group.

Since 2012, CCA has funded 133 Land for Wildlife projects in the Moggill Creek catchment. Many of these projects have involved work on multiple LfW properties. In total, over $870,000 in on-ground bushland restoration works has occurred on Land for Wildlife properties in the catchment through CCA, with another $163,000 soon to be delivered when the current round of projects commences in early 2017. When projects on Moggill Creek Catchment Group (MCCG) and Habitat Brisbane sites in the catchment are included, it brings the total of CCA funded projects in Moggill Creek catchment to $1.15 million.

One of the drivers for Land for Wildlife is improving habitat for native animals. To help land owners get a better idea on what wildlife is actually using their property, we have been using motion sensor cameras to capture the comings and goings of local fauna, both native and feral. This has led to some interesting discoveries. A number of species presumed extinct in Brisbane's western suburbs have been recorded on Land for Wildlife properties in the catchment in the past two years, including greater gliders, whiptail wallabies and red-necked pademelons. Koalas have also been confirmed as breeding in the area. Sharp–eyed Land for Wildlife members have seen the return of Richmond Birdwing and Bordered Rustic butterflies to the area, indicating positive environmental changes in the catchment. Sightings of feral animals on Land for Wildlife properties are reported to Council's Pest Animal team, to assist them in better targeting control measures.

In recent years, Land for Wildlife has also provided members with access to specialised equipment for bushland restoration work. Several 'splatter guns' are available for loan through the program, giving landowners the ability to more efficiently manage lantana with minimal labour and herbicide use. The program also has a number of 'tree poppers', a tool designed to physically remove small to medium sized woody weeds. Both of these tools have been well used on local Land for Wildlife properties, contributing to weed management within the catchment.

Council's Land for Wildlife program has always had a close relationship with MCCG, sharing the objective of protecting and improving the biodiversity of the catchment. The Land for Wildlife Officers promote MCCG's activities and services to new LfW partners, and MCCG promote Land for Wildlife to local residents. Consequently, many MCCG members are also partners in Land for Wildlife. In recent years, our program has also worked more closely with officers from Council's Habitat Brisbane and Creek Catchments programs, as well as with MCCG, leading to better integration of habitat restoration activities in the catchment and innovative projects across Council and community.

7 CATCHMENT WIDE INVESTIGATIONS

7.1 Overview

In 2009 a catchment wide call was made to find people interested in contributing to the work programs of the MCCG. This resulted in several activities that have continued to 2017 at varying levels. They are the creek health monitoring program, intermittent dragonfly surveys, bird surveys, frog surveys and a limited interest in dung beetles. A brief review was undertaken on the legislation and regulations covering creek management activities such as gravel extraction, deepening waterholes, water extraction and building of crossings. The information was circulated and at some stage was on the website. There has been no follow up in recent years.

7.2 Planning Considerations

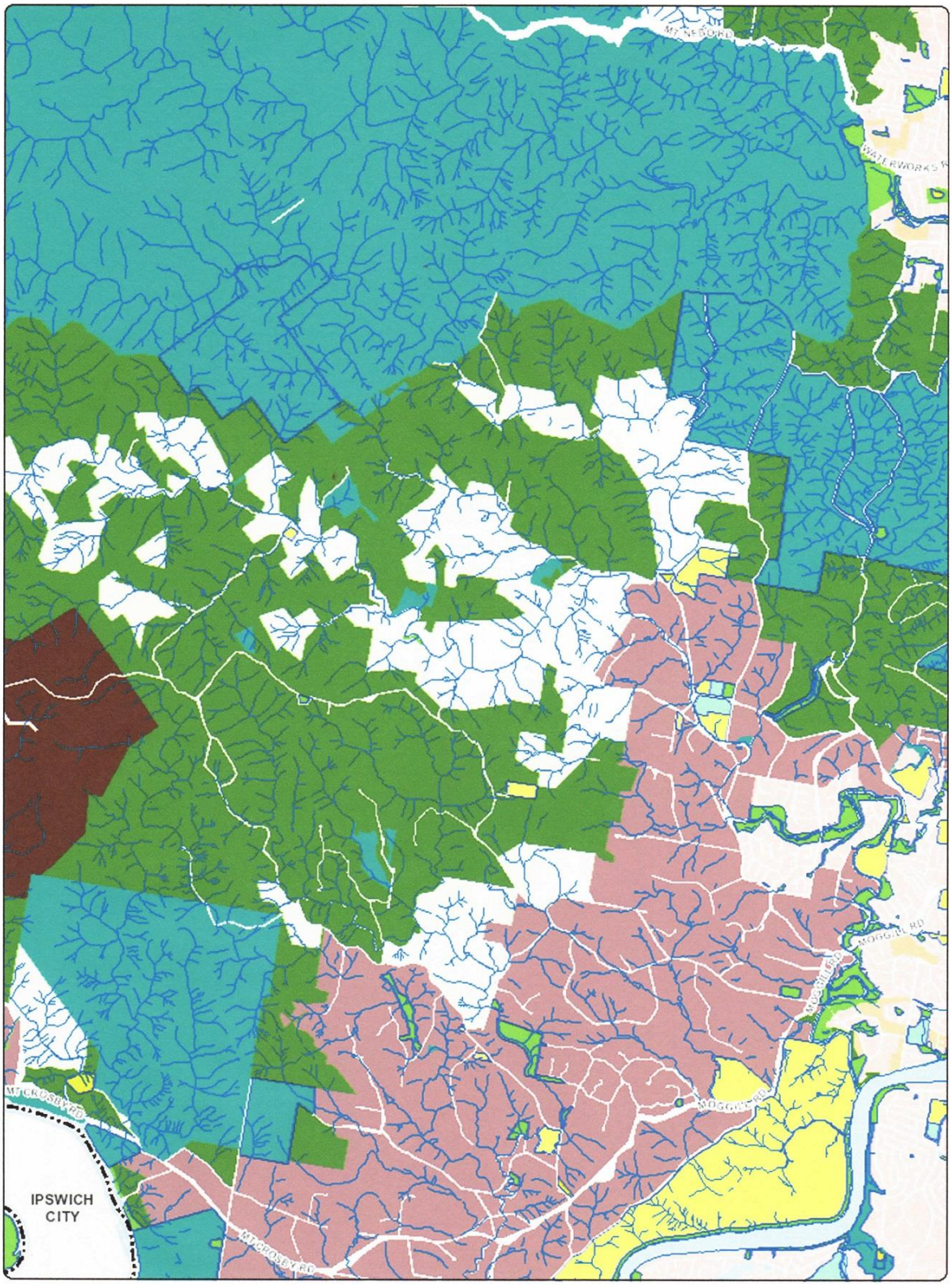
Land in the catchment is subject to State and local government (Brisbane City Council (BCC)) legislation. The State Government's South East Queensland Regional Plan (SEQRP) determines the extent of the urban footprint; in Moggill Creek catchment the area occupied by the urban footprint is small. Land outside the urban footprint is not usually allowed to be subdivided below 100 ha. City Plan 2014, BCC's revised planning scheme for the City of Brisbane, became effective on 30 June 2014. The entire area of the City is included. The City is categorised into zones and the zone codes determine what activities are appropriate for that zone. The following zones are predominant in the Moggill Creek catchment:-

- Conservation zone (blue on map) – land in Brisbane Forest Park and some land in private ownership with conservation agreements;
- Environmental Management zone (dark green on map) – much of the catchment's forested land;
- Rural zone (very pale green on map) – land that may be used for rural purposes;
- Rural Residential zone (maroon on map) – This is a new category introduced in City plan 2014 and covers most of the smaller acreage properties (between 1 and 5 ha) in the catchment. This zone is in recognition of the role that these properties play in the environmental attributes of the district and not an indication that further land can be subdivided into lots of this size;
- Low Density Residential zone (pink on map) is within the urban footprint;
- Community Facilities zone (yellow on map) – schools, retirement villages etc.;
- Open Space zone (bright green on map) – parks; and
- Extractive Industry zone (brown on map) – the Kholo Creek hardrock resource; this area is protected from any other future activity.

The new zone, the Rural Residential zone requires respect of the natural values of the land, allows for a dwelling house and limits what may be carried out in the zone to only small scale non-residential uses. Provision of local government infrastructure, such as sewerage, is limited.

Details regarding City Plan 2014 including the zone codes are available at http://eplan.brisbane.qld.gov.au/

City Plan 2014 also includes numerous overlays which affect activities that may be carried out. An important overlay in the catchment is the biodiversity overlay. A major amendment to this overlay is underway (mid 2017) which will ensure better protection of our important waterway vegetation.



Brisbane City Plan 2014

BRISBANE CITY
Planning Scheme

NOTES

This map is notional only and should not be used for interpreting City Plan provisions relating to specific sites. To properly interpret the maps, the planning scheme must be referred to. The Digital Cadastre Database (supplied by State of Queensland - Department of Natural Resources and Mines) will be updated from time to time.

Mapping adopted by Council, effective 18 September 2015.

Projection: Map Grid of Australia, Zone 56
Horizontal Datum: Geocentric Datum of Australia 1994

Approximate Scale @ A4 1:50,000
0 1,800
Metres

Date: 24/06/2017

Page 1

7.3 Platypus Survey

Historical sightings of platypus in Moggill and Gold Creeks date back to 1901 (DERM, 2007). Since that time, there have been continued anecdotal sightings reported by the catchment's local community.

In 2005, the MCCG conducted its first platypus survey as part of Wildlife Queensland's (WPSQ) Platypus Watch program. The MCCG is now an established WPSQ PlatypusWatch Group and conducts an annual snapshot platypus survey.

This popular community-based event attracts large numbers of volunteers each year from within and outside the catchment.

These data are an invaluable annual snapshot of platypus in the Moggill Creek catchment. Because the survey only occurs on one day, it is possible that more platypus are present than were observed. While it is encouraging that we are still seeing platypus in these local creeks, some as close as 10 km from the Brisbane CBD, ongoing human impacts on these peri-urban creeks is of concern.

These impacts include pollution, water extraction, recreational activities and possibly the extensive refurbishment of Gold Creek Dam in 2005-2006 that led to significant disturbance and the cessation of water flow into Gold Creek for some time. Interestingly, the sightings in 2016 occurred in creek areas that are generally less disturbed, albeit sometimes weed-infested (e.g. molasses grass and lantana). For the platypus, weeds and minimal disturbance may be better options.

Snapshot over the years:

2016 11 platypus in total; some in new spots from previous years

2015 11 platypus; most on lower reaches of Moggill Creek and mid-Gold Creek

2014 9 platypus, similar to 2013; platypus reported in less disturbed areas of the creeks

2013 7 individual platypus seen; another wet summer, but dry late winter

2012 17 individual platypus seen; wet summer, but 7 weeks without rain prior to survey

2011 13 individual platypus seen; severe flooding of creeks early in year

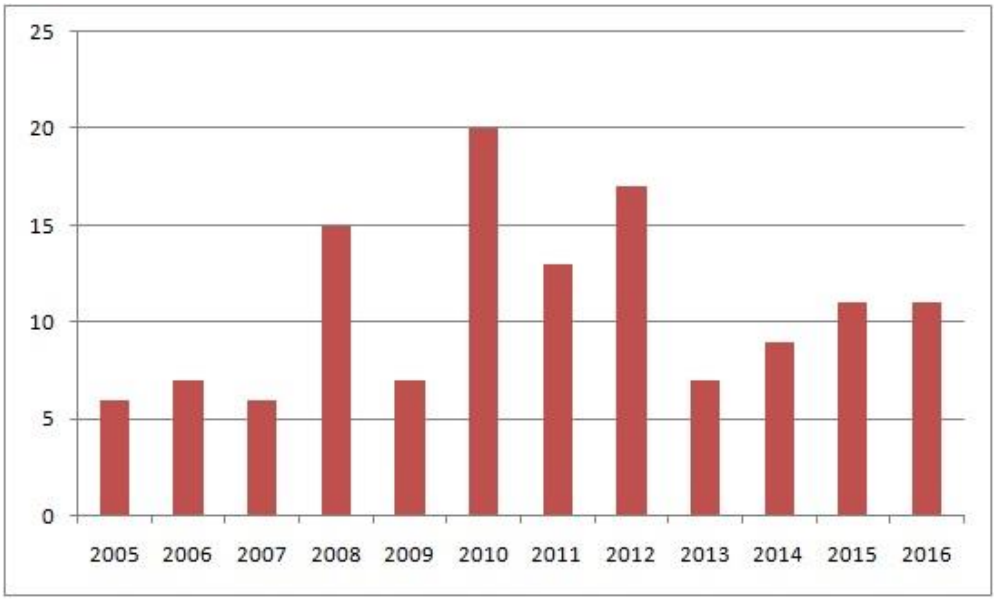
2010 20 individual platypus seen; continuing good rains

2009 7 individual platypus seen; severe flooding of creeks early in year

2008 15 individual platypus seen; 10-year drought broken, good rain, water in the creeks

2005-2007 6 individual platypus seen; extreme drought years.

The following graph shows how sightings have fluctuated over the years we have been doing the snapshot surveys:



Key Points of Recent Surveys

2016 Survey:

- Our survey yielded 11 platypus sightings in total, with platypus seen across a broad spatial scale
- Two recorded at one site at Branton Street, Kenmore and a total of three animals seen in this section (exciting ! We haven't seen this many platypus for a few years.)
- Sightings in Moggill Creek and Gold Creek in Upper Brookfield, near Brookfield Produce, in the Huntington Estate, near Kenmore High School and in lower Moggill Creek in the Kilkivan/Manyung Streets area
- A platypus seen close to the Gold Creek Dam on Gold Creek. (They haven't been seen that far up the creek since the refurbishment of the wall back in 2005)
- The creek habitat assessments were similar throughout the catchment's survey sites. Most were fair to good, with only two records of very poor quality habitat.

2015 Survey:

- Platypus are persisting in lower Moggill Creek, despite its urban environment
- Number of platypus sightings was low in upper Moggill Creek
- Platypus have returned to two sites in upper Gold Creek where they haven't been observed for several years
- This is a snapshot survey on one morning. We know there are platypus in some sites where they weren't observed this time
- We don't know if a couple of sightings in close proximity were the same animal or two individuals. We also don't know if there are any breeding pairs.

2014 Survey:

- The survey was very well supported again this year, with approximately 50 volunteers observing along the Moggill and Gold Creeks
- Platypus are persisting in a patchy distribution throughout the catchment
- Nine individual platypus were seen, from 40 sites monitored
- Nine is at the lower end of our number observed annually
- Platypus appear to have disappeared or declined from historical stronghold areas such as upper Gold Creek, the Gold Creek Dam and the Huntington Estate in Brookfield.

2013 Survey:

- In 2013 the sightings (with one exception in Upper Brookfield) were all in lower Moggill Creek. This is a higher density urban area of the catchment that has been the focus of tireless community riparian restoration efforts led by MCCG volunteers such as Malcolm Frost, Bryan Hacker and Damien Egan over many years. Perhaps the continual presence of platypus in these areas is in no small part due to their dedication to conserving the area's biodiversity. Why was the number of platypus observed lower in 2013 and why were none seen in Gold Creek, a former platypus stronghold? There is no simple answer, but factors may include:
- Little recent rainfall and therefore generally less water and flow in the creeks, meaning that platypus are currently concentrated in restricted 'stronghold' areas
- Since the surveys began, Gold Creek has been subjected to controlled water releases from the Gold Creek Dam (including flooding and complete cessation of flow) and major disturbance during dam wall reconstruction. Perhaps platypus numbers in this creek have been declining as a result. Platypus were there but simply were not seen at the time of the survey. We know from reported sightings from local residents that they are being regularly observed at some of the stronghold sites where they weren't seen on the survey morning.

A national platypus survey is to be conducted over the next 3 years by the UNSW Centre for Ecosystem Science in order to determine the conservation status of this animal. The work done by Dr Chris Hosking and her volunteers in the Moggill Creek catchment since 2005 will provide some critical data for this project.

7.4 Creek Health Monitoring Program (CHMP)

The Big Picture

The Moggill Creek catchment CHMP is a community based creek health monitoring program, supported by the Moggill Creek Catchment Group, Brisbane City Council, and 20- 30 community volunteers from Moggill Creek catchment and surrounds. The program is based on systematic monitoring over years to establish a good understanding of creek health and to identify any degradation or improvement through time.

The main objectives are to understand how creek health varies across sites in Moggill Creek and its tributaries (Gold Creek, Gap Creek, and Mckay Brook), and then by continued monitoring twice a year identify any trends / changes in the creek health, and provide early warning of changes that might threaten these ecosystems.

The creek health monitoring program commenced in early 2011, and since then has involved bi-annual monitoring at 12 sites across the catchment, once in spring – early summer, and again in Autumn - early winter. We monitor creek bed and bank physical and vegetation conditions, water quality measurements, and fish and macro invertebrate diversity and abundance. One site suffered severe sedimentation after the first two years, and is only occasionally monitored to see what water quality is like and to see if there are any macro-invertebrates.

What is monitored?

The fish diversity and numbers along with similar data on aquatic insects, are used in conjunction with water quality, creek bed and bank conditions, riparian vegetation condition and invasive aquatic weeds as ecosystem condition indicators. These are used to make assessments of the creek health across the catchment, and to help identify trends or changes over time. In addition, we attempted to monitor water quality monthly since early 2014 to late 2016 to give us a better understanding of the seasonal variability in water quality.

These assessments may highlight preferred management changes to protect the health of the creeks. For example, a severe reduction in dissolved oxygen (DO) in water, changes in pH or

nutrient content and a decline in diversity or numbers of sensitive fish species may indicate unsuitable land or water management activities at or upstream of the site being monitored.

The program has attracted willing input of 20-30 volunteers, several of whom are under-graduates or graduates with an interest in environmental management. We have been able to give some of them opportunities for training in water quality measurement and monitoring, fish, macro-invertebrate and aquatic weed identification. Like most things, we learn by practice.

The BCC and SEQC (now Healthy Land and Water), have continued to support us through training and the use of water quality monitoring equipment.

Results to Date

The results to date indicate that creek health in the catchment is generally good, considering that it has urban areas in the mid-lower catchment. Over the last six years we have developed a reasonable understanding of the variations in water quality, types of fish and aquatic insects that frequent creeks in different parts of the catchment.

This first phase has given sufficient data to allow a reliable assessment to be made about creek health in terms of the variations across the creeks in the abundance and diversity of the fish and macro-invertebrates and water quality. Rainfall and run-off conditions cause clear differences to these factors from time to time, and water quality and biodiversity can become quite poor during extended dry periods. Episodic runoff events have caused bank erosion and loss of riparian vegetation in some sites across the last five years; this has resulted in migration of bed sediment loads downstream leading to shallower areas and banks which have become infested in exotic weeds such as Senegal tea. Impacts of high velocities of flows have been common in the upper reaches of Moggill, Gold and Gap Creeks probably due to higher gradients that occur in the upper to mid-catchment.

Two sites on Gold Creek were found to be unusually high in phosphates and nitrates and this was reflected in lush aquatic weed and algal growth found in the creek water, particularly in periods of low creek flow in drier periods. Dissolved oxygen was commonly less than 2mg/L. These conditions were associated with outfalls of waste water. A report and explanatory data were supplied to Queensland Environmental officers and BCC in 2014, and the matter has been dealt with subsequently. Periodic nitrate and phosphate monitoring is continuing.

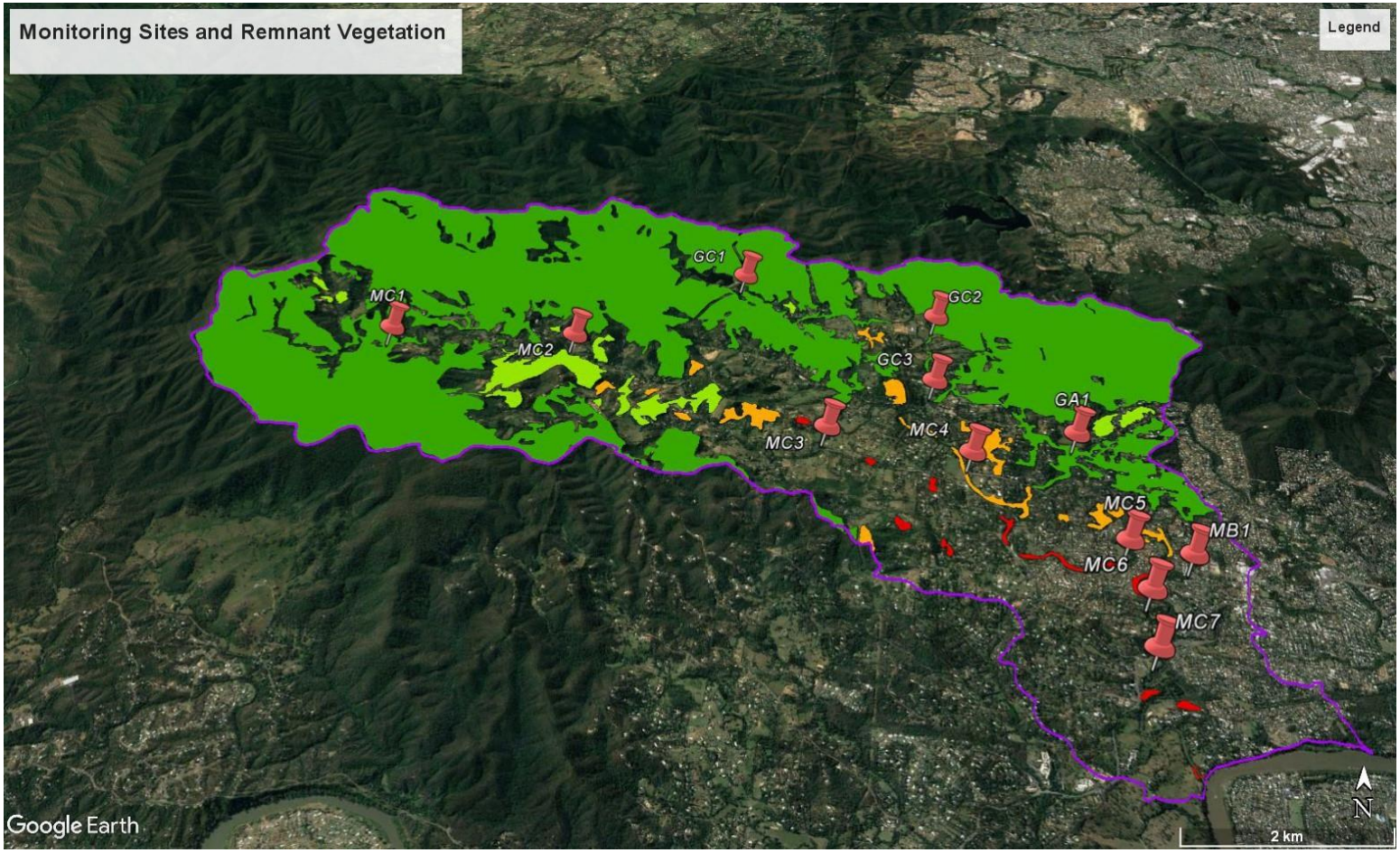


Figure 7.4.1 CHMP Monitoring Sites

Water temperature tends to reflect ambient temperatures and varies with rainfall/runoff conditions.

pH is in the range 6.5 and 7.5 which is what can be expected in creeks that have a reasonable level of vegetation on the creek banks, and little runoff from industrial areas, construction sites, and waste water inflows, including those from intensive animal industries like dairying and piggeries.

Conductivity gradients (increasing downstream) have been observed in Moggill Creek and Gold Creek since the monitoring commenced; the highest levels occur at MC7 the site just upstream of where Moggill Creek joins the Brisbane River. Here the conductivity varies with the stage of the tide. We usually measure during low tide. There seems to be higher conductivity across all sites in the warmer and drier periods like the November to December sampling period, but this can't be confirmed until we pool all data and take account of the conditions across all years.

Turbidity levels are very low usually at all sites, even at McKay Brook, and are below the Qld Water Quality Guidelines for lowland streams in SEQ. Tidal movements sometime lift the turbidity in the site near the Rafting Ground. We postpone monitoring when we have high runoff.

The diversity in fish and macroinvertebrates is high across most sites, but varies in abundance with the seasons and rainfall/runoff conditions. Moggill Creek is considered to have a higher level of biodiversity than most other streams in the Brisbane catchments. This is unsurprising when one considers the relative level of ecological assets in the various catchments.

Dissolved oxygen is relatively high across all sites during cooler and moister years, but during the last two years levels have been consistently low in most sites, probably because of low rainfall and very warm conditions. The site that regularly has very low dissolved oxygen is McKay Brook which has a smaller catchment than the others, and receives wastewater and runoff from the urban area of Kenmore. Macro-invertebrate and fish abundance and diversity at this site were very poor in 2016.

The ratio of exotic fish to total fish numbers was notably higher in four of the mid-lower Moggill and Gold Creek sites in 2014 and again in 2015-2016. In 2016 the percentage ranged from 20 to 53% in these same sites, but Mackay Brook, was 73%.

The most disappointing aspect of stream condition has been the establishment of serious aquatic weeds such as Senegal tea and Glushweed in the lower reaches of Gold Creek. MCCG first noted Senegal tea in this area in Summer 2005/06. In the last three years, significant infestations of Senegal tea have developed at the Tuckett Park site on Moggill Creek and smaller infestations near the Showgrounds. Sagittaria and purple taro have increased at each of these sites as well. Purple taro has become very heavily established at the Jones Road crossing into the Forest Park, and has resulted in substantial sedimentation upstream of the culvert crossing.

7.5 What species of fish occur in Moggill Creek?

Twenty-two native species (table 7.5.1) and six foreign introduced fish species are known to occur in the Moggill Creek catchment based on the results of past sampling by Griffith University, University of Queensland and Dr Tim Howell.

One of the native species from the Murray-Darling Basin (silver perch) has been translocated to the Brisbane River catchment where a single individual has been recorded in Moggill Creek to date. The barred grunter (a translocated native fish species) is well established in the upper reaches of the Brisbane River and is likely to invade Moggill Creek in the near future (table 7.5.3).

Considering the low number of freshwater species found in Australia relative to other regions of the world, this is quite a rich fish fauna. The Murray-Darling Basin, which covers over a million square kilometres and a seventh of Australia, contains only thirty-five native species of fish. The high native species diversity of Moggill Creek is likely to be largely attributable to the

close proximity to the Brisbane River. While a few of the native species, such as sea mullet *Mugil cephalus*, blue catfish *Arius graeffei* and Pacific blue-eyes *Psuedomugil signifer*, are found in both freshwater and estuarine environments, many others such as the gudgeons (*Hypseleotris* spp*., Philynodon* spp*., Gobiomorphus australis*) have larval stages which may be facilitated in the estuarine environment. Further to this, large freshwater flows moving down the Brisbane River enable recruitment from other areas of the river system.

One of the current threats to our native fish fauna is the presence of introduced pest fish. Of the five introduced pest fish species, eastern gambusia *Gambusia holbrooki,* platys *Xiphophorus maculatus* and swordtails *Xiphophorus helleri* are amongst the most abundant of all fish species now found in Moggill Creek. It is highly likely that they strongly compete with native species for food and space. Recent illegal introductions of koi carp *Cyprinus carpio* are another potential threat, as they are strains of the same species as common carp. Despite years of persisting in Moggill Creek these koi carp do not appear to have been able to reproduce successfully.

What are the Threats to fish?

Threats faced by the native fish fauna include:

- impediments to movements due to barriers such as road crossings
- changes to riparian vegetation structure and species
- runoff from roads and urban areas
- illegal dumping directly into Moggill Creek, and
- illegal releases of native fish originating from other catchments (including species which are already present in the creek).

Table 7.5.1 Native fish species recorded to date

Common name	**Scientific name**	**Status**
Agassiz's Glassfish	*Ambassis agassizii*	Common
Australian smelt	*Retropinna semoni*	Common
Blue catfish	*Arius graeffei*	Common in estuarine reaches
Crimson spotted rainbowfish	*Melanotaenia duboulayi*	Abundant
Dwarf flathead gudgeon	*Philypnoden macrostomas*	Abundant
Eel-tail catfish	*Tandanus tandanus*	Abundant
Empire gudgeon	*Hypseleotris compressa*	Abundant
Fire-tailed gudgeon	*Hypseleotris gallii*	Abundant
Flathead gudgeon	*Philypnoden grandiceps*	Abundant
Fly-speckled hardyhead	*Craterocephalus stercusmuscarum*	Abundant
Long-finned eel	*Anguilla reinhardtii*	Abundant
Mouth Almighty	*Glossamia aprion*	Rare?
Pacific blue-eye	*Pseudomugil signifer*	Abundant
Purple-spotted gudgeon	*Mogurnda adspersa*	Abundant
Sea mullet	*Mugil cephalus*	Abundant
Silver perch*****	*Bidyanus bidyanus*	Single specimen
Short-finned eel	*Anguilla australis*	Rare
Snub-nosed Garfish	*Arrhamphus sclerolepis*	Rare?
Spangled perch	*Leiopotherapon unicolor*	Common
Speckled goby	*Redigobius bikolanus*	Rare?
Striped gudgeon	*Gobiomorphus australis*	Abundant
Western carp gudgeon	*Hypseleotris klunzingeri*	Common

* non-native to Moggill Creek, translocated from other areas

Table 7.5.2 Exotic (from overseas) fish species recorded to date

Common name	Scientific name	Status
Swordtail	*Xiphophorus helleri*	Abundant
Platy	*Xiphophorus maculatus*	Abundant
Gambusia	*Gambusia holbrooki*	Abundant
Koi (carp)	*Cyprinus carpio*	Present in small numbers
Mozambique tilapia	*Oreochromis mossambicus*	Recently sighted, presently rare
Guppy	*Poecilia reticulata*	Likely to be locally extinct

Table 7.5.3 Translocated (non-native to Moggill Creek) fish species likely to invade

Common name	Scientific name	Potential
Barred grunter	*Amniataba percoides*	Likely invade in the near future

7.6 Bird Focus in Habitat Restoration

The publication in February 2017 of the "Australia: State of the Environment 2016" is immensely important. It is the fifth National Assessment on a five-year cycle.

Here are a few results from the State of the Environment Assessment 2016:

> "The biggest finding is that it's the cumulative impact of multiple pressures that then amplify the threat to biodiversity. It's not just cats, it is cats and climate change along with the fire regimes. What that's telling us is the impact of invasive species is immense but it's the multiple forms of threats together, "a death by a thousand cuts". That's the planning for the future where we know we have to improve how we systematically synchronise our efforts."
>
> "The report said "climate change was a pervasive pressure on all aspects of Australian environment and was altering the structure and function of the natural ecosystem. Evidence shows that the impacts of climate change are increasing, and some of these impacts may be irreversible".
>
> "Another of the big emphases for the future is around the peri-urban impacts, suburban development and small-scale farming close to cities, that is driving the loss of biodiversity as well as a constant new source of cats and wild dogs."

Birds in the catchment, like birds throughout Australia, face a series of major threats. Those threats within the influence of the MCCG are:

- habitat destruction and degradation
- fire and water disturbances, and
- predation and competition from invasive fauna and flora species.

Sections of the remnant woodlands in the catchment are severely fragmented and degraded by historical and ongoing clearing and land use, resulting in severe habitat losses for our bird communities.

There is a growing recognition that our national reserve of habitat is inadequate to protect our national treasure of bird species and that it is imperative to augment the reserve by rehabilitating and protecting key areas of habitat. Since bird fauna at a given site is a function of the type and quality of the habitat present, revegetation designs need to provide the full range of habitat substrates required by the full range of possible bird species in the area. Within a revegetated woodland site from the first plantings to the climax structure there is a sequence of habitats made available to birds and therefore a predictable sequence of bird

species. The key message from the research is that a mix of habitats is required to conserve a region's bird fauna. The target species are those in the adjacent remnant patches.

An example of the relationship between bird species and the structure of the vegetation is shown below using data collected from a gully in Gap Creek Reserve. This is a wet sclerophyll remnant forest habitat with sections of depauperate rainforest in the northern end. A representative sample of bird species is given for each substrate and guild.

Table 7.6.1 Habitat Substrate and Bird Species

MICRO-HABITATS	BIRD GUILDS and EXAMPLES
1. Ground Layer	Granivores – seed eaters *Wonga Pigeon* Pouncing Insectivores*:* *Eastern Yellow Robin*
2. Shrub Layer	Insectivores *Variegated Fairy Wren* *White-browed Scrub Wren*
3. Mid Layer	Insectivores *Brown Thornbill* *Rufous Fantail*
4. Canopy Layer	Leaf insectivores *Olive-backed Oriole* *Silvereye* Leaf gleaners *Spotted Pardalote* *Striated Pardalote*
5. Trunk and Branches	Bark Specialist - insectivores *White-throated Treecreeper* Upper-branch specialists *Varied Sitella*
6. Fruit and seeds on foliage at all levels	Frugivores & Granivores *Fig Bird* *Lewin's Honeyeater*
7.Flowers on vegetation at all levels	Nectarivores *Noisy Friarbird* *Noisy Miner* *White-throated Honeyeater*
8. Vertebrates and Invertebrates at all levels	Vertebrate Carnivores *Sacred Kingfisher* *Grey-backed Butcherbird* *Pied Currawong*
9. Aerial insects	Insectivores hawking from a perch *Leaden Flycatcher* *Spangled Drongo* Continually flying insectivores *Welcome Swallow* *White-throated Needletail*

Revegetation cannot restore these substrates quickly or completely. However, surveys of the birds in remnant forests can help design the process of revegetation.

Revegetation to restore habitat is costly to the community and a very long-term project. The obvious question is: *"Are the number of bird species present and the abundance of birds in the catchment increasing as a result of the work?"*

Resources are needed to answer this question. If MCCG wishes to monitor the biodiversity outcomes of its programs the resources will need to come from its volunteers. However, there are national organizations protecting the welfare of birds that offer support for birder volunteers, and there are people involved in the MCCG who already contribute to the national bird projects.

Birds Australia supports a standardised monitoring method for bird counts and collects nation-wide data from volunteers. The Birds Australia data base, *Birdata*, is used to write important biodiversity reports and to collate studies on bird distribution and abundance for national and local policy decisions. *Birdata* is already being used to monitor revegetation, and its methods and database infrastructure could be the basis of the MCCG efforts to monitor the impact of its revegetation projects on biodiversity in the catchment.

The Queensland State Government's Department of Environment and Resource Management maintains a data base, *Wildnet*, from which data on the birds in the catchment can be retrieved.

Current Bird lists for the Moggill Creek catchment are on the MCCG Website. The lists have been improved with thumbnail photographs of the 202 birds recorded in the catchment. Specific sites in the catchment would also be very useful for community awareness programs. These lists could be distributed to interested people for their own use because without this prompt many walkers do not see all the birds that are around them in the bush. These lists would also be important to leaders and participants in public guided bird watching walks that could be promoted.

The monthly Feather Fascination published in The Local Bulletin is now also available for downloading from the MCCG Website.

7.7 Frogs of Moggill Creek Catchment

The data was provided and verified by Gordon Grigg (MCCG) and Harry Hines (QPWS) as an historical baseline of what frog species are found in the catchment. There were 17 frog species definitely *known to be* in the catchment, six species *likely to be* in the catchment and two possible species that *could be* found in the catchment. *Litoria chloris* (The Southern red-eyed tree frog) was added last year to list of definitely-occurring in our catchment (sighted in the author's own backyard).

The Queensland Museum has specimens of *Pseudophryne major* (Great Brown Broodfrog) and *Limnodynastes terraereginae* (Scarlet-sided Pobblebonk) from the Brookfield area, and there is also a single record of *Platyplectrum ornatum* (Ornate Burrowing Frog) from the Brookfield area. (Harry Hines, per comm).

Table 7.7.1 Frog species occurring or likely to occur in the Moggill Creek Catchment

Frog species definitely in the catchment

Adelotus brevis	Tusked Frog
Crinia parinsignifera	Beeping Froglet
Crinia signifera	Clicking Froglet
Limnodynastes peronii	Striped Marshfrog
Mixophyes fasciolatus	Great Barred Frog
Pseudophryne raveni	Copper-backed Broodfrog
Uperoleia fusca	Sandy Gungan
Litoria latopalmata	Broad-palmed Rocketfrog
Litoria caerulea	Green Treefrog

Litoria gracilenta	Graceful Treefrog
Litoria fallax	Eastern Sedgefrog
Litoria dentata	Bleating Treefrog
Litoria rubella	Naked Treefrog
*Litoria wilcoxii (*Formerly *Litoria lesueuri)*	Central Stony Creek Frog
Litoria peronii	Emerald-spotted Treefrog
Rhinella marina (Formerly *Bufo marinus)*	Cane Toad
Litoria chloris	Southern Orange-eyed Treefrog

Frog species likely to occur in the catchment

*Platyplectrum ornatum (*Formerly *Limnodynastes ornatus)*	Ornate Burrowing Frog
Limnodynastes tasmaniensis	Spotted Marshfrog
Limnodynastes terraereginae	Scarlet-sided Pobblebonk
Pseudophryne major	Great Brown Broodfrog
Litoria tyleri	Laughing Treefrog

Frog species that could possibly be found in the catchment

Litoria brevipalmata	Green-thighed Frog
Litoria pearsoniana	Cascade Treefrog

Frogs are found in and around creeks, dams and ephemeral ponds where they will use these areas as a refuge, to forage for food or reproduce. Frogs will breed in either or both permanent water (creeks and/or dams) or temporary (ephemeral) water bodies. What we don't know is where in the catchment they are breeding successfully.

Cane Toad Challenge

The MCCG has been offered Affiliate membership of the Cane Toad Challenge (CTC) by Professor Rob Paton, IMB, The University of Queensland.

CTC is a UQ initiative that aims to support research and development, and facilitate the uptake of innovative cane toad control technologies (http://canetoadchallenge.org.au). In particular it aims to facilitate access, at minimal or zero cost to end-users, to patented cane toad control technology. This technology uses cane toad pheromones (baits) in conjunction with traps, to achieve the large-scale capture and removal of cane toad tadpoles from managed waterways (e.g. dams, ponds, streams, creeks). Tadpole trapping is an environmentally sustainable and intuitive technology, readily transferable to the public. Coordinated implementation of tadpole trapping has the potential to dramatically reduce cane toad populations, and alleviate the environmental impact of this toxic invasive pest.

Further information will be forth coming when the agreement has been executed and cane toad tadpole baits become available.

A frog monitoring program is planned to:

- Determine what frogs are currently found in the catchment so we can determine the species richness
- Determine where these frogs are breeding.

One strategy would be to recruit interested landowners across the various parts of the catchment to record frog calls at agreed intervals. This could be in conjunction with the CTC.

7.8 Dragonflies and dragonfly monitoring in Moggill Creek

Dragonflies and damselflies (Odonata) are a very powerful link in the public perception of waterways and their water quality. They are frequently a colourful symbol of the abundance and vibrancy of life within ponds, lakes, rivers and streams.

Within the northern hemisphere, dragonflies are much-studied insects, and their presence can be correlated with, or sometimes indicate important certain stream features, such as presence of running water, high dissolved oxygen content, shaded overhanging vegetation and many other in-stream characters. These characters can also be important for other stream-dwelling creatures, such as fish, frogs and crustaceans.

Within Moggill Creek, apparently, little is known about the species present. Some 15-20 species are known by anecdote and casual observation. There is the potential for the presence of over 40 species. Anecdotal reports suggest that the presence of some species e.g. *Austrogomphus melaleucae* (Nattrass 2006), may indicate stream areas in good condition, with respect to shaded, flowing water with relatively low nutrient loadings and high dissolved oxygen content. Moggill Creek is regarded as a relatively high water-quality stream in a district that has consistently reported low water quality indices (EHMP 2009).

Systematic survey of species (as adults) should attempt to correlate their presence with in-stream features, some of which (shaded overhanging trees, presence of rush-like plants, fast-flowing water), appear to be important for dragonflies. Some of these features have been enhanced by on-going revegetation projects along some sections of Moggill Creek (e.g. shaded streamside trees, planting of rush-like *Lomandra* spp.).

The presumed high species richness and often colourful images of specimens likely to be found, would further promote interest of Moggill Creek as a special place to members of the public. More directed searches of species, using modern methods (including digital video and still photography), may provide an engaging method of involving volunteers in census of these interesting insects.

8 MAJOR CONCLUSIONS AND RECOMMENDATIONS OF THE CURRENT REVIEW

8.1 Overview

Overall, a stand-out achievement of MCCG has been the energy and dedication of its members to improving the local environment, whether by active involvement in working bees or by choosing to plant native species on their properties. On both public and private land, many hours have been spent clearing weeds, re-planting with native species, and maintaining these areas. In some cases, this has resulted in a return, or increase, of native fauna. The involvement of local high school students, financial assistance from sponsors and grants, and the support of Habitat Brisbane have all contributed to a slow, but increasingly visible improvement to sections of the catchment. Community engagement through activities has raised MCCG's local profile and resulted in a growing membership. With changing attitudes in the catchment there is the hope that more attention and effort will be devoted to environmental issues.

However, despite 20 years of sustained efforts on the part of catchment residents, considerable support from Council particularly on public lands, and financial support through several state and federal grants, the catchment remains under environmental stress due to habitat loss and fragmentation, weed invasion, soil erosion, and riparian zone degradation, creek bank instability and stormwater runoff.

Approximately 80% of the upper half of the catchment has remnant vegetation mainly on the hills and mid slopes, while the estimates for the middle and lower sections are only 30% and 5% respectively. Most of this area was cleared for agriculture more than 70 years ago.

Much of the cleared land in the middle to upper part of the catchment has previously supported grazing, tree crops or cultivated crops and has suffered severe erosion on the middle and lower slopes. This is especially the case in the Wonga Creek sub-catchment, the mid-section of Gold Creek sub-catchment and the main Moggill Creek sub-catchment. The riparian zone vegetation has been severely degraded along approximately 50% of the streams in the mid to upper catchment, and upwards of 90% in the lower part. Stream bank erosion is a problem in several areas, and evidence of sediment accessions to the stream beds is found in many areas.

Urban development is a major land use in the lower part of the catchment (sections 1, 2 and 3). Creeping urbanisation, occasionally accompanied by excessive land clearing and the proliferation of hard and impervious surfaces has contributed to severe flash flooding in the lower part of the catchment, and creek bank erosion is more prevalent. Flooding is a common risk to revegetation work carried out by MCCG volunteers and Habitat Brisbane volunteers.

Major weeds in the middle and lower parts of the catchment are Chinese celtis and asparagus vine, while glycine, ochna, Madeira vine and cats claw creeper are serious challenges throughout the entire catchment, particularly in the more fertile riparian zones. Glycine, Madeira vine and Chinese celtis represent the greatest threat to revegetation of the lower part of Moggill Creek. Notwithstanding the difficulties outlined, volunteers in all sections have achieved some very successful revegetation on public lands in riparian zones. However, volunteers have emphasised the difficulties in long term weed control particularly from climbing vines and Chinese celtis.

Remnant vegetation in the higher parts of the landscape of sections 6, 7, 8, 10 and 13 are in relatively good condition, although mining and forestry activities in the late 1800s and early 1900s have left reminders of erosion in some parts of sections 7 and 9.

Significant restoration of riparian zones has been achieved in the upper and lower Gold Creek catchment, in the McKay Brook and Gap Creek catchments and on parts of the Moggill Creek riparian areas from above the Brookfield Road bridge near the Showgrounds down to Huntington Park.

Restoring habitat corridors from the riparian zones in the lower half of the catchment, to the lower slopes (which are largely cleared) to link with habitat on the hills has remained our biggest challenge. There is currently no clear strategy to address this important goal across the catchment. Most of these lands are privately owned and many owners do not have the resources and / or motivation to sustain the efforts required to achieve progress in restoration. Owners of many properties have joined Land for Wildlife and are active on their own properties but few have attempted to restore the riparian zones with the existing areas of remnant forests. Consequently, in parts there are long sections of poor riparian conditions that reduce the effectiveness of linkages further upstream.

The riparian corridors are probably the weakest links in creating effective corridors across the catchment to neighbouring catchments. We see this aspect as a long-term challenge but it needs to be addressed in overall city planning ***before*** urban development spreads into what others see as a "land bank" for Brisbane. The "jewel in Brisbane's crown" would then become a "lost treasure". The current buffering provided by land managers between the upper reaches of the catchment and the major conservation lands would be lost.

Section leaders still require better support from the MCCG to assist with recruitment of volunteers. The role of social media will become more important in this regard. The MCCG continues to provide expert advice to sections as required.

For many years the MCCG has recognized the importance of encouraging restoration work on the private lands that comprise almost 70 percent of the catchment. It is with great satisfaction that the Pacey Road community group with the support of the MCCG has continued to operate successfully on private lands since 2011. A second group, the Upper Brookfield Road working group has been established only recently.

Attracting and retaining the next generation of leaders to help run the MCCG is a major and ongoing challenge. Most volunteer groups in our community depend on a steady supply of willing retirees who have the time to commit to such an endeavor. Relying on a 'tap on the shoulder' by current members can be a useful strategy but it is not a basis for long term planning. The MCCG needs an active program to identify and attract people from all sections of the community.

8.2 Conclusions

The assessment of the condition of the land and water resources of Moggill Creek and the achievements of MCCG since 1997 outlined in this document have led to the following conclusions:

1. The Moggill Creek catchment is a valued natural asset to Brisbane; the natural environment is unique and deserves our care.
2. Remnant vegetation in the higher parts of the landscape of sections 6 (Upper Brookfield), 7 (Gold Creek Reserve), 8 (Wonga Creek), and 13 (Mt Coot-tha Park) is in relatively good condition.
3. However, little has been achieved in restoring habitat corridors from riparian areas across the largely cleared lower lands to the hills. There is currently no clear strategy to address this important goal anywhere in the catchment. Most of these lands are privately owned and many owners do not have the resources and/or motivation to sustain the efforts required to achieve progress in restoring corridors.
4. Flooding in the lower reaches of the catchment has caused severe damage to the stream banks and beds and the restored riparian vegetation in parts of the lower banks and made weed control extremely difficult. As a result, there have been major set-backs to extensive sustained revegetation activities on several of the parklands and other public lands in the catchment. The strategies used in these flood prone areas by bushcare groups should be documented and reviewed to ensure that better practices are introduced across all sections.

5. Aquatic weeds pose serious threats to aquatic fauna and water quality. Improvements in the reduction of nutrient levels from businesses and private properties, and restoration of riparian zones would reduce these threats.
6. Based on limited data, the threats from weeds appear to have increased on many rural properties, on public land along roads and power transmission lines, and along the riparian zones. Continued lack of effective management of exotic weeds poses the greatest threat to retention of existing vegetation communities in the catchment.
7. Biological control agents are available for some weeds, notably lantana, salvinia and cat's claw, but their effectiveness is generally limited.
8. The MCCG recognises there has been a cultural change in the catchment in recent times with increasing community awareness of the benefit of habitat restoration. MCCG contributes to this through free and expert advice from its Landcare Adviser, the distribution of local native plants and the extensive project work managed by the MCCG throughout the catchment. In addition, the uptake of the Wildlife Conservation Assistance program is the highest of any Brisbane catchment.
9. MCCG's nursery has supplied tens of thousands of plants to private land owners at no charge and has been a major success in supporting MCCG's activities. However, there is a need to ensure that seed collection keeps pace with the demand for species.
10. Numbers of plants distributed by the MCCG nursery (c. 85,500) exceeds the number planted by volunteers on public land (c. 49,000), so a larger area of private land should have been revegetated overall. However it is difficult to determine accurately:
    - how much sustained progress has been made in revegetation in many of the acreage properties of the catchment;
    - what impact the restoration efforts have had on fauna habitat.
11. Bushcare volunteer groups in the sections have carried out thousands of hours of habitat restoration activities. Community groups such as the Pacey Road Group and the Upper Brookfield Working Group, supported by the MCCG have proven to be a valuable means of encouraging cooperative works on public and private lands where bushcare groups are not operating.
12. As a result, there are several very good examples of restored riparian zone restoration that appear to be relatively stable, in the upper and lower Gold Creek catchment, in the McKay Brook and Gap Creek catchments and on parts of the Moggill Creek riparian areas from above the Brookfield Road bridge near the showgrounds down to and including Huntington Park. These have been achieved mainly by volunteer input with significant contribution from Council.
13. MCCG is well administered, financially stable, and has considerable support indicated by steadily increased membership since it was formed, and by collaborative inputs from the Brisbane City Council, and the Queensland and Commonwealth Governments.
14. MCCG's educational and community engagement programs have developed well over the past six years: The newsletter became available electronically in early 2017; the web page has been further developed and the means of community involvement through Facebook has been created; talks on environmental issues and displays are well patronized and presented; and the Photographic Competition has been a growing success.
15. Brisbane City Council's support through the Creek Ranger program has reduced since the last review, but continues to assist MCCG's activities. The Community Conservation Assistance program introduced by the Brisbane City Council is a very valuable addition to the ability to conduct works on private land through the Wildlife Conservation Assistance program.
16. Friends of Moggill Creek forums commenced in late October 2009 have been successful in encouraging more members of the catchment group to discussions on the key topics of: Landcare and Biodiversity; Watercare; and Community. As a result several new

projects have progressed, including creek health monitoring, bird monitoring, dragonfly monitoring, and frog monitoring.

17. The leased cottage at the end of Gold Creek Road is an asset as the MCCG administrative centre and the venue for an increased range of promotional and educational activities such as the monthly series of talks.
18. MCCG considers the Brisbane Catchments Network to be a useful forum for interaction between the city's catchment groups.
19. Despite Federal, State and Council financial support and the thousands of hours of volunteer work, the catchment remains under environmental stress. Continued financial support from government agencies will be essential in the future to protect and extend the environmental restoration achievements to date.
20. The key recommendations of the 2010 Review have guided the main activities within the catchment group for the last six years, and were developed to ensure alignment with State and Commonwealth funding priorities at the time. The level of achievement within each of the strategies has been subjectively rated by members of the Management Committee. These ratings and the conclusions listed above will be inputs to the deliberations on future priorities.
21. There is some confusion surrounding the Public Liability Insurance required by the MCCG to cover volunteers and attendees participating in activities other than those organised by bushcare groups working on BCC land. There are significant budgetary implications for obtaining the correct cover.

Table 8.1.1 Broad Rating of Achievement of Strategies (December 2016)*

Strategies and 2011 recommendations	Achievement Rating**
*Increase community awareness & participation in the management of major weed infestations and the restoration of natural ecosystems on public and private land	7
*Adopt a planned and integrated approach to habitat restoration and maintenance	5
*Participate in water quality improvement and monitoring in conjunction with EPA, BCC, DNR&M and other responsible groups	5
*Adopt an integrated approach to the restoration and management of riparian zones	5
*Actively support ecologically sensitive housing, land and construction developments within the catchment	6
*Promote land use practices that account for suitability of land with focus on land stability, soil conservation, minimising nutrient loss	6
*Improve community understanding and knowledge through a comprehensive and educational communication program which reaches all sectors	7
*Increase MCCG visibility within the catchment through an active promotional program	9
*Work to a business plan which ensures continuity of activities and implementation of new activities	5

Strategies and 2011 recommendations	Achievement Rating**
*Maintain a wide base of volunteers to enable effective management of day to day operations, and to enable expansion of activities	5
#Review the MCCG Strategic Plan	10
#The MCCG should seek commercial sponsors	4
# Review revegetation methods in flood prone areas of the catchment	5
# MCCG should identify ways to better assist private land owners	8
#Bushcare groups should be developed and supported in sections 1, 6 and 10.	5
#MCCG should undertake long term monitoring of riparian zone conditions, creek health, weed invasion in remnant areas, bird species and numbers in remnant vegetation	4
#MCCG should enhance the nursery`s capability through: better targeted and increased seed collection; studies on seed dormancy and storage requirements; development of vegetative propagation capability; development of an improved inventory system	5
*Strategies outlined in MCCG Strategic Plan Version 3 (2003) #Recommendations of the 2010 Review ** Ratings are 0-10, with 10 being very high achievement	

8.3 Future Direction of MCCG: Major Recommendations

In response to the conclusions from the review, the following recommendations are proposed to guide the group over the next five years and to assist in consultation with stakeholders and likely partners, particularly those who might assist with resources.

1. MCCG should regularly review its strategic plan to ensure that our resources in conjunction with those of BCC and State entities are focussed effectively on the highest priorities in the Moggill Creek catchment.
2. MCCG should continue to actively seek commercial sponsors, and partner with Governments at all levels for specific support arrangements.
3. MCCG should continue to review the revegetation methods in flood prone areas of the catchment, particularly in the higher parts of the catchment where the stream gradients result in very fast runoff velocities and turbulence.
4. The MCCG should continue to assist private land owners in their efforts, as with the Pacey Road Group, with revegetation and weed control, and to identify opportunities for protecting unique remnants and the development of habitat corridors.
5. The MCCG should continue to assist the formation of community led bushcare groups in areas not covered by Habitat Brisbane.
6. Bushcare groups should be developed and supported in sections 1, 6 and 10.
7. As a priority, MCCG should:
   a. Undertake riparian zone condition assessments to evaluate outcomes of restoration activities
   b. Ensure assessment of the last six years of data collected in the creek health monitoring program
   c. In conjunction with landholders, commence assessment of weed invasion and associated weed management activities in remnant areas, particularly those fringing conservation areas such as the Brisbane Forest Park and Mt Coot-tha Forest Park
   d. Continue to develop a monitoring program of bird species and numbers in remnant vegetation as an input to designing strategies for revegetation activities.

8. Several improvements are required to enhance the nursery's capability to keep pace with demand for plants by the catchment members. These enhancements are:
   a. Better targeted and increased seed collection to widen the variety of species grown for use by catchment members
   b. Studies on seed dormancy and storage requirements to increase the availability of plants throughout the year
   c. Development of vegetative propagation options that could be employed as an alternative approach to supplying some of the species sought by members
   d. Development of an improved inventory system.
9. Given the very high uptake of the Wildlife Conservation Partnerships Program in the catchment, the MCCG should make every effort in its project activities to complement the activities of this valuable program.
10. The MCCG should develop an explicit succession and volunteers program to ensure that the group's activities continue to be relevant and effective.

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REFERENCES

Beckmann, G.G., Hubble, G.D. and Thompson, C.H.(1987). *The Soil Landscapes of Brisbane and South-eastern Environs.* Soils and Land Use Series No.60. CSIRO, Australia.

Brisbane City Council,(2000). *Moggill Creek Catchment Management Plan, 1997*.

DERM (2007) Department of Environment and Resource Management. *WildNet Platypus Records.*

DERM (2009) *SEQ Regional Plan 2009-2031*.

DERM (2009) *Koala Habitat Assessment and Mapping Project*.

Eykamp, Lucinda (2000) *A Preliminary Study of Land Use Impacts on the Water Quality in the Moggill Creek Catchment*. Honours Thesis, The University of Queensland.

Isbell, R.F. (1996) *The Australian Soil Classification*. (CSIRO Publishing: Melbourne).

MCCG (2007) *Managing Horses on Small properties in the Moggill Creek Catchment*. Supported by BCC.

Our place in the country: Managing your acreage property in West Brisbane, (2009). Booklet developed in conjunction with Pullen Pullen Catchments Group with the support of the Gambling Community Benefit Fund.

Sands, D.P.A. (2004) *Butterfly Checklist for the Moggill Creek Catchment*. MCCG. 13pp.

WPSQ (2010) Wildlife Preservation Society of Queensland, *Platypus Watch.*

http://www.wildlife.org.au/projects/platypus/index.html

APPENDIX 1

` **MCCG Strategic Plan 2017**				
Preamble: The purpose of this plan is to communicate to our members and stakeholders our intended actions for the next 3-5 years to help retain and restore, where possible the natural environment we all enjoy. To be able to experience the benefits of a semi-rural lifestyle so close to a major centre of population is very rare. The MCCG was established in 1997 to galvanise community action around important local environmental challenges to ensure that the area retains its natural advantages. In doing so we work with all levels of Government and other relevant organisations to try to achieve what none can do alone. Our real strength comes from the practical support of our members who accept a high level of personal responsibility for our natural environment whether it is on their land, on public land or in the catchment as a whole. We will monitor our achievements against what we have set out in this plan and report to our members accordingly.				
Mission				
MCCG is a volunteer action community group aiming to conserve and improve the local natural environment of its catchment on both private and public land				
Goal 1	Goal 2	Goal 3	Goal 4	Goal 5
To retain and restore local native biodiversity in the catchment	To protect and restore the health of the catchment watercourses	To support and promote conservation and sustainable use of land	To engage the community and enhance their understanding of the natural ecological processes in the catchment	To ensure the continued effectiveness of the MCCG
Strategies	Strategies	Strategies	Strategies	Strategies
S1.Promote our understanding of the threats to the ecosystems of the catchment (climate, fire, diseases, pests, water use, urban and infrastructure development)	S5. Assess current creek health of the catchment. in conjunction with EPA, BCC, DNR&M and other responsible groups and analyse and make available relevant findings	S6. Promote land use practices with a focus on land stability, soil conservation, minimizing nutrient loss and reducing impacts on creek health	S8. Employ an integrated communication system using multiple channels to attract, retain and educate members	S12. Attract new members with appropriate skills to the management committee
				S13. Support Section Leaders in managing and operating their groups

S2. Develop and implement control strategies for exotic weed infestations that threaten remnant forests, woodlands and riparian areas in the catchment		S7. Support cooperative, community led initiatives designed to address local ecological threats eg Pacey Rd	S9. Develop and implement a variety of community engagement strategies to engage members and new volunteers in projects and on-ground activities	S14. Ensure that all project submissions are supported by appropriate strategic and operational planning
S3. Continue and extend development of the Nursery specializing in local native plant species and provision of free tubestock as an aid to restoring biodiversity on private land			S10.Utilise training opportunities offered by governments and other relevant agencies	S15. Develop and maintain constructive and apolitical relationships with stakeholders
S4. Develop long term (>5 years) strategies agreed by HB for the different ecological zones within the catchment on BCC controlled land to control major weed infestations that would allow restoration of local biodiversity.			S11. Communicate the outcomes and applications of MCCG projects.	S16. Collaborate with government agencies and other relevant groups to improve the effectiveness of our planning and operations
				S17. Promote the MCCG`s ability to make a positive difference to our local natural environment

APPENDIX 2

ACTIONS arising from the MCCG Strategic Plan 2017

S1. Promote our understanding of the threats to the ecosystems of the catchment (climate, fire, diseases, pests, water use, urban and infrastructure development)

1.1 Use the findings of recent reviews, projects and published material to identify what threats exist across the various sections or remnant ecosystems and the identification of priority corridors (Project and Section Leaders)

1.2 Articles and regular project updates posted in newsletter, on the website, the Facebook page, in the local media and at events. (All committee members)

S2. Develop and implement control strategies for exotic weed infestations that threaten remnant forests, woodlands and riparian areas in the catchment

2.1 Identify and map exotic weed (including aquatic weed) infestations in the catchment

2.2 Conduct weed identification sessions at the cottage to assist members

2.3 Collaborate with BCC, SEQW and HW&C to attract resources for and to implement weed control

2.4 Develop specific area/property projects for submission to funding bodies or collaborators

2.5 Identify areas at risk of Anzac Tree Daisy invasion. Develop project in upper Wonga creek sub-catchment. (Adrian Webb)

S3. Continue and extend development of the Nursery specializing in local native plant species and provision of free tubestock as an aid to restoring biodiversity on private land (Andrew Wilson, Bryan Hacker)

3.1 Ensure the continued operation of the Nursery to supply local native plant species to members at no cost

3.2 Encourage collection of local native plant seeds for submission to the nursery

3.3 Expand the Nursery's capacity for vegetative propagation

3.4 Conduct workshops on seed collection.

S4. Develop long term (>5 years) strategies agreed by HB for the different ecological zones within the catchment on BCC controlled land to control major weed infestations that would allow restoration of local biodiversity

4.1 Organise a workshop with MCCG, Brisbane Council and Healthy Land and Water with an agreed format and agreed attendee list (Malcolm Frost)

4.2 From this work shop develop a plan both for lower Moggill Creek catchment and upper catchment that would be supported by council and HL&W (Malcolm Frost)

4.3 Report on progress annually. (Malcolm Frost)

S5. Assess current creek health of the catchment in conjunction with EPA, BCC, DNR&M and other responsible groups and analyse and make available relevant findings

5.1 Conduct and report on a bi-annual creek health monitoring program at 12 sites around the catchment (Adrian Webb)(Data entry priority)

5.2 Conduct monthly water quality monitoring in conjunction with BCC (Adrian Webb)

5.3 Identify/map areas with poor riparian condition, and propose management response

5.4 Identify and map key creek reaches at risk of erosion and bank collapse and propose management response

5.5 Encourage on-ground visits of creek hydrologist, with support of HB.

S6. Promote land use practices with a focus on land stability, soil conservation, minimizing nutrient loss and reducing impacts on creek health

6.1 Work with HW&C to run workshops on specific land management topics

6.2 Assess risks to fauna.

S7. Support cooperative, community led initiatives designed to address local ecological threats

7.1 Encourage neighbourhood cooperation particularly in areas of high ecological value to improve the connectivity of wildlife corridors in the catchment

7.2 Encourage Community led groups to become HB groups

7.3 Continue to support the existing community led groups aiming to protect and restore native vegetation on public and private land

7.4 Promote benefits and achievements of such groups on FB and website.

S8 Employ an integrated communication system using multiple channels to attract, retain and educate members

8.1 Develop and implement an integrated communication plan by March 2017

8.2 Maintain a quarterly newsletter to members

8.3 Maintain and support MCCG Website and MCCG Facebook page

8.4 Conduct an annual Kids' Day at the Cottage (Dale Borgelt)

8.5 Investigate implementation of MailChimp.

S9. Develop and implement a variety of community engagement strategies to engage members and new volunteers in projects and on-ground activities

9.1 Conduct a series of small 'field days' to assist members to better manage invasive weeds

9.2 Look for BCC support in providing a sign that members can display at the front of their property indicating membership in the Moggill Creek Catchment Group

9.3 Conduct a "welcome event" for new members at the cottage to explain opportunities for involvement

9.4 Conduct evening cottage talks.

S10.Utilise training opportunities offered by governments and other relevant agencies

10.1 Promote training opportunities provided by BCC and other sources (e.g. aquatic weed ID, Rapid appraisal of Riparian condition, creek health monitoring).

S11. Communicate the outcomes and applications of MCCG projects

11.1 Ensure project reports are filed for inclusion in the Annual Report and the 5 yearly Review (Chair)

11.2 Project leaders to prepare reports suitable for the newsletter, website and Facebook (Project Leaders)

11.3 Compile and publish catchment landscape information:

- Regional ecosystems
- High Biodiversity Value (State Govt)
- Biodiversity corridor boundaries
- Stepping Stones
- Climate Refugia

- Listed habitat for priority species
- Aquatic conservation Assessment

11.4 Collate information on locally known scrub remnants (to combine with data from Cath Madden / LfW) for addition to the mapping (Adrian Webb)

11.5 Promote via local meetings and fliers key management approach for CCC. "CCC control must be an integrated pest management approach – biocontrol; herbicide; physical removal". (Adrian Webb)

S12. Attract new members with appropriate skills to the management committee (Chair)

12.1 Appoint a committee person to lead recruitment

12.2 Advertise for expressions of interest through our communications channels

12.3 Request Bushcare leaders to identify people who may be interested in committee activities

12.4 Invite potential new members to participate in meetings and projects.

S13. Support Section Leaders in managing and operating their groups (Chair)

13.1 Improve volunteer turnout especially for smaller groups

13.2 Regularly publicize the work of the sections in the newsletter and on the website and Facebook

13.3 Promote the idea that groups of friends or family members can make a significant contribution to the work of the sections by a once a year participation in a working bee or a special working bee

13.4 Advertise the training opportunities available to members of Bushcare groups.

S14. Ensure that all project submissions are supported by appropriate strategic and operational planning

14.1 All project submissions to be vetted by the management committee.

S15. Develop and maintain constructive and apolitical relationships with stakeholders (Chair)

15.1 Keep local political representatives informed and involved in relevant activities

15.2 Brief local politicians on issues critical to the catchment

15.3 Encourage MCCG representation on BCN.

S!6. Improve the effectiveness of our governance procedures (Chair)

16.1 Ensure our management procedures enable us to readily balance income and expenditure

16.2 Ensure that reporting enables timely decisions on resource allocation

16.3 Ensure project revenue and expenditure are readily identifiable

16.4 Ensure the MCCG has multiple revenue streams(funding bodies, donations, membership) sufficient for operations and to manage risk

16.5 Ensure the MCCG meets its obligations to retain the Cottage and Nursery for future use and enjoyment.

S17. Promote the MCCG`s ability to make a positive difference to our local natural environment

17.1 Establish a communication theme for 2017 and subsequent years. (2017 - 20th anniversary?)

17.2 Negotiate a more conspicuous partnership with Habitat Brisbane

17.3 Continue Cottage Talks

17.4 Continue providing expert advice to landholders on-site regarding restoration of native vegetation on their land

17.5 Continue interacting with Land for Wildlife officers to the mutual benefit of both organisations

17.6 Continue staging the very successful Photography competition, focussing on local wildlife and ecology

17.7 Consider establishing a book club along the lines of CWCN.

APPENDIX 3

Income and Expenditure ($) for 1998-2016

Year	Income		Expenditure		Variance
1998 –1999	Grants Membership Merchandise **Total**	350 670 96 **1,116.34**	• Administration **Total**	534 **534**	581
1999 –2000	• Grants • Membership • Merchandise • Photo Comp **Total**	2,300 820 368 1,060 **4,549**	• Administration • Photo comp • Section Expenses **Total**	1,365 1,204 928 **3,497**	1,052
2000-2001	• Grants • Membership • Photo Comp **Total**	2,200 1,252 1,248 **4,786**	• Administration • Photo comp • Section Expenses • PR expenses **Total**	703 1,480 800 122 **3,105**	(166.)***
2001 –2002	• Grants • Membership • Photo Comp **Total**	3,850 1,112 2,311 **8,491**	• Administration • Photo comp • Section Expenses • PR expenses **Total**	1,264 1,348 389 688 **3,669**	1,682
2002 –2003	• Grants • Membership • Photo Comp • Merchandise • Donation **Total**	20,059 2,438 961 1,872 3,947 **29,469**	• Administration • Photo comp • PR expenses • Section expenses • Mulch • Env expenses • Merchandise **Total**	4,938 1,659 5,810 781 1,207 5,069 1,386 **20,851**	8,617
2003 –2004	• Grants • Membership • Photo Comp • Merchandise • Donation • Plant Sales **Total**	29,584 3,330 1716 2,269 246 1,125.00 **38,363**	• Grants • Administration • Photo comp • PR expenses • Section expenses • Merchandise **Total**	25,305 1,917 1,548 3,105 577 1,799 **34,252**	4,103
2004-2005	• Grants • Membership • Photo Comp • Plant Sales • Donations **Total**	21,825 3,590 2,212 3,005 319 **32,041**	• Grants • Administration • Photo Comp • PR expenses • Section expenses • Nursery **Total**	29,527 1,803 2,034 3,372 580 1,455 **39,384**	(7,342)

Year	Income		Expenditure		Variance
2005-2006	• Grants	30,802	• Grants	8,895	32,452
	• Membership	3,400	• Administration	891	
	• Photo Comp	1,670	• Photo Comp	1,267	
	• Plant Sales	2,161	• PR expenses	6,169	
	• Donations	13,135	• Section expenses	540	
	• Interest	871	• Nursery	1,236	
	Total	**53,249**	**Total**	**20,797**	
2006-2007	• Grants	61,012	• Grants	45,832	21,629
	• Membership	4,282	• Administration	1,466	
	• Photo Comp	2,018	• Photo Comp	1,608	
	• Plant Sales	1,582	• PR expenses	5,292	
	• Donations	5,189	• Section expenses	802	
	• Interest	2,928	• Nursery	1,195	
	Total	**100,308**	**Total**	**78,679**	
2007-2008	• Grants	27,950	• Grants	51,647	(17,557)
	• Membership	5,565	• Administration	2,742	
	• Photo Comp	2,001	• Photo Comp	1,828	
	• Plant Sales	1,631	• PR expenses	5,731	
	• Donations	2,567	• Section expenses	544	
	• Interest	4,930	• Nursery	1,420	
	Total	**52,119**	**Total**	**69,676**	
2008-2009	• Grants	38,220	• Grants	35,707	(169)
	• Membership	5,805	• Administration	7,623	
	• Photo Comp	3,718	• Photo Comp	2,205	
	• Plant Sales	1,658	• PR expenses	6,447	
	• Donations	1,564	• Section expenses	600	
	• Interest	3,803	• Nursery	2,337	
	Total	**56,629**	**Total**	**56,798**	
2009-2010	• Grants	77,372	• Grants	48,594	23,932
	• Membership	6,185	• Administration	8,436	
	• Photo Comp	2,206	• Photo Comp	2,141	
	• Plant Sales	1,752	• PR expenses	8,936	
	• Donations	2,750	• Section expenses	808	
	• Interest	2,226	• Nursery	2,641	
	Total	**93,252**	**Total**	**69,321**	
2010-2011	• Grants	29,562	• Grants	33,214	(357)
	• Membership	6,405	• Administration	8533	
	• Photo Comp	21,353	• Photo Comp	1,138	
	• Plant Sales	5,249	• PR expenses	5958	
	• Donations	6306	• Section expenses	860	
	• Interest	3,469	• Nursery	1,166	
	• Total	53,540	• Total	53,897	

Year	Income		Expenditure		Variance
2011-2012	• Grants • Membership • Photo Comp • Plant Sales • Donations • Interest • Total	25,300 6,420 2,542 1,407 1,116 2,863 40,259	• Grants • Administration • Photo Comp • PR expenses • Section expenses • Nursery • Total	17,427 8,834 3,092 6,484 541 2,702 43,421	(3,162)
2012-2013	• Grants • Membership • Photo Comp • Plant Sales • Donations • Interest • Total	79,704 6,670 1,997 655 4,572 2,731 96,969	• Grants • Administration • Photo Comp • PR expenses • Section expenses • Nursery • Total	53,986 8,500 2,481 7,133 1,104 1,209 92,185	4,784
2013-2014	• Grants • Membership • Photo Comp • Plant Sales • Donations • Interest • • Total	51,569 6,950 3,503 1,272 2,218 1,946 68,012	• Grants • Administration • Photo Comp • PR expenses • Section expenses • Nursery • Total	34,973 7,060 2,180 6,997 913 1,248 56,018	11,993
2014-2015	• Grants • Membership • Photo Comp • Plant Sales • Donations • Interest • Total	58,620 8,690 960 696 2,106 1,748 73,466	• Grants • Administration • Photo Comp • PR expenses • Section expenses • Nursery • Total	88,847 5,777 2,552 8,154 961 1,663 109,747	(36,280)
2015-2016	• Grants • Membership • Photo Comp • Plant Sales • Donations • Interest • Total	69,052 9,475 2,196 718 663 1,205 84,177	• Grants • Administration • Photo Comp • PR expenses • Section expenses • Nursery • Total	77,934 6,951 2,620 7,185 1,309 2,281 100,255	(16,078)

***Note: Figures in brackets ( ) indicate over expenditure in that period.

APPENDIX 4

Grants for Specific Projects

Year	Project Title	Project Number	Amount $	Final acquittal sent
2003	Restoration of Native Rainforest Vegetation along Upper Moggill Creek	43675 (Envirofund)	7,800	No
2002-2003	Focussed Habitat Restoration between Brisbane and D'Aguilar Range	38446 (Envirofund)	16,154	Yes
2002-2003	Gambling Community Benefit Fund		c. 3,000	Yes
2002-2003	BCC	NA	19,804	NA
2003	Envirofund – Elephant Grass	43675	7,800	Yes
2001-2002	Ranges to River Stage 2	2012427 (NHT)	45,000	Yes
1998-1999	Ranges to River Stage 1 Year 1	982529 (NHT)	74,000	NA
1999-2000	Year 2	"	77,000	NA
2000-2001	Year 3	"	80,000	YES
2004-2005	Improve participation in catchment management	20020011531	10,000	No
2006	NRMA Boscombe RD		4,450	Yes
2006	SEQ Catchments Kittani St	1061 510	9,200	Yes
2006	Gambling Fund Butterfly Cages		8,212	
2006-2007	BCC Environmental Admin		4,500	Yes
2007-2008	BCC Environmental Admin	13425	5,000	Yes
2007	NRMA Bush Tucker		4,450	
2007	Aust. Govt Water Resources		40,842	Yes
2008	Small Equipment		2,750	N/A
2008	GVEHO Cottage Grounds Development		2,500	N/A
2008	Envirofund Platypus		15,950	Yes
2008-2009	Envirofund Gap Creek Butterflies		34,110	Yes
2008-2009	BCC Admin Grant	15580	4,500	Yes
2009	SEQ Carbine Rd	1434	4,017	Yes
2009	BCC Photo & Envirofest	16865	3,000	Yes
2009	BCC Photo Comp trophy	17321	450	Yes

Year	Project Title	Project Number	Amount $	Final acquittal sent
2009	GVEHO Cottage Admin Exp.		2,300	N/A
2009	Gambling Fund Mower & Laptop Grant		10,343	Yes
2009	Student Streamsavers KSHS		16,700	N/A
2009	DFACS Small Equipment	1BXKAOM	1,906	No
2010	Kids Cottage Day		1,595	No
2010	NHT Brookfield restoration		16,800	No
2010	Dung Beetle Project		6,036	No
2010	Student Streamsavers KSHS Stage 2		14,840	N/A
2011	LMSIF PA System		1,782	Yes
2011	GVESHO Admin grant		2,500	Yes
2011	LMSIF Moggill Creek restoration		3,000	Yes
2011	Student Streamsavers Stage 3		13,000	N/A
2012	SEQC Nursery tools		500	Yes
2012	SEQC Pacey Rd tools		500	Yes
2012	BCC Enviro Admin grant		3,550	Yes
2012	Energex Gap Creek Wildlife Corridor		10,000	Yes
2012	LMSIF Kids Day & chairs		3,500	Yes
2012	CCA Smiths Scrub		17,370	Yes
2012	Student Streamsavers Stage 4		10,000	No
2012	Everyone's Environment grant Pacey Rd		17,641	Yes
2013	LMSIF Kids Day & BenQ data projector		3,165	Yes
2013	GVESHO Admin grant		2,500	Yes
2013	BCC Enviro Admin grant		8,000	Yes
2013	SEQ Moggill Creek		7,500	Yes
2013	BCC Aquatic Weeds		2,748	Yes
2013	Gambling Fund Website		9,350	Yes
2014	LMSIF Kids Day		1,500	Yes
2014	SEQC Cats Claw tour		3,000	Yes
2014	BCC Admin grant		4,998	Yes
2014	GVESHO Admin grant		2,500	Yes
2014	BCC Lwr Moggill Creek		21,989	Yes
2014	NRMA Savages Rd		3,880	Yes
2014	NRMA Sml grants tools		698	Yes
2014	SEQC Rowena St		40,000	Yes

Year	Project Title	Project Number	Amount $	Final acquittal sent
2015	BCC Kids' Day		2,310	Yes
2015	LMSIF computer grant		2,112	Yes
2015	LMSIF Photo Comp		350	Yes
2015	SEQC Cat's Claw		9,000	Yes
2015	SEQC Rowena St		27,000	Yes
2015	SEQC Cat's Claw control		30,000	Yes
2015	NRMA Savages Rd		4,500	Yes
2015	BCC Admin grant		9,900	No
2016	BCC Kids' Day		803	No
	Total		822,655	

APPENDIX 5

Plant Species in Cottage Garden

Species	Common name
Abutilon oxycarpum	Small-leaved abutilon
Acronychia laevis	Glossy acronychia
Acrotricha sp.	Red ground berry
Alchornea ilicifolia	Native holly
Alectryon conatus	Small-leaved alectryon
Alloteropsis semialata	Cockatoo grass
Angophora leiocarpa	Smooth-barked apple
Angophora subvelutina	Broad-leaved apple
Aphananthe philippinensis	Rough-leaved elm
Aphanopetalum resinosum	Gum vine
Auranticarpa rhombifolia	Rough-leaved elm
Alyxia ruscifolia	Chain fruit
Austromyrtus sp.	
Babingtonia similis	
Backhousia myrtifolia	Grey myrtle
Bursaria spinosa	Black thorn
Callicarpa pedunculata	Velvet leaf
Carex declinata	A sedge
Carissa ovata	Currant bush
Cordyline petiolaris	Broad-leaved palm lily
Cordyline rubra	Red-fruited palm lily
Cordyline stricta	Slender palm lily
Corymbia citriodora	Spotted gum
Corymbia henryi	Large-leaved spotted gum
Corymbia intermedia	Pink bloodwood
Corymbia tessellaris	Moreton Bay ash
Corymbia tessellaris	Moreton Bay ash
Cryptocarya triplinervis	Hairy three-veined laurel
Cupaniopsis parvifolia	Small leaved tuckeroo
Cymbopogon refractus	Barbed wire grass
Decaspermum humile	Silky myrtle
Denhamia celastroides	Denhamia
Dianella caerulea subsp. *assera*	Blue berry lily
Dioscorea transversa	Native yam
Diospyros australis	Black plum
Diospyros geminata	Queensland ebony
Dodonea viscosa	Sticky hop bussh

Dodonea viscosa subsp. *cuneata*	A hop bush
Elaeocarpus grandis	Blue quandong
Elaeodendron australe	Red olive plum
Eucalyptus cloeziana	Gympie messmate
Eucalyptus crebra	Narrow-leaved ironbark
Eucalyptus curtisii	Plunkett mallee
Eucalyptus fibrosa	Broad-leaved ironbark
Eucalyptus melanophloia	Silver-leaved ironbark
Eucalyptus microcorys	Tallowwood
Eucalyptus moluccana	Gum-topped box
Eucalyptus propinqua	Small-fruited grey gum
Eucalyptus tereticornis	Forest red gum
Euroschinus falcatus	Ribbonwood
Ficus macrophylla	Moreton Bay fig
Ficus opposita	A sandpaper fig
Ficus superba	Deciduous fig
Flindersia schottiana	Bumpy ash
Flindersia xanthoxyla	Yellowwood
Geranium solanderii	Native geranium
Glochidion ferdinandi	Cheese tree
Gmelina leichhardtii	White beech
Goodenia rotundifolia	No common name
Grevillea robusta	Silky oak
Hardenbergia violacea	Native sarsparilla
Harpullia hillii	Blunt-leaved tulip
Hibiscus heterophyllus	Native rosella
Hovea acutifolia	Purple pea bush
Hoya australis	Wax flower vine
Jagera pseudorhus	Foambark
Jasminum simplicifolium	Native jasmin
Lobelia purpurascens	White root
Lomandra filiformis	A matrush
Lophostemon confertus	Brush box
Lophostemon suaveolens	Swamp box
Mallotus claoxyloides	Green kamala
Mallotus discolor	Yellow kamala
Mallotus philippensis	Red kamala
Maytenus sylvestris	No common name
Melaleuca saligna	Willow bottle brush
Myoporum sp.	Boobialla
Myrsine howittiana	Brush muttonwood
Myrsine variabilis	Muttonwood
Notelaea lloydii	No common name

Olea paniculata	Native olive
Oplismenus aemulus	Creeping beard grass
Parsonsia straminea	Monkey rope vine
Pavetta australiensis	Pavetta
Pittosporum multiflorum	Orange thorn
Pittosporum revolutum	Forest pittosporum
Plumbago zeylanica	Native plumbago
Poa labillardieri	Tussock grass
Polyscias elegans	Celery wood
Pomaderris queenslandica	No common name
Pouteria cotinifolia	Small-leaved coondoo
Proiphys cunninghamii	Brisbane lily
Pseuderanthemum variabile	Love flower
Psychotria daphnoides	No common name
Psychotria loniceroides	Hairy psychotria
Rhodamnia rubescens	Scrub turpentine
Rhodosphaera rhodanthema	Deep yellowwood
Rostellularia obtusa	No common name
Rubus parvifolius	Pink flowered raspberry
Scolopia braunii	Flintwood
Senna acclinis	Brush senna
Senna sophera	Pepper-leaved senna
Seringia arborescens	No common name
Smilax australis	Barbed-wire vine
Solanum stelligerum	Devil's needles
Sophora fraseri	No common name
Sterculia quadrifida	Peanut tree
Tabernaemontana pandacaqui	Banana bush
Teucrium argutum	No common name
Toechima tenax	Pitted-leaf steelwood
Trachymene procumbens	Slender parsnip
Tristaniopsis laurina	Water gum
Tristaniopsis laurina	Water gum
Vitex lignum-vitae	Lignum-vitae
Wedelia spilanthoides	No common name